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Heterosis and Combining ability Studies for Sugar content in Sweet corn (*Zea mays saccharata* L.)

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Abstract- The present investigation has been undertaken in sweet corn to carry out the combining ability analysis and to estimate heterosis of yield and yield contributing characters. Eight divergent parents were selected and crossed in diallel fashion excluding reciprocals during kharif, 2010. The resulting 28 crosses along with parents and a standard check Sugar 75 and Madhuri were evaluated in Randomized Block Design replicated thrice, during rabi, 2010-11 at Agricultural Research Institute, Rajendranagar, Hyderabad. The data were collected on various agronomic characters in which emphasis was given to sugar content in the kernel in percentage. The combining ability analysis revealed importance of both additive and non-additive gene actions in governing the characters but non-additive gene action was found predominant. The parental lines 6072-3 and 6069 were contributed maximum favourable genes for character under study and can be given status of good combiners. The hybrids, 6072-3 x 6100-2, 6072-3 x 6069, 6104 x 6082 and 6127 x 6100 were the good specific combiners for sugar content in the kernel. Estimates of heterosis, heterobeltiosis and standard heterosis were variable among crosses in desirable direction and some of them turned out to be best specific crosses. The hybrids 6072-3 x 6069, 6072-3 x 6100-2, 6069 x 6122-1, 6122-1 x 6127, 6072-3 x 6127 and 6104 x 6082 performed well over standard Madhuri for sugar content in kernel. The identified four superior cross combinations (6072-3 x 6100-2, 6072-3 x 6069 and 6104 x 6082) in the present investigation, based on heterosis and combining ability, which performed well for sugar content in the kernel may be used as single cross hybrids after evaluation in multi-location trials.

Index Terms- Combining ability, Heterosis, Madhuri, Sugar content, Sugar75.

I. INTRODUCTION

Sweet corn (*Zea mays* L. *saccharata*) is one of the most popular vegetable in countries like USA and Canada. It is characterized by translucent, horny appearance of kernel when matures and wrinkled when it dries. The research reports indicate that the sweet corn has arisen as a mutant from field corn in the 19th century. Sweet corn is consumed in immature stage of the cob. Total sugar content in sweet corn at milky stage ranges from 25-30% as compared to 2-5% of normal corn.

Sweet corn varies from normal corn essentially for gene(s) that affect starch synthesis in the seed endosperm wherein one or more simple recessive alleles in the seed endosperm elevate the level of water soluble polysaccharides (sugars) and decrease

starch (Dinges et al., 2001). In earlier history of sweet corn, corn lines with only the sugary (su1) allele on chromosome 4 used to be referred to as sweet corn. Currently, several endosperm genes affect carbohydrate synthesis in the endosperm are being used either singly or in combination for the development of sweet corn varieties (Tracy 1997). Four most useful mutants are shrunken2 (sh2), brittle (bt), sugary (su1) and sugary enhancer (se). Sweet corn is becoming increasingly popular in India and other Asian countries. Especially it is popular in star hotels in preparations like soups, jams. It is also consumed as raw or boiled. Sweet corn cultivation has increased in areas surrounding big towns and cities of different states of India. To establish a sound basis for any breeding programme, aimed at achieving higher yield, breeders must have information on the nature of combining ability of parents i.e., general and specific combining ability and their performance in hybrid combinations for yield and yield attributes. Keeping in view the growing importance of sweet corn in India, it is felt necessary to do research in this aspect by evaluation of germplasm and choosing elite parents for developing high potential single cross hybrids.

II. MATERIAL AND METHODS

The eight elite sweet corn inbreds were raised at Maize Research Centre, Agricultural Research Institute, Rajendranagar, Hyderabad during Kharif, 2010. All the 8 inbreds were crossed in a half diallel fashion to obtain 28 cross combinations. Reciprocal crosses were not attempted presuming that practically there are no cytoplasmic influences in the material concerned. Evaluation of single cross hybrids, parents and check was done in Rabi, 2010-11 at Maize Research Centre, Agricultural Research Institute, Rajendranagar, Hyderabad. The observations were recorded for various characters in which emphasis was given mainly on Sugar content in seed at milky stage (%).

For combining ability studies the data obtained from F1s and parents were analyzed as per Method II (F1s + parents) and Model -I (fixed effect) of Griffing (1956) for combining ability.

Estimates of heterosis were calculated according to Fonseca and Patterson (1968) and Standard heterosis according to Virmani et al. (1982). The significance of heterosis, was tested by using 't' test.

III. RESULTS AND DISCUSSION

The data were recorded for sugar content in the kernel. Studies on heterosis, heterobeltiosis, standard heterosis and combining ability effects were carried out in the present investigation for 8 inbreds and their 28 hybrids for sugar content in grains. The data was analyzed using diallel mating design for precise estimation of gene action.

Combining ability analysis:

The mean sum of squares of gca and sca was found to be significant for the character studied that means considerable variation was present in the material studied. The ratio of gca to sca for sugar content in the kernel was less than one which indicates that all these characters were predominantly governed by non-additive gene effects (Table 1).

In sweet corn, findings of Has (2007), Zhao YuanZeng et al. (2002) and Jyothi Kumari et al. (2008) revealed the primary role of non-additive gene action in respect of total soluble sugar content in kernel and kernel chemical composition. The relative importance and combined effect of additive and non-additive gene actions was reported for sugar content in sweet corn kernel. Considering the sugar content in the kernel for selecting the parents, 6069 and 6072-3 inbred lines were considered as good general combiner for sugar content. Hence, these parents may be inter crossed to pool the genes in desirable direction to improve sugar content in the kernel. The general combining ability (gca) effects for sugar content in the kernel in percentage was estimated and was presented in Table 2.

In case of specific combining ability among the cross combinations, 6072-3 x 6100-2, 6072-3 x 6069, 6104 x 6082 and 6127 x 6100 were considered as good specific combiners for sugar content in the kernel suggesting the scope of genetic improvement of kernel sugar concentration (non-additive gene action) independent of grain yield. Asbish Khanduri et al. (2010), Zhao YuanZeng et al. (2002), Bordallo et al. (2005) observed predominant role of specific combining ability for sugar content and carbohydrate accumulation pattern in kernel.

Hence, these high sugar yielding hybrids with good attributes can be checked under different field trials and can be developed as commercial hybrids. The results on specific combining ability (sca) effects of 28 hybrids studied in present analysis were presented in Table 3.

Heterosis:

Heterosis was estimated for sugar content in the kernel in 28 hybrids and expressed as increase or decrease over mid parental value (heterosis), over better parent (heterobeltiosis) and over standard checks (standard heterosis). Standard heterosis for grain sugar composition was studied over the standard check i.e. Sugar 75. The results of heterosis, heterobeltiosis and standard heterosis were presented in the Table 4.

The cross combinations, 6072-3 x 6069, 6072-3 x 6100-2, and 6069 x 6122-1 recorded significant positive values for sugar content in the kernel, when compared to standard check (Sugar 75). Heterotic crosses for sugar content had also been reported by Zhao YuanZeng et al. (2002), Qi Xin et al. (2008), Asbish Khanduri et al. (2010).

Considering the overall perusal of results in the present investigation, high general combining ability effects for sugar

content in the kernel was noticed in the inbred lines 6069 and 6072-3. The cross combinations 6072-3 x 6100-2, 6072-3 x 6069, 6069 x 6122-1, 6122-1 x 6127 and 6104 x 6082 were found to be superior specific combiners for sugar content and have potential application in the crop improvement programmes.

The combining ability effects and heterosis revealed the superiority of the cross combinations (6072-3 x 6100-2, 6072-3 x 6069 and 6104 x 6082) for sugar content in the kernel. These crosses may be advanced for isolation of transgressive segregants or homozygous lines for use in breeding programmes.

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Table 1: Combining Ability Analysis for Sugar content

Source	d.f	Sugar content in percentage
GCA	7	1.12**
SCA	28	0.91**
Error	70	0.21
$\sigma^2 gca$		0.09
$\sigma^2 sca$		0.69
$\sigma^2 gca/\sigma^2 sca$		0.12

Table 2: General combining ability effects for sugar content in eight elite sweet corn inbreds

Parents	Sugar content in percentage
6072-3	0.35*
6104	-0.44**
6069	0.58**
6122-1	0.09
6127	-0.13
6100	-0.16
6100-2	-0.04
6082	-0.25
Range	-0.44 to 0.58
SE (gi)	0.13
SE (gi-gj)	0.20

Table 3: Specific combining ability for sugar content in 28 single cross sweet corn hybrids

Crosses	Sugar content in percentage
6072-3 x 6104	0.37
6072-3 x 6069	1.41**
6072-3 x 6122-1	-1.37**
6072-3 x 6127	0.51
6072-3 x 6100	-1.46**
6072-3 x 6100-2	1.70**
6072-3 x 6082	0.52
6104 x 6069	-0.58
6104 x 6122-1	-0.16
6104 x 6127	-0.43
6104 x 6100	-0.60
6104 x 6100-2	0.80
6104 x 6082	1.42**

6069 x 6122-1	1.04*
6069 x 6127	-0.87*
6069 x 6100	-0.51
6069 x 6100-2	-0.65
6069 x 6082	-1.67**
6122-1 x 6127	1.27**
6122-1 x 6100	0.11
6122-1 x 6100-2	-0.71
6122-1 x 6082	-1.16*
6127 x 6100	1.42**
6127 x 6100-2	0.83
6127 x 6082	-0.39
6100 x 6100-2	0.30
6100 x 6082	0.28
6100-2 x 6082	-0.37
Range	-1.67 to 1.70
SE (Sij)	0.42
SE(Sii-Sjj)	0.51
SE(Sji-Sik)	0.62
SE(Sij-Skl)	0.58

Table 4: Per cent Mid parent heterosis, Heterobeltiosis and Standard Heterosis for sugar content in 28 single cross sweet corn hybrids.

Crosses	Sugar content in percentage			
	H	HB	S.H. (S 75)	S.H.(M)
6072-3 x 6104	6.62	2.66	2.11	8.42
6072-3 x 6069	8.19*	1.49	15.22**	22.33**
6072-3 x 6122-1	-7.41*	-9.62*	-5.60	0.22
6072-3 x 6127	6.15	5.53	4.97	11.45*
6072-3 x 6100	-9.12*	-10.84**	-7.82	-2.13
6072-3 x 6100-2	14.19**	13.71**	13.11**	20.09**
6072-3 x 6082	4.73	4.67	4.23	10.66*
6104 x 6069	-5.19	-14.15**	-2.54	3.48
6104 x 6122-1	-1.24	-7.09	-2.96	3.03
6104 x 6127	-1.39	-4.52	-6.13	-0.34
6104 x 6100	-5.25	-10.43*	-7.40	-1.68
6104 x 6100-2	7.32	3.75	2.33	8.64
6104 x 6082	9.43*	5.31	4.86	11.34*
6069 x 6122-1	2.04	-2.05	11.21**	18.07**
6069 x 6127	-7.88*	-14.06**	-2.43	3.59
6069 x 6100	-8.09*	-12.20**	-0.32	5.84
6069 x 6100-2	-6.13	-12.29**	-0.42	5.72
6069 x 6082	-13.89**	-19.18**	-8.25	-2.58
6122-1 x 6127	6.67	3.54	8.14	14.81**
6122-1 x 6100	-3.26	-3.74	0.53	6.73
6122-1 x 6100-2	-5.36	-8.00	-3.91	2.02
6122-1 x 6082	-9.64**	-11.74**	-7.82	-2.13
6127 x 6100	0.31	-2.15	1.16	7.41
6127 x 6100-2	-3.06	-3.22	-4.55	1.35
6127 x 6082	-2.67	-3.29	-3.70	2.24
6100 x 6100-2	-2.35	-4.60	-1.37	4.71

6100 x 6082	-1.04	-2.86	0.42	6.62
6100-2 x 6082	-1.76	-2.23	-2.64	3.37
Range	-13.89 to 14.19	-14.15 to 13.71	-8.25 to 15.22	-2.58 to 22.33

- **H-** Heterosis; **H.B.-** Heterobeltiosis; **S.H.-** Standard Heteosis
- **S 75-** Sugar 75; **M-** Madhuri.

Transforming Gender Identities through Quota System- Confronting the Question of Women's Representation in Politics

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Abstract- Today quotas are being introduced in countries where women only constitute a small minority in parliament, and the world is witnessing historical transformations in women's representation, for example from 19 per cent women in parliament to 35 in one election (Costa Rica) or 36 per cent women in the very first democratic parliamentary election (South Africa). Such great historical fundamental changes might not occur without quota provisions, but the focus here is on electoral gender quotas as a special measure to increase women representation. It is argued that a new international discourse on women in institutional politics is an important factor behind recent introduction of quotas all over the world, even in countries that previously had a very low representation of women. However, the fact that some countries have opened up for quotas, while others have not, and secondly, the fact that specific types of quota systems do seem to occur in regional clusters, all point to the need for contextual based research about what we will call the translation of this international discourse into individual countries and regions, and about the mechanisms behind the introduction of quotas nationally. The study will be done with a search light on situation in India and other political systems.

Index Terms- Gender Quotas, Political Power, and Women's Representation

I. INTRODUCTION

It is surely a truism today that women's issues no longer belong exclusively to the women's movement, if they ever did. This situation is especially visible in the world of politics, and finds its clearest expression in proliferating references to 'gender': in local, national and international fore, among state functionaries, development experts, academics and activists - many of whom would not think of themselves as feminists - one hears repeatedly of gender bias, gender sensitisation, gender planning and gender training, to mention just some of the more common examples of its contemporary use. At the global level, an enabling environment has been created under the UN aegis, where women's networks have learned about lobbying and advocacy, come together to debate and promote their views, to negotiate with Government representatives and hold them accountable for global conventions and resolutions (Kardam, 2004). In many countries, women's movements have also successfully pressured Governments from below to change legal institutions, laws and policies.

From such arguments it is often swiftly imputed that the global trend towards the quota system of public roles, resources and responsibilities is also good for women. The logic is as follows: because prevailing gender relations in most parts of the world continue to see women as responsible for the domestic sphere, women are more likely to be concerned with things homebound and local. As such, reservation is often regarded as an important vehicle for increasing women's representation and advancing women's rights. The reality, however, is not so clear-cut. First, quota system has its limits and there is reason to believe that effective voice and distributive policies are better exercised at national level. Second, even where the benefits of quota system can be clearly demonstrated, it is not guaranteed that these are extended to women. Third, 'women' constitute a heterogeneous constituency and even where quota system has benefits in terms of advancing gender equity, these do not necessarily extend to all categories of women with similar effect. The paper is based on the first worldwide overview of the use of quotas (www.quotaproject.org). Only electoral gender quotas are discussed in this paper, defined as legal rules (constitutional or legislative) or internal party regulations that set up a fixed minimum of women or of either sex among the political parties' candidates for public election.

II. OBJECTIVES OF THE STUDY

Thus the aim of this paper will be

i) to analyze quota discourses, ii) to identify different quota systems and iii) to discuss which factors have facilitated the introduction of electoral gender quotas in various countries in the last decades.

III. METHODOLOGY

The present study is based on secondary data collection. The secondary data was collected by various published sources like Quota Project Reports, Inter Parliamentary Union Reports, Books, Journal, Magazine, etc. The findings were discussed in the light of published literature.

IV. ENGENDERING THE POLITICS

Why do we need Gender Quotas?

New demands by feminist movements have opened a different question. Women (as well as many others) ask not for

representation as individual citizens, but as members of a group. They ask not only that citizens who happen to be women be represented, but also that women be represented because they are women. What does this demand mean? On what grounds can we argue that women are entitled to representation as members of a group rather than, simply, as individuals? Is the demand for representation of women simply or necessarily a demand for more women in political office? These questions point to vast gaps in political research, gaps that exist for two reasons. One is that barely a decade and a half has passed since the development of interest in the study of women and politics; one could hardly expect scholars in a new field to ask and answer all of its research questions in that amount of time, particularly given the lack of training in women's studies available in universities. The second problem is that most political scientists who study core political questions such as representation have tended to ignore issues concerning women or have regarded such issues as "special topics" worthy of only limited interest.

Political scientists have shown little inclination to pursue questions concerning women. The term, "women's issues" usually refers to public concerns that impinge primarily on the private (especially domestic) sphere of social life, and particularly those values associated with children and nurturance. But even within this domain "women's issues" can be interpreted in three distinct, although related ways. One interpretation is simply that women are more interested in these issues than in others as a result of their "parochial" domestic concerns (suggested by Lane, 1959). Another is that they are more interested in these issues than are men—that there is, in a sense, a division of labor in political attention. Finally, one could say that regardless of their relative level of concern with these issues, women have a "special" interest, or a particular (potential) viewpoint from which their positions or preferences might be derived. In discussing representation, we are more concerned with the latter two, and especially the final interpretation. The first is the problem of women's "objective situation" and its relevance to political interests; the other is the hardly less difficult question of women's consciousness of their own interests and the "subjective" condition of women. Research in various fields of social science provides evidence that women do have a distinct position and a shared set of problems that characterize a special interest. Many of these distinctions are located in the institutions in which women and men are probably most often assumed to have common interests, the family.

V. RELEVANCE OF GENDER QUOTAS

The current debate on the gender quotas has raised a host of questions - relating to liberal democracy, egalitarianism and the under representation of women; interest-group politics and the political inclusion and exclusion of certain identifiable group interests; the notion of 'participatory democracy' and the relationship between women's political representation and processes of further democratization; the normative basis of demands for equality and social justice; the meaning of equal opportunity and the need for more vigorous advocacy and positive intervention on behalf of women. Feminist perspectives on the state, democracy and notions of political equality and participation have emphasised that without formal mechanisms

for ensuring women's representation in political structures it will not be possible for women to cross formidable barriers to their entry into active electoral politics as it denies their viewpoints sufficient opportunity to be integrated in the political system. Law and policy serve as direct and indirect buttresses of such differentiation and stratification. In addition, gender differentiation and stratification in private life buttresses the political economy, affecting, at minimum, child care and welfare, education, consumption, employment and labor supply, and property and wealth arrangements. Law and public policy continue to create and reinforce differences between women and men in property and contract matters (especially regarding marriage, divorce, and widowhood), economic opportunity (including employment, credit, and social security), protection from violence (rape and wife battery), control over fertility and child care, educational opportunities, and civic rights and obligations. Marxist and non-Marxist scholars alike understand a group's relation to the mode of production, their relative control over both processes and products, as at least part of the basis for defining political interests. Children are perhaps the most important "products" of a society. Reproduction must be considered in a serious way as a factor in the political economy of governance (as in Eisenstein, 1979; Delphy, 1980).

If we take the example of India, the Indian democratic state is committed to the protection of individual rights within the context of citizenship, a closer look at how it operates for the women reveals that these rights are not accessible in the public and private spheres in their full potential to all the women in India. There are historical, social and cultural factors that have limited women's capacity and chances to exercise their freedom to participate in the political processes. The evolution of Indian democracy through the 14 general elections so far has reflected a low representation of women in Parliament, State legislatures, in political parties and other decision-making bodies. The under representation of women in the political sphere is inextricably linked with the low and inferior status of women in society in India especially in the context of the declining sex ratio, increasing violence and crimes against women and their marginalized status in employment, education and health sectors. (Human Development in South Asia:2012). The comparative position of gender-related development index (GDI) reveals that among 177 countries, India ranks 134th, indicating its very low gender-equity status.

Anne Phillips argues that the "contemporary demands for political presence have often risen out of the politics of new social movements and they all reflect inequalities other than social class"

She further adds that :

"the emphasis on political exclusion and what counts as political inclusion, significantly alters the framework for debates on political equality. The main achievement of nineteenth and twentieth century democracy was to make citizenship more universal, pulling down, one after another all these barriers that excluded women, people with wrong religion, the wrong skin colour or just people with too little property. Subsequent debates have focused on what else might be necessary – in the shape of

more substantial equalities in our social and economic life - to realize the promise of democratic equality. The demand for equal or fairer representation of women with men or demand for political inclusion of groups that see themselves as marginalized, is a major reframing of the problem of democratic equality.... The 'politics of ideas' (what is represented) is being challenged by an alternative 'politics of presence'. Further elaborating her ideas she says that "The politics of presence is not about locking people into pre-given essentialised identities, nor is it, just a new way of defining interest- groups that should jostle for attention. The point, rather, is to enable those now excluded from politics to engage more directly in political debate and political action". (Phillips,1994).

If this is not the case, it signifies deep flaws within the political system. Representation is not only a means of ensuring individual participation. It is also the responsibility of the representatives to act on behalf of the constituents, including women, who elected them and reflect their ideas and aspirations. Women's disproportionate absence from the political process would mean that the concerns of half the population cannot be sufficiently attended to or acted "Women must have votes and an equal legal status. But the problem does not end there. It only commences at the point where women begin to affect the political deliberations of the nation". The second part of the anticipated change never started, the vision faded out of the Indian scene once theoretical equality was incorporated in the Constitution. (Sharma,1984).

The research shows that a critical mass of women in governing institutions promotes collaboration across ideological lines and social sectors. Less than two years after the Rwandan genocide, women legislators established the Forum of Rwandan Women Parliamentarians. The FFRP has screened laws to eliminate discrimination, promoted women's and children's rights, led consultative processes, and developed legislation against gender-based violence—the first legislation to originate in the parliament rather than the executive (Kagame, 2003). Sudanese women followed suit, establishing the only all-party caucus in the national assembly since the Comprehensive Peace - Agreement in 2005.

When women are involved in the governing process, they broaden the political debate to address constituent matters, social concerns, and local issues. In Colombia, Argentina, and Costa Rica, women legislators assign higher priority to women's, children's, and family issues and are more likely than their male colleagues to initiate related bills. Local women government officials in India are more focused on providing social services. They have expanded the political agenda to include water infrastructure, children's education, and gender and matrimonial issues. In Namibia, women spearheaded efforts to combat employment discrimination and land reform as well as gender-based violence. Field research from Rwanda shows that women candidates and officials are perceived to be more likely than men to address the social and economic welfare of constituents.

In Bhopal, India, the last of four women rulers introduced compulsory education for girls throughout their kingdom. This contributed to Bhopal having universal education for girls to this date. Nation-wide, the presence of a chairwoman on the Indian University Grants Commission was critical in a marked increase in women's accessing grants. In addition, India is also one of the

few countries in which women parliamentarians have succeeded in persuading their fellow parliamentarians during the budgetary hearings to set a target of 30 per cent for women in the earmarking of total development funds—an achievement that parallels the South African Women's Budget Initiative documented by chapter 6 of this volume. In Uganda, the Women's Caucus in Parliament succeeded in increasing the government's budget allocations for nutrition and for childhood development projects. Similarly, in the Philippines, committed women parliamentarians introduced the very principle of targeted budget allocations for women and achieved an initial rate of 5 per cent. In 1998, their efforts also led to the adoption of a bill on rape.

VI. Legislation Meaningful to Women's Lives

Again in Uganda, women introduced the issue of women's equity into the overall land reform bill. Kenyan women have repeatedly striven, inside and outside Parliament, to persuade the government to give women title to land and to establish bank accounts in their own name without the approval of their fathers or husbands. In Jamaica, women parliamentarians have helped set up a number of special funds, detailed in chapter 11, that directly or indirectly benefit women. The *interpretation* of law is equally important. Most observers credit the new force of sexual harassment law throughout the USA to the presence of two women Justices on the nine member Supreme Court, who mobilized their colleagues into considering a case, even in a primary school. In that country, legislation on sexual harassment is an issue left to the each of the 50 states (as is capital punishment and most education and health matters).

Women's Impact on Corruption

As noted in the Overview chapter of this volume, a recent World Bank study indicates a close correlation between women's representation in parliaments and a decrease in the incidence of corruption. If the finding of this initial 1999 inquiry, "Are Women Really the 'Fairer' Sex", is borne out by further study, the implications are immense for women's entry into politics, as well as for government efficiency.

Women's Networking for Regional Learning and Co-operation

From the 1992 Earth Summit on, women caucused formally or informally at all the major UN conferences of the 1990s. Many took this experience back to the national level in structures ranging from parliaments through municipal assemblies—Uganda being only one example, which has had its own ripple effect throughout Sub-Saharan Africa. Similarly women's regional and international networks disseminated knowledge of the South African Women's Budget. This initiative is being replicated as far from that country as Barbados.

Changing Institutional Structures and Processes

Again in South Africa, women parliamentarians— together with civil society representatives and committed individuals— changed that country's electoral college system (including its competency requirements) to broaden the access of women to electoral posts. Similar movements are underway in countries as different as Botswana and Uruguay.

Result based Idea of Equality

In 1995 the United Nations Human Development Program (UNHDP) officially confirmed what many would confess to knowing: "In no society today do women enjoy the same opportunity as men." This harsh reality stands in sharp contrast to the global legal norms that, since the UN Charter entered into force in 1945, have promised the equality of men and women. This commitment has subsequently been reaffirmed in the Universal Declaration and in numerous other human rights conventions and conference documents. As Mary Meyer, one of the editors of *Gender Politics in Global Governance*, notes in her interesting chapter on the Women's International League for Peace and Freedom, women have been continually concerned about and involved with international issues since early in the nineteenth century. The activities of that organization itself have ranged over eight decades, and it continues to have a central role in organizing women's efforts on behalf of world peace and human rights. In the context of this long and ongoing history of women's international involvements, 1975 was a landmark year: it was declared by the United Nations as the International Year of the Woman, which became the first year in the United Nations Decade for Women. The decade included three conferences, the first of which was held in Mexico City in 1975, a year that proved to be a turning point for women: their participation in discussions by and about the role of women in global politics and governance took a decidedly public and activist turn. The Mexico City conference was marred by tensions between competing geopolitical blocs (West/North, South, and East). It underscored not just the breadth and complexity of "women's issues," but their indivisibility from, and interdependence with, larger issues of global politics and economics. The second women's conference, a 1980 meeting in Copenhagen, was also tense and problematic. The third, however—the 1985 meeting in Nairobi—was much more successful, resulting in the publication of *Forward Looking Strategies*, a document that centered women on the international agenda and specifically included (for the first time in such an international document) the issue of gender violence. It was this issue that, because of its prevalence, would later prove to be a unifying theme for women from across the globe. Ten years later, in 1995—coincidentally the year that the year the UNHDP acknowledged the persistent inequality of women—the UN-sponsored Fourth World Conference on Women produced the Beijing Platform of Action, a comprehensive document addressing ongoing issues, concerns, and needs of women—ranging from education to violence, from peace to health. These four conferences and the events surrounding them are significant signposts of the cultural changes that have occurred with regard to the discursive space of women in the international arena. It is the activism that these conferences engendered, coupled with the work of women in or around international organizations, which inspired Meyer and Pruihl's book, the central goal of which is to "compile empirical work documenting the intersection of feminist activism and international politics." This intersection not only "constitutes a significant aspect of globally oriented feminist politics but . . . provides material for current reconceptualization of the international that reach beyond the interstate arena".

The under representation of women is crucial in thinking about democracy and gender (Philips, 1991) and as showed before, there are reasonably sound argument to increase women participation in politics. Among other means (such as pool-enlarging strategies, or gender preferences) a strategy that has gained increasing currency within the movement, and relates primarily to the issue of women's political representation with liberal democracies, is that of introducing gender quotas, whether in political parties or in local or national legislatures (Randall, 1998). The evident success of such policies in the Nordic countries has inspired imitation elsewhere and has been the most widely used affirmative action policy in Latin America (Htun, 1998).

Sun-uk (1995) argues that the need for a quota system stems from the lack of opportunities for women to perform their potential capabilities. If women do have the capabilities and the power to choose, a quota system is not needed. In favour of a quota scheme implementation are arguments such as the belief that it is the most effective way of translating legal equality between men and women into de facto equality by guaranteeing women's presence in leadership in the immediate term (Htun, 1998). It has also been considered as a starting point that could balance women's participation in various fields because women leaders also function as role models for other women, and serve as evidence that society is inclusive and egalitarian. (Sun-uk, 1995).

Opponents of quotas, who include both men and women, argue that they are discriminatory and that will elevate under-qualified women to power, stigmatize beneficiaries, and that above all, they are unnecessary. There are also fears that the introduction of a women's quota will prompt other groups – ethnic minorities, homosexuals, farmers, etc. to demand their own quota. Htun (1998).

VII. Identifying different quota systems

Women's representation in formal politics matters both normatively and practically. From a normative standpoint, political elites should represent the interests of all citizens, including traditionally marginalized groups such as women (Williams 1998; Phillips 1991). Practically, a lack of female participation can result in a state that legislates in the male interest (MacKinnon 1989; Connell 1990; Waylen 1994). In that case, society-wide decisions in the form of legislation and the allocation of resources may not be enacted in women's interests. In addition, political position carries highly visible status and prestige.

While women have made remarkable inroads into both tertiary education and traditionally male occupations, the political sphere remains an arena in which women have not yet gained comparably visible status. Women are highly underrepresented in national politics, with the average percentage of women in parliaments only 19.5% in 2012 (IPU 2012) up from 15.2% in 2004 (IPU 2004). To understand the overall position of women within society it is therefore necessary to examine women's underrepresentation within the political structure. The quantitative literature on women's presence in legislatures can generally be classified into two approaches. The *first approach* focuses on national-level patterns of women's parliamentary representation. In this approach, country-level

variables are used to explain variation in the percentage of women in national legislatures across countries (Kenworthy and Malami 1999; Paxton 1997; Paxton and Kunovich 2003; Matland 1998; Reynolds 1999). For example, the percentage of women in the labor force of a country is hypothesized to represent the “supply” of women available for public office and therefore increase numbers of women in parliament (e.g., Paxton 1997). These studies tend to be large-*N*, crossnational, statistical studies with the goal of explaining variation *across* countries. A **second approach** focuses instead on *party-level* differences in the representation of women. This research has asked why parties differ with respect to the number of women they nominate as candidates, where those parties rank women on party lists, and the proportion of women they send to parliaments (Caul 1999; Gallagher and Marsh 1988; Kunovich 2003; Matland and Studlar 1996; Tremblay and Pelletier 2001; Sanbonmatsu 2002; Mateo Diez 2002; Welch and Studlar 1996). For example, leftist parties are hypothesized to provide greater support to women’s candidacies because they espouse egalitarian ideologies (e.g., Caul 1999; Beckwith 1992). Similarly, parties with women in positions of power are hypothesized to positively affect the adoption of measures favoring female candidates (e.g., Tremblay and Pelletier 2001). Because the focus is on very detailed information about parties, these studies tend to focus *within* particular countries, or a small number of countries, across a range of parties.

From above, it can be said that countries which are implementing quotas, are looking for two main objectives. On the one hand, to influence policy towards women interests and on the other to gain a greater level of women’s participation in other spheres of society. It seems that this idea may work properly in developed democracies where the parliament plays a key role in the political game and in the decision-making process. However this might not be the case in weak or “thin” democracies where the parliament is frequently bypassed by strong presidents, such as some Latin American countries where the democratisation process after military government has advanced slowly and the institutions are still weak. (O’Donnell, 1994, Munck, 1997, Tedesco, 1999). Under these circumstances, increasing the percentage of women in parliament does not necessarily lead to a change and it would be reasonable to expect that the policy influence of more women in parliament would be limited.

Different Quota Systems

There is however, some confusion about what constitutes different quota regimes. In the book, *Women, Quotas and Politics* (Dahlerup, ed. 2006, p.19-21), a distinction is made between two separate dimensions in the definition of quota systems: The first dimension covers the questions that has mandated the quota system, while the second dimension indicates what part of the selection and nomination process that the quota targets.

"If the leading party in a country uses a quota this may have a significant impact on the overall rate of female representation."

As for the mandating, *legal gender quotas* are mandated either by the constitution (like in Burkina Faso, Nepal, the

Philippines and Uganda), or by the electoral law (as in many parts of Latin America, as well as, for example, in Belgium, Bosnia—Herzegovina, Slovenia and France. But quotas may also be decided for voluntarily by political parties themselves, *voluntary party quotas*. In some countries, including Germany, Norway and Sweden, a number of political parties have introduced quotas for their own lists. In many others, though, only one or two parties have opted to use quotas. However, if the leading party in a country uses a quota, such as the ANC in South Africa, this may have a significant impact on the overall rate of female representation. Yet, even if gender quotas are increasingly popular, most of the world’s political parties do not employ voluntary gender quota at all.

Concerning the second dimension, quotas may target the first stage of the selection process, the stage of finding *aspirants*, e.g. those willingly to be considered for nomination, either by a primary or by the nominations committee and other parts of the party organization. Gender quotas at this stage are rules that demand a certain number or percentage of women or either sex be represented in the pool of candidates that are up for discussion. This has been used in countries with plurality-majority electoral systems, like the controversial ‘all-women short lists’ used for some elections by the British Labour Party. In general, it is rather complicated to construct a gender quota system that matches a majority system, but it is possible (as for instance in India and Bangladesh at the local level and elections for the new Scottish parliament).

The second stage is the actual nomination of *candidates* to be placed on the ballot by the party. This frequently used quota system implies that a rule (legal or voluntary) is installed according to which for instance 20, 30, 40 or even 50 percent of the candidates must be women. This may as mentioned above be formulated in a gender-neutral way, stating that no sex should have not less than for instance 40 percent and no more than 60.

At the third stage, those elected, we find quotas as reserved seats. Here it is decided that a certain percentage or number among those elected must be women. Increasingly, gender quotas are being introduced using reserved seat systems, and increasingly women elected on reserved seats quota systems are not appointed, but elected like in Jordan, Uganda and Rwanda.

Figure 1 shows variation in quota types when these two dimensions are combined, that is, firstly the questions of mandating and secondly the question of where in the nomination process quotas are placed.

Figure 1. Types of Electoral Quotas

Mandated by	At What Level?		
	Aspirants	Candidates	Elected
Legal quotas (Constitutional or electoral law)	Primaries	Candidate quotas	Reserved seats
Voluntary party quotas	Aspirant quotas (Short lists)	Candidate quotas	Reserved seats ^a

^a Agreements among political parties reserving a certain number of seats for women like in the case of Morocco.

Source: Dahlerup (ed.): *Women, Quotas and Politics*. London: Routledge 2006, p.21, updated.

"The crucial question is, whether the nominated women are placed in a position with a real chance of election."

Even if constitutional amendments and new electoral laws providing gender quotas may seem more commanding, it is not at all evident that these methods are more efficient than political party quotas when it comes to increasing the number of women in parliament. It all depends on the actual rules and the possible sanctions for non-compliance, as well as on the general opportunities that exist for quotas within the country. Concerning rules for nomination, the crucial issue is whether there are any rules concerning the *rank order* on the list. A requirement of say 40 percent may not result in any women elected, if all women candidates are placed at the bottom of the list. The crucial question is, whether the nominated women are placed in a position with a real chance of election.

Gender quotas may be introduced at any level of the political system: federal, national, regional or local. Examples of strong quota regimes at the local level are the 50 percent quotas at the local level in France and the 20-33 percent gender quota for the local councils in India, Pakistan and Bangladesh. In India, this gender quota system is combined with the older system of quotas for the scheduled castes.

Quotas work differently under different electoral systems. Quotas are most easily introduced in proportional representation (PR) systems. However, quotas have also been implemented in some majority systems as this web site demonstrates. But even in PR-systems, some political parties and parties in some constituencies may have difficulties in implementing quotas because the quota may be viewed as interference in the usual prerogatives of the local party organization to select their own candidates.

VIII. Factors which have facilitated the introduction of electoral gender quotas in various countries in the last decades

This intervention aims at providing some statistics and data on women in parliament and in politics since 1945 and in particular since the Fourth World Conference on Women held in Beijing. It presents trends of progress and setbacks and discusses some of the main challenges that women face when running for election, based on research carried out by the Inter-Parliamentary Union (IPU) and other organizations. There has been significant progress since 1945 on increasing the proportion of women in parliament, from around 3 percent of women in parliament, on average, across both upper and lower houses to 18.6 percent in 2009. This represents a six-fold increase – a relatively slow rate of progress. It is significant that there is an unequal division within the regions of the world. The Nordic countries have an average proportion of 42 percent women in their parliaments, and this percentage has been increasing year on year. Two regions of the world are above the world average: the Latin American countries and the European countries, with 22 percent and 21 percent, respectively. Two other regions have reached the world average of 18.6 percent across both houses – Asia and sub-

Saharan Africa. The remaining two regions, the Pacific and the Arab states, have made progress in recent years but are far from the world average. There have been some significant achievements in recent years. In 2009, 15 percent of parliamentary chambers worldwide had 30 percent or more women members. This is a first and represents important progress. The lower house in Rwanda became the first to elect a majority of women parliamentarians in September 2008, putting Rwanda at the top of the list with women making up 56.3 percent of parliamentarians. Rwanda also elected a woman Speaker for the first time in its history. The first upper chamber to appoint a majority of women in parliament.

Two Concepts of Equality

"Real equal opportunity does not exist just because formal barriers are removed. Direct discrimination and hidden barriers prevent women from getting their share of political influence."

In general, quotas for women represent a shift from one concept of equality to another. The classic liberal notion of equality was a notion of "equal opportunity" or "competitive equality". Removing the formal barriers, for example, giving women voting rights, was considered sufficient. The rest was up to the individual women.

Following strong feminist pressure in the last few decades, as expressed for instance in the Beijing "Platform for Action" of 1995, a second concept of equality is gaining increasing relevance and support: the notion of "equality of result". The argument is that real equal opportunity does not exist just because formal barriers are removed. Direct discrimination and a complex pattern of hidden barriers prevent women from being selected as candidates and getting their share of political influence. Quotas and other forms of positive measures are thus a means towards equality of result. The argument is based on the experience that equality as a goal cannot be reached by formal equal treatment as a means. If barriers exist, it is argued, compensatory measures must be introduced as a means to reach equality of result. From this perspective, quotas are not discrimination (against men), but compensation for structural barriers that women meet in the electoral process.

IX. Conclusion: Do quotas work?

"And yet, women's representation might increase as a result of the very debate about introducing quotas. But further research is needed about the implementation of quotas."

Now through www.ipu.org it is possible to see how many countries have adopted reserved seats quotas, legislated candidate quotas and political party quotas. However, from the figures of women's actual political representation, it does illustrate that quota requirements are not actually always *implemented*. It further reveals discrepancies between quota requirements and actual representation. Since it only gives information about quotas rules that have been adopted, and not about the compliance in practice in individual parties, it is not possible to make conclusions about the connection between types of quota provisions and women's representation — other than that many quota provisions are not properly implemented. And yet, women's representation might increase as a result of the very debate about introducing quotas. But further research is needed about the implementation of quotas.

The result of introducing quotas should be studied quantitatively as well as qualitatively. Electoral statistics on the country pages show the number of women elected at the last election. Unfortunately, official electoral statistics in many countries do not provide details of the candidates *nominated* for election by sex, which then must be provided through other channels, including through political parties. The effect of quotas should also be studied in qualitative terms, looking into the intended (empowerment) as well as the unintended consequences (e.g. stigmatization, glass ceilings that may prevent women from increasing their numbers above the specified quota requirement or unintended fractions between different groups of women).

The use of quotas is increasingly influenced by international recommendations and from cross-country inspiration. It seems important, however, that quotas are not just imposed from above, but rest on grass root mobilization of women and the active participation of women's organizations. Quotas in themselves do not remove all the other barriers for women's full citizenship. But under certain conditions electoral gender quotas can lead to historical leaps in women's political representation.

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Glaucoma A Multifactorial Disease and Its Multidimensional Management

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Abstract- Glaucoma is a multifactorial optic neuropathy characterized by retinal ganglionic cell death. Elevated intraocular pressure (IOP) is a recognized risk factor for retinal ganglionic cell degeneration in glaucoma, but is it the only cause of glaucoma? Do progression of glaucoma is fully controlled by controlling IOP? No. Today there are enormous pharmacological and surgical methods to control IOP, but still progression of glaucoma is uncontrolled. It is the need of an hour to work into deeper details of glaucoma, to find its associations and find new multidimensional approach to treat glaucoma. In this article, we found some associations of glaucoma with various age related disorders, and new treatment modalities. This will widen our horizon of thinking and will enable us to find better therapeutic ways to control glaucoma.

Index Terms- glaucoma, alzheimer's disease, omega 3, exercise

I. INTRODUCTION

Glaucoma is a multifactorial optic neuropathy characterized by retinal ganglionic cell death. All the cells of our body are in a continuous cycle of death and renewal but the ganglionic cell death is irreversible, once damaged means lost forever. Therefore glaucoma is an irreversible disease. This irreversible ganglionic cell death results in progressive visual field loss along with decreased color sensitivity and contrast.

Elevated intraocular pressure (IOP) is a recognized risk factor for retinal ganglionic cell degeneration in glaucoma, but is it the only cause of glaucoma? Do progression of glaucoma is fully controlled by controlling IOP? No. Today there are enormous pharmacological and surgical methods to control IOP, but still progression of glaucoma is uncontrolled, visual field loss continue to progress. So there must be some other cause or risk factor.

This disease of glaucoma is quite similar to various other diseases of body like Osteoporosis, osteoarthritis, Alzheimer's disease, coronary artery disease¹, cataract etc. All of these are chronic age related degenerative diseases in which there is a continuous damage to some cells of body is occurring whether it is bones, neurons, joints or vessels wall. With age, the efficiency of all these structures is gradually reducing, and when they cross a certain threshold, symptoms start to appear in various forms like loss of memory, pain in joints, breathlessness and many more. Similarly its occurs in glaucoma, there is a chronic neurodegenerative process, which generally starts in middle age and then progress slowly without any signs and symptoms, as age advances, visual field continues to contract, then, one fine

day patient presents with blurring of vision, decreased color and contrast sensitivity and finally diagnosed as glaucoma.

These above mentioned diseases like osteoporosis¹, osteoarthritis²⁻³, coronary artery disease⁴⁻⁵, dementia's all can occur in young patients, can be genetically inherited, and also influenced by environmental and other factors, similar occurs in glaucoma, it can also be genetically inherited and can also occur in young age.

Alzheimer disease is a progressive neurodegenerative disease which present in form of dementia. Recent studies suggest that there is a significantly higher rate of glaucoma occurrence among patients with Alzheimer disease (AD)⁷⁻⁸. In AD there is loss of neurons in the hippocampus and cerebral cortex, leading to short-term memory loss. It is characterized by the formation of aggregated proteins composed of amyloid known as amyloid plaques, and neurofibrillary tangles, composed of hyperphosphorylated tau protein. . Interestingly, it has been reported that AD and glaucoma have many common features⁶. Sunderland et al. noted that levels of A β ₁₋₄₂ significantly decreased in cerebrospinal fluid from AD patients in comparison with control subjects⁹. Subsequently, we reported that levels of A β ₁₋₄₂ significantly decreased in the vitreous fluid from glaucoma patients in comparison with control subjects with macular hole¹⁰. On the other hand, a chronic elevation of IOP induces A β in RGCs in experimental rat glaucoma⁶. This result is consistent with some previous reports on experimental mouse glaucoma models¹¹⁻¹³. Furthermore, Guo et al. reported that neutralizing antibody to A β significantly delays and attenuates RGC apoptosis in experimental glaucoma¹¹. These findings indicate that A β ₁₋₄₂ neurotoxicity as AD brain may be involved in RGC death in glaucoma. Furthermore, progression of visual field defects is accelerated in patients with open-angle glaucoma and AD versus patients with open-angle glaucoma without AD¹⁴. Hyperphosphorylated tau protein has also been detected in the retinas of glaucoma patients¹⁵. So these studies and results showed that there is some association between these two diseases. Further studies are needed to clarify this relationship.

Lifestyle and healthy habits have significant effect in controlling the progression of these diseases like regular exercise decreases the chances of coronary artery disease¹⁶⁻¹⁷, regular intake of omega 3 fatty acids control Alzheimer's disease¹⁹, decreased mental stress and tension definitely control the progression of metabolic diseases. So all these above mentioned therapies should have some role in treatment of glaucoma.

Various studies have been conducted to evaluate the role of omega 3 fatty acids on IOP reduction and glaucoma progression. Ren et al.¹⁹ found decreased omega-3

polyunsaturated fatty acids (PUFA) levels in glaucoma patients compared with their healthy siblings, whereas Kang et al.²⁰ found that a lower omega-6, omega3 consumption ratio was associated with increased glaucoma prevalence. Nguyen et al.²¹. Demonstrates that increasing omega-3 PUFA consumption leads to decreased IOP with age through increased aqueous outflow facility. Further studies are needed to consider whether manipulation of dietary omega-3 fatty acids may be important in modifying the risk for chronic eye diseases such as glaucoma. It had been observed that physical exercises could reduce the intraocular pressure (IOP) in patients with glaucoma²². However, the effect of IOP reduction varied with exercise type and intensity, as well as the duration of exercise²³⁻²⁴. Difference of lowering the IOP in glaucoma patients and healthy people were also observed. The mechanisms of reducing the IOP by exercise were very complicated and believed to be associated with the lower concentration of nor epinephrine, the rising of colloid osmotic pressure, the co-action of nitric oxide and endothelin after exercise, and also related to the gene polymorphism of β 2-adrenergic receptor²²⁻²⁵. Overall, exercise has been found to lower IOP. Studies also have found that it improves blood flow to the retina and optic nerve. In one study, jogging for 20 minutes lowered IOP by 1 mm Hg to 8 mm Hg. Valsalva maneuver (the technical term for what happens when, after an inhalation, you hold your breath and apply pressure against your epiglottis), appears to have a negative impact on IOP. While few studies have been conducted on yoga and glaucoma, there is some evidence that inverted poses increase IOP²⁶. This includes headstand, shoulder stand and the plow. Currently, there are no cohort studies reporting the relationship between exercise and glaucoma; moderate aerobic exercise has many health benefits and thus should be encouraged.

A prolonged stress-induced increase in endogenous cortisol and catecholamines with subsequent alterations of the immune response may increase IOP²⁷⁻²⁸. So, it may be prudent to ask about potential psychosocial or environmental stress factors, especially in a patient who had stable disease and now has developed a dramatic rise in IOP or deterioration of visual function.

Caffeine is consumed by a high percentage of the general public. Most of the studies²⁹⁻³⁰, with some exceptions³¹, demonstrates 2 to 3 mm Hg increase in IOP that lasts for about 2 hours after use of coffee. However, coffee beans also contain compounds that have antioxidative effects³²⁻³³ these antioxidative effects and its possible neuroprotective implications need further research.

Ginkgo biloba and bilberry (shrubs that yield a fruit resembling blueberries) have been proposed as neuroprotectors. The main components of the Ginkgo leaf extract are flavonoid glycosides and terpene lactones. Ginkgo is thought to mediate its effects through several biological mechanisms including antiplatelet action, vasodilation, and antioxidant effect. There is little data regarding the effect of Ginkgo biloba on the course of glaucoma. A placebo-controlled randomized controlled trial (RCT) found that Ginkgo biloba improved preexisting visual field loss in some patients with normal tension glaucoma³⁴. Further research is mandatory before we start recommending use of ginkgo biloba along with conventional glaucoma therapy on a routine basis.

Glaucoma is an age-related, chronic neurodegeneration of the optic nerve. The molecular and cellular pathologies that characterize the disease are shared by other chronic neurodegenerations such as AD. Therapies directed at treating chronic neurodegenerations have potential for use in treating glaucoma; conversely, therapies that are successful in treating glaucoma could be used in treating other chronic neurodegenerations.

When patients inquire about the relationship between lifestyle factors, alternative medicine, and glaucoma, the physician should take the opportunity to educate them about their disease. Few activities should be avoided by the glaucoma patients, although more evidence is needed to determine if these activities predispose to glaucoma or contribute to the progression of the pre-existing disease. So we should widen our horizons and see into the deeper details of pathophysiology, etiology, and management options for glaucoma.

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Human Body Respiration Measurement Using Digital Temperature Sensor with I2c Interface

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Abstract- Vital signs are measurements of the body's most basic functions. The four main vital signs routinely monitored by medical professionals and healthcare providers include the following body temperature, pulse rate, respiration rate (rate of breathing), blood pressure (Blood pressure is not considered a vital sign, but is often measured along with the vital signs.) Vital signs are useful in detecting or monitoring medical problems. Vital signs can be measured in a medical setting, at home, at the site of a medical emergency, or elsewhere. This paper aims at measurement of respiration rate using digital sensor extending the methods of measuring it with help of thermistor, chest expansion etc. The respiration rate is measured with the help of TMP100 a Digital temperature sensor which monitor the slightest change in temperature during inhale & exhale. Wireless GSM MODEM, which is serially interfaced with microcontroller, sends the collected data to the physician. The theory, design procedures, experimental results and discussions of these systems are presented.

I. INTRODUCTION

The respiration rate is the number of breaths a person takes per minute. The rate is usually measured when a person is at rest and simply involves counting the number of breaths for one minute by counting how many times the chest rises. Respiration rates may increase with fever, illness, and with other medical conditions. When checking respiration, it is important to also note whether a person has any difficulty breathing. Normal respiration rates for an adult person at rest range from 15 to 20 breaths per minute. Respiration rates over 25 breaths per minute or fewer than 12 breaths per minute (when at rest) may be considered abnormal. Here respiration rate is measured with the help of TMP100 temperature sensor. Communication between a mobile phone client and a server unit is achieved through programming the client using attention commands (AT commands). The experimental setup can be operated for monitoring from anywhere covered by the Cellular (GSM) service by exchanging SMS messages with the remote mobile device. At the consultation unit, dedicated application software is required to manage the follow of SMS messages from the Mobile and display the, respiration rate, of the patient. The device which can be widely used for medical equipment in diagnosis at hospital and clinics. The special of this device is it will display the measured respiration rate per minute. The device consists of electronic circuit system, embedded system that is microcontroller program.. One of the advantage of this device is it will be built integrated and standalone device with small size

and lightweight. One of the main purposes of homecare telemedicine is to develop a wireless, low-cost and use friendly system, which allows patients to measure their own vital signs, and provide the health care professionals with the facility to remotely monitor the patient's vital signs quickly and easily. The externally worn device is placed directly on the finger, allowing acquisition of the electrocardiogram without the use of leads. The 8-bit microcontroller-based transmitter digitizes the preconditioned respiration rate and identifies the signal in real-time Data is output from the microcontroller. When it is necessary to output data from the device, the digital data is transmitted in form of SMS to physician. At the monitoring station, the transmitted data is demodulated by the receiver and the data received by mobile phone .A P89V51RD2 microcontroller was then interfaced to the device to collect the data from it's devices, process them, store them and feed them to a transmitter. A high performance RF Module Tri-Band GSM/300/900/ 1800/ 1900 MHz transmitter and receiver were then used to wirelessly transmit and receive the vital sign data from the micro-controller to the consultation unit, a dedicated application software is required to manage the follow of SMS messages from the Mobile and display the vital parameter of the patient". Old age problems are very common these days, as the social structure has evolved into satellite family systems where children after attaining their adulthood no longer live with their parents anymore and the old souls are left to cater for themselves. Typically, aged people live a secluded and reclusive life with multiple problems of memory disorder, depression, falls and unsteadiness, poor nutrition, problems with self-care and other complex chronic medical conditions.

II. BACKGROUND STUDY

Respiration rate is a key indicator of ventilation. Abnormal respiration rate, either too high (tachypnea), too low (bradypnea), or absent (apnea), is a sensitive indicator of physiologic distress that requires immediate clinical intervention. In spite of its clinical importance, respiration rate is the last core vital sign without a reliable and continuous monitoring method that patients can easily tolerate. The lack of a reliable respiration rate measurement is a major contributor to avoidable adverse events. The most common method for respiration rate measurement is by physical assessment, either by counting chest wall movements or by auscultation of breath sounds with a stethoscope. Multiple studies have shown manual methods to be unreliable in acute care settings, especially on the general care floor, where the majority of patients receive care. Even if they were reliable,

manual methods are limited by their intermittent nature. Two continuous methods for respiration rate monitoring are used in multiparameter monitors, thoracic impedance pneumography and capnography monitoring. The thoracic chest wall expands and contracts during the respiratory cycle from which respiration rate can be determined by measuring changes in electrical impedance associated with this movement. Monitoring of respiration rate by thoracic impedance is convenient if the patient is already monitored for ECG, but the method is prone to inaccurate readings due to a number of factors including: ECG electrode placement, motion artifact, and physiologic events non-related to respiration rate that causes chest wall movement (e.g. coughing, eating, vocalization, crying). Another significant limitation is insensitivity to obstructive apnea where chest wall movement is often present in the absence of any actual air exchange (obstructive apnea). These limitations have rendered thoracic impedance monitoring for respiration rate unreliable in most acute care settings. Capnometers that continuously monitor ventilation for non-intubated patients require a nasal airway cannula that draws a continuous gas sample for spectrographic measurements within the capnometer. Capnometry measurement of respiration rate is the most frequent technology used by anesthesiologists. This method is sensitive to central, obstructive, and mixed apneas. The primary limitations of continuous respiration rate monitoring by capnometry are low patient tolerance of the nasal cannula and the added nursing workload to respond to dislodged or clogged cannulas during the patient stay

III. PREVIOUS WORK

Studies related to the remote collection and use of physiological information have been published across multiple disciplines including computer vision [1], image and signal processing [2], human-computer interaction [3], biomedical engineering [4], plant science [5] and robotics [6]. Traditional approaches include using devices such as thermistors to measure the air temperature changes near the nasal region [7], respiratory belt transducers to measure changes in the circumference of the chest or abdomen [8] and battery-powered wearable sensors to detect the sound created by turbulence occurring in the human respiratory system [9]. Unfortunately, these devices are impractical for use in many real-world scenarios which require patient mobility or for patients who are disinclined to wearing sensors of any kind. One of the first published works which measures breathing rate remotely uses an active radar detector to measure movements of the chest caused by cardiac and breathing events [10]. Since then, other non-contact modalities have been explored including laser doppler vibrometry (LDV) [11], radio frequency scanners [12] and mid-wave infrared video cameras [13]. One study remotely collects physiological information using LDV to deduce the stress state of an individual based on vibrations of the skin directly covering the carotid artery [14]. The main drawbacks to this approach include problems with accurate tracking due to variances in patient physiology and the prohibitive cost of the technology.

The biomedical engineering field has published a great deal of research dedicated to the acquisition of a wide variety of physiological information. A recent study uses a midwave infrared camera to capture breathing and heart rate based on air

temperature changes near the nasal region [14]. This particular implementation was designed for polysomnography and relies initially on the manual identification of a primary region of interest in order to track the outer extent of the nostril region. Because of the large amount of image and data processing required and the small size of the nostril location to be tracked, segmentation becomes challenging and computationally expensive. Grossman *et al.* [9] compared respiration and cardiac parameters measured by the Vivometrics Lifeshirt ambulatory monitor in 40 subjects during normal daily activities for when heart rate was less than 110 beats per minute. This heart rate range was chosen as it was claimed to be the primary range of cardiac parasympathetic control. They found that ambulatory respiratory sinus arrhythmia (high-frequency heart rate variability calculated using a peak-valley algorithm) was significantly associated with variations in respiratory rate and tidal volume (average $R = 0.8$). The modes of collecting physiological data described in these studies have been effective but each method still requires that the subject be fitted with the proper biofeedback sensors. In some controlled settings and with certain subjects, this may not be an issue. However, their efficacy in dynamic environments where people cannot be fitted with biofeedback sensors or in certain medical or therapeutic settings where persons are averse to wearing sensors is still somewhat limited. This paper presents a complementary approach in which one important physiological indicator - breathing is collected using a non-contact modality.

IV. PROPOSED SYSTEM

The proposed system has been divided into measurement of respiration rate, which is described, with the help of a block diagram [c]. Hardware development involves design and development of sensor circuit, Philips microcontroller circuit and MAX232 circuit. PROTEL DXP is used for simulation, schematic capture, and printed circuit board (PCB) design. The whole program is written and assembled using EMBEDDED C language. The program is written based on the P89v51rd2 specific instruction. Microcontroller is used to perform the signal processing from the sensor circuit. MAX232 connects the microcontroller circuit to GSM modem via RS232 cable. An alert message will be sent to mobile phone by modem.

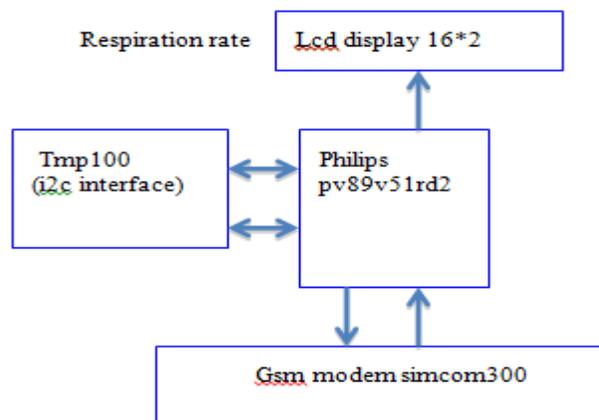
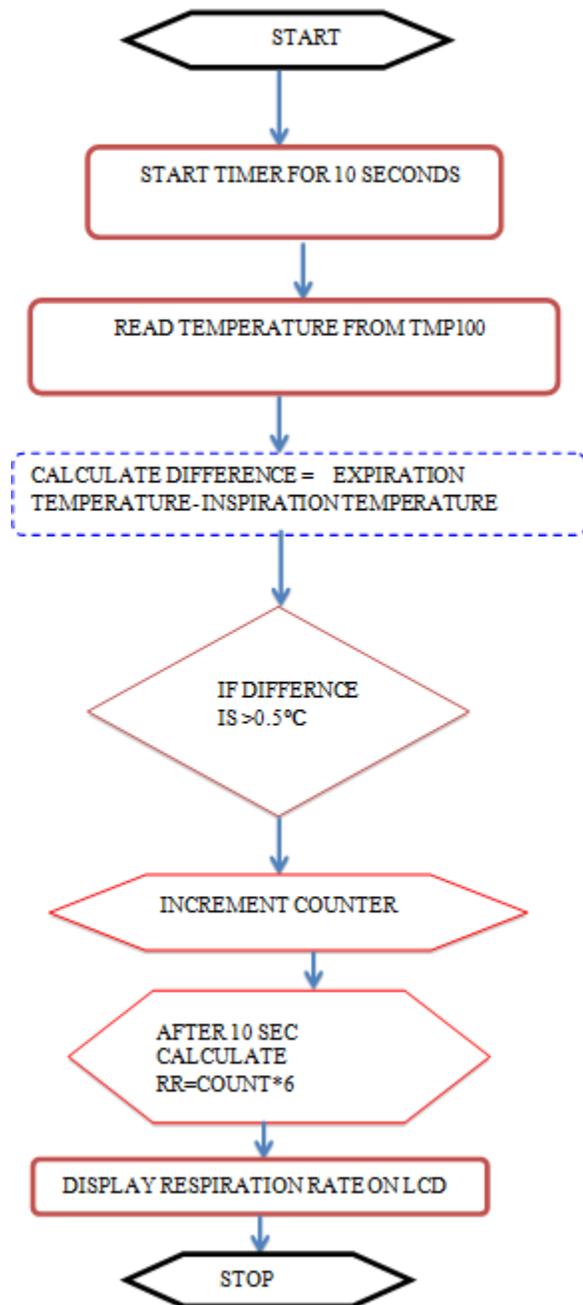
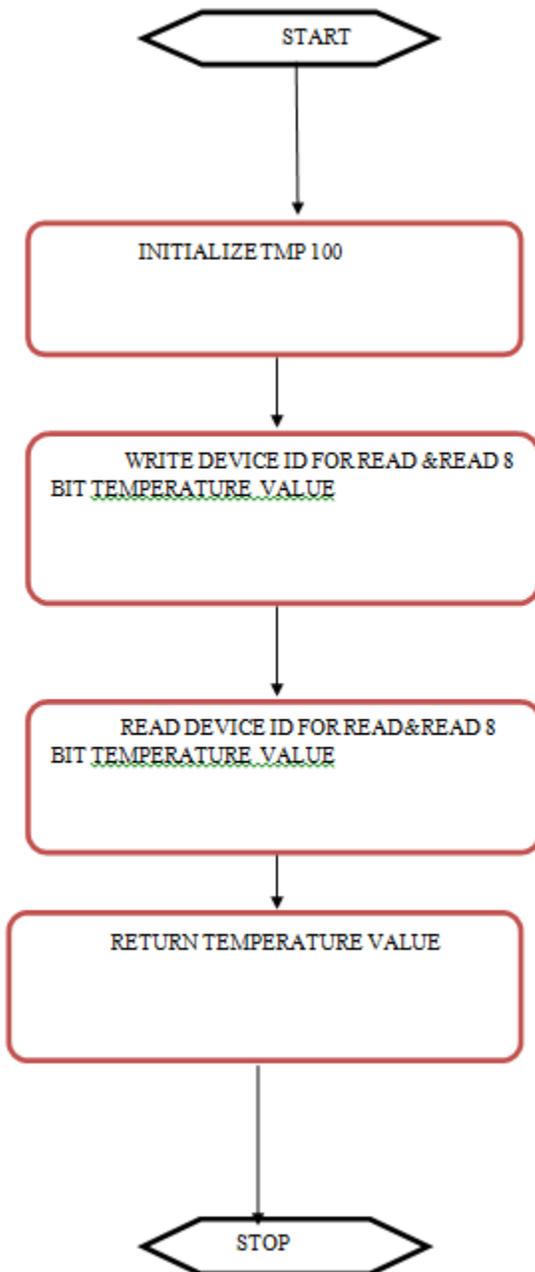


Fig 1: block diagram of respiration rate

Tmp100 is interfaced using I2C logic to microcontroller.it read & write by SCL & SDA pins. TMP100 provide 11 bits temperature reading on every inhale & exhale during respiration by nasal activity. During every inhale & exhale temperature vary, the difference for temperature for each inhale & exhale is counted for one minutes and total count is done by microcontroller which is displayed on LCD. GSM modem is connected to pin 10(RX) and pin 11(TX) pin of microcontroller p89v51rd2. The TX pin of GSM is connected with RX of microcontroller and RX of GSM is connected with TX pin of p89v51r82. AT commands are given to GSM modem at which GSM modem response by "OK". Detail working can be explained using flow chart.



1. Respiration sensor TMP100

The TMP100 are two-wire, serial output temperature sensors available in SOT23-6 packages. Requiring no external components, the TMP100 are capable of reading temperatures with a resolution of 0.0625°C. The TMP100 feature SM Bus and I2C interface compatibility, with the TMP100 allowing up to eight devices on one bus. The TMP101 offers SM Bus alert function with up to three devices per bus. The TMP100 are ideal for extended temperature measurement in a variety of communication, computer, consumer, environmental, industrial, and instrumentation applications. The TMP100 are specified for operation over a temperature range of -55°C to +125°C.

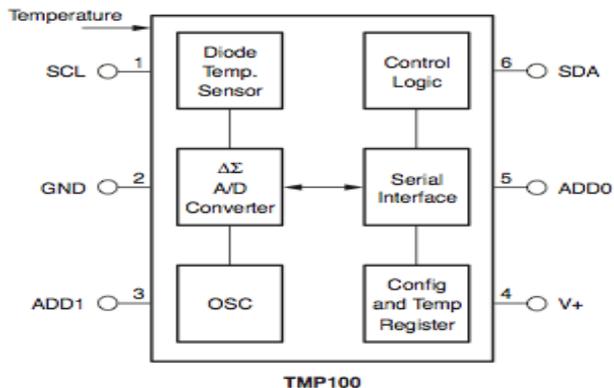


FIG3: tmp100

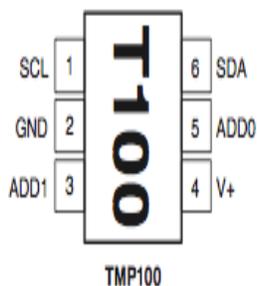


Fig4: top view of tmp100

POINTER REGISTER

The internal register structure of the TMP100. The 8-bit Pointer Register of the TMP100 is used to address a given data register. The Pointer Register uses the two LSBs to identify which of the data registers should respond to a read or write command. Table 1 identifies the bits of the Pointer Register byte. Table 2 describes the pointer address of the registers available in the TMP100 a. Power-up Reset value of P1/P0 is 00
Fig5: Internal register structure of TMP100

TEMPERATURE REGISTER

The Temperature Register of the TMP100 is a 12-bit read-only register that stores the output of the most recent conversion. Two bytes must be read to obtain data first 12 bits are used to indicate temperature with all remaining bits equal to zero. Data format for temperature is summarized in Table 1. Following power-up or reset, the Temperature Register will read 0°C until the first conversion is complete. The user can obtain 9, 10, 11, or 12 bits of resolution by addressing the Configuration Register and setting the resolution bits accordingly. For 9-, 10-, or 11-bit resolution, the most significant bits in the Temperature Register are used with the unused LSBs set to zero.

CONFIGURATION REGISTER

The Configuration Register is an 8-bit read/write register used to store bits that control the operational modes of the temperature sensor. Read/write operations are performed MSB

first. The format of the Configuration Register for the TMP100 followed by a breakdown of the register bits. The power-up/reset value of the Configuration Register is all bits equal to 0. The OS/ALERT bit will read as 1 after power-up/reset.

BYTE	D7	D6	D5	D4	D3	D2	D1	D0
1	OS/ALERT	R1	R0	F1	F0	POL	TM	SD

Table 1: configuration register

CONVERTER RESOLUTION (R1/R0)

The Converter Resolution Bits control the resolution of the internal Analog-to-Digital (A/D) converter. This allows the user to maximize efficiency by programming for higher resolution or faster conversion time. Table 2 identifies the Resolution Bits and relationship between resolution and conversion time.

R1	R0	RESOLUTION	CONVERSION TIME (typical)
0	0	9 Bits (0.5°C)	40ms
0	1	10 Bits (0.25°C)	80ms
1	0	11 Bits (0.125°C)	160ms
1	1	12 Bits (0.0625°C)	320ms

Table2: resolution of tmp100

SERIAL INTERFACE

The TMP100 operate only as slave devices on the I2C bus and SM Bus. Connections to the bus are made via the open-drain I/O lines SDA and SCL. The TMP100 and support the transmission protocol for fast (up to 400kHz) and high-speed (up to 3.4MHz) modes. All data bytes are transmitted most significant bit first.

2.5.4.5.1SERIAL BUS ADDRESS

To program the TMP100 and TMP101, the master must first address slave devices via a slave address byte. The slave address byte consists of seven address bits, and a direction bit indicating the intent of executing a read or write operation. The TMP100 features two-address pins to allow up to eight devices to be addressed on a single I2C interface. describes the pin logic levels used to properly connect up to eight devices. *Float* indicates the pin is left unconnected. The state of pins ADD0 and ADD1 is sampled on the first I2C bus communication and should be set prior to any activity on the interface.

TIMING DIAGRAMS

The TMP100 are I2C and SM Bus compatible. Figure6 to Figure 8 describe the various operations on the TMP100 and TMP101. Bus definitions are given below. Parameters for Figure 5 are defined in Table 13.

Bus Idle: Both SDA and SCL lines remain HIGH.

Start Data Transfer: A change in the state of the SDA line, from HIGH to LOW, while the SCL line is HIGH, defines a

Command	Description
AT	Check if serial interface and GSM modem is working.
ATE0	Turn echo off, less traffic on serial line.
AT+CNMI	Display of new incoming SMS.
AT+CPMS	Selection of SMS memory.
AT+CMGF	SMS string format, how they are compressed.
AT+CMGR	Read new message from a given memory location.
AT+CMGS	Send message to a given recipient.
AT+CMGD	Delete message.

Table 3: at commands

AT-Command set

The protocol used by GSM modems for setup and control is based on the Hayes AT- Command set. The GSM modem specific commands are adapted to the services offered by a GSM modem such as: text messaging, calling a given Phone number, deleting memory locations etc. Since the main objective for this application note is to show how to send and receive text messages, only a subset of the AT-Command set needs to be implemented. The European Telecommunication Standard Institute (ETSI) GSM 07.05 defines the AT-Command interface for GSM compatible modems. From this document some selected commands are chosen, and presented briefly in this section. This command subset will enable the modem to send and receive SMS messages. For further details, please consult GSM 07.05. The following section describes the AT-Command set. The commands can be tried out by connecting a GSM modem to one of the PC's COM ports. Type in the test- command, adding CR + LF (Carriage return + Line feed = \r\n) before executing. Also see chapter 3.1 for further details.

S.NO	Command	Description	Result
1	AT\r\n	Check whether communication is established	Ok
2	ATE0\r\n	ECHO off	Ok
3	AT+CMGF=1\r\n	Switch to text mode	Ok
4	AT+CMGS= mobile number\r\n	Send SMS to the mobile number	>
5	AT+CMGR=sms number\r\n	Read the sms with message index number stored in the SIM card	CMGR: "REC UNREAD", "+919685474985", "0", "10/02/21,10:09:38 MESSAGE DATA"
6	AT+CMGD=sms number\r\n	Delete the sms with message index number stored in the SIM card.	Delete the SMS with message index number stored in the SIM card.

Table4: gives an overview of the implemented AT-

3. P89V51RD2 Microcontroller

The P89V51RD2 is an 80C51 microcontroller with 64KB Flash and 1024 bytes of data RAM. A key feature of the P89V51RD2 is its X2 mode option. The design engineer can choose to run the application with the conventional 80C51 clock rate (12 clocks per machine cycle) or select the X2 mode (6 clocks per machine cycle) to achieve twice the throughput at the same clock frequency. Another way to benefit from this feature is to keep the same performance by reducing the clock frequency by half, thus dramatically reducing the EMI. The Flash program memory supports both parallel programming and in serial In-System Programming (ISP). Parallel programming mode offers gang programming at high speed, reducing programming costs and time to market. ISP allows a device to be reprogrammed in the end product under software control. The capability to field/update the application firmware makes a wide range of applications possible. The P89V51RD2 is also In-Application Programmable (IAP), allowing the Flash program memory to be reconfigured even while the application is running.

CIRCUIT DIAGRAM

RESPIRATION RATE

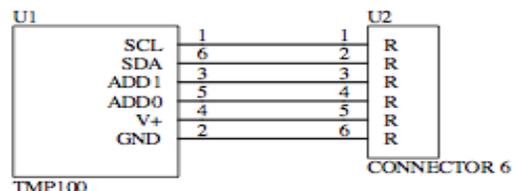


Fig9: circuit diagram of respiration using tmp100



fig10 : pcb layout of respiration

V. RESULT

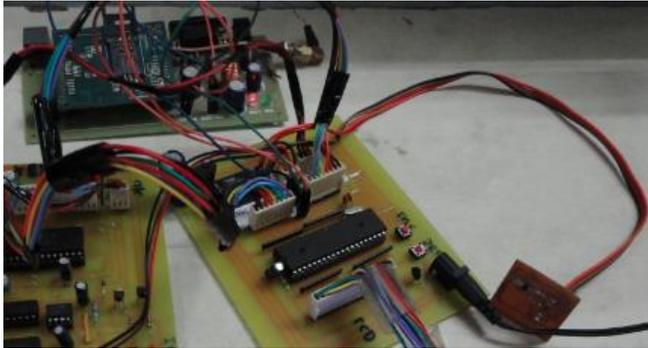


Fig11: GSM interfacing with p89v51rd2



Fig12: output of GSM modem

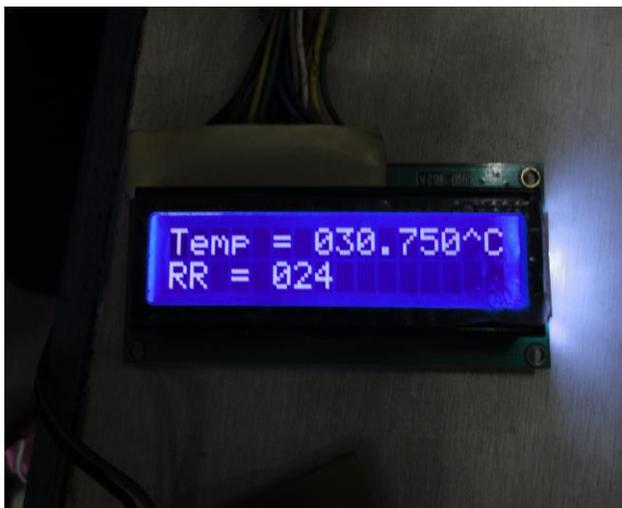


Fig13: output of respiration

VI. CONCLUSIONS

This paper presents a new technique for monitoring changes in the breathing temperature to calculate respiration rate. The main objective of our research was to examine the effectiveness of using a non-contact, simple and low cost sensor for accurately measuring breathing rate. Overall, the results

obtained from our formal experiments are very promising. Data from the typical test sets clearly demonstrate that a tmp100 sensor, when accurately positioned, can detect subtle temperature changes corresponding to inspiration and expiration. Given the small size of the sensor and the minimal computation required for non-contact breathing monitoring (as compared to existing methods), this research demonstrates the usefulness of this sensing modality for RR. Preliminary experiments highlighted limitations with the methods used to position the sensor, collect ground truth and automatically compute breathing rates, but it is our expectation that they will be reasonably easy to overcome. Collecting ground truth can be accomplished using a respiratory belt transducer or thermistors. Future experiments will engage the study participant in a light activity that will require minimal movement while breathing is monitored. Additionally, sensitivity analysis of imprecise nose detection and an examination of the possible cross-effect of perspiration in the perinasal region will be considered in future tests.

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Automatic Optic Disc Detection and Removal of False Exudates for Improving Retinopathy Classification Accuracy

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Abstract- Detection of Optic disc (OD) in a fundus image is one of the important step in the process of automated screening of diabetic retinopathy. Hard Exudates detection algorithms generally find lot of false positives at the OD region since the intensity and colour distribution of OD region will much resemble that of a Hard Exudates region. So, most of the Exudates detection algorithms will wrongly classify the pixels at the OD region as Hard Exudates or Soft Exudates.

In our previous work, we used Genetic Algorithm(GA) to find the OD location and size and reduced overall time, even doing the search on the entire problem space. In this work we are going to remove false hard exudates and will improving Retinopathy detection accuracy using GA based automatic optic disc detection and removal method. We are going to use the outputs of baseline hard exudates detection method presented in the of DIARETDB1[8] for evaluating the improvement after the removal of false positives in the OD region. We will evaluate the improvement in performance using the more versatile metric 'weighted error rate' (WER). After removing false positives at OD region by manual removal method and the proposed automatic removal method, we will compare the results of baseline method for evaluating the improvement in classification accuracy.

Index Terms- Diabetic Retinopathy, Hard Exudates Detection, Genetic Algorithm, Optic Disc Detection.

I. INTRODUCTION

The most serious diabetic eye condition involves the retina and is called diabetic retinopathy(DR). This condition is very common in people who have had diabetes for a long time. The rapid increase of diabetes pushes the limits of the current DR screening capabilities for which the digital imaging of the eye fundus (retinal imaging), and automatic or semi-automatic image analysis algorithms provide a potential solution. The eye fundus structures, such as blood vessels, vascular arcade, optic disc, macula and fovea, are an essential part in diagnosis of diabetic retinopathy, and fundamental to the subsequent characterization of the disease.

It is important to detect and isolate OD region because, most of the algorithms designed to segment/detect abnormalities such as Hardexudates will detect lot of false positives in OD region. In other words, most of the pixel intensity and colour based abnormality detection algorithms will detect OD region as

a abnormality. So, the false positives in the OD region should be eliminated from the calculations of accuracy of a abnormality detection algorithm. Optic disc (OD) detection is a main step while developing automated screening systems for diabetic retinopathy.

Diabetic Retinopathy

Diabetic Retinopathy is a diabetic eye disease leads to blindness. Retina is a light sensitive tissue at the back of the eye and it is responsible for the vision. The changes in the retinal blood vessels such as swelling of the vessel, leakage of fluid affects the surface of the retina. The resulting diseases are Micro aneurysms, Hemorrhages, Cotton wool spots, Soft exudates and hard exudates. Research indicates that 90% of the new diabetic cases can be prevented from loss of vision by regular screening and monitoring of the retinal image. Digital image processing can play a vital role in detecting the above diseases with good accuracy in all metrics.

Eye Fundus Imaging

Fundus imaging is a common clinical procedure used to record a viewing of the retina. This image may be used for diagnosis, treatment evaluation, and the keeping of patient history. These images are captured using fundus camera which is a specialized low power microscope with an attached camera. Fundus photography is also used to document the characteristics of diabetic retinopathy (damage to the retina from diabetes) such as macular edema and microaneurysms. This is because retinal details may be easier to visualize in stereoscopic fundus photographs as opposed to with direct examination[18].

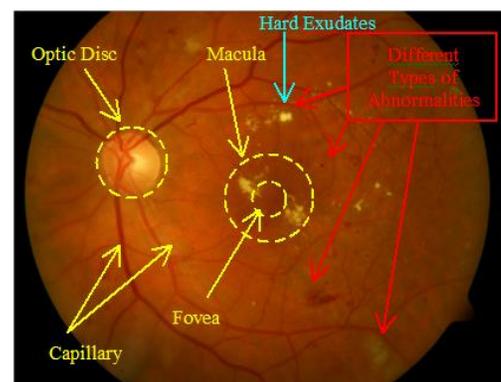


Figure 1. The Anatomical and Pathological Parts in Retinal Images

Hard Exudates

Hard Exudates are formed in the retina by the clustering of protein and lipid leakage from the damaged blood vessel. They are diverse in size and forms and vary in numbers. Hard exudates are highly reflective and bright yellowish in color with the well defined margin as shown in the figure[1].

The Optic Disc (OD)

The OD is the exit point of retinal nerve fibers from the eye, and the entrance and exit point for retinal blood vessels. It is a brighter region than the rest of the ocular fundus and its shape is usually round. The location of OD is important in retinal image analysis, for example, to help locate anatomical and pathological parts in retinal images (e.g. the fovea), for blood vessel tracking, as a reference length for measuring distances in retinal images, and for registering changes within the optic disc region due to diseases such as glaucoma and the development of new blood vessels (which is very dangerous). The central portion of disc is the brightest region called optic cup or optic disc, where the blood vessels and nerve fibers are absent. In a colour retinal image the optic disc belongs to the brighter parts along with some lesions. Applying a threshold may separate part of the optic disc and some other unconnected bright regions from the background[4]. However, further processing will be needed to separate the OD only region from the image. So, the detection of exact location of OD is a important task and it is still a challenging task. The localization of optic disc is important for several reasons. The OD location serves as the baseline for finding the exact boundary of the disc[4]. Optic disc center and diameter are used to locate the macula in the image. In some methods and practices, OD location of the fundus image is used as a reference point or registration point. Further, false detections at the OD regions should be eliminated from the calculations of accuracy for that the exact region of OD should be known.

Problem Definition

Hard exudates detection is generally done by clustering the colour histogram values. The exudates detection algorithms generally find lot of false positives at the OD region since the intensity and colour distribution of OD region will much resemble that of a hard or soft exudates region. So, most of the exudates detection algorithms will wrongly classify the pixels at the OD region as hard exudates or soft exudates based on the intensity distribution at that location.

So it is important to isolate the OD region and treat it in a different way to avoid the detection of false positives at that region. Generally, the intensity of the pixels at OD region is used to separate it from the rest of the image using a suitable intensity based thresholding techniques. But the intensity based techniques may give more than one potential location of OD from a typical fundus image since there may be brighter regions which may resemble OD. The sophisticated template matching techniques such as [1] and [2]. will search all possible pixel locations for the best matching location. This sliding window operation used in template matching is time consuming one. In our earlier work we proposed a fast GA based method for detecting location and size of the OD in a eye fundus image.

Tomi Kauppi et.al, of University of Tampere provided DIARETDB1 diabetic retinopathy database and a evaluation

protocol for evaluating the algorithms of diabetic retinopathy. They provided a baseline method for detecting different abnormalities from the retinal image. The base line algorithm may find lot of false positives in the OD region. In this work, we propose the use of GA based, automatic optic disc detection and removal of false exudates for improving retinopathy classification accuracy. The proposed algorithm will eliminate the false positives at the OD region and improve the overall classification accuracy.

II. ELIMINATION OF FALSE HARDEXUDATES USING GA BASED AUTOMATIC OPTIC DISC DETECTION AND REMOVAL

A. The Overall Design of False Hard Exudates Elimination using GA based Automatic Optic Disc Detection and Removal

The following diagram shows the simple sketch of the overall design of the proposed model for automatic removal of false exudates at OD region.

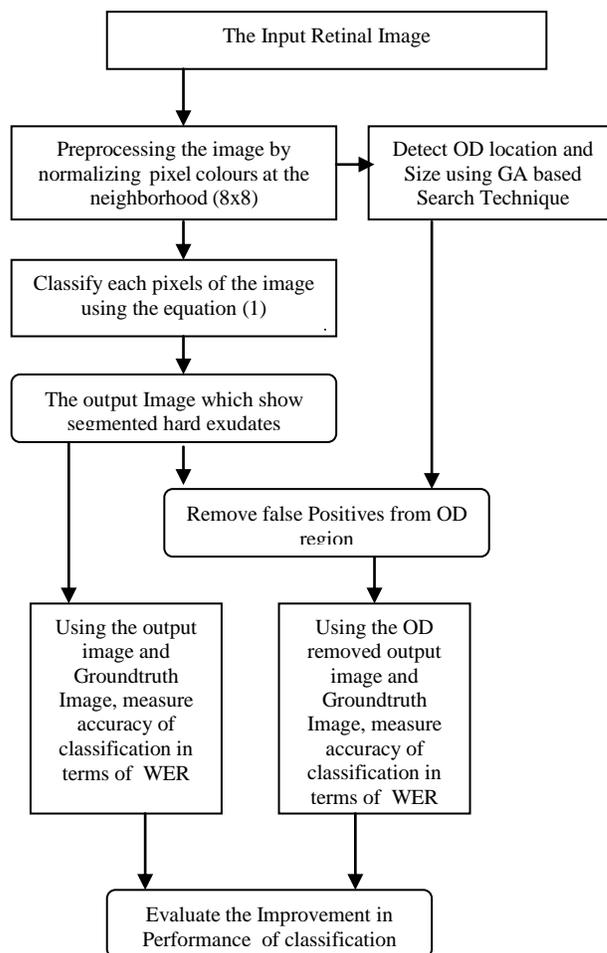


Figure 1. The Proposed Model for Automatic Removal of False Exudates at OD Region

B. Hard Exudates Detection Using Baseline Method

This baseline method provided with DIARETDB1 is based on the principle that different findings can be distinguished and detected based only on their photometric information, i.e. colour.

This method used colour locus based face detection by Hadid et al. [] to design a multi-class diabetic retinopathy detection. This method utilises two colour channels R and G without intensity component. A colour locus for each finding type, F_i , is defined by forming their colour histograms $h_{F_i}(r, g)$. The histograms are computed from the intensity normalised pixel colours at the neighborhood (8x8) of the most representative points marked by the experts. By using the colour histograms of findings, $h_{F_i}(r, g)$, and a test image itself, $h_{F_i}(r, g)$. Schwerdt and Crowley [] have derived a formula for the Bayesian decision rule to classify a pixel with color (r,g) to one of the finding classes. The formula reduces to the histogram ratio of finding and test

$$p(F_i | r, g) = \frac{h_{F_i}(r, g)}{h_{total}(r, g)} \dots\dots\dots(1)$$

image:

In this model they manually select an optimal posterior threshold for every finding type and compute the sum of pixels having higher or equal posterior value as the image based score.

C. The Different Aspects of Proposed OD Detection Algorithm

In the proposed method, the OD location will be detected using blue channel of the image of green channel of the image based on the intensity estimate on blue channel of the image. Further, instead of searching all the possible locations of better matching location, the GA will search the entire space in a fast manner by considering all the potential regions.

I. The Channel Selection based on Intensity Estimate

Let I be the colour fundus image which has three layers R,G and B

$$I = \{ R, G, B \}$$

Find the intensity estimate ρ_B at blue layer

$$\rho_B = \frac{\sum_{i=1}^n \sum_{j=1}^m B_{(i,j)}}{(m \times n)}, \forall B_{(i,j)} > 0 \dots\dots\dots(2)$$

So the normalized intensity estimate ρ_B may have value between 0 and 1. If it is 0 then it means, all the blue layer pixels are having value equal to 0. If it is 1 then it means, all the blue layer pixels are having values greater than 0.

Even though the blue layer pixel will have values near zero, and will not be visible if we try to display that layer. If 50 % percent of the pixels will have greater than 0 values, then we can use the green layer as the target image to detect the OD else we may use the green layer as target image.

```

If  $\rho_B > \tau$ 
//set Blue Layer as target Image
    T=B
Else
//set Green Layer as target Image
    T=G
End
    
```

In this experiment, we used the threshold $\tau = 0.5$ to decide whether to use blue layer of green layer for detecting the OD.

II. The Design of GA for OD detection

After selecting the suitable channel by using the above equation 1, the optimum OD location will be found using GA.

The 4 variables i, j, r_1 , and r_2 , which will decide the optimum location and size of the OD should be represented in GA.

The lower bound of i, j, r_1 , and r_2 are set as 150,150 0 0. The upper bounds i, j, r_1 , and r_2 are set as 1152-150,1500-150 0 0 where 1152 x 1500 is the size of the fundus image in which we are going to find the OD location.

The GA was seeded with the initial population with approximate mid range of these 4 variables as 575,750,5 5.

The GA applied for detecting the OD will be in the following form. The algorithm will search of optimum location and size of the OD in the target fundus image T. and will find a OD with in the radius of minimum expected radius r_{mid} and maximum expected radius r_{max} . On each iteration, the best candidate location is selected based on the intensity estimate given by equation 2 of the fitness function.

```

Function GA_OD_Detect
begin
    INITIALIZE population with random candidate solutions;
    (Each random candidate solution will represent 4 variables  $i, j, r_1$ , and  $r_2$ )
    EVALUATE each candidate;
    (find fitness of each candidate using the fitness function)
    repeat
        SELECT parents;
        (Select two candidate having best fitness value)
        RECOMBINE pairs of parents;
        (use single point crossover on the selected candidates and generate new population – this includes the original parents)
        MUTATE the resulting children;
        (use gaussian mutation on entire population)
        EVALUATE children;
        (find fitness of all new candidates of the population)
    until TERMINATION-CONDITION is satisfied
end

Mark OD on the fundus image using the final optimum values of  $i, j, r_1$ , and  $r_2$ 
    
```

Figure 1. The GA of OD detection

III. THE FITNESS FUNCTION

The following function is used to find the fitness at the location i, j . The point which has the lowest fitness value will be the potential center of the OD.

```

Function y=f(T,i,j,rmid, r1,r2)
Begin
Let R be a small region of image in the target image T.
R will have the
    Height, h=(rmid+r1) × 2 +1 and
    Width, w= (rmid+r2) × 2 +1 and
    its center at i,j
R ← T(i- rmid- r1 : i+ rmid+ r1, j- rmid- r2 : j+ rmid+ r2)
m ← min(R)
R1=zeros(size(R));
// fill R1 with elements of R which are greater than m
R1(k,l) ← 1,  $\forall R_{(k,l)} > m$ 
R ← R1

$$y = 1 - \frac{\sum_{k=1}^h \sum_{l=1}^w R_{(k,l)}}{(r_{\max} \times 2)^2 \times 255} \dots\dots\dots(3)$$

End
    
```

Figure 1. The Fitness Function

Where

- Y - is the fitness of the function f
 - T – is the target image in which we have to locate the OD
 - i,j – the center of the guessed OD location
 - r_{min} – minimum expected radius of the OD
 - r_{max} - maximum expected radius of the OD
 - r₁ - the small change in Height
 - r₂ - the small change in width
- At the exact location of OD, the above function y=f(T,i,j,r_{mid}, r₁,r₂) will give the most optimum minimum value.
 In this implementation, we set the limit of i,j as follows :
- i > 150 and i < (Height of the T – 150)
 - j > 150 and j < (width of the T – 150)

The allowed change in radius = c = 10

$$r_{\text{mid}}=90$$

$$r_{\text{min}} = r_{\text{mid}}-c = 80$$

$$r_{\text{max}} = r_{\text{mid}}+c = 100$$

So the algorithm will find a OD of arbitray size between 161x161 to 201x201.

We used the Genetic Algorithm tool box of matlab to implement this OD detection algorithm. We set Generations as 20, Population Size as 200 and used single point crossover. And for other parameters, the default values of the GA tool box is assumed.

D. Metric Used for Evaluating the Performance of Hard Exudates Detection

The classification accuracy of the diagnosis is assessed using the sensitivity and specificity measures. Following the practises in the medical research, the fundus images related to the diabetic retinopathy are evaluated by using sensitivity and

specificity per image basis. Sensitivity is the percentage of abnormal funduses classified as abnormal, and specificity is the percentage of normal fundus classified as normal by the screening. The higher the sensitivity and specificity values, the better the diagnosis. Sensitivity and specificity can be computed as

$$Sensitivity(SN) = \frac{T_p}{T_p + F_n}, Specificity(SP) = \frac{T_n}{T_n + F_p} \dots\dots\dots(4)$$

The metric Equal Error Rate (EER) measure assumes equal penalties for the both false positives and negatives, which is not typically the case in the medical diagnosis. Therefore, in [1] they adapt a more versatile measure utilized in [6] and [7], where the two measures, sensitivity (SN) and specificity (SP), are combined to a weighted error rate defined as

$$WER(R) = \frac{FPR + R \times FNR}{1 + R} = \frac{(1 - SP) + R \times (1 - SN)}{1 + R} \dots\dots\dots(5)$$

IV. RESULTS AND DISCUSSION

DIARETDB1 Database

This database consists of 89 colour fundus images of which 84 contain at least mild non-proliferative signs (Ma) of the diabetic retinopathy, and 5 are considered as normal which do not contain any signs of the diabetic retinopathy according to all experts participated in the evaluation[8]. The images were taken in the Kuopio university hospital. It, containing the ground truth collected from several experts and a strict evaluation protocol. The protocol is demonstrated with a baseline method included to the available tool kit. It provides the means for the reliable evaluation of automatic methods for detecting diabetic retinopathy.

Training and test set

The 89 images were manually assigned into categories representing the progressive states of retinopathy: normal, mild, moderate and severe non-proliferative, and proliferative. Using the categories, the images were divided into the representative training (28 images) and test sets (61 images)[8].

The model histograms used in the baseline method are originally computed from the intensity normalised pixel colours at the neighborhood (8x8) of the most representative points marked by the experts used in baseline method using the training images. In the training set with conf_{GT} = 0.75, 18 images contain hard exudates, 6 soft exudates, 19 microaneurysms, and 21 hemorrhages. In the test set with conf_{GT} = 0.75, 20 images contain hard exudates, 9 soft exudates, 20 microaneurysms, and 18 hemorrhages[8].

To evaluate the performance of the automatic method of removal of false exudates at OD region, we compare the WER of the outputs of the original baseline method as well as the WER of the manually removed false positives at OD region from the another set of outputs of the original baseline method. If the automatic detection and removal will work good, then it should give the same results of manual removal method and both(manual and automatic method) should be better than the original baseline algorithm results.

Advantages of the proposed OD Detection method:

It is obvious that the proposed OD Detection method will only consume lesser time than the other previous methods since there is no complex operations such as FFT(Fast Fourier Transform), PCA(Principal Component Analysis) and eigenvector calculations involved in it. Further, the optimization technique will converge very fast since it will randomly chose potential OD locations and will find a optimum location from a limited set of locations. On the other hand, for better results, the other two methods should do the calculations at every possible OD locations/ pixels of the image under consideration from a 1500 x 1152 size fundus image

Sample Output Shows the Automatic Removal of False Possitives from OD Region

The following is the image016 of DIARETDB1 database. We mark the region of OD in that image with a yellow circle.



Figure 2. The OD Region

The following is the ground truth image showing the confidence levels of the Hard Exudates in that particular image016. It is obvious that there is no Hard Exudates present in the region marked with yellow circle.

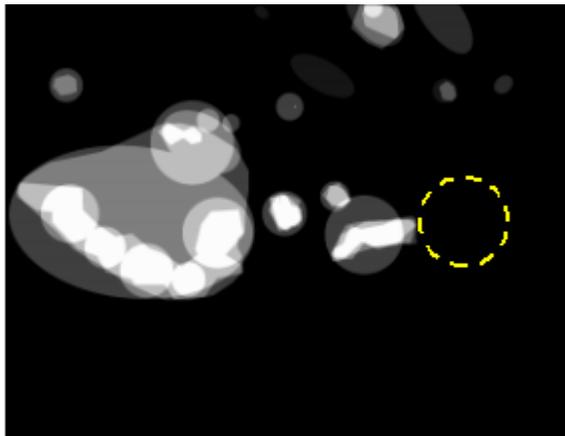


Figure 3. The OD Region in Groundtruth Image

The following image shows the Hard Exudates regions of the image016 detected by the baseline algorithm. It is obvious there are lot of false positives in the OD region and they were

wrongly wrongly identified as Hard Exudates because of the intensity distribution in that region. This region of false positives are marked with yellow circle.

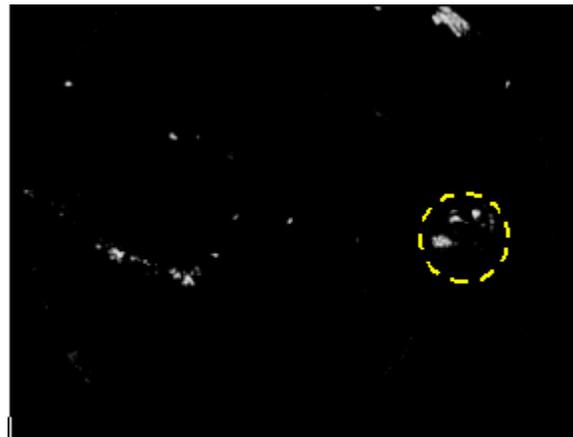


Figure 4. The False Positives at OD Region

The following image is the output after automatic OD removal by GA. The false positives inside the region marked with yellow circle were automatically removed from the output.

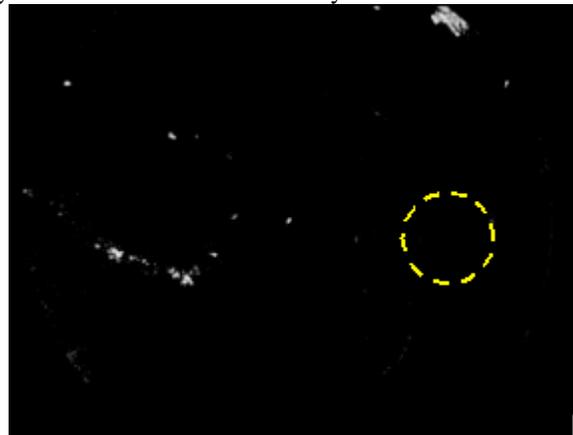


Figure 5. The False Positives Removed from OD Region

In [8] it is denoted that the WER values should be reported in results while comparing the different methods. But in the following Table, we also present the corresponding false positive and negative rates specificity and sensitivity.

Table 1. The Performance Before and After Removal of False Positives at OD Region

Performance with Different Method	FPR	FNR	WER	Specificity	Sensitivity
Baseline Method	0.073	0.250	0.162	0.927	0.750
After Manual OD Removal	0.220	0.100	0.160	0.780	0.900
After GA Based OD	0.220	0.100	0.160	0.780	0.900

Removal

WER is a more versatile and balance metric, we considered this only as the main metric while evaluating the improvement in performance. The following graph shows the improvement in performance after removing false positives at the OD region.

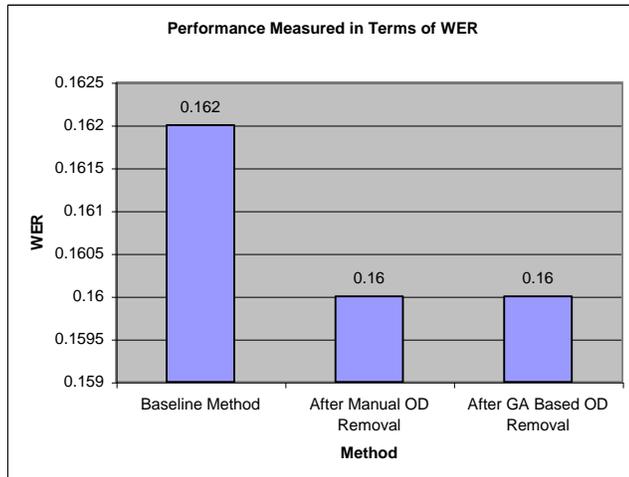


Figure 6. The Performance in Terms of WER

As shown in the above graph, there was 2% drop in weighted error rate after removing the false positives at the OD region. The performance of GA based false positive removal method gives the same result of manual removal method and proves the good working of automatic false positive removal method.

V. CONCLUSION

We have successfully implemented the proposed automatic method for optic disc detection and removal of false exudates for improving retinopathy classification accuracy. To evaluate the performance of the automatic method of removal of false exudates at OD region, we compare the WER of the outputs of the original baseline method as well as the WER of the manually removed false positives at OD region from the another set of outputs of the original baseline method.

Most of the previous methods failed in detecting OD in brighter images were the intensity of OD region is almost similar or higher than the several other regions in the target image. But, proposed method was successful in finding OD in fundus image with both brighter and darker image intensities. The GA based search algorithm was very fast in locating the OD location. The accuracy of the detected location was very much depend up on the matching policy. So, the future work may address more efficient matching policies. Since GA is reducing overall search time considerably, we may even consider much complex matching policies to improve the accuracy of location and size of the OD.

The proposed GA based optic disc detection method is very faster than other two compared methods and is finding the optimum OD location using the intensity on blue and green layer. The proposed method achieved good accuracy and speed. For

example, in the image image004 the Li and Chutataptes Method failed to detect exact OD location because of the poor intensity at the OD region. But, in this case, our proposed method will use blue channel information so that, it will find the exact location more precisely than the other two methods.

In this work, a simple intensity estimation method is used in the fitness function of the GA. In future works, we may consider more complicated matching policy in the fitness function of the GA. Future works will address the ways to improve the pixel-wise accuracy of detection.

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Crop Assessment and Monitoring for Sugar Cane Crop, Sudan, (New Halfa Case Study) Using Remote Sensing and GIS Techniques

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Abstract- There is shortage of information about sugar cane crop in Sudan; therefore, it is necessary to adopt a new technology for carrying out inventory or estimation of this crop-space technology (Remote Sensing, GIS, and GPS) can offer an invaluable assistance in this regard.

In this research, space technologies were applied for sugar cane crop estimation in New Halfa sugar cane scheme. IRS-5m resolution image was used for this purpose. Two areas were selected as the study area (area three and area six). Two sets of image were used (October, 2006 and December, 2007). The Supervised classification technique was adapted for the study.

The results showed clear variations between the sugar cane fields. To continue close monitoring of the sugar cane yield, satellite images captured at different dates during the growing period of sugar cane should be available. The research results revealed the importance of integrating RS and GIS as effective tools for the assessment, detection, monitoring and mapping of the various features on the earth's surface such as land degradation. Moreover, RS & GIS assist in the study of vegetation cover. Etc. This leads to saving effort, time and cost.

was introduced into central Sudan between latitudes 15 & 13 north with temperature higher than the optimum that suits the crop. Moreover, the winter season is relatively short.

Sugar cane is one of the most agricultural crop in terms of economic returns and for that, in addition to sugar production enjoyed that allows many products such as molasses and its derivatives as well as feed and paper and cardboard industry and with the rise in population in the world rises the for the consumption of sugar in the world.

In Sudan due to the integration of many factors, such as, appropriate climate, fertile soils, labor and reasonable infrastructures. Sugar production in Sudan started in 1962, with the establishment of the Guneid Sugar Factory in the Gazera province.

There are now five sugar factories in the country.

Guneid Sugar Company (GSC).- New Halfa Sugar Company (NHSC).- Assalaya Sugar Company (ASC).- Sennar Sugar Company (SSC) and.- Kenana Sugar Company (KSC).As shown in figure (1) .

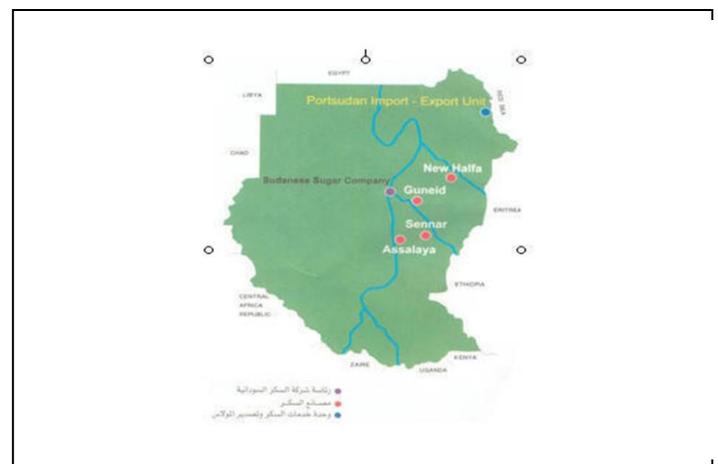
I. INTRODUCTION

There is an urgent need for interest in improved management of natural resources. As the supplies of commodities reduce and the number of environmental incidents grows, it becomes evident that better information is needed to enable humans to use their resources expertly.

The need for resources data has out-paced the capabilities of conventional survey and monitoring techniques. This need is particularly essential in developing countries. One method of meeting this challenge is through an integrated information system for resources management that could provide higher quality of information in a more timely fashion than current systems.

Crop yield estimation, in many countries is based on conventional techniques, of data collection based on ground field visits and reports. Such reports are often subjective, costly, time consuming and erroneous, leading to poor crop yield assessment and estimations.

Sudan is multi agricultures of crop like sorghum comes first by area and volume of crop. Such as wheat cultivation has been known in northern Sudan between latitudes 17 & 27 north for thousands of years. To meet this demand wheat cultivation



II. STUDY AREA

New halfa is located in the lining plain on the west bank of the River Atbara between latitude (15° 20' – 15° 30' N) and longitude (33° 25'– 33° E). About 360 kilometers in the direction of the east and 50 kilometers west of the town of Kassala, and mediates many of the most important cities Gedaref

- Kassala - Atbara - Shendi. (Sawsan 2005). The study area lies in eastern Sudan within Kassala State in area of about 50km².

It is considered of important stabilization of New Halfa Sugar factory that brings success to the process of sugar production. The gross area of the scheme is about 42,000 acres. The New Halfa project scheme was developed in the 1960s in the context of the resettlement of people who were displaced when Lake Nasser was formed. In later years, agriculture in the area had been decrease and was increasingly weakness to meet production demands. The rehabilitation project set out to increase sustainable agricultural production through the efficient use of available land, water and human resources. Improving agricultural production and cropping patterns.

The study area covered 8 divided areas from new halfa factory for administrative purposes.

III. METHODOLOGY

Two sub images from IRS (Indian Remote Sensing) covering the study area (42,000 acres) were used in this study. The two images are a False Color Composite (FCC). The Composed of three bands each of wavelength of the electromagnetic spectrum. The image used in this studied were collected October 2006 and December 2007, the specifics of images from Indian Remote Sensing (IRS) with resolution 5m.

The two sub images was Georeferenced and used as a high resolution data based on landsat band chromatic (band 8, 15 m spatial resolution). Global and Linear Enhancement was conducted, in addition to radiometric and geometric correction with Georeferencing images to ground control points and first order transformation with error < 1.0 pixel. Contrast enhancement, called global enhancement, was used for Transformation of raw data using the statistics computed over the whole data set. Linear stretching and histogram equalization was used to enhance specific data ranges. Special enhancement procedures that result in image pixel value modification, (based on the pixel values) in its immediate vicinity (local enhancement) was used to emphasize low frequency features and to suppress the high frequency component of an image using low paths filters. High pass filter do just the reverse.

Georeferencing was used to correct and adapt the maps geometrically; image to image keyboard model through Erdas imagine 9.1 was used to correct the other maps and Global Positioning System (GPS) garmin 60 was used to locate the

position. Supervised, unsupervised classification and visual interpretation was carried out. Areas and percentage of the areas that was covered by different types of vegetation, and then post classification change detection approach was adopted based on map calculation which was applied to determine the dynamic of change in landcover. Geographical Information System (GIS) was used for data capture, input, manipulation, transformation, visualization, combination, query, analysis, modeling and output, An intersection was performed between the classified image and the soil map of the study area in order to improve the classification results.

IV. RESULTS AND DISCUSSION

Based on Visual, digital image interpretation and field survey 5 major classes were recognized as:

- Class I.
- Class II.
- Class III.
- Water bodies.
- Bare land.

The Comparison between the two images (Year 2006 and 2007) interpreted Map and Filed survey data showed that class1 covered small area (367.865fadan), which estimated to 16.794% of the total area of area 3. Most of the area showed homogeneity expect in the north part of the area (as shown table 1,2 and 3).

Class 11 covered bigger are than class 1 with the area (878.385fadan) and 40.099% of the total study area both classes 1 and 11 showed some mixing in the same parts of the field.

Classes III considered to be distributed among field and estimate at 17.758% of the total area and covered (388.9975fadan). This class scattered and mixes with some bare area and also some part of water exist inside the field. The existence of the water inside the field indicated that some problems of land leveling.

The rest of the tow classes water and bare land (No care) considered being estimated more the 50% of the total area and covered (360.1475fadan) and bare land covered (195.1225fadan) and estimate 8.908% of the total area for water with bare land and classes, respectively. (Figure 4, 5, 6 and 7).

Table .1 Show five classes in area (3) year 2006

Classes	F_AREA	Area (%)
Class(I)	367.865	16.794%
Class(II)	878.385	40.099%
Class(III)	388.997	17.758%
Water	360.1475	16.441%
Bare land	195.1225	8.908%
Total Area	2190.5175	100%

In year 2007 and during the Images analysis and Interpretation the result showed that that class1 was increase compared to its area in 2006 was covered (621.5724fadan) Parts of this class were found distributed among class (II) this class was estimated at 27.910% of the total study area and this increase confirmed that the irrigation system had been improved during 2007 than 2006.

Class 11 which was large covering (452.0575fadan), was estimated at 20.99% of the total study area. Both classes 11 and class1 showed some mixing in some parts of the field. This reflects on found of organized irrigation and improved environmental factors.

Class III considered being distributed mangle all the field and covered (328.1150fadan) and estimate at 14.733%. This class scattered with water and mixed with bare land, and also part with class1, and clas11 Showed that the water, was decreased due to the improvement of water distribution system. Water covered an area of (5370124.fadan) and estimated at 24.113% of the total study area. This requires to the improvement of the water

direction of run and the slope, while the bare land increased compared to 2006 and covered an area of (288.2724fadan) which it estimated at 12.944 %. This class was related to water distribution and level of slope. (Figure 4,5,6 and 7)

Table 2: Show five classes in area (3) period 2007.

Classes	F_AREA	Area (%)
Class(I)	621.5724	27.910
Class(II)	452.0575	20.299
Class(III)	328.1150	14.733
Water	537.0124	24.113
Bare land	288.2724	12.944
Total Area	2227.0299	100%

Table (.3) change in the area3 through 2006 and 2007

Class	Map2006.T3		Map2007.T3		Change between 06/07 Increased/decreased
	F_Area	%	F_Area	%	
Class(I)	367.865	16.794%	621.5724	27.910	-3056925
Class(II)	878.385	40.099%	452.0575	20.299	-8331793
Class(III)	388.997	17.758%	328.1150	14.733	-608825
Water	360.1475	16.441%	537.0124	24.113	1768649
Bare land	195.1225	8.908%	288.2724	12.944	931499
Total Area	2190.5175	100%	2227.0299	100%	

Table 4: Show five classes in area (6) year 2006

Class	F_AREA	Area (%)
Class(I)	232.7924	13.930%
Class(II)	503.9099	30.154%
Class(III)	252.5750	15.114%
Water	194.2625	11.624%
Bare land	487.5899	29.177%
Total Area	1671.1297	100%

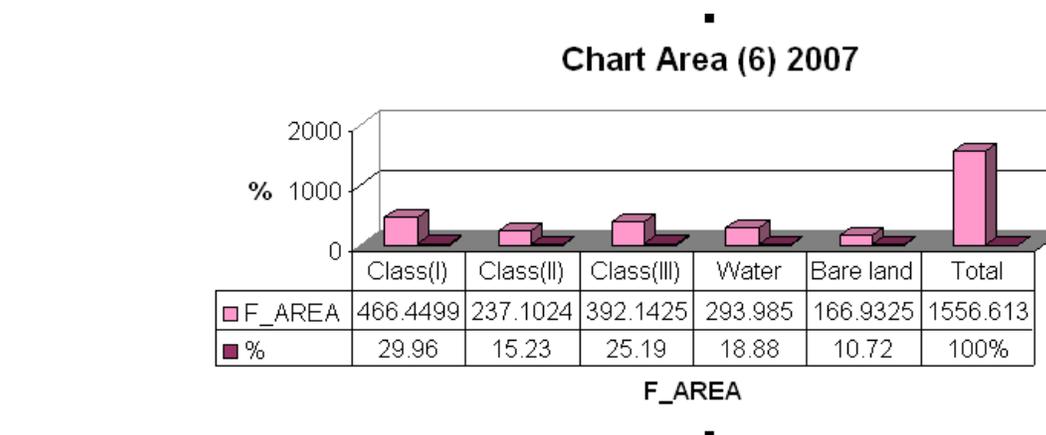


Figure 2 showed the five classes in area (6) year 2007

V. CONCLUSIONS AND RECOMMENDATION

Sudan is consider the food basket of the world in the future that need to crop assessment and monitoring purpose increasing productivity. this required highest using technology like Remote Sensing (RS) and Geographic Information System (GIS).

This study is one from the studies to apply using new technology and was apply for sugar cane crop (halfa case study) considering very important agriculture export.

The result of study in compared different time in 2006-2007 explain increased and decreased in some fields effect environmental factor, slope, water distribution system and agriculture cycles. Although this studies using unsupervised classification (Software, GIS methods) the result classified for five classes: class I, class II, class III, water and bare land. In 2006 this classes shown in area (3), class I, class II and bare land increasing while class III and water decreased compared with the total area in 2007, it might be because of improvement of the irrigation system in 2007.

Comparing the classes of area (6) in 2007 and 2006 shown class I, class III and water increased might be because of slope enhancement, while class II and bare land decrease was observed might be because it was mixed with other classes and improve water distribution system.

The last result helped to make the layout of the four maps for each area produced by applying unsupervised classification without actually being in contact with the study area. Based on the findings of this study, some measures may be considered to mitigate the problem in the study area. These include the following:

- Need to apply for a new Remote Sensing (RS) technique and Geographic information system (GIS) in assessment and monitoring sugar cane in study area (New halfa factory) requirement increasing in productivity.
- Establish especial complete unit (computer unit, different department of following remote sensing and use different GIS software)
- Training for all employees in factory.

- Use GPS in vehicles harvesting sugar cane.
- Get use of waste of sugarcane for energy produce (Ethanol, paper making).
- Use national and international experiences.
- Increase individual income and increase awareness of stability that push to increasing sustainable development.

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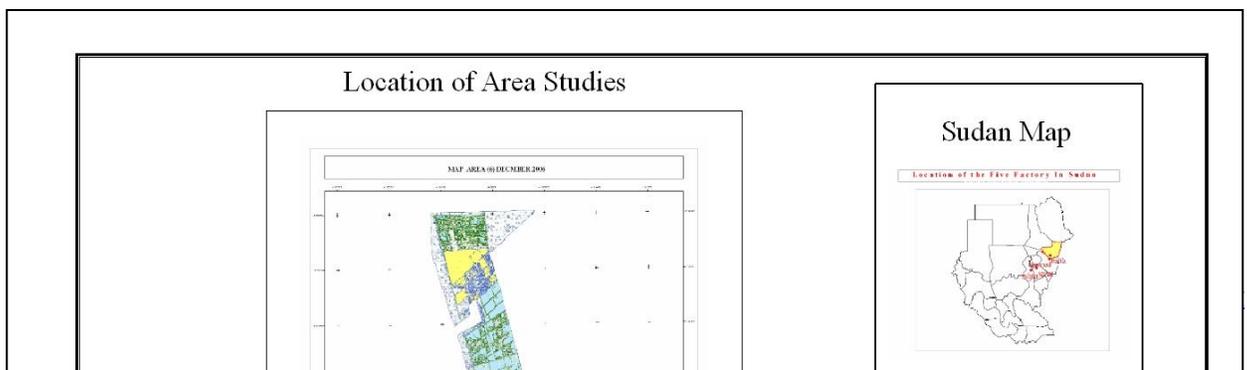
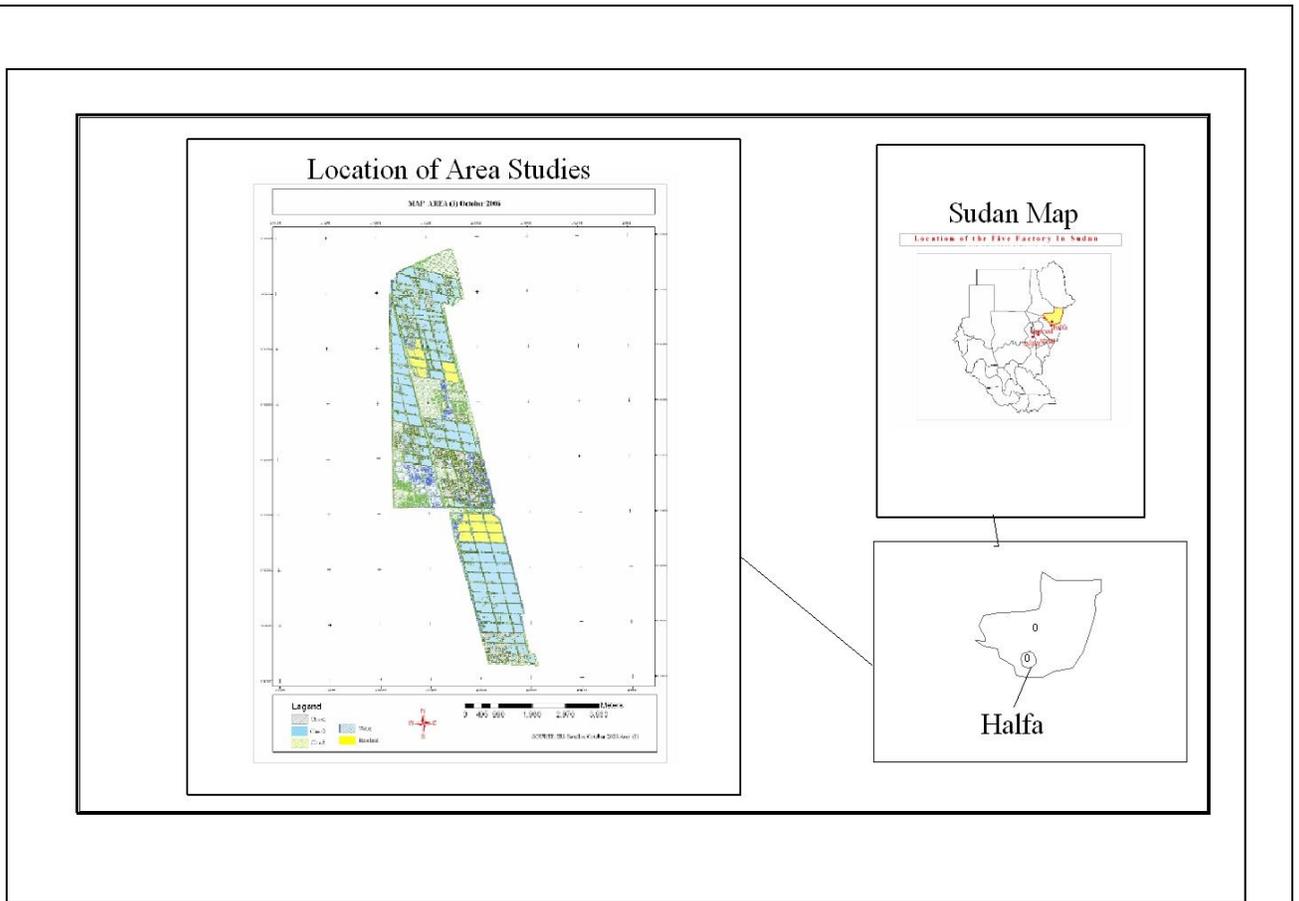
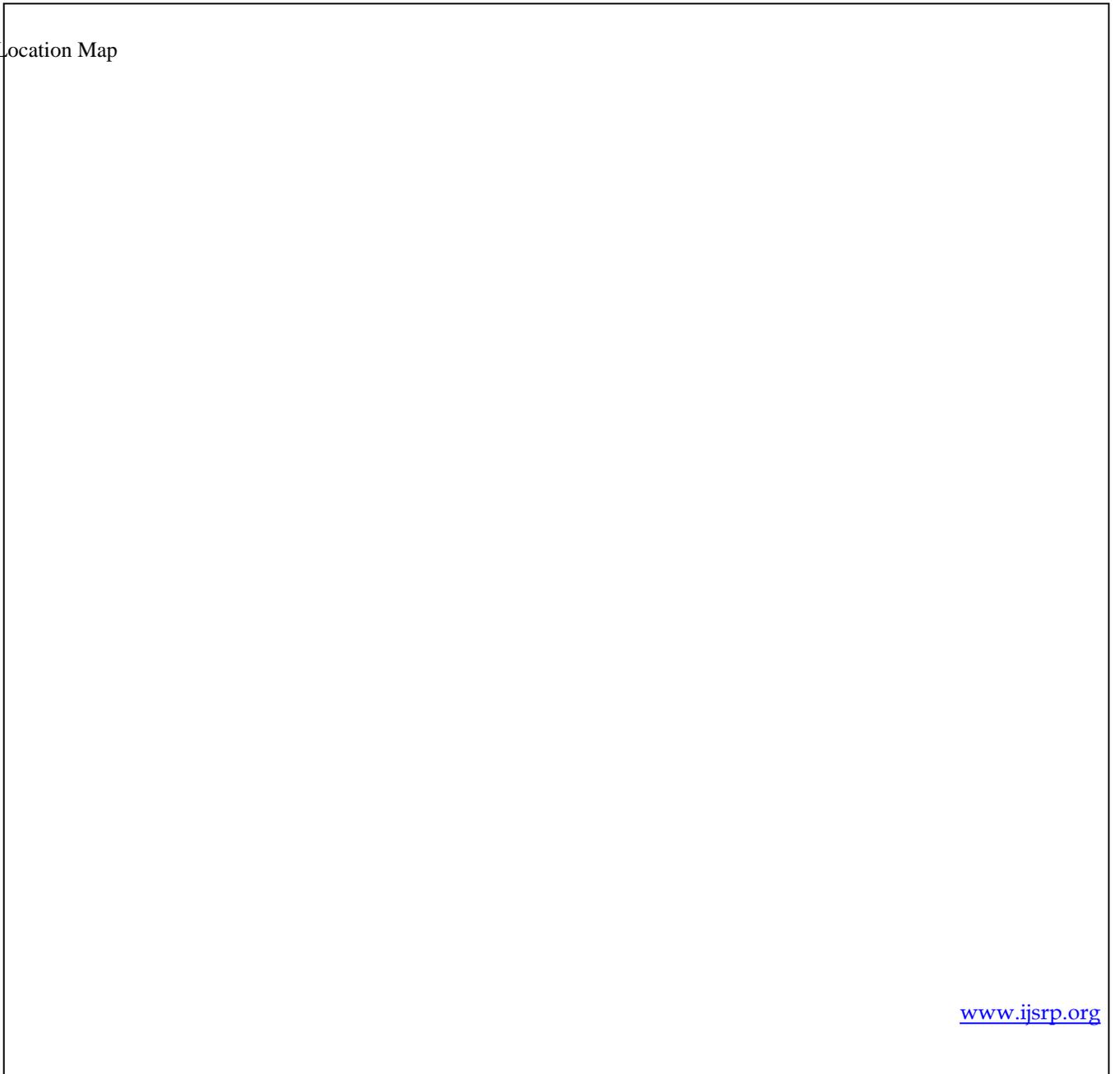


Fig.3 Location Map



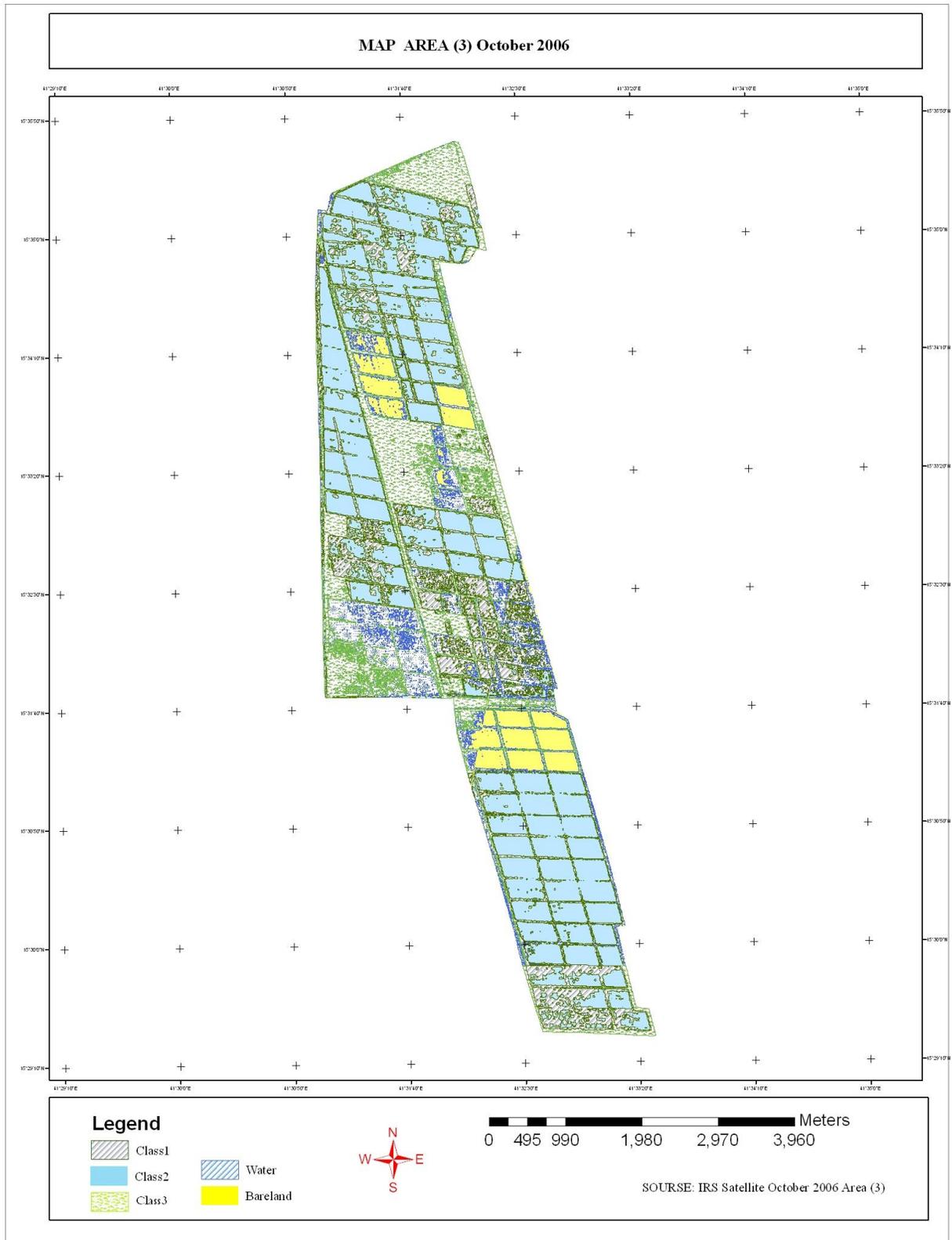
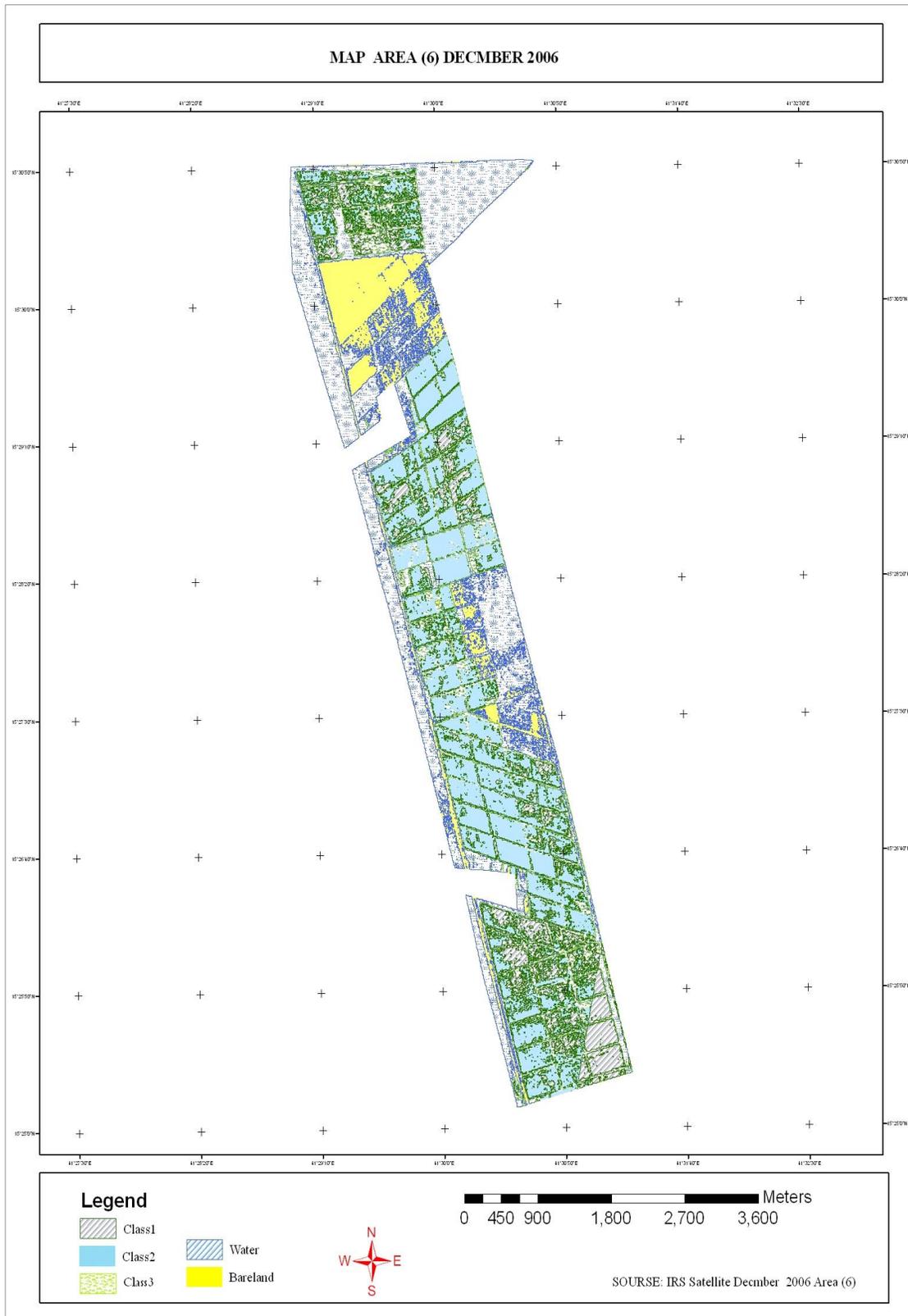
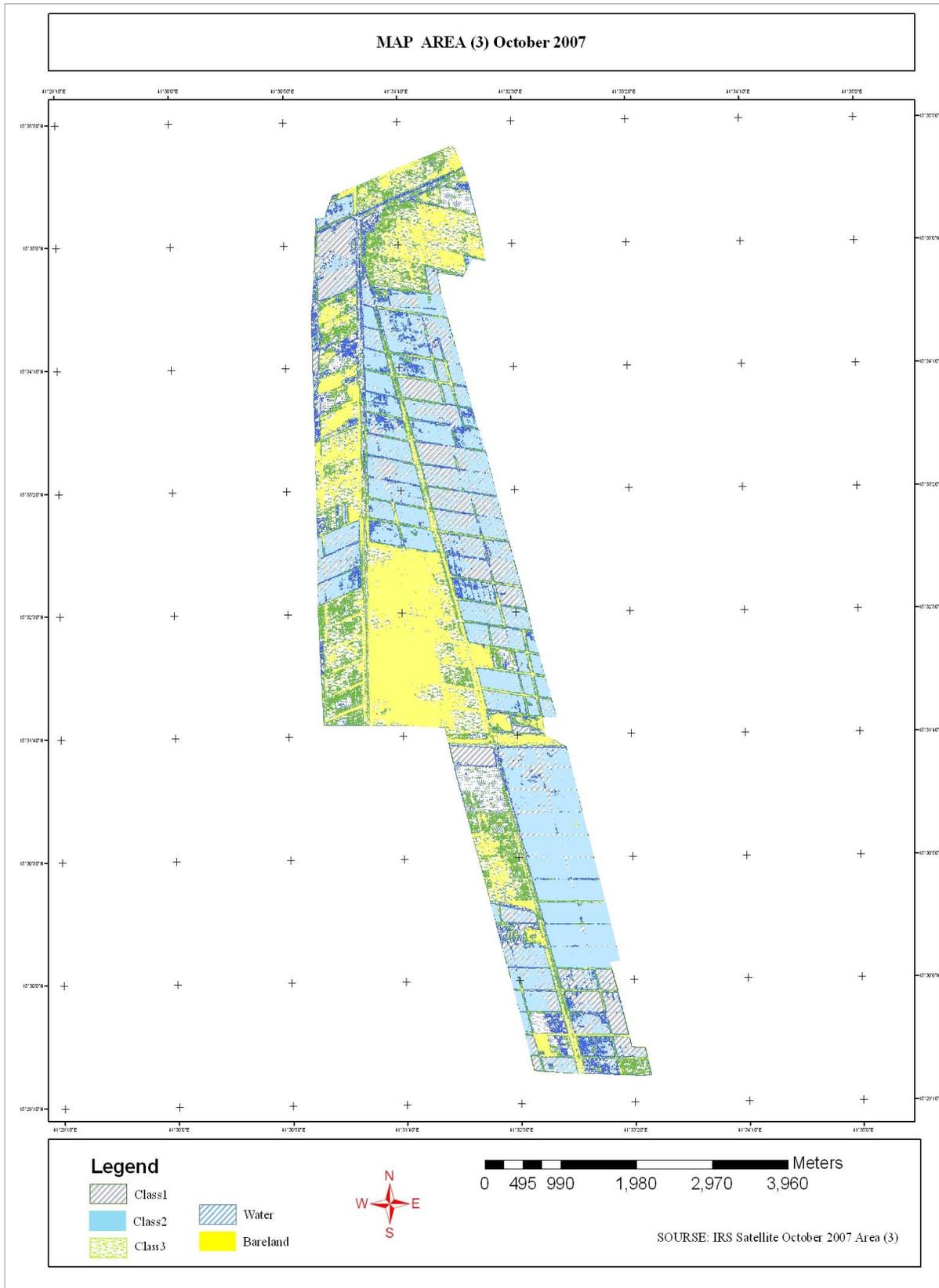


Fig (4) Map of area (3) October 2006



Fig(5) Map of area (6) October 2006



Fig(6) Map of area (3) October 2007

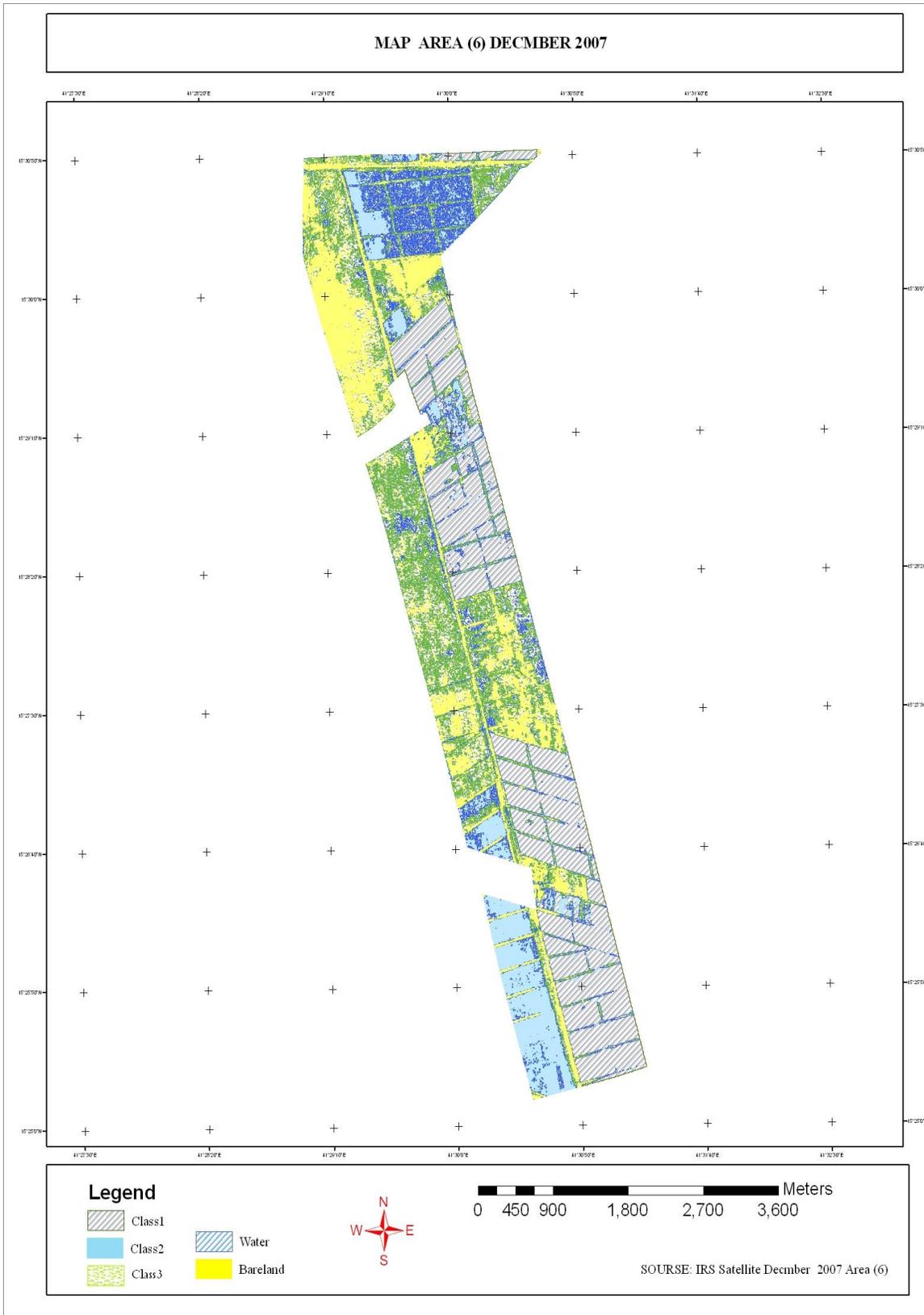


Fig (7) Map of area (3) October 2007

Monitoring, Predicting and Quantifying Soil Salinity, Sodicity and Alkalinity in Sudan, Using Soil Techniques, Remote Sensing and GIS Analysis, Case Study: University of Khartoum Top Farm

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Abstract- This study focused on the assessment of land degradation in University of Khartoum (Shambat Area), Khartoum State, Sudan. Through mapping and monitoring the changes that occurred in the soil properties, due to drought and mismanagement. The study attempted also to update some information in the study area such as chemical properties using different methods of data transformation and analysis such as: Soil analysis technique, GIS and remote sensing analysis.

The research was based on the data and information deduced and extracted from soil survey data, soil analysis, and remote sensed data, in addition to fieldwork verification and other sources. The study covered an area about 300 Acers.

Soil analysis indicated that soil degradation was taken place in the study area specially the top northern and southern parts of the area which were affected by some buckets of salinity, while the north-eastern and south- eastern parts were affected by sodicity buckets.

The study showed that there was a hardpan (Average bulk density of soil, 1.9 g/cm³) at subsurface layer (30-60 cm) and subsoil layer (60-90) that impedes the water infiltration and crop growth since tilling is done only in the surface soil to the depth of 25 cm (infiltration rate < 0.07cm/hr.). Evaluation of soil properties and degradation hazard, According to framework of the land suitability (FAO, 1976) revealed that the soil of the study area is moderately suitable (S2) for agriculture.

I. INTRODUCTION

The world's demand for food is increasing at such a rate that the ability to meet anticipated needs in the next several decades is becoming questionable. Irrigated agriculture presently accounts for about one-third of the world's production of food and fibre; it is anticipated that it will need to produce nearly 50 percent by the year 2040 (FAO, 1988). This will likely be difficult, because extensive areas of irrigated land have been and are increasingly becoming degraded by salinization and waterlogging resulting from over-irrigation and other forms of poor agricultural management (Ghassemi, et al., 1995).

Monitoring soil degradation is not only necessary to determine changes related to the real extent of erosion areas but also it enables the evaluation of programmes of soil conservation programme executed in that area.

According to Eswaran and Kapur (1998) before monitoring, we should determine what to monitor and what should be the time interval for that monitoring, because different processes of degradation require different time intervals to be recognized. They also stated that salinization monitoring should be probably, done every year, sheet erosion-monitoring could be done every five years while gully erosion monitoring may require more than five years.

Little is known about land degradation in the Khartoum area although some scattered studies were carried out on the fertility status of the soil in the state. In addition, some studies were conducted on land degradation using remote sensing techniques in the western of the Khartoum state. However these studies were mainly in the soil of Khartoum state, to the west of the study area. (Kapur, 1998).

Salt-affected soils in the Sudan occur in the desert and semi-desert climatic zones, e.g. the high terrace of the River Nile and its tributaries, and in the arid regions. Most of the salt-affected soils in the Sudan have a relatively low nutrient status and contain 0.01 -0.02% organic nitrogen. The impact of salinity on agriculture is now being felt in irrigated areas in which soil- and waterborne salts are accumulating during repeated cycles of water use. Nonsaline soils could easily be damaged and degraded by secondary salinization through irrigation with water from the Blue Nile, White Nile and River Nile (Abdalla 1986; Mustafa 1986). These problems will become more serious as increasing population leads to more intensive use of land and water, and as presently unused or marginally used resources are pressed into service. The entire physical and biological systems involved in saline agriculture must be understood and carefully managed if increased production is to be achieved without exacerbating the existing problems.

Salinity and sodicity are separate and unique descriptions of the impact of soluble salts in soil and water. Sodicity represents the relative predominance of exchangeable sodium

compared to other exchangeable cations, chiefly calcium, magnesium, potassium, hydrogen and aluminium and is expressed as ESP (exchangeable sodium percentage). The sodium adsorption ratio, SAR, is another expression of sodicity that refers to the ratio of adsorbed sodium and the sum of calcium and magnesium. Soil salinity is a characteristic of soils relating to their content of water-soluble salts and expressed mostly as E_{Ce} (electrical conductivity of paste extract) and is measured as dS m⁻¹ (Charm an and Murphy, 2000). The interrelation of all these soil parameters is important for the Interpretation of their measures (van de Graaff and Patterson, 2001).

II. STUDY AREA

Study area, University of Khartoum top farm was located in Khartoum North, Khartoum State, Sudan. It is situated on the eastern bank of the River Nile.

The study area extends about 3.5 km along a southeast-northwest direction and extends 1.5-2 km east west. It is bounded on the east by Shambat road. It is situated between longitudes 44° 01" and 44° 02" East and latitudes 03° 59" and 03° 00" North and covers an area of about 300 Acres (Fig. 1).

Populations are mainly farmers live around the study area. The soil of the study area is black cotton soil (Vertisols) and recent deposition soils (Entisols), and some parts are saline and/or sodic while are alkaline.

In the west of the Khartoum state (Omdurman city), land degradation and sand encroachment is whipping out a life that is centuries old. "Sand movement has exhausted us". Like this farmer, thousands of villagers, along the Underman area who own narrow strips of arable land that borders the study area, watch the sand moving closer every day. They are watching the land that degraded or eroded. So most of the land was lost or degraded. Then most farmers left their homeland seeking for new opportunities of work (Elamein 2005).

III. METHODOLOGY

Four false colour composite (FCC) subsets images from Landsat TM and ETM dated (1973, 1986, 2000 and 2008) covering the study area (300 Acres) were used in this study. The field work was conducted during the period 15 to 25th may 2009 aided by GPS receivers (Garmin 60C). Radiometric and image to ground points geometric corrections were conducted. Soil samples were collected from different selected locations to cover the variability that observed from satellite image analysis. Global Positioning System (GPS) was used to locate the position of the check sites. Different soil samples strategies were applied depending on satellite image interpretation and morphological and differences physical properties (colour, texture, structure...etc.). Soil samples were collected from three different depths (0-30 and 30-60cm) with a total number of 126, the distance between adjacent soil samples (in all directions) was 250 m (Fig 2). The soil samples were analyzed using the facilities of the department of soil and environment science Faculty of Agriculture, U of K. The flowing properties were determined in soil samples:

- Soil Reaction: Soil pH was measured in soil paste using analogue pH-meter JENWAY.
- The Electrical Conductivity (E_{Ce}): The electrical conductivity of the saturation extract (E_{Ce}) was measured by conductivity meter WAPcm 35 (model cm 35).
- Soluble Calcium and magnesium: Calcium and magnesium were determined volumetrically with titration against ethylene diamine tetra acetate (E.D.T.A).
- Sodium: Sodium was determined photometrically using Corning EEL flame photometer.
- Sodium Absorption Ratio: (Sodium absorption ratio was estimated from values of calcium, magnesium and sodium of saturated past extract. Exchangeable sodium percentage (ESP) was from regression equation of ESP on SAR) (Klute, 1965).

IV. RESULTS AND DISCUSSION

The soil analysis indicated that most of the soils of the study area are non-saline and non-sodic, except some buckets at surface and subsurface and subsoil samples at the top north and southern parts of the study area which was saline soil. SAR values indicated that some parts at north east and south west part of the study were sodic soil, while most of the area was non-sodic. These findings agreed with UNDP (1970).

The spatial variability of E_{Ce} for the surface, sub-surface and subsoil are shown in Figures 3 (a, b and c). Figure (a) showed that Soils with values of E_{Ce} 0.1- 0.25dS/m was located in the northern, middle, and some southern parts of the study area while soils with E_{Ce} values 0.25-0.38 dS/m are found in the eastern and south western parts, on the other hand E_{Ce} values 0.38-0.58 and 0.58-1 dS/m was found in the middle western parts of the study area. Figure 3 (b and c) showed similar results mentioned above.

Field work and survey results revealed land degradation signs which might be due to bad management such as misuse of irrigation water (wrong scheduling). The survey data showed that there was surface salt accumulation at the top north eastern and eastern parts of the study area (Plate1).

Soil Reaction (pH): The analysis of the soil samples revealed that the soil reaction ranged from moderate to slightly alkaline, which is not unexpected for soils of arid and semiarid region. Spatial pH variability for the surface, subsurface and subsoil was shown in figure 5 (a, b and c). The spatial variability of pH, values was ranged between 6.5 to 8.5, and divided into four classes as shown Figure 5 (a, b and c).

Soils with pH values of 7 to 7.5 and 7.5 to 8 were found in the southern and western parts, while other soils with pH values 6.5 to 7 and 8.5, located within the eastern parts with scattered pockets in some parts of the study area.. Figure 5 (b and c) showed similar pattern to above mentioned one with increased of values ranged from 8 to 8.5 with the depth.

Figure (5) showed that about 18.73%, 33.89% and 38.96% of the surface, sub surface and subsoil respectively, fell within values ranged between 6.5-7, while 28.43%, 30.96% and 28.57% of the surface, sub surface and subsoil, respectively, fell within

values ranged between 7-7.5, 20.46%, 17.05% and 15.58% of the surface, sub surface and subsoil respectively, fell within values ranged between 7.5-8, 32.3%, 18.08% and 16.88% of the surface, sub surface and subsoil respectively, fell within values ranged from 8 to 8.5.

The spatial variability of SAR for the surface, sub surface and subsoil was shown in figures 4 (a b and c). Figure 4 (a) showed high SAR value (4.85 to 8) which concentrated in the north and middle east parts of the study area, while SAR values in most of the area ranged within the normal non-sodic range (less than 5). Figure 4 (a) showed that most of the area was non-sodic (less than 8). In addition weighted SAR values confirm the above mentioned and most of the SAR values fell within the normal range.

The SAR values ranged from 0.03 to 8.83. The lowest values of SAR were in the surface (0-30cm); 0.5% of the surface soil sample fell within the sodic class ($SAR > 13$), while 99.5% fell within the non-sodic class ($SAR < 13$). In the subsurface layer (30-60cm) SAR values ranged from 0.3 to 8.5 and approximately 0.9% of the sub-surface soil sample values fell within the sodic class and 99.1% fell within the non-sodic class. When In the subsurface layer (60-90cm) SAR values ranged from 0.4 to 10 and approximately 1.3 % of the sub-surface soil sample values fell within the sodic class and 98.7.1% fell within the non-sodic class.

Compared to some of the results of some previous studies showed that there was some changes in the soil properties such as: salinity and sodicity which indicates a deterioration of the soil, The results also indicated that about 72% of the soils of the study area were plowed to depths of 20cm despite the presence of a hardpan (Bulk density $> 1.5 \text{ g/cm}^3$) in some parts at the depth of 30 cm. In addition, cultivation of land more than three times per year with addition minimal of fertilizers.

V. CONCLUSION AND RECOMMENDATION

The study revealed different signs of land degradation in the study area as judged by change in soil chemical properties. These changes indicated decrease in cropped yield and productivity, decrease in vegetation cover, expansion saline and sodic soils around and inside the study area as increased of buckets of saline and sodic soils. These signs could be revised with the use of agricultural indicators. Land degradation as

reduction in biological productivity can be interpreted from crop yields.

Soil analysis showed that chemical properties of the soil had revealed different changes; some parts were affected by salinity and sodicity that had negative impact on the soil productivity. The observed land degradation (poor natural vegetation and poor soil fertility) was due to both climate changes and human activities.

Based on these finding the following recommendation can be stated:

1. Subsoiling or ripping to a depth of 30 to 45 cm or more should be the practice to break the compaction and the hard pans and to improve the infiltration rates of the soil of the study area.
2. The reclamation of the slightly saline and/or sodic pockets of the soils which found in some parts of the study area should be attempted through the application of organic manure (farmyard and chicken manures) for the improvement of physical, chemical and biological properties.
3. Application of macro and micronutrients is essential at the following rates:
 - Phosphorous is recommended to be applied at the rate of 50 kg / feddan of triple superphosphate (%P = 46% P₂O₅) applied before sowing. Other sources e.g. diammonium phosphate (DAP= 21% nitrogen) may be used.
 - Potassium is recommended to be applied at the rate of 50 kg /feddan before sowing. The recommended source is potassium sulfate to make use of the contained sulfate in lowering pH of these alkaline soils which affect the availability of macro and micronutrients.
4. Proper programs should be adopted for clearance of irrigation canals from weed and deposited siltation.

APPENDIXES

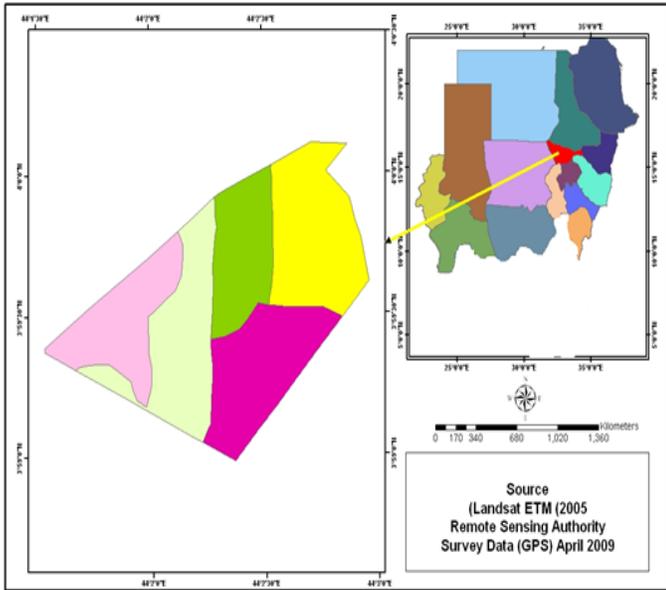


Figure 1: Location map of the study area

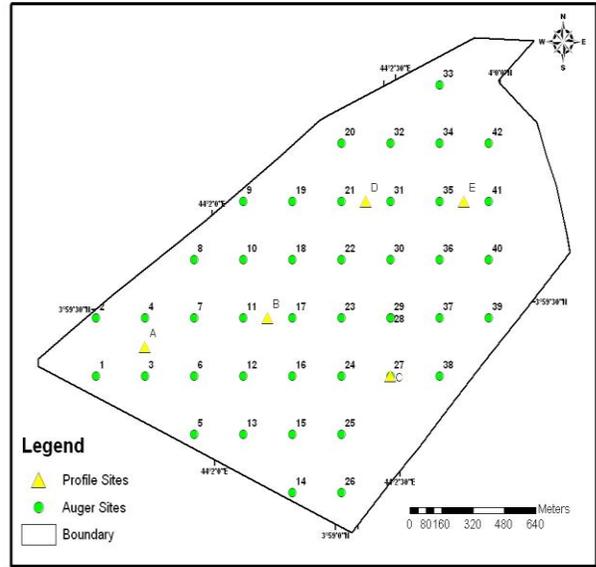


Figure 2: Location of auger and representative profiles sites



Plate No (1): Surface accumulation of salt and compacted soil, north of the study area
Source: Survey data 2009.

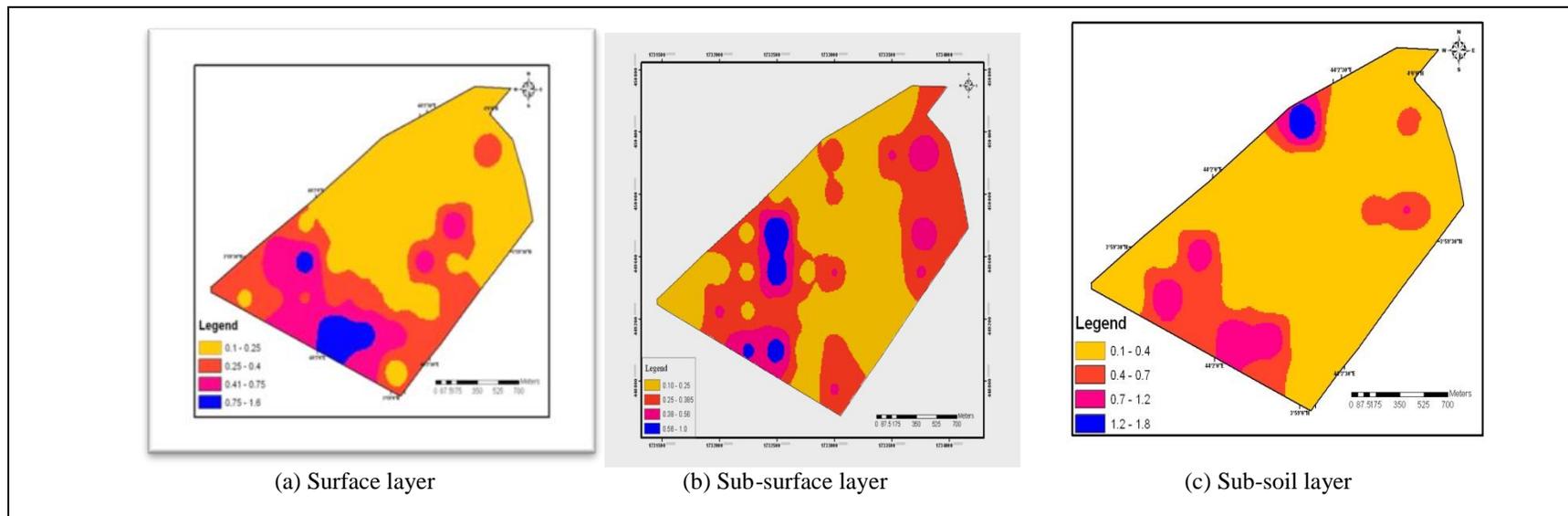
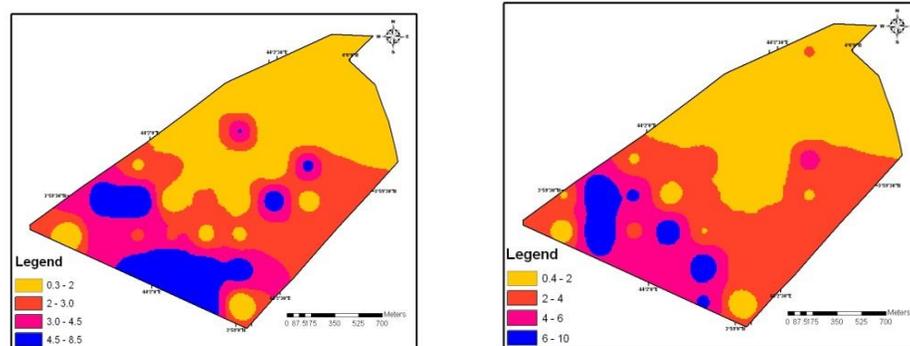


Fig 3: ECe Values for the surface (a), sub-surface (b) and (c) sub-soil layers



(a) Surface layer

(b) Sub-surface layer

(c) Sub-soil layer

Fig 4: SAR Values for the surface (a), sub-surface (b) and (c) sub-soil layers

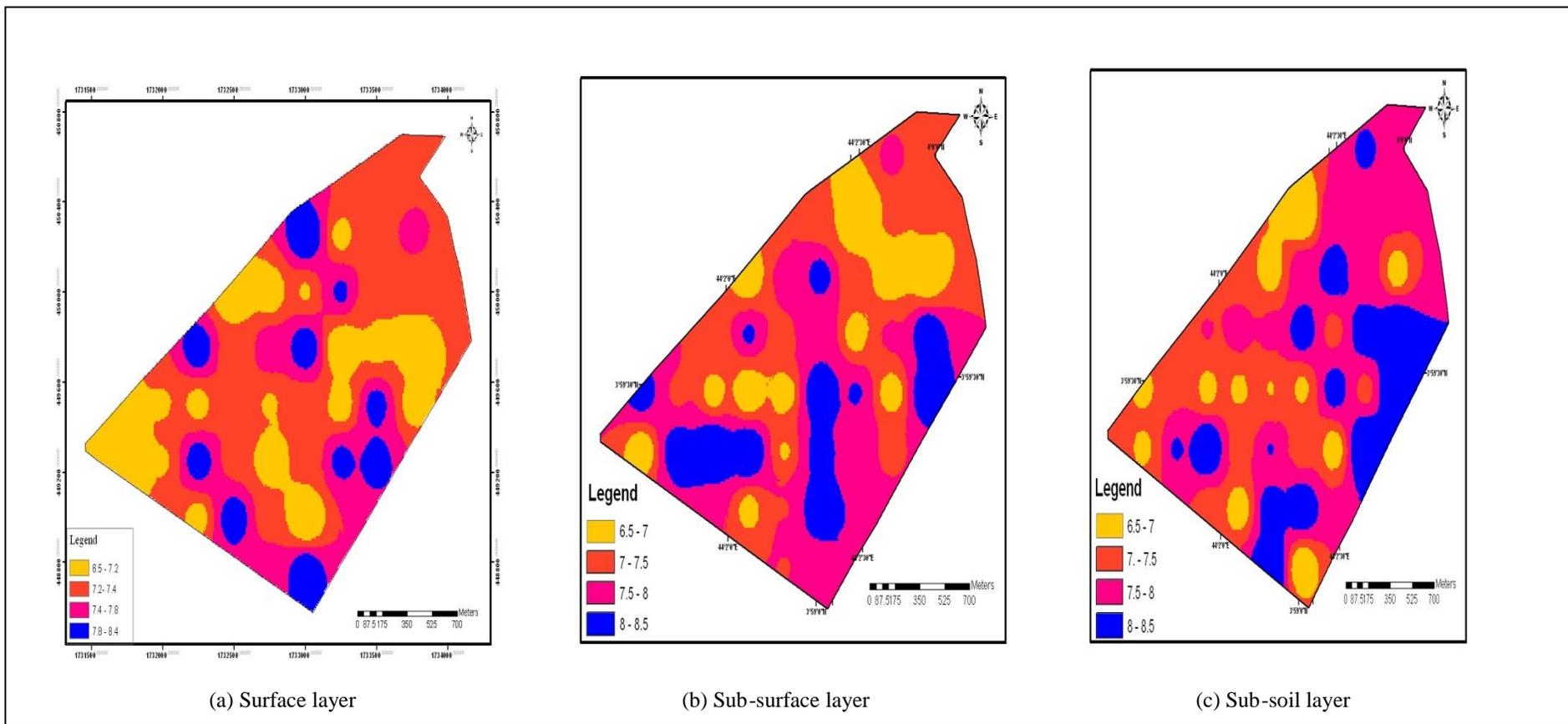


Fig 5: pH Values for the surface (a), sub-surface (b) and (c) sub-soil layers

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Analysis of Water Quality of Halena Block in Bharatpur Area

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Abstract- Bharatpur is the well known place because of “Keoladeo Ghana National Park” due to which it is a world fame tourist place. The present study deals with the water quality of Halena block in Bharatpur area, which is assessed by examine various physico-chemical parameters of open wells, bore wells and hand pumps. The studies reveal that the water of most of the sampling area is hard and contaminated with higher concentration of total dissolved solids.

Index Terms- Water pollution, Health problems, Bharatpur, Analytical techniques, Standard Data

I. INTRODUCTION

Water is life. Without water, man’s existence on the earth would be threatened and he would be driven close to extinction. All biological organisms depend on water to carry out complex biochemical processes which aid in the sustenance of life on earth. Over 70 per cent of the earth’s surface materials consists of water and apart from the air man breathes, water is one of the most important elements to man. The quality of water is of great importance also for human lives as it is commonly consumed and used by households. In industry, it serves as a solvent, substrate or catalyst of chemical reactions (Goncharuk 2012; Holt 2011; Van Leeuwen 2012; Petraccia et al. 2011). The physical, chemical and bacterial characteristics of ground water determine its usefulness for domestic, industrial, municipal and agricultural applications (CGWB, 2004 and Adhikary et al. 2010). The quality of water is more important compared to quantity in any water supply planning, especially for drinking purposes (CPHEEO 1998, Patnaik et al. 2002 and Tanriverdi et al. 2010). The accumulation of high levels of pollutants in water may cause adverse effects on humans and wildlife, such as cancer, reproductive disorders, damage to the nervous system and disruption of the immune system. Thus, it is an important requirement to interpret water quality status, identify significant parameters, and characterise the pollution sources as well as their quantitative contributions to water quality issues for conducting pollution management (Zhou et al. 2011). Water pollution means contamination of water by foreign matter such as micro-

organisms, chemicals, industrial or other wastes, or sewage. Such matters deteriorate the quality of the water and renders it unfit for its intended uses. Water pollution is the introduction into fresh or ocean waters of chemical, physical, or biological material that degrades the quality of the water and affects the organisms living in it. Although some kinds of water pollution get occur through natural processes, it is mostly a result of human activities. The water we use is taken from lakes and rivers, and from underground [ground water]; and after we have used it and contaminated it – most of it returns to these locations. Water pollution also occurs when rain water runoff from urban and industrial area and from agricultural land and mining operations makes its way back to receiving waters (river, lake or ocean) and in to the ground. Bharatpur (Fig.1: Study Area), eastern gate of Rajasthan is situated between 26° 22’ to 27° 83’ north latitude and 76° 53’ to 78° 17’ east longitude. Bharatpur is well known place because of Keoladeo Ghana National Park. Keoladeo National Park is the only the largest bird sanctuary in India. “Ajan Bandh” is the main water source to fill the various lakes, ponds of the park and villagers use this water for drinking purposes. In the present study several points of ground water sources such as open wells, bore wells and hand pumps have been selected to check the potability of water.

II. MATERIAL METHOD

Water quality is the physical, chemical and biological characteristics of water in relationship to a set of standards. Water quality is a very complex subject, in part because water is the complex medium intrinsically tied to the ecology of the earth. The physico – chemical quality of drinking water was assessed during the month of January, 2011 by standard methods as suggested by APHA (1995) and compared with the values as guided by ICMR.

The present research work is based on 15 ground water samples collected from open wells, bore wells and hand pumps in cleaned and screw capped polythene bottles. At the time of sampling, these bottles are thoroughly raised 23 times using the ground water to be sampled.

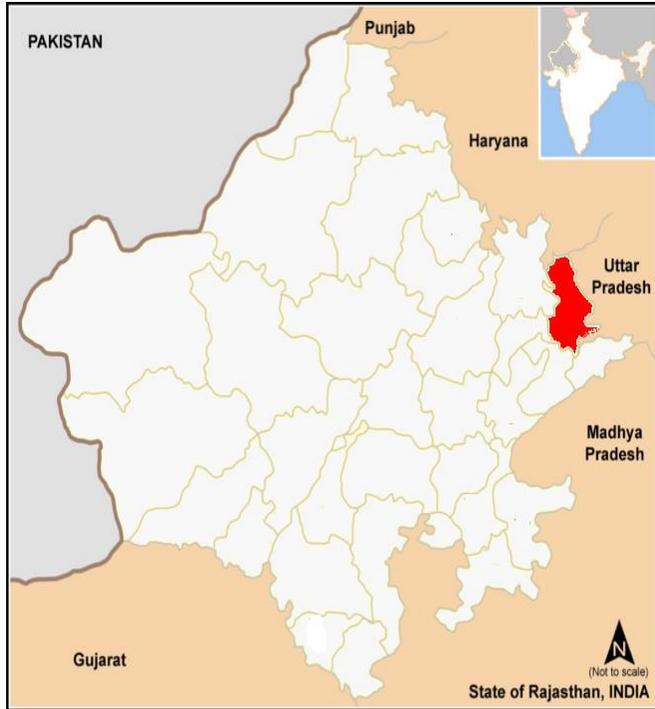
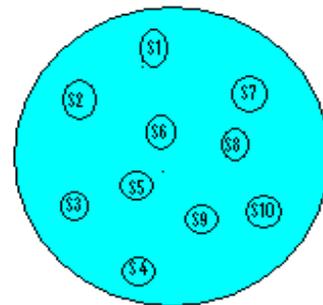
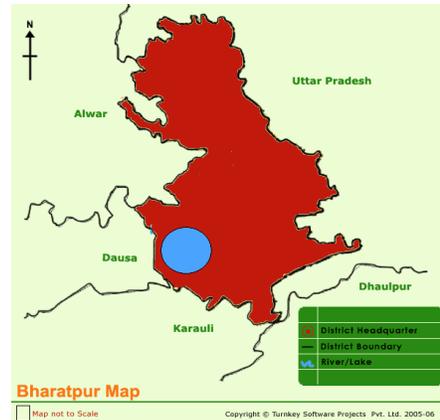


Fig . 1

These water samples are collected after pumping the water for 10 minutes (CPHEEO 1998, Chhabra 2008 and Shyam & Kalwania 2011).

All the samples were properly labeled as 1,2,3,4,5,6,7,8,9 and 10 and a record was prepared which is indicated in Table 1.



III. RESULTS AND DISCUSSION

The physico-chemical parameters which were analysed in Post-monsoon season, January 2012 have been shown in Table-2.

Colour:

The colour of a small water sample is caused by both dissolved and particulate material in water, and is measured in Hazen Units [HU]. Colour in water may be caused because of the presence of natural metallic ions (iron and manganese) humus, planktons etc. The presence of colour in water does not necessarily indicate that the water is not potable. Colour is not removed by typical water filters; however, slow sand filters can remove colour, and the use of coagulants may also succeed in trapping the colour causing compounds within the resulting precipitate. In the present study water is almost colourless.

Odour:

When minerals, metals and salts from soil etc. come in contact with water, they may change its taste and odour. Analyzed water samples are found odourless.

Temperature:

Use appropriate thermometer for calculating water temperature.

Water temperature affects the ability of water to hold oxygen, the rate of photosynthesis by aquatic plants and the metabolic rates of aquatic organisms. Temperature of water samples is varied from 26.0°C to 27.2°C the variation of the water temperature having more effect directly or indirectly on all life processes.

PH:

Ph is measured by Ph meter.

The balance of positive hydrogen ions (H^+) and negative hydroxide ions (OH^-) in water determines how acidic or basic the water is. In pure water, the concentration of positive hydrogen ions is in equilibrium with the concentration of negative hydroxide ions, and the pH measures exactly 7. pH is a term used to indicate the alkalinity or acidity of a substance as ranked on a scale from 1.0 to 14.0. In the present study area the pH value ranged from 7.70 to 8.76. A pH range from 7.0 to 8.5 is desirable concentration as per guided by ICMR. It is known that pH of water does not cause any severe health hazard. Water of study area is somewhat alkaline.

Dissolved Oxygen (D.O.):

DO can be determining by use of DO meter as well as measure by Winkler titration method.

DO is the most important water quality parameter which shows the amount of oxygen present in water. It gets there by diffusion from the surrounding air, aeration of water that has jumbled over falls and rapids; and as a waste product of photosynthesis. In general, rapidly moving water contains more dissolved oxygen than slow or stagnant water and colder water contains more dissolved oxygen than warmer water. In the studied water samples DO ranged from 4.6 to 7.8 mg/l. As DO level falls; undesirable odours, tastes and colours reduce the acceptability of water. The lowest DO value indicates not good healthy condition for the community (Jeena. B et al 2003).

Total Alkalinity:

Total alkalinity is calculate by Titration Method.

Alkalinity is not a pollutant. It is a total measure of the substance in water that have "acid-neutralizing" ability. The main sources of natural alkalinity are rocks, which contain carbonate, bicarbonate, and hydroxide compounds, borates, silicates, and phosphates may also contribute to alkalinity. Total alkalinity is the total concentration of bases in water expressed as parts per million (ppm) or milligrams per liter (mg/l) of calcium carbonates ($CaCO_3$). These bases are usually bicarbonates (HCO_3^-) and carbonates (CO_3^{2-}), and they act as a buffer system that prevents drastic changes in pHs Water with high total alkalinity is not always hard, since the carbonates can be brought into the water in the form of sodium or potassium carbonate. The desirable limit of total alkalinity is 200 mg/l (ICMR). The value of study area is ranged from 161 to 202 mg/l. Alkalinity in itself is not harmful to human being, but in large quantity, alkalinity imparts bitter taste to water.

Total Hardness:

Complexometric titration using EDTA

The total hardness is the sum of the hardness formers in a water (Ca, Mg, Ba and Sr ions) in mmol/l. Originally hardness was understood to be a measure of the capacity of water to precipitate soap. Soap is precipitated chiefly by the calcium and Mg ions present. The maximum limit of hardness in drinking water is 600 mg/l (ICMR). Total hardness is measured in grains per gallon (gpg) or parts per million (ppm). If water contains less than 3.5 gpg, it is considered soft water. If it contains more than 7 gpg, it is considered hard water.

The total hardness value ranged in the studied area from 96 to 488 mg/l. So, the water of almost all sampling stations is hard.

Hardness	
Description	Hardness range (mg/l as $CaCO_3$)
Soft	0-75
Moderately hard	75-100
Hard	100-300
Very Hard	> 300

Calcium Hardness:

Complexometric titration using EDTA

A measure of the amount of calcium in water measured in ppm. High levels can cause scale buildup. Low levels can cause etching and equipment corrosion. Calcium hardness is sometimes confused with the terms water hardness and total hardness. Too little calcium

hardness and the water are corrosive. Too much calcium hardness and the water are scale forming. The maximum permissible limit of calcium hardness is 200 mg/l (ICMR). The value of sampling stations ranged from 32.06 to 68.13 ppm. Thus sampling stations 5 and 12 have greater calcium hardness.

Magnesium Hardness:

Complexometric titration using EDTA

Magnesium salts have a laxative and diuretic effect. The maximum permissible limit of magnesium hardness is 150 mg/l (ICMR). Mg hardness value in studied area ranged from 11.54 to 91.78 ppm.

Chloride:

Using silver nitrate titration method for calculate chloride in water.

The maximum permissible concentration of chloride is 1000 mg/l. (ICMR). So except some points the chloride contents of water samples are in limit. It varies from 53.76 to 406.07 ppm

Sulphate:

Ion chromatography is the only instrumental method for the direct determination of sulphate. Sulphate may be precipitated either with Ba^{2+} or 2-aminoperimidinium salts. The precipitate may be weighed for a direct determination of the sulphate as a gravimetric method.

The maximum permissible limit of sulphate is 400 mg/l (ICMR). In the sampling areas the sulphate concentration ranged from 15.25 to 71.00 ppm. Waters with higher concentration of sulphate may cause intestinal disorders.

Nitrate:

Use spectrophotometer for calculating nitrate in water.

Nitrate is a major ingredient of farm fertilizer and is necessary for crop production. Nitrate stimulates the growth of production. Nitrate stimulates the growth of plankton and waterweeds that provide food for fish. Maximum permissible limit of nitrate is 50 mg/l (ICMR). Nitrate in water supplies in concentration over 100 mg/l. causes "methamoglobinemia".

Generally NO_3^- concentration is found in higher concentration in rural areas because of runoff of nitrate rich fertilizers and animal manure into the water supply. The nitrate value ranged in investigated area is between 17.06 to 93.2 ppm.

Total Dissolved Solids (TDS):

Use an appropriate TDS meter. Freshwater meters: 0-1990 ppm (parts per million).

The term TDS describes all solids [usually mineral salts] that are dissolved in water. Desirable limit of TDS is 500 mg/l (ICMR). All the values obtained are much higher than the limit except points-1 and 2. It is an important parameter for imparts a peculiar taste to water and reduce its potability.

Fluoride:

fluoride can be determined by spectrophotometry or by ion-chromatography.

Fluoride is more common in ground water than in surface water. The main sources of fluorine in ground water are different fluoride bearing rocks. The guideline value of fluoride is 1.5 mg/l in drinking water. In studied area, it ranged between 0.010 to 1.180ppm.

Electrical Conductivity:

Electrical conductivity estimates the amount of total dissolved salts (TDS), or the total amount of dissolved ions in the water. Its SI derived unit is the siemens per meter, ($A^2 S^3 m^{-3} Kg^{-1}$) or more simply, Sm^{-1} . It is the ratio of the current density to the electric field strength or, in more practical terms; is equivalent to the electrical conductance measured between opposite faces of a 1-meter cube of the material under test. Pure water is a poor conductor of electricity. Acids, bases and salts in water make it relatively good conductor of electricity. Electrical conductivity in studied area ranged between 7.5×10^2 to 2.1×10^3 $\mu mhos/cm$.

IV. CONCLUSIONS

The present results of water investigation show that the waters of study area are highly contaminated with total dissolved solids. Because of high concentration of TDS water loss its potability and high concentration of TDS also reduces the solubility of oxygen in water. Water of almost all study points are hard also because of this people of Bharatpur area are facing many problems like stomach diseases, gastric troubles etc. At some points nitrate level is also high than the permissible limit. It is recommended that water should be used after boiling by the people of Bharatpur because after boiling the water, temporary hardness [carbonate hardness] can be removed and concentration of total dissolved solids can also be decreased. Alum treatment is also a good option to make potable the water.

TABLE-1 Area, source of the sampling stations.

Sample No.	Area	Source
1	Halena	Hand pump
2	Halena bus stop	Hand Pump
3	Chhonkarwara Bus stand	Bore Well
4	Aamoli	Bore Well
5	Chote chhonkarwara	Hand Pump
6	Bijwari	Bore Well
7	Khedli Mod	Bore Well
8	Bachren	Hand Pump
9	Salempur Khurd	Hand Pump
10	Kamalpura	Hand Pump

TABLE-2

PARAMETER	S.1	S.2	S.3	S.4	S.5	S.6	S.7	S.8	S.9	S.10
pH	8.03	7.62	7.86	7.94	7.88	8.09	7.57	7.80	7.24	8.25
EC	1.2x10 ³	2.1x10 ³	8.6x10 ²	8.9x10 ²	1.3x10 ³	8.8x10 ²	1.5x10 ³	9.0x10 ²	1.9x10 ³	7.5x10 ²
TDS	650	1170	497	485	690	485	760	493	1090	404
TH	248	464	152	148	212	96	312	208	488	192
TA	168	183	185	191	175	174	161	176	202	188
DO	5.7	7.6	7.8	5.7	5.9	6.1	5.5	4.6	4.6	5.6
Ca ⁺² ppm	56.91	64.93	44.89	32.06	49.70	32.87	67.33	55.31	68.13	48.90
Mg ⁺² ppm	30.57	87.10	11.54	19.61	25.38	14.04	41.53	20.19	91.78	20.18
Na ⁺ ppm	90.39	176.87	50.57	83.26	138.69	94.99	110.86	51.29	118.22	89.72
Cl ⁻ ppm	149.99	406.07	53.76	87.93	197.85	81.95	262.13	69.69	340.14	84.03
SO ₄ ²⁻ ppm	15.25	41.25	14.75	50.50	71.00	39.00	51.25	21.50	64.75	28.00
NO ₃ ⁻ ppm	93.2	80.8	17.60	18.2	56.4	41.4	72.6	69.6	46.8	60.0
F ⁻ ppm	0.130	1.30	0.170	0.010	0.020	0.250	0.050	0.130	0.560	1.180

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Exposure Buildup Factor Studies in Some Soils

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Abstract- An attempt is made to generate effective atomic number, exposure buildup factor (EBF) in the energy region 0.015-15.0 MeV up to a penetration depth of 40 mfp for some soils. The five parameters geometrical progression (G-P) fitting approximation has been used to calculate exposure build-up factor (EBF). The generated exposure buildup factors has been studied as function of incident photon energy & penetration depth and represented graphically.

Index Terms- Exposure build-up factor (EBF), Mean free path (mfp), Effective atomic number (Z_{eff}), Equivalent atomic number (Z_{eq}).

I. INTRODUCTION

Today, to benefit mankind, the radiations are used in basic sciences, medicine, and industry and for generating electricity. Gamma radiations occupy the highest energy among the electromagnetic radiations. The exposure to gamma radiations with human body can occur during radiological diagnosis, nuclear reactors & nuclear research establishments. The use of radiations can be biologically hazardous, there is need of restrict and controlled exposure of human beings to these radiations by using shields of proper dimensions and of an appropriate material. The study has been focused on build-up factor which plays major role during interaction of gamma rays with the chosen soils. Nuclear accidents due to natural and manmade disasters cannot be refused in future. To avoid any hazard from day to day exposure of radiation the choice of material is very important for the purpose of shielding of radiations. People involved in industries, institutions & research labs may be the victim of gamma ray exposure. For the safety of people & selection of shielding materials, build-up factors study become important. When gamma radiations interact with material through Compton scattering. The scattering results in accumulation of photons in the interacting material due to which the number of photons buildup in the materials. Two types of build-up factors namely energy absorption build-up factor (EABF) & exposure build-up factor (EBF). The concept of buildup factor was mutually introduced by White [1] and Fano [2] recognized its importance in attenuation studies. To calculate build-up factor there are different methods like G.P. fitting method. Harima et al. 1986 [3], invariant embedding method,

Shimizu, 2002 [4]; Shimizu et al., 2004 [5], iterative method, Suteau and Chiron, 2005 [6] and Monte Carlo method, Sardari et al., 2009 [7]. Recently American National standards ANSI/ANS-6.4.3[8] has provided buildup factor data for 23 elements, one compound and two mixtures (i.e. air and water) and concrete at energies in the range 0.015-15 MeV up to penetration depths of 40 mfp by using the G.P method. D.Sardari and S. Baradaran 2010 [9] calculated buildup factor of gamma and X-ray photon the energy range of 0.2-2.0 MeV in water and soft tissue using Monte Carlo code MCNP4C. The results are compared with buildup factor data of pure water. In each case very small deviation is observed.

There are successful contributions which are based on the buildup factor studies in some soils and ceramic materials available in the literature. For example, Brar *et al.* [10] have studied the variation of buildup factors of soils with weight fractions of iron and silicon. Sidhu *et al.* [11] have studied the energy and effective atomic number dependence of the exposure buildup factors in biological samples. Manohara *et al.* [12] studied the variation of exposure buildup factors for heavy metal oxide glass with photon energy and penetration depth. Singh *et al.* [13] studied the energy dependence of total photon attenuation coefficients of composite materials Sidhu et al. [14] have studied the energy and effective atomic number dependence of the exposure build-up factors in biological samples J. S. Dhillon *et al.*[15] have studied Gamma Ray Photon Energy Absorption build-up Factor In Some Soil

II. MATERIALS AND METHODS

A. Selection of Materials

In present investigation The composition of soils has been taken from literature Lotse *et. al.*,[16] to study the exposure build-up factor (EBF) of different soil samples from some selected states of India, The chemical compositions of these soils are given in Table 1. Soils can be used as good radiation shielding material because of their low cost and easy availability. As build up factor data for these samples is not available in any form, so exposure build-up factor (EBF) of the chosen soil samples has been calculated for incident photon energy from 0.015- 15.0 MeV and up to a penetration depth of 40 mfp.

Table 1. Percentage Chemical Composition of the chosen soil samples

Chemical composition Of soil	Red Soil (Bangalore) S ₁	Red Soil (Thiruvallam) S ₂	Black Soil (Coimbatore) S ₃	Black Soil (Indore) S ₄
SiO ₂	54.34	50.44	59.80	62.46
Al ₂ O ₃	28.70	35.70	17.40	18.90
Fe ₂ O ₃	16.00	20.00	8.00	10.00
CaO	1.12	1.68	4.62	4.48
P ₂ O ₅	0.06	0.09	0.09	0.08
K ₂ O	1.80	2.72	3.85	2.71
MgO	0.21	0.23	0.21	0.23

B. Computational Work:

Build-up factors are computed by using G.P. fitting parameters and the equivalent atomic number Z_{eq} of selected soil samples following three steps given below:

Step1. Calculations for equivalent atomic number (Z_{eq}):

To compute equivalent atomic number of chosen soil samples, the value of Compton partial attenuation coefficient (μ_{compton}) and total attenuation coefficient (μ_{total}) in cm²/g are obtained for selected samples in the energy range of 0.015 to 15.0 MeV by using the state of art and convenient computer program WinXCOM computer program Gerward et al. [17]; Gerward et al. [18]) initially developed as XCOM, Berger and Hubbel, [19]. Ratio R ($\mu_{\text{compton}} / \mu_{\text{total}}$) for selected samples is calculated at energies 0.015 to 15.0 MeV using a simple computer program. For the interpolation of Z_{eq} for selected samples, the ratio R of particular sample at a given energy is matched with the corresponding ratio of elements at the same energy. For the case, where the ratio R lies between two

successive ratios of known elements, the value of Z_{eq} is interpolated using following formula, Sidhu et al., 2000 [20] The value of Z_{eq} was interpolated by using the following formula of interpolation:

$$Z_{\text{eq}} = \frac{Z_1 (\log R_2 - \log R) + Z_2 (\log R - \log R_1)}{\log R_2 - \log R_1} \tag{1}$$

Where Z₁ and Z₂ are the elemental atomic numbers corresponding to the ratios ($\mu_{\text{comp}} / \mu_{\text{total}}$) R₁ and R₂ respectively and R is ratio for given material at a particular energy. The computed Z_{eq} for selected soil samples is given in table 2.

Table 2 Equivalent atomic numbers (Zeq) of soil samples

Sr No	Energy MeV	<u>Equivalent atomic number</u>			
		S ₁	S ₂	S ₃	S ₄
1	0.015	14.49	14.64	13.53	13.72
2	0.02	14.71	14.88	13.68	13.89
3	0.03	14.93	15.1	13.86	14.13
4	0.04	15.07	15.27	13.98	14.21
5	0.05	15.19	15.37	14.06	14.32
6	0.06	15.27	15.51	14.17	14.4
7	0.08	15.4	15.64	14.21	14.45
8	0.1	15.54	15.78	14.29	14.59
9	0.15	15.49	15.49	13.98	14.92
10	0.2	16.92	16.92	14.49	14.49
11	0.3	16.99	16.99	14.5	14.5
12	0.4	16.5	16.5	14.5	14.5
13	0.5	16.5	16.5	14.5	14.5
14	0.6	16.5	16.5	14.5	14.5
15	0.8	16.5	16.5	14.5	14.5
16	1	16.5	16.5	14.5	14.5
17	1.5	16.5	16.5	14.5	14.5
18	2	12.92	12.94	12.88	12.88
19	3	12.66	12.66	11.72	11.72
20	4	12.39	12.39	11.94	11.94
21	5	12.57	12.57	11.99	11.99
22	6	12.29	12.29	11.92	11.92
23	8	12.49	12.49	12.16	12.16
24	10	12.28	12.42	11.73	11.91
25	15	12.5	12.62	11.89	12.01

Step2 – Computation of G-P fitting function parameters

The G.P fitting parameters were calculated by simple process of interpolation. These parameters were then used to generate exposure buildup factor for soil samples by using the formula which is given by Harima et al. (1986) [21] for chosen energy range of 0.015 to 15.0 MeV. and upto a penetration depth of 40 mean free path. The computed values of Zeq for the chosen samples of soil were used to interpolate G- P fitting function parameters for the energy absorption buildup factors in chosen energy range (0.015 to 15.0MeV) and penetration depth(1- 40 mfp) . The formula, Sidhu et al., 2000 [20] used for the purpose of interpolation of the G.P. fitting parameters is given below:

$$P = \frac{P_1(\log Z_2 - \log Z_{eq}) + P_2(\log Z_{eq} - \log Z_1)}{\log Z_2 - \log Z_1} \tag{2}$$

where P1 and P2 are the values of G.P. fitting parameters corresponding to atomic number Z1 and Z2 respectively at a given energy and Zeq is the equivalent atomic number of chosen soils at same energy

Step3 – Computation of Energy absorption build-up factors

The G-P fitting parameters were then used to generate exposure build-up factor for the chosen samples for energy range of 0.015 to 15.0 MeV. using the following G.P fitting formula given by Harima et al.[21]

$$B(E,x) = 1 + \frac{(b-1)(k^x-1)}{K-1} \quad \text{for } K \neq 1 \quad (3)$$

$$B(E,x) = 1 + (b-1)x \quad \text{for } K=1 \quad (4)$$

$$K(E,x) = \frac{\tanh(x/x_k - 2) - \tanh(-2)}{1 - \tanh(-2)} \quad x \leq 40\text{mfp} \quad (5)$$

Where E is the incident photon energy, x is the penetration depth in mean free path and b,c,a, X_k and d are G-P fitting parameters. The parameter K (E, x) represents photon dose multiplication and change in the shape of spectrum with increasing penetration depth. K is represented by tangent hyperbolic function of penetration depth in mfp. Here the mean free path (mfp) is defined as the average distance that photons of a given energy travel before an two successive interactions in a given medium occur. It is equal to the reciprocal of the attenuation coefficient. The ratio of the total value of a specified radiation quantity at any point to the contribution to that value from radiation reaching the point without having undergone any collision is called "buildup factor".

III. RESULTS AND DISCUSSION

The chemical composition of chosen soils is listed in Table 1. Table 2 shows the obtained equivalent atomic numbers of the chosen soil samples. The generated energy absorption build-up factor EABF values for soil samples have been shown in graphical form at fixed penetration depth (Figs. 1 to 4) as well as at fixed energy values (Figs. 5 to 8) and (Figs 9 to 12). The generated exposure build-up factor values are plotted against the penetration depth (mfp) for chosen soil samples for energy from .015 to 15 MeV with penetration depth up to 40mfp. From present results it is concluded that for chosen soil samples the energy absorption build-up factor (EABF) increases with increase in penetration depth. It is also seen that the Energy absorption build-up factor values are extremely large for low energies nearly up to 0.1 MeV, and increases with greater penetration depth. The increase in exposure build-up factor with penetration depth is small for low energies' and for high energies it increases rapidly.

1. Effect of Incident Photon Energy on Exposure Buildup Factor(EBF)

From Figs. 1 to 4 it has been observed that EBF values of chosen soils start increasing with increase in photon energy up to a maximum energy at intermediate energies and then further start decreasing with increase in energy of gamma ray. Here the low value of buildup factor around 0.015 MeV is due to predominance of photo electric effect in this energy region which results in fast removal of low energy photons, thereby not allowing these photons to buildup. It is further observed that in the energy range 0.15 MeV to 0.8 MeV the buildup factor values are high for a given penetration depth due to dominance of Compton Effect. Which only helps in the degradation of photon energy and fails to remove a photon completely. Because of

multiple scattering of photons they exist for longer time in material which leads to a higher value of buildup factor. Here it is also observed that at gamma ray energy 0.2 MeV, buildup factor value is very high because of exclusive dominance of Compton effect. Furthermore it is also observed that for energies greater than 2.0 MeV, the dominance of pair production phenomenon over Compton effect increases, so values of buildup factor decreases. The variation of EBF with incident photon energy seem to be independent of chemical composition of chosen soils beyond 2.0 MeV respectively. 0.01 0.1

2. Effect of Penetration Depth on Exposer Buildup Factor

The values of EBF of chosen soils increase with the increase in penetration depth. At lowest photon energy 0.015 MeV EBF values are low because of dominance of photoelectric effect, but at 0.2 MeV photon energy EBF values are much higher due to dominance of Compton effect. It can also be seen, at photon energy 5 and 15 MeV EBF values are low due to predominance of pair- production as in (figs. 5 to 8).

The curves of different energies show that there is continuous increase in EBF with increase in penetration depth for all soil samples. It is due to the fact that the increase in penetration depth increases the interaction of gamma-radiation photons with matter which results in generation of large number of low energy photons due to occurrence of Compton scattering process. The values of EBF of chosen soil increases with increase in penetration depth between 15 to 40 mfp at energy range of 5-15 MeV. The reason behind the pair production process starts pre- dominating and results with an electron-positron pair for lower penetration depth, these particles may escape from the material or after multiple collisions with in the material comes to rest and further annihilates. With the increase in penetration depth, these secondary gamma rays (as a result of annihilation) contribute to the rise in intensity of the primary gamma rays

3 Effect of Effective Atomic Number on EBF

As in Table 2 every soil have different Z_{eq} at various energy levels, so to assign a particular atomic number to each material, mean of Z_{eq} of each sample at various photon energies is calculated and mean so calculated is treated as the effective atomic number i.e. Z_{eff} of that soil

$$Z_{eff} = \frac{\sum_{B=0.015}^{15.0} Z_{eq}}{25} \quad (6)$$

Values of Z_{eff} of Soil samples i.e S_1, S_2, S_3 and S_4 are 14.76, 14.83, 13.51 and 13.64 respectively. This is very helpful in studying the behaviour of buildup factor of different chosen soils at fixed penetration depths and fixed photon energy.

IV. CONCLUSIONS

This study of build-up factor of chosen soils will be helpful in estimating the transport and degradation of gamma radiations in these chosen soil samples. Generally Lead and Mercury are used as shielding materials. But due to their high cost and non availability these are difficult to use at large scale. Soils can be used as a gamma-ray shielding material in field experiments which is suitable from the point of view of cost and availability. Above studies projects Soil as a potential radiation shielding material

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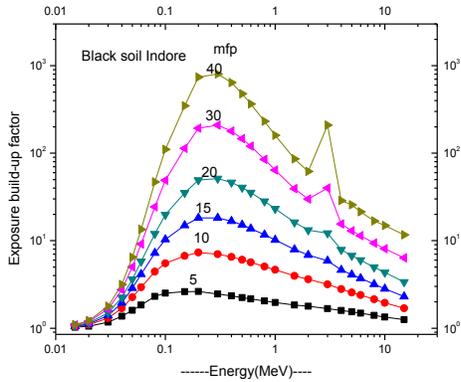


Figure 1 Variation of Exposure build-up factor with incident photon energy (MeV)

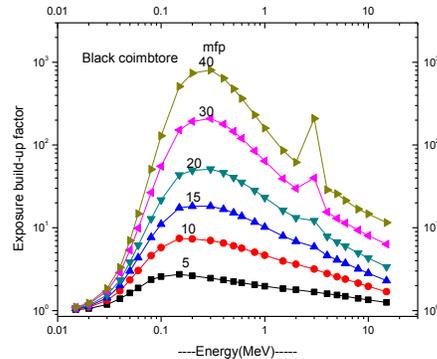


Figure 2 Variation of Exposure build-up factor with incident photon energy (MeV)

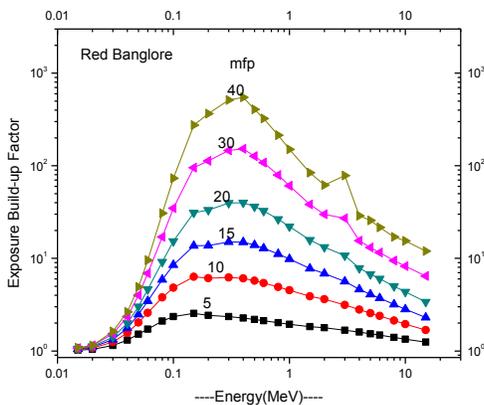


Figure 3 Variation of Exposure build-up factor with incident photon energy (MeV)

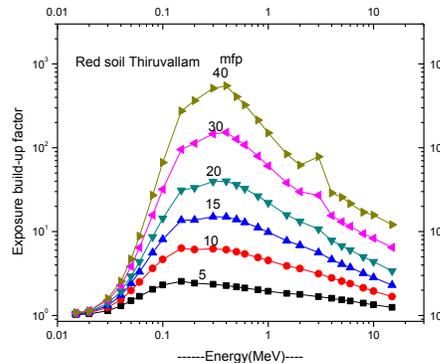


Figure 4 Variation of Exposure build-up factor with incident photon energy (MeV)

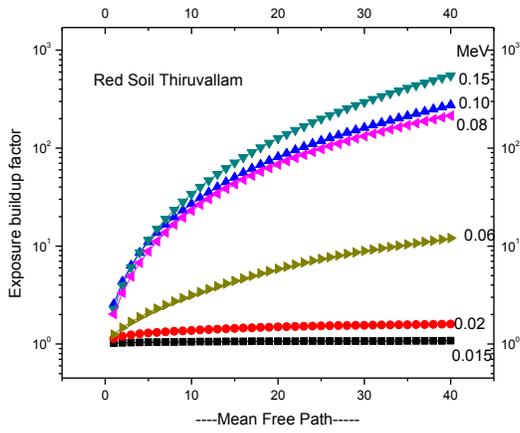


Fig. 5 The EBF for soils upto 40mfp

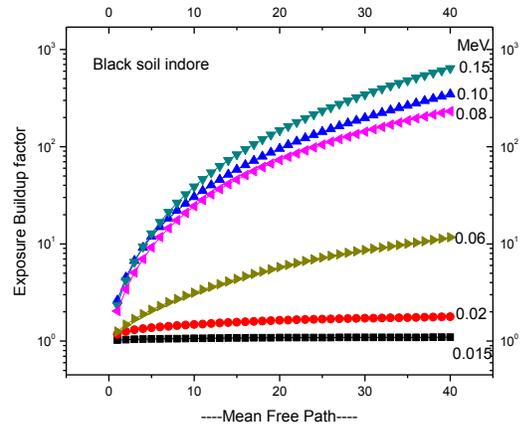


Fig. 6 The EBF for soils upto 40mfp

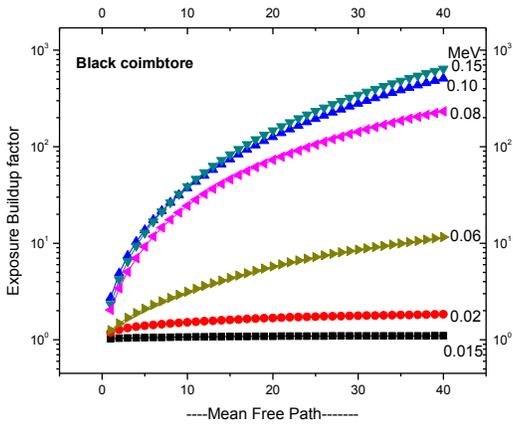


Fig. 7 The EBF for soils upto 40mfp

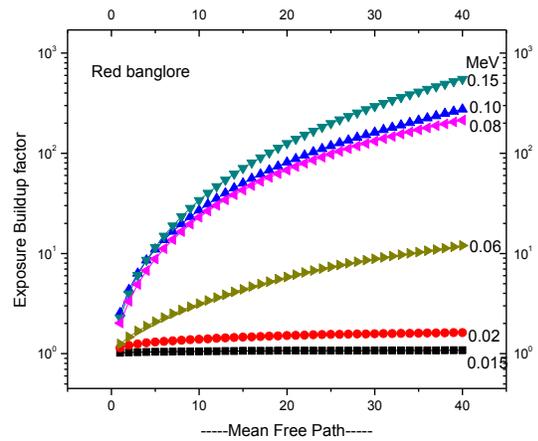


Fig. 8 The EBF for soils upto 40mfp

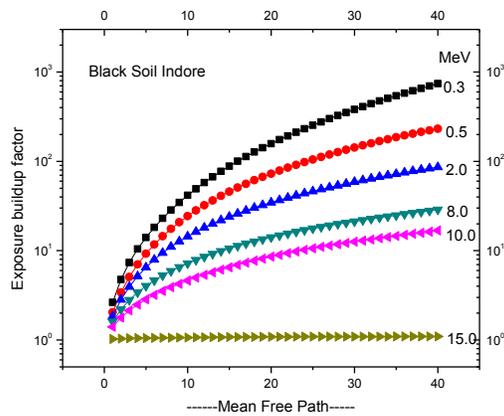


Fig. 9 The EBF for soils upto 40mfp

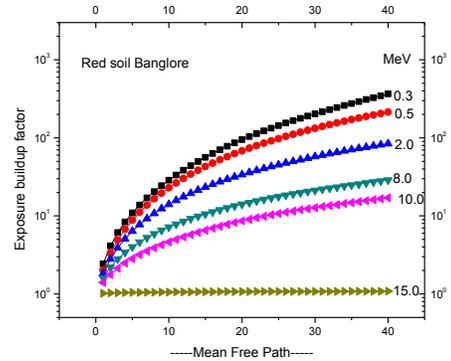


Fig.10 The EBF for soils upto 40mfp

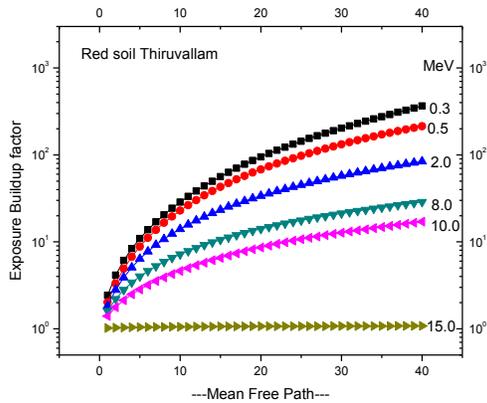


Fig.11 The EBF for soils upto 40mfp

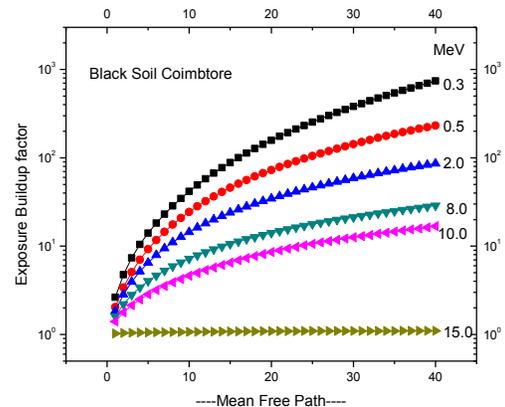


Fig.12 The EBF for soils upto 40mfp

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Comparison of Thermal Behavior of Solar Ponds with Flat (or Conventional) and Corrugated Bottom

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Abstract- The heat extraction from the lower convective zone or storage zone of salinity gradient solar pond with corrugated bottom is investigated with the aim of increasing the overall efficiency of collecting solar radiation, storing heat and delivering this heat to different applications. The energy balance equations for each zone have been used to develop the expression of temperature distribution in the solar pond. Then this equation has been used to develop the equation for efficiency of the solar pond. The analysis is based on the boundary conditions at the interface between the zones and the matching conditions. In this method, heat is extracted from the storage zone of the solar pond. A theoretical analysis is conducted to obtain expression for the variation of temperature with depth of solar pond. The dependence of the energy efficiency of the solar pond on the thickness of storage zone, temperature of delivered heat, variation combinations of the pond and storage zone heat extraction only explored. The theoretical analysis suggests that heat extraction from the storage zone has the potential to increase the overall efficiency of a solar pond delivering heat at a relatively high temperature by up to 50 %, compared with the conventional solar pond method of heat extraction solely from the storage zone. The potential gain in efficiency using storage zone heat extraction is attributed to the storage zone that can be achieved with this method. The results are then obtained by computer simulation. The effects of system and operating

parameters of the solar pond like area enhancement factor (β), heat extraction rate, heat capacity rate and depth of the pond on the temperature distribution and efficiency have been developed. It has been found that the temperature distribution in the solar pond is a strong function of system and operating parameters.

I. INTRODUCTION

Electrical or Mechanical power may be generated by direct conversion of solar energy either by photo-voltaic cells or via thermo-electric power system. Among the above mentioned ways of converting solar energy, at present the thermo-electric system is most promising, as the technology and economics for the other ways are still far away from the acceptable limits.

A basic solar energy conversion system has been shown in Fig. 1. Solar thermal power generation system comprises solar pond/solar collector/solar concentrator, turbine, condenser, storage system, cooling tower, alternator, control unit etc. The most important among those being the solar pond/solar concentrator that accounts for the cost of the major portion of the system. Due to this, the solar pond and solar concentrator both have been the areas of research and development work.

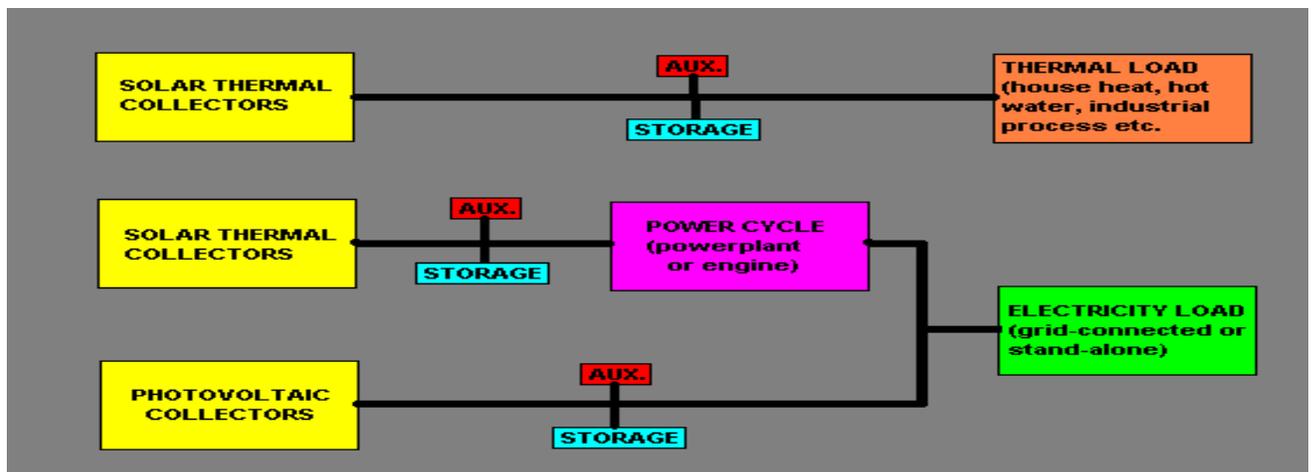


Figure 1.1: Block Diagram of Basic Solar Energy Conversion Systems

A Salt Gradient Solar Pond (SGSP) consists of three distinct zones. The Upper convective zone (UCZ) whose thickness varying between 0.15 to 0.3 m which has low and nearly uniform salt content. Beneath the UCZ is the Non-Convective Zone (NCZ) or gradient zone of thickness that varies between 1 to 1.5 m whose salt content increases with increasing depth and is therefore a zone of variable salinity properties. The bottom layer is the lower convective zone (LCZ) or storage zone, which has a thickness 1.0 to 2.0 m and has a nearly uniform high salt concentration just like saturated saline water. Salinity of the UCZ increases due to convective mixing with the NCZ and salt diffusion from bottom surface to upper surface. Several methods for enhancement of thermal performance of SGSP have been proposed and investigated by [1] a number of investigators. One of the most promising means of improving the thermal performance of conventional SGSP is to increase the bottom

surface area by making the surface corrugated (wavy)/V-shaped, which increases the heat transfer capability to the fluid (water) and consequently increases the performance of the solar pond. The important role of upper surface layer dynamics has been discussed by Atkinson and Harleman [2] and Schladow [3] while Tabor [4] and Nielsen [5] provide good general reviews of Solar Pond Technology. Rubin et al. [6-9] performed several numerical and experimental simulation of the solar pond mechanism; they eventually demonstrated that one of the most significant design modifications for increasing the solar pond thermal efficiency was the increased stability of the surface layer. The effect of the various parameters on the thermal behavior with a consideration of the stability criteria in a SGSP are studied results of the steady state indicates that the thickness of the NCZ has a significant effect on the performance of the SGSP.

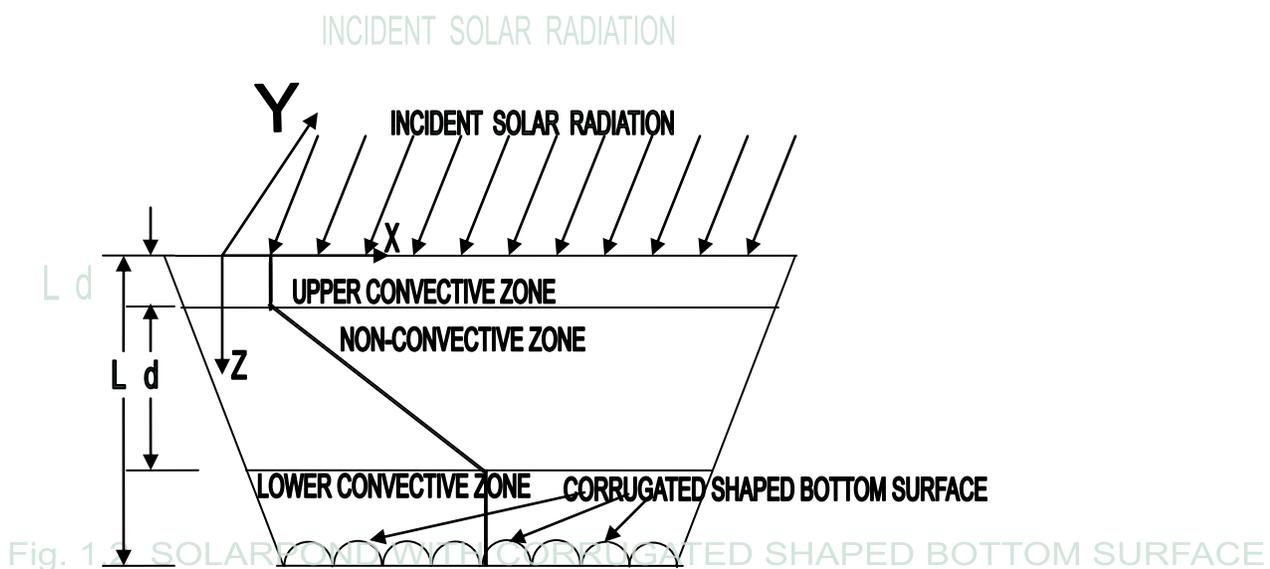


Fig. 1.2 SOLARPOND WITH CORRUGATED SHAPED BOTTOM SURFACE

Moreover, the optimum value of this thickness is found to vary with the rate of the heat to be extracted from the system [10]. A novel scheme of heat extraction from the solar pond has been presented along with preliminary two dimensional computational fluid dynamics (CFD) simulations [11]. In present work, an analytical model of SGSP with corrugated bottom surface has been developed in order to analyze the effect of various parameters like depth of solar pond, heat capacity rate, heat extraction rate, mass flow rate on temperature distribution and efficiency.

The analysis is based on the boundary conditions at the surfaces between the zones and on the following assumptions:

- The UCZ and NCZ are assumed to be perfectly mixed layers at a uniform temperature which changes only with time.

- The lateral dimensions of the solar pond are large as compared to its depth so that the temperature variation is only in the vertical direction.
- The properties are constant and assisted with these above assumptions.
- Based on the energy balance equation, an expression for temperature distribution in the gradient zone of conventional solar pond has been developed as:

A schematic diagram of a salt gradient solar pond (SGSP) with corrugated bottom surface is shown in Fig.1.2. Typically, it is about 1 to 2 m deep with a thick durable plastic liner laid at the bottom. Materials used for the liner include low density polyethylene (LDPE), high density polyethylene (HDPE), woven polymer yarn (XB-5), and hypalon reinforced with nylon mesh. Salts like Magnesium chloride ($MgCl_2$), Sodium Chloride (NaCl) or Sodium Nitrate ($NaNO_3$) are dissolved in the water, the

concentration varying from 20 to 30 percent at the bottom to almost zero at the top surface. Salt concentration gradient will disappear over a period of time due to upward diffusion of the salt. At the same time, concentrated brine is added at the bottom of the solar pond. The amount of the salt required for this purpose is about 50 gm/m²/day, which is a large quantity when considered on an annual basis. For this reason the normal practice is to recycle the salt by evaporating the saline water run off from the surface in an adjacent evaporation pond.

II. MATHEMATICAL ANALYSIS

The energy flow diagram shown in Fig. 1.3 for different zone for corrugated bottom of the solar pond for showing depth of the different zones.

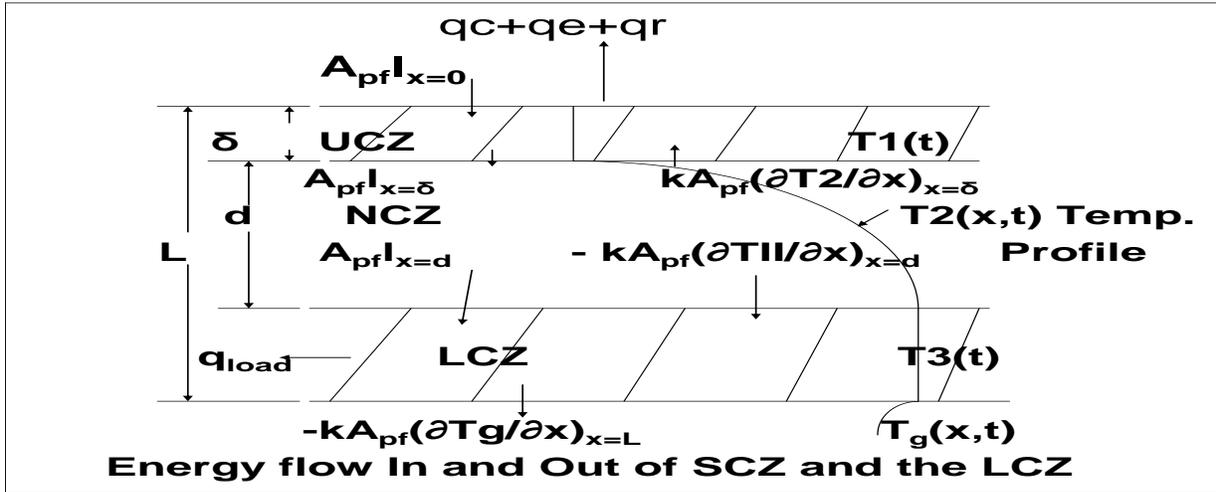


Fig. 1.3 Energy flow In and Out of the Surface Convective Zone and Lower Convective Zone

2.1 UPPER CONVECTIVE ZONE

The differential equation is to be satisfied for the UCZ of the pond is obtained by taking energy balance equation as follows-

(Rate of change of energy contained in the UCZ of thickness, δ) = (Rate at which heat is conducted in from the NCZ) + (Solar radiation absorbed in the thickness, δ) - (Rate at which heat is lost from the top surface by convection, evaporation and radiation). Thus,

$$\rho \delta C_p \left[\frac{\partial T_1}{\partial t} \right]_{x=0} = k \left[\frac{\partial T_2}{\partial x} \right]_{x=\delta} + [(I)_{x=0} - (I)_{x=\delta}] - \frac{q_c + q_e + q_r}{\beta A_f} \tag{2.1}$$

where β is the area enhancement factor which is the ratio of the area of corrugated or V-shaped surface, A_{pf} and the corresponding surface area of conventional solar pond, A_f .

2.2 NON- CONVECTIVE ZONE

The differential equation for the NCZ zone is the heat conduction equation of the form

$$\frac{\rho C_p \partial T_2}{\partial t} - \frac{\partial^2 T_2}{\partial x^2} - \frac{dI}{dx} = K \tag{2.2}$$

$$\text{where } I = I_b \tau_{rb} \tau_{ab} + I_d \tau_{rd} \tau_{ad} \tag{2.3}$$

2.3 LOWER CONVECTIVE ZONE

Taking energy balance equation as above for the LCZ of the pond as below:

[Rate of change of energy contained in the LCZ of thickness $\{L-(d+\delta)\}$] = [(Rate at which heat is conducted in from the NCZ) + {Solar radiation absorbed in the thickness $(d+\delta)$ } - (Rate at which heat is conducted out to the ground underneath) - (Rate of useful heat extraction)]. Thus,

$$\rho [L - (d + \delta)] C_p \left(\frac{\partial T_3}{\partial t} \right)_{x=d+\delta} = -k \left(\frac{\partial T_2}{\partial x} \right)_{x=d+\delta} + (I)_{x=d+\delta} + \left[\frac{\partial T_g}{\partial x} \right]_{x=L} - \frac{q_{load}}{A_{pf}} \tag{2.4}$$

Now, solution to the sets of equations (2.1), (2.2) and (2.3) have been obtained and expressed for distribution of temperature in the gradient zone for conventional solar pond as

$$T(x) = T_c + \frac{b' A_f}{m C_p} \ln(x + \delta) - \left[\frac{b' A_f}{m C_p} e^{(x+\delta) A_f / k m C_p} \right] \{ E_4 + \ln(x+\delta) \} \tag{2.5}$$

where E_4 and T_c are the integration constants and these are expressed as:

$$T_4 = T_a + \frac{(q-a)}{b'} e^{-\frac{(d+\delta)A_f}{k m C_p} + \ln(d+\delta)} \{ e^{-\frac{A_f}{k m C_p} (d+\delta)} - 1 \} \quad (2.6)$$

And,

$$T_c = T_a + \frac{m C_p}{\{ 1 - e^{-\frac{A_f}{k m C_p} (d+\delta)} \}} \ln(x+\delta) + \frac{b' A_f}{m C_p} (1 - e^{-\frac{\delta A_f}{k m C_p}}) \ln \delta - \frac{(q-a) A_f}{m C_p} \quad (2.7)$$

For corrugated bottom surface of the solar pond,

The Equ.(2.5) is further developed as

$$T(x) = T_c + \frac{b' \beta A_{pf}}{m C_p} \ln(d+\delta) - \left\{ \frac{m C_p}{e^{\beta A_{pf} x / k m C_p}} \right\} \{ E_4 + \ln(x+\delta) \} \quad (2.8)$$

where β is the area enhancement factor, E_4 and T_c are the integration constants and these are expressed as:

$$E_4 = T_a + \frac{(q-a)}{b'} e^{-\frac{\beta(d+\delta)A_{pf}}{k m C_p} + \ln(d+\delta)} \{ e^{-\frac{A_{pf}}{k m C_p} (d+\delta)} - 1 \} \quad (2.9)$$

And

$$T_c = T_a + \frac{m C_p}{\{ - e^{-\frac{A_{pf}}{k m C_p} (d+\delta)} \}} \ln(x+\delta) + \frac{b' \beta A_{pf}}{m C_p} (1 - e^{-\frac{\delta \beta A_{pf}}{k m C_p}}) \ln \delta - \frac{(q-a) \beta A_{pf}}{m C_p} \quad (2.10)$$

Where,
 $b' = \tau * H * b$

$$(2.11)$$

T_c and E_4 are the integration constants and $C = mc_p$, the heat capacity rate per unit area of the solar pond for the working fluid in the heat exchanger of the gradient zone.

The first boundary condition to be applied is that when $x=0$, $T(0) = T_a$. The second boundary condition arises from the energy balance at the interface between gradient layer and lower convective zone.

III. EFFICIENCY CALCULATION FOR VARYING PARAMETERS

The thermal efficiency of the solar pond is defined as

$$\eta = \frac{C \{ T(d) - T_a \} + q}{H} \quad (3.1)$$

where H is the average flux of solar radiation incident on the surface of the solar pond. The numerator on the right side of this equation is composed of two terms: one is the rate of heat transfer from the gradient layer per unit area of the pond, $[C \{ T(d) - T_a \}] / H$, and the second term is the rate of heat withdrawal from the lower convective zone per unit area of the pond, q/H . $T(d)$ is the temperature at the bottom of the gradient layer can be found by putting $x=d$ in equation (2.25) as well as in equation (2.28) and T_a is the ambient temperature.

IV. RESULTS AND DISCUSSIONS

4.1 EFFECT OF HEAT EXTRACTION RATE ON TEMPERATURE DISTRIBUTION OF SOLAR POND

The results show that there is a significant influence of area enhancement factor on thermal performance of salt gradient solar pond with corrugated (way)/V-shaped bottom. connect-to-mba-colleges-in-pune-adw1234.htm Fig. 4.1 shows the effect of heat extraction rate on temperature distribution of solar pond for area enhancement factor of 1.5 and heat capacity rate of $0.75 \text{ W/m}^2\text{-K}$. It has been found that the temperature of the solar pond almost remains constant in upper convective zone, whereas in the non-convective zone the temperature of the solar pond linearly increases with increasing depth and again remains constant in lower convective zone or storage zone for a particular value of heat extraction rate. The value of temperature in NCZ and LCZ decreases with increasing the value of heat extraction rate. The maximum temperature attains in the LCZ is 91.72°C for zero heat extraction rate (i.e., $q=0 \text{ W/m}^2$) at $\beta=1.5$ and then these value decreases as 69.77°C , 60.25°C and 50.74°C for $q=10 \text{ W/m}^2$, $q=20 \text{ W/m}^2$, $q=30 \text{ W/m}^2$ and a fixed value of heat capacity rate of 0.75 W/m-K^2 . It is also seen that the

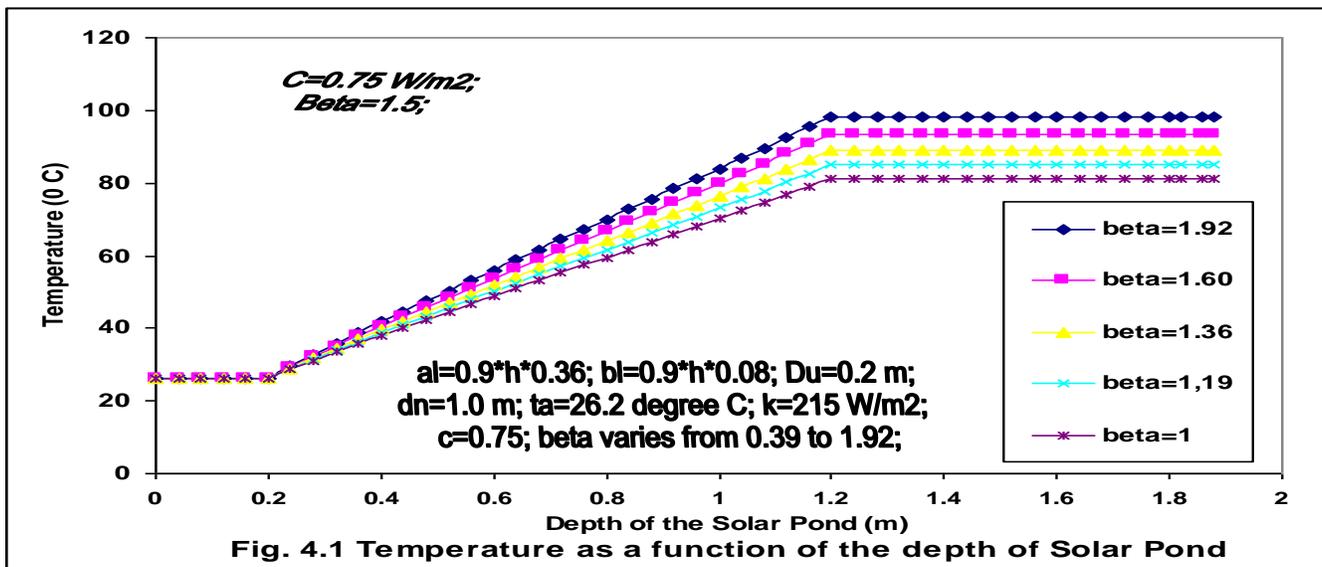


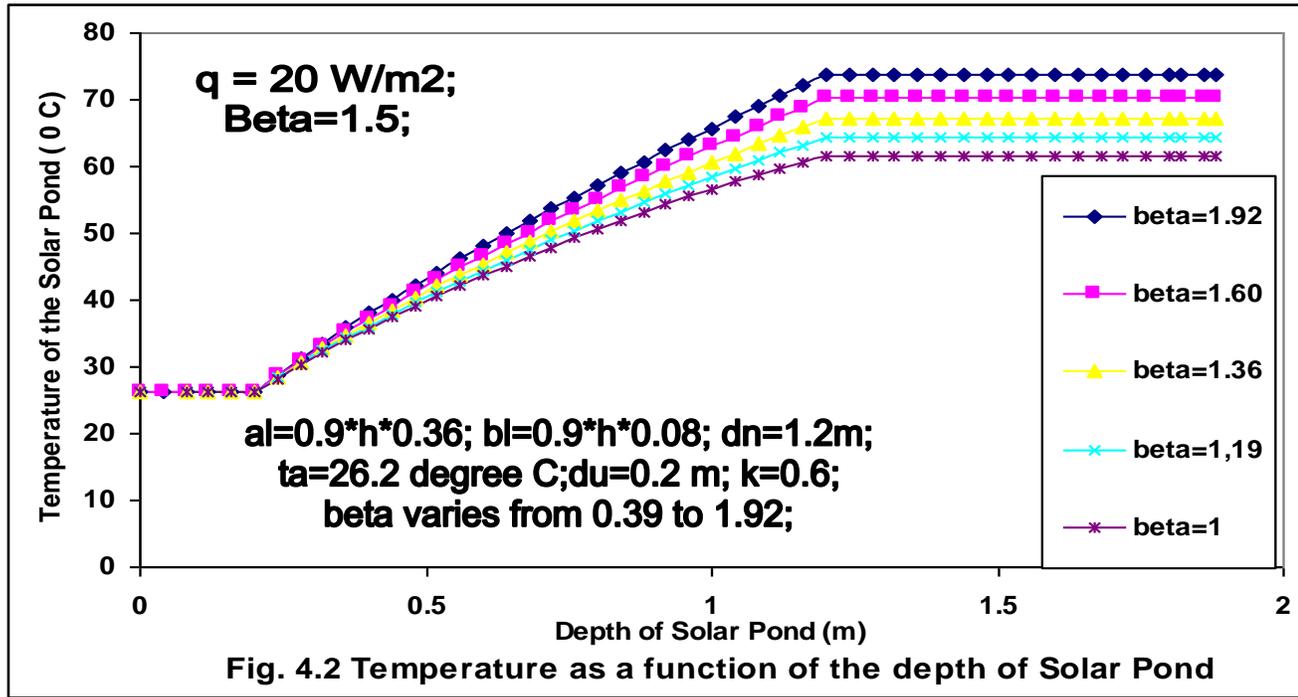
Fig. 4.1 Temperature as a function of the depth of Solar Pond

4.2 EFFECT OF HEAT CAPACITY RATE ON TEMPERATURE DISTRIBUTION OF SOLAR POND

Fig. 4.2 shows the effect of heat capacity rate on temperature distribution of solar pond with respect to depth of the pond for heat extraction rate of 20 W/m^2 and area enhancement factor $\beta=1.5$. It has been found that the temperature of the solar pond almost remains constant in the UCZ, whereas in the NCZ, temperature increases linearly with increasing depth and again remains constant in LCZ for a particular value of heat

capacity rate. These values of temperatures decrease with increase in heat capacity rate.

The maximum temperatures attains in the storage zone is found to be 69.1°C at $q=20 \text{ W/m}^2$ and $C=0.75 \text{ W/K-m}^2$ and then these values decreases as 65.31°C at $C=0.95 \text{ W/K-m}^2$ and 61.86°C at $C=1.15 \text{ W/K-m}^2$, 58.72°C at $C=1.35 \text{ W/K-m}^2$ and 55.85°C at $C=1.55 \text{ W/K-m}^2$, respectively.

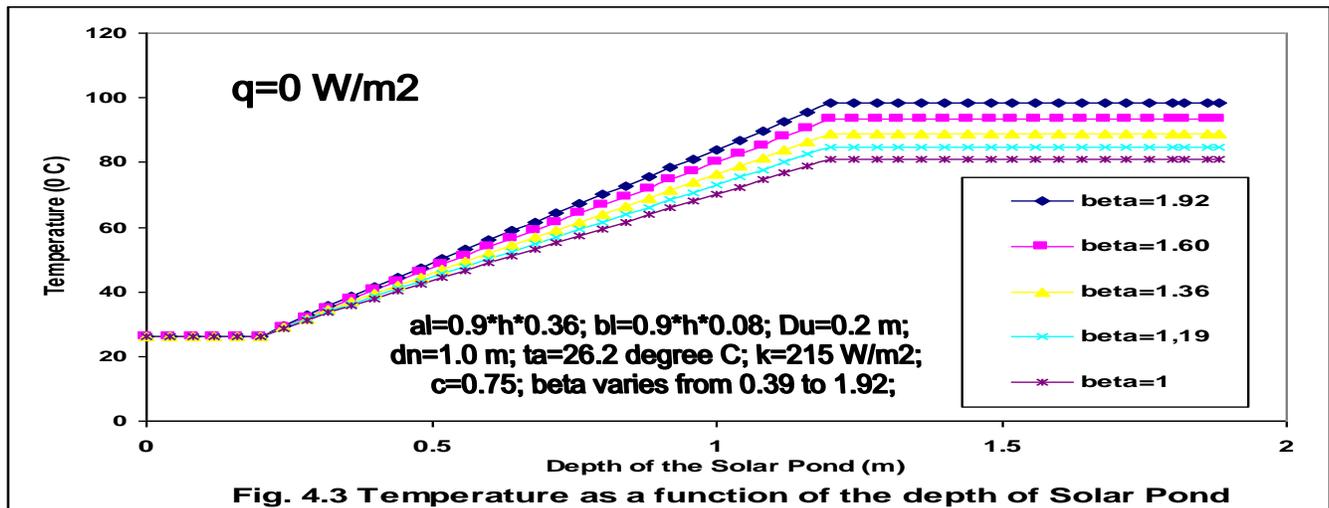


4.3 EFFECT OF AREA ENHANCEMENT FACTOR (B) ON TEMPERATURE OF SOLAR POND

Fig. 4.3 shows the effect of area enhancement factor (β) on temperature distribution of the solar pond with respect to depth of the pond for $q=0 \text{ W/m}^2$ and $C=0.75 \text{ W/K-m}^2$. The system and operating parameters are same as in previous plot shown in Fig. 4.10. It has been found that the temperature in the UCZ remains constant, whereas temperature linearly increases in the non-convective zone or gradient zone with increasing depth

and again remains constant in the storage zone for a particular value of heat extraction rate.

The maximum temperature attains in the storage zone is 91.72°C for zero heat extraction rate and then these values decreases as 87.98°C , 83.87°C , 80.13°C and 76.73°C for $\beta = 1.6, 1.36, 1.19$ and 1 , respectively.

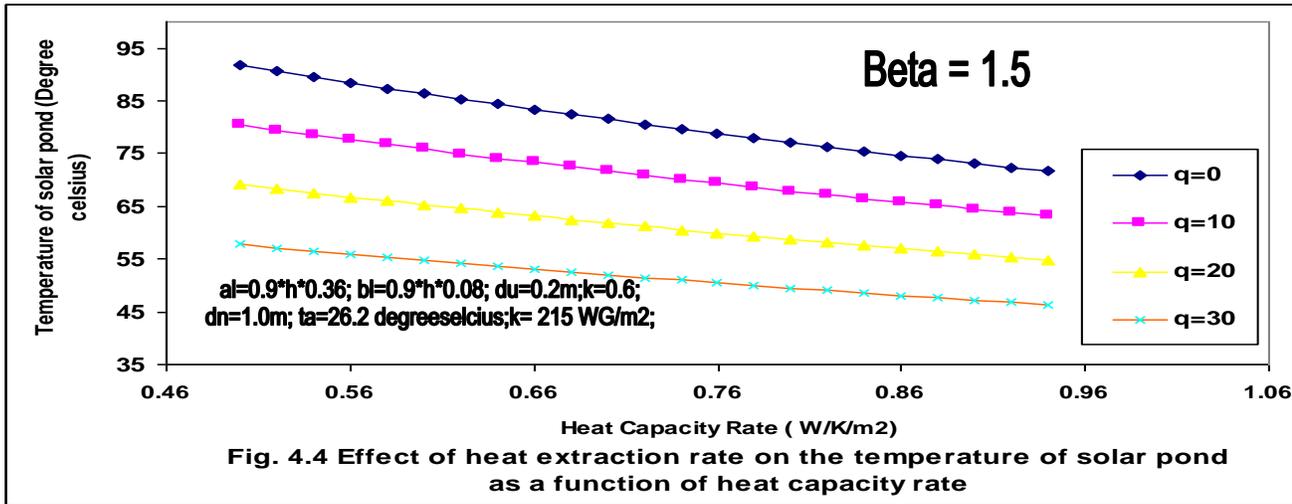


4.4 EFFECT OF HEAT EXTRACTION RATE ON TEMPERATURE OF STORAGE ZONE

Plot shown in Fig. 4.4 shows the effect of heat extraction rate on temperature of storage zone of solar pond. The temperature of storage zone of the solar pond decrease+ from 91.72° C to 71.25° C at zero heat extraction rate and area enhancement factor of 1.5, and then these values of maximum and minimum temperature decreases at various values of heat

extraction rate as 82.45° C to 62.73° C, 70.52° C to 53.15° C and 59.42° C to 47.25° C respectively for heat extraction rate of 10, 20 and 30 W/m².

It has also been observed that the rate of fall of temperature is higher for lower value of heat extraction rate and is lower for higher value of heat extraction rate.



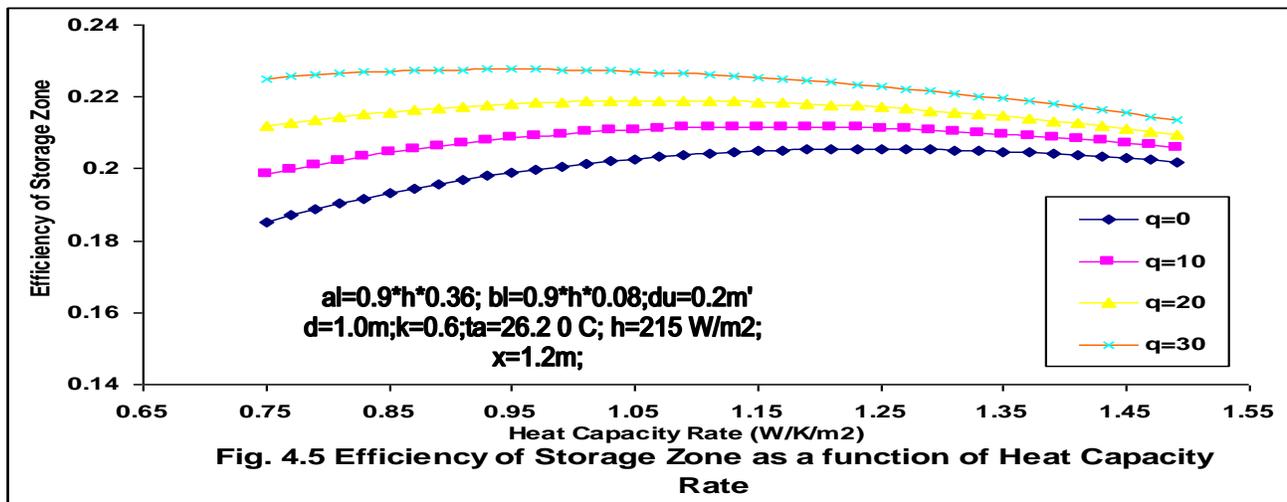
5.5 EFFECT OF HEAT EXTRACTION RATE ON EFFICIENCY OF STORAGE ZONE

Fig. 4.5 shows the effect of heat extraction rate on efficiency of storage zone. It has been observed that the efficiency of storage zone is decreasing with increasing value of heat capacity rate for all values of heat extraction rate.

The minimum and maximum value of efficiencies are 17.91 percent and 19.95 percent, 19.29 percent and 20.88

percent, 20.79 percent and 21.82 percent and 22.29 percent and 22.76 percent respectively for heat extraction rate of 0 W/m², 10 W/m², 20 W/m² and 30 W/m².

It has also been observed that the increase and decrease of efficiency is mainly depends upon the heat extraction rate. Efficiency increases if heat extraction rate increases and decreases as heat extraction rate decreases.

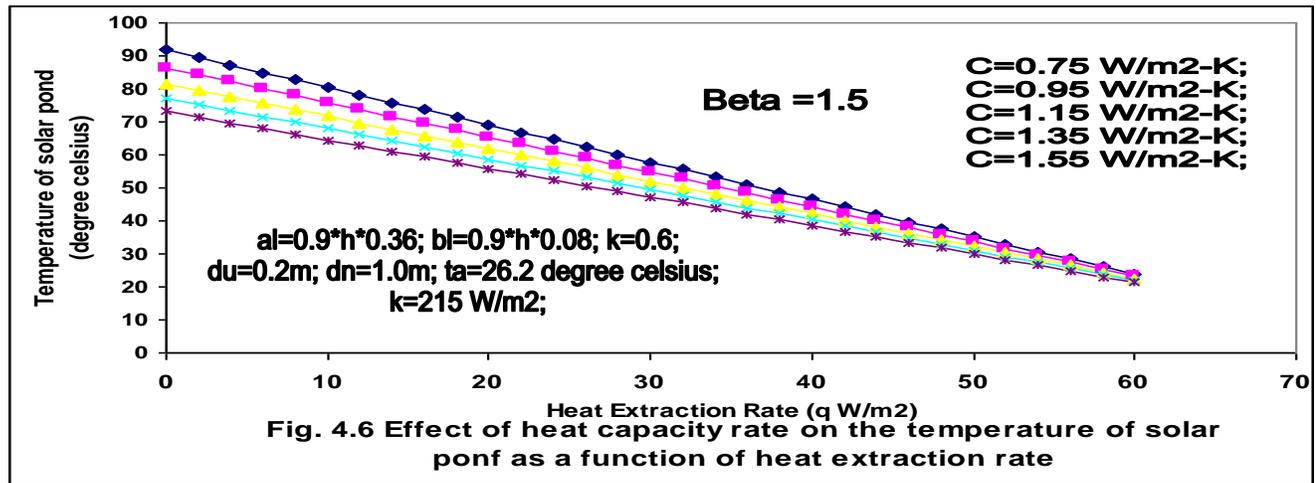


4.6 EFFECT OF HEAT CAPACITY RATE ON TEMPERATURE OF STORAGE ZONE

Fig. 4.6 shows the effect of heat capacity rate on temperature of storage zone for area enhancement factor of 1.5

and heat capacity rate from 0.75 to 1.5 W/m²-K. It has been observed that the fall in temperature of storage zone of solar pond. It is also observed that fall in temperature is higher for low values of heat extraction rate at all values heat capacity rate.

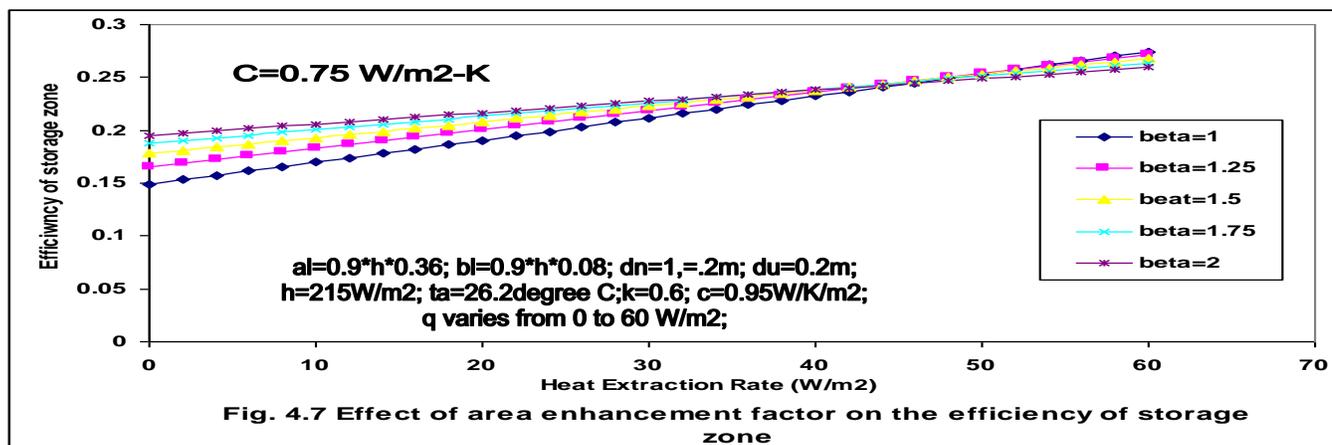
The maximum and minimum values of temperature of storage zone have been found to be 91.72°C and 28.55°C , 88.98°C and 27.85°C , 83.87°C and 27.12°C , 77.25°C and 27°C , and 74.56°C and 21.65°C at heat capacity rate of 0.75, 0.95, 1.05, 1.20 and 1.5 $\text{W/K}\cdot\text{m}^2$, respectively.



4.7 EFFECT OF AREA ENHANCEMENT FACTOR ON EFFICIENCY OF STORAGE ZONE OF SOLAR POND

Fig. 4.7 shows the effect of area enhancement factor on efficiency of storage zone of solar pond. The efficiency of storage zone of solar pond for area enhancement factor of 1.5 and heat capacity rate of $0.75 \text{ W/m}^2\text{-K}$ linearly increases with heat

extraction rate for all values of area enhancement factor. The minimum value of efficiencies has been found to be 12.5 percent, 15.48 percent, 16.25 percent, 17.20 percent and 18.15 percent at area enhancement factor of 1, 1.25, 1.15, 1.75 and 2 for a fixed value of heat capacity rate of $0.75 \text{ W/m}^2\text{-K}$.



V. CONCLUSIONS

On the basis of analytical investigations carried out in this paper in connection with the simulation and modeling of solar pond, the following conclusions are drawn:

- An analytical model of salt gradient solar pond has been developed in order to analyze the effect of various parameters like depth of solar pond, heat capacity rate, heat extraction rate, mass flow rate on temperature distribution and efficiency.
- The results are then obtained by computer simulation using C++ program for temperature distribution along the increasing depth of the solar pond for various value of the

system and operating parameters in order to prophesy the performance of the solar pond for electrical power generation.

- It has been found that for area enhancement factor equal to 1, the temperature of the solar pond almost remains constant in the upper convective zone or surface convective zone, where as in the non convective zone, temperature increases linearly with the increasing depth and again remains constant in non convective zone for a particular value of heat extraction rate (q) whereas these values decreases with increasing values of heat extraction rate. The maximum temperature attains in the lower convective zone is 79.28°C for $q=0 \text{ W/m}^2$ and then these values decreases as 69.77°C , 60.25°C and 50.74°C for $q=10 \text{ W/m}^2$, $q=20 \text{ W/m}^2$ and $q=30 \text{ W/m}^2$, respectively.

- It has been found that the temperature of the storage zone decreases with an increase in the heat capacity rate ($C=mC_p$), at all values of heat extraction rate. For no heat extraction, the maximum temperature is found to be 79.28°C for $C=0.75\text{ W}/(\text{m}^2.\text{K})$ and Minimum value of temperature is 55.81°C at $C=1.49\text{ W}/(\text{m}^2.\text{K})$. These maximum and minimum values of temperature decrease with increasing values of heat extraction rate.
- It has been observed that the efficiency of solar pond is strong function of heat capacity rate and heat extraction rate. The efficiency of solar pond increases exponentially from 18.51 percent to 20.19 percent with an increase in heat capacity rate, for $q=0\text{ W}/\text{m}^2$ while 19.84 percent to 20.58 percent for $q=10\text{ W}/\text{m}^2$. For $q=20, 30$ and $40\text{ W}/\text{m}^2$, the efficiency slowly decreases with increase in heat capacity rate. The above efficiencies values have been found to be 21.18 percent to 20.97 percent, 22.51 percent to 21.35 percent and 23.84 to 21.74 percent, respectively.
- The results show that the efficiency of the storage zone of the solar pond increases linearly with increase in heat extraction rate for various values of heat capacity rate. The minimum and maximum values of efficiencies are found to be 18.51 to 25.98 percent in the range of parameters investigated.
- The results show that there is a significant influence of area enhancement factor on thermal performance of corrugated/V-shaped solar pond. At constant value of heat capacity rate ($0.75\text{ W}/\text{m}^2.\text{K}$) and heat extraction rate ($q=0\text{ W}/\text{m}^2$), the percentage enhancement in temperature efficiency have been found to be 21.16 percent and 22.42 percent, respectively. These results are due to the fact that the increase in heat transfer surface area increases the heat transfer capability to the working fluid (water) and consequently increase the temperature and efficiency of the solar pond.

NOMENCLATURE

SGSP	Salt Gradient Solar Pond
UCZ	Upper Convective Zone
NCZ	Non-Convective Zone
LCZ	Lower Convective Zone (Storage Zone)
β	Area Enhancement Factor
A_f	Total surface area of the pond with flat bottom surface
A_{pf}	Total surface area of the pond with corrugated bottom surface
c	Concentration of the salt (kg/m^3)
C_p	Specific heat of the salt ($\text{J}/\text{kg}\cdot^{\circ}\text{C}$)
d	Thickness of the non convective zone (in m)
$T(x)$	Temperature of the pond at a depth x below the interface between UCZ Upper Convective Zone
$\Phi(x)$	Solar radiation reaching a depth x below the NCZ and LCZ interface (W/m^2)
δ	Thickness of the upper convective zone (in m)
$[L-(d+\delta)]$	Thickness of the lower convective zone (in m)
H	Average global solar radiation incident on the surface of the pond
k	Thermal conductivity of the fluid in NCZ

q_c	Heat loss due to convection (in W/m^2)
q_e	Heat loss due to evaporation (in W/m^2)
q_r	Heat loss due to radiation (in W/m^2)
q_t	Total heat loss at the pond surface (in W/m^2)
Q_{Load}	Extracted energy from the solar pond (in W)
T_a	Ambient temperature (in $^{\circ}\text{C}$)
T_c	Integration constant
E_4	Integration constant
C	Heat capacity rate ($=mC_p$) per unit area of the pond for the working fluid in the gradient layer heat exchanger
ρ	density of the fluid used in the pond (in kg/m^3)
τ	Coefficient of transmissivity of air-water interface
$a\&b$	Constants related to absorption of light in water

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Environmental Conditions Prevailing in Habitat Affect Seedlings Growth (*khaya Senegalensis*)

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Abstract- Survival of seedlings in arid and semi-arid zones plantation is strongly affect by localities requirements (soil ,moisture and climate) Many tree species are able to adapt themselves in response to these factors. Seeds from sand, clay and mixture soil (according to the main classification of soil in Sudan) which representing by sinnar, Kordofan and Southern Darfur States used for propagation of *khaya Senegalensis* for three months. The experiment was conducted at the nursery and was laid out in randomized block design with 8 replicates and the growth characteristics were measured on monthly bases The aim of this study was to evaluate the effect of localities requirements in seedlings growth characteristics of *khaya Senegalensis*. The results show significant variation in growth and productivity, which found directly correlated to environmental conditions prevailing in each geographical area. It recommended that care should made not to transfer seed from one locality to another because each plant is adapted to its own specific climate condition and a wrong seed transfer may lead to serious losses of plant martial which may fail to grow successfully away from their natural habitats

Index Terms- *Khaya senegalensis*, seedling, localities, nursery.growth.

I. INTRODUCTION

The importance of forests and natural resources is indisputable, when considering the developing countries especially areas situated in the arid and semi-arid climatic zones. The woody species provide the main parts of the population with firewood and charcoal (Plaza and Chang, 2008). In the mid-fifties, forests in Sudan constituted about 36% of the total area (Harrison and Jackson, 1958). Sudan is classified as a moderately forested country with about 28% (67 million ha) forest and woodlands cover (FRA, 2005).The scarcity of forest resources in Sudan is further aggravated by a high deforestation rate.

FAO (2005) ranked Sudan as the third country following Brazil and Indonesia in terms of net forest loss per year between 2000 and 2005. Many factors attributed to the deforestation in Sudan such as agricultural expansion, fires, overgrazing and illicit felling of trees for fuel wood. Sudan's forests provide a variety of goods including timber in the round and sawn forms arboreal biomass for domestic energy supplies and building material and a large number of non-wood forest products (NWFPs) National energy surveys indicated that forests70.8% of the country national energy balance (4.01 million tons of oil

equivalents) (FAO, 2003). Sudan forests also contribute 33% of the total feed requirement of the national herds. In addition, forestry activities provide significant opportunities for employment and income generation in almost all rural areas of Sudan. It was estimated that one out of seven of the population is engaged in forest related activities (Ballal, 2002).Salih (2000) reported that the forest and woodland area in Sudan amount to 68.90 million ha, which is continuously being encroached upon by agriculture and urbanization or otherwise degraded by uncontrolled felling. Tropical forests are important to rural people in developing countries as they provide them with fuel and other essential goods and services, with food and benefit environment (Badi, 1989).

Khaya senegalensis (Desr) A. juss, locally known as Mahogany, is one of the most economically important forest tree species. The tree is very popular, used for high-class furniture, joinery, building and construction purposes, and recommended for utilization purposes for which surface quality is of high importance .The species has also high traditional medicinal values and used as an ornamental tree for gardens and avenues. Despite its importance the species is only limited incorporated in a forestation programmers. This is mainly because, like most tropical forest tree species, studies on silviculture of the species are incomplete Mahgoub (2002).

Our objectives assess the performance of the species at localities levels at early seedling stage. The importance of this study lies in the fact that knowledge in variation within the species performance at early juvenile stage is particularly important as they determine success of species in establishing themselves under unstable climatic conditions and in their natural and artificial habitats.

II. MATERIAL AND METHOD

Seed materials used in the study collected from three provenances. .Southern Kordafan(Um Abdalla (U) 11° 45' N, 30° 55' E Annual rainfall 700 mm) , Sinnar (Sinnar (S) 13° 75' N33° 75' E Annual rainfall 600)mm and Southern Darfur States(Zalinge (Z) 13°00' N23°50' N Annual rainfall 800mm); with the help of the National .Tree Seed Center of the Forestry Research Centre, Agricultural research Corporation. The experiment conducted to assess Provenance variation of Mahogany at early stage of growth. The experiment conducted in the nursery of the Forests National Corporation at Ad Duwem), White Nile state, following the ordinary nursery practice for raising forest tree seedlings. The seedlings grow in polythene

bags of 25 cm width by 30 cm length when flat. The soil used Isis river silt. No fertilizers used and three seeds grow in each bag. The seedling watered every three days through flood irrigation which is the common practice with sunken nursery bed. The seedling placed in beds under the shade ;in randomized block design with 8 replicates were adopted. For each provenance, 480 seedlings raised i.e. 60 seedlings per plot. The seedling growth parameter measured then the seedling dried at 80°C till a constant weight obtained and the following assessments made. Total dry weight (g) shoot dry weight (g) and root dry weight (g). Results statistically analyzed using the JMP advanced statistical. Means compared using Tukey – Kramer method.

III. RESULTS AND DISCUSSION

Tables (1, 2, 3) and figures (1, 2, 3) show mean seedling characteristic by provenances for Mahogany in second month of growth. Seedling growth evaluated in term of assessment of nine growth parameters. The results showed significant differences for all growth characteristics of the three provenances. From the result obtained it is apparent that shoot in both Zalinge and Sinnar grow faster in length. The maximum root length attained by Um Abdalla, provenance Sinnar and Zalinge provenance are less than that in the shoot.

This explained in the light of the findings obtained by Ahmed (in Ibrahim 1988) for *Acacia* subspecies, that root length is critical importance at early stage, as deeper primary root system provides access to more reliable source of water in short time than available to shallow root system. However, under difficult conditions, particularly low soil moisture, the ratio of root length to shoot length considered as an important factor.

In survival of plants, the ratio believed to be large for species grow in dry region. Jacobs (1955), as quoted by Abbott (1984) Ahmed (1982) claimed that seedling of arid land tree species are characterized by that their roots grow taller than shoots even if they are watered, yet dry matter production from shoot of all provenance was much superior to the root dry matter production. The provenances Zalinge and Um Abdalla produced relatively higher number of leaves per seedling this is an indication of adaptation of Sinnar provenance to drier condition compared to the other two provenances. Variation in growth in the localities is of special interest to the tree breeder as it makes selection among localities or within species. As far as the three localities investigated in the study is concerned Sinnar and Zalinge and Um Abdalla did not differ significantly from each other. Zalinge showed good growth for three months. Sinnar showed better growth in the first month and lowest growth the third month. When using shoot height as only criteria for evaluating growth performance and productivity; early height growth determining the success of seedling establishment. Seedling that will grow rapidly could have practical advantages, damage from animal for instance lessened because the terminal part of the tree would sooner be inaccessible to browsing. Fast growing seedling can compete better with other vegetation Demister (1972) argued that outstanding seedling can maintain superior growth, rates for considerable periods. Root growth among the three localities found significant during initial two months while these difference evened down for three localities by the third month

IV. CONCLUSION AND RECOMMENDATION

The conclusion from this study is growth of Zalinge state was faster and better than other two states. The result indicates that variation in growth and productivity within the species under investigation is significant at the initial three months.

V. RECOMMENDATION

Since there are significant differences of seedling growth characteristics at juvenile growth performances between the three states, which found directly correlated within environmental conditions prevailing in each geographical area. We recommended that caution should made, when transfer seed from one locality to another because each plant is adapted to its own specific climate condition and a wrong seed transfer may lead to serious losses of plant material which may fail to grow successfully away from their natural habitats

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Table (1) Growth characteristics of 3-month old *Khaya senegalensis* seedlings of the three provenances

Growth characteristics	Provenance Um Abdalla	Sinnar	Zalinge
Shoot length (cm)	14.36 c*	16.34 b*	17.33 a*
Root length (cm)	14.61 a	12.256 b	14.61 a
Total length (cm)	29.45 b	28.60 b	31.94 a
Growth at root color (cm)	12.26 a	12.4 a	11.8 a
No. of leaves/seedling	10.40 a	9.6 b	10.2 a
Soot dry weight (gm)	0.68 a	0.67 a	0.66 a
Root dry weight (gm)	0.21 a	0.25 a	0.2 ab
Total dry weight (gm)	0.9 a	0.93 a	0.9a
Root /shoot Ratio	0.75 b	1.0129 a	0.842 b

Similar letters in the same row are not significantly different using Turkey-kramer test

Table (2) Shoot growth rate of the three provenances under investigation at the first three months in the nursery:-

Provenance	Month 1 st	2 nd	3 rd
Sinnar	7.475 a*	16.34b*	20.89c*
Um Abdalla	6.165b	14.63c	22.95b
Zalinge	1.65 a	17.335a	25.62a

* Similar letters in the same column are not significantly different using kramer- Tukey –test.

Table (3) Root growth rate of the three provenances under investigation at the first three months in the nursery:-

Provenance	Month 1 st	2 nd	3 rd
Sinnar	10.23 b*	12.265 b*	12.175 b*
Um Abdalla	10.815 b	14.82 a	15.495 a
Zalinge	11.635 a	14.615 a	15.955 a

* Similar letters in the same column are not significantly different using Tukey –

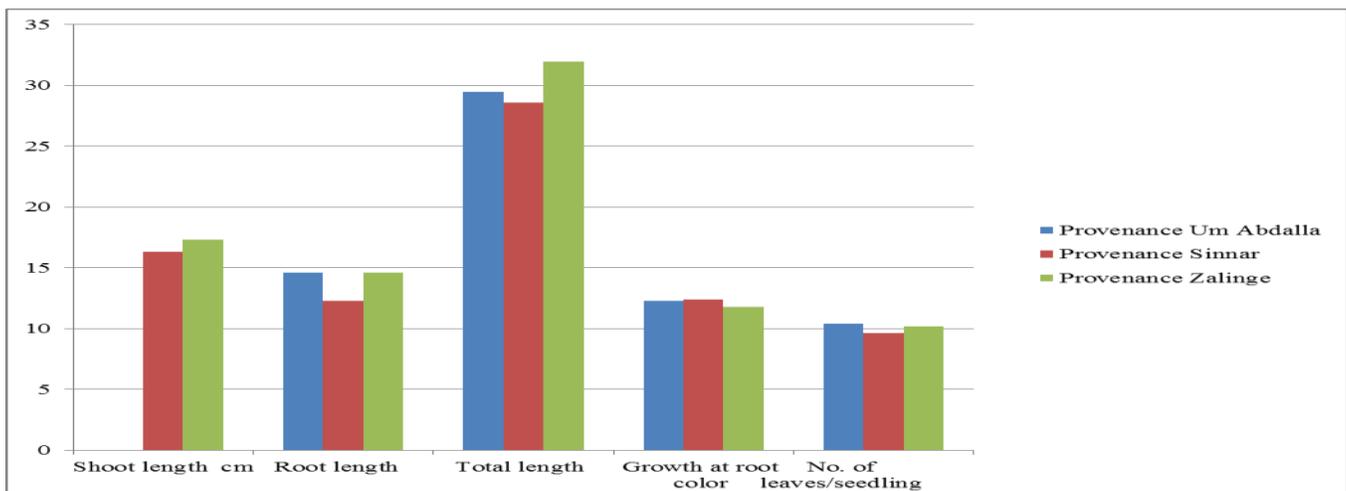


Figure (1) Growth characteristics of-3month old *Khaya senegalensis* seedlings of the three provenances at nursery growth

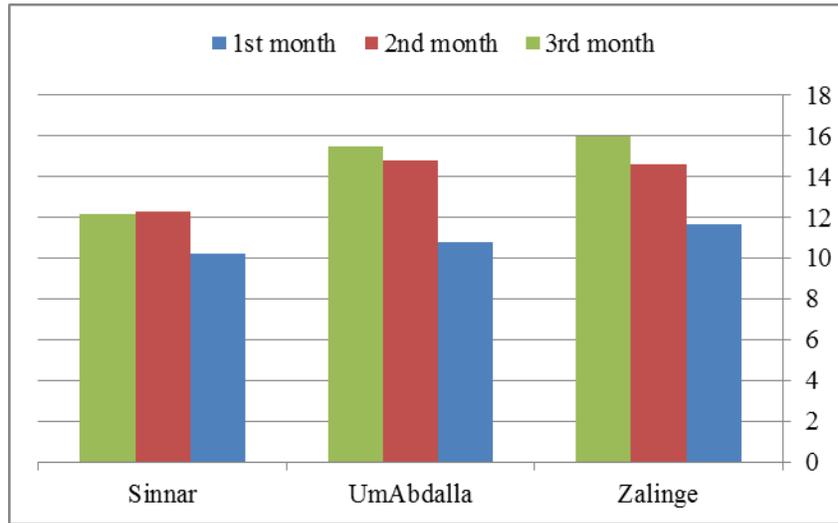


Fig (2): Shoot growth rate of the three provenances under investigation at the first three months of nursery growth

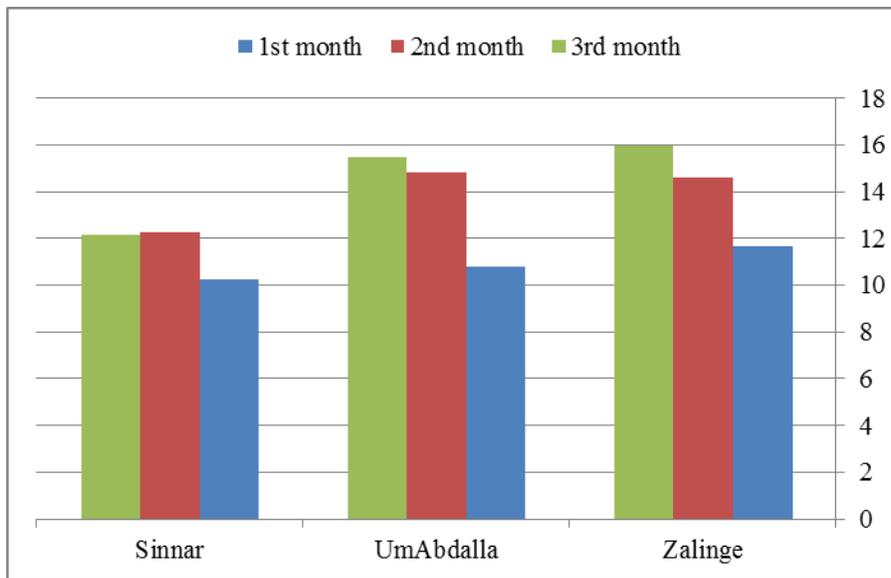


Fig (3): Root growth rate of the three provenances under investigation at the first three months in the nursery:-

Agglomerative Hierarchical Clustering Algorithm- A Review

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Abstract- Clustering is a task of assigning a set of objects into groups called clusters. In data mining, hierarchical clustering is a method of cluster analysis which seeks to build a hierarchy of clusters. Strategies for hierarchical clustering generally fall into two types: Agglomerative: This is a "bottom up" approach: each observation starts in its own cluster, and pairs of clusters are merged as one moves up the hierarchy. Divisive: This is a "top down" approach: all observations start in one cluster, and splits are performed recursively as one moves down the hierarchy.

Index Terms- Agglomerative, Divisive

I. INTRODUCTION

Fast and robust clustering algorithms play an important role in extracting useful information in large databases. The aim of cluster analysis is to partition a set of N object into C clusters such that objects within cluster should be similar to each other and objects in different clusters are should be dissimilar with each other[1]. Clustering can be used to quantize the available data, to extract a set of cluster prototypes for the compact representation of the dataset, into homogeneous subsets.

Clustering is a mathematical tool that attempts to discover structures or certain patterns in a dataset, where the objects inside each cluster show a certain degree of similarity. It can be achieved by various algorithms that differ significantly in their notion of what constitutes a cluster and how to efficiently find them. Cluster analysis is not an automatic task, but an iterative process of knowledge discovery or interactive multi-objective optimization. It will often necessary to modify preprocessing and parameter until the result achieves the desired properties.

In Clustering, one of the most widely used algorithms is agglomerative algorithms. In general, the merges and splits are determined in a greedy manner. The results of hierarchical clustering are usually presented in a dendrogram. In the general case, the complexity of agglomerative clustering is $O(n^3)$, which makes them too slow for large data sets. Divisive clustering with an exhaustive search is $O(2^n)$, which is even worse. However, for some special cases, optimal efficient agglomerative methods (of complexity $O(n^2)$) are known: SLINK^[1] for single-linkage and CLINK^[2] for complete-linkage clustering.

II. DISADVANTAGES

- 1) Very sensitive to good initialization
- 2) Coincident clusters may result

Because the columns and rows of the typicality matrix are independent of each other

Sometimes this could be advantageous (start with a large value of c and get less distinct clusters)

Cluster dissimilarity: In order to decide which clusters should be combined (for agglomerative), or where a cluster should be split (for divisive), a measure of dissimilarity between sets of observations is required. In most methods of hierarchical clustering, this is achieved by use of an appropriate metric (a measure of distance between pairs of observations), and a linkage criterion which specifies the dissimilarity of sets as a function of the pairwise distances of observations in the sets.

Metric:

The choice of an appropriate metric will influence the shape of the clusters, as some elements may be close to one another according to one distance and farther away according to another. For example, in a 2-dimensional space, the distance between the point (1,0) and the origin (0,0) is always 1 according to the usual norms, but the distance between the point (1,1) and the origin (0,0) can be 2, $\sqrt{2}$ or 1 under Manhattan distance, Euclidean distance or maximum distance respectively.

Some commonly used metrics for hierarchical clustering are:^[3]

Names	Formula
Euclidean distance	$\ a - b\ _2 = \sqrt{\sum_i (a_i - b_i)^2}$
squared Euclidean distance	$\ a - b\ _2^2 = \sum_i (a_i - b_i)^2$
Manhattan distance	$\ a - b\ _1 = \sum_i a_i - b_i $
maximum distance	$\ a - b\ _\infty = \max_i a_i - b_i $
Mahalanobis distance	$\sqrt{(a - b)^\top S^{-1} (a - b)}$ where S is the covariance matrix

cosine similarity $\frac{a \cdot b}{\|a\| \|b\|}$

For text or other non-numeric data, metrics such as the Hamming distance or Levenshtein distance are often used. A review of cluster analysis in health psychology research found that the most common distance measure in published studies in that research area is the Euclidean distance or the squared Euclidean distance.

The linkage criterion determines the distance between sets of observations as a function of the pairwise distances between observations.

Some commonly used linkage criteria between two sets of observations A and B are:

Names	Formula
Maximum or complete linkage clustering	$\max \{ d(a, b) : a \in A, b \in B \}$.
Minimum or single-linkage clustering	$\min \{ d(a, b) : a \in A, b \in B \}$.

Mean or average linkage clustering, or UPGMA

Minimum energy clustering $\frac{2}{nm} \sum_{i,j=1}^{n,m} \|a_i - b_j\|_2 - \frac{1}{n^2} \sum_{i,j=1}^n \|a_i - a_j\|_2$

where d is the chosen metric. Other linkage criteria include:

- The sum of all intra-cluster variance.
- The decrease in variance for the cluster being merged (Ward's criterion)

A simple agglomerative clustering algorithm is described in the single-linkage clustering page; it can easily be adapted to different types of linkage (see below).

Suppose we have merged the two closest elements b and c , we now have the following clusters $\{a\}$, $\{b, c\}$, $\{d\}$, $\{e\}$ and $\{f\}$, and want to merge them further. To do that, we need to take the distance between $\{a\}$ and $\{b, c\}$, and therefore define the distance between two clusters. Usually the distance between two clusters A and B is one of the following:

- The maximum distance between elements of each cluster (also called complete-linkage clustering):

$\max \{ d(x, y) : x \in A, y \in B \}$.

- The minimum distance between elements of each cluster (also called single-linkage clustering):

$\min \{ d(x, y) : x \in A, y \in B \}$.

- The mean distance between elements of each cluster (also called average linkage clustering, used e.g. in UPGMA):

$\frac{1}{|A| \cdot |B|} \sum_{x \in A} \sum_{y \in B} d(x, y)$.

- The sum of all intra-cluster variance.
- The increase in variance for the cluster being merged (Ward's method^[6])
- The probability that candidate clusters spawn from the same distribution function (V-linkage).

Each agglomeration occurs at a greater distance between clusters than the previous agglomeration, and one can decide to stop clustering either when the clusters are too far apart to be merged (distance criterion) or when there is a sufficiently small number of clusters (number criterion).

Divisive Hierarchical Clustering

- A top-down clustering method and is less commonly used. It works in a similar way to agglomerative clustering but in the opposite direction. This method starts with a single cluster containing all objects, and then successively splits resulting clusters until only clusters of individual objects remain. GeneLinker™ does not support divisive hierarchical clustering.

Disadvantages $\frac{1}{|A| |B|} \sum_{a \in A} \sum_{b \in B} d(a, b)$

No provision can be made for a relocation of objects that may have been 'incorrectly' grouped at an early stage. The result should be examined closely to ensure it makes sense. Use of different distance metrics for measuring distances between clusters may generate different results. Performing multiple experiments and comparing the results is recommended to support the veracity of the original results.

III. CONCLUSION

Agglomerative hierarchical clustering is a bottom-up clustering method where clusters have sub-clusters, which in turn have sub-clusters, etc. The classic example of this is species taxonomy. Gene expression data might also exhibit this hierarchical quality (e.g. neurotransmitter gene families). Agglomerative hierarchical clustering starts with every single object (gene or sample) in a single cluster. Then, in each successive iteration, it agglomerates (merges) the closest pair of clusters by satisfying some similarity criteria, until all of the data is in one cluster.

Advantages: It can produce an ordering of the objects, which may be informative for data display.

Smaller clusters are generated, which may be helpful for discovery. determine the similarity between prototypes and data points, and it performs well only in .

IV. FUTURE WORK

This paper was intended to compare between two algorithms. Through my extensive search I was unable to find any study that attempts to compare between all algorithms under investigation.

As a future work comparison between these algorithms can be attempted according to different factors other than those considered in this paper. Comparing between the results of algorithms using normalized data or non-normalized data will give different results. Of course normalization will affect the performance of the algorithm and quality of the results.

Another approach may consider using data clustering algorithms in applications such as object and character recognition or information retrieval which is concerned with automatic documents.

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Cryptococcal Meningitis: Looking beyond HIV

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Abstract- Introduction: Cryptococcal meningitis is a type of meningitis. It has conventionally associated with HIV infection. However, few cases are also described in patients with other forms of immunosuppression and in apparently immunocompetent individuals as well. Objectives: We reviewed 15 cases hospitalized and diagnosed with cryptococcal meningitis at Kasturba Hospital, Manipal in the last two years. We also compared the clinicopathologic characteristics of meningitis in HIV positive and HIV negative groups. Results: 9 of 15 patients with cryptococcal meningitis had been diagnosed with HIV, remaining 6 were HIV negative. The predominant clinical features in both groups were headache, vomiting and fever. The patients with HIV had the following features: more acute onset of signs and symptoms a higher mortality rate, low to normal leucocyte count with a predominance of neutrophils and an initial high cryptococcal antigen titre. The CSF glucose was low whereas the protein was elevated. The HIV negative group had a late onset of illness, higher leucocyte count with a predominance of lymphocytes and lower cryptococcal antigen titre. The CSF glucose and protein were normal. Conclusion: Both groups had a well-defined set of characteristics which could be useful in diagnosing and predicting the course of the disease.

Index Terms- Cryptococcus, meningitis, immunosuppression

I. INTRODUCTION

Cryptococcus *neoformans* is an encapsulated yeast. The incidence and prevalence of this pathogen has risen exponentially over the past two decades; parallel with the rise of HIV and with an ever increasing use of immunosuppressive therapies.¹ Cryptococcal meningitis is a common opportunistic infection and AIDS-defining illness in patients with late-stage HIV infection.^{1,2} Cryptococcal meningitis also occurs in patients with other forms of immunosuppression and in apparently immunocompetent individuals as well. Mortality from HIV associated cryptococcal meningitis remains high in many countries due to multiple factors. Some of them include the insufficiency of antifungal drugs, and the complications such as raised intracranial pressure.^{3,4} Since the data on the clinical characteristics and prognosis of cryptococcal meningitis in HIV positive and HIV negative patients is limited, we reviewed 15 cases diagnosed in a major tertiary care hospital in Karnataka.

II. OBJECTIVES

1. To review the cases diagnosed as cryptococcal meningitis in HIV positive and HIV negative patients and study their clinicopathologic profile.
2. To ascertain any distinguishing features between the 2 groups.

III. MATERIALS AND METHODS

It was retrospective study of 15 cases, hospitalized and diagnosed as cryptococcal meningitis, over the last 2 years (2010-2012) at Kasturba Hospital, Manipal. An approval from the Institutional Ethics Committee, Kasturba Hospital, Manipal was obtained before the study. The clinical data was obtained by reviewing the medical records of the patients. For patients with meningitis, cerebrospinal fluid (CSF) was routinely sent for complete white blood cell (WBC) counts and differential counts, glucose, protein and culture. CSF testing with India ink was also performed. The titres of antibody against cryptococcus species were obtained by enzyme immunoassay technique.

IV. RESULTS

The results of the clinical features at the time of presentation are shown in table 1. The median age for HIV group had a younger profile (27.4 years). The most common presenting features were fever, headache and nausea/ vomiting. 7 of 9 patients had features of meningism. The duration of symptoms was approximately 10 days. 5 patients had hydrocephalus, requiring a ventriculo-peritoneal shunt (VP shunt) to lower the intracranial pressure. Significantly, 4 patients succumbed to the disease.

The median age for HIV negative group had a relatively older profile (45.2 years). The common presenting features were similar to HIV positive group; although not as prevalent. The duration of symptoms was longer (17.6 days). Though 2 patients had hydrocephalus, neither required a ventriculo-peritoneal shunt (VP shunt). Significantly, this group had no mortality due to the disease.

Table 1: Comparison of the clinical profiles of cryptococcal meningitis in HIV positive and negative group

Clinical features	HIV positive group (n=9)	HIV negative group (n=6)
Median age	27.4 years	45.2 years
Signs& symptoms		
a. Fever	100%	100%
b. Headache	88.8%	66.7%
c. Nausea/ vomiting	55.5%	50%
d. Altered sensorium	44.4 %	16.7%
e. Meningeal signs	77.7%	50%
f. Seizures	33%	16.7%
g. Duration of onset of symptoms(days)	10	17.6

Hydrocephalus	55.5%	33%
Death due to disease	44.4%	-

The CSF examination parameters for the two groups are listed in table 2. The HIV positive group had a lower total leucocyte count (23 cells/mm³) with a predominance of neutrophils. Plasma cells were invariably noted in the differential count. The glucose levels were within normal range whereas the protein was raised. This group had a high antigen titre (>1:256).

In stark comparison, the HIV negative group had a significant leucocytosis (96.3 cells/mm³) with lymphocyte predominance. The eosinophils were relatively more compared to the first group. The CSF protein and glucose concentration were within normal range. The antigen titres were also low.

Table 2: Comparison of the CSF examination profiles of cryptococcal meningitis in HIV positive and negative group

CSF examination	HIV positive group (n=9)	HIV negative group (n=6)
Total WBC count (median)	23/cu.mm	96.3/cu.mm
Differential count (median %)		
a. Neutrophils	76.1	45.2
b. Lymphocytes	22.2	59.8
c. Eosinophil	3.1	9.2
d. Plasma cells	5.4	0.6
Glucose (mg/dL)	28	39
Protein (mg/dL)	65	42
Antigen titre	> 1:256	1:16

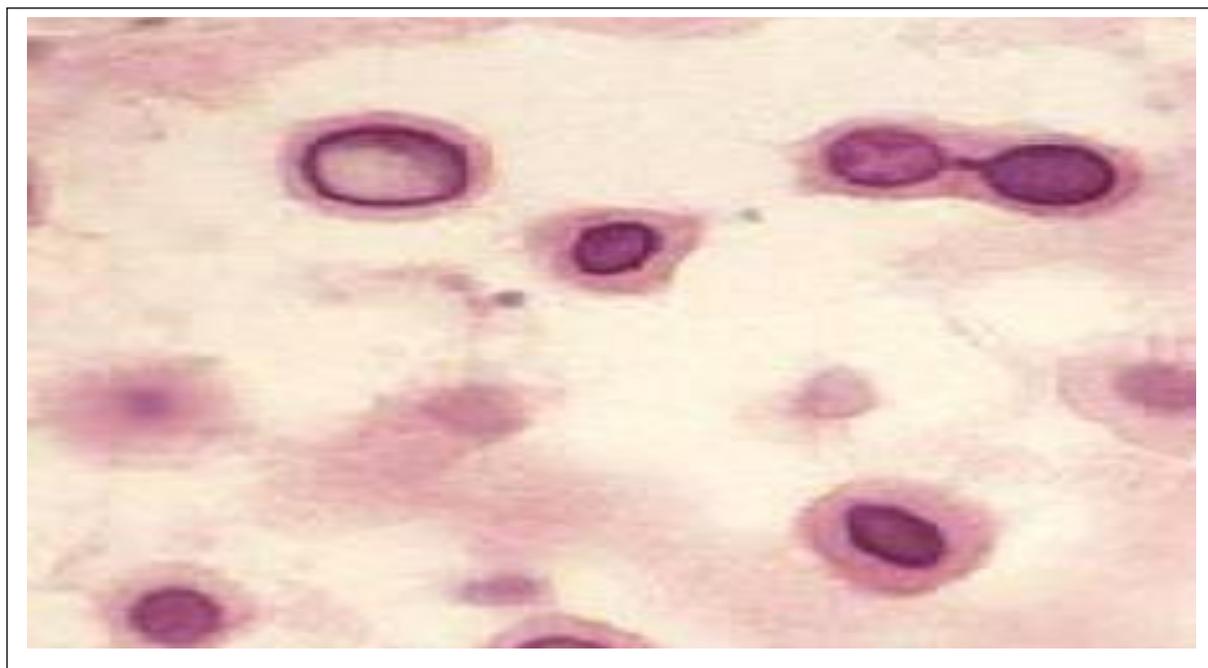


Figure 1: Cerebrospinal fluid showing budding, encapsulated yeast forms of *Cryptococcus neoformans* species. (Leishman ; x400)

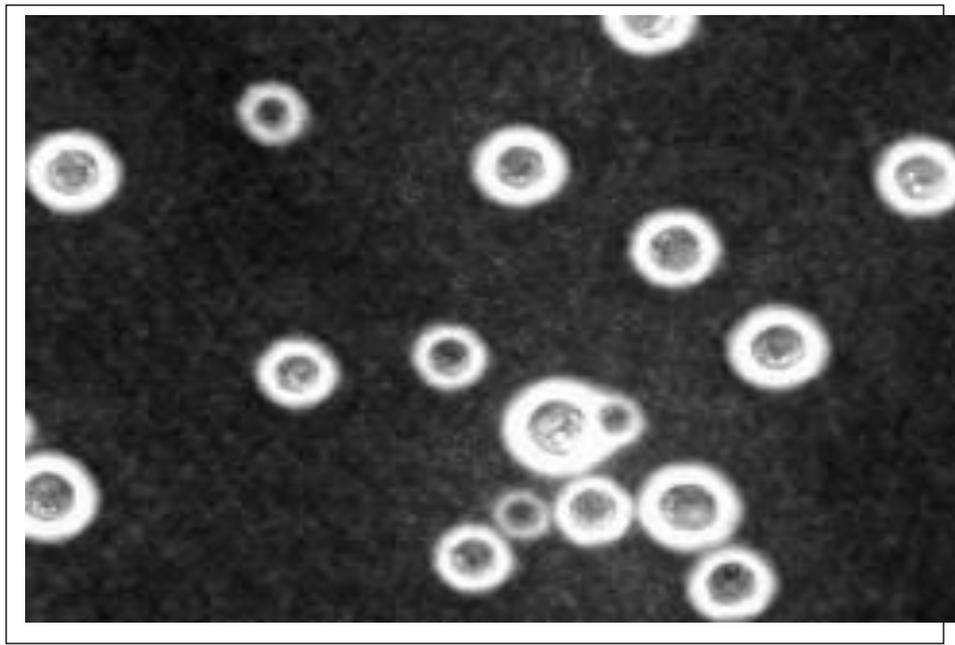


Figure 2: India ink preparation demonstrating the negative staining of Cryptococci. (India ink; x200)

V. DISCUSSION

Cryptococcus neoformans is a saprophytic fungus. The infections in humans by this fungi is accidental. However, this basidiomycete fungi has evolved over a period of time. This has also enable it to survive in humans and other mammalian and avian hosts.^{5,6} The incidence cryptococcal meningitis has risen in parallel to the HIV epidemic; particularly in the last two decades. Cryptococcal meningitis is also regarded as an AIDS-defining criteria in patients with late-stage HIV infection.^{1,2} This however has also led to the overshadowing of the data on this disease in the non HIV cases. But with the ever-increasing use of immunosuppressive therapies, the incidence of cryptococcal meningitis in the non HIV group has been on the rise.⁷

In a large case series conducted by Pappas and co-workers⁸, a total of 306 HIV-negative patients with cryptococcosis were studied. In the same study, the predisposing conditions included the long term usage of steroids (28%), post-organ transplant status (18%), chronic organ failure (liver, lung, kidney) (18%), neoplasia(18%) and rheumatologic disease (13%). A quarter of patients included in the study had no identifiable predisposing factors in the same series. In the present study, the 6 HIV-negative patients diagnosed with cryptococcal meningitis included 2 cases of chronic kidney disease on immunosuppressant drugs including steroids, 2 pediatric cases of acute lymphoblastic leukemia on antineoplastic chemotherapy regimen. The remaining 2 cases had no identifiable predisposing factors.

The main virulence factor that enables *Cryptococcus neoformans* to survive and multiply in the human host is when T-cell immunity is jeopardized. The other inherent properties of the fungus include the ability to grow at room temperature, i.e. 37°C, the capsule, which enables it to resist phagocytosis by the macrophages. The same capsule is known to inactivate the

cellular and humoral immune responses when shed into host tissues. Casadevall and colleagues had demonstrated that the fungi also possess laccase and melanin that interfere with oxidative killing by phagocytes.⁵ Production of melanin from L-dopa by the enzyme laccase is also reported to be the main cause for the predilection of the organism for the central nervous system (CNS).⁶

Meningitis is regarded as the most common clinical manifestation of cryptococcosis.⁶ Once the infection of the subarachnoid space is initiated, the involvement of the brain parenchyma usually frequent. In keeping with the conventional trend, the demographic of HIV positive patients with cryptococcal meningitis had a younger profile (median: 27.4 years) in our study. This was in sharp contrast to the non HIV group which had an older profile (median: 45.2 years). Patients with cryptococcal meningitis usually present with a diffuse headache, febrile status, generalized malaise and altered sensorium over several weeks. In our study, the most frequent symptom was fever, followed by headache and nausea/vomiting. There was no discrepancy with respect to this in both groups. Interestingly, this differed from the findings of C.C.Shih and colleagues, who found headache to the predominant symptom in the non HIV group.⁷

The HIV group had a more acute onset of clinical symptoms (median: 10 days) compared to the other group. Few research workers have recently found that T cell suppression in HIV negative population also had an acute onset of clinical features with a median of 14 days.⁷ Additionally, the meningeal signs and complication such as altered sensorium, seizures and hydrocephalus was observed more in the HIV positive group as opposed to the non HIV group. This was also associated with a rise serum cryptococcal antigen titre and a scant CSF inflammatory response. These findings could be attributed to the impairment of immune response in HIV. Furthermore, these

characteristics concurred with the observations made by Bicanic and Harrison.⁶ Significantly, 2 patients in the HIV-positive group succumbed to the illness and its complications. At the time of writing this article, the follow up available for 4 of the 6 HIV negative patients with cryptococcal meningitis has not shown mortality.

We observed that the CSF protein was higher for HIV positive patients (median: 68mg/dL) as opposed to HIV negative group (median: 42mg/dL). This finding was observed in other epidemiological studies on cryptococcosis as well.^{6,9} Meanwhile, the CSF glucose levels were within normal range in both the groups. This characteristic differed from literature findings which places a low CSF glucose levels as a feature particular to HIV positive cryptococcal meningitis.^{6,9-11}

With regard to the other laboratory findings, there was an interesting difference in the differential leucocyte count of the CSF. The HIV positive cryptococcal meningitis had a relative increase in polymorphs with fewer lymphocyte counts. More than occasional plasma cells were also noticed in the smears. In sharp contrast, the HIV negative group had mild lymphocytosis and few eosinophils. The former could be attributed to an impaired immune response while the latter could be a stronger immune reaction. The mild lymphocytosis was not observed in the CSF examination of the 2 HIV negative patients on immunosuppressants.

The India ink preparation demonstrates the capsule of *C. neoformans*. We observed that the HIV infected group had a stronger positive test than the other group. A negative India ink test on CSF is a good prognostic sign in HIV negative cryptococcal meningitis but does not seem to have the same implication in patients with AIDS.¹² The capsule of the fungus sheds specific antigens which can be detected in the CSF.¹³ Surprisingly, the demonstration of antibodies to *C. neoformans* are seldom of any utility in the diagnosis of this condition. On the other hand, detection of the cryptococcal polysaccharide antigen in body fluids by latex agglutination tests or enzyme immunoassay has a better sensitivity and at a titre of >1:4, is considered very specific. High initial CSF titres are known to parallel a high organism burden by quantitative culture and indicate a poor prognosis.^{11,14} In the present study, a higher antigen titre was seen in HIV positive group (median: >1:256) as opposed to the HIV negative group. A fall in the CSF antigen titres with the administration of antifungal drugs is noted. But this phenomenon is considered to be insignificant in the overall management of this disease.¹¹

A glance into the recent literature on cryptococcal meningitis enlists the adverse prognostic factors. These include the presence of an underlying disease (malignancy or chronic steroid use), absence of headache, abnormal mentation status, high organism load demonstrated by a Indian ink positivity or a rise in the cryptococcal antigen titre, an insufficient host inflammatory response and raised CSF pressure.^{15,16} Some of these variables were seen in the HIV positive patients in our study which could be culpable for the mortality of 2 cases. In a more recent series of cryptococcal meningitis in HIV negative patients, after the introduction of antifungal regimen, factors deciding mortality included chronic renal, liver failure, hematologic malignancy, absence of headache and altered mental status.⁸ Although no patient succumbed to the disease in the

HIV negative group, the risk factors were present in the 6 patients.

VI. CONCLUSIONS

The predominant clinical features in both groups were headache, vomiting and fever. The patients with HIV had the following features: more acute onset of signs and symptoms a higher mortality rate, low to normal leucocyte count with a predominance of neutrophils and an initial high cryptococcal antigen titre. The CSF glucose was low whereas the protein was elevated. The HIV negative group had a late onset of illness, higher leucocyte count with a predominance of lymphocytes and lower cryptococcal antigen titre. The CSF glucose and protein were normal. Thus, patients with HIV positive and HIV negative cryptococcal meningitis have distinct clinicopathologic features which could aid in diagnosis and predicting the course of the disease.

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Batch arrival Feedback Queue with Additional Multi Optional Service and Multiple Vacation

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Abstract- Batch arrival feedback queue with additional multi optional service and multiple vacation is considered. All the arriving customers demand first essential service and only some of them demand second optional service. After the completion of second service, customer may feedback to the tail of original queue to repeat the service until it is successful or may depart forever from the system. If there is no customer in the queue the server goes on multiple vacation. Service times are generally distributed and vacation time is exponentially distributed. The time dependent probability generating functions has been obtained in terms of their Laplace transforms and the corresponding steady state results are obtained explicitly. Mean queue length and mean waiting time are computed.

Index Terms- Batch arrival feedback, multi optional service, multiple vacation.

I. INTRODUCTION

In many examples such as production system, bank services, computer and communication network, besides feedback the system have vacation. Levy and Yechiali [7], Borthakur and Choudhury [2], Madan and Jehad [10], Madan and Anabosi [9], Badamchi Zadeh and Shankar [1] and many others have studied vacation queues.

Igaki [5], Chae et al [3] have studied queues with generalized vacation. Tian and Zhang [14] analyzed the discrete-time G/Geo/1 queue with multiple vacation

Medhi [11], Choudhury [4], Kalyanaraman and Pazhani Bala Murugan [6], Roobala and Udayachandrika[12] have studied single server batch arrival queuing system with an additional service channel. Madan[8] had discussed an M/G/1 queue with second multi optional service.

Thangaraj and Vanitha [13], have studied a two phase M/G/1 feedback queue with multiple vacation. In this paper we analyse a single server queue with batch arrival Poisson input with two phases of heterogeneous service. The first phase is essential and the second phase has multi optional service.

II. MATHEMATICAL DESCRIPTION OF THE MODEL

- ❖ Customers arrive in batches according to a compound Poisson process with rate λ . Let X_k denote the number of customers belonging to the k^{th} arrival batch, where $X_k, k = 1, 2, 3, \dots$ are with a common distribution

$\Pr [X_k = n] = a_n, n = 1, 2, 3, \dots$ and $X(z) = \sum_{n=1}^{\infty} a_n z^n$ denotes the probability generating function of X.

- ❖ The server provides the first essential service to all arriving customers. Its service time has general distribution with distribution function $B_0(x)$, density function $b_0(x)$, mean service times μ_0 and hazard rate function $\mu_0(x)$.

- ❖ As soon as the first service of a customer is completed, then with probability $r_k (1 \leq k \leq m)$ the customer may opt for a certain second optional service from m kinds of different service, or else, with probability $r_0 = 1 - \sum_{k=1}^m r_k$, he may opt to leave the system. The second service time has general distribution. with distribution function $B_k(x)$, density function, $b_k(x)$, mean service times μ_k and the hazard rate function $\mu_k(x)$, where $1 \leq k \leq m$.

- ❖ After completion of second service, if the customer is dissatisfied with its service, then with probability p he may join the tail of the original queue as a feedback customer for receiving another regular service. Otherwise the customer may depart forever from the system with probability $q = 1 - p$. The customers are served according to First In First Out rule.

- ❖ If there is no customer waiting in the queue, then the server goes for a vacation. The vacation periods are exponentially distributed with mean vacation time γ . On returning from vacation if the server again finds no customer in the queue, then it goes for another vacation. So the server takes multiple vacations.

III. EQUATIONS GOVERNING THE SYSTEM

- ❖ Let $P_n^{(0)}(x, t)$ be the probability that at time t, there are n customers in the queue excluding the one being provided the first essential service with elapsed service time x.
- ❖ $P_n^{(k)}(x, t)$ be the probability that there are n customers in queue excluding the customer being provided the kth optional service, with elapsed service time x.

- ❖ $V_n(t)$ be the probability that at time t, there are n customers in the queue and the server is on vacation.

Assume that initially there is no customer in the system and the server is under vacation. Then the initial conditions are $V_0(0) = 1, V_n(0) = 0$ and $P_n^{(j)}(0) = 0$ for $n \geq 0$ and $j = 1, 2, \dots, k$ (1)

IV. GENERATING FUNCTIONS OF QUEUE LENGTH

Define the probability generating functions

$$\begin{aligned}
 P_q^{(0)}(x, z, t) &= \sum_{n=0}^{\infty} P_n^{(0)}(x, t) z^n, & P_q^{(0)}(z, t) &= \sum_{n=0}^{\infty} P_n^{(0)}(t) z^n \\
 P_q^{(k)}(x, z, t) &= \sum_{n=0}^{\infty} P_n^{(k)}(x, t) z^n, & P_q^{(k)}(z, t) &= \sum_{n=0}^{\infty} P_n^{(k)}(t) z^n \\
 \text{and } V(z, t) &= \sum_{n=0}^{\infty} V_n(t) z^n
 \end{aligned} \tag{2}$$

which are convergent inside the circle given by $|z| = 1$.

Laplace transform of the differential difference equations that govern the model under consideration are

$$\frac{\partial}{\partial x} \bar{P}_0^{(0)}(x, s) + (s + \lambda + \mu_0(x)) \bar{P}_0^{(0)}(x, s) = 0 \tag{3}$$

$$\frac{\partial}{\partial x} \bar{P}_n^{(0)}(x, s) + (s + \lambda + \mu_0(x)) \bar{P}_n^{(0)}(x, s) = \lambda \sum_{i=1}^n a_i \bar{P}_{n-i}^{(0)}(x, s), \quad n \geq 1 \tag{4}$$

$$\frac{\partial}{\partial x} \bar{P}_0^{(k)}(x, s) + (s + \lambda + \mu_k(x)) \bar{P}_0^{(k)}(x, s) = 0, \quad k = 1, 2, \dots, m \tag{5}$$

$$\frac{\partial}{\partial x} \bar{P}_n^{(k)}(x, s) + (s + \lambda + \mu_k(x)) \bar{P}_n^{(k)}(x, s) = \lambda \sum_{i=1}^n a_i \bar{P}_{n-i}^{(k)}(x, s), \quad n \geq 1, k = 1, 2, \dots, m \tag{6}$$

$$(s + \lambda + \gamma) \bar{V}_0(s) = 1 + r_0 \int_0^{\infty} \bar{P}_0^{(0)}(x, s) \mu_0(x) dx + q \sum_{k=1}^m \int_0^{\infty} \bar{P}_0^{(k)}(x, s) \mu_k(x) dx + \gamma \bar{V}_0(s) \tag{7}$$

$$(s + \lambda + \gamma) \bar{V}_n(s) = \lambda \sum_{i=1}^n a_i \bar{V}_{n-i}(s), \quad n \geq 1 \tag{8}$$

$$\bar{P}_n^{(0)}(0, s) = q \sum_{k=1}^m \int_0^{\infty} \bar{P}_{n+1}^{(k)}(x, s) \mu_k(x) dx + r_0 \int_0^{\infty} \bar{P}_{n+1}^{(0)}(x, s) \mu_0(x) dx$$

$$+ (1 - q) \sum_{k=1}^m \int_0^{\infty} \bar{P}_n^{(k)}(x, s) \mu_k(x) dx + \gamma \bar{V}_{n+1}(s), \quad n \geq 0 \tag{9}$$

$$\bar{P}_n^{(k)}(0, s) = \int_{r_k}^{\infty} \bar{P}_n^{(0)}(x, s) \mu_0(x) dx, \quad n \geq 0, \quad k = 1, 2, \dots, m \tag{10}$$

Multiplying equation (4) by z^n , summing over n from 1 to ∞ and adding the result to equation (3) we get

$$\frac{\partial}{\partial x} \bar{P}_q^{(0)}(x, z, s) + (s + \lambda - \lambda(X(z)) + \mu_0(x)) \bar{P}_q^{(0)}(x, z, s) = 0 \tag{11}$$

By similar operations equations (5) and (6) yield

$$\frac{\partial}{\partial x} \bar{P}_q^{(k)}(x, z, s) + (s + \lambda - \lambda(X(z)) + \mu_k(x)) \bar{P}_q^{(k)}(x, z, s) = 0 \tag{12}$$

and equations (7) and (8) yield

$$(s + \lambda - \lambda(X(z)) + \gamma) \bar{V}(z, s) = 1 + r_0 \int_0^{\infty} \bar{P}_0^{(0)}(x, s) \mu_0(x) dx + q \sum_{k=1}^m \int_0^{\infty} \bar{P}_0^{(k)}(x, s) \mu_k(x) dx + \gamma \bar{V}_0(s) \tag{13}$$

From equations (9) and (10) we get

$$z \bar{P}_q^{(0)}(0, z, s) = [z + q(1-z)] \sum_{k=1}^m \int_0^{\infty} \bar{P}_q^{(k)}(x, z, s) \mu_k(x) dx - q \sum_{k=1}^m \int_0^{\infty} \bar{P}_0^{(k)}(x, s) \mu_k(x) dx + r_0 \left[\int_0^{\infty} (\bar{P}_0^{(0)}(x, z, s) - P_0^{(0)}(x, s)) \mu_0(x) dx \right] + \gamma [\bar{V}(z, s) - \bar{V}_0(s)] \tag{14}$$

and

$$\bar{P}_q^{(k)}(0, z, s) = \int_{r_k}^{\infty} \bar{P}_q^{(0)}(x, z, s) \mu_0(x) dx, \quad n \geq 0, \quad k = 1, 2, \dots, m \tag{15}$$

Solution of equation (11) is

$$\bar{P}_q^{(0)}(x, z, s) = \bar{P}_q^{(0)}(0, z, s) e^{-(s + \lambda - \lambda(X(z)))x - \int_0^x \mu_0(x) dx} \tag{16}$$

Integrating equation (16) with respect to x from 0 to ∞ we obtain

$$\bar{P}_q^{(0)}(z, s) = \bar{P}_q^{(0)}(0, z, s) \left[\frac{1 - \bar{B}_0(s + \lambda - \lambda(X(z)))}{s + \lambda - \lambda(X(z))} \right] \tag{17}$$

$$\int_0^{\infty} \bar{P}_q^{(0)}(x, z, s) \mu_0 dx = \bar{P}_q^{(0)}(0, z, s) \int_0^{\infty} e^{-(s+\lambda-\lambda(X(z)))x} dB_0(x) = \bar{P}_q^{(0)}(0, z, s) \bar{B}_0(s+\lambda-\lambda(X(z))) \quad (18)$$

Similarly from equation (12) we obtain

$$\bar{P}_q^{(k)}(x, z, s) = \bar{P}_q^{(k)}(0, z, s) e^{-(s+\lambda-\lambda(X(z)))x - \int_0^x \mu_k(x) dx} \quad k = 1, 2, \dots, m \quad (19)$$

$$\bar{P}_q^{(k)}(z, s) = \bar{P}_q^{(k)}(0, z, s) \left[\frac{1 - \bar{B}_k(s+\lambda-\lambda(X(z)))}{s+\lambda-\lambda(X(z))} \right] \quad (20)$$

$$\int_0^{\infty} \bar{P}_q^{(k)}(x, z, s) \mu_k(x) dx = \bar{P}_q^{(k)}(0, z, s) \bar{B}_k(s+\lambda-\lambda(X(z))), k = 1, 2, \dots, m \quad (21)$$

Using equations (13),(15),(18) and (21), in equation (14) and simplifying we get

$$\bar{P}_q^{(0)}(0, z, s) = \left[\frac{1 - (s+\lambda-\lambda(X(z))) \bar{V}(z, s)}{D(z, s)} \right] \quad (22)$$

$$\text{where } D(z, s) = z - [z + q(1-z)] \sum_{k=1}^m r_k \bar{B}_0(s+\lambda-\lambda(X(z))) \bar{B}_k(s+\lambda-\lambda(X(z))) - r_0 \bar{B}_0(s+\lambda-\lambda(X(z))) \quad (23)$$

Expressions of $\bar{P}_q^{(0)}(z, s)$, $\bar{P}_q^{(k)}(0, z, s)$, $\bar{P}_q^{(k)}(z, s)$ are obtained as

$$\bar{P}_q^{(0)}(z, s) = \left[\frac{1 - (s+\lambda-\lambda(X(z))) \bar{V}(z, s)}{D(z, s)} \right] \left[\frac{1 - \bar{B}_0(s+\lambda-\lambda(X(z)))}{s+\lambda-\lambda(X(z))} \right] \quad (24)$$

$$\bar{P}_q^{(k)}(0, z, s) = r_k \bar{B}_0(s+\lambda-\lambda(X(z))) \left[\frac{1 - (s+\lambda-\lambda(X(z))) \bar{V}(z, s)}{D(z, s)} \right] \quad (25)$$

$$\bar{P}_q^{(k)}(z, s) = r_k \bar{B}_0(s+\lambda-\lambda(X(z))) \left[\frac{1 - \bar{B}_k(s+\lambda-\lambda(X(z)))}{s+\lambda-\lambda(X(z))} \right] \left[\frac{1 - (s+\lambda-\lambda(X(z))) \bar{V}(z, s)}{D(z, s)} \right] \quad (26)$$

Let $\bar{P}_q(z, s)$ denote the probability generating function of the number in the queue irrespective of the type of service being provided. Then

$$\bar{P}_q(z, s) = \bar{P}_q^{(0)}(z, s) + \bar{P}_q^{(k)}(z, s)$$

$$= \left[\frac{N(z, s)}{s + \lambda - \lambda(X(z))} \right] \left[\frac{1 - (s + \lambda - \lambda(X(z))) \bar{V}(z, s)}{D(z, s)} \right] \quad (27)$$

where

$$N(z, s) = 1 - \bar{B}_0(s + \lambda - \lambda(X(z))) + r_k \bar{B}_0(s + \lambda - \lambda(X(z))) - r_k \bar{B}_0(s + \lambda - \lambda(X(z))) \bar{B}_k(s + \lambda - \lambda(X(z))) \quad (28)$$

It can be shown that the denominator of equation (27) has one zero inside the unit circle $|z| = 1$, which is sufficient to determine the unknown $\bar{V}(z, s)$ appearing in the numerator. Therefore $\bar{P}_q(z, s)$ and $\bar{P}_q^{(0)}(z, s)$ and $\bar{P}_q^{(k)}(z, s)$ can be completely determined.

V. THE STEADY STATE RESULTS

The steady state results can be obtained by applying the well-known Tauberian property.

$$\lim_{s \rightarrow 0} s \bar{f}(s) = \lim_{s \rightarrow \infty} f(t) \quad (29)$$

Thus, multiplying both sides of equation (27) by s and taking limit as $s \rightarrow 0$, applying property (29) and simplifying, we have

$$P_q(z) = V(z) \left[\frac{N(z)}{D(z)} \right] \quad (30)$$

where

$$N(z) = 1 - \bar{B}_0(\lambda - \lambda(X(z))) + r_k \bar{B}_0(\lambda - \lambda(X(z))), k = 1, 2, \dots, m - r_k \bar{B}_0(\lambda - \lambda(X(z))) \bar{B}_k(\lambda - \lambda(X(z))) \quad (31)$$

$$D(z) = z - [z + q(1 - z)] \sum_{k=1}^m r_k \bar{B}_0(\lambda - \lambda(X(z))) \bar{B}_k(\lambda - \lambda(X(z))) - r_0 \bar{B}_0(\lambda - \lambda(X(z))) \quad (32)$$

$$P_q(1) = \frac{-\lambda E(X) [E(V_0) + \sum_{k=1}^m r_k E(V_k)]}{[1 + \lambda E(X) E(V_0) - (1 - q) \sum_{k=1}^m r_k + \lambda E(X) \sum_{k=1}^m r_k E(V_k)]} V(1) \quad (33)$$

By normalizing condition we must have $V(1) + P_q(1) = 1$.

Therefore adding $V(1)$ to equation (33), equating to 1 and simplifying, we get

$$V(1) = \frac{1 + \lambda E(X) E(V_0) - (1 - q) \sum_{k=1}^m r_k + \lambda E(X) \sum_{k=1}^m r_k E(V_k)}{1 - (1 - q) \sum_{k=1}^m r_k} \quad (34)$$

$$\frac{1 + \lambda E(X) E(V_0) - (1-q) \sum_{k=1}^m r_k + \lambda E(X) \sum_{k=1}^m r_k E(V_k)}{1 - (1-q) \sum_{k=1}^m r_k} < 1$$

where emerges to be the stability condition under which the steady state solution exists.

We note that $V(1)$ is the steady state probability that the server is under vacation. Consequently system utilization factor is given by

$$\begin{aligned} \rho &= 1 - V(1) \\ &= 1 - \left\{ \frac{1 + \lambda E(X) E(V_0) - (1-q) \sum_{k=1}^m r_k + \lambda E(X) \sum_{k=1}^m r_k E(V_k)}{1 - (1-q) \sum_{k=1}^m r_k} \right\} \\ &= \frac{-\lambda E(X) \left[E(V_0) + \sum_{k=1}^m r_k E(V_k) \right]}{1 - (1-q) \sum_{k=1}^m r_k} \end{aligned} \tag{35}$$

VI. THE MEAN NUMBER IN THE SYSTEM

Let L_q denote the mean number of customers in the queue under steady state then

$$L_q = \frac{d}{dz} P_q(z) \text{ at } z = 1 \tag{36}$$

since the formula gives 0/0 form, applying L'Hopital rule, we get

$$\begin{aligned} L_q &= \lim_{z \rightarrow 1} \frac{d}{dz} P_q(z) \\ &= \lim_{z \rightarrow 1} \frac{D'(z) N''(z) - N'(z) D''(z)}{2(D'(z))^2} \\ &= \frac{D'(1) N''(1) - N'(1) D''(1)}{2(D'(1))^2} \end{aligned} \tag{37}$$

where

$$N'(1) V(1) = -\lambda E(X) \left[\frac{E(V_0) + \sum_{k=1}^m r_k E(V_k)}{1 + \lambda E(V_0) - (1-q) \sum_{k=1}^m r_k + \lambda E(X) \sum_{k=1}^m r_k E(V_k)} \right] \tag{38}$$

$$N''(1) V(1) = -(\lambda E(X))^2 \left[\frac{E(V_0^2) + \sum_{k=1}^m 2r_k E(V_0) E(V_k) + r_k E(V_k^2)}{1 + \lambda E(V_0) - (1-q) \sum_{k=1}^m r_k + \lambda E(X) \sum_{k=1}^m r_k E(V_k)} \right]$$

$$\left[\frac{1 + \lambda E(X) E(V_0) - (1-q) \sum_{k=1}^m r_k + \lambda E(X) \sum_{k=1}^m r_k E(V_k)}{1 - (1-q) \sum_{k=1}^m r_k} \right] \quad (39)$$

$$D'(1) = 1 + \lambda E(X) E(V_0) - (1-q) \sum_{k=1}^m r_k + \lambda E(X) \sum_{k=1}^m r_k E(V_k) \quad (40)$$

$$D''(1) = \frac{\sum_{k=1}^m [E(V_0) + 2E(V_0)E(V_k) + E(V_k^2)]}{(-\lambda E(X))^2} - \lambda E(X) \sum_{k=1}^m r_k [E(V_0) + E(V_k)] \quad (41)$$

By substituting the above values of $N'(1)$, $N''(1)$, $D'(1)$, $D''(1)$ in equation (37) we obtain L_q .

If L denote the mean number in the system including the one in service, then we have

$$L = L_q + \rho \quad (42)$$

VII. THE MEAN WAITING TIME

The mean waiting time in the queue and in the system are respectively obtained by using

$$W_q = L_q / \lambda \text{ and} \quad (43)$$

$$W = L / \lambda \quad (44)$$

VIII. SPECIAL CASES

Case (i)

If $p = 0$, the system reduces to $M^X/G/1$ queue with multi-optional service and vacation.

Probability that the system busy is

$$P_q(1) = \frac{-\lambda E(X) \left[E(V_0) + \sum_{k=1}^m r_k E(V_k) \right]}{\left[1 + \lambda E(X) \left(E(V_0) + \sum_{k=1}^m r_k E(V_k) \right) \right]} V(1) \quad (45)$$

Probability that the server is on vacation is

$$V(1) = 1 + \lambda E(X) \left(E(V_0) + \sum_{k=1}^m r_k E(V_k) \right) \quad (46)$$

Expected queue size is obtained by substituting $p = 0$ in equation (36).

Case (ii)

Taking $r_1 = r_2, \dots, r_m = 0$, in equations (33), (36), (42) and (44) we get the corresponding results for $M^X/G/1$ feedback queue with multiple vacation.

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Growth, Spectral, Optical, Thermal and Mechanical Properties of Thiourea doped Trisglycine Zinc Chloride Nonlinear Optical Crystal

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Abstract- Single crystals of thiourea doped trisglycine zinc chloride (TuTGZC) were grown from aqueous solution by slow evaporation technique. Single crystal X-ray diffraction analysis reveals that TuTGZC crystals belong to orthorhombic system. Various diffracting planes of the grown crystal were identified from the powder X-ray diffraction study. The FT- IR spectral analysis confirmed the presence of the functional groups present in the grown TuTGZC crystal. Optical studies showed that the TuTGZC crystal has good transparency in the entire UV and visible range of the spectrum. The relative second harmonic generation (SHG) efficiency of TuTGZC crystal was found by Kurtz – Perry powder technique. Thermal stability and melting point of the grown crystal were found by thermal analyses. The mechanical strength of the grown crystal is estimated by Vicker's micro hardness test.

Index Terms- Single crystal, slow evaporation technique, single crystal X- ray diffraction, FT-IR, optical studies, Thermal, micro hardness.

I. INTRODUCTION

Highly efficient nonlinear optical (NLO) materials with good mechanical strength and chemical stability are essentially required for opto electronic applications such as optical communications, high speed information processing and optical data storage [1, 2]. Nowadays, high storage capacity optical devices require laser sources at short wavelengths typically around blue region [3- 6]. Semiorganic nonlinear optical materials are reputed candidates for device fabrication, owing to their large nonlinear coefficient, high laser damage threshold and exceptional mechanical and thermal stability. Semiorganic materials are metal- organic coordination complexes in which the organic ligand plays a dominant role for the NLO effect. As for the metallic part, the focus is on group II B metals (Zn, Cd and Hg) as these compounds usually have a high transparency in the UV region, because of their closed shell [7, 8]. Also, in metal-organic compounds the mechanical and thermal stability are considerably enhanced due to the organic ligand is ionically bonded with inorganic host [9]. In the organo- metallic compounds, the metal centre is engaged in π - bonding with the organic ligand which allows metal to ligand charge transfer, and produce excellent second harmonic generation devices.

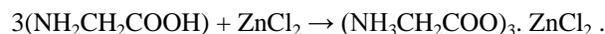
Among amino acids, glycine forms crystals with structures that frequently lead to dielectric instabilities, which in turn lead

to the formation of ferroelectric phases [10]. The inherent polarity and the zwitterionic nature of the glycine molecule are useful prerequisites for the synthesis of new non-centrosymmetric crystals. Compounds of glycine with metal halogenide zinc chloride ($ZnCl_2$) namely glycine zinc chloride hydrate, bisglycine zinc chloride dihydrate and trisglycine zinc chloride that were already published [11, 12]. The crystal structures of glycine zinc chloride hydrate and bisglycine zinc chloride dihydrate compounds are centrosymmetric space groups $P2_1/a$ and C_2/c respectively [13]. Trisglycine zinc chloride (TGZC) crystallizes in the non- centrosymmetric space group $Pbn2_1$ and the crystal structure has been reported. In that paper refractive indices, piezoelectric properties and type I and type II phase matching conditions of the TGZC crystal in the red and near IR region were discussed [14]. Detailed nonlinear properties of trisglycine zinc chloride such as many- photon stimulated Raman scattering, Cherenkov- type second harmonic generation (SHG) and third harmonic generation (THG) were discussed [15]. HRXRD and NMR spectral characterizations of TGZC were discussed [16].

Organic thiourea molecule (NH_2CSNH_2) is an interesting matrix modifier and it has the ability to form an extensive network of hydrogen bonds. In order to observe the changes in structural, optical, thermal and mechanical properties, thiourea molecule is used as dopant to tailor and improve the properties of trisglycine zinc chloride crystals and to meet the practical device fabrication requirements. In the present work, the structural, vibrational, optical, thermal and mechanical properties of TuTGZC crystal are investigated. The results of the investigations are presented in this paper.

II. EXPERIMENTAL

Trisglycine zinc chloride (TGZC) was synthesized by dissolving high purity analar grade glycine (NH_2CH_2COOH) and zinc chloride ($ZnCl_2$) in the ratio 3:1 in an aqueous medium according to the reaction.



The required volume of zinc chloride was dissolved in double distilled water . Then the calculated amount of glycine salt was slowly dissolved in the zinc chloride solution. Then 0.1 mol thiourea was dissolved and stirred well. The solution temperature was always maintained below 50°C. Impurity

content of the TuTGZC was minimized by recrystallization method. Extreme care was taken while crystallizing the salt to avoid oxidation of glycine. The solubility of the TuTGZC in double distilled water, ethanol and methanol in the temperature range 30- 50 °C in steps of 5 °C was found gravimetrically. Water was found to be suitable solvent for growth. Fig. 1 shows the solubility curves and the positive slope of the solubility curve enables growth by slow evaporation method. Saturated solution of TuTGZC was prepared. The final saturated solution was filtered using a 0.2 µm porosity filter papers after suitable preheating. The solution was kept in beaker covered with perforated sheet and loaded in the constant temperature bath set at 35 °C. Transparent and good optical quality grown crystals were harvested after 25 days by slow evaporation solution growth method. Grown TuTGZC crystal of size (25x10x10) mm³ is shown in Fig. 2.

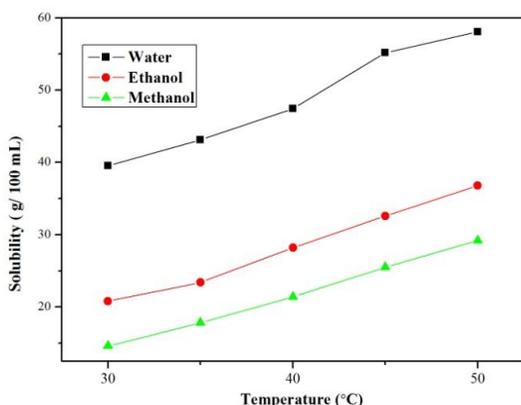


Fig. 1 : Solubility curves of TuTGZC.



Fig. 2 : Photograph of as grown crystal of TuTGZC.

2. 1 CHARACTERIZATION TECHNIQUES

The grown crystals was subjected to single crystal X-ray diffraction using an ENRAF NONIUS CAD-4 diffractometer with MoK α ($\lambda=0.71073$ Å) radiation at room temperature. Powder XRD analysis was also carried out using a Rich Seifert diffractometer with Cu K α ($\lambda=1.54059$ Å) radiation. Fourier transform infrared (FT-IR) spectrum was recorded with a Perkin-

Elmer RXI spectrometer using KBr pellet technique in the wave number range 400- 4000 cm⁻¹ in order to confirm the presence of functional groups of the grown crystals. UV-vis transmittance spectrum of TuTGZC crystal was recorded using Perkin Elmer-lambda 35 UV-vis spectrophotometer in the range of 190- 1100 nm. Second harmonic generation efficiency was measured using Kurtz and Perry powder technique using Nd: YAG laser beam of energy 1.95 mJ/ pulse. Thermal analysis was carried out using SDT Q600V 8.3 build 101 simultaneous DTA/TGA analyzer in the nitrogen atmosphere. Microhardness measurements were made using Shimadzu HMV-2 microhardness tester fitted with a Vicker's diamond pyramidal indenter.

III. RESULTS AND DISCUSSION

3. 1. X-ray diffraction analysis

Single crystal X-ray diffraction study was performed for the grown TuTGZC crystal. It was found that TuTGZC crystal belong to orthorhombic system ($\alpha= \beta= \gamma= 90^\circ$). Lattice parameter values of TuTGZC are compared with reported TGZC in Table 1. In the case of doped sample, a slight variation in the cell parameters is observed, which may be due to the incorporation of thiourea ligand. This analysis revealed that the induction of thiourea ligand in the TGZC crystal does not change the crystal system though there is a small change in the lattice parameters. The powder sample of TuTGZC was scanned over the range 10- 80° at a rate of 1° per minute and the powder X-ray diffraction patterns were indexed using Check cell software (Fig. 3).

Table 1 Lattice parameters of TGZC and TuTGZC

Samples	a (Å)	b (Å)	c (Å)	Volume (Å ³)
TGZC ^a	11.230	15.251	15.564	2666
TuTGZC ^b	11.10	15.15	15.38	2586

^a Ref. [14], ^b Present work.

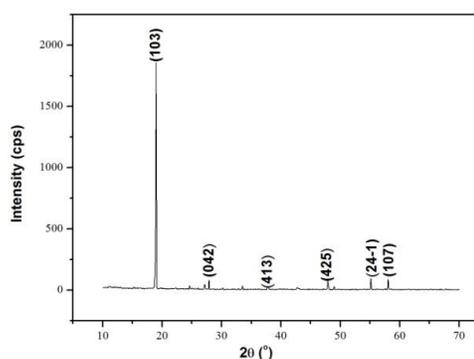


Fig. 3 : Powder XRD spectrum of TuTGZC

3. 2. FT- IR spectral analysis

The mid Fourier transform infrared (FT-IR) spectrum of TuTGZC crystal is shown in Fig. 4. The peak at 3188 cm⁻¹ is considered to be due to the NH₂ group which is associated with a broad band. This broad band in high wave number region indicates the presence of intermolecular hydrogen bonds in the

title crystal. The asymmetric and symmetric NH_3^+ vibrations occur at 1642 and 1501 cm^{-1} respectively [17]. The asymmetric stretching vibration of CH_2 appears at 2160 cm^{-1} [18]. The wagging and stretching vibration of CH_2 appear at 1309 and 903 cm^{-1} respectively. The asymmetric stretching vibration of CCN gave a peak at 1033 cm^{-1} . The wave number of the bands for both TGZC and TuTGZC are compared and given in Table 2. The frequencies in the high wave number region are slightly shifted for thiourea doped TGZC crystal due to N- H bands participate in the hydrogen bonding. The deprotonated carboxylic group (COO^-) symmetric stretching vibrational frequency of the TuTGZC crystal appears at 1417 cm^{-1} . But in TGZC crystal, this band appears at 1411 cm^{-1} . This variation may be due to mixing of C = S and C – N stretching vibrations in this region [19]. Deformation mode and rocking mode of COO^- are observed strongly for the title crystal at 674 and 568 cm^{-1} respectively [20]. The presence of dopants and intermolecular hydrogen bonding network between the cation and anion lead to corresponding shift of few stretching and deformation modes. The results confirmed that the glycine molecule existed as zwitter ions in the crystalline state of both TGZC and TuTGZC.

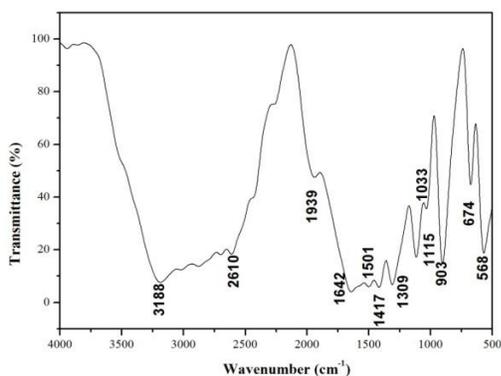


Fig. 4 : FTIR spectrum of TuTGZC

Table 2 wave number assignments for TGZC and TuTGZC.

Wave number (cm^{-1})		Assignments
TGZC [16]	TuTGZC Present work	
1560	1501	asymmetric stretching of $(\text{NH}_3)^+$
1498	-	rocking $\delta(\text{CH}_2)$
1411	1411	symmetric stretching of (COO^-)
1325	1309	wagging of (CH_2)
1134	-	rocking of $(\text{NH}_3)^+$
1126	1115	rocking of $(\text{NH}_3)^+$
1033	1033	asymmetric stretching of(CCN)
928	-	rocking of (CH_2)
918	903	rocking of (CH_2)
897	-	asymmetric stretching of (CCN)
686	674	rocking of (COO^-)
593	-	rocking of $(\text{NH}_3)^+$
561	568	rocking of (COO^-)

3. 3. Optical studies

UV- visible spectral study is a useful tool to determine the transparency which is an important requirement for a material to be optically active [21]. The optical transmittance spectrum of the grown crystal of thickness 2 mm was recorded in the wavelength range 190- 1100 nm and is shown in Fig. 5. Low absorption in the entire visible and near infrared region with the low cut- off wavelength at 248 nm suggests that the material is quite suitable for SHG generation and opto electronic applications. The good transmission of the crystal in the entire visible region suggests its suitability for NLO devices [22, 23].

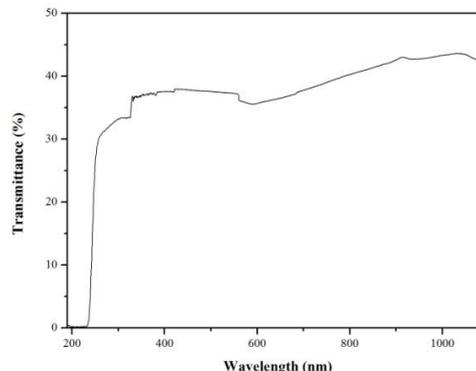


Fig.5 : UV-vis transmittance spectrum of TuTGZC.

3. 4. Nonlinear optical studies

In order to find the nonlinear optical efficiency, the second harmonic generation behaviour of the powdered TuTGZC material was tested using the Kurtz and Perry method [24]. The second harmonic generation was confirmed by emission of green light ($\lambda = 532 \text{ nm}$). The output second harmonic signal of 65 mV for TuTGZC crystal sample and 60 mV for standard KDP sample were found for the same input energy. Hence the measured relative SHG efficiency for TuTGZC sample was about 1.08 times, as that of KDP. When TGZC crystals are doped with thiourea, an NLO material, it is possible that the SHG efficiency may be improved and this is observed in this work. The value of the reported SHG efficiency for TGZC crystal was 0.5 times than that of KDP [25], and hence thiourea doped TGZC crystal is a better candidate for NLO and optoelectronic applications.

3. 5. Thermal analysis

TGA/DTA analysis of the TuTGZC crystal was carried out in the temperature range 10- 800°C. The recorded thermogram is shown in Fig. 6. From TGA curve it is observed that the weight loss start from 192°C. There is 53% weight loss between 269°C and 472°C. This weight loss is due to the liberation of chlorine atoms and glycine molecule. As there is no weight loss below 192°C, it indicates that the crystal is devoid of any physically adsorbed water in it. The DTA curve shows a sharp endothermic peak at 244.6°C which indicates the melting point of the crystal. This endothermic event is in good agreement with the TGA trace.

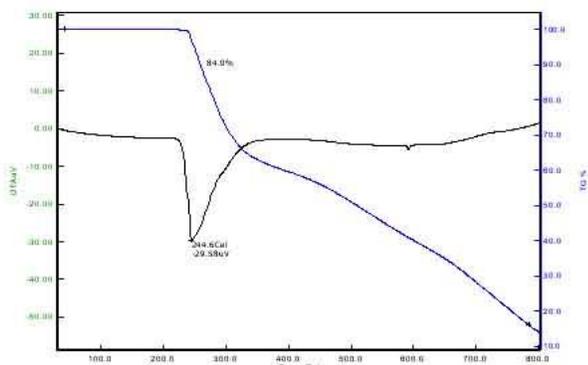


Fig. 6 : TG/DTA spectrum of TuTGZC

3. 6. Micro hardness studies

Hardness of the material is a measure of resistance, that offers to deformation. The transparent polished crystal free from cracks was selected for hardness measurements. The indentations were made on the flat surface with the load ranging from 25 to 100 g using Shimadzu make-model-HMV-2 fitted with Vicker’s pyramidal indenter and attached to an incident light microscope. The indentation time was kept as 5s for all the loads. The Vicker’s hardness (H_v) was calculated from the relation [26],

$$H_v = \frac{1.8544P}{d^2} \quad P/d^2 \text{ kg/mm}^2$$

Where P is the applied load and d the average length of the diagonal of the indentation mark. With P in g and d in μm , the units of H_v turned out to be kg/mm^2 . The variation of micro hardness with applied load for the prominent (100) plane of the TuTGZC crystal is shown in Fig. 7.

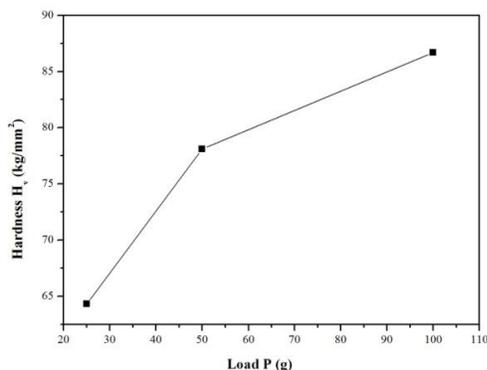


Fig. 7 : Variation of hardness number with load.

It is found that the hardness values increases with the increase of the applied load. This behaviour of increasing microhardness with the load known as reverse indentation size effect (RISE) [27], which is also attributed due to existence of distorted zone near crystal medium interface, effect of vibrations, specimen chipping etc., and the plastic deformation is dominant. At low loads or strains, plastic deformation of crystals mainly involves the nucleation of dislocations along a particular slip system. The RISE effect can be qualitatively explained on the basis of the depth of penetration of the indenter [28]. At small loads, the

indenter penetrates only the surface layers and therefore, the effect is shown sharply at the early stages. When the applied load increases, the penetration depth also increases and the overall effect must be due to the surface and inner layers. When only one slip system is active during plastic deformation at low loads, the number of active parallel glide planes during indentation is low. Therefore the nucleating dislocations rapidly propagate into the material without experiencing substantial mutual interaction stress between them. Consequently in this stage, indentation depth increases proportionally with applied pressure.

IV. CONCLUSION

Single crystals of thiourea doped trisglycine zinc chloride (TuTGZC) were grown from the aqueous solution by slow and controlled solvent evaporation technique. The lattice parameters of the grown crystals were obtained by single crystal XRD. It was found that the TuTGZC crystal was crystallized in the orthorhombic system. Powder XRD spectrum shows the crystalline nature of the compound. Functional groups of the grown TuTGZC crystal were identified by FTIR spectral analysis. The good transparency in the entire visible region and low cut-off wavelength facilitate the TuTGZC crystal to be a potential material for NLO applications. Second harmonic generation test conducted for the powdered TuTGZC crystal using Nd: YAG laser showed its relative SHG efficiency is approximately 1.08 times that of KDP. The TGA/DTA analyses revealed the melting point and the thermal stability of the TuTGZC crystal. The Vickers micro hardness study shows that hardness steadily increases with the applied load and implies the reverse indentation size effect (RISE). The above characterization and the nonlinear efficiency confirm that the TuTGZC crystal is suitable for the fabrication of various optoelectronic devices.

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An Idea for Smart Card Authentication Using Fingerprint Matching Algorithm

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Abstract- In recent technology smart card (Debit Card/Credit Card) is used for many of the activities such as marketing, online transactions, in ATMs etc. But due to theft/cracking of smart card passwords there would be an unusual loss of property. Hence in this paper i introduce some combinational techniques of securing the smart card using a biometric algorithm. This algorithm uses fingerprint recognition as a reliable method among biometric feature recognition technology which is widely applied in personal identification for the purposes of high degree of security that can be used to authenticate and secure the transactions using smart card.

Index Terms- Smart Card, Fingerprint Matching, Authentication.

I. INTRODUCTION

Fingerprint recognition is widely used reliable method among biometric feature recognition technology for personal identification for the purposes of high degree of security. In most applications, some additional requirements, for example, the high verification or recognition speed, small size of storage space for features, and enough accuracy have to be met. Consequently, it is not practically possible to store the total fingerprint as a feature into a template owing to the limitation of storage space and processing speed. As a result, we have to extract the most reliable features in the fingerprint.

The use of fingerprint verification for smart cards is a salient example among the various applications of fingerprint identification technology. Smart cards, a kind of IC cards, are being adopted in many application cases, such as mobile phones, credit cards, which require high degree of security. Fingerprint verification technology can meet this security requirement. However, smart cards are much inferior to personal computers or workstations in the capacity of storage space and processing speed because they inherently consist of the DSP (digital signal processor) or single chip microprocessor. Therefore, it is essential to save the storage space for features and speed up the processing on designing a fingerprint verification system that can be applied in smart cards.

A. Fingerprint Biometrics Steps

In Order to perform Automatic Fingerprint Identification System (AFIS) several techniques have been applied, different authors propose many different algorithms but the steps followed for fingerprint identification are similar as follows:

1. Capture of the fingerprint.

2. Pre-processing, to eliminate the redundant information and to adopt the sample to next block requirements.
3. Feature Extraction, where minutiae pores or any information related with the justness of the fingerprint is obtained.
4. Matching of the features obtained with the template previously computed in the enrollment phase. This matching will provide percentage of similarity that will be used to determine whether the user is same as enrolled user.

II. ALGORITHM

A. Computation of Orientation Field of Template Fingerprint

Orientation field is the set of directions of those pixels located in the ridges, which is stable feature information, independent of fingerprint capture equipments and distinct with respect to that of a different finger. A. R. Rao has proposed an algorithm to estimate the orientation at every pixel of texture images. In this paper, we utilize this algorithm to estimate the orientation field.

The steps to estimate the orientation field in are as follows:

- 1) Divide the input fingerprint image into blocks of size $W \times W$.
- 2) Compute the gradients $x G$ and $y G$ at each pixel in each block.
- 3) Estimate the local orientation of each block using the following formula:

$$\theta(i, j) = \frac{1}{2} \tan^{-1} \left(\frac{\sum_{u=i-W/2}^{i+W/2} \sum_{v=j-W/2}^{j+W/2} 2G_x(u, v)G_y(u, v)}{\sum_{u=i-W/2}^{i+W/2} \sum_{v=j-W/2}^{j+W/2} (G_x^2(u, v) - G_y^2(u, v))} \right)$$

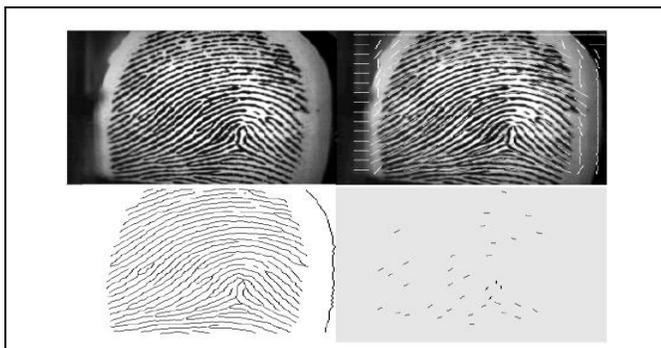
where W is the size of each block, and $x G$ and $y G$ are the gradient magnitudes in x and y directions respectively. Then, $\theta(i, j)$ is regularized into the degree range of $-90^\circ \sim +90^\circ$. Finally, we obtain the orientation field image consisting of orientations at every pixel.

B. Minutiae Extraction

Minutiae extraction intends to identify minutiae and record their attributes including coordinates, directions and types, into the template. It is difficult to reliably extract minutiae from the input fingerprint, especially from the low-quality fingerprints. The performance of the minutiae extraction algorithm highly depends on the quality of the input images. However, in reality, about 10% of acquired fingerprints are of poor quality due to variations in impression or skin condition, ridge configuration, acquisition devices, and non cooperative attitude of subjects, etc. For those poor images, some spurious minutiae may exist even after fingerprint enhancement and post-processing. It is necessary to develop an algorithm to work with these spurious minutiae.

C. Fingerprint Matching

Matching is a crucial step of fingerprint recognition. To improve the accuracy, some approaches were taken to improve the accuracy of similarity measure by employing new features which can distinguish the genuine match from the impostor match. In the matching process, we employ the algorithm belonging to the light category according to FVC protocol, which



is less memory and time consuming comparing with the on-line algorithms. Firstly, we get the raw similarity measure between two minutiae sets. Then, similarity of ridge width between two fingerprints was calculated, and was combined with the similarity of minutiae sets. Finally, we judge whether the match between two templates belongs to the genuine match or the impostor match by a fuzzy calculation of the quality contrast between both fingerprints image, and complete the matching process by calculating the final similarity measure with the global statistical features.

III. EXPERIMENTAL RESULTS

In our experiments database consists of fingerprint impressions of 640 bytes of storage are required for a 508×480 fingerprint image and 896 byte for an 832×768 fingerprint image. For those images, our algorithm will regulate the blocks to the size of 64×64 due to their large resolution 500 dpi (dots per inch). Consequently, our algorithm will require about 200~300 bytes for the features of minutiae and orientation fields (assuming there are 20~60 minutiae in a fingerprint), which is smaller than that of the method. So, our algorithm is very appropriate for applications in IC cards or chips.

The performance of a biometric system can be shown as a Receiver Operating Characteristic (ROC) curve that plots the Genuine Accept Rate against the False Accept Rate (FAR) at different thresholds on the matching score. For example, at a 1% FAR, the hybrid matcher gives a Genuine Accept Rate of 92%, while the other gives genuine accept rate of 70%-80%. The results of our experiments reveal that our algorithm is very efficient in preventing the error of false matching. That is to say, our algorithm greatly reduces the FAR, except that we reduce the constraint of the orientation field in computing matching score.

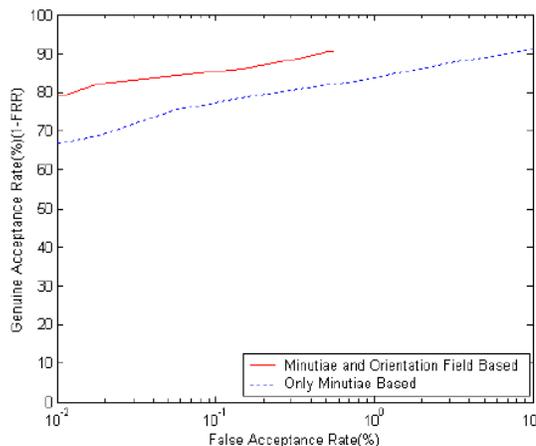


Figure 2: ROC Curve

IV. CONCLUSION

In this paper, we have proposed an improved minutiae-based pattern matching algorithm, which achieves good performance in both efficiency and accuracy neither sacrificing the processing speed nor greatly increasing the size of storage space for features. The primary advantage of the proposed method is its small size in storing extra features and easy implementation.

Another advantage of our algorithm is its more precise registration scheme, which supports the fingerprint rotation scale to 2π . Through the orientation field and computation of $P_s(p, q)$, we can, to some extent, tackle the trouble that the number of matched minutiae between two identical fingerprints is comparable with that of occasionally matched minutiae between two different fingerprints. Therefore, our method can achieve good performance without classification to fingerprints, which also helps to authenticate IC cards.

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The English Oral Communication Competency of Thai Engineering Students

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Abstract- In the present days, English communication becomes the international mass connection between people and organizations. The crucial barriers of the English communication would be low level of competency especially for non-native speakers. Developing language profiles of graduates for higher levels of speaking skills to serve the need of workplace in Asian Economic Communities becomes a high concern in many countries including Thailand as one of the providing strategies for ASEAN association. This study investigated and identified levels of English oral communication competency of civil engineering students at a Thai university of Technology with the proposing designed instrument based on the ESP theory aiming to search for specific points for further development. The informants were assessed with tasks composed of structured interviews with pictures to draw out the linguistic features in specific work context using the constructed rubrics. Finding revealed that the participants were ranged at the average level and their significant English oral competency deficiencies fall on grammatical errors and pronunciation and the use of L1 to communicate. However, the interaction aspect indicated that the students are able to interact and communicate in the specific work context if they have the technical content schema. To estimate the proposing tools, results revealed that the first set of the instrument used for signifying levels of English competency of the informants and the second set with scoring process and rubric evaluation to assess the students' English performance noted in the first set appeared the reliability. Data from this research is used for implications and recommendations for developing the quality of Thai engineers.

Index Terms- English oral communication competency, civil engineering work context, performance assessment

I. INTRODUCTION

English has been accepted as an international language used throughout the world for various reasons, including academic and professional purposes. Today's job market reinforces the importance of communication competency in English for new graduates. It is valued as one of the requirements which generally appear in many job advertisements. Stakeholders in education realize this fact and try to develop their educational outputs aiming for providing graduates who are competent in English communication to serve the requirement of global workplaces (Nguyen, 1998; Keane and Gibson, 1999; Reimer, 2002; Patil, 2005)

In engineering sectors, English communication has important roles into almost all aspects of the profession: from

marketing to manufacturing, and quality assurance to post-sale maintenance (Nickerson, 1998; Grin, 2001; Reimer, 2002). In spite of realizing its importance, English oral communication has been the crucial problems for non-native speakers especially for Thai engineering students. Shyness and typical characters are factors which significantly affected to the competence of English communication as well as other factors such as language environment, psychological barriers, vocabulary, and listening problems (Corella, 2000; Wang, 2004; Kim, 2006). In order to develop the language competency of the learners, the focused analysis of the specific language use and the language ability of the learners in the target context are needed. This research aimed to identify levels of English oral communication competency and to propose the right tools constructed on the theory of ESP performance assessment to measure this competency of civil engineering students at Rajamangala University of Technology, Tawan-Ok, Uthentawai Campus, Bangkok, Thailand. The data emerged from the study was discussed for implications and recommendations for developing the quality of Thai engineering graduates according to the stages in the ESP process (Dudley-Evans and St. John, 1998).

II. THE PURPOSES OF THE STUDY

The study has two objectives:

1. To identify levels of English oral communication competency of civil engineering students at Rajamangala University of Technology, Tawan-Ok, Uthentawai Campus, Bangkok, Thailand using the proposed instruments.
2. To create the right tools to measure the English Oral Communication Competency of Thai civil engineering students

III. LITERATURE REVIEW

One of the essential elements of communication skills is language competency (Miller & Gaitens, 1996; Corella, 2000). According to the various definitions of oral communication competency defined by researchers (Wieman and Buckland, 1980; Duran, 1983; Bygate, 1991), they refer the competency as 'an individual's ability to form abstract sentences that are produced and adapted to circumstances at the moment of speaking, by making rapid decisions and contributions that adequately fit the given situation'. Competency can be measured according to the levels of established standards (Fletcher, 1991; Parry, 1996). The definitions are in accordance with the concept of communicative competence proposed by Hyme (1992) that "Any use of language involves the attribute of communication. What the use of language are in specific groups, what purposes

people have for language, ...the perspective of communicative competence is intended to help answer the fundamental justification for introduction of the notion of communication into models of grammar”

As English has been cited as the major language of global business, communication competency in English is always referred to as an important requirement for graduates to enter the workplace.

To assess the civil engineering students’ performance in English oral communication, the language of ESP is considered to be the target language performance. The language in ESP refers to the whole range of language resources and the language produced. It should be adequate for the job and not necessarily be at a native speaker level, but it should employ communicative strategies and be effective in communicating with non-native professional users of English (Munby, 1978; Hutchinson and Waters, 1987; Robinson, 1980; Douglas, 2000). What really matters in ESP assessment is whether learners can communicate in a specific target language and use knowledge of the field in order to achieve their aims, in order to understand and be understood, and in order to get their message across in English (Douglas, 2000 as cited in Tratnik, 2008).

Characteristics of ESP performance assessment (Brown, 2004) are considered to frame the instrument design to measure the expected outcome. Task specifications and task content (Brown, 2004; Tratnik, 2008) are constructed from previous need analysis (Kaewpet, 2009), existing standards of English for Engineering Occupations developed by The English Language Development Center, or ELDC, (2005) and comments and perceptions of experts in the field. The theme of language use in this performance assessment constructed from the sourced mentioned is under the context of “Safety in a construction workplace”

In term of speaking assessment criteria, some existing types of proficiency assessment in The American Council on the teaching of Foreign Languages (ACTFL, 1999) and The Common European of Reference for Languages (CEFR, 2011) are considered to design the appropriate level identification process. Linguistic, textual, functional, sociolinguistic and strategic competences are types of language knowledge that specialists involved in assessing speaking competencies (Quellmalz, 1991; Bachman & Palmer, 1996; Luoma, 2004; Tratnik, 2008) mentioned that they should be components to be measured in the English oral communication competency performance of the learners.

IV. METHODOLOGY

The informants for this research were the interviewed 20 final year’s students of civil engineering, Faculty of Engineering and Architecture, Rajamangala University of Technology, Uthentawai campus, Bangkok as the target group to draw out their profiles of English oral communication competency for further development.

This study started from reviewing literatures to create tools for the language performance measuring. The safety issue in a construction workplace was set as the theme to define task specifications, task content, scoring and estimating for the English oral communication competency assessment. Task

specifications rely on demands of the linguistic characteristics of specialists working in the construction areas which could reflect of target group’s language used. Two sets of instrument were designed following the research objectives to define the right tools. Then, the reliability and validity of tools were examined and verified by specialists in the fields. The content of the first tool was also determined in their validity by testing with the pilot student’s opinion. The instrument was developed before administering to the informants to consider the characteristics of language input which could draw out the language performance outcome. After that, their performances were collected and analyzed for each expected task as their language profiles.

V. RESULTS

Identifying the target language profiles based on specific tasks

The participants were identified for levels of their English oral communication competency according to the eight specific tasks given as follow:

Giving personal information

Half of the informants were identified, according to the instrument, at acceptable scale (Table 1) in using appropriate syntax to perform the task. Only two persons were assessed at poor scale while seven persons were put at the good one. The significant errors found in this task were using verb ‘be’ and ‘other verbs’ together, missing verb to be (is, am and are) and describing jobs without articles. Other errors frequently appeared were tenses, subject verb agreement, articles and using incorrect pronouns.

Describing instruction signs in a construction site and identifying words for personal protective equipment

Fourteen students were rated at acceptable scale for their performances in describing instruction signs. Two participants were identified at good one while four of them were unable to communicate in English with appropriate structures expected in the task, respectively (Table 1). Structures mostly used in this task are *You must+ wear/use+ PPE, Infinitive (Wear/Use+ PPE), You should+ verb1 (wear, use) + vocab.* Meanwhile, the significant errors found were broken words and phrases without any verbs to communicate intelligibly.

Six participants were rated at good scale in identifying words of personal protective equipment while twelve students performed at acceptable one following by two students at poor scale. Problems in English communication found from the lacking knowledge of word used in specific context of personal protective equipment.

Explaining warning signs and using vocabulary explaining warning signs for safety in a construction site

Results from this task revealed that only one student was at good scale while thirteen participants were rated at acceptable one with two participants at poor scale (Table 1), respectively. Syntax errors often found in this task were missing of verb to do, omission of verb after do not, miss verb and use wrong tenses

including words causing the problem for English communication in the warning signs such as scaffold, sandals and climb.

Using phrases/ sentences to explain the circumstances of accidents

Only one person performed at good scale, ten students were measured at acceptable rank and nine students were at poor one, respectively (Table 1). Significant errors appeared in the forms of the absence of basic sentence structures, subject+verb agreement, using wrong tenses and incorrect uses of articles.

Using phrases/ sentences to explain causes of accidents

Two students performed at good scale, twelve were grouped at acceptable one and six participants failed to communicate in English language as expected goal stated in the task, respectively.

Making suggestion to prevent the accident in a construction site

Ten of civil engineering students performed at good scale while six participants were identified at acceptable one. There were four students who failed to use English communication to convey their idea.

Lacking of ability to comprehend the question especially the word 'prevent', the use of modal verb (should) without infinite verb are the significant errors found in this task.

Levels of English oral communication competency

According to table 2, levels of English oral communication competency of the target group were identified ranging from novice (N), to intermediate (I) and advance (A) with slightly differences shown with the mark of plus(+) and minus(-) depending on their competency in the areas as follow:

Pronunciation competency: results showed the numbers of 4N-, 12N and 2N+ students identified in this competency category. Interestingly, only two students were in intermediate level. Problems found in this subject are the omission of final sounds either in the consonant ending or ending 's' for plural, mispronunciation of /l/ and /r/, giving wrong pronunciation from misspelling and placing accents on wrong syllables.

Aspect of vocabulary: levels of this competency were identified, according to the established rubrics, from novice to intermediate. Participants were ranged with 2N- , 4N and 4N+. Other ten students were ranged with 2I- , 3I and 5I+, respectively. For vocabulary section, lacking of vocabulary knowledge is the significant problem found in this target, even though, the informants could perform very well in identifying personal protective equipment and safety sign tasks but they failed to choose correct words to describe the accidents in construction sites. Besides, participants were unable to produce the language suitably to the context given in the interview.

Fluency of English oral communication competency: levels of this competency of the participants fell to novice and intermediate with numbers of 2N-, 7N and 4N+ students, respectively. For intermediate levels, there were 1I-, 7I and 1I+ students, respectively. Difficulties of fluency areas mostly found in forms of speech rate, long pauses and silence Fragment, broken words and refusing to speak English often occurred during this performance assessment.

Aspect of interaction competency: this task revealed interesting results that participants have various interaction competencies as shown in the numbers of different levels. The identification ranged from the numbers of students in novice to advance levels beginning with 2N, 1I- , 13I , 3I+ and 1A, respectively. The informants showed effort trying to express their ideas, understanding and schema knowledge to interact the interviewer. Even though they have limitation of their language resource, they responded with their strategic competence to maintain the conversation. Using their native language, Thai, to clarify the tasks was mostly found as the strategy in their English oral communication.

Coherence: levels of all participants are classified into numbers of 1N-, 1N, 2I-, 15I and 1I+, respectively. Most of connectors they used in this conversation are 'and', 'but', 'then', 'so' and 'because'. Actions of the awkwardness and repetition of ideas appeared as coherent competency of some participants in the study.

VI. TIME COMPLETION

Time used by the participants to complete the 8 tasks given varied from 3.00-8.02 minutes. Overall time completion could signify into 5 different framed: 4.00-4, 30, 4.31-5.00, 5.01-5.30, 5.31-6.00 and 6.01 up to 7 minutes (Table 2).

Table 1 Summary of Individual assessment on Their English oral communication competency in a civil construction context (safety issue).

Performance Evaluation Analyses	Participant No. (N=20)																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
- Giving personal information (Structure)	A	A	A	P	A	A	G	A	A	A	G	P	A	G	G	A	A	G	G	G
- Pronunciation	N	N	N+	N	N	N	I	N	N	N-	N-	N	N	N	N	N	N+	I	N	N+
- Vocabulary	N	N	I	I+	I-	I-	I+	N	I	N-	I+	N+	N	N	N	N+	N+	I	N	N+
- Fluency	N	N	I	I	I	N	N+	N	I	N-	I	N	N+	N	N	I	N+	N+	N	I
- Interaction	I	A	I	I	I-	I-	I	I	I	N	I+	N	I	I	I	I	I	I	I+	I+
- Coherence	I	I	I	I	I-	I	I	I	I	N+	I+	N	I	I	I	I	I	I	I+	I
- Describing instruction signs on a construction site	A	A	A	A	A	A	A	A	G	P	A	A	A	A	P	P	A	A	P	G
- Identifying words for personal protective equipment	A	P	G	A	A	A	G	P	G	A	G	A	A	A	A	A	G	A	A	G
- Pronunciation	N	N	N+	N	N	N	I	N	N	N	N-	N	N	N	N	N	N+	I	N	N+
- Vocabulary	N	N	I	I+	I-	I+	I	N	I	N	I+	N+	N	N	N	N+	N+	I	I+	I+
- Fluency	N	N	I	I+	I	N	N+	N	I	N	I	N	N+	N	N	I	N+	N+	N	I
- Interaction	I	A	I	I	I-	I+	I	I-	I	N	I+	N	I	I	I	I	I	I	I+	I+

Table 1 (Continued).

Performance Evaluation Analyses	Participant No. (N=20)																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
- Explaining warning signs used on a concentration site	A	P	A	A	A	A	A	A	G	P	A	P	P	A	P	A	A	A	P	A
- Using vocabulary explaining warning signs for safety on a construction site	A	P	G	A	A	A	G	P	A	A	A	A	A	A	P	A	A	A	A	G
- Pronunciation	N	N	I	N	N	N	I	N	N	N-	N-	N	N	N	N	N	N+	I	N	N+
- Vocabulary	N	N	I	I+	I-	I-	I	N	I	N-	I+	N+	N	N	N	N	N+	I	I	I+
- Fluency	N	N	I	I	I-	I	I	N	I	N-	I	N	N	N	N	I	N+	N+	N	I
- Interaction	I	A	I	I	I-	I	I	I	I	N+	I+	N	I	I	I	I	I	I	I+	I+
- Coherence	I	I	I	I	I-	I	I	I	I	N	I+	N	I	I	I	I	I	I	I+	I
- Using phrases/ sentences to explain the circumstances of an accident	P	P	A	G	A	A	A	P	A	P	A	P	A	P	A	P	A	P	P	A
- Pronunciation	N	N	I	N	N	N	I	N	I	N	N	N	N	N	N+	N	N+	I	N	N+
- Vocabulary	N	N	I	I+	I-	I	I+	N	I	N	I+	N	N	N	N+	N	N+	I	N	I+
- Fluency	N	N	I	I	I-	N	N+	N	I	N	I+	N	N	N	I	N	N+	N+	N	I
- Interaction	I	N	I	I	I-	I	I	I	I	N	I+	N	I	N	I	N	I	I	I+	I+
- Coherence	I	N	I	I	I-	I	I	I	I	N	I+	N	I	N	I	N	I	I	N	I

Table 1 (Continued).

Performance Evaluation Analyses	Participant No. (N=20)																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
- Using phrases/ sentences to explain the cause of an accident	A	P	A	G	A	G	A	A	A	P	A	P	A	A	P	A	P	P	A	A
- Pronunciation	N	N	N+	I	N	N	I	N	N	N	N	N	N	N+	N	N	N+	I	N	N+
- Vocabulary	N	N	I	I	I	N	I+	N	I	N	I+	N	N	N+	N	N+	N+	I	I+	I+
- Fluency	N	N	I	I	I	N	N+	N	I	N	I	N	N	I	N	I	N+	N+	N	I
- Interaction	I	A	I	I	I	I	I	I	I	N	I+	N	I	I	I	I	I	I	I+	I+
- Coherence	I	I	I	I	I	I	I	I	I	N	I+	N	I	I	I	I	I	I	I+	I
- Making suggestion to prevent the accident on a construction site	A	A	G	G	A	G	G	P	G	P	G	P	A	G	A	G	P	G	G	A
- Pronunciation	N	N	N+	N	N	N	I	N	N	N	N-	N	N	N	N	N	N	I	N	N+
- Vocabulary	N	N	I	I	I-	I-	I	N	I	N	I+	N	N	N	N	N	N	I	N	I+
- Fluency	N	N+	I	I	I	N	I	N	I	N	I	N	N	I	N	I	N	N+	N	I
- Interaction	I	A	I	I	I	I-	I	I	I	N	I+	N	I	I	I	I	I	I	I+	I+
- Coherence	I	I	I	I	I	I	I	I	I	N	I+	N	I	I	I	I	I	I	N	I
Performance Score (%)	80.5	71.8	89.2	87.0	82.7	87.0	89.2	74.0	91.3	71.8	89.2	69.7	80.5	82.7	76.2	78.3	80.5	82.7	80.5	91.3

Table 2 Summary of Individual assessment on Their English oral communication competency in a civil construction context (safety issue).

English Oral Communication Competency of Thai engineering students (in Safety Issue)								
Participant No.	Performance Evaluation Structures/ 8 tasks	Performance Score	Levels of competency(N : I: A: S)					Time of Completion
			Pronunciation	Vocab.	Fluency	Interaction	Coherence	
P.1	7 A /1 P	15/24= 80.5%	N	N	N	I	I	04.32 min
P.2	3A/5 P	11/24=71.8%	N	N	N	A	I	04.03 min
P.3	3 G/5 A	19/24=89.2%	N	I	I	I	I	03.00 min
P.4	3 G/4 A/1 P	18/24=87.0%	N	I+	I+	I	I	05.26 min.
P.5	8 A	16/24=82.7%	N	I-	I	I-	I-	04.15 min.
P.6	2 G/6 A	18/24=87.0%	N	I-	N	I	I	04.15 min.
P.7	3 G/5 A	19/24=89.2%	I	I+	N+	I	I	05.14 min.
P.8	4 A/4 P	12/24=74.0%	N-	N	N	I	I	06.05 min.
P.9	4 G/4 A	20/24=91.3%	N	I	I-	I	I-	05.23 min
P.10	3 A/5 P	11/24=71.8%	N-	N-	N-	N	N+	04.43 min.
P.11	3 G/5 A	19/24=89.2%	N-	I+	I	I+	I+	04.18 min.
P.12	2 A/6 P	10/24=69.7%	N	N+	N	N	N	05.12 min
P.13	7 A/1 P	15/24=80.5%	N	N	N+	I	I	04.13 min.
P.14	2 G/4 A/2 P	16/24=82.7%	N	N-	N-	I	I	04.32 min.
P.15	1 G/3 A /4 P	13/24=76.2%	N	N+	N	I	I	05.59 min.
P.16	1 G/4 A/2 P	14/24=78.3%	N-	N+	I	I	I	04.15 min.
P.17	1 G/5 A2 P	15/24=80.5%	N+	N+	N+	I	I	04.20 min.
P.18	2 G/ 4 A/2 P	16/24=82.7%	I	I	N+	I	I	05.03 min
P.19	2 G/3 A/3 P	15/24=80.5%	N	I+	N	I+	I	05.55 min.
P.20	4 G/4 A	20/24=91.3%	N+	I+	I	I+	I	08.02 min

G: Good, A: Acceptable, P: Poor, N: Novice, I: Intermediate, A: Advance

After administered the instruments to participants, their performances in each task were recorded and assessed for their communication competency. Results revealed that individual participant could inform their personal information to serve the purpose of the task and could produce the language outcome as expected results. Before scoring the information, transcribing was done to obtain precise data. The research instrument which consists of pictures of safety context also suits the first objective as it can reflect the informants' competency to their English speech. On the administering steps, results found that most of the participants understood the target tasks and were able to communicate with clear language but their competency varied according to the rubrics proposed in the scoring interpretation

process (Good, Acceptable, Poor). This could be confirmed that the instrument is appropriate to measure the language competency in the specific target. The findings also revealed that the utterances of the informants did not go along with the expected words in the checklist of each task, leading to much effort in transcribing steps to get enough details for interpreting. Moreover, the findings also signified that clear established rubrics and descriptors could reflect the English oral communication competency of the target group and could be more reliable than assessing only numbers of expected words or structures in the checklist. The specific language of safety used in this assessment is considered 'right' for the objective as it could distinguish the competency of individual student to

produce the expected language performance. The hardest part of this study is in the transcribing process due to its complexity of speech characteristics which lead to the difficult work of identifying levels of the informants' language profiles.

VII. DISCUSSION

English oral communication competency of the Thai civil engineering students in this research was studied with the proposed tools aiming to assess their ability in the specific language components. By the first instrument, students were ranged at the average level of competency demonstrated from their performance but in the real workplace, their English oral communication competency are stated at average to low quality as similar to other countries in ASEAN (Yin, 1988; Gordon, 2002; Orsi and Orsi, 2002; Riemer, 2002; Cowling, 2007; Yasin *et al.*, 2010). Significant errors mostly found as grammatical errors when giving personal information and describing situations of accidents showed the lack of knowledge of basic structures in English. But, with the pictures of specific context like safety equipment and signs used in the construction workplace, students showed an acceptable level of communication with the application of their schema knowledge even though they made errors in structures and lack of vocabulary in some specific tasks. This finding demonstrated that pictures representing vocabulary needed in the field of their workplace with the target language could be important stimulus for English oral competency improvement. Tratnik (2008) has mentioned that special lexical, semantic and syntactic characteristics of technical language with communicative function enable people in a professional field to convey the meaning more specifically. Therefore, the teaching of English for specific purposes should be good enough for developing communicative strategies for non-native speakers. Considering on the details of this finding, in term of pronunciation the participants made mistakes frequently are the omission of the final sounds and giving wrong pronunciation which may come from different language systems. Teaching the system of English pronunciation to provide the ground knowledge for pronouncing correct vocabulary and pointing out the differences of pronunciation in Thai and English language systems can help develop the students' oral competency though it may take long time to reach the goal.

The second finding showed the appropriateness of the tool to measure the English oral language communication competency of the target group. Results indicated that students appeared to perform adequate performances to be assessed as expected tasks given in the instrument. Moreover, data obtained from the informants can answer the required language components with the 'task specifications' and 'task content' constructed on the criteria of ESP. performance assessment (Bachman and palmer, 1996; Douglas, 2000) With the scoring steps, the tools in the second set of the instrument are considered to be appropriate for this evaluation based on criteria of scoring performance (ACTFL, 1999, Brown, 2004, CEFR, 2011) as it provides the rating scale rubric to evaluate explicit aspects of the participants' language competency and the descriptor rubric for raters to work on addressing levels consistently.

VIII. CONCLUSION

The English oral communication competency of the Thai engineering students was identified ranging from Novice to Intermediate levels with the established instrument proposing to justify its appropriateness. The study showed the satisfied results as the first tool included task specifications and task content to draw out specific information to be measured while the second set of the instrument involving scoring process can provide rating systematically. The language profiles obtained from the study are valuable sources for improving the quality of Thai learners.

IX. IMPLICATIONS AND RECOMMENDATION

The findings from the assessment showed low levels of English oral communication competencies of the RMUTTO final year civil engineering students. This implies defects in the stages of ESP process in the institute. To develop the English oral competency of the students, there should be a revision of all factors related to the teaching and learning. For example, there should be more research on the need of workplace, revising English courses taught in the faculty including implementing new courses focusing on English oral communication with the competency-based teaching approach (Auerbach, 1986) and competency-based assessment (Brown, 2004).

Researching on developing standard assessment of English oral competency is recommended, similarly to the development of rating systems for teachers to produce the instrument which could signify the competencies of the assessed students. Factors affecting errors found in each task are interesting research topics to be further investigation. In addition, problems obtained from the results could be employed for upgrading the quality of Thai learners depending on their lacking in the market requirement. Issues of differences in cultures, language structures, articulation and other differences between English and Asian languages (Thai, in particular) that may cause problems of oral communication competency in English of Thai engineering students are recommended for further studies. Conducting research on comparing levels of English Oral Communication Competency of Thai civil engineering students with civil engineering students in other countries, ASEAN and ASEAN + 3, in particular, are also recommended. Learning from each other can be a way to stimulate and prepare Thai students to be ready to improve their competencies in order to be quality members of the ASEAN community in the near future.

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Illustrated Key to the Species of Genus *Datura* Linn in Pune and Adjoining Region

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Abstract- In the recent years there has been growing interest in plant diversity studies in general and floristic studies in particular. Illustrations of plants are as old as human civilization and yet, there is ever greater need for good illustration. Everyone including the specialist, knows that a good illustration is far superior and more efficient in recognizing plants than lengthy descriptions, or even keys. The present work is a sincere attempt to provide an illustrative key to species of genus *Datura* Linn. Method includes field study, herbarium study & illustrations based on plant specimens. Besides the time-consuming process of correct identification of plant species can be minimized, if such flora is easily accessible available at the nearest reference point.

Index Terms- Illustrated key, genus *Datura* Linn, Pune and adjoining region

I. INTRODUCTION

Illustrations of plants are as old as human civilization and yet there is ever greater need for good illustrations. Everyone including the specialists knows that a good illustration is far superior and more efficient in identification of plants than lengthy descriptions or even keys. In the recent years there has been growing interest in plant diversity studies in general and floristic studies in particular. In this connection regional floristic studies are of much importance. It can be achieved by intensive exploration of smaller areas. Such attempts have been made by taxonomists and other botanists in various research institutes and teachers in degree colleges.

Datura ferox, commonly known as Long Spined Thorn Apple or Fierce Thornapple, is a species of *Datura*. It is found in all the warm parts of the earth, where it is regarded as a dangerous pasture weed.

Datura stramonium, known by the common names Jimson weed or datura is a plant in the *Solanaceae* (nightshade) family, which is believed to have originated in the Americas, but is now found around the world.

In our study we have described key to the species of one of the important genus i.e. *Datura* Linn. In this study we have described key to the species of genus *D. stramonium* Linn. & *D. ferox* Linn.

There is stray floristic work on various talukas of Pune district. These floristic works i.e. the floras or check lists, very rarely provide illustrations,¹⁻² which is a easy mode of comparing, verifying and identification plants.

The present work is a sincere attempt to provide an illustrative key to species depicting important morphological characters to identify the plants easily to give structural details

and discriminate the characters of taxonomic importance to identify the plant as they are having different medicinal uses and economic values. The present work is based on the results of intensive exploration of genus *Datura* Linn so that it provide a simple key to the species to identify two species of *D. stramonium* & *D. ferox* in the Pune and adjoining regions of Pune district.

Of large number of plant species reported on the ethno botanical interest, the two species of *Datura* Linn. viz., *D. stramonium* & *D. ferox* in India holds a pride of place largely because of its medicinal uses and economic values. In our study we have described key to the species of one of the important genus i.e. *Datura* Linn. In this we have described species of genus *D. stramonium* & *D. ferox*.

II. MATERIAL AND METHODS

The present work is based on the result of intensive explorations to the study of plants of the species of genus *Datura* Linn i.e. *D. stramonium* & *D. ferox*. The study was undertaken by field study, herbarium study, illustrations based on plant specimens.

Pune and adjoining regions mentioned as above is approachable by own vehicle during all seasons. A major bulk plants were collected in rainy seasons because majority of the flowering plants found in rainy seasons and especially some ephemeral plants are only found in monsoon period.

While collecting the specimens, the data such as habit, habitat, flower colours, fragrance if present, frequency of distribution, local names and uses, if any were recorded in the field itself. Besides the wild species, some cultivated plants, weeds of cultivated field and road sides have also been collected. These specimens collected were pressed in the field using blotting and old newspaper. The flowers of some of the species which were of some botanical interest were fixed in 4% formalin for further studies in the laboratory.

These specimens have been deposited in the herbarium of University of Pune, Deptt. of Botany, Pune 411007. Generally 3-4 specimens of the each plant were collected. Two specimens were mounted and others were treated as duplicate specimens.

Preparation of herbarium sheets. The plant specimens which are carefully collected taking care that the specimens are healthy, free from evidence of insect feeding, rust infections, and other obvious pathological symptoms. It was ensured that the specimen is either in flowering or fruiting condition. The specimen is herbaceous, always include enough of the underground parts to show their characters.

The plant specimens pressed on the spot and some time collected in vasculum and pressed after coming to laboratory. While collecting the specimens, the data such as habit, habitat, locality, local name, etc. have been immediately recorded in the field diary. After returning to the laboratory, the plant specimen have been pressed in between the sheets of blotting paper. One plant should be arranged, on one sheet in a manner that there should be no over lapping of parts. The large size specimens have been folded in 'V', 'Z', 'W' 'C' shape. The blotting papers with plant specimens have been placed in field press for about 24 to 48 hrs. The press is then opened, blottings have been changed and rearranged the plant specimen properly. This practice made continuous for 10 to 15 days till the specimens get properly dried.

Poisoning: - Poisoning of the specimen have been done immediately after collection ; all the specimens were poisoned in aqueous solution of Mercuric chloride and dried using standard herbarium techniques. After drying, the specimens were mounted for permanent record on herbarium sheets. The herbarium sheets of standard size 42 cm X 28 cm; and such standard herbarium sheets have been used. The specimens were mounted on the sheets with the help of glue or by stitched wherever necessary with help of cotton thread.

The plant specimens have been tentatively identified in the field and identification was confirmed by using different floras. The important floras such as "Flora of presidency of Bombay" by Theodore Cooke (1958),^{3,4} "Flora of British India" (1872 to 1897) by J. D. Hooker⁵, "Flora of Presidency Madras" (Gamble, 1957) "Flora of Akola District, Maharashtra" by S. Y. Kamble and S.G. Pradhan (1988)⁷, " Flora of Maharashtra state" (2000) by N. P. Singh⁸ & S. Karthikeyan Flora of Mahabaleshwar and adjoins, by Deshpande (1995)⁹, "Flora of Nasik" by Lakshminarsimhan (1991)¹⁰, "Flora of Raigad by Kothari and Moorthy (1993)¹¹The cultivated species were also identified with the help of Manual of Cultivated Plants by Bailey (1949).² Then again the specimens confirmed by matching with authentically identified specimens deposited in the herbarium of Botanical Survey of India, Western Circle Pune.

Methodology of Illustrations:- A depiction of the habit, alongwith finer structural details especially of flower and fruit in a comparable format was the main purpose. Thus the details depicted are taxonomically significant. Following the general pattern of one plate per species, the first step was to visualize the number of sketches involved and scale suitable to the illustration i.e. reduction of larger organ and enlargement of smaller ones. Depiction of the twig as visual aid to recall the plant characters is important. Thus special efforts were made to make the habit sketch and dissections from the same specimen in order to avoid errors.

A photograph of the specimen from the same collection was most useful in rounding off the habit sketch. To satisfy this purpose an extensive field work was carried out in the study area in various seasons to capture the flowering and fruiting season of plants.

The plant parts were detached from the twig, and examined under a binocular dissection microscope under suitable magnification (X5 or X 10 is usually sufficient). Almost all the details were studied. Serial sketching of structure in order (Calyx, Corolla, Androecium, Gynoecium, Fruit) with detail was

done. All the sketches were drawn with fresh specimen and with hand by using isograph drawing pens with zeichentusche drawing ink on A4 size bond paper and scanned for further DTP work in Photoshop, then it was inserted in MS- word and edited for labeling, numbering and preparation of keys. The sketches were made first with pencil, with suitable scale (X 5) in case of minute flowers the magnification was X2- X20 times of the original specimen. In case of large specimen five to twenty times reduction was done. All the sketches are calibrated and suitable magnifications have been shown near the sketch.

The advantage of keeping the same scale of magnification/reduction for comparable structure within the taxon or for all the species enables us to emphasize the actual scale of various plant parts.

From the printed plate, which usually gets reduced in size during DTP or printing it is possible to compute back the original values, both of the sketch and the actual material. The sketches aim to convey maximum information for which all parts are illustrated : habit, flower, calyx, corolla, stamen (front and back view), pistil, ovary (V.S. and T.S.), fruit and seeds. Scale is individually given to all figures.

The genus *Datura Linn* was arranged in the modified Bentham and Hookers system of classification, followed in India. Within genera the species are given in alphabetical order. An index gives the names of families genera and species as well as vernacular names.

The discriminating morphological character is placed below the description in form of the actual sketch of the selected character in the indented key e.g leaves, stamens, flowers, fruits etc. lots of efforts have gone on to this DTP work to prepare the illustrated key. All the sketches here are given with scale, so as to calculate the actual size of the specimen.

The plants described are illustrated, so that even non botanist can know what is what. Finally we have no pretension that this is the last word on this topic. Probably a more extensive explanatory study might reveal more of such variations, even within Maharashtra.

III. OBSERVATION AND RESULT: DATURA LINN.

Key to the Species.

1. Corolla dull white, 4-6 cm long; capsule with few broad based spines (Fig.i.a) ... *D. ferox*

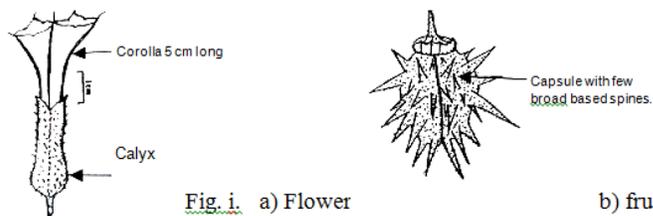


Fig. i. a) Flower

b) fruit

***D. ferox* Linn.**

1. Corolla pure white, 6-8 cm long ; capsule with numerous narrow spine. (Fig.ii.a, & b.) ... *D. stramonium*

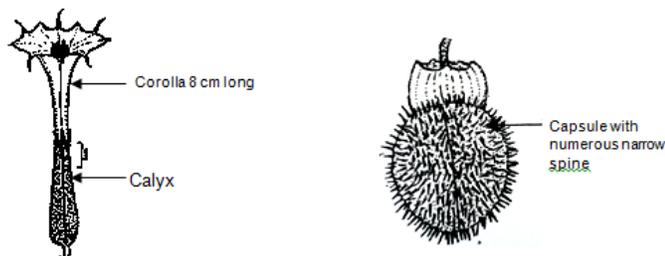


Fig. ii

a) Flower

b) fruit

D. stramonium Linn

IV. DISCUSSION

This work will provide a handy tool to those, who wish to work in the field of taxonomy. The pictorial keys enable the researcher to identify the plants by matching the characters with the illustrations which are drawn with scale. So the confusion generally created while reading the information of plant can be minimized. More extensive keys could have been prepared, but due to time constraint, which may be taken up in near future.

There have been innumerable thesis, research papers, projects going on where many ideas have been expanded, still basic need of floristic study is, correct identification of floristic elements in the field. We as researchers or botanist, get to realize the heavy price we will have to pay in future, if we don't start such work today. These illustrations are good enough as regard the habit of plant but not for the structural details. These old volumes are scarce, no larger in print and becoming beyond the reach of common research student or college teachers working on floristics. There is also ever greater need for good illustration.

D. stramonium Linn¹¹ is more often used as medication than that *D. ferox* Linn. *D. ferox* Linn like all such species, every part of the plant contains deadly toxins that can kill animals or humans that ingest it.

Datura stramonium,^{12,13} as a herbal medicine to relieve asthma symptoms and as an analgesic during surgery or bone setting. It is also a powerful hallucinogen and deliriant, which is used spiritually for the intense visions it produces. However, the tropane alkaloids which are responsible for both the medicinal and hallucinogenic properties are fatally toxic in only slightly higher amounts than the medicinal dosage, and careless use often results in hospitalizations and deaths.

So both the plants are having their own characteristics use and must be identified accurately but due to same species their identification becomes difficult in the field due to many similar characteristics. e.g In *D. forex* Linn Corolla dull white, 4-6 cm long; capsule with few broad based spines & *D. stramonium* Linn. Corolla pure white, 6-8 cm long ; capsule with numerous narrow spine but with the help of our illustrated keys we can show it easily so that identification becomes more easy by using this key to species .

This work will provide a practical introduction to the techniques of documentation in taxonomy to study the plant genetic resources. Besides the time consuming process of correct

identification of plant species can be minimized, if such flora is easily accessible available at the nearest reference point. Instead of wasting time and paying heavy fees which such institute ask for identification, one can easily go through the illustrative keys and identify the plant, within no time. Therefore such kind of floras are need of time today and in future.

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The Efficacy of Computer Assisted Cognitive Training in the Remediation of Specific Learning Disorders

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Abstract- Neuropsychological deficits have been found to underlie the developmental disorders of various skills. Studies conducted thus far suggest education based remedial training (EBRT) to be beneficial in overcoming the developmental skill deficits. Though, computer assisted cognitive training (CACT) has been found to be effective in enhancing various cognitive functions in cases of traumatic brain injury, stroke, schizophrenia, the effect of this intervention strategy has not been explored in helping children with specific learning disorders (SLD). The aim of the present study therefore was to examine the effectiveness of CACT when employed as an adjunct with EBRT in the management of children with Reading, Spelling and Arithmetic disorder. 10 children between the ages 8 and 15 years meeting at least one of the ICD-10 criteria for Reading, Spelling and Arithmetic disorder were sequentially assigned to either EBRT + CACT, or only EBRT. The training for both the groups was conducted in 8-12 sessions, spread over 2 months. Pre- and Post-assessment was conducted using NIMHANS SLD index. It was found that the adjunct intervention relative to EBRT was superior in augmenting various academic skills. However, these differences did not reach statistically significant level owing to smaller sample size. The use of CACT along with EBRT resulted in significant improvement in Spelling ability of the group undergoing the same. The CACT seems to have therapeutic potential in developmental disorders when combined with EBRT.

Index Terms- Computer assisted cognitive training, Education based remedial training, Neuropsychological deficits, Specific Learning Disorder

I. INTRODUCTION

Specific learning disabilities (SLD) is a generic term that refers to a heterogeneous group of neurobehavioral disorders manifested by significant unexpected, specific and persistent difficulties in the acquisition and use of efficient reading (dyslexia), writing (dysgraphia) or mathematical (dyscalculia) abilities despite conventional instruction, intact senses, average intelligence, adequate motivation and socio-cultural opportunity (Shapiro and Gallico 1993).

SLD are intrinsic to the individual, presumed to be due to central nervous system dysfunction, and are chronic life-long conditions. Children with SLD fail to achieve school grades at a level that is commensurate with their intelligence. The incidence of dyslexia has been reported to be 2-18%, of dysgraphia 14%, and of dyscalculia 5.5% in primary school children in India (Mittal et al 1977; Shah et al 1981; and Ramaa et al 2002). The

cornerstone of treatment of SLD is remedial education, in which the child has to undergo sessions twice or thrice weekly for a few years to achieve academic competence.

The existing literature suggests that children with SLD have neuropsychological deficits especially in attention (Richards et al 1990); working memory (Swanson and Siegal 2001); phonological processing (Wilson and Lesaux 2001); perceptual skills (Harris 1995) and visuo-spatial ability (Facoetti et al 2001). Interventions targeting these deficits are very few, particularly those employing computer based cognitive remedial training.

Though this kind of training has been used in cases of Traumatic Brain Injury, Schizophrenia, Alcohol Dependence Syndrome to remediate the cognitive deficits, the efficacy of such computer based packages have not been studied with respect to specific learning disabilities except for one study by Solan et al (2003). This study examined the effectiveness of computer based visual attention therapy in remediating the reading comprehension in a group of children with moderate reading disabilities and found it to be beneficial in improving the reading skills. Research on cognitive neuroscience using computer technology has shown some promise in improving cognitive functions. A recent research by Owen (2010), has shown that computerized cognitive training leads to significant improvement in cognitive functions namely, reasoning, memory, planning, visuo-spatial skills and attention in 11,430 adult participants.

However, there has been a dearth of literature on the efficacy of computer based cognitive retraining in remediating developmental skill deficits such as reading, spelling and arithmetic and also, its effect when used in conjunction with education based remedial interventions. In the backdrop of this, the present study was undertaken to evaluate the efficacy of computer assisted cognitive retraining in the management of various specific learning disorders, when used in conjunction with education based remedial training.

II. RESEARCH ELABORATIONS

Objective: The main aim of this research has been to test the effectiveness of Computer assisted cognitive training used as an adjunct to education based remedial training in improving the scholastic skills of children with specific learning disorders. It was hypothesized that children undergoing this combined intervention would perform significantly better than children undergoing only the education based remedial training in

domains of attention, reading, reading comprehension, spelling and arithmetic.

Design: This study employed a between group before and after with control experimental design.

Sample: Subjects (N=10) between the ages of 8 and 15 years referred with academic difficulties to the outpatient clinic of the department of Clinical Psychology of Kasturba Hospital, Manipal were clinically screened for the possibility of any of the Specific Developmental Disorders of Scholastic Skills without any co-morbidity of behavioral and emotional disorders (except Disturbance of Activity and Attention (F90.0) under Hyperkinetic Disorder), according to ICD-10 criteria. Those suspected to be having either Specific Reading Disorder (F81.0), Specific Spelling Disorder (F81.1), Specific Disorder of Arithmetical Skills (F81.2) or combination of any of these scholastic skills were taken up for a detail psychometric assessment which consisted of assessment of intelligence, type(s), nature and severity of scholastic skill deficits. Following the assessment, those having intelligence quotient of above 70 and meeting the ICD-10 criteria for Specific reading disorder, Specific spelling disorder and Specific arithmetic disorder or combination of any of these were sequentially assigned to either of the following two remedial treatment groups:

1. RT+ group which received both Computer Assisted Cognitive training and Education based Remedial training.
2. RT- group which received only Education based Remedial training.

Inclusion criteria:

1. Age - 8 - 15 years (2nd to 10th standard)
2. Meeting ICD criteria for either Specific Reading Disorder (F81.0), Specific Spelling Disorder (F81.1) or Specific Disorder of Arithmetical Skills (F81.2), alone or in combination with or without Disturbance of Activity and Attention (F90.0)
3. IQ of 70 or above on Binet Kamat test of Intelligence

Exclusion criteria:

1. Specific Developmental Disorders of Scholastic Skills with comorbid disorders like seizure, conduct and emotional disorders.
2. Subjects expressing difficulty to attend at least 2 sessions/per week of training.

Measures used

Binet Kamat Test of Intelligence (Kamat, 1967): This test is an age scale employed widely for measuring general mental ability. This scale of intelligence comprises of 78 main test items and 21 alternate test items. The entire scale is graded and covers ages from 3 to 22 years. The test consist of items which include vocabulary, language development, comprehension, sentence building, similarities and differences, analogies, sentence repetition, auditory perception, social reasoning and visuo-motor co-ordination ability. Based on the Intelligence Quotient, it becomes possible to understand the child's cognitive ability.

NIMHANS Index of Specific Learning Disabilities (John, 1989): This battery was developed to identify children with specific learning disorders. The index comprises of the tests for Attention, Language (Reading, Writing, Spelling and Comprehension), Arithmetic (Addition, Subtraction, Multiplication, Division and Fractions), Visuo-motor skill (the Bender Gestalt Test and the Developmental Test of Visuo-Motor integration), Memory (Auditory and Visual).

III. REMEDIAL TRAINING

Computer Assisted Cognitive Training (CACT) : This training was carried out by using the software (vol. 1.3) obtained from Judith Falconer, Parker Co. (US) named as - **BRAIN TRAIN®**

It consists of an integrated set of 52 computer programs designed to assist in remediation of a wide range of cognitive and behavioral deficits commonly seen in individuals with brain injuries (through trauma, stroke, encephalopathy, aneurysm, etc.) or those who are developmentally disabled. For the purpose of this study, the remedial tasks were mainly targeted at attention, visuo-spatial ability, visual perception, working memory, visual discrimination, speed of information processing and visual memory.

Education Based Remedial training (EBRT): Children with reading, spelling and arithmetic difficulties were given many drill and practice exercises. They were taught grapheme-phoneme connections, use of sight words, flash cards and basic mathematical operations. SQ3R method was taught to some of the children. The remedial training was conducted depending on the educational needs of each child.

Procedure

Each group consisted of five children. Group 1 (RT+) received both EBRT and CACT while group 2 (RT-) received only EBRT. The interventions were carried out, on out-door basis, depending on the group for which a child was assigned. The CACT was carried out in a minimum of 15 sessions and a maximum of 20 sessions spread over a period of 3 – 5 weeks and education-based remedial training was carried out in a minimum of 8 sessions and a maximum of 12 sessions spread over 2 – 5 weeks. Duration of each of the sessions ranged between 60 – 90 min. In the RT+ group, the CACT and EBRT were carried out in parallel. Post-assessment was carried out employing NIMHANS SLD Index following completion of the intervention(s). The assessment scores in both the groups were analyzed using SPSS 16.0 to assess for significance level. The difference between the RT+ and RT- groups were analyzed using independent samples t test while the differences with regard to pre and post assessment scores of the RT+ group (group undergoing both EBRT and CACT) were analyzed using the paired samples t test.

IV. RESULTS

Table 1

Reflects the descriptives and independent sample t test results for both the RT+ and RT- groups on post assessment

Variables	Groups	M (±SD)	t value	Sig.
Attention (errors)	RT+	6.00 (±5.05)	1.10	0.31
	RT-	2.80 (±4.15)		
Reading (errors)	RT+	12.20 (±8)	0.94	0.38
	RT-	7.00 (±9.54)		
Reading comprehension	RT+	3.20 (±1.30)	0.00	1.00
	RT-	3.20 (±1.90)		
Spellings	RT+	10.20 (±2.59)	0.29	0.78
	RT-	9.60 (±3.91)		
Arithmetic	RT+	16.80 (±6.38)	0.07	0.94
	RT-	16.40 (±10.41)		

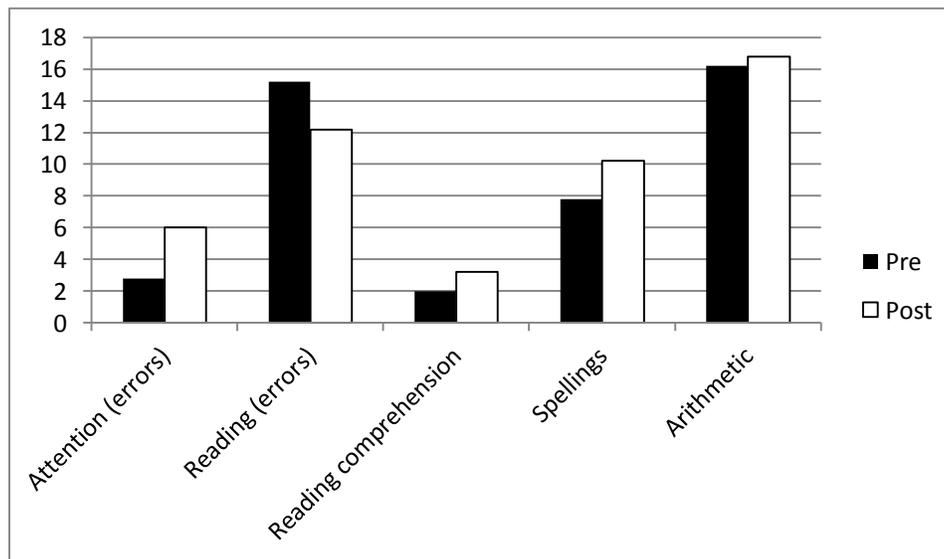
Table 2

Reflects the descriptives and paired sample t test results of the RT+ group

Variables	Assessments	M (±SD)	t value	Sig.
Attention (errors)	Pre-	2.80 (±4.20)	1.5	0.21
	Post-	6.00 (±5.05)		
Reading (errors)	Pre-	15.2 (±12.42)	0.31	0.78
	Post-	12.20 (±7.95)		
Reading comprehension	Pre-	2.00 (±1.88)	1.81	0.14
	Post-	3.20 (±1.30)		
Spellings	Pre-	7.8 (±2.59)	3.54	0.024
	Post-	10.2 (±2.59)		
Arithmetic	Pre-	16.2 (3.03)	0.30	0.78
	Post-	16.8 (6.38)		

Figure 1

Reflects the pre and post assessment changes on the cognitive and learning domains



V. CONCLUSIONS

The present study examined whether or not enhancing the neuro-cognitive functions through computer-based cognitive training produce additional benefits over and above that produced by the education-based remedial training in the

management of SLD. The table 1 results indicated that skills in attention, reading, reading comprehension, spelling and arithmetic improved better in group given computer assisted cognitive training along with education based remedial training than in group given only education based remedial training. However, the differences observed between the groups were not statistically significant. The results of the present study provide a seminal evidence that the neuropsychological remediation of the

cognitive deficits such as attention, working memory, visuospatial ability, visual perception, visual discrimination, visual memory and speed of information processing through computer package contributes further to the improvement that are derived from the education-based remedial training.

Table 2 reflects that the combined intervention of CACT and EBRT, has not led to significant improvement in attention, reading, reading comprehension and arithmetic. A significant improvement is noted only in Spelling scores ($t = 3.54$; $p < 0.05$). Overall, the means of the pre and post assessment scores of the RT+ group indicate that there has been an increase in the errors on attention. But there has been a reduction of reading errors. The RT+ group also appears to show some improvement (as reflected in figure 1) in performance on the Reading comprehension and Arithmetic domain; however these improvements are not significant presumably due to the small sample size of only 5 children.

However, the fidelity of CACT needs to be examined more closely in future studies, bearing in mind the issues raised below related to the present study,

Generally it has been observed that the CACT in the remedial training programs of various conditions are usually carried out over a period of 8 or more weeks with daily sessions lasting for 1 – 2 hours with several home assignments. For example, in a study by Ruff et al (1989) on head injury patients, the retraining was conducted over 8 week period, each patient receiving 160 hours of intervention in total. This study showed significant improvement in targeted cognitive functions in these patients. In the current study however, the number of hours of computer-based cognitive training was considerably less (average = 16 hours). In contrast, Owen's (2010) research which had led to significant findings, had used a large sample of 11, 430 participants on whom the cognitive training was conducted for a longer duration of 25 sessions.

Children with specific learning deficits have demonstrated neuropsychological deficits which however are more subtle compared to the deficits seen in people with severe conditions like head injuries, schizophrenia, etc. However, the efficacy studies of computer based cognitive retraining have been done on severely disabled conditions viz. traumatic brain injury patients on whom it is easier to observe improvement achieved by these interventions owing to severity of deficits. Hence improvement in subtle cognitive deficits in SLD group with this kind of training package requires longer duration of training. In the present study however, the training was carried out for a relatively shorter duration.

The absence of significant difference between the groups in current study could also be due to the ceiling effect. The performance of children with education-based remedial training might have produced the maximum beneficial effects, and adding or not-adding yet one more intervention might not have been of any consequence on the treatment outcome.

Further studies however, are needed to assess individual effects of Computer assisted cognitive training in the remedial training of scholastic skills, and its effects when used as adjunct in a much larger sample.

VI. EDUCATIONAL IMPLICATIONS

This research has important implications for teachers, special educators and cognitive rehabilitators in the remediation of children presenting with learning difficulties. Computerized cognitive training when used as an adjunct helps the child improve his foundation skills of attention, memory, processing speed, etc. along with academic skills and this combination of remediation would go a long way in sustaining the interest and motivation of the child to do well academically.

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Detailed Simulation of Voltage and Frequency Controller for Wind Generating System with Unbalanced Linear Load with Fixed Wind Speed

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Abstract- This paper deals with Voltage and frequency controller for wind generating system with unbalanced linear loads. The proposed system is modelled and simulated in MATLAB using simulink .The controller that controls both voltage and frequency of an asynchronous generator along with its improvement of power quality. The proposed controller has bidirectional active and reactive power flow capability along with battery energy storage system by which it controls the system voltage and frequency with variation of consumer load.

Index Terms- Battery energy storage system, isolated asynchronous generator, voltage and frequency controller, wind energy conversion system.

I. INTRODUCTION

Today the need for renewable sources is increasing particularly wind .Because wind is the most prominent source of energy available. We can easily exploit by using asynchronous generator .Squirrel cage induction are low cost, robust and simple in its construction.

Here employing a voltage and frequency controller for standalone wind power generating systems in order to maintain voltage and frequency.

The proposed voltage and frequency controller is having bidirectional active and reactive power flow capability by which it controls the system voltage and frequency with variation of consumer loads and wind .The performance is demonstrated using standard MATLAB software. Here we can discuss about detailed simulation of this scheme.

II. SYSTEM CONFIGURATION

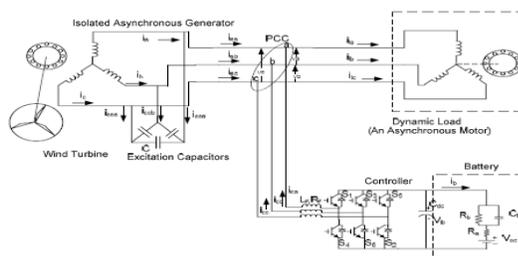


Fig.1. Schematic diagram of the proposed isolated wind energy system

The complete off grid stand alone system with asynchronous generator, wind turbine, excitation capacitor, balanced/unbalanced, linear/non-linear/dynamic consumer loads and proposed controller is shown in Fig.1. The proposed controller includes three-phase insulated gate bipolar junction transistor (IGBT) based voltage source converter (VSC) along with a battery at its dc link. The controller is connected at the point of common coupling (PCC) through the inter-facing inductor [1] . The excitation capacitor is selected to generate the rated voltage at no-load while additional demand of reactive power is met by the controller.

III. CONTROL SCHEME

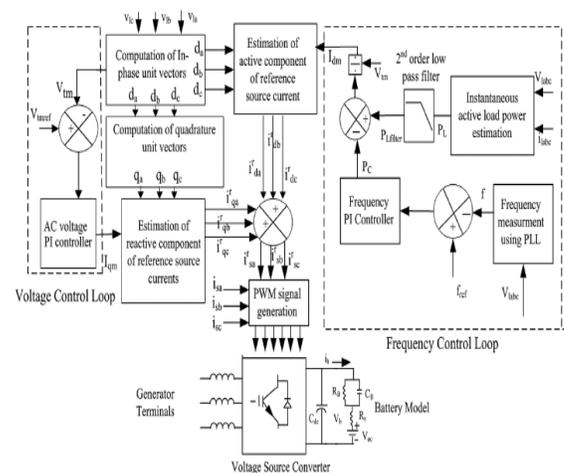


Fig.2.Schematic diagram of the proposed control strategy for an isolated wind energy system

Fig 2 demonstrates the control strategy of the proposed controller which is based on the generation of reference source currents. Reference source currents are having two components one is reactive component for controlling the magnitude of the generated voltage and other one is the active component for regulating the frequency of the generated voltage. The amplitude of active power component of the source current is estimated by dividing the difference of filtered load power and output of PI frequency controller to the amplitude of the terminal voltage. Multiplication of with in-phase unit templates yields the in-phase component of reference source currents. These templates are,

three-phase sinusoidal functions which are derived by dividing the ac voltages by their amplitude. To generate the reactive component of reference source currents another set of unit templates is derived from in-phase unit template and which are 90 leading from the corresponding voltages. The multiplication of these templates and output of PI (Proportional-Integral) terminal voltage controller gives the reactive component of reference source currents. The sum of instantaneous reactive and active Components of currents gives the total reference source currents and these are compared with the sensed source currents. The amplified current error signals are compared with fixed frequency (10 kHz) triangular carrier wave to generate the PWM switching signals for the devices of VSC.

IV. MODELING OF THE CONTROL SCHEME

Basic equations of the control scheme of the proposed controller are as follows.

A. Computation of Active Component of Reference Source Current

Active component of reference source current is estimated by dividing the difference of filtered instantaneous load power ($P_{Lfilter}$) and output of the PI frequency controller (P_C) to the terminal voltage (V_{tm}). The load power (P_L) is estimated as by taking three-phase to two-phase transform

$$v_\alpha = \left(\frac{\sqrt{2}}{3}\right)\left(v_{la} - \frac{1}{2}v_{lb} - \frac{1}{2}v_{lc}\right) \quad (1)$$

$$v_\beta = \left(\frac{\sqrt{2}}{3}\right)\left(\frac{\sqrt{3}}{2}v_{lb} - \frac{\sqrt{3}}{2}v_{lc}\right) \quad (2)$$

$$i_\alpha = \left(\frac{\sqrt{2}}{3}\right)\left(i_{la} - \frac{1}{2}i_{lb} - \frac{1}{2}i_{lc}\right) \quad (3)$$

$$i_\beta = \left(\frac{\sqrt{2}}{3}\right)\left(\frac{\sqrt{3}}{2}i_{lb} - \frac{\sqrt{3}}{2}i_{lc}\right) \quad (4)$$

Instantaneous active power is estimated as

$$P_L = v_\alpha i_\alpha + v_\beta i_\beta \quad (5)$$

It is filtered to achieve its dc component ($P_{Lfilter}$).

The frequency error is defined as

$$f_{er(n)} = f_{ref(n)} - f_{(n)} \quad (6)$$

Where f_{ref} reference frequency (50 Hz in present system) and “ f ” is the frequency of the voltage of an asynchronous generator. The instantaneous value of “ f ” is estimated using phase locked loop (PLL).

At the n th sampling instant the output of frequency PI controller (P_C) is as

$$P_{c(n)} = P_{c(n-1)} + K_{pf}\{f_{er(n)} - f_{er(n-1)}\} + K_{if}f_{er(n)} \quad (7)$$

Where K_{pf} and K_{if} are the proportional and integral gain constants of the frequency proportional integral (PI) controller.

Then active component of reference source current (I_{dm}) is calculated as

$$I_{dm} = 2 \frac{(P_{LFilter} - P_C)}{3v_{tm}} \quad (8)$$

The instantaneous line voltages at the terminals of an asynchronous generator (v_{la} , v_{lb} and v_{lc}) are considered sinusoidal and their amplitude is computed as

$$V_{tm} = \left\{ \left(\frac{2}{3}\right)(v_{la}^2 + v_{lb}^2 + v_{lc}^2) \right\}^{\frac{1}{2}} \quad (9)$$

The unity amplitude templates are having instantaneous value in phase with instantaneous voltage (v_{la} , v_{lb} and v_{lc}), which are derived as

$$d_a = \frac{v_{la}}{V_{tm}} \quad d_b = \frac{v_{lb}}{V_{tm}} \quad d_c = \frac{v_{lc}}{V_{tm}} \quad (10)$$

B. Computation of Reactive Component of Reference Source Current

Instantaneous values of in-phase components of reference source currents are estimated as

$$i_{rda} = I_{dm}d_a, \quad i_{rdb} = I_{dm}d_b, \quad i_{rdc} = I_{dm}d_c \quad (11)$$

The ac voltage error at the n th sampling instant as

$$V_{er(n)} = V_{mref(n)} - V_{tm(n)} \quad (12)$$

Where $V_{mref(n)}$ is the amplitude of reference ac terminal voltage and $V_{tm(n)}$ is the amplitude of the sensed three-phase ac voltage at the terminals of an asynchronous generator at n th instant.

The output of the PI controller ($I_{qm(n)}$) for maintaining constant ac terminal voltage at the n th sampling instant is expressed as

$$I_{qm(n)} = I_{qm(n-1)} + K_{pa}\{V_{er(n)} - V_{er(n-1)}\} + K_{ia}V_{er(n)} \quad (13)$$

Where K_{pa} and K_{ia} are the proportional and integral gain constants of the voltage proportional integral (PI) controller (values are given in Appendix). $V_{er(n)}$ and $V_{er(n-1)}$ are the voltage errors in n th and $(n-1)$ th instant and is the amplitude of quadrature component of the reference source current at $(n-1)$ th instant. The instantaneous quadrature components of reference source currents are estimated as

$$I_{rqa} = I_{qm}i_{qa}, \quad I_{rqb} = I_{qm}i_{qb}, \quad I_{rqc} = I_{qm}i_{qc} \quad (14)$$

where q_a , q_b and q_c and are another set of unit vectors having a phase shift of 90° leading the corresponding unit vectors, and which are computed as follows:

$$q_a = -\frac{d_b}{\sqrt{3}} + \frac{d_c}{\sqrt{3}} \quad (15)$$

$$q_b = \frac{\sqrt{3}d_a + (d_b - d_c)}{2 + 2\sqrt{3}} \quad (16)$$

$$q_c = -\frac{\sqrt{3}d_a + (d_b - d_c)}{2 + 2\sqrt{3}} \quad (17)$$

C. Computation of Reference Source Current

Total reference source currents are sum of in-phase and quadrature components of the reference source currents as

$$i_{rsa} = i_{rqa} + i_{rda} \quad (18)$$

$$i_{rsb} = i_{rqb} + i_{rdb} \quad (19)$$

$$i_{rsc} = i_{rqc} + i_{rdc} \quad (20)$$

D. PWM Signal Generation

Reference source currents (i_{rsa} , i_{rsb} and i_{rsc}) are compared with sensed source currents (i_{sa} , i_{sb} and i_{sc}). The current errors are computed as

$$i_{rsaerr} = i_{rsa} - i_{sa} \quad (21)$$

$$i_{rsberr} = i_{rsb} - i_{sb} \quad (22)$$

$$i_{rscerr} = i_{rsc} - i_{sc} \quad (23)$$

These current errors are amplified with a gain (K) and the amplified signals are compared with fixed frequency (10 kHz) triangular carrier wave of amplitude to generate gating signals for IGBTs of VSC of the controller.

V. ANALYSIS AND DESIGN

A. Design Of Three Leg VFC

Parameters of VFCs are designed for a 22-kW, 415-V, 50-Hz asynchronous generator-based standalone WECS. It is reported that for feeding reactive power in the case of 0.8-pf lagging reactive loads, an IAG requires 140–160% of the reactive power of the rated generated power. Therefore, the VAR rating of the VFC required for 22 kW (P_A) generator is around 30 kVAR.

Then, the apparent power SA is given as

$$S_A = \sqrt{(P_A)^2 + (Q_A)^2} = \sqrt{(22)^2 + (30)^2} = 37 \text{ kVA.}$$

So the current rating of VSC is $\sqrt{3}V I_C = 37 \text{ kVA}$

$$\therefore I_C = 51.7 \text{ A.}$$

The amplitude of the current is $I_C (pk) = 73.19 \text{ A.}$

The average current is $I_{avg} = 0.9 \times 51.7 \text{ A}$
 $= 46.53 \text{ A.}$

On the basis of earlier current rating, the peak-to-peak current ripple (considering 5% of the peak current) through the filter inductor can be estimated as

$$I_{Lripplepk-pk} = 0.05 * 73.19 \text{ A} = 3.6595 \text{ A.}$$

By estimating this current ripple and the average value of the current, the value of filter inductors and dc link capacitors can be estimated for various VFC topologies as follows

Here, the modulation index m_a is considered equal to value of 1. The ripple current through the inductor is taken 5% Overloading factor ∂ due to transient condition varies from 120% to 180%

The switching frequency of 10 kHz is selected for IGBTs of VSCs.

The filter inductor is calculated by substituting the values of parameters as

$$L_{an} = L_{bn} = L_{cn} = \frac{\sqrt{3}m_a v_{dc}}{12 * \partial * f_s * I_{L Ripple}} = 3 \text{ mH.}$$

The dc link voltage is selected as

$$V_{dc} > \frac{2\sqrt{2}}{\sqrt{3}} V = 677 \text{ V.}$$

The dc link capacitor can be estimated by considering the voltage ripple across it. The value of the capacitor can be determined by the following equation:

$$V_{dcRipple} = \frac{1}{C_{dc}} \int i_c dt = \frac{I_{avg}}{2\omega C_{dc}}$$

$I_{avg} = 46.53 \text{ A}$, and $\omega = 314 \text{ rad/s}$ for a 50-Hz WECS, the value of the dc bus capacitor is given as

Considering $V_{dcRipple}$ of 2%

$$V_{dcRipple} = 13.54 \text{ V}$$

$$C_{dc} = \frac{I_{avg}}{\partial \omega V_{dcRipple}} = 5475.6 \mu\text{F}$$

VI. SIMULATION, RESULTS AND DISCUSSION

Model with voltage and frequency control is modelled using MATLAB for linear unbalanced loads. The results are given below and we can see distortion is very much reduced.

A. Simulation of the Controller Feeding unbalanced Linear Loads

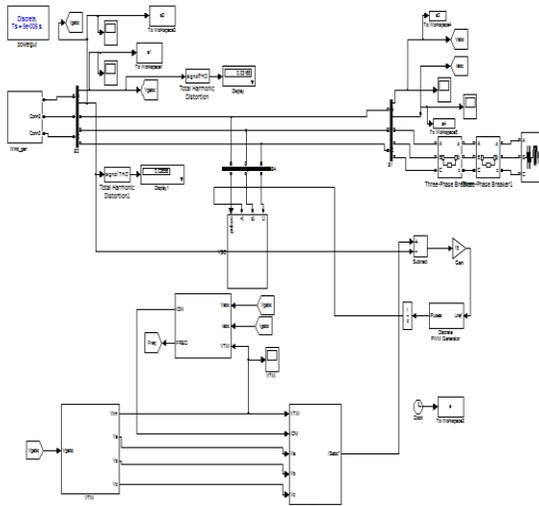


Fig.3. Wind generator feeding unbalanced linear load

Fig.3. Wind generator feeding unbalanced linear load. The unbalance is given using breakers. The system first started at no load, that is first breaker in open position. Then at 1s it is closed and load given. Then at 1.2 s unbalance is given by opening phase at 1.2s.

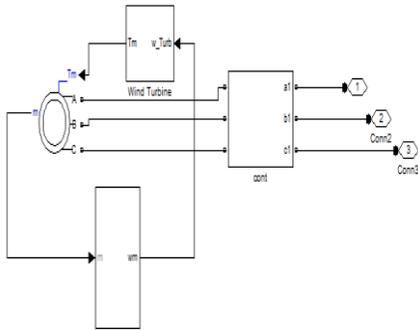


Fig.4. Wind power generation

The subsystems for active, reactive power, v_{lm} generation generation re given below.

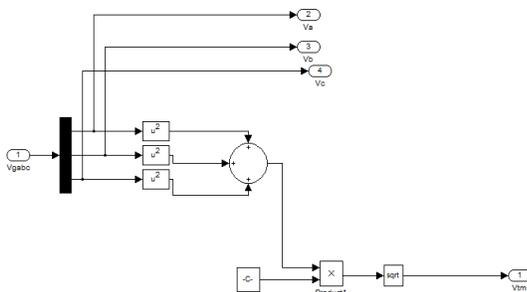


Fig.5. v_{lm} generation

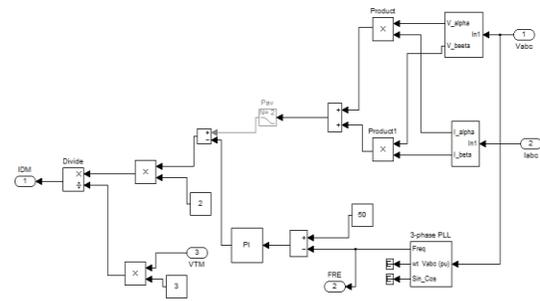


Fig.6. Computation of active component of reference source current

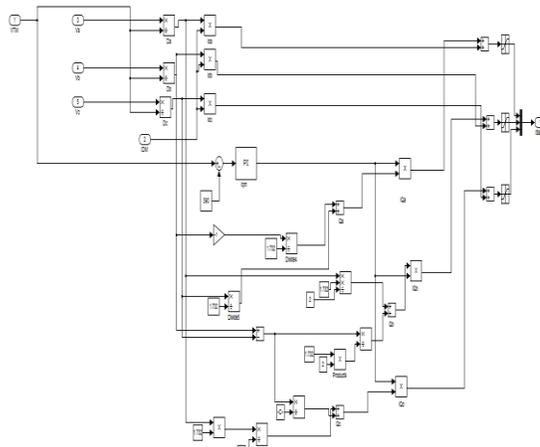


Fig.7. Computation of reactive component of reference source current and reference current generation

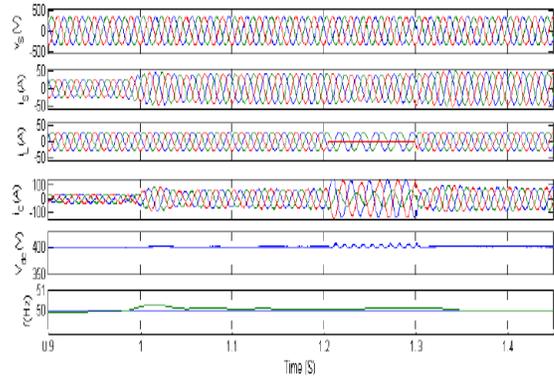


Fig.8. Transient waveforms during application of balanced/unbalanced 0.8 pf lagging load at fixed wind speed

Fig.8. demonstrates the performance of the controller for feeding unbalanced linear loads. At 1 s load is given and later on at 1.2 s one phase of the load are opened using breakers and the load becomes unbalanced but voltage and current at the generator terminals remain balanced under such worst case of load

VII. CONCLUSION

The performance of the proposed controller has been demonstrated for an isolated wind energy conversion system.

Simulation results have verified the performance of the controller under unbalanced linear load. It has been observed that the proposed controller has been found to regulate the magnitude and frequency of the generated voltage constant in isolated wind power application..

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Effect of Extraction Methods on Lipid and Fatty Acid Composition by *Mortierella Ramanniana*

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Abstract- The efficacy of three extraction methods for determining the lipid and fatty acid composition of *M. ramanniana* was studied. The extraction methods were chloroform:Methanol (2:1), Hexane:Isopropanol (3:2) and ethyl acetate. The total fatty acid composition varied in fungal cultures depending on the extraction conditions of the three methods chloroform:methanol (2:1) was found to be the best for extraction of lipid and fatty acids from *M. ramanniana*.

Index Terms- Lipid; Gamma; Linolenic acid; *Mortierella*, Fatty acid; Culture

I. INTRODUCTION

Oils containing dietetically important polyunsaturated fatty acids (PUFAs) such as gamma linolenic acid [18:3 (ω 3)] are considered to be high value [1]. A current commercial source of oils containing 18:3 ω 6 PUFAs is plant like evening primrose or borage, but an alternative source which has been extensively studied in fungi belonging to the genus *Mortierella* [2]. GLA is important as a precursor of dihomogamma-linolenic and arachidonic acids which are essential for normal bodily physiological processes, since they are required for cell structures and are also the precursors of the series of 1 and 2 prostaglandins.[3] GLA is also used in the treatment of various illnesses such as rheumatoid arthritis[4], multiple sclerosis[5], schizophrenia [6], atopic ezema[7] and premenstrual syndrome [8]. Zygomycetes fungi are known to accumulate GLA in the mycelium[9]. Attempts have been made to improve 18:3 ω 6 production in *Mortierella* sp. by changing the culture conditions [10]. Lipid extraction from biomass is an important step in the quantification of lipid from microorganisms.[11]

Rapid and reliable methods of extraction and purification of PUFAs from microbial biomass are required or further development in the area of microbial technology. At the same time, satisfactory treatment must be used to minimize autoxidative degradation and the presence of artifacts. On the other hand, if PUFA are to be used in pharmacological, medical and food applications, solvents should be selected that are acceptable in terms of toxicity, handling, safety and cost [12]. With this as background and the current interest in the production of polyunsaturated fatty acids (PUFAs) by fungi, we report chloroform: methanol to be the most suitable solvent system for extraction purposes.

II. MICROORGANISM AND CULTIVATION

M. ramanniana used in this study, was obtained from culture repository of Regional Research Laboratory, India, and was maintained on potato dextrose agar slants. The culture was grown on a medium comprising of ($g\ l^{-1}$) glucose 100, peptone 10, yeast extract 1, pH 6.5 (Control Medium). Fermentation was done in 500 ml Erlenmeyer flasks containing 100 ml medium at $28 \pm 2^\circ C$ on a rotary shaker at 220 rpm for 144 h. The mycelium after fermentation was harvested by filtration, washed with distilled water and gently dried at $50^\circ C$ for 15 h or till the weight is nearly constant. Triplicate standards of each flask were prepared to appraise average.

Lipid extraction

2 Grams of dry biomass was disrupted and homogenized in a pestle and mortar. The biomass thus obtained was disrupted and homogenized in a pestle and mortar using acid washed sand (1:2) and then acid hydrolyzed for 45 min with 50 ml of $0.25\ mol\ l^{-1}$ HCl. Lipid was extracted from the fungal biomass with chloroform: methanol (2:1) Hexane: isopropanol (3:2) and Ethyl acetate for 3 h. Anhydrous sodium sulphate is added to the extracted lipids in order to remove any residual moisture. The solvent was removed by evaporating on rotavapour and the total lipid estimated. All values were means of triplicate determination.

Fatty acid determination

The fatty acid profile of mycelium was determined by saponification followed by methylation for conversion of fatty acids to corresponding methyl esters. FAMES were prepared according to the methods of Christopherson and Glass [13] and analyzed first by TLC followed by gas chromatography fitted with a FID detector.

Thin Layer Chromatography

All comparative TLC analysis were carried out on Merck 0.25mm silica gel plates developed in solvents hexane/ethyl acetate 9:1. GLA Methyl ester was detected with 1% ceric ammonium sulphate reagent after gentle heating. It appeared as spots.

Gas Liquid chromatography

GC was performed on Agilent 6890 Series Gas Chromatograph equipped with a FID and the capillary column DB-23 (30 m X 0.25 mm i.d. X 0.5 μm film thickness; J & W Scientific, USA). The injector and detector temperatures were

maintained at 230 and 250°C respectively. The oven was programmed for 2 min at 160°C to 180 °C at 6 °C/min, maintained for 2 min at 180 °C, increased further to 230 °C at 4 °C/min and finally maintained for 10 min at 230 °C. The carrier gas, Nitrogen was used at a flow rate of 1.5 mL/min. The injection volume was 1 µL, with a split ratio of 50:1.

GC-MS.

GC-MS was performed with Agilent 6890N Gas Chromatograph connected to Agilent 5973 Mass Spectrometer at 70 eV (m/z 50-550; source at 230°C and quadruple at 150°C) in the EI mode with a HP-5ms capillary column (30 m X 0.25 mm i.d. X 0.25 µM film thickness; J & W Scientific, USA). The carrier gas, Helium was used at a flow rate of 1.0 mL/min. The inlet temp was maintained at 300°C and the oven was programmed for 2 min at 150°C to 300°C at 4 °C/min, and maintained for 20 min at 300°C. The injection volume was 1 µL, with a split ratio of 50:1. Structural assignments were based on interpretation of mass spectrometric fragmentation and confirmed by comparison of retention times as well as fragmentation pattern of authentic compounds and the spectral data obtained from the Wiley and NIST libraries.

III. RESULTS AND DISCUSSION

In the oleaginous microorganisms, lipids are present in the cell membranes and also in the cytosol. The accumulation of lipid in oleaginous organisms is known to occur when there is depletion of growth nutrient, other than carbon, preventing cell proliferation and allowing accumulation of lipid in the cell [14]. Lipids play an important role in the cells, where they occur in the membranes and cytosol. They are heterogenous compounds with different structures and properties. Due to these attributes, it is difficult to obtain their complete isolation. Pure single lipid classes are soluble in a wide variety of organic solvents are not suitable for lipid extraction from tissues or cells. The used solvent or the solvent system for extracting lipid from cells could be sufficiently polar to remove all lipids from their association with cell membranes or with lipoproteins, but could not react chemically with these lipids. At the same time the solvent should not be so polar that nonpolar lipids do not dissolve. Generally, nonpolar solvents are usually needed for lipid extraction, where most lipids are adequately dissolved. Nevertheless, their combinations with polar solvents are advantageous, mainly because of dehydration, protein denaturation, and degradation of hydrogen bonds between the lipid complex and proteins. The extractants may also have function in preventing enzymatic hydrolysis. Increasingly, attention is being given to the potential toxicity of solvents. Finally, the extractability of cells or tissues is variable and depends both on the nature of the cells and of the lipids.

The data on the amount of lipid content extracted using various solvents are given in the table (1)

As can be seen from this table, chloroform:methanol(2:1) gives the maximum extraction of lipid from the mycelium. The combination of polar and non polar solvents is thus advantages for the extraction of lipids from microorganisms. By the Chloroform:methanol method 37.715% of total lipid was

recovered. This solvent system has been employed to extract nonpolar compounds and phospholipids from microorganisms [12]

Hexane:Isopropanol is preferred for extraction of lipids because of their lower toxicity. When compared with chloroform:methanol extraction the yields are lower with hexane:isopropanol, may be due to reduced extraction of less polar lipids. The total lipid yield in this solvent is 20%. The other method chosen for lipid isolation was using ethyl acetate because it is being used as a food grade solvent / because of lower toxicity. But only 15% of the oil was extracted. The extracted oil can be used for various industrial applications as the solvent is considered to be safe. There is no significant effect of various extraction solvents on the fatty acid composition of the total lipid isolated from *M. ramanniana*. The major fatty acids extracted by three methods were palmitic, stearic and oleic acid. Fatty acid profile of *M. ramanniana* with different solvent systems was almost same as shown in (table 2)

The biomass, oil content and fatty acid content of oil are the important parameters for the development of any technology. Ideally all these parameters should be very high, to achieve the desired lipid composition. But practically it is not possible to have all the three parameters high at the same time. Bajpai et al have reported that the DHA content of the mycelial lipid was higher when the biomass contained a low lipid content [10]. Ratledge also reported that *M. circinelloides* produces oil containing high GLA, when the lipid content is low [1].

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LIPID COMPOSITION OF *M.ramanniana*.(Table 1)

Solvent System	Lipid content	
	G/l	w/w
1.Chloroform: methanol (2:1)	10	35.725
2.Hexane:Isopropanol (3:2)	5.72	20.445
3.Ethyl acetate	4.242	15.15

Fatty acid profile of *M ramanniana* with different solvent systems.(Table 2)

Solvent System	Palmitic Acid	Palmitoleic Acid	Stearic Acid	Oleic Acid	Linolenic Acid	GLA
C:M	36.36			39.79	5.89	10.68
I:H	36.8		3.9	2.5	41.5	7.0
EA	36.8	5.4	2.5	41.5	5.0	9.0

Peripheral Primitive Neuroectodermal Tumor (PNET) of the Paravaginal Tissue

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Abstract- Peripheral primitive neuroectodermal tumor (PNET)is now considered an entity of Ewings sarcoma / primitive neuroectodermal tumor family .PNET of the female genital tract especially vaginal and paravaginal region is extremely rare.We present a case of a 29 year old lady with a paravaginal PNET diagnosed on histopathology and confirmed with the help of immunohistochemistry. Awareness of occurrence of PNET at unusual sites such as vagina is required to distinguish it from other tumors and for appropriate management.

Index Terms- PNET, Ewings sarcoma, Vagina

I. INTRODUCTION

Primitive neuro-ectodermal tumor (PNET) is a rare tumor comprising just about 1% of soft tissue sarcomas^{1,2}. Primitive neuro-ectodermal tumors can be classified into central and peripheral according to the cell of origin. Central PNETs originate from the neural tube, which includes the brain and spinal cord, while peripheral PNETs arise from the neural crest, which includes sympathetic nervous system, bones or soft tissues.^{2,3} PNET is now considered an entity of Ewing's family of tumors. Ewing's family of tumors is not a single condition but a group of closely related tumors that have a similar natural history, prognosis, immunohistochemical and cytogenetic profiles³.

PNET of the female genital tract are extremely rare. The most common site of PNET in the female genital tract is the ovary followed by uterine corpus. Cervix, vulva and vagina being exceedingly rare.^{2,8} . To the best of our knowledge only 8 cases of primary vaginal PNET has been reported in the English literature.^{1,4,5}

We present a case of PNET of paravaginal tissue diagnosed by histopathology and confirmed with the aid of immunohistochemistry.

II. CASE REPORT

A 24 year old lady with an emergency Caesarian section done 6 months back presented with complaints of pain abdomen, nausea and fever since 30 days. Abdominal pain was initially confined to the right flank followed by generalized lower abdominal pain. Patient also gave a history of increased frequency of micturition and on and off white discharge per vagina. No history of weight loss or loss of appetite was present. . All investigations were within normal limits except for CA 125 and total LDH which were slightly raised. Per abdominal examination revealed a vague mass suprapubically with tenderness in the right iliac fossa. Vaginal examination showed

mass in the right fornix, about 10x8cm, tensely cystic. Ultrasonography revealed a large lobulated mass lesion predominantly solid, with few cystic areas arising from cervix measuring 7.8x7.5cm, occupying the entire right vagina. Right ovary was not visualised.The tumor was biopsied and sent to pathology department as multiple grey brown to hemorrhagic tissue bits weighing 2gms.

Microscopic examination showed tumor composed of small cells with round to oval nuclei, fine chromatin, inconspicuous nucleoli, scant cytoplasm, abundant mitotic figures arranged in diffuse sheets with scant stroma showing dilated and congested blood vessels. PAS stain showed focal cytoplasmic positivity.

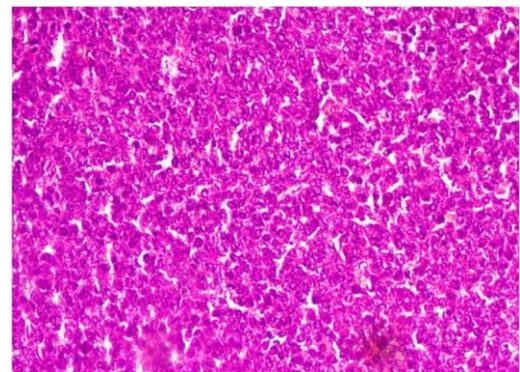


Fig 1.Diffuse sheets of small round cells H&E x 200

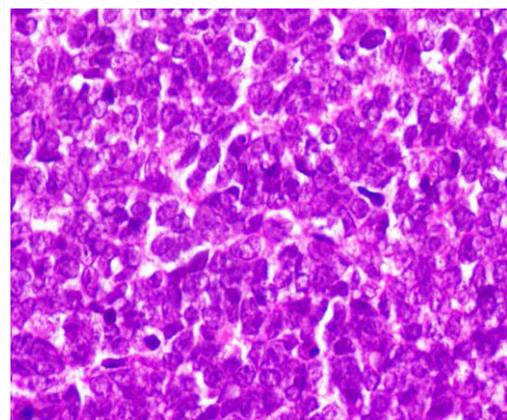


Fig 2 . Cells with fine chromatin, inconspicuous nucleoli, scant cytoplasm H&E x 400

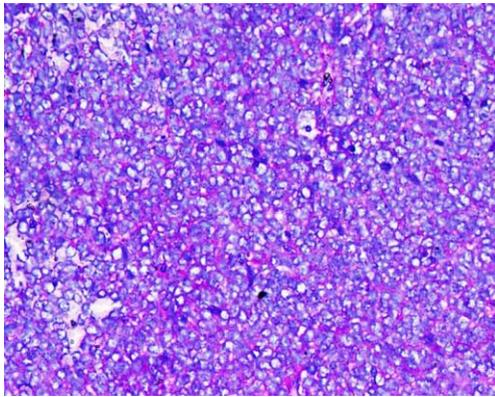


Fig 3 . Tumor cells show focal PAS positivity x 200

Immunohistochemistry showed tumor cells with strong membrane positivity for CD99, positivity for S100 (focal) and bcl2. Tumor cells were negative for Cytokeratin, Desmin, LCA, HMB45, Synaptophysin and Myogenin.

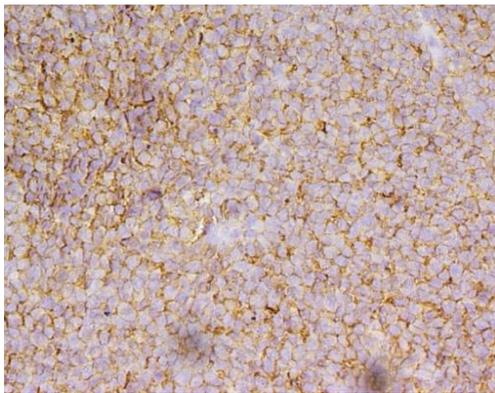


Fig 4 . Strong membrane positivity for CD 99 x 400

III. DISCUSSION

PNET was originally reported by Arthur Purdy Stout in 1918, on a tumor of the ulnar nerve with the gross features of a sarcoma but composed of small round cells focally arranged as rosettes and was initially termed neuroepithelioma⁶. The term "primitive neuroectodermal tumor" (PNET) was first coined in 1973 by Hart and Earle. In the early 1970s the proposed criteria for the diagnosis of PNET included the clear association to a peripheral nerve and excluded disseminated neuroblastoma. The original description of PNET has evolved to include soft tissue masses even if grossly unassociated with peripheral nerves that meet a variety of proposed histologic, immunohistochemical, or ultrastructural criteria. Much controversy has surrounded this diagnosis primarily because of its similarity to other undifferentiated small round cell tumors.

Ewing sarcoma(ES) and PNET were regarded as distinct entities by themselves in the past. Recent developments point out that the small round-cell tumors seen in both tumor types share common phenotypic and molecular features, supporting the concept of a single tumor category³, Ewing sarcoma/PNET family of tumors⁴. Ewing sarcoma/PNET, now defined as a

group of small round-cell sarcomas that show variable degrees of neuroectodermal differentiation. Ewing sarcomas are tumors that lack evidence of neuroectodermal differentiation when assessed by light microscopy, immunohistochemistry, and electron microscopy in contrast to PNET that show neuroectodermal features when evaluated by one or more of the above modalities. Both, however, in 85% of reported cases are characterized by a t(11; 22) (q24; q12) chromosomal translocation leading to a chimeric transcript EWS-FLI1.^{1,4,7,8} Peripheral PNETs show typical EWSR1 gene rearrangement, while central PNETs lack the EWSR1 rearrangement¹. Its presence thus confirms a diagnosis of peripheral primary Ewing's sarcoma/ PNET, especially at unusual sites where the index of suspicion is low like the present case where it is rarely even considered as a differential.

PNET of the vagina presents usually as a rapidly growing painful deep mass. Symptoms of pain along with watery and foul smelling discharge per vagina and pressure symptoms such as tenesmus and difficulty in passing urine can be present. The age of previously reported cases of PNET of the vagina varied between 17 and 47 years old². Characteristic histological features including uniform small cells with round nuclei, fine chromatin, scanty clear or eosinophilic cytoplasm with glycogen content, and indistinct cytoplasmic membranes are common microscopic features . Although the presence of glycogen in a round-cell tumor was considered to be diagnostic, few cases may be glycogen-negative.

The usual differential diagnosis of paravaginal PNET includes poorly differentiated carcinomas, lymphomas, melanomas and sarcomas⁵. The absence of positivity for epithelial markers like cytokeratin helps in differentiating between carcinomas and to a lesser extent from small cell neuroendocrine carcinomas⁵. Lymphomas most closely resemble PNETs with sheets of malignant small cells without evidence of glandular or squamous differentiation.

Immunohistochemical markers currently used in the diagnosis of Ewing sarcoma/PNET family of tumors include MIC2 (also designated CD99), neurofilament proteins, neuron-specific enolase, vimentin, and HBA- 71. CD99 is expressed in the membranes of majority of Ewing sarcoma/PNET tumors. MIC2 expression has also been detected in lymphoblastic lymphoma and related leukemias, rhabdomyosarcoma, small cell carcinoma, Merkel cell carcinoma, mesenchymal chondrosarcoma and synovial sarcoma. However, MIC2 expression is a highly sensitive and reliable marker for the diagnosis of Ewing sarcoma/PNET when used as part of a panel of immunohistochemical stains, despite the lack of complete specificity⁴. The product of *MIC2* is a glycoprotein (also designated CD99 or p30/32MIC2) with a molecular mass of approximately 30,000 daltons located on the cell surface and believed to be involved in cell adhesion. Although immunohistochemical detection of membrane localized MIC2 expression is a sensitive diagnostic marker for the ES/PNET family of tumors, it lacks specificity in that many other tumors, and for that matter, many normal tissues, are also immunoreactive with anti-MIC2 antibodies. In addition, FLI-1 positivity is also helpful even though its expression is also noted in lymphomas, rhabdomyosarcomas and synovial sarcomas. Though more sensitive for synovial sarcomas, bcl-2 positivity

has also been documented in a subset of PNETs¹. MIC2 positivity is also identified in rhabdomyosarcomas and lymphomas. However, the lack of desmin, myogenin and MyoD-1 ruled out rhabdomyosarcoma in this case while LCA negativity ruled out a diagnosis of lymphoma.

The diagnosis of ES and PNET has been largely a process of exclusion. In recent years, detection and investigation of specific genetic alterations as has been discussed above have established exquisitely sensitive and specific markers for ES and PNET that have rapidly become the standard for confirming the diagnosis.

IV. CONCLUSION

Our case being one of the very rare locations of the PNET reinforces the value of histopathological examination and IHC in the objective identification of this sarcoma at unusual sites like the vagina. However, preoperative diagnosis is often very difficult to establish. The importance of correct diagnosis and identification of the tumor helps in early institution of appropriate management¹. Multimodality therapy is used in most, including radical surgical resection and irradiation being the current treatment of choice⁹. The treatment outcome for patients with primary vaginal Ewing's sarcoma/PNET has been favorable in so far as documented cases are concerned with a 5 year survival rate of 24-80% in small resectable cases and showing better prognosis than the PNETs in the other parts of the female genital tract^{1,5}.

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Study on Growth of Retail Market in India with Special Reference to Broadening of Mallculture in Tier II City

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Abstract- The Indian retail industry continues its growth trajectory on to 2011. India has emerged as the hottest retail destination. Most of the organized retailing in India has started recently and is concentrating mainly in metropolitan cities. The growth of Indian organized retail market is mainly due to the change in the consumer behavior. This change has come in the consumer due to the increased income, changing life styles and pattern of demography which are favourable. Now the consumer wants to shop at a place where he can get food, entertainment and shopping, all under one roof. This has given Indian organized retail market a major boost.

Shopping malls are the hot shopping destinations in new life style. Due to rapid retail boom, variety of malls has emerged. With this big ticket mall culture hitting the great Indian middle class, the days of pure shopping delight seems to be diminishing.

Our study is on the 'DB Mall' that has recently come up in the city of lakes, Bhopal. It was delighting to study the shopper's attraction and their views which concluded with a positive nod on mall culture in our tier II city.

Index Terms- Window shopping – Just looking not buying., Shopaholism – is the name given to the addition for shopping., Shopper's Attraction, Huff's Law, Mall Culture, Tier II city, Traditional market, Organized Market

I. INTRODUCTION

Retail in India's largest industry is accounting for 10% of the country's GDP and around 80% of the employment. Retail industry in India is at the cross roads. It has emerged as one of the most dynamic and fast paced industries with several players entering the market. Indian retail sector is highly fragmented as compared to the developed as well as the other developing countries. This shows the great potential for the organized retail industry to prosper in India. As the market for the final consumption in India is very large, retail trade is largely in the hands of private independent owners and distributor's structure for fast moving goods consisting of multiple layers such as carrying and forwarding agents, distributors, stockiest, wholesalers and retailers. Thus the growth potential for the organized retailer is enormous.

II. PURPOSE OF THE STUDY

1. To study the growth of the retail sector in India with special study on the recently commissioned mall at our Tier II city, Bhopal.
2. To know the consumers' sensitivity on the kind of shopping.

3. To know the behavior of customers on mall culture of Bhopal.

III. OBJECTIVES OF THE STUDY

Mall culture, the concept of merchandising under one roof has seen boom-berry not only in metros, the Tier I and Tier II has also sensational feather touch of mall culture glory. The objective of our study was to find out the adaptability of mall culture in our Tier II city & to analyze the consumer behavior in the city of Bhopal.

IV. RESEARCH METHODOLOGY

Data collection:

The data has been collected both from primary as well as secondary sources. The Primary data has been collected by means of a questionnaire & through personal interviews

Sample size :

Of the total 200 Respondents, nearly half of them answered through questionnaire

Population:

Major respondents included youth between the age of 16-25 years & the next category covers the married couples with small children & the few were adults above 40 years.

Methods & Tools used:

Case study analysis, Questionnaire , Personal interviews & social networking sites.

Present scenario

Retailing in India is witness to the boom in terms of modern retailing formats, shopping malls etc. The future of retailing for any product across the country will definitely be in malls where the consumer can get –

- variety
- quality
- ambience

Retail in India – The Future

According to a study, the size of the Indian retail market is currently estimated at Rs.704 crores which accounts for a meager 7% of the total retail market. As the market becomes more and more organized, the Indian retail industry will gain greater worth. The retail sector in the small towns and cities will

increase by 50% to 60% pertaining to easy and inexpensive availability of land and demand among consumers.

According to a report, from the year 2003 to 2008 the retail sales were growing at a rate of 8.3% per annum. With this the organized retail which currently has only 7% of the total market share will acquire upto 31.5% of the market share by the year 2012.

Factors that are playing a role in fuelling the bright future of the Indian retail are as follows –

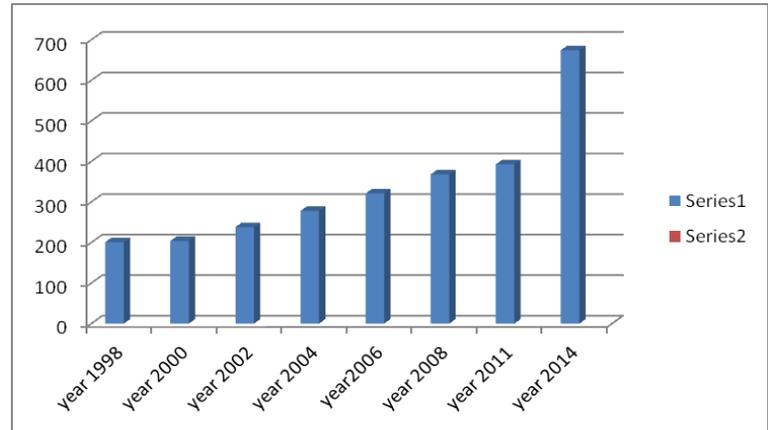
- The income of an average Indian is increasing and thus there is a proportional increase in the purchasing power.
- The infrastructure is improving greatly in all regions is benefiting the market.
- Indian economy and its policies are also becoming more and more liberal making way for a wide range of companies to enter Indian market.
- Indian population has learnt to become a good consumer and all national and international brands are benefiting with this new awareness.
- Another great factor is the internet revolution which is allowing foreign brands to understand Indian consumers and influence them before entering the market. Due to the reach of media in the remotest of the markets, consumers are now aware of the global products and it helps brands to build themselves faster in a new region.

Currently, Indian has one of the largest numbers of retail outlets in the world.

Indian Retail Landscapes

Year	\$billion retail growth
1998	201
2000	204
2002	238
2004	278
2006	321
2008	368
2011	392.63
2014	674.37

Source: BMI India retail report



Emergence of shopping malls in India

Introduction of malls has not been able to replace traditional markets which are still popular among the pocket conscious people, but has definitely added a new adventure to the shopping experience.

The Trend !

Without any doubt, the mall culture has gripped Indians and they seem love every bit of it. Crowded streets, traffic congestion and mob of people flooding a chick looking building is a popularly visible scenario every Sunday.

This brings to light that people’s perception has completely changed towards shopping. Congenial atmosphere, world class entertainment, international brands, basic amenities and exotic cuisines is what the malls aspires to provide under one roof. People are welcoming this new trend with open arms, unaware of what just be its consequences. More over, sales and bargain deals, attractive prices and schemes are the success formula, the shop keepers are trying to cash in, on customers. This has made malls a mega hit amongst the metro crowd, putting fuel to their ever increasing demand for a better living. This is a result of the expanding Indian market and disposable incomes by the service class.

As an alternative

Apart from being the shopper’s paradise, malls are also acting as good alternative, for the people to escape from the otherwise poor living conditions. This brings the flipside of the mall culture into sight which enforces that though shopping is the modern mantra, people are looking for something more. Malls act as great refuge from the scorching heat of the sun, in summers, as all the malls are centrally air conditioned for the purpose.

Another reason for the malls being so crowded is quite a number of people roam there armlessly. Their purpose can be anything from a get together with friends to simply window shopping from buying popcorns to buying cards. This explains that hot weather, frequent and prolonged electricity and water cuts are some of the strong reasons why the common man is attracted towards the escalating shrines of consumerism.

II tier and III tier cities

Malls, the temples of consumerism are cropping up every where. These malls have changed the way people are shopping. They are teaching them how to appreciate the good things of life. ‘Comfort’, ‘Style’, ‘Convenience’ and ‘Cool’ are the only some of the words used by the shoppers introduced to the mall culture. And no one is complaining. Not the mall owners, not the shop keepers and certainly not the marketing men and women of the big brands. Malls are the battle grounds where the brands, small, medium and big, the known, the not-so-well-known and the wanna-be ones, fight it out for the consumers attention. And the consumer is ‘loving it’ and asking for more.

Yes, this is one culture that consumers are happy about. So happy that no one seems to mind ‘the unplanned expenditure’ incurred by an outing to such an enticing place. They enjoy air-conditioned comfort, availability of a range of merchandise under one roof and a one-stop family entertainment arena.

While the consumer is slowing getting hooked on to the mall culture, the owners of the mall are hardly complaining. Actually, they are busy planning the erection of new malls and the more the merrier seems to be the motto of the moment. Given the rate at which the malls are coming, the commercial as well as residential real estate business is spiraling upwards. The range and scope of the economic activity generated from mall culture promises many things to many people. Other than offering shoppers more value for money, the scale of operations generates employment opportunities, direct and indirect, for thousands of people.

India was to have some 350 malls out of which nearly 250 were planned in Tier II and Tier III towns, taking this revolution further. Now there is a new association of big brands that has come together to give brand loyalists something to cherish, aspire for and much, much more. Since Bhopal is listed as Tier II city, our attempt was to find out the different Malls that have been planned here. A few amount them are listed as follows :-

List of Malls planned in Bhopal :

S.no	Name And Area	Year
1	DB City 1,000,000 sqft	2010
2	C21 Mall 700,000	2011
3	Aashima Lake City Mall 650,000 sqft	2011
4	Aura Mall	2011

V. LITERATURE REVIEW

Our analysis included assessment of publications on the development of the Indian retail industry (www.indianground.com, 2008; Gupta, 2005; www.express textiles.com, 2005). These publications were mainly published between the years 2000 and 2010 in order to

make sure that the most current industry and market activity were captured. Publications included popular Internet sites, industry publications, and reports by major retail houses. Other sources included blog spots and interviews of executive managers working in retail in newspaper publications like *Business Line* and *The Hindu*. The other major source of data collection is **Mall Culture** magazine.

The goal of the analysis was to identify evidence reflecting the challenges and threats to the organized (nontraditional) and unorganized (traditional) Indian retail industry constituencies and the infrastructure to support their co-existence in India. The aforementioned sources were analyzed to find recurrent themes on the threats these two sectors face because of the retail boom in India. This process was viewed as a first step toward documenting and understanding channel activity and relationships between the traditional and nontraditional sectors of the Indian retail industry. Data sources were supplemented by the personal and professional experiences of one of the authors, an Indian national and academician. Besides analyzing the industry reports, consumer reviews from various blog sites on the Internet were analyzed to take into account the standpoint of diverse consumers' views on the issue of retail diversification due to foreign direct investment in the Indian market.

India is being seen as a potential goldmine for retail investors from over the world and latest research has rated India as the top destination for retailers for an attractive emerging retail market. India's vast middle class and its almost untapped retail industry are key attractions for global retail giants wanting to enter newer markets. Even though India has well over 5 million retail outlets, the country sorely lacks anything that can resemble a retailing industry in the modern sense of the term. This presents international retailing specialists with a great opportunity. The organized retail sector is expected to grow stronger than GDP growth in the next five years driven by changing lifestyles, burgeoning income and favorable demographic outline Mohanty & Panda (2008) opines about retailing as a sector of India occupies important place in the socio-economic growth strategy of the country. India is witnessing retailing boom being propelled by increasing urbanization, rising purchasing power parity (PPP) of ever growing India's middle class, changing demographic profiles heavily titled young population, technological revolution, intense globalization drive etc.

Sahu (2010) describes that a rise in consumer confidence, improvement in profitability and aggressive expansion plans signal better tidings for listed players in the organized retail space. Moreover, analysts believe listed retailers could attract foreign investments by spinning off their subsidiaries into separate companies which can provide a great opportunity for the improvement of this sector.

Gellner (2007) explains in this context that in most retail meetings and/or publications, hardly ever is there any talk on problems that modern retail formats are encountering doing business in India. There is a significant profitability challenge, to deliver the brand promise in terms of quality and geographic spread in line with the growth in consumer demand.

Nagesh (2007) describes that Indian retailing will see a sea of change in the next five years, driving consumption boom never seen in the history of any country. From a drought situation we will see a flood of modern retail, So Indian retail will be on a steady ground of sustained growth year after year and thereafter.

Akash (2009) says that Retail business in India, as anywhere else in the world, plays a crucial role in an economy. Retail in India has the potential to add value over Rs 2,00,000 crore (\$45billion)business by the year 2010 generating employment for some 2.5 million people in various retail operations and over10 million additional workforce in retail support activities including contract production and processing, supply chain and logistics, retail real estate development and management.

Gibson, CEO Retail Association Of India opines (2007) that modern retailing today is growing faster than expected while the current growth rate is around 30 percent, the sector is expected to grow at 40- 50percent on a year basis.

Shivkumar, Executive Director and leader of Retail and Consumer Practices Price Warehouse Co-operatives,(2009)also holds the opinion that retailing is the next sunrise segment of the economic development of the country. Next-Generation Retailing In India: An Empirical Study Using Factor Analysis 27

Mishra (2008) says, there is a hectic activity in the sector in terms of expansion, entry of international brands and retailers as well as focus on technology, operations, infrastructure and processes. All these present a tremendous opportunity in this high growth industry.

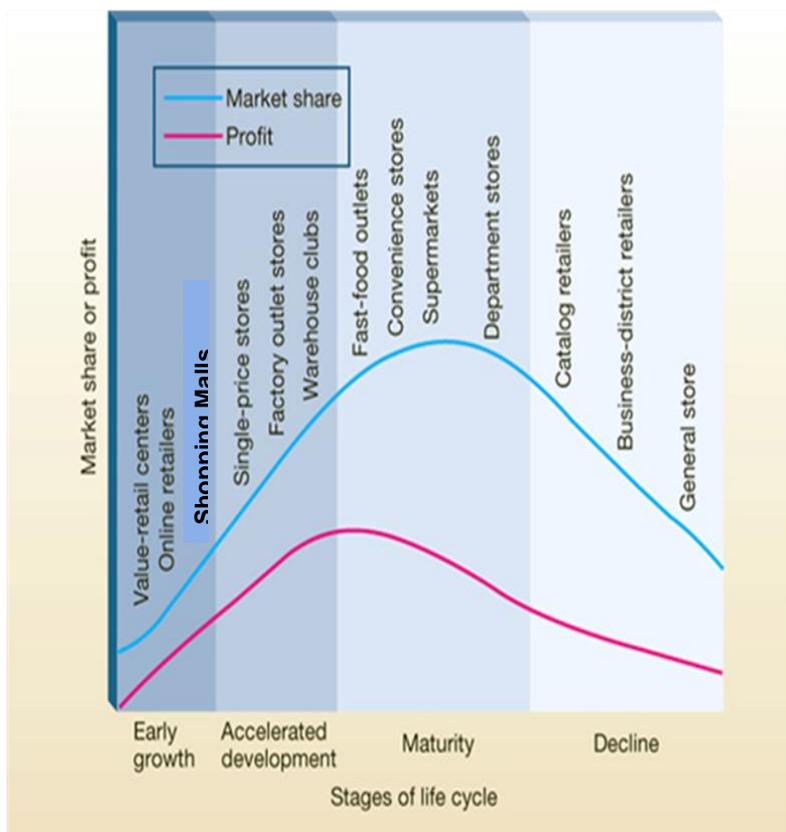
Yuvarani (2010) opines that according to a study the size of the Indian Retail market is currently estimated at Rs 704 corers which accounts for a meager 3% of the total retail market. As the market becomes more and more organized the Indian retail industry will gain greater worth. However, the future is promising, the market is growing, government policies are becoming more favorable and emerging technologies are facilitating operations.

Biyani (2007) describes that we are on the cusp of change wherein a huge, multicultural India is transforming from a socialist economy to a consumption-led, creative economy. The scope and depth of change that is taking place due to the revolutionary retail market with a gigantic opportunity for marketers and retailers, not only in large cities but also in small towns. So retailing can play a significant role in creating the India of tomorrow.

Kearney (2007) explains that the retail sector provides a unique platform to India. Government, both central and state, need to engage with the sector and utilize its potential for social development. So the Indian market and its consumers poised for a retail consumption explosion that will continue for future. India's sunrise retail sector is witnessing a major transformation as traditional markets make way for modern and indigenously

development retail formats. Standing on the threshold of a retail revolution and witnessing a fast changing retail landscape. Indian retail is still growing, and growing at an enviable rate. In the new era of liberalization, there exists immense opportunities for retail business .Progressive policies, economic and political stability ,liberal policies on technology, changing consumers profile and demographic character, increasing urbanization, improved infrastructure, increasing number of nuclear families ,increasing working women population are new opportunities. Bulging of middle and upper middle classes, whose purchasing power is now substantial and turning Indian economy as the fourth largest economy in the world in terms of purchasing power, are opportunities galore for giving further boost to retail business in India.

Position of Shopping Malls in The Life Cycle of Retail Market in Bhopal



Case Study:

Description

Dainik Bhaskar group, currently associated mainly with the print media, is developing a shopping mall christened 'DB mall' at Bhopal [Tier II city] in Madhya Pradesh. The mall comprises a building with 7.5 lakh sq. ft. basement plus ground plus six floors with 7 anchor shops, 180 retail shops, 6 screen multiplexes and food courts. It is central India's biggest mall. This mall got commissioned on July 27, 2010.

Pros and cons

Mall culture is slowly and steadily growing in India. Many brands and private labels are launched in Indian market. The specialty of such malls is that they offer a wide range of varied branded stuff, all under single roof. The buyers get an international shopping experience in such retail outlets. There are no nagging sales personnel pressurizing the customer to buy.

Mall and maul are more than homonyms, which ever way you look at it, malls work like predators. Either overtly, like when the small man’s livelihood is snuffed out, or covertly, like when a whole economic class swallows the idea that India is shining. Humongous, glitzy, these soaring, gawky piles of steel and cement represents the interests of only one slice of society the rich or the nouveau riche. For whom the rest of India is a remote world. Well, if seeing believes, then this is not far fetched. At the risk of being called a party-pooper, one is forced to weigh the pros and cons of India’s mall boom.

Huff’s law of shoppers attraction

1. Huff’s law of shopper’s attraction showed that the probability of people shopping at a location of depends on

the effect of travel time. If a product is important then the consumers are less travel sensitive.

$$P_{ij} = \frac{S_j}{\sum_j^n \frac{S_j}{(T_{ij})^\lambda}}$$

P_{ij} = probability of a consumer’s traveling from home i to shopping location j

S_j = square footage of selling space in shopping location j expected to be devoted to a particular product category.

T_{ij} = Travel time from consumer’s home I to shopping location j.

n = Number of different shopping locations

λ = Parameter used to estimate the effect of travel time on different kinds of shopping trips

Table Showing Travel Time from 2 Home Locations to different Retailers

TYPE OF OUTLET	AVERAGE AREA FOR A PRODUCT CATEGORY(in sqfts)	TRAVEL TIME(from home 1 in mins)	TRAVEL TIME(from home 2 in mins)
DB.Mall (M.P.nagar)	1000	5	15
Traditional market(M.P.Nagar)	1500	7	7
Traditional Market(New market)	1500	15	5

Using Calculations it was observed that:

- P11 = 77.6%
- P12 = 38.3%
- P13 = 8.6%
- P21 = 5.7%
- P22 = 39.6%
- P23 = 77.6%

Interpretations from

1. Huff’s Law

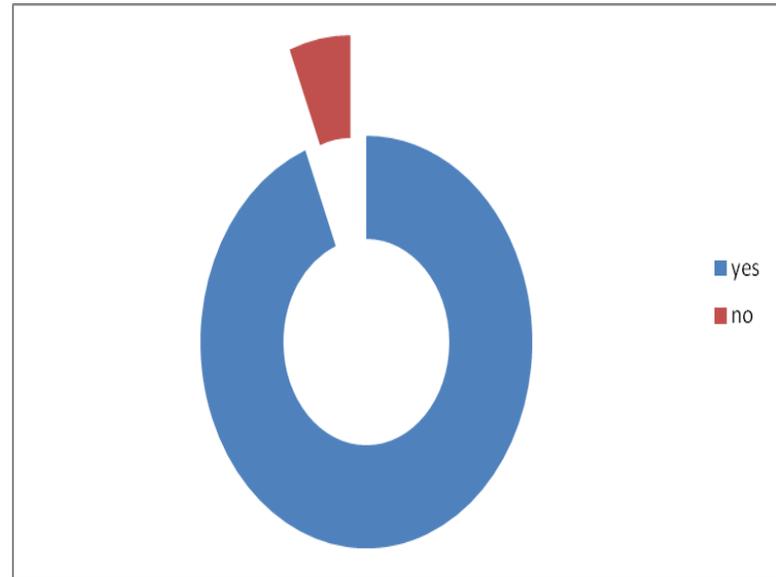
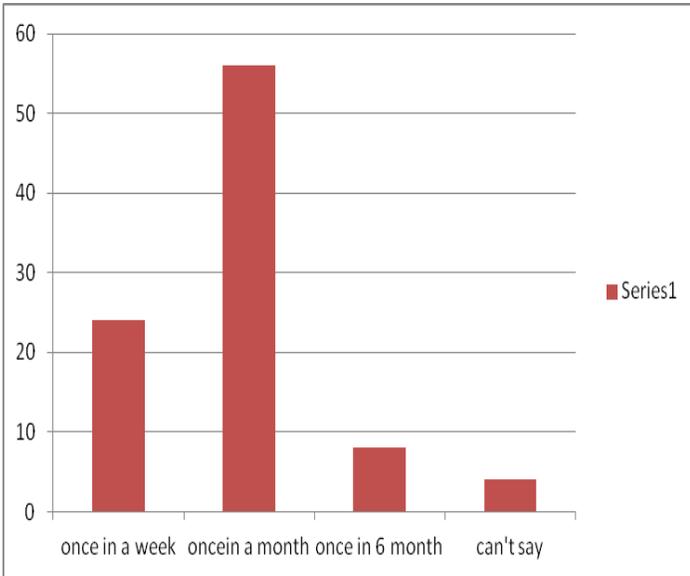
The Calculation reveals that the shoppers are attracted more to a nearby placefrom their residence, irrespective of different markets. But our survey concluded that people are more inclined to shopping in a retail market where they can enjoy the culture of shopping-tainment under one roof.

The probability of people shopping at a location depends on the effect of travel time. If the product is important such as dress, watches etc. consumers are less travel sensitive.

2. Questionnaire

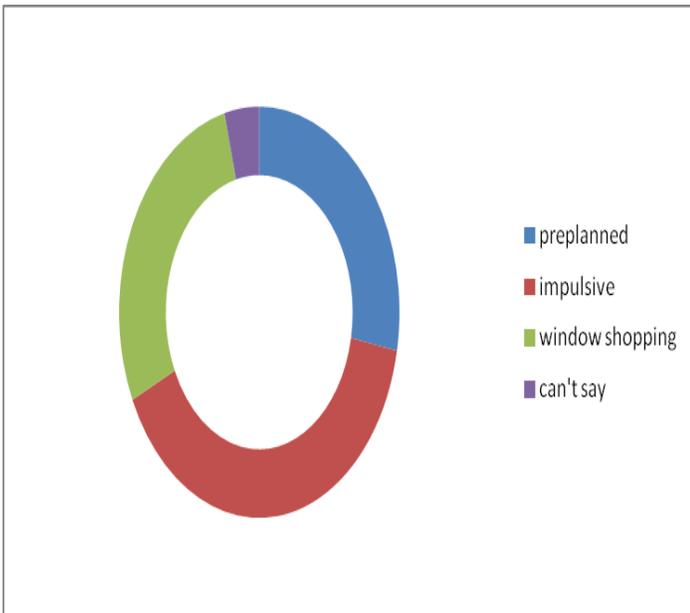
1. *How often you visit a Mall ?*

A major group visited the mall only once in a month. The group that visited once in a week was the youth.



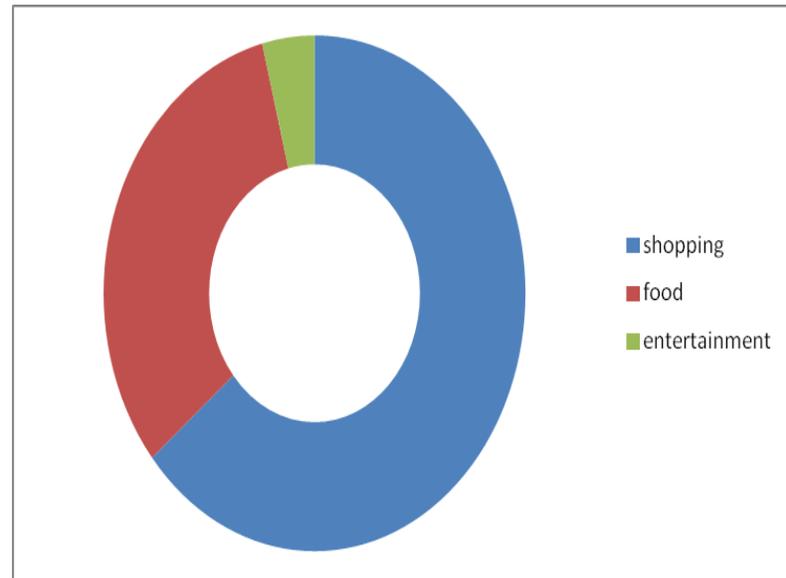
2. What is the nature of your shopping in a Mall ?

Among the 100 surveyors, 40 did preplanned shopping and 28 shared impulsive and window shopping each.



4. What do you find most interesting ?

A crowd of 64 admitted the most interesting in mall is shopping with 32 youth went only for food which was again observed to be the teenagers.

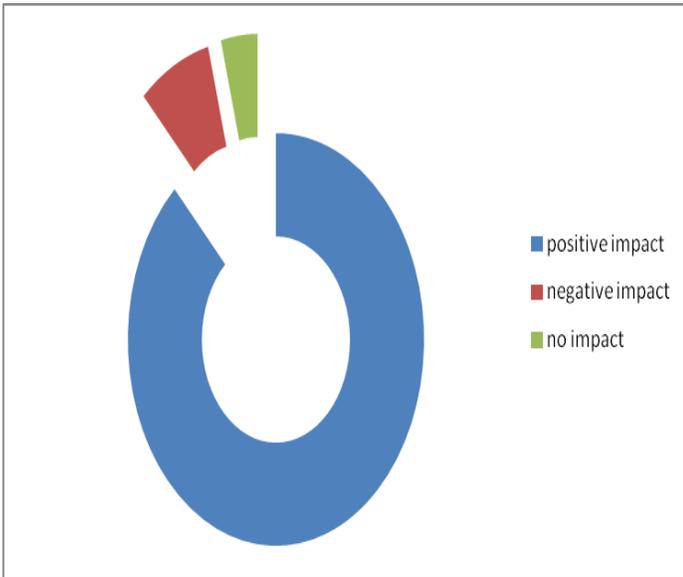


3. Do you welcome Mall culture in Bhopal ?

Of the 100 population, a huge majority of 94 welcomed mall culture in Bhopal.

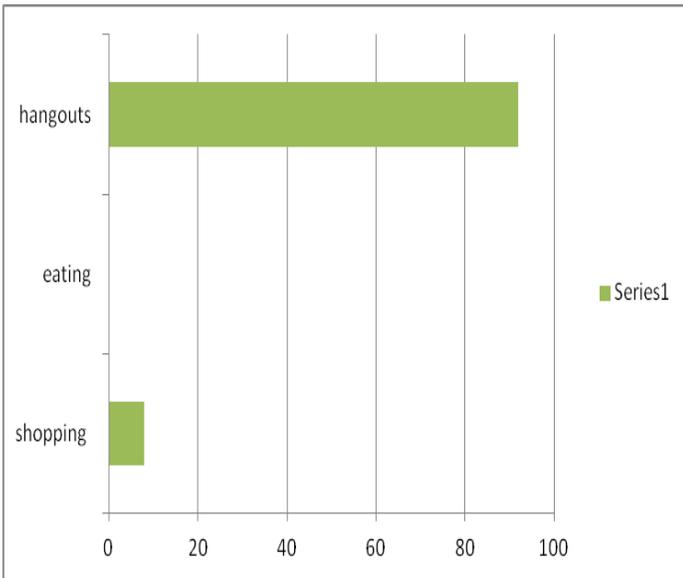
5. Impact of Mall culture on the life style of youth.

A good response of 88% said that mall culture has a positive impact of the life style of youth, at the same time a few negative impacts was stated by the parental group.



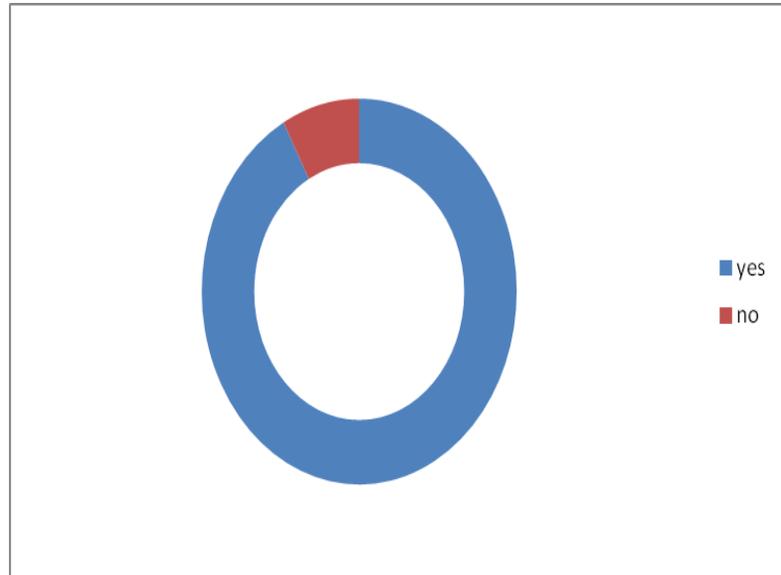
6. Rate the purpose of youth visiting Mall.

The youth themselves admitted that their purpose of visiting malls was to hangout for various reasons. Hence, the response showed high value of 92%. Elders were of the same opinion.



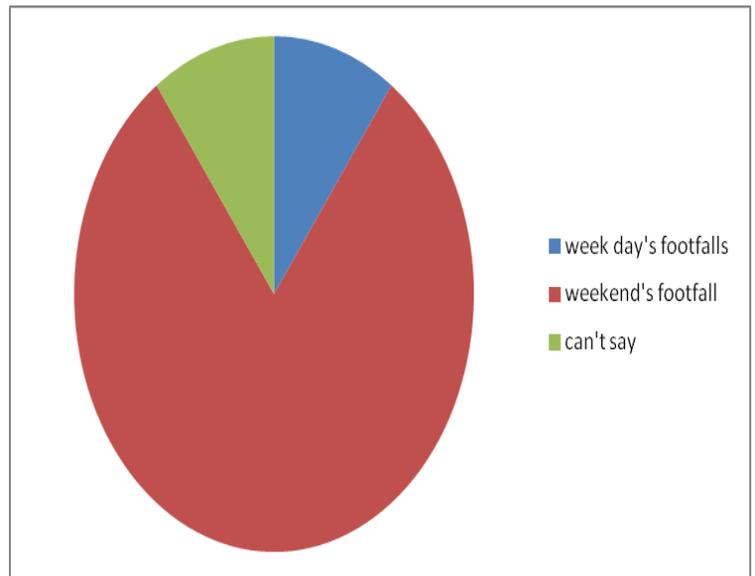
7. Do Malls increase the standard of living of the citizens of Bhopal ?

Among the 100 people surveyed, 92 accepted the fact that the malls have increased the standard of living of the citizens of Bhopal.



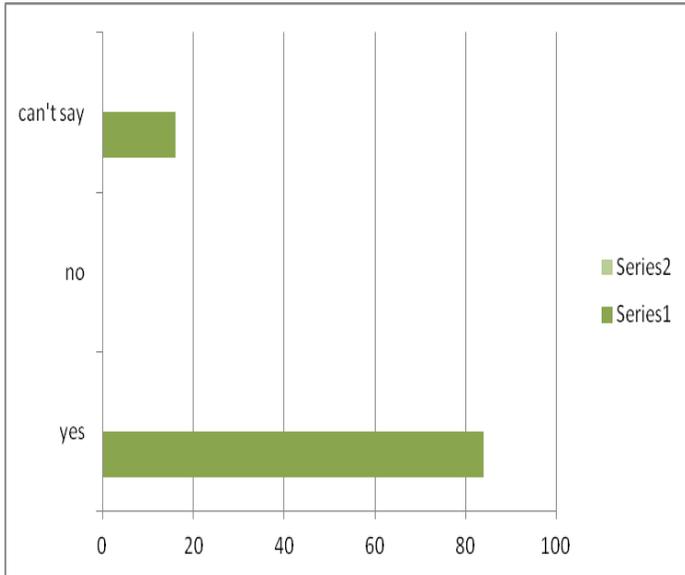
8. Rate the foot falls during week days and week ends.

80% of the population accepted that more foot falls were during week ends.



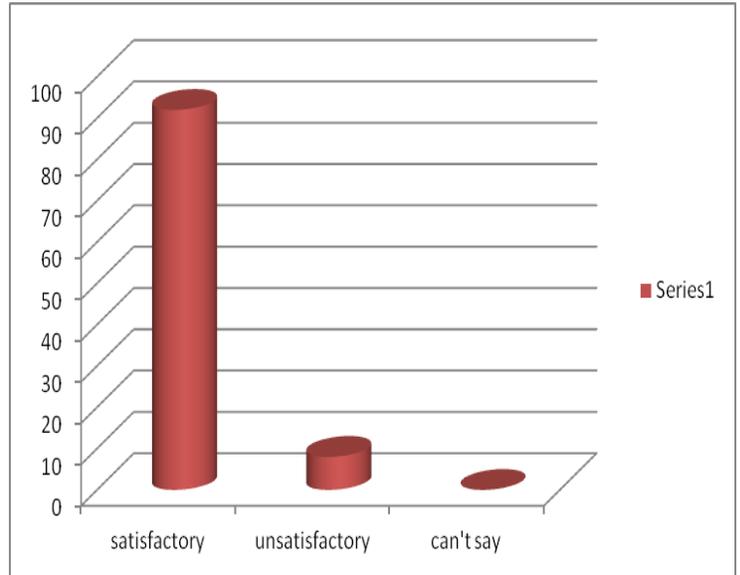
9. *Is the visitor management ok [with regards to help desk and staff] ?*

84% were satisfied with the visitor management



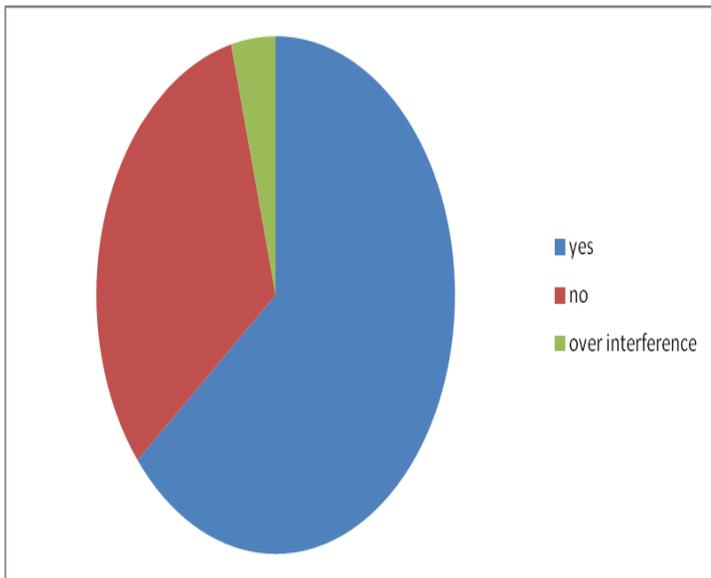
11. *How is the occupancy level of DB Mall ?*

It was a good response with 92% stating it as satisfactory.



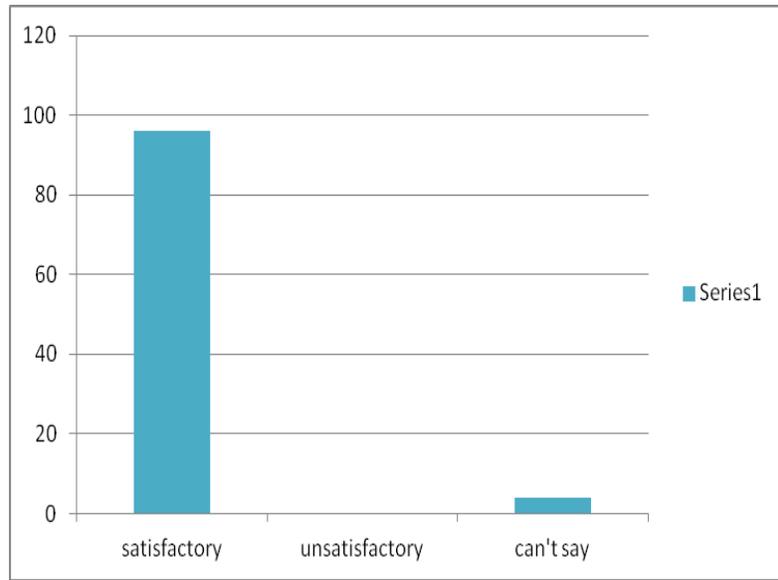
10. *Does it offer assistance in selection and shopping to the customer ?*

64% were satisfied with the assistance in selection and shopping to the customer, at the same time 32% did not agree to it



12. *How is the infrastructure and over all ambience ?*

96% of the surveyed said that infrastructure and over all ambiances is satisfactory.



13. Rate the following facilities offered by DB Mall.

(i) Safety & security measures:-

68% said that the measures are good and 28% as excellent.

(ii) Civil amenities:-

68% said that the measures are good and 28% as excellent.

(iii) ATM:-

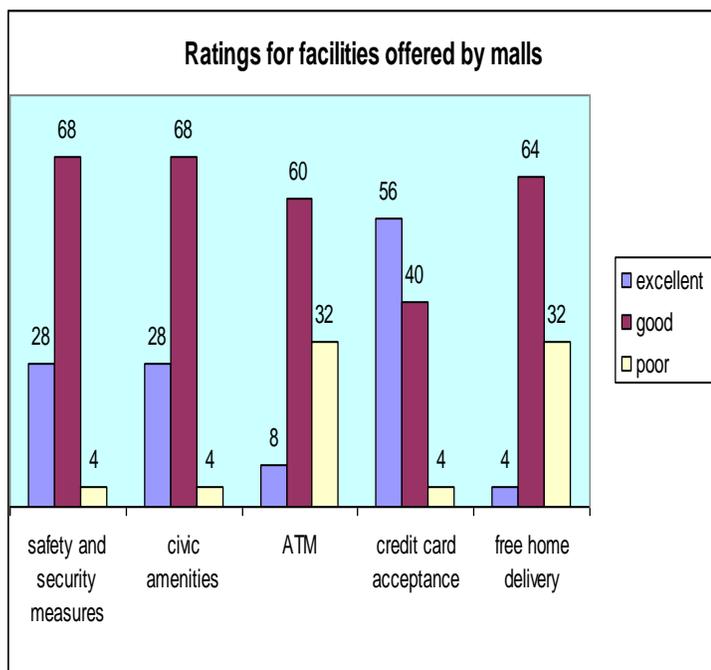
60% agreed as good, but 32% said it is poor.

(iii) Credit card acceptance:-

56% said it is excellent and 40% said as good.

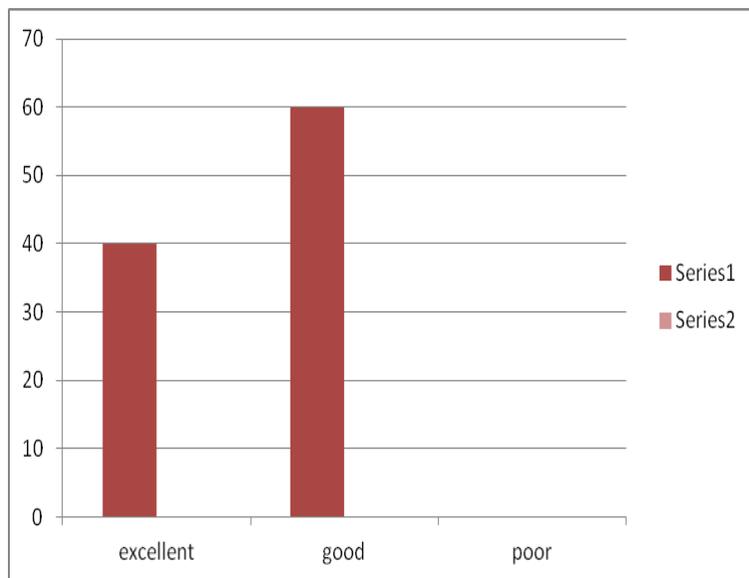
(v) Free home delivery:-

64% agreed as good, but 32% said it is poor



14. How do you rate DB Mall with respect to other traditional retail outlets in Bhopal ?

60% of the surveyors said that DB Mall is good and 40% said it is excellent.



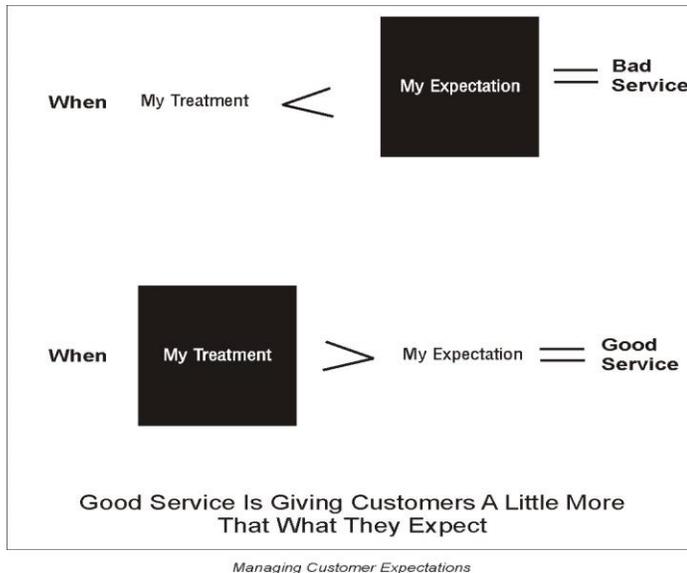
VI. CONCLUSIONS OF THE STUDY

1. Malls have marveled the lifestyle of shoppers. These are the magnetite pagodas where you merchandise from 'pin to pyramid'. You enjoy panasonic scenic beauty of unique architeck of malls while shopping.
2. A shopping mall can be described as a 'shopaholic paradise' for a number of reasons.
3. The retails and shoppers hope the upward trend in the mall purchase to stay longer. It is proved by the rising graph of sales figures in the mall merchandise.
4. The super bazaars, hyper malls really contribute a lot for the product development.

VII. SUGGESTIONS AND DISCUSSIONS

After the entire study on retail sector with special reference to malls, we have certain suggestions as enlisted below :-

1. **The gap model** indicates what the retailer needs to do, to provide high quality customer service.
When customer's expectations are greater than their perceptions of the delivered service, they are dissatisfied and feel the quality of the retailer service is poor. Thus retail needs to reduce the service gap.
2. **Managing customer expectations**



- [17] www.mall.com
- [18] www.indianmalls.com
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Simulation of PMSM Vector Control System with Fuzzy Self-Adjusting PID Controller Using MATLAB

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Abstract- The mathematical model of PMSM, using the powerful simulation modeling capabilities of Matlab/Simulink is implemented. The entire PMSM control system is divided into several independent functional modules such as PMSM body module, inverter module and coordinate transformation module and SVPWM production module and so on. The simulation model of the PMSM control system can be obtained by combining these modules. The main advantage of SIMULINK over other programming softwares is that, instead of compilation of program code, the simulation model is built up systematically by means of basic function blocks. With the simulation of the motor, we can analyse a variety of simulation waveforms and it provide an effective means for the analysis and design of the PMSM control system.

Index Terms- PMSM, SVPWM, Vector control, Fuzzy Logic Controller

I. INTRODUCTION

With the development of permanent magnetic materials and control technology, permanent magnet synchronous motor (PMSM) is mostly used due to high torque/inertia ratio, high power density, high efficiency, reliability and ease for maintenance, and is used in CNC machine tools, industrial robots and so on. The establishment of the simulation model of PMSM and its control system is of great significance to the verification of a variety of control algorithms and the optimization of entire control system. To achieve high performance, the vector control of the PMSM drive is employed.

The analysis of mathematical model of PMSM, with the powerful simulation modeling capabilities of Matlab/Simulink, the PMSM control system will be divided into several independent functional modules such as PMSM motor module, inverter module and coordinate transformation module and SVPWM production module and so on. By combining these modules, the simulation model of PMSM control system can be built.

The main advantage of SIMULINK over other programming softwares is that, instead of compilation of program code, the simulation model is built up systematically by means of basic function blocks. Through the simulation of the motor, we can analyse a variety of simulation waveforms and it provide an effective means for the analysis and design of the PMSM control system.

II. PERMANENT MAGNET SYNCHRONOUS MOTOR

A permanent magnet synchronous motor (PMSM) is a motor that uses permanent magnets to produce the air gap magnetic field rather than using electromagnets. These motors have significant advantages, attracting the interest of researchers and industry for use in many applications.

A.THE MATHEMATICAL MODEL OF PMSM

Detailed modeling of PM motor drive system is required for proper simulation of the system. The d-q model has been developed on rotor reference frame as shown in figure 1. At any time t, the rotating rotor d-axis makes an angle θ_r with the fixed stator phase axis and rotating stator mmf makes an angle α with the rotor d-axis. Stator mmf rotates at the same speed as that of the rotor.

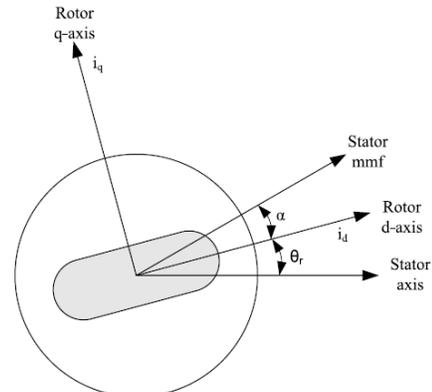


Figure 1: Motor Axis

The model of PMSM without damper winding has been developed on rotor reference frame using the following assumptions:

- 1) Saturation is neglected.
- 2) The induced EMF is sinusoidal.
- 3) Eddy currents and hysteresis losses are negligible.
- 4) There are no field current dynamic

B.STEPS TO PERFORM VECTOR CONTROL

1. Measure the motor quantities (phase voltages and currents).

2. Transform them to the 2-phase system (α, β) using a Clarke transformation.
3. Calculate the rotor flux space vector magnitude and position angle.
4. Transform stator currents to the d-q coordinate system using a Park transformation.
5. The stator current torque- (i_{sq}) and flux- (i_{sd}) producing components are separately controlled.
6. The output stator voltage space vector is calculated using the decoupling block.
7. An inverse Park transformation transforms the stator voltage space vector back from the d-q coordinate system to the 2-phase system fixed with the stator.
8. Using the space vector modulation, the output 3-phase voltage is generated.

III. SPACE VECTOR PULSE WIDTH MODULATION

A. PRINCIPLE

SVPWM tries to output a sine-wave, supplying power, whose three parts are balanced and whose frequency and voltage can be adjusted. Its controlling principle is to try to decrease output harmonic components. Three- phase windings of the motor can define a three phase static coordinate system. It has three axes. The phase voltage of three-phase stator U_a, U_b and U_c are on three-phase windings, and form three phase voltage vector U_a, U_b and U_c . Their directions are on their own axis and their volumes change with time in accordance with the sine regulation. Therefore, all three phase voltage space vector form a total voltage space vector u , which is a space vector circulating at the speed of power angle frequency ω .

Motor can be controlled by making use of the opening and closing condition and the orders of the inverter power and by modulating the time of opening and closing. Different combinations of switch tube constitute eight space voltage vectors, six of which are non-zero voltage vectors and the other two are zero vectors. After Clark transforming, phase voltage in the three-phase ABC plane coordinate system can be changed into $\alpha\beta$ right-angled coordinate system.

IV. FUZZY SELF-ADAPTING PID CONTROLLER

The fuzzy self-adapting PID controller is adopted in speed loop instead of the traditional PI controller. The PI controller is used in current loop in the PMSM two closed loops control system. The fuzzy inference of fuzzy self-adapting PID controller is based on the fuzzy rule table set previously. So the algorithm of fuzzy inference is not complex. The parameters of PID can system be adjusted on-line, which can be changed through the inquiry to fuzzy control rules table saved beforehand in the computer. The calculation speed of controller is very quick, which can satisfy the rapid need of controlled object.

V. SIMULATION MODEL OF PMSM VECTOR CONTROL SYSTEM

The PMSM control system mainly includes: PMSM body module, inverter module, coordinate transformation module and SVPWM production module.

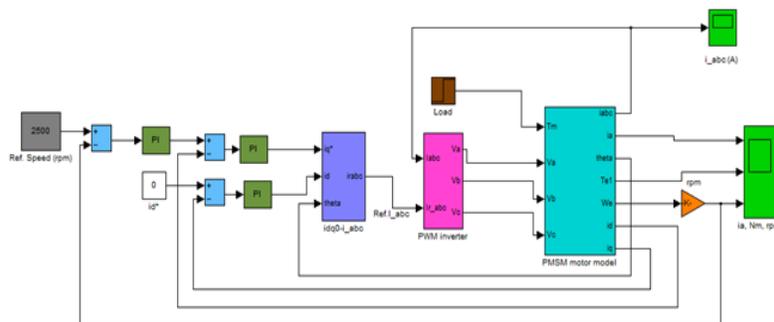


Figure 2: Simulation Block of PMSM Vector Control Block using PI controller

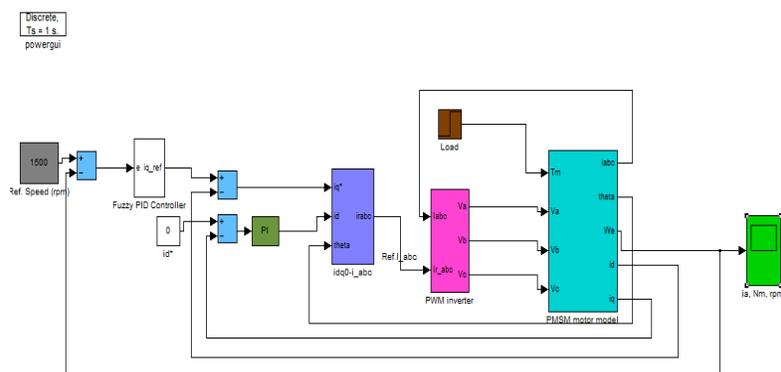


Figure 3: Simulation Block of PMSM Vector Control Block using Fuzzy Logic Controller

In this paper, different controllers for PMSM is used and the following results are obtained;

The MATLAB software is used in entire system simulation. Simulink is the simulation tool in the MATLAB, which can provide us with the function block. So the simulation analysis time can be saved and the design work can be reduced. The fuzzy self-adapting PID controller can be designed conveniently using the Fuzzy Logic Toolbox of MATLAB. The FIS editor can be opened by the input command FUZZY in the MATLAB. The membership function of every input and output variable are established in the FIS editor. The rules are formed. At last the whole system simulation block diagram is constructed.

The simulation waveform without using any controller is shown in figure 10.1. The simulation waveform when using traditional PI controller in speed and current loop is shown in figure 10.2. The response curve for speed when using fuzzy self-adjusting PID controller is shown in figure 10.3. Comparing the other two waveforms with the simulation waveform when using the fuzzy self-adjusting PID controller shows that, the fuzzy self-adjusting PID control has better dynamic and static performance, and has less rise time, less transition and smaller overshoot.

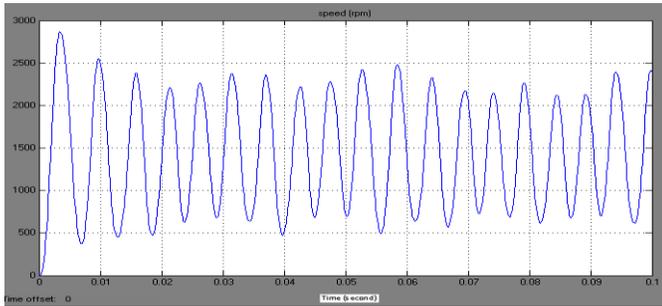


Figure 4: Simulation waveform without using controller

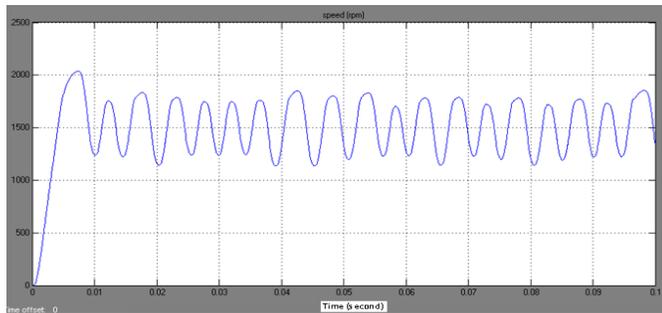


Figure 5: Simulation waveform when using traditional PI controller

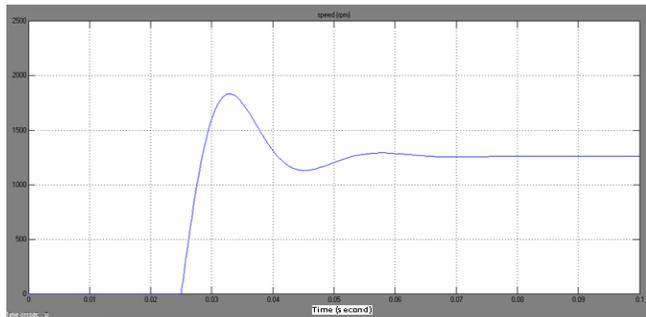


Figure 6: Simulation waveform when using fuzzy self-adjusting PID controller

VI. CONCLUSION

The PMSM servo system is a nonlinear time-varying complex system. The results of traditional PI control is not satisfactory to the higher degree of accuracy condition. The fuzzy control system has the prominent advantage in complex, time lag, time varying and non-linear system control and the mathematical model of the controlled object is not required.

The fuzzy-PID controller has the advantages of both PID control and fuzzy control, so it can get better control performance. The controller is used as the speed controller in PMSM control system, which can adjust the controller parameters on-line according to the speed error and the derivative of speed error change.

Based on the rotor field oriented control of permanent magnet synchronous motor, the simulation model of PMSM control system is established using Simulink toolbox of Matlab. The simulation results show that, the system can run smoothly

and still it has perfect dynamic and static characteristics for a speed of 1500 rpm and the fuzzy self-adapting PID controller have less regulating time and it is stronger, robust compared to the traditional PI controller.

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Electronic Kanban System

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Abstract- The project's objective is to study the role of Kanban in Production system. With the present rate at which the technology is evolving and the competition among the company there is a must among the manufacturer to produce their product at cost efficiency. The theory below hence describes about the impacts of KANBAN in an industry and its basic framework. In this paper we have talked about the Kanbans efforts on a multi stage in order to improve planning and production and role of Kanban size in Just in Time Manufacturing are discussed. The problem faced by a manufacturing company (Oral B) and how they overcame it by implementing Kanban with a great margin of profit is discussed briefly. Future trends in implementing Kanban such as digital and E-Kanban and also the scope of their effects is explained as a part of study. The scope of the project is limited to discussion of current and future Kanban strategy.

This paper presents a case study of the use of an e-Kanban system to minimize operational and logistics issues for a parts supplier within the automotive industry. Measures of operations and logistics performance are examined both before and after the implementation of the e-Kanban system through a series of observations, in-depth interviews, and documentation reviews. The results indicated improvements in production lead times, financial costs, effective and efficient work processes, and reductions in waste. The enhancement of the e-Kanban system through radio-frequency identification (RFID) is also discussed.

I. WHAT IS KANBAN?

According to Wayne Scott Ross (2003), the word "Kanban" is Japanese word for "advertising hoarding". A Kanban Card is merely advert giving the message 'Production Component for me'. Many decades have passed ever since the introduction of Toyota's production systems by Sugimori et al. (1977) and Monden (1983). Today, Just-in-Time (JIT) production system of Toyota is generally regarded as one of the most excellent system in the world (Spear and Bowen 1999). The Kanban system is the key to the success of JIT production. Ohno (1988) usually recognized as the developer of Kanban, states that the proposal for the system came with his observations of American super-market.

The process of using Kanban cards in the in-process inventory and controlling production has been proven to very simple and best for the implementation of the Just In Time (JIT) (Monden 1981). The number of authors examined the advantages of the Kanban system in the recent years (Kimura and Terada 1981, Monden 1981, Schonberger 1983, O'Grady 1988). One of the most widely studied topic is the serial system which sends single item to the workstation, by applying constant intervals (inter arrivals) for the demand, the Kanban system is the best option. The mainstream of the research was rigorously

concentrated on finding the number of Kanban as soon as replenishing the lead time is variable and the demand is inactive (static) (Monden 1981, Ress *et al* 1987) and so did Philipoom *et al.* 1990, Deleersynder *et al.* 1981, Pinault 1988, and Wang and Wang 1990)

In brief

Kanban is a Japanese word that means "signboard". This is a word that has developed into identical with "Demand Scheduling" or "Just in Time (JIT) Manufacturing". Its pedigree are traced to the near the beginning days of Toyota's pioneering production system of the late 1940s and early 1950s. Kanban was developed to manage production between the processes and to apply Just in Time Manufacturing. The facts of Kanban became famous during the global recession of the 1970s, when it was vital for companies to decrease waste and hack costs in order to be successful. (Nilesh R. Aurora, 2009).

According to Nilesh R. Aurora, (2009) the principle of Kanban is to generate Visual Indicator's to permit the operators to be the ones who decides how much of a goods to run and at what time to stop or change over. Kanban system also tells the operators what steps to take as soon as they have trouble and whom to go to when the problem occurs. Based on the actual usage the operators then starts production, rather than forecasted usage. The products that are consumed by the customer(s), they start producing those goods, and immediate next method. Only those goods are produced that are on the visual board and sent by the customer(s).

In view of the fact that the bulk of the decisions in the Kanban system are prepared by the operators, besides, by using of visual indicators also helps supervisors and managers to see the schedule position of a line at a momentary look. Now the Kanban schedule replaces the weekly or traditional production schedule. It replaces. It directs the production on a day-to-day basis.

1.1 What is Electronic Kanban (e-Kanban) System?

In order to attain the maximum efficiency, it is very important to lower the fluctuations in the order quantity (Monden 1983), and as a result of focusing on this matter, the Kanban system is developing continuously. Other methods are being implemented which promotes a constant consumption for all the products in the assembly line (S Kotani 1983, Monden 1983).

To further develop the Kanban system, the Toyota Production Company has introduced a new system called "e-Kanban" system where "e" stands for electronic, which uses the communication network and computers for maintaining a constant communication between the company and their suppliers. Generally the Kanban cards are controlled manually.

But in the e-Kanban system the entire system is efficiently controlled by the computers in a timely manner.



Figure1. Print of a sample e-Kanban sticker
(Source: S. Kotani 2007)

II. RESEARCH QUESTIONS

The objective of the dissertation is to study the role of e-Kanban in Production system.

E-Kanban efforts on a multi stage in order to improve planning and production and role of e-Kanban size in Just in Time Manufacturing.

The problem faced by a manufacturing company (Oral-B) and how they overcame it by implementing e-Kanban.

In the CVG, within an automotive section, measures are taken to minimize the logistics and operational issues for the parts supplier.

III. RESEARCH METHODOLOGY

The main aim of the dissertation is to study the role of e-Kanban in Production system. The problem faced by a manufacturing company (Oral-B) and how they overcame it by implementing e-Kanban. The company had most problems occurring at the packaging section and lost control over the inventory. In such a situation the management implemented e-Kanban and how they got out of the problem is stated in the following lines. Within the automotive company (CVG) measures are taken to minimize the logistics and operational issues for the parts supplier. Implementation of the system has shown the successful results. And finally, the e-Kanban efforts on a multi stage in order to improve planning and production and role of e-Kanban size in Just in Time Manufacturing.

In the present business competitive world, many companies and management institutions rely on the research methodology. It is system of data collection which is used for very dissertation. The collected may include theoretical or practical ideas along with operational planning methods which are conceptualised strategically. Research data and validity should be included in the research methodology. The finishing of the dissertation is measured by ethics and reliability.

3.1. RESEARCH METHODS:

There are different types of research methods that are being in use. But each particular type of method gives a different approach to a particular problem. In general, the research methodology is divided into four types

Experimental Method
Survey Method
Observation Method

Existing Data Method

The other general methods that are being used that are used in the management and I used in my dissertation are not much different from the above ones. They are

Analytical Research
Applied Research
Fundamental Research
Case Study Research

3.2. Analytical Research:

This type of research involves the person to make use of data that is already available. The person should go through the data and take the facts that are necessary for his/her purpose, analysis it and use it for his benefit. This requires the writer to be more concern about the critical analysis of the data available. (Umesh Dubey 2005)

3.3. Applied Research:

The main aim of the applied research is to find an immediate solution to the problem that is prevailing any organisation, industry or any society. Basically it can be defined as a fact gathering technique which is conducted with a point of acquiring and applying knowledge which solves a particular problem or serves the need.

3.4. Qualitative and Quantitative Research:

Meta analyses on mixed method studies have shown that combining both qualitative and quantitative methods can lead to research results which are unrelated. (Bryman 2005).

Both Qualitative and Quantitative approaches must be used, because the combination of both these research methods helps in getting more data and accurate evaluation. This combination is also referred to as triangulation. In research when interviews combined with surveys, the information collected using interviews was complimentary when compared to the surveys. (Glenn 2006)

My research will include both the Qualitative and Quantitative methods. Qualitative methods are about the verbal information where as the Quantitative method is about the numerical information. Observations, case study, surveys and Interviews are some of the Qualitative methods used and Quantitative method because the research is about the vulnerabilities, loopholes in the security system, so this method provides the percentage of security provided using the latest pentest tools.

3.5. Fundamental Research:

This type of research deals with the generalisation of a formulation of a theory. For example, research relating to pure mathematics.

3.6. Case Study Research:

This type of research brings an excel quality of understanding about a complex situation which adds extra point

as it is already known through previous experience. A case study gives a clear picture of the analysis with limited conditions and important events and their relationships. Many researchers are very beneficial with this type of study.

IV. INVESTIGATION METHODS AND FURTHER RESEARCH

4.1. Data collection:

My research begins by collecting information on how the implementation of traditional card-based Kanban system took place. I studied the principles and techniques used in Kanban system. And to accomplish this task I will use the case study method discussed above to review previous case studies and collect information on the history of Kanban system. Later my research included the information regarding e-Kanban system. I have gone through many journals and articles and carefully studied almost every authors views regarding electronic Kanban system. And this handful of information is enough to start my research and complete the first and second objective of the research.

My second phase of data collection included the details of the e-Kanban system applications in the industry. I was very much immersed going through the success stories of the e-Kanban system and its applications even in food and chemical processing industries. I have gone through many case studies which a clear picture of the e-Kanban system's in the industry.

The third phase of my collection was the review of many case studies which provided a lot of information. I had gone through the case study which was published in "lean.org" and read almost every articles of Tom Cutler. A brief part of my study given below shows the implementation of electronic Kanban system helped to increase the production and topped the Oral-B toothbrush Company in the world.

4.2. CASE STUDY

4.2.1. ORAL-B TOOTH BRUSH COMPANY

Oral-B Toothbrush Company was first constructed in 1958, in 311,000 sq.ft., was one the largest producers of the toothbrushes in the world. With a study stream production, the sales of the company were approximately one million units per day. By the year 2000, the productions of the company got worsen and the plant's items are competed with other products of countries like Mexico and China. The company's traditional MRP has driven the situation of over-production, causing more inventory and stocks of useless products in the company. The plant management decided for the closure of the company by the end of 2000.

The company was situated in the heart of North America and has good relations with Costco, Wal-mart and Target. But these things dint saved the company's future. The company has strong technical skills and good work floor. Besides, the company performed jobs like packaging and distribution; usually which is not handled by many companies. Later one employee of the company thought that Oral-B is lagging in lean principles, which has the capacity to reduce the lead time and inventory costs.

REALISATION:

The management of the company realised that the organisation would not produce the desired results, until and unless the organisation change the old traditional system, MRP. According to the old system, each machine was sent a schedule production for moulding, brush manufacturing and finally packaging. Cassidy, an expert in lean, was appointed by the management for the implementation of the lean principles.

THE PROBLEM:

The main problem of the Oral-b company is packaging. On a certain occasion, the company has produced 51 finished brushes, with different types of handles, different coloured and large varieties of filaments. But for the 51 finished brushes, the company has to perform 372 different types of packaging, including buy-one-to-get-two offers, foreign languages and the packages also includes the dual offers of the Gillette products. The company management wanted a study packaging line. At the end of the packaging section, a store—supermarket is maintained which release trigger when the finished brushes are consumed by the customers. In the same way, each different item has a unique supermarket. So in each process, the consumed materials are replaced by the newly finished brushes, when they are withdrawn from the supermarkets by the customers. In other words, the finished brushes are being "pulled" by the customers from the supermarkets. This is in turn, the packaging lines are pulling from brush making machines. Again the brush making process pulls the handles from the handle making process. The materials needed for the handle production are being pulled from the store by the downstream process, which sends a Kanban card in the upstream process for the replacing the materials which being drawn from the store.

Another major problem was that the company was not able to maintain or failed to separate the production unit from the material-handling process. It was very difficult for a mechanical technician to collect the required item from 140 rough items. The management wanted the company's material handlers not to get involved with the technician works.

"Faster is better", said Cassidy. "You build up adrenaline and momentum and sweep people along." Running old and new system in parallel sub optimizes both, he noted.

IMPLEMENTATION OF THE E-KANBAN SYSTEM

The company arranged three teams which are given three different transitions: the first team controlled all the logistics and the movement of the raw materials from the ware house. The second controlled the movement of the materials from the production division to the finished goods. The finally team helped the former two teams by providing sufficient data needed for their purpose. The management also changed the IT department with simple and user interface and applications used for kitting, which is very important under the pull system. The management spent around four weeks for the plan to be implemented on the shop floor with all machines shut down. During this period the workers are trained with lean principles and other basic training of the pull system.

The new system the company implemented was e-Kanban system, not MRP which is used for the production of daily consumed items like filaments, handles, brushes, wires and

shipping boxes. The Oral-B company uses the e-Kanban system to trigger the refilling for the brush-making and moulding departments. Racks or empty bin locations are used for the refill of finished raw materials from the ware house and stores. Items that are used for packaging some unique items are kitted on the racks in the ware house and removed when they are needed. This system even separated the jobs for different machines.

The system starts at the beginning of the packaging section, where the electronic Kanban tickets are posted which states the production for the next two weeks. It is repeated every Thursday, and the management issued the e-Kanban tickets for the next week's production after confirming the production with the Gillette Company in Boston. At this particular point, the schedule is owned by the production department. If everything is finished by the end of the week, the sequence orders can be changed by the production. The e-Kanban system gave ownership and improved the efficiency on the work floor.

The e-Kanban system triggers a signal to the material handlers who replaces the empty kits with the stock needed for the production to run continuously. In the ware house, the completed kits are stored at the designated places. The scheduled production is watched by the material handlers, so they pack the amount of brushed needed for that particular schedule and thus the order of running jobs are determined. One or two days of working more than the scheduled date, makes the packed brushed staged in the packaging machine. Kits are emptied, so that the ware house material handlers order for more raw materials from the suppliers and which increases the number of the kits. These handlers replenish the empty floors and kits with the raw materials.

A signal is triggered for the material handler when the empty trays are removed from the finished brushes in the supermarket, so that the brush making machines starts producing more brushes which should be replaced by the amount of empty trays removed from the supermarket.

No transactions are recorded during the production process. The material handlers after packaging enters the part number and the total number of cases produced into the computer. Transactions are made as a back flush, after the entire goods production is finished.

In a period of three months, about 70% of the shop floor was improved to new system, cutting down the inventories dramatically. Weekly basis production system was followed in the company. By 2002, the Oral-B Company was strong in the areas of cost along with the Gillette. In 2004, the company achieved the top rank in the production of toothbrush.

V. DEVELOPMENT OF E-KANBAN SYSTEM

5.1. Implementation of Equation:

One of the important goals for introducing e-Kanban is to change the number of Kanbans effectively, once the required number is achieved. At the same time, it is very important to control the changes of the Kanban. By using the e-Kanban, the study gives the effective method of changing the number of Kanbans. Usually, there are many types of Kanbans. In this study, we are dealing with supplier Kanban using e-Kanban system.

Using monthly production plan, the number of Kanbans for each part is calculated. Some containers are arranged along the assembly lines which are attached with Kanbans, till parts are not taken from them. Kanban is removed from the container and placed on the Kanban post, if the first part is taken from the container. These Kanbans are read by the e-Kanban system (i.e., computer) at regular intervals. After the information is stored in the computer, these Kanbans are binned. The information which is obtained from each Kanban is complied and sent to Toyota's supplier by a corporate network at appropriate time. The supplier takes the prints of the received Kanbans. Finally, Toyota receives the predetermined parts from the supplier at the predetermined time.

In the e-Kanban system, the Kanbans are collected and sorted and given to the truck driver of the supplier who delivers the parts at the appropriate time. Considering the lead time is the amount of the time order placement and the delivery of the parts from the supplier. Using e-Kanban, the lead time is decreased. In the Kanban system, each delivery represents a standard order time because, the next order is transported to the supplier by the same truck which delivered the latest parts to the company.

Order time of e-Kanban is given by:

$$\text{Equ.(1)} \quad (\text{Delivery time of order to the company}) - (\text{Lead time})$$

Therefore, in the e-Kanban system, the order time is not always the delivery time. There are many instances that the operating timings of the company may be different from the supplier's timings. So it is not possible to calculate the order time with equation (1). So while determining the order time, the following should be considered.

Care should be taken, to maintain the constant time intervals between one delivery time to the factory to the next delivery time.

Lead time should be reduced to the minimum extend.

The Kanbans in the e-Kanban system move in one-way methods i.e., from suppliers to the company. Here the Kanbans are controlled by the e-Kanban by using a computer. If an optimal way of changing the number of Kanbans is developed, then the Kanbans in the e-Kanban system can be controlled effectively and efficiently.

Conditions for changing the number of Kanbans:

If N is the number of Kanbans for a certain part, then N is given by the following formula (Monden 1983):

$$N = \left\lceil \frac{D(K + L) + S}{M} \right\rceil$$

D = part average daily demand

K = time interval between one order and the next order

L = lead time

S = part safety stock

M = capacity of container

'K+L' is known as Kanban lead-time, which is the sum of order time and lead time. This term K+L is expressed in terms of a-b-c which is called Kanban cycle (Monden 1983). The meaning of the cycle a-b-c means that the part a-b-c must be delivered in

'b' days for every 'a' days, and the part should be delivered in 'c' delivery time after the order is given to the supplier. The Kanban cycle are specified for each and every part and from the definition of the Kanban one gets:

$$K = a/b$$

$$L = (a/b)*c$$

Therefore, $K+L = [a(c+1)]/b$ Equ. (3)

Normally, $a=1$, sometimes $a>1$ is very special case. b is always a integer and $b>1$. In the Kanban system, delivery time always corresponds order time. Therefore in the e-Kanban system, c is calculated as $c = L/(a/b)$

Assuming that c is not an integer and substituting the equ (2) in equ (3)

$$N = \left\lceil \frac{Da(c+1)/b + S}{M} \right\rceil$$

$$= \left\lceil \frac{aD(c+1)}{bM} + \frac{S}{M} \right\rceil \text{ Equ. (4)}$$

From the equation (4) it can be explained that N depends upon the Kanban cycle, capacity of the container and daily demand of the part. The number of Kanbans required will change if there is a change in the daily demand. For example, the daily demand changes for the next month, which implies that the number of Kanbans for the next month also changes accordingly. The procedure is first calculation of number of Kanbans for the first month and again calculating for the next month.

Changing the Kanban depends upon two decisions:

- From which order to another order the Kanban should be changed?
- The number of Kanbans to be added or subtracted from the order quantity.

While changing the number of Kanbans, care should be taken that:

- Does not increase the fluctuation of the order quantity
- Must be performed at adequate order times

Let us consider, the number of Kanbans determined by safety stock N_s and Kanban cycle N_k

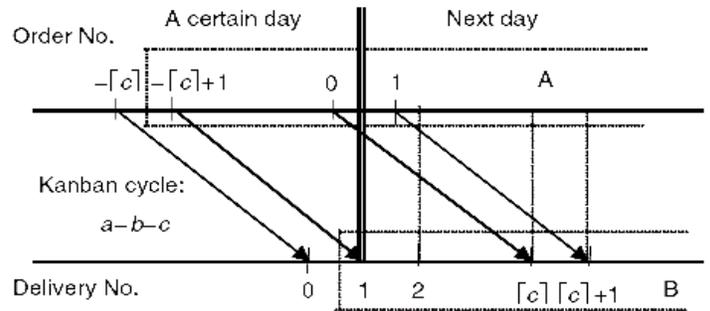
$$N_K = \left\lceil \frac{aD(c+1)}{bM} \right\rceil \text{ for safety stock, } S = 0$$

Then,

Finally, from equ (4), we get $N_s = N - N_k$ Equ., (5)

While changing the number of Kanbans, we should determine the Kanban number for safety stock and Kanban cycle separately.

Assuming the time interval between first delivery and the next delivery is same and the time of the supplier's first delivery is the starting time of the shift for any particular day. The assumptions are shown in the figure below.



Relations of orders and delivers in the Kanban cycle a-b-c

In the above figure, the delivery time are denoted from 0 to $[c]+1$ and the order time is denoted from $-[c]$ to 1, and the first delivery and first order are set to 1 for the next day.

METHODS FOR CHANGING THE NUMBER OF KANBANS:

Changing the number of Kanbans by Kanban cycle:

Based on monthly production plan for every part, the number of Kanbans is changed. The average monthly production plan for the current month will be different from the next month's average production plan.

D = average daily demand for the part

Therefore, from equ.,(5), the average order quantity is $aD/(bM)$, mean of number of Kanbans in one order. Equation (5) also states that the number Kanban is affected with 'Kanban delay coefficient' and 'mean Kanban number'. For a certain part, the following notations are used.

D_T = average daily demand, current month

D_N = average daily demand, next month

$a-b-c$ = Kanban cycle, current month

$\alpha-\beta-\gamma$ = Kanban cycle, next month

H_T = mean Kanban number, current month

H_N = mean Kanban number, next month

Therefore, from the definition,

$$H_T = \frac{aD_T}{bM}$$

$$H_N = \frac{\alpha D_N}{\beta M}$$

Assuming the change in the Kanban number based on the Kanban cycle is

$$N_K = \frac{aD_T(c+1)}{bM} = H_T(c+1) \text{ Equ., (6)}$$

From equation (5), the change in the Kanban numbers from the current to the next month is given by

$$\Delta N = H_N(\gamma + 1) - H_T(c + 1). \text{ Equ., (7)}$$

Finally equation (7) shows the key factors for changing the number of Kanbans are the Kanban coefficient factors and mean

Kanban number of order which is determined by the Kanban cycle.

Considering the case of new order in the next month is 1, and the order number is denoted and started from $-n+1$ to 2 after $-[c]$, 'n' is the current months new order number. Therefore 'n' can be calculated by the following formula

$$n = \left\lceil \frac{a(c+1)/b}{\alpha/\beta} \right\rceil$$

Since the time interval from $-[c]$ order time to the first shift starting time of the next month is $a*(b+c)/b$ and the next months order cycle is γ/β .

Case (i) $n = [\gamma]$

The change in number of Kanbans is given by i.e.,
Mean change, $\Delta N = (H_N - H_T)*(c+1)$
Here $a = \alpha$, $b = \beta$, $c = \gamma$

Case (ii) $n > [\gamma]$

This case deals when the lead Kanban approaches small and results of improvements appear.
 $\Delta N = -H_T(c - \gamma) + (H_N - H_T)*(\gamma + 1)$
Case (iii) $n < [\gamma]$

This is real case where the Kanban lead time increases in real production system
 $\Delta N = -H_N(\gamma - c) + (H_N - H_T)*(c + 1)$

VI. CONCLUSION

In the last decades, with rapidly shifting the environmental challenging high flexibility and also asking for high adaptability ways of ways of ordering of materials, it was a logical step that the traditional Kanban system should be substituted by e-Kanban system.

The important difference between the electronic Kanban and traditional card based Kanban system is to work more effectively and efficiently with a lean process. The transparency of supply chain is very much increased with the implementation of e-Kanban system. The gives an assurance of handling with high amount of materials in a good way without losing cards and with changing demand with the customers, the system reacts more flexibly.

It very important to take into considerations of the financial things of the system; it involves high investments because of the expensive terminals and other expenses connected with the IT department. Also, for the successful implementation, the communication within the IT departments, logistics and production is very important. E-Kanban is very big successful, if the implementation of the system is well-done, as it helps in optimization of the process.

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Antimicrobial Activity of *Asparagus Racemosus* Willd From Leaf Extracts – a Medicinal Plant

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Abstract- *Asparagus racemosus* Willd. (Family Asparagaceae; Liliaceae), is commonly known as Satavari. It is Medicinal plant contribute in human health care system. *Asparagus racemosus* is recommended in Ayurvedic texts for prevention and treatment of gastric ulcers, dyspepsia and as a galactagogue. It is also used successfully for nervous disorders, inflammation, liver diseases and certain infectious diseases. In the present study, we evaluated the antibacterial and antifungal investigations were carried out of the crude extracts obtained from the leaf of *Asparagus racemosus* Willd. using different solvents like Petroleum ether, Methanol, Chloroform, Acetone, Ethyl acetate and Water. The effect of different extracts were tested on Gram positive bacteria like *Bacillus subtilis*, *Staphylococcus aureus* and Gram negative bacteria *E. coli*, *Pseudomonas* and the yeast *Candida utilis*. by in vitro agar well diffusion method. This study scientifically supports the usage of whole plant as a remedy for various superficial bacterial and fungal infections in traditional medicine. The results were discussed.

Index Terms- Antimicrobial activity, *Asparagus racemosus* Willd., Solvent extraction

I. INTRODUCTION

Medicinal plants are the nature's gift to human being to make disease free healthy life. Herbal medicine is still the mainstay of about 75-80% of the whole population, mainly in developing countries, for primary health care because, better compatibility with the human body and fewer side effects (Barnet, 1992). In India thousands of species are known to have medicinal values and the use of different parts of several medicinal plants to cure specific ailments has been in vogue since ancient times (Parekh *et al.*, 2005). From over 3, 00,000 species of higher plants to occur in nature, only about 2 percent have been screened so far. Extract of plants from 157 families have been reported to be active against microorganisms (Lakshmanan, 1990 and Ravishankar, 1990).

Asparagus racemosus Willd. is a member of Liliaceae plant family (Madhavan *et al.*, 2010). It is an important monocot medicinal plant of tropical and subtropical countries like India (Gomase *et al.*, 2010). This is a woody climber growing to 1-2 m in height. The leaves are linear with a stout conical spiny spur, straight or slightly curved and pine-needles, small and uniform (Vichien, 2003).

In recent years, a large number of plant products have been investigated for their antimicrobial properties against bacteria and fungi. The study will also confirm if there is a biological

basis to the claim that the ethnomedicinal plant has useful medicinal purposes (Cowan, 1999).

In the worldwide as well as in the developing countries, the most human died due to infectious bacterial diseases (Nathan, 2004). The bacterial organisms including Gram positive and Gram negative like different species of *Bacillus*, *Staphylococcus*, *Salmonella* and *Pseudomonas* are the main source to cause severe infections in humans. Because these organisms have the ability to survive in harsh condition due to their multiple environmental habitats (Ahameethunisa and Hoper, 2010).

We have collected medicinally important medicinal plant *Asparagus racemosus* Will. for antimicrobial studies.

II. MATERIALS AND METHOD

Collection of plant: The Leaves of the plant *Asparagus racemosus* Willd. was collected in the month of April 2011 from Patan district, Gujarat, India. Plant leaves of *Asparagus racemosus* Willd. were washed thoroughly with running tap water followed by rinsing with distilled water and then leaves were separated and cut into small pieces. The leaves were shade dried at room temperature then pulverized into powder. Powdered were stored in an air tight container till further use.

Authentication of Plant: The plant material was identified and authenticated by a taxonomist Dr. R.S. Patel, Assistant professor, Biology Department, K.K.Shah Jarodwala Maninagar Science College, Ahmedabad (Gujarat).

Preparation of extracts: The dried powder of sample was successively extracted with Petroleum ether, Acetone, Chloroform, Methanol, Ethyl acetate and Water in soxhlet apparatus. The extract was stored at 4 °C and used for antibacterial activity.

Test Organisms: Gram positive & Gram negative bacteria and fungus were used as test organism for this study. Gram positive bacteria such as *Bacillus subtilis*, *Staphylococcus aureus*, Gram negative bacteria such as *Escherichia coli* and *Pseudomonas aeruginosa* and fungus like *Candida utilis*. The organisms were sub cultured on to nutrient agar in order to determine their viability. The identity of each test organism was confirmed by using standard culture, morphological and biochemical techniques. Stock cultures were maintained on nutrient agar slants at 4 °C and then sub-cultured in nutrient broth at 37 °C prior to each antimicrobial test.

ANTIMICROBIAL ACTIVITY BY AGAR WELL DIFFUSION ASSAY:

Antimicrobial susceptibility testing was done using the well diffusion method to detect the presence of anti bacterial and anti-fungal activities of the plant samples (Perez *et al.*, 1990). Nutrient Agar (Hi-media) for bacteria and Sabouraud's Agar (Hi-media) for fungus were prepared according to the manufacturer's instructions. The antibacterial activity of leaf extracts was determined by agar well diffusion method. Nutrient agar slants after solidification was inoculated with the test microorganisms, by spreading the bacterial inoculums under aseptic conditions. Wells of 5mm diameter were punched in the agar medium with sterile cork borer and filled with plant extract. The antibiotics were used in the test system as positive controls. The plates were incubated at 37⁰ c for 24 hrs. The negative control was added without adding the cultures to know the sterile conditions. The antibacterial activity was assessed by measuring the diameter of the zone of inhibition for the respective plant extract and antibiotic.

III. RESULTS AND DISCUSSION

The presence of antifungal and antimicrobial substances in the higher plants is well established as they have provided a source of inspiration for novel drug compound as plant derived medicines have made significant contribution towards human the treatment of diseases as is done in cases of Unani and Ayurvedic system of medicines.

In the present study, we evaluated the antibacterial and antifungal investigations were carried out of the crude extracts obtained from the leaf of *Asparagus racemosus* Willd. using different solvents like Petroleum ether, Methanol, Chloroform, Acetone, Ethyl acetate and Water were subjected to antimicrobial activity against *Bacillus subtilis*, *Staphylococcus aureus*, *Escherichia coli*, *Pseudomonas aeruginosa* and *candida utilis*. The results are showed in Table1. In this study, different extract of *Asparagus racemosus* leaves have potent antimicrobial activity against Gram positive and Gram negative bacteria were equally affected by the leaf extract of *A.racemosus* indicating the presence of broad spectrum antibacterial substance in the plant.

Table –1 Antimicrobial activity of *Asparagus racemosus* leaf

Zone of Inhibition (mm)						
Extract	Concentration(µg/ml)	Bacillus subtilis	Staphylococcus aureus	Escherichia coli	Pseudomonas aeruginosa	candida utilis
Methanol	25	10	10	13	13	-
	50	12	11	14	15	-
	100	13	13	16	16	-
	control	0	0	0	0	0
Chloroform	25	8	8	12	8	-
	50	9	10	14	10	-
	100	10	12	16	12	-
	control	0	0	0	0	0
Water	25	9	8	9	8	8
	50	10	9	10	12	9
	100	9	10	10	8	9
	control	0	0	0	0	0
Ethyl Acetate	25	9	10	8	9	-
	50	8	11	9	10	-
	100	8	13	9	11	-
	control	0	0	0	0	0
Petroleum ether	25	10	9	8	10	-
	50	8	10	9	10	-
	100	5	12	10	12	-
	control	0	0	0	0	0
Acetone	25	11	8	10	11	9
	50	10	12	13	12	10
	100	8	10	14	12	12
	control	0	0	0	0	0
Standard Antibiotic		15	18	22	12	20

Value are mean of three replicates.
Standard Antibiotic Streptomycin 5 µg/ml for Bacterial Strain.
Standard Antibiotic Fluconazole 5 µg/ml for Fungi.

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IV. CONCLUSION

The plant extractive studied could be an answer to the people seeking for better therapeutic agents from natural sources which is believed to be more efficient with little or no side effects when compared to the commonly used synthetic chemotherapeutic agents.

In present study, methanolic extract leaves of *Asparagus racemosus* Willd. significant inhibitory action against all the selected bacteria, it is concluded that Methanolic extract of the *Asparagus racemosus* Willd., can be effectively used for curing the bacterial diseases. Hence in the present study show the methanolic extract of the leaves of *Asparagus racemosus* Willd. Possess should be screened further for active constituents.

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Pyrethroid Based Mosquito Repellent Inhalation Induced Changes In Physical Activity In Albino Rats After Chronic Exposure

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Abstract- Introduction: The liquid vaporizers are very commonly used as residential insecticides in developing countries. Neurotoxic effects of pyrethroids have been reported earlier but study regarding its direct effect on physical activity of albino rats are scanty. So the present study was planned to assess and compare the effects of long term prallethrin (a Pyrethroid) exposure on albino rats.

Method: Twenty albino rats were divided into two groups of control and experimental. Rats in experimental group were exposed to 3.2% w/v prallethrin vapours 12 hours daily for 180 days. Control animals were kept under identical conditions without exposure to said repellent.

The albino rats in experimental group were subjected to Spontaneous Motor Activity, Forced Locomotor Activity and Swimming endurance test to record their physical activity.

Result: Significant changes in Spontaneous Motor Activity, Forced Locomotor Activity and Swimming Endurance Test were not recorded in prallethrin exposed rats as compared to control ones throughout the study.

Conclusion: Lack of changes in the behavioural parameters as seen in our study may be due to difference in the route adopted and perhaps due to limited duration of exposure and high degree of adaptability of the animal to adverse insults.

Index Terms- pyrethroids, liquid vaporizers, albino rats, physical activity, adaptability

I. INTRODUCTION

The major types of residential insecticidal products include aerosols, mosquito coils and vaporizing mats among which the liquid vaporizers have outnumbered others in popularity.¹ Their toxic effects have been observed in non target organs causing muscle pain, joint pain, ataxia, chronic fatigue, headache and difficulty in concentration.

Pyrethroid induced neurotoxicity and other toxic symptoms, and their deleterious effects in humans and experimental animals caused a concern on their chronic use. These compounds are being extensively used and the product information leaflet enclosed by the manufacturers are too ambiguous to ensure the safety profiles on prolonged usage to all groups including pregnant women. Most of the previous reports are based on studies on immature mammals who received drug through different routes except respiratory. The latter being conventional route through which millions of people are exposed

for several decades. Hence the present study is aimed at investigating and evaluating the changes in various physical activity and psychomotor parameters in albino rats after inhalation of pyrethroid based mosquito repellent.

II. MATERIAL AND METHOD

The present study was carried out on adult Charles foster rats weighing between 100-150gms. The animals were provided with standard pellet laboratory diet (Lipton India Limited) and water ad-libitum. They were housed under identical diurnal conditions and temperature. The animals were weighed, marked and divided into two groups:

Group 1-Experimental

Group 2-Control

The experimental animals were kept in unit plastic cages (36cm x 22cm x 14cm) with many holes. They were exposed to liquid mosquito repellent inside a closed room (180cm x 240cm) according to the method of Sinha.² The animals were exposed to 3.2% w/v prallethrin vapours for 12 hrs daily for a period of 180 days. The control animals were kept under identical conditions without exposure to 3.2% w/v prallethrin vapours. The permission to perform experiments on rats was taken from Institutional animal ethics committee.

The body weight was measured weekly and the water consumption was assessed daily.

On day zero that is before exposure, the weight and physical activities of both control and experimental rats were noted down.

The experiments performed to assess physical activity were,

1. Spontaneous Motor Activity
2. Forced Locomotor Activity
3. Swimming endurance test

Thereafter all these parameters were assessed at days 1, 7, 14, 21, 28, 35, 42, 49, 56, 63, 70, 77, 84, 91, 98, 105, 112, 119, 126, 133, 140, 147, 154, 161, 168, 175 and 180.

Spontaneous Motor Activity

Motor activity was recorded on "Digital Actophotometer" which has a chamber made up of perspex sheet for the animal. A variable shock of strength 100V, 50Hz, 0.2mA is provided which

is inbuilt in the instrument. Also a four digit counter is provided which counts the movement of animal inside the perspex chamber. Each animal was observed over a period of 5 minutes and values expressed as counts per 5 minutes.³

Forced Locomotor Activity (Rota Rod test)

This test was performed according to the method of Kihara.⁴ Albino rats weighing 100-150 g were taken. The animals were placed individually on a scraped rod of 7 cm in diameter and rotating at a rate of 5 revolutions per minute. Animals were tested in two trials per day. The maximum trial duration was 180 seconds and the inter trial interval was about 30 minutes. The time that each animal remained on the rod at the rotation speed was recorded.

Swimming Endurance Test

This was done according to the method of Trudeau And Murphy.⁵ A group of seven rats were tested for swimming endurance. The rats were made to swim till exhaustion in a swimming pool. The apparatus measuring 90 x 45 x 70 cm in size was fitted with a thermostat. It was filled with water at a temperature of 37°C and the temperature was maintained throughout the experiment. The time taken to swim to exhaustion was calculated for each group by taking mean of individual time. The criterion for exhaustion was the animals inability to surface for a period of 10 seconds.⁶

The physical parameters were assessed using Student's t-test.

Observation and Results

The rats were divided into two groups, experimental and control. Each group was divided into 3 subgroups to assess 3 different parameters. The experimental group was exposed to prallethrin vapors for 6 months and physical activity parameters were assessed weekly.

Physical Activity Parameters:

a) Spontaneous Motor Activity:

No statistically significant changes were observed in the motor activity of the experimental subgroup as compared to control ones throughout the study (Figure 1.1 and Table 1.4).

b) Forced Locomotor Activity:

This parameter also did not reveal any significant variation in the experimental group as compared to control group throughout the experiment (Figure 1.2 and Table 1.5).

c) Swimming Endurance Test

No statistically significant variation was observed between the experimental and control groups throughout the study (Figure 1.3 and Table 1.6).

III. DISCUSSION

Physical activity and psychomotor parameter

Neurotoxic effects of drugs are manifested as changes in behavioural and psychomotor functions as CNS controls number of functions like cognition, awareness, memory and motor functions. In our study, to evaluate the neurotoxic effects of

inhaled pyrethroids rota rod test, swimming endurance test and spontaneous motor activity test was carried out. Significant changes in Spontaneous Motor Activity (Figure 1.1, Table 1.4), Forced Locomotor Activity (Figure 1.2, Table 1.5) and Swimming Endurance Test (Figure 1.3, Table 1.6) were not recorded in prallethrin exposed rats as compared to control ones in the study. The body weight of experimental animals did not show any significant variation compared with control rats.

The studies by Ahlbom⁷ using fat emulsion vehicle containing bioallethrin, which were administered orally as a single daily dose for 7 days to 10 day old mice offsprings. He observed a significantly reduced locomotion score which was different for each dosage group. Crofton and Reiter⁸ reported that decreased motor activity of rats is dosage dependent for type I and type II pyrethroids. Crofton⁹ reported exposure to deltamethrin produced dose dependent decrease in motor activity. They adopted two different routes of administration, intraperitoneal and per oral route. Motor activity being decreased more significantly in intraperitoneal as compared to per oral route. Abou donia¹⁰ reported decreased locomotor and sensorimotor performance in rats following exposure to pyridostigmine bromide, DEET, and permethrin using dermal or oral route. Manna¹¹ found that after oral dosing of alfacypermethrin in rats, there was significant motor incoordination.

Talts¹² reported that neonatal exposure increases the susceptibility of adult mice to toxic effects of bioallethrin, if reexposed. Ahlbom⁷ also reported that exposure to an organophosphate (DFP) during a defined period in neonatal life induces permanent changes in brain muscarinic receptors and behaviour in adult mice. Wolansky¹³ studied the relative potencies for acute effects of pyrethroids on motor function in rats and found that all pyrethroids, regardless of structural class, produced dose dependent decreases in motor activity. The dosage and route of administration was acute and oral.

Sinha² reported that body weight of rat pups exposed to pyrethroid containing mosquito repellent decreased significantly but no gross abnormality in behaviour was observed. Tsuji¹⁴ also reported lack of changes in brain muscarinic receptor and motor activity of mice after neonatal inhalation exposure to d-Allethrin.

In view of these studies, it can be deduced that the physical activity and psychomotor performances, in case of pyrethroid exposure were governed by dose, age of the animal, duration of exposure and route of administration. Most common route of exposure to pyrethroids is through the inhalational method, oral intake being either accidental or suicidal. Hence in our study the inhalation administration method was adopted. Since the masses are being exposed to pyrethroid on a continuous basis that may extend upto 30 to 40 years, our 180 days study may be a limiting factor.

The higher level of sensitivity of the neonatal rat to pyrethroid toxicity is due to the incomplete development of the enzymes which catalyze the metabolism of pyrethroids in the liver of young animal.¹⁵

IV. CONCLUSION

Neurotoxic effects of drugs are manifested as changes in physical activity and psychomotor functions as CNS controls

number of functions like cognition, awareness, memory and motor functions. In our study, to evaluate the neurotoxic effects of inhaled pyrethroids rota rod test, swimming endurance test and spontaneous motor activity test was carried out. Lack of changes in the physical activity and psychomotor parameters as seen in our study suggest the relative safety of the said mosquito repellent. Our findings deviate from many of earlier studies as it may be due to difference in the route adopted and perhaps due to limited duration of exposure and high degree of adaptability of the animal to adverse insults. Further, study on the histological parameters is required to see if there is any abnormality in different areas of brain at microscopic level.

It appears that for the manifestation of abnormality in physical activity and other psychomotor parameters a further study with prolonged period of duration is required as in today's scenario the exposure to pyrethroid containing mosquito repellent is continued and chronic.

Conflict of Interest: None declared

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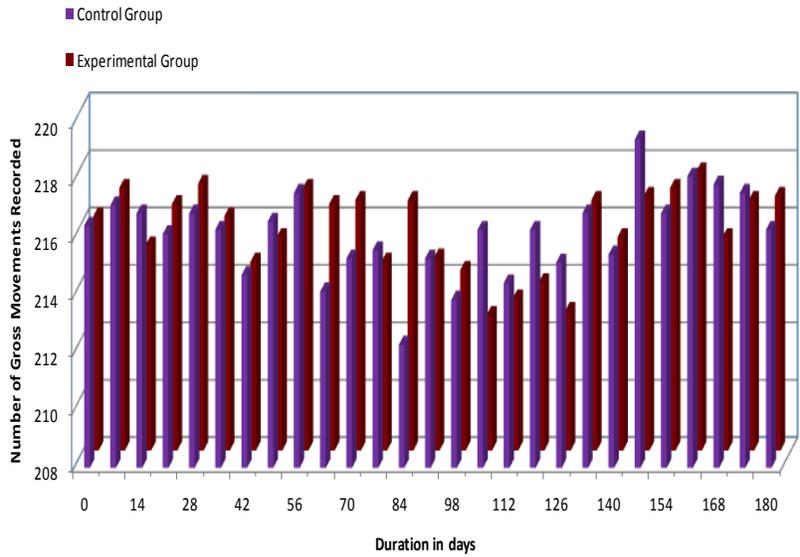


Figure 1.1. : Effect of Prallethrin vapours on spontaneous motor activity.

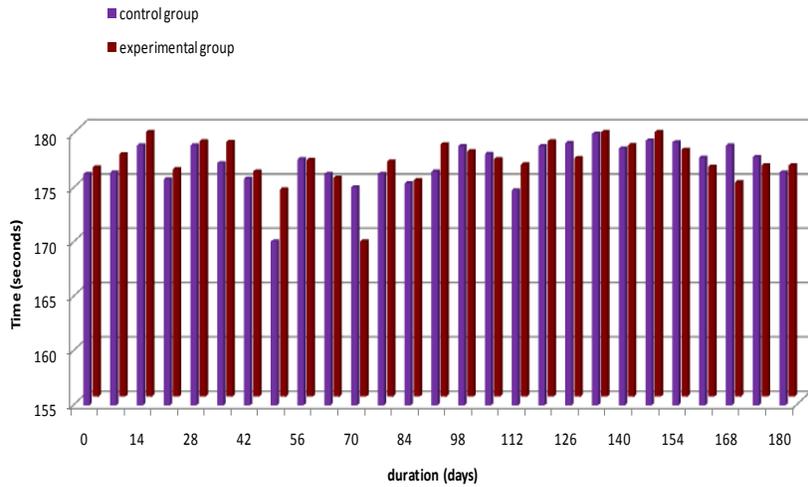


Figure 1.2 : Effect of prallethrin vapours on forced locomotor activity

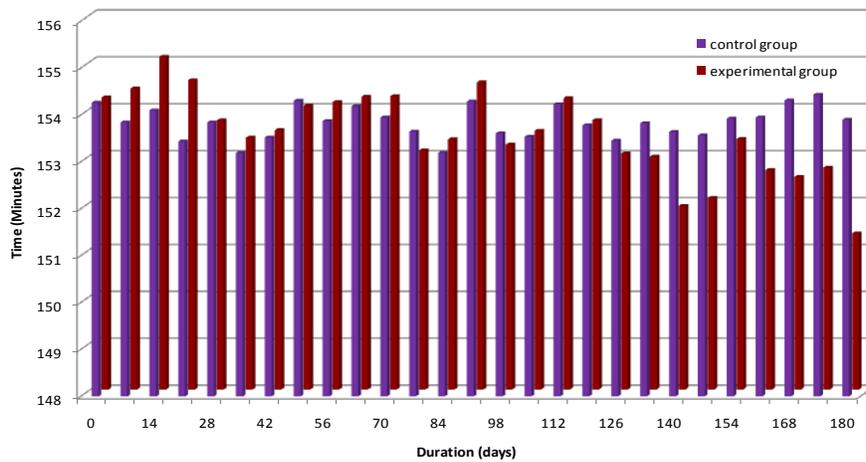


Figure 1.3 :Effect of prallethrin vapours on swimming endurance

Days	Spontaneous Motor activity		Significance
	Control	Exp	
0	216.42 ± 4.61	216.14 ± 4.25	Not Significant
7	217.14 ± 7.68	217.14 ± 4.89	
14	216.85 ± 6.08	215.14 ± 7.35	
21	216.14 ± 8.31	216.57 ± 6.37	
28	216.85 ± 4.90	217.28 ± 6.67	
35	216.28 ± 5.31	216.14 ± 6.07	
42	214.71 ± 5.41	214.57 ± 8.93	
49	216.57 ± 5.00	215.42 ± 10.37	
56	217.57 ± 3.35	217.14 ± 3.16	
63	214.14 ± 4.67	216.57 ± 9.36	
70	215.28 ± 6.28	216.71 ± 6.86	
77	215.57 ± 5.75	214.57 ± 6.58	
84	212.28 ± 8.05	216.71 ± 9.91	
91	215.28 ± 4.90	214.71 ± 5.85	
98	213.85 ± 3.23	214.28 ± 7.51	
105	216.28 ± 4.60	212.71 ± 8.77	
112	214.42 ± 5.24	213.28 ± 7.17	
119	216.28 ± 4.10	213.85 ± 8.65	
126	215.14 ± 4.33	212.85 ± 5.18	
133	216.85 ± 3.39	216.71 ± 5.73	
140	215.42 ± 4.29	215.42 ± 3.29	
147	219.42 ± 3.16	216.85 ± 3.79	

154	216.85 ± 4.90	217.14 ± 0.73
161	218.14 ± 3.77	217.71 ± 0.86
168	217.85 ± 3.98	215.42 ± 1.06
175	217.57 ± 3.31	216.71 ± 0.56
180	216.28 ± 2.16	216.85 ± 0.70

(p 0.5 to 1.0)

Table 1.4: Effect of prallethrin vapours on spontaneous motor activity (Mean ± S.E)

Days	Forced Locomotor activity		Significance
	Control	Exp	
0	176.28 ± 2.01	176.07 ± 2.44	Not significant
7	176.42 ± 2.35	177.28 ± 1.39	
14	178.92 ± 1.07	179.35 ± 0.64	
21	175.78 ± 3.21	175.92 ± 1.57	
28	178.92 ± 1.07	178.50 ± 1.20	
35	177.28 ± 1.80	178.42 ± 0.92	
42	175.85 ± 2.75	175.71 ± 2.54	
49	170.07 ± 4.13	174.07 ± 3.15	
56	177.64 ± 2.19	176.78 ± 1.80	
63	176.28 ± 3.72	175.14 ± 2.37	
70	175.07 ± 4.93	169.28 ± 10.24	
77	176.28 ± 2.63	176.64 ± 2.75	
84	175.42 ± 3.33	174.92 ± 2.07	
91	176.50 ± 2.40	178.21 ± 1.48	
98	178.85 ± 0.85	177.57 ± 1.60	
105	178.14 ± 1.31	176.85 ± 1.16	
112	174.78 ± 4.89	176.35 ± 1.12	
119	178.85 ± 0.85	178.50 ± 1.50	
126	179.14 ± 0.85	176.92 ± 2.00	
133	180.00 ± 0.00	179.35 ± 0.64	
140	178.64 ± 1.06	178.14 ± 0.91	
147	179.35 ± 0.41	179.35 ± 0.64	
154	179.21 ± 0.78	177.71 ± 0.71	

161	177.78 ± 1.44	176.14 ± 1.05	
168	178.92 ± 0.85	174.71 ± 2.15	
175	177.85 ± 1.06	176.28 ± 1.26	
180	176.42 ± 1.90	176.28 ± 1.25	

(p 0.05 to 1.0)

Table 1.5 :Effect of prallethrin vapours on forced locomotor activity (Mean ± S.E)

Days	Swimming Endurance Test		Significance
	Control	Exp	
0	154.26 ± 0.46	154.22 ± 0.33	Not significant
7	153.84 ± 0.66	154.42 ± 0.52	
14	154.10 ± 0.41	155.09 ± 0.70	
21	153.43 ± 0.43	154.59 ± 0.53	
28	153.84 ± 0.76	153.73 ± 0.22	
35	153.19 ± 0.61	153.37 ± 0.59	
42	153.52 ± 0.43	153.53 ± 0.43	
49	154.30 ± 0.55	154.05 ± 0.55	
56	153.87 ± 0.43	154.13 ± 0.37	
63	154.18 ± 0.53	154.24 ± 0.56	
70	153.94 ± 0.74	154.25 ± 0.78	
77	153.64 ± 0.63	153.09 ± 0.68	
84	153.19 ± 0.61	153.33 ± 0.59	
91	154.28 ± 0.41	154.55 ± 0.30	
98	153.60 ± 0.61	153.22 ± 0.71	
105	153.53 ± 0.43	153.51 ± 0.44	
112	154.23 ± 0.55	154.21 ± 0.56	
119	153.78 ± 0.48	153.74 ± 0.50	
126	153.45 ± 0.51	153.03 ± 0.62	
133	153.82 ± 0.65	152.96 ± 0.66	
140	153.64 ± 0.51	151.91 ± 1.19	
147	153.56 ± 0.69	152.08 ± 1.11	
154	153.92 ± 0.47	153.34 ± 1.38	
161	153.95 ± 0.65	152.68 ± 1.13	

168	154.31 \pm 0.45	152.53 \pm 1.18	
175	154.43 \pm 0.49	152.73 \pm 1.49	
180	153.90 \pm 0.50	151.33 \pm 1.38	

(p 0.1 to 1.0)

Table 1.6: Effect of prallethrin vapours on swimming endurance (Mean \pm S.E)

Optimal Transmission in Multihop Cellular Networks by Detecting Irrational Nodes

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Abstract– In multihop cellular networks mobile nodes usually transmit packets through intermediate mobile nodes for enhancing performance. Selfish nodes usually do not cooperate which has a negative effect on the network fairness and performance. A fair, efficient and optimal incentive mechanism has been proposed to stimulate the mobile node's cooperation. Hashing operations are used in order to increase the security. Trivial Hash function has been used to improve end-to-end delay and throughput. In addition Cyclic Redundancy Check Mechanism has been employed to identify the irrational nodes that involve themselves in sessions with the intention of dropping the data packets. Moreover, to reduce the collision at the Accounting Center a Border node has been entrusted the task of submitting the checks using a digital signature.

Index Terms–Border Node Mechanism, Cyclic Redundancy Check, Selfish nodes, Trivial Hash Function

I. INTRODUCTION

Reputation-based and incentive mechanisms have been proposed to avoid selfishness attacks. For reputation-based mechanisms the nodes usually monitor the transmissions of their neighbors to make sure that the neighbors relay other nodes' traffic, and thus, selfish nodes can be identified and punished. For incentive mechanisms, packet relay is a service not an obligation. The source and destination nodes pay credits (or virtual currency) to the intermediate nodes for relaying their packets. Credits can stimulate the nodes' cooperation by proving that it is more beneficial for the nodes to cooperate than behaving selfishly.

A fair and efficient incentive mechanism has been proposed to stimulate the node cooperation. Hashing operations are used in the ACK packets to reduce the number of public-key-cryptography operations.

Trivial Hash function has been used to reduce the number of public key cryptographic operations. In addition it also has the advantage that it can reduce the computation cost.

Cyclic Redundancy Check Mechanism has been employed to identify the irrational nodes that involve themselves in sessions with the intention of dropping the data packets to launch Denial-of-Service attacks.

Moreover, reducing the overhead of the payment checks is essential for the efficient implementation of the incentive mechanism due to the large number of payment transactions. To enable this, instead of allowing each of the intermediate nodes to submit checks individually for payment a Border node has been entrusted the task of submitting the checks using a digital signature. Extensive analysis and simulations demonstrate that the proposed system enables efficient data transfer by detecting irrational nodes. The network efficiency has been significantly improved by reducing the overhead of check submission using Border node mechanism. Moreover Trivial Hash function has significantly reduced the cost of computing hash functions without compromising the message integrity.

II. LITERATURE REVIEW

A secure mechanism is presented [1] to stimulate end users to keep their devices turned on, to refrain from overloading the network, and to avoid tampering aimed at converting the device into a "selfish" one. A Locally Aware Reputation system has been proposed [2] that addresses selfish behavior by using locally available information. An overview of security problems [3] for mobile ad hoc networks distinguishing the threats on basic mechanisms and on security mechanisms is discussed. A micro-payment scheme has been proposed [4] for multi-hop cellular networks that encourage collaboration in packet forwarding by letting users benefit from relaying others' packets. A protocol [5] is presented for routing in ad hoc networks that uses *Dynamic Source Routing*. Multihop Cellular Network (MCN), for wireless communications [6] preserves the benefit of conventional Single Hop Cellular Networks (SCN) where the service infrastructure is constructed by fixed bases, and it also incorporates the flexibility of ad-hoc networks where wireless transmission through mobile stations in multiple hops is allowed. In multihop cellular networks, the mobile nodes usually relay others' packets [7] for enhancing the network performance and deployment. A fair and efficient incentive mechanism-FESCIM has been proposed to stimulate the node cooperation. Two techniques have been proposed that improve throughput in an Ad-hoc network [8] in the presence of nodes that agree to forward packets but fail to do so. There is a watchdog that identifies misbehaving nodes and there is a pathrater that helps routing protocols avoid these nodes. A simulation study is carried out [9] that identifies security issues that are specific to MANET and that illustrate the effects of those threats on network performance when the DSR

routing protocol is used. A multi-party micropayment [10] scheme has been proposed that allows all parties involved in a call to be paid in real-time. Multi-hop cellular networks (also called hybrid networks) appear to be a promising combination of the dynamics of mobile ad hoc networks and the reliability of infrastructured wireless networks [11]. These hybrid networks offer several advantages for users as well as operators. A Cooperation And Accounting Strategy For Hybrid Networks called CASHnet has been proposed which stimulates cooperation among nodes by making it a rewarding alternative to selfishness. Our scheme incorporates security architecture, which is based on public key cryptography and uses digital signatures and certificates. Today's public Wireless LANs are restricted to hotspots [12]. With the current technology, providers can only target a small audience and in turn charge high prices for their service to generate revenue. Also, providers cannot react appropriately to dynamic changes in the demand. Therefore, a cooperation and accounting scheme has been which introduces monetary rewards. CASHnet is compared with the Nuglet scheme using simulations under the criteria of network liveliness, overhead, and packet drop reasons as well as cash flow. CASHnet, uses a highly decentralized accounting and security architecture .It allows selfish nodes and supports cost sharing between sender and receivers located in different sub networks. Integrated Cellular And *Ad Hoc* Relaying Systems (iCAR) [13] is a new wireless system architecture based on the integration of cellular and modern *ad hoc* relaying technologies. It addresses the congestion problem due to unbalanced traffic in a cellular system and provides interoperability for heterogeneous networks. The proper functioning of mobile ad hoc networks depends on the hypothesis that each individual node is ready to forward packets for others [14].To address this problem, we propose a credit-based Secure Incentive Protocol (SIP) to stimulate cooperation among mobile nodes with individual interests. SIP can be implemented in a fully distributed way and does not require any pre-deployed infrastructure. Sprite [15], a simple, cheat-proof, credit based system is proposed for stimulating cooperation among selfish nodes in mobile ad hoc networks.

III. EXISTING SYSTEM

In multihop cellular networks, the mobile nodes usually relay other node's packets for enhancing the network performance and deployment. As a first step to this process in FESCIM [7], a route is set up between source and destination by the Route Discovery Phase. During this the sender will send a Route Request Packet to its neighbors that contain the destination address. The neighbors in turn append their own address to the Route Request Packet and rebroadcast it. This process continues until the Route Request Packet reaches the destination. The destination will confirm this route by a Route Reply Packet. The data packet being sent will be encrypted by using hashing operation. In addition hashing process will also reduce the number of public-key-cryptographic operations. Upon receiving the Route Reply Packet, each intermediate node relays the packet.

However, selfish nodes usually do not cooperate but make use of other nodes for relaying the packets. Such nodes are identified and punished. After successful data transfer the co-operating nodes will submit a check to the Accounting Center for reimbursement of resources. The Accounting Center will then distribute the credits to the co-operative nodes after verification of the checks.

IV. PROPOSED SYSTEM

From the studies conducted over the years it has been clear that during data transfer some delay still exists. Selfish behavior among nodes is found to be one important reason for this delay in data delivery. Various techniques have been adopted to reduce this selfish behavior and enhance cooperation among intermediate nodes but it has been found out that some misbehavior still exists due to the presence of irrational nodes in the network. The existing system can avoid selfishness attacks but it cannot identify the irrational nodes that involve themselves in sessions with the intention of dropping the data packets. Techniques could be adopted to find out such irrational nodes.

Previously hashing operations have been utilized to secure the data being transferred over the network. But however hashing operations also give rise to some computational delay.

This cost of computation could be reduced using better hashing techniques.

Moreover each of the cooperating nodes that have participated in successful data transfer submit checks to the Accounting Center for reimbursement of resources. This can result in congestion at the Accounting Center. Steps could be taken to reduce this traffic congestion.

The proposed system aims at overcoming all these draw backs.

- Reduces time delay involved in data transfer by identifying irrational nodes.
- Reduces the computational cost of hashing
- Reduces the traffic congestion at the Accounting Center

A. CRC- Cyclic Redundancy Check

Cyclic Redundancy Check can be used for dealing with irrational nodes. Each data packet to be transmitted is appended with a checksum and this checksum is calculated at every hop of data transfer. If there is a difference in the checksum value there is a data loss so that particular node is found out and blocked. Such nodes are irrational nodes. This will help avoid data loss and ensure high throughput and reduce end to end delay.

B. Trivial Hash function

Trivial Hash function has been used to reduce the cost of computing the hash function. If the datum to be hashed is small enough, one can use the datum itself as the hashed value. The cost of computing this "trivial" hash function is effectively zero. This hash function is [perfect](#), as it maps each input to a distinct hash value. An index table is maintained that gives alternate form of the character Invalid data values may be left undefined in the table, or mapped to some appropriate "null" value.

C. Border Node Mechanism

To deal with congestion at the Accounting Center a border node is entrusted the responsibility of check submission. All the intermediate cooperating nodes will hand over the checks to this Border Node. This Border Node will then generate a final check and secure it with a digital signature and send it to the Accounting Center. This will ensure less congestion at the Accounting Center and help deal with the bottleneck problem.

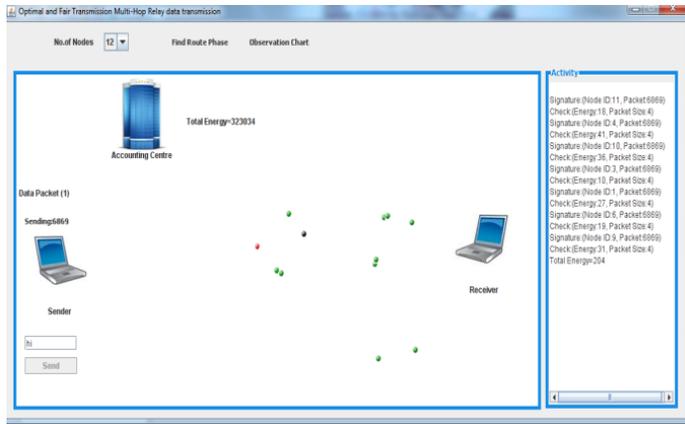


Figure 1: Data transmission secured using trivial hashing

V. RESULT AND DISCUSSION

Java Network Simulator (JNS) is used for simulation set up. JNS is a popular network simulation tool used for network lab experimentation and research. JNS provides network performance metrics at various abstraction levels such as Network, sub-network, Node and a detailed packet trace. Using JNS modeling and simulation services are provided in a variety of networking technologies and protocols. Results obtained are as shown below. Table I, II, III shows variation in throughput, end to end delay and packet loss for 12 nodes respectively. Similarly the graphs obtained for these variations are also shown below in Figures 2, 3, 4 respectively.

Performance of MANET with the nodes in mobility

Table I: Variation in throughput

Throughput(Kbps)	
FESCIM	Optimal
81.25	91.25
87.25	97.25
94.75	103.95
102.5	112.25
109.5	118.9
116.25	125.25
121.75	130.75

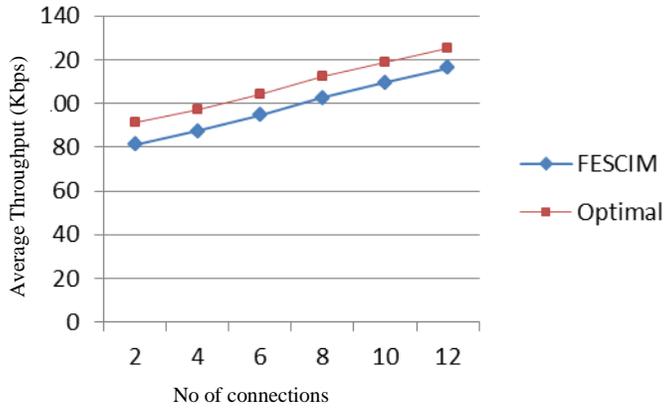


Figure 2: Comparison of throughput

Table II: Variation in end to end delay

End to end delay(ms)	
FESCIM	Optimal
98.5	96.25
100.25	99.5
101.5	100.25
102.75	100.75
104.25	103
105.25	103.75
107.5	105.25

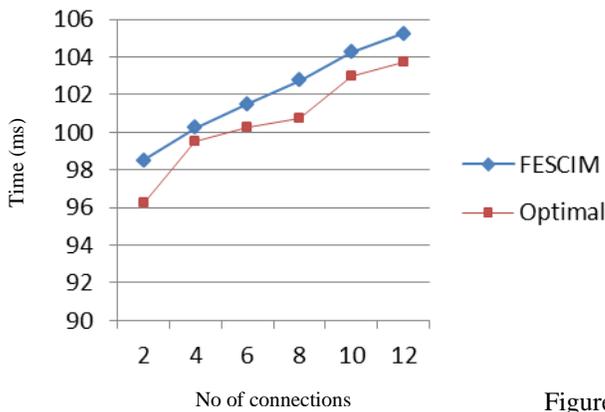


Figure 3 :Comparison of end to end delay

Table III: Variation in packet loss

Packet loss(no of packets per sec)	
FESCIM	Optimal
26.25	16.25
30.5	22.25
39.75	30.75
41.5	32.25
51.5	43.75

59.25	48.25
61.75	50.25

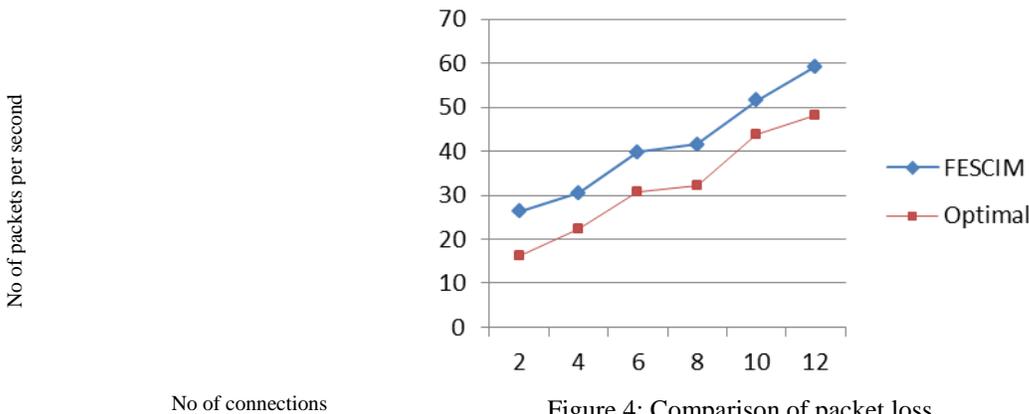


Figure 4: Comparison of packet loss

VI. CONCLUSION

An optimal and secure transmission mechanism has been proposed for Multihop Cellular Networks. Irrational nodes have been found out thereby increasing throughput by 9.4 % and reducing end to end delay by 1.6%. Extensive simulations show that the proposed mechanism achieves better transmission by reducing the packet loss by 9%.

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SWOT Analysis of Medical Education and Training in Government Medical College, Kerala, India

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Abstract- OBJECTIVES - To identify the strengths, weaknesses, opportunities and threats of Government Medical College, Thrissur, Kerala and to identify factors to enhance the proper utilization of opportunities.

METHODOLOGY – It is a cross sectional study done in Govt. Medical College, Thrissur. Twenty In-Depth Interviews were conducted with key informants for data collection. Purposive sampling was done. Data were collected using In-Depth Interview Guide, administrative & teaching reports, registers from hospitals and registers of students for results and analyzed both quantitatively and qualitatively.

RESULT – Strengths found out were Adequate Teaching and Non-teaching staff as per Medical Council of India standards, Adequate Clinical Material, good quality UG & PG teaching, Excellent results, Better Patient Care Services, Excellent Operation Theatre Complex and Well Equipped Laboratories. Weaknesses identified were Lack of Academic Block and Inadequate Lecture Halls. The Opportunities are Functional Autonomy, Expand institution with more Specialties & Super-specialties, Enhancement of PG seats, Attract more funds and grants for Research and further development. The emerged Threats are Budget Allocation inadequacy, Beaucracy and Water Scarcity during summer season.

CONCLUSION - This SWOT Analysis was a Situation Analysis of our institution. The required facilities are compared with the norms and requirements of Medical Council of India considering it as the Gold standard.

Index Terms- Medical Education, Action Research, Key Informants, Situation Analysis

I. INTRODUCTION

Medical Education is a dynamic and complex process. Individuals who receive their education from the best institutions are assumed to be more knowledgeable and to have higher intellectual potential to learn and accumulate firm-specific knowledge (Hitt,M.A., Bierman,L., Shimizu,K. & Kochhar,R., 2001). Action research is a frame work for diagnosing, implementing and evaluating a change process (Wehrich, H, 1982).

SWOT is analysis of strengths, weaknesses, opportunities and threats of an educational process or activities of an institution or medical education as a whole of a state or a nation. It is an action research where in we would like to improve the service provision and practice of the medical education system rather

than to produce knowledge. It reveals development opportunities as well as vulnerabilities to internal organizational and external environmental changes. The severe shortage of basic science teachers reported by a SWOT analysis done in Nepal in 2008 is a new attempt in this regard. The researchers came up with the conclusion of many shortages and short comings in all areas except ophthalmology where the services provided were reported as exemplary (Dixit H, Marahatta SB, 2008). Professionals devote a lot of time to deliver high quality service. The absence of useful project management methods increases the professional's work hours and reduces their job satisfaction (Wei-Ming Ou; Kang-Wei, 2007). Among the many fads and fashions in strategic management, SWOT analysis has enjoyed consistent popularity (Novicevic,M.M., Harvey, M., Autry,C.W., & Bond, E.U., 2004). SWOT is designed for the preliminary stages of decision-making and as a precursor to strategic planning in various kinds of applications (Skeese,M.E., 2002) Large numbers of academics have also applied SWOT to open new avenues for strategic research (Valentin,E.K.,2001 and Nair,K.G.K., & Prasad.P.N, 2004). Threats are conditions outside the organization's direct control and endanger the integrity and profitability of the organization (Hill. C.W.L. and Jones, 2004). SWOT Analysis of Indian Pharmacological Society done by B.N.Dhawan is a credible study in this regard (B.N.Dhawan, 2011).

Even after an extensive literature search, I failed in finding a publication of SWOT analysis from any of the Medical Colleges in Kerala and India. So it will be an innovative project in this aspect, as we could fill the existing research gap. Not only that, this action research has recently been recognized by Medical Council of India as a topic in Institutional Goals of Medical Graduate Training program by its Amendment Notification. SWOT will help in Educational Situational analysis and identification of each of them in our Institution, as is the need of both Government and public.

Government Medical College Thrissur, established in 1982 is presently one of the leading centers in medical education in Kerala. The college was granted permanent recognition by Indian Medical Council in 1991 and by World Health Organization in 1993. PG courses were started in 1997. We did the SWOT Analysis of our Institution and tried to compare the findings with MCI recommended standards. The purpose was to do an Academic Monitoring in order to find out the resources, output and subtle changes.

II. METHODOLOGY

OBJECTIVES

1. To identify the strengths, weaknesses, opportunities and threats of Government Medical College, Thrissur, Kerala.
2. To find out factors to enhance the proper utilization of opportunities.

STUDY DESIGN – Cross Sectional Study

STUDY SETTING – Government Medical College, Thrissur, Kerala

STUDY PERIOD – 2011 to 2012

SAMPLE & SAMPLING – Purposive Sampling was done as we needed key informants to generate maximum possible information. The Head of institution, Superintendent, Heads of various departments and non-teaching staff who had more than 2 years experience in the institution were selected. Similar criterion was applied in the selection of various students too. Patients were recruited randomly.

METHODS

Key informants were interviewed. We have conducted twenty In-Depth Interviews. The key informants included Principal(1), Superintendent(1), Heads of Departments of Pre-Clinical(2), Para-clinical(2) and Clinical(2) specialties, Administrative staff(2), non-teaching staff(1), para-medical staff(1), in-patients(2), undergraduate(2), postgraduate(2) and paramedical students(1) and a local political leader(1). After taking prior appointment all were interviewed in neutral places

without distractions. All respondents gave their consent to participate in the study. The interviews took forty five minutes to one hour. The whole interviews were voice recorded using a MP3 audio recorder.

DATA COLLECTION TOOL – In-Depth Interview Guide with open-ended questions. Documents of accountability from administrative office regarding administrative & teaching reports, registers from hospitals and Registers of Students for results were analyzed.

DATA ANALYSIS – Free listing, domain identification, coding and summarization of the data were done from the transcribed verbatim data of In-Depth Interviews. The bed strengths in hospitals, the availability of faculty and the results of various courses were analyzed quantitatively.

ETHICAL CONSIDERATIONS - Ethical clearance was obtained from the Institutional Ethical Committee for Human Research in Government Medical College, Thrissur. Informed written consent was obtained from the participants of the study. The autonomy of the participant was given prime importance. Confidentiality of the data was assured to the participant when consent was taken. Institutional Review Board approval was sanctioned in March 2011.

III. RESULTS

The qualitatively analyzed data is summarized in table 1 as Strengths and Weaknesses and in table 2 as Opportunities and Threats.

STRENGTHS	WEAKNESSES
<ul style="list-style-type: none"> • Hospital buildings infrastructure is made adequate by constructing additional buildings and is in the process of commissioning • Adequate number of Teaching & Non-Teaching Staff as per MCI norms • Clinical materials are adequate • Good quality UG & PG teaching • Educational outcome is exceptionally good • Better Patient care services • Proper Curriculum implementation • Well established research culture with adequate number of highly qualified Faculty • Academic program monitoring • Conduct semester wise meeting of students, parents and teachers • Well equipped and effectively functioning Operation theatre complex • Alumni Association donated A/C Auditorium with 1000 person capacity and 2 A/C halls wit 200 capacity each • Availability of needed software and learning management systems for faculty and students • Research output is in growing phase with adequate SBMR funds • Total PG seats enhanced to 105 in 20 departments in 2012 & Started Mch Neurosurgery with 1 seat • Reasonably equipped Laboratories 	<ul style="list-style-type: none"> • Academic complex with all pre-clinical and para-clinical departments cum administrative office is lacking as all are existing in separate old buildings • Lecture theatres are inadequate as per MCI norms – instead of 4 gallery type halls with capacity 180, 3 halls with 150 capacity is available. • The two hospitals (Medical & Surgical) are separated by a distance of half a kilometer and two separate casualties are being maintained one for medical specialties and one for surgical specialties. Both are inadequate in hi-tech equipments as per norms of MCI. Central oxygen available is limited. • Casualty services are insufficient in infrastructure, equipments & manpower • Separate injection rooms & dressing rooms for male and female not available. • Common Rooms for boy and girls are inadequate

<ul style="list-style-type: none"> • Affordable fees structure & highly paid faculty • Beautifully maintained Green Campus with Healing Garden containing many Ayurvedic medicinal plants • Enough land for further development 	<ul style="list-style-type: none"> • Residence Quarters for PG's and staff inadequate • Medical education Unit & Telemedicine facilities are inadequate • Standard treatment protocols are not implemented • Forensic Medicine Department issues has damaged the reputation of Institution • Lack Mission Statement
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Table 1 showing Strengths and Weaknesses

OPPORTUNITIES	THREATS
<ul style="list-style-type: none"> • Functional Autonomy • Enhance PG and UG seats • Start Dental and Pharmacy Colleges • Expand with more Super-specialties & Trauma Care Unit • Creation of more Medical & Para-medical posts to meet patient overload (including Casualty Medical Officer & Bio-Medical Engineer) • Educational Exchanges for transfer of educational credits • Electronic Medical Record System • Timely recruitment by PSC to fill up vacancies promptly • Referral System Implementation – Center of Excellence • Governmental Social Security Schemes & Health Insurance Packages 	<ul style="list-style-type: none"> • Budget Allocation Inadequacy • Beaucracy • Water scarcity - The campus at present needs 15 lakhs liters of water per day for running of hospitals, hoslels, departments and green campus (total 173 Acres). Kerala Water Authority supply is 4 to 5 lakhs liters per day. There are 7 bore wells and a pond which dries up during summer. • Escalating cost of Health Care

Table 2 showing Opportunities and Threats

The quantitatively analyzed data are shown in tables 3,4 and 5. Table 3 describes the summary of bed strength (clinical material) of Clinical Departments Medicine, Surgery and Allied specialties and Obstetrics and Gynecology in both hospitals of our Institution. Present bed strengths are compared with MCI requirements and were found to be highly adequate. The Faculty position of our Institution in 2011 is being compared with the MCI requirements in table 4. The cadre wise availability of faculty meets the MCI requirements satisfactorily. Table 5 summarizes the educational outcome of our Institution during the study period. Except for the Certified Radiology Assistant's (CRA) Course (50%), the results are exemplary. 90% pass in Post Graduate Courses, 99% MBBS, 98% BSc Nursing, 89% Diploma in Medical Laboratory Technology, 94% Diploma in Ophthalmic Assistant's Course and 100% pass for Diploma in Operation Theatre Technology Course. The teaching reports analyzed showed adequate coverage of curricula in all courses which ensured the quality of implementation. The factors derived after interviewing the key informants are listed below. If we could accomplish these, it will enhance the opportunities and help our Institution to reach the level of Centre of Excellence.

Factors to enhance opportunities

- Provide more Quality care services
- Promote Horizontal & Vertical Integration
- Multidisciplinary approach in research
- Seek and take advantage of external resources - grants & funding – for development of Institution
- Teacher & Student feedbacks for Quality Assurance
- Recognize & Reward staff & students for their achievements
- Expand activities of Telemedicine Department
- Faculty Development Programs & Capacity Building for all categories of staff

Limitation of study

- We could perform In-Depth Interview of 20 Key Informants only. Interviewing more informants might have improved the findings. We did not use Focus Group Discussion method.

Strengths of study

- Anticipated limitation of non co-operation from administrators was not encountered
- State Board of Medical Research Grant was allocated for the project
- We used Medical Council of India regulations as Gold Standard to analyze the facilities

IV. CONCLUSIONS

This SWOT Analysis was a Situation Analysis of our institution. The required facilities are compared with the norms and requirements of Medical Council of India considering it as the Gold standard. Even though it is a low resource Medical College in rural setting, the stakeholders maintain expected quality with scope for improvement. As implications are better teaching and translation of research into clinical practice, we need to monitor on a Continuous Basis to reassess the performance.

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Tables 3-5

Specialty	MCI Required beds/units	Present beds/units
Medicine & Allied		
General Medicine	150/6	200/6
Pediatrics	90/3	100/3
TB & Chest	30/1	40/1
Skin & VD	15/1	40/1
Psychiatry	15/1	40/1
Total	300	420/12
Surgery & allied		
General Surgery	150/6	190/6
Orthopedics	90/3	100/3
Ophthalmology	30/1	40/1
ENT	30/1	40/1
Total	300	370/11
Obstetrics & Gynecology		
Obstetrics & ANC	60/2	70/2
Gynecology	40/1	30/1
Total	100	100/2
Grand Total	700/26	890/26

Table 3 showing the requirements of bed strength per unit as per MCI & availability in this institution in 2011

Courses	Intake capacity	No. of students admitted	Pass % in 2011
PG Courses	105	93	90
UG Courses			
MBBS	150	150	93
Paramedical Courses			
1. BSc Nursing	60	60	98
	35	35	89
2. DMLT	35	27	50
	25	23	94
3. CRA	15	15	100
4. DOA			
5. DOTT			

Table 4 shows details of Courses and outcomes in our college in 2011 (Mch Neurosurgery & MSc Nursing courses only started & exams not conducted)

Research	2009-10	2010-11	2011-12
Projects – non funded	15	16	11

Projects - funded	40	25	40
Publications	25	20	40

Table 5 showing Research Outcome of the Institution

Sensor Network Based Automatic Control System for Oil Pumping Unit Management

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Abstract— Most oil pumping units (OPUs) have been using manual control in the oilfield. This existing oil-pumping system has a high power-consuming process and needs more manual power. In this paper, a sensor network based intelligent control is proposed for power economy and efficient oil well health monitoring. This paper consists of several basic sensors such as voltage sensor, current sensor, oil pressure sensor, temperature sensor and gas sensor. These sensors are used for oil well data sensing, i.e. it senses and collects the data from the oil well. The sensed data is given to the controller which processes the oil wells data and it is given to the oil pump control unit which controls the process accordingly. If any abnormality is detected then the fault is informed to the maintenance manager. The malfunction is sent as an SMS to the manager's mobile via GSM. Thus oil wells can be monitored and controlled from remote places.

Index Terms- Health monitoring, intelligent control, power economy, sensor network, GSM

I. INTRODUCTION

In the last few years, sensor networks have drawn much attention for their broad practical application. In this paper, a sensor network based intelligent system is proposed and applied for remote oil well health monitoring and automatic oil-pumping control. The motivation of developing this system is that 1) due to the special nature of oil exploration and oil drilling, the majority of oil pumping units (OPU) are spread over barren hills, mountains and deserts, and 2) the existing oil-pumping systems still adopt manual control. Existing manual control systems have three evident drawbacks: 1) The OPU administrators have to frequently go to the oilfield to check the OPU status and collect its health analysis data. 2) Power consumption for OPU is huge during the oil pumping process. 3) Since an administrator has to take charge of a number of oil wells, an OPU malfunction is difficult to locate and repair in a reasonable time, which causes an oil production drop.

To overcome these three disadvantages of the existing manual control system, a sensor network based automatic control system is proposed for OPU management and oil well health monitoring. This proposed system consists of three-level sensors: the first level sensors (FLS), the intelligent sensors (IS) and the third level sensors (TLS). A set of FLS, i.e., five sensors, are commonly used for an oil well's data sensing, which includes a temperature sensor, a gas sensor, a voltage sensor, a current sensor and an oil pressure sensor. The IS is developed mainly for an oil well's data elementary processing, typical data storage/indication, data/status transmission up to the TLS and command transmission down to the OPU motor.

The software-defined (SD) TLS is designed for hundreds of oilwells's data storage/management, data processing, malfunction diagnosis; oil pumping stroke-adjustment command transmission down to a specific IS for power economy and the malfunction report to the maintenance staff via global system for mobile communications (GSM) short message service.

II. SYSTEM DESCRIPTION

The proposed system is comprised of developed TLS, each of which wirelessly communicates with hundreds of IS. Each IS is designed with the capability of data transferability with a set of FLS, its adjacent IS and its corresponding TLS as well as the capability of command transmission down to its OPU motor. Each group of FLS, including a temperature sensor, a gas sensor, a voltage sensor, a current sensor and an oil pressure sensor, are used for data sensing from an OPU, which convert all measurements into electrical signals and then transport them into its corresponding IS.

The developed IS have the following features:

- Setting of oil well static parameters: manual input, edition and interface indication;
- Reception, storage and indication of sensing data from FLS;
- Elementary processing of sensing data, such as calculating the maximum value, the minimum value and the average value, etc., or such as calculating the active power, the reactive power and system efficiency of the current OPU, etc.;
- Significant malfunction detection and indication/alarm based on the elementary processing of data, such as short circuit, missing phase and over current;
- Relay protection: the power will be cut off when the phase is missing or over current occurs;

On the other hand, the capability of the developed SD TLS can be summarized as follows:

- Storage (using database) and indication of data from all IS, where data commonly consists of OPU static parameters, significant malfunction reports, sensing data and elementary processing data;
- Further data processing for oil well malfunction diagnosis by measuring OPU's load-position diagram (LPD) using a back propagation (BP) neural network;
- Data processing for recommending/transmitting the optimal pumping stroke to the IS for more oil production;
- Sending the detected oil well malfunction out to the maintenance staff using GSM SMS.

III. DEVELOPMENT OF IS

A. System Description of IS

The IS mainly contains two components: the designed control board and the frequency converter. Five kinds of sensing data from FLS are imported to its IS. The IS usually

transmits oil well static parameters, significant malfunction reports, dynamic sensing data and elementary processing data directly to the TLS.

On the other hand, when acquiring a pumping stroke adjustment command from the TLS, the control board executes this command by transporting the corresponding control logic down to the frequency converter, which has the capability of changing power frequency as well as the OPU's pumping stroke.

B. Design Diagram of IS

Fig. 1 shows the block diagram of the proposed IS. The IS consists of the following six modules: a central processing unit(CPU) module, a sensing module, a relay protection module, a frequency converter module, a wireless communication module and a user interface module.

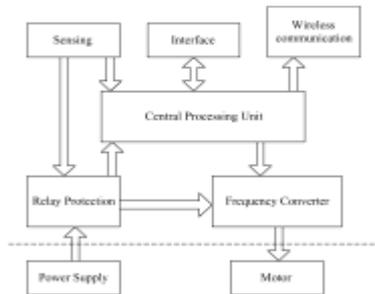


Fig. 1: Block diagram of the designed IS

1) *CPU Module*: The CPU in our system is the ARM LPC2148 microcontroller based on a 16-bit/32-bit ARM7TDMI-SCPU with real-time emulation and embedded trace support, that combine microcontroller with embedded high speed flash memory ranging from 32 kB to 512 kB. Serial communications interfaces ranging from a USB2.0 full-speed device, multiple UARTs, SPI, SSP to I²C-bus and on-chip SRAM of 8 kB up to 40 kB.32-bit timers, single or dual 10-bit ADC, 10-bit DAC, and PWM channels. Evidently, this module, i.e., CPU, is in charge of all data analysis and processing for all I/O ports. All other five modules are connected to the CPU. All data from other four modules except for the frequency converter module is imported to CPU before making a decision. The stroke-adjustment command coming from TLS is also translated by the CPU and then sent out to the frequency converter module.

2) *Sensing Module*: Sensing module contains a temperature sensor, a gas sensor, a voltage sensor, a current sensor, an oil pressure sensor and a conditioning circuit. This temperature sensor is employed to measure temperature of the oil well. The gas sensor is used to detect the pipeline leaks in the oil well. The voltage sensor and the current sensor are to measure the instantaneous voltage and the current of power supply, respectively. The oil pressure sensor is to measure the oil pressure of the oil pipe.

3) *Relay Protection Module*: Relay protection module consists of a circuit breaker, a contactor and a connection circuit. This module is used for detecting the motor operation by analyzing sensing data from the voltage sensor and the current sensor. Once a malfunction, such as a short circuit, a phase missing or an overcurrent, occurs on the motor power, relay protection module will immediately cut off the power supply.

4) *Interface Module*: Interface module includes 4*4 keyboard, 128 64 LCD, indicator lights, a buzzer, power switch, start button and stop button. This module is the interface between staff and IS, by which OPU can be started or stopped, the stroke of OPU can be changed, OPU parameters can be preset,

sensing data can be inquired and the malfunction information can be acquired.

5) *Frequency Converter Module*: Frequency converter module contains frequency converter and a braking resistor. This module can adjust the motor speed according to the received command from CPU so that the stroke of OPU is adjusted and the power is saved.

6) *Wireless Communication Module*: Zigbee module is used for wireless transmission between third level sensor and intelligent sensor. Sensing data and OPU parameters are sent to network center by using this Zigbee module.

C. Embedded Software Development of IS

The operating system (OS), a preemptive real-time multi-tasking OS, is utilized as a platform for the IS embedded development. Once the CPU chip powers up, both the hardware initialization and the software initialization are executed. After OS system initialization, the kernel dispatches tasks to be implemented. In proposed IS, embedded software development for the CPU contains 4. The 4 tasks consist of sensing data collection from FLS, data elementary processing, significant malfunction scan and user interface response. Sensing data collection indicates collecting dynamic sensing data and automatically storing these data in the IS. Data elementary processing means to process the raw sensing data to acquire the required typical data, such as the maximal/minimal/average value, the active/reactive power and the system efficiency, etc.. Significant malfunction scan is to detect the severe malfunctions, such as short circuit, missing phase and overcurrent, and report them. Also, the user interface is in charge of the external input, the oil well static parameter storage and the static parameter update.

IV. DEVELOPMENT OF TLS

A. System Description of TLS

The TLS includes three components: 1) a user interface for interaction; 2) some embedded algorithms for wireless communication between the TLS and the IS, a regular data request on all managed IS, a malfunction diagnosis, a pumping stroke adjustment and GSM SMS; and 3) a database for data storage. The wireless data, usually including dynamic sensing data and significant malfunction reports for OPU is acquired via the communication protocol and is then stored in its database. After thorough malfunction detection in the TLS, once a malfunction is identified, it is immediately sent to the maintenance staff via a GSM AT command, which generates a corresponding short message transmission. Furthermore, after a thorough data processing, if one OPU needs a different pumping stroke to improve power efficiency or increase oil production, a pumping stroke adjustment command will be sent down to its IS, by which the corresponding OPU's pumping stroke can be changed. This command is executed via the frequency converter.

B. Malfunction Diagnosis

This paper considers the 4 most important oil well malfunctions, including (1) underground oil shortage, (2) gas effect, (3) wax deposition, and (4) oil pump serious leakage. Different malfunctions have quite different LPD. The typical LPD of these 4 malfunctions are illustrated where no malfunction corresponds to a quasi-parallelogram LPD; underground oil shortage corresponds to a 'gun'-shape LPD; some irregular dog teeth occur for wax deposition; and the top-right corner is gone under the condition of oil pump serious

leakage. The oil well malfunction diagnosis can be executed based on LPD classification.

BP neural network is used for malfunction classification since it is a global approximation method and thus has a good generalization capability although its convergence is slow. Three-layer neural network is sufficient for oil-well malfunction diagnosis. In our design, the input layer has 70 neurons, where 70 uniformly spaced LPD points are considered and the distances between them and their average point are regarded as the input data for classification: 1) drawing the LPD based on the sensing data from the load sensor and angular sensor; 2) selecting 70 points from LPD with an equal sample space; 3) calculating the arithmetic average of all these points and regarding it as the average point; 4) calculating the distance between all 70 LPD points and this average point. All these distance values are the input of BP neural network. The number of neurons in the hidden layer is not fixed which is determined by optimizing the classification performance; the output layer has 4 neurons, which correspond to 4 considered malfunctions, respectively. Once a malfunction occurs, its corresponding neuron output should be equal to 1 while other neurons all output a 0.

C. Pumping Stroke Adjustment

Pumping stroke adjustment is another significant feature the proposed sensor network based automatic control system can offer. The OPU is a huge power-consuming device and automatic pumping stroke adjustment may save a considerable power. Due to the constraint of the motor belt, the OPU's pumping stroke available ranges from 2 to 10. The recommended pumping stroke always leads to an optimal performance for maximal oil production with optimal power efficiency.

G. GSM SMS

1) Short Message Transmission Using AT Commands:

There are two modes for short message transmission of the Siemens GSM module TC35i: TEXT mode and PDU mode. Both modes utilize the AT commands for short message communication. The entire short message transmission consists of four steps: 1) setting the telephone/cell phone number of the short message center using the command: AT+CSCA, 2) changing to the PDU mode using the command: AT+CMGF, 3) encoding the short message to PDU code; and 4) sending the whole PDU code using the command: AT+CMGS.

2) Malfunction Transmission via GSM SMS: The malfunction transmission to the related maintenance staff is accomplished using GSM SMS. Once the OPU malfunction is identified, the COM1 port is then continuously checked until it is idle. Furthermore, calling the sub function of GSM short message transmission sends the OPU malfunction name to all maintenance staffs one by one.

V. CONCLUSIONS

In this paper, a sensor network based oil well remote health monitoring and intelligent control system was proposed for OPU management in the oilfield. This proposed system consists of three-level sensors: the FLS, the IS and the TLS. The FLS have been used for an oil well's data sensing, including a temperature sensor, a gas sensor, a voltage sensor, a current sensor and an oil pressure sensor for each oil well. The IS was designed mainly for an oil well's data elementary processing, main fault alarm/indication, typical data storage/indication, data/status transmission up to the TLS, data/status transmission between IS, command transmission down to the OPU motor. And the SD TLS was designed for hundreds of oil well's data storage/management, data processing malfunction detection, malfunction alarm/indication; stroke-adjustment command transmission down to a specific IS for power economy and malfunction reporting to maintenance staff via GSM SMS. Two significant goals: remote pumping stroke adjustment and automatic oil well malfunction diagnosis have also been justified. Furthermore, the remote OPU management in the proposed system was convenient than the existing manual control system.

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An Efficient Majority Logic Fault Detection to reduce the Accessing time for Memory Applications

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Abstract: Even a small transition delays and little faults create major concern in digital circuits. It Produce greater impact on not only for simple memory but also for most of the memory applications. So, the majority logic decoders implemented with quasi cyclic LDPC codes are used to correct those problems in a digital circuit. In this technique majority logic decoder is used as fault detector due to usage of quasi cyclic LDPC codes the number of taps N can be reduced in the decoder to get minimum accessing time and lower area overhead.

Index Terms: Error correction codes (ECCs), Block codes, low-density parity check (LDPC), memory, majority logic, Quasi Cyclic Codes.

I. INTRODUCTION

The reliability of memories depends on dimensions of the circuit, operating voltages, and integrated density Triple modular redundancy codes and error correcting codes are mostly used for error correcting. In those techniques a majority vote has been used to give the perfect output and triggering the error correcting mechanism respectively. But they have high power consumption due to the voter circuit and it requires large area. Generally there is single bit error, double bit errors and multiple bit error detections codes are normally present in digital circuits. The decoding and encoding are so flexible in those types of codes. The consequence of augmenting integration densities, it increases the number of soft errors, which needs higher error correction capabilities.

Some multi error bit corrections Codes are Reed Solomon codes and Bose- Chaudhuri- Hocquenghem codes, but in which the algorithm is so complex and it is iteration based. The decoders too decode in fixed rate and so it reduces the operating criteria.

To attain higher capability to detect errors among error correcting codes the sub group of low density parity check code called quasi cyclic LDPC codes has been selected to increase the performance of the decoders to detect and correct large number of errors. It belongs to family of majority logic decoding.

The reason for using ML decoding is that it is very simple to implement and very practical and has low complexity. The parallel encoders and decoders have been implemented to overcome the drawback of majority logic decoder in which it takes N number of cycles to decode.

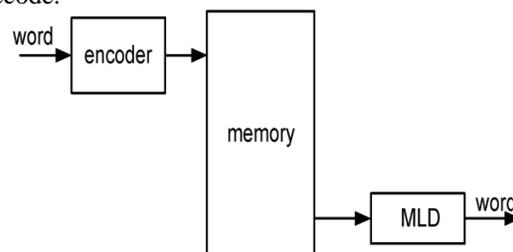


Figure 1: General Memory System

The parallel encoders and decoders have been implemented to overcome the drawback of majority logic decoder in which it takes N number of cycles to detect. In this paper we are detecting error in memory device itself so the data corruption during processing has been eliminated easily to give improved performance. The general memory system implemented with majority logic decoder as shown in the figure 1.

II. EXISTING OUTCOMES FROM MAJORITY LOGIC DECODER (EXISTING SYSTEM)

Majority logic decoder is based on a number of parity check equations which are orthogonal to each other, at each iteration, each code word bit only participates in one Parity checks equation, except the very first bit which contributes to all equations. So the majority result of these parity check equations decide the correctness of the current bit under decoding.

Reed-Muller codes were the first mentioned by majority logic decoder. Then, it was extended and generalized in for all types of systematic linear block codes that can be totally orthogonalized on each codeword bit. Initially, the data words are encoded and then stored in the memory. When the memory is read, the codeword is then fed through the majority logic

decoder before sent to the output for further processing. In this decoding process, the data word is corrected from all bit-flips that it might have suffered while being stored in the memory.

There are two types of implementing majority logic decoder. The first type is called the Type-I majority logic decoder, which determines, XOR combinations of the syndrome, which bits need to be corrected. Another type is the Type-II majority logic decoder that calculates directly out of the given codeword bits the information of correctness of the current bit under decoding. Both are similar but when it required for implementation, Type-II uses less area, as it does not calculate the syndrome as an in between steps.

A. Type I Majority Logic Decoder (plain majority logic decoder)

The majority logic decoder is a simple and powerful decoder, capable of correcting multiple random bit flips depending on the number of parity check equations. It consists of cyclic shift register, XOR matrix, majority gate and XOR for correcting the codeword bit under decoding as shown in figure 2. The input is initially stored in the cyclic shift register and shifted through all the blocks. The intermediate values in each block are used to calculate the output results of the check sum equations from the XOR matrix. The result has reached the final block, producing the final output. Input may correspond to wrong data corrupted by a soft error. After the initial step, in that the codeword is loaded into the cyclic shift register, the decoder starts by calculating the parity check equations executed in the XOR matrix.

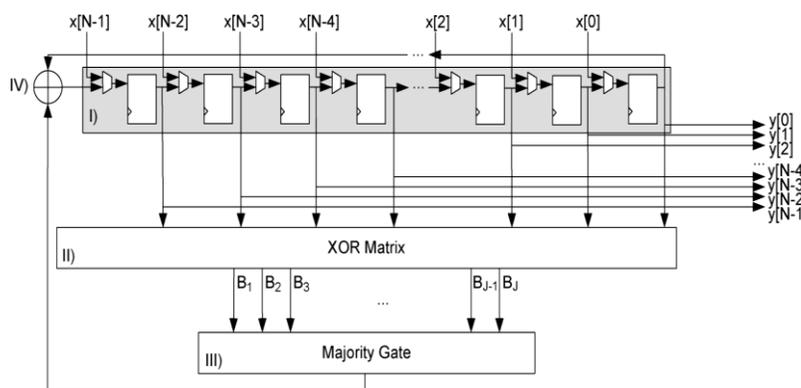


Figure 2: Majority logic decoder system.

If the number of 1's received in is greater than the number of 0's that means the current bit under decoding is wrong, and a signal to correct it would be triggered. Else the bit under decoding is correct and no extra operations would be needed on it. In next, the content of the registers are rotated and the above procedure is repeated until codeword bits have been processed. Finally, the parity check sums should be zero if the codeword has been correctly decoded.

B. Type II Majority Logic Decoder (with syndrome fault Detector)

To improve the decoder performance, various designs has been used. One possible way is to add fault detector by calculating its syndrome, so only faulty code words are decoded. But most of the code words will be error free initially, so no further correction is needed, therefore performance is not varied is disturbed. As well as the implementation of a syndrome fault detector reduces the average latency of the decoding and it also adds complexity to the design.

The syndrome fault detector is an XOR matrix that calculates the syndrome based on the parity check matrix. Each parity bit gives output as a syndrome equation. Thus, the complexity of the syndrome calculator increases with the size of the code. A faulty codeword is detected when at least one of the syndrome bits is '1'. This triggers the majority logic decoder to start the decoding. If the codeword is error free, it is forwarded directly to the output, thus saving the correction cycles.

In this way, the performance is improved in exchange of an additional module in the memory system a matrix of XOR gates to resolve the parity check matrix, where each check bit results into a syndrome equation. This finally outputs in a complex module, with a large amount of additional hardware and power consumption in the system.

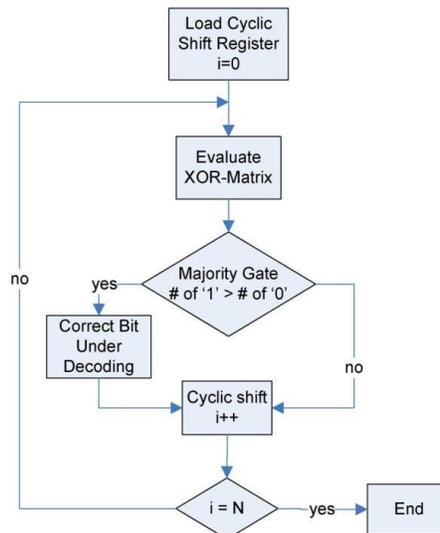


Figure 3: Flow Chart of Existing System

III. MAJORITY LOGIC DETECTOR/DECODER (PROPOSED SYSTEM)

The proposed majority logic decoder, in which the majority logic decoder itself act as a fault detector by implementing quasi cyclic LDPC codes in it. The LDPC codes which satisfies higher error correction capability due to its advanced properties.

Some important properties of cyclic codes are ability to correct more number of errors, easy to implements and very flexible algorithm systematic structure for clean partition of information bits and code bits in the memory. The cyclic codes are a systematic, distribution that allows the majority logic decoder to perform error detection in a simple way by using parity check sums.

Whenever a data is read from the memory it is protected by quasi cyclic codes in majority logic decoder and which can able to detect up to five bit flips in three decoding cycles, which is the main advantage of proposed majority logic decoder.

Generally, the decoding algorithm is still the same as the one in the Type I majority logic decoder version. The main difference is that, instead of decoding all codeword bits by processing during cycles, the proposed method stops intermediately in the third cycle, so the number of decoding cycles can be reduced to get increased performance. If the first three cycles process and if it detects there is no error means then it gives direct output.

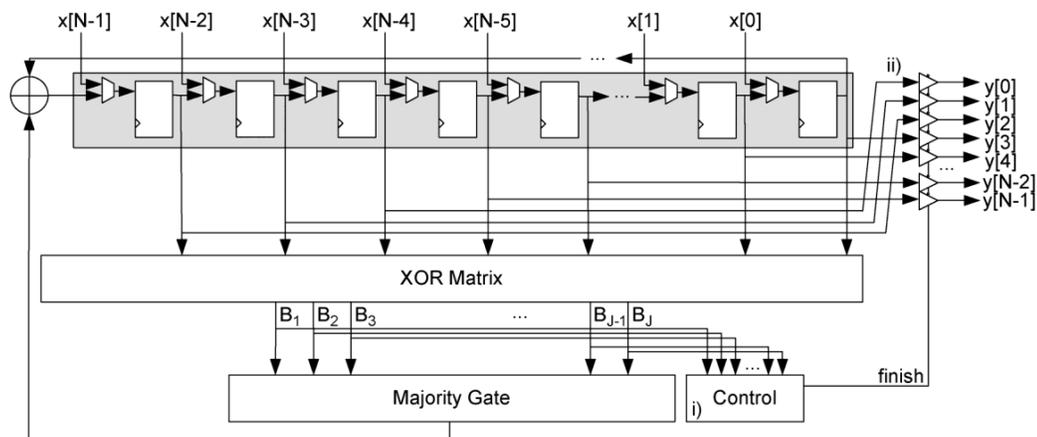


Figure 4: Schematic of Proposed System

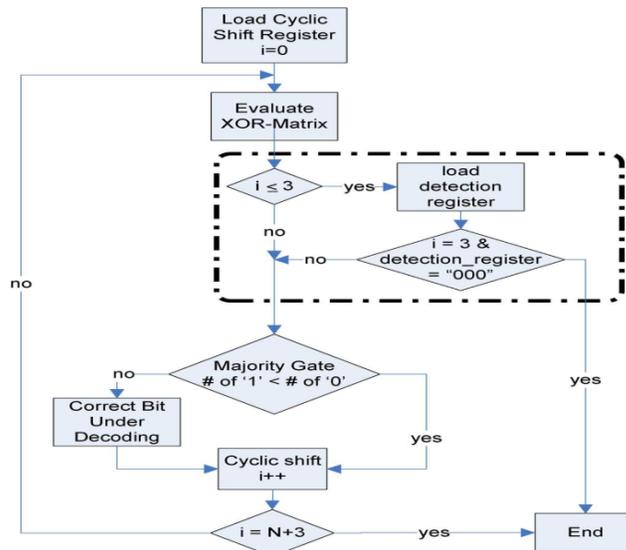


Figure 5: Flow Diagram of the Proposed System

Else, it goes with further decoding cycles with respect to the number of code words implemented which is shown in flowchart as below in figure 5. The proposed system in which a control unit has been implemented to control the tri-state buffers that store temporary data until the three cycles have to complete in the process.

$$\binom{N}{M} = \frac{N!}{M!(N - M)!}$$

The above equations have been used to find the performance of the circuit, where N number of code words, M number of bit flips occurred.

Table I: Quasi Cyclic LDPC code Length

N	data bits	parity bits
73	45	38
273	191	82
1057	813	244

The above table shows the possible combinations of cyclic LDPC codes.

IV. RESULTS

A. Area

Thus when compared to the existing system the number of decoding cycles has been minimized in the proposed system so it greatly reduces the area as well as power consumption. The syndrome fault detector version, which had the best performance, requires more area than the majority logic decoder does, ranging from 25.40% to 294.94% depending on N. It should be noted that the increment of area grows quicker than N does.

B. Read access delay and performance

The memory read access delay of the Type I majority logic decoding is directly dependent on the code size. The memory read access delay of the proposed majority logic decoder is only dependent on the word error rate. If there is more number of errors, then more number of words needs to be fully decoded. Type I decoder requires N+2 cycles but in syndrome fault detector it requires only one cycle if there is no error in the memory. The performance of the proposed system is closer to that of the Syndrome fault detector rather than to the Type I decoder. It just needs three cycles to detect any error.

Table II: Speed Up Performance of the Existing and Proposed System

N	Type I	Type II	Speed up
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73	75	5	15
273	275	5	55
1057	1059	5	211.8

V. CONCLUSION

In this work, a fault detection technique, majority logic detector and decoder, has been presented based on majority logic decoding using the quasi cyclic LDPC codes. Exhaustive simulation test output shows that the proposed system is able to detect any pattern of up to five bit-flips in the first three cycles of the decoding, which improves the performance of the design with respect to the traditional majority logic decoding approach. In the same way, the majority logic detector and decoder in which error detector module has been proposed in a way that is independent of the code size. This makes its area overhead quite reduced compared with other traditional approaches such as the syndrome fault calculation.

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Structuring Vocabulary for Tenderfoots

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Abstract- Vocabulary is a common word used in different contexts and in different situations. Vocabulary is the group of words that a person or group of people knows how to use it. Thus, vocabulary is a list or number of words that one knows and uses it regularly in daily life. This paper critically evaluates the importance of vocabulary for learners, various building strategies and activities involved in its learning.

Index Terms- Structuring, tenderfoots, vocabulary, strategies, activities, building, learners. L1, L2

I. INTRODUCTION

“Every human occupation has its repertoire of stock phrases, within which every man twists and turns until his death. His vocabulary, which seems so lavish, reduces itself to a hundred routine formulas at most which he repeats over and over”.

August de Villiers de L'Isle Vocabulary is vital when it comes to communicate with others. Man is a social being and therefore cannot live in isolation. Therefore, to survive and sustain position in the society he needs to communicate with others. Thus, the knowledge of vocabulary is needed at every phase of life. Usually it is observed that L1 vocabulary of the learners is comparatively rich and refined as compared to the English [L2] vocabulary. This shows that learners acquire their L1 vocabulary more efficiently than L2. This imbalance between vocabulary of L1 and L2 is pretty great. This difference is due to the lack of exposure, disinterest in L2, lack of awareness and importance etc. The rectification of such misconception is an urgent need of the hour. It is very important to guide learners about the building up of vocabulary which plays a vital role not only in their personal life but also contributes in their social interactions in the society and in career advancements. We all know that English is the language of global communication. It functions not only as a powerful learning tool but also a medium or a window through which the learners can access to knowledge from around the world. With such a varied applications the vocabulary of this language is a requisite to learn since it acts as a medium to develop positive values and attitudes, establish and maintain meaningful relationship with the people around, increase cultural understanding and expand their knowledge beyond the boundaries. Thus it is important to understand the importance of building vocabulary, strategies and methods which helps the learners to enhance their mental dictionary.

II. IMPORTANCE OF VOCABULARY

“Vocabulary words are the building blocks of the internal learning structure. Vocabulary is also the tool for better define a problem, seek more accurate solutions, etc.”

Ruby K. Payne Language enriched vocabulary is essential not only for the personal growth but when extended into a large prospective, it is crucial for the international business, trade and professional communication. Few years ago the emphasis was only given to language learning and that too at a very substantial rate but now with changing phase and trends more and more prominence is given to the language supplemented vocabulary. Learners with rich vocabulary helps the learners or empower with the capabilities necessary for lifelong learning, critical thinking, problem-solving, creativity and innovation and for adapting to the rapid changes and demand of society. Thus mastery of vocabulary is vital to learners as it opens up new possibilities for intellectual and social development, educational attainment, career advancement, personal fulfilment and cultural understanding.

III. CATEGORIES OF VOCABULARY

According to the Collins Cobuild English Language Dictionary (1989: 1629), the vocabulary of a language is the total number of words in it and someone's vocabulary is the total number of words in a language that he or she knows. Thus vocabulary is an important element within a language and is a must for a language learner. There are mainly two types of vocabulary which is applicable for both the native speakers as well as learners.-

[A] *Active or productive vocabulary*

[B] *Passive or receptive vocabulary*

Words that we understand and use it in our day to day life is known as *active vocabulary*. In our own language, there are many words that we use regularly while speaking or writing. These words are a part of our active vocabulary.

On the other hand, there are words that we understand but do not or cannot implement it in practical life is known as *passive vocabulary*. There are many words that we understand when we hear on televisions etc. but do not use in our everyday speech. These words are a part of our passive vocabulary.

IV. TEACHING VOCABULARY

“To enjoy and learn from what you read you must understand the meanings of the words a writer uses. You do

yourself a grave disservice if you read around words you don't know, or worse, merely gives at what they mean without bothering to look them up.

For me, reading has always been not only a quest for pleasure and enlightenment but also a word-hunting expedition, a lexical safari”.

Charles Harrington Elster

The field of vocabulary teaching is in transition. In language learning the transition is shifted from the traditional methods of teaching i.e. The Grammar-Translation methods to the innovative method of Communicative approach. The aim of vocabulary teaching provides every learner of English with further opportunities for extending their knowledge and experience of the cultures of other people as well as the opportunities for personal and intellectual development, further studies, pleasure and work in vocabulary rich language. Building vocabulary enables every learner to prepare for the changing socio-economic demands resulting from advances in information technology (IT) – demands which include the interpretation, use and production of texts for study, work and pleasure in English. These days' teachers provide vocabulary rich environment to encourage learners to learn and use the language and to support in learning other subjects. Teachers make use of a broad range of activities and materials to enhance learners' motivation and to cultivate creativity as well as critical thinking and problem-solving skills. In simple words, vocabulary is the knowledge of words and their meanings. As Steven Stahl (2005) puts it, “Vocabulary knowledge is knowledge; the knowledge of a word not only implies a definition, but also implies how that word fits into the world.” Mastering vocabulary is not an easy assignment since every now and then fresh words are added in the vocabulary list and knowing 100% is almost next to impossible. Actually it is something that expands and deepens over the course of a lifetime. Instruction in vocabulary involves for more than looking up words in a dictionary and using those words in sentences. The two basic methods involved in the instruction of vocabulary involve direct and indirect exposure to words. Vocabulary is acquired incidentally through indirect exposure to words and intentionally through explicit instruction in specific words and word learning strategies. There is another school of thought, according to which the two common ways in which meaning of new items is conveyed through traditional approach and techniques which are absolutely teacher-centered and the other is student-centered learning. In teacher centered approach, the teacher plays the lead role in framing the modules for learners whereas in the second case the students learn automatically when they are exposed themselves to the natural environment. To be more elaborate Michael Graves (2000), suggested four components of an effective vocabulary program:

- Wide or extensive independent reading to expand word knowledge.
- Instruction in specific words to enhance comprehension of texts containing these words.
- Instruction in independent word-learning strategies, and
- Word consciousness and word-play activities to motivate and enhance learning.

V. INSTRUCTIONAL PRACTICES

The National Reading Panel (2000) concluded that there is no single research based method for teaching vocabulary. From its analysis, the panel recommended to use a variety of direct and indirect methods of instruction according to the suitability of time and context.

Some of the most commonly implemented methods used worldwide are as follows:

[A] Taking advantage of students' first language- One method of building vocabulary is to capitalize on students' first language knowledge if this language shares cognate with English for eg, the Vocabulary Improvement Project (VIP) (Carlo et al., 2004) taught students to draw on their cognate knowledge as a means of figuring out the meaning of new words in English. Through this method students' become comfortable with L2 as with L1 and would learn to relate the two languages and develop interest in strengthening L2.

[B] Intentional vocabulary teaching- According to the National Reading Panel (2000) explicit instruction of vocabulary is highly effective. To develop vocabulary intentionally, students should be explicitly taught both specific words and word-learning strategies. To deepen students' knowledge of word meanings, specific word instruction should be robust (Beck et al. 2000). Seeing vocabulary in rich contexts provided by authentic texts, rather than in isolated vocabulary drills, produces robust vocabulary learning (NRP, 2000). Such instruction goes beyond definitional knowledge. It gets students actively engaged in using and thinking about word meaning and in creating relationships among words. Vocabulary dictionary is a huge thing and therefore cannot be confined into certain boundaries therefore students learn independently determining the meanings of unfamiliar words that has not been explicitly introduced in class.

[C] Review and Reinforcement- This method emphasizes on review and practice. One way to review and reinforce vocabulary is through reading aloud. It has been shown that reading aloud speeds up the lexical acquisition for L2 learners.

[D] Fostering word consciousness- It is developing awareness and creating interest in the words. It can be developed at all times and at several ways i.e. through encouraging adept diction, the word play and through research on word origins or histories. According to Graves (2000); “If we can get students interested in playing with words and language, then we are at least halfway to the goal of creating the sort of word-conscious students who will make words a lifetime interest.”

[E] Multiple exposures in multiple contexts- One principle of effective vocabulary learning is to provide multiple exposures to word's meaning. This is a great improvement in vocabulary when students encounter vocabulary words often (NRP, 2000). According to Stahl (2005), “students probably have to see a word more than once to place it firmly in their long-term memories”. “This does not mean mere repetition or drill of the word, but seeing the word in different and multiple contexts”. In other words, it is important that vocabulary instruction provide students with opportunities to encounter words repeatedly and in more than one context.

[F] Restructuring of vocabulary tasks- When the existing vocabulary strategies do not work i.e. they fail to cater the needs of the learners then in that case the instructional tasks are restructured or reshaped. Restructuring the tasks can often lead to

increased vocabulary acquisition, especially for low achieving or at risk students (NRP, 2000). According to Kamil (2004), “once students know what is expected of them in a vocabulary tasks, they often learn rapidly”.

[G]Incidental vocabulary learning- The scientific research on vocabulary instruction reveals that most vocabulary is acquired incidentally through indirect exposure to words. This can be done by engaging in rich oral-language experiences at home and at school, listening to books read aloud to them and reading widely on their own. Reading volume is very important in terms of long-term vocabulary development. (Cunningham and Stanovich, 1998). Kamil and Hiebert (2005) reason that extensive reading gives students repeated or multiple exposures to words and is also one of the means by which students see vocabulary in rich contexts Cunningham (2005) recommends providing structured read-aloud and discussion sessions and extending independent reading experiences outside school hours to encourage vocabulary growth in students.

VI. SUGGESTIONS

These days enormous efforts is being put in to enhance every element of L2 but of all the elements, vocabulary is often the least systematized and the most neglected of all the aspects of learning. This absence is due to following the old conventional syllabuses, emphasizing more on the structure, notions, functions etc. and neglecting the vocabulary aspect of language. Apart from the other elements of language it is very important for the students to focus on the vocabulary aspect as well. Since this is a teaching-learning process so the teachers should know what to teach. For many of them this will be determined by the choice of the course book, the syllabus designers etc. In the absence of teachers this can be done through the so- called awareness activities.

VII. CONCLUSION

Vocabulary is obviously an essential element within a language and student should be more aware of its importance. There are certainly other elements such as grammar, stress, rhythm, intonation, tone of voice, pauses, hesitations or silences, non-verbal phenomena etc. that has to be kept under consideration but at the same time the fact cannot be denied that no matter how well the student learns grammar, no matter how successfully the sounds of L2 are mastered, without words to express a wide range of meanings, communication in an L2 just cannot happen in any meaningful way.

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Effect of Packaging Technique in Physicochemical Composition of Sudanese White Soft Cheese

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Abstract- Effect of packing technique in chemical composition of Sudanese white soft cheese (SWSC) during storage period investigated. The cheese purchased from Galaja at Edduem,, packed in to 5 different types of packing techniques, 2 metal tin (lined with polyethylene and non-lined), 2 plastic containers (lined with polyethylene and non-lined) and petroleum gallon. Then stored at room temperature (35-37°) for 6 months (180 days) and discharged at 7, 15, 30, 45, 60, 75, 90, 120, 180 days of storage to study changes in physicochemical composition (protein, fat, total solids, salt, ash and acidity). Total solids, protein and fat content of cheese were fluctuating during storage, maximum protein content (30.5%) recorded in lined plastic and tin containers at 60 days of storage. Maximum total solids (53.3) and maximum acidity (2.6% lactic) observed in cheese kept in lined metal tins.

Index Terms- Sudanese white cheese, storage, different packaging materials, physicochemical properties

I. INTRODUCTION

Packaging or packing of cheese is one of the more important steps in the long journey from the producer to the consumer, since most of the cheese plants are far away from the consumption. Packaging of natural cheese must afford general protection of the product from mechanical damage and poor environmental conditions during handling and distribution. Recently, the consumer desire for healthier and safer foods increased. The ultimate goal of the work is to develop packing materials that suit white soft cheese handling and marketing. Cheese-making activity in Sudan generally centered in the area between latitudes 12°, 16°N, longitudes 26°, and 36°E, where most of the effective animal wealth of the Sudan found. Within this region, the town of Eddueim is today the most important center for the manufacture of Jibna-beida for commercial purpose. This town alone supplies about 60% of the total cheese on the Sudanese market (Ahmed, 1987). White cheese produced in what called farm-hut plants. These are small, seasonal huts of mud or corrugated, galvanized iron. Each hut has an expanded varandah of wire screens. The huts are scattered around the major town with a distance of about 50 km (Ali, 1987). Cheese making in Sudan is the major preservation method for surplus milk in rural areas especially during rainy season when plenty of milk is available (El Owni and Hamid, 2007; El Owni and Hamid, 2008). It is the major type of cheese in Sudan beside Mudaffara and recently Gouda and Mozzarella Introduced (Elsheikh, 1997;

Ibrahim, 2008). Sudanese white soft cheese (Jibna beida) traditionally manufactured in different areas in Sudan in which cheese packed in tins, cans and re-used petroleum gallons, which hermetically sealed. Ali and Galal (2002) studied the changes in chemical composition of Domiati cheese as affected by heat treatment,, they found that, the moisture content decreased throughout the storage period from 59.65 at the beginning to 55.9 at the end of the storage period (120 days). the fat, acidity, pH, salt % in water phase found to be 18.2, 0.22, 6.45 and 7.46 respectively at the beginning of the storage period and were changed throughout the storage period to be 20.75, 0.78, 4.9 and 8.41 respectively at the end of storage period. Osman (2005) ;studied the effect of packaging materials (plastic and metal) on the quality of Sudanese white cheese. .She observed that, the cheese stored at room temperature the moisture contents of cheese kept in metal containers significantly ($P < 0.05$.lower than the plastic containers (51.99% for metal and 51.06% for plastic containers) at the end of the storage period (84 days). The ash, fat, protein, pH and titer table acidity found 4.97%, 6.87%, 18.85%, 3.73,1.94 respectively for cheese stored in metal containers .while in plastic container they were found to be 4.13, 6.37, 16.4, 4.14 and 1.93, respectively. The ultimate goal of this study is to investigate the effect of using different packaging techniques on the physicochemical properties of Sudanese white soft cheese

Food materials

The cow milk used in cheese making purchased from nomads at the morning at Galaja village 70 kilometers south Eldueim 350 kilometers southwest of Khartoum. The salt was not of technical grade (from the market). The cheese was prepared according to the traditional methods reported by .The prepared cheese was packaged into 5 different type of packing, 2 metal tin (lined with polyethylene and non-lined), 2 plastic containers (lined with polyethylene and non-lined) and petroleum gallon. The tin containers made from tinsplate the inside coated by golden lacquer and the outside was coated by white paint. The tin was square, with push-on-closures and 2 kg size. Plastic containers were white, square, the cover lined with adhesive tape, and 2 kg size. The petroleum Gallon was 2kg size sealed by soldering.

II. METHDOLGY

Analytical procedures

Titratable acidity, total Solids, ash, protein, and fat contents were determined according to AOAC (1990). Salt

content was determined according to a method described by Breen and Price (1961).

Statistical analysis Data generated subjected to Statistical Package for Social Sciences (SPSS, 1998). Means tested using two-factor Analysis of Variance (ANOVA), and then separated using Duncan's Multiple Range Test (DMRT) according to Mead and Gurnow (1983).

III. RESULTS AND DISCUSSION

Effect of packaging material on Total solids:

Table 1 illustrates the total solids (T.S.) content of soft cheese as affected by type of packing. After 30 days of storage period, there were no significant differences ($P \leq 0.05$) among cheese samples packed in metal tin, plastic lined with polyethylene bags, and metallic gallon, the higher value observed in cheese samples stored in tin lined with polyethylene bags (53.45%). At the end of the storage period, there were no significant difference ($P \leq 0.05$) between T.S. of cheese samples stored in metal tin cans and those kept in plastic lined with polyethylene bags. The lowest values obtained for T.S. of cheese at day 60 ranged between 39.65 – 40.7%. Our findings were similar to those obtained by Hamid (2005) who found that, total solids content of cheese samples kept in anti-acid cans increased significantly ($P \leq 0.05$) compared to those, kept in plastic containers. Bilal (2000) found that the total solids content of soft cheese samples kept in can were slightly higher compared with those packed in polyethylene bags. The lower total solid content of the cheese samples kept in plastic container attributed to the high moisture content of the cheese, or due to the increased action of proteolytic and lipolytic microflora on the cheese components.

Protein content

Table 2 illustrates the protein content of soft cheese as affected by type of packing. The crude protein contents of cheese samples kept in metal tin cans, plastic and metal gallon container differ significantly ($P \leq 0.05$), however the different types of packaging showed significant variation after 30 days of storage. Similarly the interaction of the processed cheese made after different storage period and different types of packaging showed highly significant differences ($P < 0.001$) for acidity of the processed cheese (Table 3). Moreover, the interaction maximum value of 32.00% obtained for cheese samples stored in metallic gallon, followed by tin lined with polyethylene bags and plastic lined with polyethylene bags (31.5%). The lowest values observed in cheese samples kept in metal tin cans and plastic containers (29.5 and 28.5%, respectively). There was a significant difference ($P \leq 0.05$) between the samples kept in the metal tin and those kept in lined metal tin cans at the end of the storage period (180 days). Bilal (2000) reported similar value, of which protein content of the cheese samples packed in polyethylene bags was higher than those packed in anti-acid cans. Hamid (2005) stated that at storage day 120, the protein content of cheese samples kept in cans increased while those in plastic containers decreased. Osman (2005) observed no significant difference ($P \leq 0.05$) in protein content between cheese samples packed in tin and samples kept in plastic packages. The lower protein content of the cheese samples

packed in plastic containers attributed to more proteolytic action during the storage (Abdel-Salam, 1987).protein as a result the proteolysis on the one hand, or to the loss in other nutrients on the other. These findings are similar to those reported earlier (Khalid, 1991; AdurKur 1992; Abdel Razig, 1996 and Osman, 2005) where the protein content of soft cheese showed a fall and rise during storage period. Hamid (2005) attributed the decrease in the protein content to the rapid expulsion of whey from the curd

Fat content:

Table 3 illustrates the changes of fat content of soft cheese as affected by type of packing. The lowest value of fat content of soft cheese was found in cheese samples stored in plastic lined with polyethylene bag (41.39%) at day 30, while the higher value was obtained at day 60 for cheese sample packed in metal tin (74.6%). Significant differences were observed between cheese samples stored in different type of packing throughout the storage period, but they followed the same trends fall and rise. Bilal (2000) and Hamid (2005) reported similar values, they stated that, fat content of the cheese stored in anti-acid cans were higher in comparison with those kept in plastic ones. The low values of fat content of the cheese samples kept in plastic containers might be attributing to the high lypolytic activity. Osman (2005) stated similar results; she observed significant increase ($P \leq 0.05$) in fat of cheese packaged in metal than plastic packages. Similar trend observed by Hofi *et al.* (1976) who reported fat values ranging between 44.54-58.78% when Domiati cheese was stored for 3 months at room temperature .Khalid (1991), Abdalla (1992) and Nuser (2001) stated that the decrease in fat content during storage period was propably due to lipolytic activity of microorganisms on fat. The increase in fat content of soft cheese during storage attributed to the diminution of solids-non-fat content due to the partial degradation of proteins and loss by solubility to whey (Zaki *et al.*, 1974; Nofal *et al.*, 1981).

Titrateable acidity:

Table 4 illustrates changes in titrateable acidity of Sudanese soft cheese as affected by type of packing. Titratble acidity of the cheese samples packed in metal cans, significantly ($P \leq 0.05$) lowers than those stored in plastic and metallic gallon. At day 7, at day 60 the acidity of the cheese samples packed in metal tin cans increased significantly than other containers. These result in line with the findings of Bilal (2000) and Hamid (2005). They attributed the increase in acidity of the cheese stored in anti-acid cans; to the activity of lactic acid bacteria which forms considerable level of lactic acid while the low acidity of the cheese samples stored in plastic containers to the growth of yeasts in cheese stored in plastic container, which utilized lactic acid. 0.05).

Ash content:

Table 5 illustrates the changes in ash content of soft cheese as affected by type of packing. The level of ash content in soft cheese was significantly ($P \leq 0.05$) affected by the type of packing. The highest value (12.00%) was found in cheese samples kept in metal tin cans after 7 days of storage, decreased to 8% after 45 days and at day 75 of storage there were no significant

Kept in metal tin, plastic lined with polyethylene bags, metallic gallon and tin lined with polyethylene bags. Hamid (2005) and Osman (2005) reported that ash content of cheese samples kept in anti-acid cans were higher in comparison with those kept in plastic containers. The higher ash content of the cheese kept in anti-acid cans attributed to the lower moisture content and absorption of salt by the curd (Bilal, 2005).

Salt content:

Table. 6 illustrates the changes in salt content percentage of white soft cheese as affected by type of packaging. The salt content of soft cheese kept in metal tin cans (lined with polyethylene bags and non-lined) significantly ($P \leq 0.05$) higher, (27.4 and 27.2% respectively) than those kept in plastic and metal gallon. At day 60, the minimum values were observed in cheese samples kept in plastic, plastic lined with polyethylene bags and metallic gallon (20.7, 18.35 and 17.95% respectively). The lower values of salt content in plastic and gallon packages might be due to high proteolytic activity and decrease in soluble constituents of cheese that results from partial degradation of protein and their subsequent solubility in whey solution.

V.CONCLUSION

Storage in plastic containers would lead to significant losses in protein and fat. The highest values of total solids observed for samples stored in lined and non-lined tin containers, therefore keeping the white soft cheese in tin containers would conserve the nutritive value of it for long storage. Further work is recommended on the keeping quality of the Sudanese white soft cheese stored for longer period longer than 180 days to meet international quality standards.

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Table 1: Changes of total solids of white soft cheese during storage period as affected by type of packaging*

Packaging Type	Storage period (days)									
	0.0	7	15	30	45	60	75	120	150	180
MT	50.150 ^{ae}	43.900 ^{ag}	44.600 ^{af}	52.050 ^{ae}	51.100 ^{ae}	40.200 ^{cg}	50.450 ^{ae}	50.350 ^{ad}	50.300 ^{ad}	53.350 ^a
MTL	50.150 ^{fg}	48.150 ^{ae}	47.350 ^{ae}	53.450 ^a	52.750 ^{ab}	39.650 ^{cg}	53.300 ^a	53.200 ^a	32.150 ^{ah}	52.250 ^a
P	50.150 ^{ae}	43.400 ^{ag}	45.300 ^{af}	51.300 ^a	51.150 ^{ae}	40.700 ^{bg}	51.250 ^{ae}	52.200 ^{ad}	51.700 ^{ad}	45.730 ^{ad}
PL	50.150 ^{ae}	43.150 ^{ag}	44.200 ^{af}	52.000 ^{ae}	52.550 ^{ac}	40.050 ^{dg}	52.200 ^a	47.760 ^{af}	47.760 ^{af}	47.760 ^{af}
MG	50.150 ^{ae}	46.600 ^{af}	47.150 ^{af}	50.550 ^{ae}	51.600 ^{ae}	40.250 ^{cg}	52.150 ^{ae}	48.350 ^{ae}	48.350 ^{ae}	48.350 ^{ae}

* Mean values having different superscript letters in columns and rows differ significantly ($P \leq 0.05$).

Where:

MT = Metal tin

MTL = Metal tin lined with polyethylene bags

P = Plastic

PL = Plastic lined with polyethylene bags

MG = Met

Al gallon

Table 2: Changes in protein content (%) of white soft cheese during storage period as affected by type of Packaging* (on dry matter basis)

Packaging	Storage period (days)									
Type	0	7	15	30	45	60	75	120	150	180
MT	28.50 ^c	27.00 ^f	28.50 ^{c-g}	23.00 ^{l-n}	26.00 ^{hij}	29.50 ^{b-e}	25.00 ^{i-l}	29.00 ^{c-f}	26.60 ^f	27.30 ^e
MTL	28.50 ^c	27.00 ^f	28.50 ^{c-g}	22.00 ^{no}	27.50 ^{d-h}	31.50 ^{ab}	23.50 ^{k-n}	23.50 ^{k-n}	25.10 ^h	29.80 ^a
P	28.50 ^c	29.00 ^c	30.50 ^{a-c}	22.50 ^{mn}	27.00 ^{f-i}	28.50 ^{c-g}	20.00 ^o	20.00 ^o	26.55 ^f	25.80 ^h
PL	28.50 ^c	29.00 ^c	31.50 ^{ab}	21.50 ^{no}	27.00 ^{f-i}	31.50 ^{ab}	24.50 ^{j-m}	24.50 ^{j-m}	27.30 ^e	27.30 ^e
MG	28.50 ^c	27.50 ^d	30.00 ^{a-c}	25.50 ^{h-k}	26.50 ^{g-j}	32.00 ^a	16.50 ^p	16.50 ^p	25.40 ^h	25.40 ^h

* Mean values having different superscript letters in columns and rows differ significantly ($P \leq 0.05$).

Table 3: Changes in fat content (%) of white soft cheese during storage period as affected by type of packaging* (on dry matter basis)

Packaging	Storage period (days)									
Type	0	7	15	30	45	60	75	120	150	180
MT	46.15 ^{pq}	54.05 ^{i-l}	53.75 ^{j-l}	42.20 ^{rs}	60.65 ^c	74.60 ^a	60.10 ^{cd}	53.60 ^{i-l}	54.60 ^{g-l}	57.15 ^e
MTL	46.15 ^{pq}	47.75 ^{op}	50.65 ^{mn}	43.95 ^{qr}	56.80 ^{e-i}	70.40 ^b	56.10 ^{f-k}	55.40 ^{f-l}	52.70 ^{lm}	58.30 ^c
P	46.15 ^{pq}	55.20 ^{g-l}	52.95 ^{lm}	44.80 ^{qr}	57.50 ^{d-g}	70.00 ^b	59.45 ^{cde}	55.50 ^{f-l}	55.05 ^{g-l}	55.20 ^g
PL	46.15 ^{pq}	54.25 ^{h-l}	53.15 ^{k-m}	41.30 ^s	54.20 ^{h-l}	69.85 ^b	60.30 ^c	54.20 ^{h-l}	54.20 ^{h-l}	54.20 ^h
MG	46.15 ^{pq}	53.60 ^{j-l}	49.80 ^{no}	48.45 ^{n-p}	56.30 ^{f-j}	72.05 ^b	55.55 ^{f-l}	54.60 ^{g-l}	54.60 ^{g-l}	54.60 ^g

* Mean values having different superscript letters in columns and rows differ significantly ($P \leq 0.05$).

Table 4a: Changes in the acidity of white soft cheese during storage period as affected by type of packaging*

Packaging Type	Storage period (days)									
	0.0	7	15	30	45	60	75	120	150	180
MT	0.725 ^q	1.200 ^{op}	1.400 ^{no}	1.550 ^{no}	1.750 ^{h-k}	2.100 ^{c-g}	2.200 ^{g-k}	1.950 ^{b-f}	2.150 ^{d-i}	2.490 ^{a-b}
MTL	0.725 ^q	1.100 ^p	1.450 ^{m-o}	1.500 ^{l-n}	1.950 ^{i-k}	2.400 ^{d-i}	2.050 ^{f-j}	2.150 ^{e-i}	2.350 ^{b-f}	2.660 ^a
P	0.725 ^q	1.300 ^{n-p}	1.500 ^{l-n}	1.400 ^{m-o}	1.900 ^{i-k}	2.200 ^{d-i}	1.950 ^{e-i}	2.250 ^{l-n}	2.100 ^{l-n}	1.700 ^{k-m}
PL	0.725 ^q	1.350 ^{n-p}	1.450 ^{m-o}	1.500 ^{j-l}	1.850 ^{d-i}	2.100 ^{c-g}	2.000 ^{g-k}	2.050 ^{c-h}	2.320 ^{a-b}	1.710 ^{k-m}
MG	0.725 ^q	1.400 ^{no}	1.450 ^{m-o}	1.430 ^{g-k}	1.850 ^{bc}	2.100 ^{e-i}	2.050 ^{c-h}	1.570 ^{b-c}	1.570 ^{l-n}	1.570 ^{l-n}

* Mean values having different superscript letters in columns and rows differ significantly (P ≤ 0.05).

Table 4b: Changes in ash content (%) of white soft cheese during storage period as affected by type of packaging* (on dry matter basis)

Packaging	Storage period (days)									
	0	7	15	30	45	60	75	120	150	180
L	10.00 ^{cd}	12.00 ^a	10.00 ^{cd}	10.00 ^{cd}	8.000 ^{fgh}	10.00 ^{cd}	7.500 ^{gh}	8.500 ^{efg}	8.500 ^{efg}	7.500 ^{gh}
L	10.00 ^{cd}	10.00 ^{cd}	9.000 ^{def}	9.500 ^{cde}	7.500 ^{gh}	9.500 ^{cde}	7.500 ^{gh}	7.500 ^{gh}	7.500 ^{gh}	8.000 ^{fgh}
L	10.00 ^{cd}	11.50 ^{ab}	10.00 ^{cd}	10.00 ^{cd}	8.500 ^{efg}	10.50 ^{bc}	8.000 ^{fgh}	7.500 ^{gh}	8.000 ^{fgh}	9.150 ^{cd}
L	10.00 ^{cd}	11.50 ^{ab}	10.00 ^{cd}	9.500 ^{cde}	8.000 ^{fgh}	10.50 ^{bc}	7.500 ^{gh}	10.00 ^{cd}	10.00 ^{cd}	10.00 ^{cd}
L	10.00 ^{cd}	10.00 ^{cd}	9.000 ^{def}	9.500 ^{cde}	7.000 ^h	10.00 ^{cd}	7.500 ^{gh}	9.000 ^{def}	9.000 ^{def}	9.000 ^{def}

* Mean values having different superscript letters in columns and rows differ

Table 5: Changes in salt content (%) of white soft cheese during storage period as affected by type of packaging* (on dry matter basis)

Packaging type	Storage period (days)								
	0	7	15	30	45	60	75	120	150
MT	12.60 ^{mn}	14.25 ⁱ	6.950 ^{q-s}	8.750 ^{o-r}	19.60 ^{cd}	27.20 ^a	17.00 ^e	16.55 ^e	16.30 ^{e-j}
MTL	12.60 ^{mn}	12.75 ^l	5.950 ^s	9.150 ^{o-q}	15.25 ^{h-k}	27.40 ^a	17.00 ^e	15.85 ^f	14.60 ^{i-m}
P	12.60 ^{mn}	15.15 ^h	7.350 ^{p-s}	9.450 ^{op}	17.80 ^{d-g}	20.70 ^c	15.55 ^g	15.95 ^f	12.60 ^{mn}
PL	12.60 ^{mn}	14.90 ^h	7.900 ^{p-s}	10.55 ^{no}	18.40 ^{de}	18.35 ^{de}	14.50 ⁱ	13.90 ^j	13.90 ^{j-m}
MG	12.60 ^{mn}	13.40 ^k	6.700 ^{rs}	9.400 ^{op}	22.95 ^b	17.95 ^{d-f}	14.25 ⁱ	13.90 ^j	13.90 ^{j-m}

* Mean values having different superscript letters in columns and rows differ significantly ($P \leq 0.05$).

Effect of Dopamine on Alzheimer and Autism and Determination of Best Model Organism for Both

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Abstract- As medicinal science heading towards the new discoveries, but the trap of psychological disorders, kept questioning about the capabilities of medicinal science. They sinisterly kill people through their slow poisons like dementia, depression as well as in form different diseases like Schizophrenia, Alzheimer, Autism, Parkinson and many others. In our study we focused on analysis of two totally different diseases that are Alzheimer and Autism. Former one affect the old stage while later shows its presence in childhood stage of us Homo sapiens life. Many neurotransmitters, proteins and various chemicals play their different roles in these two disorders. But certainly Dopamine which is a monoamine synthesized from amino acid tyrosine is a common neurotransmitter play its vital role by varying its percentage in these two diseases. Due to dopamine's soluble nature, in case of Alzheimer aggregates with beta-peptide while in Autism's case it affect the central nervous system (CNS). In between huge number of genes of Dopamine, we selected the Dopamine beta hydroxylase gene, which help in combining the study of Alzheimer and Autism together, using different Bioinformatics tools, and proteomic and gene expression analysis. On such basis, among Bos tarus, Rattus norvegicus, Mus musculus, Canis lupus, Danio rerio, Homo sapiens and Equus caballus, we determined the best model organism for Alzheimer and Autism and which may help in future aspects of pharmacogenomics & personalized medicines for both.

Index Terms- Alzheimer, Autism, Dopamine, Dopamine beta hydroxylase, PEPSTATE, Arrayexpress.

I. INTRODUCTION

Brain, the fundamental unit of every mammalian is claimed to be the motherboard of Homo sapiens body system. But as science moving violently so fast via us, we are being conquered by different psychological problems like Schizophrenia, Autism, Dyslexia, Alzheimer etc. In our study we are interested in Alzheimer and Autism. These two diseases are poles apart from each other but have disastrous results in common like social impairment etc.

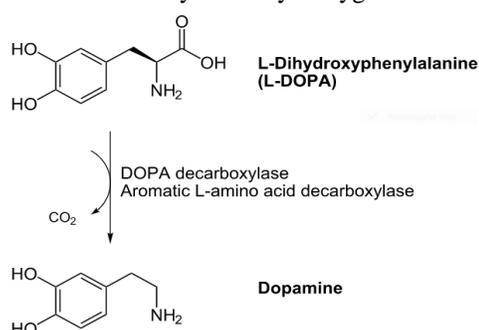
Alzheimer as a degenerative age related disease, impairs an individual's cognitive abilities; started with impaired memory and followed by impaired thoughts, speech and ended with complete helplessness. In result of Alzheimer, there is extreme shrinkage in cerebral cortex and hippocampus with severely enlarged ventricles as stated by different researchers and various brain analyses (Arch Neurol. 2007)

"As per CDC (center for disease control) report, study says about 5 million Americans in which 13% are of 65 years while the rest 50% are either of 85 years or above. It is concluded that number of patients may increase to 16 million as 70% of patients live at home and its impact may extend to millions of family members, friends and caretakers" (Kukul et al. 2002 & R. tarawneh and D. M. Holtzman 2012)

Autism is a psychic condition, started from early childhood is characterized by absorption in self-centered subjective mental activity, especially when accompanied by marked withdrawal from reality, inability to interact socially, repetitive behavior and language dysfunction.

"For Autism CDC report for united state, the autism rate skyrocket to 1 in 88 children in 2008, a 78% increase over 2002 that is about 1 in 156." Amygdala in brain, responsible for emotional responses, including hyperactivity, stereotype and negativism and is also found undeveloped in an autistic child. According to our goggling knowledge and studies an autistic child has 50mm larger brain than an average normal child.

Dopamine which is a neurotransmitter belongs to transferase of EC2 class having molecular name i.e. Dopamine N acetyl transferase isoform A (via RASMOL). It is characterized due to its soluble nature and is biosynthesized in the neuron tissue and medulla of the adrenal gland of our body. First by the hydration of amino acid L- tyrosine to L- Dopa via the enzyme tyrosine-3-monoxygenase, also known as Tyrosine hydroxygenase and then by the decarboxylation of L-Dopa by aromatic L-amino acid decarboxylase.



Dopamine along with human and other animals plays different key functions that are in, movement, memory, pleasurable reward, behavior and cognition, attention, inhibition of prolactin production, sleep, mood, and learning.

But certainly in case of Alzheimer, dopamine aggregates with Beta- Amyloid peptide. Patients of Alzheimer have an abundance of Plaques & Tangles where plaques are deposits of protein fragment Beta- amyloid and tangles are twisted fibers of another protein called as Tau. (Nat Rev Neurol. 2010).

While in case of Autism, dopamine's gene DBH (Dopamine-beta hydroxylase), convert dopamine into norepinephrine expressed in neuron and in neuroendocrine cell and therefore DBH could also be a modifier of Autism risk (Autism Res. 2011)

II. METHADODOLOGY

For obtaining the satisfying results, we performed various bioinformatics' tools and technique. In this queue of procedure we searched for 'NCBI' (National center for biotechnological information), which is a part of the United States national library of medicines (NLM), a branch of the National institute of Health. NCBI houses genome sequencing data in GenBank and an index of biomedical research articles in Pubmed central and Pubmed, as well as other information relevant to biotechnology. All these databases can be searched online through the Entrez searched engine. (Reference to 'GenBank: the nucleotide sequence database, Chapter 1).

By using NCBI's research articles we studied about Alzheimer and Autism as well as dopamine's role both the cases and its genes.

In our second step, we selected Bioinformatics' tool that is 'Uniprot KB', which comprises the EBI (European bioinformatics institute), SIB (Swiss institute of Bioinformatics) and PIR (Protein information resources). It consists of high quality and freely accessible database of protein sequences. (Reference to Uniprot.C. 2010: "ongoing and future developments at the universal protein resources).

As per 'Uniprot KB' results about dopamine, it concluded, dopamine comprises different types of genes that are DRD4, DBH, DRD3, DOP - 3T14E83, DRD5, SLC6A3, SLC6A2, SLC6A4, DDC, CDNF.ARMELT 1, DOPR2 DAMB DOP R99B CG18741, etc shows there presence in various organism like, Homo sapiens (Human), Didelphis virginiana (North American opossum), Carassius auratus (Gold Fish), Canis lupus (Grey wolf), Danio rerio (Zebra fish), Equus caballus (Plain region Horse), Mus musculus (House mouse), Bos taurus (Cow), Rattus norvegicus (Brown rat), Pan troglodytes (Chimpanzee), etc.

But we found, DBH gene as most common in different organisms with varying length. On this basis, we selected seven model organisms for determination of result that are, Canis lupus (Grey wolf), Danio rerio (Zebra fish), Equus caballus (Plain region Horse), Mus musculus (House mouse), Bos taurus (Cow), Rattus norvegicus (Brown rat), Homo sapiens (Human). So we selected DBH gene of seven model organism for performing various experiments related to Autism and Alzheimer.

After selecting the model organism, we move towards to find out the 'FASTA sequence' of dopamine gene in above selected organism. By using these nucleotide sequences, we undergo proteomic analysis via two different methods.

First, by uses a tool of EBI 'Transeq'. Transeq reads one or more nucleotide sequence from FASTA and writes the corresponding protein sequence translation of dopamine's gene DBH of selected organisms to file.

Further, EMBOSS's (European molecular biology open software suite) tool PEPSTAT, which reads one or more protein sequences that we have and write an output file with various statics on protein properties, which includes weight no. of residue charges, iso-electric point, molar extinction coefficient for each type of amino acid, number & molar percentage, etc. and this results in identifying the amino acids in loaded proportion. By using these amino acids we can work on model organisms and can be used for curing Alzheimer and Autism.

After obtaining the amino acids, we worked on 'CPG report' which identifies the CPG islands in one or more nucleotide sequences. Our next mission was to find out the number of DBH genes over and under expressed in the organs of the model organism. For this we perform gene expression analysis for DBH gene, using 'ARRAY EXPRESS tool', which is a database of functional genomics experiments including gene expression where you can query and download data collected to MIAME and MINSEQE stands.

In the end we plot a phylogenetic tree between the model organisms using phylogenetic analysis via clustal w2, which is a command line interface that offers a significant increase in scalability allowing hundreds of thousands of sequences to be aligned in only a few hours. By plotting this phylogenetic tree, we can relate all model organisms to each other and can get to know about the best model organism to study for Alzheimer and Autism.

III. RESULTS

By using PEPSTAT, we find out, Proline and Leucine amino acid in loaded percentage, along with Serine in the selected model organism.

Amino acids presents in model organisms are listed below:

- Bos taurus – Proline
- Rattus norvegicus – Leucine
- Mus musculus – Serine
- Canis lupus – Proline
- Equus caballus – Proline
- Danio rerio – Leucine
- Homo sapiens – Leucine

When we obtain the amino acids, we worked for CPG report, which shows:

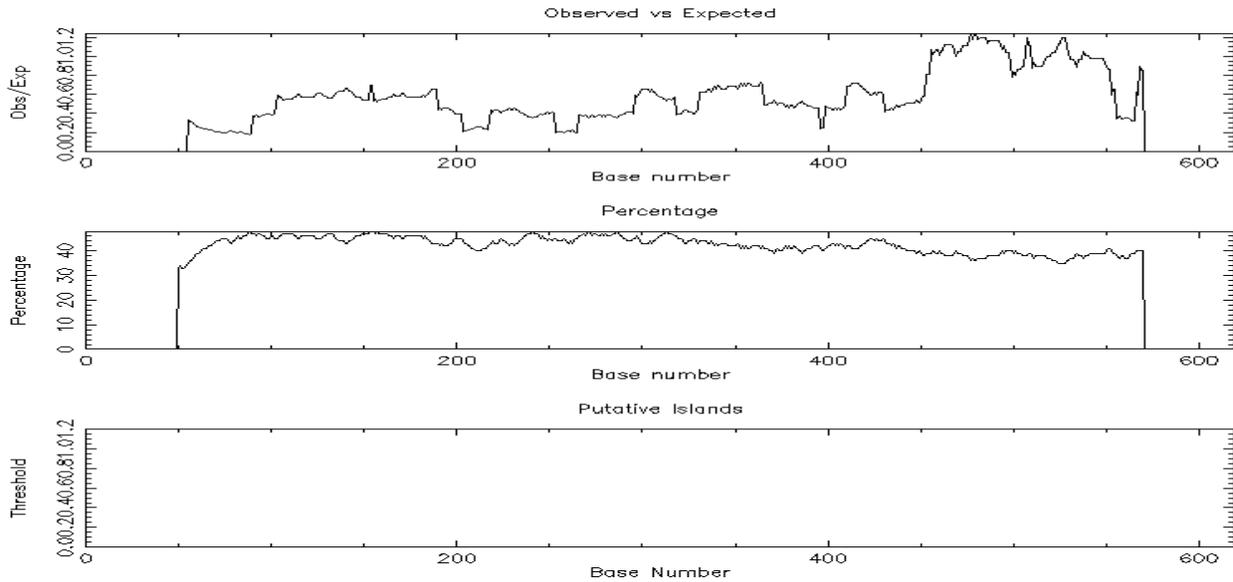
For Leucine:

CPG plot island of unusual composition.

CV012661 from 1 to 620

Observed/expected ratio > 0.60
Percent cytosine + percent guanine > 50.00
Length > 200

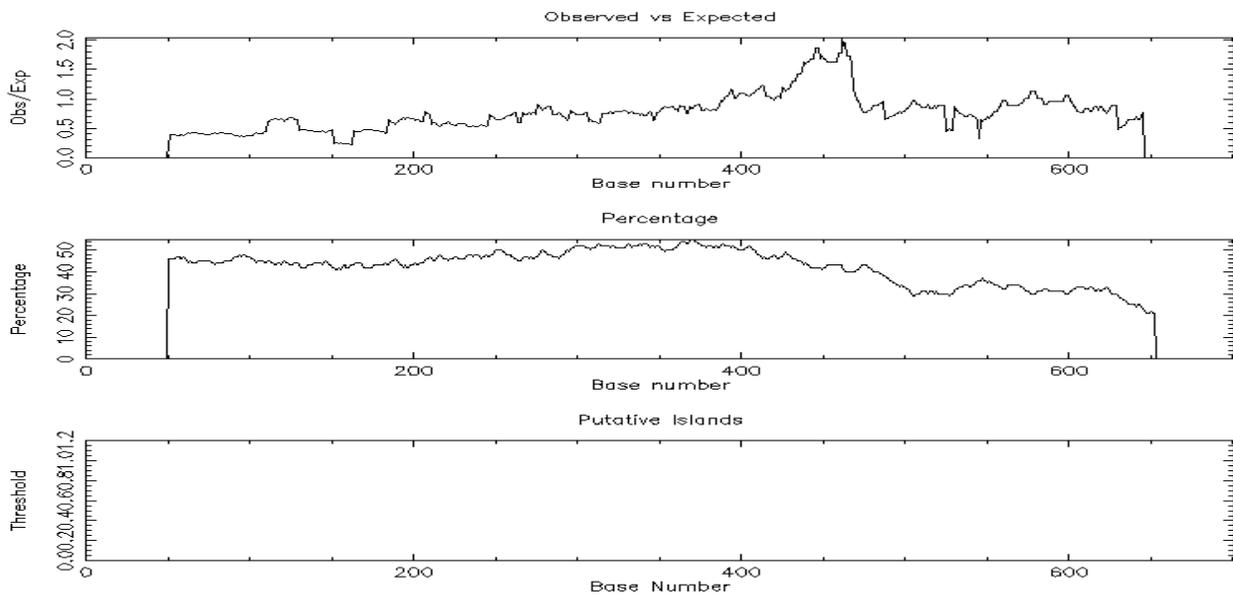
The given figure explains the CPG plot for leucin:



For Proline:

CPG plot island of unusual CG composition
FK811785 from 1 to 702
Observed/expected ratio > 0.60
Percent cytosine + percent guanine > 50.00
Length > 200

The given figure explains the CPG plot for Proline



On using ARRAY EXPRESS tool for gene expression analysis, to find over/ under expressed gene DBH with respect to Homo sapiens, we got that in following given organs, the given number of DBH genes are over/under expressed:

- Brain – 3 genes
- Heart – 1 gene
- Liver & Biliary system – 4 genes
- Pancreas – 1 gene
- Renal system – 2 genes

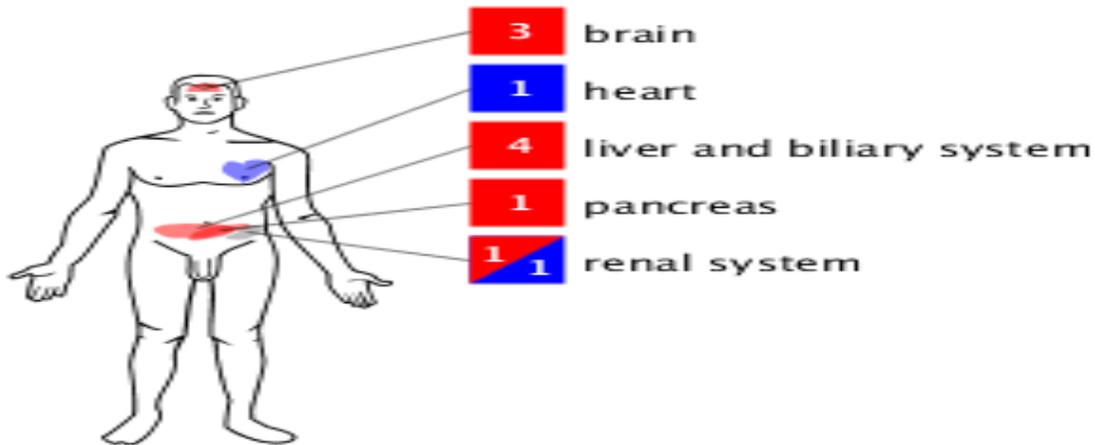
The over and under expressed genes in body of Homo sapiens are explained in figures given, obtained from analysis via the given tool.

Experimental Factors

organism part

studied in E-GEOD-15765, E-AFMX-5, E-GEOD-9531, E-GEOD-6573, E-MTAB-25, ... (20 experiments)

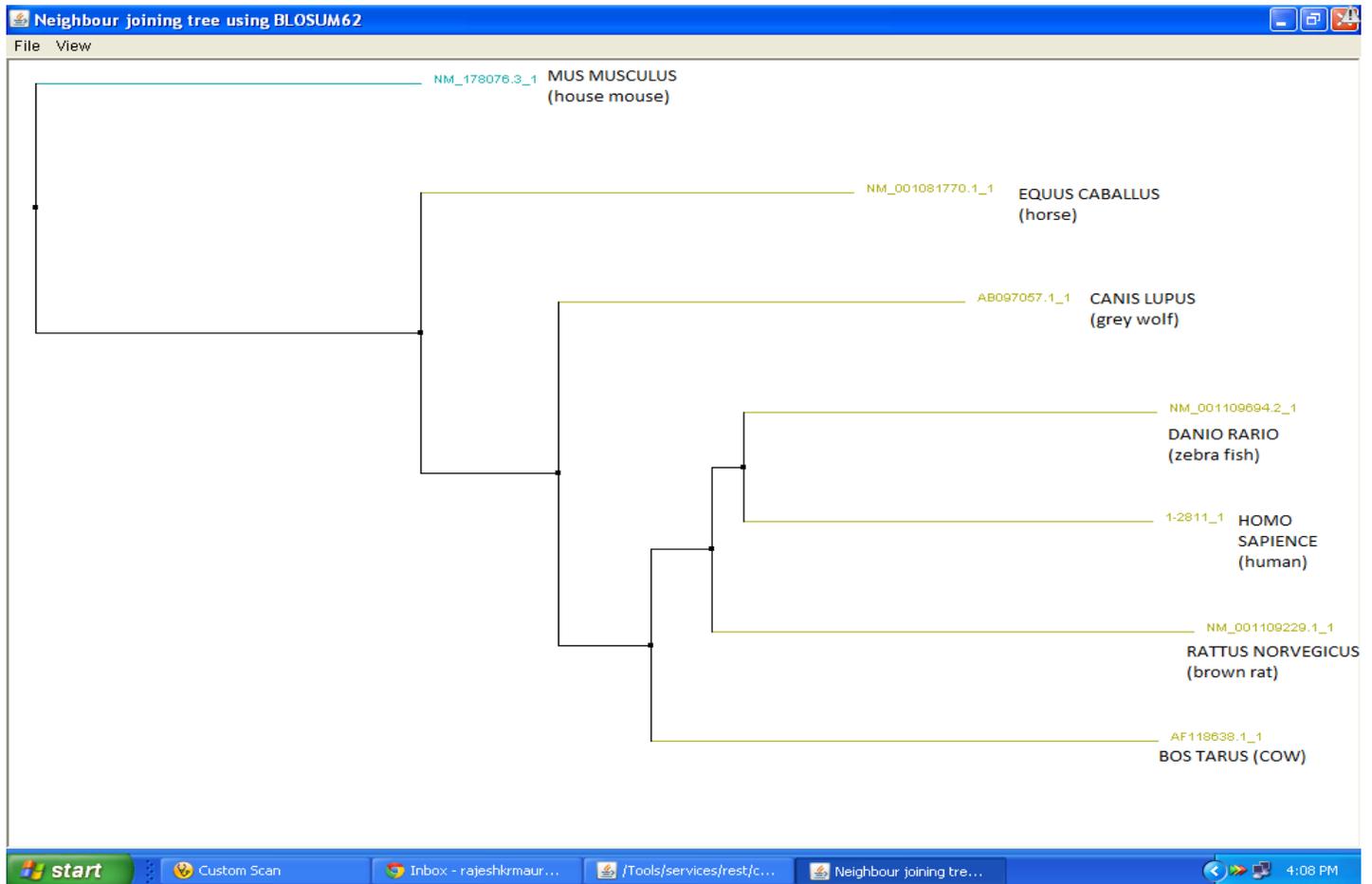
 Number of published studies where the gene is over/under expressed compared to the gene's overall mean expression level in the study.



Study ID	Infection	organism part more »															phenotype								
h.c.intraepithel...	1	1	1	1	1	1	1	1	1	1	3	2	1	2	1	1	1	1	1	1	1	1	1	1	1
al carcinoma	1	1	1	1	1	2	2	1	1	1	1	1	1	1	1	1	1	2	1	2	1	1	1	1	1
shRNA	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
human rhinovirus	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
herpes simplex virus G207	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Staphylococcus aureus	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Streptococcus pneumoniae sero...	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
uninfected	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Streptococcus pneumoniae sero...	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Kaposi's sarcoma-associated he...	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Anaplasma phagocytophilum	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
none	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
liver	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
adrenal gland	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
kidney	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
norm al. Homogenized	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
brain	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
cultured skin substitute	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
lymph nodes	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
prostate	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
lung	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
white blood cell	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
hepatocellular carcinoma	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
esophagus	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
carc er, LCM	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Multiple	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
skin	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
CD3high CD4+ CD8-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
naïve	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
differentiated	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
undiff	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

NOTE: Blue color indicates toward under expressed while red color supports for over expressed DBH gene in Homo sapiens.

A phylogenetic tree is obtained as a result of phylogenetic analysis using BLOSUM62 via clustal w2 which correlate the model organism in order to find best model organism for Alzheimer and Autism.



IV. CONCLUSION

1. According to our theoretical aspects, Dopamine which belongs to catecholamine family is a neurotransmitter and is a chemical messenger that helps in the transmission of signals in the brain and other vital areas (Reference to article reviewed by April cashin – Garbutt, BA hons (cantals)); synthesized in nervous tissue and the medulla of the adrenal gland in our body, define its roles in behavior and cognition, motor activity, motivation, reward, regulation of milk production, sleep, mood, attention, and learning (Reference live strong article no : 425629) . Since Alzheimer and Autism both revolve around the individuals' social, behavioral, and cognition problems. Dopamine is the only neurotransmitter which is common in case that affect both the diseases with its varying amount. Hence after the various experiments and articles though, we focused on dopamine's gene DOPAMINE BETA HYDROXYLASE (DBH), which is a protein and using this gene we can work on AUTISM as well as on ALZHEIMER.

2. According to our dry laboratory aspects, though dopamine is synthesized from amino acid tyrosin (Reference to various dopamine related journals onNCBI, EBI and many others), but when we use DBH of model organisms 'selected' for derivation of amino acids responsible in both diseases as a result of PEPSTAT tool, we found Leucine and Proline are the amino acids present as eye-catching loaded amount in maximum model organism. Serine also showed it high percentage in Mus musculus. As per CPG report, the no. of CG Rich Island is zero for leucine and proline. The phylogenetic analysis says Rattus norvegicus, Danio rerio and Homo sapiens are closely linked. Hence we end up with leucine amino acid as amino acid selected; since it is the only amino acid in higher percentage in the co- related model organism used for Autism and Alzheimer.

3. Due to ethnic and social issues we can't work on Homo sapiens. Though we can consider Danio rerio as best model organism for both the diseases but due its condition of less and not easily availability in laboratories and complicated in analysis, we have chosen **Rattus norvegicus as best model organism for analyzing the cases of Autism and Alzheimer.**

4. By using Rattus norvegicus as best model organism, we can turn up in field of personalized medicines and pharmacogenomics as future aspects for Alzheimer and Autism cases.

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Machining Time Required For Taper Grinding and Its Cost Analysis in G17-22U Grinding Machine

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Abstract- An attempt is made to solve problems in the process flow in an alternator production plant. The plant had to outsource their partially machined shaft for taper grinding for a certain rating of alternator. A small study was conducted for identifying if there is any opportunity to do the operation within the plant. Next approach was to solve the problem with in the plant's available resource, with high quality and low cost. Machining time and labour cost was calculated. Finally the profit of the company for a certain period of time is calculated within the available data's. This attempt helped us to know about the production process of different rated alternators, working of different departments in the firm, problems faced by a company.

Index Terms- labour cost, machining time, plunge grinding, taper grinding,

I. INTRODUCTION

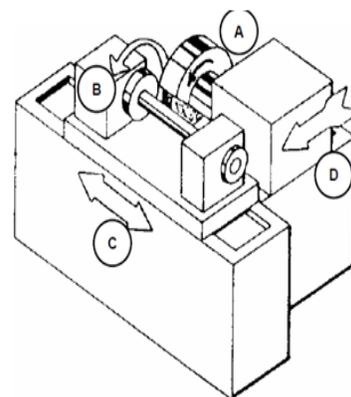
An alternator producer at Kasaragod produces different varieties of alternators for different ratings and applications, were 25kW training lighting alternators used in AC coaches for Indian railway is one among them. Its shaft has to be passed over different operations like turning, threading, taper grinding, end drilling etc. The plant has the capacity to do most of the operation except taper grinding. Presently the plant has to outsource the shaft to outside plant for the taper grinding. Presently the plant has a grinding machine of G 17-22U, which means it is a universal grinding machine that can machine a job up to 220mm diameter shaft. The grinding machine G17-22U was installed 20 years before when the plant was started. At the beginning stage the plant had no expectation of producing 25 KW alternators. So the available grinding machine in the plant does not have a provision for taper grinding. All other ratings of shaft do not need a taper grinding except 25KW and 18.5KW alternators. The shaft normally reaches the grinding machine after the operation in CNC35, where the turning operations are completed. In the case of 25 KW alternator shafts are outsourced for taper grinding. In a single transportation there can be nearly 20 to 30 numbers of shafts. The plant has to spend nearly 10000 rupees for the transportation and 225 rupees for the machining operations. The grinding machine G17-22U has a tilting headstock, but doesn't have a tilting tailstock. To replace the tailstock with a new one or to have a new universal tilting table is expensive, so we suggest for an external fixture at the tailstock. This fixture helps to hold the shaft for proper taper grinding.

Cylindrical grinding machine

This machine is used to produce external cylindrical surfaces. The surfaces may be straight, tapered, steps or profiled. Broadly there are three different types of cylindrical grinding machines as follows:

1. Plain centre type cylindrical grinder
2. Universal cylindrical surface grinder
3. Centre less cylindrical surface grinder

Plain centre type cylindrical grinder



A: rotation of grinding wheel
B: work table rotation
C: reciprocation of worktable
D: infeed

Figure 1; Traverse grinding machine

Figure above illustrates schematically this machine and various motions required for grinding action. The machine is similar to a centre lathe in many respects. The work piece is held between head stock and tailstock centers. A disc type grinding wheel performs the grinding action with its peripheral surface. Both traverse and plunge grinding can be carried out in this machine as shown in Fig 2 and 3.

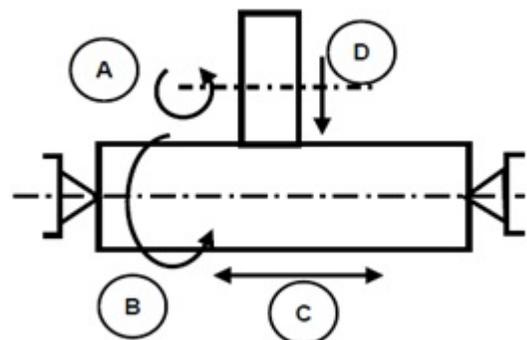


Figure 2; Traverse grinding

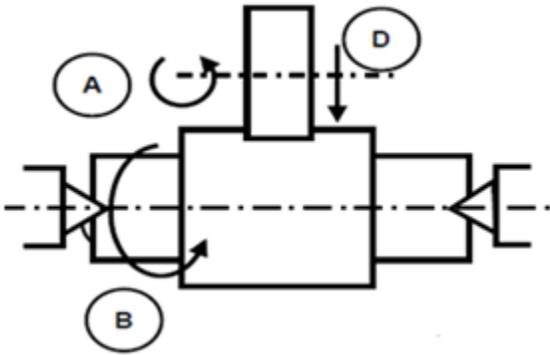


Figure 3; Plunge grinding

In cylindrical grinding, the work piece rotates about a fixed axis and the surfaces machined are concentric to that axis of rotation. Cylindrical grinding produces an external surface that may be straight, tapered, or contoured. The basic components of a cylindrical grinder include a wheel head, which incorporate the spindle and drive motor; a cross-slide that moves the wheel head to and from the work piece; a headstock, which locates, holds, and drives the work piece; and a tailstock, which holds the other end of the work. Internal diameter or "I.D." grinders finish the inside of a previously drilled, reamed, or bored hole, using small grinding wheels at high RPM.

2 Problem Analyses:

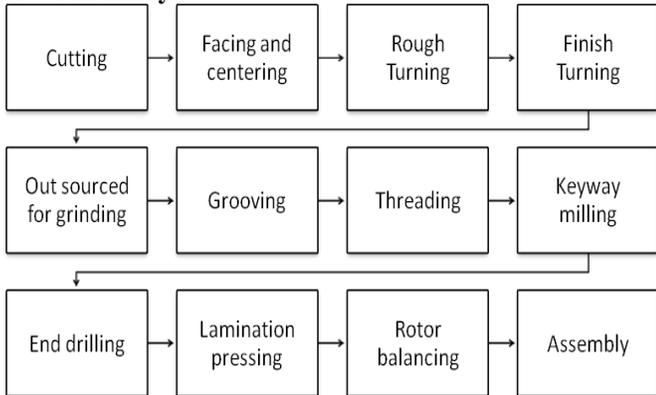


Figure 4: Present shaft flow for 25kw alternator

This plant have a G17 22 universal grinding machine presently used only for straight grinding . 25kw alternator require 2 taper grinding at two ends with a length of 95mm. larger diameter is 55mm and small diameter is 45mm.total length of the shaft is 936mm.normaly the shaft is supported horizontally in the grinding machine with the help of head stoke and tail stoke. the shaft is reached to here after the operation in CNC depend on the shaft diagram. The portion to be grinded have a stoke of .5mm which is to be removed by grinding. for normal grinding operation the wheel and the job should be in parallel so tilt the head stoke so that both job and wheel are parallel.G17 machine have provision to rotate about 90 degree but zero at tail stoke. So at the tail stoke if a special type of fixture is attached the job can be supported easily and taper grinding can be carried out.

2.1 Idea for solving the problem

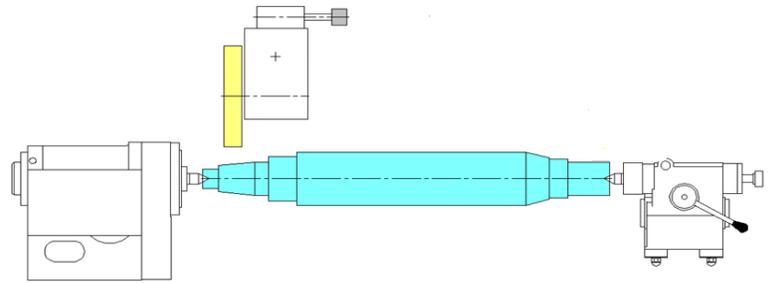


Figure 5;25kw shaft hold between head and tail stoke (front view)

Fig shows present situation if 25 KW is fixed for grinding operation in g17 grinding machine .this machine can tilt the head stoke but not the other like tail stoke and wheel

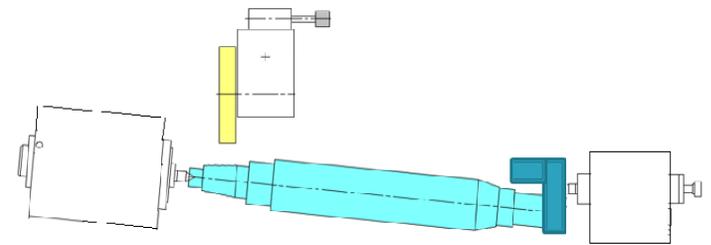


Figure 6; 25kw shaft hold between head stoke and fixture supported at tail stoke (top view)

Fig 6 shows a rough idea of fixture used for taper grinding .G17 grinding machine have a grinding wheel of width 65mm.If this type of arrangement is there the portion to be grinded will be parallel to the wheel so that proper grinding can be carried out.

Tapper angle calculation
 Large diameter (D) =55mm
 Smaller diameter (d) =45mm
 Tapper length (l) =95mm

$$\text{Tapper angle} = \frac{D-d}{2L} \times \frac{630}{11}$$

$$= \frac{55-45}{2 \times 95} \times \frac{630}{11}$$

$$= 2.86^\circ$$

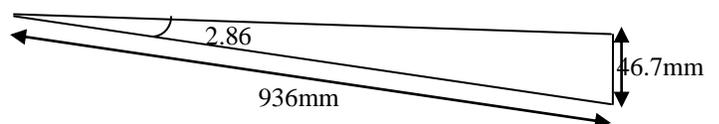


Figure 7; Eeccentricity of the shaft after fixing

The above fig 6 shows that the center of new fixture should be 46.74mm apart from the current setup.

2.2 Overall Production Time

Machining time

Time required for cylindrical grinding (T) = $\frac{\text{Length of cut} \times \text{Number of cuts}}{\text{Feed/rev} \times \text{R.P.M}}$
 Length of cut = length of taper + over travel
 = 95 + 130

$$\text{Feed/rev} = \frac{W}{4} \quad (W=\text{width of grinding wheel})$$

$$= \frac{225}{4} = 56.25 \text{ mm}$$

$$\text{R.P.M of job} = 78 \text{ R.P.M}$$
 Assuming depth of cut = 0.0025mm

$$\text{Total stoke to be removed} = \frac{D-d}{2}$$

$$= \frac{0.5}{2} = 0.25 \text{ mm}$$

$$\text{number of cut required} = \frac{0.25}{0.0025} = 100 \text{ cuts}$$

$$\text{Time required for cylindrical grinding (T)} = \frac{225 \times 100}{16.25 \times 78}$$

$$\text{Machining time} = 17.75 \text{ min}$$
 Besides machining time following time allowance must be given due consideration
 1. Set up time
 Time for setting and fixing the job and tool. It also include time for studying, blue prints, gauge setting fixture setting etc. For this case time for job setting = 1min, fixture setting = 2min, time for study = 3min ,clearance= 2min
 set up time =8 min
 2. Operating time
 Time taken for actual operation
 a. Handling time
 Time consumed in all physical movement by the operator to prepare the job for machining and disposing off the job after machining
 Handling time = 2 min
 b. Machining time
 Total time consumed by the machine for machining of the job.
 Machining time depend on cutting speed, depth of cut , feed
 Machining time =17.75 min
 3. Unloading time
 Time for removing the job from machine
 Unloading time =1min
 4. Miscellaneous time
 a. Tool changing and re sharpening (5%-10% of machining time)

$$10/100 \times 17.75 = 1.78 \text{ min}$$
 b. Checking and inspection (5%-30% of machining time)

$$30/100 \times 17.75 = 5.33 \text{ min}$$
 c. Fatigue allowance (5% of machining time)

$$5/100 \times 17.75 = .89 \text{ min}$$
 d. Personal allowances (5% of machining time)

$$5/100 \times 17.75 = .89 \text{ min}$$
 e. Cleaning and disposal (15%- 20% of machining time)

$$20/100 \times 17.75 = 3.55 \text{ min}$$

$$\text{Time for a single taper} = 8 + 2 + 17.75 + 1 + 1.78 + 5.33 + .89 + .89 + 3.55 = 38.41 \text{ min}$$
 Each shaft require two taper grinding

$$\text{Total time required for two taper} = 38.41 \times 2 = 76.82 \text{ min}$$

$$\text{Total working hours} = 7 \times 60 = 420 \text{ min}$$

$$\text{Total no of product can be prepared} = \frac{420}{76.82} = 5.46 \text{ no;}$$

For deciding the actual working norms they have to passed after discussion and meeting with management and worker .After the meeting it is expected to have 4 jobs to be machined in each shift

2.3 Labour costing

Labour costing includes

1. Direct costing (cost can be allocated to a single product)
2. Indirect costing (cost cannot be allocated to a single product)
3. Labour welfare relevant cost (incentive D.A, etc)
4. Labour losses (cost paid at ideal time)

Labour cost include fixation of wage rates and standard time for particular activity .we have already calculated the time for the activity which is about 76.82 min for each shaft. normally the working hour for a shift is 8 hours but there will be an idle time which is almost 1hour.

Labour cost = Net hourly rate X No. of hours worked on the product

$$\text{Net hourly rate} = \frac{\text{Wages paid} + \text{other expenses}}{\text{Effective hour worked}}$$

In BHEL electrical machines limited a worker is paid Rs.10000 per month including rs.140 as dearness allowance. In addition to this Rs100 per month is paid as H.R.A .a bonus @20% is given at the end of the year. the employer contribute P.F @ 8% and insurance premium @ 2% of wage The employee are entitled to and availing one day leave for every 10 days work. Total number of working days for E.L calculation is taken as 300.Industry provides a subsidiary of Rs 18000 to its canteen. If 300 employees work 8 h a day with 10% normal idle time
 Wages paid to worker per year = 10000* 12

Wages paid to worker per year	= 120000
H.R.A paid per year	= 1200
Share of P.F paid @8% of 120000	= 9600
Insurance premium 2% of 120000	= 2400
Bonus 20% of 120000	= 24000
Subsidy to canteen	= 18000
Total expense	= 120000 + 1200 + 9600 + 2400 + 24000 + 18000
	= 175200 Rs

No. of working hours /day	= 8 hours
Total no. of working day/year	= 300 days
Total no. of working hours/year	= 2400 hrs
Leave	= 30*8 = 240 days
Remaining time	= 2160 hrs
Nominal idle time for year	= 270 hrs
Effective no. of working hours	= 2160 -270 = 1890 hrs

Net hourly rate	$= \frac{175200}{1890} = 92.69 \text{ Rs}$
Labour cost for a day	= 92.69*7 = 648.88 Rs
Labour cost for machining one 25Kw shaft	= 648.88/4 = 162.22 Rs
Indirect labour cost	=50 Rs
Total labour cost	=212.22 Rs
Production cost	
Cost of operation per shift =	
Wattage/1000 x rate/kWh x hours used	

Cost of operation per pieces = $2/100 * 7 * 5.5$
 = 69.82 Rs
 Miscellaneous cost = 17.45 Rs
 Total cost = 20 Rs
 = 249.67 Rs

3. RESULTS AND DISCUSSION

Now the plant is spending 225 Rs for labour cost since they are out sourcing the shaft for taper grinding. Up and down transportation require almost 7500 Rs. There can be an unexpected time delay, problems in quality maintenance and inventory cost. If the process is carried within the firm this operations can be completed for Rs 249. There will not be any time delay and reduce inventory cost.

3.1 FINANCIAL BENEFITS

Number of shaft nearly outsourced at a time = 25
 Amount for transportation = 7500 Rs
 Machining cost = 225 Rs
 Transportation cost for a single shaft = $\frac{7500}{25}$
 = 300 Rs
 Total cost spend for a single shaft = 300 + 225
 = Rs 525
 Total cost = 525 * 25
 = 13125 Rs
 If the same operation is carried under the plant = 249.67 Rs
 Total cost for completing the 25 pieces = 25 * 249.67
 = 6241.75 Rs
 Cost for preparing the fixture (including the machining cost) = 2000
 Life time for the fixture = 3 years
 Expected number of order within 3 years = 200 no.
 Total cost for the company in machining 200 pieces = $8 * 6241.75 + 2000$
 = 49934 + 2000
 = 51934 Rs
 If it was out sourced = $525 * 200$
 = 105000 Rs
 Total cost saved within 3 years = $105000 - 51934$
 = 53066 Rs

Figure 8; Fixed and total cost if outsourced

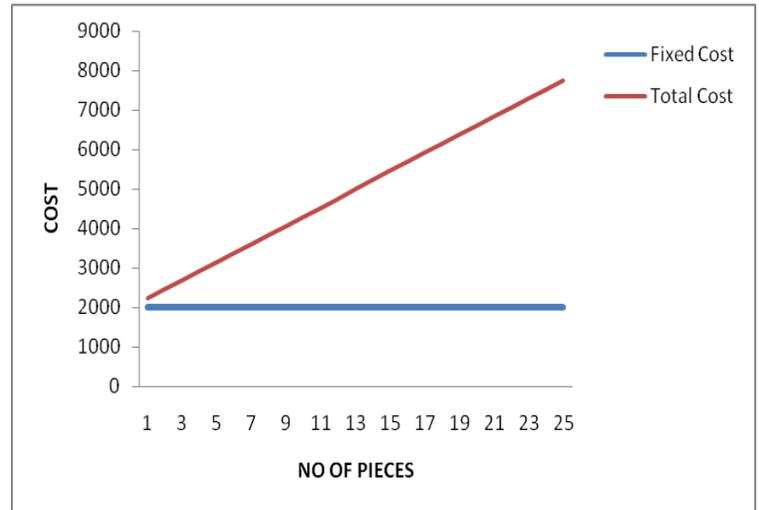


Figure 9; Fixed and total cost if not outsourced

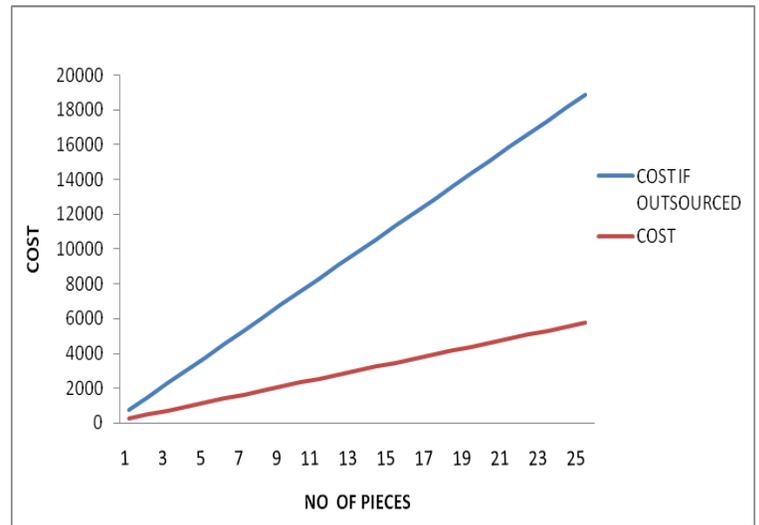
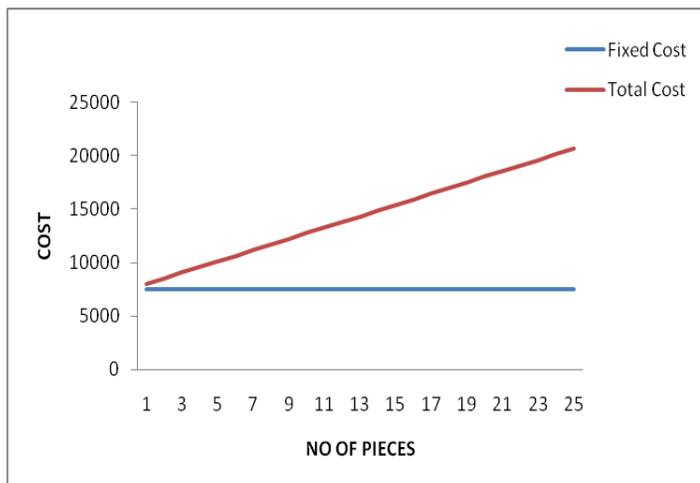


Figure 10; Cost comparison of outsourcing and not outsourcing



3.2 EXPECTED SHAFT FLOW

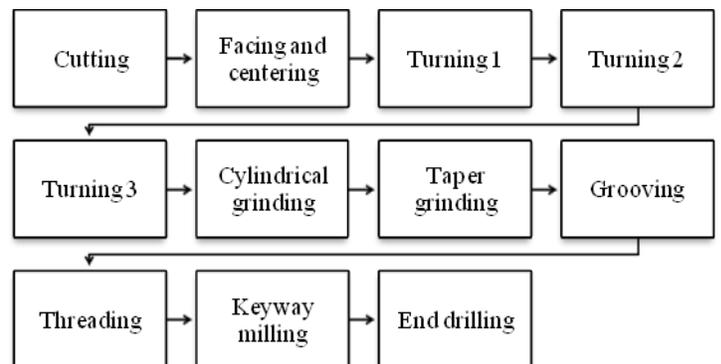


Figure 11; Expected shaft flow

CONCLUSION

Although BHEL EML is a recently incorporated joint venture company, with all its constraints it has made its own mark in the highly competitive and dynamic market, BHEL EML is recognized as the quality product manufacturer in its play ground. It has maintained an upper hand in terms of trust among customers and still holds the monopoly in certain fields. In very short span of operation BHEL EML has made major strides in this vital sector and has acquired a solid reputation for superior quality, high efficiency, reliable performance after sales service and quick serviceability

In my training i could suggest a proposal which brings about 53000 Rs saving for the company after all constrain in the company. This proposal could help the company not to outsource their products to outside for tapper grinding result in smooth process flow and fast output.

APPENDIX

G17 -grinding machine center height 170mm.
22U - grinding machine center distance 220cm

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DESIGN AND IMPLEMENTATION OF THE LAB REMOTE MONITORING AND CONTROLLING SYSTEM BASED ON EMBEDDED WEB TECHNOLOGY

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Abstract— Describe a software and hardware design solution of an embedded web-based remote monitoring system for the environment in the laboratories. Build an embedded web server to publish the data of sensor networks and video images to achieve remote monitoring which is based on Web Technology. Managers can monitor and control the equipments in the lab through a web browser which is cross-platform. The embedded database manages the data collected by sensor networks, realizing the local management of environmental data. The Laboratory Monitoring and controlling system was developed to implement early warning remote control, real time Monitoring and other functions in the laboratories, which can realizes the local management and remote publishing applications for large-scale dynamic data of sensors networks and video images by using different sensors and webcam ARM Intelligent Monitoring center uses Samsung's S3C2440 processor as its main controller and Embedded Linux operating system. The experimental results show that the system designed implements safe and convenient remote monitoring and local management of the environment in laboratories and has high availability, reliability and popularization.

Index Terms— embedded web server; embedded database; remote monitoring system; S3C2440 ARM microprocessor.

I. INTRODUCTION

The web technology has begun to have a rapid development in the field of embedded systems in the post-PC era. The application of embedded web technology in the remote monitoring system has given rise to the technological change in the field of industrial control. Nowadays the management of the domestic laboratories in the research institute and universities has issues of poor real time, high cost and low precision .It is difficult to determine the quality of the environment of the laboratory. So the Laboratory Intelligent Monitoring System should be developed to implement early warning, remote control, real-time monitoring and other functions. This paper comes up with a design solution of an embedded web-based remote monitoring system for the environment in the laboratories, which realizes the local management and remote publishing applications for large-scale dynamic data of sensor networks and video images.

Lab remote monitoring and controlling system makes use of latest, less power consumptive, small size and fast working micro controller like S3C2440.This system is based on ARM9 and Linux operating system for managing the data collected by sensor networks, realizing the local management of environmental data, and to automatically detect and identify images.

I. RESEARCH ELABORATIONS

A. Lab remote Monitoring and controlling system –

ARM Intelligent Monitoring Center uses Samsung's S3C2440 processor as its main controller, the performance and frequency of which are suitable for real-time video image capture and processing applications.

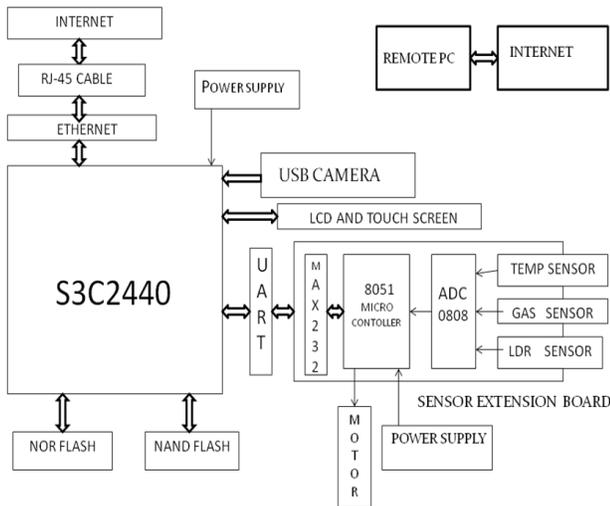


Figure 1: Block Diagram of Monitoring and controlling system

Embedded Linux operating system and embedded web server run on the main controller to manage various types of equipments including sensor networks, GSM / GPRS dual band module, USB cameras and so on. We are connecting different sensors also which are used to monitor the conditions inside the area and we can control the devices present at different locations by using web technology. The block diagram of Proposed Method is shown below. This system makes use of S3C2440 (ARM9), Webcam, Ethernet, touch screen, PC, temperature sensor, gas sensor and LDR, Fan, Motor, Light.

B. Mini2440 Development Board

Samsung Mini2440 is a practical low-cost ARM9 development board, is currently the highest in a cost-effective learning board. It is for the Samsung S3C2440 processor and the use of professional power stable core CPU chip to chip and reset security permit system stability. The mini2440 Immersion Gold PCB using the 4-layer board design process, professional, such as long-wiring to ensure that the key signal lines of signal integrity, the production of SMT machine, mass production; the factory have been a strict quality control, with very detailed in this manual can help you quickly master the development of embedded Linux and WinCE process, as long as there is C language.

Features:

1. CPU Processor: Samsung S3C2440A, frequency 400 MHz, the highest 533 MHz
2. SDRAM Memory: On-board 64MB SDRAM 32-bit data bus SDRAM clock frequency up to 100 MHz
3. FLASH Memory: On-board 64 MB NAND flash, Power-down non-volatile. On-board 2 MB NOR flash, Power-down non-volatile, BIOS has been installed.
4. LCD Display: On-board integrated 4-wire resistive touch screen interface, you can directly connect 4-wire resistive touch screen. Support for black and white, 4 gray-scale, 16 gray-scale, 256-color, 4096-color STN LCD screen size from 3.5; to 12.1; 1024x768 pixels screen resolution can be achieved. Standard configuration for the NEC 256K-color 240x320/3.5; TFT True Color LCD Screen with touch screen. Leads to a 12 V power supply on-board interface, for the large-size TFT LCD 12 V CCFL backlight module (inverting) power supply.

Mini2440 interface layout is shown below it in a very compact area of 100 mm x 100 mm delicate arrangement of open made from a variety of commonly used interface, and also leads to the need for development and testing of the surplus of the I/O ports and bus interfaces. We cannot get S3C2440 microcontroller individually. We will get it in the form of Friendly ARM board else, we can call it as MINI 2440 board which is designed and developed by a Samsung company. This is latest and less power consume microcontroller like ARM 9 to attain a real time remote monitoring and controlling system.

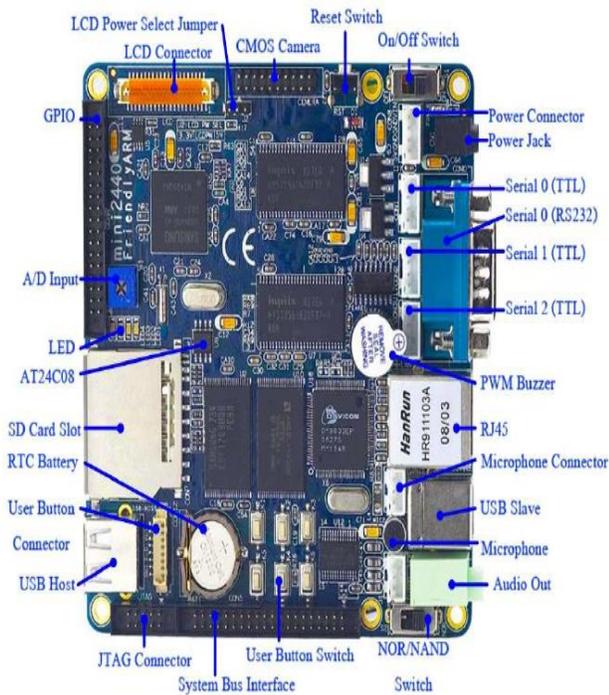


Figure2: Mini2440 interface layout

C. Monitoring and Controlling system algorithm –

The proposed lab remote monitoring system makes use embedded board which makes use of less power consumptive and advanced micro controller like S3C2440. S3C2440 is a Samsung company's microcontroller, which designed based on the structure of ARM 920T family. This microcontroller works for a voltage of +3.3V DC and at an operating frequency of 400 MHz, The maximum frequency up to which this micro controller can work is 533 MHz.

We cannot get S3C2440 microcontroller individually. We will get it in the form of Friendly ARM board else, we can call it as MINI 2440 board.

In order to work with ARM 9 micro controllers we require 3 things. They are as follows.

1. Boot Loader
2. Kernel
3. Root File System

The essential programs that are required in order to work with MINI 2440 like Boot loader, Embedded Linux related Kernel, Root File System will be loaded into the NOR flash which is present on the MINI 2440 board itself. The program related with the application will be loaded into NAND flash, which is also present on the MINI 2440 board itself. By using bootstrap switch that is present on the MINI 2440 will help the user to select either NOR or NAND flash. After that by using DNW tool we can load Boot loader, Embedded Linux neither related kernel and Root File System into NOR flash by using USB cable and the application related program into NAND flash. Once loading everything into MINI 2440 board it starts working based on the application program that we have loaded into the NAND flash. So controlling station waits for the remote data that is coming from the remote location.

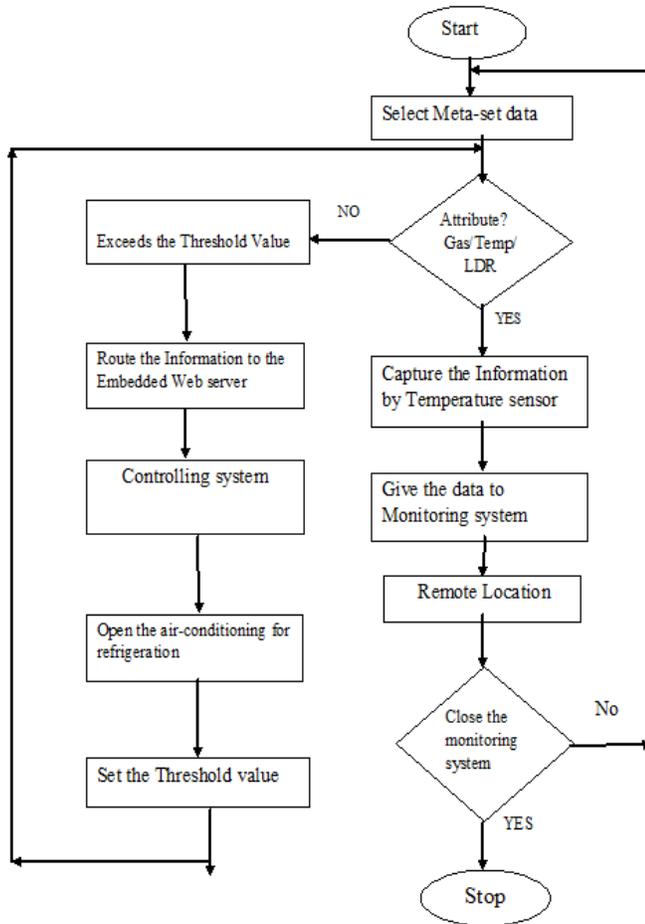


Figure 3: Flow chart for Monitoring and Controlling System

The remote location like lab consists of an embedded board, which interfaced to the sensors like light, temperature and gas. Light Dependent Resistor (LDR) will continuously measure the intensity of the light and converts the analog quantity like light intensity into voltage format. In order to check whether any poisonous gas that is released in the lab or not for that purpose we are having a gas sensor. This gas sensor also converts the analog quantity like gas release into voltage format. To indicate the temperature present in the lab we are having a temperature sensor, which will convert analog quantity like temperature into voltage. But in order to observe the step to step changes that are occurring in the lab we need to connect the output of the temperature, LDR and gas sensors to the ADC so that we can observe the step to step voltage change that are occurring in the lab with the help of temperature sensor, LDR and gas sensor.

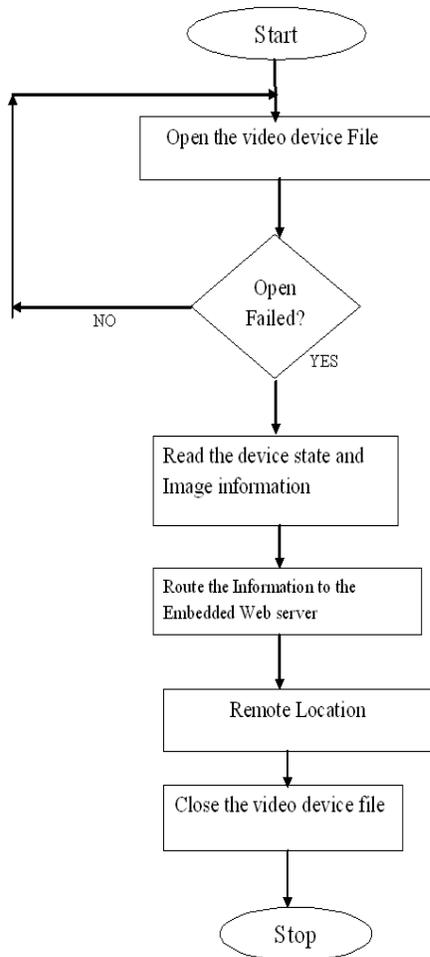


Figure 4: Flow Chart for Video Capturing

In this way, the output of the light, gas and temperature sensors is given as an input to the microcontroller. The measured values sent wirelessly through the Ethernet connection to the controlling station. At the controlling station, we will have Ethernet connection by using which the parameters measured at the remote location is received and given as an input to the MINI 2440 board by using serial port. The measured values of temperature, gas alert and the light intensity will be send from the controlling station to anywhere by using the technology like Ethernet with a speed of 100Mbps the Ethernet technology. From the remote locations, also we can monitor the parameters that are present at the lab.

We can control the parameter like the temperature then from the remote location through any PC. We can automatically activate a blower fan that already interfaced to the embedded board and we can reduce the temperature before reaching the threshold value. If the required intensity of the light is not present we can activate a bulb and we can supply required intensity of the light for the lab.

III. RESULTS

Here after connecting and placing this equipment in the Lab then the Data related to this will appear in the remote location as below.



IV.CONCLUSION

The project “Design and Implementation of the Lab Remote Monitoring and Controlling System Based on Embedded Web Technology” has been successfully designed and tested. It has been developed by integrating features of all the hardware components and software used. Presence of every module has been reasoned out and placed carefully thus contributing to the best working of the unit. Secondly, using highly advanced ARM9 board and with the help of growing technology the project has been successfully implemented.

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Inadequacies of Wittgenstein's Earlier Theory of Meaning

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I. INTRODUCTION

The main concern of this article will be to discuss the reasons that led Wittgenstein to give up his earlier theory of meaning as advocated in the *Tractatus*.¹ There is a specific problem relating to colour predicates, which initially led Wittgenstein to change his theory. As he realizes, his notion of elementary propositions which provide the foundation for his earlier theory of meaning, cannot be retained. It is thus felt that the problem posed by elementary propositions signifies the inadequacy of the earlier theory of meaning. On this consideration, Wittgenstein's analysis of colour predicates assumes a paramount importance in the middle phase (during the period before investigation) of his philosophy. In this changed perspective, propositions are considered not in isolation, as in the case of elementary propositions, but as a system. Different propositions form a system of propositions. The idea of system of propositions... has a lasting impact on the final stage of Wittgenstein's theory of meaning. In fact, his main attempt to explain meaning in the light of "Language-game" as proposed in the *Investigation* can be shown to be a full-blown expression of the middle stage of his philosophy.² In this discussion we will first see the problem of elementary proposition and second, Wittgenstein's idea of a system of proposition. Finally, I will explain some important points relating to this issue. In the present discussion the above mentioned points will be discussed with reference to Wittgenstein *Philosophical Remarks*.³

II. CENTRAL IDEA OF WITTGENSTEIN

According to Wittgenstein's earlier theory of meaning, one must be able to distinguish between simple or atomic and compound propositions. Atomic propositions refer to atomic facts. Logically compound propositions such as $\neg P$, $P \& q$, etc., cannot have sense, as there are no propositions and facts corresponding to them. But Wittgenstein's does not regard two atomic propositions as contraries. The collapse of the earlier theory of meaning seems to be explained by this problem. For example, 'P is white' and 'p is black' are atomic propositions and they are distinct propositions and logical contraries. Wittgenstein explained in *Tractatus* that if two propositions are contraries then they are not regarded as atomic proposition and we can treat them as non-atomic propositions. He abandons this option in his lecture 'On Logical forms' and explains that concepts other than colour concepts involve the notion of the degree of a property in an object. All such concepts yield contrary pairs, and they are treated as atomic propositions. Wittgenstein said that such propositions cannot be true and are non-sensical. 'q is black' does not contradict 'q is white' since

elementary proposition cannot contradict each other but simply exclude each other. He tried to reformulate *Tractatus*. His effort to reformulate it led him to develop his work, that is, *Philosophical Investigations*.

In his later works Wittgenstein seeks to give a better version of the meaning of word. In this connection Wittgenstein returns to the problem of colour predicates in *Philosophical Remarks*, which gives a clear explanation of contradictory colour predicates as encountered in *Tractatus*. The important part of the discussion is as follows: In logic, contradiction, tautology and various logical forms of construction, such as, conjunction and disjunction are accepted as truth-functional relationships between propositions. Contradiction is the conjunction of a proposition and its negation, such as P and $\neg P$. A set of contradictory proposition should appear to exhibit the form of P and $\neg P$. The propositions "A is white" and "A is black" is true of conjunction but it is impossible for two colours to be in the same place at the same time, or in other words, white and black both cannot be accommodated in "A" at the same time. The mere facts that the colours have an elementary affinity with one another looks as if a constant is possible within the elementary propositions. What follows from the example is the fundamental principle that the only necessity that exists is the logical necessity. Hence, 'White' cannot be the name of a simple and a proposition "A is white" is not fully analyzed. His immediate problem was to remedy the glaring error or mistake in the *Tractatus* account of logical necessity. Ramsey objects to this view and states that Wittgenstein is only reducing the difficulty to that of the necessary properties of space and time.

The contribution made or criticism given by Ramsey was the innovation of new ideas in such a way as to preserve *Tractatus*'s demarcation between logical and empirical truth and to solve the colour exclusion problem.⁴ His first step was regarding the problem of a proposition underlying natural language, that is, what one can say in particular language. What demands explanation? What gives us the feeling that these must be an explanation? In *Tractatus* proposition's function as significant units in isolation from one another, but the truth or falsity of a proposition implies truth or falsity of other. In this regard, Wittgenstein says that the proposition "A is white" and "A is black" can be written down as two particular propositions and not their logical product. The question is if each of the two propositions are well formed, intelligible, why is it not possible to write down their logical product of both the propositions. Wittgenstein defends his position and shifts to a new position and states that intelligibility and well formedness cannot be given to a single proposition taken in isolation and they are not the properties of their own without reference to the way in which

they are related to other propositions. Hence, he brings in the notion of a system of proposition, that is, it is not single proposition, but in a system of propositions that language is seen comprising a complex network of propositional systems, each of which comprise a distinct 'logical space'.

In Tractatus, logical space was define in terms of the internal relationship between objects which compose states of affairs corresponding to a single proposition whereas in Philosophical Remarks it is conceived in terms of the relationship of systems of propositions to the ordinary material of sense experience. Wittgenstein concluded that elementary propositions are not logically independent. There seem to be non-truth-functional logical relations. In an analyzed proposition, names designate the objects in a state of affairs. According to the Tractatus the logical forms of the proposition are like the graduating marks of a ruler. This mirrors the logical form of a state of affairs. In Philosophical Remarks, a system of propositions is compared to a ruler or a yardstick. Wittgenstein later argued that a word only has meaning in the context of its propositional system, and the meaning of a word is the rules governing its use in that system. The proposition "P is white", and "P is black" do not correspond to independent states of affairs, but are intrinsically connected to one another as possible alternatives. Syntax may prohibit construction of such propositions as "q is black" and "q is white" but in speech they are not different propositions but different forms of the same proposition.⁵ Wittgenstein brings the notion of 'agreement in use' which plays a prominent role with words in the specific context of a discourse and to makes clear various problems regarding the relationship between a system of propositions and the aspects of reality which are mediated by linguistic construction. This is the only possibility through which one can guarantee that others understand words as one understands them. This theme led Wittgenstein to formulate that the sense of a proposition is the method of understanding the meaning of the earlier theory of meaning. According to the Tractatus theory of meaning, we know the meaning of a sentence only when we know the case for the sentence to be true. Wittgenstein in the beginning actually related a proposition to a yardstick but later with his invention of a system of propositions he posited a more complete theory that the whole scale of a yardstick gives a range of interdependent readings. For example; if "P is white" it is not blue, not orange, and not green. The meaning understand from a proposition, that is, when a proposition is compared with reality and found to be true, it is taken as absolute. The meanings of simple expressions are usually given by explanation, that is, through language, by reference to simples which are taken as elements of representation.

The problem of elementary sentence brought a distinct change in Wittgenstein's approach to language and meaning. The meaning of a proposition is linked to its truth conditions. Truth conditions are meant to specify only those conditions under which the entire proposition will be true. Consequently, the absence of those conditions will make the entire proposition false. We know from our earlier discussion that elementary propositions which constitute the base of the Wittgenstein hierarchy of propositions can be true only when they are pictures

of reality. To elaborate, an elementary proposition is true only when the pictorial form of the proposition is identical with the state of affairs it purports to describe. Hence, the stated truth condition for an elementary proposition is as follows: if the pictorial structure of the proposition mirrors the actual structure of the state of affairs, the proposition is said to be true. This means that the concatenation of names of the elementary proposition must mirror the structural arrangements of objects in the state of affairs. For an elementary proposition to have sense it must exhibit its own pictorial structure as a concatenation of names - a structure representing some possible state of affairs. The notion of truth in this approach is essentially related to the identity of structure between proposition and fact. What is characteristic of this conception of truth is that for a proposition to be true there must be an identity of form between proposition and fact. The same consideration holds for molecular or compound propositions. The truth or falsity of a molecular proposition is dependent on the truth or falsity of the elementary propositions that compose it. On this ground, the truth or falsity of a molecular proposition is thus determined in a truth-functional way. Its meaning is specified by its truth conditions since they are governed by the particular combinations of truth or falsity of the elementary propositions.

From our earlier account of colour terms, we know that Wittgenstein realized the untenability of elementary propositions. The down fall of elementary propositions brought a radical change in his approach to language and meaning. He finds that he can no longer rely on his earlier theory of meaning. The reason is that there is a distinct change in his attitude towards language. As he argues, language should be explored as we find it and this indeed is in sharp difference with his earlier Tractatus belief that for its exploration, language should be submitted to a process of logical analysis in accordance with the requirements of truth-function logic. To see language as it is transformed by logic and to see language as it is practiced are two distinct philosophical standpoints on language.⁶

Now, we would like to mention some additional points in order to explain further the problems or inadequacies associated with the picture theory of meaning. One important source of confusion lies on the vague and metaphorical use of the word "object". In general, to use this word is to refer some things like "Pens" and "Books". When we give the name "Pen" to an actual "Pen", then we call the "Object signified" by the word "Pen". This is the actual use of the expression "object signified by such-and-such a word". But when we also give the name "red" to the colour signified by that word, we commonly stretch the use of the word 'object' so as to call also the colour 'the object signified by the word 'red'. When we are to stretch the expression 'object signified by the name A' then it will apply to certain things which are not physical objects like 'Pens' and 'Books'. It is very important to avoid the confusion that 'A' is not a physical object whereas 'Pens' and 'Books' are physical objects. We have to understand these two distinctions, namely physical object and non-physical object. If we speak of the object signified by the word 'red', this expression must be a substitute for the word 'red'. Now, if we compare the phrase 'the object signified by 'red' and 'the object signified by "Books", then we can

understand that the grammar of this expressions is different from the grammar of the words 'Red' and 'Books'. We will go on calling 'Red' and 'Books' on objects. However, we must note that they are objects in very different senses. This means that the expression 'the object' 'red' is different from the expression the object 'dog'. To use the word 'object' about both in instances does not result in making them any more similar than they were before. And to say that a fact is composed of objects is a misuse of the word 'object'.⁷

According to Wittgenstein and Schlick, it is the transference of a definite 'form' or structure that constitutes the nature of communication. We can represent the form of a fact by the use of variables: thus 'aRb' may be used to represent the form of the fact. That "John loves Mary". Two names are having identity of structure in term of the description of those facts they imply in language. Two facts have same structure and the sentence expressing them shows it. Speaking of the structure of a fact makes sense only in relation to a given language. But the phrase "identity of structure" misleads us only too reality into losing sigh of this reference to language while we are thinking that two facts may have in themselves the same structure independently of their linguistic expressions.

Suppose, we substitute the sentence 'John loves Mary' by the following words: 'Russell for John', 'taught for loves' and 'Wittgenstein for Mary'. We will get a new sentence, that is, "Russell taught Wittgenstein". This sentence also has the same structure as the former sentence. According to Russell's view, the two facts, which are corresponding to those sentences are supposed to have the same structure. Now let us imagine a situation in which Wittgenstein's learned from Russell and in the same way as John express his attraction for Mary. Notice that in both the cases facts and structures are the same but expressed in a different way. As Schlick says, "one and the same fact may be expressed in a thousand different languages, and the thousand different propositions will have the same structure, and the fact which they express will have the same structure too". We will clarify the point with the help of the example given below:

"X is greater than Y
Y is greater than Z"

This may be said to be describing that 'X is greater than Z', and 'Y is between X and Z'. These two descriptions are equivalent: They both express exactly the same situation. I can replace one by the other without changing the meaning. The logical form of the two descriptions is totally different. These two sentences are symbolically represented by Russell as:

"X G Y. Y G Z
X G Z . B (Y X Z)".

These two descriptions originally cited are now made into three descriptions. These two descriptions have quite different forms. Now given these two forms the question that may be raised in which one among these two structures is to be called the structure of reality. As a final defence of this view it could be said that the structure of a fact mirrors itself in all the sentences

which can be transformed into each other without altering the meaning and that this class of propositions is the true expression of the structure of a fact. But if we say this, the word becomes so vague that it loses any definite sense. For the concept of 'all sentences which can be transformed into each other without alteration of meaning' is not clearly limited. Such sentences depend essentially on what kind of language we admit, whether only word-language or gesture-language or picture-language...etc. There is no concept of 'structure' which applies to all these languages indiscriminately.⁸

The word 'structures' may cause confusion due to the properties constituent of structure. In mathematics every word has well-defined meaning for example, the structure of the series of cordinal or rational members. We can say that all separated or isomorphic groups have the same structure. Russell very brilliantly transferred this expression from mathematics to logic. He said that two systems of relations have the same structure when they are represented by the same map. We can also give a different sense that the structure of a proposition will be divided into two parts. That two parts are the subject and the predicate. That these propositions have two and three relations, and so on. What can we understand by the structure of a fact? As we have seen the former expresses that the same fact can be expressed by sentences which have entirely different structures. The word 'structure' as applied to a fact, loses all definite meaning and we can arbitrarily choose one of these sentences. Than we may decide that the structure of the fact is to be the same as that of the sentence chosen. But if we may do this, the statement that 'the fact has the same structure as the sentence' may become true. The structure of the fact will be defined as the structure of the sentence. The statement explains how facts can be expressed by language.

The conclusion which we draw from this is that it is best to avoid altogether the term 'structure' is the light of these considerations. If we want to say something about the structure of a mood then we have to explain first of all what the meaning of the phrase is. At the same time if we speak of the structure of facts in general, or say that sentence imitates the structure of the fact it expresses, it is nothing but a misuse of language.⁹

Generally, our ordinary language is vague. So we are tempted to say that 'every sign represents an object' and that the sentence stands for the situation it expresses in the way as expressed above. This is misusing the expressions 'stand for' or 'represent'. We say for example, 'the sign R stands for Russell', but does not represent Russell. But we can say that R stands for the particular person or particular object. Whenever there is a similarity between the sign and what it represents, it is found to be misleading. For example, when the person 'John is symbolized by a picture of a little figure with a dog, we can speak of representation and such an expression is quite fitting. But to say that the word 'John' represents the person John is misleading.

Certain words are used for representation, for example representing a person. Suppose, I put cards with the names of Mr, X, Y, Z, etc., printed on it on conference chairs in order to indicate the chair where they are to sit. We can say that those

cards with the printed names are kept to indicate seats meant for Mr.X, Y, Z, etc. Those particular seats represent these particular persons like Mr.X, Y, Z, etc. Hence the names Mr.X, Y, Z, etc., represent these particular person. In view of this characterization, one may argue that the word 'chair' represents objects, namely object chair, and the word 'sit' represents specific place for people to sit. But to say this will be a misuse of the language. Because the word cannot represent a person. We can only say that the word stands for a person. So while we are using these two words – 'stand for' or 'represent', we must understand the slight difference of use of these terms. If we do not understand the use of these two words in the specific sense then we will be misusing language.

In accordance, we may briefly mention the difficulties associated with Wittgenstein's picture theory of meaning. After the publication of *Tractatus*, Wittgenstein realized that the central ideas of his picture theory of meaning were false. He recognized grave mistakes in his earlier theory of meaning. To quote Wittgenstein, "I was helped to realise these mistakes to a degree which I myself hardly able to estimate - by the criticism which my ideas encountered from Frank Ramsey".¹⁰ It is very important for us to consider those criticisms of his earlier views which Wittgenstein discussed in his *Philosophical Investigation*. As he pointed out, in his earlier period he had imposed impossible demands on proportion. Another of his important earlier view which he extensively criticized has concept of meaning. The doctrine that the meaning of a name is whatever it denotes is abandoned. There is no longer any need to suppose such a theory of meaning. A name can have a meaning even though nothing exists corresponding to it. The earlier theory of proposition is unable to survive. It makes no sense to speak of absolutely simple, indestructible elements of reality, that is, what Wittgenstein called objects in the *Tractatus*.

III. CONCLUSION

Finally, he came to the conclusion that his earlier theory of meaning was fundamentally wrong. It is significant to note here that Wittgenstein himself realized in his later writings the mistakes and shortcoming of his earlier theory of meaning as presented in the *Tractatus*.

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Intelligence of Heart (WoH)

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Abstract: This article is an attempt based on common day experiences that something exists beyond the so called Intelligence of Brain (IoB) that helps us to act in situation. It also describes situations in which IoB enters into an open conflict with this so called new intelligence. This new thing has been traced to an extension of the well known Emotional Intelligence (EI) as well we make to classify the observable traits of the so called people.

The key term used in this article is Wisdom of Heart (WoH). It's a new term to denote this kind of people and its an extension of the common term EI. We classify these people under the head WoH people.

I shall begin with some real life incidents that happened to me.

Incident 1: one day I was traveling in a general compartment of a train. To be precise it was the 2.30PM train to Chennai from Trivandrum (In India). It was the time after Diwali holidays so the train was heavily crowded. A group of students had occupied a birth of the compartment and they were occupying the top seats too (intended for luggage), and there were ladies too. The students at the top had to climb down to share some food with their friends at bottom. All students climbed down with ease except one girl, who didn't know how to climb down. Her friends at bottom started to joke and laugh at her, Joined by some co passengers, Like "if you don't know to climb down why did you go up". Immediately after the laughing ceased, a girl from the bottom birth got up and walked down to the aisle (where normally people climb up/down). She gestured to her friend to climb down. Her friend on top told her that she was afraid, to which she gestured with her hand that "don't worry, If anything awkward happens I will take care". Reminds me of the old ICICI Bank ad' hum hai na' when a mother leaves her child at school but is worried to leave him alone. To which the teacher gestures with the same sign. Astonishingly the other girl climbed down with little or no help from the one at bottom. I thought of standing up and applauding at the

instant. But showed thumbs up sign to the other girl to which she nodded (Thankfully).

Back during my train journey I kept pondering over what type of intelligence had the girl used which made her rise meteorically like a hero , for some (at least one) during the situation. Was it her academic skills that mattered?

Incident 2: A couple of months back I was undertaking the same train. A local vendor (An old lady) was selling some eatables. After making her sale tired of the days' work she asked a passenger sitting at the window seat to kindly let her sit as she was feeling headache and she could breathe fresh air. He refused. A local passenger sitting at the aisle row (near to the window), Got up and offered his seat. He left at the direction of exit, towards the back side of the coach. I joined him , he told me that he didn't have the money nor the need to buy what the old lady was selling. But was thinking of how he can be of help to the vendor. It was much like a God sent opportunity for him, to help the old lady! When I returned to my seat I could find the vendor cracking joke with an old lady sitting next to her!

Incident 3: This happened during my first job. I was in sales, and our company was a hardcore sales organization. There was a particular friend of mine who had engineering as well Management Degree. Since we were in sales we would have parties after our month end on reaching our targets. Drinks were common in such parties. This particular friend (Say X) of mine would not take drinks during college days or not so far. To make our boss feel elated we told him that sir X has not taken drinks so far, but may be U can make him drink today. We all sat in a room for the routine and my boss announced that Mr X is joining us tonight for drinks. Though my friend resisted, in the end succumbed to what my boss demanded. We all thought our boss had won. He asked to place glasses as per the head count. Drinks were poured in each glasses. My boss declared that Mr X would start the party today by sipping first. We all told cheers raising our glasses. Then something unusual happened. My friend X dropped his glass on the table, looked straight into the eyes of my boss and told" boss, if none among us is not going to drink a peg more from these glasses again, I wont touch this glass any more!" We all knew our boss had a terrible anger (he had

told not to drop our glasses without drinking a sip after saying cheers), but instead he told us Mr X wont join us tonight for drinks. Lets us drink and enjoy. Mr X joined us for the party but did not take any drinks.

The next day at office I just asked my friend where did he get the courage to tell NO to my boss, who didn't have a second opinion / Suggestion at our office. My friend laughed at me and a bit hesitantly told me his story!

His mother took much pains to see him through his studies. His father was a drunkard. While he was a kid, he was the eldest (had two younger sisters) , his father would come home drunk and fight with his mother and beat her for not giving him the money to drink. His mother would silently suffer all these but took a promise from him while he was a kid. When he grew up he WONT drink. My friend then told me "tomorrow I may stand to loose my job / career. But I am not worried. I don't want to break the promise given to my mother". Frankly I fumbled for words. I did not know how to answer him. That day when I went to my bosses cabin I knew I had a job in hand.

We have addressed the instances that happened. Well what was in these situations that mattered. I recall my childhood lessons were we studied a subject which had less than an hour a week. I am talking of moral science. It reminded me it is the most important subject , because you can forget all the subjects on your academics but not this, because it teaches you how to live. We all know of the intelligence of the brain and , we term ourselves as intelligent beings inheriting planet Earth. There are well known methods to measure intelligence of the brain like IQ tests and academic brilliance. But does brain alone has intelligence for us intelligent beings?

Recalling the incidents mentioned above in none of the cases it was a case of intelligence of the brain that mattered. It was something else that mattered that made them stand up in the situation, a deviation from the normal phase. I have brushed through the available resources, but all speak of intelligence of brain alone, but there is something beyond, Intelligence of something else, Intelligence of the HEART Wisdom of Heart (WoH). It can be associated with the term Emotional Intelligence (EI). It speaks of intelligence of the heart!. It's purely EI at work!

In the incidents mentioned above first of it was the lady in the train. It can be said here that her friend needed help / Support which she was able to provide, forgetting the situation. Her friend only needed the feeling / Confidence that someone was out there to support her which she was able to provide. She was able to act in the situation while others resisted.

In the second incident the man in the train he empathized with the old lady . Was thinking how he could

be of help? That's why when the situation came he acted. He got a chance when the other person refused to yield ,That's what he told later "much like a God sent opportunity".

Moving to the third case It was much like a case of conflict with Intelligence of Brain (IoB) Vs WoH. His academics /Learning's /Career all which can be associated with IoB which must have told him to obey him to obey his boss, But it was on the other hand it was WoH which kept him reminded him of the promise made. It can be guessed well here that he must have encountered many situations before wherein he had to yield or in his words "Had to break the promise given" but it was a NO from his part. His situation was he had to lose many by earning the wrath of his boss, His career / Job security etc. But he said come whatever may he chose not to break the promise given to his mother. In future also if any kind of similar situations come he may do the same (I believe).

I have tried to observe these kind of people and have found the following traits common for these kind of people.

1. At Perfect Harmony with Themselves : This is a distinguishing feature of WoH people. WoH people are always at perfect harmony with themselves. They enjoy / indulge in solitude more than anyone else. They tend not to escape rather enjoy it. This can be more pronounced / observed during journey times. People try all sort of things like sleeping, Reading , Listening to music , Playing games, Doing work, operate laptop etc to escape the boredom. But WoH people on the other hand rather than escaping, indulge in it. They observe things around them , Watch nature etc and don't make others feel they are bored. They enjoy solitude rather than avoid it.

2. Talkers to themselves than to others: This is a striking feature of WoH people. They tend to be more speakers to themselves. It can be correlated with the point No 1 discussed i.e. At perfect harmony with themselves , as their way of escaping solitude. Rather than keeping others bothered, by this act they themselves find a way to keep engaged. Talking to themselves in fact increases their strength.

3. Empathetic: Empathy – what does it mean. Putting yourself in the shoes of the other. For that you will have to remove your shoes first and make sure that the other persons fit yours. who people know this act. They not only sympathize with the person / situation , but act in the situation . Empathetic rather than sympathetic.

4. Authentic: Authenticity -- What is the word meaning. Does it have anything to do with the moral fabric of a person? It simply can be said as the power to be oneself. WoH people are authentic. Their direction and priorities are clear.
5. Honest : WoH people are honest. They stand up to any situation were they require to exhibit this trait.
6. Respect the other sex: WoH people respect and honour the opposite sex.
7. Observers : WoH people are keen observers . They are aware of the situations around them. They observe other people, things around them as well nature.
8. Thinkers : WoH people are good thinkers. They use the help of their brains in making judgments / conclusions.
9. Proactive : Proactive ness notes their ability to master situations. Rather than being a slave to situations they master the given situation. Proactive ness notes their ability to guess how a situation would unfold and hence act accordingly. Proactive rather than reactive.
10. Logical : WoH people have a definite reason / Logic for everything. They do things / arrive at judgments based on this logic.
11. Conscience Driven : WoH people judge based on their conscience , not based on people or situations. They have a moral element in all the things they do.
12. Respect life: WoH people respect and promote other forms of their fellow creatures (Visible)

Thus , We have seen how apart from intelligence of brain something else in our body too have intelligence to help us act in situations, Intelligence of heart (WoH). WoH is important since it helps us act in situations where IoB fails miserably.

Dedication:

I wish to thankfully remember my good friend Mr KrishnaPrasad (dasarpknair@gmail.com) who has been a constant source of motivation and encouragement for getting this article published. He has also provided me the financial help to get this materialized. So I would like to dedicate this article to his belief in my capability..

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Prevalence of Epibiont Protozoan communities on *Penaeus monodon* (Fabricius) from the Hatchery off Visakhapatnam, East Coast of Andhra Pradesh, India

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Abstract- The present study aimed to establish the information on protozoan diseases in Black tiger shrimp *Penaeus monodon* during the year 2012. Due to high levels of ciliate infestations can affect respiration, feeding, growth, survival and also irritation behaviour of larvae (zoea, mysis and post larvae) was observed. Protozoan diseases in *P. monodon* was global problem in hatcheries mainly affect the eggs and larval stages. In current study we found different variations of ciliary infections were observed throughout the year (2012), we also concentrated on some physical parameters like PH, Temperature (to C), and salinity (ppt), variations of these parameters will affect the larval growth and survival rate in hatchery system.

Index Terms- *Penaeus monodon*, Protozoans, ciliates and survival rate.

I. INTRODUCTION

T*Penaeus monodon* serve as host for different kinds of protozoan parasites and commensals, occur both outside and inside the host body Peritrichous ciliates like *Zoothamnium* sp. and *Vorticella* sp. are ecto-commensals and microsporidia and gregarines are endo-commensals.

In farmed shrimp, heavy infestations of ectosymbionts are expected because transmission is enhanced due to high stocking densities and variations of environmental parameters (e.g., ammonium, nitrate, and dissolved oxygen levels), the consequence of pond fertilization (Kautsky et al., 2000; Gualteros-Rodríguez, 2003). The ectosymbionts peritrichous ciliates remain attached to the gills and limbs. A possible relationship between the peritrich ciliate, *Zoothamnium* sp., and mortality of host following stress was discussed previously (Overstreet 1973). Their abundant presence can interfere with the breathing and mobility of the host. The *Zoothamnium* infections are at their peak during monsoon and post-monsoon months and these infections appear to be governed directly by salinity of the habitat and indirectly by the rainfall (Jayasree et al. 2001).

Microbial diseases have been reported to be a major limiting factor in production both in wild and cultured shrimps. A large amount of data has recently been accumulated on a variety of pathogens affecting both larval and cultured shrimp (Overstreet, 1973, 1982; Lightner, 1983, 1985). Among the Protozoa, microsporidia have been most frequently recorded (Parsons & Khan, 1986) but the knowledge of other protozoan infecting shrimp is not so extensive. From the observation already made by different workers in the field of Pathology of

Penaeus monodon. Bradburg and Trager (1967) were reported Excystation of apstone ciliates in relation to moulting of their crustacean hosts. Diseases caused by protozoa in the biology of crustacean was by Couch John (1983), Kruse (1959) gave detailed information about parasites of the commercial shrimps.

II. MATERIALS AND METHODS

For studies on protozoan diseases of larvae and post larvae, the larval samples were collected from each tank by means of 250 ml beaker and estimated by random sampling method for larval populations. Every day sampling was practiced for this study. For studies on the symptoms of various diseases, the larvae were observed under a research microscope and noted the physical appearance of the larvae and post larvae. The behaviour of the larvae and their feeding condition and their activity was also note down. . Observations were made on the seasonal prevalence of ciliate protozoan and in relation to survival and mortality. Further, the infected larvae and post larvae were experimented to control the infection by using different antibiotics and chemicals. The following antibiotics were used for this experiment

A) Chloramphenicol	(CP)	1.5 - 3.5 ppm
B) Prefuran	(PREF)	0.5 - 1.0 ppm
C) Treflan	(TFL)	0.05 - 0.5 ppm
D) Oxytetracycline	(OTC)	1.5 - .3.5 ppm
E) Furozolidone	(FZ)	1.5 - 3.5 ppm
F) Erythromycine	(EM)	1.5 – 2.5 ppm
G) Cifrofloxine	(CF)	1.5 - 2.5 ppm
H) Formaldehyde		5.0 - 15 ppm

III. RESULTS

Experiments were conducted on the prevalence of protozoan, diseases of *P. mondon* larvae (from Z₁ – PL – 20) for the year of 2012. Microbial diseases have been reported to be a major limiting factor in production both in hatchery and cultured shrimps

A number of ciliate protozoans occur as symbionts, commensal, parasites and pathogens of crustacean larvae. The exoskeleton of the shrimp larvae served as a substratum on which both sessile and mobile forms of peritrichous ciliates lived and reproduced. Most peritrichous ciliates viz., *Zoothamnium* *Epistylis*, *Vorticella*, *Lagenophrys*, *Acineta* found to attach themselves on the cuticle, causing mortality of larvae and post-

larvae. They were observed to also interfere in feeding and respiratory activity of the larvae and post-larvae. This was the main reason found for the mortality of the shrimp larval and post-larval stages.

Site of occurrence and pathological signs of ciliate (Protozoan) diseases: The peritrichous ciliates viz *Zoothamnium* sp., *Vorticella* sp. *Epistylis* sp. and *Lagenophrys* sp. were recorded in *P. monodon*'s larvae and juveniles. All the peritrichous ciliates were commonly noticed on external part of the body, on the cuticle and gills. Reddish to brownish gills were observed in case of chronic protozoan infections.

The affected larvae and post-larvae faced difficulties in locomotion and feeding activities. Large numbers of colonial ciliates were observed to attach themselves on the mouth parts, hindering the free movement of the mouthparts and disabling the larvae and juvenile forms to collect and feed the food material. Larvae and post-larvae were found to die due to starvation stress.

Table 1: Seasonal variations of Protozoan diseases in *Penaeus monodon* and survival of zoea larvae percentage in 2012.

Months	Stocking density in millions	Protozoan diseases		Percentage of survival after treatment	
		Millions	%	Millions	%
January	0.945	0.138	14.67	0.818	83.87
February	0.938	0.171	18.24	0.764	81.54
March	0.874	0.173	19.82	0.704	80.62
April	0.960	0.210	22.46	0.762	79.40
May	0.875	0.160	18.34	0.687	78.54
June	0.967	0.124	12.87	0.809	83.72
July	0.890	0.139	15.63	0.743	83.46
August	0.865	0.178	20.61	0.727	84.13
September	0.956	0.166	17.35	0.790	82.67
October	-	-	-	-	-
November	-	-	-	-	-
December	0.845	0.142	16.89	0.711	84.19

Table 2: Seasonal variations of Protozoan diseases in *Penaeus monodon* and survival of Mysis larvae percentage in 2012.

Months	Stocking density in millions	Protozoan diseases		Percentage of survival after treatment	
		Millions	%	Millions	%
January	0.818	0.143	17.49	0.708	86.65
February	0.764	0.166	21.74	0.668	87.55
March	0.704	0.096	13.70	0.597	84.87
April	0.762	0.142	18.62	0.639	83.88
May	0.687	0.084	12.37	0.560	81.53
June	0.809	0.167	20.66	0.708	87.56
July	0.743	0.114	15.38	0.634	85.36
August	0.727	0.085	11.74	0.632	86.82
September	0.790	0.114	14.46	0.638	80.76
October	-	-	-	-	-
November	-	-	-	-	-
December	0.711	0.128	18.10	0.584	82.25

Table 3: Seasonal variations of Protozoan diseases in *Penaeus monodon* and survival of Post larvae (PL1-10) percentage in 2012.

Months	Stocking density in millions	Protozoan diseases		Percentage of survival after treatment	
		Millions	%	Millions	%
January	0.708	0.116	16.49	0.630	89.11
February	0.668	0.145	21.74	0.593	88.90
March	0.597	0.102	17.13	0.551	92.46
April	0.639	0.119	18.62	0.552	86.38
May	0.560	0.069	12.37	0.479	85.64
June	0.708	0.146	20.66	0.633	89.36
July	0.634	0.097	15.38	0.554	87.47
August	0.632	0.086	13.74	0.558	88.28
September	0.638	0.130	20.46	0.559	87.55
October	-	-	-	-	-
November	-	-	-	-	-
December	0.584	0.106	18.10	0.513	87.82

Table 4: Seasonal variations of Protozoan diseases in *Penaeus monodon* and survival of Post larvae (PL11-20) percentage in 2012.

Months	Stocking density in millions	Protozoan diseases		Percentage of survival after treatment	
		Millions	%	Millions	%
January	0.630	0.096	15.30	0.574	91.21
February	0.593	0.134	22.67	0.546	92.17
March	0.551	0.100	18.26	0.501	90.78
April	0.552	0.118	21.47	0.485	88.02
May	0.479	0.072	15.12	0.429	89.61
June	0.633	0.118	18.65	0.579	91.53
July	0.554	0.108	19.63	0.478	86.24
August	0.558	0.118	21.26	0.482	86.52
September	0.559	0.118	12.35	0.477	85.45
October	-	-	-	-	-
November	-	-	-	-	-
December	0.513	0.075	14.63	0.465	90.54

Figure 1: Rounded area in the figure 1 infected with protozoan disease at egg stage

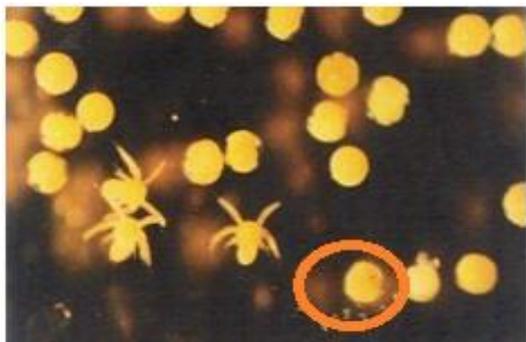


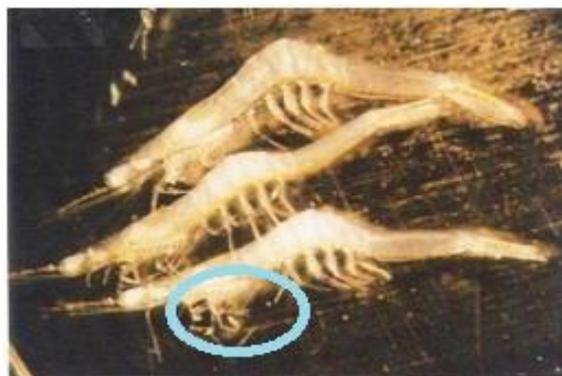
Figure 2: Marked area in figure 2 with attachment of Protozoans



Figure 3: Appendages, Uropods were infected with Protozoans at Mysis 3rd stage



Figure 4: Pleopods were infected with Protozoan diseases



Stage – Zoea: 1 – 3

Table (1) shows percentage of infected larvae and survival rate after infection due to protozoan diseases. It is evident from the table that protozoan disease have been observed throughout the year, highest percentage, 22% infected zoea was noticed in the month of April during the year 2012, lowest of 14% observed in January in the same year. The high survival rate of 83%, 83%, 83%, 83%, 82% and 84% was recorded during monsoon and post monsoon period in the year 2012 (Table 1) after treatment.

Stage - Mysis: 1 - 3

Mysis larvae were also affected with protozoan diseases, especially with the ciliate infection. The highest percentage of protozoan disease in Mysis stage was recorded as 21% and 20% in the months of February and June and lowest percentage of 11%, observed in the month of August during the year of 2012 (Table 2).

Post Larvae (PL): 1 – 10:

Incidence of infection due to protozoan ciliates, were recorded in the early juvenile stages. The contagious diseases used to spread fast in the aquatic media from larval stages to the post-larval stages. The various details about the % of juvenile shrimps infected are shown in Table 3. It was noticed in the present observations that prolonged rearing of the larvae and

continuous operation of the hatchery or laboratory without frequent time gaps between cycles lead to the development of infections. It was also observed that the juvenile stages were relatively resistant to diseases when compared to the larval forms. Various antibiotics and disinfectants were used to control the infection caused by ciliates, It was observed that the ciliates were susceptible to 1-10 ppm in various post-larval stages. Similarly 2-4 ppm of cupric sulphate was found to be useful for successful control of the ciliates in commercial operations; thorough water exchange followed each treatment.

Post Larvae (PL): 10-20:

Table 4 shows that the highest percentage 22.67% infected post larvae was noticed in the month of February and lowest of 12.35% observed in September in the same year. The high survival rate of 92.17%, 91.53%, 91.21%, 90.78%, and 89.61% was observed February, June, January, March, May respectively after treatment with antibiotics.

IV. DISCUSSION:

Disease is a major threat for any biological system against which man's fight is an ending. In an aquatic system prevention is the best remedy. If a hatchery system is infected with a disease, it is better to discontinue the operation till the pathogen is eradicated by disinfection and drying. Parasitic infections were earlier reported from different geographical areas of India (Bower et al. 1994; Prasad and Janardan 2001; Johny et al. 2006).

Diseases and parasites of shrimp constitute a potential constraint on successful production this valuable seafood. A large amount of data has recently been accumulated on a variety of pathogens affecting both natural and cultured shrimp (Overstreet, 1973, 1982 and Lightner, 1983, 1985).

The development of protozoan infection has a direct relation to the water exchange and quality of the feeds. In good water exchange by flow through mechanism, that left over feeds and excretory materials can be removed efficiently preventing the ciliates to multiply. But in poor quality feeds which are left behind in the tank bottom and water exchange, resulting in high nutrient levels the ciliates multiply rapidly attacking the appendage of the swimming larvae. Overstreet (1973) made extensive study on *Zoothamnium* infection in penaeid shrimps and found a positive correlation between the stocking density of shrimp and the prevalence of infection.

The prevalence of the protozoan parasite was observed in summer following the same seasonal trend as ciliates. This parasite is highly pathogenic to shrimp and heavy infection may cause loss of appetite, growth retardation and ultimately death of the host in the culture system (Lightner 1993). The current studies revealed that the peritrichous ciliates infected larvae and post larvae of *P. monodon* exhibited a fuzzy appearance, frequent jumping or circular swimming movements. Similarly, earlier studies have shown that epi-commensal organisms if occurred in large numbers on the body surfaces and appendages could cause difficulties in locomotion, feeding, moulting or respiration, resulting in mortalities (Johnson et al., 1973, Chang and Su 1992). Transmission of ciliate parasites increases during summer in tropical or subtropical climates because of the

physicochemical conditions of the farm (Norma et al. 2009), increasing metabolism and molting of decapods host occurred due to heavy amount of solar energy (Rhode 1992; Jayasree et al. 2001).

Infection of protozoan ciliates on the gills of the larvae usually do not effect growth because they do not derive nourishment directly from the host but considered to have a synergistic effect during the periods of stress. But the commensal ciliates are considered pathogenic because of their heavy anastomosis on the gills and mouthparts, causing the mouthparts immobile, preventing the larvae to feed actively; death was due to starvation.

From the discussion it can be concluded that, During summer months due to high intensity of solar energy the moulting process is favoured (Rhode 1992; Jayasree et al. 2001), thus increasing the invasion of parasites. So adequate measures should be taken in the particular months to avoid protozoan infections.

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A Clustering-Based Approach for Detecting Profile-injection attacks in Recommender Systems

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Abstract- E-Commerce recommender systems are vulnerable to different types of profile-injection attacks where a number of fake user profiles are inserted into the system to influence the recommendations made to the users. In this paper, we have proposed a way of detecting such attacks by applying clustering technique. The attack-profiles are considered as outliers in the user rating dataset, which are identified by the clustering algorithm. In our work, we have used Partition around Medoid (PAM) clustering algorithm in detecting the attack-profiles. An incremental version of the PAM algorithm has been applied and tested for evaluating the performance of the system in identifying attack profiles when they come into the system. Experiments show that though PAM is able to detect attack profiles with larger number of filler items very well, a percentage of attack profiles with smaller number of filler items is not included in outlier clusters-they are included in large clusters. We have applied a PAM-based outlier detection algorithm to find these attack profiles in large clusters.

Index Terms- Recommender System, Attack-profile, profile-injection attack, PAM, Outlier-detection.

I. INTRODUCTION

Many web sites attempt to help users by incorporating a recommender system that provides users with a list of items and/or web pages that are likely to interest them. Content-based filtering and collaborative filtering are usually applied to predict these recommendations. Among these two, Collaborative filtering is the most common approach for designing e-commerce recommender systems. It works by building a database of items with users' opinions on them. Then a specific user is matched against this database in order to find her neighbors, those with whom he or she shares similar tastes. As the system is open to user input, chance of attack on it is always there. The researchers have discussed different types of attacks. The ultimate target of all type of profile injection attacks is either to push a product (or a group of products) or to nuke a product (or a group of products). In case of Random Attack [1] a pre-specified rating is assigned to the target item and random ratings are assigned to the filler items whereas in average attacks [1], rating of each filler item corresponds to the mean rating for that item. Some additional attack types have been specified by Burke et. al.[2] namely Bandwagon Attack, Segment attack, Reverse Bandwagon Attack and Love/Hate Attack. The last one is a very simple attack and requires no system knowledge where the attack profile consists of minimum/ maximum rating value for target items and

maximum/ minimum rating value for filler items for nuke/push attack.

On the other hand, in literature, the researchers have proposed several outlier detection techniques. They can be broadly categorized into different groups namely distance based approach, density based approach, clustering based approach and depth based approach. In clustering based approach, the clusters having small number of members are considered as the clusters consisting of outliers assuming that outliers are a small percentage of the total data. The main advantage of this approach over the other approaches is that the outlier detection is totally unsupervised.

In clustering-based anomaly detection techniques it is assumed that the percentage of data, which is inserted during attack event, is very small compared to the total data. At the same time, the nature of the attack data also differs from the data without attack. Based on these two assumptions, the data members of clusters with small sizes are considered as outliers, which in turn, correspond to the attack data. As rightly mentioned in [3], attack profiles are highly correlated and at the same time the number of attack profiles are very small compared to total number of genuine user profiles, we have considered the problem of profile-injection attack detection as a problem of outlier detection in the user rating dataset and applied PAM clustering algorithm in detecting the outliers or injected attack profiles.

In our paper, after evaluating the performance of PAM clustering algorithm in detecting attack-profiles with different size of filler items, an incremental version of the PAM algorithm has been applied to test whether a new user profile which is going to be inserted into the system is an attack profile or not. Finally we have applied a PAM-based outlier detection algorithm to find attack profiles in large clusters that are not identified by the PAM algorithm.

II. RELATED WORK

Detection of profile-injection attacks on recommender systems have been studied by many researchers. Supervised classification techniques have been used in [2] in order to distinguish attack profiles from genuine user profiles.

In their paper [4] used hierarchical clustering technique in detecting outliers. They have compared the performance of several hierarchical clustering algorithms in this regard. The authors of paper [5] have proposed a two-stage approach of outlier detection by using the concept of minimum spanning tree along with clustering. A Fuzzy-based clustering algorithm has

been proposed by authors of paper [6] in detecting outliers in data. In both of the papers [7] and [8], PAM has been used as clustering algorithm. The authors of the first paper [7] have used a separation technique after applying PAM algorithm. In the second paper [8], the members of the small clusters generated by the clustering algorithm are identified as outliers.

The unsupervised methods have been used by many researchers in the field of network intrusion detection [9], [10]. In the area of recommender system also, a few works [11], [12] have also been reported in the literature where unsupervised methods have been used as a tool of attack detection. In their paper [11], authors proposed a Principal Component Analysis (PCA) based clustering algorithm for detecting attack profiles based on the assumption that attack profiles are very highly correlated with each other.

III. PROPOSED APPROACH

In our approach of attack detection, the user profiles, which have been injected into the system during attack event, are considered as outliers, which are, in turn, detected by clustering algorithms. In this paper, for the purpose of outlier detection, we have applied PAM (Partition Around median) algorithm [14], one of the first k-medoid algorithm introduced in the literature.

PAM

In PAM algorithm, the most centrally located object (called medoid) in each cluster is considered as cluster centre and as medoids are less influenced by outliers than means, PAM is more robust than k-means [13] in presence of outliers in the dataset. In PAM algorithm, an initial set of medoids is selected first. Each one of the selected medoids are then replaced iteratively by one of the none-selected medoids until sum of the distances of the data objects to their closest medoids is improved.

The algorithm is as follows-

1. arbitrarily select k objects medoid points out of n data points ($n > k$)
2. repeat
3. associate each remaining data object in the given data set to most similar medoid.
4. randomly select a non-medoid object, O_{random}
5. compute the total cost, S of swapping medoid object O_j with O_{random}
6. if $S < 0$ then swap O_j with O_{random} to form the new set of k-medoid objects
7. until no change.

We have taken Euclidean distance measure to define similarity between two data objects. After applying the PAM algorithm on the user rating profiles we identify those user profiles as attack profiles that belongs to the small clusters. Following the definition of small cluster given in [4] we identify outliers as the data objects that belong to a cluster having size lesser than half the average number of points in the k clusters.

Cluster Updation

Whenever a new rating data comes into the system we need to reconstruct the existing clusters which is very costly. We

apply a simple cluster-updating algorithm proposed by [15] based on the previous algorithm to dynamically update the clusters. After partitioning the existing n data points using PAM algorithm, assume, the total distance which is the summation of all distances from each data point to its closest medoid is T. This information is also stored in the database and used by our cluster updating algorithm which is as follows-

1. For the new rating data object D' , find the closest medoid, say M' with distance Dist' .
2. Compute total distance T' if M' is replaced with D' .
3. if $T' < T + \text{Dist}'$ then swap M' with D' to form the new set of medoids.

Identifying Attack-profiles in Larger Clusters

From our experiment we observe that most of the attackers are detected in outlier clusters when the percentage of filler items of the attack profiles is high. When the filler percentage is low, a large fraction of attackers are not detected and belongs to the large clusters. To identify those attackers who belongs to large clusters we have used a PAM-based outlier detection algorithm developed by the authors of paper [8].

The algorithm [8] first computes absolute difference between each data point of a large cluster and the medoid of that cluster. If the difference crosses a threshold limit for a data point then that data point is detected as outlier. The threshold value is computed as 1.5 times of the average of differences between each data point of a large cluster and the medoid of that cluster (ADMP as they name). The algorithm can be described as-

1. Apply PAM to detect outlier clusters.
2. For each cluster not defined as outlier cluster-
 - a. For each data point in that cluster-
 - i. Calculate ADMP, the absolute difference between the data point and the medoid of that cluster.
 - ii. If it crosses Threshold, T declare that data point as outlier.
 - iii.

IV. RESULT

DATASET

In our experiment we have used MovieLens dataset (movielens.umn.edu). The data set used contained 100,000 ratings from 943 users and 1682 movies (items), with each user rated at least 20 items. The item sparsity is easily computed as 0.9369. The ratings in the MovieLens dataset are integers ranging from 1 to 5.

EXPERIMENT

In our experiment the attack size (in terms of false user profiles) has been set to one percentage of the total number of users in the dataset. The attacker profiles have been built following Random attack model where the target item is given the maximum rating value and the filler items are given random rating values. In comparing performance PAM algorithm in attack-profile detection, we have used different percentage of filler items in the attack profiles. As per definition of small

cluster given in [4] clusters having less than ninety five members are considered as clusters having outlier or attack profiles for MovieLens dataset that we have used. In our experiment, True Positive is considered as number of attackers present in small clusters, False Positive is considered as number of non-attackers present in small clusters and False Negative is considered as number of attackers not present in small clusters.

Table 1 shows that when percentage of filler items is 70%, the performance of PAM algorithm in detecting attack profiles is 100% i.e. all the attack-profiles belong to outlier clusters. When percentage of filler items is 60%, 68% (average of five runs) attack-profiles belongs to outlier clusters whereas other 40% attack-profiles belongs to the other large clusters. In case of attack-profiles with 40% percent of filler items the average number of attack-profiles detected correctly reduces to 16%.

At the time of evaluation of the performance of the incremental version of the PAM algorithm [15], we first incorporate 0.5 percent attack profiles(i.e. five fake user profiles in our case) into the system and perform PAM algorithm. Then five other attack profiles (rest 0.5 percent of 1 percent attack profiles) are inserted into the system one at a time. We, then, check whether the algorithm is able to identify them as attack profile or not. When the size of the filler items in the attack profiles is 70% the algorithm gives 100% accuracy. For filler items size 60% the accuracy is 80%(the average of three runs) and whereas for filler items size 60% the accuracy is 33%.

The performance of the algorithm [8] for detecting attack-profiles in larger clusters has been shown in the last column of the Table 1. In all runs of the experiment for filler item percentage 40 and 60, all the attack-profiles in the large clusters are detected successfully and the number of genuine user-profiles detected as attack-profiles reduces significantly.

Percentage of Filler items in attack-profile	Run	% of attacker detected in outlier cluster by PAM	Size of clusters where other attackers belong	Number of False attacker detected in large clusters by PAM-based algorithm
70%	1	100	-	-
70%	2	100	-	-
70%	3	100	-	-
70%	4	100	-	-
70%	5	100	-	-
60%	1	100	-	-
60%	2	40	899	44
60%	3	30	809	26
60%	4	90	864	53
60%	5	80	861	51
40%	1	10	841	76
40%	2	0	915	96
40%	3	10	888	74
40%	4	50	877	62
40%	5	10	880	66

V. CONCLUSION

In this paper, we have proposed a data clustering-based approach of detecting profile-injection attack by considering the attack profiles as outliers in the rating dataset as it has been seen that attack-profiles have different characteristics than the normal user profiles and number of attack profiles are very small compared to the total number of user profiles. At first PAM has been used for clustering and profiles in small clusters are identified as attack-profiles. Then for identifying attack-profiles in larger clusters, a PAM-based algorithm has been used. The performance has been measured for a random attack model. In future, we are interested in measuring the performance of our approach for other attack models.

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Signal Bursts observed by low Earth Satellite during Seismicity

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Abstract- Every year, the world is hit by a large number of earthquakes, which result in enormous damage, not only in terms of mortality rate but also adversely weaken the socio-economical spine of any nation. Recent years have evidenced a comprehensive study about seismic activities and the various phenomena associated to such events. An interesting and relatively nascent subject related to earthquakes is the generation of Ultra Low Frequency and the Extremely Low Frequency emissions, that account for changes in the electric and the magnetic field prior to moderate as well as strong earthquakes. This paper attempts to emphasize on and discuss the association of ULF and ELF waves in context to the seismic activities. Also some of the intricate causes pertaining to generation mechanism of such electric burst are discussed.

Index Terms- DEMETER, Earthquakes and Electric Field Variation.

I. INTRODUCTION

The study of electro-magnetic emissions during a seismic event has attracted a large number of physicists and seismologists. Among the electro-magnetic emissions during earthquakes, the Ultra low frequency (upto 10 Hz.) and the Extremely low frequency (3Hz. to 3kHz.) prove as an effective mode to study the precursors associated with moderate as well as large scale earthquakes. These emissions propagate up to the ionosphere (Gokhberg et.al., 1983, 1984; Molchanov, 1991). Observations made by low altitude satellites also show enhancement in the ELF signals over seismically active regions. Despite the involvement of high frequency emissions, this paper presents the ULF and ELF variations associated with seismic activity as they possess a greater skin depth. The ELF and ULF measurements started recently in Seikoshi station have detected the precursory anomalies for large earthquakes ($M > 6.0$) near Izu Island. The Guam earthquake of 1993 and California quake of 1989 are other such evidences of ULF and ELF emissions. This paper presents the electric field data recorded by a low altitude satellite during a recent Indonesian earthquake (3.68 °S, 135.46 °E, 07:36 hrs. UTC and 100 kms. from Enarotali) that measured 6.1 on the Richter scale .

Generation mechanism of Electro- Magnetic emissions:

The primary mechanisms for the generation of electric and magnetic field changes during earthquakes include effects such as piezoelectricity, tribo-electricity, the electro kinetic effect and micro-fracturing. These phenomena are briefly discussed below.

Piezoelectric effect: The mechanism is based on the phenomena that opposite sides of certain piezoelectric crystals become oppositely charged when stress is applied to them in certain crystallographic directions. It happens due to subtle displacement of ions in the structure (Finkelstein et.al., 1973). This causes a voltage (piezo-voltage) to generate and it is expected that similar processes of indentation in tectonic plates due to their differential motion could lead to electromagnetic emissions.

Tribo-electric effect: it describes the phenomena that when crystals are violently rubbed or abraded sparks may be observed. In the process, current is generated referred to as the tribo electricity and cause the disturbed electric and magnetic fields.

Electro kinetic effect: The role of active fluid flow in the earth's crust as a result of dislocation or volcanic activity can generate electric and magnetic fields (Fenoglio et.al., 1995). Such variations in the electric and magnetic fields result from fluid flow through the crust in presence of an electric double layer at the solid liquid interface.

This double layer consists of ions enclosed to the solid face along with the equivalent ionic charge of opposite sign distributed in the liquid phase near the interface. Fluid flow in this system transports the ions in the direction of the flow of fluid and in turn results an electric current.

Micro-fracturing: When stress from a rock under high uniaxial compression are released suddenly a micro crack is generated with emission of electrons from the atoms giving rise to the distribution of oppositely charged particles (electrons and ions) near the tip of the generated crack. With the consequent increase in stress, two micro cracks are nucleated at the end points of the initial crack. They grow in both directions and finally cause an axial splitting. The negative charges exist in the middle and the positive charges at the ends. Such a distribution of charges, is equivalent to a moving electric quadrupole which is sufficient to generate electric and magnetic fields.

Project DEMETER (Detection of Electro-Magnetic Emissions Transmitted from Earthquake Regions):

In order to encourage studies related to large number of earthquakes and related phenomena simultaneously, the French scientists have launched a microsatellite 'DEMETER' (Detection of Electro-Magnetic Emissions Transmitted from Earthquake Regions) mainly to study and investigate the ionospheric perturbations associated with major geophysical hazards such as volcanic eruptions and earthquakes.

The mission was proposed by *Laboratoire de Physique et Chimie de l'Environnement (LPCE)-Environment Physics and*

Chemistry Laboratory. It is also equipped with instruments to detect the electro magnetic field variations linked with seismic occurrences.

Magnetic field component measurements: The ‘Instrument Magnetometre Search Coil’ (IMSC) has been used to measure the three components of the magnetic field upto 18 kHz. The value of the corresponding magnetic field is given by the current circulating in a spiral coil around a metallic core. The 3 antennas supporting the tri axial measurement of the magnetic field are mounted according to three orthogonal axes at the end of 1m arm.

Electric field component measurements: The ‘Instrument Champ Electrique’ (ICE) is utilized for making the electric field measurements upto 3MHz. The three components are obtained by measuring the potential difference between the electrodes.

II. OBSERVATIONS

In this paper, the electric field variations measured by **DEMETER** satellite that occurred during the earthquake in the Irian Jaya region in Indonesia (**3.68 °S, 135.46 °E, 07:36 hrs. UTC** and **Ms=6.1** 100 kms. from Enarotali) have been presented for the ELF range.

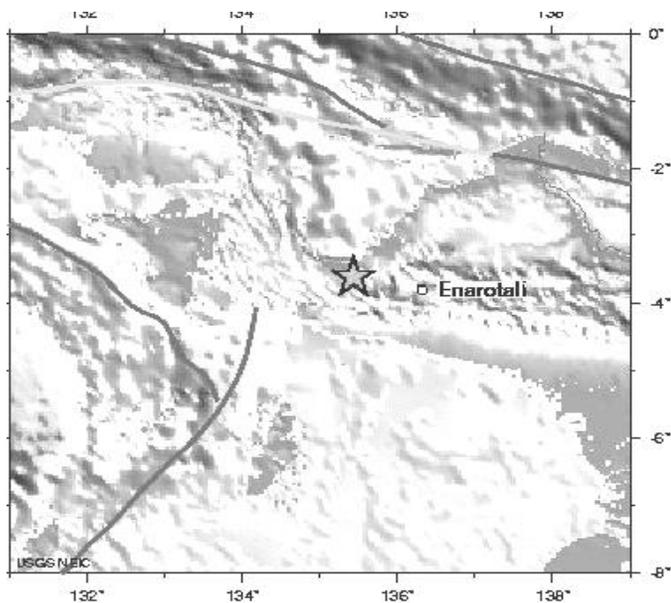
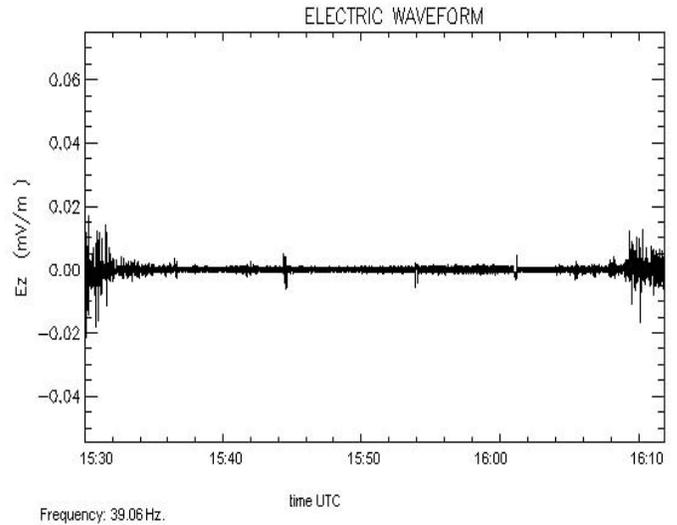


Fig.1 Earthquake location (3.68 °S, 135.46 °E, 07:36 hrs. UTC and Ms=6.1) (courtesy: NEIC)

The electric field component fluctuations have also been shown. The corresponding orbit numbers for 26 Nov.04 and 28 Nov. 04 are 2140 and 2168 respectively.



26/11/04 data

Fig.2 Plot showing ELF electric field for Ez component two days before earthquake over the same region.

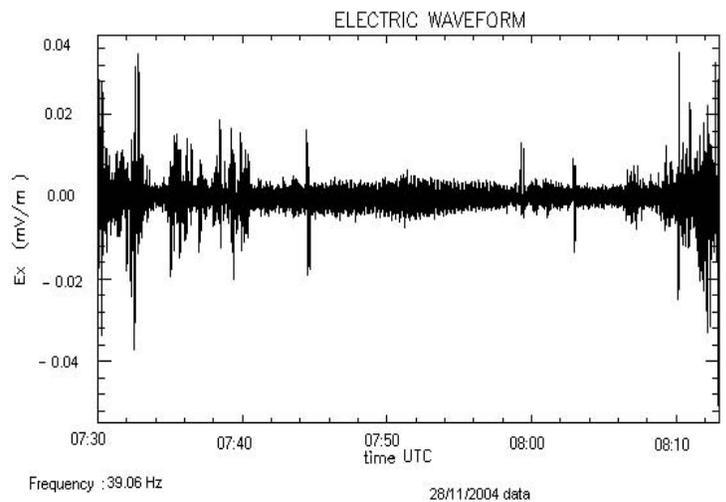


Fig. 3(a) Plot showing ELF electric field bursts during earthquake for Ex component during the time of the Indonesian earthquake.

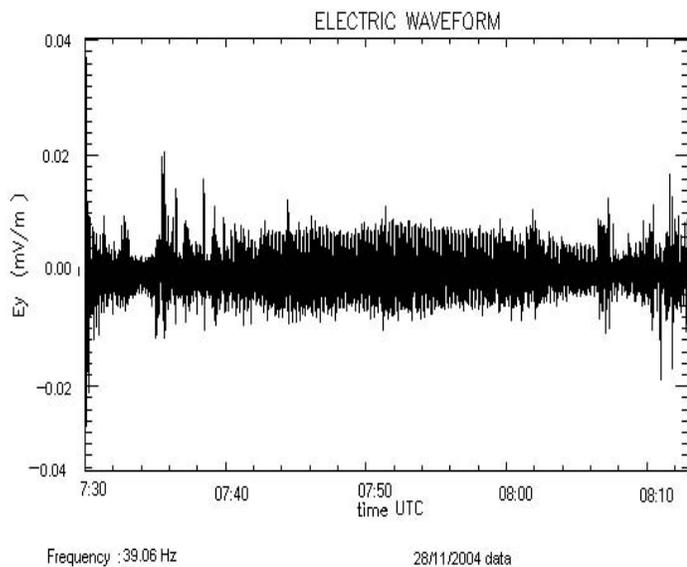


Fig. 3(b) Plot showing ELF electric field bursts during earthquake for E_y during the time of the Indonesian earthquake.

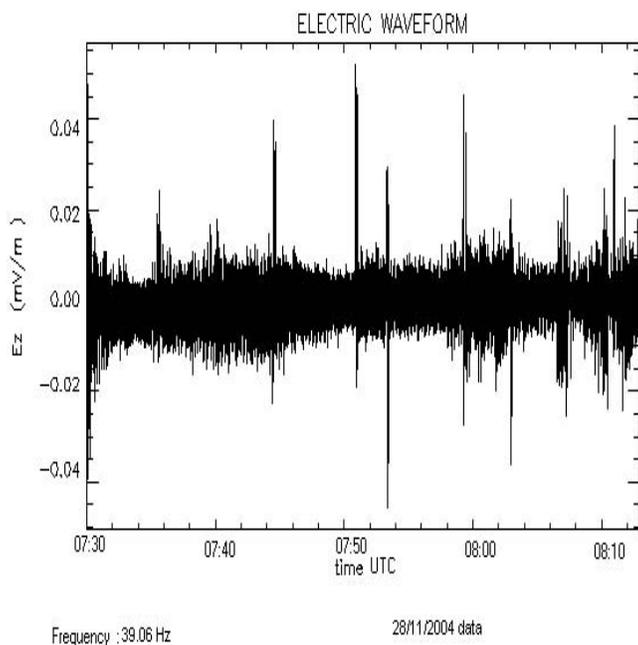


Fig. 3(c) Plot showing ELF electric field bursts during earthquake for E_z during the time of the Indonesian earthquake.

III. RESULTS AND DISCUSSIONS

Fig. 2 indicates the data of electric field for the vertical E_z component two days before the earthquake (26 November 2004, 15:30 UTC). Fig.3(a), 3(b) and 3(c) illustrate the ELF electric field for the E_x , E_y and E_z components respectively around the 40 Hz. range (ELF) which was observed by the DEMETER satellite over the Irian Jaya region in Indonesia just before the time of occurrence of earthquake ($M_s=6.1$). One could observe

that there were no extraordinary variations in the E_z component (Fig. 2) during the pass of satellite. However, significant noise bursts in the ELF (around 40 Hz.) were observed in E_x and E_z components during the occurrence of the seismic activity on 28 Nov. 2004 {Fig. 3(a) and 3(c)}. The earthquake occurred on 28 November 2004 at 07:36 hrs. UTC and during this period the E_x component shows enhancement in the signal. Thereafter, sudden variations in the vertical E_z component occur for some significant point of time in the form of bursts suggesting, the association of ULF-ELF emissions with the seismic activity in the Irian Jaya region of Indonesia.

IV. CONCLUSIONS

Electro-magnetic emissions in the ULF and ELF range are very common in the ionospheric region. But moderately strong earthquakes also suggest the involvement of such emissions that could occur before, during or after seismic activities. The Indonesian earthquake justifies one such example where the magnitude is large enough to cause electric field perturbations in the ELF range. One of the main scientific objectives of Project DEMETER is to study and analyze the association of electro-magnetic field emissions with earthquakes by capturing a larger number of seismic activities globally.

ACKNOWLEDGEMENTS

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Network Delineate Safeguard for Surplus Control

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Abstract- The end-to-end nature of Internet congestion control is an important factor in its scalability and robustness. However, end-to-end congestion control algorithms alone are incapable of preventing the congestion collapse and unfair bandwidth allocations created by applications that are unresponsive to network congestion. To address this flaw, we propose and investigate a novel congestion avoidance mechanism called *Network Border Patrol (NBP)*.

NBP relies on the exchange of feedback between routers at the borders of a network in order to detect and restrict unresponsive traffic flows before they enter the network. An enhanced core-stateless fair queuing mechanism is proposed in order to provide fair bandwidth allocations among competing flows. NBP is compliant with the Internet philosophy of pushing complexity toward the edges of the network whenever possible. Simulation results show that NBP effectively eliminates congestion collapse that, when combined with fair queuing,

NBP achieves approximately max-min fair bandwidth allocations for competing network flows.

I. INTRODUCTION

The essential philosophy behind the Internet is expressed by the scalability argument: no protocol, algorithm or service should be introduced into the Internet if it does not scale well. A key corollary to the scalability argument is the end-to-end argument: to maintain scalability, algorithmic complexity should be pushed to the edges of the network whenever possible. Perhaps the best example of the Internet philosophy is TCP congestion control, which is achieved primarily through algorithms implemented at end systems. Unfortunately, TCP congestion control also illustrates some of the shortcomings of the end-to-end argument.

A number of rate control algorithms have been proposed that are able to prevent congestion collapse and provide global max-min fairness to competing flows. These algorithms (e.g., ERICA, ERICA+) are designed for the ATM Available Bit Rate (ABR) service and require all network switches to compute fair allocations of bandwidth among competing connections. However, these algorithms are not easily adaptable to the current Internet, because they violate the Internet design philosophy of keeping router implementations simple and pushing complexity to the edges of the network.

Floyd and Fall have approached the problem of congestion collapse by proposing low-complexity router mechanisms that promote the use of adaptive or “TCP-friendly” end-to-end congestion control. Their suggested approach requires selected gateway routers to monitor high-bandwidth flows in order to determine whether they are responsive to congestion.

Flows that are determined to be unresponsive are penalized by a higher packet discarding rate at the gateway router. A limitation of this approach is that the procedures currently available to identify unresponsive flows are not always successful. Hence we try to introduce and investigate a new Internet traffic control mechanism called the Protocol Encombrement Éviter which prevents congestion collapse by patrolling the network’s borders, ensuring that packets do not enter the network at a rate greater than they are able to leave it. Associative Functional requirement Receives the packets on basis of frequency of the destination port.

II. ARCHITECTURAL COMPONENTS

The only components of the network that require modification by NBP are edge routers; the input ports of egress routers must be modified to perform per-flow monitoring of bit rates, and the output ports of ingress routers must be modified to perform per-flow rate control. In addition, both the ingress and the egress routers must be modified to exchange and handle NBP feedback packets.

The input ports of egress routers are enhanced in NBP. Figure 3.1 illustrates the architecture of an egress router’s input port. Data packets sent by ingress routers arrive at the input port of the egress router and are first classified by flow. Flow classification is performed by ingress routers on every arriving packet based upon a flow classification policy.

An example flow classification policy is to examine the packet’s source and destination *network addresses*, and to aggregate all packets arriving on an ingress router and destined to the same egress router into the same NBP flow (i.e., a macro-flow).

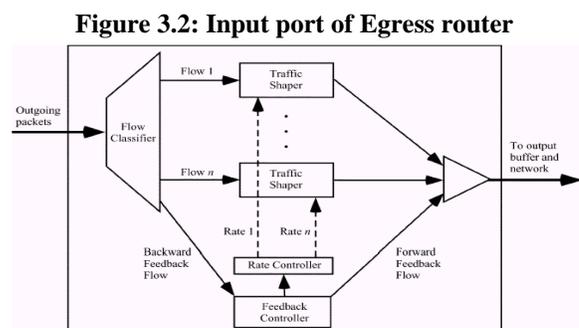


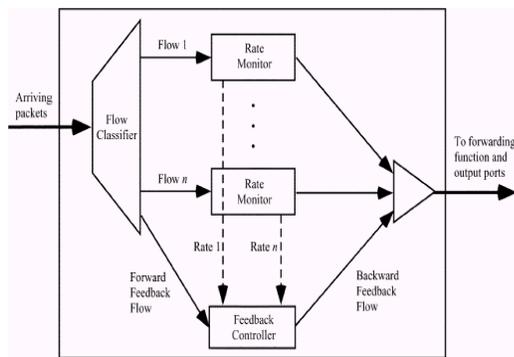
Figure 3.2: Input port of Egress router

After classifying packets into flows, each flow’s bit rate is then rate monitored using a rate estimation algorithm such as the Time Sliding Window (TSW) algorithm. These rates are collected by a feedback controller, which returns them in

backward feedback packets to an ingress router whenever a forward feedback packet arrives from that ingress router.

The output ports of ingress routers are also enhanced in NBP. Each output port contains a flow classifier; per-flow traffic shapers (e.g., leaky buckets), a feedback controller, and a rate controller (Figure 3.2).

The flow classifier classifies packets into flows, and the traffic shapers limit the rates at which packets from individual flows enter the network. The feedback controller receives backward feedback packets returning from egress routers and passes their contents to the rate controller. It also generates forward feedback packets that are transmitted to the network's egress routers. To prevent congestion collapse, the rate controller adjusts traffic shaper parameters according to a TCP-like rate-control algorithm, and the rate-control algorithm used in NBP is described later in this section. Figure 3.3: Output port of Ingress Router



Algorithms used:

A set of algorithms have been implemented in order to design the core stateless protocol PEE. These algorithms have been listed below:

- Rate Control Algorithm
- Leaky Bucket Algorithm
- Feedback Control
- Time Sliding Window Algorithm

The algorithms have been dealt in detail in the following sections.

3.4.1 Rate Control Algorithm:

Figure 3.4: Rate Control Algorithm The PEE rate-control algorithm regulates the rate at which each flow is allowed to enter the network. Its primary goal is to converge on a set of per-flow transmission rates (hereinafter called *ingress rates*) that prevents congestion collapse due to undelivered packets. It also attempts to lead the network to a state of maximum link utilization and low router buffer occupancies, and it does this in a manner that is similar to TCP.

In the PEE rate-control algorithm, shown in Figure 3.4, a flow may be in one of two phases, *slow start* or *congestion avoidance*, similar to the phases of TCP congestion control. The desirable stability characteristics of slow-start and congestion control algorithms have been proven in TCP congestion control, and PEE expects to benefit from their well-known stability features. In PEE, new flows entering the network start with the

slow-start phase and proceed to the *congestion-avoidance* phase only after the flow has experienced incipient congestion.

The rate-control algorithm is invoked whenever a backward feedback packet arrives at an ingress router. Recall that backward feedback packets contain a timestamp and a list of flows arriving at the egress router from the ingress router as well as the monitored egress rates for each flow. Upon the arrival of a backward feedback packet, the algorithm calculates the current round-trip time (*currentRTT* in Fig. 6) between the edge routers and updates the base round-trip time (*e.base RTT*), if necessary.

The base round-trip time (*e.base RTT*) reflects the best-observed round-trip time between the two edge routers. The algorithm then calculates *deltaRTT*, which is the difference between the current round-trip time (*currentRTT*) and the base round-trip time (*e.baseRTT*). A *deltaRTT* value greater than zero indicates that packets are requiring a longer time to traverse the network than they once did, and this can only be due to the buffering of packets within the network.

PEE's rate-control algorithm decides that a flow is experiencing incipient congestion whenever it estimates that the network has buffered the *equivalent* of more than one of the flow's packets at each router hop. To do this, the algorithm first computes the product of the flow's ingress rate (*f.ingressRate*) and *deltaRTT* (i.e., *f.ingressRate deltaRTT*). This value provides an estimate of the amount of the flow's data that is buffered somewhere in the network. If this amount (i.e., *f.ingressRate deltaRTT*) is greater than the number of router hops between the ingress and the egress routers (*e.hopcount*) multiplied by the size of the largest possible packet (MSS) (i.e., *MSS e.hopcount*), then the flow is considered to be experiencing incipient congestion.

The rationale for determining incipient congestion in this manner is to maintain both high link utilization and low queuing delay. Ensuring there is always at least one packet buffered for transmission on a network link is the simplest way to achieve full utilization of the link, and deciding that congestion exists when more than one packet is buffered at the link keeps queuing delays low.

Therefore, PEE's rate-control algorithm allows the "equivalent" of *e.hopcount* packets to be buffered in flow's path before it reacts to congestion by monitoring *deltaRTT*. A similar approach is used in the DEC bit congestion-avoidance mechanism. Furthermore, the approach used by PEE's rate control algorithm to detect congestion, by estimating whether the network has buffered the equivalent of more than one of the flow's packets at each router hop, has the advantage that, when congestion occurs, flows with higher ingress rates detect congestion first.

This is because the condition $f.ingressRate \cdot deltaRTT > MSS \cdot e.hopcount$ fails first for flows with a large ingress rate, detecting that the path is congested due to ingress flow.

When the rate-control algorithm determines that a flow is not experiencing congestion, it increases the flow's ingress rate. If the flow is in the slow-start phase, its ingress rate is doubled for each round-trip time that has elapsed since the last backward feedback packet arrived (*f.ingress*).

The estimated number of round-trip times since the last feedback packet arrived is denoted as *RTTs Elapsed*. Doubling the ingress rate during slow start allows a new flow to rapidly capture available bandwidth when the network is underutilized.

If, on the other hand, the flow is in the congestion-avoidance phase, then its ingress rate is conservatively incremented by one *rate Quantum* value for each round trip that has elapsed since the last backward feedback packet arrived ($f.ingressrate \text{ rate Quantum } RTTsElapsed$). This is done to avoid the creation of congestion. The rate quantum is computed as the maximum segment size divided by the current round-trip time between the edge routers. This results in rate growth behavior that is similar to TCP in its congestion-avoidance phase.

Furthermore, the rate quantum is not allowed to exceed the flow's current egress rate divided by a constant quantum factor (QF). This guarantees that rate increments are not excessively large when the round-trip time is small. When the rate-control algorithm determines that a flow is experiencing incipient congestion, it reduces the flow's ingress rate.

If a flow is in the slow-start phase, it enters the congestion-avoidance phase. If a flow is already in the congestion-avoidance phase, its ingress rate is reduced to the flow's egress rate decremented by a constant value. In other words, an observation of incipient congestion forces the ingress router to send the flow's packets into the network at a rate slightly lower than the rate at which they are leaving the network.

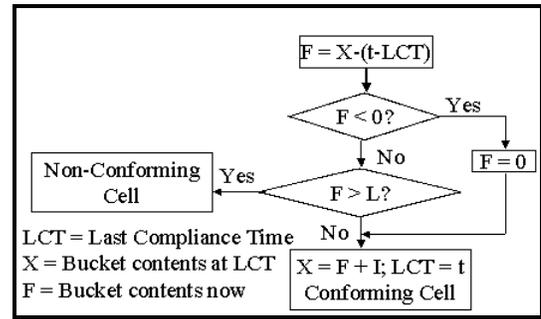
PEE's rate-control algorithm is designed to have minimum impact on TCP flows. The rate at which PEE regulates each flow ($f.ingressRate$) is primarily a function of the round-trip time between the flow's ingress and egress routers ($currentRTT$). In PEE, the initial ingress rate for a new flow is set to be $MSS/e.baseRTT$, following TCP's initial rate of one segment per round-trip time.

PEE's $currentRTT$ is always smaller than TCP's end-to-end round-trip time (as the distance between ingress and egress routers, i.e., the $currentRTT$ in PEE, is shorter than the end-to-end distance, i.e., TCP's round-trip time). As a result, $f.ingressRate$ is normally larger than TCP's transmission rate when the network is not congested, since the TCP transmission window increases at a rate slower than PEE's $f.ingressRate$ increases. Therefore, PEE normally does not regulate TCP flows. However, when congestion occurs, PEE reacts first by reducing $f.ingressRate$ and, therefore, reducing the rate at which TCP packets are allowed to enter the network. TCP eventually detects the congestion (either by losing packets or due to longer round-trip times) and then promptly reduces its transmission rate. From this time point on, $f.ingressRate$ becomes greater than TCP's transmission rate, and therefore, PEE's congestion control does not regulate TCP sources until congestion happens again.

Leaky Bucket Algorithm:

The leaky bucket algorithm is used to regulate the traffic flow from the input port to the output port. We assume leaky bucket as a bucket with a small hole at the bottom. Hence any packet that enters the bucket at any rate must go out of the bucket at a controlled rate from the hole at the bottom. Also we assume that the limit of the bucket is infinity. Hence there is no case of bucket getting filled and the packets getting lost due to the limit of the bucket.

The leaky bucket algorithm is described as a flowchart in Figure



Feedback Control Algorithm:

The feedback control algorithm in NBP determines how and when feedback packets are exchanged between edge routers. Feedback packets take the form of ICMP packets and are necessary in NBP for three reasons. First, forward feedback packets allow egress routers to discover which ingress routers are acting as sources for each of the flows they are monitoring. Second, backward feedback packets allow egress routers to communicate per-flow bit rates to ingress routers. Third, forward and backward feedback packets allow ingress routers to detect incipient network congestion by monitoring edge-to-edge round-trip times.

Time Sliding Window algorithm:

It is used for rate monitoring. TSW estimates the sending rate upon each packet arrival, and decays, or forgets the past history over time. TSW maintains three state variables in the hash structure: Win_length, which is measured in units of time, Avg_rate, the rate estimate upon each packet arrival, and T_front, which is the time of last packet arrival. TSW is used to estimate the rate upon each packet arrival, so state variables Avg_rate and T_front are updated each time a packet arrives. Win_length is pre-configured.

III. CONCLUSION

In this paper, we have presented a novel congestion avoidance mechanism for the Internet called Network Border

Patrol and an enhanced core-stateless fair queuing mechanism. Unlike existing Internet congestion control approaches, which rely solely on end-to-end control, NBP is able to prevent congestion collapse from undelivered packets. It does this by ensuring at the border of the network that each flow's packets do not enter the network faster than they are able to leave it. NBP requires no modifications to core routers nor to end systems. Only edge routers are enhanced so that they can perform the requisite per-flow monitoring, per-flow rate control and feedback exchange operations.

Extensive simulation results provided in this paper show that NBP successfully prevents congestion collapse from undelivered packets. They also show that, while NBP is unable to eliminate unfairness on its own, it is able to achieve approximate global max-min fairness for competing network flows when combined with ECSFQ, they approximate global max-min fairness in a completely core-stateless fashion.

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Controlling Measures to Reduce Rejection Rate due to Forging Defects

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Abstract- The objective of this paper was to investigate the various forging defects that occur in a forging industry that causes high rejection rates in the components and this paper describes the remedial measures that can reduce these defects in the hot forging. The investigation was done with the help of quality assurance department within the industry. The various defects that occur in the components during forging are identified. The result indicates that the rejection rate in the company was more than five percent of the total productions made each month. The defects in the forged components includes the lapping, mismatch, scales, quench cracks, under filling etc. In this paper, it describes the remedial actions that to be done in order to reduce the rejection rates. The remedial actions includes the proper use of anti scale coating, venting process to prevent the under filling, the simulation software for determining the material flow, proper lubricant (espon lss) instead of furnace oil etc.

Index Terms- forging defects, forging defects remedies, forging errors, closed die forging, controlling measures for forging errors

I. INTRODUCTION

Forging is the process by which metal is heated and is shaped by plastic deformation by suitably applying compressive force. Usually the compressive force is in the form of hammer blows using a power hammer or a press.

Forging refines the grain structure and improves the physical properties of the metal. With proper design, the grain flow can be oriented in the direction of principal stresses encountered in actual use. Grain flow is the direction of the pattern that the crystals take during plastic deformation. Physical properties (such as strength, ductility and toughness) are much better in a forging than in the base metal, which has, crystals randomly oriented.

There are many imperfections that can be considered as being defects, ranging from those traceable to the starting materials to those caused by one of the forging processes or by post forging operations. Defects can be defined as imperfections that exceed certain limits. In other words, there may be imperfections that are not classified as true "defects" because they are smaller than allowances in the applicable specifications.

There are differences in allowable imperfections on the surfaces of forgings and these vary depending on the material being forged. This is the area that requires attention especially that going to focus in this paper and the remedial or controlling measures to be taken to reduce the rejection rate in the forging industry due to these imperfections.

This article describes the investigation that carried out in a forging industry in kerala, south india. By investigating the plant it's noted the defects that are occurring in the forged parts that causes rejection rate, and the remedial actions or controlling measures that should be taken to avoid these rejections.

II. IDENTIFICATION

During the investigation that done within a forging industry, its manufacturing more than 24 types of components by the hot forging technique. With the help of the QA department within the plant its clear that in July 2012 company manufactured 24 types of components for different clients using ten ton hammer. In the total number of 2798 products about 150 products were rejected, which means the plant has a rejection rate of more than five percent per month. These much rejection rate cannot be tolerated by the company, this lead me to undergo an detailed study in the company about the defects that caused these much rejection rate and the remedial actions suitable for that to reduce the rejection rate.

From the table:1 it's clear that the quantity received for each components both in numbers and in metric tons, quantity accepted and the quantity rejected during the specific month. From the inspection report given from the quality assurance department within the plant out of 2798 manufactured components a total of 143 components were rejected.

This led me to undergo an investigation in the company about the defects that caused these much rejection rates and the remedial actions suitable for that to reduce the rejection rates.

III. STUDIES AND FINDINGS

The quality assurance department made remarks after conducting various tests to analyze the defects caused to the components that forged within the company.

The various tests conducted by the quality assurance department include dye penetrant testing, magnetic particle testing, and ultrasonic inspection to check whether there are internal cracks or external surface defects after the forging process. After these testing processes they are making a detailed report on these as shown in table 1.

INSPECTION REPORT FOR MONTH JULY 2012						
Sl no.	item	Quantity received		Quantity accepted		Qty rejected
		No.s	M tons	No.s	M tons	No.s
1	680 bevel pinion	119	16.07	118	15.93	1
2	786 crank shaft gear	155	17.83	155	17.83	0
3	254 saddle	101	11.11	62	6.82	39
4	833 coupling	42	3.23	39	3	3
5	819 pylon	20	0.59	18	.53	2
6	621 saddle	10	1.55	10	1.55	0
7	807 integral axle arm	58	10.21	58	10.21	0
8	794 cam shaft gear	55	3.96	55	3.96	0
9	256 crank shaft gear	39	2.34	39	2.34	0
10	496 rod wheel arm	180	7.38	180	7.38	0
11	175 con rod	635	25.84	549	22.34	86
12	855 gear	25	11.25	20	9	5
13	55 valve body	200	21.4	200	21.4	0
14	263 cam shaft gear	81	11.34	81	11.34	0
15	837 gear	55	18.15	54	17.82	1
16	814 companion flange	63	4.28	63	4.28	0
17	779 gear	250	14.88	250	14.88	0
18	958 mf center	37	4.51	37	4.51	0
19	959 mf inter	15	1.38	15	1.38	0
20	960 mf end	15	1.58	15	1.58	0
21	527 d cage	113	2.6	111	2.55	2
22	127 valve body	200	36.6	200	36.6	0
23	219 mb cap	285	19.38	281	19.38	4
24	272 gear	45	8.28	45	8.28	0
total		2798	255.74	2655	244.89	143

Table 1: inspection report by the QA department for month July

By plotting the defects that caused on the components graphically the figure 1 shows it. From the graph we can get a clear idea that out of 24 components a total of 14 components are affected by the unfilling and scale pits which are the major defects. The other major defects are mismatch, lapping, oversize in the forged components.

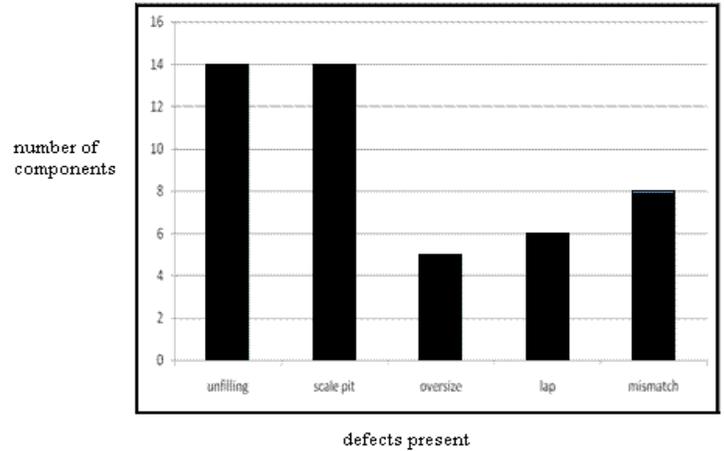


Figure 1: graphical representation defects presented in the components

IV. TECHNIQUES USED BY QUALITY ASSURANCE DEPARTMENT TO ANALYZE THE DEFECTS DURING FORGING

A: GREEN STAGE

There are several techniques that used for check the defects that caused in that forged components. It may be in hot stage or it may be in green stage. The green stage checking is done after the forged components are cooled.

1. Dye penetrant inspection
2. Magnetic particle inspection
3. Ultrasonic inspection

1. DYE PENETRANT INSPECTION

Dye penetrant inspection (DPI), also called liquid penetrant inspection (LPI) or penetrant testing (PT), is a widely applied and low-cost inspection method used to locate surface-breaking defects in all non-porous materials (metals, plastics, or ceramics). The penetrant may be applied to all non-ferrous materials and ferrous materials; although for ferrous components magnetic-particle inspection is often used instead for its subsurface detection capability. LPI is used to detect casting, forging and welding surface defects such as hairline cracks, surface porosity, leaks in new products, and fatigue cracks on in-service components.

2. MAGNETIC PARTICLE INSPECTION

Magnetic particle inspection (MPI) is a non-destructive testing (NDT) process for detecting surface and slightly subsurface discontinuities in ferromagnetic materials such as iron, nickel, cobalt, and some of their alloys. The process puts a magnetic field into the part. The piece can be magnetized by direct or indirect magnetization. Direct magnetization occurs when the electric current is passed through the test object and a magnetic field is formed in the material. Indirect magnetization

occurs when no electric current is passed through the test object, but a magnetic field is applied from an outside source. The magnetic lines of force are perpendicular to the direction of the electric current which may be either alternating current (AC) or some form of direct current (DC) (rectified AC). The presence of a surface or subsurface discontinuity in the material allows the magnetic flux to leak, since air cannot support as much magnetic field per unit volume as metals. Ferrous iron particles are then applied to the part. The particles may be dry or in a wet suspension. If an area of flux leakage is present the particles will be attracted to this area. The particles will build up at the area of leakage and form what is known as an indication. The indication can then be evaluated to determine what it is, what may have caused it, and what action should be taken, if any.

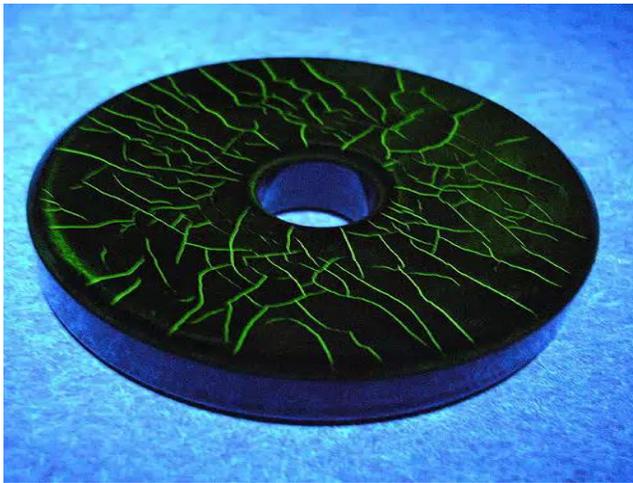


Figure 2: magnetic particle inspection

3. ULTRASONIC TESTING

In ultrasonic testing, an ultrasound transducer connected to a diagnostic machine is passed over the object being inspected. The transducer is typically separated from the test object by a couplant (such as oil) or by water, as in immersion testing. There are two methods of receiving the ultrasound waveform, reflection and attenuation. In reflection (or pulse-echo) mode, the transducer performs both the sending and the receiving of the pulsed waves as the "sound" is reflected back to the device. Reflected ultrasound comes from an interface, such as the back wall of the object or from an imperfection within the object. The diagnostic machine displays these results in the form of a signal with an amplitude representing the intensity of the reflection and the distance, representing the arrival time of the reflection. In attenuation (or through-transmission) mode, a transmitter sends ultrasound through one surface, and a separate receiver detects the amount that has reached it on another surface after traveling through the medium. Imperfections or other conditions in the space between the transmitter and receiver reduce the amount of sound transmitted, thus revealing their presence. Using the couplant increases the efficiency of the process by reducing the losses in the ultrasonic wave energy due to separation between the surfaces.

B: HOT STAGE

There are several techniques that used for check the defects that caused in that forged components .Hot stage checking consists of the analysis of forged part at the stage of forging itself. In this it will thoroughly inspect the laps, scale pits, unfilling, cracks, and mismatch by directly. And for control the dimensions we will use the GO and NO-GO gauges.

DEFECTS DURING FORGING ANALYZED BY THE QUALITY ASSURANCE DEPARTMENT

1. UNFILLED SECTION

Some section of the die cavity is not completely filled by the flowing metal or Metal does not fill the recesses of the die completely. Its mainly due to the improper design of the die. This unfilling process is occurring due to following.

- improper design of the forging die .
- improper material flow in the die.
- air, gas or lubricant being trapped in a corner feature of a forging dies.

2. LAPS AND FOLD

A lap is defined as surface to surface contact in the workpiece when the surface of the workpiece folds or collapses on itself. A section of the workpiece flowing into itself. A "flow-by" in which the workpiece surface is in contact with a die and is subsequently pulled away by a tensile stress component and closes on itself. "Peeling" that can form when the surface of a billet or preform is sheared by a die, resulting in an area of localized folding. A die corner is frequently involved, as it forces material ahead of a moving contact region, without significant subsurface deformation. This defect can be the result of a poor design or inadequate process control.

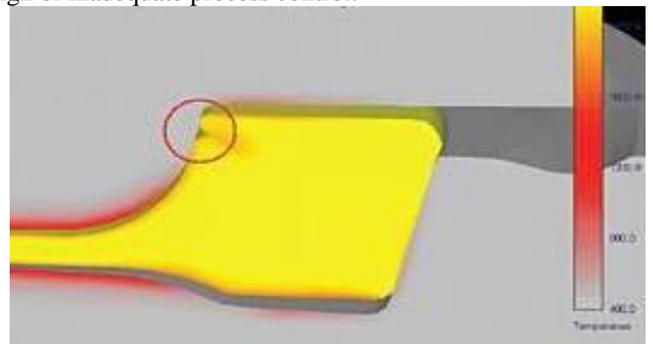


Figure 3: laps formed in the component during forging

3. SCALE PITS

The oxidation and decarburization of steel take place when steel components are heated in the presence of air or products of combustion. Undesired and excessive oxidation can lead to problems such as scale pit marks, dimensional changes, poor surface finish, rejections and quench cracking. Additionally, these problems may lead to the need for expensive operations like shot blasting, machining and acid pickling. Protection against scaling and decarburization is achieved by heating in molten salts, fluidized-bed furnaces, protective gaseous media or vacuum. These measures demand heavy capital investment,

highly skilled personnel and special safety precautions. Many companies cannot afford them, yet they are under mounting pressure to prevent oxidation and decarburization.

4. QUENCH CRACKS

Forgings such as knuckle joints and crankshafts, when heat treated in furnaces of oxidizing atmosphere, are susceptible to quench cracking. Quench cracks appear when stresses generated during quenching are greater than the tensile strength of thin sections of the forging. Chrome-moly grades of steel are most susceptible to quench cracks, which usually occur in the gear-end portion of the crankshaft. By coating the gear-end with an anti-scale coating, the cracking is prevented.



Figure 2: Quench cracks

- Overheating during the austenitizing portion of the heat treatment cycle can coarsen normally fine grained steels. coarse grained steels increase hardening depth and are more prone to quench cracking than fine grain steels. Avoid overheating and overly long dwell times while austenitizing.
- Improper quenchant. Yes, water, brine, or caustic will get the steel “harder.” If the steel is an oil hardening steel, the use of these overly aggressive quenchants will lead to cracking.
- Too much time between the quenching and the tempering of the heat treated parts. A common misconception is that quench cracks can occur only while the piece is being quenched. This is not true. If the work is not tempered right away, quench cracks can (and will) occur.

5. MISMATCH

Mismatch is occurring due to the deflection or the movements caused in the upper die and lower die from its centre due to the repeated blows. The die here is examined after a large batch of components being forged. We have to examine the die, its position periodically to identify the deflection caused in the dies.

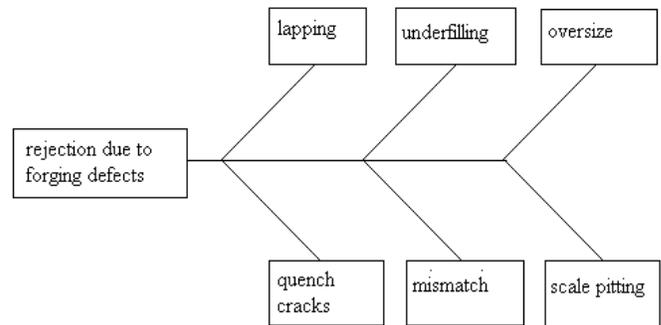


Figure 3: cause and effect diagram for the rejection rate

The figure shows the cause and effect diagram of the forging defects and its causes as shown in the figure 3.

V. RESULTS AND DISCUSSIONS

REMEDIAL ACTIONS TO BE TAKEN

1. USE ANTI-SCALE COATING

An anti-scale coating, which we call ESPON, is applied on components or billets to be heated before charging them into the furnace. Care is taken to apply a uniform coating by brushing, dipping or spraying. The coating is then allowed to dry for 30 minutes at ambient temperature of 35°C. This anti-scale coating acts as a barrier to the basic reactions of oxidation and decarburization. To prevent scaling and decarburization, care is taken to apply a uniform coating layer on the component. The coating also reduces decarburization on billets and ingots during hot-forging and hot-rolling operations. Heat transfer from the heating medium to the metal is unaffected by the coating. Additionally, the coating has no reaction with the steel surface and no release of toxic fumes during use, heat treatment or storage. The coating is nonhazardous and economical to use.

Benefits:

- Prevention of Quench Cracks – Forgings such as knuckle joints and crankshafts, when heat treated in furnaces of oxidizing atmosphere, are susceptible to quench cracking. Quench cracks appear when stresses generated during quenching are greater than the tensile strength of thin sections of the forging. Chrome-moly grades of steel are most susceptible to quench cracks, which usually occur in the gear-end portion of the crankshaft. By coating the gear-end with an anti-scale coating, the cracking is prevented.
- Reduction in Shot-Blasting Time - After Heat Treatment Operations like shot blasting, grinding and pickling are expensive and time-consuming procedures. They are necessary to remove scaling from components and to enhance the product’s aesthetic appeal, but they do not add value to the product. These operations can be substantially reduced if a coating is applied to components before heat treatment.

- Reducing Decarburization During Hot Forging and Hot Rolling – During the hot rolling of special grades of steel in which decarburization needs to be kept in check, unforeseen conditions like mill breakdown and unplanned downtime may arise. Even when the plant is closed for a weekly holiday, the furnace may be shut off abruptly, leaving billets inside. Billets left in the furnace are subjected to prolonged heating, leading to decarburization. Applying an anti-scale coating ensures that billets are protected from decarburization.

2. VENTING TO PREVENT UNDERFILLING

Underfilling is typically a problem when a large part is manufactured on a small press with a less-than-optimum preform geometry. Smaller equipment does not provide the option of overpowering a less-than-optimum design or leave much margin for process variation. Depending on the equipment, force, power, speed or energy can be the culprit for an underfill. A steel forging being produced on an undersized hydraulic press. Because the press is slow, there is significant chilling of the work piece, as indicated by the temperature profiles in the figure. This causes the flow strength of the steel to increase and require more force to deform it. Because of its small size, the press will stall before the component is completely forged, leaving an underfilled region. To avoid this, equipment of the right capacity must be used.

Venting: Underfills can also result from air, gas or lubricant being trapped in a corner feature of a forging. These can be eliminated by a redesigned preform, which provides a vent for gas, or by adding corner closure to the final forging. The ideal gas law can be used to describe the behavior of gas being compressed in a die corner

3. USE SIMULATION SOFTWARE FOR THE MATERIAL FLOW

During open-die forging or forging without any die contact, the work piece may flow in a manner that is different from the design plan. Even though we would like the material to flow in a prescribed manner, if it is unconstrained it may move in an undesirable fashion, leaving a part that does not meet the customer's specifications. This type of material movement is not random or arbitrary and will take the path of least resistance in determining its flow. Simulation programs can aid the forger in understanding actual material flow. These packages incorporate the flow along the path of least resistance within their calculations and provide a detailed view of the actual geometry that a part would take when the dies do not provide constraint.

Simulation programs: It can be effectively used to see the formation of defects. These tools allow the forger to "see" inside the die and the work piece during deformation. The simulation tool can also provide a serial view of the process dynamics in both forward and backward directions. These can provide the forger with significant insights into the origin and evolution of the geometrical defects that are described in this paper.

Simulation has allowed us to clearly illustrate die designs that contribute to geometrical defects of laps and

underfills. The programs also allow the forging engineer to test a number of "what if" scenarios without having to actually sink a die and run tests in the forge shop.

Today there are some simulation software to analyse this forging operation. For example: quantor form, forge 3D etc

4. PROPER LUBRICANT (ESPON LSS)

Many forge shops in India use furnace oil as 'lubricant'. They are realizing day by day that it is a wrong practice. First of all, furnace oil is not a lubricant. When it comes in contact with the die surface which is at temperatures up to 500⁰ C, the hydrocarbons present in it burn out partially. The gas pressure generated between the forged component and the die wall give rise to hairline cracks. These cracks grow fast during subsequent operations of the forging hammer or press. The serrations so generated in the die cavity impair the surface finish of the forgings. Due to incomplete combustion of the hydrocarbons, a lot of smoke is generated. Sulphur present in the furnace oil enhances pungent smell of the smoke. This smoke is carcinogenic. Workmen feel tired soon and their efficiency is affected. Pollution Control Board would raise serious objections to the use of furnace oil for swabbing the dies.

5. CORRECT DIE DESIGN

A "flow-by" in which the work piece surface is in contact with a die and is subsequently pulled away by a tensile stress component and closes on itself.

"Peeling" that can form when the surface of a billet or preform is sheared by a die, resulting in an area of localized folding. A die corner is frequently involved, as it forces material ahead of a moving contact region, without significant subsurface deformation. This defect can be the result of a poor design or inadequate process control.

Flow localization that can also show up as a forging lap in alloys where flow softening exists. Most laps are resolved by changing the forging preform, forged shape or process. The prevention of laps is primarily a process-design issue due to improper preform geometry or improper impression geometry.

- Proper draft, corner radius and fillet.
- Reduction of friction by the use of polished dies and suitable lubrication.
- By grinding the die in the curved edges before use

VI. CONCLUSION

In this paper it's described the different factors for effective forging is studied and the remedial actions that required for controlling the rejection rates due to forging defects. By the proper usage of anti scale coating, proper lubricant, proper design of dies by polishing and grinding, and use the simulation programs for monitoring the material flow inside the dies. Thus it will be very useful in control the forging defects effectively.

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A Comparative Study of Stress of Class X Students under Grading and Numerical Marking System of Evaluation

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I. INTRODUCTION

The history of education is the history of teaching and learning. Each generation, since the beginning of human evolution and writing, has sought to pass on cultural and social values, traditions, morality, religion and skills to the next generation. The history of the curricula of such education reflects human history itself, the history of knowledge, beliefs, skills and cultures of humanity.

Teaching is a triangular process wherein instructional objectives, learning experience and evaluation procedures lie inseparably intertwined. In this process, evaluation occupies a pertinent position as it provides constant feedback on the quality of course content, teaching- learning process and advancement of learner's performance.

Evaluation and measurements are terms often used with little regard to their meaning. Measurement refers to observation that can be expressed quantitatively and answers the question "how much". Evaluation goes beyond the statement of how much to concern itself with the question, "what value". It seeks to answer to the pupil's and teacher's question, "what progress am i making?" Evaluation hence presupposes a definition of goals to be reached- objectives that have been set-forth. According to Education Commission (1964-66), "It has been accepted that evaluation is a continuous process. It exercises greatest influence on the teacher's method of instruction and on pupil's study habits and this helps not only to measure educational achievements but also to improve it. The new approach to evaluation will attempt to improve the written examination so that it becomes a valid and reliable measure of educational achievement and to devise techniques for measuring those important aspects of the student's growth that cannot be measured through written examinations".

II. MARKING SYSTEM AND ITS INADEQUACIES

Nowadays, according to opinions expressed by various experts, the existing education system in India has become somewhat outdated. In addition, excessive workloads have made it very rigorous for the students. Children today are perennially handicapped by the lack of time, as they are made to work extremely hard in schools. On top of that, there are exams at regular intervals, which make life all the more miserable for the children. Life of the present-day has become stress personified, which can have various adverse effects on their overall personality traits in later years. Also, the need for changing the existing system, which puts a premium on rote learning, was being felt for quite some time. As a result of this, a school

examination system designed to reduce stress and bring India on a par in quality with international educational standards has been recently introduced in India.

In the traditional marking system, teachers usually assign marks ranging from 0 to 100, and therefore it is called 101 point scale. This inference is not correct, because the marks scored by each students are subject to several uncertainties. The 101 point scale appears to be an absolute scale indicating the exact level of a student's achievement. But it is infact, a relative scale.

Stanley and Hopkins (1978) stated some of the observations regarding marks as:

- Marks are inaccurate and incomparable.
- Marks are responsible for a variety of detrimental effects such as anxiety, dishonesty, hostility and poor mental health. But it is pointed out there is nothing wrong with encouraging students to work for high marks if the marks are reliable measures for achievement.
- Marks have created controversy over high and low achievement among students. But Ebel remarked that the measurement and reporting of pupils achievement are necessary and no substantially better or more scientific means that marks seems likely to appear.
- Apathy in marking system is that marking standards vary from evaluation to evaluation and institution to institution. Major variations have been found in marking standard of the same examiner if the same answer script is got evaluated after some interval.
- Although the marking is unreliable but can increasingly be made reliable by improved assessment techniques.
- Sometimes the evaluator does not discriminate properly because he lacks discrimination power.
- The range of marks in social sciences is skewed and marks cluster on a point which is biased and spurious.
- In the marking of scripts of any discipline of social sciences, the examiners keep in view the content, facts, figures, language and logical sequences in writing the essay type answers.
- The shortcomings of marks are attributable to frequent lack of clearly defined and scrupulously observed meanings for the marks and the frequent lack of sufficient good evidence to use as a basis for assigning marks.

The major shortcomings of marks, as they are assigned by many instructors and recorded in many institutions, are twofold:

- i. The lack of clearly defined, generally accepted, scrupulously observed definitions of what the various marks should mean.
- ii. The lack of sufficient relevant, objective evidence to use as a basis for assigning marks.

As per reports, every day more than 17 students aged between 15-25 years commit suicide in India due to non-performance in the examination or an entrance test. One of the points to note here is the thinking of the society, which puts lot of pressure on students to 'to perform'. This pressure from schools, parents, peer groups and society takes away the youthfulness of a child. Further, a health report also supports that this often causes health hazard such as fatigue, body aches, eye weakness, stress and in more severe cases, depression (neurotic/psychotic).

Examination can be improved upon by continuous evaluation. Examinations are an indispensable part of the educational process as some form of assessment is quite necessary to determine the effectiveness of the dissemination of knowledge by teachers and its assimilation by students. According to Dandekar (1968), "The first purpose of any examination is just to rank students in order of merit. The advantage of the objective over the traditional examination is that it ranks students more accurately". The strength and success of an educational system mostly depends on the examination system.

III. ACADEMIC GRADING IN INDIA

Grades are standardized measurements of varying levels of comprehension within a subject area. Grades can be assigned in letters (for example, A, B, C, D, or F), as a range (for example 4.0 - 1.0), as descriptors (excellent, great, satisfactory, needs improvement), in percentages, or, as is common in some post-secondary institutions in some countries, as a Grade Point Average (GPA). The most predominant form of grading in Indian higher education is the percentage system. In all India, marks are generally given in percentages to encourage perfection and good presentation, despite the extra pressure on the students. Percentage differences up to two decimals was taken into consideration for ranking. For many schools up to XII grade high percentage above 90% is supposed to indicate the excellent quality of a student while in many undergraduate and graduate courses scoring above 65% also is very difficult, though it varies depending upon the board or University. However, the existing system of evaluation suffers from a number of anomalies. It focuses more on cognitive learning and ignores the non-cognitive aspects that are vital components of human personality (NCERT, 2000). The term evaluation is associated with examination, stress and anxiety and the board examinations negatively influence all testing and assessment through the school years, beginning with preschool (NCERT, 2005). In order to improve the educational evaluation, the National Curriculum Framework 2000, recommended introducing grading system in schools. According to Scriven (in Davis et.al., 1983) it can also be used for various purposes as stated below-

1. To describe unambiguously the worth, merit or value of the work accomplished.

2. To improve the capacity of students to identify good work, that is, to improve their self-evaluation or discrimination of skills with respect to work submitted.
3. To stimulate and encourage good work by the students.
4. To communicate the teachers judgement of student's progress.
5. To inform the teacher about what students have and have not learned.
6. To select people for rewards or continued education.

The use of a coarser scale of measurement i.e., a few units, each comprising a larger band on a scale reduces error of measurement. The impetus for introducing the grading system was to minimize the negative assumptions and effects of 0 to 100 marking system. The widely held presumption that a student who receives 60 per cent in a subject is truly superior to one who receives 58 per cent and the erroneous assumption that marks are based on absolute scale. After analysing the result obtained from a university for standard error varies from 3 marks to 14 marks out of 100 in different subjects. This means if a student obtains a mark of 52, it is likely for every 2 out of 3 chances that his marks can be anything between 47 and 57. If there are three students obtaining 47, 52 and 57, it is more meaningful to say that they all are in same band of achievement. This is in essence the background to Grading.

Marks are treated by most people as though they are fixed amounts like the centi-metres or degrees or rupees. Grades are statements of value. Marks are statements of quantity, grades are statements of quality. Marks are based upon percentage of questions or of knowledge. Grades are related to percentage of people. Marks claim to be absolute measurements. Grades are much like merit lists. The position of a person in the group is considered more important than the actual mark awarded. Those who really understand what they are talking about, frequently emphasize that grades are evaluations on a 'relative scale', while marks claim to be 'absolute measurements'. It is the reliability of grades that is their essential feature.

The advantage of grading scale is that we do not attempt to use large number of categories. With only 5, 7, 9 or 11 grades, each representing a range of marks, we have a more dependable differentiation among the students. It is fair to ask why we should choose a particular use of 5, 7, 9 or 11 grades. Why not more or fewer? The decision is some what arbitrary. To use these numbers of grade is definitely better than using 101 point scale. Using a 101 point scale we are attempting to make distinctions that are too fine. In view of the error involved, these distinctions are not meaningful. The advantage of the grading scale is that we do not attempt to use such a large number of categories with 5, 7, 9 or 11 grades each representing range of marks, we have a more dependable differentiation among marks. It is observed that classificatory error can be reduced by using a grading system which has a fewer intervals. It is apparently less precise but more reliable. This makes the process of evaluation more scientific. The problem of border line cases becomes less probable under the grading system. The range of grades awarded to students in different subjects would not vary widely as the marks in 101 point scale. Combining grades in different subjects rather than combining marks will considerably reduce the inaccuracies. Thus the grading system which has few classificatory intervals, can be

considered to be superior to the marking system in identifying the performance of students. Hence the adoption of the grading system for evaluating student performance in tests and examinations in the universities and college is preferable. It is important to note that these percentage apply equally to history or to mathematics or to biology or to any subject.

The Indian education system has taken a step forward towards reviving the education system with the introduction of grading system in session 2009-10. It will help in reducing the pressure on students during exams. In the last five years the meaning of education has changed for students from imbibing knowledge to merely scoring marks, resulting in myriad forms of education policies.

IV. C.B.S.E. GRADING SYSTEM

C.B.S.E. has introduced new grading pattern for class X students. There will be nine grades. The highest will be A1 (exceptional) with a grade point of 10 and a marks range of 91-100%. Second grade will be A2 (excellent) with a grade point of 9 and marks in the range of 81-90%. Third grade will be B1 (very good) with grade point of 8 and a marks range of 71-80%. The fourth grade will be B2 (good) with a grade point of 7 and marks range of 61-70%. Fifth grade will be C1 (fair) with grade point of 6 and marks range of 51-60%. C2 (average) will be the sixth grade with grade point of 5 and marks range of 41-50%. D (below average) will be the seventh grade with 4 grade points and marks range of 33-40%. E1 (needs improvement) and E2 (unsatisfactory) are the last two grades.

Grading system based on continuous and comprehensive evaluation (CCE) will be done in two terms (April-September, October-March). In a year, the school will conduct four formative and two summative assessments.

The New Scheme of Grading has been introduced with the aim that:

- It will minimize misclassification of students on the basis of marks.
- It will eliminate unhealthy competition among high achievers.
- It will reduce societal pressure and will provide the learner with more flexibility.
- It will lead to a focus on a better learning environment Operational.
- It will facilitate joyful and stress free learning.

The nine-point scale grading system will require students to get qualifying grades in four of the five subjects to get promoted to the next level. It had been decided not to carry pass or fail on the mark sheets of students, who will have four options to improve on their grades within a period of two years from their exam. The grading system will adopt a five-point scale, which means awarding students grades from A to E. This will eliminate the schools from showing raw scores on the evaluation report of each student.

V. RAJASTHAN EDUCATION PROFILE

In India education is constitutionally a responsibility of the states. Public examinations are conducted by state educational authorities- by a statutory Board of Secondary Education or by the State Education Department. When students complete the high school (normally class X), or the higher secondary school (class XI), they take examination prescribed and conducted by the state authority, and their examinations determine their grade for their secondary education. They may pass with distinction; or in first, second or third division; or they fail. With the promulgation of the Rajasthan Secondary Education Act in 1957, the Board of Secondary Education was set up in Jaipur on 4th Dec, 1957. In Rajasthan the secondary level school examination is of traditional (percent based) type.

VI. OBJECTIVES OF THE STUDY

- The study was conducted with basic objectives as under-
1. To compare the examination stress in between boys and girls student of class X of CBSE Board (Grading System).
 2. To compare the examination stress in between boys and girls student of class X of Rajasthan Board (Traditional System).
 3. To compare the examination stress in between students (both gender taken together) of class X of CBSE Board (Grading System) and of Rajasthan Board (Traditional System).

VII. DESIGN OF THE STUDY

SAMPLING PLAN:

- a. Sample Units- Boys and girls student of class 10th of both CBSE and Rajasthan Boards.
- b. Sampling Size- A sample of 200 respondents was taken for the study.
- c. Sample Method- Stratified Random Sampling method was followed in the study.
- d. Sample Extent- Schools from Alwar district in Rajasthan.

TOOLS:

- Examination stress: Bist Battery of Stress Scales made by Abha Rani Bisht. This battery measures four components of stress- frustration, conflict, pressure and anxiety through 13 sub-tests. For the study purpose the Scale for Academic Stress (SAS) was selected.

METHOD:

Keeping the nature (comparative and analytical sort) of the problem in mind the researcher followed the present study on the lines of Descriptive Survey Method. In selection of sample Purposive Method of Sampling was employed for selecting the schools for the respondent groups.

ADMINISTRATION OF TOOLS AND COLLECTION OF DATA:

For collecting the data respondents from six schools were selected (three schools from each board). The respondents include 200 students, of which 100 were from each board (and out of which 50 were boy and 50 girl students). For the collection of data from the respondents the tool Bisht Battery of Stress Scale (scale of achievement stress) was applied.

STATISTICAL TECHNIQUES:

- Descriptive Statistics- Central tendency (mean), Measures of variability (S.D.)
- Inferential Statistics- t- test

VIII. FINDINGS OF THE STUDY

Objective 1: To compare the examination stress in between boy and girl students of X class studying under grading system of evaluation (CBSE Board). The result states that there is no significant effect of the gender on the examination stress of the students studying under grading system of evaluation.

Objective 2: To compare the examination stress in between boy and girl students of X class studying under traditional numerical marking system of evaluation (Rajasthan Board). The result states that there is no significant effect of the gender on the examination stress of the students studying under numerical system of evaluation.

Objective 3: To compare the examination stress in between students of X class studying under grading system of evaluation (CBSE Board) and traditional numerical marking system of evaluation (Rajasthan Board). The result states that there is significant effect of the evaluation system on the examination stress of the students studying under grading system and marking system of evaluation.

IX. CONCLUSIONS OF THE STUDY

The study reveals that the evaluation system lays an effect over the students on the level of examination stress. The numerical marking system (traditional system) has a direct effect on the examination stress of the students. It increases the pressure and stress among the students during the exam time, and thus, results into their poor academic achievement, which can further lead to severe consequences and dangerous steps can be taken by the students. Whereas on the contrary the grading system of evaluation puts minimum examination stress, and thus, the students can perform better and yields best results. Since the examination stress is minimal in case of grading system of evaluation, the academic achievement might be higher in the students studying under this system (grading system).

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A Novel Low Power Optimization for On-Chip Interconnection

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Abstract- This paper presents a low power design methodology for the Quasi Resonant Interconnection networks (QRN). This focuses mainly on reducing the power utilized at the receiver by replacing the existing delay element by a digitally controlled delay element. The analysis and design of the transmitter, receiver and the Interconnect and spiral inductor models are presented using 0.18 μm CMOS technology. A very efficient reduction in power can be obtained by this method as about 0.12W is the power at the proposed receiver when compared to 50W in the existing receiver.

Index Terms-Quasi resonant interconnection networks, delay element, spiral inductor,RZ-ASK modulation

I. INTRODUCTION

In various circuit modules transmitting signals over large areas required long interconnections. With the continuous scaling of technology and increased die area, cross sectional areas of wires has been scaled down while interconnect length & frequency has increased.

In [1] the damping factor and the ratio of the rise time of the input signal at the driver of an interconnect line to the time of flight of signals across the line are the two figure of merits that were studied and a primary result of this study is that a range for the length of the interconnect exists for which inductance effects are prominent and under certain conditions, the inductance effects are negligible.

To overcome the above undesirable effects, many techniques developed over these years. Repeaters are often used [2] to minimize the delay required to propagate a signal through those interconnect lines that are best modeled as an RC impedance. But the major drawback was increased power dissipation and delay when used in large numbers when required. In [3] a current sensing method for ULV Applications is presented using a new auto-regulated current sensing scheme (ARCS).

In [4] it is shown that high performance can be obtained by using differential signaling, current mode sensing, bridge termination, and driver pre-emphasis. The adaptive bandwidth bus architecture based on hybrid voltage/current mode repeaters [5] for long global interconnect achieves high-data rates while minimizing static power dissipation. Low voltage signaling can also be used over long on-chip interconnects [6] [7].

A design which takes advantage of the inductance-dominated high-frequency regime of on-chip interconnects is shown capable of transmitting data at velocities near the speed of light [8]. This approach offers a five times improvement in delay over a conventional repeater insertion strategy but poor spectral efficiency. Alternatively a method was proposed [9] in which sharp current pulse data transmission was used to modulate transmitter energy to higher frequencies which provides considerably reduced dispersion.

It was found that the optoelectronic interconnects outperform their electrical counterparts, under certain conditions, especially for relatively long lines and multichannel data links [10]. But the major issue in this method is the interface between electrical and optical signals.

Finally, a low power, low latency on-chip interconnect design methodology based on inserting an on-chip spiral inductor to resonate interconnect around the fundamental harmonic of the transmitted signal was proposed. Thus, the interconnect capacitance resonates with the inserted on-chip inductance and the fundamental harmonic of the input signal is amplified and transmitted to the output. The energy resonates between electric and magnetic field rather than being dissipated as heat.

II. PRINCIPLE OF QUASI-RESONANT INTERCONNECTION

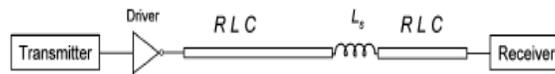


Figure 1: Quasi-resonant network

The quasi resonant interconnect network architecture is as shown above. The block consists of the transmitter, driver, and the RLC distributed interconnection or transmission line, on-chip spiral inductor L_s and a receiver.

The transmitter is used to modulate the input data signal for transmission. The inverter is used as a driver which drives the interconnect. The RLC transmission lines are found to be separated by the inductor L_s which is used to resonate the network at the desired frequency for minimum power consumption and delay. Finally the receiver demodulates the received modulated signal to the original input bit stream of data.

The fundamental harmonic of the input signal is amplified by the magnitude of the transfer function. Thus the network resonates at specific target frequency and magnitude. The output signal in the frequency domain is given by

$$V_{out}(s) = H'(s) \cdot V_{in}(s) \quad (1)$$

$H'(s)$ is the transfer function of the network between and $V_{in}(s)$ is the input data stream. The input data signal in the time domain can be given as,

$$v_{in}(t) = \sum_{k=-\infty}^{\infty} a_k e^{jk\omega_p t} \quad (2)$$

where a_k is the k^{th} harmonic of the signal and ω_p is the resonant radian frequency.

The average power consumed by the network is

$$P_{total,avg} = P_{trx,avg} + P_{qrn,avg} + P_{rec,avg} \quad (3)$$

where $P_{trx,avg}$ and $P_{rec,avg}$ are the average power consumption of the transmitter and receiver, respectively, and $P_{qrn,avg}$ is the average power consumption of the quasi-resonant network (including the driver). The resonant interconnect network is a passive linear network $P_{qrn,avg}$. A one-port network, as depicted in Fig. 8, can therefore be used to determine. The output impedance of the driver R_d and the input impedance of the network Z_{in} determine the power consumption of the network.

III. OVERVIEW OF SPIRAL INDUCTOR MODEL

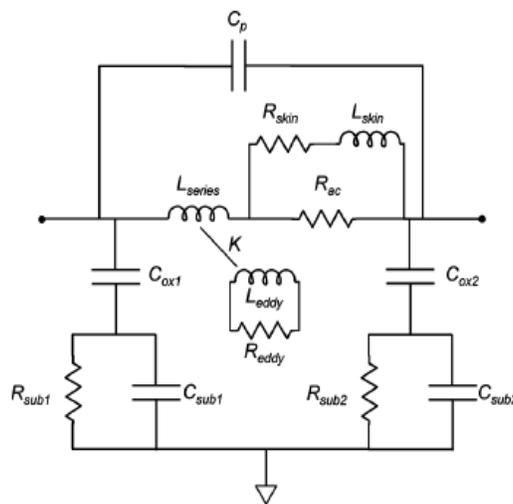


Figure 2: Lumped model of a spiral inductor

Figure 2 shows the lumped spiral inductor model. The capacitance C_p represents the capacitive coupling between the windings of the spiral inductor. The elements L_{series} and R_{ac} represent the inductance and parasitic resistance, respectively, while R_{skin}

and L_{skin} model the skin effect. Also note that L_{series} incorporates the eddy current effect coupled to the inductor by the coefficient K . The parasitic capacitance between the lines and the substrate is modeled by C_{ox} . The parallel C_{sub} and R_{sub} combination models the parasitic resistance and capacitance to the substrate.

IV. DESIGN METHODOLOGY

This part contains the design of transmitter and receiver sections.

A. Transmitter Design

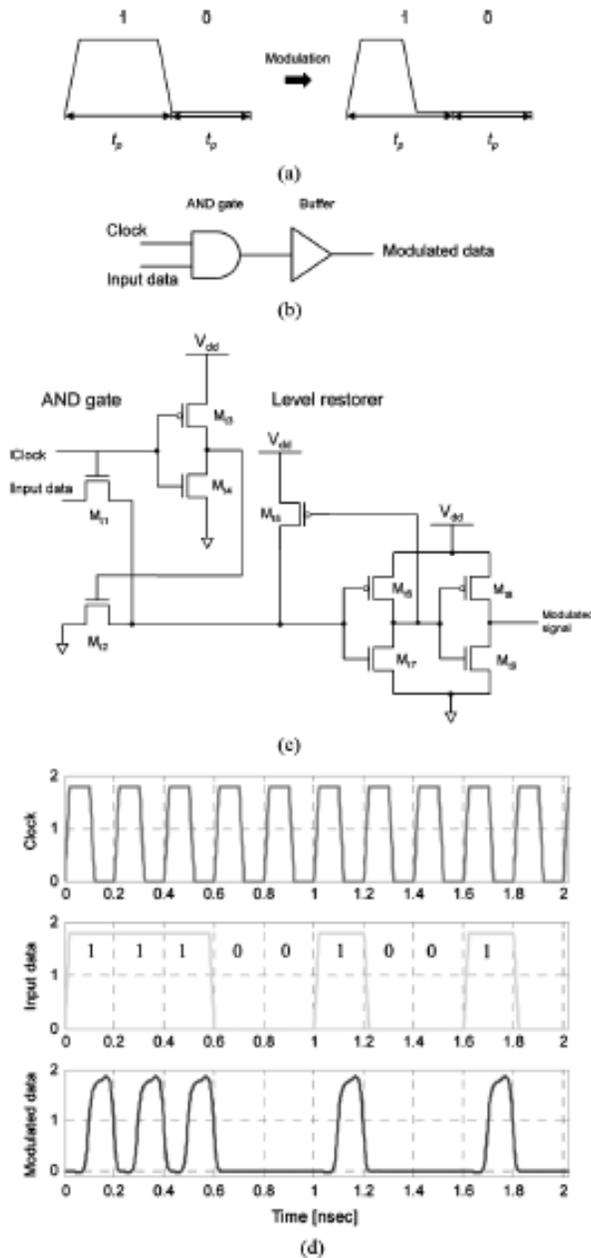


Figure 3: Transmitter circuit: (a) modulation scheme (b) gate level circuit (c) transistor level circuit (d) signal waveforms

The transmitter performs RZ-ASK (return to zero-amplitude shift keying) modulation in order to support the single transmission frequency of $1/t_p$ bits/s. This method has three main advantages.

They are,

1. The transmitted signal has a single frequency.
2. Power is dissipated only during the half cycle period of transmission of logic 1.
3. No complex circuit is required.

The proposed modulation scheme and signal waveforms are shown in Fig. 3. To maintain high speed operation, a transmission gate-based circuit (consisting of transistors M_{t1} , M_{t2} , M_{t3} , and M_{t4}) is used for the logic, as shown in Fig. 3(c). In the case where both the clock and data are at logic one, the transmission gate M_{t1} passes the logic one state to the input of the buffer chain, while the inverter (consisting of transistors M_{t3} and M_{t4}) turns off transmission gate M_{t2} . In all of the other cases, the logic zero state is passed to the input of the buffer chain.

Transistor M_{t5} restores the voltage (equal to V_{th}) associated with the operation of transmission gates M_{t1} and M_{t2} . The input data as well as the modulated signal are shown in Fig. 5(d). In this example, a “100100111” bit stream is modulated at a 5-GHz operating frequency. Note that the modulated signal follows the return to zero amplitude shift keying scheme, essential for quasisonant operation.

B.Receiver Design

The receiver circuit, its timing diagram and the signal waveforms are as shown in Fig. 4. When the clock is high, the switch closes and the data is sampled and transferred. The sampled signal charges (and discharges) the parasitic capacitance C_p . When the clock is low, the switch is open and the logic state is stored (or held) until the following clock cycle.

When the clock state is high, transistor M_{r1} turns on and the data is sampled and transferred. When the data state is low, the restorer transistor M_{r2} turns on, maintaining the high state signal at the input of the second inverter (consisting of transistors M_{r3} and M_{r4}). This mechanism serves a dual purpose. It restores the voltage associated with the transmission gate M_{r1} , and prevents charge leakage by replenishing the charge on the parasitic capacitance of transistors M_{r3} and M_{r4} (through the feedback connection).

When the clock logic is low, M_{r2} prevents the charge from leaking. When the data logic is high, transistor M_{r2} turns off and the logic low state is transferred to the output. Finally, when the clock state is low, the previous logic state is preserved until the following clock cycle.

Note that for the receiver to operate properly, the allowed skew between the clock and the incoming modulated data should be less than one quarter of the clock cycle. This constraint is required since the demodulation circuit is level sensitive. To synchronize the clock with the data, a delay element is used. A delay element based on inverters is used as shown in Fig. 4(c). The delay element provides a coarse and a fine delay. If coarse tuning is required (i.e., the delay of a half clock cycle, $t_p/2$), an odd number of inverters is used. If fine tuning is required (i.e., the intrinsic delay of the inverters), an even number of inverters is required. In this manner, for an odd number of inverters, a total delay of $t_p/2 + n\delta$ is achieved. For an even number of inverters, a total delay of $n\delta$ is achieved. δ and n are the intrinsic delay of a single inverter and number of inverters, respectively.

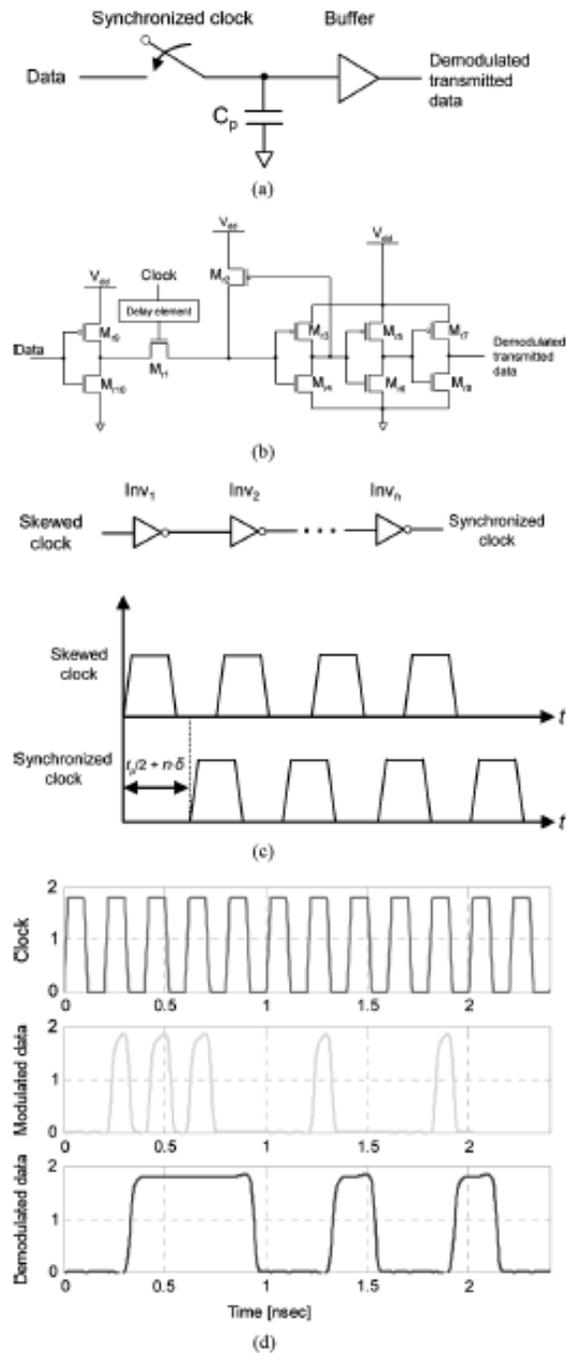


Figure 4: Receiver circuit: (a) sample and hold circuit (b) transistor level circuit (c) existing delay element circuit and timing diagram (d) signal waveforms.

V PROPOSED DELAY ELEMENT

The proposed delay element is as shown in Fig.5. In digitally controlled delay element by applying a specific binary vector to the controlling transistors ($M_{n0}, M_{n1}, \dots, M_{p0}, M_{p1}, \dots$), a combination of transistors are turned on at the sources of the M1 and M2 transistors. Such an arrangement, controls the rise and fall times (and hence, the delay) of the output voltage of the first inverter. The W/L ratios of the controlling transistors are usually chosen in a binary fashion so as to achieve binary, incremental delay.

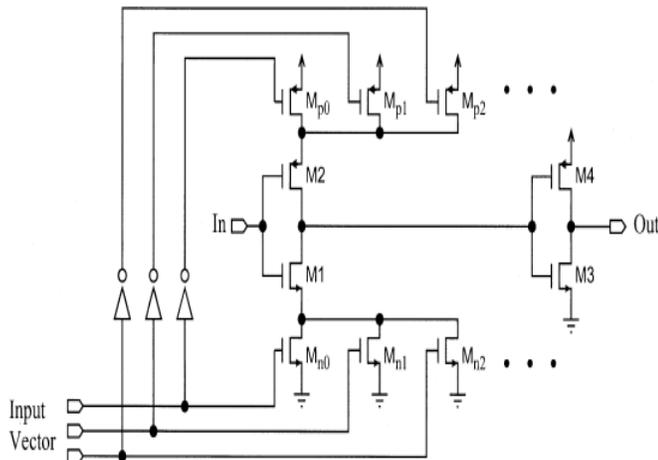


Figure 5: Digitally Controlled Delay Element

VI SIMULATION RESULT

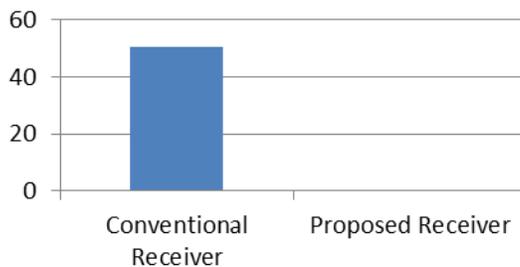
The proposed delay element was implemented in a standard 0.18 μ m process and transistor level simulation was carried out to verify the effectiveness of the methods. Table 1 summarizes the performance of the presented delay element in the receiver with the one reported. The power is only 0.1289W in the proposed receiver when compared to 50.43W in the conventional receiver.

TABLE I
PERFORMANCE SUMMARY AND COMPARISON

Receiver Type	Conventional Receiver	Proposed Receiver
Power(W)	50.43W	0.1289W

The proposed receiver and conventional receiver have been simulated and compared using TSPICE in 0.18 μ m (micrometer) technology. The two proposed receiver structures show significant decrease in power consumption.

POWER ANALYSIS



VII CONCLUSION

Thus the receiver using the proposed digitally controlled delay element has been presented. The method is based on 0.18 μ m CMOS technology. An accurate model is presented based on transmission line theory and a lumped high frequency model of an on-chip spiral inductor. This method is shown to outperform the conventional method. The receiver power value using conventional method is 50.43W whereas the power value of the proposed receiver is 0.1289W. Thus significant power reduction is achieved.

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Web Authentication using Graphical Virtual Environment

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Abstract- Authentication has become integral part of 90% of web sites. The major issue in web authentication is the limitation of human memory to remember the password string for longer period. Almost all websites are still using traditional recall-based textual password to identify their remote users. Vulnerability of this authentication mechanism due to the sophistication of online identity theft has led to the increased scope for the studies of recognition-based web authentication. This paper discusses the web authentication using graphical password built over the virtual environment. It examines the security threats associated with poor authentication practices of the Web and why is the need for businesses to strengthen web authentication. The paper also proposes a new approach for delivering one-time passwords using mobile phones.

Index Terms- Web authentication, Graphical password, OTP, Virtual environment.

I. INTRODUCTION

The purpose behind integrating authentication on a website may be to achieve Security, for Marketing/ advertisement, to establish Trustworthiness. This paper is focused on analyzing authentication of web sites which are highly sensitive towards security. Most of the financial or e-commerce websites are in search of improved web authentication mechanism for providing better security to their users. Security and trustworthiness are biggest challenges for such highly sensitive businesses running over public network. Security is important in authentication since breaking it, not only leads to financial losses but also in loss of user confidence in online services.

Every alternate website the user access asking for creation of credentials are resulting in selection of trivial password or choosing same password for lower as well as higher-security websites. Due to the lack of security implementation in lower-security websites, the attacker may easily get access to the user credentials which he may then use for accessing the user's account on highly secured website. E.g. - a user account on social site like www.ibibo.com may help attacker to exploit his bank account, provided that they have overlapping bases. Such cross-site account negotiation attacks are very common among the others.

Another reason that opens the door for the attacker is rare use of websites on which accounts are created. In such cases, often users are likely to forget their password. In response to solve this problem, they copy down the password somewhere, assuming it is the best place to keep their password safe!

This paper introduces an innovative way of web authentication using Graphical Virtual Environment. It is graphical password that helps the website users to efficiently create the secret information which is difficult for the attacker to guess. This leaves the human memory free to remember experiences and emotions; not engage in remembering random, critical string.

II. GRAPHICAL PASSWORDS

All the proposed and commercial graphical passwords can be categorized as recognition-based and recall-based. In first category mostly image or face is used whereas second uses grids to divide the picture.

Passfaces[1, 2]: In this recognition-based scheme, the user is required to select four images of human faces from a face database as the part of password generation. At the time of authentication, the user will face a grid of nine faces, consisting of one face previously chosen by him and rest eight decoy faces. The user recognizes and clicks anywhere on the known face. This procedure is repeated for four rounds. The user is authenticated if he/she correctly identifies all the four faces. This technique assumes that people can recognize human faces easier than other pictures. The major disadvantage of Passfaces is that login process takes longer than text passwords. Also the passwords selected by users are very much predictable. Other problem is that it has smaller password space.

Similar kind of a system built for mobile devices was Imageshield introduced by Confident Technologies [6, 7].

GPEX[3, 4]: It is the password manager program implemented as a plug-in to the Firefox web browser. Passwords were generated by clicking five points on the picture which is divided into several small grids. The number of clicks to go is presented at the bottom of the image. Alternatively user can select five icon-size images out of set of images presented to him, by clicking on them to generate the password. The biggest problem with this scheme is the icon-size images are too small and shown plenty altogether, so memory stress required to recognize them. For the grid-based images, it is very difficult for the user to recall the click points over the image.

V-GO[5]: It allows a user to create a graphical password by navigating through an image. To enter a password, a user can click and/or drag on a series of items within that image. The scheme is lacking with the size of password space. In addition, a user chosen password might be easily guessable. Finally, the system requires users to precisely recall the authentication task, instead of relying on recognition.

III. PROPOSED SCHEME

Hackers are always moving a step ahead and developing new techniques to gain access to corporate information and we must be proactive in attempting to keep them away. Providing multiple layers of security is always the most effective way for securing any system. Such layered security can be provided through *multifactor authentication* [8]. Proposed here is a Multifactor Graphical Authentication Solution for web authentication using Virtual Environment.

There is a traditional trade-off associated with web authentication between security and usability. The websites that opts for security with the two-factor authentication scheme end up with the users facing complexity and paying high costs. On the other hand simple system like text password is not secured at all. Proposed system provides the balance between the two. It helps to build highly usable authentication system without compromising security.

When something is chosen out of interest rather than following the strict rules, recognition replaces the recall procedure. The main purpose of this scheme is to reduce the cognitive load of the user. The password is created by the using the sequence of actions performed by user within the virtual environment. Instead of remembering and typing a long and complex textual string, the user creates the password by clicking the graphical views. This scheme combines recognition-based system with the token-based system and optionally with the textual password. When the user faces virtual environment with which he is familiar, he can easily repeat the actions performed earlier. The reason behind the ease of usability is the selection of password is completely based on user's personal interest. The virtual environment provides hint at every step for completing the password as opposed to the text password where user gets no clue for recollecting the password.

Following sections describe the multiple factors of the proposed authentication system.

A. First Factor: Graphical Password

Recognizing picture is much easier than recalling non-dictionary words. This fact can be demonstrated with the example – Lets think of the game where no. of objects shown for a minute to a person and then he has to make list of their names. Doing this task is always better than reading a list with names of objects and then recalling and identifying the corresponding objects shown to you.

Password construction with Graphical Virtual Environment:

Virtual environment consists of virtual objects representing real life objects. The password generation process is divided into multiple categories. For example, selecting a bunch of flowers to insert into flower-pot, dialing a number on the mobile, setting time and date, selecting tour place for picnic, selecting favorite cricketer etc. For each category a screen is presented to the user where he may choose to interact or may skip the category. User has complete freedom of choosing the category containing objects of his interest. This helps him to remember the sequence of interactions for longer period. If user opts to interact then the interaction is converted into substring and added to the password being generated for the user. The substring generation on user interaction can be done as follows:

Formula: Action1(A1) Parameters List 1(PL1) #A2
PL2#.....An PLn

Example: SELECTbunch(1)#TRIPcity(5)#CRICKSachin

All the substrings are concatenated as shown above to form the password string. At the time of authentication, user is presented with the category screens he has interacted with. Along with that few more random category screens are inserted between them. This strategy helps in defending from the shoulder surfing attack. The observer will be confused with the different random categories inserted for every authentication. On the contrary, legitimate user recognizes the categories he has interacted with earlier and repeats the procedure to generate the password.

B. Second Factor: Mobile Phone as OTP device

In addition to user created graphical password, the presented scheme makes user enter one-time password (OTP) generated by software on his mobile to protect against Malware and Shoulder Surfing attack.

Use of an OTP device which generates OTP for the user to be entered on the website has four major issues: firstly, it will increase the cost of the system. Secondly, there is a risk of losing the device or it may be stolen. Third issue is that user has to carry this device wherever he goes as one never know when and where he may need it for web access. Fourth problem is that hardware tokens expire after a limited life span and then they need to be discarded and new ones have to be issued.

Alternative that provides solutions to these problems is to make use of user's mobile phone as an OTP device. It will save the additional cost of the device. Users are more likely to recognize the loss of their mobile phone rather than the loss of hardware token. This means that they are more likely to recover a misplaced mobile phone before finding a lost hardware token. Moreover, everyone generally carries mobile phones wherever they go. Also, mobile tokens are implemented using existing hardware; this minimizes negative externalities. An added benefit with such implementation is that this soft token embedded in mobile phone will not expire. This will help to improve customer satisfaction. As a result mobile phones are more reliable deployment method than hardware tokens.

In most of the recent multifactor implementations, website sends an OTP to the user's mobile phone via SMS text message. The criminals use various technologies to intercept the text messages and extract the OTP to use it for authenticating their fraudulent transactions. This is the well-known man-in-the-middle (MITM) attack. Furthermore, the SMS text messages are often sent in clear text form and anyone having access to the mobile phone can read the message. To protect OTP against the MITM, the proposed scheme provides the generation of OTP on mobile device itself to avoid transferring it over insecure network. The OTP can be calculated on the basis of following factors:

Exact date and time of day synchronized with the server
Unique secret key
IMEI number of user's mobile phone
Hash salt based on the domain name of the target website

The application for generating OTP can be provided on the user's mobile token in a number of ways including Bluetooth connection, WAP Push, downloading, SMS request from a short-code or a long number or an URL from mobile Internet portal or from any relevant applications store.

This scheme also protects against phishing attack by using a hash salt based on the domain name of the target website. If the user enter password at an imitated website of attacker, that site's domain will be used as the hash salt. This will produce totally different OTP than the original one.

C. Third Factor (Optional)

If user opts for this factor to be included in his password then the possible options to form this factor are user's PIN or he can select to enter text password. Another option is to answer the selected questions from list provided.

D. Password Space Size

Introducing graphical environment instead of blank textual password increases the usability of the proposed scheme. But equally important is the security of the authentication scheme. Size of the password space is the major factor affecting security of any authentication system. The proposed systems claim to provide a superior space of possible password combinations compared to traditional 8-character textual passwords.

Password space size for proposed scheme is dependent on number of categories (c), number of objects available as option (ob) and all the possible combinations of them. More the number of categories i.e. type of interactions in the virtual environment; more will be size of password space.

$$S = \sum_{i=1}^n P_c(j)_i P_{ob}_i$$

$j \geq 1$ & $j \leq m$, m is no. of categories, n is total no. of interactions chosen by user. P is the permutation function.

E. Password Recovery

Many of the websites visited by the user where he had created the account are rarely revisited. This is the reason password recovery systems are equally used as much the login procedures. Therefore, password recovery and login system are the two entrances for attacker to gain privileged access to legitimate user's account in order to break confidentiality and integrity. If either of the two has design loophole then that will open the second entrance for the attacker. Recently many websites have implemented strong authentication system using latest techniques but the recovery system is still following the traditional method of presenting security hint questions to the user which has quite predictable answers.

In the proposed scheme, the recovery system has four categories from which user need to select one. For the chosen category, user has to face four questions out of which he may select two or three questions. For selected questions he has to provide answers. This process is performed at the time of registration. Later if the user wants to recover his password, he must select the same category and set of questions. Based on their answers some hint is sent to the user mobile. User has to enter the data according to the hint and he gets back his password.

IV. CONCLUSION

This paper has proposed a new multifactor authentication system based on graphical password. This approach is highly secured and can be used by layman. It is a web authentication mechanism for public and un-trusted network. Presented method doesn't need a familiarization or a lengthy password setup process. It employs a cell phone as the second factor of authentication in conjunction with graphical password. This system has the advantage that the authentication task is more reliable, easier and fun to use. Being purely recognition based system, it reduces user's cognitive load helping users to stop reusing password for multiple web accounts; specially on low as well as high security sites i.e. sites with varying security levels, avoiding cross site account compromise attack. Since user's cognitive load is reduced, they will not copy down password for memorizing it. This avoids leaking of password. Even if they want to copy it, they can't write password as it is since it's not a string. What user knows is a set of actions. Only they can write the hint for generating password. But such hint may not be completely useful for the attacker. It helps user to choose non-trivial but difficult to guess password. Lastly, it is resistant to the attacks like phishing, MITM, Malware and Shoulder Surfing attack apart from tradition brute force attack.

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A Monotonic Digitally Programmable Delay Element for Low Power VLSI Applications

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Abstract- Digitally programmable delay elements (DPDE) are required to be monotonic and low power. A low power digitally programmable delay element (DPDE) with monotonic delay characteristics is proposed and a dynamic current mirror together with a feedback technique enables a current-on-demand operation. The dynamic power is made proportional to the delay with a maximum of $25\mu\text{W}$ and static power is eliminated. DPDE is implemented with two new designs of CMOS digitally controlled oscillators (DCO). First design has been implemented with one driving strength controlled delay cell and with two NAND gates used as inverters. The second design with one delay cell and by two NOR gates is presented.

Index Terms- Delay element, dynamic current mirror, Current-Starved Inverter, monotonic, Digitally Controlled Oscillator (DCO)

I. INTRODUCTION

Delay elements with programmability are often solicited in several high performance VLSI systems to control the rising/falling edge of a desired signal. A continuous voltage can be used to manipulate the delay [8]. However, it is sometimes desirable to vary the delay digitally. Presently, low power Digitally Programmable Delay Elements (DPDE) play a key role in many applications such as Digitally Controlled Oscillators (DCOs), Digital Delay Locked Loops (DDLs), All Digital Phase Locked Loops (ADPLLs), microprocessors and memory circuits.

Several types of digitally controlled delay elements have been reported. The DPDE based on the current-starved inverter is one of the most popular because of its low power consumption. However, charge sharing introduces non-monotonic delay with respect to increasing input digital code. A Current mirror based DPDE that provides monotonic delay and maintains low sensitivity to temperature variation was presented. One main advantage of the delay element is finding the input vector for a specific delay is straightforward.

The architecture, however, dissipates considerable static power and the direct path currents are not well managed.

This paper describes a power efficient DPDE architecture where a dynamic current mirror together with a feedback technique is used to provide current only when needed. This paper examines some of the most classical digitally programmable delay elements. The new delay element and DCO is presented while simulation characterization is given.

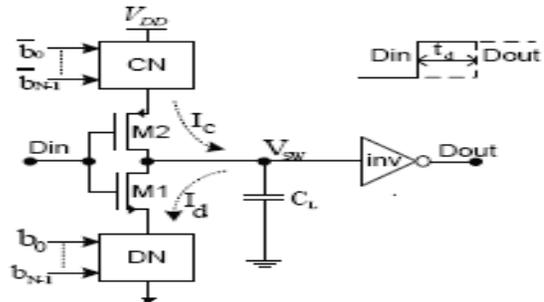


Figure 1 Basic Concept of DPDE

II. DIGITALLY PROGRAMMABLE DELAY ELEMENT

Figure 1 depicts the basic concept of a DPDE. It consists of load capacitor C_L , charging network CN that provides charging current I_c , discharging network DN that provides discharging current I_d , an output inverter INV, and an input inverter formed by M1 and M2. The delay, t_d , depends on the load capacitance, (dis)charging current, and the voltage swing across capacitor, V_{sw} , and is given by

$$t_d = (C_L * V_{sw}) / I \quad (1)$$

Delay control is often accomplished by adjusting I , C_L or V_{sw} .

A. Shunt-capacitor based DPDE

Figure 2 is a shunt capacitor based DPDE that was proposed. A digital input code controls the output capacitive load seen by the input inverter. The MOS with source and drain shorted can be used for the capacitors. The technique is quite robust but the use of capacitors is prohibitive in terms of area.

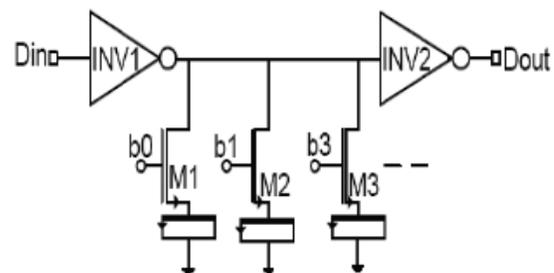


Figure 2 Shunt capacitor based DPDE

B. Variable resistor based DPDE

Figure 3 illustrates another DPDE technique that was proposed. An input code switches a bank of stacked transistors

thereby producing varying resistance at the source of M1. Different resistance values produce different discharging currents and hence different delays. Extra coding is however required for the transistor switching.

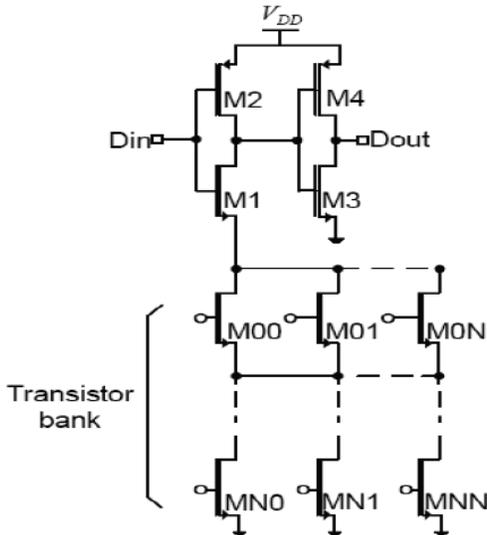


Figure 3 Variable based DPDE

C. CSI based DPDE

A simple technique to digitally program the delay based on current starved inverters was proposed and shown in Figure 4. NMOS control transistors, Mn0, Mn1, Mn2, are connected to the source of M1 and PMOS control transistors, Mp0, Mp1, Mp2, ..., are connected to the source of M2. By an input code, the rising/falling edge can be controlled accordingly. However, due to charge sharing between the capacitance at the output of the input inverter and the capacitance at the source of M1, the delay may not be monotonic. A one to one mapping of input vector to delay is therefore not guaranteed.

This problem was identified and analyzed and a different technique based on a current mirror, shown in Figure 5, was proposed to solve the problem.

The core of the current mirror CSI based DPDE is formed by a current source transistor Msc, current mirror transistors, Mn1, Mn2, input inverter transistors M1, M2 and output inverter transistors, M3 and M4. The delay is controlled through the transistors Mp0~Mp3. The number of transistors can be increased as desired. When Din is low, M1 is off and the output of the input inverter, Vo1, is charged to Vdd. When Din goes high, M1 turns on and starts discharging the capacitance at the output of the input inverter. The discharge current depends on the current through Mn2 which is provided by the current source Msc and control transistors that are switched on. The charge sharing effect is avoided. Though monotonic delay can be achieved, this design suffers from power inefficiency. Firstly, the delay element consumes significant amounts of static power and the dynamic power is not well managed. When the delay element is in reset mode where Din is low, the current source transistor Msc, the current mirror transistor Mn2 and the control transistors are all on resulting in static power dissipation. Nejad suggested that this static power can be minimized by scaling down the W/L

ratios of the controlling, the current source and the current mirror transistors.

However, this might lead to reliability issues. Secondly, as acknowledged, the current starved nature of the structure may cause significant direct currents to flow through the output inverter transistors M3 and M4. This is because, when Din goes high and the discharge current is small, Vo1 may drop at a very slow rate allowing both M3 and M4 to be on simultaneously for a longer time. Moreover, even when the delay event has been completed, the current source transistor Msc continues to provide unnecessary current. As acknowledged the power dissipation resulting from these three sources is very high. The direct current through the output inverter also complicates the derivation of an equation for the delay. The static and direct path currents can be completely eliminated with dynamic current mirror and gate decoupling techniques, respectively.

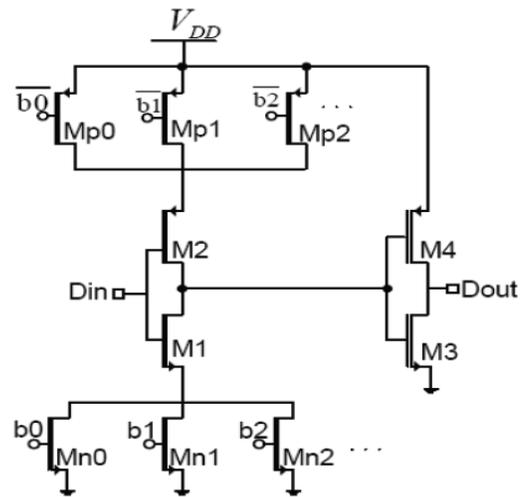


Figure 4 CSI based DPDE

D. PROPOSED DIGITALLY PROGRAMMABLE DELAY ELEMENT

The proposed digitally programmable delay element is shown in Figure 5. The goal is to eliminate static power, reduce dynamic power and improve the current mirror accuracy.

The set of control transistors, MP0~MP4 is connected in a similar manner as in Figure 5 so as to preserve the simplicity and monotonic delay characteristics of the delay element. Three major modifications can be identified. The gate of the current source transistor, MCS, is connected to the output of the output inverter. The gates of the NMOS and PMOS transistors of the output inverter are separately controlled. The NMOS transistor, M3 is controlled by the inverted version of Din while the PMOS is still controlled by the output of the input inverter. Another modification is in the current mirror. The NMOS switch of the input inverter, M1, is placed at the source of the current mirror transistor, Mn1, rather than the drain. Another switch transistor, M5, is placed at the source of the other current mirror transistor Mn2.

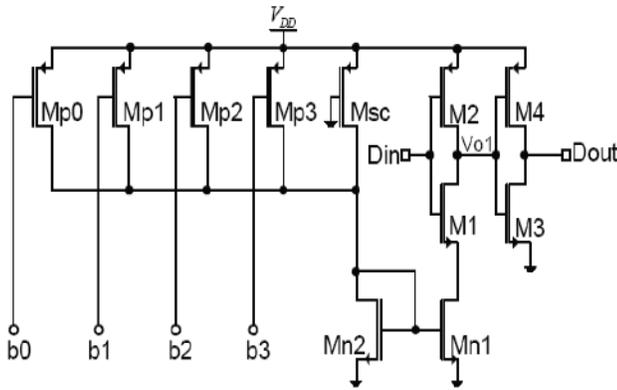


Figure 5 Modified CSI based DPDE

When Din is low, M1, M5 and M6 are switched off. M2 is switched on followed by M7 and M3. Since M2 has to switch on before M7, the gate voltage of M3 lags behind that of M4. Therefore, M4 switches off before M3 switches on and direct path currents through these transistors are eliminated. The source transistor Msc is switched on since M3 pulls its gate to a low voltage. When Din turns high, M1, M5, M6 are switched on while M2, M7 and M3 are switched off. The delay element then operates just as the conventional type. However, since M3 turns off before M4 turns on, direct current during this phase is also eliminated. Moreover, when Dout switches to V_{DD}, current source transistor Msc switches off since it is no longer needed and the current through it is cutoff till Dout goes low again during reset. Another interesting modification worth noting is that, Mn1 and Mn2 are always in saturation when needed. When Din, switches from low to high, the source of Mn1 and Mn2 are at ground voltage giving them sufficient drain-source voltage to remain in saturation. Before Mn1 enters the linear region Dout would have switched to V_{DD}. This allows a more accurate current mirror than that presented in Figure 5 and better predictability of the delay. The input current I_{IN} through Mn2 is given as

$$I_{IN} = I_0 + I_0 \cdot \sum_{k=0}^N 2^k \bar{b}_k \quad (2)$$

Where k= 0,1...N-1 is the bit number, I₀ is the current through Msc and the second term is the total current through the control transistors that are on varying in a binary fashion.

III. DCO

A. Introduction

The DCO is the combination of a digital-to-analog converter (DAC) and a voltage controlled oscillator (VCO). Based on the input code, the DAC converts the code to the voltage V_C. Then the voltage V_C controls the frequency of the VCO. Seen from Figure 6(a), the ring-type VCO can generate five clocks which are named as clk0-clk4, respectively. From Figure 6(b), it is seen that the delay cell consists of a modified NOR cell and two inverter cells. In order to reduce power, the signal Run turns to be high level when the PLL is not in use. Then the output of the delay cell keeps low level. When the

signal Run is low level, the voltage V_C controls the frequency of the VCO. The current M₀ through increases as the voltage V_C increases, so the delay time of the delay cell decreases and the frequency of the VCO increases (or vice versa). Figure 6(c) shows that the voltage V_C is generated by the digital current controller. The PMOS transistors are (M₈~M₁₃) coded in a binary fashion, for example, the W/L ratio of M₉ is twice that of M₈ and so on. So, the range of the codes in the DCO is from 0 to 315. In order to obtain the minimum frequency of the DCO, M₁₄ always keeps on the DCO, M₁₄ always keeps on. The sizes of M₁₅ and M₁₆ are the same. M₁₅ and M₁₆ can act as resistors. So the voltage V_C increases with the increase of the current I_C.

Fi

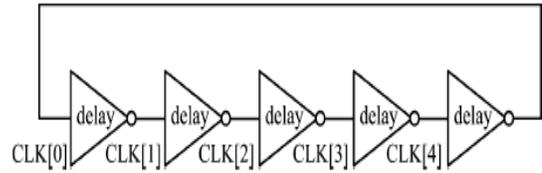


Figure 6(a) Structure of DCO

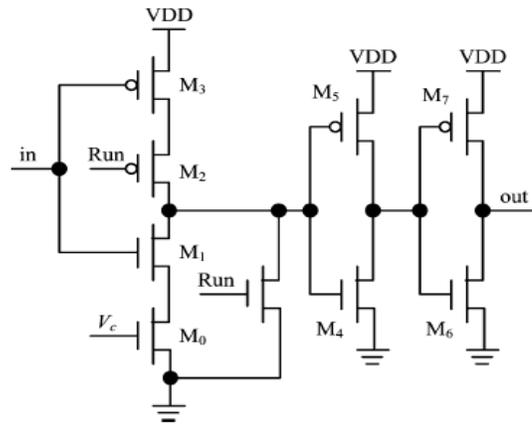


Figure 6(b) The circuit of the delay cell

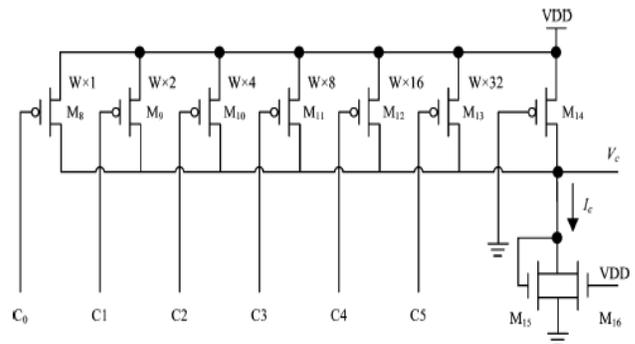


Figure 6(c) Digital Current Controller

B. Conventional DCO

The conventional DCO has three stages of driving strength controlled inverter cells and one AND gate for shutting down the DCO during idle mode. Like VCOs or CCOs, DCOs also have frequency controlled mechanism to control the output frequency of oscillation by means of digital control word applied at the control input of DCO. A variable delay inverter is a core

element of DCO and its precision directly affects the overall performance of DCO. The propagation delay time of inverter is inversely proportional to equivalent MOS width. With change in digital control word the equivalent width of MOS transistors varies, which changes the propagation delay time of the inverter.

With fixed supply voltage, two parameters modulate the output frequency of oscillator. One is total number of delay cells connected in the closed loop and other is propagation delay time of each delay cell. Block diagram of conventional DCO is shown in Figure 7. It employs the coarse code as well as fine code to control the output frequency. The circuit consist of three stages of driving strength controlled inverter cells and one AND gate to enable/disable the DCO. The W/L ratio of MOS transistors are binary weighted which enables to achieve binary incremental delays. The control bit applied at the input of first two stages is used for coarse tuning while the code applied at the control input of third stage provides fine tuning.

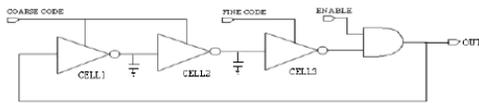


Figure 7 Conventional DCO

C. Proposed DCO

In proposed DCO-I structure, one driving strength controlled inverter cells & two NAND gates have been used as shown in Figure 8(a) and 8(b). In the second design, inverter cell & two NOR gates have been utilized as compared to three delay cell and one AND gate in conventional DCO.

In conventional DCO, control word is applied at the binary controlled input of all the three stages but in proposed DCO designs control word is applied only at the control input of first stage. Therefore, the propagation delay time of first stage i.e. driving strength controlled delay cell is only varied to control the output frequency of oscillation while propagation delay time of NAND/NOR gates remains fixed. As the number of transistors used in two proposed designs are much less than the conventional so circuit shows considerable power saving. The conventional DCO uses total 54 MOS transistors and two capacitors. On the other hand both modified circuits use only 24 MOS transistors. Due to less numbers of transistors delay time introduced by the circuit reduces and output operating frequency increases. However the numbers of frequency components that can be generated by proposed DCO are less than the conventional structure. There are applications which require particular specified frequency or need only a few frequency components. For those applications the proposed circuit shows power saving up to 40%.

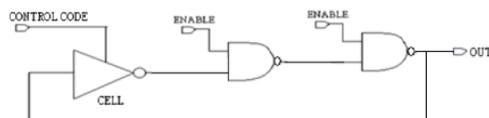


Figure 8(a) Proposed DCO-I

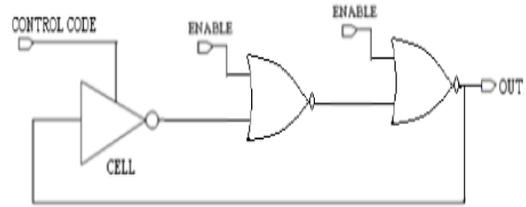
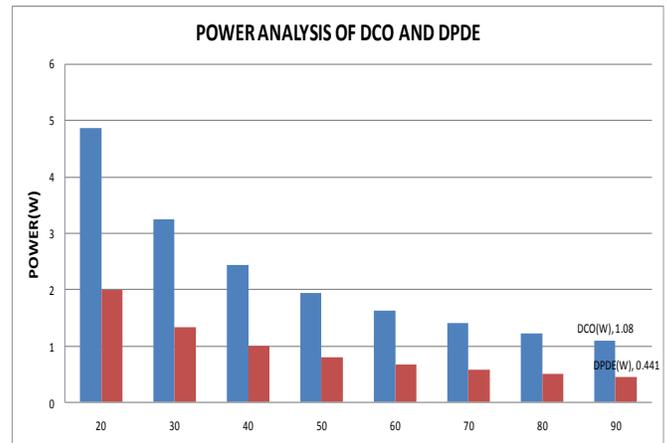


Figure 8(b) Proposed DCO-II

B. Simulation Results

The proposed DPDE was implemented in a standard 0.18 μ m process and transistor level simulation was carried out to verify the effectiveness of the methods. In order to eliminate the direct current paths in M3 and M4, the gate control voltage of M3 is delayed so that the two transistors are never on simultaneously. As can be seen M3 completely turns off before M4 turns on and M4 turns off before M3 turns on. The design procedure for this delay element is similar to the one presented.

The proposed DCOs and conventional DCO have been simulated and compared using TSPICE in 0.18 μ m (micrometer) technology. The two proposed DCO structures show significant increase in operating frequency with reduced power consumption.



A Digitally Programmable Delay Element (DPDE) with very low power consumption has been presented. The proposed circuit is compared with two other architectures. By using a current mirror with feedback, the static current is eliminated and the dynamic power is made proportional to the delay with a maximum of 25 μ W power consumption. It is shown that the delay element will be more linear when implemented in improved technologies. The two new designs of DCO have been presented. The proposed method results in reduced power consumption than the conventional DCO and also reduces number of transistors. Finally DPDE and DCO are compared on the basis of their output power. By using improved CMOS technologies, power dissipation can be further reduced using delay element. The low power DPDE can also be used to implement many applications such as DDPLs, ADPLLs, memory circuits, microprocessors and clock multipliers. There are applications which require particular specified frequency or need

only a few frequency components. For those applications the proposed DCO circuit results in reduced power consumption.

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The Immitigable Hardships and Physical and Mental Agonies of the Untouchables in Mulk Raj Anand's: Untouchable

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Abstract- Untouchable is Mulk Raj Anand's first novel and it brought to him immense popularity and prestige. This novel shows the realistic picture of society. In this novel Anand has portrayed a picture of untouchable who is sweeper boy. This character is the representative of all down trodden society in pre-independence of India. . With Bakha, the central character, there are other characters who also suffer because of their lower caste. The present paper of us is concerned with evils of untouchability and the need for radical empathy.

I. INTRODUCTION

From the time immemorial, Caste has been a dominant subject in India. Even after completing 65 years of independence the inhuman, savage practice of untouchability still prevails almost everywhere in the country. Mulk Raj Anand was an eminent Indian writer in English, notable for his depiction of the lives of the poorer castes in traditional Indian society. He has to his credit sixteen novels, twelve collections of short stories and more than twenty-five books on art and other general subjects and hundreds of articles.

Mulk Raj Anand – His themes and Style of writing:

Anand is Dickensian in his ultra-sensitivity to the existence of social evils in protean forms. In fact, it is the keen awareness of the human predicament that propelled him into creative writing. Therefore the themes which Anand has chosen for his novels are based on such problems as casteism and human suffering caused by a variety of factors-political, economic, social and cultural. He tries to create in the readers an urgent awareness of the dehumanizing, social evils, to stir the springs of tenderness in them and to activate them for the removal of these evils in order that a desirable, just social order may come into being.

Anand's debut novel, 'untouchable', has brought him immense popularity that shows the realistic picture of society of the nineteen thirties during which Indian struggle for Independence was at its peak. The readers will realize the humiliation and physical as well as mental agonies of the untouchables throughout the novel. It was very heart rending to know that the so-called upper castes have not even accepted the lower castes with equality. In this novel, Anand succeeds in exposing the oppression, injustice, exploitation to the whole community of the outcastes in India.

Miserable Living Conditions of Untouchables:

'Untouchable' happens to be the very first novel written by M.R. Anand under the deep influence of Gandhi. With Bakha, the central character, there are other characters who also suffer because of their lower caste. For the privileged, the colony of the untouchability is a forbidden place. That is why it is termed as "out-castes' colony". It reveals that the privileged people are totally indifferent to the welfare of the people who slavishly serve them. They treat the outcastes as their moveable, yet untouchable, property. They consider the sweepers dirty just because they clean their dirt. They make the untouchable lead a life of total dependence on them. Even for water, the basic necessity of human existence, the sweepers have to depend on the mercy of the caste Hindus.

Bakha symbolizes the exploitation and oppression which has been the fate of untouchables like him. The novel describes a single day in the life of Bakha; the untouchable belonging to the scavenger caste, commonly known as *bhangi* in many Indian languages. The work of this caste was to clean toilets and streets and keeps them clean for the upper castes. The living conditions of the untouchables were extremely squalid and they were forced to reside in kutcha mud-walled, single-roomed cottages. There was not proper system of drainage and there was foul smell everywhere. Almost every page of the novel is drenched in Bakha's unseen tears who patiently endure the most humiliating and depressing days of his young life in this story. From sunrise on he is forced to deal with discrimination, hatred and hypocrisy. Bakha begins his daily routine work with his father's cascade of abuses:

"Get up, ohe, you Bakhya, Ohe son of pig! Are you up? Get up, you illegally begotten".¹

The Plight and mental agonies of down-trodden:

Bakha is a very dexterous workman; passerby's often marveled at his skill and thought for a while that he was not the kind of man who ought to be cleaning public latrines. Despite Bakha's skill and work ethic he was no chance of moving up in his life. He is forever confined to his duty, demeaning job as he has taken birth in down-trodden class. Bakha's potentialities are curbed and strangulated before they can even sprout. In spite of his ardent desire to go to school and by being educated, he is not allowed to school because the parents of the high castes children would not allow their sons to be contaminated by the touch of the low-caste man's son. Bakha worked in the barracks of a British regiment and was caught by the glamour of the white man's life. He is all enthusiastic and has his own set of dreams. His dreams

vary from to dress like a “Tommie” (Englishman) in ‘fashun’ to play Hockey. However his limited means and the circumstances force him to literally beg for the food and get humiliated in each turn of the road. They were not permitted even to take water from a well and had to wait for hours for the mercy of the upper caste. The food will be given to them by throwing and if they touch anybody by accident they will be punished. The upper class however doesn’t find this untouchability when they molest their teen girls. More humiliation is in store for Bakha before his day is out. His curiosity takes him to a local temple, and he becomes inquisitive to see the hidden mystery in the temple. While Bakha was peering through the window he was interrupted by the priest shouting “Polluted! Polluted!” Meanwhile the crowd gathered and shouted him by saying:

“Get off the steps you scavenger! Off with you! You have defiled our whole service!”²

Bakha ran down to the courtyard where his sister Sohini was waiting. Here he got a shock again as the priest claimed, “I have been defiled by contact”. Sohini with sobs and tears in her eyes explained the priest claim saying:

“That man made suggestions to me, when I was cleaning the lavatory of his house there. And when I screamed, he came out shouting that he had been defiled”.³

Though Bakha’s eyes flared wild and red and was enraged by this and flew into a tirade, he remains a mute witness. He desperately comes and tells his father.

“They think we are mere dirt, because we clean their dirt.”⁴

The inhuman treatment meted out to Untouchables:

The conditions which the untouchables are enforced into are really shocking through one can share their aches and agonies. Cigarettes are flung at him as a bone is flung at an insistent sniffing dog. Jilebis are thrown at him, like the wastes thrown at a pig; and the thin paper-like pancake (given as food to the sweeper) flies down to him like a kite from the third floor. Wherever Bakha goes, he is belittled with such words as ‘defiled’ and ‘polluted’. The privileged castes Hindus assert their superiority over the outcastes by inflicting pain on them.

“Dogs” is the name that normally comes to the mind of the privileged folk to identify the outcastes. The “touching incident” reveals the horror of being an untouchable. The people who gather around Bakha shoot abuses by calling him, “low-caste vermin”, “swine”, “dog”, “brute”, “son of a bitch”, “offspring of a pig” etc. These abusive words thrown on a lonely and helpless person are in opposition to the privileged folk’s claim of being “twice-born”. These words actually reveal their polluted mind. The story goes on to show even more examples of the harsh treatment of untouchables.

II. CONCLUSION

All these incidents reveal how unjustly the untouchables are treated by caste-Hindus. Anand concludes the novel *Untouchable* with a note of faith and idealism. The manifest plea in the novel is for the total abolition of untouchability. Bakha fervently hopes for the dawn to his nature of his work and his relevance in the society without the label of ‘untouchable’. The inhuman treatment meted out to Bakha in *Untouchable* could

have really happened to a social outcaste during the colonial days in India; perhaps such cruelties are being perpetuated in many parts of villages even today which the objective newspapers publish. Undoubtedly, Anand had drawn upon what he had himself witnessed and heard as a boy, he brings into print in the form of a novel. As a novelist addressing himself to the task of exposing social evils, Anand has been an effective writer and he can be compared to Dickens in this respect. The novel evokes in the mind of the objective reader, the horrifying social malady that existed in the colonial days and in the subsequent decades makes a tale of socially created woe to the downtrodden in the Indian society. Anand dreamt for our strong, united, prosperous and peaceful nation.

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Performance Analysis of MANET with Low Bandwidth Estimation

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Abstract- A Mobile Ad-hoc network (MANET) is a self-organizing and adaptive in environment. A MANET consists of a set of mobile nodes that have to collaborate, interact and communicate to complete an assigned operation. These applications have need of Quality of Service (QoS) parameters such as: minimum hop path, minimum transmitted energy path, residual energy, bandwidth, throughput and power to be adequate so that a reliable and trustful connection between participating nodes is maintained. The proposed work on the performance analysis of low bandwidth and power constraints of nodes, being used in the mobile ad hoc network and design its basic structure and evaluates the outcome of same; on a designed simulator in MATLAB -7.0 and studies its performance on various inputs, like as number of nodes, transmission range, transmission radius of each node throughput and number of iterations. Simulation results show that the number of hop-counts decreases as we increase the percentage of low down bandwidth nodes in the network, it was also concluded that the throughput rate decreases as we increases the number of low down bandwidth nodes in the network.

Index Terms- Ad-hoc Network, Bandwidth, Battery Power Transmission range, Matlab 7.0

I. INTRODUCTION

The bandwidth estimation is a basic function that is required to provide QoS in Mobile Ad-hoc Networks [1]. It is a way to determine the data rate accessible on a network path. It is of curiosity to users wishing to optimize end-to-end transport performance, overlay network routing, and peer-to-peer file distribution [2].

Techniques for accurate bandwidth estimation are also necessary for traffic engineering and capacity development support. Because of an Ad-Hoc network is a collection of wireless mobile hosts forming a temporary network without aid of any centralized administration. Mobile Ad- Hoc Networks has a new structure in the field of wireless Communication network. They do not require any fixed infrastructure for instance a base station to work. The nodes themselves address topology changes due to the mobility, the entrance or the exits of nodes. These networks use a radio medium. The technology gives the user a freedom to move freely any were in the communication range and it has become independent of its infrastructure [6] [15]. This freedom from existing infrastructure has made Mobile Ad-Hoc Networks more flexible, affordable and easily deployable in all environments including military and rescue operations. There are two types of mobile network namely Mobile IP and MANET.

MANET consists of nodes that are cable to communicate wirelessly among them. MANETs consist of a group of wireless mobile nodes which dynamically exchange data among themselves without the reliance on a fixed base station or a wired backbone network [3].

MANET nodes are typically differentiated by their limited power, processing, and memory resources as well as high degree of mobility. In MANETs, the wireless mobile nodes may dynamically enter in the network as well as leave the network. Because of the limited transmission range, minimum hop path, minimum transmitted energy path, minimum normalized residual energy used, minimum absolute residual energy used, bandwidth, throughput, hop-count and power to be adequate so that a reliable and trustful connection between participating nodes is maintained of wireless network nodes, multiple hops are generally required for a node to exchange information with any other node in the network [4]. Multi-path routing permits the formation of multiple paths between one source node and one destination node. We have used the means of simulation using MATLAB (7.0), a simulator is being designed in MATLAB 7.0. It gathers data about number of hop-count (number of nodes between source and destination for successful routes) and throughput rate (total number of packets received by the destination to the total number of packets send by source). The simulator uses dijkstra algorithm to implement shortest path routing. To evaluate the effectiveness of MANET for nodes having lower bandwidth, the nodes were made unreachable by assigning low bandwidth to a group of some specified percentage nodes in the network [5]. The rest of the paper is organized as: the Section II contains the related work in Manet protocols. Section III. Literature review and bandwidth allocation algorithm for Manet and simulation and results in Section IV. Conclusion is in Section V.

II. RELATED WORK IN MANET PROTOCOLS

The key issue with ad-hoc networking is how to send a message from one node to another with no direct link. The nodes in the network are moving around randomly, and it is very difficult that which nodes are directly linked together. Same time topology of the network is constantly changing and it is very difficult for routing process. Another key issue is the problem of bandwidth allocation in wireless networks. Even if the progress is being made for high-speed wireless communications, such as the introduction of 3G and WLAN, bandwidth is still the major bottleneck in wireless networks due to the physical limitation of wireless media [3] [5]. This kind of system in my application

brings up the effective management of bandwidth which provides transmission range to transfer the packets of data between several nodes within the network.

III. BANDWIDTH ALLOCATION ALGORITHM FOR MANET

A. Literature review

In an ad hoc network, a host's available bandwidth refers to amount of bandwidth available to the node to send packets to the network. Bandwidth estimation can be done using various methods for example; bandwidth estimation in a cross-layer design of the routing and MAC layers and the available bandwidth is estimated in the MAC layer and is sent to the routing layer for admission control. Therefore, bandwidth estimation can be carried out in various network layers [1] [8].

All the information of MANET which include the History of ad hoc, wireless ad hoc, wireless mobile approaches and types of MANETs, and then they present more than 13 types of the routing Ad Hoc Networks protocols were proposed. They give description of routing protocols, analysis of individual characteristics and advantage and disadvantages to collect and compare, and present all the applications or the Possible Service of Ad Hoc Networks [8].

Present bandwidth estimation tools measure more than three related metrics: capacity, available bandwidth, hop count, throughput, and bulk transfer capacity etc. Currently available bandwidth estimation tools utilize a various strategies to measure these metrics. These issues of multipath routing in MANETs were particularly examined. They also discuss the application of multipath routing to support application constraints such as reliability, load-balancing, energy-conservation and QoS [7].

An improved mechanism was proposed to estimate the available bandwidth in IEEE 802.11-based ad hoc networks. In 802.11-based ad hoc networks, few works deal with solutions for bandwidth estimation. In a distributed ad hoc network, a host's available bandwidth cannot decided only by the unprocessed channel bandwidth, but also by its neighbour's bandwidth usage and interference caused by other sources, each of which reduces a host's available bandwidth for transmitting data. Therefore, applications cannot properly optimize their coding rate without knowledge of the status of the entire network [12] [13].

An incorporating QoS into routing, and introduce bandwidth estimation by propagating bandwidth information through "Hello" messages and. A cross-layer approach, including an adaptive feedback scheme and an admission scheme to give information to the application about the network position, are implemented. According to the simulations show that their QoS-aware routing protocol can improve packet delivery ratio greatly without impacting the overall end-to-end throughput, while also decreasing the packet delay and the energy consumption significantly [9] [14].

The problem in available bandwidth estimation was reorganize in IEEE 802.11 based ad hoc networks. According to them estimation accuracy is increased by improving the calculation accuracy of the prospect for two adjacent nodes idle period to overlap [10].

In a scattered ad hoc network, a host's available bandwidth cannot decided only by the unprocessed channel bandwidth, but also by its neighbour's bandwidth usage and interference caused

by other sources, each of which reduces a host's available bandwidth for transmitting data. Therefore, applications cannot properly optimize their coding rate without awareness of the status of the entire network. The problem in available bandwidth estimation was reorganize in IEEE 802.11 based ad hoc networks [10]. According to them estimation precision is increased by improving the calculation accuracy of the prospect for two neighboring nodes inactive period to overlap.

B. Bandwidth constraints

The purpose of the MANET is to homogenize IP routing protocol functionality is appropriate for the wireless routing application within both dynamic and static topologies with raised dynamics because of node motion and other factors [11]:

- **Dynamicity:** Every host can randomly change position. The topology is generally unpredictable, and the network position is inaccurate.
- **Non-centralization:** There is no centralized organization in the network and, therefore, network possessions cannot be assigned in a predetermined approach.
- **Radio properties:** The wireless channel can suffer from multi-path effects, fading and time variation, etc.

C. Bandwidth Estimation Methods

Estimating precise available bandwidth allows a node to make optimal decision before transmitting a packet in networks. It is therefore clear that the available bandwidth estimation enhances the QoS in wired and wireless Networks [15]. Measuring available bandwidth in ad hoc networks is challenging issue in MANET and calculating the residual bandwidth using the IEEE 802.11 MAC is still a challenging problem, because the bandwidth is shared among neighboring hosts, and an individual host has no knowledge about other neighboring hosts' traffic status and battery power. Two methods for estimating bandwidth are used below [12]:

Intrusive Bandwidth Estimation Techniques

The intrusive approaches techniques are based on end-to-end probe packets to estimate the available bandwidth along the length of a path [13].

Passive Bandwidth Estimation Techniques

The passive approaches techniques uses local information on the used bandwidth and that may exchange this information via neighborhood broadcast [13].

IV. SIMULATION AND RESULTS

A. Setup Parameters:

We have primarily selected the number of hop-count and throughput rate under bandwidth constraint. Here hop-count is defined as the number of nodes between source and destination for successful routes and throughput rate is the total number of packets received by the destination to the total number of packets sends by source. The flow chart and table 1 given below which gives the setup parameters for the developed simulator.

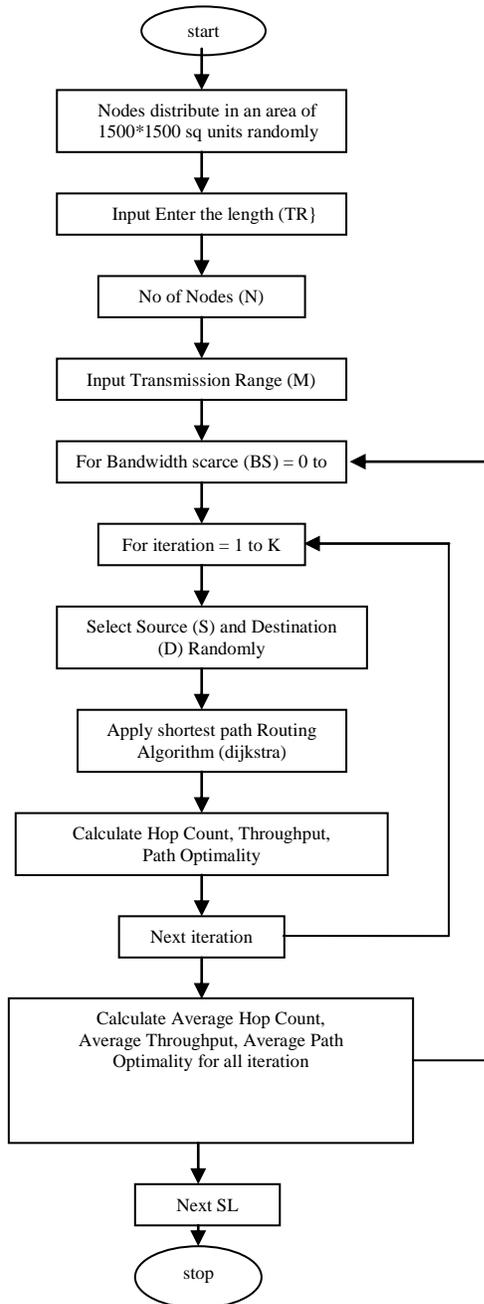


Fig. 1 Flow chart for design simulator

B. Simulation Model:

We have used a comprehensive simulation model based on MATLAB 7.0, for system protocol modeling. MATLAB is a high-performance language for technological computing. It integrates computation, visualization, and programming in an easy-to-use environment, where problems and solutions are expressed in familiar mathematical notation. Typical uses include math and computation algorithm development data acquisition modeling etc.

Table 1: Simulation set up parameters

Parameters	Values
Area	1500*1500
Number of Nodes	50
Transmission Range (TR)	300m
Nodes Placement Strategy	Random
Number of iteration	25
Percentage of nodes having low bandwidth	Varies from 0 to 100 percentage (with a interval of 10)

C. Snapshots:

The figures mentioned below are the variety of outcomes which came during the simulation running process.

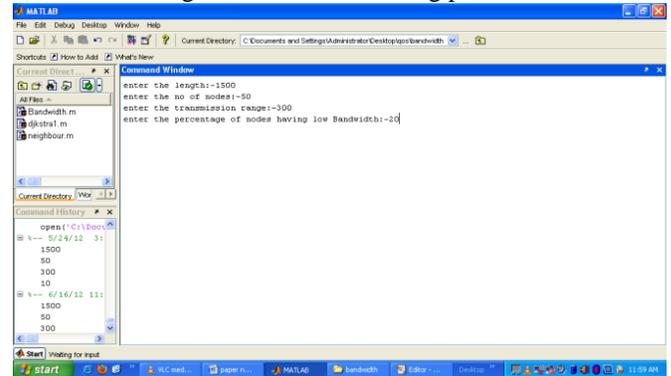


Fig. 2 Snapshots of simulator producing input data.

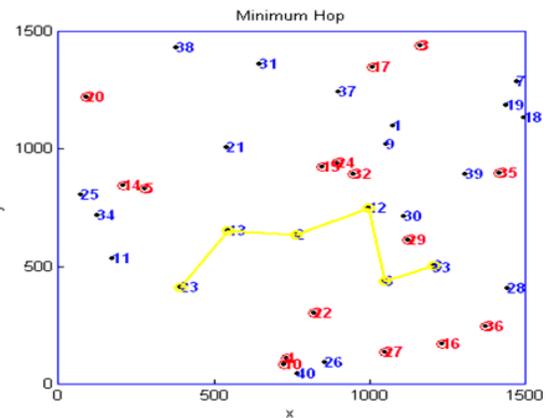


Fig. 3 Number of minimum hop in a shortest path

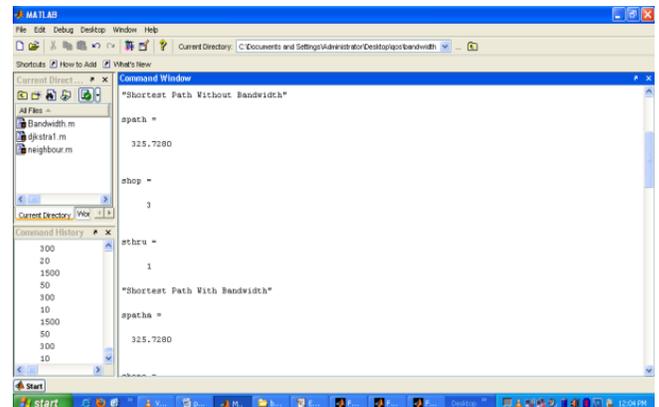


Fig. 4 Snapshots of simulator producing output data.

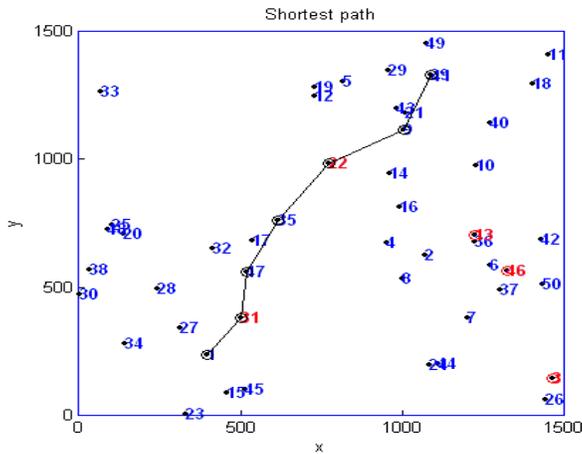


Fig. 5 Number of hop-counts in a shortest path

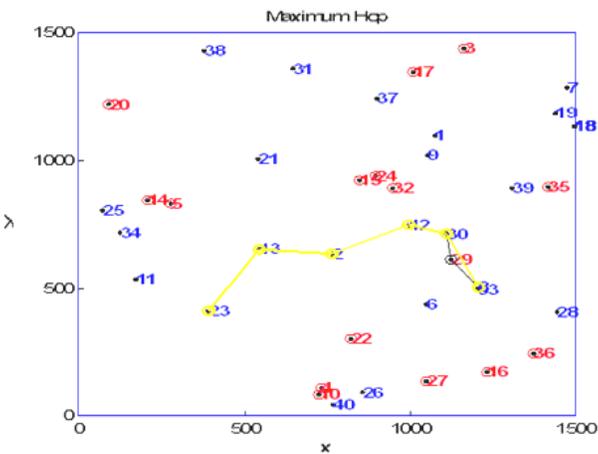


Fig. 6 Number of maximum hop in a shortest path

D. Impact of Low bandwidth on hop-count:

The Fig. 7 shows that as we gradually increases the percentage of low bandwidth nodes form 10 to 40 number of nodes and than on going up to 100, then hop-count decreases; It shows that the routes which required more intermediate nodes are not forming in the network. Simply longer routes were not being established with the growth of low bandwidth nodes.

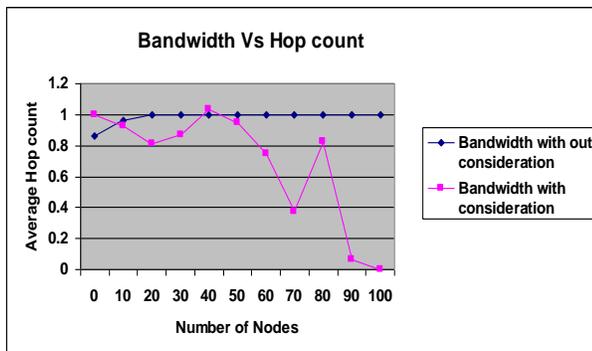


Fig. 7 Number of hop-counts in a shortest path

E. Impact of Low bandwidth on throughput:

Throughput of a network is the ratio of number of packets received by the destination to the total number of packets send by source. Here in this study as shown in Fig 8.

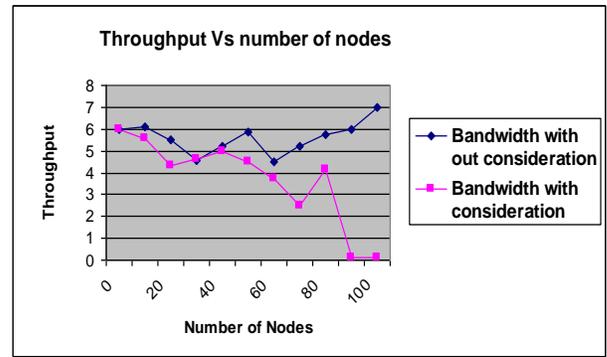


Fig. 8 Number of hop-counts in a shortest path

The throughput rate is going to decrease from level of 50 nodes to the level 100 in proportionate to increasing percentage of low bandwidth nodes in the network and it reaches to level 0 with 100% low bandwidth nodes.

F. Impact of Low bandwidth on path optimality:

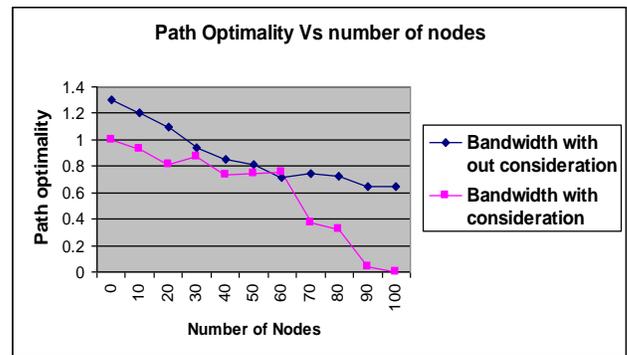


Fig. 9 Number of hop-counts in a shortest path

Fig. 9 shows the impact of simulation of path optimality of nodes path length on the percentage of packets dropped. There is no remarkable change in the percentage packet dropped in between 0 to 50, when the node concentration is up to 30. It reaches to a maximum value of nearly 60 nodes then the bandwidth decreased.

V. CONCLUSION

A MANET consists of autonomous, self-organizing and self-operating nodes. It is characterized by links with less bandwidth, nodes with energy constraints, nodes with less memory and processing power and more flat to security intimidation than the fixed networks. However, it has many advantages and different application areas, different assumptions such as location information availability and transmission power control. In this paper, we designed a simulator which is intended in MATLAB-7.0. The simulator uses dijkstra algorithm to implement shortest path routing. To evaluate the effectiveness of MANET for nodes having lower bandwidth, the nodes were made unreachable by assigning a distinct bandwidth to divergent nodes. We conclude performance of three QoS factors (hop count throughput and path optimality) on the basis of varying percentage of low bandwidth nodes in the network. The simulator designed in MATLAB 7.0 gathers data about number of hop-count (number of nodes between source and destination for successful routes) and

throughput rate (total number of packets received by the destination to the total number of packets send by source). This information later on is being analyzed with nodes having normal/ideal bandwidth, for which comparative graph have been discussed above in the paper. There is almost 45% decrease in values of hop count, throughput, and path optimality in the varying number of nodes. In future, the scope for this paper can be found in designing routing protocols where bandwidth utilization of each node is required in advance.

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Real Time Implementation of Secured Multimedia Messaging Service System using Android

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Abstract- In this paper encryption and steganography algorithms are implemented using JAVA™ with android platform to provide the security for real time multimedia messaging service system. Establishing hidden communication for mobile has become an important subject of security. One of the methods to provide security is steganography. Steganography is used to hide secret information inside some carrier. To improve the security, encrypted secret data will be hidden inside MMS. The image is made to be hidden into image from MMS which provides more secured transmission than text information embedded into the MMS. The Least Significant Bit (LSB) embedding technique is used to hide the secret information (image). Different sizes of secret images are taken and later the calculations have been done for the PSNR (Peak Signal to Noise Ratio) of image in MATLAB. Encryption and steganography algorithms are ported on HTC Desire mobile device with android version 2.2.3.

Index Terms- Android Platform, Encryption, LSB, MMS, PSNR, Security, Steganography.

I. INTRODUCTION

After rapid growth of the Internet, establishing hidden communication is an important subject of security that has gained increasing importance. Telecommunication companies started to add additional features to their mobile phones such as MMS (Multimedia Messaging Service) in order to attract more customers. And users can securely communicate its secrets by means of sending and receiving MMS messages. One of the most popular uses of mobile phones has been the exchange of messages between users. The Short Messaging System (SMS) was introduced with GSM mobile phones and it very rapidly became popular among users. The Multimedia Messaging System (MMS) offers the ability to send and receive multimedia content using a mobile phone. Now a day, most of the mobile phones not only are capable of sending and receiving Multimedia Messages (MM), but also contain an embedded camera and can run customized applications (e.g. using Java 2 Platform Micro Edition, J2ME).

MMS is a technology that allows a user of a properly enabled mobile phone to create, send, receive and store messages that include text, images, audio and video clips. One of the main and relatively new hidden communication methods is steganography. In steganography the data are hidden in a cover media so that other persons will not notice that such data is there. This is a major distinction of steganography method with the other methods of hidden exchange of information such as

cryptography and can be mainly applied to media such as images, text, video clips, music and sounds. The combination of both may give the best results, as a message can be encrypted before it is hidden into another object. Steganography concerns itself with ways of embedding a secret message into a cover object, without altering the properties of the cover object evidently.

The encryption, transforming message (here used image) into cipher text (encoded form) and decryption, a reverse process, plays an important role in concealing the confidentiality of the message. The message is first encrypted with a key during an encryption process and then hiding it in available format (here used image). Thus sending an encrypted message increases the security level of the message. Once received the message need to be decrypt using same key [1] which implies the concept of symmetric key steganography in which the key is symmetric for both sender and receiver. The paper introduce an approach which enhance the security of data by first encoding it , hiding in cover medium and sent it to the intended recipient.

II. PROBLEM DEFINITION

The aim of the project is to hide the data as an image over an image from MMS using least significant steganographic algorithm and before hide an image perform encryption on it. Send the stego file to the destination where the retrieving of the secret image is done on mobile device with Android.

Problem Solution

The proposed method should provide better security while transferring the data or messages from one end to the other end. The main objective of the project is to hide encrypted secret image into an image from MMS which acts as a carrier file having secret data and to transmit to the destination securely without any modification. If any distortions occur in the image or on its resolution while inserting the secret message into the image, there may be a chance for an unauthorized person to modify the data. So, the data (image) encryption at sender and decryption at receiver and steganography plays an important role in this project.

Proposed System Architecture

The data hiding patterns using the steganographic technique in this project can be explained using this simple block diagram. The block diagram for steganographic technique is as follows.

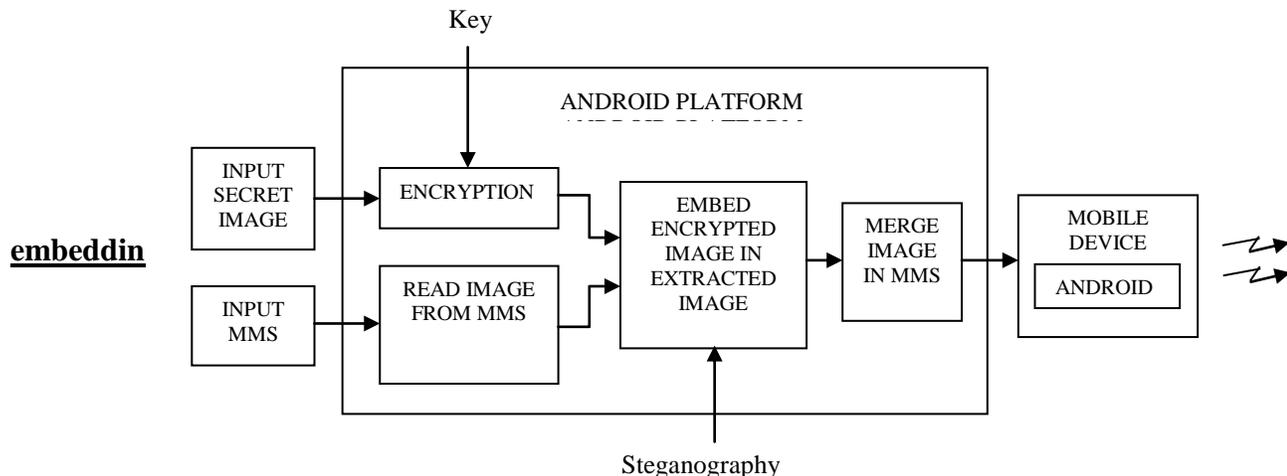


Figure 1. Block Diagram of Embedding Process in Binary Image

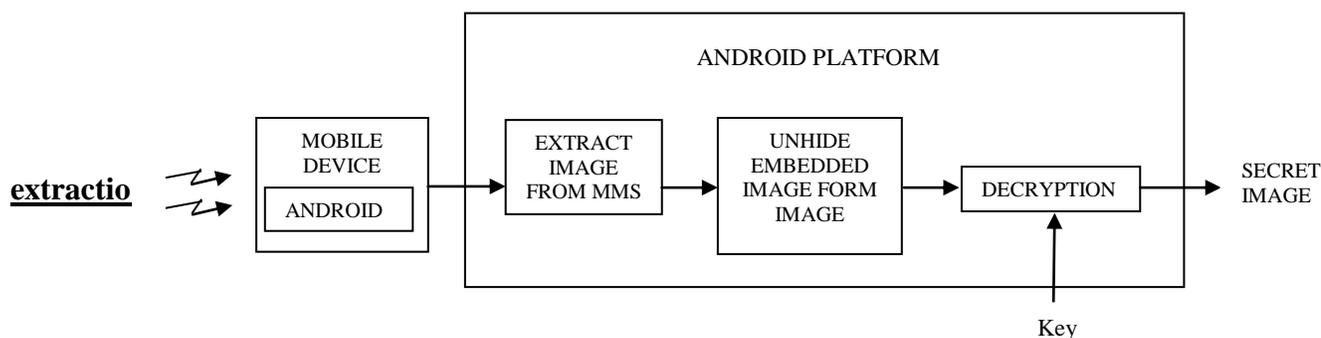


Figure 2. Block Diagram of Extracting Process from Binary Image

III. IMAGE STEGANOGRAPHY ALGORITHM

LSB (Least Significant Bit) substitution is the process of adjusting the least significant bit pixels of the carrier image. It is a simple approach for embedding message into the image. The Least Significant Bit insertion varies according to number of bits in an image. For an 8 bit image, the least significant bit i.e., the 8th bit of each byte of the image is changed to the bit of secret message. For 24 bit image, the colours of each component like RGB (red, green and blue) are changed. LSB is effective in using BMP images since the compression in BMP is lossless. But for hiding the secret message inside an image of BMP file using LSB algorithm it requires a large image which is used as a cover. For JPEG, the direct substitution of steganographic techniques is not possible since it will use lossy compression. So it uses LSB substitution for embedding the data into images.

Each of these pixels in an image is made up of a string of bits. We can commandeer the 4-least significant bit of 24-bit true color image to hold 4-bit of our secret message (image) by simply overwriting the data that was already there. By experimental, we note that: The impact of changing the 4-least significant bits will be minimal and indiscernible to the human eye.

4-LSB Embedding Algorithm

1. Start
 2. Read Multimedia Message from MicroSD card of an Android mobile device.
 3. Extract an image from Multimedia Message
- Cover image = Extracted image
4. Convert the cover image into stream of binary bit.
 5. Make 4 LSB of each byte zero.
 6. Read a Secret image from Android mobile MicroSD card.
 7. Encrypt Secret image using key, PRNG and encryption algorithm with Android platform.
 8. Convert Encrypted Secret image into stream of binary bit.
 9. Read the lower nibble of Encrypted Secret image byte.
 10. Hide lower nibble of Encrypted Secret image byte into the lower nibble of blue channel pixel byte of Cover image.
 11. Read the upper nibble of Encrypted Secret image byte.
 12. Hide upper nibble of Encrypted Secret image byte into next blue channel byte of the Cover image.
 13. Go to step 9 till to hide complete encrypted secret image
 14. Merge an image with hidden encrypted image (stego image) into MMS.
 15. Send MMS.

As given in algorithm secret image byte is divided into two nibble. Hide each nibble into the blue channel byte of cover image.

The minimum size of Cover image = $10 \times \text{Size of Secret image} + n$

We add n pixels because we don't set secret data in the header of cover image; we start setting secret data after the header of cover image. We just presented the used algorithm to hide an image file in a JPEG image. In the next section, we present the extracting algorithm.

4-LSB Extracting Algorithm

Extracting the secret image data is performed by reversing the process used to insert the secret message in the cover image. The following steps describe the details of extraction process.

1. Read Multimedia message.
2. Extract the image from Multimedia message i.e. stego image
3. Read lower nibble from first pixel of blue channel from stego image which is the lower nibble of secret image.
4. Read lower nibble from second pixel of blue channel from stego image which is the upper nibble of the secret image.
5. Now this is the byte of secret image.
6. Repeat the step 3 and step 4 to read all byte of secret image.
7. Decrypt secret image using same key.
8. Display retrieved secret image.

For measuring the quality of reconstructed image as compared to the original image, the metric needs to be define. There are three common error metrics used for estimating noise on images are RMSE, PSNR, and SSIM. The PSNR is defined as:

$$\text{PSNR} = 10 \times \log_{10} \left(\frac{\text{MAX}}{\text{RMSE}} \right)$$

Where, MAX is the maximum pixel value of the image. In the case of 8 bits gray scale images the MAX value will be 255.

IV. IMPLEMENTATION

The cover images and secret images which want to send/transfer are stored in the MicroSD card of Android mobile device with android version 2.2.3. Cover image along with text message is Multimedia Message. Access both the images (cover and secret) from sdcard using android platform and follow the following steps on android platform to perform steganography.

- A. The first part which is an encryption /decryption process is implemented in JAVA™ with android platform and the output of encryption is save in a file which is needed at the time of hiding the content in an image.
- B. In the next phase, the encrypted file and cover image is taken as input file. The file is hiding in the image and

this implementation is done in JAVA™ with android platform.

- C. At the receiver side follows exactly opposite steps. First unhide an image and then decrypt it.
- D. The last phase is the PSNR calculation and analysis which is implemented in MATLAB [11]. The function code is written in Editor Window for PSNR calculation which is executed and the PSNR for the two images – original secret image at sender and retrieved secret image at receiver.

V. RESULT

We implemented the proposed algorithms to hide a secret image into cover image. Results of developed algorithms for encryption and steganography are shown in Table I and Table II.

EXAMPLE 1:



Figure 4. Android Logo



Figure 5. Cameraman Secret image



Figure 6: Stego Image

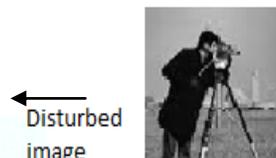


Figure 7: Retrieved Secret Image

Table I: PSNR calculation of various size secret images For Example 1(Android Logo)

Cover Image Size	Secret Image Size	PSNR
171 X 131	100 X 100	60.4065
171 X 131	120 X 120	57.7510
171 X 131	125 X 125	55.6609

EXAMPLE 2:

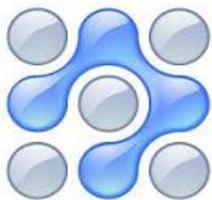


Figure 8: Bubbles Cover image Figure 9: Secret image



Disturbed Image



Figure 10: Stego image Figure 11: Retrieved secret image

Table II: PSNR calculation of various size secret images
For Example 2 (Bubbles)

Cover Image Size	Secret Image Size	PSNR
150 X 150	112 X 112	65.2210
150 X 150	125 X 125	62.7042
150 X 150	140 X 140	59.5214

VI. CONCLUSION

4-LSB substitution is successfully implemented to hide secret image into an image from MMS which provides the security during transmission of MMS. Algorithm is developed on android platform and tested by porting same on actual android mobile device HTC Desire with android version 2.2.3. It gives PSNR results as varying size of secret image. From the results it is observed that noise in stego image increases as size of secret image increases and PSNR should be greater than 55 to transfer image successfully. In this way encryption and steganography security algorithms are successfully implemented using Android platform with high potential of security.

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Zero –Free Regions for Analytic Functions

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Abstract- In this paper we find some interesting zero-free regions for a certain class of analytic functions by restricting the coefficients to certain conditions. Our results generalise a number of already known results in this direction.

Mathematics Subject Classification: 30C10,30C15

Index Terms- Zeros, Maximum Modulus, Analytic Function

I. INTRODUCTION AND STATEMENT OF RESULTS

Regarding the zero-free regions of analytic functions Aziz and Mohammad [1] have proved the following result:

$$f(z) = \sum_{j=0}^{\infty} a_j z^j (\neq 0)$$

Theorem A: Let $f(z)$ be analytic for $|z| \leq 1$ such that $a_j > 0$ and $a_{j-1} \geq ta_j, j = 1, 2, 3, \dots$, for some $t > 0$, then $f(z)$ does not vanish in $|z| < t$.

Aziz and Shah [2] relaxed the hypothesis of Theorem A and proved the following result:

$$f(z) = \sum_{j=0}^{\infty} a_j z^j (\neq 0)$$

Theorem B: Let $f(z)$ be analytic for $|z| \leq 1$ and for some $k \geq 1$, $ka_0 \geq ta_1 \geq t^2 a_2 \geq \dots$,

then $f(z)$ does not vanish in

$$\left| z - \frac{k-1}{2k-1} t \right| \leq \frac{kt}{2k-1}.$$

Aziz and Zargar [4] generalised the above results by proving the following results:

$$f(z) = \sum_{j=0}^{\infty} a_j z^j (\neq 0)$$

Theorem C: Let $f(z)$ be analytic for $|z| \leq t$ and for some $k \geq 1$,

$$\max_{|z|=1} |(ka_0 - ta_1) + (a_1 - ta_2)z + (a_2 - ta_3) + \dots| \leq M$$

Then $f(z)$ does not vanish in the disk

$$\left| z - \frac{(k-1)|a_0|^2 t}{M^2 - (k-1)^2 |a_0|^2} \right| \leq \frac{Mt|a_0|}{M^2 - (k-1)^2 |a_0|^2}.$$

$$f(z) = \sum_{j=0}^{\infty} a_j z^j (\neq 0)$$

Theorem D: Let $f(z)$ be analytic for $|z| \leq t$ and for some $k \geq 1$,

$$\max_{|z|=1} |(ka_0 - ta_1) + (a_1 - ta_2)z + (a_2 - ta_3) + \dots| \leq M$$

Then $f(z)$ does not vanish in

$$|z| \leq \frac{t|a_0|}{(k-1)|a_0| + M}.$$

$$f(z) = \sum_{j=0}^{\infty} a_j z^j (\neq 0)$$

Theorem E: Let $f(z)$ be analytic for $|z| \leq R$ such that for some $k \geq 1$ and $t > 0$,

$$\max_{|z|=R} |H(z)| \leq M,$$

where

$$H(z) = (ka_0 - ta_1) + (a_1 - ta_2)z + (a_2 - ta_3) + \dots$$

Then $f(z)$ does not vanish in

$$|z| \leq \min \left\{ \frac{t|a_0|}{(k-1)|a_0| + M}, t \right\}.$$

In this paper we prove the following generalizations of the theorems

C, D and E:

$$f(z) = \sum_{j=0}^{\infty} a_j z^j (\neq 0)$$

Theorem 1: Let $f(z)$ be analytic for $|z| \leq t$ and for some $\rho \geq 0$,

$$\max_{|z|=1} |(\rho + a_0 - ta_1) + (a_1 - ta_2)z + (a_2 - ta_3) + \dots| \leq M$$

Then $f(z)$ does not vanish in the disk

$$\left| z - \frac{\rho t |a_0|}{M^2 - \rho^2} \right| \leq \frac{Mt |a_0|}{M^2 - \rho^2}.$$

Remark 1: Taking $\rho = (k-1)a_0$, Theorem 1 reduces to Theorem C.

Taking $t=1$, Theorem 1 immediately gives the following result:

$$f(z) = \sum_{j=0}^{\infty} a_j z^j (\neq 0)$$

Corollary 1: Let $f(z)$ be analytic for $|z| \leq 1$ such that for some $\rho \geq 0$,

$$\max_{|z|=1} |(\rho + a_0 - a_1) + (a_1 - a_2)z + (a_2 - a_3)z^2 + \dots| \leq M$$

Then $f(z)$ does not vanish in

$$\left| z - \frac{\rho |a_0|}{M^2 - \rho^2} \right| \leq \frac{M |a_0|}{M^2 - \rho^2}.$$

$$f(z) = \sum_{j=0}^{\infty} a_j z^j (\neq 0)$$

Theorem 2: Let $f(z)$ be analytic for $|z| \leq t$ and for some $\rho \geq 0$,

$$\max_{|z|=1} |(\rho + a_0 - ta_1) + (a_1 - ta_2)z + (a_2 - ta_3)z^2 + \dots| \leq M$$

Then $f(z)$ does not vanish in

$$|z| \leq \frac{t |a_0|}{\rho + M}.$$

Remark 2: Taking $\rho = (k-1)a_0$, Theorem 1 reduces to Theorem D.

Taking $t=1$, Theorem 1 immediately gives the following result:

$$f(z) = \sum_{j=0}^{\infty} a_j z^j (\neq 0)$$

Corollary 2: Let $f(z)$ be analytic for $|z| \leq 1$ and for some $\rho \geq 0$,

$$\max_{|z|=1} |(\rho + a_0 - ta_1) + (a_1 - ta_2)z + (a_2 - ta_3)z^2 + \dots| \leq M$$

Then $f(z)$ does not vanish in

$$|z| \leq \frac{|a_0|}{\rho + M}.$$

$$f(z) = \sum_{j=0}^{\infty} a_j z^j (\neq 0)$$

Remark 3: If $f(z)$ be analytic for $|z| \leq 1$, $a_j > 0$ and $a_{j-1} \geq ta_j, j=1,2,3,\dots$, then

$$\max_{|z|=t} |(\rho + a_0 - ta_1) + (a_1 - ta_2)z + (a_2 - ta_3)z^2 + \dots|$$

$$\leq \rho + |a_0 - ta_1| + |a_1 - ta_2|t + |a_2 - ta_3|t^2 + \dots$$

$$= \rho + a_0 - ta_1 + ta_1 - t^2 a_2 + t^2 a_2 - t^3 a_3 + \dots$$

$$= \rho + a_0$$

and we immediately get the following result from Theorem 1:

$$f(z) = \sum_{j=0}^{\infty} a_j z^j (\neq 0)$$

Corollary 3: Let $f(z)$ be analytic for $|z| \leq t$ such that for some $\rho \geq 0$,

$$\rho + a_0 \geq ta_1 \geq t^2 a_2 \geq \dots$$

Then $f(z)$ does not vanish in

$$|z| \leq \frac{t |a_0|}{2\rho + a_0}.$$

$$f(z) = \sum_{j=0}^{\infty} a_j z^j (\neq 0)$$

Theorem 3: Let $f(z)$ be analytic for $|z| \leq R$ such that for some $\rho \geq 0$ and $t > 0$,

$$\max_{|z|=R} |H(z)| \leq M,$$

where

$$H(z) =$$

$$(\rho + a_0 - ta_1) + (a_1 - ta_2)z + (a_2 - ta_3)z^2 + \dots$$

Then $f(z)$ does not vanish in

$$|z| \leq \min \left\{ \frac{t |a_0|}{\rho + M}, R \right\}.$$

Remark 4: Since

$$M = \max_{|z|=t} |H(z)| \geq |H(t)|$$

$$= |(\rho + a_0 - ta_1) + (a_1 - ta_2)t + (a_2 - ta_3)t^2 + \dots|$$

$$= |\rho + a_0|$$

$$\geq |a_0| - \rho,$$

we have

$$|a_0| \leq \rho + M$$

so that

$$\frac{t|a_0|}{\rho + M} \leq t.$$

This shows that Theorem 2 is a special case of Theorem 3 for $R=t$.

Remark 5: Taking $\rho = (k-1)a_0$, Theorem 2 reduces to Theorem E.

Taking $\rho = 0$ in Theorem 2, we get the following result:

$$f(z) = \sum_{j=0}^{\infty} a_j z^j (\neq 0)$$

Corrolary4: Let be analytic for

$$|z| \leq R \text{ and}$$

$$\max_{|z|=R} \left| \sum_{j=1}^n (a_{j-1} - ta_j) z^{n-j} \right| \leq M$$

Then $f(z)$ does not vanish in

$$|z| \leq \min \left\{ \frac{t|a_0|}{M}, R \right\}$$

Cor.4 was independently proved by Aziz and Shah [3].

II. PROOFS OF THEOREMS

Proof of Theorem 1: It is obvious that $\lim_{j \rightarrow \infty} a_j z^j = 0$. Consider the function

$$F(z) = (z-1)f(z)$$

$$\begin{aligned} &= (z-1)(a_0 + a_1 z + a_2 z^2 + \dots) \\ &= -a_0 + (a_0 - a_1)z + (a_1 - a_2)z^2 + \dots \\ &= -a_0 - \rho z + (\rho + a_0 - a_1)z + (a_1 - a_2)z^2 + \dots \\ &= -a_0 - \rho z + zH(z) \end{aligned}$$

where

$$H(z) = (\rho + a_0 - a_1) + (a_1 - a_2)z + (a_2 - a_3)z^2 + \dots$$

Clearly

$$\begin{aligned} M &= \max_{|z|=1} |H(z)| \\ &\geq |H(1)| \\ &= |(\rho + a_0 - a_1) + (a_1 - a_2)z + (a_2 - a_3)z^2 + \dots| \\ &= |\rho + a_0| \end{aligned}$$

(1)

Since $H(z)$ is analytic for $|z| \leq 1$ and $|H(z)| \leq M$ for $|z|=1$, by the Maximum Modulus Theorem, it follows that, $|H(z)| \leq M$ for $|z| \leq 1$. Therefore, for $|z| \leq 1$,

$$\begin{aligned} |F(z)| &\geq |a_0 + \rho z| - |z| |H(z)| \\ &\geq |a_0 + \rho z| - M|z| \\ &> 0 \text{ if} \\ &|a_0 + \rho z| > M|z|, \end{aligned}$$

which is true if

$$|a_0| + \rho|z| > M|z|$$

or

$$|z| < \frac{|a_0|}{M - \rho}$$

It is easy to verify that the region E defined by

$$\left\{ z; |z| < \frac{|a_0|}{M - \rho} \right\}$$

is precisely the disk

$$\left\{ z; \left| z - \frac{\rho|a_0|}{M^2 - \rho^2} \right| \leq \frac{t|a_0|}{M^2 - \rho^2} \right\}.$$

Further, if $z \in E$, then $|z| < \frac{|a_0|}{M - \rho} \leq 1$ if $|a_0| \leq M - \rho$

i.e., $M \geq \rho + |a_0|$, which is true by (1). Using these observations we conclude that $F(z)$ does not vanish in the disk

$$\left| z - \frac{\rho|a_0|}{M^2 - \rho^2} \right| \leq \frac{t|a_0|}{M^2 - \rho^2}.$$

Since the zeros of $f(z)$ are also the zeros of $F(z)$, we conclude that $f(z)$ does not vanish in the disk

$$\left| z - \frac{\rho|a_0|}{M^2 - \rho^2} \right| \leq \frac{t|a_0|}{M^2 - \rho^2}.$$

That completes the proof of Theorem 1.

Proof of Theorem 2: Consider the function

$$F(z) = (z-t)f(z)$$

$$\begin{aligned} &= (z-t)(a_0 + a_1 z + a_2 z^2 + \dots) \\ &= -a_0 t + (a_0 - ta_1)z + (a_1 - ta_2)z^2 + \dots \\ &= -a_0 t - \rho z + (\rho + a_0 - ta_1)z + (a_1 - ta_2)z^2 + \dots \\ &= -a_0 t - \rho z + zH(z) \end{aligned}$$

where

$$H(z) = (\rho + a_0 - ta_1) + (a_1 - ta_2)z + (a_2 - ta_3)z^2 + \dots$$

We first suppose that $M > \frac{t|a_0|}{R} - \rho$ i.e. $\frac{t|a_0|}{R} < \rho + M$ or $\frac{t|a_0|}{\rho + M} < R$. (2)

Then since $H(z)$ is analytic for $|z| \leq R$ and $|H(z)| \leq M$ for $|z| = R$, it follows, by Maximum Modulus Theorem, that $|H(z)| \leq M$ for $|z| \leq R$. Therefore, for $|z| \leq R$,

$$\begin{aligned} |F(z)| &= |-a_0t - \rho z + zH(z)| \\ &\geq |a_0t + \rho z| - |z||H(z)| \\ &\geq t|a_0| - \rho|z| - M|z| \\ &\geq t|a_0| - (\rho + M)|z| \\ &> 0 \text{ if} \\ &|z| < \frac{t|a_0|}{\rho + M} \end{aligned}$$

or if, by (2),

$$|z| < \frac{t|a_0|}{\rho + M} < R.$$

Thus $|F(z)| > 0$ for $|z| \leq R$ i.e. $F(z) \neq 0$ for $|z| \leq R$, if (2) is satisfied.

Now, suppose that $M < \frac{t|a_0|}{R} - \rho$ i.e. $\frac{t|a_0|}{R} > \rho + M$ or $\frac{t|a_0|}{\rho + M} > R$. (3)

Then

$$\begin{aligned} |F(z)| &= |-a_0t - \rho z + zH(z)| \\ &\geq t|a_0| - (\rho + M)R \\ &> 0 \text{ by using (3).} \end{aligned}$$

Thus $|F(z)| > 0$ for $|z| \leq R$. This implies $F(z) \neq 0$ for $|z| \leq R$. Hence, it follows that $F(z)$ does not vanish for $|z| \leq R$ in this case also.

Combining the above two arguments, we conclude that $F(z)$ and hence $f(z)$ does not vanish in the disk

$$|z| \leq \min\left\{\frac{t|a_0|}{\rho + M}, R\right\}.$$

That proves the result.

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Isomorphism on Intuitionistic Fuzzy Directed Hypergraphs

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Abstract- Directed hypergraphs are much like standard directed graphs. In intuitionistic fuzzy directed hypergraphs, like directed graphs, standard arcs connect a single tail node to a single head node, hyperarcs connect a set of tail nodes to a set of head nodes. In this paper, the isomorphism between two intuitionistic fuzzy directed hypergraphs is discussed. The condition for two intuitionistic fuzzy directed hypergraphs is isomorphic also discussed and some of its properties are also analyzed.

Index Terms- Intuitionistic fuzzy hypergraph(IFHG), intuitionistic fuzzy directed hypergraph, isomorphism, weak isomorphism, co-weak isomorphism

I. INTRODUCTION

There are several ways of introducing the notion of direction for the edges of a hypergraph. For example, in [1] a directed hypergraph is obtained from a hypergraph H, by partitioning every edge of H into two sets of vertices, namely the tail and the head of the edge. This concept has been extended to intuitionistic fuzzy hypergraphs.

The authors already introduced the concept of intuitionistic fuzzy directed hypergraphs[11]. Generally isomorphism between two graphs is proved to be an equivalence relation. Kalaivani et al., [7] discussed the properties of isomorphism on intuitionistic fuzzy hypergraphs(IFGs) and strong IFGs. Radhamani et al., introduced the concept of isomorphism on fuzzy hypergraphs and their properties[8]. In this paper, an attempt has been made to derive the isomorphism between two intuitionistic fuzzy directed hypergraphs.

II. PRELIMINARIES

In this section, some basic definitions relating to index matrix representation of intuitionistic fuzzy graphs (IMIFG)and intuitionistic fuzzy hypergraphs are given. In [9], Prof. K.T. Atanassov defined cartesian products of intuitionistic fuzzy sets (IFSs) on different universes. Here, the authors have defined six cartesian products of two IFSs over the same universe.

Definition 2.1 [5] Let a set E be fixed. An intuitionistic fuzzy set (IFS) A in E is an object of the form $A = \{(x, \mu_A(x), \gamma_A(x)) / x \in E\}$ where the function $\mu_A : E \rightarrow [0,1]$ and $\gamma_A : E \rightarrow [0,1]$ determine the degree of membership and the degree of nonmembership of the element $X \in E$, respectively and for every $X \in E$, $0 \leq \mu_A(x) + \gamma_A(x) \leq 1$.

Definition 2.2 Let X be an universal set and let V be an IFS over X in the form $V = \{(v_i, \mu_i(v_i), \gamma_i(v_i)) | v_i \in V\}$, such that $0 \leq \mu_i(v_i) + \gamma_i(v_i) \leq 1$. Six types of Cartesian products of n elements of V over X are defined as

$$v_1 \times_1 v_2 \times_1 v_3 \dots \times_1 v_n = \left\{ \left\langle \langle v_1, v_2, \dots, v_n \rangle, \prod_{i=1}^n \mu_i, \prod_{i=1}^n \gamma_i \right\rangle \mid \langle v_1, v_2, \dots, v_n \rangle \in V \right\},$$

$$v_1 \times_2 v_2 \times_2 v_3 \dots \times_2 v_n = \left\{ \left\langle \langle v_1, v_2, \dots, v_n \rangle, \sum_{i=1}^n \mu_i - \sum_{i \neq j} \mu_i \mu_j + \sum_{i \neq j \neq k} \mu_i \mu_j \mu_k - \dots + (-1)^{n-2} \sum_{i \neq j \neq k \neq n} \mu_i \mu_j \mu_k \dots \mu_n + (-1)^{n-1} \prod_{i=1}^n \mu_i, \prod_{i=1}^n \gamma_i \right\rangle \mid \langle v_1, v_2, \dots, v_n \rangle \in V \right\}$$

$$v_1 \times_3 v_2 \times_3 v_3 \dots \times_3 v_n = \left\{ \left\langle \langle v_1, v_2, \dots, v_n \rangle, \prod_{i=1}^n \mu_i, \sum_{i=1}^n \gamma_i - \sum_{i \neq j} \gamma_i \gamma_j + \sum_{i \neq j \neq k} \gamma_i \gamma_j \gamma_k - \dots + (-1)^{n-2} \sum_{i \neq j \neq k \neq n} \gamma_i \gamma_j \gamma_k \dots \gamma_n + (-1)^{n-1} \prod_{i=1}^n \gamma_i \right\rangle \mid \langle v_1, v_2, \dots, v_n \rangle \in V \right\}$$

$$v_1 \times_4 v_2 \times_4 v_3 \dots \times_4 v_n = \left\{ \left\langle \langle v_1, v_2, \dots, v_n \rangle, \min(\mu_1, \mu_2, \dots, \mu_n), \max(\gamma_1, \gamma_2, \dots, \gamma_n) \right\rangle \mid \langle v_1, v_2, \dots, v_n \rangle \in V \right\}$$

$$v_1 \times_5 v_2 \times_5 v_3 \dots \times_5 v_n = \left\{ \left\langle \langle v_1, v_2, \dots, v_n \rangle, \max(\mu_1, \mu_2, \dots, \mu_n), \min(\gamma_1, \gamma_2, \dots, \gamma_n) \right\rangle \mid \langle v_1, v_2, \dots, v_n \rangle \in V \right\}$$

$$v_1 \times_6 v_2 \times_6 v_3 \dots \times_6 v_n = \left\langle \left\langle v_1, v_2, \dots, v_n \right\rangle, \frac{\sum_{i=1}^n \mu_i}{n}, \frac{\sum_{i=1}^n \gamma_i}{n} \right\rangle \left\langle v_1, v_2, \dots, v_n \right\rangle \in V$$

It must be noted that $v_i \times_t v_j$ is an IFS, where, $t = 1, 2, 3, 4, 5, 6$

Definition 2.3 An intuitionistic fuzzy hypergraph H is an ordered pair $H = \langle V, E \rangle$ where

- (i) $V = \{v_1, v_2, \dots, v_n\}$, a finite set of vertices
- (ii) $E = \{E_1, E_2, \dots, E_m\}$, a family of intuitionistic fuzzy subsets of V
- (iii) (i) $E_j = \{(v_i, \mu_j(v_i), \gamma_j(v_i)) : \mu_j(v_i), \gamma_j(v_i) \geq 0 \text{ and } 0 \leq \mu_j(v_i) + \gamma_j(v_i) \leq 1\}, j = 1, 2, \dots, m$
 (ii) $E_j \subseteq V \times V$ where $\mu_j : V \times V \rightarrow [0, 1]$ and $\gamma_j : V \times V \rightarrow [0, 1]$ are such that

$$\mu_{ij} \leq \mu_i \text{ e } \mu_j$$

$$\gamma_{ij} \leq \gamma_i \text{ e } \gamma_j$$

$$\text{And } 0 \leq \mu_{ij} + \gamma_{ij} \leq 1$$

Where μ_{ij} and γ_{ij} are the membership and nonmembership values of the edge (v_i, v_j) ; the values of $\mu_i \text{ e } \mu_j$ and $\gamma_i \text{ e } \gamma_j$ can be determined by one of the Cartesian products $\times_t, t = 1, 2, 3, 4, 5, 6$ for all i and j given in definition 2.2.

- (iv) $E_j \neq \emptyset, j = 1, 2, \dots, m$
- (v) $\cup_j \text{supp}(E_j) = V, j = 1, 2, \dots, m$

Here the edges E_j are IFSs. $\mu_j(x_i)$ and $\gamma_j(x_i)$ denote the degree of membership and non-membership of the vertex v_i to edge E_j . Thus, the elements of the incidence matrix of IFHG are of the form $(a_{ij}, \mu_j(v_i), \gamma_j(v_i))$. The sets (V, E) are crisp sets.

Notations

1. Hereafter, $\langle \mu(v_i), \gamma(v_i) \rangle$ or simply $\langle \mu_i, \gamma_i \rangle$ denotes the degrees of membership and nonmembership of the vertex $v_i \in V$, such that $0 \leq \mu_i + \gamma_i \leq 1$
2. $\langle \mu(v_{ij}), \gamma(v_{ij}) \rangle$ or simply $\langle \mu_{ij}, \gamma_{ij} \rangle$ denotes the degrees of membership and nonmembership of the edge $(v_i, v_j) \in V \times V$, such that $0 \leq \mu_{ij} + \gamma_{ij} \leq 1$

Note

If $\mu_{ij} = \gamma_{ij} = 0$, for some i and j , then there is no edge between v_i and v_j , it is indexed by $\langle 0, 1 \rangle$. Otherwise there exist an edge between v_i and v_j .

III. INTUITIONISTIC FUZZY DIRECTED HYPERGRAPHS

In this section, isomorphism, between two intuitionistic fuzzy directed hypergraphs has been discussed.

Definition 3.1 An intuitionistic fuzzy directed hypergraph (IFDHG) H is a pair $\langle V, E \rangle$ where V is a non empty set of vertices and E is a set of intuitionistic fuzzy hyperarcs; an intuitionistic fuzzy hyperarc $e \in E$ is defined as a pair $(T(e), h(e))$, where $T(e) \subset V$, with $T(e) \neq \emptyset$, is its tail, and $h(e) \in N - T(e)$ is its head. A vertex s is said to be a source vertex in H if $h(e) \neq s$, for every $e \in E$. A vertex d is said to be a destination vertex in H if $d \neq T(e)$, for every $e \in E$.

Definition 3.2 Let $E = (E^-, E^+)$ be a hyperarc in an IFDHG. Then the vertex sets E^- and E^+ are called the in-set and the out-set of the hyperarc E , respectively. The sets E^- and E^+ need not be disjoint. The hyperarc E is said to be join of the vertices of E^- and the vertices of E^+ .

Furthermore, the vertices of E^- are incident to the hyperarc E and the vertices of E^+ are incident from E . The vertices of E^- are adjacent to the vertices of E^+ , and the vertices of E^+ are adjacent from the vertices of E^- .

Definition 3.3 The order of an IFDHG $H = \langle V, E \rangle$ is defined to be $O(H) = (O_\mu(H), O_\gamma(H))$ where $O_\mu(H) = \sum_{v_i \in V} \mu_i(v_i)$ $O_\gamma(H) = \sum_{v_i \in V} \gamma_i(v_i)$

Definition 3.4 The size of an IFDHG is defined to be $S(H) = (S_\mu(H), S_\gamma(H))$ where

$$S_\mu(H) = \sum_{v_i, v_j \in V} \mu_{ij}(v_i, v_j) \quad S_\gamma(H) = \sum_{v_i, v_j \in V} \gamma_{ij}(v_i, v_j)$$

Definition 3.5 The in-degree of v is the number of hyperarcs that contain v in their out-set, and is denoted $d_H^-(v)$. Similarly, the out-degree of v is the number of hyperarcs that contain v in their in-set, and is denoted by $d_H^+(v)$.

Definition 3.6 Consider the two IFDHGs $G = \langle V, E \rangle$ and $G' = \langle V', E' \rangle$. An isomorphism between two IFDHGs G and G' , denoted by $G \cong G'$, is a bijective map $I: V \rightarrow V'$ which satisfies

- (i) $\mu_i(v_i) = \mu'_i(I(v_i)); \gamma_i(v_i) = \gamma'_i(I(v_i))$ for every $v_i \in V$
- (ii) $\mu_{ij}(v_i, v_j) = \mu'_{ij}(I(v_i), I(v_j)); \gamma_{ij}(v_i, v_j) = \gamma'_{ij}(I(v_i), I(v_j))$ for every $v_i, v_j \in V$

Definition 3.7 A homomorphism between two IFDHGs $G = \langle V, E \rangle$ and $G' = \langle V', E' \rangle$, is defined as $H: V \rightarrow V'$ is a map which satisfies

- (i) $\mu_i(v_i) \leq \mu'_i(H(v_i)); \gamma_i(v_i) \geq \gamma'_i(H(v_i))$ for every $v_i \in V$
- (ii) $\mu_{ij}(v_i, v_j) \leq \mu'_{ij}(H(v_i), H(v_j)); \gamma_{ij}(v_i, v_j) \geq \gamma'_{ij}(H(v_i), H(v_j))$ for every $v_i, v_j \in V$

Definition 3.8 A weak isomorphism between two IFDHGs $G = \langle V, E \rangle$ and $G' = \langle V', E' \rangle$ is defined as $I: V \rightarrow V'$ is a bijective homomorphism that satisfies

$$\mu_i(v_i) = \mu'_i(I(v_i)); \gamma_i(v_i) = \gamma'_i(I(v_i)) \text{ for every } v_i \in V$$

Definition 3.9 A co-weak isomorphism between two IFDHGs $G = \langle V, E \rangle$ and $G' = \langle V', E' \rangle$ is defined as $I: V \rightarrow V'$ is a bijective homomorphism that satisfies

$$\mu_{ij}(v_i, v_j) = \mu'_{ij}(I(v_i), I(v_j)) \text{ and } \gamma_{ij}(v_i, v_j) = \gamma'_{ij}(I(v_i), I(v_j)) \text{ for every } v_i, v_j \in V$$

IV. SOME PROPERTIES OF ISOMORPHISM ON INTUITIONISTIC FUZZY DIRECTED HYPERGRAPHS

Theorem 4.1 For any two isomorphic IFDHG their order and size are same.

Proof . If $I: G \rightarrow G'$ is an isomorphism between the IFDHGs G and G' with the underlying sets V and V' respectively, then $\mu_i(v_i) = \mu'_i(I(v_i)); \gamma_i(v_i) = \gamma'_i(I(v_i))$ for every $v_i \in V$ and $\mu_{ij}(v_i, v_j) = \mu'_{ij}(I(v_i), I(v_j)); \gamma_{ij}(v_i, v_j) = \gamma'_{ij}(I(v_i), I(v_j))$ for every $v_i, v_j \in V$

We know that

$$\begin{aligned} O_\mu(G) &= \sum_{v_i \in V} \mu_i(v_i) = \sum_{v_i \in V} \mu'_i(I(v_i)) = O_\mu(G') \\ O_\gamma(G) &= \sum_{v_i \in V} \gamma_i(v_i) = \sum_{v_i \in V} \gamma'_i(I(v_i)) = O_\gamma(G') \\ S_\mu(H) &= \sum_{v_i, v_j \in V} \mu_{ij}(v_i, v_j) = \sum_{v_i, v_j \in V} \mu'_{ij}(h(v_i), h(v_j)) = S'_\mu(H) \\ S_\gamma(H) &= \sum_{v_i, v_j \in V} \gamma_{ij}(v_i, v_j) = \sum_{v_i, v_j \in V} \gamma'_{ij}(h(v_i), h(v_j)) = S'_\gamma(H) \end{aligned}$$

Corollary 4.2 Converse of the above theorem need not be true.

Remark 4.3 If the IFDHGs are weak isomorphic then their order are same. But the IFDHGs of same order need not be weak isomorphic. The following example illustrates this.

Example 4.4 Let $G = \{v_1, v_2, v_3, v_4, v_5, v_6\}$ and $G' = \{v'_1, v'_2, v'_3, v'_4, v'_5, v'_6\}$ be two IFDHGs as given in Figure 1 and Figure 2 respectively.

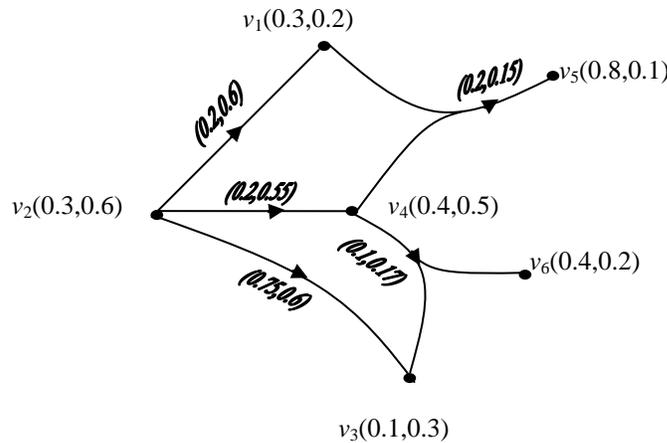


Figure 1: G

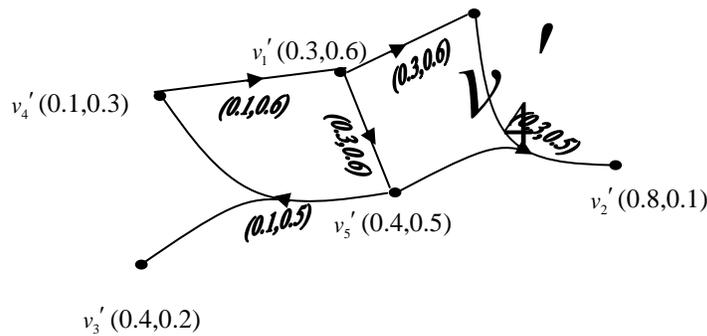


Figure 2: G'

Remark 4.5 If the IFDHGs are co-weak isomorphic, then their sizes are same. But the IFDHGs of same size need not be co-weak isomorphic.

Theorem 4.6 If G and G' are isomorphic IFDHGs then the degrees of their vertices are preserved.

Proof. Let $I:V \rightarrow V'$ be an isomorphism of G and G' . By definition 3.6, we have

$$\mu_{ij}(v_i, v_j) = \mu'_{ij}(I(v_i), I(v_j)); \gamma_{ij}(v_i, v_j) = \gamma'_{ij}(I(v_i), I(v_j)) \text{ for every } v_i, v_j \in V$$

$$d_{\mu}^{-}(v_i) = |E_{\mu}^{+}| = d_{\mu}^{-} I(v_i) \quad d_{\gamma}^{-}(v_i) = |E_{\gamma}^{+}| = d_{\gamma}^{-} I(v_i)$$

$$d_{\mu}^{+}(v_i) = |E_{\mu}^{-}| = d_{\mu}^{+} I(v_i) \quad d_{\gamma}^{+}(v_i) = |E_{\gamma}^{-}| = d_{\gamma}^{+} I(v_i)$$

Example 4.7 Consider the two IFDHGs G and G' which preserve the degree of vertices but G and G' are not isomorphic.

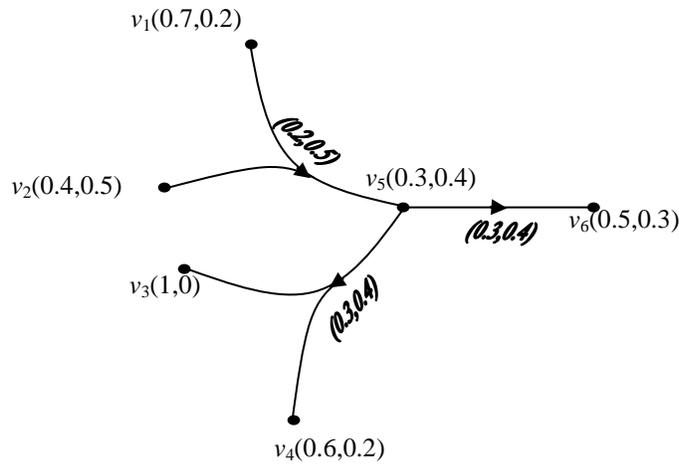


Figure 3: G

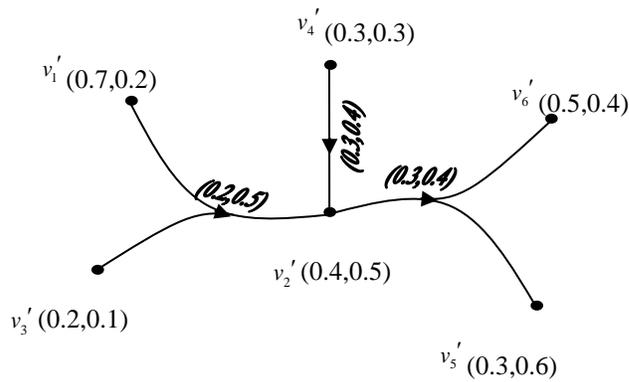


Figure 4: G'

V. ISOMORPHISM ON INTUITIONISTIC FUZZY DIRECTED HYPERGRAPHS USING INDEX MATRIX

In this section, the index matrix representation of two isomorphisc intuitionistic fuzzy directed hypergraphs is discussed. To check isomorphism between two intuitionistic fuzzy directed hypergraphs, it is necessary to check whether (i) they have the same number of vertices, (ii) they have the same number of hyperarcs and (iii) they have the same number of vertices with the same degrees.

Consider the two IFDHGs $G_1 = \{v_1, v_2, v_3, v_4, v_5\}$ and $G_2 = \{u_1, u_2, u_3, u_4, u_5\}$ given in Figure 5 and Figure 6 as follows.

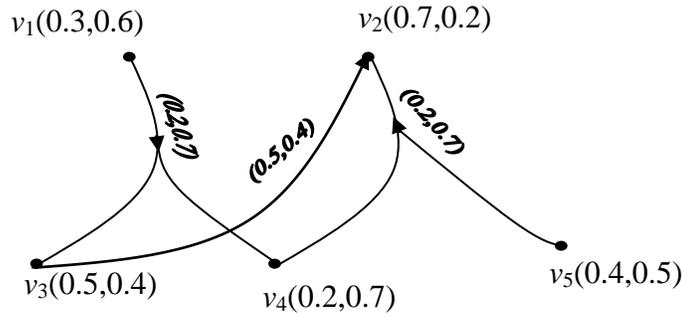


Figure 5: G_1

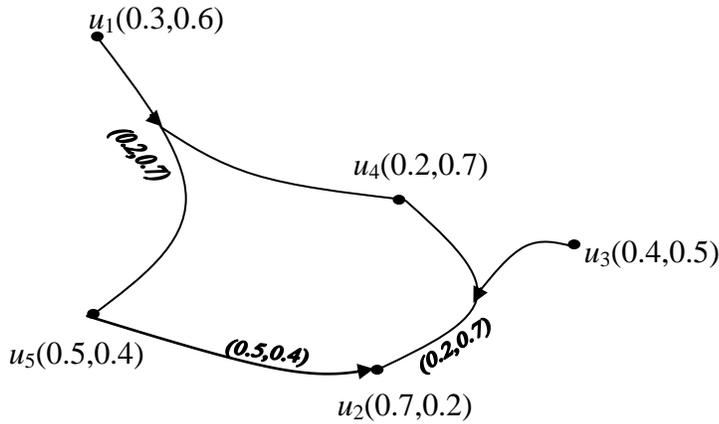


Figure 6: G_2

The Index matrix of G_1 is $G_1 = [V_1, \mu_{ij}, \gamma_{ij}]$ where $V_1 = \{v_1, v_2, v_3, v_4, v_5\}$ and

	v_1	v_2	v_3	v_4	v_5
v_1	$\langle 0,1 \rangle$	$\langle 0,1 \rangle$	$\langle 0,1 \rangle$	$\langle 0,2,0.7 \rangle$	$\langle 0,2,0.7 \rangle$
v_2	$\langle 0,1 \rangle$	$\langle 0,1 \rangle$	$\langle 0,1 \rangle$	$\langle 0,1 \rangle$	$\langle 0,1 \rangle$
v_3	$\langle 0,1 \rangle$	$\langle 0,2,0.7 \rangle$	$\langle 0,1 \rangle$	$\langle 0,1 \rangle$	$\langle 0,1 \rangle$
v_4	$\langle 0,1 \rangle$	$\langle 0,2,0.7 \rangle$	$\langle 0,1 \rangle$	$\langle 0,1 \rangle$	$\langle 0,1 \rangle$
v_5	$\langle 0,1 \rangle$	$\langle 0,5,0.4 \rangle$	$\langle 0,1 \rangle$	$\langle 0,1 \rangle$	$\langle 0,1 \rangle$

The Index matrix of G_2 is $G_2 = [V_2, \mu_{ij}, \gamma_{ij}]$ where $V_2 = \{u_1, u_2, u_3, u_4, u_5\}$ and

	u_1	u_2	u_3	u_4	u_5
u_1	$\langle 0,1 \rangle$	$\langle 0,1 \rangle$	$\langle 0,2,0.7 \rangle$	$\langle 0,2,0.7 \rangle$	$\langle 0,1 \rangle$
u_2	$\langle 0,1 \rangle$	$\langle 0,1 \rangle$	$\langle 0,1 \rangle$	$\langle 0,1 \rangle$	$\langle 0,1 \rangle$
u_3	$\langle 0,1 \rangle$	$\langle 0,5,0.4 \rangle$	$\langle 0,1 \rangle$	$\langle 0,1 \rangle$	$\langle 0,1 \rangle$
u_4	$\langle 0,1 \rangle$	$\langle 0,2,0.7 \rangle$	$\langle 0,1 \rangle$	$\langle 0,1 \rangle$	$\langle 0,1 \rangle$
u_5	$\langle 0,1 \rangle$	$\langle 0,2,0.7 \rangle$	$\langle 0,1 \rangle$	$\langle 0,1 \rangle$	$\langle 0,1 \rangle$

Therefore, the degrees of vertices are calculated and displayed as follows:

$$\begin{aligned}
 d_H^-(u_1) &= 0, & d_H^+(u_1) &= 1; & d_H(u_1) &= (0,1) \\
 d_H^-(u_2) &= 2, & d_H^+(u_2) &= 0; & d_H(u_2) &= (2,0) \\
 d_H^-(u_3) &= 0, & d_H^+(u_3) &= 1; & d_H(u_3) &= (0,1) \\
 d_H^-(u_4) &= 1, & d_H^+(u_4) &= 1; & d_H(u_4) &= (1,1) \\
 d_H^-(u_5) &= 1, & d_H^+(u_5) &= 1; & d_H(u_5) &= (1,1) \\
 d_H^-(v_1) &= 0, & d_H^+(v_1) &= 1; & d_H(v_1) &= (0,1) \\
 d_H^-(v_2) &= 2, & d_H^+(v_2) &= 0; & d_H(v_2) &= (2,0) \\
 d_H^-(v_3) &= 1, & d_H^+(v_3) &= 1; & d_H(v_3) &= (1,1) \\
 d_H^-(v_4) &= 1, & d_H^+(v_4) &= 1; & d_H(v_4) &= (1,1) \\
 d_H^-(v_5) &= 0, & d_H^+(v_5) &= 1; & d_H(v_5) &= (0,1)
 \end{aligned}$$

$d_H(u_1)=d_H(u_3)=d_H(v_1)=d_H(v_5)$, we must have either
 (i) $f(u_1)=v_1$ and $f(u_3)=v_5$ or (ii) $f(u_1)=v_5$ and $f(u_3)=v_1$. Perhaps either will work.
 $d_H(u_2)=d_H(v_2)$. So $f(u_2)=v_2$

Finally, since $d_H(u_4)=d_H(u_5)=d_H(v_3)=d_H(v_4)$, we must have either

(i) $f(u_4)=v_3$ and $f(u_5)=v_4$ or (ii) $f(u_4)=v_4$ and $f(u_5)=v_3$

The relabeling is done by using (i) in each of the above cases to get the map $1 \rightarrow 1; 3 \rightarrow 5; 2 \rightarrow 2; 4 \rightarrow 3; 5 \rightarrow 4$ permute the rows and columns of the index matrix of G_1 using this map to see if we get the index matrix of G_2 . Otherwise, change the labels of the graph G_2 to produce the graph G_2^*

according to the above permutation and recalculate the index matrix. Therefore, the new index matrix of G_2^* (after labeling of G_2) becomes

	u_1	u_2	u_3	u_4	u_5
u_1	$\langle 0,1 \rangle$	$\langle 0,1 \rangle$	$\langle 0,1 \rangle$	$\langle 0.2,0.7 \rangle$	$\langle 0,1 \rangle$
u_2	$\langle 0,1 \rangle$	$\langle 0,1 \rangle$	$\langle 0,1 \rangle$	$\langle 0,1 \rangle$	$\langle 0,1 \rangle$
u_3	$\langle 0,1 \rangle$	$\langle 0.2,0.7 \rangle$	$\langle 0,1 \rangle$	$\langle 0,1 \rangle$	$\langle 0,1 \rangle$
u_4	$\langle 0,1 \rangle$	$\langle 0.2,0.7 \rangle$	$\langle 0,1 \rangle$	$\langle 0,1 \rangle$	$\langle 0,1 \rangle$
u_5	$\langle 0,1 \rangle$	$\langle 0.5,0.4 \rangle$	$\langle 0,1 \rangle$	$\langle 0,1 \rangle$	$\langle 0,1 \rangle$

Which is same as G_1 . Hence, $G_1 \cong G_2$

VI. CONCLUSION

A graph isomorphism search is an important problem of graph theory. It provides a bijective correspondence which preserve adjacent relation between vertex sets of two graphs. In this paper, an attempt has been made to define an isomorphism between two intuitionistic fuzzy hypergraphs. For, six types of cartesian products of two IFSs over the same universe are defined. Also intuitionistic fuzzy directed hypergraph is defined using cartesian products, in addition to the index matrix representation of isomorphism between two IFDHGs.

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Preliminary study on Population status and Activity budgeting of Western Hoolock Gibbon (*Hoolock hoolock*) in the Inner-line Reserved Forest of Barak valley, Assam, India

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Abstract - In India, the Hoolock gibbon, *Hoolock hoolock*, is found only in a small part in the northeast, south of the Brahmaputra River and east of the Dibang River. The Hoolock gibbon, a canopy dependent species, occurs in some reserve forests of Cachar district of Barak Valley, Assam. but its numbers is declining due to habitat loss and hunting. They are now surviving in some isolated pockets in the reserved forest areas, where they are occur in scattered groups and fighting for survival. A status survey was done in the Inner line reserved forest and its adjoining areas from July 2010 to Dec. 2011. Ten family groups and thirty-three individuals made up the total count. Of these the adult males and females comprised of 54.54% while the sub-adults, juveniles, and infants were 27.27%, 12.12% and 6.06% respectively. In activity budget, maximum time (%) spent in feeding i.e. 23.30% followed by foraging (27.90%), resting (23.50%), calling (3.10%) and others (13.20%). Adequate protection of existing protected areas, ban on timber logging, control of *jhum* cultivation and poaching, and conservation education/awareness and mass involvement of the local communities can help this valuable species to survive in their natural habitats in Barak Valley, Assam.

The present paper deals with the population status and activity budgeting of Hoolock Gibbon in the Inner line Reserve forest and its adjoining areas of Cachar district of Barak Valley, Assam.

Index Terms- *Hoolock hoolock*, conservation, Inner line Reserve Forest, Cachar, Assam, India

I. INTRODUCTION

The northeast region in India with highest primate diversity has the most intense conservation problems and social unrest in this region has increased pressure in the forest in the form of selective logging and encroachment. Therefore, the greatest need is to continue applying some of the conservation strategies and tactics in this region hence proper planning is essential.

Gibbons are brachiates and depends solely on the continuity of the forest canopy. Habitat loss in the form of breaking of the continuity of forest canopy have restricted and isolated their populations to smaller patches (sub-populations), even within a forest. Gibbon population are more prone to extirpation from a particular area at a faster rate than the other primates, as they have inter group spacing, small group size (2-3 individuals), longer inter birth interval (3- year), long parental care (2- years), late sexual maturity (7- years) and less reproductive turnover (Adult female gives birth to 6 individuals approximately in the reproductive life of 20 years).

Hoolock gibbon, both eastern and western species are the two representatives of the apes in India and the status of Hoolock gibbon has been categorized as 'Endangered' A2acd+3cd+4acd based on the IUCN Red List Criteria, 2009. Western Hoolock gibbon (*Hoolock hoolock*) is one of the 25 most endangered species of primates of the world [1].

It was found that Inner line Reserve Forest one of the largest landscapes left for the gibbons in Assam with substantially good population of Hoolock gibbon [2]. Part of this reserve forest falls in neighboring Mizoram state, besides another part of it lying in the adjacent Hailakandi district. This landscape is facing lot of encroachments particularly from the illegal timber harvesting and procuring of non timber forest products. Inner line Reserve forest is very important from the point of primate conservation as this forest support eight different species of primates.

II. MATERIAL AND METHOD

2.1 Study Area: The study was conducted in the Inner-line Reserve Forest of Cachar district which is situated in the Barak valley of southern Assam (Fig.1). There are 7 reserved forest in the Cachar district, the Inner line reserved forest is one of them, occupied Assam-Mizoram border. Total area of the forest is 44266 hectare and lies between 24° 22' N and 25°8' N Latitude and 92°24' E and 93°15' E Longitude. Manipur and Mizoram border lies in the east and South respectively of the said reserved forest. There are 24 nos. of forest villages inside the reserved forest (notified by the forest dept., Cachar dist.).Of the 24 forest villages 9 are inhabited solely by tribal groups such as Halem, Jaintia (P'nar), Reang, Mizo, Hmar, Dimasa, Khasi and Kuki; 5 solely by non tribes like Bengali Hindu (Scheduled Caste), Bengali Muslims, north Indian and ex tea garden laborers; and the remaining 10 by a mixed population of tribes and non tribes. Out of these, 3 are tribal forest villages, 2 non tribal forest villages and 5 having mixed population of forest villages.

The vegetation of the site is mixed evergreen and deciduous forest. Most common deciduous trees are *Artocarpus lakoocha*, *Dilena indica*, *Careya arborea*, *Acanthocephalus cinensis*, *Magnifera indica*, *Sterosperrnum personatum*, *Dysoxylum benectariferum* etc. Important evergreen trees are *Ficus bengalensis*, *Syzigium jambulana*, *Garcinia cowa*, *Pterospermum acerifolium* etc. Most of these trees make up a close canopy of about 20-30 m above the ground. Other notable vegetation are bamboo, canes etc. Other than reserve forests, all remaining forest patches are surrounded by the Jhum-fields and mostly restricted near the villages. Cultivated orchard fruit trees (mango, Jackfruit, orange, and guava) also form part of the habitat. Rivers of the district namely Barak, Sonai, Dholai, Rukni flows south north and south north-east. The most prominent primate species other than gibbons are Capped langur, Phayre's langur, Rhesus monkeys, Assamese macaques, and Slow lorises.

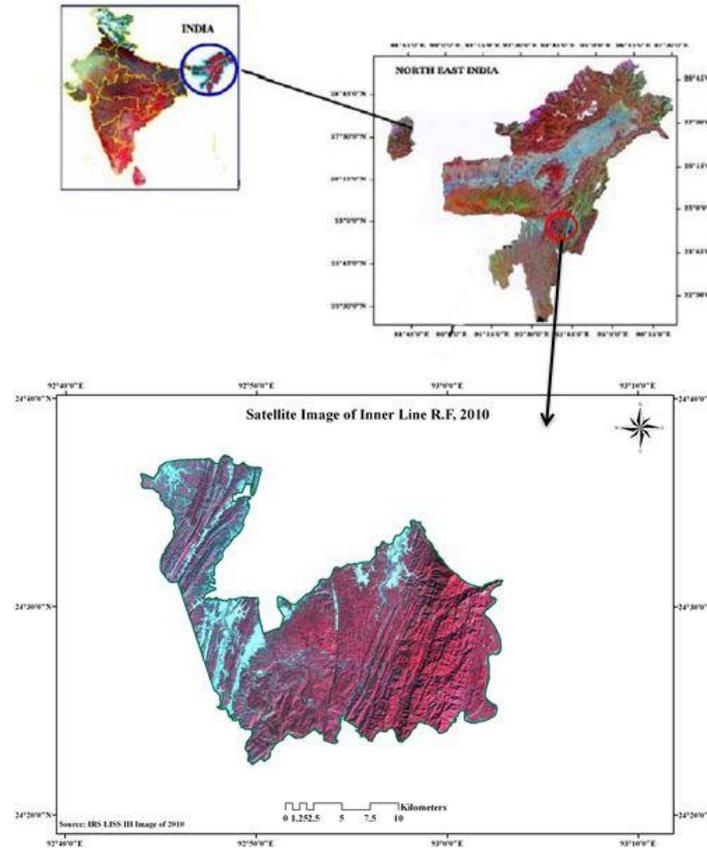


Fig. 1. Map of study area (Inner-line reserve forest, Cachar, Assam)

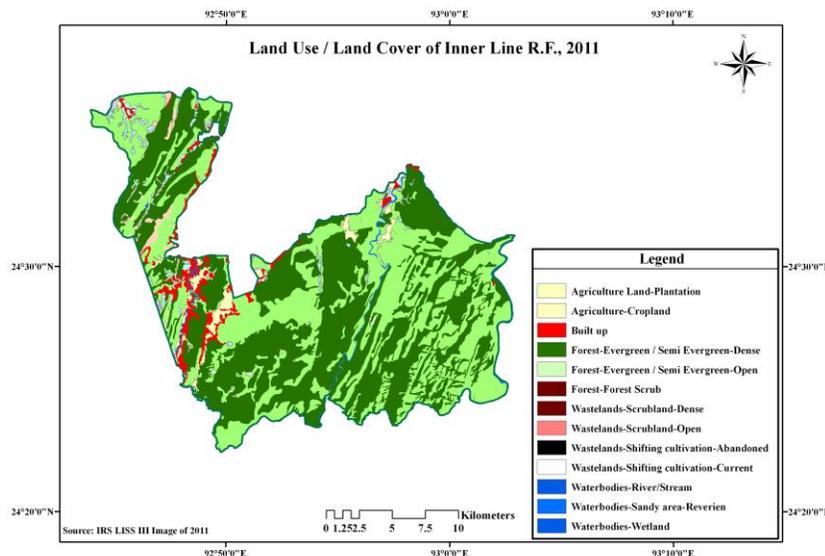


Fig. 2. Landuse-landcover map of the study site

2.2 Population status, Group Composition and Group Size: The present distribution and population status of *H. hoolock* was carried out at 23 specific locations in the reserved forest & its adjoining areas from August, 2010 to Nov, 2011 based on information gathered from the forest department and local inhabitants. The population was estimated by line transect method [3;4] and direct count method in different forest types. The line transects were laid in a stratified random manner to cover all selected areas in the forest. Two observers walked slowly covering a distance of between 10 and 15 km per day between 0600 hr to 16300 hr or until sunset. While sighting the presence of gibbon by direct or indirect methods, such as calls, branch shaking, and sounds associated with locomotion and feeding, observers recorded the exact count of each group size with GPS point, composition, and sex. Age and sex compositions of Hoolock gibbon were classified into two major age categories, adult and immature; these were further subdivided into four sub-categories i.e. adult (7 years and above), sub- adult(4-7 yrs.), juvenile(2-4 yrs.) and infant(0-2 yrs, always carried by mother), based on morphological differences as described by Gupta et al.(2005)[5].

Study group : A total of 10 groups of gibbon were located in the Inner line reserved forest and its adjoining areas. Of these, one group consisting of one adult male, one adult female with infant and one sub-adult male located at a fragmented habitat adjoining Rose Kandy Tea Estate (adjoining part of the reserved forest) were selected for prior study.

2.3. Data on activity : The specific ethological pattern of gibbons were studied for a period of four months(Aug. to Nov,2011) in the field. The group was followed for four days a week, each day from dawn to dusk (total 448 contact hours; range 06-08 hours, mean = 07 hours per day) and time spent on different activities was estimated from Focal animal sampling method adopted as per Altmann (1974).The help of a local guide having versatile knowledge of forest patches was taken for locating the gibbon groups. The groups were located either by their morning calls or by the site of their roosting trees. On sighting the group, it was followed for that day. Selected behaviours have been continuously recorded every sixty seconds on a ½ hour scan data sheet . Each individual animal of the group was followed for half an hour alternately for entire active period. Binocular was also used when it was difficult to observe the animal with naked eyes. Besides focal sampling, opportunistic observations of rare but important behaviours were recorded Ad libitum [6]. A 'scan' refers to a single recording of the behavior of an individual within 15 minutes intervals, which provided data on different activities, broadly classified into feeding, resting, foraging and other activities(playing, territorial, travel, allogrooming, aggression, sexual activities). Percent time spent in feeding was estimated by the following formula;

$$T = (nf \times 100)/N,$$

where T = % daytime spent feeding, nf = number of records that included feeding, and N = total number of records for the day.

2.4. Threats: During the survey period all types of threats of Hoolock gibbon (anthropogenic activities) inside the reserve forest were recorded. Various threats like deforestation, poaching, illegal felling, hunting, grazing etc. were recorded in the field on the basis of direct observations as well as personal communication.

III. RESULT AND DISCUSSION

3.1 Population Status

Population survey was mostly conducted in the buffer zone areas of the reserved forest except for a few areas of the core zone. The core zone of the reserved forest is completely inaccessible due to dense vegetation and hilly terrain. Six populations of *H. hoolock* were found throughout the entire tropical evergreen forest of the reserved forest and four population were recorded from sub-tropical and bamboo thick forest. They were found to be sympatric with the Capped Langur (*Trachypithecus pileatus*).

210 km of transects were laid and surveyed for the presence of Hoolock gibbon in 21 different localities of the reserved forest. Out of these from 7 localities a total of 10 groups were recorded (Table-1). Of the 10 groups, 4 groups (40%) were from one locality i.e. a fragmented habitat adjoining Rose Kandy Tea Estate (adjoining part of the reserved forest).

3.2 Group composition and size:

A total of 33 individuals were recorded in the 10 groups during population estimation. The group size and composition of the population surveyed in different localities are presented in Table 1. The smallest group contained a single sub-adult solitary male. Of the 33 individuals, 09 (27.27%) were adult males, 09 (27.27%) were adult females, 06 (18.18%) were sub-adult male, 03 (9.09%) were sub-adult female, 04 (12.12%) were juveniles, and 02 (6.06%) were infants (**Fig. 3**). The sub- adults, juveniles and infants formed the immature class comprising 45.45% of the total population. The average group size was estimated to be at 3.3 individuals, ranging from 01 to 04 individuals. The estimated adult sex ratio (male: female) was 1:1.

Table 1. Total number of groups and individuals with age-sex composition recorded from seven Surveyed localities in the Inner line R.F. of Cachar district and its adjoining areas

No.	L. Name	No. of Groups	GPS reading	Adults		Immature				Total	Avg. Group size
				M	F	SAM	SAF	JUV	INF		
1	Chourashikona	01	24°35'20.4''N 92°44'09.5''E	01	01	01	-	-	-	03	3.00
2	Nagathal (Khasipunji)	01	24°35'25.8''N 92°45'37.5''E	-	-	01	-	-	-	01	1.00
3	Dholabalu	01	24°34'57.5''N 92°44'42.6''E	01	01	-	-	01	-	03	3.00
4	Maragang	01	24°39'28.4''N 92°47'35.5''E	01	01	-	-	01	-	03	3.00
5	Shantosora	01	24°35'11.6''N 92°47'08.0''E	01	01	-	01	-	-	03	3.00
6	Jarultola	01	24°32'52.7''N 92°52'36.5''E	01	01	01	-	-	01	04	4.00
7	Fragmented area adjoining Rose kandy Tea Estate	04	24°25'N&24°44'N 92°40'E&92°45'E	04	04	03	02	02	01	16	4.00
	Total =	10	-----	09	09	06	03	04	02	33	3.30

M- Male; **F-** Female; **SAM-** Sub-adult male; **SAF-** Sub-adult female; **JUV-** Juvenile; **INF-** Infant.

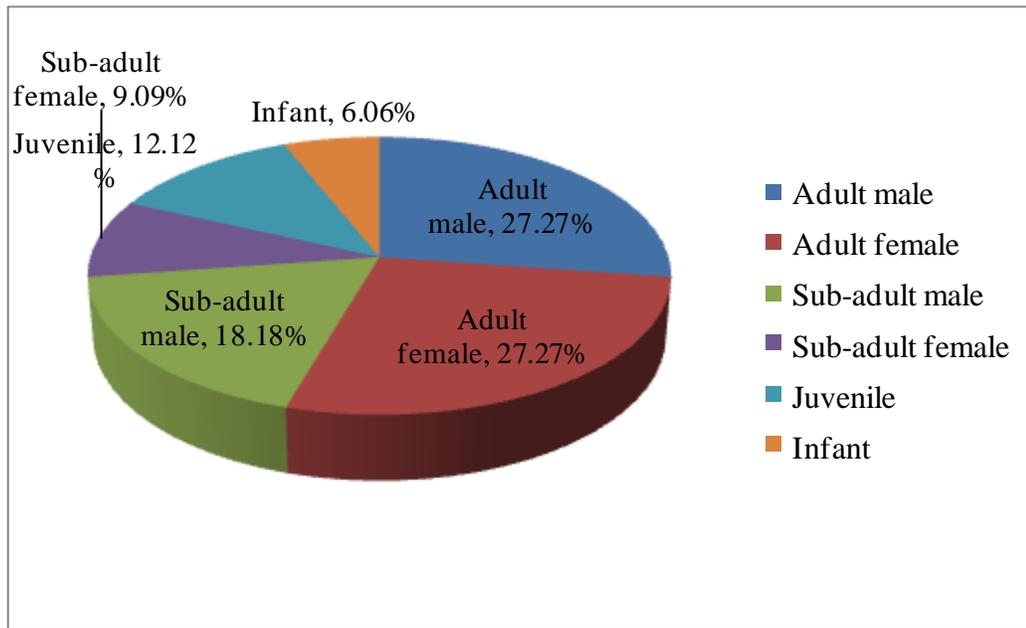


Figure 3. Group composition of Hoolock Gibbon.

3.3 Activity budget: Group scan yielded 6168 records (at times all three individuals were not visible) in this study. Feeding accounted for 32.30% of the total activity time, followed by foraging (27.90%), resting (23.50%), calling (3.10%) and Other activities (playing, territorial, travel, allogrooming, aggression, sexual activities.) accounted for 13.20%.

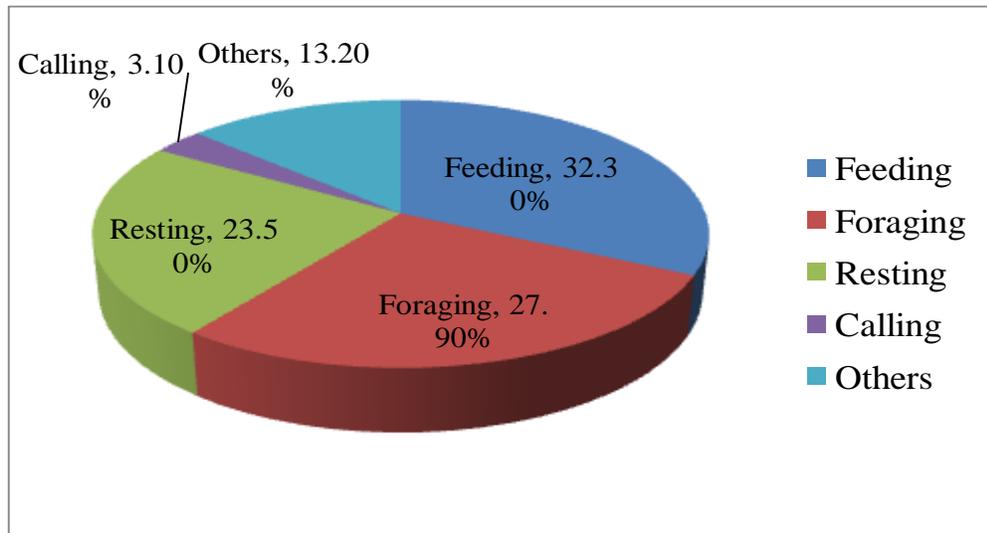


Figure 4: Time spent in different activities by the Hoolock Gibbon group in the study.

3.4 Threats:

The main anthropogenic activities which caused the threats in the survival of Hoolock gibbon inside the reserved forest area were observed during the survey were deforestation, poaching, expansion of agriculture, encroachment, illegal tree felling, *jhum* cultivation, paan *jhum*, livestock grazing, timber logging and hunting. Based on the recorded data it was found that the timber logging, illegal felling and *jhum* cultivation and hunting of wild fauna caused maximum threats to Hoolock gibbon in the surveyed areas in the

reserved forest and its adjoining areas (Fig.5). Timber logging and agricultural activities, hunting, illegal felling, jhum cultivation and hunting of wild fauna like civet, otter, slow Loris, squirrel, wild goat, deer, sambar, Hoolock gibbon and a variety of birds by local inhabitants, particularly the Reang, Mizo, Khasi and Kuki tribes for bush meat and their body parts, was a very common phenomenon. Some of the tribes believe that the bones of Hoolock gibbon have medicinal value that's why they kill them traditionally. Livestock grazing, human settlement, jhum cultivation and illegal felling of trees were recorded in the Khashipunji, dakhinthal, Shaytansora, Jhumkona, Dholabalu, Balisuri and Shantasora areas in the reserved forest. Rampant illegal felling of important food trees of gibbon such as *Artocarpus chaplasha* and *Michelia champaca* has caused a scarcity of food resources in the habitat.

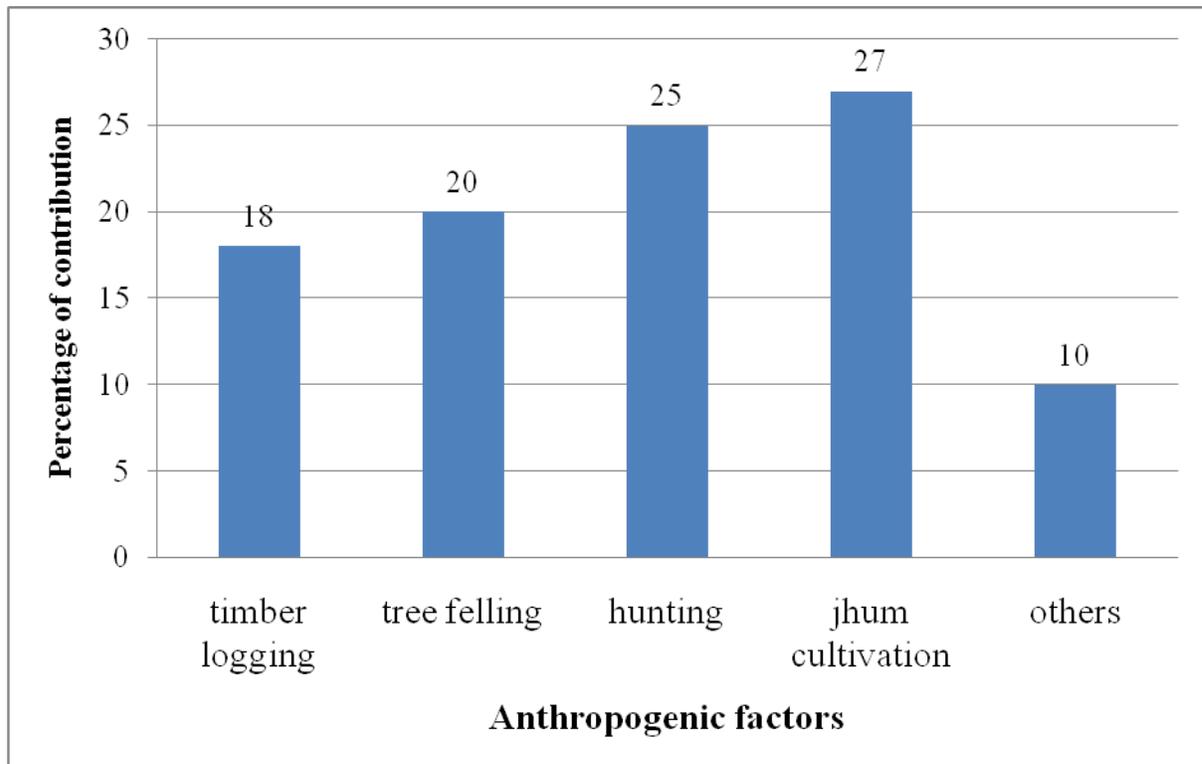


Fig. 5: Threats of Hoolock gibbon in the Inner-line reserved forest.

3.5. DISCUSSION:

Hoolock hoolock survive primarily in tropical evergreen forests, tropical wet evergreen forests, tropical semi-evergreen, tropical moist deciduous, and subtropical hill forests in India [7;8]. This study clearly shows 60% of the gibbon groups observed in tropical evergreen forest. As this species is largely frugivorous, food availability may be a limiting factor for its distribution versus for a folivorous primate species [9]. There is no quantitative information on the population estimation of *H. hoolock* based on systematic studies in the Inner line reserve forest, Cachar. In north-eastern states Das et al. (2005)[10] reported the occurrence of *H. hoolock* populations in Assam (1994) and Tripura (2003) comprising 1985 and 97 individuals, respectively. *H. hoolock* are monogamous, maintain a social network within a group and social proximity with neighboring groups of the same species (Alfred & Sati 1990). Alfred & Sati (1990) also reported that a typical family group consists of a mating pair and one to three immature offspring. We compared the group composition and group size with standard literature as furnished by Choudhury (1990, 1991)[11;12] for Assam. Our group size of 3.3 individuals for 10 groups is closely comparable to other studies conducted in different part of *H. hoolock* distribution range: 3.2 individuals for 24 groups and 3.4 for seven groups [13], 3.1 for eight groups and 3.0 for 14 groups (Choudhury 1990, 1991) in Assam, 3-3.2 for six to 10 groups [14], 2.1 for 34 groups [15] in Tripura, 3.0 individual for 42 groups [16] in Meghalaya, 3.5 for six groups [17], 2.3 for five groups and 2.9 for 15 groups [18;19], and 2.9 for 13 groups [20] in Bangladesh.

The economic status of local people affects the gibbon population and its habitat directly and indirectly and this has become a major concern for gibbon conservation. Local people use forest resources and land for extracting fuel wood, housing materials, medicinal plants, wild vegetables, and for agricultural activities. This results in forest fragmentation and degradation in the form of canopy gaps, and food paucity in both quantity and quality. This makes gibbons' particularly vulnerable to hunting and predation by domestic and wild dogs while moving on forest floor to forage for food, mate, and find safe shelter. Community hunting for their flesh and socio-cultural practices by tribal people is one of the major threats to primate species, including the endangered *H. hoolock* [21;22]. Further, the songs of gibbons act as a definite guide for hunters, allowing them to locate gibbons easily [5]. This has also contributed in a sharp decline of gibbon populations in the entire northeast. The majority of gibbon populations in the northeast are very small and declining [23;24;8;25] and several fragmented populations face a high probability of extinction(75%) in the near future (Molur et al. 2005) due to isolation, decrease in habitat quality, availability of food and hunting. Gupta et al. (2005) stated that the alarming changes in gibbon habitat that has taken place in the recent years, in the ecology and landscape, have brought about a number of changes in the distribution and population structure of *H. hoolock* in the species range. *H. hoolock* can be considered a keystone and flagship species, as it helps in the local health of the forest, is a state animal and is a tourist attraction.

IV. CONCLUSION

Hoolock Gibbons are mostly arboreal, canopy depended frugivorous primates, who live in small family group, feeding on different plant parts including fruit, use of *Ficus* species as main food plants. Secondary forests with drastic reduction in plant species diversity fail to support resident groups of frugivorous gibbons requiring year round supply of fruit. Mean group size of gibbon populations is 3.3 mainly because of the fragmented status of the gibbon habitat coupled with the heavy pressure of shifting cultivation, which is further adding to the fragmentation of the habitat and replacement of the primary forests with secondary forests. Adequate protection of existing protected areas, ban on timber logging, control of jhum cultivation and poaching, and conservation education/awareness and mass involvement of local communities can help this valuable species to survive in their natural habitats in the reserve forest, Cachar, Assam.

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The Efficacy of Cognitive Behavior Therapy on Depression

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Abstract- The study examined the efficacy of cognitive behavior therapy (CBT) for the treatment of +1 girl students suffering from mild depression without psychotic features. The sample (N=14) of mildly depressed +1 girl students was arrived at using RBDI. The treatment group and waiting list control group had a sample size of 7 each. The cognitive behavior therapy was given for the treatment group three months which helped the participants to recover from the mild symptoms of depression. A post test employing RBDI revealed that there is significant positive change in the treated group with CBT.

I. INTRODUCTION

The term depression is applied to a range of emotional states, both normal and psychopathological. As a normal mood, depression is almost universal in human experience; for example, not to grieve after the loss of a loved one is somehow “less than human”. Depressive mood, however, is not exclusively human; equivalent reactions occur in most mammals, especially primates. As a symptom, depression occurs as a component of reaction to stress and in patients with medical and psychiatric conditions.

“Depression” is a clinical term used by psychiatrists to describe a long period when a person feels very sad to the point of feeling worthless, hopeless and helpless- a mental disorder indeed.

Adolescence is a time of emotional turmoil, gloomy introspection, great drama and heightened sensitivity. It is a time of rebellion and behavioral experimentation. The challenge is to identify depressive symptomatology in adolescence which may be imposed on the backdrop of a more transient, but expected developmental storm.

Also, depression is a difficult diagnosis to make among teen – agers because the symptoms – irritability, low self-esteem and performance – “get confused with the angst of being a teenager”.

Recent studies have shown that greater than 20% of adolescents in the general population have emotional problems and one – third of adolescents attending psychiatric clinics suffer from depression (Maurice Blackman, 1994 cited in Murphy et al., 1994). Comparable statistics for Indian adolescents are absent.

Cognitive behavioral therapy is the most used treatment for depression. It is a well established promising and effective treatment procedure for depression (Hollon et.al, 1993); and 75% of participants show significant improvement with the application of cognitive behavior therapy (Chambhess & Gillis, 1993).

Cognitive – behavioral therapy (CBT) is an action – oriented form of psychosocial therapy that assumes that maladaptive, or faulty, thinking patterns cause maladaptive behavior and “negative” emotions is behavior that is counterproductive or interferes with everyday living. The treatment focuses on changing individual’s thoughts (cognitive patterns) in order to change his or her behavior and emotional state.

Essentially the goals of CBT in depressed clients include:

1. Identifying and correcting inaccurate thoughts associated with depressed feelings of clients;
2. Helping clients to engage in more enjoyable activities to promote feelings of well - being; and
3. Encouraging clients to use rational thinking to solve problem rather than unhealthy thought processes.

Hence an attempt has been made here to identify the depressed among the adolescent students who may be suffering from varying levels of unipolar depression without psychotic features as also apply the cognitive behavior therapy to them in order to know its efficacy as a treatment process for adolescent depression.

Objective of the study:

The objective of the study was to apply the cognitive behavior therapy for unipolar depression among +1 female school students suffering from mild depression without psychotic features.

Hypothesis:

Cognitive behavior therapy will be efficacious in reducing unipolar depression among higher secondary school girl students.

Method

Design:

The present study is a pretest-posttest experimental and waiting list control group design.

Sample:

The samples comprised of 14 mildly depressed higher secondary school girl students. From among these 14 students, half of them were randomly assigned to each of the experimental treatment group and ‘waiting list control group’.

Tool Used:

Identification of the sample as mildly unipolar depression was done with the use of a clinical instrument. Revised Beck’s Depression Inventory (RBDI: Beck, 1973). It was further

employed to assess the depression level of the sample after the CBT intervention.

CBT Procedure:

The cognitive behavior therapy (CBT) procedures were used as a group work. The therapy was implemented in 60 minutes session. A total of 16 sessions were conducted. The content of the CBT procedures used in the present context is outlined below session wise.

Session 1 & 2:

Firstly, a warm, empathetic and genuine therapeutic relationship was established by the practitioner with the participants to reinforce learning.

In Sessions 3 and 4:

The Jacobson Muscular Relaxation training (JPMR: Jacobson, 1938) was administered to the experimental group till the 16th session.

In Session 5 & 6:

The home assignment technique was used. Participants were encouraged for doing home assignment - to keep a daily record of activities on an hourly basis and to make an assessment of their sense of mastery and pleasure activities. "Mastery" refers to a sense that something has been achieved, even if the activity itself was not pleasurable. Eg. cleaning a cupboard, writing a letter or paying a bill.

'Pleasure' means feeling of happiness, fun, joy, etc., Then with the continuation of the above the particular told participants to choose some activities as targets as graded tasks; they are nothing but choosing targets which is difficult for them to do & split that into components and subcomponents as also tasks which can be graded as easy to perform or difficult to perform.

In the Next Session:

When the mastery and pleasure ratings and graded task assignment ratings began to improve the participants, they were given home assignment to keep a daily record of automatic thoughts. Automatic thoughts are thoughts that automatically come to mind when a particular situation occurs. Cognitive behavioral therapy seeks to challenge these automatic thoughts. So whenever the participants felt depressed they had to record

the objective situation, the thought they had and feeling they led to.

In the 8th and 9th session:

The participants were asked to write down the alternatives to irrational ways of perceiving the situation. It was done to help the participants realize that they had been locked into one way of seeing the situation and that there were other rational ways.

In Sessions 10 & 11:

The participants were motivated by giving lecture on assertive training with example. It was found useful by all the participants who could not express anger or irritation or difficult to say no, who are overly polite and allows others to take advantage of them, to express affection and other positive responses, who felt they did not have the right to express their thought, beliefs, and feelings as also expressed social phobias.

In Session 12 to 16:

Participants were encouraged to improve the frequency and quality of social interactions by a 'role play' and by 'telling stories' to them. By teaching role play to the participants, they were encouraged to improve the frequency, quality and intensity of social interactions. The practioner played the roles of teacher and parents before the students and how they can show socially desirable behaviors towards them.

All in all, cognitive behavior therapy procedures of treatment continued for 16 sessions for three months: 8 sessions for 1st month and 4 sessions in the 2nd month and 4 sessions in the last month respectively. Each session lasted for at least an hour. At the termination of the therapy, the participants were reassessed using the RBDI.

The participants were requested to keep doing these enjoyable activities as also indulge in social interactions for another six months.

Statistical Analysis:

Mean, standard deviations, t-test for correlated and independent sample were the statistical techniques used by the practitioner to test the hypothesis of this investigation.

II. RESULTS AND DISCUSSION

Table 1: Showing the level of Pretest depression score and posttest depression score in mildly depressed experimental group among Higher Secondary School girl students.

Group	N	\bar{X}	σ	't' value	Level of Significance
Pretest depression score in mild level experimental group	7	13.85	0.83	6.86	5%
Posttest depression score in mild level experimental group	7	8.28	1.93		

The results summarized in Table 1 show that the obtained 't' value is significantly different i.e., posttest depression score is significantly different and very less compared to pretest depression score among the mildly depressed girl students because of the administration of cognitive behavior therapy by the practitioners could have led to the lowering of depression in

the experimental group to them. This supports the hypothesis of the present study. The outcome of this study is supported by **Haby et al (2006)** and **Asarnow et al (2005)** which indicate that cognitive behavior therapy is an effective treatment for childhood and adolescent depressive disorder.

Table 2: Showing the level of Posttest depression score of mildly depressed experimental group versus mildly depressed waiting list control group among Higher Secondary School girl students.

Group	N	\bar{X}	σ	't' value	Level of Significance
Posttest depression score in mildly depressed experimental group	7	8.28	1.91	6.90	5%
Posttest depression score in mildly depressed waiting list control group	7	13.85	0.83		

The results summarized in Table 2 show that the obtained 't' value is significant i.e., posttest depression score in mildly depressed experimental group is significantly different from posttest depression score in mildly depressed waiting list control group supporting the hypothesis of the study. It is due to the cognitive behavior therapy given to the mildly depressed experimental group but not to the waiting list control group that reduced the depression level among the mildly depressed experimental group. Thus from this it can be concluded that there is efficacy of cognitive behavior therapy among mildly depressed Higher Secondary School girl students. This finding supports Weersing et. al., (2006) and Dubey and Madhurima Pradhan (2004) observation that cognitive behavior therapy was effective for overcoming adolescent depression.

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III. CONCLUSION

The present study concludes that cognitive behavior therapy is efficacious in significantly reducing depression among higher secondary school girl students.

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Simulation Analysis of AODV, DSR and ZRP Routing Protocols in MANET using QualNet 5.0 Simulator

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Abstract- Mobile Ad Hoc Networks are formed by devices that are able to communicate with each other using a wireless physical medium without having a route to a preexisting network infrastructure. Mobile means moving and Ad Hoc means temporary without any fixed infrastructure so mobile ad hoc networks are a kind of temporary networks in which nodes are moving without any fixed infrastructure or centralized administration. In this paper, we evaluate simulation and analysis based performance comparison of reactive and hybrid routing protocols: we use performance metric for simulation number of hop count, number of routes selected, RREQ packets forwarded, RREP packets received and number of update Packets/Messages received by above routing protocols has been carried out using QualNet 5.0 Simulator. The result shows that neither of the protocol is best in all situations. For some parameters one outperforms the other and vice-versa for some other parameters.

Index Terms- AODV, DSR, MANETs, ZRP, QualNet 5.0

I. INTRODUCTION

Mobile Ad Hoc Networks (MANETs) [1][2] are wireless networks that continually re-organize themselves in response to their environment without the benefit of a pre-existing infrastructure. Several routing protocols have been developed to suit Ad Hoc networks. The routing protocols in MANETs are classified into three different categories according to their functionality and performance: Proactive (Table driven) routing protocols, Reactive (On-demand) routing protocols and Hybrid routing protocols [3].

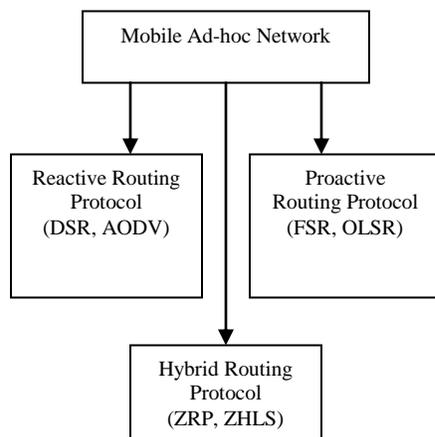


Fig. 1: Classification of routing protocols

Proactive Routing Protocols: In these protocols, the routing information is stored in the structure of tables maintained by each node. These tables need to be updated due to frequent change in the topology of the network. These protocols are used where the route requests are frequent. STAR, FSR, GSR, DSDV, CGSR, OLSR and WRP are the examples.

Reactive Routing Protocols: They involve discovering routes to other nodes only when they are needed. A route discovery process is invoked when a node wishes to communicate with another for which it has no route table entry. DSR, AODV, LAR, TORA, CBRP and ARA are the examples.

Hybrid Routing Protocols: Hybrid routing protocols which combine merits of both the proactive and reactive approaches. Such hybrid protocols offer means to switch dynamically between proactive and reactive parts of protocol. For instance, proactive protocols could be used between networks and reactive protocols inside the networks. ZRP, DST, DDR, ZHLS are the examples.

The rest of the paper is organized as follows: section- II gives a brief description and overview Manet routing protocols AODV, DSR and ZRP. Section III Simulation setup and environment gives a detailed description of our proposed work. Section IV Simulation Result. Finally, conclusion and future work are presented in section V.

II. Brief Description and Overview of Routing Protocol of MANET (AODV, DSR, and ZRP)

Overview Ad hoc ON Demand Distance Vector Routing Protocol (AODV):

The AODV Routing protocol [4] uses an on-demand move toward for finding routes, that is, a route is established only when it is required by a source node for transmitting data packets. It employs destination sequence numbers to identify the most recent path. The major difference between AODV and Dynamic Source Routing (DSR) stems out from the fact that DSR uses source routing in which a data packet carries the complete path to be traversed. However, in AODV, the source node and the intermediate nodes accumulate the next-hop information corresponding to each flow for data packet transmission. In an on-demand routing protocol, the source node floods the route request packet in the network when a route is not available for the desired destination. It may obtain multiple routes to different destinations from a single route request. The major difference between AODV and other on- demand routing protocols is that it uses a destination sequence number to determine an up-to-date path to the destination. A node updates its path information only if the destination sequence number of the current packet received

is greater than the last destination sequence number stored at the node. A route request carries the source identifier, the destination identifier, the source sequence number, the destination sequence number, the broadcast identifier, and the time to live (TTL) field. Destination sequence number indicates the freshness of the route that is accepted by the source. When an intermediate node receives a route request, it either forwards it or prepares a route reply if it has a valid route to the destination. The validity of a route at the intermediate node is determined by comparing the sequence number at the intermediate node with the destination sequence number in the route request packet. If a route request is received multiple times, which is indicated by the broadcast identification number pair, the duplicate copies are discarded. All intermediate nodes having valid routes to the destination, or the destination node itself, are allowed to send route reply packets to the source. Every intermediate node, while forwarding a route request, enters the previous node address and its broadcast identification number. A timer is used to delete this entry in case a route reply is not received before the timer expires. This helps in storing an active path at the intermediate node as AODV does not employ source routing of data packets. When a node receives a route reply packet, information about the previous node from which the packet was received is also stored in order to forward the data packet to this next node as the next hop toward the destination [5][10].

Overview of Dynamic Source Routing (DSR):

The Dynamic Source Routing protocol [6][7] is composed of two main mechanisms route discovery and route maintenance.

Route Discovery: It is the mechanism by which a source node wishing to send a packet to a destination node, obtains a source route to the destination.

Route maintenance: It is the mechanism by which a node wishing to send a packet to a destination is able to detect, while using a source route to the destination, if the network topology has changed. A routing entry in DSR contains all the intermediate nodes information of the route rather than just the next hop information maintained in DSDV and AODV. A source puts the entire routing path in the data packet, and the packet is sent through the intermediate nodes specified in the path. If the source does not have a routing path to the destination, then it performs a route discovery by flooding the network with a route request (RREQ) packet. Any node that has a path to the destination in question can reply to the RREQ packet by sending a route reply (RREP) packet. The reply is sent using the route recorded in the RREQ packet.

Need for route discovery: DSR allows nodes to operate their network interfaces in promiscuous mode and the all data packets sent by their neighbors. Since complete paths are indicated in data packets, snooping can be very helpful in keeping the paths in the route cache updated. To further reduce the cost of route discovery, the RREQs are initially broadcasted to neighbors only by zero-ring search, and then to the entire network if no reply are received. When an intermediate node forwarding a packet detects through Route Maintenance that the next hop along the route for that packet is broken, if the node has another route to the packets' destination it uses it to send the packet rather than discard it [10].

Overview of Zone Routing Protocol (ZRP):

Zone Routing Protocol or ZRP [8] [9] was the first hybrid routing protocol with both a proactive and a reactive routing component. ZRP was first introduced by Haas in 1997. ZRP is proposed to reduce the control overhead of proactive routing protocols and decrease the latency caused by routing discover in reactive routing protocols. In ZRP, the distance and a node, all nodes within-hop distance from node belongs to the routing zone of node. ZRP is formed by two sub-protocols [11], a proactive routing protocol: Intra-zone Routing Protocol (IARP) is used inside routing zones and a reactive routing protocol: Inter-zone Routing Protocol (IERP) is used between routing zones, respectively. A route to a destination within the local zone can be established from the proactively cached routing table of the source by IARP; therefore, if the source and destination is in the same zone, the packet can be delivered immediately. Most of the existing proactive routing algorithms can be used as the IARP for ZRP.

III. SIMULATION SETUP AND ENVIORMENT

The objective of this work is to simulate and analyzed the performance evaluation of various routing protocols by using QualNet 5.0 simulator [13]. A simulation can be very useful because it is possible to scale the networks easily and therefore to eliminate the need for time consuming and costly real world experiments. While the simulator is a powerful tool, it is important to remember that the ability to do predictions about the performance in the real world is dependent on the accuracy of the models in the simulator. The following parameters were configured as shown in Table 1. The parameters were configured different routing protocols like as AODV, DSR and ZRP are chosen for simulation [10][11][12] using the performance metrics like as number of hop count, number of routes selected, RREQ packets forwarded, RREP packets received and number of update Packets/Messages received with different scenarios on 15 numbers of nodes. A scenario with 15 nodes with random nodes placement is shown in Fig. 1. The nodes were randomly distributed in 1500 X 1500 unit area. The nodes 3, 9 (as Source) and 14, 15 (as Destination) were connected and 1kb data was transmitted. The simulation time was run for 30 seconds. The routing protocols taken were AODV, DSR, ZRP and a comparison of the following parameters have been done.

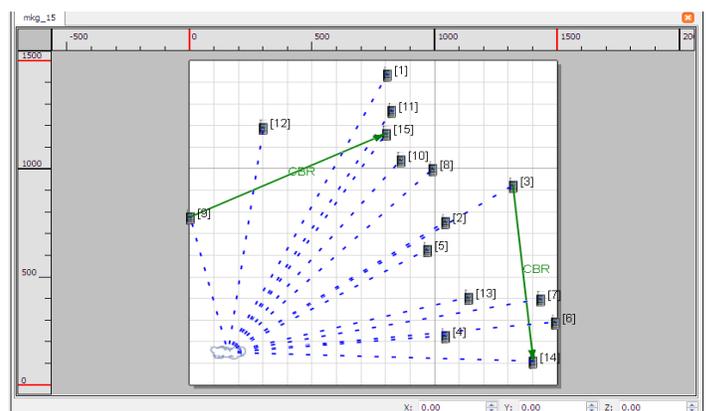


Fig. 1 Snapshot of designed scenario for AODV routing protocol using random selection of 15 nodes.

Table 1: Configured Parameters

Parameters	Values
Physical Layer Protocol	802.11
Routing protocol	AODV, DSR, ZRP
Fading Model	Rayleigh
Shadowing Model	Constant
Energy Model	Mica Motas
Battery power	Simple Linear
Area	1500 X 1500
Mobility	Random way point
Mobility Speed	0-30mps
Data Link Layer	802.11.DCF
Application Layer	CBR Traffic
Channel Frequency	2.4 GHz
Total Power	1200ma
Antenna Model	Omni Directional Antenna

IV RESULTS

Number of routes selected:

Number of route request messages forwarded by intermediate nodes. In case of AODV, the numbers of routes selected are quite less in comparison to DSR which indicates that redundant paths are more in route finding in case of DSR, as shown in Fig. 1 and Fig. 2.

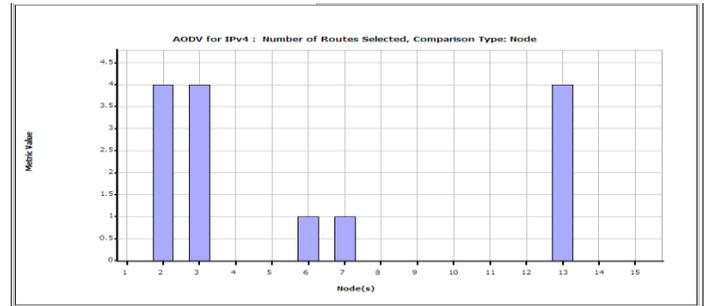


Fig. 1 Number of Routes Selected in AODV

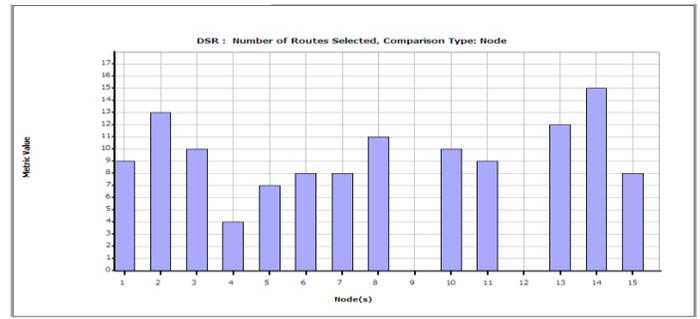


Fig. 2 Number of Routes Selected in DSR

Number of hop counts:

Aggregate sum of the hop counts of all routes added to the route cache. In case of DSR, numbers of hop counts are very high which indicates that congestion will be quite more in DSR in comparison to AODV, as shown in Fig. 3 and Fig. 4.

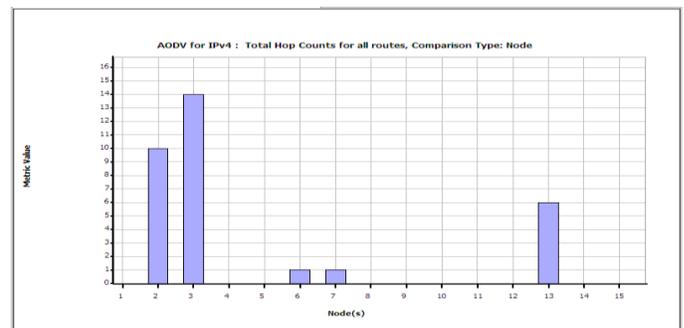


Fig. 3 Number of Hop Counts in AODV

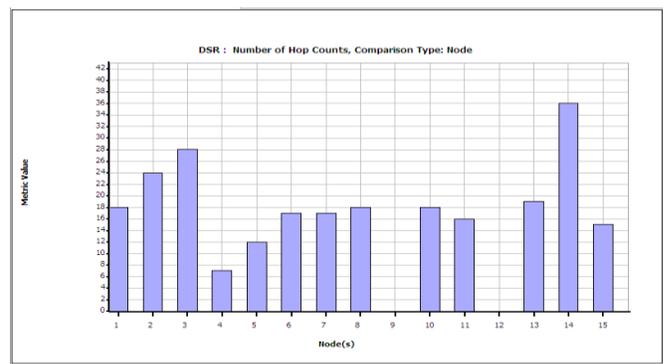


Fig. 4 Number of Hop Counts in DSR

Number of RREQ packets forwarded:

Number of data packets forwarded between source nodes to destination. In case of AODV, the numbers of route request (RREQ) packets are more as compared to DSR, as shown in Fig. 5 and Fig. 6.

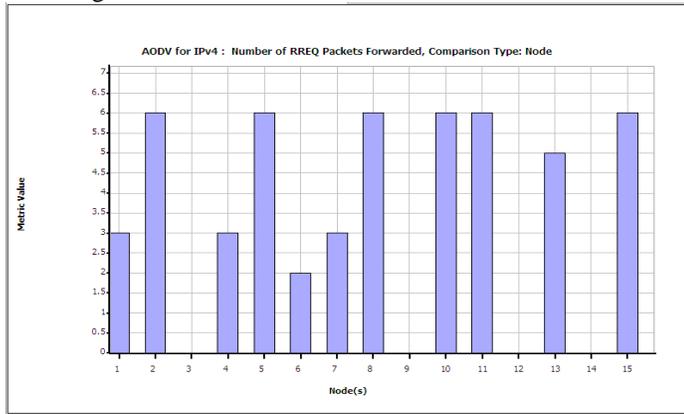


Fig. 5 Number of RREQ Packets Forwarded in AODV

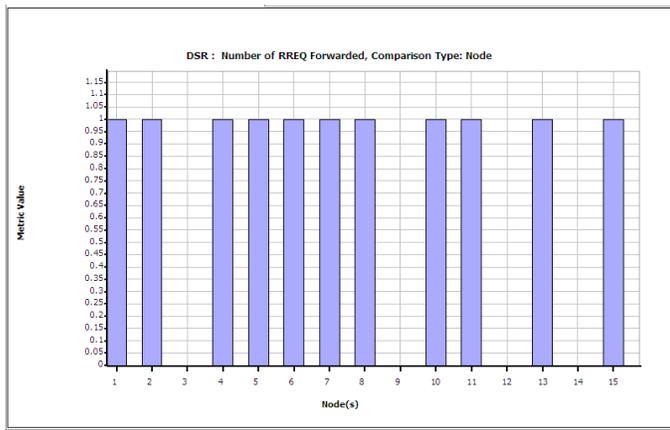


Fig. 6 Number of RREQ Packets Forwarded in DSR

Number of RREP packets received:

Number of route replies received by the source node to destination nodes. The numbers of route reply (RREP) packets are quite similar in both AODV as well as DSR, as shown in Fig.7 and Fig. 8

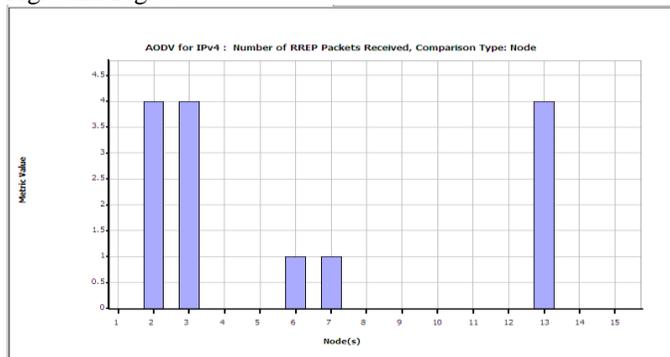


Fig. 7 Number of RREP Packets Received in AODV

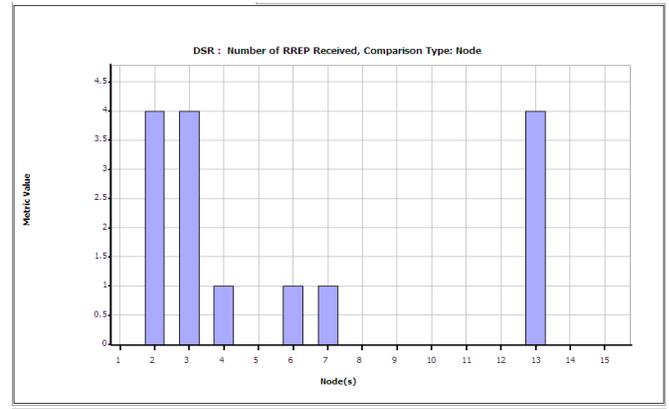


Fig. 8 Number of RREP Packets Received in DSR

Number of RERR packets received:

Number of route error packets received form source node to destination node. In case of AODV, the numbers of route error (RERR) packets are more as compared to DSR, as shown in Fig. 9 and Fig. 10.

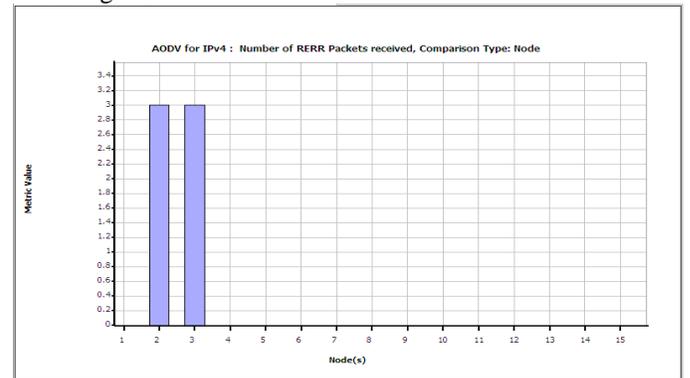


Fig. 9 Number of RERR Packets Received in AODV

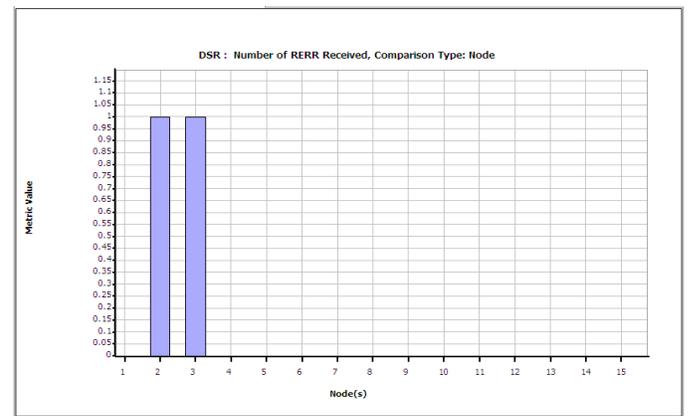


Fig. 10 Number of RERR Packets Received in DSR

Number of Periodic/Regular updates sent:

Total number of periodic update messages sent from source node to destination node. The numbers of periodic updates are in ZRP as shown in Fig. 11.

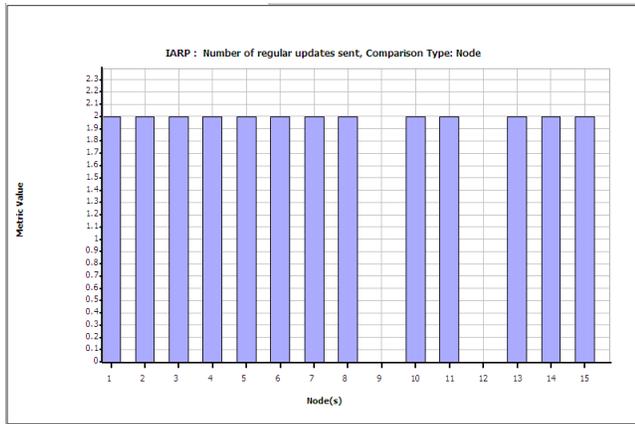


Fig. 11 Number of Regular updates sent in ZRP

Number of update Packets/Messages received:

Total number of periodic update messages received from source node to destination node. The numbers of update packets in ZRP, as shown in Fig. 12.

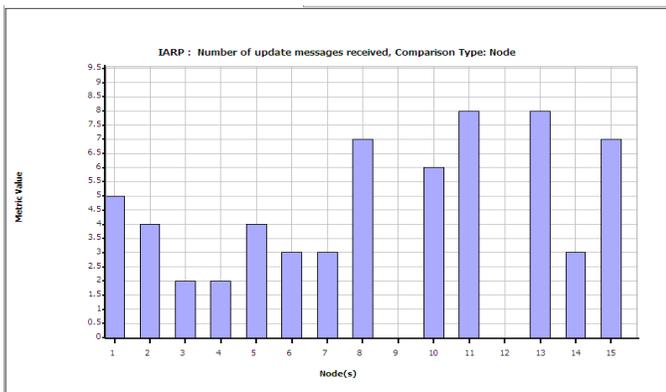


Fig. 12 Number of update messages received in ZRP

Table 2: Comparison between AODV, DSR and ZRP

Parameters	AODV	DSR	ZRP
Hop Count	Normal	Very High	Medium
Possible Routes Selected	Less	More	Medium
Congestion	Medium	More	Medium
Update Packets/ Messages Received	Almost Same	Almost Same	Very Low
Error Messages	More	Less	Medium
Routing Scheme	Reactive	Reactive	Hybrid
Routing Overhead	Low	Low	Medium

V CONCLUSION

This paper compares and analyzes the performance of the three routing protocols AODV, DSR and ZRP in QualNet 5.0 Simulator. The evaluation shows that the number of possible routes selected is quite less in case of AODV in comparison to DSR. This implies that on using DSR we have more redundant paths. The hop count for a route is quite less in case of AODV in comparison to DSR indicating that it is less prone to network congestion. The congestion due to route reply is more in AODV than DSR. The number of route error messages is quite high in case of AODV implying that under given condition there are more chances of error in AODV in comparison to DSR. The main characteristics have been presented and a thorough evaluation has been carried out for ZRP against DSR and AODV. Regretfully ZRP was not up to the task and it performed poorly throughout all the simulation sequences, hence putting itself out of competition. AODV performed well in most of the network sizes (better than ZRP). Table 2 is very much useful for researcher because of resultant of reactive and hybrid protocols. The results also throw a challenge and an excellent opportunity to look deeper into ZRP protocol.

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Block Processing Video Stabilization

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Abstract- The removal of unwanted vibrations in a video sequence induced by camera motion is an essential part of video acquisition in industrial, military and consumer applications. In this paper, we present a new image processing method to remove such vibrations and reconstruct a video sequence void of sudden camera movements. This approach to separating unwanted vibrations from intentional camera motion is based on a block matching motion estimation framework. The estimated parameters of interframe camera motion are the noisy observations of the intentional camera motion parameters. Video stabilization algorithm consists of a motion estimation (ME) block and a motion correction (MC) block. ME estimates the motion between frames and can be divided as a local motion estimator and a global motion decision unit. Basically the local motion estimator will return the estimated dense optical flow information between successive frames using typical block-based methods. The global motion decision unit will then determine an appropriate global transformation that best characterizes the motion described by the given optical flow information. Finally MC warps the current frame using the filtered global transformation information and generates the stabilized video sequence.

Index Terms- Video stabilization, motion estimation, motion compensation, motion vector.

I. INTRODUCTION

Video footage from hand-held camcorders is typically jerky due to small, unwanted camera movements. Removal of those undesired movements requires video stabilization techniques. As its name suggests, video stabilization is the process of generating a compensated video sequence where image motion by the camera's undesirable shake or jiggle is removed. Digital image processing techniques are often used to perform such a task and are favorable over mechanical or optical video stabilization approaches since modern VLSI techniques will allow a more compact camera design.

The implementation of the algorithm has to be cheap in the context of used memory and CPU power. The image stabilization method, Digital Image Stabilization (DIS) meets these demands, as it uses the image stream for stabilization and therefore does not need any additional equipment. This report describes one method of DIS, called block matching motion estimation, which uses matching the blocks with in the frames to estimate the motion

II. VIDEO STABILIZATION ALGORITHM STRUCTURE

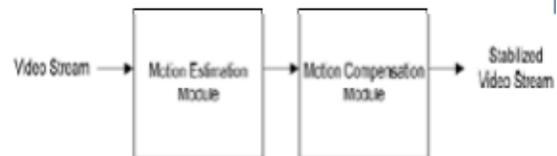


Figure. 1 :

As in any video stabilization algorithm, the crucial component of this algorithm lies on motion estimation. Since in real world, camera motion often involves some type of global transformation, it is particularly important to get an accurate estimate of the global motion when performing motion estimation. To account for various types of motions such as rotation, zoom and so on, applying parametric motion models is highly preferred over pure block-based motion methods. On the other hand, to better illustrate the algorithm, it is, however, always advantageous to start with the simplest scenario, which in our case is the translational camera motion which we shall describe in next section.

III. MOTION ESTIMATION MODULE

The block matching motion estimation algorithm is based on the following assumptions that: each frame in the given image sequence is distinct, and the image instability is the result of translation, rotation, skewing and scaling between frames. Through analyzing image frames, the motion vectors (including amounts of translation, rotation and scaling), which are the basis of compensation processing, can be calculated. Motion estimation between Frames is usually based on a rigid motion model as follows

$$\begin{bmatrix} x_{new} \\ y_{new} \end{bmatrix} = \begin{bmatrix} \sigma_x & 0 \\ 0 & \sigma_y \end{bmatrix} \begin{bmatrix} \cos \alpha & \sin \alpha \\ \sin \alpha & \cos \alpha \end{bmatrix} \begin{bmatrix} \cos \theta & -\sin \theta \\ \sin \theta & \cos \theta \end{bmatrix} \begin{bmatrix} x_{old} \\ y_{old} \end{bmatrix} + \begin{bmatrix} \Delta x \\ \Delta y \end{bmatrix}$$

The above given model is explained in the following text. In the formula, x_{new} , x_{old} are horizontal coordinates of corresponding pixels in input frame and reference frame; y_{new} , y_{old} are vertical coordinates of corresponding pixels in input frame and reference frame; Δx , Δy are translation amounts between two frames; θ and α are the rotation and deformation angles between two frames respectively. The two factors σ_x , σ_y are the scaling factors.

Above equation can be rewritten as follows:

$$\begin{bmatrix} x_{new} \\ y_{new} \end{bmatrix} = A \begin{bmatrix} x_{old} \\ y_{old} \end{bmatrix} + \begin{bmatrix} \Delta x \\ \Delta y \end{bmatrix}$$

where, A is a sequence of rotation, scaling and angular deformation. And it can be decomposed in the form:

$$A = A_S A_D A_R = \begin{bmatrix} \sigma_x & 0 \\ 0 & \sigma_y \end{bmatrix} \begin{bmatrix} \cos \alpha & \sin \alpha \\ \sin \alpha & \cos \alpha \end{bmatrix} \begin{bmatrix} \cos \theta & -\sin \theta \\ \sin \theta & \cos \theta \end{bmatrix}$$

Matrix A is a 4x4 matrix. So, it is in the form:

$$A = \begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{bmatrix}$$

Hence,

$$\begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{bmatrix} = \begin{bmatrix} \sigma_x & 0 \\ 0 & \sigma_y \end{bmatrix} \begin{bmatrix} \cos \alpha & \sin \alpha \\ \sin \alpha & \cos \alpha \end{bmatrix} \begin{bmatrix} \cos \theta & -\sin \theta \\ \sin \theta & \cos \theta \end{bmatrix} \\ = \begin{bmatrix} \sigma_x & 0 \\ 0 & \sigma_y \end{bmatrix} \begin{bmatrix} \cos(\alpha - \theta) & \sin(\alpha - \theta) \\ \sin(\alpha + \theta) & \cos(\alpha + \theta) \end{bmatrix} \\ = \begin{bmatrix} \sigma_x \cos(\alpha - \theta) & \sigma_x \sin(\alpha - \theta) \\ \sigma_y \sin(\alpha + \theta) & \sigma_y \cos(\alpha + \theta) \end{bmatrix}$$

By solving above Equation

$$\sigma_x = \sqrt{a_{11}^2 + a_{12}^2}$$

$$\sigma_y = \sqrt{a_{21}^2 + a_{22}^2}$$

$$(\alpha - \theta) = \text{atan2}(a_{12}, a_{11})$$

$$(\alpha + \theta) = \text{atan2}(a_{21}, a_{22})$$

To find the values of α and θ , we need to solve above equation simultaneously,

Now, we have six variables to estimate, these values are show in Table 1. Table 1 :

Motion Vector	Description
σ_x	The Scaling Factor in x axis
σ_y	The Scaling Factor in y axis
θ	Rotation angle
α	Deformation angle
Δx	Translation in x axis
Δy	Translation in y axis

IV. MOTION COMPENSATION MODULE

The result of the motion estimation process described in the last section is capable of computing the motion vectors between two frames. The objective of motion compensation is to keep some kind of history of the motion estimates in order to create a stabilized sequence. We have seen that the DIS proposed is based on a hypothesis that the image instability in image sequence is the result of translation, rotation, skewing and scaling between frames. So, by knowing these motion vectors which are estimated in the last section, an image can be constructed.

An image can be constructed using the hypothesis in Equation which was given bellow:

$$\underline{x}'_n = A \underline{x}_n + C$$

Assume \underline{x}_n is a feature point in an image at time=t where n is the image number. And assume \underline{x}'_n is the same feature point in the same image at time=t+1 where n is the image number.

$$\underline{x}'_n = \begin{bmatrix} x'_n \\ y'_n \end{bmatrix}, \quad \underline{x}_n = \begin{bmatrix} x_n \\ y_n \end{bmatrix} \quad \text{and} \quad C = \begin{bmatrix} \Delta x \\ \Delta y \end{bmatrix}$$

In order to estimate the value of A and C, we need 6 images; that is three images at time=t and the same 3 images but at time=t+1. This can be written mathematically as follows

$$\underline{x}'_1 = A \underline{x}_1 + C$$

$$\underline{x}'_2 = A \underline{x}_2 + C$$

$$\underline{x}'_3 = A \underline{x}_3 + C$$

These equations can also be expanded to the following equations:

$$x'_1 = a_{11}x_1 + a_{12}y_1 + \Delta x$$

$$y'_1 = a_{21}x_1 + a_{22}y_1 + \Delta y$$

$$x'_2 = a_{11}x_2 + a_{12}y_2 + \Delta x$$

$$y'_2 = a_{21}x_2 + a_{22}y_2 + \Delta y$$

$$x'_3 = a_{11}x_3 + a_{12}y_3 + \Delta x$$

$$y'_3 = a_{21}x_3 + a_{22}y_3 + \Delta y$$

These equations can be solved simultaneously to find the values of a_{11} , a_{12} , a_{21} , a_{22} , Δx and Δy . The above computation can be expressed in the form of matrix algebra as follows:

$$\begin{bmatrix} x_1' \\ x_2' \\ x_3' \\ y_1' \\ y_2' \\ y_3' \end{bmatrix} = \begin{bmatrix} x_1 & y_1 & 1 \\ x_2 & y_2 & 1 \\ x_3 & y_3 & 1 \\ & & x_1 & y_1 & 1 \\ & & x_2 & y_2 & 1 \\ & & x_3 & y_3 & 1 \end{bmatrix} \begin{bmatrix} a_{11} \\ a_{12} \\ \Delta x \\ a_{21} \\ a_{22} \\ \Delta y \end{bmatrix}$$

Which is of the form:

$$\underline{p} = P\underline{a}$$

standard pseudo inverse computation computes an optimal estimate of \underline{a} such that:

$$\underline{a} = (P^t P)^{-1} P^t \underline{p}$$

As we know already, pixels of an image occupy integer coordinates. We can note from above Equation that the destination pixels may lie between the integer coordinates. So, in order to create an image from these pixels, destination pixels are interpolated at the integer coordinates.

V. RESULTS

To test the efficiency of the video stabilization algorithm, simulated video sequences were generated as follows: take one real life video sequence which was intentionally unstable. This video sequence (eg. Vasu.avi) was simulated using MATLAB 7.6 version. The images shown in fig 3 are unstable frames and the images in fig 4 are stabilized frames. Input and out put videos are accommodated in CD-ROM. The following steps are implemented to achieve the stabilized video.

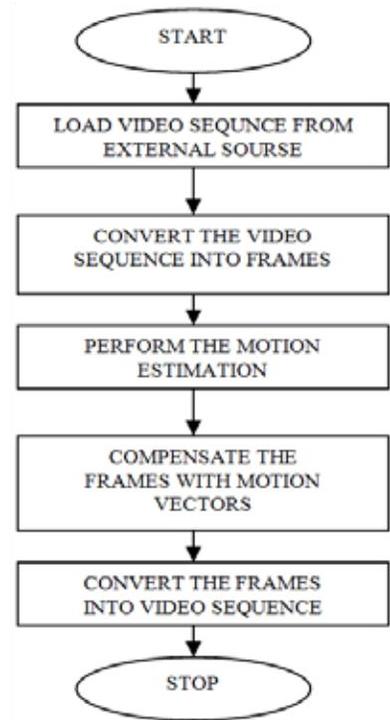


Figure 2 : Steps Followed for video stabilization

After completion of all the steps we will get stabilized video



Figure 3 : Few Input (unstable) video frames



Figure 4 : Few output (stable) video frames

VI. CONCLUSION

This report describes the video stabilization algorithm using a block-based motion model. In particular, it shows how to apply this algorithm to translational and rotational camera motions. Experimental results have indicated good performance from this algorithm.

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Software Development Life Cycle Processes with Secure

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Abstract- It is to be to present the information about existing processes, standards, life cycle models, frameworks, and methodologies that support or could support secure software development. This includes software engineering process group (SEPG) members, software developers, and managers seeing information about existing software development life cycle (SDLC) processes that address security.

Index Terms- SDLC processes, security Risk Identification, security engineering activities.

I. INTRODUCTION

The purpose of is to collect and present overview information about existing processes, standards, life cycle models, frameworks, and methodologies that support or could support secure software development. Where applicable and possible, some evaluation or judgment may be provided for particular life cycle models, processes, frameworks, and methodologies.

The target for this includes software engineering process group (SEPG) members who want to integrate security into their standard software development processes. It is also relevant for developers and managers looking for information on existing software development life cycle (SDLC) processes that address security. Technology or content areas described include existing frameworks and standards such as the Capability Maturity Model® Integration (CMMI®) framework, the FAA-iCMM, the Trusted CMM/Trusted Software Methodology (T-CMM/TSM), the Systems Security Engineering Capability Maturity Model (SSE-CMM), in addition to existing processes such as the Microsoft Trustworthy Computing Software Development Lifecycle, the Team Software Process SM for Secure Software Development (TSPSM-Secure), Correctness by Construction, Agile Methods, and the Common Criteria.

Capability Maturity Models (CMMs)

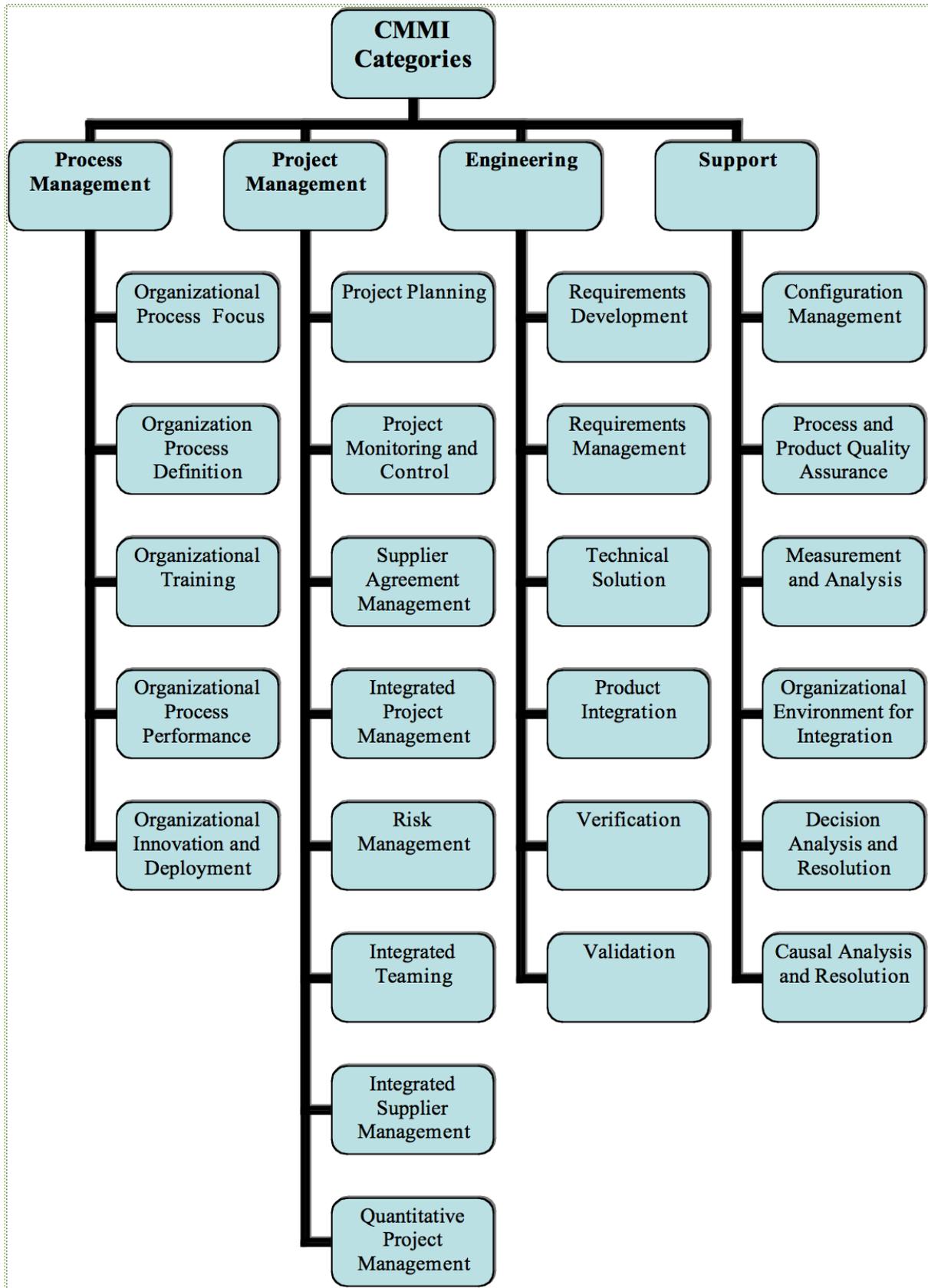
Capability Maturity Models provide a reference model of mature practices for a specified engineering discipline. An organization can compare their practices to the model to identify potential areas for improvement. The CMMs provide goal-level definitions for and key attributes of specific processes (software engineering, systems engineering, security

engineering), but do not generally provide operational guidance for performing the work. In other words, they don't define processes, they define process characteristics; they define the what, but not the how:

“CMM-based evaluations are not meant to replace product evaluation or system certification. Rather, organizational evaluations are meant to focus process improvement efforts on weaknesses identified in particular process areas”

Capability Maturity Model Integration (CMMI)

The Capability Maturity Model Integration (CMMI) framework helps organizations increase the maturity of their processes to improve long-term business performance. The CMMI provides the latest best practices for product and service development, maintenance, and acquisition, including mechanisms to help organizations improve their processes and provides criteria for evaluating process capability and process maturity. Improvement areas covered by this model include systems engineering, software engineering, integrated product and process development, supplier sourcing, and acquisition. The CMMI has been in use for more than three years and will eventually replace its predecessor, the Capability Maturity Model for Software (SW-CMM), which has been in use since the mid-1980s. As of June 2005, the Software Engineering Institute (SEI) reports that 782 organizations and 3250 projects have reported results from CMMI-based appraisals [SEI 05a]. Beginning in 1987 through June 2005, 2,859 organizations and 15,634 projects have reported results from SW-CMM-based appraisals and assessments [SEI05b]. The CMMI addresses four categories for process improvement and evaluation. Each category includes several Process Areas. As shown in Figure 1, the CMMI addresses project management, supplier management, organization-level process improvement as well as training, quality assurance, measurement, and engineering practices. However, it does not specifically address the four areas mentioned earlier (security risk management, security engineering practices, security assurance, and project/organizational processes for security), although it is not unreasonable to assume that each of these are special cases of practices already addressed by the CMMI.



II. CONCLUSION

Other key standards and methods that apply to developing secure software but have not been summarized in this paper include

- ISO/IEC 15288 for System Life Cycle Processes,
- ISO/IEC 12207 for Software Life Cycle Processes
- ISO/IEC 15026 for System and Software Integrity Levels
- Clean room Software Engineering.

This Research paper demonstrates that although there are several processes and methodologies that could support secure software development, very few are designed specifically to address software security from the ground up. The notable exceptions are Microsoft's Trustworthy Computing SDL and the SSE-CMM. As software security becomes a more important issue in an increasingly networked world, more processes that explicitly address the four focus areas identified in this paper (security engineering activities, security assurance activities, security organizational and project management activities, and security risk identification and management activities) should achieve visibility.

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A Novel Low profile Planar Inverted-F Antenna (PIFA) for Mobile Handsets

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Abstract- A low profile planar inverted-F antenna (PIFA) is proposed for mobile handset applications. The proposed antenna covers DCS-1800 & PCS-1900 bands. The antenna consists of a square planar element suspended above the FR4 dielectric substrate. The ground plane is on the bottom side of the substrate. Overall size of the antenna is 22*22*5.2 mm³ and is well suited for mobile handsets due to its low profile, small size, wide bandwidth and good gain. The antenna geometry, simulations of return loss, input impedance, VSWR & gain are also discussed.

Index Terms- PIFA, internal antenna, FR4 dielectric, planar element, return loss, VSWR.

I. INTRODUCTION

In last three decades PIFA antenna structure has emerged as one of the most promising candidate in the category of low profile antennas used in handheld devices. Broad range of applications employs PIFA as their basic antenna. For a system to perform optimally, the antennas must have simple construction, high radiation efficiency, small volume, low-loss impedance matching.

PIFA is extended form of Inverted F antenna (IFA) which have a plate in place of wire radiator element to expand the bandwidth. There are many advantages of PIFA making its widespread use in devices that is, easy fabrication, simple structure, small volume, low manufacturing cost. PIFA structure is easy to hide in the casing of the mobile handset as compared to monopole, rod & helix antennas. Also, PIFA has reduced backward radiation towards user's head and body which further minimizes SAR and improves performance[1]. They can resonate at much smaller antenna size and by cutting slots in radiating patch, resonance can be modified. Proper shape of the patch and positions of feeding and shorting pins results in multiband operation.

The major drawback of PIFA is its narrow bandwidth; therefore it is important and necessary to widen the bandwidth for using it in mobile phones and other devices. The evolution of the handset antenna structures from a monopole to the PIFA shows that the essential component of a mobile handset antenna is the "wire". The patches, slots, and stubs are only used to compensate for the mismatch and improve the radiation characteristics.

Next section explains the basic structure of simple PIFA and discusses the relationship between various parameters. Section III discusses the design of the proposed antenna with square patch radiator and its properties using HFSS simulation

software. Section IV provides conclusion and section V discusses future scope of the design.

II. PIFA THEORY

The Inverted-F antenna has transformed the horizontal element from a wire to a plate resulting in the so called planar inverted-F antenna (PIFA). It has a self-resonating structure with purely resistive load impedance at the frequency of operation. Variation of length, distance and location of the feed and shorting point, height of the radiator etc. affects the electrical performance of these antenna structures [2]. Typical configuration of PIFA is shown in Fig. 1. The antenna is fed through feeding pin which connects to the ground plane. The shorting pin and shorting plate allows good impedance matching achieved with the patch above ground plane of size less than $\lambda/4$. Resulting PIFA structure is of compact size than conventional $\lambda/2$ patch antennas.

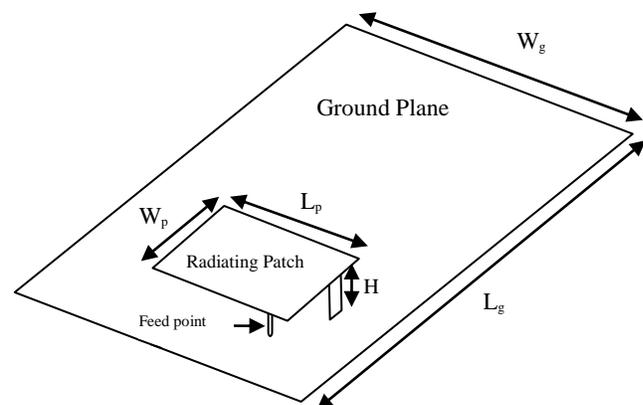


Fig.1. Basic PIFA Structure

The frequency at which PIFA resonates can be calculated by using a basic formula as given below

$$f_0 = \frac{c}{4(W_p + L_p)} \quad \dots\dots (1)$$

Where c is the speed of light,

W_p and L_p are the width and length of the top plate of PIFA,

f_0 is the resonant frequency.

Above equation represents that the sum of the width and length of the top plate should be $\lambda/4$. This approximation is very rough and does not cover all the parameters that significantly

affects the resonant frequency of the antenna [3]. As width of the shorting plate also affects resonant frequency of the antenna. So, reduction in the width of shorting plate results in lowering the resonant frequency and vice versa. By analyzing the resonant frequency and bandwidth characteristics we can determine the optimum location of the feed point, at which minimum return loss is to be obtained. By optimizing the spacing between feed point and shorting point impedance matching of the PIFA can be obtained.

To broaden the bandwidth of PIFA structure various techniques have been employed and the most widely used method is to increase the height of the shorting plate which finally results in increase of volume[4]. Also by optimizing the dimensions of the ground plane, the bandwidth of PIFA can be adjusted such as reduction in dimensions of ground plane can effectively widen the bandwidth of the antenna. Several other techniques can also be used to enhance the bandwidth of a PIFA namely using dielectric material of high permittivity [5], using capacitive loading, using additional shorting plate etc.

III. PROPOSED PIFA DESIGN

In this section a novel and simple PIFA design with broad bandwidth is discussed. The bandwidth here can be specified as impedance bandwidth for which return loss S_{11} is -6 dB as this value is good enough for mobile handset applications. Also frequency bandwidth can be specified for voltage standing wave ratio (VSWR) less than 2:1 which is equivalent to 10 dB level [6]. At this level 10% of the incident power is reflected back at the source. The geometry of the proposed antenna design is as shown in Fig. 2. The antenna comprises a square shaped top plate also referred as radiating patch, ground plane, feed wire and shorting pin or plate.

As compared with conventional PIFA design, the difference is the structure of top plate. As in conventional PIFA

structure the top plate is of rectangular shape while in this paper the square top plate is proposed. Effect of using square shaped top plate results in reduction in volume of antenna. The antenna is using an FR4 PCB with relative permittivity, $\epsilon_r = 4.4$ and dielectric loss tangent, $\delta = 0.02$.

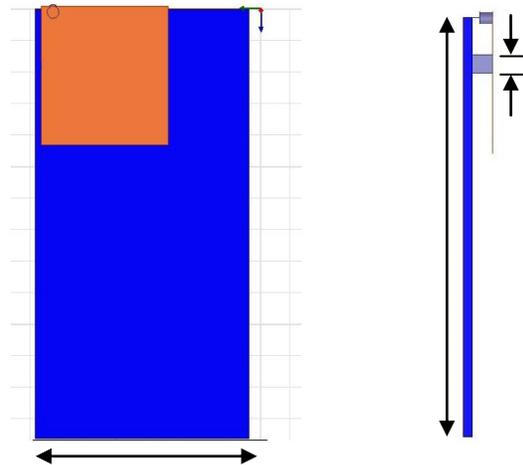


Fig. 2 Proposed antenna design (a) Top view, (b) Side view

The proposed design was simulated using HFSS simulator and design configuration is as follows : $L_p = 22$ mm, $W_p = 22$ mm, $H = 5.2$ mm, $L_s = 5.2$ mm, $W_s = 3$ mm. The ground plane was selected with size of $L_g = 68$ mm and $W_g = 37$ mm. The space between ground plane and top plate is air filled; here air is used as dielectric material [7]. Using a dielectric material between ground plane and top plate has effect on gain and bandwidth of PIFA antenna. To get good return loss and gain, the height of top plate selected is 5.2 mm. The ground plane, shorting plate and top plate are made perfect electrical conductor (pec) [8].

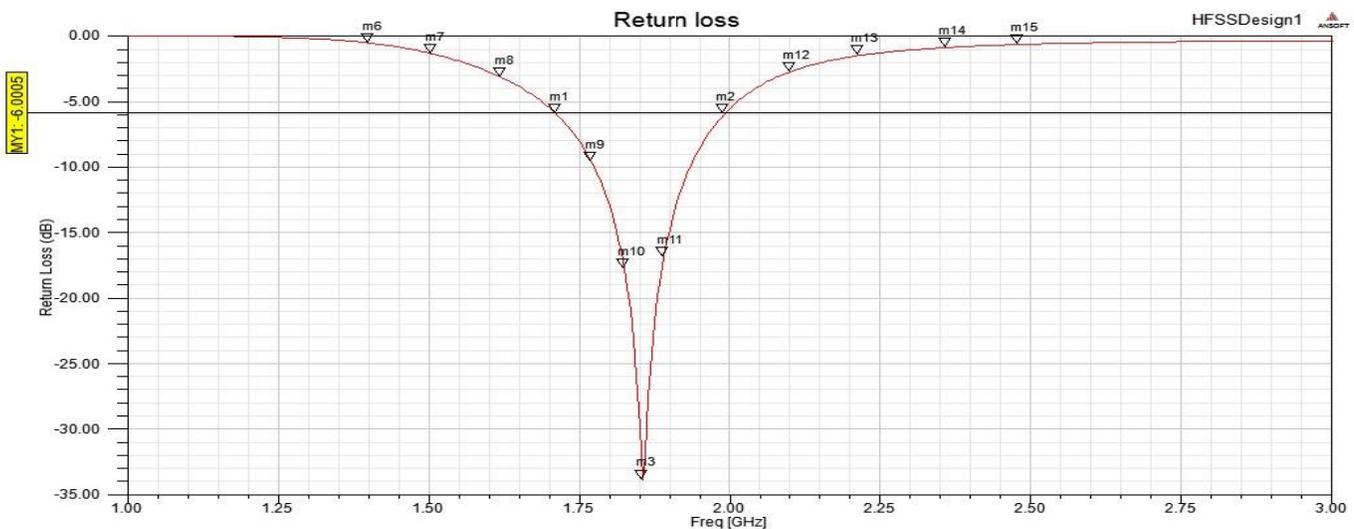


Fig. 3 Simulated Results: Return Loss of PIFA

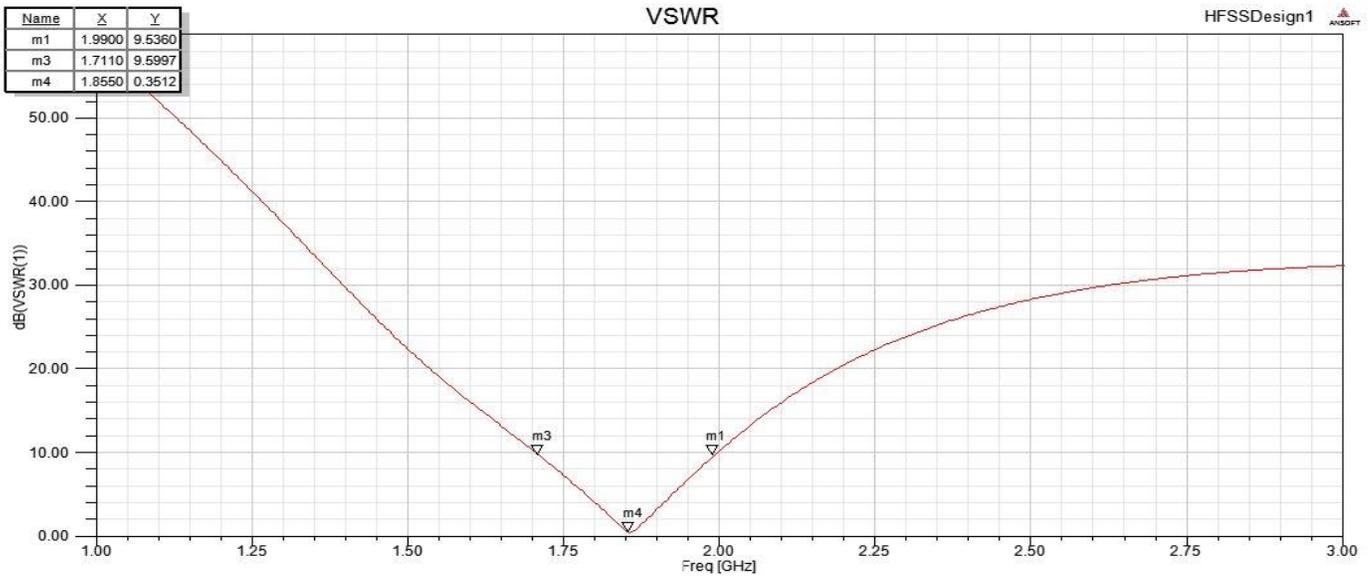


Fig. 4 Simulated Results : 3D Gain Plot of PIFA

loss is -33.88 dB obtained at resonant frequency of 1.855 GHz. At resonant frequency the impedance obtained is $1.0183 + 0.0365 j$. Also, it is observed from results that at resonant frequency the Voltage Standing Wave Ratio (VSWR) is well below 2dB [7] i.e. at 1.8550 GHz value of VSWR is 0.3512 dB. The upper and lower frequency at which return loss of -6 dB is obtained is 1.990 GHz and 1.711 GHz, respectively. Therefore, the impedance bandwidth of the proposed PIFA design is the difference between upper and lower frequency [9] which is 0.28 GHz. Hence, the impedance bandwidth of PIFA is 15.1 %.

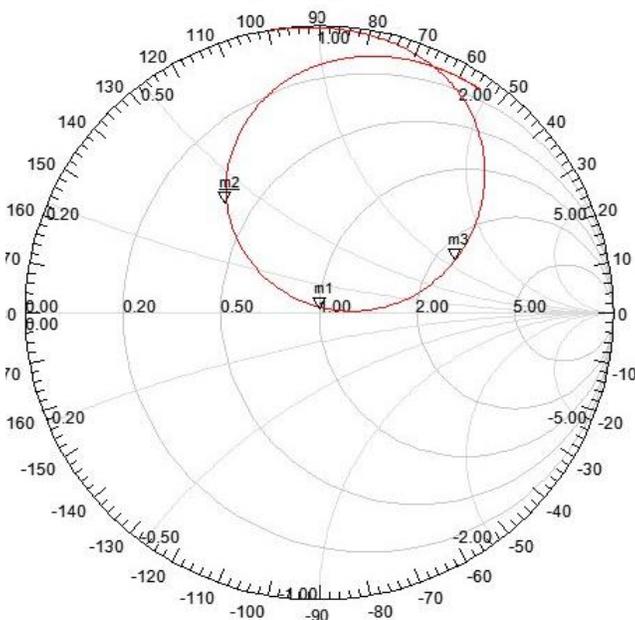


Fig. 5 Simulated Results : Input Impedance of PIFA

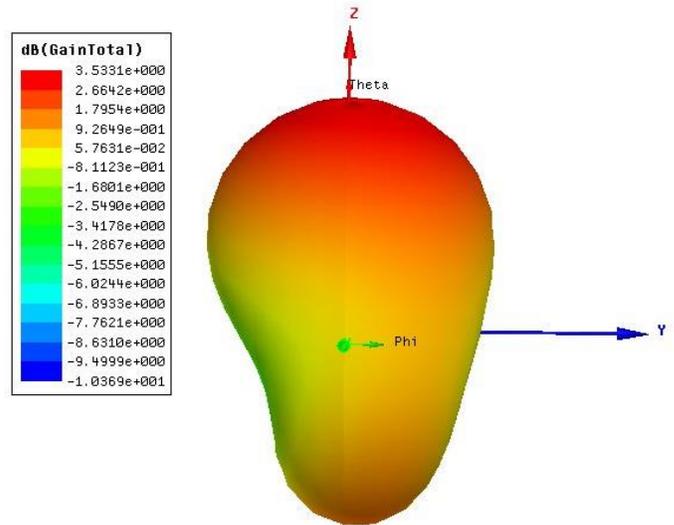


Fig. 6 Simulated Results : 3D Gain Plot of PIFA

IV. CONCLUSION

The design of a modified low profile PIFA with square shaped top plate have been presented and proposed. PIFA antennas are having a narrow bandwidth characteristic which is overcome by using several techniques. The main aim of the design is to widen the bandwidth with limited volume. Simulation results have shown good performance characteristics in terms of return loss, gain, VSWR. The design details of the antenna can be used as base for increasing the number of bands covering several communication standards.

V. FUTURE SCOPE

Proposed antenna design can be modified by introducing slots, shorting plates, slots on ground plane and several other techniques to get multiple bands supported by the structure (3G, 4G LTE, WLAN etc.). More and more frequencies in a structure are well suited for mobile applications as there is space constraint in handsets.

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Infectobesity? Role of Ad-36 virus

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Abstract- Obesity is one of the greatest challenges of our time affecting vast majority of population. It is a serious chronic disease that has numerous etiologies. The Human Adenovirus-36 (Ad-36) was first described in 1980, about the time that the prevalence of obesity began to increase. Support for Ad-36 being a contributor to the obesity epidemic has been accumulating over several years and has been shown to cause obesity in chickens, mice and nonhuman primates.¹The purpose of this study was to determine the prevalence of Ad-36 virus in obese and non-obese individuals.

Plasma titers of Ad-36 virus were evaluated in 20 obese and 21 non obese individuals. Blood samples were obtained from obese subjects with BMI 27-34 and also from non-obese controls with BMI <27. Ad-36 titers were estimated using Real-time PCR SYBR green I fluorescence assay. Statistically increased titers of Ad-36 were found in obese subjects when compared to those of non-obese controls (p<0.001). Thus, in our study, titers of Ad-36 virus are increased in obese individuals suggesting that this virus may play a role in etiology of obesity.

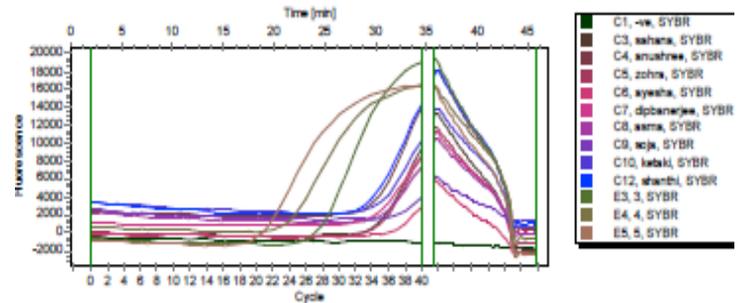
Index Terms- Ad-36 virus, body mass index, infectobesity, real time PCR

I. INTRODUCTION

Obesity is serious chronic multifactorial disease affecting mankind in epidemic proportions. Hence the term “globesity” defines its current situation.² Bariatrics is the branch of medicine that deals with the causes, prevention, and treatment of obesity. **Sclafani (1984)** classified the etiology of animal obesity into 9 groups, including obesity of neural, endocrine, pharmacological, nutritional, environmental, seasonal, genetic, idiopathic, and viral origin.²The rapid increase in obesity and the associated health care costs have prompted a search for better approaches for its prevention and management. Such efforts may be facilitated by better understanding the etiology of obesity. Recently, viral infections have been recognized as possible cause of obesity.³So the term infectobesity can be used to describe the growing nature of it. To date, in animals six viruses and a scrapie agent have been shown to be associated with obesity.⁴Of the several etiological factors, infection, an unusual causative factor, has recently been receiving greater attention. Understanding contribution of various etiologic factors of obesity may lead to treatments directed specifically toward the cause, and consequently, its successful management.

II. MATERIALS AND METHODS

The present study was conducted on 20 obese (BMI- 27-34) and 21 non-obese individuals (BMI < 27) between age group 20-40. Patients were taken from outpatient department of our institute. Patients with long time medication, chronic debilitating diseases and endocrine disturbances were excluded from the study. Age and sex matched individuals served as controls. Ethical clearance for conducting study was obtained from the Institutional Ethical Clearance Committee. Weight in kilograms was measured using digital weighing machine and height was measured using height chart for both obese subjects and controls. Body mass index was calculated by formula weight in kilograms/ height in metres square. 5ml blood was collected from obese subjects and controls under aseptic conditions, stored in EDTA vials until dispatched to laboratory. Ad-36 viral load was estimated using real time PCR SYBR green I fluorescence assay.⁵



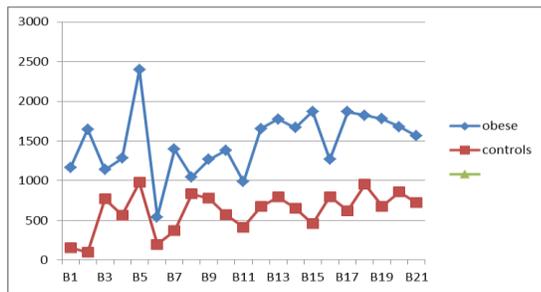
III. RESULTS

Analysis of data obtained was done using ANOVA and χ^2 test. Statistically increased titers of Ad-36 virus were seen in obese subjects compared to non-obese controls (p<0.001) (Table 1) when viral load was measured using real time PCR SYBR green I fluorescence assay. These observations are in accordance with study conducted by **Atkinson RL et.al (2005)**⁶ and **Trovato GM et al. (2009)**⁷

Table 1: Characteristics of the subjects

Variables	Subjects (n=20) Mean (s.d.)	Controls (n=21) Mean (s.d.)	p value
Male/female	11/9	11/10	1.000*
Age(years)	35.6 (1.18)	34.04 (1.32)	0.194 ⁺
Weight (kg)	86.7 (10.18)	59.52 (7.41)	<0.001 ⁺
Height (m)	1.66 (0.101)	1.64 (0.107)	0.292 ⁺
BMI (Kg/m ²)	30.85 (2.20)	18.95 (1.77)	<0.001 ⁺
Ad-36 virus	1438.85 (79.24)	615.46 (55.04)	<0.001 ⁺

*chi square test χ^2 as statistical analysis method
+ ANNOVA as statistical method

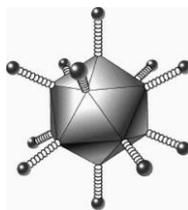


IV. DISCUSSION

Ad-36 was first isolated in 1978 in a diabetic child in Germany.⁶The name is derived from the adenoids, or pharyngeal tonsils, where the first adenovirus was discovered. The adenovirus family is a large family of naked, DNA containing viruses, with a symmetrically icosahedral shape and a diameter ranging from 65–80 nm.³They replicate in the nucleus of the infected cell the genome is commonly consists of 36 kb pairs of linear double stranded DNA.^{3, 8}Fifty human adenovirus serotypes have so far been described and they have been classified into six sub-groups, A–F. The virus can be transmitted very easily via respiratory, droplet, venereal and fecal–oral routes.³ In addition to upper respiratory tract infections, they also cause enteritis and conjunctivitis.³

The classification of adenovirus 36:

Group: Group I (dsDNA)
Family: Adenoviridae
Genus: Mastadenovirus
Species: Human adenovirus D (HAdV-D)
Serotype: Human adenovirus-36 (HAdV-36)³



Many hypotheses have been proposed by **Ginneken VV et al. (2008)** to elucidate the role of Ad-36 virus in causation of obesity.³

Hypothesis 1: Increased food intake

It was thought that Ad-36 virus might induce changes in the brain or body, which lead to food cravings.³ However, animal studies indicated that Ad-36 inoculated animals did not eat more food than the control group. Therefore the hypothesis, that an increase in food intake is unlikely to be the main cause of Ad-36 induced obesity.³

Hypothesis 2: Changes in brain morphology

In a study conducted by **Dhurandhar NV et al.** no morphological changes occurred in the brain resulting from Ad-36 infection, suggesting that the mechanism causing obesity is different from that seen in CDV infection.³ Viral DNA has been isolated in the brains of infected marmosets, although its effects are unknown. Recently it was demonstrated that Ad-36 induces increases in insulin sensitivity, and alters hypothalamic monoamines in rats. We hypothesize, therefore, that obesity in infected individuals may be caused by changes in brain chemistry.³

Hypothesis 3: Liver abnormalities

One of the most important organs in lipid metabolism is the liver. It is therefore likely that Ad-36 has an influence on its functioning and performance. But, no morphological alterations have been reported as a result of Ad-36 infection, nor have any chemical changes been discovered.³

Hypothesis 4: Adipose tissue

Ad-36 accelerates differentiation of preadipocytes to adipocytes in 3T3-L1 cells, and this has been confirmed in human preadipocytes, as well. This is the most accepted hypothesis.^{1,3,6,8,9} Viral mRNA expression, although transient, is a prerequisite for enhancing differentiation of preadipocytes by Ad-36.⁸ If Ad-36 is a significant factor in the widespread increase in obesity, it is important to investigate possible vaccines to prevent infection, or treatments to alleviate the effects once infected.

Later, **Salehian B et al. (2010)** proposed another mechanism to explain the role of Ad-36 virus in causation of obesity. This includes changes in gene expression of multiple enzymes like sterol regulatory element binding protein I, fatty acid synthases and transcription factors like CCAAT/enhancer binding protein beta, peroxisome proliferator activated receptor gamma and lipoprotein lipase by the virus, which results in increased lipid transport into cells and fatty acid synthesis within cells. These changes are thought to be caused by the action of Ad-36 open reading frame I early region 4 gene.¹⁰

Further, **Wang ZQ et al. (2010)** proposed that Ad-36 acts on lipid metabolism by reducing fatty acid oxidation and increasing lipogenesis in the cultured skeletal muscle cells and this process is mediated by promoting Cidec/FSP27 expression.¹¹

Association of Ad-36 virus with increased body weight and lower serum lipids has been studied extensively.⁶

Na HN et al. (2010) conducted a study to determine an association between Ad-36 virus with obesity and lipid disorders and reported that Ad-36 antibodies are present in 29% of obese and 14% nonobese children.¹²

In contrast to the previous studies, **Goossens VJ et al. (2009)** reported a very low prevalence of human adenovirus-36 (Ad-36) and no evidence of its association with obesity in Dutch and Belgian individuals.¹³

V. CONCLUSION

Thus, from our study it may be concluded that in Indian population there is increased titers of Ad-36 virus in obese individuals than non-obese people. Though obesity has multiple causes, an overlooked possibility is that, in some instances it could be due to an infection. It is possible that viral infections exacerbate and facilitate the development of obesity, or its complications, by working in conjunction with other adipogenic factors. The insidious onset of human obesity makes it difficult to retrospectively link obesity or any of its co-morbidities to a particular episode of infection. Thus, a causative role for infectious pathogens in human obesity is difficult to establish. Due to ethical considerations, human beings cannot be experimentally infected with these pathogens.² In order to determine the role of viral pathogens in human obesity, that is does the Ad-36 virus cause obesity or there are increased titers of virus due to obesity, further research with larger sample size is required.

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ENHANCING ITERATIVE NON-PARAMETRIC ALGORITHM FOR CALCULATING MISSING VALUES OF HETEROGENEOUS DATASETS BY CLUSTERING

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Abstract- Machine learning and data mining resort heavily on a large amount of data to build learning models and make predictions. There is a need for quality of data, thus the quality of data is ultimately important. Many of the industrial and research databases are plagued by the problem of missing values. A variety of methods have been developed with great success on dealing with missing values in data sets with uniform attributes. But in real life dataset contains heterogeneous attributes. In this paper, apart from the overview of imputation, then discussing about the proposed work i.e a new setting of handling missing data imputation (that is imputing missing data in data sets with mixed attributes and also in clustered data sets only with continuous attributes) in non-parametric mixture kernel based.

Index Terms— Data mining, Missing values, Mixed attributes, Imputation, Regression

I. INTRODUCTION

Data mining, the extraction of hidden predictive information from large databases, is a powerful new technology with great potential to help companies focus on the most important information in their data warehouses. A common problem in data mining is that of automatically finding outliers or anomalies in a database. Outliers are an observation that is numerically distant from the rest of the data. Since outliers and anomalies are highly unlikely, they can be indicative of bad data or malicious behaviour. Bad data interns produce falls outcome. Examples of bad data include skewed data values resulting from measurement error, or erroneous values resulting from data entry mistakes, missing values, missing data. Missing data, or Missing values, occur when no data value is stored for the variable in the current observation. Common solution is either ignore the missing data is called as marginalization or fill in the missing values is called

as imputation. Imputed values are treated as just as reliable as the truly observed data, but they are only as good as the assumptions used to create them.

Techniques of dealing with missing values can be classified into three categories [7], [12]. 1) Deletion, 2) Learning without handling of missing values, and 3) Missing value imputation The first technique is to simply omit those cases with missing values and only to use the remaining instances to finish the learning assignments [13].The deletion is classified in two categories they are, i) List wise or Case deletion ii) Pair wise deletion.

The second approach is to learn without handling of missing data, such as Bayesian Networks method, Artificial Neural Networks method [15], the methods in [10]. Missing data imputation is a procedure that replaces the missing values with some possible values, such as [11], [12]. A variety of methods have been developed with great success on dealing with missing values in data sets with uniform attributes. (their independent attributes are all either continuous or discrete).

However, these imputation algorithms cannot be applied to many real data sets, such as equipment maintenance databases, industrial data sets, and medical databases, because these data sets are often with continuous, discrete and categorical independent attributes. These heterogeneous data sets are referred to as mixed-attribute data sets and their independent attributes are called as mixed independent attributes. It advocates that a missing datum is imputed if and only if there are some complete instances in a small neighbourhood of the missing datum, otherwise, it should not be imputed. Further, a Non parametric iterative estimator is proposed to utilize all the available observed information, including observed information in incomplete instances with missing values.

In this paper, we present an imputation overview in that we discuss the problem of imputing the mixed attribute datasets and then we see how this problem can be solved by implementing the nonparametric iterative imputation method for estimating missing values in mixed-attribute data sets and also in clustered data sets (only clustering the continuous attributes).

II. IMPUTATION OVERVIEW

Missing data imputation is a procedure that replaces the missing values with some possible values. Imputed values are treated as just as reliable as the truly observed data, but they are only as good as the assumptions used to create them. The imputation consists of many types. In that some types of imputations are, (i) Single Imputation, (ii) Partial Imputation and (iii) Multiple Imputation, (iv) Iterative Imputation. According to our paper, previous work has been handling the missing values in heterogeneous data sets using semi parametric way of iterative imputation method [15].

Normally this method is inconsistent in some datasets. To avoid this problem, and also to improving the efficiency, the non parametric way is possible. So the proposed work based on handling the missing values in heterogeneous datasets and also in clustered data sets (only continuous attributes) using non parametric way of iterative imputation.

III. OBJECTIVE OF OUR WORK

The proposed work bring out the new setting of missing data imputation, i.e., imputing missing data in data sets with mixed attributes (their independent attributes are of different types i.e. the datasets consists of both discrete and continuous attributes), referred to as imputing mixed-attribute data sets in [13]. Although many real applications are in this setting, there is no estimator designed for imputing data sets with heterogeneous attributes. It first proposes two reliable estimators for discrete and continuous missing target values, respectively. Imputing mixed-attribute data sets can be taken as a new problem in missing data imputation because there is no estimator designed for imputing missing data in mixed attribute data sets.

The challenging issues include, such as how measuring the relationship between instances (transactions) in a mixed-attribute data set, and how to construct hybrid estimators using the observed data in the data set. To address the issue, this research proposes a nonparametric iterative

imputation method based on a mixture kernel for estimating missing values in mixed-attribute data sets. A mixture of kernel functions (a linear combination of two single kernel functions, called mixture kernel) is designed for the estimator in which the mixture kernel is used to replace the single kernel function in traditional kernel estimators. These estimators are referred to as mixture kernel estimators.

Based on this, two consistent kernel estimators are constructed for discrete and continuous missing target values, respectively, for mixed-attribute data sets. Further, a mixture-kernel-based iterative estimator is proposed to

utilizes all available observed information, including observed information in incomplete instances (with missing values), to impute missing values, whereas existing imputation methods use only the observed information in complete instances (without missing values). To improve the accuracy cluster based non-parametric iterative imputation is proposed. Fig 1 shows that proposed system architecture. It initially considers the database with missing values, and then identifies the attribute type by using appropriate techniques to find attributes of either continuous or discrete attribute. If it is a continuous attribute Mean Pre-Imputation is applied otherwise Mode Pre-Imputation is applied. This is the basic step of imputation techniques. Then by using the pre imputed data sets kernel function is applied separately to both the attributes.

This imputation is said to be single imputation. Mixture kernel function is obtained by integrating both the discrete and continuous kernel function. Estimated value is calculated by the standard formulas. Finally Iterative kernel estimator is applied separately for continuous as well as discrete attributes to get final value for imputation. This data will be imputed in the missing data set to make it as a complete dataset. Further to improve the accuracy clustering algorithm is applied. This clustered data set considered as a first step of the framework.

There are five steps in our proposed system. They are (i) Data Preparation (ii) Single Imputation Using Kernel Function (iii) Constructing the Estimator and Iterative Imputation (iv) Pre-Processing dataset Using Clustering Algorithm (v) Performance Analysis

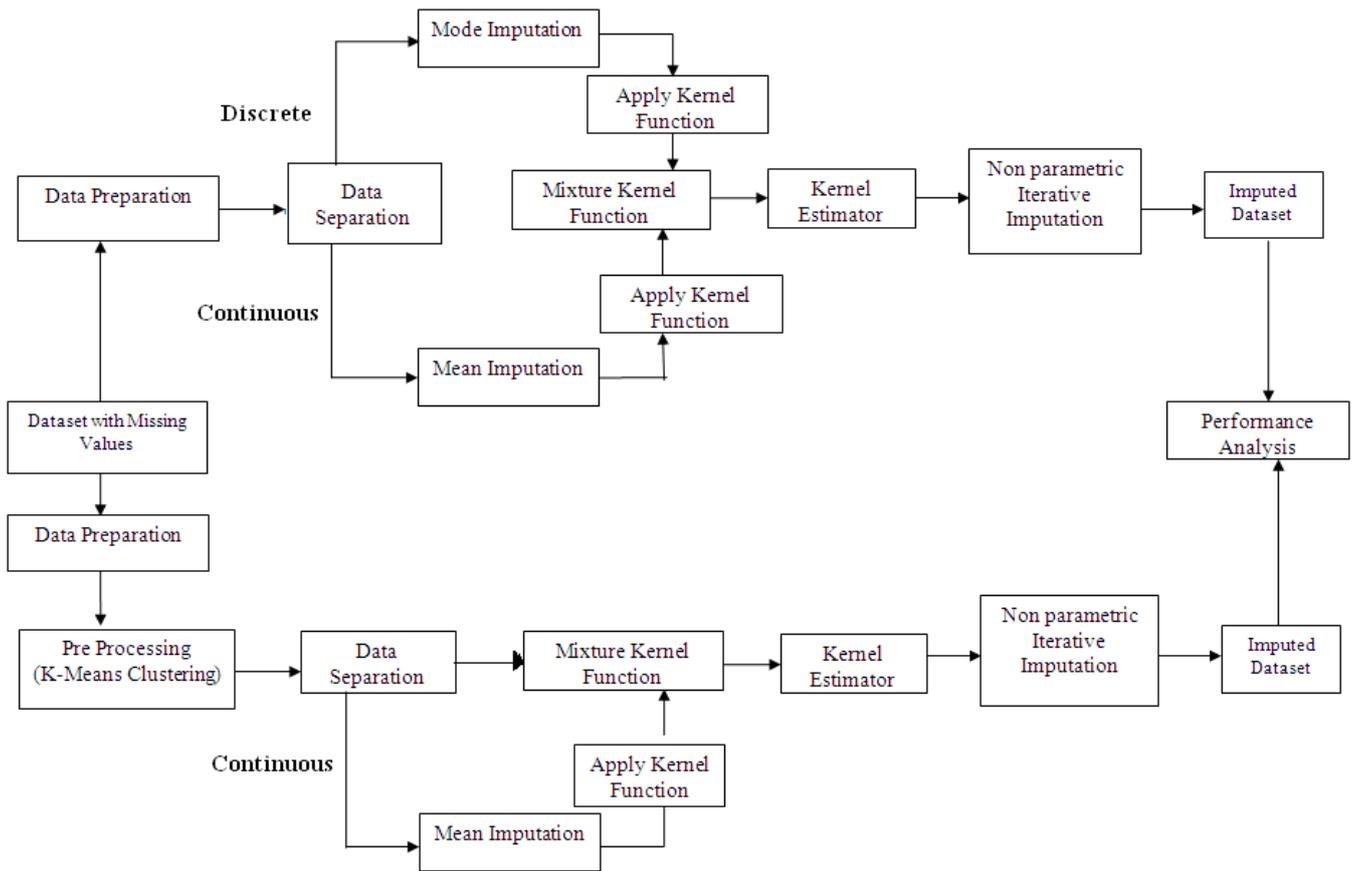


Fig. 1. System Architecture for Proposed System

Data Preparation

In this module, from the input heterogeneous data set the records with missing values will be identified and categorized based on attribute type of missing values, attributes are grouped. Mean and mode value for continuous and discrete category is calculated separately. Basic imputation has been done with this calculated value.

Single Imputation Using Kernel Function

This module shows about the kernel function. After getting the basic imputation, then apply the kernel function separately for both the discrete and continuous attributes. Then integrate both the discrete and kernel function to get the mixture kernel function

Discrete Kernel Function

$$L(X_{t,i}^d, x_t^d) = \begin{cases} 1 & \text{if } X_{t,i}^d = x_t^d \\ \lambda & \text{if } X_{t,i}^d \neq x_t^d \end{cases} \quad \text{-----} \quad \text{(B.1)}$$

Where,

X_i^d -- Discrete Variable or attributes

λ -- Smoothing Parameter

Normally discrete attributes are contains a binary format values example is either it will be 0 or 1. so for this step ,the output will shows about the similar values as the imputation for the missing values by taking one attribute as a relation.

Continuous Kernel Function

$$K(x - X_i/h) \quad \text{-----} \quad \text{(B.2)}$$

$K(.)$ is a mercer kernel, i.e., positive definite kernel.

Mixture Kernel Function

$$K_{h, \lambda, ix} = K(x - X_i/h) L(X_i^d, x_i^d, \lambda) \quad \text{-----} \quad \text{(B.3)}$$

Where,

$h > 0$ and $\lambda > 0$ (λ, h is the smoothing parameter for the discrete and continuous kernel function , respectively),

$K_{h,\lambda,ix}$ -- symmetric probability density function.

$K(x-X_i/h)$ -- Continuous Kernel Function

$L(X_i^d, x_i^d, \lambda)$ -- Discrete Kernel Function

Constructing the Estimator and Iterative Imputation

Construct the estimator, separately for both attributes. Estimator is nothing but, it attempts to approximate the unknown parameter using the measurements. Then by the idea of the estimator calculate the iterative value for each attributes by using the formula. The iterative method explains that all the imputed values are used to impute subsequent missing values, i.e., the (t+1)th ($t \geq 1$) iteration imputation is carried out based on the imputed results of the t th imputation, until the filled-in values converge or begin to cycle or satisfy the demands of the users. Normally first imputation is single imputation. It cannot provide valid standard confidence intervals. Therefore running extra (imputation) iterative imputation based on the first imputation is reasonable and necessary for better dealing with the missing values. Since the second iteration imputation is carried out based on the former imputed results.

Here, a stopping criterion is designed for nonparametric iterations. With t imputation times, there will be (t-1) chains of iterations. Note that the first imputation won't be considered when talking about the convergence because the final results will be decided mainly by imputation from the second imputation. Of course, the result in the first imputation always generates, to some extent, effects for the final results

Kernel estimator for Continuous Missing attributes

$$\hat{m}(x) = \frac{n^{-1} \sum_{i=1}^n Y_i K_{h,\lambda,ix}}{n^{-2} \sum_{i=1}^n K_{h,\lambda,ix} + n}$$

(C.1)

where ,

item $n^{-2} m(x)$ -- only used for avoiding the denominator to be 0.

Y_i -- Denoting the ith Missing Value.

Kernel estimator for Discrete Missing attributes

When the missing value $m(X)$ is in a discrete attribute, the estimator is, let $D_{m(x)} = (0,1,\dots,c_u-1)$ denote the range of $m(x)$. One could estimate $m(x)$ by,

$$\hat{m}(x) = \frac{n^{-1} \sum_{i=1}^n Y_i K_{h,\lambda,ix}}{n^{-2} \sum_{i=1}^n K_{h,\lambda,ix} + n^{-2}} + \frac{\lambda n^{-1} \sum_{i=1}^n \sum_{Y \in D_y, y \neq Y_i} K_{h,\lambda,ix}}{n^{-2} \sum_{i=1}^n K_{h,\lambda,ix} + n}$$

(C.2)

Where $l(Y_i, y, \lambda) = 1$ if $y = Y_i$ and λ if $y \neq Y_i$.

Iterative Kernel Estimator for continuous Missing attributes

$$\hat{m}(x) = \frac{n^{-1} \sum_{i=1}^n Y_i^t K_{h,\lambda,ix}}{n^{-2} \sum_{i=1}^n K_{h,\lambda,ix} + n}$$

(C.3)

Where,

Y_i^t -- tth imputation of the ith Missing Value

Iterative Kernel Estimator for discrete Missing attributes

$$\hat{m}(x) = \frac{\sum_{i=1}^n \sum_{y \in D_y, y \neq Y_i} l(Y_i, y, \lambda) y_i K_{h,\lambda}}{\sum_{i=1}^n K_{h,\lambda}}$$

(C.4) Where,

$y_i^t = \{ Y_i \text{ if } \delta_i = 0 \text{ or } i=1, \dots, r,$

$Y_i^t \text{ if } \delta_i = 1 \text{ or } i=r+1, \dots, n$

In particular, Y_i^t is the best common class in the discrete target variable, and

$Y_i^i = 0, i = r+1, \dots, n.$

Pre-Processing Data set using cluster Algorithm

Before sending data to the data preparation module, clustering take place to group similar data object. By applying the formula mentioned below,

the data sets are grouped in two sets with respect to every attribute.

Performance Analysis

Imputed values without using clustering and using k-means clustering are compared. The performance analysis takes place by using both the method

IV. CONCLUSION AND FUTURE WORK

Imputation is the best solution for handling the Missing values. Missing data imputation is a procedure that replaces the missing values with some possible values. But this is not appropriate solution for discrete and categorical missing values. A consistent kernel regression has been proposed for imputing missing values in a mixed-attribute data set and uses the techniques of data driven method for bandwidth selection. The data-driven (i.e., automatic) bandwidth selection procedures are not guaranteed always to produce good results due to perhaps the presence of outliers or the rounding/discretization of continuous data, among others. The nonparametric estimators are proposed against the case that data sets have both continuous and discrete independent attributes and also in clustered data sets. It utilizes all available observed information, including observed information in incomplete instances (with missing values), to impute missing values, whereas existing imputation methods use only the observed information in complete instances (without missing values). That is the work includes exploring a framework for non parametric iterative imputation based on mixture kernel estimation in both mixture data sets and also in clustered data sets (only continuous attributes). In future work furthermore, this paper could be extended to handle this imputation process in more than one missing value in a single attribute.

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The Role of Libraries in Shaping the Engineering Students

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Abstract- Now a days library are not a store house of information, but treated as information dissemination centers. In academic libraries, librarians play a role of a teacher. Here he knows the information needs of students and motivates them towards their resources and also helps them how to access the resources. This paper discusses the role of Libraries in shaping the Engineering students. The authors have conducted researches in the Engineering Students and have come to the conclusion library science as a subject by the user may be said to be indispensable for the effective and efficient utilization by the user.

I. INTRODUCTION

Th modern age of Science and Technology, Technological advancements are essentially responsible for Social, Political, Economical, Cultural and Educational developments. Profound changes are taking place in all the fields. The important among these factors are the Economy, Science and Technology, Educational System, Political System, the Managerial Styles, Government Policies and Programs, research and Development and other social changes. Among these various factors, Library and Information Science helps to provide required input in all the fields in the form of knowledgeable manpower to utilize all other resources. However the Technical educational system is facing various challenges caused by changing trends in all its activities.

It is expected to create an atmosphere in which Students, Teachers, Researchers will learn to think critically. They are expected to adopt new Technologies. Library and Information Science which deals with many areas to all is an important discipline to face. Such challenge Information Communication Technology has brought revolutionary changes in all the field of Human life Library is the major component of Information Communication Technology to transmit knowledge.

II. NEED FOR THE STUDY

The Increasing way of Information Communication Technology is making the Library Information Science professionals to rethink and readjust to the changes in Teaching, Learning, Research and Librarianship, Librarians, Archivists and Information Scientists should take a leading role in educating Society.

Library and Information Science subjects deal with management of Libraries and Information centers, Document offices which are the reliable information Providers, Services of the Library, Programmes, functions and activities, cataloging, classification, indexing and citation. Technical Library should

make flexible learning arrangement where the user will be well trained about new technologies.

The Library as an institution exists for the benefits of a particular social group. It may be the citizens of a community member and students of an educational institutions or some larger or more specialized group. The library is a resource learning center and it is a service oriented Organization. User satisfaction is the important service of Library. Education bereft of Library service is like a body without soul or vehicle without an engine. Education and Library services are twin sisters and one cannot live apart from the other. It means the Library is the chief instrument so far perfected for accumulating and using man's intellectual heritage and any formal education at all levels can be conducted more effectively and efficiently only with a well equipped Library. It would not be an Exaggeration if said that a Library is an essential prerequisite for successful implementation of higher educational programs.

Those who have a love for knowledge frequent to the Libraries and make use of materials available there. The Library Science can be introduced as a subject of study in the school curriculum. We are happy to know that some weightage is given for the subject in plus one and plus two English papers. But a lot has to be done in this direction. A Survey was conducted by "Dinamani daily" and it published the following results in the issue dated 01-03-2010. From the data it is inferred that 84% of the people opted for including Library Science as a subject in School curriculum. 14% of people were not for including the subject and 1.4% of people did not want to pass comments.

This news item kindled the thought of the Researcher and a survey among Engineering Students was conducted. The question placed before them was "What would have happened if you had learnt of the Library Science in your school days?". 80% of Engineering Students Suggested that they would have got a better score had they been introduced to the Library Science and the facilities available in the Libraries.

From the opinions collected from the Engineering Students the Researcher could elicit the following conclusions.

1. Introduction to Library Science is a boon to the Engineering Students community.
2. It easily supplements the work of the teachers.
3. It creates and maintains a constancy of purpose towards services in Library.
4. It breaks down the barriers between departments and enlightens the student.
5. It helps the Engineering Students to strive hard towards their goal.
6. Using Library drives out the fear and inhibition of the students and develops leadership qualities.

III. CONCLUSION

An Information center or systems can be successful if the user community is actively involved in the design of the system from the initial stages. Similarly the detailed knowledge of Information Services can be identified only through study of the Library Science as a subject by the User. User needs should be considered for the improvement of the existing facilities. Thus Library Science as a subject by the user may be said to be indispensable for the effective and efficient utilization by the user.

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Analysis of Attention Factors and EEG Brain Waves of Attention Deficit and Hyperactivity Disorder (ADHD) - A Case Study Report

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Abstract- Studies have suggested that relaxation therapy can help children with ADHD to reduce their hyperactivity. This study aims to find out the changes on the absolute power of alpha and theta brain waves of Attention Deficit and Hyperactivity Disorder-Hyperactive Impulsive (ADHD-HI) case and attention factors are also analyzed by applying relaxation therapy as an intervention programme. The experimental sample for the present study was a single ADHD-HI case and control group for comparison with quasi experimental approach. Brain waves of the control samples including the experimental case were recorded for pre test using Electro Encephalogram (EEG) along with attention scores and relaxation therapy was given for the experimental case alone and post test was recorded on brain waves and attention scores again. Statistical analyses were done on the different brain waves. It is found that increase in alpha, theta and attention scores of the ADHD-HI case.

Index Terms- Brain Waves, ADHD, EEG, Relaxation Techniques

I. INTRODUCTION

A child with Attention-Deficit/Hyperactivity Disorder (AD/HD) demonstrates an inability to sit still, concentrate, develop self control, and maintain consistent work performance (American Psychiatric Association (APA), 2000). A range of studies have suggested that relaxation training can help children with ADHD to learn to relax thereby decreasing their autonomic activity (Chan, 2002; Goldbeck & Schmid, 2003). The EEG signal generated by alpha (8–12 Hz) activity was first described by Hans Berger in 1929, when he demonstrated that closing the eyes decreased sensory input and increased alpha power over the occipital scalp (Berger, 1929). This study aims to find out the changes on the absolute power of alpha and theta brain waves of Attention Deficit and Hyperactivity Disorder-Hyperactive Impulsive (ADHD-HI) case and attention factors are also analyzed by applying relaxation therapy as an intervention programme. Resting state EEG oscillations are typically subdivided into different bands such as low frequencies delta (1 - 4 Hz) and theta (4 - 8 Hz) and higher frequencies alpha (8 - 12 Hz) and beta (13 - 30 Hz). Alpha and theta EEG waves are considered in this study in order to compare with attention of ADHD-HI case. In general, increased low frequency power is a

typical phenomenon in lower arousal functional states such as sleep (Cajochen et al., 2002; Campbell and Feinberg, 2009), neuropathology (Llinas et al., 2005; Llinas et al., 1999) or sedation (John et al., 2001).

Gregg D. Jacobs & Richard Friedman, 2004, conducted a study on EEG spectral analysis of relaxation techniques. This Controlled randomized study included thirty-six subjects were randomized to either RT or a music comparison condition. After listening to relaxation techniques audiotape or music audiotapes daily for 6 weeks, the acute central nervous system effects of relaxation techniques and music were measured using power spectral analysis of alpha and theta EEG activity in all cortical regions. Relaxation techniques produced significantly greater increase in theta activity in multiple cortical regions compared to the music condition. Maria Hernandez-Reif et al., 2001, studied the benefits of Tai Chi among ADHD children. For that thirteen adolescents with Attention Deficit Hyperactivity Disorder (ADHD) were selected for Tai Chi classes twice a week for 5 weeks. Teachers rated the children's behaviour on the Conners Scale during the baseline period, after the 5 week Tai Chi session period and 2 weeks later. After the 10 Tai Chi sessions the adolescents displayed less anxiety, improved conduct, less daydreaming behaviours, less inappropriate emotions, and less hyperactivity. These improved scores persisted over the 2-week follow up (no Tai Chi period).

II. OBJECTIVES OF THE STUDY

- ◆ To find out the impact of relaxation therapy on absolute powers of alpha and theta of ADHD-HI case.
- ◆ To find out the impact of relaxation therapy on attention of ADHD-HI case.
- ◆ To improve the quality of academic life of ADHD-HI case.

III. RESEARCH QUESTION

- Does relaxation therapy change the absolute powers of various wave patterns of the brain?

- Does relaxation therapy improve the attention of ADHD-HI case?

IV. DESIGN OF THE STUDY

Out of 150 slow learners (age range 14 - 17 years) 15 ADHD-HI students were chosen, from which eight ADHD-HI students were randomly selected from special school for learning disabled and they are called as control group. Initially Simple Random Sampling Technique was adopted for control samples' selection and Selective Sampling Method was used to select the Experimental Sample. Subjects were free from medical and sleep disorders as determined by history, physical examination, biochemical screening tests, electrocardiograms, and psychological screening questionnaires. Quasi-Experimental design is used for the study. Under that Single Case pre test and post test having control group design is framed for the present study. In order to measure their brain waves permission had been requested from the school authorities and parents of the selected students. After receiving the permission, Electro Encephalogram was recorded for all the students to measure their brain activation waves, attention scores were measured using the attention questionnaire of Johann M. Schepers, 2007 and these values were considered as pre test values. After that, one student had

been taken randomly from the control group as a case for present research. Relaxation therapy was given to the single case for about a month. Post-test was recorded on brain waves while doing relaxation therapy for the experimental case at the end of the intervention programme and attention scores were also measured. A method proposed by Crawford and Howell (1998) that treats the control sample statistics as sample statistics (Crawford & Garthwaite, 2002) is used to compute the significance of difference between pre test and post test of the ADHD-HI case.

Attention Scores were measured using the Attention Questionnaire of Johann M. Schepers, 2007 which is the revised and extended version of De W Vos & Schepers, 1993. It deals with the factors of concentration ability, arousal and distractibility. There are totally 60 items in this attention questionnaire (Concentration Ability- 29 items; Arousal-21 items; Distractibility-10 items) and are measured using a seven point scale. Reliabilities of concentration ability, arousal and distractibility are 0.886, 0.757 and 0.863 respectively and validity of these three factors is 0.9412, 0.8700 and 0.9290 respectively.

V. STATISTICAL ANALYSES AND RESULTS

Table 1: Differentiation of pre and post test absolute power of Alpha and Theta from ADHD-HI Case

Case Category	Control Group N	Brain Waves	Pre Test Mean	Post Test Score	Theta/Alpha Ratio(Pre Test)	Theta/Alpha Ratio (Post Test)
ADHD-HI	8	Alpha	417.65	1103.68****	1.30	2.41
		Theta	543.40	2662.22****		

P* < 0.05, P** < 0.01, P*** < 0.001, P**** < 0.000

It is clear from the table 1 that the calculated 't' values of ADHD-HI Case are significantly greater than that of the table 't' values (p<0.000, N=8) for alpha and theta. Hence it is proved that there are significant differences between Pre Test and post test scores of alpha and theta brain waves of ADHD- HI Case

before and after applying Relaxation Therapy. Increased theta/alpha ratio is also observed in post test score compared to the pre-test in ADHD-HI case after relaxation therapy.

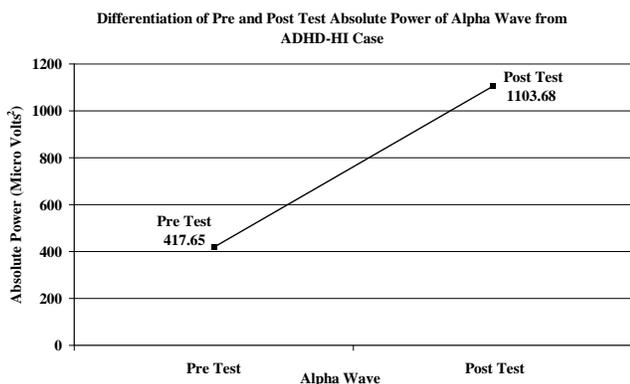


Figure (1)

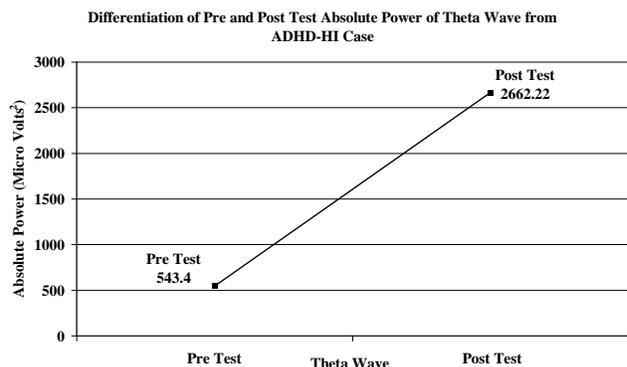


Figure (2)

Figure (1): Shows Differentiation of Pre and Post Test Absolute Power of Alpha Wave from ADHD-HI Case

Figure (2): Shows Differentiation of Pre and Post Test Absolute Power of Theta Wave from ADHD-HI Case

The above result is supported by the following studies. EEG studies have used these methods to limn the neurophysiological changes that occur in meditation (Rael Cahn & John Polich, 2006). (Lagopoulos et al., 2009) observed alpha power increase over the posterior regions. Alpha power increase is one of the more consistent findings about meditation state effects: alpha is generally associated with relaxation (Aftanas & Golosheikine, 2001). The most dominant effect standing out in the majority of studies on meditation is a state-related slowing of the alpha rhythm (8–12 Hz) in combination with an increase in the alpha power (Hirai, 1974). These findings were relatively robust, because they did not depend on either a certain meditation tradition or the experience of the mediators. (Anand et al., 1961) worked with Raj yoga meditation type having the experimental design of ((N=6) and rest vs. meditation) showed that increased alpha power during Samadhi in meditation state. (Travis, 1991) studied with Transcendental Meditation (TM) type having Long Transcendental Meditation and Short Transcendental Meditation design (N=20), showed that increased alpha power in their meditation traits. (Lee et al., 1997) analyzed with Qigong meditation type having Rest and meditation group (N=13) showed increased alpha power in their states. There was a significant increase in alpha power in the meditation condition compared to the rest condition, when averaged across all brain regions, and it was found that alpha was significantly greater in the posterior region as compared to the frontal region (Lagopoulos, 2009).

The most consistent finding is increased theta activity during relaxation therapy (Banquet, 1972, 1973; Corby, Roth, Zarcone, & Kopell, 1978; Fenwick, Donaldson, & Gillis, 1977; Hebert & Lehman, 1977; Jacobs & Lubar, 1989; Kasamatsu & Hirai, 1966; Stigsby et al., 1981; Wallace, 1970; Wallace, Benson, & Wilson, 1971; Warrenburg, Pagano, & Hlastala, 1980). Several researchers have also drawn parallels between increase in theta activity during relaxation therapy, Stage 1 sleep, and the hypnagogic state (Elson, Hauri, & Conis, 1977; Fenwick et al., 1977). Increased frontal theta power from Begin to end of the relaxation period was observed. The relaxation therapy group exhibited a significantly greater increase in central theta power from Begin to end of the relaxation period compared to the music group, $F(1, 31) = 9.54, p < .0043$. The relaxation therapy group exhibited a significantly greater increase in parietal theta power from Begin to end of the relaxation period compared to the music group, $F(1, 31) = 8.66, p < .0127$. The relaxation therapy group exhibited a significantly greater increase in occipital theta power

from Begin to end of the relaxation period compared to the music group, $F(1, 31) = 5.59, p < .0246$ (Gregg & Richard, 2004). Studies reported increased theta EEG activity during the practice of relaxation therapy (Banquet, 1972, 1973; Corby et al., 1978; Fenwick et al., 1977; Hebert & Lehman, 1977; Jacobs & Lubar, 1989; Kasamatsu & Hirai, 1966; Stigsby et al., 1981; Wallace, 1970; Wallace et al., 1971; Warrenburg et al., 1980). EEG studies have widely reported increased theta activity during meditation (Aftanas & Golosheikine 2001, 2002; Jacobs & Lubar 1989). Significantly increased theta power was found for the meditation condition when averaged across all brain regions. On closer examination, it was found that theta was significantly greater in the frontal and temporal-central regions as compared to the posterior region (Lagopoulos, 2009).

Frequency Maps

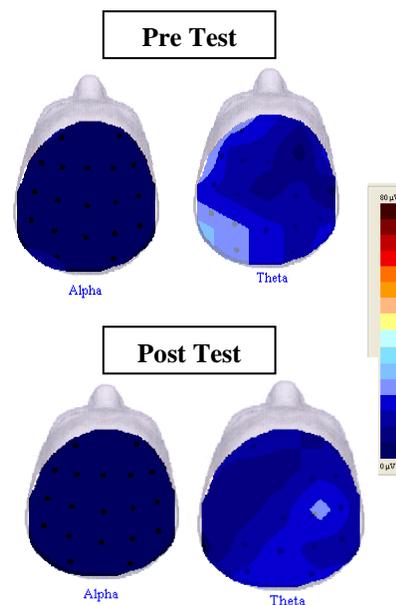


Figure (3)

Figure (3): Shows the Pre and Post Test Frequency Map of Alpha and Theta Waves of ADHD-HI Case

Egner et al. (2002) studied with alpha theta training on experimental group and mock feedback group and found that Theta/Alpha ratio increased in experimental group. Both the experimental and mock feedback group showed increased relaxation after treatment. Batty et al. (2006) investigated with alpha theta training and found that Theta/Alpha ratio increased in experimental group.

Table 2: Differentiation of Pre and Post test of Factors of Attention Scores and the Total Attention Score in ADHD-HI Case

Variable	N	Problem	Dimensions	Pre Test Mean	Post Test Score
Attention	8	ADHD-HI	Concentration Ability	100.75	145 ^{****}
			Arousal	76.25	60 ^{***}
			Distractibility	28.13	15 ^{**}
			Total Attention	205.13	220 [*]

$P^* < 0.05, P^{**} < 0.01, P^{***} < 0.00, P^{****} < 0.000$

It is clear from the table 2 that the calculated ‘t’ values of ADHD-HI Case are significantly greater than that of the table ‘t’ values ($p < 0.000, N=8$) for concentration ability, for Arousal ($p < 0.00, N=8$), for Distractibility ($p < 0.01, N=8$) and for total

attention ($p < 0.05, N=8$). Hence it is proved that there are significant differences between Pre Test and post test scores of concentration ability, arousal, distractibility and total attention scores of ADHD- HI Case before and after applying Relaxation Therapy.

Differentiation of Factors of Attention in Pre Test Mean Scores of ADHD-HI Case

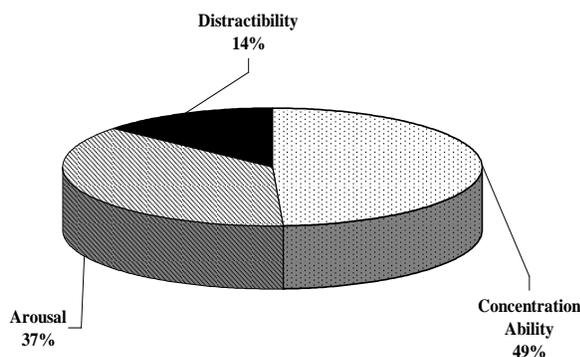


Figure (4)

Figure (4): Shows Differentiation of Factors of Attention in Pre-Test Mean Scores of ADHD-HI Case

Figure (5): Shows Differentiation of Factors of Attention in Post-Test Scores of ADHD-HI Case

One recent study has demonstrated improved attention and cognition with reduced anxiety and depression after an 8 week mindfulness training program (Zykowski et al., 2008). An another study demonstrated increased concentration and decreased hyperactivity after children with ADHD received 15 minute massages for 10 consecutive school days (Khilnani et al., 2003). A recent exploratory study conducted at a private school reported in current issues in Education stated that the use of meditation can be beneficial to 11 to 14 year old students diagnosed with ADHD (Robert Myers, 2010). The video game used biofeedback

Differentiation of Factors of Attention in Post-Test Scores of ADHD-HI Case

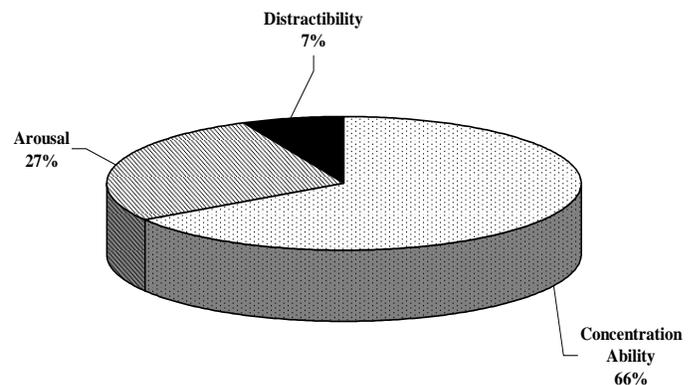


Figure (5)

technology and combined relaxation techniques reported by Chang (1991) and Margolis, such as the use of meditation procedures, abbreviated relaxation methods, and visual images and auditory stimulus. Participants in this study took great interest and were stimulated with the therapy, through the video game format. Further research however, needed to explore long term effects of biofeedback on a greater number of participants, as it had been shown to have the ability to teach skills that can help in improving concentration and attention to tasks and activities, and may also help to reduce the core symptoms of AD/HD. Findings from previous research studies have shown that the use of yoga and meditation to have positive benefits for children with AD/HD in improving concentration, classroom behaviours, and emotional developments (Harrison, Manocha, & Rubia, 2004). Similarly, the use of neurofeedback has shown improvements in AD/HD symptoms and related behaviours

(Fuchs et al., 2003). Yoga and relaxation techniques can help improve students' classroom behaviors. Peck et al. (2005) implemented a yoga intervention program that included meditation for a group of elementary students that had been sent to the school psychologist's office for attention problems, even though the students were not diagnosed with ADHD (Attention Deficit Hyperactivity Disorder). The program was reported to decrease students' hyperactivity, inattention and anxiety. A program that consisted of positive touch, yoga, breathing and relaxation was used on a group of students that were at risk for exclusion from their classrooms because of behavioral and emotional problems. The program improved the students' listening skills, attention span, and relaxation while decreasing their fidgeting. The findings of the present study are in line with the above results.

VI. DISCUSSION

The present research study shows that relaxation therapy increases concentration, relaxed feeling, increased attention and reduced anxiety. Similar findings were observed in various studies. Benson (1975) showed relaxation response involves bodily changes when one experiences deep muscle relaxation. This response is a naturally occurring measure against overstress bringing the body back to a healthier balance. Focusing on the breath is a simple and effective way to achieve concentration, awareness and relaxation. Research indicates that incorporating stress reduction programs into the school curriculum is associated with improvement of academic performance, self-esteem, mood, concentration and behavior problems (Ballinger & Heine, 1991; Dendato & Diener, 1986; Kiselica, Baker, Thomas & Reedy, 1994; Napoli, 2002; Shillingford & ShillingfordMackin, 1991). Another study of third, fourth and fifth-grade students found that children who participated in mindfulness training reported positive changes in behavior, mood, and attitude after being taught to pay attention to their breath (Napoli, 2002). Children in this study also reported feeling more relaxed, experiencing reduced tension and anxiety. Reductions in problem behaviour, increased attention span and greater internal locus of control are other potential benefits of relaxation therapy. It should be noted, however, that these skills need to be practiced regularly for continued effect (Klein & Deffenbacher, 1977; Donney & Poppen, 1989; Raymer & Poppen, 1985; Dynn & Howell, 1982). Mindfulness meditation may also improve behavioural and neurocognitive impairments in adolescents and adults with ADHD (Chan, 2002; Goldbeck & Schmid, 2003). The effects of yoga have been associated with altered brain wave states, with specific increases in medium frequency and low beta ranges, which are related to concentration, perception, alertness, and attention (Aftanas & Golocheikine, 2001, 2002). According to the researchers, "the meditation technique has potential to improve attention, behavioral regulation, and executive function by naturally reducing stress and anxiety and improving brain functioning". Relaxation training has been known for sometime to provide benefits, and Robert Myers is using this technique along with others since '80s to help kids with ADHD (Robert Myers, 2010). In order to increase children's capacity to pay attention is the goal of mindfulness training; yet, there are other residual benefits

that have been found. The hand-full of programs that have been implemented incorporating mindfulness with children have shown success in reducing anxiety and disruptive behavior, and improved concentration and self-control in children (Feindler, Marriott, & Iwata, 1984; Fluellen, 1996; Ryan, 2000). As evidenced by numerous studies, the positive effects of relaxation training in children include decreased dysfunctional behaviour, reduced stress and anxiety levels, alleviated headaches, encouraged reading achievement, improved self-concepts, and enhanced self-esteem (Margolis, 1990). (Powell, Gilchrist, & Stapley, 2008). Norlander, Moas, and Archer (2005) reported that relaxation techniques can be used to lower classroom noise and increase students' concentration.

As a result of the present research findings increase in alpha power by relaxation therapy in ADHD-HI case is because of the internal mental operations thereby relaxed and internal attention of the case has increased. The similar findings related to the present research were found in some of the previous studies. Alpha oscillations are known to arise from an increase of internal attention (Ray & Cole, 1985) which of course does not only occur due to meditation. Various studies showed an increase of alpha power related to internally driven mental operations, like the imagery of tones (Ray & Cole, 1985; Cooper et al, 2003; Cooper et al, 2006) or working memory retention and scanning (Jensen, 2002; Klimesch, 1999). Increase in alpha power was often observed when meditators are evaluated during meditating compared with control conditions (Aftanas & Golocheikine, 2001; Anand, Chhina, & Singh, 1961; Arambula, Peper, Kawakami, & Gibney, 2001). Several EEG meditation studies reported sleeplike stages during meditation with increased alpha power (Pagano, Rose, Stivers, & Warrenburg, 1976; Younger, Adriance, & Berger, 1975). The association between alpha changes and cortical activation had been assessed with combined EEG and fMRI-PET studies, with increased alpha power related to decreased blood flow in inferior frontal, cingulate, superior temporal and occipital cortices (Goldman, Stern, Engel, & Cohen, 2002; Sadato et al., 1998).

The results of the present study prove that reduction in cortical arousal leads theta power increase with the intervention of relaxation therapy. Many people with high amounts of theta brainwave activity are able to "get in the zone" and stay intensely focused and motivated with one idea. Many people with ADD or ADHD attribute their success in certain areas of life to their ability to hyperfocus. Hyperfocus is a unique phenomenon that can really only be experienced in the theta brainwave range (Drew, 2008). Researchers involved in meditations have also claimed to have learned the hyperfocus ability. Increased theta power across multiple cortical regions during relaxation therapy is consistent with widespread reductions in cortical arousal (Canteros et al., 2002; Jacobs & Lubar, 1989; West, 1980). Although the therapeutic effects of relaxation therapy have traditionally been attributed to reductions in sympathetic nervous system activity (Wallace, 1970; Wallace et al., 1971), relaxation therapy may exert their primary effects through reductions in central nervous system activity (Gregg & Richard, 2004). An increase in theta activity is associated not only with decreased activity in brain arousal systems but also with the sleep-onset

process itself (Canteros et al., 2002; Rechtschaffen & Kales, 1968; Schacter, 1976; West, 1980), represent a hypoactive CNS state that is similar to Stage 1 sleep. Stage 1 is the transitional state between wakefulness and sleep. It is characterized by a gradual transition from a predominant alpha pattern (relaxed wakefulness, eyes closed) to the appearance of theta intermixed with alpha, followed by the disappearance of alpha and a predominant theta frequency as measured by poly-somnography (Rechtschaffen & Kales, 1968). Stage 1 sleep and other states of decreased or abolished consciousness (e.g., reverie, hypnosis) involve cortical hypo-activation, widespread deactivation of stress/arousal systems, and reduced capacity for attending to and interpreting external stimuli that favors low levels of self-consciousness and hypnagogic/primary process/reverie mentation (Budzynski, 1976; Hobson, Pace-Schott, & Stickgold, 2000; Kutz, Borysenko, & Benson, 1985; Maquet, 2000; Schacter, 1976). Because relaxation therapy appear to induce a hypoactive CNS state that is similar in some respects to Stage 1 sleep, relaxation therapy may exert their therapeutic effects through similar mechanisms, probably as a result of a repetitive mental focus and reduced/monotonous sensory input. In a similar vein, relaxation therapy may serve as a cerebral energy conservation/restoration function by allowing the cortex to go offline from its normal activating, energy demanding role of processing complex, stressful stimuli (Jacobs, 2003). Elevated levels of theta activity are associated with alterations in CNS arousal commonly observed in meditation practitioners (Canteros et al. 2002; Jacobs & Friedman 2004). The widespread increase in theta power leads to general reductions in the brain arousal systems (Canteros et al. 2002; Jacobs & Friedman 2004). EEG-based Low-Resolution Electromagnetic Tomography Analysis (LORETA) have shown that the significantly increased theta activity during Triarchic Body-pathway Relaxation Technique (TBRT) was generated by the anterior cingulate cortex, an area that has been widely reported to be involved in attention (Asada et al. 1999; Ishii et al. 1999; Pizzagalli et al. 2003). Increased frontal midline theta during attention-demanding tasks (Asada et al. 1999; Ishii et al. 1999) was found to be closely associated with the concentrative aspect of meditation (Aftanas & Golosheikine 2002; Dunn et al. 1999; Kubota et al. 2001; Lazar et al. 2000; Pan et al. 1994). It was found that nondirective meditation techniques alter theta and alpha EEG patterns significantly more than regular relaxation, in a manner that is perhaps similar to methods based on mindfulness or concentration (Lagopoulos, 2009).

Reduction in sympathetic nervous system activity is the result of reduction in arousal. The same findings are observed in the present research study. Sympathetic nervous system is responsible for fight or flees in time responses that get our body aroused to respond. This system works with the parasympathetic nervous system which is responsible for calming our body after the arousal (to get back to normal). Both of these are actually part (subparts) of the autonomic nervous system. But also during rest, brain activity transiently fluctuates spontaneously between states of higher or lowered arousal. With the use of eyes-open (EO) and eyes closed (EC) conditions, systematic arousal variations can be induced in the resting state. Both EEG and fMRI reflect arousal related features of resting brain state regulation. In the EEG the sensitivity is reflected by the

oscillatory compound (reviewed in (Olbrich et al., 2009; Sadaghiani et al., 2010) such as Alpha (10 Hz) oscillations typically reflect an "idling" state, higher frequencies (> 13 Hz) reflect an increase and lower frequencies (< 8 Hz) a decrease in arousal. Resting state fMRI features two major (and antagonistic) Resting State Networks (RSNs), they are the default mode network (DMN) (Raichle et al., 2001; Raichle and Snyder, 2007) and the attention network (ATN) (Fox et al., 2005) which activity reflects shifts along the arousal scale as their engagement relates to rest or attentional task activity. Vigilance and arousal is regulated among others by thalamic activity and thalamocortical circuitry (Linias et al., 1998; McCormick and Bal, 1997; Steriade et al., 1993). A comprehensive study of resting state EEG-BOLD coupling covering the common spectral frequency bands and resting states has not yet been performed. Such a study is important, because the profile formed by different EEG rhythms is characteristic of different brain states and brain functions, and because eyes-open and eyes-closed states differ substantially in levels of arousal and EEG (Barry et al., 2007; Berger, 1929; Bianciardi et al., 2009; Marx et al., 2004; Marx et al., 2003) as well as in fMRI (Bianciardi et al., 2009; Marx et al., 2004; Marx et al., 2003). While the fMRI indicated increased activity during eyes-open, the EEG activity in contrast (in particular within alpha band, consistent with the classical observation of Berger, 1929) was increased during eyes-closed. This result is in line with other observations that synchronization of background EEG is often correlated with states of lower arousal or suppression of brain areas (Barry et al., 2007; Pfurtscheller, 2001), and illustrates the inverse relationship between lower frequency EEG and fMRI.

Where beta represents arousal, alpha represents non-arousal. Alpha brainwaves are slower and higher in amplitude. Their frequency ranges from 9 to 14 cycles per second. A person who has completed a task and sits down to rest is often in an alpha state. A person who takes time out to reflect or meditate is usually in an alpha state. A person who takes a break from a conference and walks in the garden is often in an alpha state. The post test results show increased alpha brain power and it is an evidence of relaxed condition and decrease arousal. The present study strongly proves that this result is in line with the similar studies.

On the left, the increased 'Theta' EEG power is clearly visible specifically in fronto-central brain areas. Satterfield and colleagues (Satterfield et al., 1973; Satterfield et al., 1971) were the first to investigate the potential use of EEG in predicting treatment outcome to stimulant medication. They found that children with excess slow wave activity and large amplitude evoked potentials were more likely to respond to stimulant medication (Satterfield et al., 1971) or more general that abnormal EEG findings could be considered a predictor for positive treatment outcome (Satterfield et al., 1973). Chabot et al. (Chabot, di Michele, Prichep & John, 2001; Chabot, Orgill, Crawford, Harris & Serfontein, 1999) found that ADHD and ADD children with excess relative alpha or beta power were likely to show behavioral improvement, whereas the relative excess theta group showed a worse response to medication. Their group exhibiting this 'excess Theta' was described as: 'generalized excess of theta absolute and relative power, decreased alpha mean frequency, and frontal theta

hypercoherence'. Note the mentioning of decreased alpha mean frequency, suggesting that in fact they were looking at a combined group of excess theta and slowed alpha power frequency. The function of the hippocampal theta rhythm is not clearly understood. Green and Arduini, in the first major study of this phenomenon, noted that hippocampal theta usually occurs together with desynchronized EEG in the neocortex, and proposed that it is related to arousal. Vanderwolf and his colleagues, noting the strong relationship between theta and motor behavior, have argued that it is related to sensorimotor processing. Another school, led by John O'Keefe, has suggested that theta is part of the mechanism animals use to keep track of their location within the environment. The most popular theories, however, link the theta rhythm to mechanisms of learning and memory. (Hasselmo, 2005)

In the present study the ADHD-HI case shows increased theta/alpha ratio in post test than pre test. It is obvious from this result that relaxation therapy produces hypoarousal state among ADHD case. EEG studies of children with ADHD have revealed a relatively consistent picture that includes an excess of slow-wave EEG activity (Predominantly theta) and increased theta/alpha and theta/beta ratios that are more predominant in children with ADHD combined than inattentive type. These results are generally in accord with theories that propose cortical hypoarousal in ADHD (sergeant, 2000). The point in time when theta activity supersedes alpha activity, the so-called theta/alpha "crossover", is commonly associated with loss of consciousness and the onset of early sleep stages (John Gruzelier, 2006). Earlier evidence shows that muscle relaxation training was effective to some extent in enhancing hypnotisability (Leva, 1974). Elevating the theta/alpha ratio is a widely used clinical and optimal performance EEG-neurofeedback protocol which we have recently validated (Gruzelier, 2005). It was originally developed to produce an hypnogogic state for the purpose of enhancing creativity when benefits were found in enhanced well being and psychic integration (Budzynski, 1972).

VII. CONCLUSION

All these results give a valuable contribution in understanding the brain dynamics. However, despite all the advances due to the development of new techniques and experiments, is still very little what we know about this topic. The attempts to understand the dynamics of the brain by analyzing the EEG is like trying to understand the conversations occurring in a building by analyzing a sound recorded from far away. Divergent stages and apartments are making divergent tasks, and we are not able to get inside and see what is going on. The EEG, the sound recorded from far away, is still one of our main tools to access to one of the most unknown and complex systems in nature, "One of the Still Elusive Treasures of Science".

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Power System Stability Enhancement under Three Phase Fault with FACTS Devices TCSC, STATCOM and UPFC

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Abstract- With the ever increasing complexities in power systems across the globe and the growing need to provide stable, secure, controlled, economic and high quality power especially in the deregulated power market. It is envisaged that FACTS controllers will play a vital role in power systems. This paper investigates the improvement of transient stability of a test system under three phase fault using facts devise. TCSC- Thyristor Controlled Series Capacitor and STATCOM- Static Synchronous Compensator are utilized as a series and shunt compensation respectively. UPFC-Unified Power Flow Controller is considered as a shunt-series compensator.

Index Terms- TCSC; STATCOM; UPFC; Transient stability.

I. INTRODUCTION

Today's power system is a complex network comprising of generator, transmission lines, variety of loads and transformers. With the ever increase in power demand some transmission line is more loaded than was planned when they were built [1]. With increased loading of long transmission line the problem of transient stability after major disturbance, will cause the entire system to subside. Power system stability is the ability of electric power system, for a given initial operating condition to regain a state of operating equilibrium after being subjected to a physical disturbance, with most system variables bounded so that practically the entire system remains intact [2]. And the main challenges of modern power system is transient stability is referred as the capability of the system to maintain synchronous operation in the event of large disturbance and this kind of stability depends on parameters of system and intensity of disturbance [3] [4].

The recent development of power electronics introduces the use of flexible ac transmission system (FACTS) controllers in power system [5]. FACTS technology provides the opportunity to [6] [7]-

- Increase loading capacity of transmission lines.
- Prevent blackouts.
- Improve generation productivity.
- Reduce circulating reactive power.
- Improves system stability limit.
- Reduce voltage flicker.
- Reduce system damping and oscillations.
- Control power flow so that it flows through the designated routes.
- Congestion management

The conventional control devices like synchronous condenser, saturated reactor, thyristor controlled reactor, fixed capacitor thyristor controlled reactor, thyristor switched capacitor having less system stability limit, less enhancement of system damping, less voltage flicker control when compared to emerging facts devices like TCSC, STATCOM and UPFC [8][9]. This paper investigates the improvement of system stability with various emerging FACTS devices and their comparisons. [10] - [13]

II. DESCRIPTION OF FACTS DEVICES

A. TCSC

The basic conceptual TCSC module comprises a series capacitor, C , in parallel with a thyristor-controlled reactor, LS , as shown in Fig.1. A TCSC is a series-controlled capacitive reactance that can provide continuous control of power on the ac line over a wide range. The principle of variable-series compensation is simply to increase the fundamental-frequency voltage across an fixed capacitor in a series compensated line through appropriate variation of the firing angle. This enhanced voltage changes the effective value of the series-capacitive reactance and control the reactive power [9] [14].

B. STATCOM

STATCOM is a controlled reactive-power source. It provides the desired reactive-power generation and absorption entirely by means of electronic processing of the voltage and current waveforms in a voltage-source converter (VSC). A single-line STATCOM power circuit is shown in Fig.2

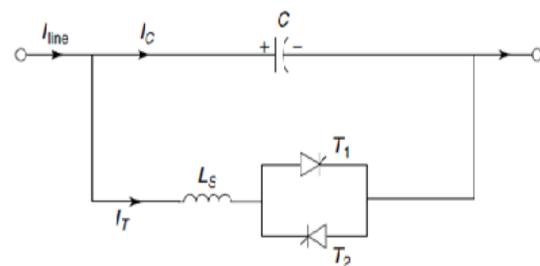


Figure1-Configuration of TCSC

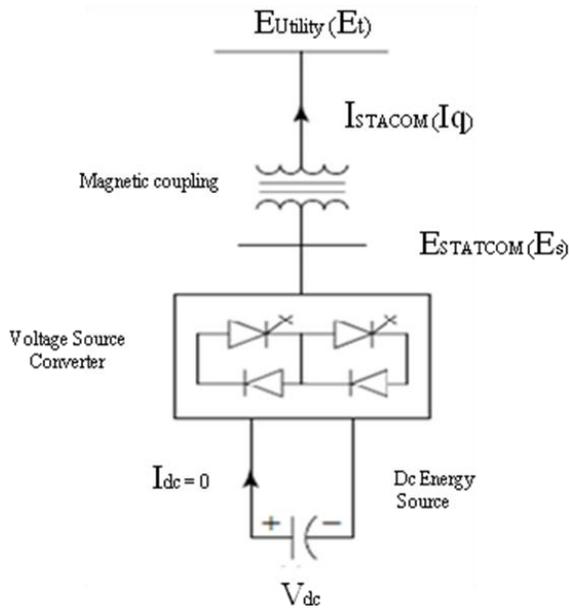


Figure 2-Configuration of STATCOM

where a VSC is connected to a utility bus through magnetic coupling. The exchange of reactive power between the converter and the ac system can be controlled by varying the amplitude of the 3-phase output voltage, E_s , of the converter. That is, if the amplitude of the output voltage is increased above that of the utility bus voltage, E_t , then a current flows through the reactance from the converter to the ac system and the converter generates capacitive-reactive power for the ac system. If the amplitude of the output voltage is decreased below the utility bus voltage, then the current flows from the ac system to the converter and the converter absorbs inductive-reactive power from the ac system. If the output voltage equals the ac system voltage, the reactive-power exchange becomes zero, in which case the STATCOM is said to be in a floating state [9] [15] – [16].

C. UPFC

The UPFC is the most versatile FACTS controller developed so far, with all encompassing capabilities of voltage regulation, series compensation, and phase shifting. It can independently and very rapidly control both real- and reactive power flows in a transmission line. It is configured as shown in Fig.3 and comprises two VSCs coupled through a common dc terminal.

One VSC-converter 1 is connected in shunt with the line through a coupling transformer, the other VSC-converter 2 is inserted in series with the transmission line through an interface transformer. The dc voltage for both converters is provided by a common capacitor bank. The series converter is controlled to inject a voltage phasor, V_{pq} , in series with the line, which can be varied from 0 to

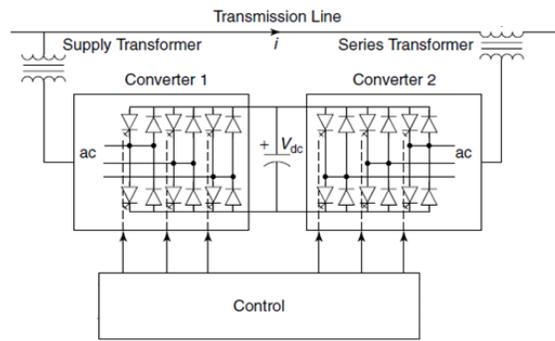


Figure3-Configuration of UPFC

V_{pq} max. Moreover, the phase angle of V_{pq} can be independently varied from 0 to 360 degree. In this process, the series converter exchanges both real and reactive power with the transmission line. Although the reactive power is internally generated/ absorbed by the series converter, the real-power generation/ absorption is made feasible by the dc-energy storage device that is, the capacitor. The shunt-connected converter 1 is used mainly to supply the real-power demand of converter 2, which derives from the transmission line itself. The shunt converter maintains constant voltage of the dc bus. Thus the net real power drawn from the ac system is equal to the losses of the two converters and their coupling transformers. In addition, the shunt converter behaves like a STATCOM and independently regulates the terminal voltage of the interconnected bus by generating/ absorbing a requisite amount of reactive power [9] [17] – [18].

III. MODEL OF TEST SYSTEM

The below test network is tested with TCSC, STATCOM, and UPFC separately to investigate the behavior with five parameters such as generator voltage (V_g), generator current (I_g), generated load angle (δ), voltage near infinite bus (V_b) and current near infinite bus (I_b). These are done through MATLAB/SIMULINK with following stages

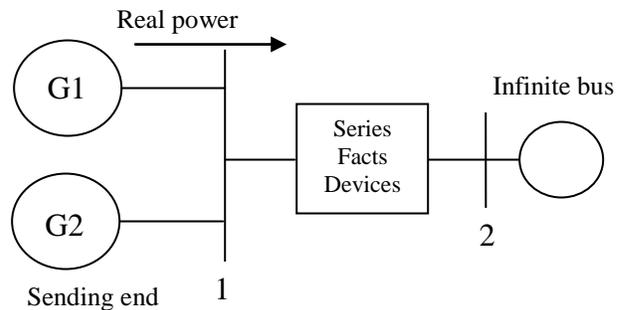


Figure 4. Test system with series FACTS device

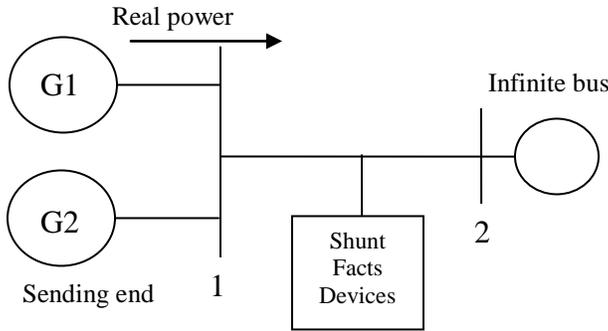


Figure 5. Test system with shunt FACTS device

- Stage 1 -To design test system shown in fig 6.
- Stage 2 - To measure five parameters under normal operating condition.
- Stage 3 -To create three phase fault near to infinite bus in test system. Fault duration 0.5 to 0.6 seconds. Shown in fig 7.
- Stage 4- To measure five parameters under three phase fault conditions
- Stage 5 - To design FACTS devices (TCSC, STATCOM and UPFC) Shown in fig 8, fig 9 and fig 10 respectively.
- Stage 6- To connect FACTS devices (0.6 to 0.8 seconds) in test system under three phase fault condition and to measure behavioral change of system.

The test system specification is

- Generator 1, 2 - 10KV, 110MW, 300 rpm,
- TCSC - 10MVAR, 10KV,
- STATCOM - 10MVAR, 10KV and
- UPFC - 10MVAR, 10KV.

IV. RESULT AND DISCUSSION

In accordance with the above SIMULINK work the five different parameters - generator voltage (Vg), generator current (Ig), generated load angle (δ), voltage near infinite bus (Vb) and current near infinite bus (Ib) of test system is measured and the settling time of each parameter is calculated for system stability and also to maximize the power flow in transmission line. The simulation result for generator voltage (Vg) of phase A is shown in fig 11. It is clear that under three phase fault, without FACTS device the voltage fluctuation of generator is more, whereas, it is less when the FACTS devices are involved. A table for generator voltage (Vg) under different time interval is constructed from the observed result. During the time interval of 0.5 to 0.8 seconds and 0.8 to 3.2 seconds the voltage rises from 3200 to 5000 volts and from 5000 to 8000 volts respectively which is greater than the generator voltage (Vg) without the involvement of FACTS device. So, when FACTS devices are connected to the system, it takes 2.4 seconds for TCSC, 2.0 seconds for STATCOM and 1.4 seconds for UPFC to reach the stability level.

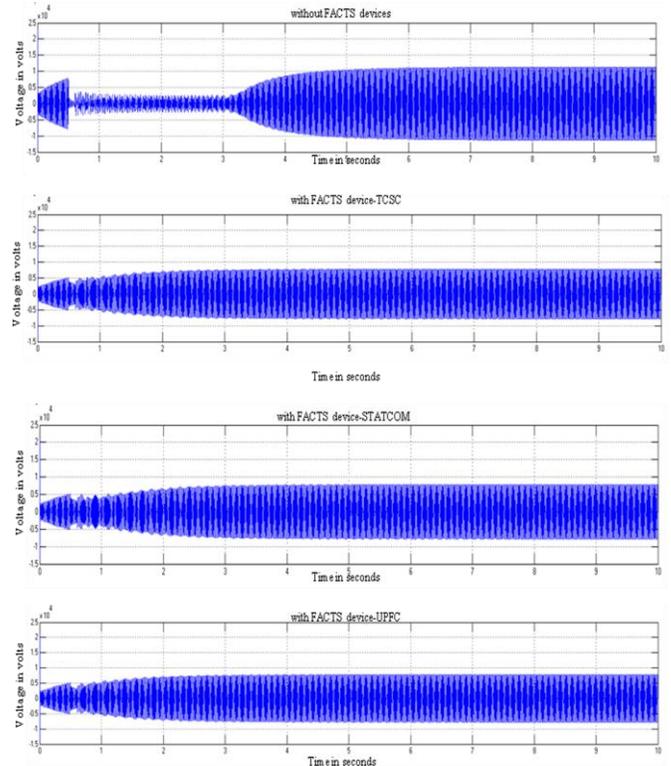


Figure 11. Simulation Result for Generator Voltage (Vg)

Table 1. Generator Voltage (Vg) in volts

Generator Voltage (Vg) in volts	Time in seconds	0 to 0.5	0.5 to 0.6	0.6 to 0.8	0.8 to 3.2	3.2 to 10
	Without FACTS device		0 to 5000	2000 to 0	4000	4000
TCSC		0 to 5000	3200	3200 to 5000	5000 to 8000	8000
STATCOM		0 to 5000	3200	3200 to 5000	5000 to 7000	7000 to 8000
UPFC		0 to 5000	3200	3200 to 5000	5000 to 7600	7600 to 8000

The fig 12 shows the generator current (Ig) of phase A. The generator current (Ig) is reached to stable at 4.4 seconds when the FACTS devices are not connected. After incorporating the FACTS devices TCSC, STATCOM and UPFC, the settling time of generator current (Ig) is reduced as 2.4, 3.4 and 2.3 seconds respectively for reaching the stable condition, Which is understood through table 2.

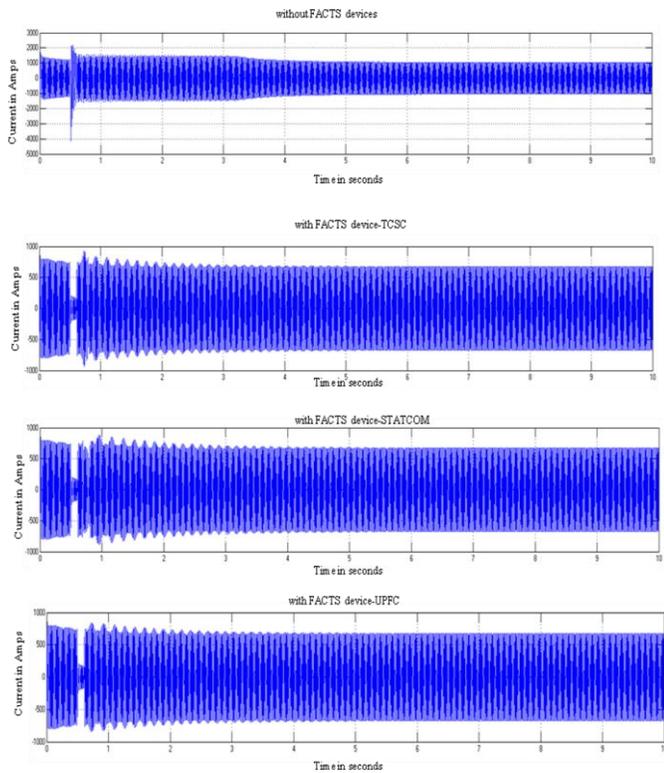


Figure 12. Simulation Result for Generator Current (I_g)

Table 2. Generator Current (I_g) in Amperes

Generator Current (I_g) in Amperes	Time in seconds	0 to 0.5	0.5 to 0.6	0.6 to 0.8	0.8 to 3.2	3.2 to 10
	<i>Without FACTS device</i>		1500 to 1250	5000	1500	1500
<i>TCSC</i>		800 to 750	200	1000	1000 to 700	700
<i>STATCOM</i>		800 to 750	200	800	800 to 700	700
<i>UPFC</i>		800 to 750	200	800	800 to 700	700

Before connecting the FACTS devices in test system the load angle (δ) of generator is varied up to 18 degree and takes around 7.4 seconds to settle down to stable region after the fault recovery. But due to the interfacing of FACTS device the settling time is reduced to 4.2, 4.4 and 4.2 seconds for TCSC, STATCOM and UPFC respectively is shown in fig 13 and table 3.

Table 3. Generator Load Angle (δ) in degree

Generator Load Angle (δ) in degree	Time in seconds	0 to 0.5	0.5 to 0.6	0.6 to 0.8	0.8 to 3.2	3.2 to 10
	<i>Without FACTS device</i>		1.5	3.5	18	18
<i>TCSC</i>		2.5	4	4 to 2	2 to 0.2	0.2 to 0
<i>STATCOM</i>		2.5	4	4 to 3	3 to 0.4	0.4 to 0
<i>UPFC</i>		2.5	4	4 to 2.5	2.5 to 0.1	0.1 to 0

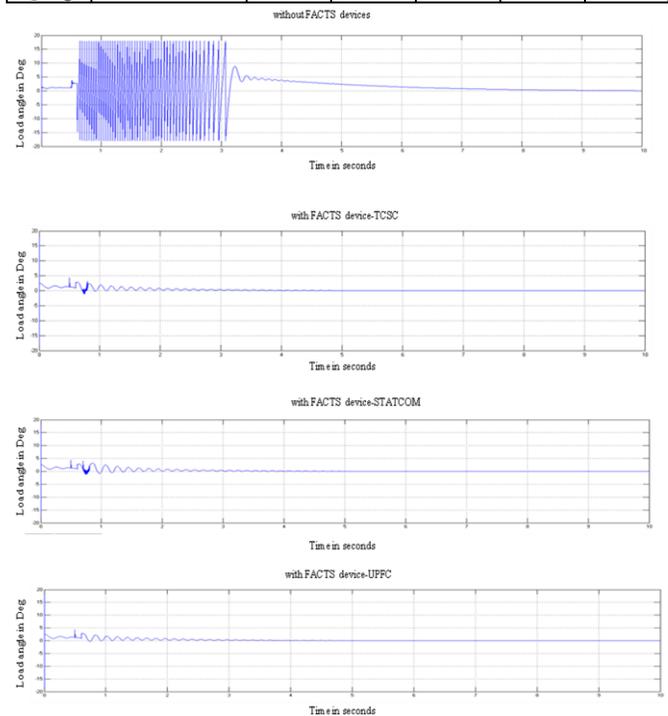


Figure 13. Simulation Result for Generator Load Angle (δ)

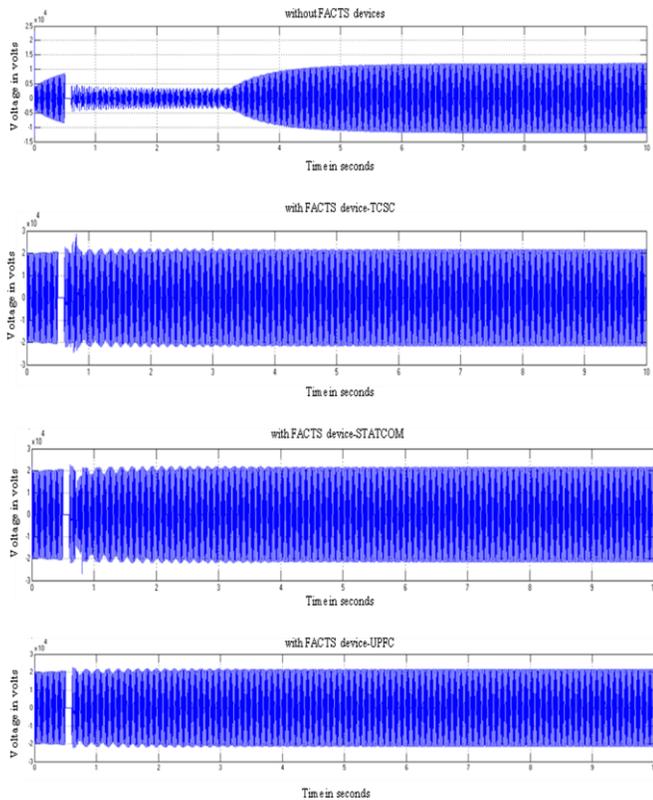


Figure 14. Simulation Result for Voltage near Infinite Bus (Vb)

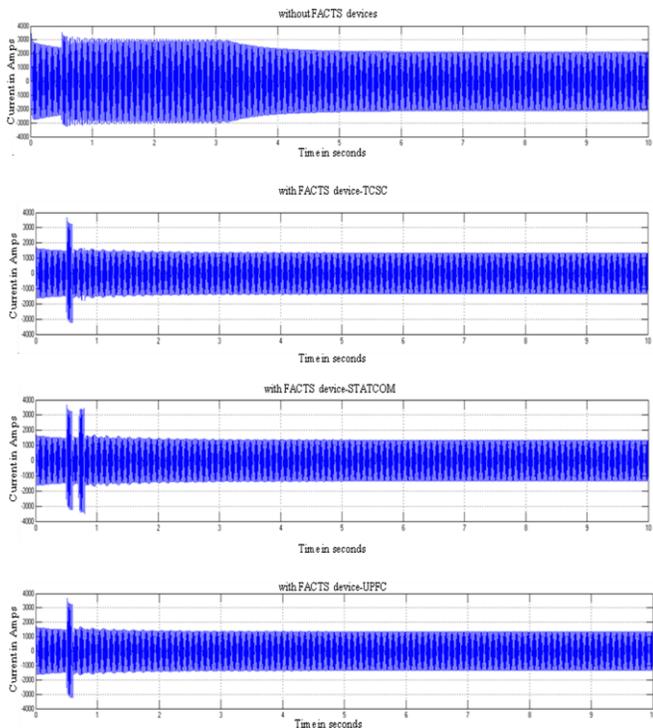


Figure 15. Simulation Result for Current near Infinite Bus (Ib)

From Fig 14 it is observed that the settling time for the voltage near infinite bus (Vb) is 5.4 seconds when the FACTS

devices are not connected. After connecting the FACTS devices settling time is reduced as 0.4, 0.5 and 0.2 seconds for stable condition. Similarly the current near infinite bus (Ib) comes to stable within 0.4, 0.5 and 0.2 seconds for TCSC, STATCOM and UPFC respectively after the fault recovery. But without those devices it takes 3.4 seconds to reach stability is shown in fig 15. The settling time of V_g , I_g , δ , V_b , I_b for TCSC, STACOM and UPFC are studied and shown in table 4. It is found that the system stability is achieved in short interval while interfacing UPFC.

TABLE 5. COMPARISON OF SETTLING TIME

Settling time in seconds				
Parameter s	Without FACTS devices	TCSC	STATCOM	UPFC
Generator voltage (V_g)	4.4	2.4	2	1.4
Generator Current (I_g)	4.4	2.4	3.4	2.3
Generator load angle (δ)	7.4	4.2	4.4	4.2
Voltage near infinite bus (V_b)	5.4	0.4	0.5	0.2
Current near infinite bus (I_b)	3.4	0.4	0.5	0.1

V. CONCLUSION

In this paper the power system stability enhancement of test network with FACTS devices TCSC, STATCOM and UPFC is presented and discussed under three phase short circuit fault. It is clear that the system regains its stability under any one of the FACTS device is involved. Also the settling time to reach the stability of the system with UPFC for different parameters (Generator Voltage – 1.4 secs, Generator Current – 2.3 secs, Generator Load Angle – 4.2 secs, Voltage near Infinite Bus – 0.2 secs and Current near Infinite Bus – 0.1 secs) is comparatively much better than STATCOM as well as TCSC.

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Frequency Control Scheme Using Integrated Grid Inverter for Wind Mill Applications

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Abstract- Wind is a copious vital source of energy which is complimentary and a fabulous gift of Mother Nature. The escalating levels of wind generation have resulted in an urgent appraisal of their impact on frequency control of power system. Despite the consequences of wind turbine technology, The main intention of this paper is to counterpart the generated frequency from the existing system along with the GRID side frequency which has an unremitting variation due to the loads connected besides the GRID. This frequency disparity is the major concern in today's renewable energy system and is particularly true in portable wind mill applications connected with the grid. So a frequency control scheme using integrated grid inverter for such wind mill applications is being discussed in this paper.

Index Terms- wind generation, frequency control, grid issues, integrated grid inverter.

I. INTRODUCTION

The development of wind power in India began in the 1990s, and has significantly increased in the last few years [1]. Although a relative newcomer to the wind industry compared with Denmark or the United States, India has the fifth largest installed wind power capacity in the world [2].

In India, demand is more whereas generation is less. Even if we generate enough wind energy, it cannot be effectively utilized [3] due to the technical challenges such as grid quality [4] as well as wind turbine issues [5],

So, the integration of wind generation with an existing electricity system depends on number of factors like technical as well as regulatory. The grid codes for wind, in general deals with the following technical requirements like Active power control, Frequency, Voltage and reactive power issues, Protection, Power quality issues like flicker, harmonics etc [6].

II. ELDERLY SYSTEM ISSUES

In general, the wind generation is described in two levels such as small wind generators and large wind generators. A small wind generator is connected to an isolated load and the large wind generator is connected with the grid.

The small wind electric generator (SWE) is an implemented project to produce a decentralized power supply in remote locations of India which is directly connected to AC load [7].

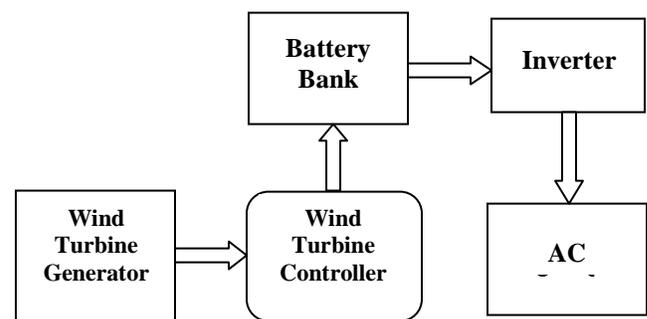


Figure 1. Schematic of a typical SWE project

In order to maintain a constant output voltage as well as frequency, the storage equipments like battery banks, capacitor banks and etc are used, which delivers a constant dc output voltage to the inverter which converts a fixed dc to a variable ac output voltage and it is connected with the load [8] [9].

Also, the regulation of ac voltage and frequency to the load is done via an algorithm proposed in [10]. Such kind of wind generators do not have sufficient scheme towards frequency control when connected across a grid and also these are very expensive as compared to that of large wind electric generators.

In common, large wind generators are connected with the grid via proper control devices. Due to wind fluctuations, the wind generator is not suitable for use because its output varies with amplitude and frequency. So, these methods use many techniques to control the fluctuated voltage and frequency in the wind mill rotor side itself which minimizes the overall power fluctuations.

The most familiar Doubly Fed Induction Generator (DFIG) drive is used to balance the power quality parameters to an extent [11]. This DFIG drive is enhanced by Wind Turbine Generators (WTG). But, due to certain constraints in current limit, the DFIG WTG needs some design modification such as increase in DFIG converter rating, as required [12].

The voltage and frequency control of wind generator is done through vector controlled PWM voltage source inverter for both load and wind variation but the control

scheme derived is complicated and number of controlling devices is more [13]. Also, the wind frequency control is achieved through variable speed wind turbines (VSWTs). This control has energy storage device to enhance the performance of wind output [14].

In all these above mentioned elderly methods the control strategy for frequency fluctuation in the grid side is not focused highly.

During a sudden change in the grid frequency, the generator feeds excess power to the grid through an inverter or converter, which is isolated from the grid to prevent the entire system from major crisis such as abnormalities in the transmission line parameters. Also, this causes a foremost damage in wind generator as well as other accessories connected along with it. Many isolated grids are in practice to avoid such frequency collapse and other power quality issues which is economically not appropriate.

III. CONVENTIONAL SYSTEM SIMULINK MODEL

The grid frequency fluctuates according to various loads connected besides the grid which in order fabricates a local circulating current in between the grid and the inverter. This circulating current will not depart to the load and creates a major issue in the form of heat. It destroys the entire system connected with the existing structure [15]. This frequency mismatch is the major concern in today's renewable energy system while connected with the grid.

The issues described above are conferred with a simulink example as shown in Fig 2. Under no load condition, the three phase inverter output voltage of 400 V and frequency of 50 Hz is connected to the grid, which also consists of the same voltage and frequency. Fig 3 and Fig 4 indicates the inverter output voltage and grid voltage for phase AB respectively. In this case, both the grid frequency as well as the inverter frequency is same and it is perfectly matched which is shown in Fig 5. In this case there is no frequency mismatch issue until the grid frequency fluctuates.

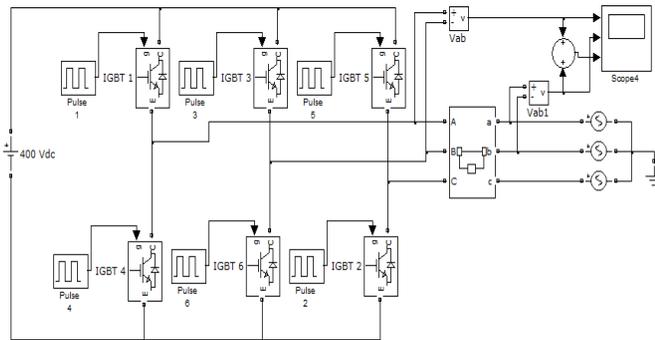


Figure 2. Simulink model for conventional system

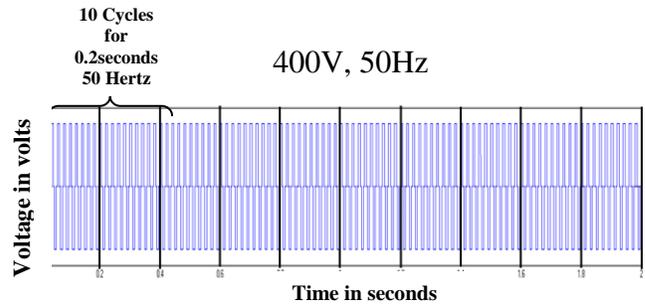


Figure 3. Simulation result for inverter voltage Vab

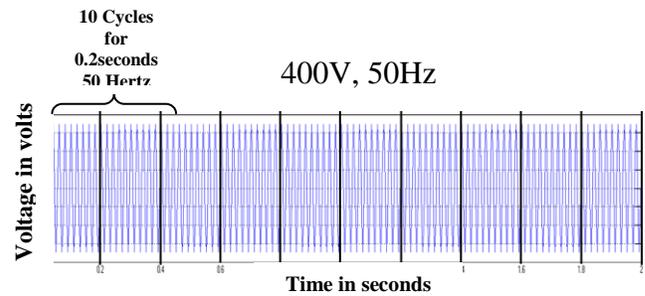


Figure 4. Simulation result for grid voltage Vab

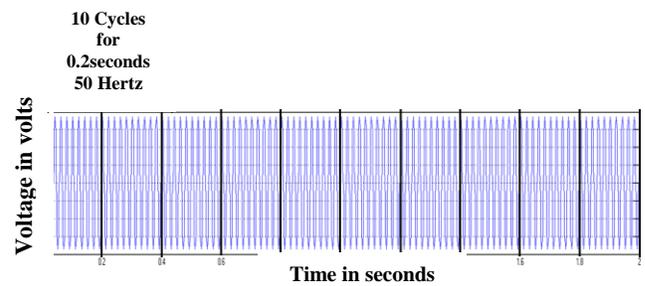


Figure 5. Simulation result for same frequency in grid and inverter

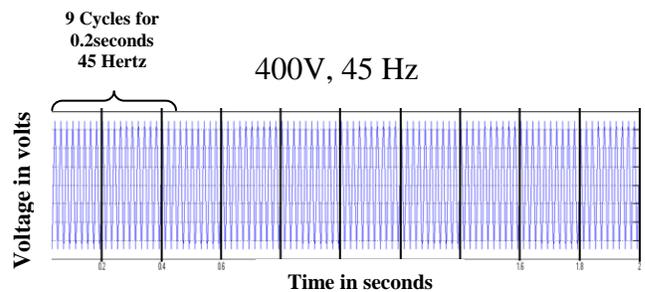


Figure 6. Simulation result for grid voltage Vab

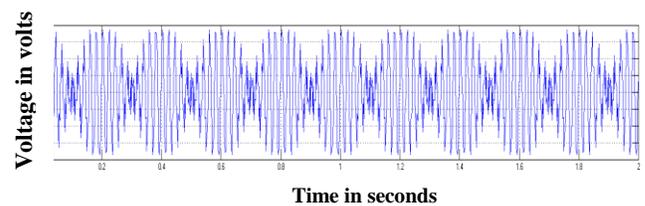


Figure 7. Simulation result for frequency mismatch in grid and inverter

Under load condition, whenever there is an increase in the load inductance then there will be a frequency mismatch.

For example - impedance of 500 ohm, resistance of 100 ohm, inductive reactance of 300 ohm and inductance of 1.05 Henry will reduce the grid frequency to 45 Hz, [16] which causes a frequency mismatch between the grid and the inverter.

Fig 7 confirms the phase displacement between both the grid as well as inverter frequency. Fig 3 explains the inverter frequency with 50 numbers of cycles per second and Fig 6 shows grid frequency with 45 numbers of cycles per second in which the phase displacement between them is 5 numbers of cycles per second. It is understood by adding grid and inverter voltage as shown in Fig 5 and 7. Hence all the above results confirms the issues in an existing system and thus to avoid such problems we propose an integrated grid inverter which helps to maintain the system stability always.

IV. TEST SYSTEM MODEL

The test system specification is as follows

- Wind velocity – 3 to 8 meter per second.
- Wind Generator (G) – 24 Vdc, 500 W, 300 rpm.
- Step UP Chopper – 24 / 400 Vdc.
- Grid Inverter – 400 Vdc / 400 Vac (three phase).
- Grid – 400 Vac, 50 Hz, 10 KW.

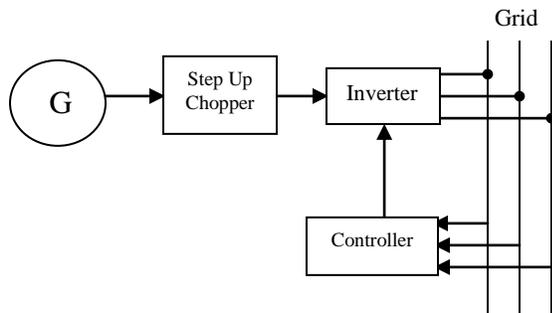


Figure 6. Block diagram of Test system.

V. SIMULINK MODEL OF TEST SYSTEM

An AR-500W portable wind mill is used to experiment the frequency control scheme. The rated electrical power is 500 w at 8.2 m/s. A 24 volt dc generator of speed 300 rpm is used to convert the wind energy into electrical energy. The generated electrical energy is stored in a battery from which a constant dc output voltage is delivered to the inverter via step up chopper (24 / 400 Vdc).

A three phase integrated grid inverter with 180 degree mode of conduction is designed for this test system. This inverter with an input of 400 V dc delivers a three

phase output of 400 Vac to the grid. A feedback from the grid (voltage and frequency) is fed to a pulse generator through which the inverter switches are controlled.

Under normal operating condition there is no change in the grid frequency. While there is an increase in the load inductance, then a lagging power factor occurs which cause a change in grid frequency. The frequency deviations under various load conditions are listed in Table1 [16].

The change in grid frequency signal is given to the pulse generator which is compared with a reference signal. The compared signals generate six different pulses to the inverter. This operates the inverter for three phase 400V ac output with frequency similar to grid frequency. The entire test model is designed in MATLAB / SIMULINK environment as pictured in Fig 7.

TABLE 1. FREQUENCY DEVIATIONS IN GRID

<i>L (H)</i>	<i>Z (ohm)</i>	<i>R (ohm)</i>	<i>X_L (ohm)</i>	<i>Frequency (HZ)</i>
1.10	500	100	300	43
1.05	500	100	300	45
1.00	500	100	300	48
0.95	500	100	300	50
0.92	500	100	300	52
0.90	500	100	300	53
0.88	500	100	300	54
0.86	500	100	300	55

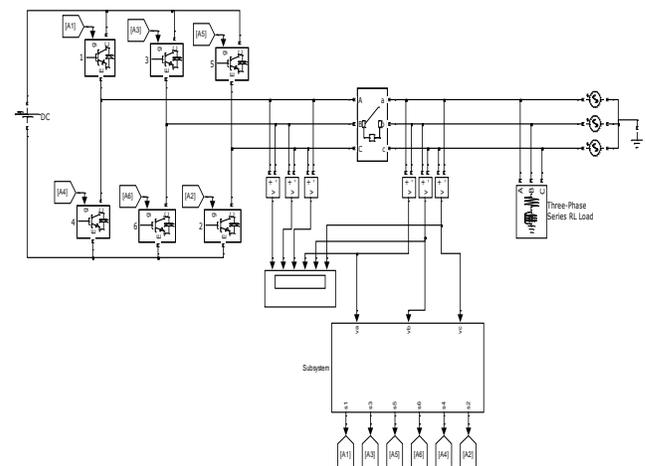


Figure 7. Simulink model of Test System

VI. RESULT AND DISCUSSION

The Fig 7 indicates that the number of cycles per second in the grid as well as number of cycles per second in the inverter is equal under different load conditions at various time periods. Fig 8 describes the result for phase AB output frequency matching of both inverter and grid.

Test system is designed such that for every 0.2 seconds the grid frequency changes according to various loads. Hence the Inverter output frequency also changes.

The result for frequency matching is shown in Table 2. With this type of system the inverter could always be connected to the grid without isolating the inverter circuit from the grid even when there is a change in frequency. Observably the Test system reduces the issues of conventional system.

TABLE 2. INVERTER-GRID FREQUENCY MAPPING

Simulation Time in seconds	Load Inductance L(H)	Grid Frequency in Hz	Inverter Frequency in Hz
0 to 0.2	1.10	43	43
0.2 to 0.4	1.05	45	45
0.4 to 0.6	1.00	48	48
0.6 to 0.8	0.95	50	50
0.8 to 1.0	0.92	52	52
1.0 to 1.2	0.90	53	53
1.2 to 1.4	0.88	54	54
1.4 to 1.6	0.86	55	55

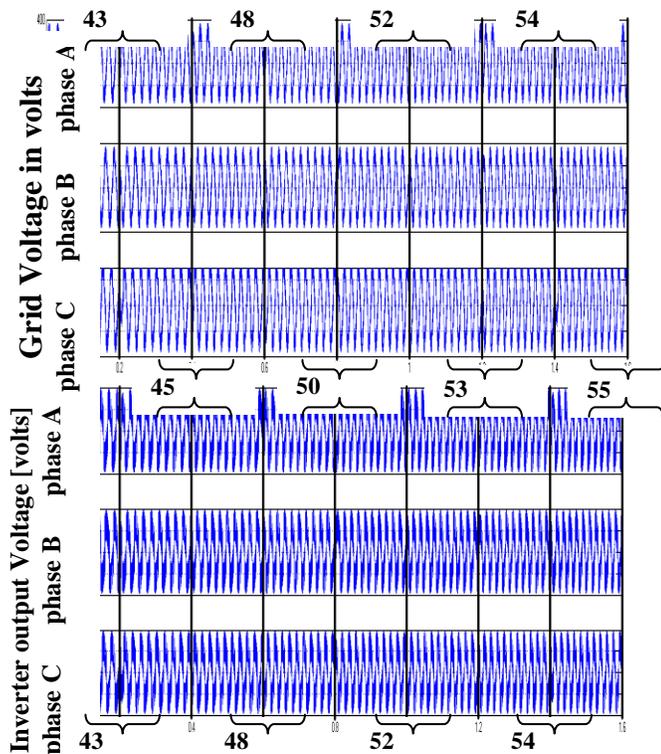


Figure 8. Simulation result for frequency match between inverter and grid

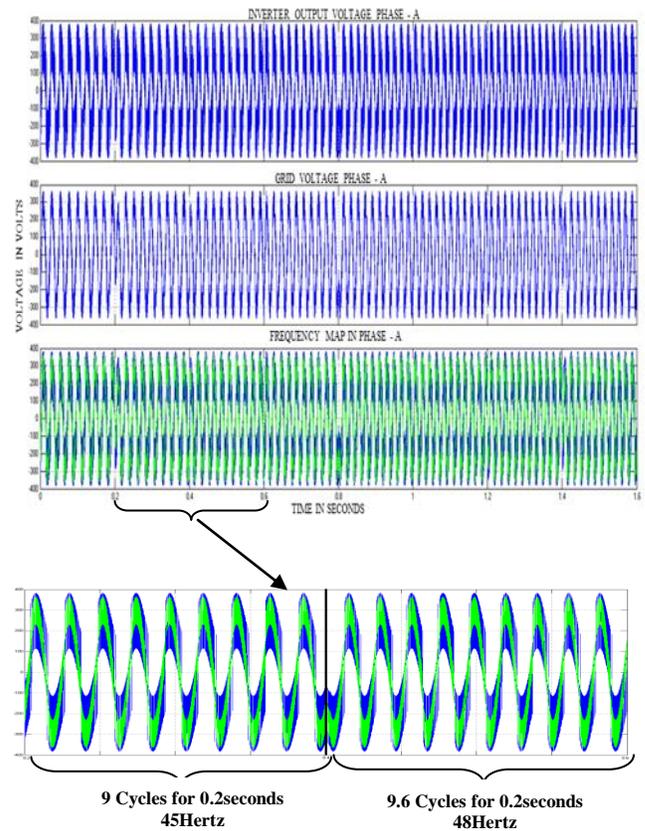


Figure 9. Simulation results for frequency match in phase A.

From Table 2, the time interval of 0.4 to 0.6 seconds the load inductance varies which impacts the change in the grid frequency from 45 to 48 Hertz. Due to this sudden change in the grid frequency, causes unstable condition in the grid. To overcome this crisis, the proposed inverter design corrects the frequency mismatch which is shown in fig 9. According to the grid frequency signal received, the inverter operates in order to match the grid frequency. This makes the system to perform from unstable to stable condition. Therefore the performance of grid as well as inverter frequency has been improved.

VII. CONCLUSION

From above discussion, number of cycles per second in the grid and number of cycles per second in the inverter is equal under various load conditions. This helps to connect the inverter along with the grid always in order to avoid the frequency mismatch. So, the wind power generation could be utilized effectively which reduces the demand to a maximum level. Hence the setback in the foregoing method is met by successfully mapping the frequencies between the grid as well as the inverter.

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Emerging Opportunities and Challenges for Cottage Industries in India

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Abstract-The commodities that are being produced by cottage industries are basically consumable ones and are produced through the utilization of the traditional techniques. Cottage Industry especially started its function in the country sides of a country where unemployment along with under-employment are prevalent. Thus, this industry helps the economy by absorbing a huge amount of surplus labor of the rural economy. Another glaring feature of Cottage Industry is that it is not a mass producer of commodities. The main risk that is being faced by this industry is from the factory based medium or large industries which are again capital intensive in nature. This is because of the fact that these large industries utilize all sorts of cost effective technologies which enable them to supply the products at low price. On the other hand, The Cottage Industry is basically labour intensive and utilizes traditional techniques in production process which are generally not cost effective in nature which escalates the price of their product. The products supplied by the Cottage Industry thus face risk of extinction if they don't receive enough financial or other form of support from the government.

Index Terms- Cottage industries – women entrepreneurs – Opportunities - Challenges

I. INTRODUCTION

The term 'cottage industry' is used when products are manufactured on a small scale. India is well known for its large number of traditional cottage industries. But with the advent of the industrialization, cottage industries witnessed a sharp decline. However, the government has taken steps to revive cottage industries and they now play an important part in contributing to the economy of the country. The top five Indian cottage industries are cotton weaving, silk weaving, carpet making, leather industry, metal handicrafts and small food processing industries.

Cotton weaving is a very important cottage industry in India. This skill dates back to ancient times as cotton clothing is widely worn around the country. Indian cotton weaving is known for traditional designs and patterns done by skillful weavers with their looms. The cotton industry in India is concentrated in Maharashtra, Tamil Nadu, and Gujarat. Silk weaving is another famous cottage industry in India. India is one of the major producers and consumers of silk as it is worn on special occasions such as weddings and festivals. Mulberry, Muga, Tassore, and Eri are the types of silk produced in India. Around 70% of the silk weaving industry in India is concentrated in Karnataka.

Carpet making was introduced in India during the Mogul era. Even though the Kashmiri carpets are world famous for their fine quality, India also is known for its durries and coir mats. The carpet making industry in India is in Kashmir, Rajasthan, Punjab, Uttar Pradesh Andhra Pradesh and Punjab. The Government of India has set up the Carpet Export Promotion Council for promoting hand-knotted rugs and all other types and styles of floor coverings from around the country.

India is a supplier of high quality leather to the global market. The Indian tanning industry can produce around 10% of the global demand. This industry employs around 2.5 million people and is considered one of the major export earners for India. The major leather producing regions in India are Tamil Nadu, West Bengal and Uttar Pradesh. Metal has always been used in India to make figurines, utensils, jewelry. Metal handicrafts have a distinctly Indian touch and are widely appreciated around the world. They have been a significant contributor to the Indian economy. Cottage Industry is a concentrated form of small scale industry where the productivity of the goods takes place in the houses of the laborers and the workforce include the members of the family. The equipments used to generate products are not the hi-tech ones but generally those which are used at homes.

Cottage industry is generally unorganized in character and falls under the category of small scale industry. They produce consumable products through the use of conventional methods. These types of industries originate in the country sides where unemployment and under-employment are widespread. In this way, cottage industries help the economy by engrossing a massive amount of remaining workforce of the rural areas. But on the flip side Cottage Industry cannot be considered as the mass producer of products. It faces major risks from medium or large industries which demand huge amount of capital investment for all types of hi-end technologies.

II. OPPORTUNITIES FOR COTTAGE INDUSTRIES IN INDIA

Cottage Industry is often characterized by its enormous potential for employment generation and the person getting employed is basically regarded as a self-employed one. It has been empirically found out that Cottage Industry has given economic independence to the women in the developing as well as developed countries. Cottage industries involve all the family members contribution for the development of the family. The most common form of support extended by the governments towards this industry is through forwarding of capital subsidies. Another form through self-help groups. They are very much helpful for the cottage industries. As the women employed in the cottage industries are the members of the self-help group and they can get financial assistance at low interest rate which is a great boon for them.

III. PROBLEMS FACED BY COTTAGE INDUSTRIES IN INDIA

Cottage industry is considered for its enormous potential of providing employment. But, over the years, employment may have increased in this industry but the income of the people has definitely decreased as the middlemen offer low prices to the manufacturers but take heavy chunks of money from the buyers. But, it is not only the middlemen and the dealers. The new revised foreign policies, globalization is also responsible for the current condition of cottage industry. The handloom **weavers** are facing constant competition from the power looms. These workers have given their whole life to stitching and knitting. The skill that they possess is just unmatched. But, still they are at the same place where they had started years ago.

An industry, providing employment to a large section of our population is in such distress. With over 4 million people engaged in handloom industry, such a condition proves the adversities which these people are facing. An interesting point to note is that out of the total people engaged in this industry, around 47% are below poverty line. Also, according to the new census, the average annual household income of these people is just Rs 41,068. And given the large family size among this section of the society, the per capita income is just a little more than nothing.

Cottage industries in India face dearth of capital and large quantity of labour, which force them to buy capital-saving techniques. Hence, there is an urgent need for implementation of techniques which not only enhances productivity but develops skills of the laborers and meets the requirements of the local market. Endeavors should be directed towards the development of technology so that labours can enjoy a decent lifestyle. Government should also provide subsidies for the growth of cottage industries especially in the preliminary stages. The labourers of cottage industry often find themselves fighting against all odds at every stage of their business, be it buying the raw materials or promoting their products, arranging for capital or access to insurance covers, etc.

A. Problem of Raw-materials

Due to their limited resources, the owners of these industries cannot afford to purchase raw-material in bulk. That is why they get low quality materials at high rates.

B. Problem of Finance

Cheap and easy finance is not available to these industries. The financing system of government institutions and banks is such that these industries have to complete many formalities and there are so many complications which can be followed by these less educated entrepreneurs.

C. Marketing problems

These industries mainly exist in villages and due to lack of transport and communication facilities they are handicapped in finding suitable markets for their products,

D. Lack of Managerial Talent

Cottage and small scale industries are mostly run by the small businessmen having no training of management and organization. How these industries, therefore, can stand before the large scale industries which are managed and organized by the specialists of that field?

E. Competition with large-scale industries

The main problem before these industries is that they are unable to compete with large-scale industries. The economies of large-scale production are not available to them and therefore they fail to compete with large-scale industries.

Cottage industries are the victims when it comes to attracting the attention of modern industry. This calls for preservation and promotion of cottage industries through formulation of public policies directed at improving the industry both in context of income of laborers and technological aspects. It is high time now that the Government took some initiatives. Though in every budget, new promises are made, new policies are made. But, so far none of them has benefitted these people much. They are almost in the same conditions as they were decades ago. Though there's a marginal increase in their income but if at the same time, we also notice the increase in the expenditures, then, we can say that in fact they are worse now than they were earlier.

IV. STEPS TAKEN BY GOVERNMENT TO OVERCOME THE PROBLEM

Keeping in view the importance of cottage and small scale industries the government have taken many steps to overcome their problems. The main steps taken are:

(a) The Union Government has set up a number of agencies to help the village and small industries. These include the Small Scale Industries Board the Khadi and Village Industries Commission, the All India Handicrafts Board, the AH India-Handloom Board and Central Silk Board.

(b) Credit facilities are made available to these industries through a number of institutions. Small scale sector is included in the priority sector for the supply of institutional credit.

(c) Industrial estates and rural industrial projects have been set up and industrial co-operatives have been organized.

(d) To encourage the small scale sector, the Central Government has reserved 807 items for exclusive production in the sector.

(e) The District Industries Centres are being established at the district level to provide under one roof, all the services and support required by small and village entrepreneurs.

The Industrial Policy Resolution, 1980 has these following provisions for the development of cottage and small-scale industries

(a) Introducing a scheme for building up of buffer stocks of essential materials which are often difficult to obtain. Special needs of states which rely heavily on a few essential raw-materials will receive priority.

(b) To generate as many ancillaries and small and cottage units as possible, the government will set up a few nucleus plants in each district. A nucleus plant would concentrate on assembling the products of the ancillary and small scale units falling within its orbit.

(c) Enhancing the limit of capital investment for small scale and ancillary industries.

V. ORGANIZATIONS WORKING FOR THE BENEFIT OF COTTAGE INDUSTRY IN INDIA

The well-known organization like Khadi and Village Industries Commission (KVIC) is working towards the development and endorsement of cottage industries in India. Other premier organizations are Central Silk Board, Coir Board, All India Handloom Board and All India Handicrafts Board, and organizations like Forest Corporations and National Small Industries Corporation are also playing an active role in the meaningful expansion of cottage industries in India. The Department of Industries and Commerce also implements a variety of programmes to provide financial assistance, technical support and guidance service to the existing as well as new industries. These programmes are implemented with an accent on the development and modernization of industries, up-gradation of technology and quality control. It operates through a network of District Industries Centers (DICs), one in each district, headed by a General Manager.

VI. THE VARIOUS ACTIVITIES UNDERTAKEN BY THE DEPARTMENT INCLUDE

- 1) Registration and promotion of small scale and tiny industries and industrial Co-operative societies.
- 2) Sanction and disbursement of various subsidies and incentives such as State Capital Subsidy, Generator Subsidy, Power Tariff Subsidy.
- 3) Offering various testing facilities for chemicals, metals, metallurgical, electrical, electronic gadgets and appliances.
- 4) Implementation of centrally sponsored schemes like Self Employment Programmes for the Educated Unemployed Youth and Prime Minister's Rozgar Yojana schemes.
- 5) Conducting Entrepreneur Development Programmes particularly special schemes for women.
- 6) Creating awareness about the various policies and programmes of the Government through seminars and dissemination meets.
- 7) Providing Escort Services to the Entrepreneurs.
- 8.) Maintenance of Special purpose Industrial Estates for Electrical and Electronics Industries.
- 9) Providing entrepreneurial guidance through Data Bank and Information Centre and technical information sections attached to various District Industrial Centers.
- 10) Identification of new areas with growth potential and providing familiarization and Incubator facilities to promising entrepreneurs.
- 11) Conducting Techno-Economic Surveys.
- 12) Conducting sample and comprehensive surveys.
- 13) Development and promotion of cottage and handicrafts industries.
- 14) Training facilities in the field of light engineering, tool and die designing.
- 15) Assistance for import of capital goods machineries and scarce raw materials.
- 16) Implementation of Quality Control Act on Electrical household appliances, etc.
- 17) Export Promotion.
- 18) Supervision of implementation of special assistance schemes announced by Government in favour of small and tiny sector units.

Apart from this the entrepreneurs are assisted in getting statutory clearances from Local Bodies, Town Planning, Pollution Control Board, Public Health, Factories and other Departments and getting power connections through the Single Window Committee. The District Single Window Committee has been formed with District Collector as its Chairman. A State Level Committee under the Chairmanship of the Chief Secretary to Government periodically reviews the functioning of the District Window Committees in the State. In order to promote Tiny and Rural Industries, 287 Blocks in the State have been declared as industrially Backward/ Most

Backward. Small Scale Industries (SSIs) located therein are eligible for grant of State capital subsidy, Low Tension Power Tariff (L.T.P.T.) subsidy and other concessions. Here comes the most crucial step for your research publication. Ensure the drafted journal is critically reviewed by your peers or any subject matter experts. Always try to get maximum review comments even if you are well confident about your paper.

VII. CONCLUSION

Cottage Industries are of cultural and economic importance to India. They keep the age old traditions alive and also provide employment to a number of people. Support should be provided by the community to prevent exploitation and further develop these industries as they face stiff competition from other economies. In the over-populated countries like ours, the only way to fight the monster of unemployment is the development of cottage and small scale industries. They will bring about a more equitable distribution of wealth. In the words of Dr. V.K.R.V. Rao, "Small scale and cottage industries have a special claim for consideration in that they are the local investments through which the decentralization of industrial production can be achieved." It can, therefore, be said that 'Small is Beautiful'.

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Stabilization of soil of Indian origin

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Abstract- Scrap tires are being produced and accumulated in large volumes causing an increasing threat to the environment. In order to eliminate the negative effect of these depositions and in terms of sustainable development there is great interest in the recycling of these non hazardous solid wastes. The potential of using rubber from worn tires in many civil engineering works have been studied for more than 20 years. Tire wastes can be used light weight material either in the form of powder, chips, shredded and as a whole. Applications of tire rubber proven to be effective in protecting the environment and conserving natural resources. They are used above and below ground water. Many work regarding the use of scrap tires in geotechnical application have been done especially as embankment materials (Ghani et al, 2002) The reuse application for tire is how the tire are processing basically includes shredding, removing of metal reinforcing and further shredding until the desired materials are achieved. A passenger car tire contains approximately 26% carbon black, 47% natural rubber, 30% of synthetic rubber. India is fabricating one lakh metric ton of recycle rubber which is sold@ Rs 70 per Kg.

Index Terms- Scrap, Sustainable, embankment, Shredded

I. INTRODUCTION

This paper deals with stabilization of soil using tire chips of different size. Stabilization is the method employed for modifying the properties of soil to improve the civil engineering performance. The main objective is to increase the strength and to reduce the construction cost by using locally available materials such as municipal wastes scrap tire is one of them. how much wastes scrap tires is produced in India is not known but 40 million vehicles are added in last two years Scrap tires can be used in many ways either as a whole or halved or shredded They can be used alone ,embedded or mixed with soil. Shredded tires used in Geotechnical engineering include embankment fill, retaining wall and bridge abutment backfill insulation to frost, vibration damping layers and drainage layers (Edil&Bosscher 1992). We know that accumulation and disposition both resulted

into pollution. Leaching from scrap tires produce toxin and cannot be used under ground water.

Soil selected of Indian origins is Laterite soil, sandy soil and black cotton soil found central, northern and eastern part of India.

II. MATERIALS USED FOR STUDIES

Bernal *et al.* (1996) reported; It has been found that the use of tire shreds and rubber-sand (with a tire shred to mix ratio of about 40%) in highway construction offers technical, economic, and environmental benefits. settlements, good drainage (avoiding the development of pore water pressure during loading), and usage of large quantities of local waste tires, which would have a positive impact on the environment .Akbulut *et al.* (2007) investigated modification of clayey soils using scrap tire rubber and synthetic fibers. This result showed that the unreinforced and reinforced sample was subjected to unconfined compression, shear box, and resonant frequency tests to determine their strength and dynamic properties. These waste fibers improve the strength properties and dynamic behavior of clayey soils. The scrap tire rubber, polyethylene, and Polypropylene fibers can be successfully used as reinforcement materials for the modification of clayey soils.

ENGINEERING PROPERTIES OF TIRE WASTES

Specific gravity of shredded tires ranges from 1.02 to 1.36. The specific gravity of soils ranges from 2.6 to 2.8. The unit weight of different types of compacted tire shreds as reported in literature range from 2.4 to 7KN/m³ (Humphrey and Menion 1992) these values are .1 to .4 times the unit weight of soil.

The effect of the compaction energy of the unit weight of tire shred and soil mixture is only with tire shred content is less than 25% .Tire chips are generally uniformly graded with specific gravity ranging from 1.02 to 1.27 specific weight of soil is just double than the tire chips.

The hydraulic conductivities of the mixture depend highly on % of soil –chip mix (Geosyntec construction 1998).

Shear strength increases as the tire chips size decreases and as the chip content increases shear strength of the mix increases.

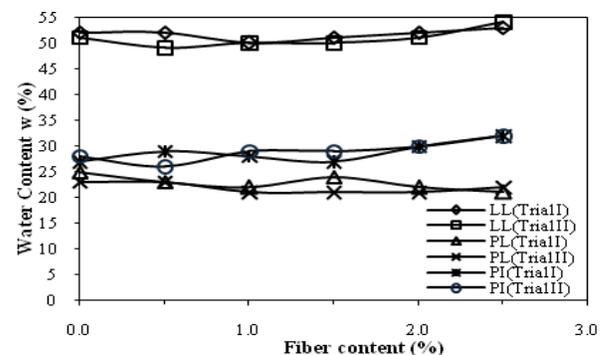


Figure 1: vibration of consistency limit

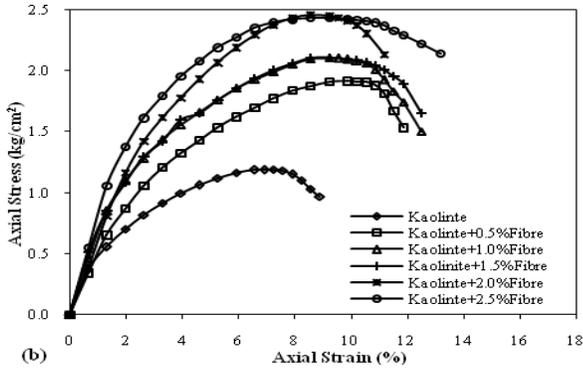


Figure 2 unconfined test sand

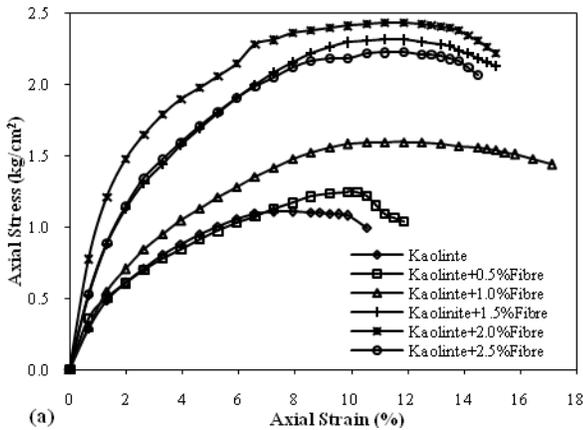


Figure 3: unconfined test clay

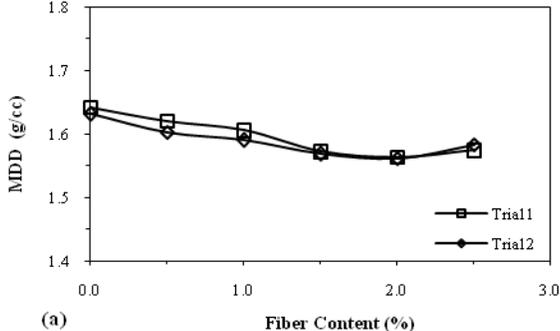


Figure 4: compaction characteristics (a,b)

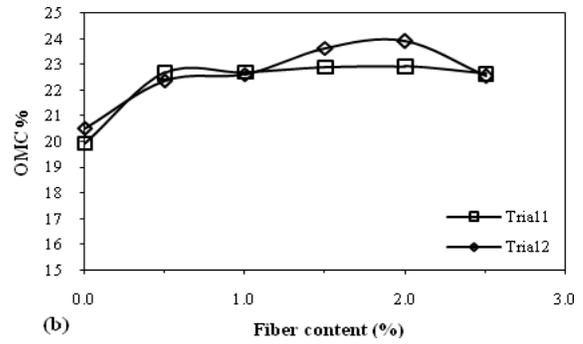


Table 1

% of tire chip	Average UCS (kg/cm ²)	Peak Axial Strain (%)	Avg. Cohesion, c (kg/cm ²)	Increase in Strength (%)
0.0	1.175	7.461	0.59	NA
0.5	1.589	9.875	0.79	34.83
1.0	1.765	10.091	0.89	50.35
1.5	2.087	9.872	1.05	77.55
2.0	2.354	9.650	1.18	99.79
2.5	2.230	11.181	1.12	89.45

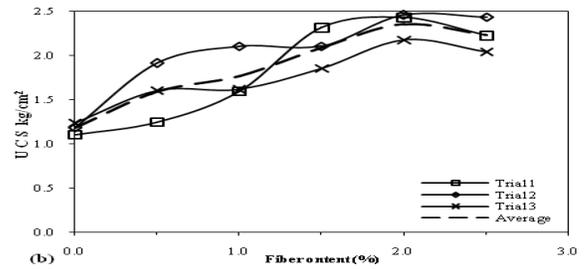


Figure 5: unconfined test mixed with tire chips

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Employee Level Inventory Control by Integrated Coding Of Raw Materials

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Abstract- Raw materials are commonly stored inventories or work in process inventories. These inventories are handled by employees include engineering team,raw material management team, and bottom level workers. Engineers are doing the technical as well as R&D task of raw materials. Management teammanages the raw materials in an economic way to avoid shortage. Workers employ physical means to get desired properties and desired shapes ofthe raw material. Lack of attention of any ofthe employee will badly affect the company's performance. This paper introduces a raw material management system using employee's attention. It is an integrated coding method. Three letters are used to represent each raw material, first alphabet is for R and D team, second alphabet is for raw material management team and last alphabet for thebottomlevelworkers. This integrated coding system will give an idea about how much attention is required to be given to each item by each employee.

Index Terms- Raw material control, inventory control, material management,integrated coding

I. INTRODUCTION

For the success of an industry it is important that concerned employees must know which raw material requires their utmost attention. In the case of raw material handling, this minute level attention is very important, because raw materials are the building blocks of the product. Most of the money of a short term budget in a production industry is spend for the raw materials. If employee attention is given to all raw materials in the making of a product, then it may not be economic. Different raw materials require attention from different employee level, for example costly raw materials need care from bottom level workers to avoid wastage, but the same raw material may not need that much care from raw material managers, because the chance for shortage may be less. An integrated coding system will help to develop sophisticated employee level raw material management. This integrated coding is very helpful when large varieties of raw materials are processed in the same industry. Then, it leads to a perfect management. This study is conducted at fabrication department of Kerala Automobiles Limited, Thiruvananthapuram, Kerala, India. This integrated coding system will reduce wastage of items and shortage of raw materials. It also helps to identify the material which requires cost effective Research and Development. Workers can reduce wastage of costly items, material engineers can identify proper raw materials which require R&D, and managers can avoid stock outs. This integrated coding will give corresponding information to raw material management team, raw material engineering team, and workers for proper attention during their work.

II. DATA COLLECTION

This work was done at fabrication department of Kerala Automobiles Limited. Raw materials used in the fabrication department was selected for this study. Material details are given below

Table 2.1: Data collection

SI NO	ITEM	QUANTITY NEEDED (for one product)	UNIT COST(RS)
1	M S SHEET(1mm)	6.25 kg	53.27
2	M S SHEET(1.5mm)	4.4 kg	53.27
3	M S SHEET(2mm)	5.7 kg	53.27
4	M S SHEET(2.5mm)	2 kg	54.52
5	M S SHEET(3mm)	0.6 kg	54.52
6	M S SHEET(4mm)	3 kg	47.85
7	M S SHEET(5mm)	0.2 kg	47.85
8	M S PIPE(40*2.5mm)	11m	189
9	M S PIPE(63.5*3.25mm)	0.643m	394

10	M S PIPE(46*3mm)	0.39m	261
11	M S PIPE(35*6mm)	0.508m	190
12	M S PIPE(35*2mm)	0.702m	135
13	MS PIPE (38*4mm)	0.534m	289
14	M S PIPE (42*1mm)	0.66m	88
15	M S PIPE(46*3mm)	0.39m	261
16	M S PIPE(56*3mm)	1m	322
17	M S PIPE(63.5*4mm)	0.92m	420
18	M S PIPE(42*3.5mm)	0.262m	269
19	M S PIPE(30*1mm)	1.343m	62
20	M S ROD(20mm)	1.343m	104

For the convenience of further calculations, the unit of quantity needed(initially in m and kg) was converted to a unique unit(kg). The corresponding data is given below

Table 2.2: Data with unique unit(kg) and corresponding unit cost

ITEM	QUANTITY NEEDED (Kg)	UNIT COST(rupees)
M S PIPE(40*2.5mm)	11.00	189.00
M S PIPE(63.5*4mm)	0.92	420.00
M S ROD(20mm)	3.31	104.00
M S SHEET(1mm)	6.25	53.57
M S PIPE(56*3mm)	1.00	322.00
M S SHEET(2mm)	5.70	54.52
M S PIPE(63.5*3.25mm)	0.64	394.00
M S SHEET(1.5mm)	4.40	53.57
MS PIPE (38*4mm)	0.53	289.00
M S SHEET(4mm)	3.00	47.85
M S SHEET(2.5mm)	2.00	54.52
M S PIPE(46*3mm)	0.39	261.00
M S PIPE(46*3mm)	0.39	261.00
M S PIPE(35*6mm)	0.51	190.00
M S PIPE(35*2mm)	0.70	135.00
M S PIPE(30*1mm)	1.34	62.00
M S PIPE(42*3.5mm)	0.26	269.00
M S PIPE (42*1mm)	0.66	88.00
M S SHEET(3mm)	0.60	54.52
M S SHEET(5mm)	0.20	47.85

III. WORK DONE

Integration of ABC, FSN, HML classifications are used here. ABC classification is helpful for the Research and Development team to identify the raw materials which need more concentration. FSN is helpful for avoiding shortage and reducing the carrying cost of items. HML classification is helpful for workers in reducing the wastage of costly raw materials.

3.1.ABC CLASSIFICATION

ABC classification is based on the usage value of raw materials. Usage value means, cost of a particular raw material in the manufacturing of a unit product. Each raw material has its own usage value. The items with high usage value are classified as A,

with moderate usage value are classified as B, and the items with lower usage value are classified as C. This idea will be helpful to the material engineers to identify items which need more Research and Development. The ultimate aim of almost all R&D processes is to reduce the production cost. So they try to reduce the usage value of each items. They can spend more time and money in high usage valued items.Reduction in usage value automatically leads to reduction in production cost. This will lead to profit of the company. The procedure is given below

1. Obtain the usage value of each item from the collected data.
Usage value of each item = Quantity demanded for single product * Unit Cost
2. Arranging the data in descending order based on usage values.
3. Classify the top 20% of the parts as A, the next 30% of the parts as B and the remaining parts as C.

Table3.1.1:Calculation of usage value

ITEM	NEED FOR SINGLE PRODUCT (Kg)	UNIT COST(RS)	USAGE VALUE
M S PIPE(40*2.5mm)	11.00	189.00	2079.00
M S PIPE(63.5*4mm)	0.92	420.00	386.40
M S ROD(20mm)	3.31	104.00	344.28
M S SHEET(1mm)	6.25	53.57	334.81
M S PIPE(56*3mm)	1.00	322.00	322.00
M S SHEET(2mm)	5.70	54.52	310.76
M S PIPE(63.5*3.25mm)	0.64	394.00	253.34
M S SHEET(1.5mm)	4.40	53.57	235.71
MS PIPE (38*4mm)	0.53	289.00	154.33
M S SHEET(4mm)	3.00	47.85	143.55
M S SHEET(2.5mm)	2.00	54.52	109.04
M S PIPE(46*3mm)	0.39	261.00	101.79
M S PIPE(46*3mm)	0.39	261.00	101.79
M S PIPE(35*6mm)	0.51	190.00	96.52
M S PIPE(35*2mm)	0.70	135.00	94.77
M S PIPE(30*1mm)	1.34	62.00	83.27
M S PIPE(42*3.5mm)	0.26	269.00	70.48
M S PIPE (42*1 mm)	0.66	88.00	58.08
M S SHEET(3mm)	0.60	54.52	32.71
M S SHEET(5mm)	0.20	47.85	9.57

Table3.1.2: ABC classification based on the usage value

ITEM	CLASS
M S PIPE(40*2.5mm)	A
M S PIPE(63.5*4mm)	A
M S ROD(20mm)	A
M S SHEET(1mm)	A
M S PIPE(56*3mm)	B
M S SHEET(2mm)	B
M S PIPE(63.5*3.25mm)	B
M S SHEET(1.5mm)	B
MS PIPE (38*4mm)	B
M S SHEET(4mm)	B
M S SHEET(2.5mm)	C
M S PIPE(46*3mm)	C

M S PIPE(46*3mm)	C
M S PIPE(35*6mm)	C
M S PIPE(35*2mm)	C
M S PIPE(30*1mm)	C
M S PIPE(42*3.5mm)	C
M S PIPE (42*1mm)	C
M S SHEET(3mm)	C
M S SHEET(5mm)	C

3.2.FSN CLASSIFICATION

FSN classification is used to classify the fastmoving parts from the slow and non-moving parts. The parts having the highest need in the manufacturing process are classified as fast moving and the parts having the least demand are classified as slow-moving. The remaining are classified as non-moving. This will be helpful for the raw material management team. They can arrange items based on the need for certain period of time, also care can be given for avoiding the shortage of items. Items having more chances for shortage are classified as F.

The FSN classification procedure is given below

1. Obtaining the annual need for each raw material.
2. Arranging the data in descending order based on the annual need.
3. Calculate the first and third limits (H1 and H3) as $(n+1)/4$ and $3(n+1)/4$, where “n” is the number of raw materials
4. Classifying the items using the following criteria:

If annual need $>H3$,Classify as Fast Moving

If annual need $<H1$,Classify as Non-Moving .Otherwise Classify as Slow Moving.

H1 and H3 for this situation (for $n=20$) is, $H1=5.25$, $H3=15.75$

Table3.2.1:Calculation of annual demand

SI NO	ITEM	QUANTITY NEEDED(in kg)	ANNUAL NEED (kg)
1	M S SHEET(1mm)	6.25	37500
2	M S SHEET(1.5mm)	4.4	26400
3	M S SHEET(2mm)	5.7	34200
4	M S SHEET(2.5mm)	2	12000
5	M S SHEET(3mm)	0.6	3600
6	M S SHEET(4mm)	3	18000
7	M S SHEET(5mm)	0.2	1200
8	M S PIPE(40*2.5mm)	27.63	165792
9	M S PIPE(63.5*3.25mm)	3.33	20000
10	M S PIPE(46*3mm)	1.35	8112
11	M S PIPE(35*6mm)	2.67	16079
12	M S PIPE(35*2mm)	1.23	7406
13	MS PIPE (38*4mm)	2.03	12234
14	M S PIPE (42*1mm)	0.69	4178
15	M S PIPE(46*3mm)	1.35	8112
16	M S PIPE(56*3mm)	4.22	25321
17	M S PIPE(63.5*4mm)	5.87	35220
18	M S PIPE(42*3.5mm)	0.96	5805
19	M S PIPE(30*1mm)	1.01	6073
20	M S ROD(20mm)	3.31	19862

Table 2.2.2Classification based on annual demand

NO	ITEM	CLASS
1	M S PIPE(40*2.5mm)	F
2	M S SHEET(1mm)	F
3	M S PIPE(63.5*4mm)	F
4	M S SHEET(2mm)	F
5	M S SHEET(1.5mm)	F
6	M S PIPE(56*3mm)	S
7	M S PIPE(63.5*3.25mm)	S
8	M S ROD(20mm)	S
9	M S SHEET(4mm)	S
10	M S PIPE(35*6mm)	S
11	MS PIPE (38*4mm)	S
12	M S SHEET(2.5mm)	S
13	M S PIPE(46*3mm)	S
14	M S PIPE(46*3mm)	S
15	M S PIPE(35*2mm)	S
16	M S PIPE(30*1mm)	N
17	M S PIPE(42*3.5mm)	N
18	M S PIPE (42*1mm)	N
19	M S SHEET(3mm)	N
20	M S SHEET(5mm)	N

3.3.HML CLASSIFICATION

The raw material are listed in the descending order of unit cost. This will help the workers to identify items, which need to be processed with minimum wastage. Items that require extra care are classified as H, minimum wastage should be maintained for such items. Since H items are very costly items, even wastage of small a small quantity will lead to a big loss. Items that need moderate care and moderate wastage are classified as M, whereas items that require fast processing are classified as L. For L items wastage is not important.

Table 3.3.1 Unit cost of items

SI NO	ITEM	UNIT COST(RS)
1	M S SHEET(1mm)	53.27
2	M S SHEET(1.5mm)	53.27
3	M S SHEET(2mm)	53.27
4	M S SHEET(2.5mm)	54.52
5	M S SHEET(3mm)	54.52
6	M S SHEET(4mm)	47.85
7	M S SHEET(5mm)	47.85
8	M S PIPE(40*2.5mm)	75.24
9	M S PIPE(63.5*3.25mm)	76.00
10	M S PIPE(46*3mm)	75.29
11	M S PIPE(35*6mm)	36.02
12	M S PIPE(35*2mm)	76.77
13	MS PIPE (38*4mm)	75.69
14	M S PIPE (42*1mm)	83.41
15	M S PIPE(46*3mm)	75.29

16	M S PIPE(56*3mm)	76.30
17	M S PIPE(63.5*4mm)	65.83
18	M S PIPE(42*3.5mm)	72.85
19	M S PIPE(30*1mm)	82.27
20	M S ROD(20mm)	109.00

Table 3.3.2. Classification based on unit cost

ITEM	COST (for 1kg)	CLASS
M S ROD(20mm)	109.00	H
M S PIPE (42*1mm)	83.41	H
M S PIPE(30*1mm)	82.27	H
M S PIPE(35*2mm)	76.77	M
M S PIPE(56*3mm)	76.30	M
M S PIPE(63.5*3.25mm)	76.00	M
MS PIPE (38*4mm)	75.69	M
M S PIPE(46*3mm)	75.29	M
M S PIPE(46*3mm)	75.29	M
M S PIPE(40*2.5mm)	75.24	M
M S PIPE(42*3.5mm)	72.85	M
M S PIPE(63.5*4mm)	65.83	M
M S SHEET(2.5mm)	54.52	M
M S SHEET(3mm)	54.52	M
M S SHEET(1mm)	53.27	M
M S SHEET(1.5mm)	53.27	M
M S SHEET(2mm)	53.27	M
M S SHEET(4mm)	47.85	M
M S SHEET(5mm)	47.85	M
M S PIPE(35*6mm)	36.02	L

IV. RESULT AND DISCUSSIONS

Each raw material was given a code by combining ABC, FSN and HML classifications. The integration of classifications are given in the table below

Table4.1.Classification and coding

NO	ITEM	ABC CLASSIFICATION	FSN CLASSIFICATION	HML CLASSIFICATION	ITEM CODE
1	M S SHEET(1mm)	A	F	M	AFM
2	M S SHEET(1.5mm)	B	F	M	BFM
3	M S SHEET(2mm)	B	F	M	BFM
4	M S SHEET(2.5mm)	C	S	M	CSM
5	M S SHEET(3mm)	C	N	M	CNM
6	M S SHEET(4mm)	B	S	M	BSM
7	M S SHEET(5mm)	C	N	M	CNM
8	M S PIPE(40*2.5mm)	A	F	M	AFM
9	M S PIPE(63.5*3.25mm)	B	S	M	BSM

10	M S PIPE(46*3mm)	C	S	M	CSM
11	M S PIPE(35*6mm)	C	S	L	CSL
12	M S PIPE(35*2mm)	C	S	M	CSM
13	MS PIPE(38*4mm)	B	S	M	BSM
14	M S PIPE(42*1mm)	C	N	H	CNH
15	M S PIPE(46*3mm)	C	S	M	CSM
16	M S PIPE(56*3mm)	B	S	M	BSM
17	M S PIPE(63.5*4mm)	A	F	M	AFM
18	M S PIPE(42*3.5mm)	C	N	M	CNM
19	M S PIPE(30*1mm)	C	N	H	CNH
20	M S ROD(20mm)	A	S	H	ASH

These item codes will help the employees to understand which type of care should be given for each raw material. This will help in storing, processing and ordering of raw materials according to their importance. For example, item with the code AFL have more usage value. So more care should be given to reduce the usage value. Also F indicates, it is a fast moving material, so care should be given to avoid stock outs. L indicates that less care is required, and processing time is important.

V. CONCLUSIONS

Wastage of costly items, improper storage of raw materials and shortage of items are the main problems in fabrication department. Till now there was no proper method for controlling inventories at employee level. Proper classification and coding of raw materials help to eliminate these problems. After the introduction of this integrated coding system, employees can identify the raw material which needs their care. Workers can identify the costly materials and give their attention to reduce its wastage. Manager can give care to avoid stock outs. If the usage value of an item reduces, the entire production cost of product gets reduced. So this is helpful for R&D to identify where the material research should be done. This method also has good application in the case of medium and small scale industries. This system will have more applications when this method is incorporated with electronic identification systems.

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Post-1971 Illegal Immigration from Bangladesh: A Demographic Changed Scenario of Assam

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Abstract- Illegal immigration from Bangladesh to Assam has been a burning problem and is adversely affecting the economy and social environment; creating law and order problem wherever they are present in sizeable number. It is due to both 'pull' and 'push' factors. Foremost among these are the economic factors (like better employment opportunities in India) while the poverty, subsistence living, ravages caused by flood and other natural calamities in Bangladesh act as push factors. The data provided in the study indicates that if necessary steps are not taken immediately, Assam, the elder sister of North-East India would lose its identity from the map of India very soon. To meet the problem, a few suggestions are forwarded in this paper.

Index Terms- Assam, Bangladesh, Demography, India, Illegal Immigration, Religion.

I. INTRODUCTION

Assam, the eldest sister amongst the seven sisters of NE-India possesses a very marked individuality and is situated between $24^{\circ} 3' N$ and $28^{\circ} N$ latitudes and $89^{\circ} 51' E$ and $96^{\circ} 1' E$ meridians of longitude. The state covers an area of 78,438 sq. km i.e., 2.39 percent of the total area of India and supports a population of 26,638,407 (2001) accounting for 2.59 percent of the total population of the nation. The state is surrounded by two foreign countries namely Bhutan and Bangladesh and it is obvious that there will be some sort of influx of population across the border. At present, out of the total twenty seven districts of Assam, the districts that have been facing mostly this crucial problem are Dhuburi, Goalpara, Barpeta, Morigaon and Nowgong of Brahmaputra valley and Karimganj and Hailakandi of Barak valley. Migration from Bangladesh into Assam is a serious and perennial problem over a century old. Only with India's independence did the migration become 'illegal'. Since then there have been dramatic changes in the scale and complexity and implications of migration.

Factors Responsible for Illegal Immigration from Bangladesh:

The implications of large-scale immigration from Bangladesh into Assam are going to be very grave. It is adversely affecting our economy and social environment; creating law and order problem wherever they are present in sizeable number. Hence, the danger due to on-going immigration is extremely known. Lt. Gen. (Retd.) S.K Sinha, the then Governor of Assam, in a report submitted to the president of India in November 1998 wrote, "As a result of population movement from Bangladesh,

the specter looms large of the indigenous people of Assam being reduced to a minority in their home state. Their cultural survival will be in jeopardy, their political control will be weakened and their employment opportunities will be undermined. This silent and invidious demographic invasion of Assam may result in loss of the geostrategically vital districts of Lower Assam (on the border with Bangladesh). The influx of these illegal migrants is turning these districts into a Muslim majority region.....Loss of Lower Assam will sever the entire land mass of the North-East from the rest of India and the rich natural resources of the region will be lost to the nation."

Illegal immigration is due to both 'pull' and 'push' factors. Foremost among these are the economic factors (like better employment opportunities in India) while the poverty, subsistence living, ravages caused by flood and other natural calamities in Bangladesh act as push factors. The major factors responsible for illegal immigration from Bangladesh are the following:

- Religious persecution of the Hindus and Buddhist forcing them to leave their homes.
- Islamic interests encouraging uncontrolled population growth and migration keeping in view the future expansion of the territory.
- Competitive politics of vote-bank and the patronage extended to them by political parties/vested political groups in India.
- Help rendered by organized groups of touts/anti-social elements.
- Increasing pressure on land and mounting unemployment in Bangladesh due to uncontrolled steep rise in population.
- Un-natural partition based on two nation theory; difficulties of Regional Planning.
- Recurrent floods and cyclones uprooting large segments of population.
- Better economic opportunities across the border.
- Porous and easily negotiable Indo-Bangladesh border.
- Dominance of fundamentalist agenda and fundamentalist groups in Bangladesh, and
- Presence of strong pro-Bangladesh lobby in India often creates myths and confuses Indians about the gravity of the problem.

Magnitudes of Illegal Immigration:

The problem of illegal immigration from Bangladesh into Assam and the other states of North-East India has been studied and analysed in recent years by a good number of social thinkers (Vergese et, al., 1980; Goswami and Gogoi, 1984; Hazarika, 1992; Weiner, 1993; Taher, 1997; Saikia, 2001; Bezbarua, 2001, Bhuyan, 2001; Deka, 2010) and from their studies the depth and magnitude of the said problem can be well understood. Let us see some other important facts in this regard:

- On the basis of Indian and Bangladesh documents one estimate holds that not less than one third of Assam's 22.38 million populations are immigrants and their descendants and that 10-14 million Bangladeshi migrants were settled in India (Hazarika, 1992).
- Another estimate by a former Governor of Arunachal Pradesh and West Bengal holds that about 5 million illegal migrants from Bangladesh are settled in Assam (Rajeswar, 1996).
- Central Home Ministry/Intelligence Bureau sources place Assam's alien population from Bangladesh at about 4 million.
- Another study estimates that 'based on the 1951 growth rate, the state of Assam should have a population of about 15 million. It has more than 7 million extra, according to 1991 Census. The extra numbers can be accounted for by either immigrants and/or their descendants' (Hazarika, 1994).
- The large-scale immigration was actually encouraged by the congress from early sixties mainly as a means of considering its vote-banks with alien voters and they began to pretend very doggedly that there were no illegal immigrants from Bangladesh in Assam, and that all the 'so-called' Bangladeshis were, in fact, Indian citizens (Bezbarua, 2001). But now, after the *Time Magazine* report of October 21, 2002 about the activities of the ISI and the Al Qaeda in Bangladesh, and the recent reports of the Home Ministry putting the total number of illegal immigrants from Bangladesh illegally living in India at about 15 million, the pseudo-secular political parties of India that had insisted on considering the religion of the illegal migrants, have become far less vocal about defending the illegal migrants or pretending that all of them are Indian citizens.
- Large-scale illegal infiltration has already reduced the indigenous people of Tripura into minority and is fast changing the demographic composition of more and more areas of Assam in their favour and is also aggravating the unemployment problem and tensions and conflicts over possession of unchanging land area, resulting in many agitation and law and order situations (Changkakoti, 2002).

Objectives of the Study:

The objectives of the present study are:

- I. To study the scenario of the post -1971 illegal immigration from Bangladesh to Assam and its impact on the demographic structure more particularly on the religious composition of population of Assam.

- II. To suggest some remedial measures to meet the problem.

Methodology:

For the present study data were collected merely from the secondary sources viz. several census reports of India during 1971-2001, books, journals, magazines, internet etc. The collected data were analyzed by employing the analytical method of research.

Delimitations of the Study:

1. The study was restricted to mainly the post -1971 illegal immigration from Bangladesh to Assam.
2. Regarding the sample for the study only the secondary data collected from the various Census reports of India from 1971 to 2001 were counted.
3. The impact of illegal immigration from Bangladesh was studied on the demographic structure more particularly on the religious composition of population of Assam.

Results and Discussion:

After independence of India, the affect of migration to Assam was the highest. The rate of migration may be divided broadly into two parts, pre-1971 and post-1971. Post-1971 period refers to the trend of migration after the creation of Bangladesh. The Illegal Migration (Determination by Tribunals) Act 1983 (IMDT) that came into force in Assam for detection of illegal migrants points out the illegal migrants is one who:

- Has entered into India on or after 25th day of March, 1971;
- Is a foreigner;
- Has entered into India without being in possession of a valid passport or other travel document or any other lawful authority in that behalf. (IMDT, 1983)

After the emergence of Bangladesh the immigration pattern has undergone changes. Census could not be conducted in Assam in 1981 due to disturbed condition prevailing at that time. So, our study for post-1971 period is restricted to the entire thirty year period i.e., 1971- 2001. Census was, however, conducted in the other North-Eastern states in 1981.

Table-I: District wise percentage decadal variation in population since 1971-2001

Districts	1971-1991	1991-2001	Average Decadal Growth
Dhubri	56.57	23.42	26.66
Kokrajhar	76.78	12.05	29.61
Bongaigaon	64.64	12.23	25.62
Goalpara	54.12	23.07	25.73
Barpeta	43.02	18.53	20.51
Nalbari	49.27	11.98	20.41
Kamrup	65.72	25.75	30.49
Darrang	55.63	15.79	23.80
Sonitpur	57.14	17.80	21.64
Lakhimpur	56.29	18.34	24.87
Dhemaji	107.50	18.93	42.14
Morigaon	50.90	21.29	24.06
Nagaon	51.26	22.30	24.52
Golaghat	58.12	14.21	24.00

Jorhat	33.10	15.84	16.13
Sivasagar	38.76	15.95	18.23
Dibrugarh	37.78	12.43	16.60
Tinsukia	47.03	19.52	22.18
Karbi Anglong	74.72	22.57	32.30
N.C. Hills	98.30	23.47	37.30
Karimganj	42.08	21.35	21.14
Hailakandi	45.94	20.92	22.28
Cachar	47.59	18.66	22..00

From the above table it is observed that the percentages of population during 1991-2001 decade were found increased among the districts like Dhubri, Goalpara, Morigaon, Nagaon, Barpeta, Karimganj and Hailakandi except the two hilly districts namely Karbi Anglong and N.C. Hills and Kamrup (city).

Table-II: Growth Rate of population of three major religious communities, their growth rates and percentages to total population during 1971-2001.

Religious community	Total Population			Percentage to total population			Growth Rate	
	1971	1991	2001	1971	1991	2001	'71-91	'91-2001
Hindu	10,604,618	15,047,293	17,296,455	72.51	67.13	64.89	41.89	14.94
Muslim	3,592,124	6,373,204	8,240,611	24.56	18.43	30.92	77.42	29.30
Christian	381,010	744,367	986,589	2.61	3.32	3.70	95.37	32.54
Others	47,400	247,458	97,505	0.32	1.12	0.36	426.28	-60.91
Assam	14,625,152	22,414,322	26,655,528	100	100	100	53.26	18.92

The data presented in the above table shows the high growth rate among the Christians during the periods of 1971-1991 (95.37%) and 1991-2001 (32.54%), which was largely due to conversion from other religions, mostly from Hindus. On the other hand, if we compare the growth rates between the two major religious communities of Assam i.e., Hindu and Muslim, we see that their growth rates were decreased in the period of 1991-2001 i.e., 14.94% and 29.30% respectively as compared to the periods of 1971-1991 (41.89% and 77.42% respectively). But, it is observed that the growth rates were found greater among Muslim community than that of the Hindu community in all the periods. Here, a question may be aroused as where is the illegal immigrants? For answering this, let us take the data from 1971 to 1991 and analyze it:-

If the figures of all the non-Muslim communities are combined together, the growth rate comes to 45.39 per cent for the twenty year period. The decadal growth rate is, therefore, calculated at about 20.38 percent. The natural growth rate of Assam in 1991 for all the religious groups combined is estimated as 19.4 per thousand. If the natural growth rate for the non-Muslims is slightly lower than 19.4, say 19 per thousand, then the excess of about four lakhs non-Muslims may be due to migration for the entire twenty years from 1971 to 1991. If the decadal natural growth rate for the Muslims during this period is considered to be 20.5 per cent, then the growth rate for this period is calculated at 45.2 per cent. In that case, the excess of about 11.5 lakhs may be considered as illegal immigrants of

Muslims, mostly from Bangladesh. It may be mentioned that only a few entered Assam with passport during this period.(Bhuyan, 2001).

Table-III: District wise population percentages of Hindu, Muslims and other religions in Assam during 1991-2001

Districts	1991			2001		
	Hindu	Muslim	Others	Hindu	Muslim	Others
Dhubri	28.73	70.45	.82	24.74	74.29	.97
Kokrajhar	66.38	19.33	14.29	65.60	20.36	14.04
Bongaigaon	64.00	32.74	3.26	59.18	38.52	2.3
Goalpara	39.89	50.18	9.93	38.22	53.71	8.07
Barpeta	40.26	56.07	3.67	40.19	59.37	.44
Nalbari	77.48	19.94	2.58	76.05	22.10	1.85
Kamrup	74.32	23.38	2.3	72.80	24.78	2.42
Darrang	60.54	31.98	7.48	57.74	35.54	6.72
Sonitpur	80.20	13.33	6.47	76.58	15.94	7.48
Lakhimpur	79.70	14.50	5.8	79.06	16.14	4.8
Dhemaji	93.87	1.49	4.64	95.95	1.84	2.21
Morigaon	54.56	45.31	.13	52.21	47.59	.2
Nagaon	51.73	47.19	1.08	47.80	51.00	1.2
Golaghat	86.12	7.11	6.77	85.94	7.91	6.15
Jorhat	93.59	4.32	2.09	92.86	4.77	2.37
Sivasagar	89.26	7.63	3.11	88.21	8.15	3.64
Dibrugarh	91.30	4.49	4.21	90.79	4.50	4.71

Tinsukia	90.18	3.13	6.69	89.48	3.48	8.3
Karbianglong	84.82	1.57	13.61	82.40	2.22	15.38
N.C. Hills	72.92	2.21	24.87	69.91	2.48	27.61
Karimganj	50.15	49.17	.68	46.70	52.30	1.00
Hailakandi	43.71	54.79	1.5	41.11	57.63	1.26
Cachar	63.42	34.49	2.09	61.37	36.13	2.5

From the Table-III it is clear that during 1991-2001 periods, the percentages of Hindu population were decreased in each and every district of Assam whereas the population percentages of Muslim community were increased in every district. This picture indicates that Assam is going to be a Muslim dominated state near future.

Table-IV: Growth of Muslim population (%) in some of the Border Districts of Assam during 1971-2001.

Districts	1971-1991		1991--2001	
	Hindu	Muslim	Hindu	Muslim
Dhubri	-6.07	+6.0	-4.0	+3.84
Goalpara	-11.0	+8.6	-1.68	+3.61
Barpeta	-9.4	+7.3	-.10	+8.9
Karimganj	-4.9	+5.0	-5.5	+3.1
Marigaon	-4.85	+4.90	-2.34	+2.29
Nagaon	-7.87	+7.3	-3.93	+3.90

It is clear from the above Table-IV that in some border districts of Assam the percentages of Hindu population have been decreasing decade to decade whereas it is increasing in case of the Muslim population. Various studies of renowned thinkers of the state have already proved it with data that Muslim migrants have entered to these border districts in large numbers along with the Hindu migrants (Bhuyan, 2002). With the help of analysis of data, they have also showed that the natural growth rate of Muslims should not have much difference between Bangladesh and Assam; but the difference in actual rate clearly confirms the migration of Muslims to Assam during 1971-2001 (Kumar, 2002).

Some Recommendations to Meet the Problem:

Uncontrolled illegal immigration of the Bangladeshis is a serious problem the country is facing today. It is no more a regional problem, as they are spreading throughout the country now. How to deal with millions of these illegal migrants is a question to which there are no easy answers. Here, we would like to put some recommendations taken at a two-day National Seminar on “Illegal Migration from Bangladesh” organized by Astha Bharati in association with the Centre for North-East Studies and Policy Research (C-NES) in New Delhi on 27 and 28 November, 2001:

- Illegal migration from Bangladesh must be recognized as a national problem and not a regional issue. The Central and State Governments must not underplay the gravity of the threat posed to national security.
- All political parties should put the issue of illegal migration and their view on ways to tackle it on their agenda.

- The Central Government should appoint a National Immigration Commission to frame a National Migration Policy and a National Refugee Policy. The Commission should examine ways of strengthening the Foreigners Act, 1946, as well as feasibility of Identity Cards for both citizens and non-citizens and Work Permits for migrants.
- The Illegal Migrants Determination by Tribunal Act of 1983 should be repealed.
- Preventive measures should be taken urgently to curb further illegal migration. The existing Border Security Force posts and the BSF water wing should be strengthened and border fencing, patrolling and lighting should be improved.
- The National Register of Citizens of 1951 should be reviewed, computerized and updated. The process of updating the NRC should be done regularly and citizen registration should be made compulsory by law.
- Governments, non-government organizations and media should launch campaigns to educate the public about the dangers inherent in illegal influx.

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An Implementation of Algorithms in Visual Cryptography in Images

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Abstract- Visual Cryptography is a new Cryptography technique which is used to secure the images. In Visual Cryptography the Image is divided into parts called shares and then they are distributed to the participants. The Decryption side just stacking the share images gets the image. The initial model developed only for the bi-level or binary images or monochrome images. Later it was advanced to suit for the Colour Images means Gray Images and RGB/CMY Images. For the RGB/CMY Images different methods are developed based on the colour decomposition techniques.

I. INTRODUCTION

With the rapid advancement of network technology, multimedia information is transmitted over the Internet conveniently. Various confidential data such as military maps and commercial identifications are transmitted over the Internet. While using secret images, security issues should be taken into consideration because hackers may utilize weak link over communication network to steal information that they want. To deal with the security problems of secret images, various image secret sharing schemes have been developed. Visual cryptography is introduced by first in 1994 Naor and Shamir.[1] Visual cryptography is a cryptographic technique which allows visual information(e.g. printed text, handwritten notes and pictures) to be encrypted in such a way that the decryption can be performed by the human visual system, without the aid of computers. Naor and Shamir [1], in 1994 proposed a new security technique named visual cryptography scheme. In this technique, a secret image of type binary is encoded in a cryptographical manner into random binary patterns which contains n shares in a k -out-of- n scheme. The n shares are distributed among n participants in such a way the each participant's share is not known to another participant. The secret image can be visually revealed by k or more participants by joining all the shares available. Even if computational power decoding is available, cannot be done on the secret image by $k-1$ or fewer participants.

Pixel	White 	Black 
Prob.	50% 50%	50% 50%
Share 1	 	 
Share 2	 	 
Stack share 1 & 2	 	 

Fig. 1- Construction of (2, 2) VC Scheme

In fig. 1 If each pixel p of the SI is encoded into a pair of subpixels in each of the two shares. pixel. If a pixel p is white, the superposition of the two shares always outputs one black and one white subpixel. If p is black, it yields two black subpixels. There is a contrast loss in the reconstruction, however the decoded pixel is readily visible.

As the shares in the layers occur as random noise, the attackers cannot identify any useful information about the individual shares. Even with the availability of computer, it is not possible to decrypt the message or information with the limited availability of the share. The limitation of the above method is its randomness without any visual information. Extended Visual Cryptography have been suggested which also suffers from the same drawbacks of randomness. This paper is well thought-out as follows, Section II deals with the review of literature. Section III described image encryption technique. Section IV offers comparison. Finally the conclusion of this paper in Section V.

II. LITERATURE SURVEY

Recently in the literature, many new methods have been implemented for visual cryptography. In 1994 Naor and Shamir [1], have developed the *Visual Secret Sharing Scheme (VSSS)* to implement this model[Naor95]. In k out of n VSSS(which is also called (k, n) scheme), an binary image(picture or text) is transformed into n sheets of transparencies of random images. The original image becomes visible when any k sheets of the n transparencies are put together, but any combination of less than k sheets cannot reveal the original binary image. In the scheme, one pixel of the original image is reproduced by m subpixels on

the sheets. The pixel is considered “on”(transparent) if the number of transparent subpixels is more than a constant threshold, and “off” if the transparent subpixels is less than a constant lower threshold, when the sheets are stacked together. The contrast α is the difference between the on and off threshold number of transparent pixels. Which predicted an optimal dissimilarity in k-out-of-n scheme to alleviate the contrast loss problem in the reconstructed image. A visual cryptography scheme is a broad spectrum method which is based upon general access structure. In k-out-of-n secret sharing scheme, any k shares will decode the secret image, which reduce the security level.

Rijimen presented a new 2-out-of-2 VC scheme by applying the idea of colour mixture. The stacking two transparencies with different colours leads to raises a third mixed colour.

A new method of Extended Visual Cryptography for natural images is used to produce meaningful binary shares which is predicted by Nakajima[2] in the year 2002 presents a system which takes three pictures as an input and generates two images which correspond to two of the three input pictures. The third picture is reconstructed by printing the two output images onto transparencies and stacking them together. Generally, visual cryptography suffers from the deterioration of the image quality. In this also describes the method to improve the quality of the output image.

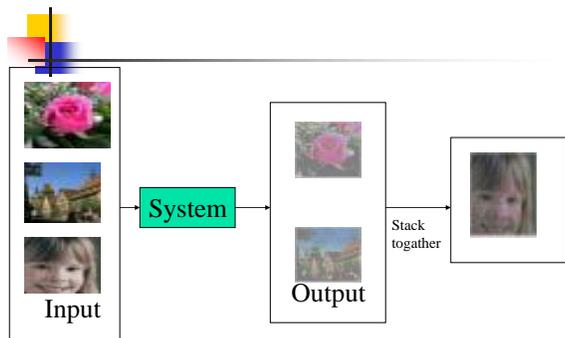


Figure- 2 The basic idea of the proposed system.

Hou[3] has proposed the binary visual cryptography scheme which is applied to gray level images, that a gray level image is converted into halftone images in the year 2004. The method that uses the density of the net dots to simulate the gray level is called “Halftone” and transforms an image with gray level into a binary image before processing.

According to this first transformed the gray level image into a halftone image and then generated two transparencies of visual cryptography. Obviously we indeed cannot detect any information about the secret image from the two sharing transparencies individually, but when stacking them together, the result clearly shows a picture.

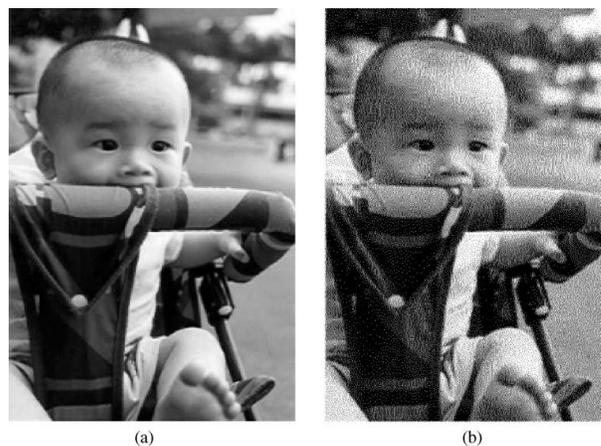
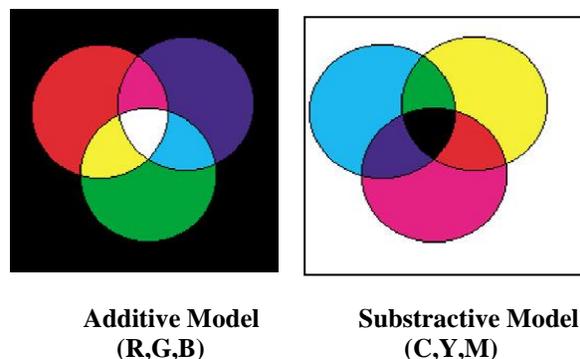


Fig. 4. (a) Continuous tone, and (b) Halftone

Hou[3] shares generated by applying halftone methods and colour decomposition. He decomposed the colour image into three (yellow, magenta and cyan) halftone images and then improvised three coloured 2-out-of-2 VC schemes which follow the subtractive model. Thus in the (C,M,Y) representation (0,0,0) represents full white and (255,255,255) represents full black.



The earlier methods in VC, however, the colour schemes for 2-out-of-2 secret sharing where the reconstructed colours are interpreted by some mixing rules of colours. For colour shares the general construction of a k-out-of-n VC scheme was first introduced by Verheul All of these VC schemes for colour images generate random pattern shares. Even though the decrypted messages show messages with distinct colours, it is more desirable to produce meaningful shares which are less suspicious of encryption. Some other approaches to colour VC aiming to generate meaningful colour shares.

In 2006 the Zhi Zhou, Gonzalo, R.Arce and Giovanni Dicrescenzo [4] have proposed halftone visual cryptography which produce good high quality and meaningful halftone shares, the generated halftone shares contain the visual information. In halftone visual cryptography a secret binary pixel „P” is encoded into an array of $Q1 \times Q2$ („m” in basic model) sub pixels, referred to as halftone cell in each of the „n” shares. By using halftone cells with an appropriate size, visually pleasing halftone shares can be obtained and also maintained contrast and security. Based on the blue noise dithering principles the proposed method utilizes the void and cluster algorithm. Abhishek parakh and Subhash Kak have proposed recursive threshold visual

cryptography which is used in network applications and also reduce the network load.

In 2009 the Inkoo Kang,, Gonzo R. Arce,, and Heung-Kyu Lee [5]have proposed the Visual Cryptography for color image using visual information pixel (VIP) synchronization with error diffusion technique. They are introduced a color Visual Cryptography encryption method which leads to significant shares and is free of the previously mentioned limitations. This method is used to filtering the error in an image and produces the meaningful shares. The error filtering schemes for color images is very simple and efficient method.

In 2010 Chandramathi [6]proposed an overview of Visual Cryptography. This technique allows Visual information (pictures, text, etc) to be encrypted in such a way that their decryption can be performed by the human visual system, without any complex cryptographic algorithms. This technique encrypts a secret image into shares such that stacking a sufficient number of shares reveals the secret image. Shares are usually presented in transparencies. In this paper we provide an overview of the emerging Visual Cryptography (VC) and related security research work done in this area.

1. Visual cryptography for general access structures.
2. Visual cryptography for gray level images.
3. Recursive Threshold visual cryptography.
4. Extended visual cryptography for natural images.
5. Halftone visual cryptography.
6. Visual cryptography for color images. .
7. Progressive color visual cryptography.
8. Regional incrementing visual cryptography (RIVC).
9. Segment based visual cryptography.

In 2010 Anantha Kumar Kondra, Smt. U.V. Ratna Kumari proposes “ An Improved (8,8) Colour Visual Cryptography Scheme using Floyd Error Diffusion[7]. Which introduce a new solution helps to identify the error in the shares and to verify the authentication.

In 2011 S. Kandar, Maithi and Dhara [8]proposes a visual cryptographic scheme for color images where the divided shares are enveloped in other images using invisible digital watermarking. The shares are generated using random number. Like other multimedia components, image is sensed by human. Pixel is the smallest unit constructing a digital image. Each pixel of a 32 bit digital color image are divided into four parts, namely Alpha, Red, Green and Blue; each with 8 bits. Alpha part represents degree of transparency.

A 32 bit sample pixel is represented in the following Figure.

11100111 11011001 11111101 00111110
Alpha Red Green Blue

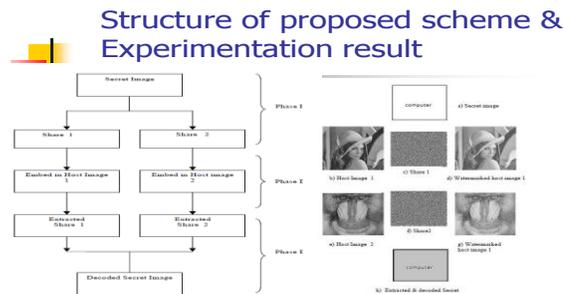
Fig3: Structure of a 32 bit pixel

To add more security to this scheme a technique called digital enveloping is used. This is nothing but an extended invisible digital watermarking technique.

In 2011 Mrs. Bhandare Shital, Mr. Jhade Manoj & Mrs. Jadhav Angarika [10] introduces An improved approach for Extended Visual Cryptography Scheme for Colour Images.

Visual Cryptography is an image encryption technique used to hide the secure information in images. It allows the encryption of secret image into n number of shares and distributed into n number of participants. For example in (k, n) secret sharing problem the secret image can be visually recover by stacking together any k or more transparencies of the shares. But cannot reveal any secrete information by stacking less than k transparencies together. The Embedded EVCS is constructed by adding random shares of secret image into meaningful covering images.

A visual cryptographic technique to secure Image shares by Jagdeep Verma in 2012[9] proposes an approach for embedding visual cryptographically generated image shares in the host images to provide authentication for the VC shares and makes these secret shares invisible by embedding them into host images.



In 2012 Tripta Deendayal & Ch.Sunitha [11] introduces Enhanced Visual Cryptography Using color Error diffusion and Digital Watermarking.

A new visual cryptography scheme is proposed for hiding information in images which divide secret images into multiple shares. In order to provide more security to existing schemes a new Technique called Digital Watermarking is used, and to improve the quality and size of images obtained color error diffusion technique is used .secret information can be retrieved by stacking any k number of decrypted shares. which reduces the color sets that renders the halftone image and chooses the color whose brightness variation is minimal.

In 2012 Dr.D.Vasumathi1 M.Surya Prakash Rao, M.Upendra Kumar3 Dr.Y.Ramadevi4 Dr.R.Rajeswapra Rao[12] introduces Novel Approach for Color Extended Visual Cryptography Using Error Diffusion. Error-diffusion scheme that produces higher quality results. The error filter employed in the error diffusion also affects the share quality. An error filter with longer weight leads to high contrast of encryption shares. The algorithm is faster than the universally used Floyd-Steinberg algorithm, while maintaining its original simplicity.

III. PERFORMANCE ANALYSIS OF VISUAL CRYPTOGRAPHY SCHEMES

Various parameters are recommended by researchers to evaluate the performance of visual cryptography scheme. Naor and Shamir [1] suggested two main parameters: pixel expansion m and contrast α . Pixel expansion m refers to the number of subpixels in the generated shares that represents a pixel of the original input image. It represents the loss in resolution from the original picture to the shared one. Contrast α is the relative difference in weight between combined shares that come from a white pixel and a black pixel in the original image.

Accuracy is considered to be the quality of the reconstructed secret image and evaluated by peak signal-to-noise ratio (PSNR) measure. Computational complexity concerns the total number of operators required both to generate the set of n shares and to restructure the original secret image C .

The meaningful shares generated in Extended visual cryptography proposed by Mizuho NAKAJIMA and Yasushi. Zhi Zhou, Gonzalo R. Arce, and Giovanni Di Crescenzo proposed halftone visual cryptography which increases the quality of the meaningful shares. Also maintains contrast and security.

Colour contrast is improved in VIP synchronization. The watermarked images possess good Peak Signal to Noise Ratio (PSNR) and good visual quality.

From above literature some of them advised security, pixel expansion, accuracy and computational complexity as a performance measures. Security is satisfied if each share reveals no information of the original image and the original image cannot be reconstructed if there are fewer than k shares collected. Visual cryptography scheme should support wide image format like color and gray scale. Author also argued that random looking shares appear to be suspicious and thus are vulnerable to attacks by attackers in the middle, to fill in this security gap, meaningful shares should be produced. VCS should support multiple secret to work efficiently. If scheme support only one secret to share at a time to share multiple secret images numerous share have to be generated, transmitted and maintained.

Table 1. Comparison of visual cryptography schemes on the basis of number of secret images, pixel expansion, image format, type of share generated.

Sr. No	Authors	Year	Number of Secret images	Expansion	Image Format	Type of Share generated
1.	Naor and Shamir	1995	1	4	Binary	Random
2.	Nakajima	2002	1		Binary	Meaningful
3.	Young-Chang Hou	2003	1	4	Color	Meaningful

4.	Z. Zhou	2006	1	4	Binary	Meaningful
5.	Inkoo Kang,	2009	1	4	Color	Meaningful
6.	Jagdeep Verma, Dr.Vineeta	2012	1	4	Color	Meaningful
7.	Dr.D.Vasumathi1 M.Surya Prakash Rao2 Rao5	2012	1	4	Color	Meaningful

m indicate pixel expansion of corresponding visual cryptography schemes, c number of colors in visual cryptography schemes, n is the number of shares. As shown in the Table 1 shows visual cryptography schemes with pixel expansion. If $m > 1$ large storage space required to store and transmit the shares. Schemes with $m=1$ are good candidate for secure transmission over limited bandwidth communication networks. Meaningful shares can be helpful to avoid attacks by hacker. Scheme supporting color images are useful in the multimedia environment. Less overhead for storage and transmission is required to share multiple secrets while using the scheme. In order to hide secrecy we go for expansion and increasing of the number of shares, but this affect the resolution. Therefore an optimum number of shares are required to hide the secrecy. At the same time security is also an important issue. Hence research in VC is towards maintaining the contrast at the same time maintaining the security.

IV. CONCLUSIONS

Visual cryptography is the current area of research where lot of scope exists. Currently this particular cryptographic technique is being used by several countries for secretly transfer of hand written documents, financial documents, text images, internet voting etc. There are various innovative ideas and extensions exist for the basic visual cryptographic model introduced till now. The decoded secret image quality is improved. Yet many possible enhancements and extensions can be made to improve further.

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Estimation of 24 Hour Protein in CKD Patients by analyzing the Protein/Creatinine Ratio of Four Spot Urine Samples

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Abstract- The study was aimed to evaluate whether which spot urine protein to creatinine ratio (PC) can be a reliable alternative to 24-hour urinary total protein (UTP) estimation by analyzing four day time spot urine samples of CKD clinic patients.

We studied 48 CKD patients attending Nephrology unit with different nephritis such as diabetic nephropathy, CKD due to hypertension and unknown etiology (28male and 20 female) with proteinuria over 1g/day (GFR > 45 ml/min/1.73m²) to determine the correlation between the measures of urine protein excretion by using four spot urine samples namely early morning, 7am - 10 am, 10am-4pm and before going to bed. The simple linear regression, central tendency and dispersion were calculated. The Friedman test was done to evaluate difference among urine protein levels of 4 day time urine samples.

The mean 24 hour protein concentration was 3.8g/day ± 1.6 and the correlation coefficient (*r*) between 24-hour urine total protein and spot urine PC ratio were early morning 0.81 (*P* < 0.001), 7am - 10 am 0.64 (*P* < 0.001), 10am-4pm 0.66 (*P* < 0.001) and before going to bed 0.792 (*P* < 0.001) in the study population. Early morning spot urine sample showed the highest linear association whereas the 7am-10am and 10am-4 pm shows lower associations compared to other two spot urine samples. Highest and lowest median of PC ratio were 7 am -10am and before going to bed respectively. Highest dispersion of PC ratio was observed in 10am-4 pm and the distribution of before bed is somewhat skewed to right. We conclude that the protein-to-creatinine ratio (PC) in early morning urine sample is an accurate, convenient, and reliable method to estimate the protein excretion in urine in study population in early stages of CKD.

Index Terms- urine protein to creatinine ratio, spot urine sample, 24 hour urine protein estimation, early morning

I. INTRODUCTION

Protein in urine is recognized as an independent risk factor for cardiovascular and renal disease and as a predictor of end organ damage. In particular, detection of an increase in protein excretion is known to have both diagnostic and prognostic value in the initial detection and confirmation of renal disease (1), and the quantification of proteinuria can be of considerable value in assessing the effectiveness of therapy and the progression of the disease (2). The National Kidney Foundation of USA has

recommended that an increase in protein excretion be used as a screening tool in patients at risk of developing renal disease (3). An increase in protein excretion has been used in the early detection of several specific conditions, e.g. preeclampsia, diabetic nephropathy, and nephrotoxicity attributable to drugs (1-3). The variation in urine protein excretion from 100 % to 500% throughout the day could be attributed to several factors including variations in water intake, amount of exercise, food pattern and life style of the different populations. The variation may be further exacerbated by pathologic changes in blood pressure and renal architecture. Only some studies concluded that ethnic genetic and unmeasured environmental factors may contribute to proteinuria in patients (4).

Measurement of protein excretion in a 24-hour urinary collection is the gold standard for the quantification of proteinuria. 24-hour urinary collection is used to smooth the fluctuations in proteinuria over the day and gives precise results. However, this method is time consuming, cause inconvenience to patients and often unreliable because of frequent errors in timing the 24 hour sample especially in outpatient setting and for infants and children (5,6,7).

Several authors have studied the relationship between the urine protein to creatinine ratio of different day time spot samples and 24-hour protein excretion in patients with different types of nephritis which provides a more convenient way to calculate the protein excretion. Kidney Disease Outcomes Quality Initiatives (KDOQI) of United States National Kidney foundation guidelines for chronic kidney disease recommended that assessment of proteinuria in adults and children should be conducted in spot urine sample(2). Some studies show that the protein to creatinine ratio in samples collected in the mornings a reliable estimation of 24 hours protein in patients with glomerulonephritis while second voided urine sample is suggested in another study. Therefore this study was aimed to evaluate which spot urine protein creatinine ratio can be a reliable alternative to 24-hour urinary protein (UTP) estimation by analyzing four day time spot urine samples of patients with different nephritis such as diabetic nephropathy, CKD due to hypertension and unknown etiology attending renal clinics in Sri Lanka.

II. MATERIAL AND METHODS

The ethical clearance was taken from the Ethical committee conducted by the Faculty of Medicine, University of Peradeniya, Sri Lanka and informed consent was taken from each participant. Forty eight (48) CKD patients with different types of nephritis such as diabetic nephropathy, due to hypertension and unknown etiology attending nephrology unit at General Hospital Kandy were selected for the study. The age range of the patients was 18 to 65 years. CKD patients with GFR greater than 45 ml/min/1.73m² were chosen for the study including 28 male (age 54±11) and 20 female (age 47±8) Patients. Clinical records (files) of the patients were considered and 24 hours protein greater than 1g/24 hours were selected for the study. Although clear instructions were given for all patients regarding urine sample collection, 6 (11%) patients were excluded due to substandard urine collection. Ten milliliters (10 ml) of four (4) spot urine samples namely early morning, spot samples between 7am - 10 am and 10am-4pm and before going to bed were collected, centrifuged and supernatants were frozen immediately at -20⁰ C for one day. The 24 hour urine sample was also collected in the same day. The concentrations of total protein in urine in both 24 hour and spot samples were measured by using turbidometric assay (U/CSF protein assay kit, sensitivity-4mg/dl) and the urine creatinine of spot urine samples were measured by using modified Jaffe method (Roche reagent). The PC ratios of all spot samples were calculated by dividing protein concentration (mg/dl) by urine creatinine concentration (mg/dl). Central tendency and data dispersion were observed with a box-plot diagram and Friedman test was done to evaluate whether there are significant differences among evaluated 4 day time spot urine samples. The relationship between 24HUP and PC ratio were evaluated with Pearson correlation coefficient and simple linear regression analysis by using Minitab statistical soft ware.

III. RESULTS

The box plot diagram depicts PC ratio of the four study samples. According to the box plot the highest median was observed during samples collected between 7 am -10am and

lowest was before parting to bed. Highest dispersion observed during 10am-4 pm and the distribution was skewed to right in samples collected before going to bed.

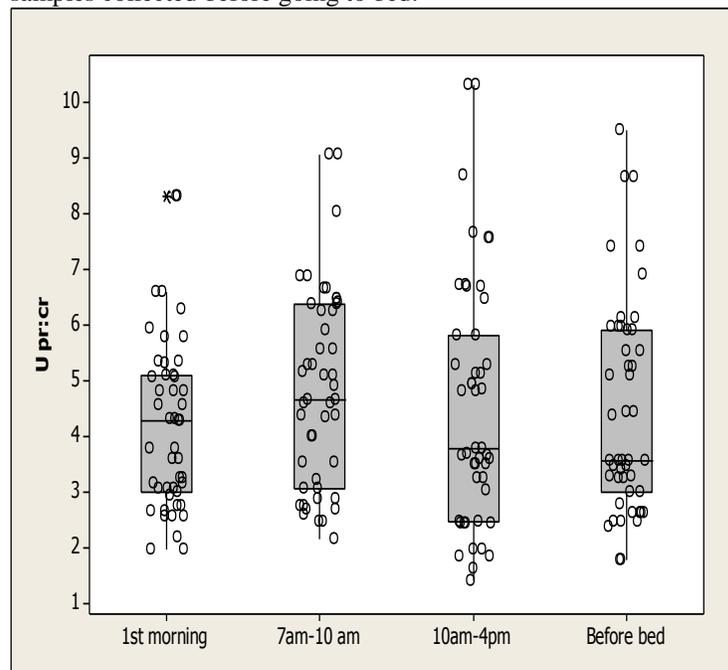


Figure 1- Box plot diagram of PC ratios of four spot urine samples

The relationship between 24-hour urine total protein and spot urine PC ratio were tested with Pearson correlation coefficients. All PC ratios of spot urine samples showed significant linear relationships (<0.0001) with 24-hour urine total protein.

The correlation coefficient (r) between 24-hour urine total protein and spot urine PC ratio are given in Table 1.

	Early morning	7am to 10am	10am-4pm	Before bed
Correlation coefficient	0.81	0.64	0.66	0.79
P value	<.0001	<.0001	<.0001	<.0001

Table 1. Correlation coefficient between 24 hour urine total protein and spot urine PC ratios

Early morning spot urine sample showed the highest linear relationship whereas the 7am-10am and 10am-4 pm samples showed lower linear relationships compared to other spot urine samples.

Regression models involve total urinary proteins as independent variable and PC ratio as the dependant variable which helps to understand how the typical value of the PC ratio changes when total UTP is varied.

The Friedman test was applied to compare the effect of time on PC ratios. The Friedman test provides the desired test of null hypothesis; all time effects are zero vs. alternative hypothesis: not all time effects are zero. The PC ratio versus time was blocked by patients and the test statistic, had a p-value of 0.446 (P>0.05). Therefore the data do not support that the overall median difference as an effect of time.

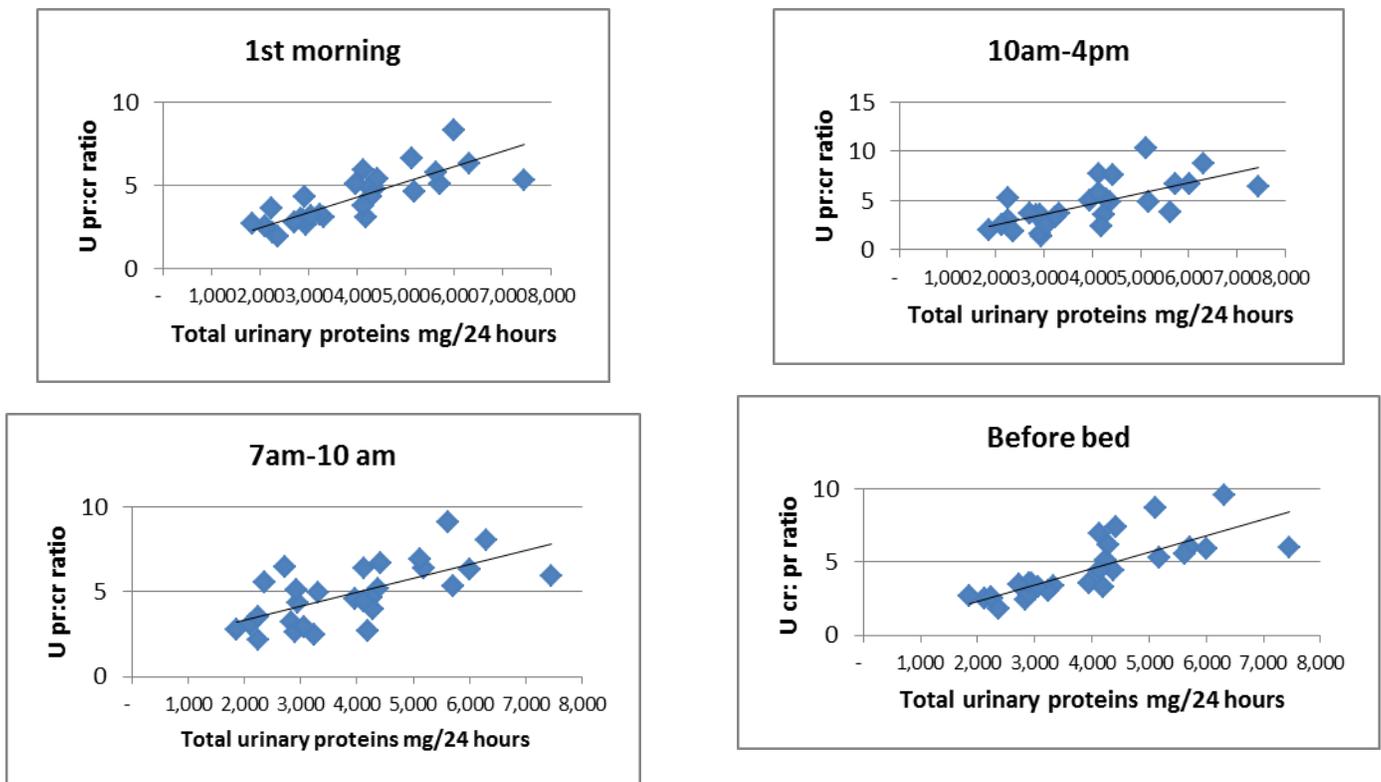


Figure 1 – Relationship between PC ratio in spot urine samples and 24 hour total urine protein

Spot urine sample	Regression equation	R2	P value
1 st morning	$U\ pr:cr=0.63192+0.00091971\times 24HUpr$	0.6617	<.0001
7-am-10am	$U\ pr:cr=1.6424+0.00082484\times 24HUpr$	0.4055	<.0001
10am-4pm	$U\ pr:cr=0.36161+0.00107\times 24HUpr$	0.4363	<.0001
Before bed	$U\ pr:cr=0.12113+0.00111\times 24HUpr$	0.6265	<.0001

Table 2- Regression equations for spot samples

IV. DISCUSSION

Quantification of proteinuria is important for monitoring disease progress and the response to therapies in patients with different types of nephritis such as diabetic nephropathy, due to hypertension and unknown etiology. Recently, collecting 24 h urine sample for estimation of total protein has been the standard method(8,9). However, 24 h urinary collections are cumbersome and frequently unreliable

due to inadequate collection (11% samples were discarded in this study due to incomplete sample collection) hence a reliable and convenient estimation easy measure like the spot urine PC ratio would be ideal in clinical practice. This study investigated the agreement between 24 h urine total protein and urine PC ratio of four spot urine samples in patients with diabetic nephropathy, CKD due to hypertension and unknown etiology.

Several investigators studied the relationship between the PC ratio and 24-h protein excretion. Ginsberg et al. (10) was investigated a correlation coefficient of 0.972, these authors also studied the variation of this relationship during the course of 24 h

by studying the PC ratio and absolute amount of protein excreted in urine samples 24 hours from 46 patients collected over timed periods throughout the day. They identified that the relationship varied by as much as 30% but that during normal daylight activity when most random samples are likely to be collected the variation was minimal. The greatest differences were seen during the times when the patients were most likely to be recumbent. These authors concluded on the basis of these data that the PC ratio of a spot urine could be used as a reliable estimator of the 24-h urine protein excretion. Further, several investigators have made similar observations and drawn similar conclusions (11), whereas others have stated a preference for the first sample collected after the first morning void (12,13). However, some authors have pointed out that regression analysis and the reporting of a correlation coefficient indicate the degree of linear association between the two variables but do not enable a reliable decision to be made to replace one with the other (14). Thus, the high degree of association between the PC ratio and the 24-h protein excretion does not necessarily give reliable information on whether use of the ratio in a random sample will enable clinicians to reduce their dependence on the 24-h urine collection.

Another study showed that urine protein excretion was influenced by physical activity. They studied 48 patients with proteinuria and varying levels of physical activity to determine the correlation between the measures of urine protein excretion. The correlation coefficient (r) between 24-hour urine total protein and random urine P-C ratio was 0.75 ($P < 0.01$) in the overall study population, but varied according to the level of proteinuria and physical activity in a stratified analysis. They conclude that the random urine P-C ratio is a reliable and practical way of estimating and following proteinuria, but its precision and accuracy may be affected by the level of patient physical activity(15).

The present study also revealed that a best correlation coefficient of 0.812 with early morning urine sample and the Friedman test was used to detect differences in 4 day time spot urine samples that not showed any significant difference among them.

According to the kidney disease management guidelines, 24 h urine total protein <0.5 g/day has been used as one of the remission criteria for diagnosing kidney diseases. Proteinuria of >1 g/day is considered as clinically significant or a threshold to recommend renal biopsy, while proteinuria >3.5 g/day is severe in the nephrotic range. In this study, proteinuria > 1 g/day were considered for calculation and analysis because renal biopsies are rarely carried out in our health system therefore we can conclude that early morning PC ratio of spot urine sample shows the highest linear relationship with 24 hour protein excretion.

Therefore we conclude that the protein-to-creatinine ratio (PC) in early morning urine sample is an accurate, convenient, and reliable method to estimate the 24 hour protein excretion in urine in study population in early stages of CKD patients (protein excretion >1 g/day). Other three urine samples such as 7am-10am, 10am-4pm and before bed will also be used for the estimation.

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Empirical Nexus between Teaching/Learning Resources and Academic Performance in Mathematics among Pre-University Students in Ile-Ife, South-West Nigeria

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Abstract- The education system in Nigeria is faced with a mirage of defects which include inadequate provision of teaching and learning resources as a result of poor planning and corruption among other things. This study considers the effect of teaching/learning resources on academic performance in mathematics among pre-university students in Ile-Ife, South-West, Nigeria.

A total of 126 questionnaires were administered among two major pre-university schools in Ile-Ife, Nigeria. The research instrument developed for this research is student's questionnaire on performance (SQP) to answer at least three research questions on academic performance of students in mathematics. Correlation analysis, coefficient of determination and multiple regression analysis were used to analyze the data.

In all analyses, we find that all the independent variables considered could not account well for academic performance of students in mathematics. Cogent recommendations were made based on our empirical findings.

Index Terms- Teaching/Learning aids, Mathematics, Academic Performance, Pre-University Students, Nigeria, Regression Analysis.

I. INTRODUCTION

Globally, education is viewed as an essential pathway to making a total child. As noted by Wolfenson (2000), Yara & Otieno (2010), it is a fundamental human right. The pivot to sustainable development, stability and tranquility within and among nations is the provision of education to the populace of such countries. Availability and adequacy of teaching/learning resources promote the effectiveness of schools as these are basic things that can trigger good academic performance in the students. Resources (both human and non-human) are germane to overall students' outcome. Maicibi (2003) submitted that all institutions or organization are made up of human beings (workers) and other non-human resources which can be manipulated to realize set objectives. Yara & Otieno, (2010) asserted that the abstract nature of mathematics should be reduced through demonstration, practical methods and use of teaching/learning materials like relevant textbooks; classroom/laboratories; stationeries/teaching aids; textbooks and trained teachers. Agwagah (1997) observed that the problem of ineffective teaching can be tackled through planned and intelligent application of the mathematics laboratory.

Teachers are very important human resources to achieve the objectives of a school system. Teachers are usually responsible for teaching and learning process in the schools. They are important inputs in the educational system which involves highly-skilled labour resources that combine with educational materials (Hansen, 1996). They are that largest most critical inputs of an educational system (Combs, 1968). Teachers are the backbone of the entire educational system. Their effectiveness is perhaps the most vital function affecting the future development of education process Akudu(2007). Ukeje(1979) described them as the hub of the educational system. They are seen as role model in the schools and custodians of knowledge. According to Balogun (1995), teacher's job does not end at teaching effectively and efficiently only, but he is a model, as his students look up to him both as a mirror and as an instrument of learning, not only does what he says but what he does also matter. The outcomes of their efforts are typically represented by grades. The consequence of these opinions is that well trained teachers in mathematics if well deployed to the secondary schools will produce students who will perform academically well in mathematics. Mathematics is the pillar of science and technology and its functional roles in the development of science and technology is multi-dimensional that no area of science, technology and business enterprise escapes its application (Okereke, 2006, Okigbo and Osuafor, 2008). Ukeje (1986) posited mathematics as the backbone of civilization in all the centuries of meticulous calculation, and the most basic discipline for any person who would be truly educated in any science and in many other endeavours.

The problem of poor performance in mathematics as a subject is global and it is a serious concern to parents and education stakeholders (Valverde and Schmidt 1997; Mudulia, 2012). This problem is made worse in developing countries by the existing digital divide, poverty and other problems unique to the third world especially Nigeria. Mathematics being a compulsory subject up to pre-university level especially in social science and science oriented subjects. Despite the importance placed on mathematics, researchers (Odili, 1986; Salau, 1995; Amazigo, 2000; Agwagah, 2001; Betiku, 2001; Obioma, 2005; Maduabum and Odili, 2006; Okereke, 2006 Okigbo and Osuafor, 2008) had observed that students lack interest in the subject and perform poorly in it. During the past few years, performances in Mathematics in National examinations such as General Certificate Examination, WASC, NECO, NBTE and UTME) have dropped significantly and this has been a major concern for the society. Ale (2012), submitted that lack of interest in

mathematics and mass failure in mathematics at school certificate level and the country could not achieve its transformation agenda without promoting the study of sciences through mathematics. This paper aims to determine the connection between teaching/learning resources and academic performance in mathematics among pre-university students in south-western Nigeria. Two major pre-university institutes were used as case studies viz Damico Educational Institute and Obafemi Awolowo University Parent Assisted Coaching Centre, both situated at Ile-Ife, South-West Nigeria.

The rest of this paper is organized as follows: Section 2 is on literature review, section 3 on the research design and methodology, section 4 discusses the results of empirical analyses while section 5 is on conclusion and recommendation.

II. REVIEW OF RELATED LITERATURES

Setidisho (1996) asserted that mathematics is a fulcrum on which understanding of most other fields hang. Probably, no subject forms such a binding force among the various branches of science - physical, biological and social as mathematics (Adetoye & Aiyedun, 2003, Olatoye 2007). Mathematics is the universal language of science and central intellectual discipline of the technological societies (Kalejaye, 1985; Odeyemi, 1995). A student needs fundamental knowledge of mathematics like change of subject to understand density which appears under major topics like Ecology in Biology, diffusion in Chemistry and Floatation in Physics. Students' achievement in mathematics at both Junior and external examinations worsen as years go by (Oyedeeji, 2000).

Many other researchers confirm low performance in mathematics at both the qualifying examination (SSCE) and placement examination like Unified Tertiary Matriculation Examination – UTME (Ukeje, 1991; Buhari, 1994 & Okoro, 2005).

If the vision 20:2020 will be a reality, the education to develop human resources should be given much attention. In particular, low quality education in Science and Mathematics is an urgent issue to be addressed. In response to the request, there have been massive manpower development through workshops/in-service training of teachers by National Teacher Institute and National Mathematical Center and other relevant agencies and also the procurement of mathematics kits to enhance Mathematics and Science education in secondary schools and pre-university in Nigeria. All the aforementioned efforts will not yield the desirable fruits if the teaching activities are not students centered, based on experiments and improvisation where necessary. Mathematics laboratory is a place where students can learn and explore various mathematical concepts and verify different mathematical facts and theories using varieties of activities and material (Igbokwe, 2000; Okigbo and Osuafor, 2008). The use of mathematics laboratory helps to synchronize theory and practical work in mathematics teaching /learning. Ohuche (1990) advocated the need for moderately equipped mathematics laboratories. Yadar (2007, Yara & Otieno, (2010) opined that no course in Science and Mathematics can be considered as complete without including some practical work. The practical work ought to be carried out by individuals either in Science laboratories or in classes. They stated further that at

school level, practical work is even more important because of the fact that we learn by doing. Scientific practices and applications are thus rendered more meaningful. It is an established truth that an object handled impresses itself more firmly on the mind than the object merely seen from a distance or in an illustration. Thus practical work forms an important feature in any Science and Mathematics Course (UNESCO, 2008; Yara & Otieno, 2010).

Yara & Otieno, (2010) opined that the teaching/learning of Longitudes and Latitudes in mathematics can be accompanied by improvising a metallic or plastic globe and using it in locating the position of an object along the equator. The current dearth of teachers through attrition is serious concern to all and sundry. Students in most public schools are worst heated with mirage of overcrowded classrooms and lack of adequate learning resources. Consequently, they do not get individual attention from their teachers. On many occasion, they lack adequate textbooks and laboratory equipment. As a result, the students may lose hope in performing well in academic work. This is in sharp contrast to private schools where the numbers of students are few as there are adequate learning resources and the teachers are willing to sacrifice their time to ensure that the students perform well in examination.

Indigent students from low socio-economic status families tend to value domestic activities more than schooling. Such children are subjected to child labour, street hawking and they have little time for studies. Financial problems and penury which are prevalent in the third world nations have been major impedance to effective undertaking of the major government financed programmes. In most developing nations, there are many families whose members despite full days hard labour who find it hard to make two ends meet. Children of tender age in such families have to work for their living. These coupled with little government financing of education sector makes many families unable to meet the requirements for their children's education thus contributing greatly to their abysmal academic performance. All these are perceived to be responsible for students' poor performance in external examinations.

In the spirit of Yara and Otieno(2010),we intend to investigate some of the indices and yardsticks used to measure academic performance in mathematics among a sample of pre-university mathematics students in South-West Nigeria in this study. The research questions considered in this study are written below:

- Is there any empirical relationship between availability of teaching/learning resources and students' academic performance in mathematics?
- Is there any significant relationship between availability of mathematics laboratory and students' academic performance in mathematics?
- Is there any empirical relationship between availability of mathematics textbooks and students' academic performance?

III. HYPOTHESES OF THE STUDY

H₀: There is no significant difference between the effect of availability of mathematics textbooks, availability of mathematics laboratory and availability of teaching/learning resources on students' academic performance in mathematics.

i.e $H_0: X_1=X_2=X_3$ VS
 H_1 : Not H_0 .

IV. RESEARCH DESIGN AND METHODOLOGY.

A descriptive research of the survey was adopted in this study. A total of 126 questionnaires were administered among two major pre-university schools in Ile-Ile, south west Nigeria, using simple random sampling technique. The research

instrument developed for this research is student's questionnaire on performance (SQP) to answer at least three research questions on academic performance of students in mathematics. The data collected was analyzed using frequency count, percentage score. Correlation analysis, coefficient of determination and multiple regression analysis formed part of the inferential analysis adopted in the study.

V. EMPIRICAL ANALYSIS AND RESULTS

This section contains the various empirical analyses carried out in this research. The frequency counts and percentages are contained in the tables 1-4 below:

Table 1: SCHOOL

	Frequency	Percent	Valid Percent	Cumulative Percent
DAMICO	76	60.3	60.3	60.3
OAU PRE - SCHL	50	39.7	39.7	100.0
Total	126	100.0	100.0	

Table 2: T/L RESOURCE AVAILABLE

	Frequency	Percent	Valid Percent	Cumulative Percent
YES	109	86.5	86.5	86.5
NO	17	13.5	13.5	100.0
Total	126	100.0	100.0	

Table 3: AVAILABILITY OF MATHS LAB

	Frequency	Percent	Valid Percent	Cumulative Percent
YES	24	19.0	19.0	19.0
NO	102	81.0	81.0	100.0
Total	126	100.0	100.0	

Table 4: NUMBER OF MATHS TEXTBOOKS USED

	Frequency	Percent	Valid Percent	Cumulative Percent
ONE	23	18.3	18.3	18.3
TWO	35	27.8	27.8	46.0
MORE THAN TWO	68	54.0	54.0	100.0
Total	126	100.0	100.0	

Table 5: CORELATION MATRIX

		PERFORMAN CE IN MATHS	NO. OF MATHS TEXTBK	T/L RESOURCE AVAIL	AVAIL OF MATH LAB
Pearson Correlation	PERFORMANCE IN MATHS	1.000	-.135	-.068	-.003
	NO OF MATHS TEXTBK	-.135	1.000	-.040	.120
	T/L RESOURCE AVAIL	-.068	-.040	1.000	-.194
	AVAIL OF MATH LAB	-.003	.120	-.194	1.000
Sig. (1-tailed)	PERFORMANCE IN MATHS	.	.066	.226	.489
	NO OF MATHS TEXTBK	.066	.	.330	.091
	T/L RESOURCE AVAIL	.226	.330	.	.015
	AVAIL OF MATH LAB	.489	.091	.015	.
N	PERFORMANCE IN MATHS	126	126	126	126
	NO OF MATHS TEXTBK	126	126	126	126
	T/L RESOURCE AVAIL	126	126	126	126
	AVAIL OF MATH LAB	126	126	126	126

Table 6: Regression Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					
	R Square Change	F Change	df1	df2	Sig. Change	F Change	R Square Change	F Change	df1	df2
1	.154(a)	.024	.000	.76977	.024	.984	3	122		.403

a Predictors: (Constant), AVAIL OF MATH LAB, NO OF MATHS TEXTBK, T/L RESOURCE AVAIL

Table 7: ANOVA(b)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.748	3	.583	.984	.403(a)
	Residual	72.291	122	.593		
	Total	74.040	125			

a Predictors: (Constant), AVAIL OF MATH LAB, NO OF MATHS TEXTBK, T/L RESOURCE AVAIL

b Dependent Variable: PERFORMANCE IN MATHS

Table 8: Model Coefficients(a)

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta	B	Std. Error
1	(Constant)	2.409	.462		5.219	.000
	NO OF MATHS TEXTBK	-.137	.090	-.138	-1.532	.128
	T/L RESOURCE AVAIL	-.151	.188	-.073	-.801	.424
	AVAIL OF MATH LAB	.000	.179	.000	-.002	.999

a Dependent Variable: PERFORMANCE IN MATHS

Table 1 above, shows the two pre- university institutions captured in this research. one represented government owned and the other represented the private owned institution. 76(60.3%) were from Damico Educational Institution while others were randomly selected from OAU pre-varsity coaching center. Table 2 revealed that 86.5% of the respondents made use of teaching /learning aid. On the other hand, only 19.3 were being taught with aid of mathematics laboratory. Our survey also shows that a good number of the respondents possessed more than two mathematics textbooks. The correlation matrix in table 5 revealed that there is negative correlation between students'

academic performance in mathematics and the correlates considered in this study. The multiple regression model using number of mathematics possessed(X1) teaching/learning resources availability(X2) and mathematics laboratory(X3) as predictors of performance in mathematics (Y) gives the following model:

$$Y=2.409-0.137X_1-0.151X_2$$

The coefficient revealed that these variables accounted for only 2.4% of academic performance in mathematics among the students considered.

Result from the ANOVA table in table 7 above, shows that there is no significant difference between the effects of availability of mathematics textbooks, mathematics laboratory; and availability of teaching/learning resources on students' academic performance in mathematics. We fail to reject H_0 at $\alpha = 0.05$ since $p\text{-value} > 0.05$, hence the test is not significant.

VI. CONCLUDING REMARKS AND RECOMMENDATION

A lot of deductions have been made in this study. The fact that only 19.3% of the respondents are being taught with the aid of mathematics laboratory shows the pathetic state of education in Nigeria. Government and education stakeholders should provide mathematics laboratory in the schools in order to aid students' performance in mathematics. Also, the correlation matrix depicts negative correlation between the predictors and the dependent variables X_1, X_2, X_3 . This reveals that there is opposite relationship between these variables. The coefficient of determination obtained from the regression model shows that these variables can only account for 2.4% performance in mathematics. It means these variables (availability of teaching/learning resources, availability of mathematics laboratory and the number of textbooks) do not account for students' performance in mathematics. The result of this study is in support of Birgen (2005), Yara and Otieno (2010).

Government and private institutions should provide enough teaching/learning aid to students in order to enhance academic performance in mathematics. Parents should be sensitized on the importance of textbooks to academic performance of their children in mathematics. Government should collaborate with private institutions and NGOs in order to establish mathematics laboratory in schools. Moreso, The National Mathematic Center of Nigeria (NMC) should critically look into how mathematics kits could be made available for the use of students to aid performance. Also, funds should be extended to private institutions. NGOs and other funding agencies should collaborate with private educational institutes like Damico Educational Institute, Ile-Ife, Nigeria to augment the efforts in trying to halt the abysmally low performance rate of students in mathematics.

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Anodization of Aluminum

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Abstract- The investigation into the effect of time and voltage on anodization of aluminum using 0.1M concentration and 2.5 pH of H₂SO₄ electrolyte, under 35°C and 2.22amp/cm² current density was carried out. The result obtained showed that as the time and voltage increases the thickness of the coating on the surface of aluminum increases giving a much desired product for industrial and domestic use.

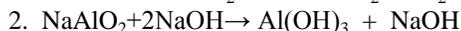
The optimum parameter for the coating was found to be 40minutes and 40volts for a thickness of 800µm.

Index Terms- Anodization, coating, electrolyte, thickness, time, and voltage.

I. INTRODUCTION

Anodization is the chemical change brought about by the passage of a direct current through and electrolyte via an aluminum anode and a suitable metal as cathode.

Basic Reaction



Anodization of aluminum is formed by exothermic reaction on the external surface of aluminum or aluminum alloys with the nascent atomic oxygen produced by the electrolysis of an aqueous electrolyte. The electrolyte can be a solution of sulphuric acid, chromic acid, phosphoric acid and oxalic acid. The excellent corrosion resistance of pure aluminum is largely due to its affinity for oxygen. This results in the production of a very thin but tenacious oxide film which covers the surface as soon as a freshly cut piece of metal is exposed to the atmosphere.

Anodization can find its use in protection application against corrosion and abrasion; and since it is an extremely versatile process capable of giving coating of great thickness, durability and highly corrosion resistance, it is therefore used for naval equipment. It is also used in interior decoration, in the design work and more also in architectural design in making of sliding door, sliding window and cotton rail. It is also use in decorating motor vehicle.

II. MATERIALS AND METHOD

Apparatus: Thermometer, Voltammeter, Ammeter, Flexible wire, Anodizing bath made of high density polyethene materials, A.C. source (feedback generator), Beaker, 1 liter cylindrical flask, pH indicator, Oven.

Material: 0.1M H₂SO₄, 0.1M NaOH, 0.1M HNO₃, Ionized water, Aluminum anode, Lead cathode, Sand paper

Anodization Condition: temperature 35°C, Current density 2.22 amp/cm², 0.1M H₂SO₄

Procedure:

Anodizing bath made of high density polyethene material was washed and rinsed with water and 0.1M H₂SO₄ (electrolyte) to remove dirt and greasy materials.

The anodizing solution was prepared to a concentration of 0.1M H₂SO₄ in a 500ml conical flask. The pH and the specific gravity of the baths were measured to be 2.5 and 1.251 using pH indicator and a specific bottle respectively.

The aluminum piece (anode) to be anodized was first washed thoroughly with soap to remove the dirt and later rinsed with water. The aluminum piece was then degreased using 0.1M NaOH, to allow for clean surface, and after rinsed in distilled water. The piece was introduced into a warm air circulation oven operating at 65°C, from which they came out perfectly dry. The lead material (cathode) was clean with cloth and washed with distilled water to remove dirt.

The weighed aluminum piece (anode) and the lead (cathode) were inserted into the bath solution and connected to the positive and negative terminal of the D.C. generator respectively.

The current was switched on and the voltage was adjusted to 10volt, it was allowed to flow for 10 minutes and the current was switched off. The anodized aluminum was removed and rinsed with distilled water and dried in the oven. The anodized aluminum was then reweighed to ascertain the thickness of the coating. The experiment was then repeated severally. After the anodizing process, thorough observations were made on the nature and surface properties of the anodized aluminum, and these properties were noted. The anodized were rinsed thoroughly with distilled water and dried in the oven at the temperature of 60°C for 30 minutes, to ensure complete drying of the anodized aluminum.

III. EXPERIMENTAL RESULTS AND DISCUSSION

Table I: Effect of corresponding increase in time and voltage on anodized aluminum.

Bath	Time (min)	Voltage (v)	Observation
Bath I	10	10	Not noticed
Bath II	20	20	Thin bright deposit
Bath III	30	30	Thin bright deposit
Bath IV	40	40	Bright smooth deposit
Bath V	50	50	Rough burnt deposit

Table II: Effect of voltage variation on anodized aluminum at constant time.

Bath	Time (min)	Voltage (v)	Observation
Bath I	40	10	Thin bright deposit
Bath II	40	20	Thin bright deposit
Bath III	40	30	Bright smooth deposit
Bath IV	40	40	Bright smooth deposit
Bath V	40	50	Bright smooth deposit

Table III: Effect of time variation on anodized aluminum at constant voltage.

Bath	Time (min)	Voltage (v)	Observation
Bath I	10	40	Not Noticed
Bath II	20	40	Not Noticed
Bath III	30	40	Thin bright deposit
Bath IV	40	40	Bright smooth deposit
Bath V	50	40	Rough burnt deposit

Table IV: Effect of Voltage on the thickness of the anodized aluminum.

Time (min)	10	20	30	40	50
Voltage (v)	10	20	30	40	50
Thickness (µm)	160	241	480	800	960

From the results obtained it was observed that there was no notice in the first 20 minutes until a thin bright deposit was observed after 30 minutes. But there was bright smooth deposit at 40 minutes, while in the fifth case where the time was increased to 50 minutes, rough burnt deposit was seen. This implies that 40 minutes is the optimum time for the anodization process.

IV. CONCLUSION

The optimum voltage and time for the anodization process has been determined after careful observation of the coat formed on the surface of the aluminum. It was found that at 40 volts and 40 minutes, the aluminum was effectively anodized and, the coating formed was very smooth and clear.

APPENDIX

$$\text{thickness} = \frac{P2 - P1}{S} \times D$$

Where: P_2 - weight after anodization
 P_1 - weight before anodization
S - surface area of the aluminum
D - density of the aluminum

Sample 1		Sample 2
P_2	58g	57.5g
P_1	57g	56g
S	22.5cm ²	22.5cm ²
D	2.771g/cm ³	2.771g/cm ³
thickness	160μm	241μm

$$\begin{aligned} \text{Current density} &= \frac{\text{Current}}{\text{Surface}} \\ S &= \text{Surface Area (22.5cm}^2\text{)} \\ I &= \text{Current (50amp)} \\ \text{Current density} &= \frac{22.5}{50} \\ &= 2.22 \text{ amp/cm}^2 \end{aligned}$$

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Assessment of the existing rehabilitation protocol relative to the International standard protocol for knee soft tissue injuries among school level rugby players in the Kandy zone

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Abstract- Objective: To assess the existing rehabilitation protocol relative to the international standard protocol for knee soft tissue injuries among school level rugby players in Kandy zone. **Design, setting and sample:** A retrospective whole population survey was conducted among division A and B, 45 school level male rugby players (Under 17 and 19) who had undergone knee soft tissue injuries in the Kandy zone, Sri Lanka. **Measurements:** A self-administered questionnaire which contained 21 close ended (Yes/No) questions on acute, rehabilitation and training stages which prepared according to the international standard rehabilitation protocol developed by human kinetics organization. **Results:** According to the responses obtained from the self-administered questionnaire; 24.4 % followed the rehabilitation stage, 4.4 % followed the training stage and none of the players followed the acute stage of the rehabilitation process. Even though the players were not following all the five components of acute stage accurately, they have followed each component separately, such as protection (75%), rest (57%), ice (37%), compression (60%) and elevation (8%). Approximately 71% of players were engaged in stretching and 62% in endurance training in the rehabilitation stage. However majority of players (77%) got back to their sport before getting proper recovery. The study revealed that 24.44% of knee injured players were props in their teams. 40% of these players have got recurrent injuries in their histories. The study identified that the percentage of availability of sport physician and physiotherapists to be 35.55% and zero respectively. This indicated that the entire rehabilitation process is not being implemented among Kandy zone school level rugby players. **Conclusion:** In conclusion, the results of this study showed that, the implementation of the rehabilitation protocol in the Kandy zone, Sri Lanka is not up to international standard. Therefore, an internationally standard rehabilitation protocol should be adapted by the Kandy zone school level rugby players in Sri Lanka

Index Terms- Knee; Rugby; Rehabilitation; Soft tissue injuries

I. INTRODUCTION

Rugby is a popular, contact sport among all the team sports with high incidence of injuries which impose both psychological and physiological stress on the player [1, 2]. In this game players are required to demonstrate speed, stamina, strength and agility [3]. The major location of injuries occur during rugby is lower limb (60%) due to major weight bearing area of the body and the most common diagnosis is musculoskeletal injuries which are muscle and tendon (50%) and joint (non-bone) and ligament (41%) injuries [1, 4, 5]. In the lower limb, knee is the common site which causes serious issues on players among 16-25 years old [6, 7]. Majority of these injuries result from the contact phase, with the main cause of being tackle [8].

School sports are also not risk free and it is the largest contributing factor to injuries at school [9, 10]. These injuries are most commonly occurred in rugby (43%) [9]. A high level player with a major knee injury has a high incidence of knee osteoarthritis, because defect in articular cartilage have limited ability to heal and may progress to osteoarthritis [11]. In addition to that, it may prevent the injured person from playing rugby or other sports. Thus, it may cause economic, social, physical and psychological problems to the player.

Therefore, after an injury, it is essential for the injured player to gain normal functional level. This is the main goal of rehabilitation. Hence, it is necessary to eliminate pain and reestablish range of motion, technique, and coordination, while at the same time avoiding the loss of muscle strength and endurance, during the period that the athlete cannot train to the maximum capacity [12].

The existing internationally recognized protocol is established by the Human Kinetic Network which is the largest international research based forum on sport medicine. According to them, there are certain elements to be done during the different phases of Rehabilitation. Rehabilitation can be divided into three stages;

- Acute stage - lasts a few days to weeks.
- Rehabilitation stage – lasts from weeks to months.
- Training stage – lasts a few weeks to months.

These stages often overlap. What determines when an athlete will pass from one stage to another is not the time that has elapsed but the progress the patient has made.

In the acute stage, it is essential to begin the effective PRICE principle as soon as possible. Here, "P" stands for Protection, "R" for Rest, "I" for Ice, "C" for Compression and "E" for Elevation. The goal of the protection and rest is to avoid further injury and reduce the blood supply to injured area which has a high blood flow during the activity. In rehabilitation stage, the main goal is to prepare the athlete to train normally and the main considerations here are pain and swelling. That is, it is necessary to ensure: normal range of motion, normal strength, normal neuromuscular function and normal aerobic capacity.

The goal of the training stage is to ensure that the athlete regains his normal ability to perform in the sports, to tolerate the loading that is unavoidable in competition, and to tolerate normal amounts of training before being allowed to complete again.

In considering standard protocol for soft tissue injury management which has developed by Human Kinetic Organization, the protocol used in Sri Lanka might be different from the standard. Therefore, it is necessary to have an idea about this protocol. However, research on rugby is extremely limited in Sri Lanka. The purpose of this study was therefore, to assess the rehabilitation protocol practiced in soft tissue injuries in rugby specified to knee in the Kandy zone.

II. METHOD

Data of this retrospective survey for assessment of the existing rehabilitation protocol relative to the International standard protocol for knee soft tissue injuries among school level male rugby players in the age groups of under 17 and 19 years in the Kandy zone was collected via a self-administered questionnaire. Items in the questionnaire pertaining to injury management were prepared according to the international standard protocol for soft tissue injury management developed by the Human Kinetic Organization [12]. Ethics approval for this survey was granted by the ethical committee of the Faculty of Allied Health Sciences, University of Peradeniya.

The questionnaire was categorized into three parts, such as part A, B and C. Additional items detailing age, gender, school and matches which were missed due to injury were included into part A and C. Part B consisted of questions that were related to acute stage, rehabilitation stage and training stage. Acute stage management was assessed by correctly identifying application of PRICE principle. Rehabilitation and training stages were by evaluating if the players follow the required steps according to the standard protocol. There were one or two optional questions in each stage of part B, which were not accounted in evaluation, if they were failed to respond due to economic and social problems. Majority of the questions were close ended. Also, there were few open ended questions. A draft version of the questionnaire was administered to ten school Rugby players known to the authors to refine the final instrument.

Players were recruited from 7 schools with the assistance of the local rugby football union administrators. In November 2010, research team members visited schools which were eligible for the study. Each player was given information about the project and invited to participate. Those who were chosen to do so were required to provide written informed consent and complete the questionnaire anonymously. The questionnaire was self-administered, with physiotherapists (research team) available to answer questions and assist where necessary. All the data was collected from October to November. Each subject was given a questionnaire to fill within the given time. They were asked to put an 'x' mark in the relevant boxes.

Statistical Analysis

Collected data from the questionnaire was entered into the computer database for analysis. Each stage was composed of 5 questions and the three stages of the rehabilitation program were separately evaluated by taking the proportion of followed standard protocol.

III. RESULT

Data were analyzed using Minitab statistical software. During the follow up period, 45 school level knee injured rugby players were recorded. Seven schools of the Kandy zone were involved in the study. As two schools didn't have rugby in their school and one school didn't have any players with knee injuries, data was collected from 7 schools. Injury surveillance data was completed for seven schools during the study period. There was a total of 45 players who had knee injuries according to our study.

During the acute stage none of the players were sticking on to the protocol, In contrast, during the rehabilitation stage 24.4% and 4.4% in the training stage were following the protocol (Figure-01).

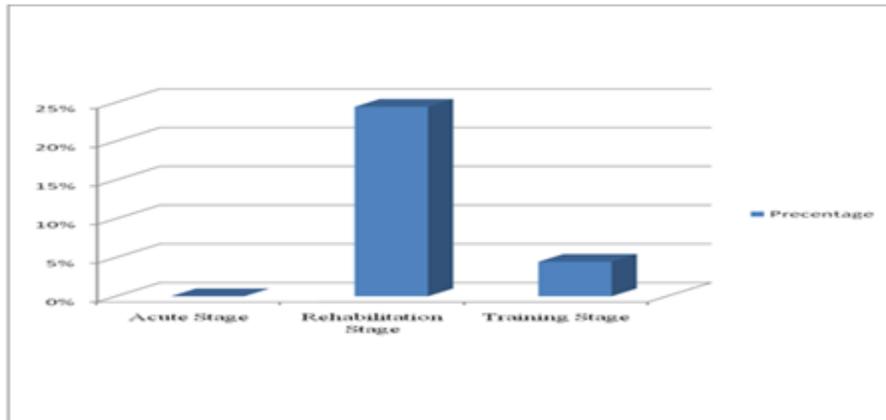


Figure 1: Percentage of Implementation

Even though the players were not following all the five components of acute stage accurately, they have followed each component separately, such as protection (75%), rest (57%), ice (37%), compression (60%) and elevation (8%) (Figure-02). Approximately 71% of players were engaged in stretching and 62% in endurance training in the rehabilitation stage. However majority of players (77%) got back to their sport before getting a proper recovery.

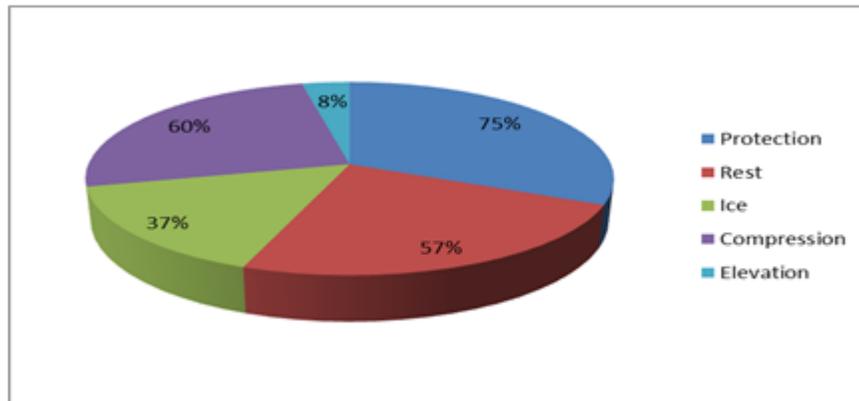


Figure 02: Acute Stage

The study revealed that 24.44% of knee injured players were props in their teams. 40% of these players have got recurrent injuries in their histories (Figure- 03). The study identified that the percentage of availability of sport physician and physiotherapists to be 35.55% and zero respectively. Overall no one was following a satisfactory rehabilitation protocol in Kandy Zone.

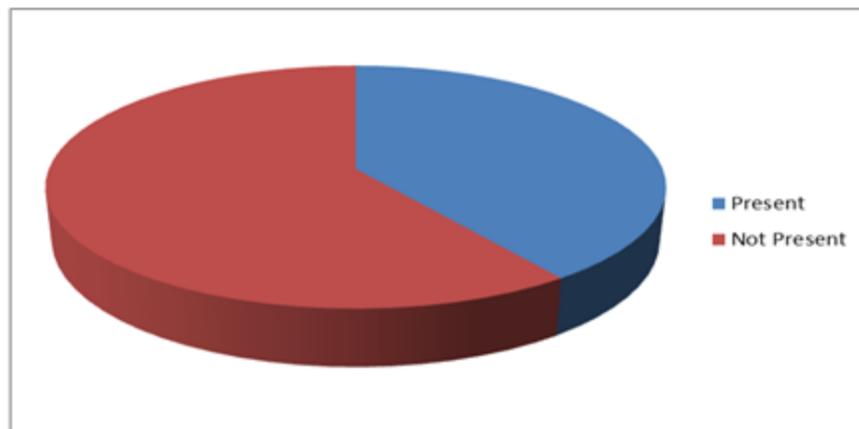


Figure 03: Recurrent Injuries

IV. DISCUSSION

Rehabilitation is defined as “The restoration of and individual part or a part to normal or near normal function after a disabling disease, injury, addiction or incarceration” [13]. Therefore rehabilitation protocols are essential in the sporting field to give relief to the injuries [14]. To the best of our knowledge, this study is the first to assess the existing rehabilitation protocol practiced in Kandy zone relative to the international standard protocol.

This study reports percentage of implementation of overall rehabilitation protocol and its stage from a retrospective cohort survey. The overall percentage of implementation of international rehabilitation protocol observed in this study was zero (0). Here the study concentrated on collection of acute, rehabilitation and training stages’ results. The percentage of implementation of acute stage is zero. This stage consists of five components. Those are protection (P), Rest(R), Ice (I), Compression (C) and elevation (E). All five of them together are known as PRICE principle.

A previous study on pattern and management of sports injuries at national sports festival in Nigeria revealed that cryotherapy and bandaging (form of compression) were the most frequently used treatment modalities during the games. In addition to that, it had concentrated on importance of cryotherapy. It is emphasized that it should be made abundantly available in the form of portable cold spray for easy transportation and application during the game [15]. As the above study was concerned about I-Ice; C-compression and R- rest as other issues of PRICE principle. In addition to that all five components should be fulfilled in equal proportion. Even though they have followed each component separately, the present study is concerned about not only on the usage of each component of PRICE, but also on the correct technique and way of usage of them. The result zero means school level rugby players don’t apply PRICE principle in the accurate and efficient manner after having an injury.

Rehabilitation stage consists of stretching programs, general strength and muscular endurance training programs and FITT (Frequency, Intensity, Time, Type) approach. Percentage of fulfillment of the above all facts is 24.4%.

An earlier study on physical testing prior to returning to normal sports activity has focused on rehabilitation of elite athletes following ACL injuries. According to that, several months are required for a proper rehabilitation; bring back the players to professional sport activity. He has emphasized on end of the rehabilitation programme should include, Isokinetic testing, Functional tests and Stability clinical assessment [16].

Percentage of implementation of training stage in our study is 4%. According to human kinetics, this is the training stage of rehabilitation protocol. This is in agreement with the previous study. Here, application of special shoes, braces, practical tests conducted by physicians or physical therapists and use of proper monitoring techniques for record the training and pain, were considered.

The finding that props got knee injuries much more frequently than players in other positions. It has also been reported that forwards received a larger than expected number of injuries, based on the number of player positions [17]. Prop is a player playing in either of the two forwards position and his responsibilities are to support the hooker during a scrum and the second rows during a lineout. Forwards tend to be involved in more collisions. Then perhaps they should be more susceptible to injuries [3].

The study emphasize on the importance of team work process of health care system to prevent and manage injuries in the sporting field. The team physician and physiotherapists are the essential components in the medical team. The study revealed that physiotherapists play a major role in establishing injury prevention and management routines [15]. Another study informs physical therapists regarding legal consideration impacting the practice of sports physical therapy and refreshing their responsibilities in the sporting field. And also it has tended to generate awareness of these issues to enhance the quality of physical therapy provided to proper injury management.

According to the study, physical therapists are involved in various angles in the field. These include;

- Providing treatment designed to enable continued play with an injury before it is fully healed
- Informing a player of the potential health risks of continued activities in his physical condition
- Evaluating and advising players concerning his or her ability to resume play activity [18].

In the research literature, various individuals and groups have attempted to emphasize the importance of health care team in the sporting field and their responsibilities. But our study included the percentage of availability of sport physician and physiotherapists in our study population.

Establishing injury rehabilitation programs as well as injury prevention program, it is important to have a proper health team and they should be trained to provide a proper management [15]. It is recognized that players are unaware about the rehabilitation protocol, its contents and how to use it properly. Most of the players had poor knowledge regarding rehabilitation protocol and were not informed about it [19].

A variety of protective and supportive devices such as braces, special shoes are designed to prevent or reduce the severity of knee injuries by absorbing the valgus producing forces [20]. The study identified that poor knowledge regarding those appliances and high cost of special external appliances such as special shoes; fitted braces keep the players from the using of them. Because of that players tend to avoid using special safety appliances which are useful and beneficial in relieving the extra force from the injury site.

There are several limitations of this work which merit attention. During the course of this study two schools were excluded as they didn’t have a rugby team (Mahanama College and Kahalla Kanishta Vidyalaya). But they were included in the statistics of education department and there were no knee injured players in Vidyartha College.

Knowing proper rehabilitation protocols will be beneficial for players, to focus on the proper rehabilitation after getting an injury, to regain their pre injury level of fitness and also to improve the contents and quality of the existing rehabilitation protocol in Sri Lanka.

And also health care professionals and authority members can get a clear idea regarding the standards of a rehabilitation protocol. It is essential that the governing bodies of rugby, together with team coaches and health care professionals, have a complete understanding of the incidence, causes, treatment and rehabilitation strategies of sport injuries [1]. Our study results give a clear idea to the health care professionals and authority members regarding the standard of rehabilitation protocol. There is a need for improvement in training for sport rehabilitation. A qualified sport medicine team needs to be an integral part of all rugby programs.

V. CONCLUSION

In health care profession, Injury management and rehabilitation can be added as a component inside the curriculum of courses such as physiotherapy, sports medicine and exercise sciences. By improving awareness regarding these issues, barriers to performances of players will be reduced. It is essential to appoint and maintain a physiotherapist per team and the importance should be emphasized to them. And also have to correct the improperly acting techniques currently. From this study, we can get an idea about overall injury rehabilitation in Kandy zone. By knowing proper rehabilitation techniques from the beginning, the players can reduce the time loss or medical seeking after injury. So players can play the game without missing matches and refraining from the game. Similar kind of studies can be done all over the country for every sport to analyze the standard of the rehabilitation in sports in Sri Lanka.

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Palm Oil Mill Wastes Utilization; Sustainability in the Malaysian Context

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Abstract- Palm oil contributes about 19% of worldwide vegetable oil production with Malaysia accounting for over 50% of total production. Due to the global rise in crude oil prices, scientists have been forced to look for cheaper alternatives and palm oil has provided the right platform. This in turn led to an increase in the oil plantations and production in countries such as Malaysia, Indonesia and Thailand. Palm oil contains a number of vitamins, carotenes, fatty acids, sterols, pigments, and some other components enabling its wide application in the chemical, food and pharmaceutical industries. Palm oil production is an integrated process with several stages starting from good cultivation practices for fruits of high oil content followed by a number of integrated processes for maximal separation and utilization of each oil fraction. The various processing phases generate several by-products which if not dealt with in a scientific manner could lead to deterioration in the ecosystem. In this paper we shall discuss the various on- going researches regarding the use of Palm mill wastes and suggestions on uses of this valuable crop and its by-products as a future to agriculture and a sustainable environment in Malaysia.

Index Terms- Sustainability; Composting; Vermicomposting; POMW; “Crop for the future”

INTRODUCTION

12% of the Malaysian GDP is contributed by Agriculture and has also provided employment opportunities for 16% of the people. The Colonialists acquired extensive land areas and introduced commercial crops such as rubber, palm oil and cocoa. Since then, these crops have been leading agricultural exports in Malaysia. Local farmers cultivate a variety of fruits and vegetables for the domestic market, such as bananas, coconuts, durian, pineapples, rice, rambutan and a few others. In 1998, the production of rice was about 1.94 million metric tons. In 1999, Malaysia produced 10.55 million metric tons of palm oil out of which 8.8 million metric tons was exported and since then has remained one of the world's largest producers. They are also one of the world's leading suppliers of rubber (767,000 metric tons in 1999). Logging in the tropical rainforest is an important export revenue earner in East Malaysia and in the northern states of Peninsular Malaysia. In 2000, 21.94 million cubic meters of sawed logs was produced earning US\$450 million from exports. In spite of efforts at regulating felling and reforestation in the early 1990s, logging companies destroyed the ecosystem. Condemnation from various nature activists and environmentalist groups led to the ban on the direct export of timber. (Encyclopedia of the Nations 2010)[1]

Oil palm

Oil palm was introduced to Malaysia from Nigeria by the British colonialists in 1917 and has fast become a major contributor to the nations GDP with around \$7million per annum. Latest figures indicate that over 89 million tonnes of fresh fruit bunch (FFB) is produced per year in Malaysia (Singh et al., 2010)[2]. Eleais guineensis Jacq is the most commercially efficient oil producer among the

other species in the palmeae family. Oil palm plantation has increased from 2.03 million hectares to 4.49 million hectares from 1990 to 2009, an increase of 121.2%, in Malaysia (Embrandiri et al., 2011)[3]. It is a very versatile crop which can produce effectively for over 20 years if maintained properly.

Palm oil has a wide range of uses from deep frying to margarine and shortening for cakes, snacks, instant noodles etc. It is also being used in cosmetics, soaps and synthetic detergents. Due to the rises in crude oil globally, palm oil has become a much sought after fuel alternative. It could be regarded as the “*Crop for the future*” considering its numerous uses. With this increase in demand, environmental management in the palm oil industry is an issue of major concern today. The mills are most often located in the plantations and the prevailing practice is collecting the waste and dumping in the most unscientific manner as excess nutrients may be harmful to both the growing plants and the ecology on the whole. Oil losses due to process instabilities and leakage result in increased oil concentration in the mill’s effluent. A total oil loss of 10 - 15 kg/t FFB has been reported (Chavalparit et al., 2006)[4]. In addition, inefficient equipment, defective machinery, leakage (by break down or overflow of tanks) may often be the reason for extra oil losses.

Utilization of wastes from Oil Processing.

The process of palm oil production involves a number of stages from the sterilization of the FFB to the digestion, threshing and clarification of the oil. At each processing phase a different form of waste is produced. Figure 1 summarizes the processes in the extraction of oil palm and the various wastes obtained. In general all wastes from the palm industry are termed as Palm Oil Mill Wastes (POMW). The milling process and plantation activities generate a large amount of solid waste consisting of trunks, fronds, leaves from the plantation and empty fruit bunch (EFB), palm oil mill sludge (POMS), palm kernel cake (PKC), decanter cake, fibre and shells from processing. Palm kernel cake is a by-product of oil extraction from palm kernel seeds. Chavalparit et al (2006)[4] reported that average values of waste generation rate per ton FFB from palm oil mill in Thailand were 140 Kg of fiber, 60 Kg of shells, 240 kg of empty fruit bunch (EFB) and 42 kg of decanter cake. The liquid waste comes from oil extraction and processing and is referred to as Palm Oil Mill Effluents (POME). It has been estimated that one tonne of crude palm oil production requires 5-7.5 tonnes of water in which about 50% ends up as POME(Ma, 1999)[5].

Malaysia produced an average of about 53 million m³ POME per annum obtained from 14.8 million tonnes of palm oil production in 2005 (Lorestani, 2006)[6]. POME contains cellulosic material, fat, oil and grease (Agamuthu, 1995)[7]. It has a very high Biochemical Oxygen Demand (BOD) (25,000 mgL⁻¹) and Chemical Oxygen Demand (COD) (50,000 mgL⁻¹) which is 100 times more than the domestic sewage. Although it is non toxic as no chemical is added during the oil extraction process, the effluent is considered as one of the major sources of aquatic pollution in Malaysia. The effluents from palm oil mill can cause considerable environmental problems if discharged untreated (Singh et al., 2010)[2]. However, it also contains appreciable amounts of N, P, K, Mg and Ca which are the vital nutrient elements for plant growth. This has led to the open dumping of the wastes and occasional disposing beneath the palm trees. Similarly, the POME is discharged into the fields. Table 1 shows a summary of the wastes produced and its uses in various industries.

Sustainable Management of POMW

Even though several researches have been carried out for alternative sustainable management, there is still much work to be done as the quantities being produced on a daily basis exceeds its use. Environmental- friendly approaches are required right from the harvesting to operation of the mills such as zero burning, waste minimization and recycling or re-use of the wastes. Less or total avoidance of inorganic fertilizers .The sending back of EFB to the plantation areas is considered good but due to its highly organic nature, it reaches a threshold after which is considered harmful to the plants and ecosystem. Composting is considered as one of the sustainable ways to

minimize the waste from the industries. It is a microbial practice used in stabilization of organic wastes. During the composting process, aerobic microorganisms decompose the substrate and most of the biodegradable organic compounds are broken down to chemically stabilized composted material. Composting reduces the volume of the wastes and to improve the process of composting, degradation rate has to be increased thus quality of final compost too is enhanced. Several modifications have been carried out to enhance this degradation process such as addition of biodegradable waste to reach the optimum C/N ratio of about 30 (Rupani et al., 2010)[8]. This is known as co- composting. Yaser et al., 2007[9] carried out co-composting process using palm sludge with saw dust. The mixture prevents air pollution and improves the efficiency of the composting process.

To facilitate the composting process in order to obtain good quality fertilizer, earthworms can also been introduced, this is known as vermicomposting. Vermicomposting is the process in which earthworms are used to convert organic materials into humus-like material known as vermicompost or earthworm compost. Through the vermicomposting process, physical, chemical and biological reactions take place breaking down the organic matter into simpler forms. The resultant product (vermicast) is much more fragmented, porous and microbially active (Edwards and Bohlen, 1996)[10]. Moreover the earthworm can further be processed as a source of animal feed. Longsdon (1994)[11] reported that during the vermicomposting process important plant nutrients such as nitrogen, phosphorus, potassium, etc. present in the waste are converted into many soluble and available forms to plants. As a result it increases the plant nutrients as compared to the simple composting [12]. Table 2 shows a comparison of the composition of nutrients present in vermicompost and backyard manure [13].

CONCLUSIONS AND RECOMMENDATION

In the Palm Oil production process there is an overall surplus of by-products and the utilisation rate of these by-products is low especially for POME, EFB and Decanter cake. As the bio-based economy develops and markets for carbon neutral products grow those by-products should be seen as resources. The increased nutrient recycling will improve soil fertility and sustainability of palm oil production. Systems that minimise the removal of nutrients and carbon from the system should be preferred. Still not all carbon and nutrients have to be re-cycled. What the optimum is between biomass utilisation and recycling varies according to soil and climate. Composting, Co-composting and Vermi composting techniques although are in practice have not been utilized in full as large amounts of palm waste can be decomposed in shorter lengths of time. The end products can not only be applied to palm plantations but to other crops as well. This will in turn eradicate the use of chemical fertilizers and prevent heavy metal leaching problems. However unscientific land application of this compost can also be harmful to plant growth and soil properties. Thus more funds should be given to Research and Development of the palm and its residues. Scientific bodies and Universities should dedicate more to eco- friendly management of these resources more than development of new products. As in the coming years, Malaysia could become a self sustainable nation

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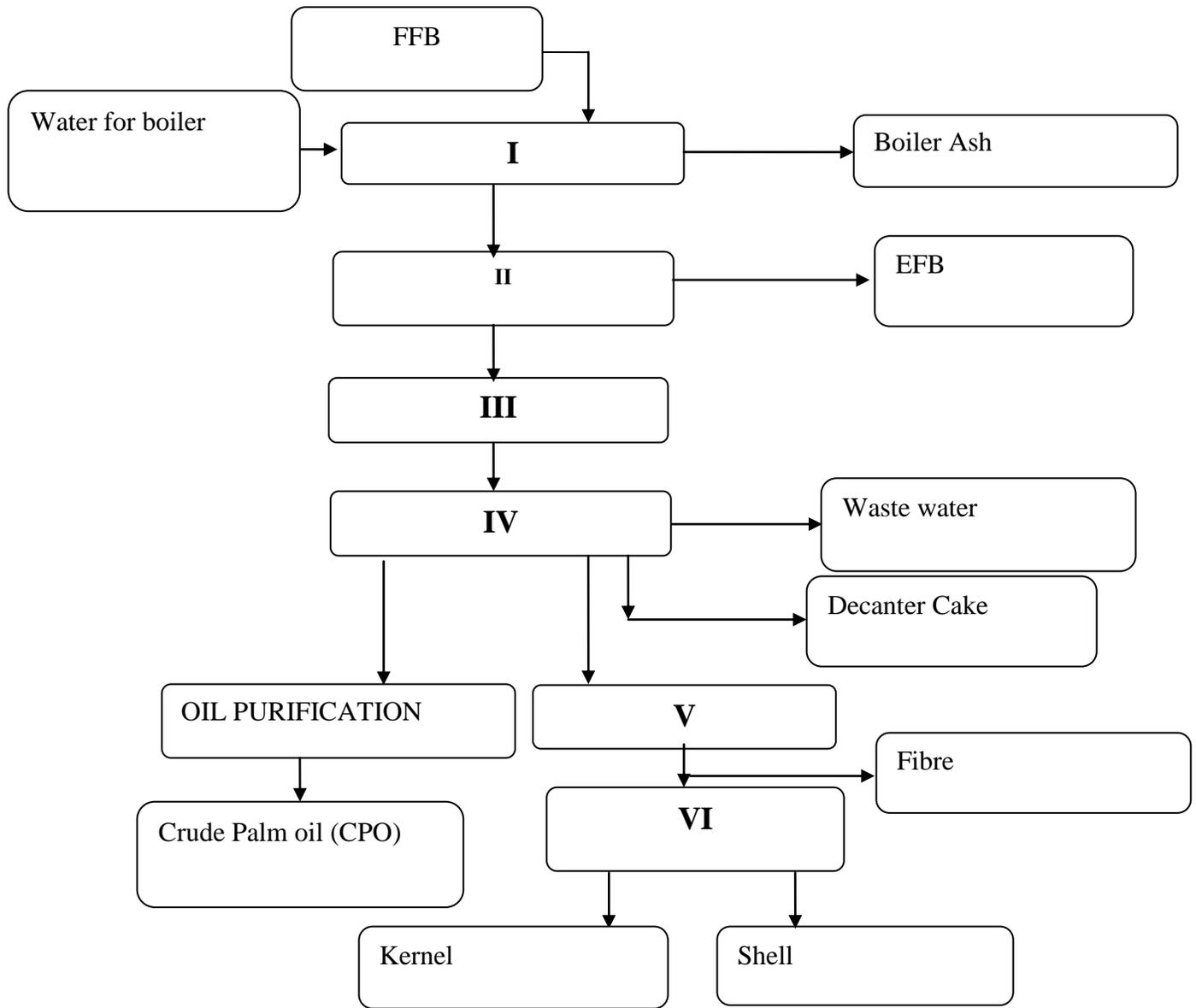
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Source: Modified from *Oil recovery from palm oil solid wastes*- [13].

Figure1: Chart showing the stages in production of palm oil, the type of waste produced.

I-STERILIZATION II- STRIPPING III- DIGESTION IV- EXTRACTION V – NUT AND FIBRE SEPARATION VI – NUT CRACKING

Table 1: Various palm mill wastes and their common uses

No	TYPE OF WASTE RESIDUE	USES
1	FRONDS, TRUNKS & LEAVES	<ul style="list-style-type: none"> • Used as mulching material in the fields which helps in moisture retention. • Also used as roofing material and some are processed as furniture.
2	Empty Fruit Bunch(EFB)	<ul style="list-style-type: none"> • Earlier used for generating steam for the mills and ash residues used as fertilizer. A major cause of environmental pollution so done on low key. • As raw material for products such as paneling, composites, fine chemicals, pulp and paper as well as compost and bio-fertilizer [14] • Main substrate for the cultivation of <i>Pleurotus ostreatus</i> (oyster mushroom) (Tabi et al., 2008)[15] • Most of it is just disposed off back into the fields as the above uses are not in large scale.
3	Palm Press Fibre(PPF)	<ul style="list-style-type: none"> • Fuel for the mills • Used as a substrate for animal feed in addition to soymeal, fishmeal. • Used for making fibre boards. • Polymeric composites for building materials referred to as AGROLUMBER for products like wall panels, sub-floors, doors and furniture parts. (MPOB 2009)[14] • Used as potting material for ornamental plants • Currently trials are on-going utilizing fibre+ Pome for vermicompositing.
4	Decanter cake	<ul style="list-style-type: none"> • Used as animal feed • Used in combination with inorganic fertilizer to improve soil quality (Haron and Mohammed, 2008)[17] • Currently on going work using dried, powdered form of DC as biofertilizer for vegetable gardening.[18]
5	Palm Kernel Cake(PKC)	<ul style="list-style-type: none"> • Suitable as feedstock because it has 48% carbohydrate and 19% protein (Kolade et al., 2005).[19]
6	Shells	<ul style="list-style-type: none"> • Used mainly for fuel. • Converted into activated carbon for water purification purposes.
7	POME	<ul style="list-style-type: none"> • Mainly used for Irrigation purposes but due to its acidic nature is quite toxic to flora and hence needs to be treated. • Carotenes are extracted from POME by pharmaceutical industries

Table 2: Nutrient composition of vermicompost and Backyard compost

Type of Compost	OC	N	P	K	Ca	Mg	Na	Zn	Cu	Fe
Vermicompost	9.8- 13.4	0.51- 1.61	0.19- 1.02	0.15- 0.79	1.18- 7.61	0.0093- 0.568	0.058- 0.158	0.0042- 0.110	0.0026- 0.0048	0.2050- 1.3313
Backyard compost	12.2	0.8	0.38	0.48	2.27	0.57	<0.01	0.0012	0.0017	1.1690

Source:(Nagavallema et al., 2004)[13]

Cost Effective & Innovative Impact Attenuator for Formula SAE Car with Drop Test Analysis

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Abstract- The impact attenuator [7] is an energy absorbing device installed forward of the front bulkhead of the car with the function to absorb energy and to protect the driver from a sudden change of momentum experienced during an event of a collision. It achieves that by deforming plastically and absorbing a part of the total energy involved during a collision. Aim of this paper is to provide innovation towards the usual and conventional Honeycomb Structured Attenuators for FSAE cars, and testing its effectiveness with drop weight test analysis providing average deceleration impact of vehicle to be less than 20g, which is required according to FSAE design rules.

Index Terms- Cost Effective Innovation, Drop weight Test Analysis, Formula SAE, Impact Attenuator

I. INTRODUCTION[4] [5] [6]

After researching over the internet it was found that a honeycomb structure was mostly preferred for Impact attenuator, usually an Aluminium Honeycomb was used, with some teams using carbon Fibre Honeycomb. With the resources in hand Honeycomb was just out of league, as a result considering the need of an hour to think innovatively it was decided that empty beer cans, 600ml cold drink plastic bottles, and 330ml coca cola cans could make up a potential impact attenuator.

Also the FSAE design rules didn't mention of how the impact attenuator should be, it just mentioned it to be constrained within certain dimensions and providing experimental data to provide its effectiveness, so the focus was to design the attenuator in a way to comply with FSAE deceleration and size rules with minimum cost and maximum result.

II. DESIGN OF IMPACT ATTENUATOR [1] [2]

A shell of sheet metal was designed to accommodate the bottles/cans minding the minimum dimensions as required by the rules. The shell was made in the shape of a frustum of a pyramid with the upper cross-section of 240mm * 150mm and the lower cross section of 320mm * 230mm with the height of the shell as 215mm. With these dimensions the shell was designed using SolidWorks.

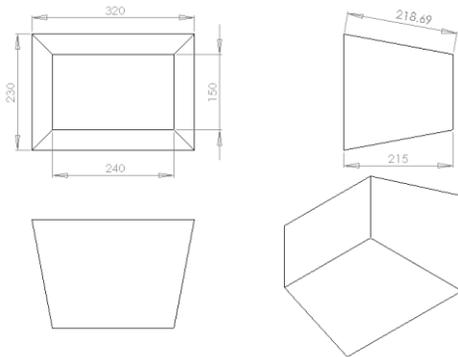


Figure 1: [1] [2]

To accommodate the bottles/cans in the shell was the next step; the bottles and cans were fixed to the shell using plaster of Paris. The maximum diameter and the length of the bottles/cans were:

- Beer can: Max Diameter = 60mm and length = 160mm
- 600mL Cold drink Bottle: Max Diameter = 69mm and length = 245mm

Orientations of bottles/cans were made in such a way that their axes were parallel to the axis of the frame. The length of the beer can is less than 215mm (length of the shell). Oasis foam (easily available from a florist) of thickness 55mm was added to fill the gap, while the length of 600mL Cold drink bottle is more than the length of the shell so the bottle was cut from its end to the length of the 215mm. Using SolidWorks simulation it was found that each shell could accommodate about 6 bottles or cans.

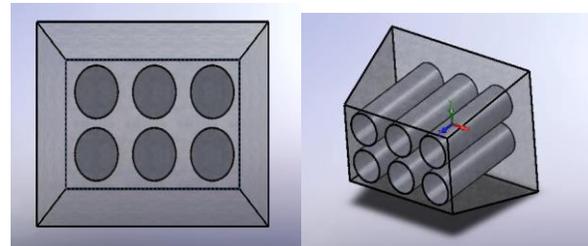


Figure 2: [1][2]

After the bottles/cans with the shell are assembled, the lower cross section of the shell (320mm * 230mm) was welded along its edges to the center of a base plate (390mm X 290mm). The base plate made of sheet metal was bolted to the anti-intrusion plate [8]



Figure 3: Different setups for can/bottles in the first shell.

III. MODIFICATION: [1] [2] [3]

A two-stage impact attenuator was made:

- The first shell was a frustum of pyramid with upper cross-section of 240mm*150mm and lower cross-section of 270mm*180mm. The height of the first shell was 110mm. This shell accommodated six 330mL Coca Cola Cans (length = 110mm and diameter = 66mm).
- The second shell (again, a frustum of pyramid) was made with upper cross-section of 290mm*200mm and lower cross-section of 320mm*230mm. The height of this shell was 110mm and accommodated eleven 330mL Coca Cola cans (length = 110mm and diameter = 66mm).

First shell was placed on top of second shell and then spot welded along the edges of the lower cross-section of the first shell.

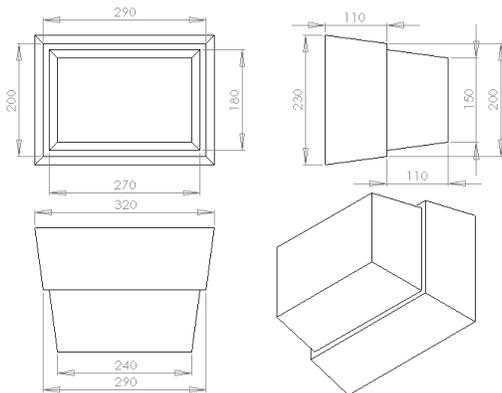


Figure 4:



Figure 5: Second Shell with Cans

IV. TEST SCHEMATIC [1][2]

According to the FSAE design rule: [3]

“The team must submit test data to show that their Impact Attenuator, when mounted on the front of a vehicle with a total mass of 300 kg (661 lbs) and run into a solid, non-yielding impact barrier with a velocity of impact of 7.0 m/s (23.0 ft/sec), would give an average deceleration of the vehicle not to exceed 20 g, with a peak deceleration less than or equal to 40 g.

The kinetic energy for which the impact attenuator is designed is given by:

$$K.E. = (1/2)*m*v^2$$

$$K.E = (1/2)*300*7^2$$

$$K.E = 7,350 \text{ J}$$

To simulate the given scenario, a drop weigh test was conducted. The mass (m) was dropped on the impact attenuator, which was kept on the ground from a known height (h). The velocity (v) of the mass (m) dropped from a height (h) can be given by the relation:

$$v = \sqrt{(2*g*h)}$$

Where, g (acceleration due to gravity) =9.8 m/s²; and for velocity of 7 m/s, the required height is 2.497 m.

But, we were available with a drop height of 5m. So, the velocity, for a drop height of 5m can be approximated as:

$$v = 9.9\text{m/s [By Conservation of Energy]}$$

The impact attenuator is designed for an energy of 7350J, therefore, the mass required for the same energy, when impact velocity is 9.9m/s can be approximated as:

$$7350 = (1/2)*m*(9.9)^2$$

$$m = 149.98\text{kg}$$

Thus, the specifications of the drop weight test were:

Height (h) = 5m, Mass (m) = 150kg, Velocity of impact (v) = 9.9m/s & Energy (E) = 7350J.

The drop test was recorded with help of a high speed camera, capable of capturing 10,000 fps. A scale was kept along the impact attenuator and such that the readings on the scale were clearly visible as a part of the video and it wasn't crushed under test weight. The drop test was accurately done, taking care that was no one near the test site. Then to determine the peak deceleration, video of the test was analyzed and the whole process of deformation was divided into number of small steps. The amount of deformation in each step was obtained through the scale. This time period of each step and the initial velocity of impact for the first step were known, and were used to calculate for each subsequent step:

For the first step of deformation:

Velocity of impact (u) = 9.9m/s

Deformation = s (known)

Time period of deformation = t (known)

Deceleration during the step = a (unknown)

Final velocity (at the end of the step) = v (unknown)

According to motion Equations:

$$s = u*t + (1/2)*a*t^2$$

Thus, 'a' was calculated.

$$v = u + a*t$$

Thus, 'v' was also calculated.

For the deformation of second step, the final velocity of first step becomes the initial velocity of the second step with rest of the procedure remaining same. The amount of deformation is noted from the scale and the time is noted from the video. So, the deceleration and final velocity of the second step are calculated using the equations of motion.

Thus, the final velocity of second step becomes the initial velocity of third step and so on. The whole deformation is analyzed by dividing it into a number of small steps. The maximum value of deceleration amongst all the steps gives the peak deceleration.

The average deceleration is calculated by considering the initial condition, just before the impact, and the final condition, just when the deformation is complete.

The initial velocity (u) = 9.9m/s

Total deformation = s (known)

Time period of deformation = t (known)

Let the average deceleration = a (unknown)

From the equations of motion:

$$s = u*t + (1/2)*a*t^2$$

Thus average value of deceleration is calculated.



Figure 6: Set up

V. TEST DATA

During the test, an empty shell was also tested to see how it behaves and the difference that the bottles/cans create. The calculations for average decelerations are shown below.

- Empty Shell

Deformation Start Time = 1.6s

Deformation End Time = 3.2s

Total Deformation Time, t = 1.6s

Average Deceleration, a = (v-u)/t

$$a = (9.9 - 0)/1.6$$

$$a = 6.18\text{m/s}^2 = 0.63\text{g}$$

- Beer Can

Deformation Start Time = 1.6s

Deformation End Time = 4s

Total Deformation Time, t = 2.4s

Average Deceleration, a = (v-u)/t

$$a = (9.9 - 0)/2.4$$

$$a = 4.12\text{m/s}^2 = 0.42\text{g}$$

- 600mL cold drink Bottle

Deformation Start Time = 2.0s

Deformation End Time = 4.0s

Total Deformation Time, t = 2.0s

Average Deceleration, a = (v-u)/t

$$a = (9.9 - 0)/2.0$$

$$a = 4.95\text{m/s}^2 = 0.50\text{g}$$

- 2 Step Shell with 330mL Coca Cola Can
Deformation Start Time = 1.88s
Deformation End Time = 4.5s
Total Deformation Time, $t = 2.62s$
Average Deceleration, $a = (v-u)/t$
 $a = (9.9 - 0)/2.62$
 $a = 3.78m/s^2 = 0.38g$

VI. RESULTS

From the above data, it can be seen that the deceleration is minimum in the case of the two step shell with 330mL Coca Cola cans. Thus, this was chosen as the final Impact Attenuator.

During the testing, it was realized that the sheet metal shell was creating problems in deformation. Thus, holes were made in the side faces of the shell of the final design.



Figure 7: Impact Attenuator before test



Figure 8: After Test

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Convexity Preserving C^2 Rational Quadratic Trigonometric Spline

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Abstract- A C^2 rational quadratic trigonometric spline interpolation has been studied using two kinds of rational quadratic trigonometric splines. It is shown that under some natural conditions the solution of the problem exists and is unique. The necessary and sufficient condition that constrain the interpolant curves to be convex in the interpolating interval or subinterval are derived. Approximation properties has been discussed and confirms the expected approximation order is h^2 .

Index Terms- Approximation, Constrained interpolation, Continuity, Convexity, Rational quadratic trigonometric spline, Shape parameter .

I. INTRODUCTION

During the recent years rational parametric spline have gained widespread acceptance for use in computer aided geometric designs. They have been studied by several authors (see [1], [4], [8], [10]), with special emphasis on the shape preserving properties. In [1] Duan have presented the construction and shape preserving analysis of a new weighted rational cubic interpolation and its approximation. Trigonometric splines serves as an alternative for polynomial splines for solving many problems of interpolation and have been studied from application point of view (see [2], [3], [5], [6], [7], [9]). Trigonometric splines behave in a better way for path approximation or scattered data interpolation. B-splines introduced by Schoenberg [9], have become immensely popular for applications in curve and surface generation problems. Keeping in a view of the above ideas and the applications of trigonometric splines, we have extended the ideas of Duan [1] and constructed convexity preserving rational trigonometric spline. We have introduced a weighted rational quadratic trigonometric spline interpolation and the C^2 continuity of rational trigonometric spline. The convexity control and approximation properties of C^2 rational quadratic trigonometric spline have been described.

II. A C^1 WEIGHTED RATIONAL QUADRATIC TRIGONOMETRIC INTERPOLATION

A weighted rational cubic spline interpolation based on function values and derivative was given in [1]. Given a data set $(t_i, f(t_i), d_i)$, $i = 0, 1, \dots, n, n+1$, where $f(t_i)$ and d_i are the function values and the derivative values defined at knots, respectively, and $t_0 < t_1 < \dots < t_n < t_{n+1}$ are the knots.

Let $h_i = t_{i+1} - t_i$, $\theta = \frac{(t - t_i)}{h_i}$, $t \in [t_i, t_{i+1}]$ and α_i, β_i are

$$P^*(t) = \frac{(1 - \sin \frac{\pi\theta}{2})^2 \alpha_i f(t_i) + 2 \sin \frac{\pi\theta}{2} (1 - \sin \frac{\pi\theta}{2}) U_i^* + 2 \cos \frac{\pi\theta}{2} (1 - \cos \frac{\pi\theta}{2}) V_i^* + (1 - \cos \frac{\pi\theta}{2})^2 \beta_i f(t_{i+1})}{\alpha_i \cos \frac{\pi\theta}{2} + \beta_i \sin \frac{\pi\theta}{2}} \quad (1)$$

where

$$U_i^* = (\alpha_i + \frac{\beta_i}{2}) f(t_i) + \frac{\alpha_i h_i d_i}{\pi} \quad V_i^* = (\beta_i + \frac{\alpha_i}{2}) f(t_{i+1}) - \frac{\beta_i h_i d_{i+1}}{\pi}$$

This rational quadratic trigonometric spline $P^*(t)$ satisfies

$$P^*(t_i) = f(t_i), \quad P'^*(t_i) = d_i, \quad i = 0, 1, \dots, n, n+1.$$

for the given data set $(t_i, f(t_i)), i = 0, 1, \dots, n, n+1$

let

$$P_*(t) = \frac{(1 - \sin \frac{\pi\theta}{2})^2 \alpha_i f(t_i) + 2 \sin \frac{\pi\theta}{2} (1 - \sin \frac{\pi\theta}{2}) U_{i,*} + 2 \cos \frac{\pi\theta}{2} (1 - \cos \frac{\pi\theta}{2}) V_{i,*} + (1 - \cos \frac{\pi\theta}{2})^2 \beta_i f(t_{i+1})}{\alpha_i \cos \frac{\pi\theta}{2} + \beta_i \sin \frac{\pi\theta}{2}} \quad (2)$$

where

$$U_{i,*} = (\alpha_i + \frac{\beta_i}{2}) f(t_i) + \frac{\alpha_i h_i \Delta_i}{\pi} \quad V_{i,*} = (\beta_i + \frac{\alpha_i}{2}) f(t_{i+1}) - \frac{\beta_i h_i \Delta_{i+1}}{\pi}$$

in which $\Delta_i = \frac{f(t_{i+1}) - f(t_i)}{h_i}$.

Obviously the spline $P_*(t)$ satisfies

$$P_*(t_i) = f(t_i), \quad P'_*(t_i) = \Delta_i, \quad i = 0, 1, \dots, n.$$

It is called rational quadratic trigonometric spline based on function values.

The weighted rational quadratic trigonometric spline will be constructed by using the two kinds of rational trigonometric quadratic spline interpolant described above.let

$$P(t) = \lambda P^*(t) + (1 - \lambda) P_*(t) \quad t \in [t_i, t_{i+1}], \quad i = 0, 1, \dots, n-1. \quad (3)$$

where

$$P(t) = \frac{(1 - \sin \frac{\pi\theta}{2})^2 \alpha_i f(t_i) + 2 \sin \frac{\pi\theta}{2} (1 - \sin \frac{\pi\theta}{2}) U_i + 2 \cos \frac{\pi\theta}{2} (1 - \cos \frac{\pi\theta}{2}) V_i + (1 - \cos \frac{\pi\theta}{2})^2 \beta_i f(t_{i+1})}{\alpha_i \cos \frac{\pi\theta}{2} + \beta_i \sin \frac{\pi\theta}{2}} \quad (4)$$

and

$$U_i = (\alpha_i + \frac{\beta_i}{2}) f(t_i) + \frac{\alpha_i h_i}{\pi} (\lambda d_i + (1 - \lambda) \Delta_i),$$

$$V_i = (\beta_i + \frac{\alpha_i}{2}) f(t_{i+1}) - \frac{\beta_i h_i}{\pi} (\lambda d_{i+1} + (1 - \lambda) \Delta_{i+1}),$$

with the weight coefficient $\lambda \in R$.

This rational quadratic trigonometric spline $P(t)$ satisfies

$$P(t_i) = f(t_i), \quad P'(t_i) = \lambda d_i + (1 - \lambda) \Delta_i, \quad i = 0, 1, \dots, n.$$

III. A C^2 WEIGHTED RATIONAL QUADRATIC TRIGONOMETRIC SPLINE INTERPOLATION

We now follow the familiar procedure of allowing the derivative parameters $d_i, i = 1, \dots, n-1$. to be degrees of freedom which are constrained by the imposition of the C^2 continuity conditions

$$P''(t_i^+) = P''(t_i^-), \quad i = 1, \dots, n-1.$$

the conditions leads to the following continuous system of linear equations:

$$\begin{aligned} & \left(\frac{\pi\alpha_{i-1}}{2\beta_{i-1}h_{i-1}}\right)d_{i-1} + \left(\frac{\pi(\alpha_i + \beta_i)}{\alpha_i h_i} + \frac{\pi(\alpha_{i-1} + \beta_{i-1})}{\beta_{i-1}h_{i-1}}\right)d_i + \left(\frac{\pi\beta_i}{2\alpha_i h_i}\right)d_{i+1} = \\ & \frac{\pi^2}{2\lambda\alpha_i^2 h_i^2} \left\{ (\alpha_i + 2\beta_i) \frac{h_i \alpha_i}{2} \Delta_i - 2(1-\lambda)(\alpha_i + \beta_i) \left(\frac{\alpha_i h_i}{\pi}\right) \Delta_i - (1-\lambda) \frac{\alpha_i \beta_i}{\pi} \Delta_{i+1} \right\} \\ & + \frac{\pi^2}{2\lambda\beta_{i-1}^2 h_{i-1}^2} \left\{ (2\alpha_{i-1} + \beta_{i-1}) \frac{\beta_{i-1} h_{i-1}}{2} \Delta_{i-1} - (1-\lambda)\beta_{i-1} \frac{\alpha_{i-1} h_{i-1}}{\pi} \Delta_{i-1} \right. \\ & \left. - 2(1-\lambda)(\alpha_{i-1} + \beta_{i-1}) \frac{\beta_{i-1} h_{i-1}}{\pi} \Delta_i \right\} \end{aligned} \tag{5}$$

$i=1, \dots, n-1$.

Therefore, if the successive parameters $(\alpha_{i-1}, \beta_{i-1})$ and (α_i, β_i) satisfy (5) at $i = 1, 2, \dots, n-1$, namely, for the positive parameters $\alpha_{i-1}, \beta_{i-1}$ and the selected β_i , if

$$\alpha_i = \frac{2\beta_i \{(\pi - 2)\Delta_i - \Delta_{i+1} + 2\lambda(\Delta_i - d_i) + \lambda(\Delta_{i+1} - d_{i+1})\}}{h_i \alpha_{i-1} [(2 - 2\pi)\Delta_{i-1} + 4\Delta_i - 4\lambda(\Delta_i - d_i) - 2\lambda(\Delta_{i-1} - d_{i-1})] + \beta_{i-1} \{h_i [-\pi\Delta_{i-1} + 4\Delta_i - 4\lambda(\Delta_i - d_i)] + h_{i-1} [(4 - \pi)\Delta_i - 4\lambda(\Delta_i - d_i)]\}}$$

then $P(t) \in C^2(t_0, t_n)$.

IV. CONVEXITY CONTROL OF RATIONAL QUADRATIC TRIGONOMETRIC SPLINE

Positivity, monotonicity and convexity are basic and fundamental shapes, which normally arise in everyday scientific phenomena. To get condition for the interpolation to keep convex in the interpolating interval, consider the condition for the second order derivative to remain positive or negative in the interpolating interval, this task can be carried out simply by selecting suitable values of the parameter λ to satisfy the linear inequality. In this section we assume that the knots are equally spaced.

For simplicity of presentation let us assume a strictly convex set of data so that

$$\Delta_1 < \Delta_2 < \dots < \Delta_n.$$

In a similar fashion, one can deal with a concave data so that

$$\Delta_1 > \Delta_2 > \dots > \Delta_n.$$

For a convex interpolant $P(t)$, it is then necessary that the derivative parameters should be such that

$$d_1 < \Delta_1 < \dots < d_i < \Delta_i < \dots \Delta_{n-1} < d_n < \Delta_n$$

and for concave data.

$$(d_1 > \Delta_1 > \dots > d_i > \Delta_i > \dots \Delta_{n-1} > d_n > \Delta_n)$$

Now $P(t)$ is convex if and only if

$$P''(t) \geq 0$$

For $t \in [t_i, t_{i+1}]$, the second-order derivative $P''(t)$ can be computed and has the form

$$P''(t) = Z(\theta) \cdot (\alpha_i \cos \frac{\pi\theta}{2} + \beta_i \sin \frac{\pi\theta}{2})^{-3} \tag{6}$$

where $Z(\theta) = Q + R + T$

and

$$\begin{aligned} Q = & \left(\frac{\pi}{2h_i}\right)^2 (\alpha_i \cos \frac{\pi\theta}{2} + \beta_i \sin \frac{\pi\theta}{2})^2 \{ (1 - \sin \frac{\pi\theta}{2})^2 (2U_i - \alpha_i f_i) + 2 \sin \frac{\pi\theta}{2} (1 - \sin \frac{\pi\theta}{2}) (2V_i - \beta_i f_{i+1}) \\ & + 2 \cos \frac{\pi\theta}{2} (1 - \cos \frac{\pi\theta}{2}) (2U_i - \alpha_i f_i - (2V_i - \beta_i f_{i+1})) + (1 - \cos \frac{\pi\theta}{2})^2 (-(2V_i - \beta_i f_{i+1})) \\ & + 2 \sin \frac{\pi\theta}{2} (2U_i - \alpha_i f_i - (2V_i - \beta_i f_{i+1})) + 2 \cos \frac{\pi\theta}{2} (-(2U_i - \alpha_i f_i)) + 2(V_i - U_i + \alpha_i f_i) \} \end{aligned}$$

$$\begin{aligned} R = & \left(\frac{\pi}{2h_i}\right)^2 (\alpha_i \cos \frac{\pi\theta}{2} + \beta_i \sin \frac{\pi\theta}{2}) (\alpha_i \sin \frac{\pi\theta}{2} - \beta_i \cos \frac{\pi\theta}{2}) \{ 2 \cos \frac{\pi\theta}{2} (U_i - \alpha_i f_i) \\ & + 2 \sin \frac{\pi\theta}{2} \cos \frac{\pi\theta}{2} (2V_i - \beta_i f_{i+1} - (2U_i - \alpha_i f_i)) + 2 \sin \frac{\pi\theta}{2} (\beta_i f_{i+1} - V_i) \} \end{aligned}$$

$$\begin{aligned} T = & \left(\frac{\pi}{2h_i}\right)^2 (\alpha_i \sin \frac{\pi\theta}{2} - \beta_i \cos \frac{\pi\theta}{2})^2 \{ (1 - \sin \frac{\pi\theta}{2})^2 \alpha_i f_i + 2 \sin \frac{\pi\theta}{2} (1 - \sin \frac{\pi\theta}{2}) U_i \\ & + 2 \cos \frac{\pi\theta}{2} (1 - \cos \frac{\pi\theta}{2}) V_i + (1 - \cos \frac{\pi\theta}{2})^2 \beta_i f_{i+1} \} \end{aligned}$$

The sufficient and necessary condition for the interpolating function $P(t)$ defined by (4) to be convex on $[t_i, t_{i+1}]$ is the positive parameter λ satisfy

$$\frac{2\beta_i h_i \Delta_{i+1} - \pi \alpha_i f_{i+1}}{2\beta_i h_i (\Delta_{i+1} - d_{i+1})} \leq \lambda \leq \frac{2\alpha_i h_i \Delta_i + \pi \beta_i f_i}{2\alpha_i h_i (\Delta_i - d_i)} \quad (7)$$

Here it is observed that if the data are positive/convex then the interpolant will be positive/convex. Thus we have proved the following theorem

Theorem 1. Given $(t_i, f_i, d_i), i = 0, 1, \dots, n, n + 1$, the necessary and sufficient condition for the interpolation defined by (3) to be convex on $[t_i, t_{i+1}]$ is that the given data and the positive parameter λ satisfy

$$\frac{2\beta_i h_i \Delta_{i+1} - \pi \alpha_i f_{i+1}}{2\beta_i h_i (\Delta_{i+1} - d_{i+1})} \leq \lambda \leq \frac{2\alpha_i h_i \Delta_i + \pi \beta_i f_i}{2\alpha_i h_i (\Delta_i - d_i)} \quad (8)$$

V. NUMERICAL EXAMPLE

Example: Let $f(t) = \cos^2(\pi t / 6), t \in [1.5, 4.5]$ with interpolating knots at $t_0 = 1.5, t_1 = 2.25, t_2 = 3.00, t_3 = 3.75, t_4 = 4.5$, $h = 0.75$. let $\lambda = 0.99$, and let $f(t)$ is the function being interpolated. Denote the corresponding C^2 -continuous interpolating function defined by (4) in $[1.5, 4.5]$ by $p(t)$ since the interpolating data and parameter λ satisfy the condition of theorem 1. as shown in figure 1.

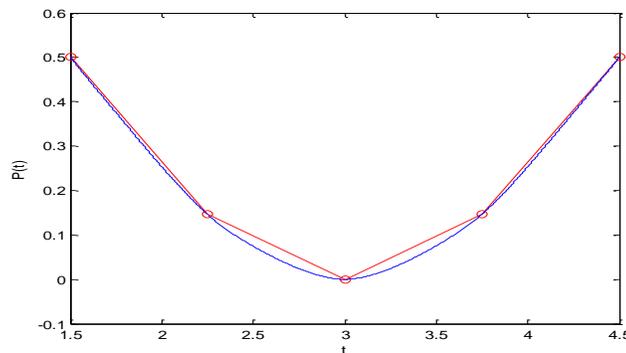


Figure 1: graph of $P(t)$

VI. APPROXIMATION PROPERTIES OF THE WEIGHTED RATIONAL QUADRATIC TRIGONOMETRIC INTERPOLATION

To estimate error of the weighted rational quadratic trigonometric interpolating function defined by (4), since the interpolation is local, without loss of generality, we consider the error in the subinterval $[t_i, t_{i+1}]$. When $f(t) \in C^2[t_0, t_n]$ and $P(t)$ is the rational quadratic trigonometric spline interpolating function of $f(t)$ in $[t_i, t_{i+1}]$. It is easy to see that this type of interpolation is exact for $f(t)$, the polynomial being interpolated, in which the degree is no more than 1. Consider the case when the knots are equally spaced, namely, $h_i = h = \frac{t_n - t_0}{n}$ for all $i = 1, 2, \dots, n$, using the Peano-Kernel Theorem in Schultz [13]] gives the following

$$R[f] = f(t) - P(t) = \int_{t_i}^{t_{i+1}} f^{(2)}(\tau) R_r[(t - \tau)_+] d\tau, \quad t \in [t_i, t_{i+1}] \quad (9)$$

where

$$R_i[(t-\tau)_+] = \begin{cases} p(\tau) & t_i < \tau < t \\ q(\tau) & t < \tau < t_{i+1} \\ r(\tau) & t_{i+1} < \tau < t_{i+2} \end{cases}$$

where

$$p(\tau) = (t-\tau) - \left\{ \left[\frac{(1-\lambda)\alpha_i}{\pi} 2 \sin \frac{\pi\theta}{2} (1 - \sin \frac{\pi\theta}{2}) + (\beta_i + \frac{\alpha_i}{2}) 2 \cos \frac{\pi\theta}{2} (1 - \cos \frac{\pi\theta}{2}) + (1 - \cos \frac{\pi\theta}{2})^2 \right] (t_{i+1} - \tau) - \frac{\beta_i h_i}{\pi} 2 \cos \frac{\pi\theta}{2} (1 - \cos \frac{\pi\theta}{2}) \right\} / (\alpha_i \cos \frac{\pi\theta}{2} + \beta_i \sin \frac{\pi\theta}{2}),$$

$$t_i < \tau < t; \tag{10}$$

$$q(\tau) = - \left\{ \left[\frac{(1-\lambda)\alpha_i}{\pi} 2 \sin \frac{\pi\theta}{2} (1 - \sin \frac{\pi\theta}{2}) + (\beta_i + \frac{\alpha_i}{2}) 2 \cos \frac{\pi\theta}{2} (1 - \cos \frac{\pi\theta}{2}) + (1 - \cos \frac{\pi\theta}{2})^2 \beta_i \right] (t_{i+1} - \tau) - \frac{\beta_i h_i}{\pi} 2 \cos \frac{\pi\theta}{2} (1 - \cos \frac{\pi\theta}{2}) \right\} / (\alpha_i \cos \frac{\pi\theta}{2} + \beta_i \sin \frac{\pi\theta}{2}),$$

$$t < \tau < t_{i+1}; \tag{11}$$

$$r(\tau) = \frac{\frac{\beta_i(1-\lambda)}{\pi} 2 \cos \frac{\pi\theta}{2} (1 - \cos \frac{\pi\theta}{2}) (t_{i+2} - \tau)}{(\alpha_i \cos \frac{\pi\theta}{2} + \beta_i \sin \frac{\pi\theta}{2})}, \quad t_{i+1} < \tau < t_{i+2}; \tag{12}$$

Then

$$\|R[f]\| = \|f(t) - P(t)\| \leq \|f^2(t)\| \left\{ \int_{t_i}^t |p(\tau)| d\tau + \int_t^{t_{i+1}} |q(\tau)| d\tau + \int_{t_{i+1}}^{t_{i+2}} |r(\tau)| d\tau \right\} \tag{13}$$

for $\lambda \leq 1$ $r(\tau) \geq 0$ for all $\tau \in [t_{i+1}, t_{i+2}]$, thus

$$\int_{t_{i+1}}^{t_{i+2}} |r(\tau)| d\tau = h^2 \frac{\frac{\beta_i(1-\lambda)}{\pi} \cos \frac{\pi\theta}{2} (1 - \cos \frac{\pi\theta}{2})}{(\alpha_i \cos \frac{\pi\theta}{2} + \beta_i \sin \frac{\pi\theta}{2})} \tag{14}$$

for $q(\tau)$, since

$$q(t) = -h\left\{(1-\theta)\left[\frac{\alpha_i(1-\lambda)}{\pi} 2\sin\frac{\pi\theta}{2}\left(1-\sin\frac{\pi\theta}{2}\right) + \left(\beta_i + \frac{\alpha_i}{2}\right)2\cos\frac{\pi\theta}{2}\left(1-\cos\frac{\pi\theta}{2}\right) + \beta_i\left(1-\cos\frac{\pi\theta}{2}\right)^2\right] - \frac{\beta_i}{\pi} 2\cos\frac{\pi\theta}{2}\left(1-\cos\frac{\pi\theta}{2}\right)\right\} / \left(\alpha_i \cos\frac{\pi\theta}{2} + \beta_i \sin\frac{\pi\theta}{2}\right) \leq 0 \quad (15)$$

and

$$q(t_{i+1}) = h \frac{\frac{\beta_i}{\pi} 2\cos\frac{\pi\theta}{2}\left(1-\cos\frac{\pi\theta}{2}\right)}{\left(\alpha_i \cos\frac{\pi\theta}{2} + \beta_i \sin\frac{\pi\theta}{2}\right)} \geq 0 \quad (16)$$

It is easy to see that the root τ^* of $q(\tau)$ is

$$\tau^* = t_{i+1} - h \frac{\frac{\beta_i}{\pi} 2\cos\frac{\pi\theta}{2}\left(1-\cos\frac{\pi\theta}{2}\right)}{\left[\frac{\alpha_i(1-\lambda)}{\pi} 2\sin\frac{\pi\theta}{2}\left(1-\sin\frac{\pi\theta}{2}\right) + \left(\beta_i + \frac{\alpha_i}{2}\right)2\cos\frac{\pi\theta}{2}\left(1-\cos\frac{\pi\theta}{2}\right) + \beta_i\left(1-\cos\frac{\pi\theta}{2}\right)^2\right]}$$

Thus

$$\int_t^{t_{i+1}} |q(\tau)| d\tau = \int_t^{\tau^*} -q(\tau) d\tau + \int_{\tau^*}^{t_{i+1}} q(\tau) d\tau = h^2 [Q_1]$$

$$Q_1 = h^2 \left\{ \left[\frac{\alpha_i(1-\lambda)}{\pi} 2\sin\frac{\pi\theta}{2}\left(1-\sin\frac{\pi\theta}{2}\right) + \left(\beta_i + \frac{\alpha_i}{2}\right)2\cos\frac{\pi\theta}{2}\left(1-\cos\frac{\pi\theta}{2}\right) + \beta_i\left(1-\cos\frac{\pi\theta}{2}\right)^2 \right] \left(\frac{(1-\theta)^2}{2} + z^2 \right) + \left(\frac{\beta_i}{\pi} 2\cos\frac{\pi\theta}{2}\left(1-\cos\frac{\pi\theta}{2}\right) \right) (2z - (1-\theta)) \right\} / \left(\alpha_i \cos\frac{\pi\theta}{2} + \beta_i \sin\frac{\pi\theta}{2} \right) \quad (17)$$

$$z = \frac{\frac{\beta_i}{\pi} 2\cos\frac{\pi\theta}{2}\left(1-\cos\frac{\pi\theta}{2}\right)}{\frac{\alpha_i(1-\lambda)}{\pi} 2\sin\frac{\pi\theta}{2}\left(1-\sin\frac{\pi\theta}{2}\right) + \left(\beta_i + \frac{\alpha_i}{2}\right)2\cos\frac{\pi\theta}{2}\left(1-\cos\frac{\pi\theta}{2}\right) + \beta_i\left(1-\cos\frac{\pi\theta}{2}\right)^2} \quad (18)$$

similarly $\ominus p(t) = q(t) \leq 0$

$$p(t_i) = h[\theta - \{ \frac{\alpha_i(1-\lambda)}{\pi} 2 \sin \frac{\pi\theta}{2} (1 - \sin \frac{\pi\theta}{2}) + (\beta_i + \frac{\alpha_i}{2}) 2 \cos \frac{\pi\theta}{2} (1 - \cos \frac{\pi\theta}{2}) + \beta_i (1 - \cos \frac{\pi\theta}{2})^2 - \frac{\beta_i}{\pi} 2 \cos \frac{\pi\theta}{2} (1 - \cos \frac{\pi\theta}{2}) \} / (\alpha_i \cos \frac{\pi\theta}{2} + \beta_i \sin \frac{\pi\theta}{2})] \geq 0 \quad (19)$$

and the root τ_* of $p(\tau)$ in $[t_i, t]$ is

$$\tau_* = t_{i+1} - h \frac{M}{N}$$

where

$$M = h[(\theta - 1)(\alpha_i \cos \frac{\pi\theta}{2} + \beta_i \sin \frac{\pi\theta}{2}) + \frac{\beta_i}{\pi} 2 \cos \frac{\pi\theta}{2} (1 - \cos \frac{\pi\theta}{2})] \quad (20)$$

$$N = [\frac{\alpha_i(1-\lambda)}{\pi} 2 \sin \frac{\pi\theta}{2} (1 - \sin \frac{\pi\theta}{2}) + (\beta_i + \frac{\alpha_i}{2}) 2 \cos \frac{\pi\theta}{2} (1 - \cos \frac{\pi\theta}{2}) + \beta_i (1 - \cos \frac{\pi\theta}{2})^2 - (\alpha_i \cos \frac{\pi\theta}{2} + \beta_i \sin \frac{\pi\theta}{2})] \quad (21)$$

so that

$$\begin{aligned} \int_{t_i}^t |p(\tau)| d\tau &= \int_{t_i}^{\tau_*} p(\tau) d\tau + \int_{\tau_*}^t -p(\tau) d\tau \\ &= h^2 \{ z_1 + z_2 \frac{[\frac{(1-\lambda)\alpha_i}{\pi} 2 \sin \frac{\pi\theta}{2} (1 - \sin \frac{\pi\theta}{2}) + (\beta_i + \frac{\alpha_i}{2}) 2 \cos \frac{\pi\theta}{2} (1 - \cos \frac{\pi\theta}{2}) + (1 - \cos \frac{\pi\theta}{2})^2] (t_{i+1} - \tau) - \frac{\beta_i h_i}{\pi} 2 \cos \frac{\pi\theta}{2} (1 - \cos \frac{\pi\theta}{2})}{(\alpha_i \cos \frac{\pi\theta}{2} + \beta_i \sin \frac{\pi\theta}{2})} \\ &\quad + z_3 \frac{\frac{2\beta_i}{\pi} \cos \frac{\pi\theta}{2} (1 - \cos \frac{\pi\theta}{2})}{(\alpha_i \cos \frac{\pi\theta}{2} + \beta_i \sin \frac{\pi\theta}{2})} \} \\ &= h^2 Q_2 \end{aligned}$$

where

$$z_1 = [\frac{\theta^2}{2} - ((1-\theta) - \frac{M}{N})^2]$$

$$z_2 = [\frac{M^2}{N} - \frac{1}{2} - \frac{(1-\theta)^2}{2}]$$

$$z_3 = [(2(1 - \frac{M}{N}) - \theta)]$$

$$\|R[f]\| = \|f(t) - P(t)\| \leq h^2 \|f''(t)\| w(\theta, \alpha_i, \beta_i)$$

where

$$w(\theta, \alpha_i, \beta_i) = \left[\frac{\beta_i(1-\lambda)}{\pi} \cos \frac{\pi\theta}{2} (1 - \cos \frac{\pi\theta}{2}) \right. \\ \left. (\alpha_i \cos \frac{\pi\theta}{2} + \beta_i \sin \frac{\pi\theta}{2}) + Q_1 + Q_2 \right] \quad (22)$$

where $w(\theta, \alpha_i, \beta_i)$ is a constant depending upon $\theta, \alpha_i, \beta_i$.

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Human Rights Education as a Means of Ensuring the Observance of Human Rights

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Abstract- Human Rights are a universal phenomenon because rights have been imbibed in our society over the years. It has been realized that without human rights we cannot live as human beings. These rights are necessary to ensure the dignity of every person as a human being irrespective of one's race, religion, nationality, language, sex or any other factor. The concept of Human Rights is based on the assumption that human beings are born equal in dignity and rights. It was after the two world wars that the necessity for promoting and promoting human rights was felt seriously, and the General Assembly of the United Nations adopted the Universal Declaration of Human Rights on 10th December 1948. This declaration provides that all men and women are entitled to civil, political, economic, social and cultural rights without any discrimination. Human rights education is not something like consideration of abstract ideas reflecting certain generous ideas. It is naturally to be adapted to the specific needs of every human being by providing one with norms, values and criteria to which one can refer to in the course of daily life. This paper tries to present Human Rights Education as a means of ensuring the observance of human rights and at the same time UGC's approach towards human rights.

Index Terms- UDHR; Human Rights; Dignity; Discrimination; Universal

I. INTRODUCTION

The UN General Assembly proclaimed on 10th December 1948 The Universal Declaration of Human Rights 'as a common standard of achievement for all people and all nations, to the end that every individual and every organ of the society, keeping this declaration constantly in mind, shall strive by teaching and education to promote respect for these rights and freedoms.' Human Rights teaching covers all levels in the context of both school and out- of- school education. What is there to be taught? In the simple and memorable words of UNESCO Director General, Mr. Amadou Mahtar m'Bow, in his address to the International Congress on the teaching of Human Rights(Vienna, 12-16 September 1978) synchronizing with the 30th anniversary of the UDHR it is to teach every one 'to respect, and ensure that others respect, one's own human rights and those of other people, and to be prepared, when necessary, to find the courage to defend them in all circumstances, even the most difficult- such is the most imperative moral duty of our generation'. And it is education which must make human rights known to everyone since the very aim of education is to ensure the full development of every human being's individual personality. Human rights education is not something like consideration of abstract ideas reflecting certain generous ideas. It is naturally to be adapted to the specific needs of every human being by providing him/her with norms, values and criteria to which he/ she can refer in the course of daily life. An education of this kind cannot be purely theoretical at least in the early years of life. The roots of such an education are to be found in the living relationship between the teacher and the taught., the parent and the child, the educator and the pupil. When a child is out of the cradle, the baby begins to learn how to perform the duties as a member of the family and then of the community/society. The powers of initiative begin to grow and mature in course of time.

Children are greatly influenced by the quality of these relationships. An instinctive attitude will come to be shaped by habits and temperament and normally children will adopt such attitude towards human rights of fellow men and women. UNESCO stressed that for their full observance human rights must be ensured to all human beings and that this aim cannot be attained unless human rights are made known to them, particularly through teaching and education.

The UDHR is a document of world historic importance. The UDHR is the first final expression on a global basis of the fundamental liberties of the mankind. Two other major international treaties in the form of covenants- the International Covenant on Civil and Political Rights (ICCPR) and the International Covenant on Economic, Social and Cultural Rights(ICESCR)- constitute together with the UDHR, the International Bill of Rights. Thus, human rights embrace civil, political, economic, social and cultural rights. Rulers are accountable on the matter of implementing the rights enshrined in the several documents beginning with the UDHR. Human Rights are to be enjoyed by all people without exception at all times, and no one set of rights can be enjoyed at the expense of other rights.

To know one's rights is the first step towards making efforts at obtaining their recognition. The UN General Assembly called upon all member states to publicize the text of UDHR and 'to cause it to be disseminated, displayed, read and expounded principally in schools and other educational institutions, without distinction based on the political status of the countries or territories.' Thereafter, again, while the text of the ICCPR, ICESCR and the optional protocol to the ICCPR were approved, it was recommended that while the texts should be made throughout the world, the Governments of States and NGOs should also publicize the text of these instruments 'as widely as possible, using every means at their disposal, including all the appropriate media of information.' While the NGOs did their part even with all the limited resources at their command, governmental response in most cases has been frankly

negative. By their studied silence, governments sought to hide facts regarding the approved and acknowledged human rights from the people. More than fifty years back, UN Member States pledged themselves 'to achieve, in cooperation with the UN, the promotion of universal respect for and observance of human rights and fundamental freedoms' for all without distinction as to race, sex, language or religion. But fifty years after the UDHR regime, governments have been found sorely wanting in respecting human rights, nay governments more often than not, treated human rights with contempt. Human rights teaching has not proceeded in the manner set forth in the UDHR. After World War II, there has been no global war so far, but there have been a good many localized general wars whether in the Cold War period or thereafter. Wars meant war crimes and genocide, evidenced so very cruelly in some former Soviet Republics, former Yugoslavia, Rwanda, etc. Human rights continue to be violated. Basic economic and social rights are denied to many, particularly in the Third World countries, marked by rising illiteracy, poverty, homelessness and hunger, and denial of access to rights to education, employment, health care and social security facilities.

The list of negatives appears to be unending. The very first sentence of Article 1 of the 30 article UDHR states: 'All human beings are born free and equal in dignity and rights'. But the truth is that the dignity of men and women in a large majority of cases is callously disregarded practically in every part of the world because of the existence of political, economic or social conditions which deny them the right to education, equality of opportunity and sometimes the most elementary standards of well-being or in even more tragic circumstances, is trampled on by the forces of oppression which do not hesitate to resort to violence, torture and murder in order to perpetuate an unjust social order.' As far as India is concerned, its human rights record has indeed been disappointing. With the operation of several black laws, tyranny and terror served as the keynote of governmental record vis-a-vis the human rights situation. Faced with organized human rights movement and international pressure, the Government of India had to move Parliament and thus, THE PROTECTION OF HUMAN RIGHTS ACT 1993 has to be cleared. The setting up of the National Human Rights Commission (NHRC) and the establishment thereafter of around half a dozen State HRCs have been positive steps. NHRC made some powerful interventions in defense of citizens' human rights. But, then, it is wholly powerless to deal with complaints of violation of human rights by members of the armed forces: it can only seek reports thereon from the Central Government and make recommendations to it. The NHRC cannot do anything to stop army atrocities: this is the tragic experience of the people in several parts of the country, more particularly in several states of the North-East. The Act needs a basic restructuring, particularly after India's ratification, at the instance of the NHRC, of the international convention against Torture and other Cruel Inhuman or Degrading Treatment or punishment. It is good to know that the NHRC itself has set up a review panel to suggest appropriate changes for amendments to the Act of 1993. But without bringing human rights violations by members of the armed forces within its purview, NHRC or State HRC cannot reasonably be expected to deliver the goods.

II. THE TEACHING OF HUMAN RIGHTS

Education is one of the primary human rights. It is the one right which largely conditions in a very substantial manner all other rights. Article 26 of the UDHR relates to education. On the eve of the thirtieth anniversary of the Universal Declaration of Human Rights, UNESCO convened the first International Congress on the Teaching of Human Rights (Vienna, 12-16 September 1978).

The document gives an outline for the development of substantial programmes in the field of human rights teaching and education. The ten principles and considerations of the document lay stress on the indivisibility of different categories of human rights as also the need for teaching about human rights at all levels of education, including out of school settings. The ten principles and considerations serving as guidelines may be summarized as follows:

1. Human rights education and teaching should be based on the principles which underline the UN Charter, the UDHR, the International Covenants on Human Rights, and other international human rights instruments..... equal emphasis should be placed on economic, social, cultural, civil and political rights as well as individual and collective rights. The indivisibility of all human rights should be recognized.
2. The concept of human rights should not be formulated in traditional or classical terms alone; this should include the historical experience and contributions of all people having particular regard to major contemporary problems like self-determination and all forms of discrimination and exploitation.
3. Human rights education must aim at:
 - Fostering the attitudes of tolerance, respect and solidarity inherent in human rights
 - Providing knowledge about human rights, in both their national and international dimensions and the institutions established for their implementation.
 - Developing the individual's awareness of the ways and means by which human rights can be translated into social and political reality at both national and international levels.
4. Education makes an individual aware of his/her rights. At the same time instill respect for the rights of others.
5. Constant care should be taken to create awareness about the close relationship between human rights and development and peace including inter alia disarmament.
6. Human rights must be seen as an aspect of professional, ethical and social responsibility in all fields of research, study, teaching and work.
7. Human rights education and teaching should stress that a new international economic, social and cultural order is essential to enable all people to enjoy their human rights and to promote and facilitate education on human rights at all levels in all countries.

8. Human rights must be taught at all level of the educational system, as well as in out of school settings, including the family, and in continuing education programmes including literacy and post- literacy programmes.
9. Human rights should also be taught as a subject integrated in the appropriate disciplines and in particular fields such as philosophy, political science, law and theology, they should be taught as an independent course.
10. To enable the teacher of human rights to carry out his/her task properly, it is particularly important his/her personal integrity and freedom of expression be guaranteed.

The Annex to the document explains in details the Programmes, Teaching materials, Methods and Structures. The sub-theme on human rights education of this Seminar may include some interaction on this UNESCO document as well as the UGC document on human rights education.

III. UGC'S APPROACH TO HUMAN RIGHTS EDUCATION

UGC's Ninth Plan Approach To Promotion of Human Rights Education(HRE) in Universities and Colleges is a very studied and comprehensive document covering as it does the latest developments in the field even while laying down a detailed set of guidelines for implementation of the scheme of HRE in the University system embracing all the dimensions of the system. It adds to our insight and understanding of the subject. The introduction to the document analyzes the concept of human rights in its expanding comprehension and explains in clear terms the goal of evolving human rights culture, noting, at the same time, the existing deficiencies in the area of human rights teaching. The 'Preview' section is a stock- taking exercise: while the factual position of the state of HRE has been given, it says that the whole teaching and learning of human rights in India in the early 60s and 70s was kept linked to the international ethos. Thus, the document says: ' the context of human rights studies in India got metamorphosed with the highlighting of the gross violations of human rights of the weaker sections, cases of custodial violence, mass detentions without trial, bonded and child labour, environmental degradation and the like which were brought into public attention essentially through NGOs, the media and the public interest litigations. The publicity of the work of the National Human Rights Commission(NHRC) also contributed to this new ethos. The human rights educators in India today, therefore, feel convinced that grassroots and indigenous orientation, focus on local human rights problems of deprived sections of the society is much more important than the mere projection of international human rights conventions and norms. This change of focus is extremely significant and needs to be crystallized in human rights education of the future.

The section on ' Perspective for Human Rights Education' highlights inter alia, the fact that 'cultivation and promotion of human rights culture is the sine qua non for smooth functioning of organs of a democratic state, and for the kind of development that results into over all development of each member of society'. Further, a very important point has been made: 'one of the greatest challenges of today's time in pluralistic societies like India is the rising conflicts and tensions in the name of particularistic loyalties to caste, religion, one's own region or language. Such a situation is not in accord with the concept of unity in diversity and poses a threat to human rights as well as to principles of democracy and rule of law. It is imperative that people realize the positive social and cultural value of diversity rather than treating it as a source of conflict. The human rights education must imbibe the understanding, tolerance and respect for differences and diversities; further, ' human rights education has to be the catalyst in bringing about attitudinal and social change'

Interestingly enough, the 'Objectives and Strategies' section of the UGC document is also a ten- point statement(4.1-4.9 1) in line with the ten principles and considerations of the UNESCO document referred to earlier. This and the 'Scope and broad contents of human rights courses. Deserve to be discussed at length. Other sections have been devoted to Curriculum Development: Compilation of Teaching Materials; Development of Teaching Methods; Research; Field Action and Outreach; Training of Teachers; Coordination with NHRC and State HRCs; Human Rights Education Centre/Cell, and Financial Support. This very short summary of the UGC scheme is no substitute for personal reading of the document by teachers, students and University and College administrators with a view to meaningful implementation of the scheme. The State Government has also to bear its share of responsibility in this regard.

IV. CONCLUSION

The running thread of this presentation is promotion of human rights education as a means of ensuring the observance of these rights in the interest of this generation to come. Science and technology have opened up tremendous prospects practically all along the line for material progress. Peaceful conditions should ensure a just social order for all human beings all over the world. National and regional efforts are to be directed at sharing the benefits of progress on an equitable basis.

Before we conclude, we may refer to another matter of vital significance for the advance of the society. We have spoken of women's rights or, better still, human rights as a whole constituting of women's rights. The next logical step after 33% reservation of seats for women in Panchayati Raj Institutions(PRI) upto and including the district level was to extend the same at the level of the Lok Sabha and State Assemblies. This would change the status quo. Actually the reservation of seats or the quota should be increased so that representation of women in the legislative bodies at the state and national levels bears relationship to their position in the total population of the country. The quota bill as introduced in the Lok Sabha more than once should have been cleared in 1996 or at least by the International Women's Day on 8 March 1997 as demanded by women's organizations. Patriarchy ordained that this must not happen and hence, this tamasha about the quota bill. Society would be better place to live in if both the male and female views are given equal importance. Democracy is functional only when citizens, both men and women, are political equal.

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WDM and SEC assisted FSO

Sonal Job

Abstract- The spectrum licensing issues and interference at unlicensed ISM bands limits the market penetration. Though emerging license-free bands appear promising, they still have certain bandwidth and range limitations. The advantage of FSO communication over Fiber Optic communication (FO) is that, there is no time and money wasting trench digging involved, for laying the optical fiber cables underground and no acquiring of road digging permission from the municipality, because the optical carrier signal travels through the atmosphere. Optical wireless (FSO) can augment RF and milli meter wave links with very high (>1 Gb/s) bandwidth. In fact, it is widely believed that optical wireless is best suited for multi-Gb/s communication. As this is a telecommunication technology that transmits data in the form of optical signals across the air and, as such, can be considered as a wireless (line-of-sight) transmission system; which is being capable of handling data rates at the Gbps level, does not require licensing, and can be deployed at one-fifth of the cost of fiber; also, the narrow beams employed in the transmission of signals are very difficult to be affected by jamming, interception or interference. This article reviews the FSO Link suitability for achieving reduced error communication. With its high-data-rate capacity and wide bandwidth on unregulated spectrum, FSO communication is a promising solution for the “last mile” problem, however its performance is highly vulnerable to adverse atmospheric conditions. A number of phenomena in the atmosphere, such as absorption, scattering, and turbulence, can affect beam attenuation, but in the case of wavelengths typical of FSO systems operation, only scattering and turbulence are appropriate to be taken into consideration.

Index Terms- Dispersion interleaving, WDM, ONSR, BER switch-and-examine.

I. INTRODUCTION

In recent years, free-space optical (FSO) communications has received much attention, from both industry and academia, as an alternative solution for terrestrial broadband wireless access over short distances. This is thanks to its advantages of cost-effectiveness, quick and easy deployment, and high data-rate provision. Especially, when the radio-frequency (RF) spectrum has been heavily congested, the feature of license-free service becomes a significant advantage of FSO communications. In terrestrial FSO communications, the primary factors that degrade the system performance of are atmospheric attenuation and turbulence.

- 1) The atmospheric attenuation-It is caused by absorption and scattering processes, it is variable and difficult to predict hence significantly limits the covering range of FSO systems. Fog is one of the most significant factors influencing the range and reliability of optical links. Fog events usually persist from minutes to several hours. This phenomenon can be regarded as changing

relatively slowly in comparison with atmospheric turbulences. The major challenge to FSO communications is fog. Rain and snow have little effect on FSO, but fog is different. Fog is vapor composed of water droplets, which are only a few hundred microns in diameter but can modify light characteristics or completely hinder the passage of light through a combination of absorption, scattering and reflection. The primary way to counter fog when deploying FSO is through a network design that shortens FSO link distances and adds network redundancies.

- 2) Atmospheric turbulence-It is a phenomenon occurring when there are the variations in the refractive index due to inhomogeneity in temperature and pressure changes. Atmospheric turbulence causes phase disturbances along propagation paths that are manifested as intensity fluctuation (scintillation), beam broadening and beam wandering at the receiver. These disturbances are generally considered to be a multiplicative noise source that reduces the capability of receiver to distinguish the information contained in the modulated optical wave. They make the received signal fade and impair the link performance. Due to atmospheric turbulence, signals are affected. This atmospheric turbulence leads to fading of the channel. The variations in the temperature and pressure of the atmosphere cause variations in the refractive index. Thus there comes fluctuations in the intensity (scintillation) and phase of the received laser beam signal. If the propagation distance is small, then the number of scatterers will be finite and random in nature.

These index in homogeneity and attenuation could deteriorate the quality of the received signal and lead to an increase in the bit-error rate (BER) of the FSO systems.

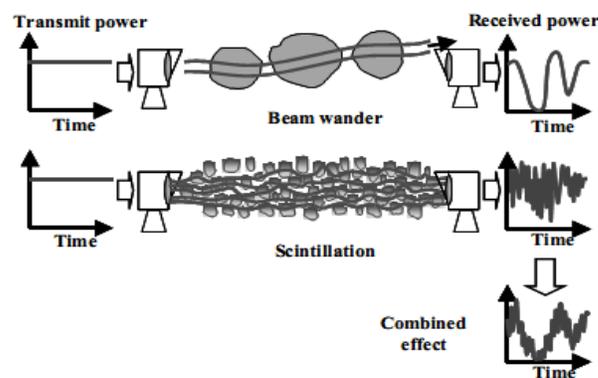


Fig no.1 Atmospheric attenuation and turbulence affecting FSO system

In the air the areas with different temperatures and pressures create zones with different refraction indices. Various inhomogeneities in the atmosphere affect the beam distortion.

II. RESEARCH

If the optical signals are subjected to different turbulence conditions, fluctuations in the intensity (scintillation) and phase of the received laser beam signal occurs, also due to the propagation temperature and wind velocity, there will be fluctuations in the intensity of the signal which occurs in random.

Thus in order to mitigate the effect of turbulence, error control codes and spatial diversity schemes are used. Single laser transmitter and multiple receivers can be placed at both ends to mitigate the turbulence fading and exploit the advantages of spatial diversity. Spatial diversity is particularly crucial for strong turbulence channels in which single-input single-output (SISO) link performs extremely poor. In this paper, we propose the concept of limiting the error rate performance of FSO systems for atmospheric turbulence channels and potential advantages of spatial diversity deployments at the transmitter and/or receiver. A comparative study of SIMO and MISO links shows that the efficiency of adding diversity in error rate and outage capacity appears more in SIMO, both in the weak and strong turbulence conditions.

The WDM technique is used to transmit multiple wavelengths, multiple data channels simultaneously, as a single optical signal along the FSO communication link. When FSO is combined with WDM technology, then the transportable bandwidth is yet higher and WDM-FSO becomes suitable to disperse-grid. In such case, WDM FSO combined with short-distance EM wireless clusters, allows for a large product $\{\text{bit rate}\} \times \{\text{distance}\}$ which can be several orders of magnitude than pure E-M technology. Although WDM network offers much higher bandwidth than copper cable and is less susceptible to various kinds of electromagnetic interferences and other undesirable effects. WDM history started with opaque network, in which there was O-E-O conversion at each node that means that the optical signal carrying traffic terminate where it undergo O-E-O conversion. This approach had full independence between the network and physical layer but it also requires a large amount of O-E-O conversion devices that increased the network cost and energy consumption. In transparent optical networks, no O-E-O conversion is involved and the optical signal at the source node reaches the destination nodes. This approach reduces the cost, but also implies that physical layer must support end-to-end communication, but in due course, transmission is affected due to impairments that occurs in the so used channel. These impairments cause the transmitted data not to be received correctly at the destination. Since the data that has been transmitted for the entire light path, remains in optical domain, the signal is degraded due to the accumulation of noise and signal distortions. Thus due to the accumulation of these impairments at the destination the received signal quality may be so poor that BER can reach an unacceptably high value and thus the light path is not usable.

III. FREE SPACE OPTICAL LINK DESIGN

A. The Transmitter

1. Multi-wavelength EDFL source: To achieve high bandwidth based on WDM technique, multi-wavelength EDFL is needed. The purpose of using a multi-wavelength laser is to increase the bandwidth of the link using the wavelength division multiplexing technique (WDM). The WDM technique is used to transmit multiple wavelengths, multiple data channels simultaneously, as a single optical signal along the FSO communication link.

2. De-multiplexer: The signal is split into different wavelengths by a de-multiplexer.

3. Intensity modulator: The purpose is to modulate each wavelength separately by data signals. These wavelengths are then modulated with data by the intensity modulator.

4. Multiplexer: The modulated wavelengths/data-channels are multiplexed into one optical signal by a wavelength-division-multiplexer (WDM), but often it becomes hard to increase the number of multiplexed channels, which otherwise is made on account of decreasing the channel spacing, as a resultant, due to the very small channel spacing, the power leakage from one channel to its adjacent channels occurs and hence exhibit high insertion loss, and often cause large intersymbol interference (ISI).

The usage of dispersion-interleaving facilitates the amplitude of the adjacent channel leakage to be reduced. In dispersion interleaved system, the dispersion-compensating fiber (DCF) is removed from either the first or the last span of the link and placed at the transmitter side for the odd channels and at the receiver side for the even channels. As a result, the channel signals arrive at their receivers with dispersion fully compensated, thus the performance improves. With Dispersion interleaving the improvement is nearly independent whether the signal channel is completely synchronized or delayed by a half bit interval with respect to adjacent channel. Hence there is a significant improvement in the performance of the system as per the earlier researches on dispersion interleaving, that is both signal power and OSNR have improved significantly. Noise power also increases but increase in noise power is less than the increase in signal power. As a result OSNR increases considerably. The improvement in signal power and OSNR slightly decreases with increase in data rate and decrease in the channel spacing.

5. Beam collimator: The purpose of this device is to collimate the optical signal to be transmitted so that the divergence of the signal is minimized. Too much divergence of the signal results to the decrease in the received optical power.

B. The Receiver

1. Laser beam receiver: The device collects the light sent from the transmitter.

2. De-multiplexer: The purpose of this device is to split the received optical signal into separate wavelengths. Switch-and-examine combining (SEC) technique is our suggestion for the diversity combining solution in multi-transceiving configuration. As only a handful of diversity approaches are potentially viable for switched diversity. Based on a switch-and-stay combining (SSC) scheme where the combiner switches to a new branch only after the existing received SNR fall below a threshold (T). This switching occurs regardless of the new branch SNR—even if it is inferior to the original branch. A major deficiency for SSC is the high probability that the optical beam will fail to illuminate the receiving branch, that is, half of the receivers are not illuminated

rendering it an unacceptable choice for FSO. SEC diversity scheme is similar to SSC, albeit with minor modification.

Each of the demultiplexed signal is followed separately by the SEC, where a low SNR reading initiates branch switching; however, the SNR of the new branch is considered first, for example, if the SNR is above the threshold level, the original branch is maintained. Branch evaluation continues to alternate branches until an acceptable SNR is observed, and a branch selection is made. SEC is designed on a switching threshold basis and proposes to reduce the volume of processing load and thus implementation complexity in the receiver design. When an SEC scheme is employed, branch switching is initiated only when the active branch SNR drops below a defined threshold, thus limiting the switching repetitiveness that persists in an SC scheme. An SEC receiver examines in sequence the SNR of each of its branches and switches to the branch with an SNR deemed acceptable.

3. Demodulator: The purpose of this device is to demodulate the separated wavelengths. For each wavelength, the device makes use of photo-detectors, such as Avalanche photo diodes, to recover the data that has been sent.

IV. FUTURE SCOPE

1. Control coding suggested as per earlier researches

The error control codes usage like FEC (forward error correction codes) on top of multi-hop approach can be made to improve link reliability. If we manage to tightly bound error variance within certain limits, we can design more efficient error control codes for a given FSO link. Some other researches going on the issue of the error control coding for FSO show through simulations that multi-hop end-to-end error is lower and also has a smaller variance than single hop.

LDPC error-correction codes with outstanding correction capabilities for the FSO channel may also be used as these codes provide very large SNR gains over Reed-Solomon codes of similar rate for a wide range of turbulence conditions. Researchers have observed that the uncoded channel becomes practically useless as the turbulence strength (or the propagation length) increases. However, the use of these LDPC codes can provide a large improvement and make the FSO links a realistic communication alternative. In strong turbulence conditions, code provides good performance at realistic SNR values. These codes have low encoder and decoder complexity, a feature that makes them practical for FSO communication system.

2. Adaptive optical methods suggested as per earlier researches

Nevertheless, when the system bit rate increases and the transmission distance is far, the FSO systems using PPM signaling critically suffer from the impact of pulse broadening caused by dispersion, especially when the modulation level is high therefore of multi-wavelength PPM (MWPPM) signalling to overcome the limitation of PPM. To further improve the system performance, avalanche photodiode (APD) is also used. To model the impact of intensity fluctuation caused by the atmospheric turbulence, by using MWPPM, the effects of both intensity fluctuation and pulse broadening are mitigated, the BER is therefore significantly improved. Additionally, the system

performance is further improved by using APD, especially when the average APD gain is chosen.

V. CONCLUSION

With the above proposed system model we will be able to efficiently deploy the wavelengths corresponding to the transmission of various data onto the SIMO structure without its power (wavelengths) being leaked into each other, hence at the transmitter section itself the ISI is inhibited while as many signals are sent to the receiver side by the means of the FSO, where after the signal's demultiplexing it is subjected to the switch – and – examine circuit where the appropriate OSNR is switched from thereafter it is demodulated.

The scope of this model is that a robust type of structure towards the atmospheric disturbances like attenuation and turbulence is proposed which perhaps intercept the optically transmitted signal but its mitigation is successfully carried out

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Anti-bacterial Activity of Crude Extracts of Compound Ascidian *Aplidium Multiplicatum* from Vizhinjam Bay (South West Coast of India)

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Abstract- Ascidians are rich source of bioactive agent which could be used for novel antimicrobial drugs. Ascidians are belongs to phylum chordata and class ascidiacea. In the present study a compound ascidia *Aplidium multiplicatum*, collected from Vizhinjam, south west coast of India was assayed for their antibacterial activity against six human bacterial pathogens. The antibacterial activity of crude extract of ascidians showed inhibitory activity against all six species. The crude methanol extract was more active exhibiting a broad spectrum antibacterial activity than the crude ethanol and acetone extract against each of the bacterial species tested. In antibacterial activity the gram negative bacteria *Pseudomonas aeruginosa* showed most sensitive against 12.0533 ± 0.010116 mm *A.multiplicatum* in crude methanol extract. And the minimum zone of 1.06 ± 0.121244 mm in *K.pneumoniae* in ethanol extract. The corresponding zones of ethanol extract produced a maximum zone of 10.3533 ± 0.7274 mm in *Proteus mirabilis* and acetone extract produced a maximum zone of 10.143 ± 0.1266 mm against *Pseudomonas aureus*. These results indicated that the ascidian *A.multiplicatum* is found to have remarkable antimicrobial activities against isolated microbes. Further, studies will fulfill for purification and structural elucidation of antimicrobial drugs.

Index Terms- Ascidian, Antibacterial activity, crude extract, isolated pathogen, Vizhinjam

I. INTRODUCTION

The study of marine organisms as a source of biologically active compounds is considered a very lucrative field, having already led to the discovery of various new pharmacological tools and medicines (Bhakuni, 1994[1], Munro et al, 1999[2] Faulkner, 2000a [3]. The work of Bergman and Feeney at the beginning of the 1950s initiated the study of marine natural products, and in the last few decades, an appreciable number of new compounds have been isolated from marine organisms (Bergman and Freaney, 1951[4] Bhakuni, 1994[1] Faulkner, 2000b[5] Faulkner, 2000c[6]. Many authors believe that the improvement in isolation and chemical identification techniques, the collaboration between chemists and pharmacologists, and most recently, the interest of pharmaceutical industries have been important determinants in the development of marine natural products research Faulkner, 2000b[5]. Ascidians, commonly called sea squirts (subphylum:

Urochordata, Class: Ascidiacea) are a prolific source of diverse bioactive metabolites and also interesting organism from the view point of chemical ecology Hongwel et al, 2004[7]. The number of natural products isolated from marine organisms increases rapidly and now exceeds with hundreds of new compounds being discovered every year Proksch et al, 2002[8] Jain et al, 2008[9]. A large portion of these natural products have been extracted from marine invertebrates, especially ascidians and some of them are currently in preclinical and clinical trials Proksch et al, 2002[8]. The need for discovery of new and novel antibiotics is imperative because evidence suggests that development and spreads of resistance to any new antimicrobial agents is inevitable.

Tunicates have been reported to be rich source of biologically active compounds and ranked third for their overall activities, next to sponges and bryozoans Davis et al, 1999[10]. Although researches on bioactive compounds from ascidians were recently initiated, it is significant that the first marine natural product Didemnin B is entering into human clinical trial and it is an ascidian metabolite. In the last two decades, the incidence of human bacterial and fungal infections has increased dramatically, in parallel with the wide spread of incurable infectious diseases associated with antibiotic –resistant bacteria. Fungal and bacterial diseases have become a growing threat, especially in immunocompromised patients, for whom few or no effective drugs are currently available Lupetti et al, 2002[11]. Accordingly, a variety of studies have been conducted in an attempt to isolate natural anti-bacterial and anti-fungal substances with potential pharmaceutical utility, and to develop and design new synthetic or semi-synthetic drugs Viejo et al, 2005[12].

The case of living marine surfaces the colonization process can additionally be affected by organic metabolites produced by the host organisms. These metabolites may affect bacteria in a number of ways, ranging from the induction of chemotactic responses to the inhibition of bacterial growth or cell death. Since they accumulate chemical defences, ascidians have been screened in a variety of pharmacological bioassays. Biological activities which have been frequently observed in ascidian crude extracts include antibiosis against both human microbial pathogens and micro organisms Mayer et al, 2007[13]. Hence a broad spectrum screening of ascidians for bioactive compound is necessary. The present study was carried out to investigate the antibacterial activity in crude extracts of ascidians from Vizhinjam bay, south west coast of India.

II. MATERIALS AND METHODS

Specimen collection and identification: Ascidians were collected as common and persistent bio foul ants from the cement blocks, pilings and pearl oyster cages of Vizhinjam bay (lat 8°22'35.95" N-76°59'16.40 E"), by SCUBA diving at the depth ranging from 4 to 6 m between October and November 2011. The samples were thoroughly washed with sea water, cleaned of sand, mud and overgrowing organisms at the site of collection and transported to laboratory and identified by standard study of Kott,1985[14], and Meenakshi ,2002[15].

Extraction: The extraction was followed by chellaram et al,2004[16].The freshly collected samples were weighed (20g) each and soaked in methanol; ethanol and acetone for one week and filtering through What man No.1 filter paper and the solvents were concentrated by rotary evaporator with reduced the pressure to give a dark brown gummy mass. The resultant residues were stored at 4°C for further analysis.

Microbial strains used: Antibacterial activity of tissue extract was determined against six different bacterial pathogens, viz., *Klebsiella Pneumonia*, *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Escherichia coli*, *Salmonella typhi* and *Proteus mirabilis*. The clinical strains were obtained from MTCC microbial culture collection, Chandigarh.

Antimicrobial susceptibility assay: The antibacterial activity was carried out by standard disc diffusion method. The

extract were applied on to 6mm sterile discs in aliquots of 30µL of solvent, allowed to dry at room temperature and placed on agar plates seeded with micro organisms. The bacteria were maintained on nutrient agar plates and incubated at 37°C for 24 hrs. Zones of growth inhibition were measured in mm using a scale.

Statistical analysis: The results were expressed as Mean ±SD of the three independent values.

III. RESULTS

Antibacterial activity of crude methanol, ethanol and acetone extract of *A. multiplicatum* against six human pathogenic bacterial strains were presented in Table.1. Among these extracts, methanol and ethanol showed more activity against all pathogens than acetone extract. In the present investigation, methanol extract of *A. multiplicatum* showed high antimicrobial activity against both gram positive and gram negative bacteria. From the bacteria tested *P. aeruginosa* was the most sensitive against methanol extract 12.0533± 0.10116 mm of *A.multiplicatum*. And the minimum zone of 2.166± 0.13081 mm was observed in *S. typhi*. *Corresponding zones of ethanol extract produced a maximum zone of 10.3533± 0.7274 mm in P. mirabilis and minimum zone of 1.06± 0.121249*

Table 1. Antibacterial activity of Aplidium multiplicatum against human pathogens

PATHOGENS	METHANOL	ETHANOL	ACETON
<i>Staphylococcus aureus</i>	3.9833±0.035119	3.2733±.24986	2.9667±0.035119
<i>Salmonella typhi</i>	2.1466±0.13081	2.1466±0.1350512	1.97±.03
<i>Klebsiella pneumonia</i>	0	1.06±0.121244	0
<i>Pseudomonas aeruginosa</i>	12.0533±0.10116	10.3533±0.72748	10.143±0.1266
<i>E.coli</i>	5.15833±0.14682	7±0.1	5.9566±0.058595
<i>Proteus mirabilis</i>	4.0733±0.2289	8.0633±0.118462	4.0933±0.17039

Zone of inhibition* (mm)

*Zone in mm indicates the distance from the border of the disc to the edge of the clear zone

mm in *K. pneumonia*. Acetone extract produced a maximum zone of 10.143± 0.1266 mm against *P. aureus* and minimum activity 1.97± 0.03 mm against *S. typhi*. There was no activity was observed in acetone and methanol extract against *K. Pneumonia*. Both extracts showed a broad-spectrum of antibacterial activity against, *S. aureus*, *S. typhi*, *P. aeruginosa*, *E. coli* and *P. mirabilis*.

IV. DISCUSSION

Marine organisms have been found to produce a great diversity of novel bioactive secondary metabolites and potential source of drug discovery. Extensive investigations of ascidians pharmacology research have been undertaken all over the world. Several drug discovery projects have screened

ascidians for antibiotic activities. Overall, ascidian extract caused growth inhibition in gram positive and gram negative bacteria, indicating that these extracts do not selectively inhibit one group of micro organisms Thompson et al, 1985[17]. Here we examined antibacterial activity of the crude methanol and ethanol extracts of *A. multiplicatum* against gram positive and gram negative bacteria and it was evident that the gram negative strains were more resistant, than gram positive. This study is contrary with the findings of Ali et al, 2008[18] who reported maximum antibacterial activity of the crude methanol extract of the test and mantle bodies of *P. nigra* against the gram positive strains inhibitory zones of $(12.3 \pm 0.8 \text{ mm})$ and $(8.2 \pm 0.8 \text{ mm})$ respectively.

In the present study *A. multiplicatum* showed promising source of antibacterial activity in crude extracts. It showed high antibacterial activity against six pathogens assayed, from the bacteria tested: *P. aureus* was the most sensitive against methanol extract $(12.0533 \pm 0.10116 \text{ mm})$. Minimum zone of inhibition $(2.166 \pm 0.13081 \text{ mm})$ was observed in *S. typhi* against methanol extract. The crude ethanol extract showed maximum activity against *P. mirabilis* $(10.3533 \pm 0.7274 \text{ mm})$ followed by; $(8.0633 \pm 0.118462 \text{ mm})$ in *P. aureus*, $(7 \pm 0.1 \text{ mm})$ in *E. coli*, $(3.2733 \pm 0.24986 \text{ mm})$ in *S. aureus*, and $(2.14667 \pm 0.130512 \text{ mm})$ in *S. typhi* respectively. And minimum activity was noticed against $(1.06 \pm 0.12124 \text{ mm})$ in *K. pneumoniae*. Acetone extracts showed maximum activity against $(10.143 \pm 0.1266 \text{ mm})$ in *P. aureus*, followed by zone of inhibition $(5.9566 \pm 0.058595 \text{ mm})$ in *P. mirabilis*, zone $(4.0933 \pm 0.17309 \text{ mm})$ against *E. coli*, $(2.9667 \pm 0.03511 \text{ mm})$ in *S. aureus* and minimum zone of $(1.97 \pm 0.03 \text{ mm})$ in *S. typhi*. No activity was observed in both methanol and acetone extract against *K. pneumoniae*. The result of present study similar to that the previous report of Sivaperumal et al, 2010[19] who reported that the methanol extract of *A. multiplicatum* exhibited antimicrobial activity against most of the bacterial species studied; no effect was observed in *K. pneumoniae* species.

The crude methanol extract of *Policlinium madrasensis* and *Phallusia arabica* were found to have higher antibacterial activities against *P. aeruginosa* Amutha et al, 2010[20]. In this study also *P. aeruginosa* was the most sensitive to methanol extracts of *A. multiplicatum* than ethanol and acetone. Ramasamy et al, 2003[21] also reported that the *P. aeruginosa* was the most successful bacteria for all fractions of ascidian extracts with maximum zone of 8-5mm. The bacterial species like *Bacillus* and *Pseudogeneus* species found to have inhibitory effect for the extracts of colonial ascidians with MIC value 200mg/ml Sivaperumal et al,[19]. Kartykayen et al, [22] reported that the methanol and ethanol extracts of ascidian showed more activity against all pathogens than hexane and butanol extracts. The present study reported that methanol and ethanol extracts of *A. multiplicatum* showed higher activity against microbes than acetone extract. The crude methanol, ethanol and acetone extracts of *A. multiplicatum* was more effective against gram negative bacteria than gram positive bacteria. This study similar to the previous report of Sivaperumal et al, 2010[19] reported that the crude ethyl acetate of *A. multiplicatum* was more effective against gram negative bacteria than gram positive bacteria.

Antibacterial activity has previously been detected in methanol and dichloromethane extracts of the ascidians *H. pyriformis* and a mixture of two *Styela* species where one of the species was *S. rustica* Lippert et al, 2003[23]. Prem Anand and Edward 2002[24] reported that comparatively ascidians *D. pasmathodes* seems to be promising source of antibacterial compound. Ramasamy et al, 2003[21] reported that for the crude methanol extract of *D. pasmathodes*, the range of inhibition of bacteria varied from 6 to 10 mm with an average of 7.1 mm. Meenakshi, 2002[15] revealed that the preliminary screening of nine species of ascidian indicate, the presence of antibacterial activity of the three different solvent and methylene extract showed maximum activity followed by methanol and hexane. Methanol and methylene chloride extracts of *Aplidium indicum* were active against all pathogens. The test body of *P. nigra* harboured smaller number of total heterotrophic bacteria compared to that of the surrounding water medium Ali et al, 2008[18].

The tunicates have the potential to yield novel compounds with ecological, chemical, and biomedical interest Paul et al, 2008[25]. In particular, the cosmopolitan genus *Aplidium* is renowned for the variability of its metabolites. A large variety of alkaloids have been isolated from this group, such as piperidins, tetracyclic alkaloids and indoles, which display potent bioactivities Zubia et al, 2005[26]. Many studies have been conducted to examine the antimicrobial activity of ascidians against bacteria, fungi even tumour cells Ronald et al, 1997[27]. The extracts from *D. pasmathodes* showed the promising results against isolated and human pathogens. These results indicate that ascidians exhibits remarkable activity against microbes Kumaran et al, 2011[28]. The continuing and over whelming contribution of ascidian metabolites to the development of new pharmaceuticals are clearly evident and need to be explored. Antibacterial compounds form natural resources would be alternative to overcome the resistance problems. Thus the current studies revealed the presence of antibacterial activity from ascidians of Vizhinjam bay South west coast of India has much importance in marine secondary metabolites. Further, purification of the actual compounds involved in the activity may lead to the discovery of novel antimicrobial compounds.

V. CONCLUSION

Activities found in crude extracts showed promising results and with enormous potential for discovery and development and marketing of novel marine bio products methods by which these products can be supplied in a way that will not disrupt the ecosystem or deplete the resources. It is worthy to note that the product from nature source is good for health and devoid of side effects. However, further investigations involving application of the extracts as drug for human administration need more research.

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A SNR based Comparative Study of JPEGmini and a Novel Proposed Algorithm

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Abstract- In this paper a comparative study is has been done on JPEGmini (online service for compressing images) and a proposed algorithm for image compression. We are focusing on the Quantization method in image compression which results in the actual reduction of the size of the image. The proposed algorithm is based on modifying the Quantization method. Performance will be analyzed based upon the compression ratio and the image quality.

Index Terms- Quantization, Lossless, DCT, High resolution, JPEG, JPEGmini.

I. INTRODUCTION

The objective of image compression is to reduce irrelevancy and redundancy of the image data to store or transmit data in an efficient form thus saving storage costs and transmission time. Image compression can be lossless or lossy. Lossless compression means that you are able to reconstruct the exact original data from the compressed data whereas it is difficult in lossy compression. Here we are trying to compress image by quantizing DCT values of 8x8 pixel block.

II. LITERATURE REVIEW

In this section we have reviewed the existing tools and technologies in the field of JPEG standard. One of the things that the JPEG realized is that many digital images have very gradual changes in the intensity over most of the image. Besides this they realized that the human eye can only differentiate between similar shades of light-intensity, or luminance, to a certain extent^[1].

The JPEG discovered that besides removing the most of the variations in luminance, most of the slight changes in color (from pixel to pixel) can be removed and still end up with a very good representation of the image. This way, instead of storing the individual pixel's color and intensity, only the gradual changes of color and luminance (across the picture) need to be stored which results in smaller file size. In order to get to a place where they could do this, the JPEG implemented The Discrete Cosine Transform.

The fundamental idea behind JPEG, and for that matter any picture compression is that you can take the values stored in a picture matrix and transform those numbers from one basis to another, where the new basis stores your relevant information in a more compact form. For the JPEG, the original basis was the

two-dimensional spatial basis, where, as stated above, every entry in the picture matrix represents an actual square pixel which has a spatial position in the picture (e.g. Figure 1). The basis that would store the image values more compactly was the frequency basis, where the frequencies represent changes in the values of luminosity. Higher frequencies represent, quick changes if luminosity from pixel to pixel, and the low frequencies represent gradual changes across the entire picture. The way we get from one basis is through a transform, and the way we get from the spatial domain and into the frequency domain is through the Discrete Cosine Transform (DCT)^[1].



Fig.1 Image and blocks of pixels

(source: JPEG Compression, Ben O'Hanen and Matthew Wisan)

JPEGmini:

JPEGmini is a photo recompression technology, which significantly reduces the size of photographs without affecting their perceptual quality. The technology works in the domain of baseline JPEG, resulting in files that are fully compatible with any browser, photo software or device that support the standard JPEG format.

JPEGmini is capable of reducing the file size of standard JPEG photos by up to 80% (5X), while the resulting photos are visually identical to the original photos. The JPEGmini algorithm imitates the perceptual qualities of the human visual system, ensuring that each photo is compressed to the maximum extent possible by removing redundancies, without creating any visual artifacts in the process. This enables fully automatic, maximal compression of photos with no human intervention required.

III. IMPLEMENTATION

The technique of Lossless compression is implemented on colour images having high resolution. The implementation part is done using Matlab software. The RGB image is read and stored in Matlab as a 3-dimensional matrix consisting of three 2-dimensional matrices, each comprising the respective pixel

values of the R, G and B components. Next, colour space conversion^[12] is done. Here the image is converted to the YUV colour space from the RGB colour space^[3]. The 3-D matrix now consists of three Y(luminance), Cb & Cr (Chrominance) matrices. The Y(luminance) matrix is then taken and divided into 8x8 blocks i.e. blocks containing 8 rows and 8 columns of the Y matrix. The pattern followed here is that first the top leftmost 8x8 block is taken, then we move from left to right and then up to down. On each of the blocks 2-dimensional Discrete Cosine Transform is applied^[4]. The same process is then carried out on both the chrominance components. Thus we obtain a DCT matrix consisting of the transformed values of all the elements of the original matrix.

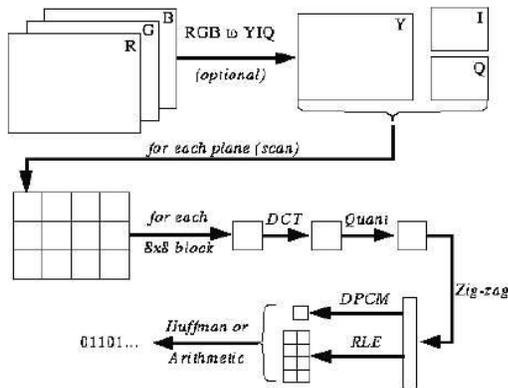


Fig-2: Basic block diagram for Image Compression
(source: Basic JPEG Compression Pipeline, Cardiff University)

The next step in compressing the image is quantizing each element of the transformed matrix. This is done by dividing the 8x8 blocks of the transformed matrix by a quantization matrix of the same size. The 8x8 blocks are taken in a similar fashion as described above. Here we have used two separate quantization matrices for the luminance and the two chrominance components. The use of two different matrices is based on the fact that the Human Visual System is more sensitive to luminance as compared to the colour components. The chrominance components convey information about colour and hence can be quantized more effectively (suppressed more) than the luminance components. In the DCT matrix the low frequency components are present in the top left part of the matrix and the higher frequency components in the lower right part. Eye is most sensitive to low frequencies (upper left corner) and less sensitive to high frequencies (lower right corner)^[5], these higher frequency values can be quantized to zero. In the DCT matrix the first element of each 8x8^[6] block will consist of the dc component. This dc coefficient is usually very high in magnitude as compared to the rest of the 63 values. The compressed values are then rounded. The following equation sums up the quantization process, where c_{ijk} is the value in dct matrix and q_{ij} is from quantization matrix.^[7]

$$u_{ijk} = \text{Round}[c_{ijk}/q_{ij}] \quad \dots\dots(1)$$

The maximum absolute error (MAE) is calculated as

$$MAE = \max |f(x,y) - f'(x,y)| \quad \dots\dots(2)$$

Where $f(x, y)$ is the original image data and $f'(x, y)$ is the compressed image value.

The formulae for calculated image matrices are:

$$MSE^{(9)} = \frac{1}{M \cdot N} \sum_{n=1}^N \sum_{m=1}^M f(x,y) - f'(x,y) \quad \dots\dots(3)$$

$$RMSE = \sqrt[3]{MSE} \quad \dots\dots(4)$$

Where M and N are the matrix dimensions in x and y , respectively.

Signal-to noise-ratio (SNR) measures are estimates of the quality of a reconstructed image compared with the original image

$$SNR = 10 \log \left| \frac{\sum_{n=1}^N \sum_{m=1}^M f(x,y)^2}{M \cdot N \cdot MSE} \right| \quad \dots\dots(5)$$

$$PSNR^{[13]} = 20 \log \left| \frac{255}{RMSE} \right| \quad \dots\dots(6)$$

To find the most efficient quantization matrix we first tried to find out on average what is the value of the dc coefficient. After implementing the dct on various images we came to the conclusion that the dc coefficient can range from anywhere between few hundred to about a thousand in magnitude. Since the dc coefficient contains most of the information, it has to be quantized by a very small value. The following quantization matrix was used to quantize the image:

	2	4	6	8	10	12	14	16		
			4	6	8	10	12	14	16	18
			6	8	10	12	14	16	18	20
Q =	8	10	12	14	16	18	20	22	24	28
	10	12	14	16	18	20	22	24	28	32
	12	14	16	18	20	22	24	28	32	36
	14	16	18	20	22	24	28	32	36	40
	16	18	20	22	24	26	28	30	36	40

The dc coefficient is divided by two and the rest of the values are quantized by increasing multiples of two. Next all the values except the top left 4x4 block are increased by a factor of two and applied to the chrominance matrices. According to the quality of the image and the reduction in the size we proceed with the next iteration. If the quality is maintained we increase the values of the quantization matrix. We also checked the size compressed image. If the size started to increase after initially reducing we accordingly tried to adjust the quantization matrix. Thus we have tried to obtain an optimum quantization matrix which gives high compression ratio and also almost no visible loss in the image quality.

The software used for image processing was Matlab from Mathworks, Inc.

For a comparative study we used JPEGmini online service for compressing images. We compressed the same images using our proposed algorithm i.e. using our quantization matrix. The following are the results that we have obtained:

Table 1
Comparison of Compression Ratio

	JPEGmini	Proposed Algorithm
Image 1 (9.62 MB)	3.25	5.37
Image 2 (4.7 MB)	3.64	6.37
Image 3 (2.35 MB)	4.7	5.54

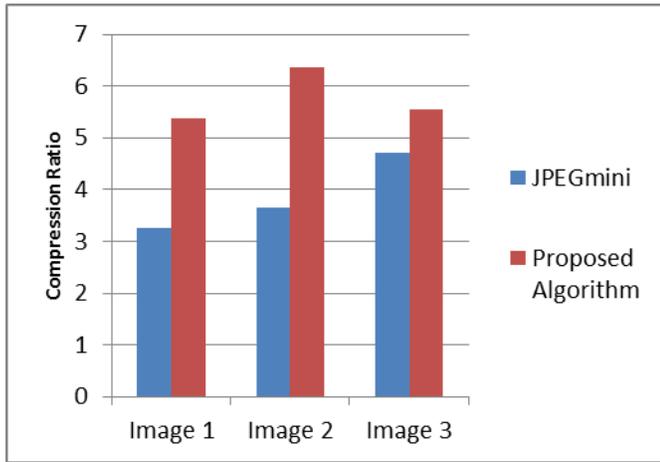


Fig. 3: Comparison of Compression Ratio

The following are results for Signal to Noise Ratio(SNR):

Table 2: Comparison of SNR

	JPEGmini	Proposed Algorithm
Image 1 (9.62 MB)	130.06	118.24
Image 2 (4.7 MB)	118.68	117.24
Image 3 (2.35 MB)	129.89	112.91

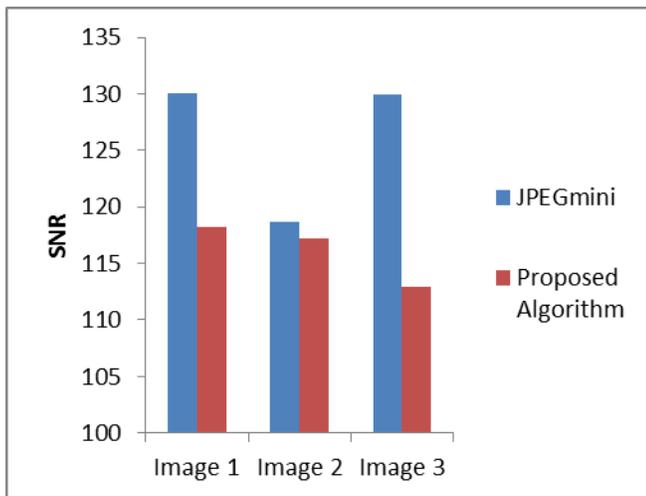


Fig. 4: Comparison of SNR

Usually high values for Compression Ratio (the ratio of original image size to that of compressed image size) and SNR

are desired. With the obtained results for Compression Ratio we can say that our algorithm gives better compression than JPEGmini. On the other hand JPEGmini has better values of SNR (Signal to Noise Ratio) as mentioned in Table 2. Still the compressed images obtained through our approach do not show any loss in visual quality. Though we get less SNR values the compressed images have lesser size as compared to JPEGmini and there is no visual loss of data.

The following two images are obtained from JPEGmini compression and our approach respectively:



Fig.4 Compressed image using JPEGmini (Image 3)



Fig.5 Compressed image using proposed algorithm(Image 3)

Both the images look exactly the same, but our results prove that better compression is achieved using our approach.

IV. CONCLUSION

Our proposed algorithm for compressing images gives higher compression than JPEGmini without any degradation of images. On an average improvement in the compression ratios of about 50% is obtained from our algorithm. Additionally the algorithm gives very good results for high resolution images, as compared to low resolution ones.

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Comparative in Vitro Replication and Serial Passaging of BMNPV in the DZNU-BM-12 and Other Cell Lines

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Abstract- The newly established ovarian cell line of *Bombyx mori*, DZNU-Bm-12 was tested for its susceptibility to homologous nucleopolyhedrovirus, BmNPV. The BmNPV was serially passaged in the cell line for five times along with the other four cell lines Bm-1, Bm-16 and Bm-17 which is established in our laboratory and Bm-5 is a widely used cell line. All the cell lines are susceptible to BmNPV. The overall range of BmNPV infection during serial passaging was more than 90% was observed in Bm-1, Bm-5 and Bm-16, whereas in Bm-12 and Bm-17 it was between 77 and 89%. The average number of OBs/infected cell was 16-19 in Bm-1, Bm-5 and Bm-16 but in Bm-12 it was 9-13 and only 7-8 in Bm-17.

Index Terms- *Bombyx mori*, Ovarian cell line, DZNU-Bm-12, BmNPV, Baculovirus expression system.

I. INTRODUCTION

Insect cell cultures are widely used in viral diagnosis and biotechnology, for the production of recombinant proteins, viral pesticides and vaccines. In recent years, there is renewed interest in developing new lepidopteran cell lines due to their potential application in biotechnology for the production of recombinant proteins by the use of the Baculovirus expression vector (Granados and McKenna, 1995; Smith et al., 1983; Vaughn, 1981; Summers, M.D., 1989). *Bombyx mori* nucleopolyhedrovirus (BmNPV) is one such baculovirus, which is being used in BEV system for expression of recombinant proteins in susceptible cell lines (Meada, 1987, 1989; Maeda et al., 1991 Raghov, et al., 1974).

Several cell lines have been established from silkworm embryos (Inoue and Mitsuhashi 1984; Chen et al. 1988; Pandharipande 1994; Pan et al. 2007) and larval and pupal ovaries (Sudeep et al 2002; Khurad et al. 2006) of this economical important insect however, only a few of these cell lines are susceptible to *B. mori* nucleopolyhedrovirus (BmNPV) and support its replication efficiently *in vitro*.

In the present study the indigenously developed larval ovarian cell line DZNU-Bm-12 (Khurad *et al.*, 2009) was tested for susceptibility to homologous virus (BmNPV). The other ovarian cell lines of *B. mori* Bm-1 (Khurad *et al.*, 2006), Bm-16 and Bm-17 and a widely used, Bm-5 cell lines were also tested for susceptibility of BmNPV and its replication to compare with Bm-12 cell line.

II. MATERIALS AND METHODS

BmNPV was obtained from diseased fifth instar larvae of the silkworm, *B. mori*. Turbid haemolymph was collected through an incision on proleg. After centrifugation (3000 rpm, 10 min) the supernatant was diluted with equal volume of medium and passed through 0.45 μ m membrane filter and used as an inoculum. It was stored in refrigerator at 4°C.

Inoculation of Cultures:

The cells of each cell line at log phase were harvested, counted and transferred to three 30 mm Falcon plastic Petri-plates at about 3×10^5 cells/ml to higher densities ($1-1.8 \times 10^6$ cell/ml). The cultures were inoculated by adding 2-3 drops of the inoculum with a Pasteur pipette. The infected cultures were maintained at 25°C and examined every day for cytopathic effect and occurrence of occlusion bodies (OBs) in the nuclei.

Serial Passaging of BmNPV:

After 10-12 days post inoculation, the content of the inoculated cultures were centrifuged at 3000 rpm for 15 min and the supernatant was collected separately of each infected cell line in a sterile centrifuge tube. This served as inoculum for the next passage of the virus. OBs were harvested from the cell pellet by resuspending in sterile distilled water, washing with 0.5% (w/v) sodium lauryl sulphate and rinsing thrice in distilled water. The harvested OBs were counted in the haemocytometer and recorded.

III. OBSERVATION AND DISCUSSION

Table 1: Serial passage of *B. mori* nucleopolyhedrovirus (BmNPV) in DZNU-Bm-12 cell line.

S.P No.	Days (PI)	Cell passage No.	Cells/ml ($\times 10^5$)	Viable cells ($\times 10^5$)	% Infection ^a	Infected Cells/ml ($\times 10^5$) ^b	OBs/cell ^c	OBs/ml ($\times 10^7$) ^d
1	8	273	9.67	8.70	85.75	7.46	9	0.73
2	8	281	10.35	9.91	87.16	11.25	9	0.78
3	10	289	10.07	9.06	88.89	8.05	10	0.79

4	8	295	9.57	8.61	84.49	7.27	10	0.76
5	9	300	10.42	9.37	79.43	7.44	10	0.76

Table 2: Serial passage of *B. mori* nucleopolyhedrovirus (BmNPV) in DZNU-Bm-1 cell line.

S.P No.	Days (PI)	Cell Passage No.	Cells /ml (X 10 ⁵)	Viable cells (X 10 ⁵)	% Infection ^a	Infected Cells/ml (X 10 ⁵) ^b	OBs/ cell ^c	OBs/ml (X 10 ⁷) ^d
1	6	294	3	2.7	87.29	2.35	15	0.55
2	6	297	3.1	2.79	88.78	2.47	15	0.59
3	5	301	3.3	2.97	90.36	2.68	16	0.61
4	5	311	4.02	3.61	90.06	3.25	16	0.64
5	9	316	4	3.6	86.28	3.10	16	0.62

Table 3: Serial Passage of *B. mori* nucleopolyhedrovirus (BmNPV) in DZNU-Bm-5 cell line.

S.P No.	Days (PI)	Cell passage No.	Cells /ml (X 10 ⁵)	Viable cells (X 10 ⁵)	% Infection ^a	Infected Cells/ml (X 10 ⁵) ^b	OBs/ cell ^c	OBs/ml (X10 ⁷) ^d
1	5	8	6.75	6.07	91.78	5.57	18	1.17
2	5	12	6.51	5.85	93.06	5.45	18	1.20
3	4	17	5.82	5.23	93.57	4.89	18	1.17
4	4	26	5.02	4.51	90.28	4.07	17	0.95
5	4	31	4.68	4.21	90.64	3.81	17	0.85

Table 4: Serial Passage of *B. mori* nucleopolyhedrovirus (BmNPV) in DZNU-Bm-16 cell line.

S.P No.	Days (PI)	Cell passage No.	Cells /ml (X 10 ⁵)	Viable cells (X 10 ⁵)	% Infection ^a	Cells/ml (X 10 ⁵) ^b	OBs/ cell ^c	OBs/ml (X10 ⁷) ^d
1	5	34	6.81	6.12	93.19	5.70	18	1.07
2	4	37	6.4	5.76	90.60	5.21	19	1.08
3	5	41	18.32	16.48	91.85	15.14	16	1.11
4	4	52	7.7	6.93	86.69	6	18	1.14
5	5	57	10.5	9.45	83.61	7.90	17	NR

Table 5: Serial passage of *B. mori* nucleopolyhedrovirus (BmNPV) in DZNU-Bm-17 cell line.

S.P No.	Days (PI)	Cell passage No.	Cells /ml (X 10 ⁵)	Viable cells (X 10 ⁵)	% Infection ^a	Infected Cells/ml (X 10 ⁵) ^b	OBs/ cell ^c	OBs/ml (X10 ⁷) ^d
1	8	74	10.02	9.01	81.90	7.37	7	0.58
2	8	79	9.2	8.28	78.94	6.53	8	0.56
3	10	82	10.23	9.20	78.05	7.18	8	0.61
4	8	92	9.5	8.5	81.20	6.94	8	0.56
5	10	97	14.1	12.69	77.43	9.82	7	0.62

^aThe presence of OBs in cell was the criterion of its infection with BmNPV. Each value is the mean of sample of three hundred cells each from three plates.

^bCalculated by multiplying the cell number by percentage infection.

In the present study, the BmNPV was serially passaged in the the newly established cell line DZNU-Bm-12 as well as in four other *B. mori* cell lines for five times. All the cell lines were susceptible to BmNPV infection.

At early stage of infection, the cytopathic effect such as hypertrophy of nuclei, heavy clumping and adherence of the cells to the substratum of the culture flask in TNM-FH medium were prominent in all the five cell lines. Numerous large clumps of cells were observed 16-20 h post inoculation (h pi) in Bm-1, Bm-16 and Bm-12 and about 40-48 h pi small refractive OBs were appeared in the nuclei of cells. By 72 h pi OBs were prominently seen in the nuclei of aggregated and dislodged cells. The replication of BmNPV between 16 and 18 h pi and formation of OBs by 40-48 h pi in *B. mori* cells have also been reported earlier (Raghow and grace 1974, Khurad *et al.*, 2006). Some of the cell aggregates that exhibited infected cells were removed from the infected cultures and examined under microscope. The cells were loaded with OBs in the nuclei depending on the cell size in each cell line. In DZNU-Bm-1, Bm-5 and Bm-16 the lysis of cells loaded with OBs was a common feature 96 h pi, the OBs loaded Bm-12 and Bm-17 cells remained in the infected cultures for a long time and only a few cells exhibited lysis and release of OBs by 96 h.p.i. This may be the characteristic feature of these cell lines.

IV. SERIAL PASSAGING

The BmNPV was serially passaged in all the five cell lines for 5 times. The infection rate was highest (93.19%) in Bm-16 followed by Bm-5 (91.78%), Bm-1 (87.26%), Bm-12 (85.75%) and Bm-17 (81.29%). However, the yield of OBs was 1.17×10^7 /ml in Bm-5 followed by 1.07×10^7 /ml in Bm-16, 0.73×10^7 /ml in Bm-12, 0.58×10^7 /ml in Bm-17 and 0.55×10^7 /ml in Bm-1 (Tables 1,2,3,4, and 5). The overall range of BmNPV infection during serial passaging was more than 90% was observed in Bm-1, Bm-5 and Bm-16, whereas in Bm-12 and Bm-17 it was between 77 and 89%. The average number of OBs/infected cell was 16-19 in Bm-1, Bm-5 and Bm-16 but in Bm-12 it was 9-13 and only 7-8 in Bm-17. The results obtained further indicate that Bm-12 cell line has one advantage that it is a fast growing cell line as compared to those of the remaining four cell lines and the susceptibility and production of BmNPV are also comparable with the other indigenously developed cell lines.

V. CONCLUSION

Thus the data obtained from the present study revealed that all the four cell lines all four indigenously developed cell lines DZNU-Bm1, Bm-12, Bm-16, and Bm-17 are highly susceptible to baculovirus BNPV and can be comparable to widely used Bm-5 cell line of Japanese origin. Among indigenously developed cell lines, Bm-1, Bm-12 and Bm-16 are highly productive cell lines and they can be utilized to express recombinant proteins using BmNPV derived expression vectors/bacmids, however further studies using an appropriate BmNPV expression system and comparative BmNPV replication assays are essential to confirm the utility of these cell lines.

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Transportation System of Security Issues in Vehicular Ad Hoc Networks

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Abstract- Vehicular Ad Hoc Networks is a part of wireless ad hoc network that it has the characteristics of high node mobility and fast topology changes. The Vehicular Networks can provide wide variety of services, ranges from safety and crash avoidance to Internet access and multimedia applications. These vehicular communication problems include network architecture, protocols for physical and link layers, routing algorithms, as well as security issues. In this paper, we deal with the multiple issues in the vehicular ad hoc network communications and solution about these problems.

Index Terms- Mobility, Protocols, Rebroadcast, VANET, Vehicular Communication

I. INTRODUCTION

Every year peoples are injured in vehicle accidents. Implementations of safety information such as speed limits and road conditions are used in many parts of the world but still more work is required. VANETs collect and distribute safety information to massively reduce the number of accidents. Such networks consist of sensors and On Board Units (OBU) installed in the vehicle as well as Road Side Units (RSU). The data collected from the sensors on the vehicles can be displayed to the driver, sent to the RSU or even broadcasted to other vehicles depending on its nature and importance. The RSU distributes data and road sensors, weather centers, traffic control centers, etc to the vehicles. It's also provides commercial services such as parking space booking, Internet access and gas payment. This paper deal with the structure of VANET systems, the characteristics and applications, IEEE WAVE standard for vehicular communications, the routing algorithms for VANET and its security issues.

II. HISTORY OF VEHICULAR COMMUNICATION

Vehicular communications were safety on the road, many lives were lost and much more injuries have been incurred due to vehicle crashes. A driver realizing the brake lights of the vehicle in front of him has only a few seconds to respond, and even if he has responded in time vehicle behind him could crash since they are unaware of what is going at the front. This has motivated one of the first applications for vehicular communications, namely cooperative collision warning which uses V2V communication. Other safety applications soon emerged as well as applications for more efficient use of the transportation network, less

congestion and faster and safer routes for drivers. These applications cannot functions efficiently using only V2V communications therefore an infrastructure is needed in the form of RSU. The safety applications are important for governments to allocate frequencies for vehicular communications, non-safety applications for Intelligent Transportation Systems (ITS). Besides road safety, new applications are proposed for vehicular networks, among these are Electronic Toll Collection, travel & tourism information distribution, multimedia & game applications etc.

III. VANET COMPONENTS & FEATURES

A VANET consists of vehicles and roadside base stations that exchange primarily safety messages to give drivers the time to react to life-endangering events. A vehicle in a VANET is equipped with processing, recording and positioning features and is capable of running wireless security protocols as shown in Fig.1.

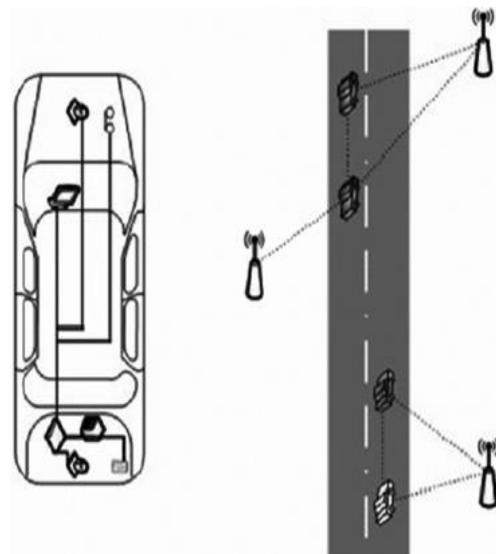


Fig.1: VANET,s Architecture

3.2. Features

Though vehicular ad hoc networks share general features with conventional ad hoc networks, VANETs have individual characteristics that are decisive in the design of the communication system, these include:

- i. *Dynamic topology,*
- ii. *Mobility models,*
- iii. *Infinite energy supply and*
- iv. *Localization functionality.*

3.3. Applications

VANETs enable vehicle-to-vehicle (v2v) and vehicle-to-infrastructure (v2i) communication. It can exchange information about traffic issues, road conditions and added value information. VANET's applications are

- Warning
- Traffic management
- Added value

IV. IEEE STANDARDS

While ASTM E2213 standard is being developed, the IEEE standards IEEE P1609.1, P1609.2, P1609.3 & P1609.4 were prepared for vehicular networks. P1609.1 is the standard for Wireless Access for Vehicular Environment Resource Manager. It defines the services & interfaces of the RM application, the message & data formats. It provides access for applications to the rest of the architecture. P1609.2 defines security, message formatting, processing & exchanging the message. P1609.3 defines routing, transport services & the management information base for the protocol stack. P1609.4 covers how the multiple channels specified in the DSRC standard should be used.

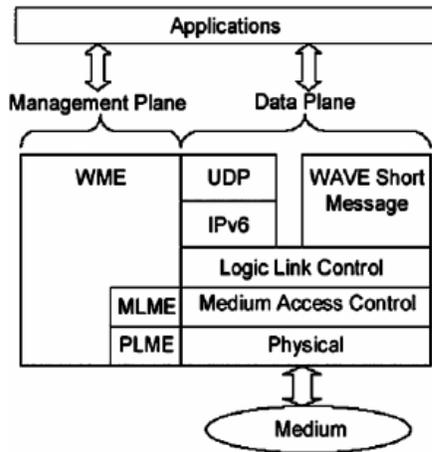


Fig.2: Protocol Architecture

The WAVE stack uses a modified version of IEEE 802.11a for its Medium Access Control (MAC) known as IEEE 802.11p.

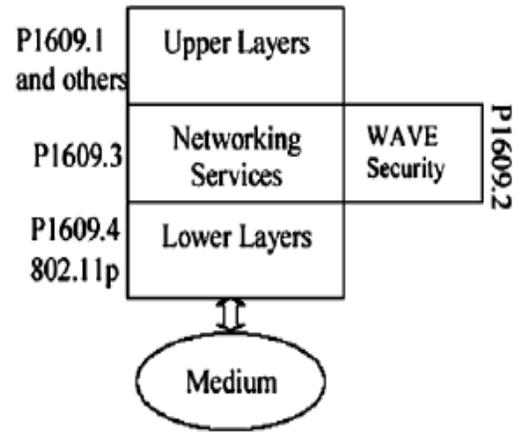


Fig 3: IEEE Architecture

V. ROUTING ALGORITHMS

Broadcasting and routing algorithms for VANET were studied in FleetNet project. Three routing protocols were considered,

- Position Based Forwarding (PBF),
- Contention Based Forwarding (CBF)
- Ad hoc On Demand Distance Vector (AODV).

These reactive protocols discover the route to a destination only when a message is to be delivered counter to proactive protocols which tend to store routing tables for every destination and update these routing tables continuously.

- PBF and CBF use location service algorithms to find the position of the destination.
- In CBF the source transmits the message with the position of the destination; every node receiving the message sets a timer proportional to the difference between its position and the destination. If the timer expires and no other node has broadcasted the message, the node forwards the message to the destination.
- In AODV the source floods the network with a route request for the destination. Nodes receiving the request calculate a distance vector & forward the message, this process is repeated till the destination is reached which sends a route reply.

CBF performs better than the other algorithms and it adapts to changes in the topology which interrupt routes in the other two protocols. It requires the assistance of maps in cities when multiple roads intersect and run in parallel, its performance in congested areas also requires more investigation. A broadcasting algorithm based on CBF suggested for safety applications. A car encountering an accident broadcasts a safety message and its current position. Other cars receiving this message set a retransmission timer inversely proportional to their distance from the source and rebroadcast the message if no other node broadcasts first and keeps rebroadcasting till it receives a message from another node or the message is no longer relevant.

Another routing algorithm called Greedy Traffic Aware Routing (GyTAR) targets the routing problem. It works with the aid of maps & traffic density information to calculate the best direction in junctions the packet should take to reach its destination. This calculation based on the distance, number of cars within that distance, their movement and speed. This paper proposed a system for collect and distributes information about the road & traffic conditions. GyTAR as well as other algorithms that its provide a solution to the routing problem in VANET.

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VI. SECURITY ISSUES

Most of the critical messages in VANETs are broadcast oriented safety messages that should have a deep saturation and delivered in a short time. Additionally these messages must be secure and must not leak personal, identifying, or linkable information to unauthorized parties, as the owners of the vehicles involved in the communication have a right to privacy. Attacks can be sending false information, cheating with position information, tracking a location of a vehicle and jamming the channel for Denial of Service. A security system in VANETs must have the features of Authentication & Data Integrity, Anonymity & Availability, Low Overhead & Privacy and Real-time Constraints

VII. CONCLUSION

Vehicles are becoming a part of the global network. In this paper we have provided an overview of the development of the communication standards and ongoing research for vehicular networks. Although many problems are not yet solved, the general feeling is that vehicles could benefit from spontaneous wireless communications in a near future, making VANETs a reality. Vehicular networks will not only provide safety and life saving applications, but they will become a powerful communication tool for their users.

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The Comparative Research on Various Software Development Process Model

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Abstract- In the present scenario all software systems are because they cannot be built with mathematical or physical certainty, Hence in this research paper the comparison of various software development models has been carried out. According to SDLC each and every model has the advantage and disadvantage so in this research we have to calculate the performance of each model on behalf of some important features. The concept of system lifecycle models came into existence that emphasized on the need to follow some structured approach towards building new or improved system.

Index Terms- Software Engineering, Model, SDLC, Software Product, software Development Process

I. INTRODUCTION

A software development process, also known as a software development life cycle (SDLC), is a structure imposed on the development of a software product. It is often considered as a subset of system development life cycle. There are several models for such processes, each describing approaches to a variety of activities that take place during the process. Software Engineering (SE) is the application of a systematic, disciplined, quantifiable approach to the development, operation, and maintenance of software, and the study of these approaches; that is, the application of engineering to software because it integrates significant mathematics, computer science and practices whose origins are in Engineering. Various processes and methodologies have been developed over the last few decades to improve software quality, with varying degrees of success. However, it is widely agreed that no single approach that will prevent project overruns and failures in all cases. Software projects that are large, complicated, poorly-specified, and involve unfamiliar aspects, are still particularly vulnerable to large, unanticipated problems. A software development process is a structure imposed on the development of a software product. There are several models for such processes, each describing approaches to a variety of tasks or activities that take place during the process. It aims to be the standard that defines all the tasks required for developing and maintaining software. Software Engineering processes are composed of many activities, notably the following:

- ✓ Requirement Analysis
- ✓ Specification
- ✓ Software architecture
- ✓ Implementation

- ✓ Testing, Documentation
- ✓ Training and Support
- ✓ Maintenance

Software development teams, taking into account its goals and the scale of a particular project, and have a number of well-established software development models to choose from. Therefore, even though there are number of models each software Development Company adopts the best-suited model, which facilitates the software development process and boosts the productivity of its team members.

II. RESEARCH ELABORATIONS

A Programming process model is an abstract representation to describe the process from a particular perspective. There are numbers of general models for software processes, like: Waterfall model, Evolutionary development, Formal systems development and Reuse-based development, etc. This research will view the following five models:

1. Waterfall model.
2. Iteration model.
3. V-shaped model.
4. Spiral model.
5. Extreme model.

These models are chosen because their features correspond to most software development programs.

➤ The Waterfall Model

The waterfall model is the classical model of software engineering. This model is one of the oldest models and is widely used in government projects and in many major companies. As this model emphasizes planning in early stages, it ensures design flaws before they develop. In addition, its intensive document and planning make it work well for projects in which quality control is a major model:

1 System requirements: Establishes the components for building the system, including the hardware requirements, software tools, and other necessary components. Examples include decisions on hardware, such as plug-in boards (number of channels, acquisition speed, and so on), and decisions external pieces of software, such as databases or libraries.

2 Software requirements: Establishes the expectations for software functionality and identifies which system requirements the software affects. Requirements analysis includes determining interaction needed with other applications and

databases, performance requirements, user interface requirements, and so on.

3 Architectural design: Determines the software framework of a system to meet the specific requirements. This design defines the major components and the interaction of those components, but it does not define the structure of each component. The external interfaces and tools used in the project can be determined by the designer.

4 Detailed design: Examines the software components defined in the architectural design stage and produces a specification for how each component is implemented.

5 Coding: Implements the detailed design specification.

6 Testing: Determines whether the software meets the specified requirements and finds any errors present in the code.

7 Maintenance: Addresses problems and enhancement requests after the software releases.

In some organizations, a change control board maintains the quality of the product by reviewing each change made in the maintenance stage. Consider applying the full waterfall development cycle model when correcting problems or implementing these enhancement requests.

In each stage, documents that explain the objectives and describe the requirements for that phase are created. At the end of each stage, a review to determine whether the project can proceed to the next stage is held. Your prototyping can also be incorporated into any stage from the architectural design and after.

Many people believe that this model cannot be applied to all situations. For example, with the pure waterfall model, the requirements must be stated before beginning the design, and the complete design must be stated before starting coding. There is no overlap between stages. In real-world development, however, one can discover issues during the design or coding stages that point out errors or gaps in the requirements.

The waterfall method does not prohibit returning to an earlier phase, for example, returning from the design phase to the requirements phase. However, this involves costly extensive documentation development. Thus, oversights made in the requirements phase are expensive to correct later.

Because the actual development comes late in the process one does not see results for a long time. This delay can be disconcerting to management and customers. Many people also think that the amount of documentation is excessive and inflexible.

Advantages :

- Easy to understand and implement.
- Widely used and known (in theory!).
- 3. Reinforces good habits: define-before- design, design-before-code.
- Identifies deliverables and milestones.
- Document driven, URD, SRD, ... etc. Published documentation standards, e.g. PSS-05.
- Works well on mature products and weak teams.

Disadvantages :

- Idealized, doesn't match reality well.
- Doesn't reflect iterative nature of exploratory early in project.
- Software is delivered late in project, delays discovery
- 4. Difficult and expensive to make changes to documents, "swimming upstream".

Pure Waterfall

This is the classical system development model. It consists of discontinuous phases:

- ✓ Concept.
- ✓ Requirements.
- ✓ Architectural design.
- ✓ Detailed design.
- ✓ Coding and development.
- ✓ Testing and implementation.

Table 1: Strengths & Weaknesses of Pure Waterfall

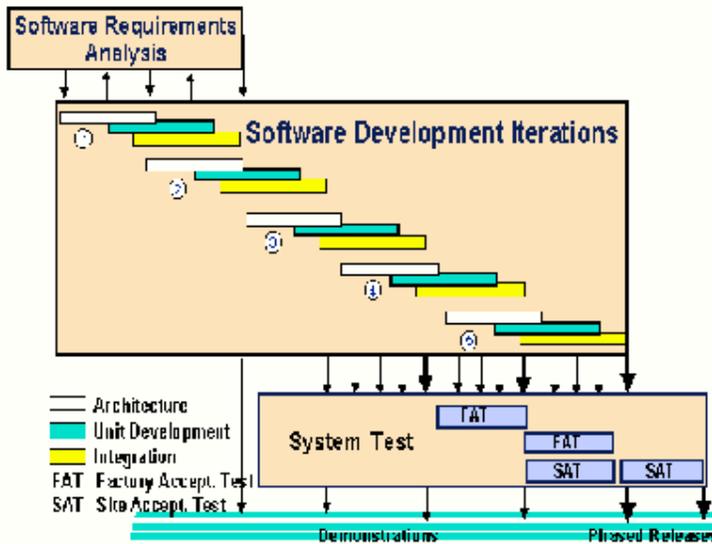
Strengths	Weaknesses
Minimizes planning overhead since it can be done up front.	Only the final phase produces a non-documentation deliverable.
Structure minimizes wasted effort, so it works well for technically weak or inexperienced staff.	Backing up to address mistakes is difficult.

➤ **Pure Waterfall Summary**

The pure waterfall model performs well for products with clearly understood requirements or when working with well understood technical tools, architectures and infrastructures. Its weaknesses frequently make it inadvisable when rapid development is needed. In those cases, modified models may be more effective.

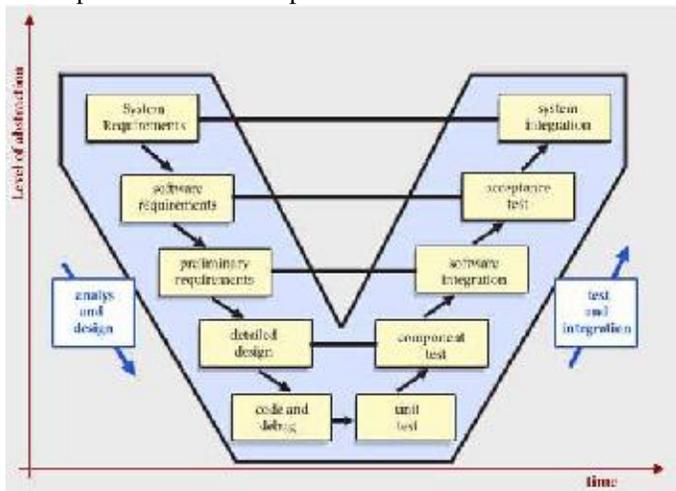
Iterative Development

The problems with the Waterfall Model created a demand for a new method of developing systems which could provide faster results, require less up-front information, and offer greater flexibility. With Iterative Development, the project is divided into small parts. This allows the development team to demonstrate results earlier on in the process and obtain valuable feedback from system users. Often, each iteration is actually a mini-Waterfall process with the feedback from one phase providing vital information for the design of the next phase. In a variation of this model, the software products, which are produced at the end of each step (or series of steps), can go into production immediately as incremental releases.



➤ **V-Shaped Model**

Just like the waterfall model, the V-Shaped life cycle is a sequential path of execution of processes. Each phase must be completed before the next phase begins. Testing is emphasized in this model more than the waterfall model. The testing procedures are developed early in the life cycle before any coding is done, during each of the phases preceding implementation. Requirements begin the life cycle model just like the waterfall model. Before development is started, a system test plan is created. The test plan focuses on meeting the functionality specified in requirements gathering. The high-level design focuses on system architecture and design. An integration test plan is created in this phase in order to test the pieces of the software systems ability to work together. However, the low-level design phase lies where the actual software components are designed, and unit tests are created in this phase as well. The implementation phase is, again, where all coding takes place. Once coding is complete, the path of execution continues up the right side of the V where the test plans developed earlier are now put to use.



Advantages

- Simple and easy to use.
- Each phase has specific deliverables.
- Higher chance of success over the waterfall model due to the early development of test plans during the life cycle.

Disadvantages

- Very rigid like the waterfall model.
- Little flexibility and adjusting scope is difficult and expensive.
- Software is developed during the implementation phase, so no early prototypes of the software are produced.
- This Model does not provide a clear path for problems found during testing phases [7].

➤ **Spiral Model**

The spiral model is similar to the incremental model, with more emphases placed on risk analysis. The spiral model has four phases: Planning, Risk Analysis, Engineering and Evaluation. A software project repeatedly passes through these phases in iterations (called Spirals in this model). The baseline spiral, starting in the planning phase, requirements are gathered and risk is assessed. Each subsequent spiral builds on the baseline spiral. Requirements are gathered during the planning phase. In the risk analysis phase, a process is undertaken to identify risk and alternate solutions. A prototype is produced at the end of the risk analysis phase. Software is produced in the engineering phase, along with testing at the end of the phase. The evaluation phase allows the customer to evaluate the output of the project to date before the project continues to the next spiral.

Advantages

1. High amount of risk analysis.
2. Good for large and mission-critical projects.
3. Software is produced early in the software life cycle.

Disadvantages

1. Can be a costly model to use.
2. Risk analysis requires highly specific expertise.
3. Project's success is highly dependent on the risk
4. Doesn't work well for smaller projects .

Spiral model sectors

1. Objective setting :Specific objectives for the phase are identified.
2. Risk assessment and reduction: Risks are assessed and
3. Development and validation: A development model for the system is chosen which can be any of the
4. Planning: The project is reviewed and the next phase of the spiral is planned

WinWin Spiral Model

The original spiral model [Boehm 88] began each cycle of the spiral by performing the next level of elaboration of the prospective system's objectives, constraints and alternatives. A primary difficulty in

applying the spiral model has been the lack of explicit process guidance in determining these objectives, constraints, and alternatives. The Win-Win Spiral Model [Boehm 94] uses the theory W (win-win) approach [Boehm 89b] to converge on a system's next-level objectives, constraints, and alternatives. This Theory W approach involves identifying the system's stakeholders and their win conditions, and using negotiation processes to determine a mutually satisfactory set of objectives, constraints, and alternatives for the stakeholders. In particular, as illustrated in the figure, the nine-step Theory W process translates into the following spiral model extensions:

1. Determine Objectives: Identify the system life-cycle stakeholders and their win conditions and establish initial system boundaries and external interfaces.

2. Determine Constraints: Determine the conditions under which the system would produce win-lose or lose-lose outcomes for some stakeholders.

3. Identify and Evaluate Alternatives: Solicit suggestions from stakeholders, evaluate them with respect to stakeholders' win conditions, synthesize and negotiate candidate win-win alternatives, analyze, assess, resolve win-lose or lose-lose risks, record commitments and areas to be left flexible in the project's design record and life cycle plans.

4. Cycle through the Spiral: Elaborate the win conditions evaluate and screen alternatives, resolve risks, accumulate appropriate commitments, and develop and execute downstream plans

➤ **Extreme Programming**

An approach to development, based on the development and delivery of very small increments of functionality. It relies on constant code improvement, user involvement in the development team and pair wise programming. It can be difficult to keep the interest of customers who are involved in the process. Team members may be unsuited to the intense involvement that characterizes agile methods. Prioritizing changes can be difficult where there are multiple stakeholders. Maintaining simplicity requires extra work. Contracts may be a problem as with other approaches to iterative development.

➤ **Extreme Programming Practices**

Increment Planning: Requirements are recorded on Story Cards and the Stories to be included in a release are Incremental planning: Requirements are recorded on determined by the time available and their relative priority. The developers break these stories into development "Tasks".

Small Releases: The minimal useful set of functionality that provides business value is developed first. Releases of the system are frequent and incrementally add functionality to the first release.

Simple Design: Enough design is carried out to meet the current requirements and no more.

Test first development: An automated unit test framework is used to write tests for a new piece of functionality before functionality itself is implemented.

Refactoring: All developers are expected to re-factor the code continuously as soon as possible code improvements are found. This keeps the code simple and maintainable. \

Pair Programming: Developers work in pairs, checking each other's work and providing support to do a good job.

Collective Ownership: The pairs of developers work on all areas of the system, so that no islands of expertise develop and all the developers own all the code. Anyone can change anything.

Continuous Integration: As soon as work on a task is complete, it is integrated into the whole system. After any such integration, all the unit tests in the system must pass.

Sustainable pace: Large amounts of over-time are not considered acceptable as the net effect is often to reduce code quality and medium term productivity.

On-site Customer: A representative of the end-user of the system (the Customer) should be available full time for the use of the XP team. In an extreme programming process the customer is a member of the development team and is responsible for bringing system requirements to the team for implementation.

➤ **XP and agile principles**

- ✓ Incremental development is supported through small, frequent system releases.
- ✓ Customer involvement means full-time customer engagement with the team.
- ✓ People not process through pair programming, collective ownership and a process that avoids long working hours.
- ✓ Change supported through regular system releases.
- ✓ Maintaining simplicity through constant refactoring of code.

Advantages

- Lightweight methods suit small-medium size projects.
- Produces good team cohesion.
- Emphasizes final product.
- Iterative.
- Test based approach to requirements and quality assurance.

Disadvantages

- Difficult to scale up to large projects where documentation is essential.
- Needs experience and skill if not to degenerate into
- code-and-fix.
- Programming pairs is costly.

II RESEARCH RESULT

Modified Waterfall

The modified waterfall uses the same phases as the pure waterfall, but is not based on a discontinuous basis. This enables the phases to overlap when needed. The pure waterfall can also split into subprojects at an appropriate phase (such as after the architectural design or detailed design).

Table 2: Strengths & Weaknesses of Modified Waterfall

Strengths	Weaknesses
More flexible than the pure waterfall model.	Milestones are more ambiguous than the pure waterfall.
If there is personnel continuity between the phases, documentation can be substantially reduced	Activities performed in parallel are subject to miscommunication and mistaken assumptions.

Modified Waterfall Summary

Risk reduction spirals can be added to the top of the waterfall to reduce risks prior to the waterfall phases. The waterfall can be further modified using options such as prototyping, JADs or CRC sessions or other methods of requirements gathering done in overlapping phases .

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Fuzzy rw Super- Continuous Mapping

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Abstract- In this paper we extend the concepts of rw super closed sets and rw super continuous mappings in fuzzy topological spaces and obtain several results concerning the preservation of fuzzy g- super closed sets. Furthermore we characterize fuzzy rw super continuous and fuzzy rw- super closed mappings and obtain some of the basic properties and characterization of these mappings.

Index Terms- Fuzzy super closure fuzzy super interior fuzzy super closed set, fuzzy super open set fuzzy g- super closed sets, fuzzy g- super open sets, fuzzy g- super continuous, fuzzy rw super closed, fuzzy rw -super continuous and fuzzy gc-super irresolute mappings.

I. INTRODUCTION

After the introduction of fuzzy sets by Zadeh [17] in 1965 and fuzzy topology by Chang [3] in 1968, several researches were conducted on the generalizations of the notions of fuzzy sets and fuzzy topology. Thakur and Malviya [14] introduced the concepts of fuzzy g- closed sets, fuzzy g-continuity and fuzzy g-irresolute mappings in fuzzy topological spaces.

In this paper we introduce the concepts of fuzzy rw -super closed and fuzzy rw -super continuous mappings using fuzzy g- super closed sets. This definition enables us to obtain conditions under which maps and inverse maps preserve fuzzy g- super closed sets. We also characterize fuzzy $T_{1/2}$ -spaces in terms of fuzzy rw super continuous and fuzzy rw -super closed mappings. Finally some of the basic properties of fuzzy rw super continuous and fuzzy g- super closed mappings are investigated.

II. PRELIMINARIES

Let X be a non empty set and $I = [0,1]$. A fuzzy set on X is a mapping from X into I . The null fuzzy set 0 is the mapping from X into I which assumes only the value 0 and whole fuzzy set 1 is a mapping from X onto I which takes the value 1 only. The union (resp. intersection) of a family $\{A_\alpha; \alpha \in \Lambda\}$ of fuzzy sets of X is defined by to be the mapping $\sup A_\alpha$ (resp. $\inf A_\alpha$). A fuzzy set A of X is contained in a fuzzy set B of X if $A(x) \leq B(x)$ for each $x \in X$. A fuzzy point x_β in X is a fuzzy set defined by $x_\beta(y) = \beta$ for $y = x$ and $x_\beta(y) = 0$ for $y \neq x$, $\beta \in [0,1]$ and $y \in X$. A fuzzy point x_β is said to be quasi-coincident with the fuzzy set A denoted by $x_\beta q A$ if and only if $\beta + A(x) > 1$. A fuzzy set A is quasi-coincident with a fuzzy set B denoted by $A q B$ if and only if there exists a point $x \in X$ such that $A(x) + B(x) > 1$. For any two fuzzy sets A and B of X , $A \leq B$ if and only if $\overline{(A_q B^c)}$ [5]. A family τ of fuzzy sets of X is called a fuzzy topology [1] on X if $0,1$ belongs to τ and τ is closed with respect to arbitrary union and finite intersection. The members of τ are called fuzzy open sets and their complement are fuzzy closed sets. For any fuzzy set A of X the closure of A (denoted by $cl(A)$) is the intersection of all the fuzzy closed sets of A and the interior of A (denoted by $int(A)$) is the union of all fuzzy open subsets of A .

Definition 2.1 [6]: Let (X, τ) fuzzy topological space and $A \subseteq X$ then

1. Fuzzy Super closure $scl(A) = \{x \in X : cl(U) \cap A \neq \emptyset\}$
2. Fuzzy Super interior $sint(A) = \{x \in X : cl(U) \leq A \neq \emptyset\}$

Definition 2.2 [5,6]: A fuzzy set A of a fuzzy topological space (X, τ) is called:

- (a) Fuzzy super closed if $scl(A) \leq A$.
- (b) Fuzzy super open if $1-A$ is fuzzy super closed $scl(A) = A$

Remark 2.1[5,6]: Every fuzzy closed set is fuzzy super closed but the converses may not be true.

Remark 2.2[5,6]: The intersection of two fuzzy super closed sets in a fuzzy topological space (X, \mathfrak{F}) may not be fuzzy super closed.

For

Definition 2.2[1,5,6,7]: A fuzzy set A of a fuzzy topological space (X, τ) is called:

- (a) fuzzy semi super open if there exists a super open set O such that $O \leq A \leq cl(O)$.
- (b) fuzzy semi super closed if its complement $1-A$ is fuzzy semi super open.

Remark 2.3[1,5,7]: Every fuzzy super open (resp. fuzzy super closed) set is fuzzy semi super open (resp. fuzzy semi super closed) but the converse may not be true .

Definition 2.3[7]: A fuzzy set A of a fuzzy topological space (X, τ) is called fuzzy w -super closed if $cl(A) \leq U$ whenever $A \leq U$ and U is fuzzy semi super open.

Remark 2.4[5,6]: Every fuzzy super closed set is fuzzy w -super closed but its converse may not be true. For,

Definition 2.4[3,7]: A fuzzy sets A of a fuzzy topological spaces (X, \mathfrak{F}) is called fuzzy regular super open if $A = int(cl(A))$.

Definition 2.5[3,7]: A fuzzy sets A of a fuzzy topological spaces (X, \mathfrak{F}) is called fuzzy regular super closed if $A = cl(int(A))$.

Remark 2.5: Every fuzzy open (resp. fuzzy regular super closed) set is fuzzy regular super open (resp. fuzzy regular super closed) but the converse may not be true [].The family of all fuzzy regular super open (resp. fuzzy regular super closed) sets of a fuzzy topological (X, \mathfrak{F}) will be denoted by $FRO(X)$ (resp. $FRC(X)$).

DEFINITION 2.6[3,5,6,7]: A mapping $f: (X, \mathfrak{F}) \rightarrow (Y, \Gamma)$ is said to be fuzzy almost super continuous if $f^{-1}(G) \in \mathfrak{F}$ for each fuzzy set of $G \in FRO(Y)$.

Remark 2.6[6]: Every fuzzy super continuous mapping is fuzzy almost super continuous but the converse may not be true [7].

Definition 2.7: A fuzzy sets A of a fuzzy topological spaces (X, \mathfrak{F}) is called fuzzy regular semi super open if there exists a fuzzy regular super open set O such that $O \leq A \leq cl(O)$ [6]

The family of all fuzzy regular semi super open sets of a fuzzy topological (X, τ) will be denoted by $FRSSO(X)$.

Remark 2.7: Every fuzzy regular super open set is fuzzy regular semi super open but the converse may not be true .

Definition 2.8: A mapping $f: (X, \mathfrak{F}) \rightarrow (Y, \Gamma)$ is said to be fuzzy almost super irresolute if the inverse image of every fuzzy regular semi super open set of Y is fuzzy semi super open in X . [6]

Remark 2.8: Every fuzzy super irresolute mapping is fuzzy almost super irresolute but the converse may not be true [P_6].

Definition 2.9: A fuzzy set A of a topological spaces (X, \mathfrak{F}) is called fuzzy rg - super closed if $cl(A) \leq U$ whenever $A \leq U$ and U is fuzzy regular super open in X .

Remark 2.9: Every fuzzy g - super closed set is fuzzy rg - super closed but its converse may not be true.

Definition 2.10: A mapping $f: (X, \mathfrak{F}) \rightarrow (Y, \Gamma)$ is said to be fuzzy rg -super continuous if the inverse image of every fuzzy super closed set of Y is fuzzy rg - super closed set in X .

Remark 2.10: Every fuzzy g -super continuous mapping is fuzzy rg -super continuous but the converse may not be true .

III. FUZZY RW SUPER-CLOSED SETS

In the present section we introduce the concepts of fuzzy rw super-closed sets in fuzzy topology and obtained some of its basic properties.

Definition 3.1: A fuzzy set A of a topological spaces (X, \mathfrak{F}) is called fuzzy rw super-closed if $cl(A) \leq U$ whenever $A \leq U$ and U is fuzzy regular semi super open in X .

Remark 3.1: Every fuzzy w - super closed set is fuzzy rw - super closed but its converse may not be true for,

Example 3.1: Let $X = \{a, b\}$ and the fuzzy sets A and U be defined as follows:

$$A(a)=0.7, A(b)=0.8, U(a)=0.7, U(b)=0.6$$

Let $\tau = \{0, U, 1\}$ be a fuzzy topology on X . Then A is fuzzy rw -super closed but not fuzzy w -super closed.

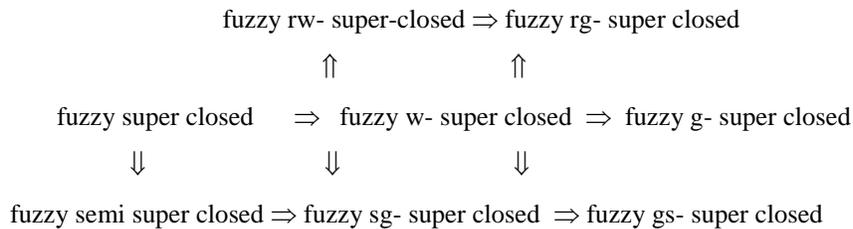
Remark 3.2: Every fuzzy rw -super-closed set is fuzzy rg -super closed but not conversely. For,

Example 3.2: Let $X = \{a, b, c, d\}$ and the fuzzy sets $O, U, V, W,$ and A are defined as follows:

$$O(a) = 1, O(b) = 0, O(c) = 0, O(d) = 0, U(a) = 0, U(b) = 1, U(c) = 0, U(d) = 0$$

$$V(a)=1, V(b) = 1, V(c) = 0, V(d) = 0, W(a) = 0, W(b) = 0, W(c) = 1, W(d) = 1$$

$A(a) = 0, A(b) = 0, A(c) = 1, A(d) = 0$, Let $\tau = \{0, O, U, V, W, 1\}$ be the fuzzy topology on X . then A is rw super-closed but not rg -super closed. Thus we have the following diagram of implications:



Theorem 3.1: Let (X, τ) be a fuzzy topological spaces and A is fuzzy subset of X . Then A is fuzzy rw super-closed if and only if $\tau(\text{cl}(A)_q F) \Rightarrow \tau(\text{cl}(A)_q F)$ for every fuzzy regular semi super closed set F of X .

Proof: Necessity: Let F be a fuzzy regular semi super closed subsets of X and $\tau(\text{cl}(A)_q F)$. Then $A \leq 1-F$ and $1-F$ is fuzzy regular semi super open in X . Therefore $\text{cl}(A) \leq 1-F$ because A is fuzzy rw -super closed. Hence $\tau(\text{cl}(A)_q F)$.

Sufficiency: Let $U \in \text{FRSSO}(X)$ such that $A \leq U$ then $\tau(\text{cl}(A)_q (1-U))$ and $1-U$ is fuzzy regular semi super closed in X . Hence by hypothesis $\tau(\text{cl}(A)_q (1-U))$. Therefore $\text{cl}(A) \leq U$, Hence A is fuzzy rw super closed in X .

Theorem 3.2: Let A be a fuzzy rw -super closed set in a fuzzy topological space (X, τ) and x_β be a fuzzy point of X such that $x_\beta q(\text{cl}(\text{int}(A)))$ then $\text{cl}(\text{int}(x_\beta))_q A$.

Proof: If $\tau(\text{cl}(\text{int}(x_\beta))_q A)$ then $A \leq 1-\text{cl}(\text{int}(x_\beta))$ and so $\text{cl}(A) \leq 1-\text{cl}(\text{int}(x_\beta)) \leq 1-x_\beta$ because A is fuzzy rw super closed in X . Hence $\tau(\text{cl}(\text{int}(x_\beta))_q A)$, a contradiction.

Theorem 3.3: If A and B are fuzzy rw -super closed sets in a fuzzy topological space (X, τ) then $A \cup B$ is fuzzy rg -super closed.

Proof: Let $U \in \text{FRSSO}(X)$ such that $A \cup B \leq U$. Then $A \leq U$ and $B \leq U$, so $\text{cl}(A) \leq U$ and $\text{cl}(B) \leq U$. Therefore $\text{cl}(A) \cup \text{cl}(B) \leq \text{cl}(A \cup B) \leq U$. Hence $A \cup B$ is fuzzy rw -super closed.

Remark 3.3: The intersection of any two fuzzy rw -super closed sets in a fuzzy topological space (X, τ) may not be fuzzy rw -super closed for,

Example 3.3: Let $X = \{a, b, c, d\}$ and the fuzzy sets A and B are defined as follows;

$$\begin{array}{cccc}
 A(a)=1, & A(b)=1, & A(c)=0, & A(d)=0, \\
 B(a)=1, & B(b)=0, & B(c)=1, & B(d)=1,
 \end{array}$$

Let $\tau = \{0, A, B, A \cap B, 1\}$ be the fuzzy topology on X . Then A and B are fuzzy rw -super closed but their intersection $A \cap B$ is not fuzzy rw -super closed.

Theorem 3.4: Let $A \leq B \leq \text{cl}(A)$ and A is fuzzy rw -super closed set in a fuzzy topological space (X, τ) then B is fuzzy rw -super closed.

Proof: Let $U \in \text{FRSSO}(X)$ such that $B \leq U$. Then $A \leq U$ and since A is fuzzy rw -super closed. Then $\text{cl}(A) \leq U$. Now $B \leq \text{cl}(A) \Rightarrow \text{cl}(B) \leq \text{cl}(A) \leq U$. Consequently B is fuzzy rw -super closed.

Definition 3.2: A fuzzy set A of a fuzzy topological space (X, \mathfrak{T}) is called fuzzy rw -super open) if and only if $1 - A$ is fuzzy rw -super closed.

Remark 3.4: Every fuzzy w- super open set is fuzzy rw- super open .But converse may not be true. For the fuzzy set B defined by $B(a)=0.5$ and $B(b)=0.7$ in the fuzzy topological (X, \mathfrak{T}) of example 6.1.1 is fuzzy rg- super open but not fuzzy regular super open.

Theorem 3.5: A fuzzy set A of a fuzzy rw-super open if and only if $F \leq \text{int}(A)$ whenever $F \leq A$ and F is fuzzy regular semi super open.

Proof: Obvious.

Theorem 3.6: Let A be a fuzzy rw -super open set in a fuzzy topological spaces (X, \mathfrak{T}) and $\text{int}(A) \leq B \leq A$ then B is fuzzy rw- super open.

Proof : Obvious .

Theorem 3.7: Let (X, \mathfrak{T}) be a fuzzy topological space and $FC(X)$ be the family of all fuzzy super closed sets of X .Then $FRSSO(X) \subseteq FSC(X)$ if and only if every fuzzy subset of X is fuzzy rw- super closed.

Proof: Necessity: Suppose that $FRSSO(X) \subseteq FC(X)$ and that $A \leq U \in FRSSO(X)$ then $\text{cl}(A) \leq \text{cl}(U) = U$ and A is fuzzy rw -super closed.

Sufficiency: Suppose that every fuzzy subset of X is fuzzy rw- super closed .If $U \in FRSSO(X)$ then since $U \leq U$ and U is fuzzy rw -super closed, $\text{cl}(U) \leq U$ and $U \in FC(X)$.Thus $FRSSO(X) \subseteq FC(X)$.

Theorem 3.8: Let A be a fuzzy w- super closed set in a fuzzy topological space (X, \mathfrak{T}) and $f: (X, \mathfrak{T}) \rightarrow (Y, \sigma)$ is a fuzzy almost super irresolute and fuzzy super closed mappings then $f(A)$ is fuzzy rw - super closed in Y .

Proof: If $f(A) \leq G$ where $G \in FRSSO(Y)$. Then $A \leq f^{-1}(G) \in FSSO(X)$ and hence $\text{cl}(A) \leq f^{-1}(G)$, because A is a fuzzy w- super closed in X . Since f is fuzzy super closed, $f(\text{cl}(A))$ is a fuzzy super closed set in Y . It follows that $\text{cl}(f(A)) \leq \text{cl}(f(\text{cl}(A))) = f(\text{cl}(A)) \leq G$. Thus $\text{cl}(f(A)) \leq G$ and $f(A)$ is a fuzzy rw –super closed set in Y .

Definition 3.2: A mapping $f: (X, \mathfrak{T}) \rightarrow (Y, \sigma)$ is said to be fuzzy regular semi super irresolute if the inverse image of each fuzzy regular semi super open in X .

Theorem 3.9: Let A be the fuzzy rw -super closed set in a fuzzy topological space (X, \mathfrak{T}) and $f: (X, \mathfrak{T}) \rightarrow (Y, \sigma)$ is a fuzzy regular semi super irresolute and fuzzy super closed mapping then $f(A)$ is fuzzy rw super closed sets in Y .

Proof: If $f(A) \leq G$ where $G \in FRSSO(Y)$ then $A \leq f^{-1}(G) \in FRSSO(X)$ and hence $\text{cl}(A) \leq f^{-1}(G)$ because A is fuzzy rw -super-closed in X . Since f is fuzzy closed $f(\text{cl}(A))$ is a fuzzy closed set in Y . It follows that $\text{cl}(f(A)) \leq \text{cl}(f(\text{cl}(A))) = f(\text{cl}(A)) \leq G$ thus $\text{cl}(f(A)) \leq G$ and $f(A)$ is fuzzy rw -super closed sets in Y .

Definition 3.3: A collection $\{G_\alpha: \alpha \in \Lambda\}$ of fuzzy rw- super open sets in a fuzzy topological space (X, \mathfrak{T}) is called a fuzzy rw- super open cover of a fuzzy set A of X if $A \leq \bigcup \{G_\alpha: \alpha \in \Lambda\}$.

Definition 3.4: A fuzzy set of a topological space (X, \mathfrak{T}) is said to be fuzzy rw -super compact if every fuzzy rw –super open cover of X has a finite sub cover.

Definition 3.5: A fuzzy topological space (X, \mathfrak{T}) is said to be fuzzy rw- super compact relative to X , if for every collection $\{G_\alpha: \alpha \in \Lambda\}$ of fuzzy rw -super open subsets of X such that $A \leq \bigcup \{G_{\alpha_j}: \alpha_j \in \Lambda_0\}$.

Definition 3.6: A crisp subset of A of a fuzzy topological space (X, \mathfrak{T}) is said to be fuzzy rw –super compact if A is fuzzy rw- super compact as a fuzzy subspace of X .

Theorem 3.10: Fuzzy rw-super closed crisp subsets of a fuzzy rw –super compact space are fuzzy rw- super compact relative to X.

Proof: Let A be a fuzzy rw super-closed crisp set off a fuzzy rw- super compact space (X, \mathfrak{T}) .Then $1 - A$ is fuzzy rw –super open in X .Let $G = \{G_\alpha: \alpha \in \Lambda\}$. Be a cover of A fuzzy rw- super open sets in X .Then the family $\{G, 1-A\}$ is a fuzzy rg- super open in X is fuzzy rw –super compact.it had sub cover $\{G_{\alpha_1} G_{\alpha_2} G_{\alpha_3} \dots G_{\alpha_n}\}$. If the sub cover contain $1-A$, we discard it thus we have obtained a finite fuzzy rg-open sub cover of A is fuzzy rw -super-compact relative to X.

IV. FUZZY RW-SUPER CONTINUOUS MAPPINGS

In the present section we introduce the concept of fuzzy regular super w-Super continuous mappings in fuzzy topology and obtained some of its basic properties.

Definition 4.1: A fuzzy set A of topological spaces (X, \mathfrak{T}) is called fuzzy regular w- super continuous mapping (written as fuzzy rw -super continuous mapping) if the inverse image of every fuzzy closed set of Y is fuzzy rw –super closed in X.

Theorem 4.2:A mapping $f: (X, \mathfrak{T}) \rightarrow (Y, \sigma)$ is fuzzy rw-super continuous if and only if the inverse image of every fuzzy super open set of Y is fuzzy rw- super open in X.

Proof: It is obvious because $f^{-1}(1-A) = 1-f^{-1}(A)$ for every fuzzy set A of Y.

Remark 4.2: Every fuzzy w-super continuous mapping is rw -super continuous but its converse may not be true for,

Example 4.1: Let $X = \{a, b\}$ and $Y = \{x, y\}$ the fuzzy sets U and V be defined as follows;

$$\begin{aligned} U(a) &= 0.7, & U(b) &= 0.6 \\ V(x) &= 0.2, & V(y) &= 0.2 \end{aligned}$$

Let $\mathfrak{T} = \{0, U, 1\}$ and $\sigma = \{0, V, 1\}$ be a fuzzy topology on X and Y respectively .Then the mapping $f: (X, \tau) \rightarrow (Y, \sigma)$ defined by $f(a) = x$ and $f(b) = y$ is fuzzy rw- super continuous mapping but not fuzzy w-super continuous mapping.

Remark 4.2: Every fuzzy rw -super continuous mapping is rg-super continuous but its converse may not be true for,

Example 4.2: Let $X = \{a, b\}$ and $Y = \{x, y\}$ the fuzzy sets U and V be defined as follows;

$$\begin{aligned} U(a) &= 0.7, & U(b) &= 0.6 \\ V(x) &= 0.2, & V(y) &= 0.2 \end{aligned}$$

Let $\mathfrak{T} = \{0, U, 1\}$ and $\sigma = \{0, V, 1\}$ be a fuzzy topology on X and Y respectively .Then the mapping $f: (X, \mathfrak{T}) \rightarrow (Y, \sigma)$ defined by $f(a) = x$ and $f(b) = y$ is fuzzy rw- super continuous mapping but not fuzzy w-super continuous mapping.

Theorem 4.2: If $f: (X, \mathfrak{T}) \rightarrow (Y, \sigma)$ is fuzzy w-super continuous then for each fuzzy point x_β of X and each fuzzy open set B, $f(x_\beta) \in B$ then there exists a fuzzy rw –super open set A such that $x_\beta \in A$ and $f(A) \leq B$.

Proof: Let x_β be fuzzy point of X and B be a fuzzy open set such that $f(x_\beta) \in B$ put $B = f^{-1}(A)$, then by the hypothesis A is a fuzzy rw- super open set of X such that $x_\beta \in A$ and $f(A) = f(f^{-1}(B)) \leq B$.

Theorem 4.3: If $f: (X, \mathfrak{T}) \rightarrow (Y, \sigma)$ is fuzzy rw super continuous then for each fuzzy point x_β of X and each fuzzy open set B of Y such that, $f(x_\beta)_q B$ then there exists a fuzzy rw –super open set A such that $x_\beta q A$ and $f(A) \leq B$.

Proof: Let x_β be fuzzy point of X and B be a fuzzy super open set such that $f(x_\beta)_q B$ put $B = f^{-1}(A)$,then by the hypothesis A is a fuzzy rw- super open set of X such that $x_\beta q A$ and $f(A) = f(f^{-1}(B)) \leq B$.

Definition 4.2: Let (X, \mathfrak{T}) be a fuzzy topological .The rw –super closure of the fuzzy set A of X denoted by rw –super $cl(A)$ is defined as follows $rw\text{-super } cl(A) = \inf\{B: B \geq A, B \text{ is fuzzy rw- super closed set of } X\}$.

Remark 4.3: It is clear that $A \leq_{rw} \text{-super cl}(A) \leq \text{cl}(A)$ for any fuzzy set A of X .

Theorem 4.4: If $f: (X, \mathfrak{S}) \rightarrow (Y, \sigma)$ is fuzzy rw -super continuous then $f(rw \text{-super cl}(A)) \leq \text{cl}(f(A))$ for every fuzzy set A of X .

Proof: Let A be a fuzzy set of X . Then $\text{cl}(f(A))$ is a fuzzy super closed set of Y . Since f is fuzzy rw -super continuous $f^{-1}(\text{cl}(f(A)))$ is fuzzy rw -super closed in X . Clearly $A \leq f^{-1}(\text{cl}(f(A)))$ therefore, $rw \text{-super cl}(A) \leq rw \text{-super cl}(f^{-1}(\text{cl}(f(A)))) = f^{-1}(\text{cl}(f(A)))$, hence $f(rw \text{-super cl}(A)) \leq \text{cl}(f(A))$.

Remark 4.4: The converse of the theorem 6.2.2 is not true .

Definition 4.3: A fuzzy topological space (X, \mathfrak{S}) is said to be fuzzy rw -super- $T_{1/2}$ if every fuzzy rw -super closed set in X is fuzzy super closed in X .

Theorem 4.5: Let f be a mapping from a fuzzy rw -super- $T_{1/2}$ space (X, \mathfrak{S}) to a fuzzy topological space (Y, σ) then the following condition are equivalent:

- (a) f is fuzzy super continuous.
- (b) f is fuzzy w -super continuous.
- (c) f is fuzzy rw -super continuous.

Proof: Obvious.

Theorem 4.6: If $f: (X, \mathfrak{S}) \rightarrow (Y, \sigma)$ is fuzzy rw -super continuous and $g: (Y, \sigma) \rightarrow (Z, \eta)$ is fuzzy super continuous .Then $g \circ f: (X, \mathfrak{S}) \rightarrow (Z, \eta)$ is fuzzy rw -super continuous.

Proof: If A is fuzzy closed in Z then $f^{-1}(A)$ is fuzzy closed in Y because g is fuzzy super continuous. Therefore $(g \circ f)^{-1}(A) = f^{-1}(g^{-1}(A))$ is fuzzy rw -super closed in X . Hence $g \circ f$ is fuzzy rw -super continuous.

Theorem 4.7: If $f: (X, \mathfrak{S}) \rightarrow (Y, \sigma)$ and $g: (Y, \sigma) \rightarrow (Z, \eta)$ are two fuzzy rw -super continuous mapping and (Y, σ) is fuzzy rw -super- $T_{1/2}$ super continuous. Then $g \circ f: (X, \tau) \rightarrow (Z, \eta)$ is fuzzy rw -super continuous.

Proof: Obvious.

Theorem 4.8: A fuzzy rw -super continuous image of a fuzzy rw -super compact space is fuzzy compact.

Proof: Let $f: (X, \mathfrak{S}) \rightarrow (Y, \sigma)$ be a fuzzy rw -super continuous mapping from a fuzzy rw -super compact space (X, τ) on to a fuzzy topological space (Y, σ) . Let $\{A_i: i \in \Lambda\}$ be a fuzzy super open cover of Y , then $\{f^{-1}(A_i): i \in \Lambda\}$ is a fuzzy rw -super open cover of X . Since X is fuzzy rw -super compact it has a finite sub cover, say $\{f^{-1}(A_1), f^{-1}(A_2), f^{-1}(A_3) \dots f^{-1}(A_n)\}$ since f is onto $\{A_1, A_2, \dots, A_n\}$ is a fuzzy super open cover of Y so (Y, σ) is fuzzy compact.

Definition 4.4: A fuzzy topological space (X, \mathfrak{S}) is fuzzy rw -super connected if there is no proper fuzzy set of X which is both fuzzy rw -super open and fuzzy rw -super closed.

Remark 4.5: Every fuzzy rw -super connected space is fuzzy super connected but he converse may not be true. For;

Example 4.4: Let $X = \{a, b\}$ and A be defined as follows, $A(a) = 0.5, A(b) = 0.7$. Let $\mathfrak{S} = \{0, A, 1\}$ be topology on X , then (X, \mathfrak{S}) is fuzzy super connected but not fuzzy rw -super connected.

Theorem 4.10: If (X, \mathfrak{S}) fuzzy rw -super- $T_{1/2}$ connected if and only if it is fuzzy rw -super connected.

Proof: Obvious.

Theorem 4.10: If $f: (X, \mathfrak{S}) \rightarrow (Y, \sigma)$ fuzzy rw -super continuous surjection and X is fuzzy rw -super connected then Y is fuzzy super connected.

Proof: Suppose Y is not fuzzy super connected .Then there exists a proper fuzzy set A of Y which is both fuzzy super open and fuzzy super closed, therefore $f^{-1}(A)$ is proper fuzzy set of X , which is both fuzzy rw -super open and fuzzy rw -super closed, because f is fuzzy rw -super continuous surjection. Hence, X is not fuzzy rw -super connected, which is a contradiction

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Design & Implementation of DWT – IDWT Algorithm for Image Compression by using FPGA

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Abstract- Image compression is one of the major image processing techniques that is widely used in medical, automotive, consumer and military applications. Discrete wavelet transforms is the most popular transformation technique adopted for image compression. Complexity of DWT is always high due to large number of arithmetic operations. In this work a modified Distributive Arithmetic based DWT architecture is proposed and is implemented on FPGA. The modified approach consumes area of 6% on Spartan 3 FPGA and operates at 134 MHz. The modified DA-DWT architecture has a latency of 44 clock cycles and a throughput of 4 clock cycles. This design is twice faster than the reference design and is thus suitable for applications that require high speed image processing algorithms.

Index Terms- Discrete Wavelet Transforms (DWT), Distributive Arithmetic (DA), Poly-phase structure, and convolution

I. INTRODUCTION

Technological growth of semiconductor industry has led to unprecedented demand for low power, high speed complex and reliable integrated circuits for medical, defence and consumer applications. Today's electronic equipment comes with user friendly interfaces such as keypads and graphical displays. As images convey more information to a user, it is many of the equipment today have image displays and interfaces. Image storage on these smaller, handled devices is a challenge as they occupy huge storage space; also image transmission requires higher bandwidth. Hence most of the signal processing technologies today has dedicated hard ware that act as co-processors to compress and decompress images. In this work, a reliable, high speed, low power DWT-IDWT processor is designed and implemented on FPGA which can be used as a co-processor for image compression and decompression.

In wavelet transforms, the original signal is divided into frequency resolution and time resolution contents. The decomposition of the image using 2-level DWT is shown in Figure 1.

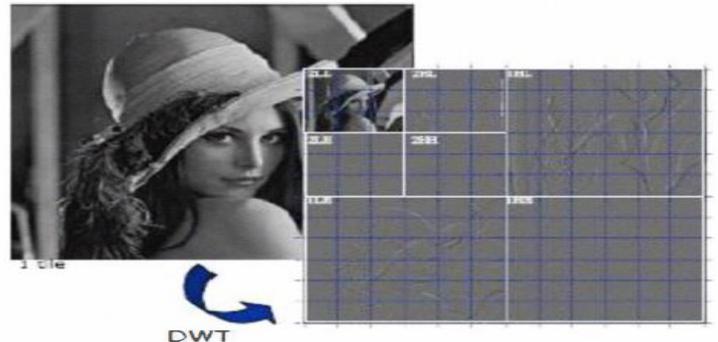


Figure 1: Decomposition of Image.

II. DWT ARCHITECTURE

Image consists of pixels that are arranged in two-dimensional matrix, each pixel represents the digital equivalent of image intensity. In spatial domain adjacent pixel values are highly correlated and hence redundant. In order to compress images, these redundancies existing among pixels needs to be eliminated. DWT processor transforms the spatial domain pixels into frequency domain information that are represented in multiple sub-bands, representing different time scale and frequency points. Human visual system is very much sensitive to low frequency and hence, the decomposed data available in the lower sub-band region and is selected and transmitted, information in the higher sub-bands regions are rejected depending upon required information content. In order to extract the low frequency and high frequency sub-bands DWT architecture shown in figure below is used. As shown in the figure, input image consisting rows and columns are transformed using high pass and low pass filters. The filter coefficients are predefined and depend upon the wavelets selected. In this work, 9/7 wavelets have been used for constructing the filters. First stage computes the DWT output along the rows, the second stage computes the DWT along the column achieving first level decomposition. Low frequency sub-bands from the first level decomposition is passed through the second level and third level of filters to obtain multiple level decomposition as shown in Figure 2.

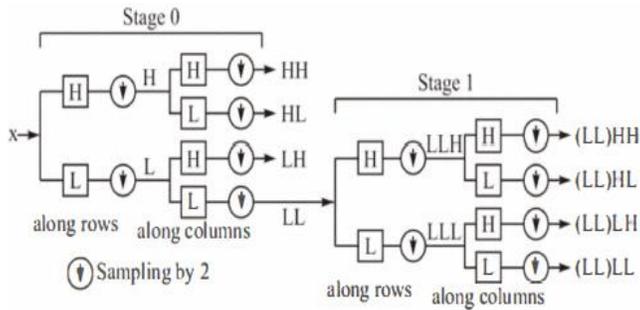


Figure 2: DWT architecture

There are several architectures for realizing the DWT shown in Figure 2. paper [11] summarizes various schemes. Most popular one is the DA-DWT scheme that is suitable on FPGA, as it consumes fewer resources and has high throughput. DA-DWT architecture based on pipelining and parallel processing logic is realized and implemented on FPGA [12]. In this work, a modified DA-DWT architecture is designed based on the work reported in [12]. The number of LUTs and number of shift registers are reduced by exploiting the symmetric property of the 917 wavelet filters. Efficient fixed point number representation scheme is identified to accurately represent the 917 filter values and are stored in the LUT memory space on FPGA. A control logic designed loads the input data into the FPGA from the external memory, LUT contents are read out based on the input samples as address to LUT. After 8 clock cycles of initial latency, DWT outputs are computed every clock cycle. A detailed discussion of the proposed architecture is presented in section IV. Software reference model for DWT-IDWT processor is built using Matlab. Multiple image test vectors are used in analysing the performances of the software reference model. A detailed discussion of the software reference model results are presented in section III.

III. DISTRIBUTIVE ARITHMETIC BASED 2D DWT/IDWT ARCHITECTURE

In this section, we first outline how to perform multiplication by using memory based architecture. Following this, we briefly explain architecture for DWT filter bank. Using this we show complete design for block based DWT. The memory based approach provides an efficient way to replace multipliers by small ROM tables such that the DWT filter can attain high computing speeds with a small silicon area as shown in Figure 3. Traditionally, multiplication is performed using logic elements such as adders, registers etc. However, multiplication of two n-bit input variables can be performed by a ROM table of size of 2^{2n} entries. Each entry stores the pre-computed result of a multiplication. The speed of the ROM lookup table is faster than that of hardware multiplication if the look-up table is stored in the on-chip memory. In DWT, one of the input variables in the multiplier can be fixed. Therefore, a multiplier can be realized by 2^n entries of ROM. Distributed arithmetic implementation of the Daubechies 8-tap wavelet FIR filter consists of an LUT, a cascade of shift registers and a scaling accumulator [12].

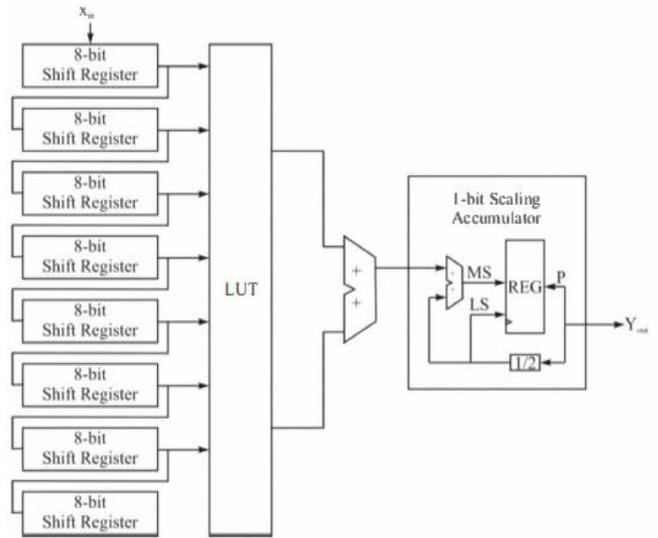


Figure 3 Distributive Arithmetic

To speed up the process parallel implementation of the Distributive Arithmetic (DA) architecture shown in Figure 4 is realized in [12]. In parallel implementation, the input data is divided into even samples and the odd samples based on their position. This scheme reduces the memory size to half due to the symmetric property of the filter coefficients. This increases the throughput as the input samples are simultaneously used to read the data from two LUTs and hence speed is increased.

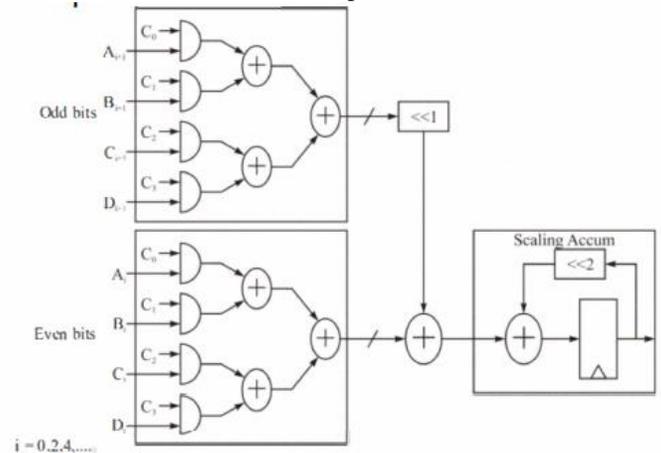


Figure 4 Parallel implementation of DA technique

In order to further increase the speed and reduce the area, the LUT can be further split into four stages, and can be accessed by the input values for data read.

IV. MODIFIED DA-DWT ARCHITECTURE

The modified DA-DWT architecture shown in Figure 5 consists of four LUTs, each of the LUTs are accessed by the even and odd samples of input matrix simultaneously. Odd and even input samples are divided into 4 bits of LSB and 4 bits of MSB, each 4-bit data read the content of four different LUTs that consist of partial products of filter values computed and stored as per the DA logic. Input samples are split into even and odd in the first stage, the data is further loaded sequentially into the serial in

serial out shift registers, top four shift register store MSB bits and bottom four shift register stores the LSB bits. It requires 40 clocks cycles to load the shift register contents. At the end of 40th clock cycle, the control logic configures the shift register as serial in parallel out, thus forming the address for the LUT. The partial products stored in the LUT are read simultaneously from all the four LUTS and are accumulated with previous values available across the shift register in the output stage. The output stage consisting of adders, accumulators and right shift registers are used to accumulate the LUT contents and thus compute the DWT output. This architecture has a latency of 44 clock cycles in computing the first high pass and low pass filter coefficients, and has a through put of 4 clock cycles. This architecture is faster by the previous architectures as the latency is reduced by half clock cycles and through put is increased by a factor of 2.

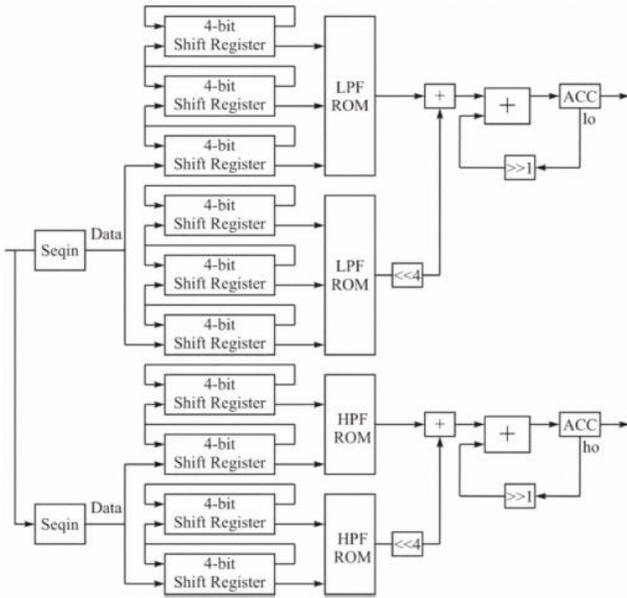


Figure 4 Practical Parallel implementation of DA technique

V. SOFTWARE REFERENCE MODEL DESIGN

In this section, a software reference model is developed to analyze the performances of various wavelets for image compression using DA-DWT. Input image is rescaled into 100x100 and is processed using DWT and IDWT algorithm. Decomposed sub-band components are selected to achieve different compression ratios. In this case, bits per pixels are used to express the compressed data. Bi-orthogonal, Haar and DB2 wavelets have been used to compare the performances of DWT-IDWT. Two test results have been shown in Figure 6. At very log bit BPP, the reconstructed image has lost the edges, this is due to the fact that very few sub-bands are chosen for reconstruction, hence data loss occurs.

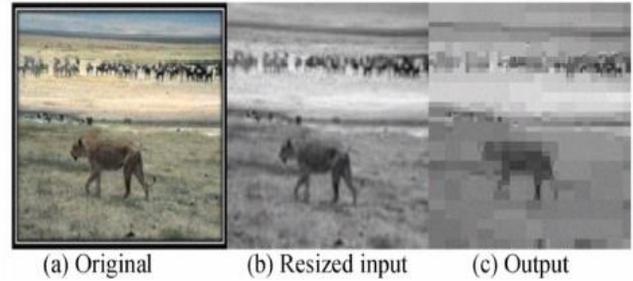


Figure 5 Software reference model outputs

VI. FPGA IMPLEMENTATION

HDL model for the proposed architecture is developed using VHDL. The HDL model is synthesized using Xilinx XPS Spartan 3 FPGA. The proposed design is implemented and the synthesis report is generated. The results obtained are presented in Table 2. The proposed design implemented on FPGA occupies only 6% of the total slices on FPGA, thus the proposed architecture reduces the area by 30% compared to the earlier designs.

TABLE 2 SYNTHESIS REPORT

Selected Device: Xc2vp30ff896-7			
Logic utilization	Used	Available	Utilization
Number of Slices:	832	13696	6%
Number of Slice Flip Flops:	634	27392	2%
Number of 4 input LUTs:	1186	27392	4%
Number of bonded IOBs:	19	416	4%
Number of MULT18X18s:	2	136	1%
Number of GCLKs	1	16	6%

VII. CONCLUSIONS

The Discrete Wavelet Transform provides a multi-resolution representation of images. The transform has been implemented using filter banks. For the design, based on the constraints the area, power and timing performance were obtained. Based on the application and the constraints imposed, the appropriate architecture can be chosen. For the Daubechies 2, the poly-phase architecture, with modified DA technique was implemented. The latency of the proposed architecture is 44 clock cycles and throughput is 4 clock cycles, and hence is twice faster than the reference design. It is seen that, in applications, which require low area, power consumption, and high throughput, e.g., real-time applications, the poly-phase with DA architecture is more suitable. The bi-orthogonal wavelets, with different number of coefficients in the low pass and high pass filters, increase the number of operations and the complexity of the design, but they have better SNR than the orthogonal filters. First, the code was written in Verilog HDL and implemented on the FPGA using a 64 x 64 random image. Then, the code was taken through the ASIC design flow. For the ASIC design flow, 8x8 memory considered to store the image. This architecture enables fast computation of DWT with parallel processing. It has low memory requirements and consumes low power. By using the same concepts which are mentioned above are useful in designing the Inverse Discrete Wavelet Transform (IDWT).

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Taxonomy of Security in Vehicular Ad-Hoc Network

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Abstract- Vehicular Adhoc NETWORKS (VANETs) have the high potential in commercial value and application prospect. For VANET have some specific security requirements so the routing protocols and security schemes in ad hoc networks not adapt to VANETs. As the vehicle move very quickly, hence it's necessary to a new security scheme for VANETs. In this paper we discuss the necessary requirements for security and safety in VANETs. We give detail taxonomy of security in VANET. Also describe the privacy and authenticity issue of vehicle to vehicle and vehicle to infrastructure and defined the problems of protecting privacy in VANET.

Index Terms- Ad-hoc network, Privacy, Authenticity, Intruder, VANETs

Introduction

Vehicular Ad-Hoc Networks (VANET) is a form of mobile ad-hoc networks. VANETs have the impending to optimize traffic in modern urban areas, reduce congestions and pollution, and increase passenger safety and comfort. The amount of information disseminating in VANET is enormous. This information is very wide in range to its speed, direction, emergency messages, surfing the internet and gaming information. Security for such networks represents a key point that is still under development. One of the most important aspects from the theoretical point of view is that, better communication efficiency can be achieved by sacrificing security and vice versa in VANETs. Applications design for such networks pose new security constraints[1]. The mobile devices have limited resources to spare, and the network connectivity is reduced because of the mobility of cars. We discuss the security issues design for VANET environments. Privacy of the passengers

must be preserve in VANET because the security protocol is design not to rely on the driver's identity [2]. The authorities will consider authenticity to make the VANET more safe in terms of privacy deploy such as public keys encryption and the use of pseudonyms. All proposed solutions must be able to maintain the privacy of individual vehicle avoid tracing the path and the movement and check the accuracy of data with a low operating cost and handling enormous data each vehicle transmit and receive.

Privacy

The term privacy is Anglo-Saxon origin, originally referred

the sphere of private life. But in recent decades the concept of privacy is means the right to control personal data. For last 15 years the privacy is increasingly subject to invasion to the intruder [3]. The privacy is the right to maintain the personal information and private life to be let alone. The policy often results in the ability of a person (or a group of people), to prevent the information on it becomes known to others, including organizations and institutions, if the person has not voluntarily choose to provide it, despite the enactment of special laws to protect people every day our privacy is violated more and more. The invention of new and new technology is the thread to violate the privacy [4]. The term privacy should also be applied in the field of VANET. This technology should be able to prevent any leakage of information regarding the tracking of routes carried by a vehicle and driver on the movements on road. The privacy of each vehicle and its passenger must be guaranteed in every respect to the authorities.

Privacy is obtained through the use of pseudonyms short-lived to the peer. A vehicle is given a nickname which will be changed periodically so one will not be able to trace the true identity of the vehicle. In the case of tracing of particular events

(accidents, traffic jams, etc.) It make the correlation of data from the authorities involve that is associated with the nickname the real identity of vehicles [5]. The peers have a limited view of the information passing over a geographical area, so the use of pseudonyms of short duration is reasonable. The preservation of privacy requires the consideration of any peer as a potential malicious, in fact for every one of them makes use of security measures. This arises from the objective of preserving the security of the individual vehicle and the VANET.

Authentication

Privacy against the authorities is a very complex issue. First we start with the assumption that the authorities carry out in the most honest as possible the tasks assigned to them and do not abuse their powers. In case of corruption of some internal member authorities might still be provided illegal access to unauthorized individuals to sensitive data on roads, vehicles and their movements. It must govern by the authorities to splitting the power to different independent bodies, to control the privacy and can prevent corruption. The large number of bodies to be corrupt and the involvement to leaks information is difficult than single authority. VANET attacks can be carried out by different people with different purposes [6]. An "attacker" is a node (a vehicle) which maliciously trying to steal private data of another vehicle and / or illegally trying to sabotage the proper functioning of VANET. In general, an attacker tries to convince a node by non-existent or distorted information [7]. He achieves this goal when he manages to convince by giving decency information to a victim. The attacker will send false data to other nodes by attached knot to victim like wildfire. A malicious node can distort the data on a share network. In VANET each node receives one message from many sources. The redundancy of this message is used for verification of accuracy of the data. If the same information is receive from multiple sources then the probability of the message be valid is high [8-9]. However use of redundancy of message makes it difficult to detect an attack.

Types OF ATTACK

Possible attacks in the network can be various types, active, passive, control of movement, falsification of data etc. Attack can be classified based on nature,

based o area of interest, based on object and based on impact.

4.1 Classification Based on Nature

Depending on the nature attacks can be classified according to fig. 1.

1. **Active vs. passive:** An active attacker is a node that can generate packets and placing on the network, while passive one is that can only push the message in the network.
2. **False information:** Attackers are spread wrong information in the network to influence the behaviour of other vehicles [10].
3. **False position:** Attackers use this technique of attack to alter the fields related to their position, speed, and direction of travel by broadcast messages. In the worst case, the attacker can clone other vehicles, hiding in this way their presence in case of accidents, and avoiding any responsibility [11].
4. **Vehicle tracking:** This is the scenario of like big brother, where a global observer can control the routes of the vehicles designated to use and the observed data for various purposes (for example, some companies that rent cars can trace their cars). To make such a control the "global observer" could control infrastructure such as roads or vehicles in a given geographical location. In this case, the attack is the passive type. We assume that the attacker does not use cameras or devices for tracking physically of a vehicle which wants to discover the identity. This assumption is made to create a scenario feasible in terms of manufacturing cost even if the application of devices such as cameras would give considerable aid to the controls of vehicles.

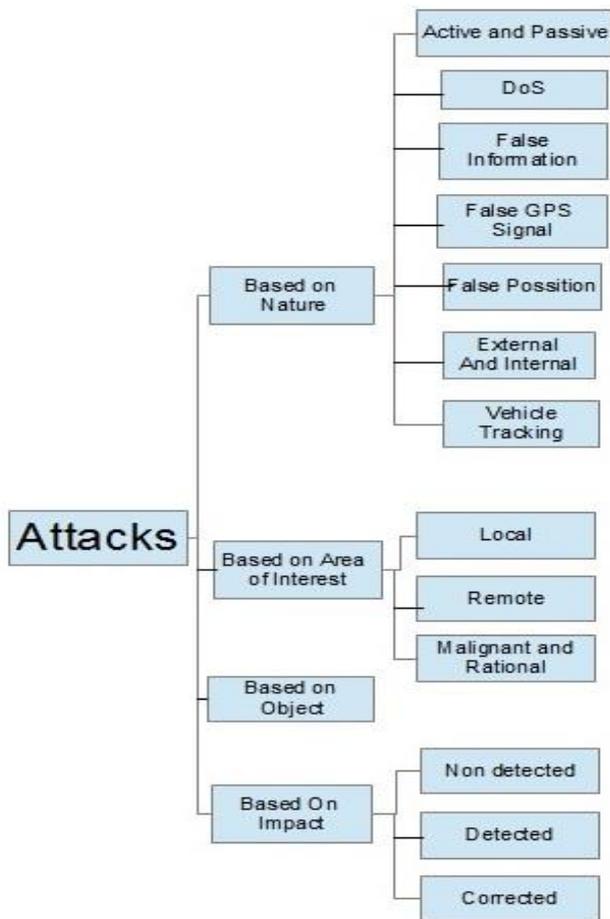


Fig. 1: classification of the attacks in VANET

5. **Internal vs. external:** Any attacks by internal nodes are part of the network. This means that the attacker node is a member of the network. Whereas any attacks by external nodes is considered by the network as an intruder. Generally attacks by internal nodes are most effective as they treats authenticated by the network.
6. **False GPS signal:** The vehicles that use GPS are easily vulnerable to various attacks such as the GPS signal.
7. **Denial of service:** In this style of attack a node may want to block the services offered by VANET or even may want to cause an accident. Examples of attack can be flooding the network with fake messages or blocking transmissions in the network itself. This kind of attack has no intention to make profit by the malignant node.

An example of attack in VANET shows in Figure 2. In this figure two vehicles A2 and A3 enter false information within a network for changing the flow of traffic of the road and obtain a useful result.

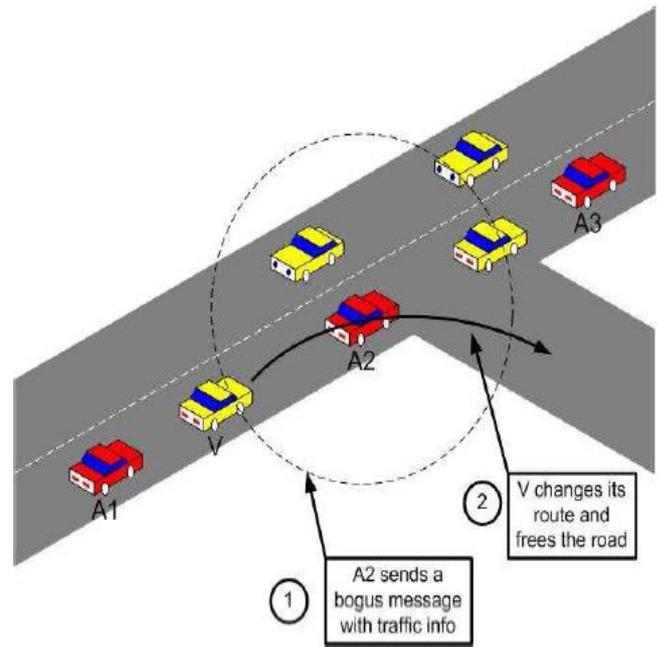


Figure 2: Attack with false information A2 and A3 disseminate false information to influence network.

4.2 Classification of attacks according to the region

Attacks based on the area of interest are those attacks based on geographical data. We define the attack nodes of an area of interest by "victim nodes ". The area of interest may be limited or extended. Characteristic of this kind of attack is the potential expansion of the infected areas where there is the presence of data corrupted by malicious nodes. The expansion can take place in peripheral area when one or more infected node passing bogus information into another area.

1. **Local attacks:** Attackers unleashed by malicious nodes to neighbouring nodes by sending false data in order to change the status of evaluation and decision of victim node. Such attacks can be very effective located in the vicinity of one or more malignant nodes. The victim node cannot make comparisons with other nodes in the network; therefore unable to test the veracity of the received data is valid.
2. **Remote attacks:** Attackers are attacks to targets node that is distant from the malicious node. The message sending by attackers node contain the fake information, it can arise conflict on a qualitative level between the message and the received message by neighbouring nodes to a target node.
3. **Rational vs. evil:** A malicious attacker does not seek personal benefits from attacks that push into network. This attack in the network does not consider the financial benefits; in contrast to a rational attacker seeks personal profit. To gain a personal profit, a rational attacker much more predictable than a malicious attack in terms of goals and objectives.

4.3 Classification of attacks according to the objectives

They may be also guided by well-defined objectives. The objectives can be traffic control in a given area, the control of vehicle movement, the induction to change the trajectory of vehicles, blocking a service or even block all the services offered by the VANET.

4.4 Classification of attacks based on Impact

The attacks may have different impacts depending on the technique and technology that the attacker uses. The classification according to the impact is as follows:

1. **Non Detected:** Attack is not detected by the target nodes. A target node cannot detect an attack if it is isolated or completely surrounded by the malignant nodes. It continuously transmits false information and a victim node accepts incoming fake messages. But as soon as the victim node is in the vicinity of an honest node, can re-evaluate the integrity of the data receive so far and then correct the message.
2. **Detected:** Attack detected by the target nodes. A victim node can detect an anomaly attack, because of the small amount of available correct data, remains in doubt about the contents of the receive data. This doubt remains until it encounters a sufficient number of honest nodes that provide a sufficient amount of information for a correction of the data. An example of node surrounded by evil nodes is represented in Figure 3

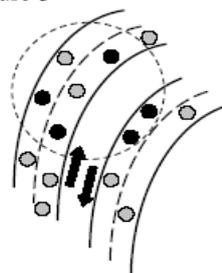


Figure 3: A node is surrounded by many malicious nodes and only one honest node

3. **Corrected:** A node detects a malicious node due to the data received from node that are in contradiction with the data of observations by honest nodes. Some nodes have the opportunity to correct the false messages, in addition to identifying the malicious node. An example of node surrounded by honest nodes and by some malicious node is represented in Figure 4.

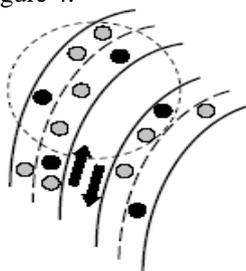


Figure 4: A node is surrounded by many honest nodes and only 3 nodes malignant

Techniques To Ensure Safety In VANET

As seen in [12], attacks on a VANET or its subnet can be varied and with different purposes. Such attacks could undermine the road system, potentially creating a hazardous situation for vehicles and passengers. To avoid this type of dangers is necessary for a safety system that allows preserving the accuracy of messages transmitted and consequently the safety of the passengers.

5.1 Requirements for achieving security

Data exchange in VANET is safe if meets the following requirements:

Authentication: authentication is required by sender's messages; so that response of the vehicles to roads events is based on messages from legitimate senders.

Consistency: in addition to authentication, it is necessary to check the consistency of the data. It may happen that the sender is found to be authenticated but the data are sent to be false.

Availability: It is necessary to have alternative forms of communication even in the presence of strong communication channels, for denial of service attacks (DoS) attacks in some cases can create serious problems in the operation of the network.

Identification: In case of accidents, must be identify the drivers of the vehicles in order to study the flow of data elapsed between vehicles and neighbours in times prior to the accident.

Privacy: The privacy of vehicles should be ensured as much as possible. It should be avoid the unauthorized control of users to the tracking the vehicle movements.

Real-time constraints: Due to the high mobility of vehicles in the network, one needs the ability to react in real time to various events.

Verification of the positions: It is a necessary to verify the data received from the GPS through their neighbour nodes, to avoid the attacks on GPS coordinates.

5.2 Properties of Security protocol in VANET

1. A vehicle V periodically sends messages of a hop length of every 300 ms (the minimum range is 110 meters and the maximum is 300meters)
2. The interval between messages is sent to every 100ms if the vehicles have low speeds or completely stop (10 miles / h ~ 16km / h)
3. Vehicles make decisions base on messages receive and send new message. For example, if a vehicle V receives a distress message from a vehicle W, V concludes that this danger also may include other vehicles in its time can send a warning message.

PREVENTING THE THREAT IN VANET

The received data must be authenticated and verified to ensure security for protecting data from both internal and external nodes. The packets exchanged sensitive data between the vehicles. The lack of such data that does not require any form of encryption, but only a few form of authentication. There are

two types of authentication mechanisms, symmetrical and asymmetrical. Public Key Identification (PKI) is used to verify the identity of a vehicle. The PKI is managed and controlled with competence. Heuristics method is used to determine the nature of the attacks and targets, in order to predict the possible effect of the network and nodes. In symmetric authentication based solutions add sensors. In the following sections we will discuss in detail these three authentication solutions. We will also study the various features by that application.

6.1 Asymmetric Authentication

There are several methods on safety in VANET and the possibility of using asymmetric authentication associated with digital signatures, certificates and public keys [13]. The digital signature may be the best possible solution in VANET since the safety messages sent in this kind of network typically stand-alone and have need to sent as quickly as possible. In fact, in VANET a hand-shake prior to a communication between nodes, may create an overhead is not acceptable to the entire system [14]. Moreover, the huge number of nodes of the network and the connection of these sporadic to authentication servers, makes the use of public key identification (PKI), the most suitable way to implement an authentication system [13]. Though security is a vital issue, a very few protocols proposed for safety and security purpose.

With the use of PKI, each vehicle is assigned a key pair (public / private) and a session key which provides efficient authentication. A vehicle, before sending a message about road safety must sign it with its private key and must include CA (Certification Authority) as follows:

$$V = * : M, \text{Sig}_{Pr_{K_v}}[M|T], \text{Cert}_v$$

- Where V= is the vehicle
- *=Sender indicates all recipients,
- M=is the message,
- Sig_{Pr_{K_v}} indicates the private signing of V,
- | = indicates the concatenation of messages,
- T=is the timestamp and
- Cert_v =indicates the public certificate of V.

The CA can be issued uniquely to each individual vehicle by a competent body. The receiver of the message must extract and verify the public key of V with the certificate and then use the certified public key to verify the signature of V. To perform these tasks, the receiver should be in possession of CA will have prior loaded. If the message is sent in a context emergency, it will be saved in an EDR (Event Data Recorder) so you can then make prospective investigation of an event that happened.

The use of keys for authentication

The use of private keys in VANET for transmitting message among vehicle is intended to arouse the interest of attackers. Attackers are interested in possession of the keys so you can send messages and sign them on behalf of other vehicles. Physical access to safety devices installed on vehicles shall be restricted to authorized personnel. The private key must be renewed periodically to further increase the security. In market

already have some commercial products which perform such task. Electronic ELP (Electronic License Plate) [15] issued by the administrative staff, or an ECN (Electronic Classic Number) issued by manufacturers of motor vehicles. These identities assigned to the vehicle, must be unambiguous and verifiable with controls by the competent authorities. A pair of keys anonymous fitted to preserve the privacy. This pair is a public / private key certified by the authentication authority, which does not contain information on the vehicle or its owner. Normally, every vehicle will be equipped with a set of keys anonymous set that will be able to prevent or control the tracking his movements. The ELP could also be installed by the authorities involved in the carriage on the vehicle, and the owner may periodically update the keys.

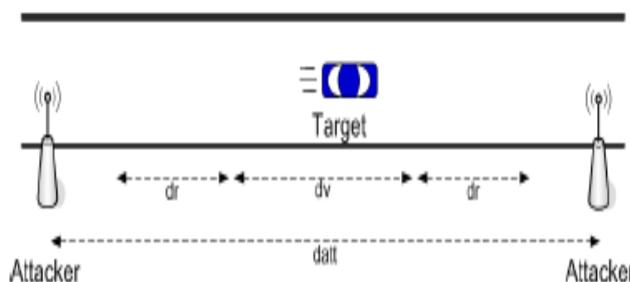
Certification and revocation of keys

Certifications, as mentioned above, can be attributed to government agencies (engine) or directly from manufacturers. It may happen, however, the need for the withdrawal of a key. Two scenarios that require the withdrawal of a key are as follows:

All cryptographic material of a car is compromised. To avoid overloading the network, the organization dedicated to the withdrawal sends a request for waiver to the receiving device of the vehicle. A particular vehicle key has been compromise. In this case sending a revocation for each key possessed by the vehicle would create a strong network overhead. In the literature [16] there are several options for the withdrawal but all have as a prerequisite a permanent connection to the control bodies. This condition is not satisfied in VANET. The use of certificates associated with keys of short duration, which at the expiration of the certificate the associated keys are cancelled. The system of certificates on the keys, however, requires a large storage capacity of data by vehicle; because the vehicles must replace their keys.

Analysis of the security provided by asymmetric authentication

It is need a verification of the data by the vehicles, to prevent network attacks from fogging techniques scenarios, false fog, and fake accidents and so on. This verification consists in comparing a node receives the data of neighboring nodes, in order to find a comparison of truthfulness. This technique is



known as the "correlation of data" [17]. The study of the correlations of the data makes

Figure 5: The identity of the attacker nodes attached keys

the system much more stable to external attacks. In addition, the correlations combined with the use of certificates, greatly reduce the types of attacks that can deliver to vehicular networks. As shown in Figure 5, the anonymity of the vehicle is vulnerable long distance. This means that even if the vehicle changes its key frequently in short distances, the attacker is able to correlate the keys of the vehicle with good probability of success along the distance.

Implementation issues for asymmetric authentication

The size of the keys anonymous should be small so as reduce the space required for storing them on vehicles. On the other hand, the duration of the certificate should be short, so minimize the window of vulnerability in the case of public / private key compromised.

Duration of the certificate

Each anonymous key should be used only in a consecutive sequence of messages and for a limited time. The attacker would be able to seize it and may extract information from this key at other valid times. A certificate should last about one day in order to limit possible damage from correlations. The duration of a certificate is also a function of the path traveled by the vehicles. The longer route will take longer duration of the certificate. The different durations of certificates arise from the need to try to reduce the number of keys circulating in the network. For example, if a vehicle did long trips, the use of certificates in the short term lead to a continuous flow of keys in the network and therefore more exposure to security risks. The number of these circulating keys would be reduced considerably, if the duration is a day or more. The opposite case, if a vehicle did short trips, a certificate to long-term exposes to security risks the vehicle. In fact, if the key had been intercepted and corrupted by an attacker, this could use it for the duration of its validity.

6.2 Symmetric Authentication

There are many proposals based on asymmetric authentication, the application of symmetric encryption to VANET is quite rare. One explanation for the low use of symmetric encryption is due to the low flexibility of its use. A study on symmetric

encryption is discussed in [18]. Authors make use of fixed infrastructure that performs authentication and message store. As mentioned previously, even though the system of symmetric-key encryption is less flexible than asymmetrical, in many aspects, for messages small size, this system requires less computing power and is more resistant to attack by crypto analysis. These two features are very attractive to VANET. In VANET the exchange of messages between vehicles must be carried out in the shortest possible time, also one must try to reduce as much as possible the loss or duplication of packets. The symmetric encryption in this case brings a benefit to the system since the calculation operations for encryption of each package are minimal. Other advantages of the solution with respect to that asymmetric symmetric encryption are:

There is no need to keep the current public key infrastructures (PKI) certification, which were reached at times with BS, something that is required for asymmetric authentication. No need to establish connection link between vehicle and CA .No need to establish connection link between vehicle and CRL (Certificate revocation list).

A. Network model with symmetric encryption

The authenticity problem in VANET can be solve in two different ways vehicle to vehicle and vehicle thought as Hybrid model and Opponent. Now we explain the characteristics of malicious nodes in detail. Hybrid Model consists of vehicle to vehicle and vehicle to infrastructure type VANET. It would be difficult to create a hybrid network with no infrastructure and no monitoring body as the mobility of vehicle is high that certificate various transmitter vehicle. We classify VANET in two types vehicle to vehicle and vehicle to infrastructure. We need a synchronize system between vehicle and Infrastructure. An attacker has the ability to listen to all messages in transmission in a communication channel, compromise a node, to launch attacks in the node. A node compromise is usually disabled or used as a communication bridge for other attacks. These systems are used in a variety of contexts such as e-marketing. The anonymous routing techniques that attempt to provide anonymity to the nodes. This model is used in a system of storage and verification from third parties of the real identities of the nodes and their associated aliases.

B. Digital Signature:

Digital signatures applied to end-to-end, hop-to-hop to protect the routing message from being tampered by malicious nodes, and assistant to backward evaluation mechanism. Another part of the evaluation mechanism is forward evaluation mechanism. It mainly used to detect the drop-malicious nodes. The main idea of the solution is that the problem which the cryptosystem can't deal with has been solved, such as drop packets to ruins the efficiency of the routing protocol.

Conclusion

In this paper, we demonstrated the need for security in vehicular networks (VANETs), and why this problem requires a specific approach. When talking about the security aspect of VANETs we encounter some major problems that are discussed in this paper. The first problem would be that there is a privacy problem. Secondly, we discuss about authenticity which also take into consideration. The main purpose of a VANET which is the creation of efficient traffic condition for that we need a secure network. Road side units, trust components, privacy and many aspects have to be discussed in this papers in order to create a complete picture of this problem regarding VANETs. Attackers can become an important part in VANETs if the security aspect of these type of network is not analyzed correctly. The goal of this paper is to avoid the situations like in those in which the attacker becomes more important due to the information he sends to the other participants of the VANET. As the privacy protection in VANET is necessary to keep the confidentiality of the routing message and data and the routing scheme needs to adjust parameter to optimize the network performance.

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Usage of Oobleck as a Packaging Material

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Abstract-Oobleck is a non-Newtonian fluid made of cornstarch and water, easily made and biodegradable. The aim of this research article is to evaluate the performance of Oobleck as a packaging material and compare it with Polyethylene, the most common packaging material in use today. To compile this article, a review of literature in the field of packaging material was done, leading to the design and realization of a simple experiment to make a comparison. The result indicates that Oobleck may possess better packaging shielding than the conventional methods of packaging.

Index Terms- Non Newtonian Fluids, Oobleck, Polyethylene, Packaging

I. INTRODUCTION

Pressure in all areas of industry to try to reduce the environmental impact of products has pushed forward the development of new materials for manufacturing, but also for packaging and product protection purposes. A much used material in this field is Polyethylene (PE). The usage of fluids as packaging material is not very common in the industry. In an attempt to propose an alternative to this, the authors suggest the use of Oobleck as a protective packaging material, from the observation of the non-Newtonian fluid properties, and its successful use in the sport padding industry. Depending on the kind of fluid used, they might be easier to obtain, biodegradable, and reduce the use of plastic products derived from oil. Cost can be reduced as well. A Non-Newtonian fluid has the property that the viscosity is a function of other parameters beside the temperature. One of these parameters can be the shear rate applied to the fluid. In some special case of the non-Newtonian fluids called shear thickening, the viscosity increases up to the point that the fluid behaves as a solid when a high shear rate is applied. Then, the energy in the fluid gets dissipated trying to break into the inner part of the fluid. In a packaging application, this property might be interesting, as the fluid dissipates high impacts on the product being protected [1].

II. THEORY

Packaging is the science of enclosing or protecting products while they are distributed, stored or used. Film packaging, plastic boxes, Thermocol packaging, textile packaging and foam packaging are common types of packaging. Almost all the products that are to be used in our everyday life involve packaging. Damage of goods can happen for various reasons. These include inappropriate packaging, incorrect or faulty materials or mishandling of packages.

The major necessity of egg packaging is the protection of the eggs by prevention of eggshell breakage. The main reason for egg breakage is too much pressure on the shell of the egg. It is

a common fact that more eggs are broken during egg transportation than any other step during processing and distribution [2].

In the packaging industry, packages are subjected to a well-defined computer-simulated vibration test on an electrohydraulic test machine. A.C.Seydim and P.L.Dawson made a research study on the packaging effects on shell egg breakage rates during simulated transportation [3]. Shell eggs are usually packaged in so called egg cartons made from either expanded polystyrene (EPS) foam or molded paper pulp (MPP). During transport these are usually bulk packaged in either polypropylene crates or corrugated boxes. When cartons were packed in 15-dozen corrugated boxes, no significant difference was found in total eggshell damage rates between the MPP carton and the EPS carton. However, when eggs were packed in 15-dozen plastic crates, there were more eggshell damages in the EPS cartons than the MPP Cartons.

Nethercote et al. in 1974 [4] also compared the molded pulp and foam cartons in corrugated boxes arranged in different configurations. They also assessed their individual protective properties using different laboratory procedures. From their results, it was evident that crossed tiers of cartons protected eggs better than cartons all aligned in the same direction. Furthermore, they concluded that the carton design was more important than material in determining the relative protective ability. Roland in 1988 [5] estimated that the percentages of cracked eggs at final destination (retail store) ranged from 5% to 7%. This result is not only due to poor eggshell quality but also to the protective quality of egg packaging.

Egg was chosen as the test subject, since it would be easy to see the damages if any. In all the above cited background study, it was found that careful attention needs to be paid while packaging egg. Also, it was evident that packaging in different configurations also affects the credibility of the shell damages. A new kind of packaging material which focusses on lesser production time was investigated with the result being the usage of Oobleck as packaging material. Oobleck is produced by mixing water with cornstarch. Both components are cheap and easy to find. One important advantage of Oobleck is that it is non-toxic so it can be used in the food industry. Oobleck is also environmentally friendly since it is biodegradable.

III. NON NEWTONIAN FLUIDS

Already in the 17th century Sir Isaac Newton described how liquids behave; they all have a constant viscosity which means that the behavior changes depending on temperature and pressure. Some fluids however have been found to not follow these basic rules, hence the name non-Newtonian fluids [6]. Newtonian fluids change the viscosity under stress. The sudden change of stress can change the fluid thickness or in some cases it gets thinner. Several different kinds of non-Newtonian fluids exist [7].

Rheopectic and Thixotropic both exhibit the same behavior, when exposed to stress or a force is applied for an extended period, the fluid changes its viscosity. A rheopectic fluid thickens under constant stress. An example of this is cream, when you whip it, it gets thicker. A thixotropic on the other hand shows the opposite behavior, when force is applied the fluid gets runnier. Dilatant and pseudo-plastic fluids both have in common that under stress (for a short period) the viscosity changes. When the force is removed the viscosity changes back to normal. The dilatant is shear thickening, which means that when a force is applied the fluids viscosity immediately increases. This property may make it attractive as a packaging protection material since the force exerted on the fluid is distributed over the whole surface, meaning that the pressure is lower. Example of this is Oobleck, which is subject to the test presented in this article.

Pseudoplastic is the opposite to dilatant, shear thinning. This fluid gets runnier as more force is applied to it. One example of this can be found in kitchen; Tomato ketchup is pseudoplastic, when shaking the bottle the fluid changes its viscosity and can flow through the bottle Oobleck is a common example of a dilatant fluid, and it is also easy and cheap to make. Our goal is to demonstrate the possibilities for shear thickening fluids, using this as an example. This fluid presents the following advantages in our experimental setup:

- Instructions on how to make it are available online easily.
- The materials required to create it are available in any convenience store.
- The cost of making a lot of this material is small.
- Oobleck behaves similarly to other shear thickening fluids.

The following research question thus emerged in need for further investigations?

How much can a biodegradable non-Newtonian fluid like the Oobleck outperform a standard used polyethylene cushion?

IV. TEST METHODOLOGY

The experiment is a drop test of an egg. The test is performed to compare three different materials, Oobleck, Polyethylene and a normal egg carton.

A. Oobleck

The name Oobleck is inspired from Dr. Seuss children's book - Bartholomew and the Oobleck, where Bartholomew had to protect his kingdom from the sticky fluid Oobleck. The basic recipe for this fluid is cornstarch and water. The small particles in cornstarch repels each other slightly which makes the fluid float normally but when a sudden force is applied the small repulsing force is overcome and the particles now stick together, making the fluid hard. As the force dissipates the particles repels each other and the fluid becomes normally floating again.

B. Polyethylene

Polyethylene foam is widely used as packaging material due to its shock absorbing properties. Other good properties which make polyethylene classify as packaging material is its ability to absorb vibrations and the fact that it is lightweight.

V. EXPERIMENT

The research is based on experimental method under a quantitative approach which allows:

- General validation of the hypothesis
- Numeric measurement of variables
- Repeatability of the results
- Objective analysis

The experiment is only performed in order to see if a 5mm packaging of Oobleck can be able to prevent the damage of Egg or not. Egg was chosen as the test material, since it is a very delicate material and any damage shall be easily observable. A review of relevant literature in the area of packaging and testing was performed in order to understand whether other studies using similar procedures and materials to the ones we are proposing have been performed or not. The experiment was performed by dropping an egg, enclosed in the material to be tested, from a specified height. This made easier to assure that the energy applied to each execution was the same. The egg was then checked for breaks, if the egg is still intact, the test is repeated at more height. For each drop a mark of break/no break was logged. Successive tests for each material start at the last good height (where the egg did not break). The test was performed with three different materials namely Oobleck, Polyethylene and a normal egg carton. Egg cartons were chosen as they are the normal way to transport eggs. Polyethylene was chosen since it is a major material for packaging in the world [8].

Oobleck was enclosed by placing 30cl of liquid in a 1 liter bag. Then another bag containing a single egg was placed inside the first bag. The egg is positioned in the center of the first bag and the openings strapped together. Figures 1 show the setup for Oobleck. The bag was dropped by holding where the bag is closed.



Figure 1: Test setup for Oobleck.

Since the polyethylene is not a liquid, the setup was a bit different. The polyethylene material was wrapped around the egg, so as to form a protective shell, and glued with duct tape. Figure 3 show the setup.



Figure 2: Test setup for Polyethylene.

In order to be able to test one egg at a time, we had to make some adjustments when testing the egg carton. By placing plastic bags with the approximate weight of a large egg (65 grams) in place of the other eggs, we made sure the weight distribution was correct.



Figure 3: Test setup for egg carton.

Three tests were performed per each material. The first test was performed from a low height. The subsequent tests were performed from the last good drop in the previous test. The motivation is that the dropping may affect the structural integrity of the egg and therefore the reliability of the results. Small cracks can be produced when hitting the ground making the egg breakage more likely in the next droppings. Starting the test from the last good drop eliminates the problem.

VI. RESULTS

The results of the experiment are shown in Figure 5. The Y-axis represents the height at which the eggs wrapped in the packaging material are dropped. The X-axis represents the different tests performed with the packaging materials.

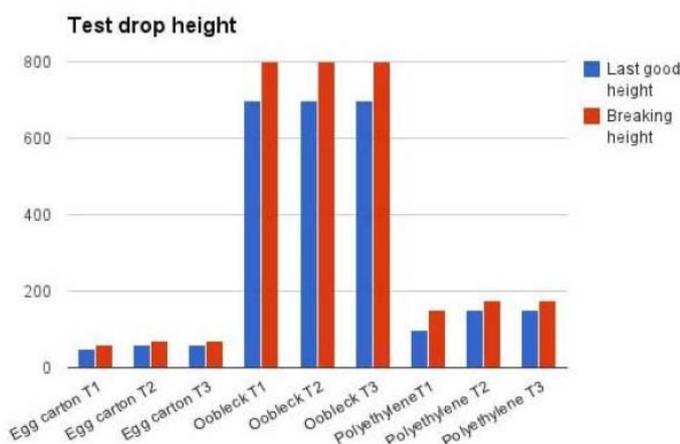


Figure 4: Test Results

The result of the test is that the carton package withstands a 0.6m drop. The Polyethylene package has an improved performance resisting a drop from 1.5 meters. The best packaging material is the Oobleck with an outstanding height of 7 meters.

Table 1: Heights withstood by the materials

Material	Height
Polyethylene	1.5 m
Oobleck	7.0 m
Egg Carton	0.6 m

The Oobleck package withstood a 7 meters drop whereas the egg carton package withstood 0.6 meters drop which represents an improvement in the performance of 6.4 meters or 1066%.

VII. ANALYSIS AND DISCUSSION

Initially, our hypothesis was that the Oobleck package would protect the egg better than the egg carton. However, we did not

expect the comparison test to result in the large difference in performance as it did. Especially considering that the setup for this experiment consists of no special packaging design, just regular bags filled with the solution. In several of the tests with Oobleck, the bag broke before the egg. This might lead future tests to discover the influence of the container in the protection level of the egg, because it seems that it could be possible to get an even better performance when considering design parameters for the container [9].

There are several theories that can be used to explain the superior performance of Oobleck in this experimental setting. One of them, states that shear thickening fluids at a molecular level, are two-phase suspensions that dissipate energy when submitted to shear stresses through the flow of the liquid phase between the molecules of the solid state. When a high shear rate is applied, the solid phase molecules are rearranged closer between each other, thus making more resistance for the flow of the liquid phase of the suspension. This results on a fast rise of the viscosity, until a certain point where the fluid stops acting as such and behaves like a solid [10].

Another hypothesis that tries to explain this is presented in [11] by Boersma, Laven & Stein. The aforementioned authors define a critical shear rate that defined the behavior of the fluid in terms of the molecular interaction in it. If the shear rate is below this critical shear rate value, repulsive force between particles will maintain an ordered structure in the fluid. When the shear rate applied is above the critical shear rate, these repulsive forces are counteracted, forcing them into an irregular, disordered state, which in the end is what causes the increase in viscosity. For the purposes of this report, the first hypothesis is better to explain the resultant phenomena, because it not only describes the behavior of the fluid, but also the energy dissipation.

In this testing there are several limitations that might affect the results and it is suggested to improve these in order to carry on more investigation in this topic. The first limitation is the type of PE that was used for testing. Despite it is PE, it's a slightly different version of the material commonly used for packaging applications. The second limitation is the container of the egg in the tests, which is a standard 1 liter plastic bag. As it was previously mentioned, the quality of the container should be improved, so this doesn't affect the results. Also the number of test samples should be substantially increased, in order to be able to get more reliable data. The result in this study indicates that Oobleck may outperform standard packaging materials.

Literature shows that there are several steps that Oobleck need to go through to become widely implemented as a new packaging material. There are five main bullets in the general framework presented by Azzi, Battini and Sgarbosa [10] which need to be considered when developing this material as a packaging solution. These are: Safety, Marketing and Communication, Logistics, Sustainability and Ergonomics.

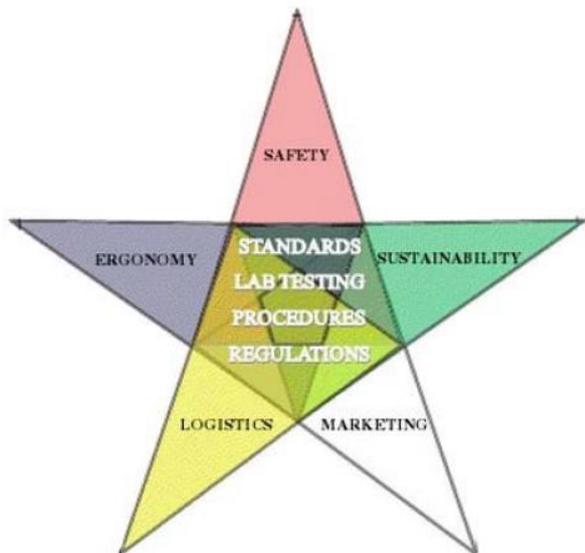


Figure 5: Roadmap for packaging design studies and research

These will define the processes and tests defined for the material before its implementation. In the next figure a diagram developed by the aforementioned authors is shown. These bullets won't be addressed in depth, since it escapes the scope of our research, but it is shown as a reminder for future work in this topic to further develop.

VIII. APPLICATION IN INDUSTRY

Once we concluded that Oobleck can be used as a packaging material, the main challenge was regarding the incorporation of Oobleck in packaging industry. The experiment was conducted just to see if Oobleck has a better packaging capability with regards to Egg. We noted that if the material is to be covered around with Oobleck in 5 mm thick layer of plastic, we could achieve the desired protection. For the same protection, we might need to implement more volume of paper or polyethylene, which is not currently practiced in the industry. Should the industry stick with the current allowances of packaging material thickness, then Oobleck might be a good solution.

The Design of the proposed packaged material shall look like the commercially available egg carton (with some modifications). The outer layer will be paper like the commercially available ones while the inner layer will be a polyethylene plastic cover. A 5mm layer of Oobleck will have to be sandwiched between these two layers. Although the new design will be comparatively heavier, it is assured that material won't be damaged. Since the cost of making Oobleck is very minimal, only a slight increase in packaging cost will be observed.

IX. CONCLUSION

Despite the successful usage of Oobleck in similar applications [12] and the fact that our initial test results have proven that the properties of Oobleck are excellent for protective packaging usage, further investigations from other authors show that this is only the first step when conceiving and implementing the material as a packaging solution. Although in order to be implemented in packaging industry there needs to be further tests that has to be carried out for qualification, it is to be noted that by further modifying the package setup, we can design the

optimal packaging layer for the corresponding content. Though we might be adding to the cost, we can rely on the fact damages in the material enclosed won't be occurring.

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Design and Implementation of Flexible Arbiter for DDR SDRAM Memory Controller to Support 9 Arbitration Schemes on FPGA

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Abstract- As fabrication technology continues to improve, smaller feature sizes allow increasingly more integration of system components onto a single die. Communication between these Components can become the limiting factor for performance unless careful attention is given to designing high performance Arbiter. Amongst various components on the device, a high-performance arbiter has to be design which decides the bus grant signal to component.

In this Project, we propose the design and implementation of a flexible arbiter for the DDR SDRAM Memory Controller to support three priority policies: 1) fixed priority, 2) round robin, and 3) dynamic priority and three data multiplexing modes 1) transfer, 2) transaction, and 3) desired transfer length. In total, there are nine possible arbitration schemes. The proposed arbiter, which is self-motivated (SM), selects one of the nine possible arbitration schemes based upon the priority-level notifications and the desired transfer length from the masters so that arbitration leads to the maximum performance. Along with the design of memory controller to provide proper commands For SDRAM initialization, read/write accesses and memory refresh.

DDR SDRAM uses double data rate architecture to achieve high-speed data transfers. DDR SDRAM (referred to as DDR) transfers data on both the rising and falling edge of the clock. This DDR controller is typically implemented in a system between the DDR and the Processor units.

I. INTRODUCTION

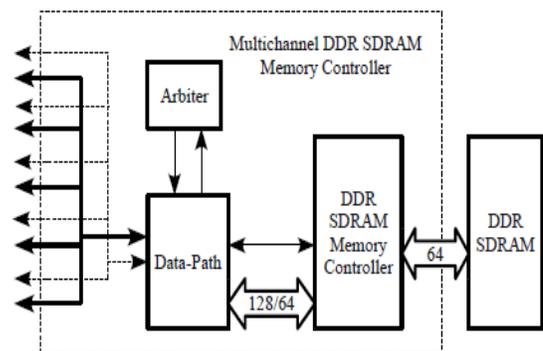
As the era of a billion transistors on a single chip fast approaches, more Processing Elements (PEs) can be placed on a System-on-a-Chip (SoC). Most PEs in a SoC communicates with each other via buses and memory. As the number of bus masters increases in a single chip, the importance of fast and powerful arbiters commands more attention. Especially, a fast arbiter is one of the most dominant factors for high performance many systems exist in which a large number of requesters must access a common resource.

An arbiter is required to determine how the Resource is shared amongst the many requesters. When putting an arbiter into a design, many factors must be considered. The interface between the requesters and the arbiter must be appropriate for the size and speed of the arbiter. Interfacing to an arbiter can appear very straight forward at first. The requester sends a request (req) signal, and the arbiter returns a grant. However, as the timing

margin of the design is tightened, some modifications to this interface may be necessary.

II. ARCHITECTURE OF DDR SDRAM CONTROLLER

This Architecture consists of three main blocks 1). Arbiter 2).Data path 3).DDR SDRAM Memory Controller

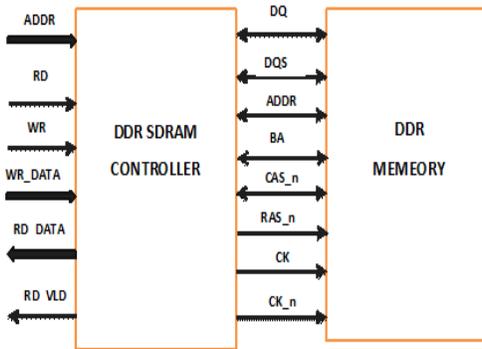


DDR SDRAM memories provide only one bus for data transfers, thus it is necessary a multichannel memory controller, whose purpose is to guarantee Quality of Service (QoS) between the processing units accessing external memory. The controller needs to provide fast access per missions to read or write shared data during the decoding process. It also needs to split the available data channel bandwidth in order to guarantee real time decoding by providing the necessary bandwidth that each PU need for their data requirements.

The implemented multichannel DDR SDRAM memory controller is divided in an arbiter module, a data path module and a DDR SDRAM memory controller, implemented as an IP. It is not a new design, but an extension of the multichannel memory controller implemented.

If a PU A needs to access memory, it sends an access Request. Arbiter then decides, according to a policy, if A will have the channel assigned to it or not. If arbiter decides to assign the channel to A, it verifies if there is another PU B accessing memory and asks it to leave. When B leaves, arbiter sends a permission signal back to A, indicating that A can access memory. All accesses and permissions signals goes through data path, that provides an interface communication for PUs and arbiter to communicate.

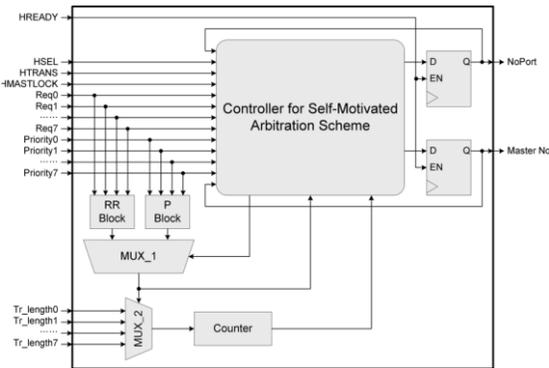
TOP LEVEL BLOCK DIAGRAM OF CONTROLLER



PIN DESCRIPTION:

- DEV_RDY : device ready
- RD : READ Signal
- RD_data : read data
- RD_VLD : read valid signal
- WR : write signal
- WR_data : write data
- clk : clock
- Dq : data bus
- Dqs : data strobe bus
- Addr : address bus
- ba : bank address
- Ras_n : row address strobe RAS
- Cas_n : column address strobe CAS

ARBITER SCHEMES:



Our SM arbitration scheme has the following advantages: 1) It can adjust the processed data unit; 2) it changes the priority policies during runtime; and 3) it is easy to tune the arbitration scheme according to the characteristics of the target application. Hence, our arbiter is able to not only deal with the transfer-based fixed-priority, round-robin, and dynamic-priority arbitration schemes but also manage the transaction-based fixed-priority, Round robin, and dynamic-priority arbitration schemes. Furthermore, our arbiter provides the desired-transfer-length-based in total, there are nine possible arbitration schemes. The proposed arbiter, which is self-motivated (SM), selects one of the nine possible arbitration schemes based upon the priority-level

notifications and the desired transfer length from the masters so that arbitration leads to the maximum performance.

The input stage is responsible for holding the address and control information when transfer to a slave is not able to commence immediately. The decoder determines which slave that a transfer is destined for. The output stage is used to select which of the various master input ports is routed to the slave. Each output stage has an arbiter. The arbiter determines which input stage has to perform a transfer to the slave and decides which the highest priority is currently.

Round robin schemes:

The Round Robin Arbiter (RRA) is a building block for many applications. In particular, it is a crucial building block for high-speed network switches/routers. For instance, when inputs of a network switch are competing for the usage of the switch to send traffic to their respective outputs, Round Robin-based sophisticated arbitration schemes, such as Islip, Ping-Pong Arbitration or DRRM are used for fair sharing of switch bandwidth between inputs.

A round-robin token passing bus or switch arbiter guarantees fairness (no starvation) among masters and allows any unused time slot to be allocated to a master whose round-robin turn is later but who is ready now. A reliable prediction of the worst-case wait time is another advantage of the round-robin protocol. The worst-case wait time is proportional to number of requestors minus one. The protocol of a round-robin token passing bus or switch arbiter works as follows. In each cycle, one of the masters (in round-robin order) has the highest priority (i.e., owns the token) for access to a shared resource. If the token-holding master does not need the resource in this cycle, the master with the next highest priority who sends a request can be granted the resource, and the highest priority master then passes the token to the next master in round-robin order

Priority arbiter schemes:

One common arbitration scheme is the simple priority arbiter. Each requester is assigned a fixed Priority and the grant is given to the active requester with the highest priority. For example, if the request vector into the arbiter is req [N-1:0], req [0] is typically declared the highest priority. If Req [0] is active, it gets the grant. If not, and req [1] is active, grant [1] is asserted, and so on. Simple priority arbiters are very common when choosing between just a few requesters. For example, a maintenance port may always be lower priority than the functional port. ECC corrections may always be higher priority than all other requests.

Priority arbiters are also often used as the basis for other types of arbiters. A more complex arbiter may reorder the incoming requests into the desired priority, run these scrambled requests through a simple priority arbiter, and then unscramble the grants which come out. Several examples of this can be seen in the round-robin arbiters.

III. SELF MODE ARBITER SCHEMES

The SM arbitration scheme is achieved through iteration of the aforementioned steps. Combining the priority level and the desired transfer length of the masters allows our arbiter to handle

the transfer-based fixed-priority, round-robin, and dynamic-priority arbitration schemes (abbreviated as the FT, RT, and DT arbitration schemes, respectively), as well as the transaction-based fixed-priority, round-robin, and dynamic-priority

arbitration schemes (abbreviated as the FR, RR, and DR arbitration schemes, respectively). Moreover, our arbiter can also deal with the desired-transfer-length-based fixed-priority, round-robin, and dynamic-priority arbitration schemes (abbreviated as the FL, RL, and DL arbitration schemes, respectively).

The transfer- or transaction-based arbiter switches the data transfer based upon a single transfer (burst transaction), and the desired-transfer-length-based arbiter multiplexes the data transfer based on the transfer length assigned by the masters.

22 bits Address bus:

We use part of a 22-BIT address bus of the masters to inform the arbiters of the priority level and the desired transfer length.

MSB					LSB	
21	-	18	-	15	-	2
19		16		12		1-0

Bits (1 : 0) = bank selection

input	Bank selection
0 0	Bank 0
0 1	Bank 1
1 0	Bank 2
1 1	Bank 3

Bits (11:2) = address bits

Bits (15:12) = transfer length

Bits (18:16) = priority level

Bits (21:19) = indicate master number

Fixed priority arbitration schemes:

The smaller the priority level number, the higher the priority level. In the fixed-priority arbitration schemes, each master has a static priority. In transfer-based arbitration, however, the transfer length is allocated as 1, indicating a single transfer; in transaction-based arbitration, the transfer length is equal to the 8, which refers to the transaction type (transfer). In addition, the transfer length for the desired-transfer-length-based arbitration is allotted by the demand of each master.

Three schemes:

- 1) Fixed priority Transfer based(FT)
- 2) Fixed priority transaction based(FR)
- 3) Fixed priority length based(FL)

Round Robin arbitration schemes:

A round-robin token arbitration guarantees fairness (no starvation) among masters and allows any unused time slot to be allocated to a master whose round-robin turn is later but who is ready now. A reliable prediction of the worst-case wait time is

another advantage of the round-robin protocol. The worst-case wait time is proportional to number of requestors minus one. The protocol of a round-robin works as follows. In each cycle, one of the masters (in round-robin order) has the highest priority for access to a shared resource. If the master does not need the resource in this cycle, the master with the next highest priority who sends a request can be granted the resource in round-robin order.

Three Schemes:

- 1) Round robin Transfer based(FT)
- 2) Round robin transaction based(FR)
- 3) Round robin length based(FL)

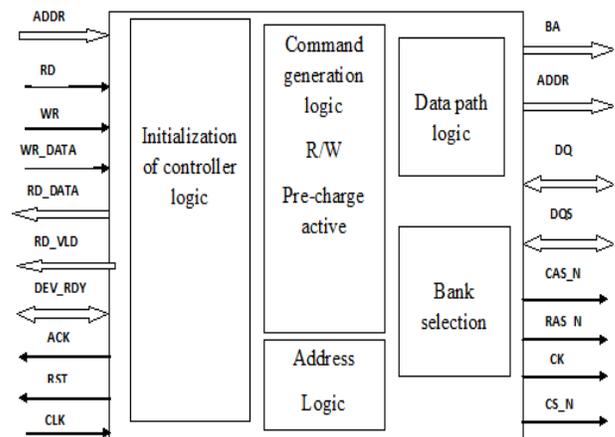
Dynamic arbitration schemes:

Fixed-priority arbiter has to choose among input requests with predefined hardware coded priority values. In a dynamic priority arbiter, each input channel carries requests with priority values. The dynamic priority arbiter performs comparisons and grants the active requests with the highest priority value.

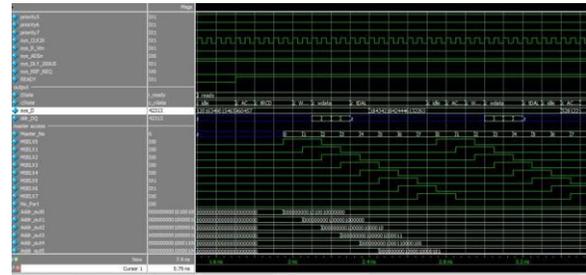
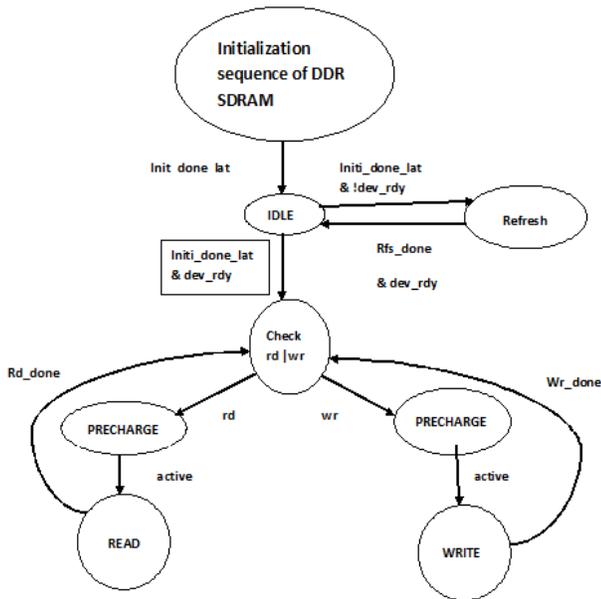
Three Schemes:

- 1) Dynamic Transfer based(FT)
- 2) Dynamic transaction based(FR)
- 3) Dynamic length based(FL)

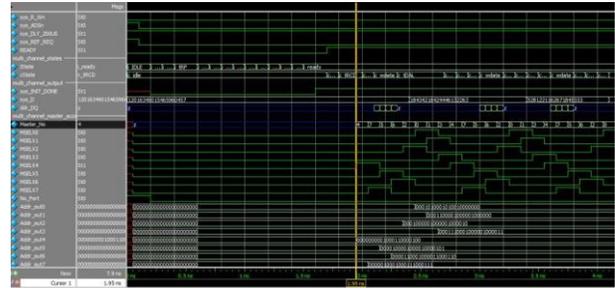
Inner block of memory controller:



FSM of memory controller:

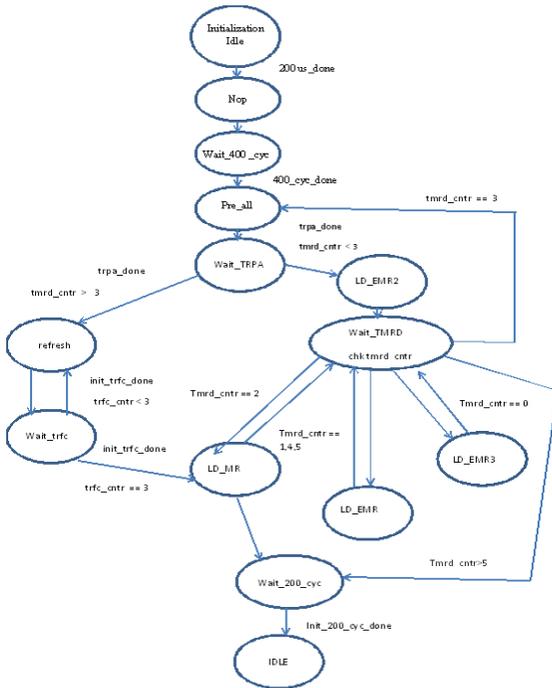


Priority scheme simulation wave form:



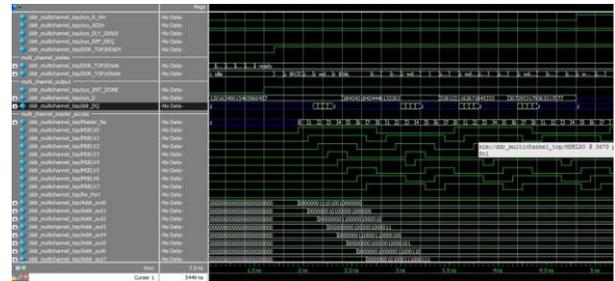
Dynamic scheme simulation wave form:

Initialization FSM of controller:



IV. SIMULATION AND RESULT

Round robin simulation wave form:



V. CONCLUSION

In this paper, we proposed a flexible arbiter based on the SM arbitration scheme for the ML-AHB bus matrix. Our arbiter supports three priority policies-fixed priority, round-robin, and dynamic priority-and three approaches to data multiplexing-transfer, transaction, and desired transfer length; in other words, there are nine possible arbitration schemes. In addition, the proposed SM arbiter selects one of the nine possible arbitration schemes based on the priority-level notifications and the desired transfer length from the masters to allow the arbitration to lead to the maximum performance.

VI. FUTURE SCOPE

For future work, we feel that the configurations of the SM arbitration scheme with the maximum throughput need to be found automatically during runtime.

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Calcifying fibroblastic granuloma- A rare case report

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Abstract- Calcifying fibroblastic granuloma is a relatively rare gingival overgrowth that is considered to be reactive rather than neoplastic in nature. It is a benign fibro-osseous lesion of the jaws consisting of cellular fibroblastic tissue containing rounded or lobulated masses of calcified cementum like tissue. In this article, we present a case of 32 year female with an intra oral swelling on the labial aspect of 32 & 33, appearing to originate from the marginal gingiva & interdental papilla. The swelling was sessile, mobile, non-tender, firm in consistency with an irregular surface. The colour of the gingiva was normal with slight ulceration. The swelling was excised & sent for histopathological examination. Based on clinical, radiologic and histopathologic findings a final diagnosis of calcifying fibroblastic granuloma was made.

Index Terms- excision, calcification, flap, granuloma

I. INTRODUCTION

Calcifying fibroblastic granuloma has been described by various synonyms such as peripheral ossifying fibroma, peripheral odontogenic fibroma with cementogenesis, peripheral fibroma with osteogenesis, peripheral fibroma with calcification, fibrous epulis, etc.¹ Dental calculus, plaque, microorganisms, dental appliances, and restorations are considered to be the irritants triggering the lesion.² It occurs exclusively on the gingiva as a nodular mass, either pedunculated or sessile, that usually emanates from the interdental papilla. It has also been reported that it represents a maturation of a pre-existing pyogenic granuloma or a peripheral giant cell granuloma.³ The color ranges from red to pink, and the surface is frequently, but not always ulcerated. It is a localized reactive enlargement of the gingiva that typically measures less than 1.5cm in size.⁴ It is one of the several common reactive hyperplastic inflammatory lesions of the gingiva. It occurs approximately 2 to 4 times more frequently in females than in males⁵, most often between the ages of 25 to 35 years.⁶ A case of calcifying fibroblastic granuloma in the mandibular gingiva of a 32 year old female patient is described here.

II. CASE REPORT

A 32 year old female patient reported to the OPD of Department of Periodontics, Rungta Dental College with a chief complaint of swelling in lower front tooth region since last nine months. The swelling was associated with mild pain on digital pressure. History revealed that the lesion started growing on its own since she first noticed it about nine months back when it was

a small nodule. The patient also complained of bleeding on brushing in that area. Intra-oral examination revealed a solitary sessile oval lesion on the labial interdental papilla and adjacent marginal gingiva of 32 and 33 (Fig 1).



Fig 1: Pre-operative

The lesion was reddish pink in colour and measured about 5 by 9mm. It was seen to be extending till the middle third of coronal portion of 32 and 33. There was no significant medical and familial history.

Radiographic examination revealed widening of periodontal ligament space with thickening of lamina. Complete hemogram was performed which showed all blood counts to be within normal limits. After obtaining informed consent, the patient was scheduled for full mouth scaling. After one week excisional biopsy of the growth was done (Fig 2) and the excised mass was sent for histopathological examination (Fig 3).



Fig 2: Excisional biopsy done



Fig 3: Excised mass measured

This was followed by flap reflection and thorough debridement (Fig 4) to prevent recurrence. Sutures were placed and periodontal dressing was given. Patient was called after 15 days; healing was uneventful (Fig.5). Oral hygiene instructions were reinforced; patient is still under follow-up.



Fig 4: Flap reflection and debridement done



Fig 5: Post-operative

III. HISTOPATHOLOGY

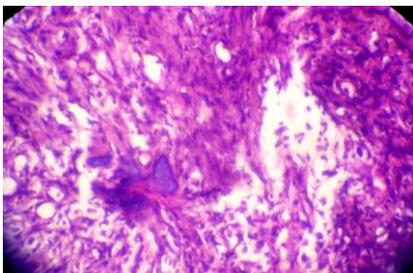


Fig 6: Histopathological picture

Histopathological examination of the specimen revealed parakeratinized stratified squamous epithelium. Underlying connective tissue stroma is fibrocellular and bony trabeculae formed in the central portion. Fibro-cellular connective tissue

revealed spicules of bone formation and high degree of cellularity where the cells were found to be plump and active. Also, there is presence of curvilinear trabeculae and spheroidal calcifications. Trabeculae is lined by osteoblast and few trabeculae with reversal line and calcification. All these findings were suggestive of calcifying fibroblastic granuloma (Fig 6).

IV. DISCUSSION

The present case is a rare case of calcifying fibroblastic granuloma which mainly occurs as a reactive lesion. It has been suggested that calcifying fibroblastic granuloma represents a separate clinical entity rather than a transitional form of pyogenic granuloma, peripheral giant cell granuloma or irritation fibroma.³ Many authors suggest similar sex and site predilection for calcifying fibroblastic granuloma, pyogenic granuloma, peripheral giant cell granuloma and a similar clinical and histological features. They opined that these lesions could simply be varied histological responses to irritation.⁵ However, **Gardner**⁷ stated that cellular connective tissue of calcifying fibroblastic granuloma is so characteristic that a histological diagnosis can be made with confidence, regardless of the presence or absence of calcification.

Though the etiopathogenesis of calcifying fibroblastic granuloma is uncertain, an origin from cells of periodontal ligament has been suggested.⁸ The reasons for considering periodontal ligament origin for calcifying fibroblastic granuloma include excessive occurrence of calcifying fibroblastic granuloma in the gingiva (interdental papilla), the proximity of gingiva to the periodontal ligament, and the presence of oxytalan fibres within the mineralized matrix of some lesions. Excessive proliferation of mature fibrous connective tissue is a response to gingival injury, gingival irritation, subgingival calculus or a foreign body in the gingival sulcus. Chronic irritation of the periosteal and periodontal membrane causes metaplasia of the connective tissue and resultant initiation of formation of bone or dystrophic calcification. It has been suggested that the lesion may be caused by fibrosis of the granulation tissue.⁹

Treatment requires proper surgical intervention that ensures deep excision of the lesion including periosteum and affected periodontal ligament. Thorough root scaling of adjacent teeth and/or removal of other sources of irritants should be accomplished. Early recognition and definitive surgical intervention result in less risk of tooth and bone loss.¹⁰ Although calcifying fibroblastic granuloma is a benign, reactive lesion, the recurrence rate is fairly high. Therefore, the patient is still on regular follow-up.

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The Study on Data Warehouse Design and Usage

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Abstract- Data ware housing is a booming industry with many interesting research problem. The data warehouse is concentrated on only few aspects. Here we are discussing about the data warehouse design and usage. Let's look at various approaches to the data ware house design and usage process and the steps involved. Data warehouse can be built using a top-down approach, bottom – down approach or a combination of both. In this research paper we are discussing about the data warehouse design process.

Index Terms- Analysis, Data Warehousing, Data Warehouse Design, Process.

I. INTRODUCTION

Before we seen the design process, let's we seen about what is data warehouse? Think of a data warehouse as a central storage facility which collects information from many sources, manages it for efficient storage and retrieval, and delivers it to many audiences, usually to meet decision support and business intelligence requirements. "What is the need of data warehouse? What goes into a data warehouse design? How are data warehouse used? How do data warehousing and OLAP relate to data mining?" In this research paper we are discussing about business analysis framework for data warehouse design, data warehouse design process, data warehouse usage for information processing and from OLAP to multidimensional data mining. The concept of data warehousing is deceptively simple. Data is extracted periodically from the applications that support business processes and copied onto special dedicated computers. There it can be validated, reformatted, reorganized, summarized, restructured, and supplemented with data from other sources. The resulting data warehouse becomes the main source of information for report generation, analysis, and presentation through ad hoc reports, portals, and dashboards. Building data warehouses used to be difficult. Many early adopters found it to be costly, time consuming, and resource intensive. Over the years, it has earned a reputation for being risky. This is especially true for those who have tried to build data warehouses themselves without the help of real experts.

II. RESEARCH ELABORATIONS

[A] A BUSINESS ANALYSIS FRAMEWORK FOR DATA WAREHOUSE DESIGN:

"What can business analyst gain from having a data warehouse?" **First**, we having a data warehouse may provide a competitive advantage by presenting relevant information from which to measure performance and make critical adjustments to help win over competitors. **Second**, a data warehouse can

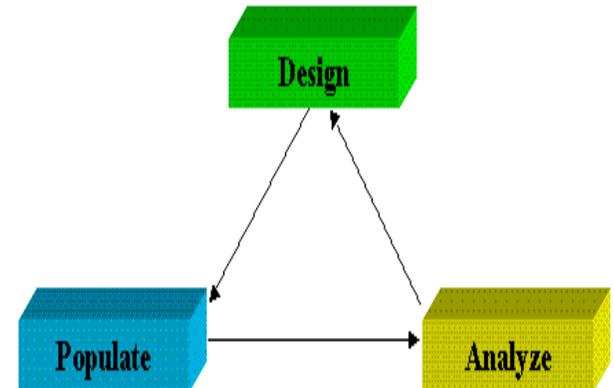
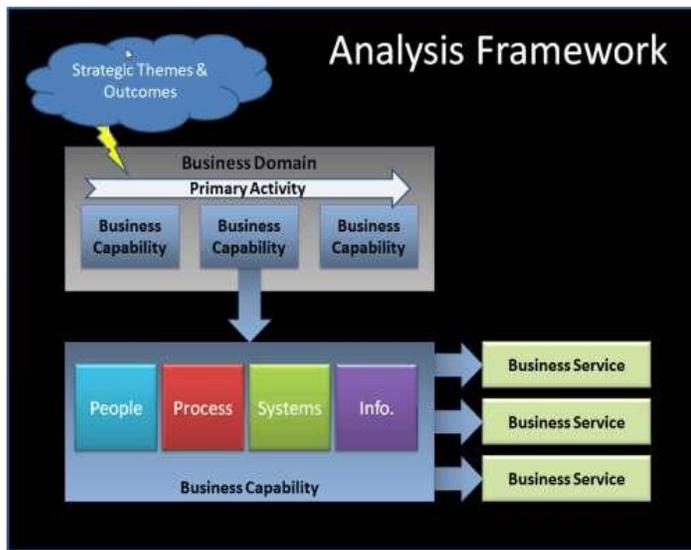
enhance business productivity because it is able to quickly and efficient gather information that accurately describes the organization. **Third**, a data warehouse facilitates customer relationship management because it provides a consistent view of customers and items across all lines of business, all departments, and all markets. Finally, a data warehouse may bring about cost reduction by tracking trends, patterns and exceptions over long periods. If you wanted to do design effective data warehouse you must know the business needs and construct a business analysis framework. The construction of a large and complex information system can be viewed as the construction of a large and complex building, for which the owner architect and builder have different views. This view are combined to form a complex framework that represents the top-down, business-driven, or owner's perspective, as well as the bottom-up, builder-driven, or implementor's view of the information system. **Four**, different views regarding a data warehouse design must be considered: the top-down view, the data source view, the data warehouse view, of the information system.

- ✓ **The top - Down view** allows the selection of the relevant information necessary for the data warehouse. This information matches current and future business needs.
- ✓ **The Data source view** exposes the information being captured, stored, and managed by operational system. This information may be documented at various levels of detail and accuracy, from individual data source tables to integrate at various levels of detail and accuracy, form individual data source tables to integrated data source tables. Data sources are often modeled by traditional data modeling techniques, such as the E-R model or DASE tools.
- ✓ **The Data warehouse view** includes fact tables and dimension tables. It represents the information that is stored inside the data ware house, including precalculated totals and counts, as well as information regarding the source, date and time of origin added to provide historical context.
- ✓ **The Business Query View** is the data perspective in the data warehouse form the end-user's view point

So, building and using a data warehouse is a complex task because it requires business skill technology skills, and program management skills. Regarding business skills, building a data warehouse involves understanding how systems store and manage their data, how to build extractors that transfer data from the operational system to the data ware house, and how to build

warehouse refresh software that keeps the data warehouse reasonably up-to-date with the operational system's data.

[B] DATA WAREHOUSE DESIGN PROCESS



A frame work provides the structure for the upsurge of using analysts of all sorts: business analysts, business process analysts, risk analysts, system analysts, and provides a standardized way to gather, communicate and develop the desired information required by:

- The Program Management Office;
- Business users;
- key stake holders and
- Technology developers.

Based on our experience, even for projects that are completed on time and on budget, there may be significant inefficiencies in performing business analysis functions. These inefficiencies include:

- lost opportunities
- Rework
- No realization of benefits

By implementing a framework you provide structure and standards that are intended to serve as a support or provide guidance for your BA's. You can expect consistent quality outputs from your BA resources and provide the ability to attract and retain experienced and motivated BA's to: Reduce waste Create solutions Complete projects on time Improve efficiency Document the right requirements A Framework enables your organization to bring to market your competitive innovations more effectively and efficiently and to underpin an increase in the delivery of successful projects.

Here we discussed about various approaches to the data warehouse design process and the steps involved. A data warehouse can be built using a top-down approach, a bottom-up approach or a combination of both. The top – down approach starts with overall design and planning. It is useful in cases where the technology is mature and well known, and where the business problems that must be solved are clear and well understood. The bottom -up approach starts with experiments and prototypes. This is useful in the early stage of business modeling and technology development. And it also allowed an organization to move forward at considerable less expenses and evaluate the technological advantages before making significant commitments. In the combined approach, an organization can be exploit the planned and strategic nature of the top-down approach while retaining the rapid implementation and opportunistic application of the bottom – up approach. If we are thinking in from the software engineering point of view, the design and construction of a data analysis, warehouse design , data integration and testing, and finally deployment of the data warehouse. Large software systems can be developed by using one of the two technologies. The Waterfall method and The spiral method. So, here it is.

The Water Fall method performs a structured and systematic analysis at each step before proceeding to the next, which is like a water fall, falling form one step to the next. The Spiral Method involves the rapid generation of increasingly functional systems, with short intervals between successive releases.

This is always considered as a good choice for data warehouse development, especially for data marts, because the turnaround time is short, modifications can be done quickly, and new designs for the technologies and that can be adapted in a timely manner. So, here we are discussed about the warehouse design process. This includes various steps as follows:

Choose a Business Process to Model if the business process is organizational and involves multiple complex object collections, a data warehouse model should be followed. However, if the

process is departmental and focuses on the analysis of one kind of business process, a data mart model should be chosen.

Choose the business process gain, which is the fundamental, atomic level of data to be represented in the fact table for this process.

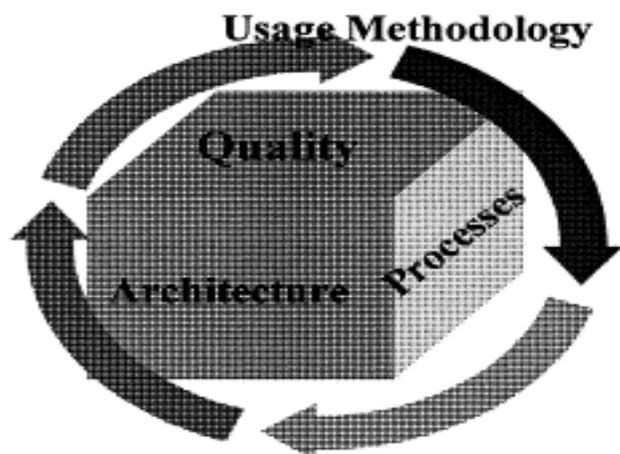
Choose the dimension that will apply to each and every fact table record. Typical dimensions are time, item, customer, supplier, warehouse, transactions type, and status.

Choose the measures that will populate each fact table record. Typical measures are numeric additive quantities like dollars_sold and units_sold.

Because the process of construction of data warehouse is a quite difficult and long-term task, its implementation scope should be clearly defined. The goals of an fundamental data warehouse implementation should be specific, achievable and measurable. This involves determining the time and budget allocations, the subset of the organization that is to be served. So, once a data warehouse is designed and constructed, the fundamental deployment of the warehouse includes the initial installations, roll – out planning, training, and orientations. And platform upgrades and maintenance must also be considered. So, the data warehouse administration includes data refreshment, data source synchronization, planning for disaster recovery, managing access control and security, managing data growth, managing data base performances and of course data warehouse enhancement and extension.

Data warehouse development tools provide functions to define and edit metadata repository contents (i.e. schemas, scripts, or rules), answer queries, output reports, and ship metadata to and from relational database system catalogs. Planning and analysis tools study the impact of schema changes and of refresh performance when changing refresh rates or time windows.

[C] DATA WAREHOUSE USAGE FOR INFORMATION PROCESSING



The proposed Meta model of data warehouse operational processes is capable of modeling complex activities, their interrelationships, and the relationship of activities with data sources and execution details. Moreover, the Meta model complements the existing architecture and quality models in a coherent fashion, resulting in a full framework for quality-oriented data warehouse management, capable of supporting the design, administration and especially evolution of a data warehouse. Data warehouse and data marts are used in a wide range of applications. Business executive use the data warehouses in data warehouses and data marts to perform data analysis and makes strategic decisions. In many firms, data warehouses are used as an integral part of a plan-execute-access” Closed-loop” feedback system for enterprise management. Data warehouses are used extensively in banking and financial services, consumer goods and retail distribution sectors, and controlled manufacturing such as demand-based production. Now, typically the longer a data warehouse has been in such a use, the more it will have evolved. This evolution should take place throughout a number of phases. Initially, the data warehouse is mainly used for generating reports and answering the predefined queries. Progressively, it is used to analyze, summarized and detailed data, where the results are presented in the form of reports and charts, later, the data warehouse is used for strategic purposes, performing multidimensional analysis and sophisticated slice-and-dice operations. So, at that stage we finally we reach the data warehouse may be employed for knowledge discovery and strategic decision making using data mining tools. In this context, the tools for data warehousing can be categorized into access and retrieval tools, database reporting tools, data analysis tools, and data mining tools. There are total three kinds of data warehousing applications: Information processing, Analytical processing, and data mining.

- ✓ **Information Processing** supports querying, basic statistical querying, basic statistical analysis, and reporting using cross tabs, tables, charts or graphs. A current trend in data warehouse information processing is to construct low-cost web-based accessing tools that are then integrated with web browsers.
- ✓ **Analytical Processing** supports basic OLAP operations, including slice-and-dice, drill-down, roll-up, and pivoting. It generally operates on historic data in both summarized and detailed forms. The major strength of online analytical processing over information processing is the multidimensional data analysis of data warehouse data.
- ✓ **Data Mining** supports knowledge discovery by finding hidden pattern and association constructing analytical models, performing classification and prediction, and presenting the mining results using visualizations tools.

So these are the three various data warehouse applications which will help to design and use of data warehouse.

[D] FROM ONLINE ANALYTICAL PROCESSING TO MULTIDIMENSIONAL DATA MINING

Multidimensional data mining integrates OLAP with data mining to uncover knowledge in multidimensional databases. Among the many different paradigms and architectures of data mining systems, multidimensional data mining is particularly important for the various reasons which are as follows:

- ✓ **High Quality of data in data warehouse:** Most data mining tools need to work on integrated, consistent, and cleansed data, which requires costly data cleaning, data integration and data transformation as preprocessing steps. A data warehouse constructed by such preprocessing steps. While a data warehousing constructed by such preprocessing serves as a valuable source of high-quality data for OLAP as well as for data mining. Now, we notice that data mining may serve as a valuable tool for data cleaning and data integration as well.
- ✓ **Available information processing infrastructure surrounding data warehouses:** Comprehensive information processing and data analysis infrastructures have been or will be systematically constructed surrounding data warehouses, which includes the accessing, integration, consolidation and transformation of multiple heterogeneous databases and OLAP analytical tools. It is prudent to make best use of the available infrastructure rather than constructing everything from scratch.
- ✓ **OLAP-Based exploration of multidimensional data:** Effective data mining needs exploratory data analysis. A user will often want to traverse through a database, select portions of relevant data, analyze them at different granularities, and present knowledge in different forms. Multidimensional data mining provides facilities of pivoting filtering, dicing, and slicing on a data cube and intermediate data mining results.
- ✓ **Online Selection of data mining functions:** Users may not always know the specific kinds of knowledge they want to mine. By integrating OLAP with various data mining functions, multidimensional data mining provides users with the flexibility to select desired data mining functions and swap data mining tasks dynamically.

So, these are the various multidimensional data mining resources for the data warehouse usage and designing. The data warehouse is concentrated on only few aspects. Here we are discussing

about the data warehouse design and usage. Let's look at various approaches to the data warehouse design and usage process and the steps involved. So, at the end of the research we are clearly said that data warehouse can be built using a top-down approach, bottom – down approach or a combination of both. In this research paper we are discussing about the data warehouse design process.

II RESEARCH RESULT

The paper is based on the literature research. The intention is to provide an overview over the current state of the art and use that as a base for presenting a data warehouse design and its usage and planning framework that emphasizes the data warehouse specific needs. As we have seen, the introduction to data warehousing design and usage technology presented in this research paper is essential to our study of data warehousing. We are discussing about business analysis framework for data warehouse design, data warehouse design process, data warehouse usage for information processing and it is from OLAP's Multidimensional data mining. The idea of data warehousing is deceptively very simple. It is very much important to prepare data warehouse by using the proper design methodology and process. This is because data warehousing provides users with large amounts of clean, organized, and summarized data. Which greatly facilitates data mining. Suppose rather than storing the details of each sales transaction, a data warehouse may store a summary of the transactions per item type for each branch or summarized to higher level of summarized data in a data warehouse sets a solid foundation for successful data mining. Fundamentally, data is never deleted from data warehouses and updates are normally carried out when data warehouses are offline. This means that data warehouses can be essentially viewed as read-only databases. This satisfies the users' need for a short analysis query response time and has other important effects. First, it affects data warehouse-specific database management system (DBMS) technologies, because there is no need for advanced transaction management techniques required by operational applications. Second, data warehouses operate in read-only mode, so data warehouse-specific logical design solutions are completely different from those used for operational databases. For instance, the most obvious feature of data warehouse relational implementations is that table normalization can be given up to partially denormalize tables and improve performance. Other differences between operational databases and data warehouses are connected with query types. Operational queries execute transactions that generally read/write a small number of tuples from/too many tables connected by simple relations. For example, this applies if you search the data of a customer in order to insert a new customer order. So, these kinds of queries are called an OLTP query. A data warehouse constructed by such preprocessing steps. While a data warehousing constructed by such preprocessing serves as a valuable source of high-quality data for OLAP as well as for data mining. So, the as per our research methodology data warehouse design and usage is very important but a little complex task.

III. CONCLUSION

Creating and managing a warehousing system is hard. Many different classes of tools are available to facilitate different aspects of the process described in Section 2. Development tools are used to design and edit schemas, views, scripts, rules, queries, and reports. Planning and analysis tools are used for what-if scenarios such as understanding the impact of schema changes or refresh rates, and for doing capacity.

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CYCLIC CODES OF LENGTH n OVER $GF(q)$ – CYCLOTOMIC COSETS MODULO n AND APPLICATION OF BURNSIDE’S LEMMA

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Abstract : The idea of q - cyclotomic cosets modulo n due to carry Huffman and Vera pless is considered in the context of linear codes of length n over $GF(q)$ where $q = p^m$, p is a prime, $m \geq 1$. An explicit formula for the number of q - cyclotomic cosets modulo n is obtained as an application of the classical Burnside’s lemma. The formula for the number of cyclic codes in $R_n = F_q[x]/(x^n - 1)$ is deduced. Illustration is shown for special value of q and n .

Index terms: Field extensions, splitting fields, cyclic codes, minimal polynomial, primitive roots, Orbit of group action, q -Cyclotomic cosets.

1. INTRODUCTION

Let F_q denotes a finite field having q - elements $q = p^l$ where p is a prime and $l \geq 1$. The set of nonzero elements of F_q is denoted F_q^* is a cyclic group of order $q-1$ under multiplication. It implies that $F_q^* = \{ \alpha^i / 0 \leq i \leq q-2 \}$ Where α is a generator of the cyclic group F_q^* . Infact α may be taken as an imaginary $(q-1)$ th root of unity α is a complex number such that $|\alpha| = 1$.

Definition 1 A linear code C is called cyclic code if whenever $a = a_0, a_1, a_2, a_3, \dots, a_{n-1}$ is a code word, then a' obtained from a by a cyclic shift of the coordinates is such that $a' = a_{n-1}, a_0, a_1, a_2, \dots, a_{n-2}$ is also a codeword. By a cyclic shift of the coordinates we mean a permutation π of the set $\{1, 2, 3, \dots, n\}$ defined by $\pi(i) = i + 1 \pmod{n}$ of $i \rightarrow i + 1 \pmod{n}$.

Definition 2 The q -cyclotomic cosets of s modulo n is the set $C_s = \{s, sq, sq^2, \dots, sq^{r-1}\}$ modulo n where r is the smallest positive integer such that $sq^r \equiv s \pmod{n}$. C_s is the orbite of the permutation $\tau : i \rightarrow iq \pmod{n}$ that contains s . It is shown in [3] that the number of cyclic codes in R_n is 2^m where m is the number of q – cyclotomic cosets modulo n .

The purpose of this note is to give an evaluation of m using a counting principle called Burnside’s Lemma [7] while highlighting a few related results we revisit cyclic codes of length 2^m considered by Manju Pruthi in [5].

2. PRELIMINARIES

Let s be an integer satisfies $0 \leq s \leq n - 1$. The q –cyclotomic cosets of s modulo n is given by $C_s = \{s, sq, sq^2, \dots, sq^{r-1}\}$ where

$r = \exp_n q$. That implies r is the least positive integer such that

$$sq^r \equiv s \pmod{n} \quad \dots \dots \dots (1)$$

Definition 3 Let $\sigma = \pi_{q^i}$ for $i = 1, 2, 3, \dots, r-1$ be a permutation belonging to G_q . Let $s \in T, 0 \leq s \leq n-1$. The orbit of s under σ written $O_{\sigma} = \sigma^t(s) \mid t \in \mathbb{N} \cup \{0\}$.

Example 4 Let $T = \{0, 1, 2, 3, 4\}$ $n = 5$ $q = 3$ $G_3 = \{I_5, \pi_3, \pi_{3^2}, \pi_{3^3}\}$. We note that $\pi_{3^4}(T)$ the orbit of $2 \in T$ under π_3

$$is O_{2, \pi_3} = \{\pi_3^t(2) \mid t \in \mathbb{N}\} = \{2, \pi_3(2), \pi_{3^2}(2), \pi_{3^3}(2), \pi_{3^4}(2)\}$$

Next, when C is a cyclic code of length n , a codeword $c(x) = c_0c_1c_2 \dots c_{n-1}$ where $c_i \in \mathbb{F}_q$ is identified with the polynomial $c(x) = c_0 + c_1x + c_2x^2 + \dots + c_{n-1}x^{n-1}$ which is an element of \mathbb{R}_n . Since \mathbb{R}_n is the ring the set $V_{n,q}[x] = \{c_0 + c_1x + c_2x^2 + \dots + c_{n-1}x^{n-1} \mid c_i \in \mathbb{F}_q, i = 0, 1, 2, 3, \dots, n-1\}$ is a vector space of dimension n over \mathbb{F}_q . Therefore $V_{n,q}[x]$ is isomorphic to \mathbb{R}_n when multiplication of polynomial in $V_{n,q}[x]$ is reduced modulo $x^n - 1$, while considering \mathbb{R}_n since $\langle x^n - 1 \rangle$ is principle ideal of $\mathbb{F}_q[x]$, $I[x] = \langle x^n - 1 \rangle = \{g(x)(x^n - 1) \mid g(x) \in \mathbb{F}_q[x]\}$ an element of \mathbb{R}_n is of the form $c_0 + c_1x + c_2x^2 + \dots + c_{n-1}x^{n-1} + I[x]$ $c_i \in \mathbb{F}_q$. Since \mathbb{R}_n is also a principle ideal domain, the principle ideal generated by $h(x) \in \mathbb{R}_n$ is denoted by $\langle h(x) \rangle$. If α is a primitive n^{th} root of unity $\alpha^n = 1$ and $\alpha^m \neq 1$ occurring in some extension \mathbb{F}_{q^t} of \mathbb{F}_q , $t \geq 1$, then $h(x) = \prod_{s \in C_s} M_{\alpha^s}(x)$ where s runs through a subset of representatives of the q -cyclotomic cosets modulo n and $M_{\alpha^s}(x) = \prod_{i \in C_s} (x - \alpha^i)$ where C_s is the q -cyclotomic cosets modulo n in [3]. If

$\mathbb{F}_{q^t}^* = \mathbb{F}_q^t - \{0\}$ is a cyclic group of order $q^t - 1$. If α is a primitive n^{th} root of unity occurring in $\mathbb{F}_{q^t}^*$, $\alpha^n = 1$ implies that $\mathbb{F}_{q^t}^*$ contains a cyclic subgroup of order n and by Lagrange's theorem n divides $O(\mathbb{F}_{q^t}^*) = q^t - 1$. Suppose that r is a primitive element in \mathbb{F}_{q^t} where $t = \exp_n q$. If $\alpha \in \mathbb{F}_{q^t}$ is such that $\alpha = r^d$ is a primitive n^{th} root of unity where $d = \frac{q^t - 1}{n}$ the zeros of $M_{\alpha^s}(x)$'s are $\alpha^{ds}, \alpha^{dsq}, \alpha^{dsq^2}, \dots, \alpha^{dsq^{r-1}}$.

There are actually $\alpha^s, \alpha^{sq}, \alpha^{sq^2}, \dots, \alpha^{sq^{r-1}}$ where r is the least positive integer such that $dsq^r \equiv ds(q^t - 1)$ if and only if $sq^r \equiv s \pmod{n}$. This leads to the definition of the q -cyclotomic cosets given in (1).

3. q-ARY CYCLIC CODES OF LENGTH 2^m ($m \geq 3$)

We consider cyclic codes of length 2^m ($m \geq 3$) over $GF(q) = \mathbb{F}_q$ where $q = p^l$, p an odd prime and $l \geq 1$. Manju pruthi [5] obtains q -cyclotomic cosets modulo 2^m using purely number theoretic ideas and the structure of a cyclic code given as a $[2^m, 2^{i-1}, 2^{m-i+1}]$ code over \mathbb{F}_q ,

$1 \leq i \leq m$ and $m \geq 3$. The restriction $m \geq 3$ arises from the fact that when q is odd $\frac{\varphi(2^m)}{2} \equiv 1 \pmod{2^m}$. In other words, 2^m ($m \geq 3$) has no primitive roots modulo 2^m . It follows that $\exp q = 2^{m-2}$, $\varphi(2^m) = 2^{m-1}$ Manju pruthi articles [5] appeared before the publication of the book [3] authored by Huffman and Pless.

4. AN APPLICATION OF BURNSIDES LEMMA

Definition 5 In [7] For $x, y \in X$ we define a congruence $x \equiv y \pmod{G}$ to mean that there exists an element $g \in G$ such that $g(x) = y$ congruence mod G is an equivalence relation on x . The equivalence classes under \equiv are called the orbit of G in x .

Definition 6 In [7] For $x \in X$ we define G_x as the set given by $G_x = \{ g \in G / g(x) = x \}$ is called the stabilizer of x in G . If O_x denotes the orbit of G containing x , then $|G| = |G_x| |O_x|$ where $|O_x|$ is the number of cosets of G_x in G .

Theorem 1 Let $T = \{0, 1, 2, \dots, (n-1)\}$ be the least non negative complete residue system

$(\text{mod } n)$. If G_q denotes the group of permutations $\pi_q : i \rightarrow i_q$ for $i \in T$. The number of q -cyclotomic cosets modulo n is given by $N_n(q) = \frac{1}{r} \sum_{g \in G} \psi(g)$ Where $\psi(g)$ is the number of elements of T which are left fixed by $g \in G_q$

Proof : We suppose that $S(G)$ denotes the set of orbits of G_q in X . let d denote the number of elements of the form $g(x)$ where $x \in X$, $g \in G_q$ and $g(x) = x$ for fixed $g \in G_q$. The number of such elements is $\psi(g)$. Then $d = \sum_{g \in G} \psi(g)$

Now, for fixed $x \in X$ the number of elements $g(x)$ for which $g(x) = x$, $g \in G_q$ is by definition of G_q is $|G_q|$. If J denotes the union of orbits of G_q we obtain

$$\begin{aligned} d &= \sum_{y \in J} |G_y| \\ &= \sum_{O \in S(G)} \sum_{x \in G_q} |G_q| \\ \sum_{O \in S(G)} \sum_{x \in X} |G_q| &= \sum_{O \in S(G)} \sum_{x \in X} \frac{|G_q|}{|O_x|} \\ &= \sum_{O \in S(G)} |O_x| \frac{|G_q|}{|O_x|} \\ &= |G_q| \sum_{O \in S(G)} 1 \\ &= |G_q| N_n(q) \\ &= r N_n(q) \text{ since } |G_q| = r, \text{exp}_n q = r. \end{aligned}$$

$$\begin{aligned} r N_n(q) &= \sum_{y \in J} |G_y| \\ N_n(q) &= \frac{1}{r} \sum_{y \in J} |G_y| \\ &= \frac{1}{r} \sum_{y \in G_q} \psi(g) \end{aligned}$$

Example 8 We consider 2-cyclotomic sets modulo 9. Here as $\text{exp}_9(2) = 6 = \phi(9)$, 2 is a primitive root modulo 9.

We have $C_0 = \{0\}$, $C_1 = \{1, 2, 4, 8, 7, 5\}$, $C_3 = \{3, 6\}$

The primitive 9th roots of unity lie in F_{26} , but in no smaller extension of $GF(2)$. The irreducible factors of $x^9 - 1$ over $GF(2)$

have degree 1, 6 & 2. The polynomials are $M_1(X) = x + 1$, $M_\alpha(x) = x^6 + x^3 + 1$. Where α is a primitive 9th root of unity in F_2^6 α^3 is a primitive 3rd root of unity as $(\alpha^3)^3 = 1$. The extension F_2^6 of F_2^3 is of degree 2. So, irreducible polynomial α^3 over $GF(2)$ is of degree 2. The only quadratic irreducible polynomial over $GF(2)$ is $X^2 + X + 1$. Therefore

$X^9 - 1 = (X + 1)(X^6 + X^3 + 1)(X^2 + X + 1)$ Here $q = 2$, $|G_2| = 6$ The elements of G_2 are $\{I, \Pi_2, \Pi_4, \Pi_8, \Pi_{16}, \Pi_{32}\}$

$T = \{0, 1, 2, 3, 4, 5, 6, 7, 8\}$ $\psi(1) = 8$ elements of T which are kept fixed on multiplication by 2. The q – cyclotomic cosets modulo 9 are already shown So, by Burnside’s lemma, number of 2 cyclotomic cosets (mod 9) = $18/6 = 3$

Example 9 We consider 3-cyclotomic cosets modulo 13. α be a primitive 13^{th} root of unity. The 3 – cyclotomic cosets are

$C_0 = \{0\}$ $C_1 = \{1, 3, 9\}$ $C_2 = \{2, 6, 5\}$ $C_4 = \{4, 12, 10\}$ $C_7 = \{7, 8, 11\}$ As $\exp_{13}(3) = 3$ the primitive 13th roots of unity lie on \mathbb{F}_3 but in no smaller extension of $GF(3)$. The irreducible factors of $X^{13}-1$ are

$$M_1(X) = X - 1 = X + 2$$

$$M_\alpha(X) = X^3 + 2X + 1$$

$M_{\alpha^2}(X), M_{\alpha^4}(X)$ and $M_{\alpha^7}(X)$ are also of degree 3. The number of 3 – cyclotomic cosets modulo 13 is 5. In the notation of burnside’s lemma. $|G_q| = 3$ $\psi(1) = 13, \psi(\pi_3) = 1, \psi(\pi_9) = 1$ So, the number of 3 – cyclotomic cosets modulo 13 is

$$\frac{1}{3}(13+1+1) = 5$$

Theorem 10 The number of cyclic codes in $R_n = \frac{F_q[x]}{(x^n - 1)}$ is equal to 2^N where N is the number of q – cyclotomic cosets modulon n .

Proof Let α be a primitive n th root of unity occurring in F_{q^t} where $t = \exp_n(q)$. A cyclic code C in R_n is generated by a manic polynomial $h(x)$ of minimum degree. From (2) we see that $h(x)$ contains $M_{\alpha^S}(X)$ determined by q – cyclotomic cosets modulon n , as a factor $M_{\alpha^S}(X)$ is manic and in irreducible over F_q . Since $M_{\alpha^S}(X)$ splits only in an extension \mathbb{F}_{q^t} of \mathbb{F}_q . So, each non zero cyclic code C is associated with one or more q - cyclotomic cosets chosen one at a line , two at a line and so an out of the $N - q$ – cyclotomic cosets modulo n we observe that (o) The zero cyclic code corresponds to x^n-1 the counting of a non zero cyclic code C happens with counting 1.

- 1) $\binom{N}{1}$ times, when each q – cyclotomic coset modulo n is chosen one at a time.
- 2) $\binom{N}{2}$ Times, when two q – cyclotomic cosets modulo n are chosen at a time.
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- 3) $\binom{N}{i}$ times, when i q – cyclotomic coset modulo n are chosen at a time.
- 4) $\binom{N}{N}$ times, when all the N q – cyclotomic coset modulo n are chosen at a time.

Thus the total member of cyclic codes in R_n is given by $1 + \binom{N}{1} + \binom{N}{2} + \dots + \binom{N}{i} + \dots + 1 = 2^N$.

Example 12 We consider 2 – cyclotomic cosets modulo 15. If α is a primitive 15th root of unity α belongs to $F_2^4 = F_{16}$. The 2 – cyclotomic cosets modulo 15 are

$$C_0 = \{0\}, C_1 = \{1, 2, 4, 8\}, C_3 = \{3, 6, 9, 12\}, C_5 = \{5, 10\}, C_7 = \{7, 11, 13, 14\}.$$

$$\begin{aligned} (X - \alpha)(X - \alpha^2)(X - \alpha^4)(X - \alpha^8) &= M_\alpha(X) = X^4 + X + 1 \\ (X - \alpha^3)(X - \alpha^6)(X - \alpha^9)(X - \alpha^{12}) &= M_{\alpha^3}(X) = X^4 + X^3 + X^2 + X + 1 \\ (X - \alpha^5)(X - \alpha^{10}) &= M_{\alpha^5}(X) = X^2 + X + 1 \\ (X - \alpha^7)(X - \alpha^{11})(X - \alpha^{13})(X - \alpha^{14}) &= M_{\alpha^7}(X) = X^4 + X^3 + 1 \end{aligned}$$

The factorization of $X^{15}-1$ into irreducible polynomials over \mathbb{F}_2 is the number of cyclic codes in $\mathbb{F}_2[X]/(X^{15}-1)$ is

$$X^{15} - 1 = (X + 1)(X^4 + X + 1)(X^4 + X^3 + X + 1)(X^4 + X^3 + 1)$$

Example 13 We consider 3 – cyclotomic cosets modulo 13. $\exp_{13}(3) = 3$ Let α be primitive 13th root of unity. The splitting field of α is $F_{3^3} = F_{27}$ $(X^{13} - 1) = (X - 1)(X^3 + 2X + 1)$. The 3– cyclotomic cosets modulo 13 are

$$\begin{aligned} C_0 &= \{0\} \quad C_1 = \{1, 3, 9\} \quad C_2 = \{2, 6, 5\} \quad C_4 = \{4, 12, 10\} \quad C_7 = \{7, 8, 11\} \\ M_\alpha(X) &= (X - \alpha)(X - \alpha^3)(X - \alpha^9) = X^3 + 2X + 1 \quad M_{\alpha^2}(X) = (X - \alpha^2)(X - \alpha^6)(X - \alpha^5) \\ M_{\alpha^4}(X) &= (X - \alpha^4)(X - \alpha^{12})(X - \alpha^{10}) \\ M_{\alpha^7}(X) &= (X - \alpha^7)(X - \alpha^8)(X - \alpha^{11}) \end{aligned}$$

The number of cyclic codes in $R_{13} = \frac{F_3[X]}{X^{13} - 1}$ is $2^5 = 32$.

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Modeling Supply Chain Performance of Organized Garment Retailing

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Abstract- Purpose – The purpose of this paper is to produce the findings of a research project seeking to develop and validate a model for measuring supply chain performance of organized garment retailing in India.

Design/methodology/approach – The paper draws its conclusions from an analysis of survey data from samples of Indian organized garment retailing practitioners and consultants. The pre-pilot and pilot survey has been done to improve the questionnaire. Later, large scale survey is used to classify key performance indicators and structural equation modeling has been used to develop and validate a model for measuring supply chain performance of organized garment retailing in India.

Findings – The twenty key performance indicators have been arranged to measure the supply chain performance of organized garment retailing. The first most important group of key performance indicator is inventory metrics with seven indicators in this node. This nodal point needs to be supported by another supply chain node, i.e., flexibility metrics with three indicators. Also, keeping in view the customer requirements, customer metrics have developed another nodal point for assessing supply chain performance. This nodal point has the support of six performance indicators. The stakeholder metric presents the final nodal point for assessing supply chain performance. This nodal point uses four indicators and projects the monetary outcome of the business.

Research limitations/implications – Larger-scale empirical studies are required from the top management for enhanced validity. In particular, the explicit comparison of the supply chain performance of major firms is recommended for future research. Also, there is a need to compare organized and unorganized garment retailing sector for gap analysis.

Originality/value – This is the first study to systematically develop and validated a model for measuring supply chain performance of organized garment retailing in India. The analyses and discussions provide a basis for future research. In addition, the insights of this study shall help for the betterment of this sector.

Index Terms- Key performance indicators, Organizational performance, Organized garment retailing, Supply chain management, Supply chain performance metrics

I. INTRODUCTION

Organized Garment Retailing (OGR) is a sunrise industry with maximum growth rate and maximum contribution to

GDP in India. It has attracted many national and international players. Nowadays the intense market competition has shifted to the supply chain (SC) domain. Hence, the need for developing a SC performance of OGR is now a major concern for all the organizations. It shall be counted by using selective sets of key performance indicators (KPI) for measuring SC performance. Also, measuring supply chain performance (SCP) is one of the key managerial tasks associated with a wide range of activities of planning, organizing, motivating the workforce and controlling events. Providing a long list of KPI shall overload the managers leading to inefficiency.

A performance measurement system helps to address the issues of finance, customer, internal processes, and innovation and improvements. Hence, “No measures, No improvement” (Kaplan and Norton, 1996). In the early stage of high technology organizations, managers focus on efficiency, reliability, and speed. However, in the different stages of organizational growth KPI are also different (Bhasin, 2008). Here, it is pertinent to mention that OGR in India is in the growth stage. Hence, developing a SCP measurement model shall be applicable to this industry as a whole.

However, many organized retail outlets failed despite best growth for the industry. The OGR professionals revealed it an SCP failure. The reason for the failure was unavailability of an effective SCP measurement model for OGR. So, we identified the need to develop a SCP measurement model by selecting limited sets of KPI and arranging them in the form of a model. Here, we have used structural equation modeling (SEM). It is pertinent to mention that factor analysis, correlation, regression etc. shall test, single relationship at a time. However, SEM shall test multiple relationships at a time. Hence, we used this technique to develop and validate a model for measuring SCP of OGR.

The remainder of this paper is organized as follows. The second section presents KPI used in this sector based on strong literature support in consultation of practitioners and consultants in the field of OGR. The third section focuses on database and methodology. The fourth section focuses on the discussion. In the last section we concluded the results and future research space has been discussed with the reference studies.

II. KEY PERFORMANCE INDICATORS

Measuring SCP leads to informed decision making to track the efficiency failure. The aim of implementing a performance

measurement system is to improve organizational performance. The selected KPIs are shown in the Table 1 as follows:

Table I: Key performance indicators

Performance Indicators/Researchers
Product Quality: Beamon (1999), Ramdas & Speakman (2000), Sahin et al. (2000), SCC (2000), Lambert & Terrance (2001), Luning et al. (2002), Krajewski & Ritzman (2002), Lin et al. (2005), Jile et al. (2007)
Process Quality: SCC (2000), Luning et al. (2002)
Customer Response Time: Viswanadham (1999), Beamon (1999), Sahin et al. (2000), SCC (2000), Ramdas & Speakman (2000), Lambert & Terrance (2001), Tan (2002), Morgan (2004), Jile et al. (2007), Zheng & Li (2008), Gunawan et al. (2008)
Return Adjustment: Viswanadham (1999), Lambert & Terrance (2001), Harrison & New (2002), Morgan (2004), Zheng & Li (2008)
Product Personality: Ramdas & Speakman (2000), Lambert & Terrance (2001), Sahin et al. (2000)
Transaction Satisfaction: Ramdas & Speakman (2000), Bowersox et al. (2000), SCC (2000), Morgan (2004), Zheng & Li (2008), Gunawan et al. (2008)
Spoilage Adjustment: Harrison & New (2002), Morgan (2004), Zheng & Li (2008)
VMI: Lambert & Terrance (2001)
Lead Time: Viswanadham (1999), Bowersox et al. (2000), Sahin et al. (2000), Ramdas & Speakman (2000), Harrison & New (2002), Krajewski & Ritzman (2002), SCC (2000), Harrison & New (2002), Chan & Qi (2003b), Morgan (2004), Taylor (2004), Lin et al. (2005), Jile et al. (2007), Zheng & Li (2008), Gunawan et al. (2008)
Fill Rate: Viswanadham (1999), SCC (2000), Lambert & Terrance (2001), Harrison & New (2002), Chen & Qi (2003b), Morgan (2004), Lin et al. (2005), Jile et al. (2007), Zheng & Li (2008)
Inventory Cost: Viswanadham (1999), Ramdas & Speakman (2000), SCC (2000), Tan (2002), Krajewski & Ritzman (2002), Harrison & New (2002), Chen & Qi (2003a), Morgan (2004), Taylor (2004), Zheng & Li (2008)
Distribution Cost: Viswanadham (1999), Krajewski & Ritzman (2002), SCC (2000), Harrison & New (2002), Chen & Qi (2003b), Taylor (2004), Morgan (2004), Zheng & Li (2008),
Operations Flexibility: Beamon (1999), Viswanadham (1999), SCC (2000), Krajewski & Ritzman (2002), Chen & Qi (2003b), Jile et al. (2007), Zheng & Li (2008)
Volume Flexibility: Beamon (1999), Viswanadham (1999), SCC (2000), Krajewski & Ritzman (2002), Chen & Qi (2003a), Jile et al. (2007), Zheng & Li (2008)
Delivery Flexibility: Beamon (1999), Viswanadham (1999), Bowersox et al. (2000), SCC (2000),

Harrison & New (2002), Krajewski & Ritzman (2002), Chen & Qi (2003b), Taylor (2004), Jile et al. (2007), Zheng & Li (2008)
ROI: Kaplan & Norton (1996), Beamon (1999), SCC (2000), Chen & Qi (2003b), Morgan (2004), Zheng & Li (2008), Gunawan et al. (2008)
Sales Profit: Kaplan & Norton (1996), SCC (2000), Tan (2002), Chen & Qi (2003), Taylor (2004), Morgan (2004), Zheng & Lai (2008), Gunawan et al. (2008)
Stakeholder Value: Neely et al. (1995); Jusoh & Parnell (2008)
Innovations: Kaplan & Norton (1996), Lummus et al. (2000), Speakman et al. (2002), Zheng & Li (2008)
Shipping Errors: Harrison & New (2002), Morgan (2004), Zheng & Li (2008), Gunawan et al. (2008)

Product quality is one of the most important metric to retain customers. The customers always expect better quality at lower prices. Lin et al. (2005) and Jile et al. (2007) revealed product quality as an important metric for SC performance measurement. The product quality is also associated with the *process quality*. The use of efficient processing technologies shall help to mitigate wastage and ultimately the product quality shall be better. The use of statistical process control, root cause analysis of poor quality, improvement in process capability, staff training and development of facilities shall help to improve process quality. Luning et al. (2002) revealed process quality as an important metric for better SCP.

Customer response time is the time taken to handle customer queries. The customers visit retail stores to collect the products for their requirements. They shall ask questions regarding product variety, quality, availability and prices. A prompt response shall help to attract and retain customers. Hence, it is also an important metric for measuring SCP (Nuthall, 2003; Morgan, 2004; and Gunawan et al., 2008).

Many times the products shipped shall be of inferior quality. The customers may return them even after purchase. The efforts should be made to adjust the returns immediately otherwise the long flow of products in the SC shall waste time and resources. Viswanadham (1999) and Morgan (2004) also added that *return adjustment* significantly affects SCP.

Product personality is also one of the important indicators of better SCP. It can be judged by focusing on colour, size, appearance and design of the fabric. These factors shall not only help to attract customers but also to retain them. Gunasekaran et al. (2004) and Aramyan (2006) also revealed product personality as an important indicator to evaluate SCP.

Customers visit garment retail stores to get their requirements satisfied. *Transaction satisfaction* helps to convert visits into a purchase. Neely et al. (1995), Beamon (1999) and Viswanadham (1999) revealed transaction satisfaction as a means to attract and retain customers. Gunawan et al. (2008) revealed it as an important SCP indicator. The customer satisfaction-pre-transaction, transaction and post-transaction shall help to develop customer loyalty.

The garment products are very delicate in nature and mishandling shall adversely affect the quality of the garments. The movements in the value added process should be in a position to maintain product quality. Otherwise, the damaged products shall waste time and resources. Hence, *spoilage adjustment* plays an important role in better SCP. So, efforts should be made to immediately identify spoilage and adjust it to prevent further delay and the products (Harrison and New, 2002; Morgan, 2004).

The *inventory cost* involves major cost component of retail supply chains. Tan (2002) and Harrison and New (2002) focused on inventory cost as an important indicator of SCP. The management of inventory is also one of the important indicators in measuring SCP. Inventory ordering, receiving and inspecting needs great efforts. Shifting these responsibilities to the suppliers helps to save time and resource. Nowadays organized retailers are using automated inventory management system with the help of advanced software and internet. Hence, *vendor managed (VMI)* has significantly reduced major inventory overheads. As and when inventory falls below certain levels automated orders are placed with the suppliers at the negotiated rates. Hence, VMI is also an important indicator for measuring SCP (Lambert & Terrance, 2001).

Lead time is the time between placement of an order and receipt of the goods. Many times the customers ask for products not available in the garment retail outlet. Also, these products may not be listed for VMI. In such situations and also when demand fluctuates sudden, the lead time plays a very important role. It is a critical success factor in SCM. Also, uncertainty in different stages of procurement, packaging, distribution, and forecasting amplifies lead time. Novac and Thomas (2004) identified lead time as an important indicator for measuring SCP.

The efforts of procuring best inventory in the stock is useless until the products are displayed in the racks to attract customers. These efforts can be vitalized by using efficient *fill rate*-which is the rate at which products are transferred to the rack for sale. Many researchers focused on fill rate as an important SC indicator (Harrison and New, 2002; Kleijnen and Smiths, 2003).

Distribution cost is the second major cost component of the OGR business. It is an important component of SC where cost shall be minimized by selecting suitable modes of transportation compatible with urgency and capacity. Sahin et al. (2000) and Krajewski and Ritzman (2002) also revealed it as one of the important SC indicators.

Operational flexibility refers to the firm's ability to rapidly design and implement new products/services for the customers. The operational flexibility adjusts the demand fluctuations without excessive costs, time and organizational disruptions. Shepherd and Gunter (2006) identified it as an important SC indicator.

Volume flexibility is making a variable quantity of products available at any location and time. Here, capacity of transportation shall play an important role. Flexible modes of transportation and large volume flexibility can make any quantum available at the demand point. Jile et al. (2007) and Zheng and Li (2008) identified it as an important KPI in measuring SCP.

The delivery flexibility measure is more concerned with the location of the destination. Many times the customers expect home delivery. Hence, to satisfy customers delivery flexibility has become an important indicator for measuring SCP (Jile et al. 2007; Zheng & Li, 2008).

Return on investment (ROI) is also one of the important indicators that shall be calculated over a period of time. It gives the overall business outcome for which the retailers look for good results. Nuthall (2003) and Morgan (2004) revealed ROI as one of the important indicators for measuring SCP.

Sales profit is the gain over the quantum of goods sold. It shall be calculated when goods are sold for the satisfaction of customers. Nuthall (2003) identified it as an important SCP indicator. Here, it is pertinent to mention that not only the sale but also the sales profit, helps to evaluate OGR business success.

Stakeholders are the investors, customers, employees, regulators and suppliers who play an active role in the business. The wants and needs of stakeholders should be satisfied for the business success. Neely et al. (2002) considered *stakeholder value* as the focal point of the performance measurement process. The collaboration among stakeholders plays an important role in business growth.

Innovations is the design, invention, development and/or implementation of new/modified ideas for business growth. The emergence of OGR has made it necessary not only to train employees for attitude and skill development but also to develop technology for performance enhancement. Shepherd and Gunter (2006) identified innovation as a valuable SCP indicator. It focuses on growth by making innovative efforts through people, systems and organizational procedures.

Shipping errors are the errors associated with delivery of products/services to the SC nodes. Many times short lead time, manual processing of outbound products and dispatch bottlenecks shall add to costly shipping errors, delivery related disputes, claims, and charge back. These errors should be eliminated immediately otherwise customer dissatisfaction shall not only loose a sale but also tarnish company image. Many researchers (Harrison and New, 2002; Morgan, 2004; and Gunawan et al., 2008) identified it as an important SCP indicator.

III. GAP ANALYSIS

The studies quoted above are applicable to the manufacturing and service industries other than organized garment retailing. Also, most of the studies have been conducted abroad. Organized garment retailing is a new industrial sector in India with maximum growth rate. Despite all many store outlets failed. Hence, it is the necessity to focus on it to find a solution for the same. In this paper an attempt has been made to provide insights for the organized garment retailing practitioners by developing a model to develop supply chain performance.

IV. DATABASE AND METHODOLOGY

Scale development

A survey questionnaire has been designed based on a strong literature support in consultation with both the practitioners and consultants working on OGR. A 20-item Likert scale was used

to rate the importance/use of the KPI discussed in the literature survey. The items so developed were rated on a five point Likert scale.

The pre-pilot survey helped us to get insights to improve the questionnaire. Later, a pilot survey was done and questionnaire was improved based on the insights from professionals engaged in SC activities of OGR. Finally, the full scale survey was conducted in north India i.e., Chandigarh, New-Delhi, Gurgaon and the principal cities of state Punjab.

A total of 600 questionnaires were mailed by randomly selecting respondents from OGR websites, telephone directory 2011 and PROWESS data base maintained by CMIE. The questionnaires sent were followed and finally 398 questionnaires were received from respondents operating in the banking sector (CEO/President /VP/GM=25; Sr.Managers/MIS coordinators, etc.=100; Managers(Store/purchase/SC), Supervisors etc. =273) yielding a response rate of 63.3%. The questionnaire responses were digitized using SPSS software and scale reliability was done.

V. SCALE REFINEMENT

The items were refined and purified to obtain the reliable scale. Here, corrected item-to-total correlation(Table:II) and Cronbach's alpha statistics were used. Item and reliability analysis was performed to retain and delete scale items for the purpose of developing a reliable scale. Corrected item-to-total correlations and Cronbach's alpha statistics were employed to conduct this type of analysis. It was used to know the extent to which any one item is correlated with the remaining items in a set of items under consideration. This analysis found Cronbach's alpha to be 0.8335 and item-to-total correlation (Table:II) was more than 0.5 and inter-item correlation (Table:III) is greater than 0.3. Here, it is pertinent to mention that Alpha value greater than 0.6 and item-to-total correlation greater than 0.5 and inter-item correlation greater than 0.3 is good enough for conducting research in social sciences (Hair et al. 2009).

Hair et al. (2009) classified modelling techniques using SEM as; confirmatory modelling strategy, competing modelling strategy and model development strategy. The confirmatory modelling strategy specifies a single model and SEM is used to assess how well the model fits the data. Here, the focus is on "either model works or not". The competing model strategy is a mean of evaluating the estimated model with alternate models and overall model comparisons can be performed with this strategy. The model development strategy differs from these two. Here basic framework is proposed and modeling tries to improve the model through modification of structural and measurement models. Here, theory provides only a starting point for development of a theoretically justified model. Here, we have used confirmatory modeling technique. It is due to the fact that the location of KPI in the model was supposed to work in the direction of theoretical and practical logic. So, we tested and validated the model with AMOS 4.0 version.

Factor analysis results for key performance indicators

The scale mean for the twenty key performance indicators is 78.46 (Table:II). If all the KPIs are rated at 5 the total comes to be 100. Hence, 78.46% of the construct is explained. This is

sufficient to explain construct validity. The correlation matrix is shown in Table: III. The inter-item correlation is more than 0.5, scale reliability is 0.8335 and item-to-total correlation is more than 0.03. Also, the Kaiser-Meyer-Olkin Measure of Sampling Adequacy is 0.878 and the Bartlett's Test of Sphericity has chi-square=0.8890.75, degree of freedom=190 and level of significance=0.00. The communality ranges from 0.765 to 0.896 (Table:II). Hence, all the requirements for conducting factor analysis are met. The factor analysis was conducted using principal component analysis (Table:IV). The four grouped factors are explained as follows:

Inventory Metrics

This factor covers seven KPI. These are Inventory cost, Distribution cost, Lead time, Vendor Managed Inventory, Fill rate, Spoilage adjustment, and Shipping errors. The factor loading ranges from 0.923 to 0.846. The inter-item correlation ranges from 0.945 to 0.714 and item to total correlation ranges from 0.9005 to 0.8293. Here, 32.81% of the variance is explained and it covers 6.563 of the Eigen values.

Customer Metrics

This factor covers six KPI. These are customer response time, product personality, transaction satisfaction, return adjustment, process quality, and product quality. The factor loading ranges from 0.926 to 0.873. The inter-item correlation ranges from 0.855 to 0.746 and item to total correlation ranges from 0.8996 to 0.8219. Here, 25.97% of the variance is explained and it covers 5.195 of the Eigen values.

Stakeholder Metrics

This factor covers four KPI. These are stakeholder value, sales profit, innovations, and return on investment (ROI). The factor loading ranges from 0.898 to 0.869. The inter-item correlation ranges from 0.835 to 0.777 and item to total correlation ranges from 0.8781 to 0.8361. Here, 19.49% of the variance is explained and it covers 3.899 of the Eigen values.

Flexibility Metrics

This factor covers three KPI. These are volume flexibility, delivery flexibility, and operations flexibility. The factor loading ranges from 0.887 to 0.856. The inter-item correlation ranges from 0.828 to 0.790 and item to total correlation ranges from 0.8742 to 0.8484. Here, 5.653% of the variance is explained and it covers 1.131 of the Eigen values.

Structural model results

The proposed structural model is shown in Fig. I. It has Chi-square = 958.982, Degrees of freedom = 167, Probability level = 0.000. The fit measures are; RMR=0.051, GFI=0.803, NFI=0.900, RFI=0.880, IFI=0.904, TLI=0.900, CFI=0.904. The total effect estimates are shown in Table... The total effect for $f1 \rightarrow f4$ is 0.327, $f1 \rightarrow f2$ is 0.113, and $f3 \rightarrow f1$ is -0.203. All the total effects are significant i.e., greater than 0.05. Hence this model is valid.

The total effect (Table:V) for inventory metrics are; shipping errors (0.89), distribution cost (1.0), lead time (0.97), VMI (0.96), fill rate (0.92), spoilage adjustment (0.99) and

inventory costs (0.95). Here, it is pertinent to mention that the distribution cost plays most significant role followed by spoilage adjustment. It is due to the fact that distribution cost has major component in the supply chain. Also, the garment products are very delicate in nature and defects shall appear during procurement of raw material, production, transportation and display of the final product. Hence, spoilage metric plays an important role. The lead time to customer response is also needed to be taken care of by efficient vendor managed inventory. The vast variety shall lead to shipping errors. All the metrics covered here have a significant total effect. Also, the KPI in these constructs are in consonance with the studies quoted in the Table: I.

The total effect for items on customer metrics are product quality (0.93), process quality (0.91), return adjustment (0.97), transaction satisfaction (1.0), product personality (0.95), and customer response time (0.99). Here, transaction satisfaction plays most dominating role followed by customer response time. It is pertinent to mention that these metrics are important to attract customers. The return adjustment is also important for retaining customers. The product quality, process quality, and product personality are helpful to attract customers. All the KPI mentioned here are in consonance with the studies quoted in the Table: I.

The total effect on the flexibility metrics are volume flexibility (1.0), operations flexibility (0.96) and delivery flexibility (0.92). Here, volume flexibility plays most significant role followed by operations flexibility and delivery flexibility. It is pertinent to mention that qualified customers visit organized garment stores. They compare product quality with price and quantity. Many times they purchase in bulk for less price. Also, to satisfy customers' operations and delivery flexibility is needed. All the KPI mentioned here are in consonance with the studies quoted in the Table: I.

The total effect for the stakeholder metrics are stakeholder value (1.0), sales profits (0.95), innovations (0.97), and return on investment (0.92). Here, stakeholder value plays most significant role. It is pertinent to mention that the stakeholders are investing in the business. They shall remain part of the business if satisfied otherwise shall depart. Innovations are needed for competing the competitors. The ultimate objective of the business is to maximize sales for better return on investment. All the metrics mentioned here are in consonance with the studies quoted in the Table: I.

Table II: Mean, corrected item-to-total correlation and communality for key performance indicators

SN	Items	Mean	Corrected item-total	communality	
				Initial	final

			correlation		
I1	Product Quality	3.8741	.5278	1.00	.975
I2	Cust Response Time	3.9244	.5063	1.00	.949
I3	Return Adjustment	3.9169	.5034	1.00	.968
I4	Process Quality	3.9144	.5088	1.00	.968
I5	Product Personality	3.9144	.5083	1.00	.967
I6	Transaction Satisfaction	3.9169	.5050	1.00	.920
I7	Spoilage Adjustment	3.9723	.5171	1.00	.923
I8	VMI	3.9899	.5450	1.00	.954
I9	Lead Time	4.0000	.5618	1.00	.837
I10	Fill Rate	4.0252	.5324	1.00	.722
I11	Inventory Cost	4.0403	.5059	1.00	.758
I12	Distribution Cost	4.0126	.5381	1.00	.805
I13	Shipping Errors	2.2796	.5380	1.00	.753
I14	Operations Flexibility	3.9673	.5441	1.00	.850
I15	Volume Flexibility	3.9698	.5721	1.00	.821
I16	Delivery Flexibility	3.9698	.5402	1.00	.653
I17	ROI	4.1763	.5390	1.00	.708
I18	Sales Profit	4.1788	.5626	1.00	.975
I19	Stakeholder Value	4.1839	.5314	1.00	.949
I20	Innovations	4.1839	.5347	1.00	.968
Statistics for Scale:					
(Mean=78.4106; Variance=71.9648, Std Dev=8.4832, N of Variables=20; N of cases=397; alpha=.8335)					

Table III: Correlation matrix of key performance indicators

	11	12	9	8	10	7	13	2	5	6	3	4	1	19	18	20	17	15	16	14	
K11	1.0																				
K12	.76	1.0																			
K90	.78	.80	1.0																		
K84	.71	.81	.81	1.0																	
K103	.79	.78	.81	.76	1.0																
K79	.70	.74	.78	.83	.73	1.0															
K139	.77	.94	.82	.77	.79	.75	1.0														
K21	.04	.07	.09	.06	.07	.05	.08	1.0													
K57	.04	.10	.10	.07	.08	.07	.07	.81	1.0												
K63	.05	.08	.08	.06	.12	.06	.11	.84	.83	1.0											
K33	.05	.08	.07	.06	.10	.07	.09	.85	.80	.81	1.0										
K41	.08	.09	.08	.10	.09	.07	.10	.82	.81	.81	.81	1.0									
K19	-.01	.09	.09	.15	.05	.17	.06	.76	.80	.74	.74	.74	1.0								
K19	-.17	-.12	-.17	-.15	-.19	-.17	-.17	-.17	-.15	-.15	-.17	-.16	-.16	1.0							
K18	-.13	-.14	-.17	-.17	-.18	-.13	-.18	-.17	-.15	-.16	-.17	-.17	-.15	.81	1.0						
K20	-.15	-.14	-.14	-.17	-.15	-.15	-.13	-.19	-.17	-.17	-.19	-.18	-.16	.83	.78	1.0					
K17	-.14	-.15	-.16	-.18	-.13	-.15	-.17	-.21	-.19	-.17	-.21	-.20	-.18	.78	.78	.77	1.0				
K15	.28	.26	.31	.29	.28	.25	.25	.03	.01	-.01	.03	.06	.01	.38	.32	.38	.34	1.0			
K16	.24	.29	.31	.25	.29	.24	.28	.03	.03	.01	.03	.02	.01	.36	.32	.40	.36	.82	1.0		
K14	.25	.26	.28	.27	.29	.26	.24	.01	-.01	-.02	.04	.01	-.00	.39	.39	.43	.37	.82	.79	1.0	

Table IV: Factor analysis results for key performance indicators

	Factors			
	Inventory metrics (f1)	Customer metrics(f2)	Stakeholder metrics(f3)	Flexibility metrics(f4)
Inventory Cost	.923			
Distribution Cost	.921			
Lead Time	.901			
VMI	.890			
Fill Rate	.878			
Spoilage Adjustment	.870			
Shipping errors	.864			
Cust Response Time		.926		

Product Personality		.921		
Transaction Satisfaction		.919		
Return Adjustment		.911		
Process Quality		.908		
Product Quality		.873		
Stakeholder Value			.898	
Sales Profit			.895	
Innovations			.876	
ROI			.869	
Volume Flexibility				.887
Delivery Flexibility				.867
Operations Flexibility				.856
Eigen values	6.563	5.195	3.899	1.131
% variance	32.81	25.97	19.49	5.653
Cumulative % variance	32.81	58.79	78.28	83.973
Scale Reliability alpha	0.9624	0.9606	0.9401	0.9305
Kaiser-Meyer-Olkin Measure of Sampling Adequacy=.878, Bartlett's Test of Sphericity (Chi-Square=8890.759, Df=190, Sig.=0.00) Mean=79.39				

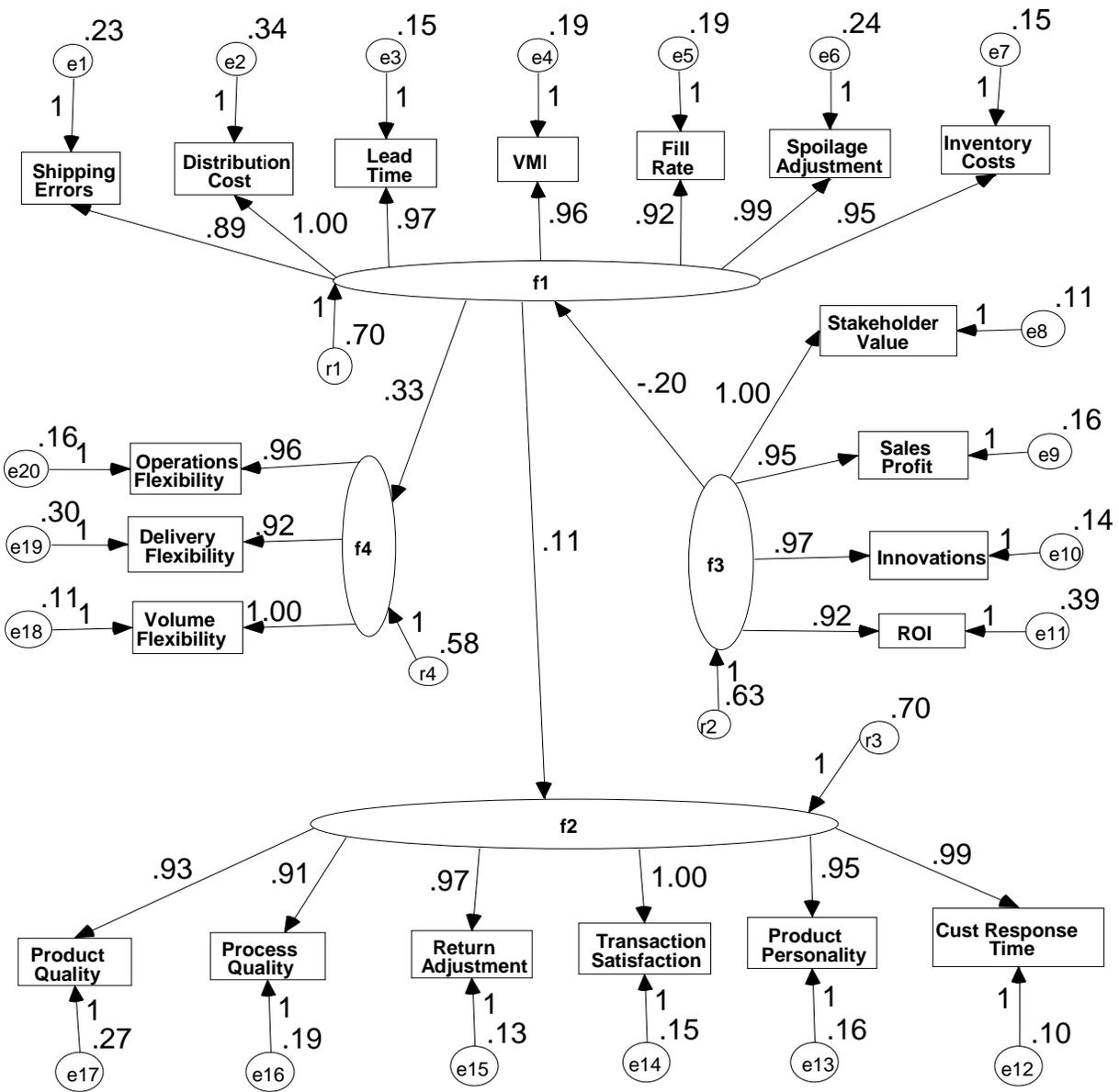


Fig. I: Structural model for measuring supply chain performance

Table V: Total effect estimates for key performance indicators

SN	Effect Estimates				
		f3	f1	f4	f2
Total Effect	f1	-0.203	0.000	0.000	0.000
	f4	-0.067	0.327	0.000	0.000
	f2	-0.023	0.113	0.000	0.000
Direct Effect	f1	-0.203	0.000	0.000	0.000
	f4	0.000	0.327	0.000	0.000
	f2	0.000	0.113	0.000	0.000
Indirect Effect	f1	0.000	0.000	0.000	0.000
	f4	-0.067	0.000	0.000	0.000
	f2	-0.023	0.000	0.000	0.000

Chi-square = 958.982, Degrees of freedom = 167; Probability level = 0.000. RMR=0.051, GFI=0.803, NFI=0.900, RFI=0.880,IFI=0.904, TLI=0.900, CFI=0.904

VI. CONCLUSION, LIMITATIONS AND FUTURE RESEARCH

The model developed to evaluate SC performance of OGR has been shown in the Fig. I. All the twenty KPI are well arranged to meet the SC performance measurement requirements. The first most important group of KPI is *inventory metrics*. Here, seven KPI are suggested to measure the SC performance of this node. This nodal point needs to be supported by another SC node i.e., *flexibility metrics*. The flexibility metrics focus on operations, delivery and volume of the inventory. Also, keeping in view the customer requirements, *customer metric* has developed another nodal point for assessing SC performance. This nodal point has the support of six KPI. Here, organized garment retailers do their best to attract and retain customers. The *stakeholder metric* presents the final nodal point for assessing SC performance. This nodal point has four KPI to project the monetary outcome of the business.

This model has projected the structural relationship among KPI. It shall help OGR professionals to understand and make use of limited sets of KPI. However, focusing on a large number of KPI shall be confusing and leading to inefficiency. Also, it need to be noted that all the SC nodes are connected directly and indirectly to meet the business goals. Hence, all the nodal points are important for better SC performance. Here, practitioners shall be helped by dividing the SC into nodes for better management. This nodal formulation shall help to answer the questions; (1) How to construct SC nodes ?; (2) How to fix responsibility ? and (3) How to improve SC performance?

Despite the statistical sophistication of structural equation modeling, this research has the main limitations: (1) we could not contact better lot from the top management; (2) the SC performance assessment has a major role of organizational culture; (3) the OGR professional hesitate to respond to the questionnaire. However, the purpose here is not to validate the results statistically but to provide insights to develop this sector.

The future research is required to assess the performance of both the organized and unorganized garment retail sector. This shall help us to understand the gap between them. Also, it is needed to compare the performance national and international players in this sector.

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Acoustic Transverse Transmission Loss from ducts with Flat-oval Configuration with Anechoic Termination using Spline Interpolation Coefficients

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Abstract- This paper describes a predictive model for acoustic transverse transmission loss from ducts with flat oval configuration of finite length. The transmission mechanism is essentially that of “mode coupling”, whereby higher structural modes in the duct walls get excited because of non-circularity of the wall. Effect of geometry has been taken care of by evaluating Fourier coefficients of the radius of curvature. Emphasis is on understanding the physics of the problem as well as analytical modeling. Effects of the flat ovality, curvature have been demonstrated. With Anechoic termination, progressive approach modeling has been adopted in this paper.

Index Terms- Flat oval ducts, Acoustics, Transverse Transmission loss, anechoic termination, Progressive Wave

I. INTRODUCTION

Among the non-circular shells of practical use in automobile industry, after elliptical shells, flat oval shells are of utmost importance. Generally, when space constraints arise under the chassis of automobile for incorporating muffler of circular shape, an elliptical muffler is preferred with minor axis in the vertical direction, so that cross-sectional area is equal to that of the circular shell. But, if that also is unable to match the micro-level space adjustment under the chassis, flat oval shells are preferred that have the advantage of easy manufacturing and adapting to space constraints. Combat Vehicles as well as Heavy Vehicles use this type of configuration if space is a constraint and to reduce the maintenance. In some combat vehicles double flat oval mufflers are used as exhaust ducts. Flat oval shells consist of two semi-circular ducts joined by flat plates as shown below in Figure 1:

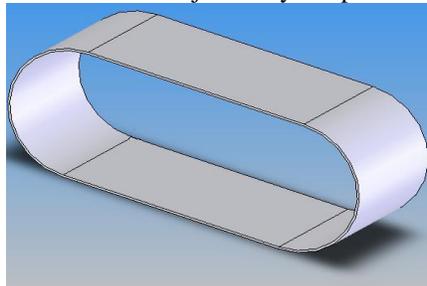


Figure 1: Cross Section of a flat oval duct

However, the Transmission Loss curves for the flat oval ducts are lower than that of ideal circular ducts because of the flat portion. It is known that flat plate radiators are worst of all types of surfaces among the ones that radiate sound.

Cummings [1] analyzed flat oval ducts using finite difference scheme which has its own disadvantages. There is a need for analytical model for prediction of break out noise from flat oval shells.

The approach for finding the Transverse Transmission Loss for Flat Oval duct is same as that of elliptical ducts [2]. However there is a major problem in calculation of Fourier coefficients A_m . For elliptical duct, the curvature varies smoothly with angular coordinate ‘ θ ’ whereas flat oval ducts don’t have continuous curvature in the angular direction.

For a thin non-circular cylindrical shell of constant wall thickness and cross-section as shown in Figure [3], the radius of curvature of the shell is q and this is generally a function of θ , the angular co-ordinate or s , the perimetral co-ordinate, but not of z , the axial co-ordinate.

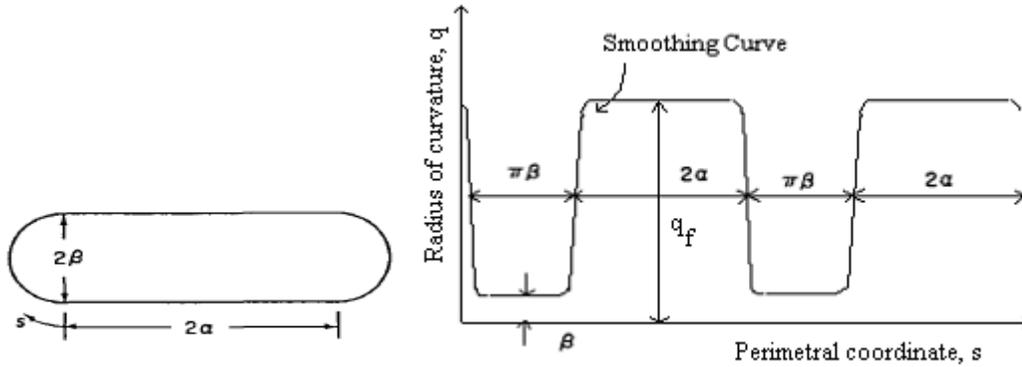


Figure 2: (a) Cross-sectional dimensions of a flat-oval duct; (b) Assumed radius of curvature of walls of a flat-oval duct

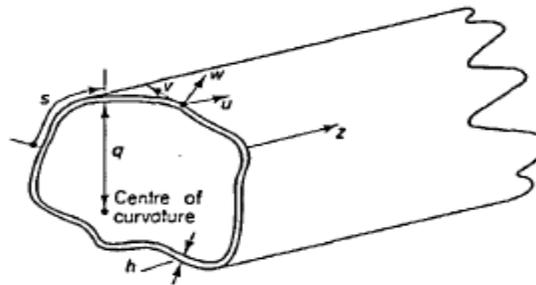


Figure 3: Geometry of a Cylindrical Shell

For a thin non-circular cylindrical shell of constant wall thickness and cross-section as shown in Figure [3], the radius of curvature of the shell is q and this is generally a function of θ , the angular co-ordinate or s , the perimetral co-ordinate, but not of z , the axial co-ordinate. Adopting the Reissner- Naghdi-Berry formulation, governing equations of motion are [3]:

$$\frac{\partial^2 u}{\partial z^2} + \frac{1-\mu}{2} \frac{\partial^2 u}{\partial s^2} + \frac{1+\mu}{2} \frac{\partial^2 v}{\partial z \partial s} + \mu \frac{\partial}{\partial z} \left(\frac{w}{q} \right) - \frac{\ddot{u}}{c_L^2} = 0 \tag{1a}$$

$$\frac{1+\mu}{2} \frac{\partial^2 u}{\partial z \partial s} + \frac{1-\mu}{2} \frac{\partial^2 v}{\partial z^2} + \frac{\partial^2 v}{\partial s^2} + \frac{\partial}{\partial s} \left(\frac{w}{q} \right) - \frac{\ddot{v}}{c_L^2} = 0 \tag{1b}$$

$$\frac{\mu}{q} \frac{\partial u}{\partial z} + \frac{1}{q} \frac{\partial v}{\partial s} + \frac{w}{q^2} + \frac{h^2}{12} \nabla^4 w + \frac{\ddot{w}}{c_L^2} = \frac{p}{h\rho_p c_L^2} \tag{1c}$$

where u , v and w are the wall displacement components in the axial, azimuthal and radial directions respectively, c_L , ρ_p , and μ are (respectively) the longitudinal wave speed in, and the density and Poisson's ratio of, the shell material, h is the shell thickness, a is the average radius of the shell, 'p' is the pressure difference (internal minus external pressure) across the shell (generally a function of s and z) and $\nabla^2 = \partial^2/\partial z^2 + \partial^2/\partial s^2$.

In Eq. (1), the radius of curvature q , of the shell, as a function of the perimetral co-ordinate s (See Figure 3-- u , v and w are the orthogonal wall displacement components), and its first, second and third derivatives with respect to s , appear. This could cause difficulty in solving the equations of motion for a flat-oval duct, because q is constant over the curved duct walls, but tends to infinity on the flat walls as shown in Figure 2(a). Thus q , and of course its derivatives, are discontinuous. To overcome this problem, q is made very large, but finite, on the flat walls and a half-sinusoid "smoothing function" is used to give a smooth variation in $q(s)$, $q|$, $q|'$ and $q|''$ between flat and curved walls. Only a subtle alteration of the actual geometry (which has no significant effect on the structural motion) is thereby created, but the solution of the equations of motion is facilitated. Figure 2(a) shows the characteristic dimensions of the duct cross-section and Figure 2(b) shows the assumed variation of q with s ; here, q_f is the radius of curvature of the flat walls which is assumed to be very large compared to β .

II. FOURIER COEFFICIENTS OF FLAT OVAL DUCT

To find the Fourier coefficients A_m , expressions for radius of curvature (q) throughout the perimeter must be known. So at the region of discontinuity radius of curvature is assumed to be SPLINE polynomial of third degree, so that even third order derivative with respect to perimetral coordinate exists.

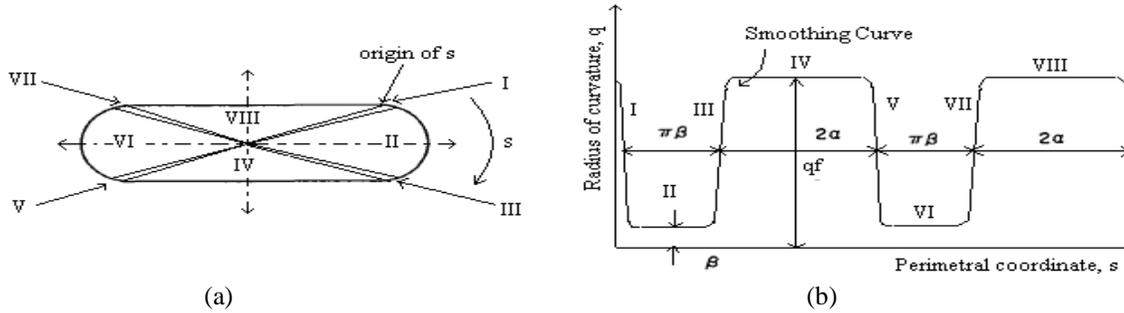


Figure 4: a) Perimetral division of flat oval duct into 8 parts, b) Representation of the radius of curvature with respect to perimetral coordinate

Let us adopt ζ (zeta), a very the small number (of the order 10-3), to represent the perimetral divisions in the 8 parts shown in the Figure 4. These may be represented in terms of the perimetral coordinate 's' as follows.

- I at $s = 0, q = q_f$ and at $s = (2\alpha + \pi\beta)\zeta, q = \beta$
- II at $s = (2\alpha + \pi\beta)\zeta, q = \beta$ and at $s = 2\alpha\zeta + \pi\beta(1 - \zeta), q = \beta$
- III at $s = 2\alpha\zeta + \pi\beta(1 - \zeta), q = \beta$ and at $s = 2\alpha\zeta + \pi\beta + 2\alpha\zeta, q = q_f$
- IV at $s = 2\alpha\zeta + \pi\beta + 2\alpha\zeta, q = q_f$ and at $s = 2\alpha\zeta + \pi\beta + 2\alpha(1 - \zeta), q = q_f$
- V at $s = 2\alpha\zeta + \pi\beta + 2\alpha(1 - \zeta), q = q_f$ and at $s = 2\alpha\zeta + \pi\beta + 2\alpha + \pi\beta\zeta, q = \beta$
- VI at $s = 2\alpha\zeta + \pi\beta + 2\alpha + \pi\beta\zeta, q = \beta$ and at $s = 2\alpha\zeta + \pi\beta + 2\alpha + \pi\beta(1 - \zeta), q = \beta$
- VII at $s = 2\alpha\zeta + \pi\beta + 2\alpha + \pi\beta(1 - \zeta), q = \beta$ and at $s = 2\alpha\zeta + \pi\beta + 2\alpha + \pi\beta + 2\alpha\zeta, q = q_f$
- VIII at $s = 2\alpha\zeta + \pi\beta + 2\alpha + \pi\beta + 2\alpha\zeta, q = q_f$ and at $s = 2\pi\beta + 4\alpha, q = q_f$

Defining 's' points in all regions as I: s_1 to s_2 ; II: s_2 to s_3 ; III: s_3 to s_4 ; IV: s_4 to s_5 ; V: s_5 to s_6 ; VI: s_6 to s_7 ; VII: s_7 to s_8 ; VIII: s_8 to S ,

- $s_1 = 0$
- $s_2 = (2\alpha + \pi\beta)\zeta$
- $s_3 = 2\alpha\zeta + \pi\beta(1 - \zeta)$,
- $s_4 = 2\alpha\zeta + \pi\beta + 2\alpha\zeta$
- $s_5 = 2\alpha\zeta + \pi\beta + 2\alpha(1 - \zeta)$
- $s_6 = 2\alpha\zeta + \pi\beta + 2\alpha + \pi\beta\zeta$
- $s_7 = 2\alpha\zeta + \pi\beta + 2\alpha + \pi\beta(1 - \zeta)$
- $s_8 = 2\alpha\zeta + \pi\beta + 2\alpha + \pi\beta + 2\alpha\zeta$
- $S = 2\alpha\zeta + \pi\beta + 2\alpha + \pi\beta + 2\alpha(1 - \zeta) = 2\pi\beta + 4\alpha$

So, from the above values we find the SPLINE interpolation polynomial for regions I, III, V and VII. In region II, $q = \beta$; in region IV, $q = q_f$; in region VI, $q = \beta$ and in region VIII, $q = q_f$.

Denoting $\beta = \text{beta}$; $\zeta = \text{zeta}$; $\alpha/\beta = \text{delta}$; $q_f = \text{cu} * \text{beta}$ (cu is of order 25) and $\pi = \text{pi}$, the SPLINE interpolating polynomials for regions I, III, V and VII are being obtained using MAPLE-Symbolic Package.

Ratio of radius of curvature square to average radius square in terms of Fourier coefficients as

$$\frac{q_f^2}{\text{average radius}^2} = \sum_{m=0}^{\infty} A_m \cos\left(\frac{2\pi m s}{S}\right) \tag{2}$$

If q_x is the radius of curvature in the region 'x' (x=I to VIII), then average radius can be found for the flat oval duct as avr_f (flat oval) = $\sqrt{(\text{Area of duct}/\pi)}$, Area of duct (A_f) = $\pi\beta^2 + 4\alpha\beta$, Perimeter of duct (S) = $2\pi\beta + 4\alpha$, $\text{costerm} = \cos(2\pi m s/S)$ (where 'm' is mode number), s_1 to s_8 and S are defined already.

A_m is found for the given mode along the perimeter (S) for i^{th} region as follows:

$$\frac{1}{S} \int_{s_x}^{s_{x+1}} \frac{q_x^2}{\text{avr}_f^2} \text{costerm} ds \quad (x = I, II, \dots, VIII) \tag{3 a, b, c, d, e, f, g, h}$$

In region x, $A_{mx} =$

So, finally $A_m = A_{mI} + A_{mII} + A_{mIII} + A_{mIV} + A_{mV} + A_{mVI} + A_{mVII} + A_{mVIII}$ (4)

III. ANALYTICAL STUDIES USING PROGRESSIVE WAVE APPROACH (ANECHOIC TERMINATION)

With the end termination as anechoic i.e., Reflection Coefficient $R \sim 0$ which generates a progressive wave pattern in the flat oval duct. For obtaining Radial Wall Displacement W_m same procedure as mentioned in Ref [3] of Eq.34 is adopted. The wall displacement components are written in terms of positive traveling waves only,

$$u = U(s)e^{i(\omega t - k_z z)}, v = V(s)e^{i(\omega t - k_z z)}, w = W(s)e^{i(\omega t - k_z z)} \tag{5 a-c}$$

(k_z being the axial wave number)

$$U(s) = \sum_{m=0}^{\infty} U_m \cos\left(\frac{2\pi m s}{S}\right), V(s) = \sum_{m=0}^{\infty} V_m \sin\left(\frac{2\pi m s}{S}\right) \tag{6 a, b}$$

$$W(s) = \sum_{m=0}^{\infty} W_m \cos\left(\frac{2\pi m s}{S}\right) \tag{6 c}$$

The acoustic pressure within the duct may be written as

$$p = P e^{i(\omega t - k_z z)} \tag{7}$$

Substituting equations (5) to (7) in the Eq. (1) and assuming without plane strain approximation, we get

$$\left[\frac{\omega^2}{c_L^2} - k_z^2 - \left(\frac{1-\mu}{2}\right) \left(\frac{2\pi m}{S}\right)^2 \right] U_m - ik_z \left(\frac{1+\mu}{2}\right) \left(\frac{2\pi m}{S}\right) V_m - \frac{ik_z \mu}{avr_f} W_m = 0 \tag{8a}$$

$$ik_z \left(\frac{1+\mu}{2}\right) \left(\frac{2\pi m}{S}\right) U_m + \left[\frac{\omega^2}{c_L^2} - \left(\frac{2\pi m}{S}\right)^2 - \left(\frac{1-\mu}{2}\right) k_z^2 \right] V_m - \left(\frac{1}{avr_f}\right) \left(\frac{2\pi m}{S}\right) W_m = 0 \tag{8b}$$

$$\left[-ik_z (avr_f) \mu \right] U_m + avr_f \left(\frac{2\pi m}{S}\right) V_m + \left[1 - \frac{\omega^2 avr_f^2}{c_L^2} \right] W_m = (P avr_f^2 / h\rho_p c_L^2) A_m \tag{8c}$$

In the above equations it is assumed that at differential scale ‘q’ is constant and equals to average radius of flat oval duct ‘avr_f’, so q¹ is zero.

In the present context $k_z = k_o$. On further simplification using equations (8(a)), (8(b)) and (8(c)), W_m can be expressed in terms of A_m as:

$$W_m = P avr_f^2 A_m \left(h\rho_p c_L^2 \left\{ -ik_o (avr_f) \mu \frac{U_m}{W_m} + avr_f \left(\frac{2\pi m}{S}\right) \frac{V_m}{W_m} + \left[1 - \frac{\omega^2 avr_f^2}{c_L^2} \right] \right\} \right)^{-1} \tag{8d}$$

Substituting A_m from Eq. (4) in the above Eq. (8(d)) we can evaluate the radial wall displacement W_m .

For obtaining radiation from the duct walls the procedure is same as in Ref [4]. And Transverse Transmission Loss can be evaluated by means of equations (9) and (10), and incorporating cubic spline functions for calculating Fourier Coefficients A_m .

The internal sound power is calculated as

$$\Pi_i = \frac{\pi a^2 P^2}{2\rho_o c_o} \tag{9}$$

(Where P is the unit internal sound pressure amplitude). The sound transmission loss of the duct wall is defined as the logarithmic ratio between the internal sound power per unit cross-sectional area and the radiated sound power per unit surface area and is given by

$$TTL = 10 \log \left(\frac{2L \Pi_i}{a \Pi_t} \right) \tag{10}$$

IV. RESULTS AND DISCUSSION

Based on the approach given in the section 3, a code is developed in MATLAB for the flat oval shell. Transverse Transmission loss vs. Frequency curves are plotted for the flat oval duct and ideal circular duct, i.e., DUCT I of reference [4]. Figure 5 show that the flat oval shell would radiate much more breakout noise than the equivalent circular shell. Average radius of duct is taken same as DUCT I, i.e., 0.178 m; α as 0.0255 m and β as 0.1625 m (From Figure 2(a)).

Data of h , a , ρ_p , E , η , μ specify the rest of the “system parameters” for Duct I without loss of generality. Values are $h=1.22$ mm, $a=0.178$ m, $\rho_p=7800$ kg/m³, $E=210$ GPa, $\eta=0.1$, $\mu=0.3$.

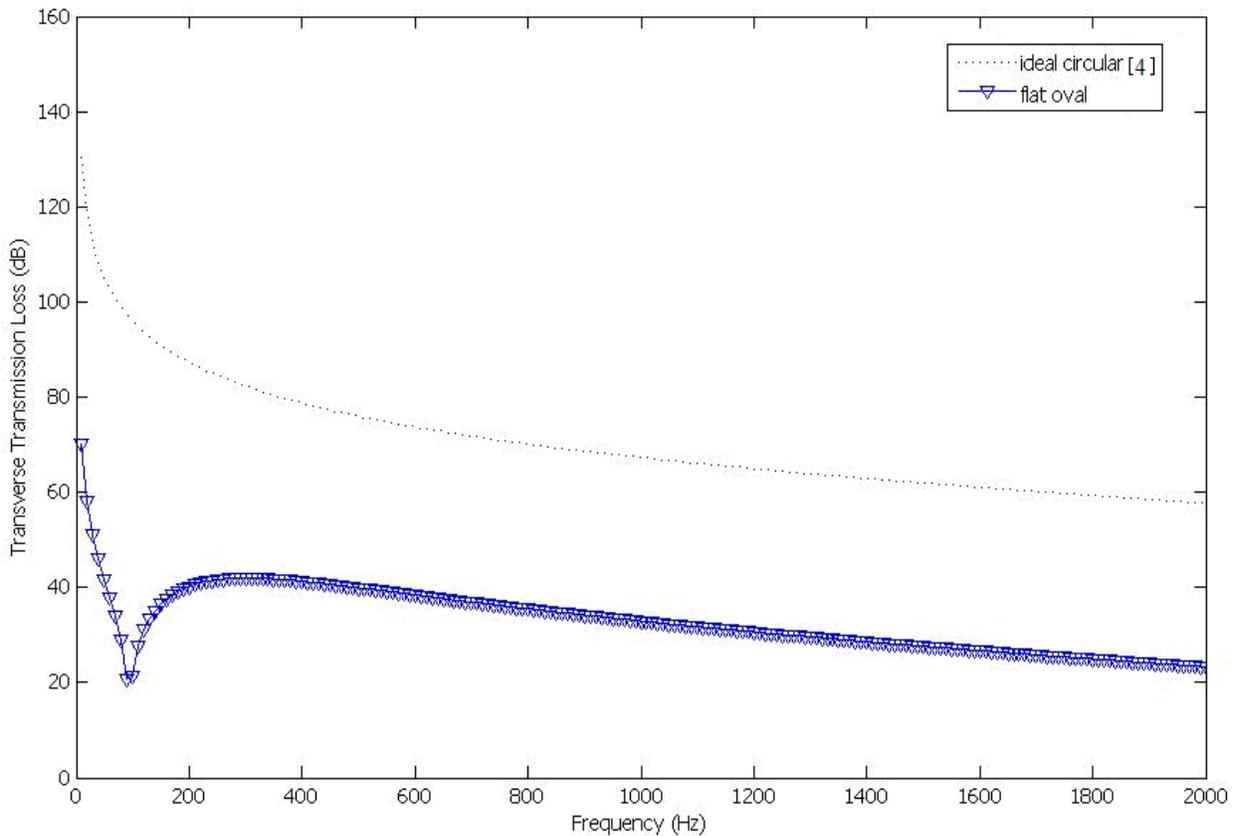


Figure 5: Comparison of the flat oval duct with an equivalent ideal circular duct using progressive wave approach

Comparison with experimental results from reference [1] (DUCT II) is done here and experimental results which were measured at one-third octave band frequency are shown in Figure 6.

Experimental estimation of transverse transmission Loss has been obtained from Ref [1]. Analytical predictions are following the same pattern as obtained from the experiments. Some deviation from experimental results can be observed at lower frequencies. This may be due to the effect of localized flattening at the seam weld in the experimental duct. Impact of flat portion on the acoustic transverse transmission loss has been confirmed with this analytical evaluation. In general the physics of the problem has been understood and corroborated with Ref [1, 4].

Flat-oval Configuration of ducts which are of generic type when used in specific space optimization industrial equipment for exhaust systems can be verified with the results presented here. The spline interpolation assumption is a novel approach for the analytical modeling. An experimental study for every configuration seems to be tedious and time consuming. An analytical study not only gives a feel of the physics of the problem but also reduces time of design considerably.

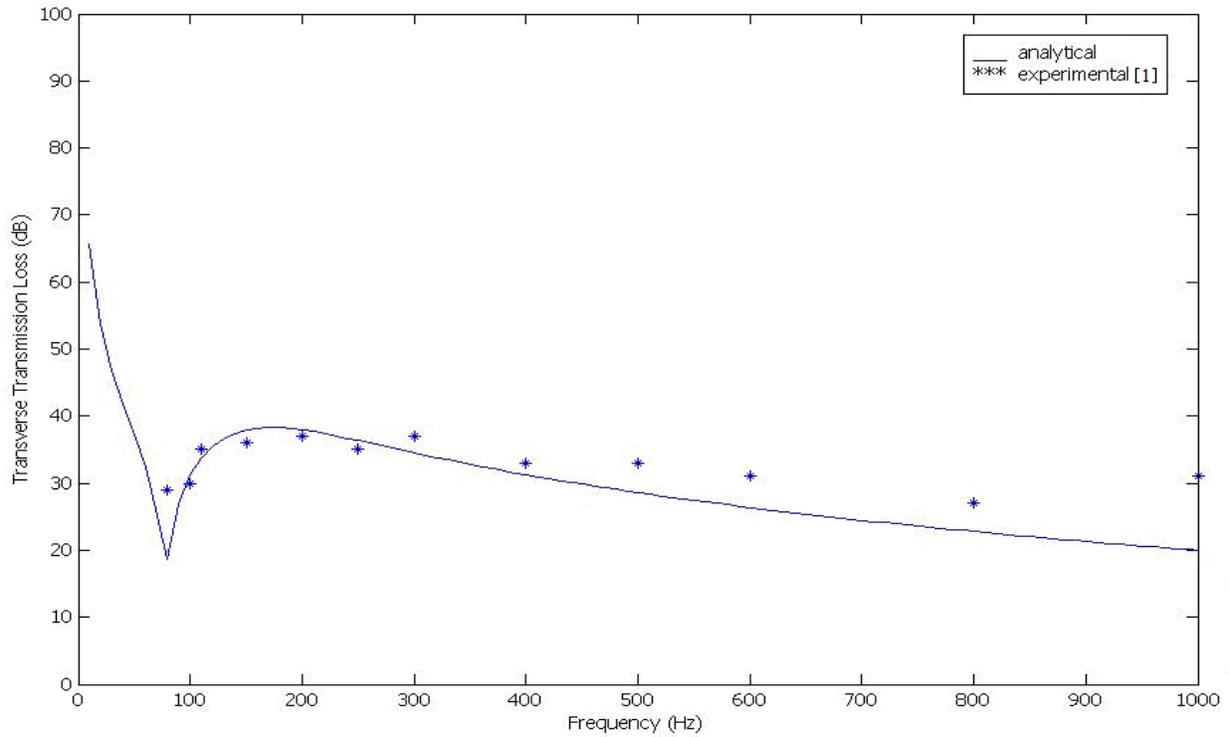


Figure 6: Comparison between analytical and experimental results for the flat oval duct using the progressive wave approach-anechoic termination

With the variation in length of the shell effect of transverse transmission loss had been plotted in Figure 7. From Figure 7 it is observed that for frequencies up to 1000 Hz, 20 m duct has higher TTL, while above this frequency, TTL is almost same. This is due to the fact that up to 1000 Hz the higher structural modes tend to radiate sound power principally from the ends of the duct, because of scattering effects. This means that the radiated power per unit length will decrease as the duct length increases.

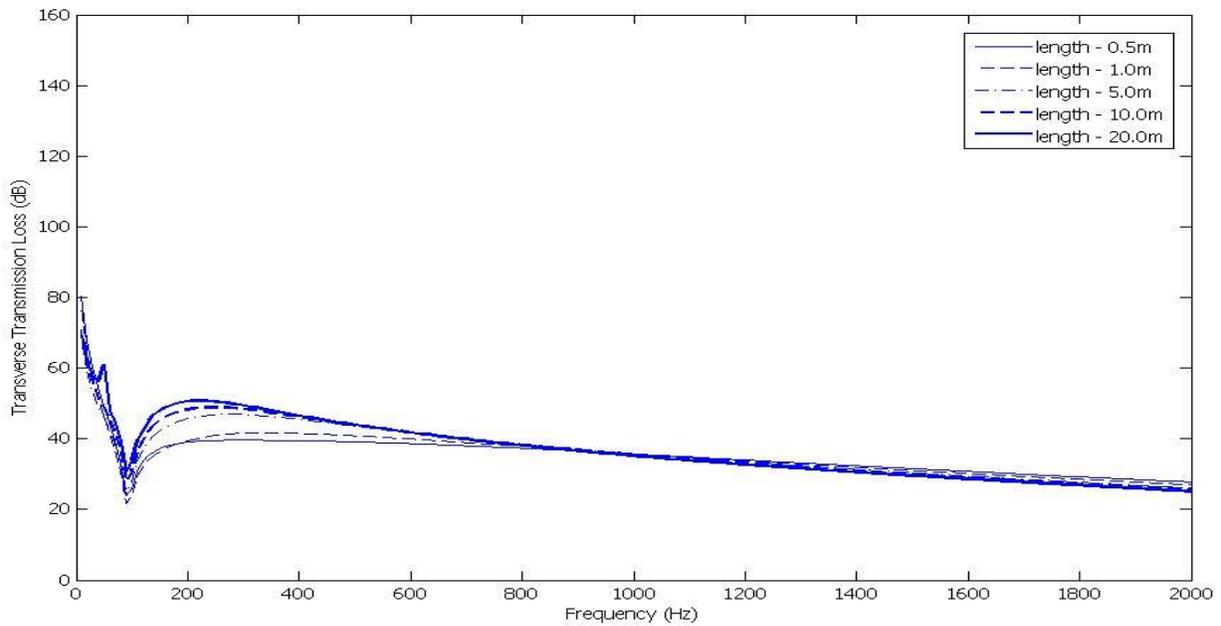


Figure 7: Effect of the length on prediction of transverse transmission loss for flat oval duct with anechoic termination

Comparison is made with flat oval duct, rectangular duct, ideal circular duct and elliptical duct. Here, equivalent radius of ideal circular duct, elliptical duct, flat oval duct and rectangular duct is assumed to be same. Length of the ideal circular duct, elliptical duct, flat oval duct and rectangular duct is the same i.e., 1.17 meters (rectangular duct dimensions) as in reference [5]. Ovality of elliptical duct is taken as 0.5.

Rectangular duct dimensions:

Width =0.206 m; Height =0.258; Length of duct =1.17 m; thickness=1.295 mm; Young's Modulus =1.816 E11 N/m², density of shell=8278 Kg/ m³ ; poissons ratio =0.291 and loss factor=0.01

Using the above Rectangular duct dimensions equivalent dimension of ideal circular duct is obtained as 0.13 meters which is the radius of the duct.

Using the above Rectangular duct dimensions equivalent dimension of elliptical duct is obtained as 0.1839 meters which is the length of major axis and 0.0919 meters as length of minor axis with ovality 0.5.

Using the above Rectangular duct dimensions equivalent dimension of flat oval duct is obtained as 0.0187(α) meters which is the length flat portion and 0.1187(β) meters as the radius of the circular portion.

Comparison is made for anechoic termination which is shown in Figure 8 and it is observed that for anechoic termination TTL of ideal circular duct is the highest, TTL of elliptical duct lies between ideal circular duct and flat oval duct and TTL of rectangular duct is the least.

For anechoic end termination Transverse Transmission Loss for flat oval duct with different delta values is plotted in Figure 9. Here delta is the ratio of alpha to beta ($\delta = \alpha/\beta$). With an increase in this value delta (ovality of flat oval duct) there is an increase in the radiated power from the flat portion of flat oval duct which signifies a decrease in Transverse transmission Loss. It can be observed from Figure 9 that even a little ovality ($\delta = 0.1$) of flat oval duct results in a large decrease in TTL with respect to the ideal circular duct. Interestingly, further increase in ovality ($\delta = 0.5$) results in only a little additional deterioration, and the resulting TTL remains significantly higher than that of an equivalent rectangular duct which has comparatively little transverse stiffness.

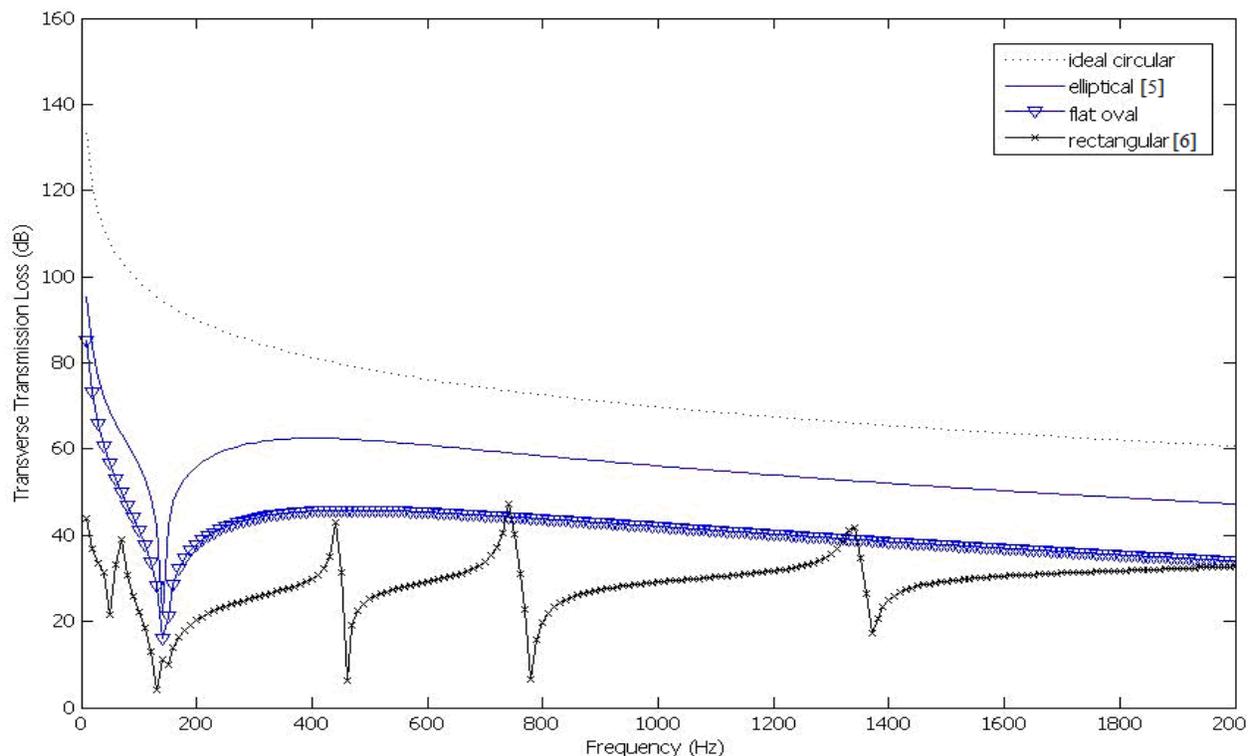


Figure 8: Comparison between ideal circular, elliptical, flat oval and rectangular duct with anechoic termination

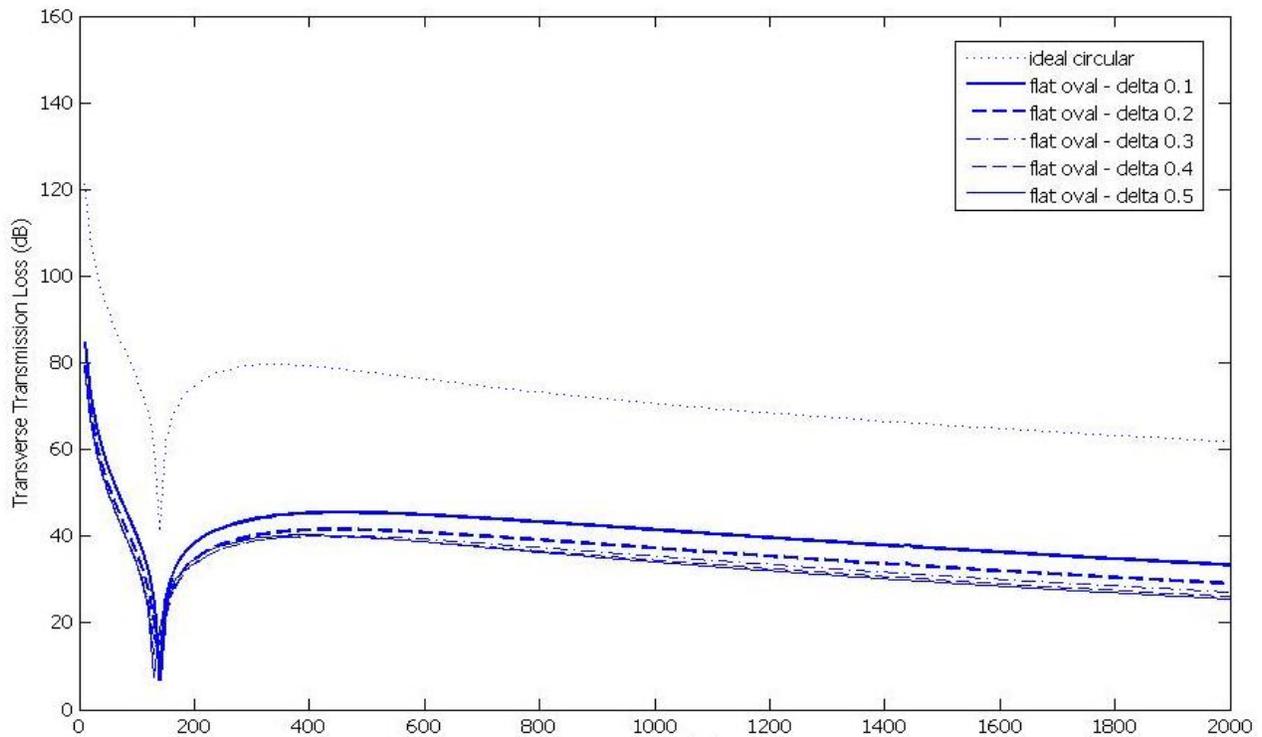


Figure 9: Effect of delta (a/β) value on the transverse transmission loss for flat oval duct with anechoic termination

V. CONCLUSION

The analytical model has been formulated successfully for a flat oval duct with anechoic termination. Progressive approach acoustic transverse transmission loss has been obtained for flat oval configuration. Results found are well in good agreement with published results of Ref [1]. First Resonance has been observed for flat oval ducts at much lower frequencies in comparison with the circular ducts. With this approach engineers can evaluate the feasibility of using the flat oval ducts instead of circular ducts where space optimization is important.

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Point Prevalence of Gastrointestinal Helminthiasis in large Ruminants of Jammu, India

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Abstract- The present study was carried out to determine the prevalence of gastrointestinal helminthiasis in large ruminants (cattle and buffalo) in Jammu area of J&K. For this purpose, 310 faecal samples were collected from cattle and buffalo from different areas of Jammu. Parasitological procedures used for the identification of helminthes were direct and indirect methods. The overall prevalence of helminthiasis was 51.29 % (67.15% in case of cattle and 38.72% in case of buffaloes). Helminthic infection was recorded throughout the year with seasonal variations.

Index Terms- Gastrointestinal helminthiasis, large ruminants, Prevalence, Jammu

I. INTRODUCTION

The prevalence of helminthes in tropical and subtropical areas has reduced production potential of livestock development programmes by causing countless deaths and economic losses (Al-Quaisy *et al.*, 1987). Helminthic infection is a major constraint of livestock and causes great economic losses to dairy industry of retarded growth, low productivity and increased susceptibility of animals to other diseases. In spite of significant production losses, which may run into millions of rupees (Jithendran and Bhat 1999), the problem is persisting because of chronic and insidious nature. Helminthiasis adversely affects ruminants e.g. hematological and biochemical disturbances (Iqbal *et al.*, 1998 and Hayat *et al.*, 1999). The incidence of parasites in cattle and buffaloes has been reported from different states of India (Krishna *et al.*, 1989; Hirani *et al.*, 1999 and Aggarwal *et al.*, 2002). In Jammu and Kashmir the incidence has been reported by Alam *et al.*(1994), Raina *et al.*,(1999), Pandit *et al.*,(2004), Yadav *et al.*,(2004), Hassan *et al.*,(2005) and Kuchay *et al.*,(2011). The present investigation records and highlights the prevalence and other epidemiological parameters of gastrointestinal helminthiasis of large ruminants of Jammu in order to add more information to already existing data.

II. MATERIALS AND METHODS

Study area and sample collection

The study subtropical area is located between 74.24^o and 75.18^o and between 32.50^o and 33.30^o N. The annual rainfall in subtropical Jammu is 1115.9 mm.

In total of 310 faecal samples collected over a period of one year from November 2007 to October 2008 from the study areas like Samba, Akhnoor, Bisnah, Jammu, and R S Pura. The

samples were collected either directly from the rectum or when freshly passed and subjected to direct microscopic examination as well as Sedimentation and floatation methods (Solusby 1982).

Parasitological procedures

Faecal samples were examined for helminth eggs using direct and sedimentation/ floatation techniques (Solusby 1982). Identification of eggs was made according to the description given by Solusby (1982).

III. RESULTS AND DISCUSSION

Out of the 310 samples collected, 159 (51.29%) were found positive for single mixed helminthic infection. Among various infections, maximum incidence was of trematodes (24.83%) followed by nematodes (21.93%) and minimum of cestodes (4.51%). The most prevalent helminth parasites isolated were *Paramphistomum spp.* (20.32%), *Haemonchus spp.* (11.93%), *Trichuris spp.* (5.16%), *Chabertia spp.* (4.83%), *Dicrocillium spp.* (2.58%), *Moniezia spp.* (2.25%), *Stilesia spp.* (2.25%) and *Fasciola spp.* (1.93%) as shown in **Table 1**. The overall prevalence was 67.15% in case of cattle and 38.72% in case of buffaloes as shown in **Table 2**. The infection was recorded maximum in summer and spring and lowest in autumn and winter as shown in **Table 3**.

The present study showed that the highest prevalence of helminthes was recorded in cattle followed by buffaloes because of higher proportion of time spend on grazing by cattle as compared to buffaloes which are grazed proportionally less and kept mainly in stalls for feeding in the present study area. The highest infection of helminth in case of cattle is in agreement with D' Souza *et al.* 1983 who reported 67.22% infection and Maske *et al.*, 1990 who reported 83.46% infection.

The helminthes isolated in the present study are in agreement with the previous findings of Dhar *et al.* 1988; Alam *et al.*, 1994; Raina *et al.*, 1999; Pandit *et al.*, 2004; Yadav *et al.*, 2004 and Kuchay *et al.*, 2011. The present findings are in agreement of the helminthic infection reported in other subtropical areas of the world (McCulloch & Kasimbala, 1968; Taylor & Canthone 1972; Beveridge & Ford, 1982; Pinto *et al.*, 1988; El- Sayed, 1997 and Stear *et al.*, 1998). However, these workers have also recorded the occurrence of other helminthes and this regional variation may be attributed to different geographical distributions, host factors and climatic conditions required for the development of free living stages of the nematodes. The maximum prevalence of amphistomes in the present study is in agreement with Yadav *et al.*, 2004 and

Kuchay *et al.*, 2011. Wallowing habit, easy dispersion of faeces in water and bulk ingestion of grasses near the water sources increases the risk of amphistomes due to availability of intermediate host (Radostitis *et al.*, 1994). Although FAO (1994) recommended strategic dosing against fluke diseases in ruminants in India, non-adaptation of strategic deworming schedule in the region is responsible for high parasitic infection.

The higher helminthic infection as observed in summer and spring months are in agreement with Sanyal (1998) and Agrawal *et al.* (2002).

strategies for the helminthes control in this region of Jammu And Kashmir State

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IV. CONCLUSION

Keeping in view the present findings, it can be concluded that there is urgent need for chemotherapeutic and prophylactic

Table 1: Prevalence of gastrointestinal helminth parasites in large ruminants.

S.No	Species	Total samples examined	Total samples positive	Prevalence percentage
1	<i>Paramphistomum spp.</i>	310	63	20.32
2	<i>Dicrocoelium spp.</i>	310	8	2.58
3	<i>Fasciola spp.</i>	310	6	1.93
4	<i>Trichuris spp.</i>	310	16	5.16
5	<i>Haemonchus spp.</i>	310	37	11.93
6	<i>Chabertia spp.</i>	310	15	4.83
7	<i>Moniezia spp.</i>	310	7	2.25
8	<i>Stilesia spp.</i>	310	7	2.25
	Total	310	159	51.29%

Table 2: Overall prevalence's (%) of helminthes in large ruminants.

Species of Helminth	Cattle	Buffalo
<i>Paramphistomum spp.</i>	29.92	12.71
<i>Dicrocoelium spp.</i>	4.37	1.15
<i>Fasciola spp.</i>	2.18	1.73
<i>Trichuris spp.</i>	8.02	2.89
<i>Haemonchus spp.</i>	14.59	9.82
<i>Chabertia spp.</i>	2.91	6.35
<i>Moniezia spp.</i>	3.64	1.15
<i>Stilesia spp.</i>	1.45	2.89
Total	67.15	38.72

Table 3: Seasonal prevalence of gastrointestinal helminthes in large ruminants.

S.No	Season	No. of samples examined	No. of samples positive	Percentage of infection
1	Summer	81	59	72.83
2	Autumn	71	22	30.98
3	Winter	83	34	40.96
4	spring	75	44	58
	Total	310	159	51.29

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ELECTRICITY GENERATION FROM FOOTSTEPS; A REGENERATIVE ENERGY RESOURCE

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Abstract— A slab of concrete harnesses kinetic energy whenever it is stepped on. This energy, created by 5 millimeters of flex in the material, is then either stored by lithium polymer batteries contained within the slabs or transmitted immediately to streetlights or other electronics located close by. The current model, made from stainless steel, recycled car tires and recycled aluminum, also includes a lamp embedded in the pavement that lights up every time a step is converted into energy (using only 5 percent of the generated energy).

Index Terms- Accidents, Companies, Production, Safety

I. INTRODUCTION

Due to a need to reduce carbon emissions and keep costs down, producing renewable energy is increasingly important for most governments and the tech industry at the moment. With that in mind investments are being made in the popular green energy sectors such as wind, solar, and wave energy. However, people's steps (thousands upon thousands a day) utilize and channel kinetic energy too [1]. An emerging startup called Pavegen has installed such squares of energy-generating pavement in London.

In an effort to keep the production of the pavement as green and sustainable as possible, Pavegen partnered with Ryburn Rubber Limited and Advanced LEDs (which has also invested in the idea) to make sure that its components create as small an environmental impact as possible [4]. The average square of pavement produces about 2.1 watts of electricity. And according to Pavegen, any one square of pavement in a high-foot traffic area can see 50,000 steps a day. Based on this data, only five units of Pavegen pavement can be enough to keep the lights on at a bus stop all night [2]. The company, led by 24-year old founder Laurence Kemball-Cook, says it eventually wants its slabs to power automatic doors, ticket machines, neon signs, and even computers and major appliances.

Pavegen isn't targeting its product exclusively at municipalities. One of its big ideas is to have stores located on busy sidewalks install them in front of their locations to power their signage or any internal electronics. To encourage this adoption, the company says it will brand its slabs for its commercial customers. The slabs installed in East London happen to be green (thus suggesting its clean-tech solution) but they come in a variety of colors [3]. The company believes the embedded lamp is important to inform passersby of their contribution to the clean energy movement.

The startup plans to roll out more Pavegen units in the United Kingdom in the next year, but it envisions installing them one day in Times Square in New York — think of all the electronic displays it could help power there — and other frequented locations in the U.S. One of the ideas pitched on its web site is to install slabs in subway turnstiles where thousands of people — about 36,000 per hour — walk a day to power station electronics.

The system from Pavegen makes a lot of sense in very busy public areas as it will constantly be generating energy which will no doubt mean the system pays for itself very quickly and then continues to cut energy costs, the need for extended power wires and carbon emissions. It also helps that they are self-contained units meaning no expensive digging up of the ground surrounding them, thus making them easy to install [5]. Pavegen is not the only company thinking this way and along their direct competition, we're bound to see many other companies trying to develop their energy harvesting products for all the other activities we carry out regularly.

II. WORKING MECHANISM

As per our reference we are using same technique in our work as shown below. We use one rick and pinion gear system with dynamo fixing with its gear mechanism.

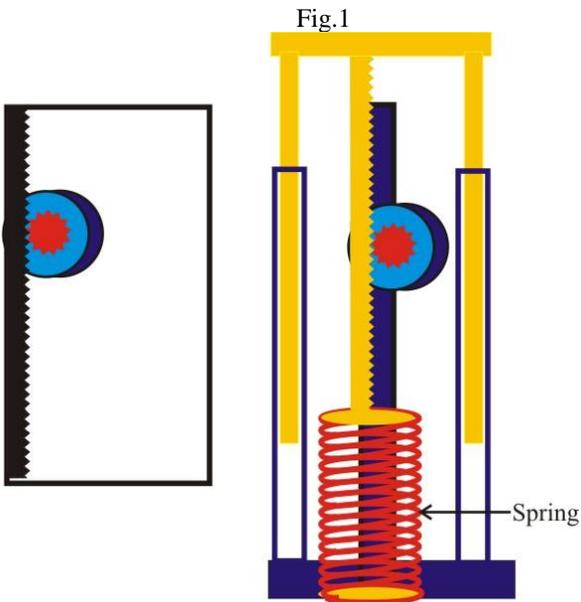
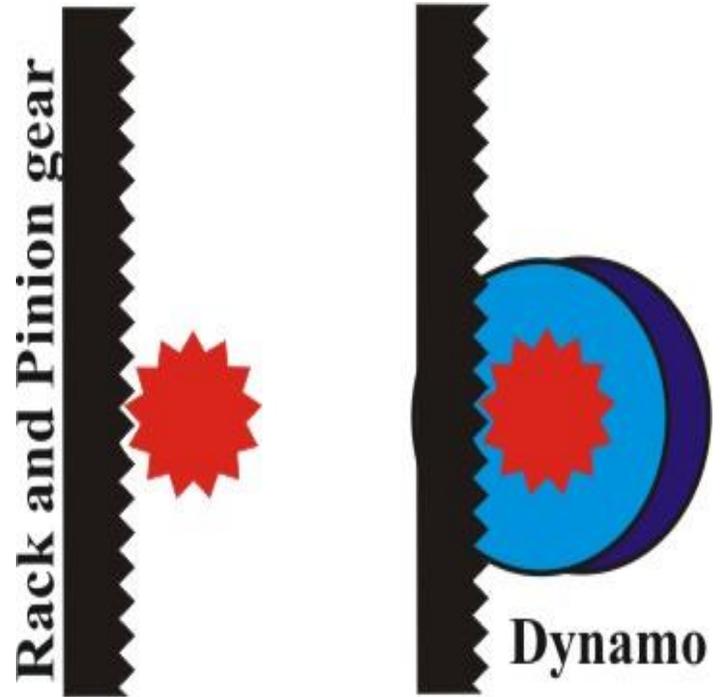


Fig.2

When we press that slider while walking attach spring push back that slider attach dynamo with slider rack and pinion generate current.

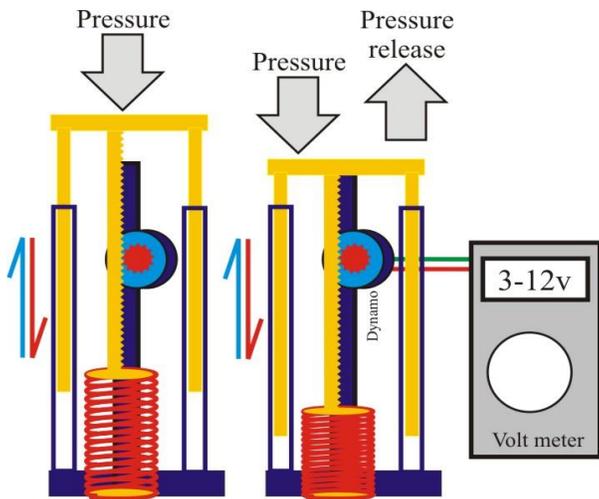


Fig.3

Placement of our project in daily life as a footstep

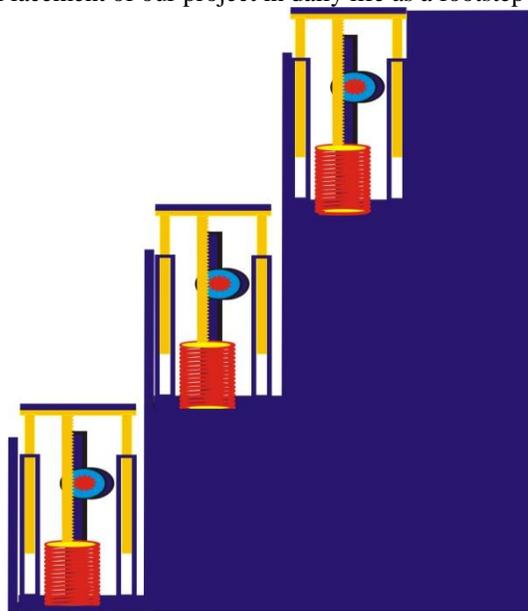


Fig.4

III. COMPONENTS REQUIRED

Dynamo: A dynamo, originally another name for an electrical generator, now means a generator that produces direct current with the use of a commutator. Dynamos were the first electrical generators capable of delivering power for industry, and the foundation upon which many other later electric-power conversion devices were based, including the electric motor, the alternating-current alternator, and the rotary converter. They are rarely used for power generation now because of the dominance of alternating current, the disadvantages of the commutator, and the ease of converting alternating to direct current using solid state methods. The word still has some regional usage as a replacement for the word generator. A small electrical generator built into the hub of a bicycle wheel to power lights is called a Hub dynamo.

Rotary Converter Development: After dynamos were found to allow easy conversion back and forth between mechanical or electrical power, the new discovery was used to develop complex multi-field single-rotor devices with two or more commutators. These were known as a rotary converter. These devices were usually not burdened by mechanical loads, but watched just spinning on their own. The rotary converter can directly convert, internally, any power source into any other. This includes direct current (DC) into alternating current (AC), 25 cycle AC into 60 cycle AC, or many different output currents at the same time [7]. The size and mass of these was very large so that the rotor would act as a flywheel to help smooth out any sudden surges or dropouts. The technology of rotary converters ruled until the development of vacuum tubes allowed for electronic oscillators. This eliminated the need for physically spinning rotors and commutators.

Rack and pinion system: A rack and pinion is a type of linear actuator that comprises a pair of gears which convert rotational motion into linear motion. The circular pinion engages teeth on a linear "gear" bar – the rack. Rotational motion applied to the pinion

will cause the rack to move to the side, up to the limit of its travel. For example, in a rack railway, the rotation of a pinion mounted on a locomotive or a railcar engages a rack between the rails and pulls a train along a steep slope.

The rack and pinion arrangement is commonly found in the steering mechanism of cars or other wheeled, steered vehicles. This arrangement provides a lesser mechanical advantage than other mechanisms such as recirculating ball, but much less backlash and greater feedback, or steering "feel". The use of a variable rack (still using a normal pinion) was invented by Arthur E Bishop, so as to improve vehicle response and steering "feel" especially at high speeds, and that has been fitted to many new vehicles, after he created a specialised version of a net-shape warm press forging process to manufacture the racks to their final form, thus eliminating any subsequent need to machine the gear teeth. For every pair of conjugate involute profile, there is a basic rack. This basic rack is the profile of the conjugate gear of infinite pitch radius. A generating rack is a rack outline used to indicate tooth details and dimensions for the design of a generating tool, such as a hob or a gear shaper cutter.

IV. DESIGN OF MECHANISM

Board (base):- length=56 cm
width=40 cm
thickness=1cm
First stair block:- length=33cm
width=21cm
height=9cm
Second stair:- length=23cm
Third stair:-13cm
Foot space:- length=11cm
width=21cm
Gap from working stair to plate =3cm
Tension spring =1
LED (light emitting diode) =5
Dc dynamo (3-volt) =1
Wires =2mtr.
Slider block: - width=13cm
height=18ccm
Rack: length=7cm
length of teeth cut=5cm
Gear :- teeth=40
pinion :- teeth =12
height = 9cm
slider :- width = 12.5cm
height = 15cm
Black tape=10meters
White ply board = 100cmX50cm
Femi coal= 0.250 kg

V. FUTURE ASPECTS

In future aspects we can use this principal in the speed breakers at high ways where are rushes of the vehicles too much thus increase input torque and ultimate output of generator. If we are used this project at very busy stairs palace then we produce efficient useful electrical for large purposes

VI. ADVANTAGES

- To store the electricity in battery.
- It can be use at any time when it necessary.
- Easy construction.
- Less number of parts required.
- Electricity can used for many purposes

VII. APPLICATIONS

- In street light.
- In LED light for specific purposes.
- In air circulation system for room by the small fans.

- For used in security alarm.

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Application of Robotics in Disaster Management in Land Slides

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Abstract:

In recent years, robots have been applied at different domains to co-ordinate collaborative behavior in distributed systems and providing a powerful basis for proactive applications of complex nature, especially in large scale disasters requiring complex tasks to be performed by groups under extreme time and resource constraints. Now a day's robotics technology is became very popular in all fields of human life. That's why Robotics was chosen as a focal point of this paper of its potentially transformative role both in a positive and negative way in addressing a wide range of development challenges, from climate change, healthcare, and agriculture to housing, transportation, and education. Yet while there is little doubt that technology will continue to be a driver of change across the developing world in the future, the precise trajectory along which technological innovation will travel is highly uncertain. A robot is a machine designed to execute one or more tasks repeatedly, with speed and precision. An important aspect of robotics security systems is surveillance of specified area. All of these tasks are performed mostly by human and trained dogs, often in very dangerous and risky situations. This is why since some years mobile robots have been proposed to help them and to perform tasks that neither humans, dogs nor existing tools can do.

Finally, the paper provides new avenues for effective utilization of automation and robotics through mapping of best practices ,through we try to introduce the fuzzy based interesting application of robotics in disaster management and as well as for security purpose. The robot is controlled by pc or mobile phone. These works mainly focus on target perception and identification and robot localization.

Index Terms: Flying Robot, Wheeled Robot, GPS Communication, ZIGBEE, Automation and Robotics, Post disaster

I. INTRODUCTION

Natural disasters and conflicts continue to devastate communities around the world. It is important to prepare measures for both pre and post disasters to ensure safety and peace of mind to public as well as the environment. In recent years, automation and robots have been applied at different domains to coordinate collaborative behavior in distributed systems and providing a powerful basis for proactive applications of complex nature, especially in large scale disasters requiring complex tasks to be performed by groups under extreme time and resource constraints. A robot is a machine designed to execute one or more tasks repeatedly, with speed and precision. An important aspect of robotic security systems is surveillance of specified area. Interesting application can be seen in robot scanning areas to find explosive devices. Asset and location protection systems using robots allow hands-free operation via pre-operational programming to response to external stimuli. Over the long haul, it is easy to see that security robots can provide significant cost savings, while they may never replace a human security professional. Others may need to approach an armed barricaded suspect or enemy combatant. Still others need to go into a nuclear reactor to check if all is well. Increasingly, security managers are turning to robots to help get the job done. These works mainly focus on target perception and identification and robot localization. It is very essential to have a robot during disaster conditions like Earthquake or Bomb blast, where we have to identify live human beings as quickly as possible to save life. In these situations, human rescuers must make quick decisions under stress, and try to get victimsto safety often at their own risk. They must gather the location information and status of victims and the stability of

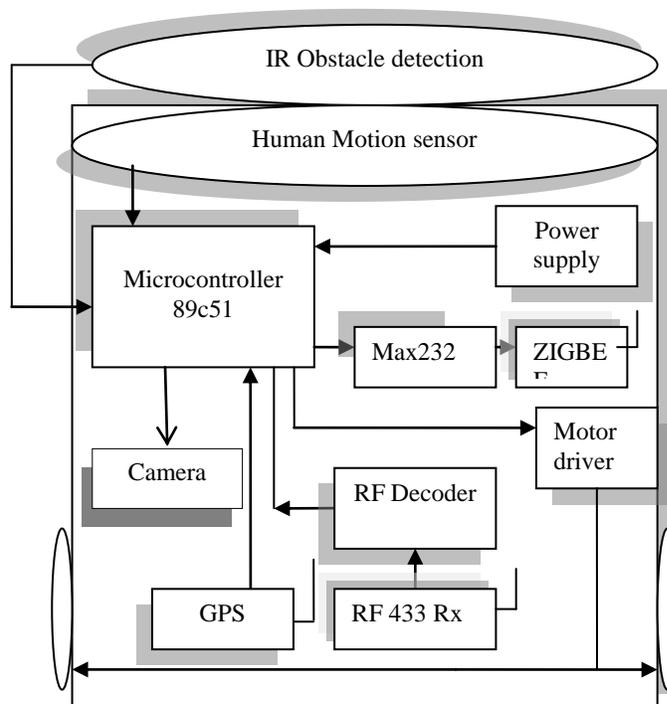
the structures as quickly as possible so that medics and firefighters can enter the disaster area and save victims. All of these tasks are performed mostly by human and trained dogs, often in very dangerous and risky situations. This is why since some years; mobile robots have been proposed to help them and to perform tasks that neither human's dogs nor existing tools can do. To most people, embedded systems are not recognizable as computers. Instead, they are hidden inside everyday objects that surround us and help us in our lives. Embedded Technology predominates as it overcomes the drawbacks of all the existing mechanical and electronic systems. An embedded system is housed on a single microcontroller board with the programs stored in ROM. Embedded systems typically do not interface with the outside world through familiar personal computer interface devices such as a mouse, keyboard and graphic user interface. Instead, they interface with the outside world through unusual interfaces such as sensors, actuators and specialized communication links. The novel idea of this paper is to locate the human presence using the robot which is controlled through RF communication. If it detects any human presence or obstacle, it will trace the longitude and latitude position and will send to the central control unit which is controlled by computer mobile using ZIGBEE communication.

This paper can find its application in military and security where without our presence we can get to know the status of the other side. This project can also be used to navigate around the disaster areas and try to find humans who need help. After finding the humans it transmits the location to the static section. The second part is the static section and the controller. Specially designed pyro electric sensor is used for human detection. IR proximity sensor is used for obstacle detection. The data obtained by the sensors in the dynamic section are displayed in the static section using ZIGBEE and GPS technologies.

II. SYSTEM DESIGN REQUIREMENT

Microcontroller(AT89c51), GPS Communication, LCD, IR sensor, Motor Driver L293D, PIR Sensor, RF with Encoder and Decoder, ZIGBEE, Capacitor, Inductor, Transformer, MAX232, RF 433 Rx, HT12D Receiver, RS232, Timer, Wi-Fi Camera, Personal computer, Stepper motor, NOT gate, EMBEDDED C program with KeilµVision3 IDE, Window XP, Flash magic .

III. BLOCK DIAGRAM



IV. WORKING METHODOLOGY

Different methodologies are adopted for different parts of this study. Applications of automation and robotics were analyzed based on existing papers and documents, aided by interviews with selective practitioners and experts of the field. The work environment for a rescue robot differs from the rough terrain caused by the debris. This rescue robots to negotiate complex and collapsed structures, find simulated victims, and generate human readable maps of the environment. The movement of this robot is controlled by using the ZIGBEE Communication. The human present are observed by sensor and display the indoor personal computer.

V. CONCLUSION

In recent years, exploration of applications of automation and robotics to minimize the risk of disasters are becoming an interested area as the disasters, are occurring with increased frequency around the world and their impact in terms of human, structural and economic losses has increased considerably. Although most robots in use today are designed for specific tasks, the goal is to make universal robots, robots flexible enough to do just about anything a human can do. The goal of this paper was to provide a sensor suite for human detection in the urban disaster environment. The detection of human body shapes from visual input data was chosen as the recognition method, a decision mainly due to the available sensor equipment on board of the victim detection robot.

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Fuzzy Based Model for Accident Prevent System

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Abstract: Now a day, due to status symbol everyone is trying to purchase their own four wheelers. All the vehicles run by Petrol, Diesel, and CNG etc. Mostly the people prefer the AC vehicle, in these vehicles' the rate of fuel consumption is high and also extracting huge amount of heat from the atmosphere. It often happens during rainy season, in heavy traffic area the pollution level is very high if the engine is ON for long time the vehicles are on standing mode. Then due to this reason the toxic gas is emitted inside the vehicle that is injurious to the health of human.

In this paper, we are planned to fuzzy logic to make a one gazette which controls the emission of toxic gases, smoke inside the vehicle and avoid drunken drive. Sometimes during the long drive or whole night driving driver may feel sleepy which is also dangerous for passengers, through the blinker system and eye lid blinking if the count is less ,then auto alarm which may indicate the toxic gas ,smoke level through alarm sound must be made alert for drivers and passengers. And if the driver is drinking then through the control unit the vehicle door is not opening and if door is not locked then engine is not ignited. If the toxic gas level is increasing then through auto control system the window will open while the level is decrease then it may be closed.

I. INTRODUCTION

A sensor is a converter that measures a physical quantity and converts it into a signal which can be read by an observer or by an (today mostly electronic) instrument. For example, a mercury-in-glass thermometer converts the measured temperature into expansion and contraction of a liquid which can be read on a calibrated glass tube. A thermocouple converts temperature to an output voltage which can be read by a voltmeter. For accuracy, most sensors are calibrated against known standards.

Sensors are used in everyday objects such as touch-sensitive elevator buttons (tactile sensor) and lamps which dim or brighten by touching the base. There are also innumerable applications for sensors of which most people are never aware. Applications include cars, machines, aerospace, medicine, manufacturing and robotics.

A sensor is a device which receives and responds to a signal when touched. A sensor's sensitivity indicates how much the sensor's output changes when the measured quantity changes. Vehicle accidents are most common if the driving is inadequate. These happen on most factors if the driver is drowsy or if he is alcoholic. Driver drowsiness is recognized as an important factor in the vehicle accidents. It was demonstrated that driving performance deteriorates with increased drowsiness with resulting crashes constituting more than 20% of all vehicle accidents. But the life lost once cannot be re-winded. Advanced technology offers some hope avoid these up to some extent.

This project involves measure and controls the eye blink using IR sensor. The IR transmitter is used to transmit the infrared rays in our eye. The IR receiver is used to receive the reflected infrared rays of eye. If the eye is closed means the output of IR receiver is high otherwise the IR receiver output is low. This to know the eye is closing or opening position. This output is give to logic circuit to indicate the alarm. The main driver behind this research relates to real cases which occurred in recent years. CO leakage normally happens due to one of two events. First, the original exhaust system has been altered for a certain reason. Usually, a standard car has a long exhaust system but modified exhaust systems are usually a bit shorter. Due to this, it is believed that the CO manages to seep into the cars inner chamber through its extractor exhaust system more easily compared to a standard exhaust. Second, the air conditioning system in a car operates by filtering air from the outside before it is used. However, it is recommended not to turn on the air condition system while the engine idles or while the car is stall. Car air conditioners may gather CO gas while the engine idles. The possible conditions for gas leakage. The breath alcohol tester is an electronic device that is used to measure and test . The breath alcohol tester is The breath alcohol tester is an electronic device that is used to measure and test the blood alcohol content in a person's blood stream. Commonly known as 'breathalyzer' which means breath analyzer, the breath sample of a person is examined by the device through an alcohol sensor to check its alcohol content and displays its output in units of blood alcohol concentration (BAC). The detected amount is shown by means of BAC percentages through display components such as LCD display or seven segment decoder.

This project involves controlling accident due to unconscious through Eye blink. Here one eye blink sensor is fixed in vehicle where if anybody loses conscious and indicate through alarm. A car simulator study was designed to collect physiological data for validation of this technology. Methodology for analysis of physiological data, independent assessment of driver drowsiness and development of drowsiness detection algorithm by means of sequential fitting and selection of regression models is presented. The developments of gas detection sensors such as for methane, propane, or any harmful gases in the automotive industry have been very encouraging. Such examples include the monitoring of carbon dioxide (CO₂) concentration in cabin. A high-precision spectroscopic gas sensor measuring CO₂ for harsh environmental conditions of automotive applications was developed and investigated. Sensors for explosive gas leakage recognition and a compact wireless gas sensor using a carbon nano tube/PMMA thin film chemi resistor were also

recently developed. Such examples illustrate the importance of gas detection systems as embedded components in engine management systems for the safety of vehicle operators and cabin passengers.

Initially, the breath alcohol detector's usages were quite limited. However, as the number of drunken driving cases has increased in recent years, extensive research and developments in applying these devices in vehicles to prevent individuals from driving vehicles after consuming an excessive amount of alcoholic beverages. Subsequently, in the United States of America, when the nation's drunk driving related accident cases reached a level worthy of concern, drunk driving or better known as DUI (Drive Under Influence) offenders were required to install an alcohol detection system in their vehicles. These detectors require the vehicle drivers to produce a breath sample to examine for excess alcohol presence before the engine is allowed to start. A breath alcohol detector which controls the ignition switch using microcontroller was developed. Instead of just indicating and displaying the BAC percentage, the tester is programmed to control the ignition switch, as well as an alarm and a number LEDs. The fundamental components of this system are the MQ-3 alcohol sensor, PIC16F877A microcontroller unit, 2x16 characters LCD alphanumeric display and ignition switch circuit.

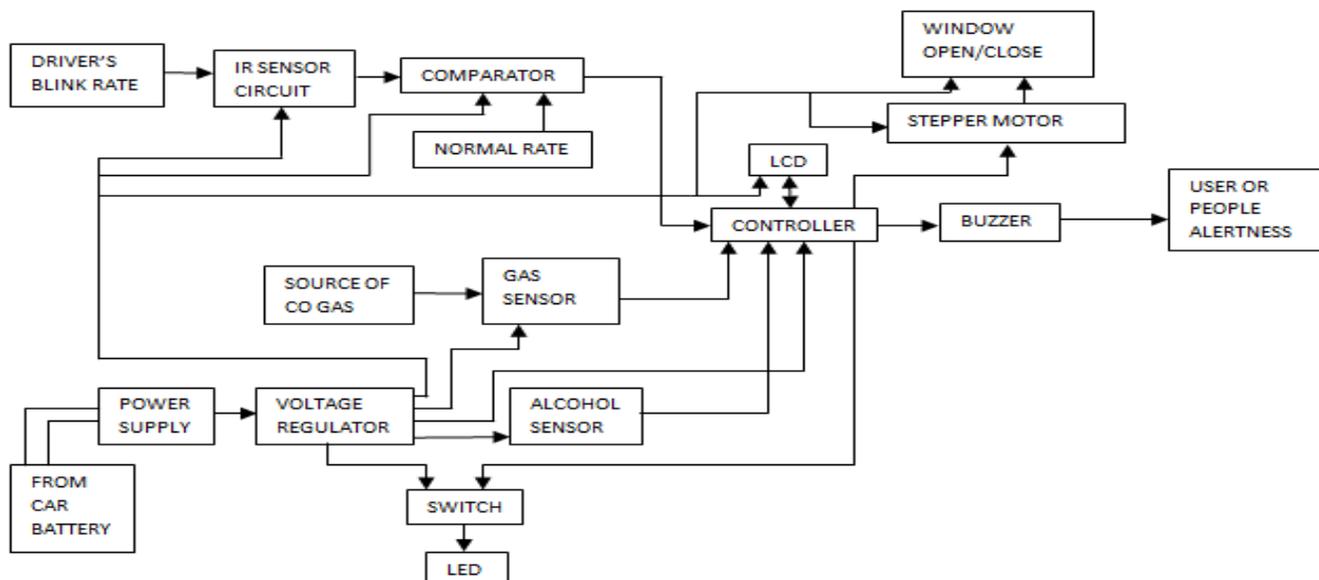
II. SYSTEM DESIGN REQUIREMENT

Microcontroller ,gas sensor , IR sensor, alcohol detector , transformer , voltage regulator, power supply , LCD and buzzer , capacitor ,resistor, bread board ,keil c cross compiler ,flash magic .

III. SYSTEM DESIGN

we are making three application in one gazette in this gazette first system is poisons' gas detecting and we using alcohol detecting sensor and to find the low eye blink count of driver in the system give alert to the passenger .

IV. BLOCK DIAGRAM OF THE SYSTEM



V. CONCLUSION

The proposed system tested for a small area (3meters) of smoke, alcohol, gas, eye lid blinking. It is working effectively. In future planning we are using GPS tracking, which area is car going on it send message to user mobile. Using this system in toll plaza, check post and we are using the system in automobile industries.

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A Fuzzy Based Model for Breast Cancer Diagnosis

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Abstract: The purpose of the present paper is to classify among different age group of the patients and their symptoms of breast cancer through the mammographic images under single slices and to determine appropriate therapeutic action. This also helps to diagnosis of diseases which having the same symptoms.

This paper deals with knowledge based expert systems which have been developed for the diagnosis of diseases based on the symptoms obtained from the interaction and observation from the patient. The diagnoses are vague or uncertain for the treatment so there is a requirement of fuzzy. An example of Breast Cancer and other group of diseases is taken where the retaliated diagnosis is approach to fuzzy logic.

I. INTRODUCTION

The Medical information acquired in the two ways

- Through numerical or Linguistic evaluation by Medical Experts.
- By statically evolutionary of the database or schema containing the medical data of the patient with confirm diagnosis. The information on the relationship gathered numerically or linguistically.

Generally the primary stage of investigation of diseases is uncertain, mainly Medical Experts follow the way of diagnosis through the interaction from the patients and also know the history of the patient, and after the process of the primary investigation he got a schema of various symptoms from the patients. The Expert kept all the information in mind and these information is vague at the right movement because various diseases having some common symptoms so for the diagnosis there is a requirement of **fuzzy logic** i.e. relationship from the standard data base through fuzzy membership function, and identify the actual diseases through fuzzy membership which is represented by the binary value (1) and if the symptoms is not retaliated with the standard schema that shows false membership (0). After the diagnosis of the diseases they prescribe the related treatment for the diseases. After the medicine if the patient is perfectly alright so the treatment is true i.e. true relationship, and if the patient doesn't get any relief i.e. false relationship. Then once again the patient approach to the Expert. The accuracy of this expert system depends on the accuracy of the data presented to it. The physician subjects the patient to a physical examination from which he obtains more or less objective data. However, measurement errors, organizational

problems (misleading samples, sending them to the wrong laboratory, etc), or improper behavior on the part of patients prior to examinations lead to imprecise and sometimes even totally incorrect data and physicians make mistakes, overlook important indications, or fail to carry out a complete examination. Furthermore, they may misinterpret other indications because the boundary between healthy and pathological status is not always clearly defined. There are always borderline values that can not be said to be either normal or pathological and the physician can not interpret it. But with this expert system, we can define the healthy, borderline, clear cut and severe pathological conditions. There has been a growing interest in healthcare among many people. Some topics related to healthcare are: drinking water quality, driving fatigue, health risks in work environment and healthcare organizations.

II. FUZZY CONTROL TECHNIQUES

Various therapeutic situations are related to control problems. Although the early medical systems appeared at the same time as the article by Zadeh (1965), there has been little communication between the research fields, but recently this has changed due to the developments in computer systems, and rapid development of the literature searching methods motivated by the internet. Many systems are being developed which utilize fuzzy logic and fuzzy set theory.

III. RULE-BASED OPEN-LOOP SYSTEMS

Deterministic open-loop fuzzy control approaches have been proposed in many applications. Generally, in open-loop configuration, it is assumed that the pharmacokinetics relationships can be modeled exactly by a linear system with known parameters. Open-loop fuzzy control is based on a different approach. Rather than assuming the patient model is known, the physiological behavior is modeled using control rules and actions. Most of the controllers are advisory systems. In healthcare, the "heaviness" is defined by mean of fuzzy sets for advising workers how heavy their weight. Also fuzzy control was used to develop a computer-based system for control of oxygen delivery to ventilated infants. An open-loop system for treatment of diabetic out-patients was developed for calculating the insulin dose. Advisory expert systems can also be considered as an open-loop controller for advising on drug administration in general anesthesia

IV. FUZZY LOGIC

Definition and design of Fuzzy Relational Maps (FRMs) .In FCMs with the help of correlations between causal associations among concurrently active units. But in FRMs we divide the very causal associations into two disjoint units. A fuzzy set A in X is characterized by a membership function $\mu_A(x)$ which maps each point in X onto the real interval [0, 1]. As $\mu_A(x) = 1$, the "grade of membership" or true membership function of x in A increases. A is EMPTY or Null iff for all x, $\mu_A(x) = 0$.ie. False membership. $A = B$ iff for all $\{x: \mu_A(x) = \mu_B(x) \text{ [or } \mu_A(x) = \mu_b(x)]\}$

Definition9: Data are binary Computer representation of stored logical entities. Index files and data dictionaries, store administrative information known ads meta data. A fuzzy relational R on a relational schema if A_i be the set of attributes and $R(A_1, A_2, \dots, A_n)$ is the fuzzy sub set of the Cartesian product of Universe defined by $\text{dom}(A_1) _ \text{dom}(A_2) _ \dots _ \text{dom}(A_n)$. According to the complexity of the $\text{dom}(A_i)$ the classical fuzzy relational can be classified to type 1, fuzzy relational. In first type each attribute domain $\text{dom}(A_i)$ can only crisp set or a fuzzy sub set so we can capture the impression of attributed value in a type 1 fuzzy relational allow each domain to be a crisp set, a fuzzy sub set of fuzzy sets, and the second type is relation express the imprecision in the association among the attribute value.

V. ALGORITHM

Step1: Get the input

Get the list of symptoms from the patient as i/p.

Step2: i/p of the mammogram result to the preprocessing
(Picture is converted into s/t copy)

While (mammogram i/p is available)

Step3: classify the image gray scale/color.

Step4: Identify the particular defect segment of the picture.

Step5: corping the identified part.

Step6: To identify the brighter spot boundary of the part.

Step7: To identify the pixel value of the gland.
(Extract the gland value)

Step8:To generate the fuzzy vector matrix for pixel value BAM.

Step9: To convert the correlated variables into uncorrelated variables to the .mathematical representation by RAM.

Step10: To producing a quantifiable result in fuzzy logic (Defuzzification).

Step11: Get the o/p image (denoise image).

Step12: To compare the o/p image to i/p image.

If (o/p is equal to i/p)

Output is correct.

else

End while.

VI. FUZZY TECHNIQUES FOR BIOMEDICAL DATA ANALYSIS

The knowledge acquisition system is capable of acquiring information on medical entities and relationship between the relationships is stored in terms of numerical values in the range 0 and 1.

Example: Cancer in its preliminary stage is uncertain in its character. There is a loss of appetite and sign of dyspepsia, neuralgia, nausea, rheumatic and articular pains, fever irregular or intermittent and un-accountable lassitude and anxiety. After some time the new symptoms are developed by periodical eruptions. The symptoms blotches first reddish, then brown with a white border and then appear and disappear in various parts of the body. Some times on the joint but generally on the articulation of the fingers and toes of

the small tumor rise failed with a yellowish substance fast turning to darker hue. These tumors leaves the permanent spots pole or brown, or nodels. According to its effect on the skin and mucous membrane (cutaneous cancer) or the nerves (anesthetic) or both mixed or complete the dieses develop in the form of leprous formation and diverges in to the different varieties. Each of these varieties merges frequently on others and some times became very difficult to draw the line between the causes. The effect of tubercular cancer they may occur on the part of the body but usually effect the face (forehead, eyelids ,nose, lips ,chin, cheeks and ears. In anesthetic cancer the anesthesia of the little finger is one of the characteristic symptoms which may occur. The ulcer, at first usually located on to the finger, attack on the fingers, on other hand in some cases feet is also effected at the same time. The medical history of the patient, which is highly subjective and may include simulated to understated symptoms that finally leads to the correct diagnosis.

VII. FUZZIFICATION OF THE SYMPTOMS

A binary relationship is established for the symptoms of the subject and takes the values between 0 and 1 .These values indicate the degree of which the exhibits a symptoms. In fuzzy set theory these binary is expressed in terms of membership function. Dieses or diagnosis also takes values between 0 and 1. Fuzzy values is ranging from 0 and 1 represent the membership function of any dieses while the values 1 and 0 represent the confirmation of the dieses. Some fuzzified symptoms of some dieses is given in the table for the Cancer fuzzy number is assigned to the symptoms Glaucoma is a silent disease which results in blindness which has symptoms similar to other common eye and ear problem. If deducted during earlier stages can be cured and the damage to the human system can be reduced. It is basically due to the variation of pressure of aqueous

S.no.	Symptoms	Range	Fuzzification Value
	Temperature	T<98.6 F	00
		98.6 F<T<100 F	01
		100 F<-T<102 F	10
		102 F<T	11
2	Appearance	Normal	00
		Small	01
		Blowing	10
3	Bumps	Normal	00
		Small variation	11
4	Color	Reddish spot	00
		Whitish spot	01
5	Texture	Not seen	00
		Permanent	01
6	Lump	Normal	00
		Medium	01
		High	10
7	Excoriations	Normal	00

		Low	01
		Medium	10
		High	11
8	Feeling of discomfort	No	00
		Low	01
		Medium	10
		High	11
9	Reddish spot on the body	Not Seen	00
		Low	01
10	Brown Spot on the body	Not seen	00
		Low	01
11	Spot With White border	No	00
		Low	01
		Medium	10
		High	11
12	HRT(Hormone Replacement Therapy)	No pain	00
		Low	01
		Medium	10
		High	11
13	Discharge blood from nipple	Yes/ No	1/0
14	Gland on neck	Yes/ No	1/0
15	Change in voice	Yes/ No	1/0
16	Change in daily routine	Yes/ No	1/0

And some other symptoms also defined with the help of membership value for the same diseases .

7.1 Fuzzy Clustering:

Clustering algorithms are mainly concerned with partitioning the data into a number of subsets. Within each subset, the elements are similar to each other. On the other hand, elements from different sets are as different as possible. There are different fuzzy clustering techniques based on unsupervised learning such as relation criterion functions, object criterion functions, c-means clustering, etc. Most

of the clustering techniques are being applied to diagnosis. C-means clustering was applied for brain injury using magnetic resonance images), and tumor measurement in response to treatment Fuzzy classification differs from clustering by the labeling method, the former giving a label to each data set, while in the latter method a label is given to each data set. Supervised learning is usually used for classification. Most of the fuzzy classification applications occur in the psychology field there are also forensic application and classification of path physiology laboratory data

VIII. FUZZY MODELING AND IDENTIFICATION

Fuzzy logic models can be developed from expert knowledge or from process (patient) input-output data. In the first case, fuzzy models can be extracted from the expert knowledge of the process. The expert knowledge can be expressed in terms of linguistics, which is sometimes faulty and requires the model to be tuned. Therefore, identifying the processes a more attractive way using the help of expert knowledge. This process requires defining the model input variables and the determination of the fuzzy model type. There are two ways to develop a fuzzy model, the first beings based on defining the initial parameters of the model (membership functions) and selecting the rules construction method Neuro fuzzy algorithms are often used for the tuning of parameters). The second method is used if there is no knowledge about the process, when the rules and membership functions can be extracted directly from the data by clustering the input / output space

8.1 Fuzzy Relational Mapping:

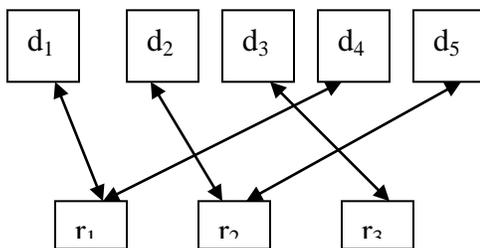
Relational mapping is defined between patient and Medical Expert by taking an example domain symptoms set $D_i = \{d_1, d_2, d_3, d_4, d_5\}$ and range disease

Set $R = \{r_1, r_2, r_3\}$ where r_1, r_2, r_3 be the disease like hart attack ,general disease, cancer.

IX. FUZZY MATRICES AND THEIR APPLICATIONS

Matrix theory has become a very simple but an effective tool in the analysis of collected raw data. Fuzzy matrix or CETD matrix model is the one, which helps to analyze the raw data. The analysis is carried out in five stages. In the first stage the collected raw data, which is time dependent is made into an Initial Raw Data (IRD) matrix. A FRM is a directed graph or a map from D to R with concepts like policies or events etc, as nodes and causalities as edges. It represents causal relations between spaces D and R .Let D_i and R_j denote that the two nodes of an FRM. The directed edge from D_i to R_j denotes the causality of D_i on R_j called relations. Every edge in the FRM is weighted with a number in the set $\{0, \pm 1\}$. Let e_{ij} be the weight of the edge $D_i R_j$, e_{ij} The weight of the edge $D_i R_j$ is positive if increase in D_i implies increase in R_j or decrease in D_i implies decrease in R_j ie causality of D_i on R_j is 1. If $e_{ij} = 0$, then D_i does not have any effect on R_j . We do not discuss the cases when increase in D_i implies decrease in R_j or decrease in D_i implies increase in R_j .When the nodes of the FRM are fuzzy sets then they are called fuzzy nodes. FRMs with edge weights $\{0, \pm 1\}$ are called simple FRMs. An FRM with cycles is said to be an FRM with feedback.

When there is a feedback in the FRM, i.e. when the causal relations flow through a cycle in a revolutionary manner, the FRM is called a dynamical system.



And the fuzzy relational matrix is between D and R defined as

$$E = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \end{bmatrix}$$

where (1 0 0) vector which shows that the symptoms is matched for diagnosis of dieses

9.2 Error Back Propagation:

Through the above mentioned tables the out put that is the fuzzified values taken by the various combination of the symptoms

X. DIESES DIAGNOSIS RELATED THEORETIC ACTION

It is a complex partly uninvestigated process in which the knowledgebase expert system is obviously able to work with uncertain and imprecise set of possibilities so for that IF-THAN rule is followed .

XI. CONCLUSIONS

The fuzzy based expert system has been successfully developed and tested for the diagnosis initial level dieses. This approach is reliable and provides wide spread of information to help the physician in reaching a more logical conclusion for a more accurate diagnosis. The system has been successfully tested for disease diagnostics for number of combinations of healthy and diseased categories. With the help of this system, it is possible to know the degree of severity as well as the type of disease. The expert system has been successfully developed and tested for the diagnosis of other dieses. This approach is reliable and provides wide spread of information to help the physician in reaching a more logical conclusion for a more accurate diagnosis. The system has been successfully tested for disease diagnostics for number of combinations of healthy and diseased categories. With the help of this Algorithm we analyze by the denosing with the help of wavelet and curvlet transform the memographic, it is possible to know the degree of severity as well as the type of disease.

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Effect of bat guano on the growth of *Vigna radiata* L.

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Abstract- Bat guano is known to contain all the macro and micronutrients that plants require in a natural form and hence ably serve as plant fertilizer, soil builder, soil cleanser, fungicide, nematocide and compost activator. In ancient times it was used in agricultural practice as manure but with advent of chemical fertilizers its usage became less popular. Health menace created by chemical fertilizers is again popularizing organic farming but bat guano is still not popular among the farming community since no explicit work on its plant growth promoting activity has been done. Hence the present study was undertaken to study the effect on the growth of *Vigna radiata* seedlings using *Megaderma lyra* guano from two different geographical locations (Yennehole and Varanga) in different quantities (soil: guano; 20:1, 20:0.5, 20:0.1) and in two types of soil (Autoclaved and Nonautoclaved). NPK content of guano was also analysed using standard techniques.

The results clearly indicated that the *M lyra* guano was rich in phosphorus content and comparing the guano from two locations the Varanga guano was found to be higher in its nitrogen content. Plant growth assay indicated that guano from Yennehole was found to be better as manure compared to that from Varanga. Likewise bat guano was required in a very small quantity to increase the efficiency of plant growth. Amendment of both types of soil with bat guano from both locations showed good growth at soil: guano ratio of 20:0.5.

Index Terms- Bat, Guano, *M. lyra*, NPK content, Plant growth, *Vigna radiata*

I. INTRODUCTION

In traditional India, the entire agriculture was practiced using organic techniques, where the fertilizers, pesticides were obtained from plant and animal products. Some of the commonly used organic fertilizers included are bovine dung and urine, sheep manure, poultry waste, chicken manure, night soil, composted agricultural wastes, bat guano, vermicompost. But due to the ever increasing population and so also the food demand, more lands were brought under cultivation, organic manure replaced by chemical fertilizers and locally made pesticides were replaced by chemical pesticides and the crop production increased. As time went by, extensive dependence on chemical farming has shown its darker side. The land is losing its fertility and is demanding larger quantities of fertilizers to be used. Pests are becoming immune requiring the farmers to use stronger pesticides. This in turn is posing great threat to the health of young population at large. In order to overcome the menace of chemical fertilizers and pesticides, modern India is once again reverting to the organic farming techniques and application of organic manure has been suggested (Mehdi et al., 2012; Michael et al., 2102; Naseer et al., 2003; Reddy et al., 1998). Application of vermicompost to improve soil fertility is becoming more popular but very little is known about the application of bat guano as organic manure (Sridhar et al, 2006). Bat guano is the feces of bats rich in carbon, nitrogen, vital minerals and of course beneficial microbes. Chemical properties and the microbes in the guano enrich the soil fertility and the texture and the microbes help to clear any toxins in the soil, control the fungi and nematodes in the soil. These properties of the guano again depend upon the bat species, location and age of the guano. Inspire of so many valuable properties, use of this rich manure has not gained any popularity among the farming community. Bat guano deposits have been found in several natural caves of the world and commercially exploited as natural manure (Bhat et al., 1990; Korine et al., 1999). Western countries promote and sale bat guano as manure some of which include Jamaica, Indonesia, Mexico but is not so in India. Since bat guano has ample of scope in agrobased industries and very few studies have explicitly measured its effects on plant growth, the present study was undertaken with two main objectives 1. to assess the impact of bat guano on the growth of mung bean, *Vigna radiata* and 2. to compare the effect of *M lyra* bat guano from two different geographical locations on the growth of *Vigna radiata*.

II. MATERIALS AND METHODS

Collection site- Two colonies of bat one dwelling in an abandoned house in Yennehole village and another in a Mutt in Varanga village of Karkala taluk of Udupi district, Karnataka, India respectively were used for collecting the guano. Both the colonies were of *Megaderma lyra* which is a semicarnivorous bat feeding on both insects and vertebrates like frogs and fishes (Bates and Harrison, 1997). Colony in Yennehole house comprise of 30-40 individual and this house is surrounded by coconut and arecanut plantations, paddy fields and small stretches of wood land. Those dwelling in Varanga Mutt comprise of 40-50 individuals and Mutt is surrounded by paddy fields, small lake, and Ghats. Droppings (guano) deposited beneath the roosting colony was collected for the plant growth study.

Chemical analysis of guano

The guano collected from two different locations were properly labeled upon collection. It was further analysed for its pH (Sridhar et al., 2006), total nitrogen (Sadasivam and Manickam, 2008), phosphorus and potassium (Baruah and Barthakur, 1997) content.

Plant growth study

To assess the impact of guano on plant growth black soil was collected from 30 cm depth. One half of the soil collected was autoclaved. 150g of each soil type (autoclaved and nonautoclaved) was mixed with guano in different ratios in plastic pots. The treatments included:

T1- autoclaved soil (control); T2-T4-autoclaved soil + Yennehole bat guano (20:1,20:0.5,20:0.1) respectively; T5-T6- autoclaved soil + Varanga bat guano (20:1, 20:0.5) respectively; T7-non- autoclaved soil (control); T8-T10- nonautoclaved soil + Yennehole bat guano (20:1,20:0.5,20:0.1) respectively;T11-T12 non-autoclaved soil + Varanga bat guano (20:1, 20:0.5) respectively. All the treatments were taken in triplicates. Guano from Varanga were studied with only two ratios due to shortage of sample at the roosting site. *Vigna radiata* seeds were used as test seeds to study the impact of guano on its growth. Seeds were soaked in tap water up to six hours. Water was drained and the seeds were allowed to germinate overnight on wet cloth. Five germinated green gram seeds were sown separately per treatment and allowed to grow in lab conditions. The pots were watered (sterile water) twice a day until harvest (10 days).On uprooting the seedlings shoot and root lengths were determined. Plants were oven dried at 80°C until constant weight was obtained to determine the dry weight (biomass).

III. RESULTS

Guano properties.

The fecal pellets collected were blackish brown and grey around 9-11mm in size. Fecal pellets were elongated with rough surface, ends usually blunt, rarely pointed. Fecal pellets containing shiny insect bits (blackish brown) could be easily powdered whereas the pellets with vertebrate parts(greyish) were comparatively harder.

Chemical properties of guano

pH of *M. lyra* guano from Yennehole was slightly alkaline(7.54) whereas that from Varanga was neutral(7.26).The NPK ratio of the guano 1:3:1 and 2:3:1 from Yennehole and Varanga respectively clearly indicated it is a phosphorus rich guano. However the nitrogen content is found to be higher in the guano collected from Varanga as shown in the figure 1

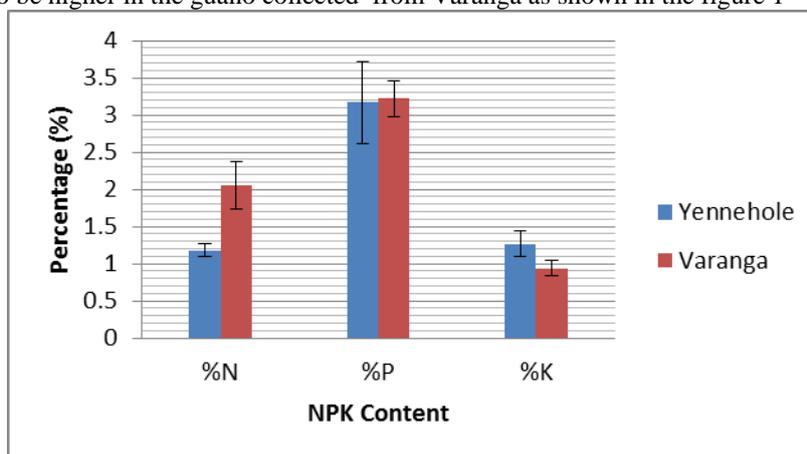


Fig. 1: NPK composition of *M. lyra* guano from Yennehole and Varanga (n=6; mean±SE)

Plant growth assay

Growth parameters of *Vigna radiata* in terms of its root and shoot length and biomass using two types of bat guano in different ratios is given in the (fig:2-9).Soil amendment with bat guano from Yennehole(T2-T4 and T8-T10) gave better results than controls, T1 (autoclaved soil) and T7 (nonautoclaved soil). Also T3 (autoclaved soil+Yennehole bat guano,20:0.5) and T9 (nonautoclaved soil+ Yennehole bat guano,20:0.5) gave the best growth in shoot length and biomass. Soil amendment with guano from Varanga in only T6(autoclaved soil+ mutt bat guano,20:0.5) showed better shoot growth from control,T1 and the treatment T12 (nonautoclaved soil+ Varanga bat guano,20:0.5) showed similar growth as that of control,T7. However the production of biomass in T6 and T12 was better than the controls T1 and T7 respectively. Autoclaved soil amended with bat guano showed better growth of *Vigna radiata* when compared to nonautoclaved soil.

Thus the application of bat guano showed significant growth differences from the control in both autoclaved and nonautoclaved soil.

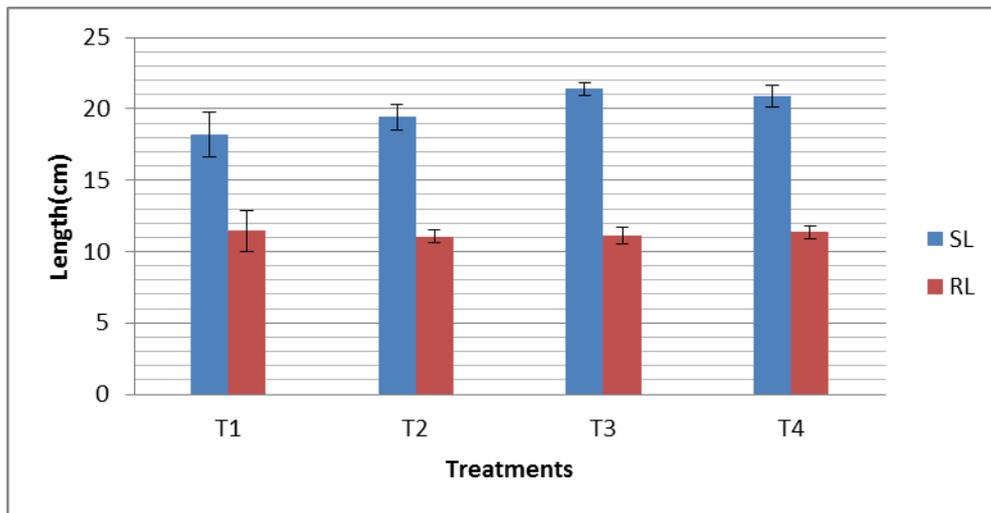


Fig. 2: Shoot length (SL) and Root length (RL) of seedlings in autoclaved soil + Yennehole guano. T1-autoclaved soil (control); T2-T4-autoclaved soil + Yennehole bat guano (20:1,20:0.5,20:0.1) (n=15:mean±SE).

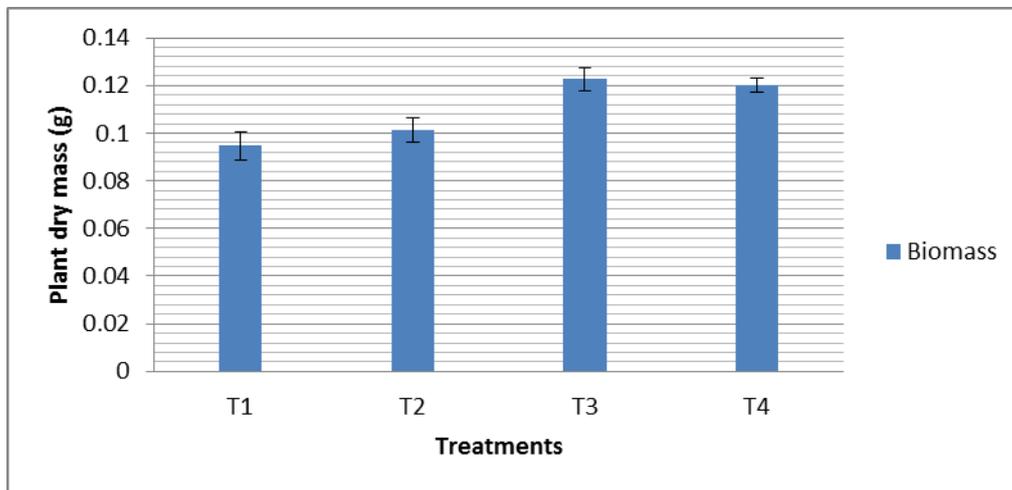


Fig. 3: Biomass of seedlings in autoclaved soil + Yennehole guano. T1-autoclaved soil (control); T2-T4-autoclaved soil + Yennehole bat guano (20:1,20:0.5,20:0.1) (n=3:mean±SE).

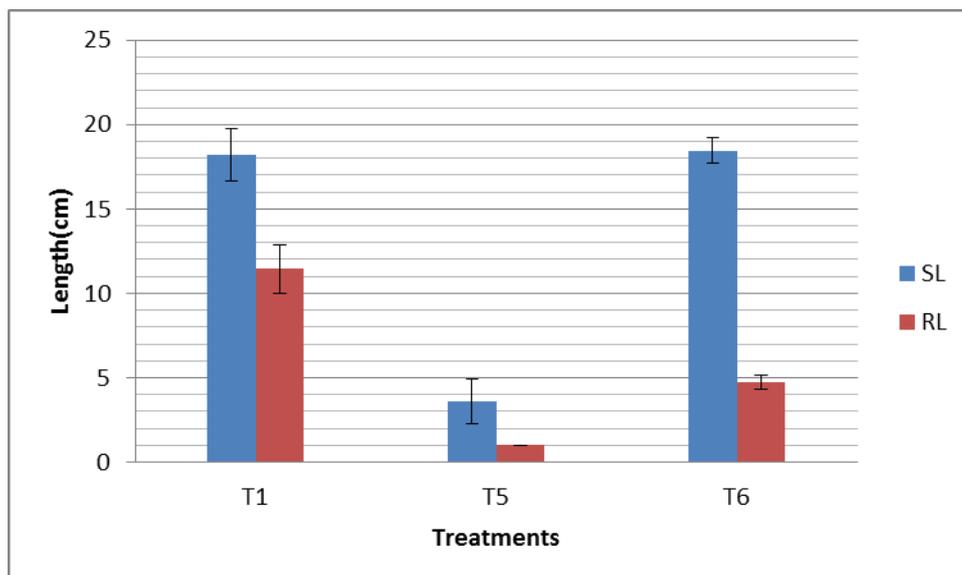


Fig. 4: Shoot length (SL) and Root length (RL) of seedlings in autoclaved soil +Varanga guano. T1-autoclaved soil (control); T5-T6-autoclaved soil + Varanga bat guano (20:1,20:0.5) (n=15:mean±SE).

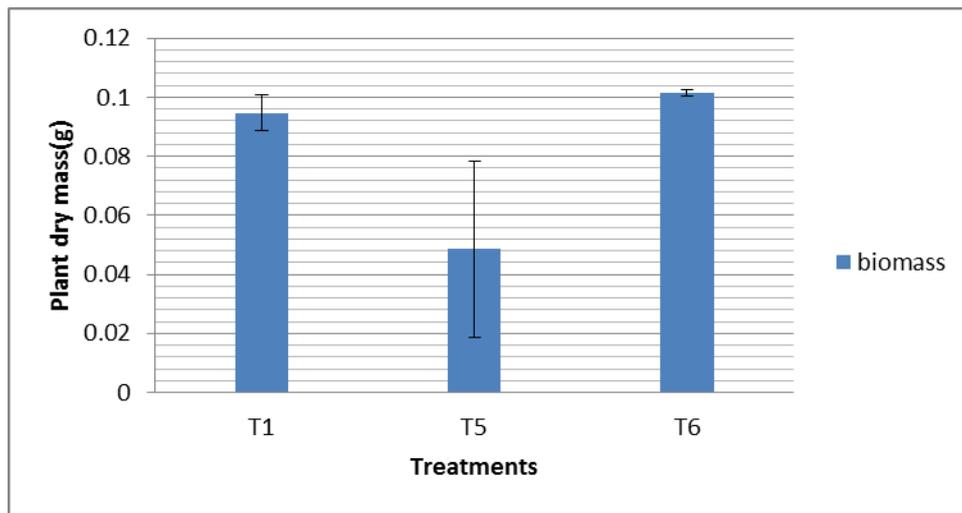


Fig. 5: Biomass of seedlings in autoclaved soil + Varanga guano. T1-autoclaved soil (control); T5-T6-autoclaved soil + Varanga bat guano (20:1,20:0.5,20) (n=3:mean±SE).

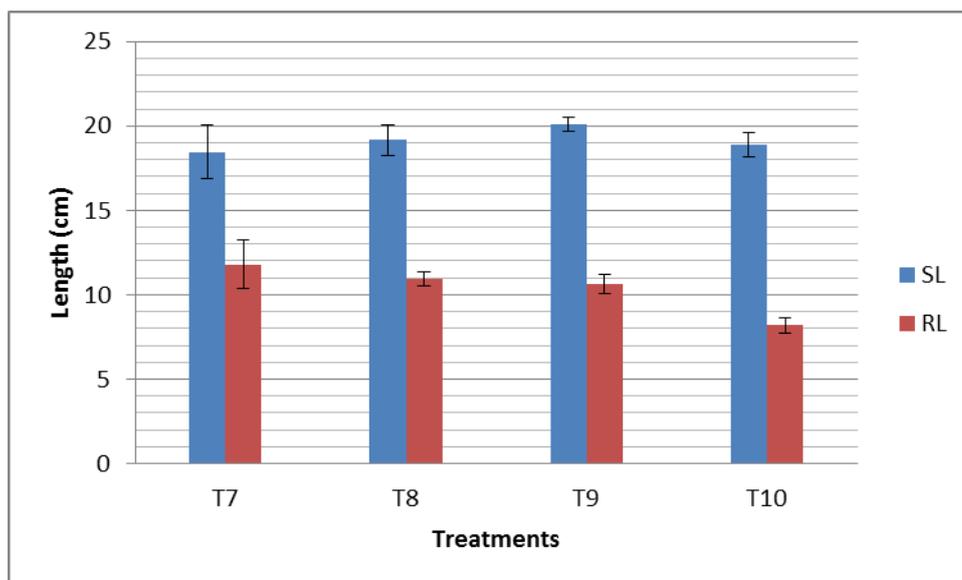


Fig. 6: Shoot length (SL) and Root length (RL) of seedlings in nonautoclaved soil +Yennehole guano. T7-nonautoclaved soil (control); T8-T10-nonautoclaved soil + Yennehole bat guano (20:1,20:0.5,20:0.1) (n=15:mean±SE).

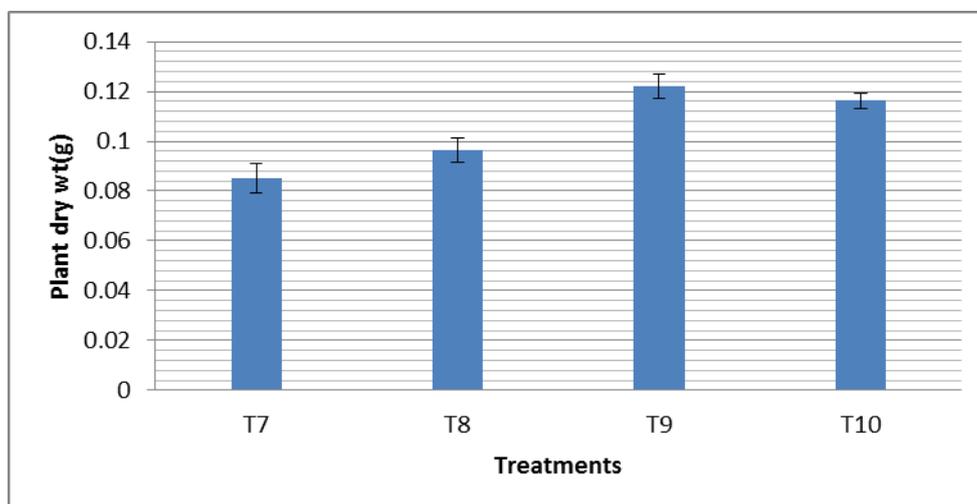


Fig. 7: Biomass of seedlings in nonautoclaved soil + Yennehole guano. T7-nonautoclaved soil (control); T8-T9-nonautoclaved soil + Yennehole bat guano (20:1,20:0.5,20:0.1) (n=3:mean±SE).

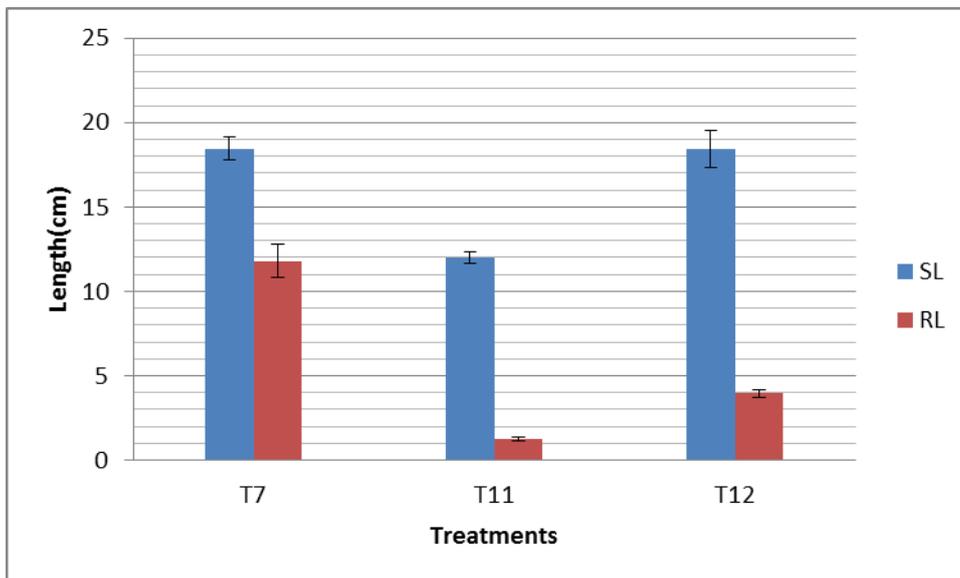


Fig. 8: Shoot length (SL) and Root length (RL) of seedlings in nonautoclaved soil + Varanga guano. T7-nonautoclaved soil (control); T10-T11-nonautoclaved soil + Varanga bat guano (20:1,20:0.5) (n=15:mean±SE).

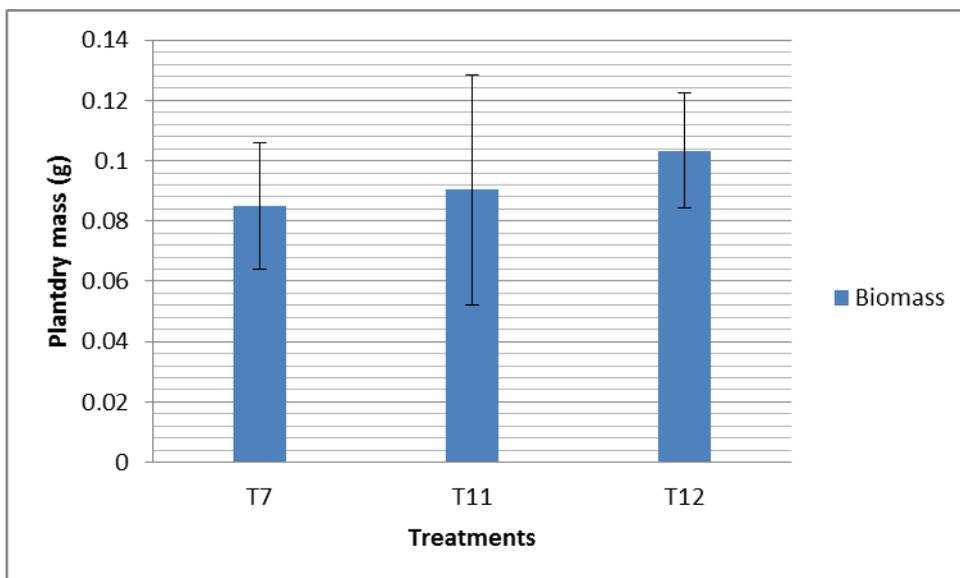


Fig. 9: Biomass of seedlings in nonautoclaved soil + Varanga guano. T7-nonautoclaved soil (control); T11-T12-nonautoclaved soil + Varanga bat guano (20:1,20:0.5) (n=3:mean±SE).

IV. DISCUSSION

Among the bat guano, two broad categories have been identified based on NPK ratios: high phosphorus guano (3:13:4- 4:30:4) from frugivorous bats and high nitrogen guano (8:4:1- 13:3:3) from insectivorous bats (Sridhar et al., 2006). *Megaderma lyra* being a semicarnivorous bats, the guano analysed in this study showed higher phosphorus levels than nitrogen. However the nitrogen content was higher in guano collected from Varanga than in Yennehole guano. Comparing this bat guano with other manures, guano has higher phosphorus and lower nitrogen content than chicken, sheep, goat, cow and pig manure (Olayiwola, 2011). Nitrogen rich manure enhances crop growth and phosphorus rich manure induces root development, shoot budding, branching and flowering. Hence bat guano can be mixed at various proportions with other high nitrogen organic manures for wholesome plant growth and soil fertility.

Guano from bats has long been mined from caves for use as fertilizer on agricultural crops due to its high concentrations of nitrogen and phosphorous, the primary limiting nutrients of most plant life (Pierson, 1998; Hutchinson, 1950). Reichard

demonstrated that moderate applications of guano in a controlled greenhouse experiment promoted growth in a grass species native to Texas (Indian grass, *Sorghastrum nutans*), but reduced root/stem ratio and had a neutral effect on two other native species: little bluestem, *Schizachyrium scoparium*, and prairie coneflowers, *Ratibida columnifera*, respectively. He further speculated that guano deposition may have species specific effects on plant communities (Reichard, 2010; Kunz et al., 2011). To add on, the present study also confirmed that the guano from same species of bat but from different geographical locations show difference in plant growth promoting properties possibly due to the differences in its microbial composition exerting a difference in the plant microbe interaction. Sridhar et al. in their studies on insectivorous bat guano on seedling growth of finger millet, *Eleusine coracana* and legume, *Phaseolus mungo* reported better growth, biomass and nitrogen content of the plants in soil amended with guano at 20:1 ratio. Also speculated that soil amendment with high quantities of guano resulted in wilting of seedlings. The present study was carried out at even lower quantities of soil : guano ratio (20:0.5, 20:0.1) indicating that guano is in fact needed to be incorporated at even lower quantities (20:0.5) for better crop production. It is also evident from the results that the bat guano in lower quantities increased the biomass significantly. Likewise amending the guano with farm yard manure in appropriate ratios may help overcome the nutrient deficiencies to improve crop production (Sridhar et al., 2006)

In the present study the autoclaved soil was used with an idea of removing the soil microbes and study the plant growth effect of guano microbes. It was interesting to record that even the autoclaved soil amended with the bat guano showed best growth at soil: guano (20:0.5) ratio indicating that the bat guano contained plant growth promoting microbes along with requisite nutrients. Thus bat guano can be a promising source of biofertilizers due to their rich composition of nutrients and microbial flora.

V. SUMMARY AND CONCLUSION

The present study was conducted to study the effect on the growth of *Vigna radiata* seedlings using *M. lyra* guano from two different geographical locations (Yennehole and Varanga) in different quantities and in two type of soil (Autoclaved and Nonautoclaved).

The results clearly indicated that the *M lyra* guano is rich in phosphorus content and comparing the guano from two locations the Varanga guano is higher in its nitrogen content. Plant growth assay indicated that guano from Yennehole is better as manure compared to that from Varanga which may be possibly due to the differences in microflora of the guano. Likewise bat guano is required in a very small quantity to increase the efficiency of plant growth. Although the guano obtained were from same species of bat *M. lyra* but the differences in their effects on plant growth is due to the differences in the microbial community that has a lot of influence on the growth promoting activity of the guano. Hence a better insight on guano microflora can give a better idea on these differences observed.

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ANALYSIS OF INVENTORY CONTROL TECHNIQUES; A COMPARATIVE STUDY

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Abstract- Every organization needs inventory for smooth running of its activities. It serves as a link between production and distribution processes. The investment in inventories constitutes the most significant part of current assets and working capital in most of the undertakings. Thus, it is very essential to have proper control and management of inventories. The purpose of inventory management is to ensure availability of materials in sufficient quantity as and when required and also to minimize investment in inventories. So, in order to understand the nature of inventory management of the organization, In this paper we analyzing different inventory control techniques for efficient inventory management system.

Index Terms- Assets, Distribution, Inventory, Production, Working capital

I. INTRODUCTION

So inventory control is vitally important to almost every type of business, whether product or service oriented. Inventory control touches almost every facets if operations. A proper balance must be struck to maintain proper inventory with the minimum financial impact on the customer. Inventory control is the activities that maintain stock keeping items at desired levels. In manufacturing since the focus is on physical product, inventory control focus on material control.

“Inventory” means physical stock of goods, which is kept in hands for smooth and efficient r

unning of future affairs of an organization at the minimum cost of funds blocked in inventories. The fundamental reason for carrying inventory is that it is physically impossible and economically impractical for each stock item to arrive exactly where it is needed, exactly when it is needed.

Inventory management is the integrated functioning of an organization dealing with supply of materials and allied activities in order to achieve the maximum co-ordination and optimum expenditure on materials. Inventory control is the most important function of inventory management and it forms the nerve center in any inventory management organization. An Inventory Management System is an essential element in an organization. It is comprised of a series of processes,

which provide an assessment of the organization’s inventory. For example we are considering the inventories in a company which make washing machines in all these analysis.

II. ECONOMIC ORDER QUANTITY

Economic Order Quantity is the Inventory management technique for determining optimum order quantity which is the one that minimizes the total of its order and carrying costs.

In the given table the EOQ & the no. of orders purchased per year for various components are calculated. The calculated EOQ is compared with the no. of units of each component purchased in the organization. It is found that, there is a variation in the EOQ & no. of unit purchased. It is understood that the company is not following EOQ for purchasing the materials & therefore the inventory management is not satisfactory.

There are two major cost associated with inventory. Procurement cost and carrying cost. Annual procurement cost varies with the numbers of orders. This implies that the procurement cost will be high, if the item is procured frequently in small lots. The annual procurement cost is directly proportional to the quantity in stock. The inventory carrying cost decreases, if the quantity ordered per order is small. The two costs are diametrically opposite to each other. The right quantity to be ordered is one that strikes a balance between the two opposition costs. This quantity is referred to as “Economic Order Quantity”(EOQ).

$$EOQ = \sqrt{\frac{2 * Demand * Re-order Cost}{Carrying Cost}}$$

Sl. No.	Components	Demand Per year	Re-Order Cost/ order	Carrying Cost/unit/year		No. of units Ordered	No. of order per year
1.	Bearing - Ball Sealed – 6006	3,60,000	12,200	2	66,272.17	30,000	5.43
2.	Bearing - Ball Sealed - 6205 - Swift	48,000	6,200	2	17,251.09	4,000	2.78
3.	Drive assly - NBO - China (Agitator) - 2 pin drive	1,44,000	1,700	36	3,687.82	12,000	39.05
4.	Drive assly - ECO Dlx - NBO - China (Impeller)	96,000	1,700	36	3,011.09	8,000	31.88
5.	Driven Pulley - NBO - China (Same pulley)	2,40,000	1,700	36	4,760.95	20,000	50.41
6.	Wash timer - Eco Dlx (Ningbo) - With buzzer (S60)	30,000	1,700	2	7,141.43	2,500	4.20
7.	Wash timer - Eco Dlx (Ningbo) - Without buzzer (SI 60)	42,000	1,700	2	8,449.85	3,500	4.97
8.	Heater (WW)	21,600	4,700	2	10,075.71	1,800	2.14
9.	Heater (Chandini)	9,600	6,200	2	7,714.92	800	1.24
10.	Pig tail connector-3.0	3,60,000	6,200	2	47,244.05	30,000	7.62
11.	Pig tail connector-3.8	1,80,000	6,200	2	33,406.59	15,000	5.39
12.	Seal drive tube - Swift	42,000	6,200	2	16,136.91	3,500	2.60
13.	Seal tub support - Swift	42,000	6,200	2	16,136.91	3,500	2.60
14.	WW Motor - Welling	90,000	6,200	18	7,874.01	7,500	11.43
15.	Splash Motor	42,000	6,200	18	5,378.97	3,500	7.81
16.	Motor - Jeamo	3,00,000	65,200	18	46,619.02	25,000	6.44
17.	Clamp tub	66,600	10,100	2	25,935.69	5,550	2.57

18.	Suspension Spring Assly FLT 70 (Fimstud)	7,200	10,000	2	8,485.28	600	0.85
19.	Door Lock - High End	1,800	15,400	2	5,264.98	150	0.34
20.	Door Lock, Low End, FLT70	1,800	15,400	2	5,264.98	150	0.34
21.	Ball Bearing-Outer, FLT70	3,600	8,400	2	5,499.09	300	0.65
22.	Ball Bearing-Inner, FLT70	3,600	8,400	2	5,499.09	300	0.65
23.	Heating Element , High/Mid End,FLT70	1,800	8,400	2	3,888.44	150	0.46
24.	Heater Low end	1,800	8,400	2	3,888.44	150	0.46
25.	Pressostat, FLT70	3,600	8,400	2	5,499.09	300	0.65
26.	Timer T2-EC6018-FLT	1,800	8,900	2	4,002.50	150	0.45
27.	Water Distribution Actuator, FLT70	1,800	7,900	2	3,770.94	150	0.48
28.	Nut Push In, FLT70	21,600	16,400	2	18,821.26	1,800	1.15
29.	Heater Clip,FLT70	3,600	7,750	2	5,282.05	300	0.68
30.	Bellow, FLT70	3,600	84,300	2	17,420.68	300	0.21
31.	Shock Absorber Assy, FLT70	7,200	9,800	2	8,400.00	600	0.86
32.	Universal Motor Assy, Mid&High End,FLT70	1,800	49,200	18	3,136.88	150	0.57
33.	Motor Low end	1,800	57,200	18	3,382.31	150	0.53
34.	Window Glass,FLT70	3,600	23,100	18	3,039.74	300	1.18
35.	Drain Pump, FLT	1,800	20,100	2	6,014.98	150	0.30
36.	On / Off Switch Low end (Push button switch)	1,800	7,700	2	3,722.90	150	0.48
37.	Thermostat Variable, Low End, FLT70	1,800	8,500	2	3,911.52	150	0.46
38.	Poly V Belt,FLT70	1,800	1,700	2	1,749.29	150	1.03
39.	Tub Sealing, FLT70	3,600	1,700	2	2,473.86	300	1.46
40.	SS Coil	2,40,000	52,200	18	37,309.52	20,000	6.43

(Table- I)

III. SAFETY STOCKS

Safety stocks are the minimum additional inventories which serve as a safety margin to meet an unanticipated increase in usage resulting from an unusually high demand and an uncontrollable late receipt of incoming inventory.

In the given table, safety stocks for the various components calculated are shown. Actual demand is given for each component for a period of 1 year and the lead-time is calculated at a maximum of 100 days & normal of 60 days and these were converted into per annum. So, from calculation of safety stock, we can able to determine how much the company can hold the inventory in reserve stock per annum.

Sl. No.	Components	Max. Lead Time	Normal Lead Time	Demand	Safety Stock
1.	Bearing - Ball Sealed – 6006	0.27	0.166	3,60,000	37,440
2.	Bearing - Ball Sealed - 6205 – Swift	0.27	0.166	48,000	4,992
3.	Drive assly - NBO - China (Agitator) - 2 pin drive	0.27	0.166	1,44,000	14,976
4.	Drive assly - ECO Dlx - NBO - China (Impeller)	0.27	0.166	96,000	9,984
5.	Driven Pulley - NBO - China (Same pulley)	0.27	0.166	2,40,000	24,960
6.	Wash timer - Eco Dlx (Ningbo) - With buzzer (S60)	0.27	0.166	30,000	3,120
7.	Wash timer - Eco Dlx (Ningbo) - Without buzzer (SI 60)	0.27	0.166	42,000	4,368
8.	Heater (WW)	0.27	0.166	21,600	2,246.4
9.	Heater (Chandini)	0.27	0.166	9,600	998.4
10.	Pig tail connector-3.0	0.27	0.166	3,60,000	37,440
11.	Pig tail connector-3.8	0.27	0.166	1,80,000	18,720
12.	Seal drive tube – Swift	0.27	0.166	42,000	4,368
13.	Seal tub support – Swift	0.27	0.166	42,000	4,368
14.	WW Motor – Welling	0.27	0.166	90,000	9,360
15.	Splash Motor	0.27	0.166	42,000	4,368
16.	Motor - Jeamo	0.27	0.166	3,00,000	31,200
17.	Clamp tub	0.27	0.166	66,600	6,926.4
18.	Suspension Spring Assly FLT 70 (Fimstud)	0.27	0.166	7,200	748.8
19.	Door Lock - High End	0.27	0.166	1,800	187.2
20.	Door Lock, Low End, FLT70	0.27	0.166	1,800	187.2

21.	Ball Bearing-Outer, FLT70	0.27	0.166	3,600	374.4
22.	Ball Bearing-Inner, FLT70	0.27	0.166	3,600	374.4
23.	Heating Element , High/Mid End,FLT70	0.27	0.166	1,800	187.2
24.	Heater Low end	0.27	0.166	1,800	187.2
25.	Pressostat, FLT70	0.27	0.166	3,600	374.4
26.	Timer T2-EC6018-FLT	0.27	0.166	1,800	187.2
27.	Water Distribution Actuator, FLT70	0.27	0.166	1,800	187.2
28.	Nut Push In, FLT70	0.27	0.166	21,600	2,246.4
29.	Heater Clip,FLT70	0.27	0.166	3,600	374.4
30.	Bellow, FLT70	0.27	0.166	3,600	374.4
31.	Shock Absorber Assy, FLT70	0.27	0.166	7,200	748.8
32.	Universal Motor Assy, Mid & High End,FLT70	0.27	0.166	1,800	187.2
33.	Motor Low end	0.27	0.166	1,800	187.2
34.	Window Glass,FLT70	0.27	0.166	3,600	374.4
35.	Drain Pump, FLT	0.27	0.166	1,800	187.2
36.	On / Off Switch Low end (Push button switch)	0.27	0.166	1,800	187.2
37.	Thermostat Variable, Low End, FLT70	0.27	0.166	1,800	187.2
38.	Poly V Belt,FLT70	0.27	0.166	1,800	187.2
39.	Tub Sealing, FLT70	0.27	0.166	3,600	374.4
40.	SS Coil	0.27	0.166	2,40,000	24,960

(Table II)

IV. ABC ANALYSIS

The ABC system is a widely used classification technique to identify various items of inventory for purposes of inventory control. On the basis of unit cost involved, the various items are classified into 3 categories:

(1) A, consisting of items with the large investment,

(2) C, with relatively small investments but fairly large number of items and

(3) B, which stands mid-way between category A & C.

Category A needs the most rigorous control, C requires minimum attention and B deserves less attention than A but more than C.

➤ A Class (High Value)

- Drive assly - NBO - China (Agitator) - 2 pin drive

- Drive assly - ECO Dlx - NBO - China (Impeller)
- Wash timer - Eco Dlx (Ningbo) - With buzzer (S60)
- Heater (WW)
- Heater (Chandini)
- WW Motor - Welling
- Splash Motor
- Motor - Jeamo
- Heating Element, High/Mid End,FLT70
- Heater Low end
- Timer T2-EC6018-FLT
- Water Distribution Actuator, FLT70
- Bellow, FLT70
- Thermostat Variable, Low End, FLT70
- Universal Motor Assy, Mid & High End,FLT70
- Motor Low end
- Window Glass,FLT70
- Drain Pump, FLT
- B Class (Moderate Value)
 - Bearing - Ball Sealed - 6006
 - Bearing - Ball Sealed - 6205 - Swift
 - Wash timer - Eco Dlx (Ningbo)
 - Door Lock - High End
 - Door Lock, Low End, FLT70
 - Ball Bearing-Outer, FLT70
 - Ball Bearing-Inner, FLT70
 - Seal drive tube - Swift
 - Seal tub support - Swift
 - Pressostat, FLT70
 - Shock Absorber Assy, FLT70
 - On / Off Switch Low end (Push button switch)
 - SS Coil
 - Poly V Belt,FLT70
- C Class (Low Value)
 - Driven Pulley - NBO - China (Same pulley)
 - Pig tail connector-3.0
 - Pig tail connector-3.8
 - Clamp tub
 - Suspension Spring Assy FLT 70 (Fimstud)
 - Nut Push In, FLT70
 - Heater Clip,FLT70
 - Tub Sealing, FLT70

Catego ries	Total No. Items in Classes	Percentage
A	18	45
B	14	35
C	8	20

(Table-III)

V. FSN ANALYSIS

All the items in the inventory are not required at the same frequency. Some are required regularly, some occasionally and some very rarely. FSN classifies items into Fast moving, Slow moving and Non-moving.

➤ *Fast moving items*

- Bearing - Ball Sealed - 6006
- Bearing - Ball Sealed - 6205 - Swift
- Drive assly - NBO - China (Agitator) - 2 pin drive
- Drive assly - ECO Dlx - NBO - China (Impeller)
- Driven Pulley - NBO - China (Same pulley)
- Wash timer - Eco Dlx (Ningbo) - With buzzer (S60)
- Wash timer - Eco Dlx (Ningbo)
- Heater (WW)
- Heater (Chandini)
- Pig tail connector-3.0
- Pig tail connector-3.8
- Seal drive tube - Swift
- Seal tub support - Swift
- WW Motor - Welling
- Splash Motor
- Motor - Jeamo
- SS Coil

➤ **SLOW MOVING ITEMS**

- Clamp tub
- Suspension Spring Assy FLT 70 (Fimstud)
- Door Lock - High End
- Door Lock, Low End, FLT70
- Ball Bearing-Outer, FLT70
- Ball Bearing-Inner, FLT70
- Heating Element , High/Mid End,FLT70
- Heater Low end

- Pressostat, FLT70
- Timer T2-EC6018-FLT
- Water Distribution Actuator, FLT70
- Nut Push In, FLT70
- Heater Clip,FLT70
- Bellow, FLT70
- Shock Absorber Assy, FLT70
- Universal Motor Assy, Mid & High End,FLT70
- Motor Low end
- Window Glass,FLT70
- Drain Pump, FLT
- On / Off Switch Low end (Push button switch)
- Thermostat Variable, Low End, FLT70
- Poly V Belt,FLT70
- Tub Sealing, FLT7023 17

Categories	Total No. items in Classes	Percentage
F	17	43
S	23	57
N	0	0
TOTAL	40	100

(Table-IV)

In the above table shows the classification of various components as FSN items using FSN analysis techniques based on movements. From the classification F items are those which moves fastly and constitutes 43% of total components. S items are those which moves slowly constitute 57% of total components and N items are those which don't move (Non-moving items). According to data given, there are no Non-moving items. It is not good as the company maintains low percentage in moving items.

VI. RESULTS AND DISCUSSIONS

It is found that, there is a variation in the EOQ & no. of unit purchased. It is understood that the company is not following EOQ for purchasing the materials. So, the inventory management is not satisfactory. From calculation of safety stock, we can able to determine how much the company can hold the inventory in reserve stock per annum

From the classification A classes are those whose unit value is more than Rs.100 and constitutes 45% of total components. B classes are those whose unit value is between Rs.25-100 constitutes 35% of total components and C classes are those whose unit value is less than Rs.25 constitutes 30% of total components. It is good that the company maintains its inventories based on its value using controlling techniques. From the classification F items are those which moves fastly and constitutes 43% of total components. S items are those which moves slowly constitute 57% of total components and N items are those which don't move (Non-moving items). According to data given, there are no Non-moving items. It is not good as the company maintains low percentage in fast moving items in compared to slow moving inventories based on movements using controlling techniques.

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Improved Hybrid Dynamic Load Balancing Algorithm for Distributed Environment

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Abstract- With the rapid development of high-speed and Computational resources Load Balancing has become a necessity in emerging distributed environment to address the inherit heterogeneity in computing resources. From two load balancing strategies static and dynamic, dynamic strategy is efficient for these systems. In dynamic also the centralized dynamic approach limits the scalability with the load balancing unit itself becoming a bottleneck. Conversely, the decentralized dynamic approach though overcomes the above problems, suffers from increased communication overhead. The hybrid dynamic approach which uses centralized and decentralized strategy suffers from bottleneck and communication overhead problem for large number of system. In this paper we propose the design of a simple yet effective improved hybrid dynamic load balancing algorithm that overcomes the limitations of hybrid dynamic algorithm and performs competitively for heterogeneous system having large number of heterogeneous nodes.

Index Terms- Bottleneck, Communication Overhead, Distributed Environment, Heterogeneous System, Load Balancing.

I. INTRODUCTION

Load balancing is an operation that involves redistribution of the system workload, as evenly as possible, among the processing elements of a distributed system based on prior analysis of the existing load. Load balancing is to ensure that every processor in the system does approximately the same amount of work at any point of time. Load balancing is one of prerequisites to utilize the full resources of parallel and distributed system [1]. Load balancing is basically to do following benefits as optimal resource utilization, maximum throughput, reduce mean job response time under job transfer overhead, increase the performance of each host, remove starvation that causes to small job[2]. In parallel and distributed system more than one processors processing parallel programs, the amount of processing time needed to execute all processes assigned to a processor is called **workload** of processor [3]. Processes may migrate from one node to another even in the middle of execution to ensure equal workload. A distributed system provides the resource sharing as one of its major advantages, which provide the better performance and reliability than any other traditional system in the same condition [4].

A load balancing has two strategies **Static Load Balancing (SLB)** and **Dynamic Load Balancing (DLB)** depending on the freshness of the input parameters used for determining the load distribution. An associated aim is to avoid system overload by using the processing power of the entire system evenly to smooth out periods of high congestion at individual nodes and network. Dynamic load balancing is more

responsive to changes in the system workload and hence is more suitable to heterogeneous environment [5][6]. A DLB algorithm is further based on either centralized OR decentralized (distributed) approach. **Centralized DLB algorithm** approach limits the scalability [6] because the load balancing unit itself becomes a bottleneck and susceptible to failures so **Decentralized DLB algorithm** is preferred [7][8].

The critical issue here is the inter-node communication and synchronization required – that involves an all-to-all broadcast as compared to that in the centralized approach (all-to-one and one-to-all)[9]. Thus, though the decentralized approach overcomes the limitations of the centralized approach, it raises the number of messages used for information exchanges. Therefore, the development of an efficient DLB algorithm is really critical design issue – one that must ensure a tradeoff between the scalability and efficiency. In this backdrop, the hybrid dynamic algorithm is designed which uses both centralized and decentralized strategy but which is also less effective in case of large number of nodes in the system [10]. Therefore we propose the design of a simple yet effective improved hybrid dynamic load balancing algorithm. Our approach typically sits between the two extremes mentioned above.

The report proceeds with what other related work we have done before in section II. Section III The new improved hybrid load balancing approach which is overcoming the drawbacks of hybrid algorithm work that we have done. After that in section IV Analysis of the improved algorithm is done with hybrid system showing that how proposed method is efficient, finally conclusion is produced in chapter V and references that we have taken for whole work in section 6.

II. RELATED WORK

There are many sources available to write literature for the parametric analysis of static and dynamic load balancing algorithm and the design of load balancing algorithm that try to address one or another design issues, but no one of them addressed efficiency concern as per my observation. Load balancing involves the distribution of jobs throughout a networked computer system, thus increasing throughput without having to obtain additional or faster computer hardware [1]. Load balancing policies may be either static or dynamic.

A. Static Load Balancing(SLB)

Static load balancing policies are generally based on the information about the average behavior of system; transfer decisions are independent of the actual current system state. SLB algorithm collects no information and makes probabilistic balancing decisions[2]. Processes are assigned to the processors before the execution starts.

B Dynamic Load Balancing(DLB)

Dynamic load balancing algorithm collect varying amount of state information to make their decisions. DLB can reassign the processes. Dynamic policies, on the other hand, react to the actual current system state in making transfer decisions. This makes dynamic policies necessarily more complex than static ones, and truly optimal dynamic policies are known only for special systems. Load balancing algorithms vary in their complexity where complexity is measured by the amount of communication used to approximate the least loaded node and cost of transferring a job from one node to another. Potentially the more information an algorithm can collect the better decision it will make [3]. Figure 1 shows the general dynamic load balancing system [5].

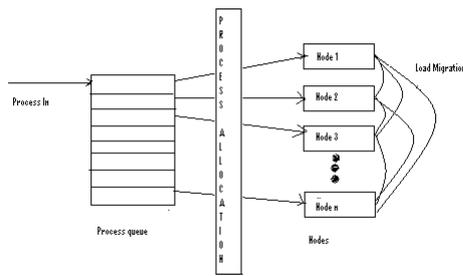


Figure 1: Simple dynamic load balancing

The problem with the complex load balancing algorithm is that they cannot keep up with the rapidly changing state information of the system. An associated aim is also to avoid system overload by using the processing power of entire system evenly to smooth out periods of high congestion at individual nodes and network [4].

In a distributed network of computing hosts, the performance of the system can depend crucially on dividing up work effectively across the participating nodes. Dynamic load balancing is still very effective when a large portion of the workload is immobile. All hosts, even those with light loads, benefit from load balancing. Similarly, all types of jobs see improvements in their response times, with larger jobs benefiting more. System instability is possible, but can be easily avoided. The random arrival of tasks at each processor is likely to bring about uneven processor loads in a distributed system [5]. Dynamic Load balancing can be improved by having one centralized node to handle the uneven load. DLB can be centralized or decentralized.

1) Centralized DLB Algorithm

A central node acts as the load balancing node, working on the jobs from different nodes in the system. However, this approach limits the scalability because the load balancing unit itself becomes a bottleneck and susceptible to failures.

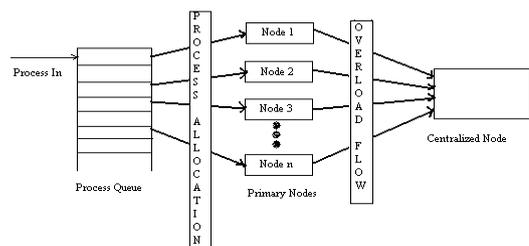


Figure 2: Centralized node based load balancing

Figure2 shows the centralized node based balancing in which one central node handles all the load distribution of the overloaded node [6].

2) Decentralized DLB Algorithm

In decentralized algorithm all nodes participate in load balancing. Decentralized dynamic approach though overcomes the above problems, suffers from increased communication overhead. The project work shows that efficiency can be improved by replacing the centralized node with a number of nodes added with interrupt service which is shown in figure 3 [6]. The scheme can reduce the waiting time by significant amount of time [7]. This approach supports scalability and has better fault tolerance [8]. The decentralized approach is preferred for the heterogeneous system for balance allocation [9][10].

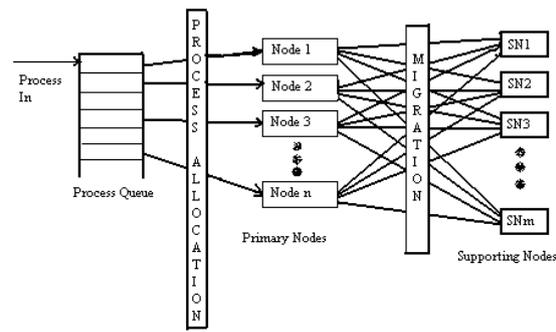


Figure 3: Centralized node replaced by number of supporting nodes

3) Hybrid DLB algorithm:-

To overcome the problem of centralized and decentralized DLB the hybrid load balancing algorithm is developed which gives greater performance over decentralized approach increasing response time [11].

In figure 4, the MasterNode MSN are replaced by multiple supporting nodes $S1, S2, S3, \dots, Sp$. Each node in the system is allowed to access any supporting node. When a node becomes overloaded, it first queries the member nodes of its group and collects the load information in a decentralized fashion. There is a high probability that the Overloaded node will find a lightly loaded node in the same group. Here, when a highly loaded node does not find a lightly loaded node in the same group, it randomly selects one supporting node and now supporting node follows the same procedure as pursued by MSN. The algorithm gives very high performance with large reduction of response time for large system having large number of processes.

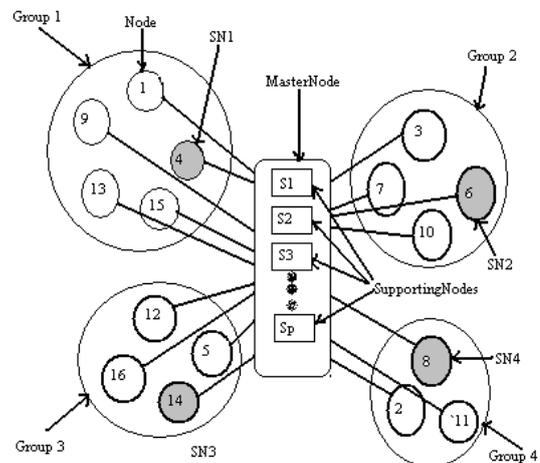


Figure 4: View of groups in simplified distributed system with supporting nodes

The disadvantage of the system is that communication overhead will be very large in case of large number of nodes

since the nodes are directly connected to the supporting node of master node in this algorithm [11]. So Here, we propose the design of a simple yet effective improved hybrid dynamic load balancing algorithm that overcomes limitations of hybrid approach performs competitively for heterogeneous system. Under this new hybrid approach, a highly loaded node is expected to discover lightly loaded node in lesser time as compared to hybrid dynamic approach, minimizes the communication overhead, and is also expected to produce improved performance under variety of workloads.

III. PROPOSED APPROACH

A. Design issues

There are various factors pertaining to design of a load balancing algorithm. For the proposed hybrid approach, all these factors are discussed in the following

1) Heterogeneity

The proposed algorithm is designed to consider system heterogeneity that is to be associated with varied hardware and software resources of the nodes. We address heterogeneity with respect to diverse set of CPUs, memories, and disks machine platform. Specifically, we characterize each node ni by its CPU speed Ci , the storage capacity Mi and the disk speed Di .

2) Target applications

A real distributed system can have workload consisting of applications that may be using significant amount of CPU, memory, and/or I/O. Therefore, to prevent performance fall under variety of applications, it is essential to make a decision upon intended applications while designing a DLB algorithm.

3) Metrics for load measurement

Our design takes into account the following parameters to measure the load at each node in the system; based on which the decision for further distribution is done.

- maximum CPU queue length
- maximum CPU utilization
- maximum memory queue length
- maximum memory utilization
- maximum I/O queue length
- maximum I/O utilization
- maximum context switch rate

An appropriate combination of these parameters is used to constitute the load index. Considering maximum load measurement matrices over short interval improves instantaneous values, and overcome the use of too long averaging interval that reduces the responsiveness of the index to load changes[11]. Hence, we use maximum load of resources over an interval of 4 seconds.

B. Components of proposed algorithm

Various kinds of components exist, and they should be chosen according to the desired environment, such as application types or system environment. The improved hybrid dynamic algorithm uses same component as that of hybrid dynamic algorithm with little changes named as follows,

1) Information Policy

The proposed **information policy** uses an effective mechanism to exchange state information that considerably reduces the communication overhead while quickly updating the state

information in large system environment. We use traditional **demand-driven** information policy same as hybrid approach. When any node becomes highly loaded, initially, load information of local nodes from any one supporting node that resides within the same group is collected. If a lightly loaded node is not found within the same group, other groups are searched to find a lightly loaded node. In former case, lesser number of messages will be used while in latter case, the number of messages will increase gradually.

2) Transfer policy

We use a threshold policy as the **transfer policy** that is dynamic in nature. However, for simplicity single threshold policy is considered. Defining a suitable threshold value for a particular computing environment is a challenging task. Therefore, one node in each group is selected as a **MasterNode**. The MasterNode periodically collects the load information of other nodes in the group to compute the average load of the group. This average load is set as a new threshold value T and is broadcast to other nodes in the group.

3) Selection policy

Selection policy is same which is used in hybrid dynamic load balancing algorithm[13].

4) Location policy

Location policy considered is polling (or probing). Under this policy, a MasterNode polls all the nodes in the same group to find out a lightly loaded node. The node whose load is lowest taking into account all the parameters is considered as the destination node. Thus, this approach makes an effort to choose the best node for the process transfer. The destination node executes the process regardless of its resource usage at the time of arrival of the transferred process.

C. Working of Proposed Approach

The proposed algorithm is designed for a system in which $N = \{n1, n2, n3, \dots, nn\}$ nodes are connected via a high speed communication network. Each node in the system is composed of a combination of various resources including processor, memory, disk, network connectivity and every node differs in its capacity of processor, memory and disk. A system is divided into m groups, where $1 < m < n/2$. For simplicity, static groups are created. Moreover, each group can have different size where a number of nodes in each group can be minimum 2 and maximum $n/2$. In each group one node is selected as MasterNode and which is also divided into p number of **MasterSupportingNode** (MSN) where $1 < p < m/2$, which is the central node for that group that periodically collects the load of the other nodes in the group to set new threshold value. Communication between groups is possible via number of supporting node SN.

Table 1: Definition of notations

Notations	Definition
N	Number of nodes in distributed system
Ni where $1 < i < n$	Different nodes in system
M	Number of groups
MN	Master node
Msn	MasterSupportingNode

SN	Supporting node
Li	Load of the node ni
Pi	Overload of the node ni
T	Threshold value to decide status of the node

Figure 5 shows groups created for simplified distributed system. Here, system consists of n=13 nodes that are divided into m=4 groups, where group1 and group 3 has 4 nodes, group2 has 4 nodes, and group4 has 2 nodes. Nodes 3, 7, 8, and 12 are MasterNode. Each MN is divided into Msn. Each Msn node has access to SN. Msn is responsible for monitoring available resources of other nodes in the group.

When a node becomes overloaded, it first queries any one of the Msn of its group and Msn collects the load information in a centralized fashion. There is a high probability that the Msn will find a lightly loaded node in the same group for large system (unlikely if the majority of nodes in group are highly loaded).

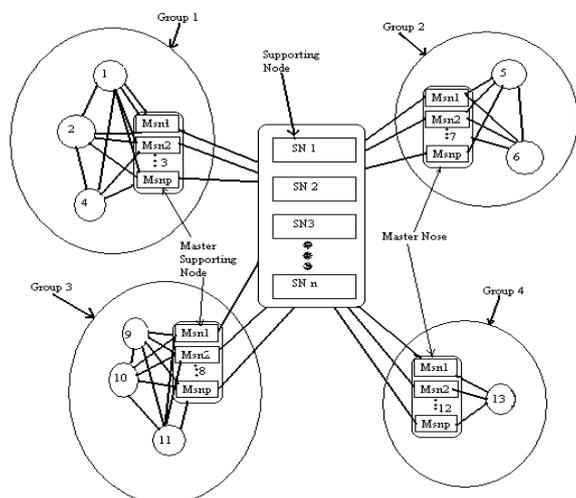


Figure 5: View of groups in simplified distributed system with supporting nodes

However, when the Msn does not find a suitable destination node in the same group to transfer its overload, it requests to one of the supporting nodes to search for the lightly loaded node in the other groups. The SN randomly selects one group and collects the load status of all nodes in this group from Msn to ensure the availability of destination node. If any lightly loaded node is found, the overload will be transferred to this node, otherwise Msn selects another supporting node and process will be repeated until either a lightly loaded node is found or all groups are searched. In the latter case, the overload will be executed on the original node. Since the groups contains very large number of nodes so there is no possibility that Msn becomes a bottleneck and a single point of failure occur due to presence of number of Msn. Each Msn in the group is allowed to access any supporting node. We will see algorithm utilized by highly loaded, Master supporting and supporting node.

Algorithm utilized by a highly loaded node

Assumption: Each node is having some load

Input: load Li of the node and threshold T

Output: destination node to transfer overload

Algorithm LoadBalancingProcedure (Li, T)

1. if $Li > T$ for any node Ni

2. Consult Msn (or randomly selected MasterSupportingNode) to find lightly loaded node within the group
3. if (destination node found)
4. dispatch $Pi = Li - T$ load to this node
5. exit

Algorithm utilized by MasterSupportingNode

Assumption: Each node is having some load

Input: load Li of the node and threshold T

Output: destination node to transfer overload

algorithm LoadBalancingProcedure Msn(Li, T)

1. if $Li > T$ for any node Ni
2. collect the load status of all nodes in the same group
3. take out lightly loaded nodes
4. destination node = most lightly loaded node
5. if (destination node found) send ID of the destination node to overloaded node
6. transfer overload to destination node
7. exit
8. else
9. Consult SN (or randomly selected supporting node) to find lightly loaded node in other group

Algorithm utilized by SupportingNode

Assumption: Each node is having some load

Input: load Li of the node and threshold T

Output: destination node to transfer overload

Algorithm LoadBalancingProcedureSN (Li, T)

1. while (destination node is not found OR all groups are not searched)
2. FOR each group in the system
3. obtain value of threshold T for the selected group from Msn
4. take out lightly loaded nodes
6. destination node = most lightly loaded node
7. if (destination node found)
8. send ID of destination node to Msn
9. Transfer overload to destination node
10. exit
- 11.else
12. Execute overload on the original node

IV. PERFORMANCE ANALYSIS

The proposed improved hybrid algorithm is evaluated using following two parameters: Communication overhead and Response time for large system having node in of large number.

Table 2: Comparison of decentralized approach and proposed approach

	Communication Overhead	
	Hybrid dynamic Approach	Proposed Improved Hybrid dynamic approach
Best Case	7	5
Average Case	18 or 26	16 or 22
Worst Case	30	30

Table 2 summarizes the number of messages utilized by hybrid and improved hybrid approaches in order to achieve load balancing for the given example.

Consider figure 5, let's assume that node 4 in group-1 has become overloaded. As per the proposed approach, initial

number of messages used to collect the load information from the same group is equal to 7 (4 request messages and 4 response messages). If lightly loaded node is found in this group, then 1 message will be used to transfer overload to destination node. Thus, the number of messages is limited to 9 if lightly loaded node is found in the same group. However, if a destination node is not found in the same group, the highly loaded node sends a request to Msn to locate lightly loaded node from the other group. Msn will consult with SN1 and SN1 will search group2, group3, and group4 until lightly loaded node is found with 18, 26, and 30 messages respectively.

This analysis shows that proposed approach has higher probability of lesser communication overhead. For the above mentioned example, it takes only 9 messages to transfer overload in best case while the same communication in decentralized approach would have taken 31 messages. In average case, it takes 18 or 26 messages. However, in worst case, it may need 30 messages to transfer the overload, but the likelihood of worst case is less. Moreover, it has been reported in literature that lesser communication overhead minimizes response time. Thus, proposed approach is expected to improve performance of system in terms of communication overhead and response time. Thus, from all the above study we will come to conclusion which is explained in next chapter.

V. CONCLUSION

With increasing number of nodes in the system due to large number of resources used by user the previous load balancing algorithms failed to perform efficiently to provide greater performance with efficient work distribution. We have designed an effective improved hybrid dynamic load balancing algorithm that fulfills main objectives to overcome several limitations of hybrid load balancing method, provides Load measurement policy that gives load status of major affecting parameters using Effective information policy. This improved hybrid load balancing approach significantly minimizes the communication overhead along with demand-driven information policy for system containing large number of nodes. Our algorithm is expected to perform efficiently for CPU-intensive, memory-intensive, I/O intensive applications, and any combination of these because we have defined the load index utilizing load information of critical resources viz. CPU, I/O, memory to measure the load in large system.

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Biodiversity: Importance and Climate Change Impacts

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Abstract: Biodiversity is the variability among living organisms, including genetic and structural difference between individual and within and between individual and within and between species. Biodiversity plays a direct role in climate regulation. Biodiversity conservation will lead to strengthening of ecosystem resilience and will improve the ability of ecosystem to provide important services during increasing climate pressures.

This review basically focuses on the importance of biodiversity, the consequences faced by the plants, animals, humans and ecosystem owing to the global warming and climate change and the possible mitigation and adaptation strategies in terms of biodiversity conservation which can protect the planet from the consequences of climate change.

Index Terms: Biodiversity, climate change, mitigation and adaptation

INTRODUCTION

BIODIVERSITY AND ITS IMPORTANCE

Biodiversity is the variability among living organisms, including genetic and structural difference between individual and within and between individual and within and between species. The world biodiversity has a total of 1,263,500 species of plants and animals while India has only 51,828 species (table-1) (1). It provides us with all the necessities of life and sustains and nourishes us. Biodiversity plays a direct role in climate regulation. Climate always changes resulting in evolutionary changes in the species. Biodiversity is important in following ways (3) ;

i). Soil formation and maintenance of soil quality: The activities of microbes and animal (bacteria, algae, fungi, millipedes, etc) condition soils, break down organic matter, form soil and prevent soil erosion.

ii). Maintain air quality: Plants purify the air and regulate the composition of the atmosphere, by taking in CO₂ during photosynthesis and liberating oxygen in the atmosphere.

iii). Maintain water quality: Trees and forest soils purify water; prevent siltation of rivers and reservoirs arising due to soil erosion and landslides.

iv). Pest control: Conserving biodiversity can control 99% of potential crop pests.

v). Detoxification and decomposition of wastes: About 130 billion metric tons of organic waste (including industrial wastes) is processed every year by earth's decomposing organisms.

vi). Pollination and crop production: Without plant and animal

(bees, butterflies, bats, birds) interactions, no pollination will be possible and hence would lead to decline in crop yield.

vii). Climate stabilization: Oceans, soil and vegetation are huge carbon sinks and help reduce the CO₂ in atmosphere. In rainforests the surface temperature is maintained by regular rains, while in cold regions the temperature is regulated by forests acting as insulators and windbreaks.

viii). Prevention and mitigation of natural disasters: Ecosystem biodiversity (forest, salt marshes, mangrove) prevents erosion, nutrient loss, landslides, floods and impacts of storms.

ix). Provision of food security: biodiversity in terms of plants and animals is the ultimate source of food, fiber, fuel and shelter.

Biodiversity conservation will lead to strengthening of ecosystem resilience and will improve the ability of ecosystem to provide important services during increasing climate pressures.

GLOBAL WARMING AND CLIMATE CHANGE: DRIVERS AND IMPACTS

Global warming is the increase in the world's average temperature occurring due to increasing emission of the greenhouse gases (GHGs) which results in an enhanced greenhouse effect. *Climate change* refers to a statistically significant change in either the mean state of the climate or in its variability persisting for decades or longer (17). Climate change results due to both; natural and anthropogenic drivers.

Natural drivers: It involves the contribution of plants, animals and humans naturally by processes of respiration, death and decomposition. Earth's climate variability is also caused by changes in the solar radiations, Milankovitch cycle, volcanic eruption, plate tectonics, ocean circulations, earthquakes and so on (18).

Anthropogenic drivers: It involves the human activities leading to climate change (table-2) (20). The concentration of CO₂ has increased from pre-industrial concentration of 280ppm to 392ppm in 2010. It is all due to the burning of fossil fuel to generate the electricity in power plants, industrialization, deforestation, mechanization of agricultural practices, increasing vehicular transportation (In India, vehicles have increased from 350 million to 40 billion since 1947) (21), land use changes, urbanization, industrialization and the disposal of subsequent waste generated out of it all.

Impacts: Millennium Ecosystem Assessment (MEA) predicts climate change to be the principal threat to the biological diversity (2). The average global temperature has increased by 0.6°C since mid 1800s and is predicted to rise by 1.4-5.8°C by the year 2100. The global mean sea level has risen by 10 to 20

cm (8) and may further rise to 88 cm. Thickness of Arctic ice has decreased by about 40%. Many areas are facing problem of water shortage. Alaska's boreal forest has moved about 100 km for every 1°C rise in temperature. Climate change has resulted in extinction of animals like golden toad and Monteverde harlequin frog (8). Many communities have already become climate refugees to evade rising sea level (2). The rainfall is predicted to increase in Southeast Asia and decrease in Central Asia, Australia, New Zealand, Mediterranean region and Africa. Extreme climatic events (heat waves, storms and hurricanes) and tropical vector-borne diseases (malaria, dengue etc) are predicted to increase.

IMPACTS OF CLIMATE CHANGE ON BIODIVERSITY

[I] Vegetation: The vegetation is exhibiting the following changes;

a). Migration of vegetation towards a higher altitude: In Nainital, species such as *Berberis asiatica*, *Taraxacum officinale*, *Jasminum officinale* etc have shifted from 1000 to 2000m height (4). Teak dominated forests are predicted to replace the Sal trees in central India and also the conifers may be replaced by the deciduous types. According to climatologists and palynologists, temperature change of 3°C may lead to forest movement of 250 km at a rate of 2.5 km/year which is ten times the rate of natural forest movement (6,7).

b). Invasive species: Invasive species (*Lantana camara*, *Parthenium hysterophorous*, *Ageratum conyzoides*) are a threat to native species being more tolerant to climatic variations (4).

c). Changes in phenological behaviour: Climate/season affects the normal life cycle (bud, leaf fall, flowering, fruiting, fertilization time and production) of the plant (4). The crops show early flowering and maturation which has shortened their grain fill period and yield.

d). Forest fires have increased in number due to high temperature conditions.

f). Increase in the pest attacks: Due to climate change, pests (Pine wood nematode-*Bursaphelenchus xylophilus*, Pitch canker-*Gibberella circinata*, Red palm weevil-*Rhynchophorus ferrugineus*, virus, aphids, fungi) have increased in number. Variation in temperature and precipitation patterns can result in more frequent droughts and floods making indigenous plants more vulnerable to pests and diseases (rots, blights) (5).

[II] Animals: Sensitivity of the species to even a slight change in the climate leads to their extinction as in case of the golden toad. Polar bears are in danger due to reduction in Arctic ice cover. North Atlantic right whale may become extinct, as planktons, its main food have shown decline due to climate change. The sex of sea turtle depends on temperature and more female turtles are produced as a result of high temperature. Some threatened species (frogs, toads, amphibians, tigers and elephants) are vulnerable to the impacts of climate change like sea level changes and longer drier spells. Changes in ocean temperature and acidification may lead to loss of 95% of the living corals of Australia's Great Barrier Reef (2).

[III] Ecosystem

a). Marine and Coastal: 70% of the Earth's surface is covered by oceans comprising some of the world's most diverse and unique ecosystems (mangroves, coral reefs, sea grass beds) (10). Climate change is leading to sea level rise, increased coastal erosion, flooding, higher storm surges, sea salinity ingress, increased sea-surface temperatures, ocean acidification, coral bleaching, mangroves and millions of climate change refugees. Species composition and distribution will surely be affected by such changes. Indian coastal areas vulnerable to climate change are Sundarbans, Maharashtra, Goa and Gujarat (Rann of Kutch) (15,16). The distribution and composition of the species is bound to be effected.

b). Island ecosystem: Islands are the most fragile with rich biodiversity and a high economic importance. 23% of island species are at present endangered (11). Islands have small and endemic species (corals) (11) sensitive to the changing climate. Climate change leads to an increase in the sea level, frequency and intensity of storms, variability in rainfall and intolerably high temperatures affecting the endemic species and hence economic loss in the tourism sector.

c). Inland water ecosystem: Inland water systems include the fresh water systems and are only 0.01% of the world's water source comprising 0.8% of the Earth's surface, but support 6% of the total species (12). They are rich source of food, income, employment and biodiversity. Changing rainfall patterns will lead to change in the course of the streams affecting breeding and food habits of many species. The ice cover is bound to decrease causing an increase in the number of flood and drought. This would further lead to changes in the phenology, physiology and migration trends of some organisms like migratory birds.

d). Forest: Forest area is about one-third of the Earth's surface and comprises two-thirds of all the known terrestrial species. They are also rich biodiversity hotspots. Half of the original forest cover has been cleared up till now. The increased level of CO₂ has led to increase in the growth of some forest. Increased temperature (even 1°C) has resulted in significant migration of tree species, increased attack of pest, invasive species and wild fires, hence modifying the composition of forest. Many animals, primates and 9% of all known tree species (woody trees, white spruce) are at risk of extinction (13).

e). Agriculture: About one-third of the world's area is under cultivation (2). Climate change leads to variability in rainfall patterns, heat stress, spread of pests and diseases and shortening of the crop cycle and affecting plant growth and production.

f). Dry lands and Grassland: They support 35% of the world population and comprise of the arid and semi-arid areas, grasslands and savannahs. They have localized species (wild ass, Kutch etc) and have varied crops and livestock. The desertification is expanding and so is the temperature making them drier and intolerable for the threatened species. The risk of wild fire is increasing which could change the species biodiversity. Climate change is a threat to the diverse hotspots (Succulent Karoo, South Africa) (2).

g). Mountain: One-third of the Earth's surface is covered by the mountains which supports one-third of the world population. Many species are very specific and endemic to this ecosystem and are rich natural reservoirs of goods. Climate change is leading to the glacier retreat, change in the course of rivers, migration of the tree species northward (13) and subsequent

extinction of some species.
h). Polar ice/Glaciers: They are diverse ecosystem facing extremes of the cold temperature with the flora (planktons) and fauna (migratory birds, whales) and Arctic people modified to such conditions (2). Climate change has resulted in an increase in the temperature to about 5°C to the normal and has resulted in the melting of the ice, increase in sea level which is threatening the endemic species (polar bears, walruses, seals, emperor penguins, krill, ringed seal). Studies show a decline in the weight of the polar bears from 325 kg in 1980 to 253 kg in 2004 (14). Biodiversity loss has impacted the fishing and hunting practices by indigenous people (Saami and Inuit of Canada) posing an implication on their only source of food (2). (ref. table-3)

[IV] Humans

Climate change leads to an increase in temperature, melting of the ice and increased extreme events. All the extreme events like floods, droughts, cyclones displace the humans from their home and lead to outbreak of water borne diseases like cholera, typhoid etc; spread of tropical and vector borne diseases like malaria, dengue etc and rodent borne diseases like plague. These diseases have shown a persistent increase in the past 50 years. The incident of heat waves has registered an increase throughout the world taking away a heavy toll of the people life every year (5). The increasing sea level rise has already submerged many islands and will soon leave millions of refugees for the world to provide shelter. The sea salinity ingress in the fresh water sources has made land barren and will soon be a threat to the food security.

PREVENTION OF CLIMATE CHANGE: MITIGATION AND ADAPTATION STRATEGIES

Mitigation deals with the causes of climate change, while adaptation tackles its effects. Global warming mitigation involves reducing the intensity of radiative forcings so as to reduce the effect of global warming and it can be made possible by two aspects; Geo-engineering and Carbon sequestration. Geo-engineering are the proposals to manipulate the earth’s climate so as to decrease the impact of global warming from the greenhouse gas emission. It comprises of Sulphur dioxide spraying, artificial trees, cloud seeding ships, iron and limestone fertilization of the oceans and space mirrors (19).

Another technology comprises of the various methods of carbon sequestration called Carbon Capture and Storage (CCS). According to a 2005 IPCC report major point sources of carbon dioxide include coal-fired power stations, natural gas, fossil fuel-based hydrogen, and synthetic fuel. CO₂ emissions from such sources can be captured and stored in underground geologic formations. CCS technologies are already being widely used in industries producing fertilizers, hydrogen and natural gas processing (21). Carbon sequestration can also be made practically possible by methods of organic farming using natural manures, fertilizers (algae- *Nostoc*, *Anaebaena*, mycorrhizae) and pesticides and bringing a halt on the application of chemical fertilizers and pesticides and promoting tree plantations and agro-forestry practices (20). Environment Impact Assessment (EIA) of the industrial areas, checking vehicular pollution by the use of biofuels and using the clean technology, reducing over-exploitation of resources (over-fishing, land-use-changes); preventing poaching of rare,

endangered and endemic species; preventing habitat fragmentation. The biodiversity can be conserved by management programmes including ecosystem conservation and restoration. The forest need to be conserved with practices of reforestation and afforestation as they have 80% of the total carbon stored in terrestrial vegetation. The indigenous knowledge can also be used to prevent climate change or adapt to it (2).

Strategies by the United Framework Convention on Climate Change (UNFCCC) focuses on cutting down greenhouse gas emissions to prevent climate change. Kyoto protocol has brought into existence joint implementation, emission trading and Clean Development Mechanism (CDM) to reduce greenhouse gas emission. Like all other countries National Action Plan on Climate Change of India was released in Delhi in 2009 and involves eight missions on solar mission, enhanced energy efficiency, sustainable habitat, water mission, sustaining Himalayan ecosystem, Green India through massive tree plantation, sustainable agriculture and strategic knowledge for climate change by establishing a knowledge platform on climate change (22). Successful implementation of all these plans would surely help reduce global warming and conserve biodiversity.

CONCLUSION

The increase in the greenhouse gases is leading to climate change at a faster rate and impacts the people and ecosystems. Every change in the ecosystem process works on the principle of Newton’s law of motion (Every action has an equal and opposite reaction) which may be damaging or complimentary. Even a small change in the climate can lead to the extinction of some vulnerable and sensitive species. Climate change results in the impact on the biodiversity like change in their distribution pattern, migration of species, invasion of invasive species, change in the phenological behaviour like breeding period, migration time etc, increase in the forest fires and pest attacks. To maintain the balance of ecosystem, interaction between the plants, animals and biodiversity needs to be understood, hence promoting its conservation and protection by designating the hotspots as biosphere reserves, increasing afforestation, reforestation and agroforestry practices. Biodiversity-based adaption and mitigation strategies will enhance the resilience of ecosystems and prevent damage to human and natural ecosystems.

Table-1: Species biodiversity in India and World

Species	Number in India	Number in world
Mammals	410	4,000
Birds	1,228	10,000
Reptiles	447	10,500
Amphibians	197	
Fishes	2,546	19,000
Plants	47,000	2,70,000

Table-2: Percent GHGs emissions by various sectors (Smith et al., IPCC, 2007)

Anthropogenic sectors	Percentage emission
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Energy supply	25.9%
Industrial sector	19.4%
Forestry (deforestation)	17.4%
Agriculture	13.5%
Transportation	13.1%
Urbanization	7.9%
Waste	2.8%

observing climate change

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Table-3: Ecosystem: vulnerability, impacts, mitigation and adaptation with respect to climate change

Ecosystem	Polar ice/Glaciers, Marine and Coastal, Inland water, Island, Forest, Dry lands/Grassland, Mountain and Agriculture
Vulnerability	Climate sensitivity of flora and fauna, low resilience power
Impacts	Rising temperature, Melting ice, Sea level rise, Altering stream flow Ocean acidification, Increased extreme events like floods, storms Sea salinity ingress Increased pest attacks and diseases, Wildfires Invasion of invasive species Endemic species like polar bears, penguin, walrus, seals, krill are threatened Changes in phenological, physiological and migration pattern of species. Reduced agricultural yield
Mitigation and Adaptation	Reducing pollution both industrial and vehicular, Environment impact assessment, CDM, using clean and renewable energy and biofuels Biodiversity conservation: Forest conservation, reforestation, afforestation, agro-forestry, avoiding deforestation, sustainable and efficient management of water resources, ecosystem management and restoration, preventing habitat fragmentation, over-exploitation of resources and land-use-change Agriculture: Organic farming, biological pest control, improving rice farming, no-till practices and in-situ and ex-situ gene preservation. Consideration of suggestion on methods to conserve biodiversity from indigenous people

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Antioxidant activity and antimicrobial property of some Indian spices

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Abstract-Solvent extracts of five Indian spices viz., Turmeric, Cinnamon, Cumin, Ginger and Garlic were examined for their antioxidant activity and antimicrobial activity. The antioxidant capacity of the spice extracts were found in descending order: Cumin>Garlic>Cinnamon>Turmeric>Ginger by DPPH method, Garlic>Cumin>Turmeric>Ginger>Cinnamon by FRAP method and Turmeric>Cinnamon>Garlic>Cumin>Ginger by TPC method. Cinnamon had the highest antimicrobial effect (12mm) at maximum concentration on the growth of bacterial strains *Vibrio vulnificus* and *Micrococcus luteus* followed by cumin (9mm), Garlic (8mm), Ginger (8mm) and Turmeric (7mm). These results indicated that the spice extract supplement is promising as a prophylactic for fish health improvement.

Index terms: spices, solvent extraction, DPPH, FRAP, TPC, antimicrobial activity.

I. INTRODUCTION

Over the past two to three decades many beneficial effects of the common food spices on the health have been understood. There are also new concerns about food safety due to increasing occurrence of new food-borne disease outbreaks caused by pathogenic micro-organisms. This raises considerable challenges, particularly since there is increasing unease regarding the use of chemical preservatives and artificial antimicrobials to inactivate or inhibit growth of spoilage and pathogenic micro-organisms^{1,2,3}. Spices can be added to foods in several forms: as whole spices, as ground spices, or as isolates from their extracts.

Spices are aromatic and pungent food ingredients, like herbs, spices can have significant antioxidative effects⁴. Total equivalent antioxidant capacities and phenolic contents (Folin-Ciocalteu) of 32 spices was measured⁵. Spices can also have antibacterial effects. Out of 46 spice extracts evaluated, many exhibited antibacterial activity against foodborne pathogens. Gram-positive bacteria were generally more sensitive than Gram-negative bacteria. *Staphylococcus aureus* was the most sensitive, while *Echerichiacoli* were the most resistant. The antibacterial activity of the extracts was closely associated with their phenolic content^{6,7}.

Antioxidant can be defined as substances whose presence in relatively low concentrations significantly inhibits the rate of oxidation. These are the substances that may protect cells from the damage caused by unstable molecules known as free radicals. Scientific research now confirms that free radicals play a major role in the development of cancer, heart disease, aging, cataracts and impairment of the immune system. They are seen as molecular loose cannons involved in biological fireworks. The battle to conquer cancer is an international effort for the treatment of cancer. Currently we have about 30 chemotherapeutic agents and out of these nearly one third are natural products. The use of antioxidants as an adjunct to conventional or as an integral part of alternative cancer therapy is an area of intense research. Antioxidants vitamins and minerals should enhance the body's natural defense mechanisms and improve the quality and length of life. Antioxidants are abundant in fruits and vegetables, spices as well as in other foods including nuts, grains, and some-meats, poultry and fish.

The continuous evolution of bacterial resistance to currently available antibiotics has necessitated the search for novel and effective antimicrobial compounds. Globally, plant extracts are employed for their antibacterial, antifungal and antiviral activities. It is known

that more than 400,000 species of tropical flowering plants have medicinal properties and this has made traditional medicine cheaper than modern medicine⁸.

Spices are some of the most commonly used natural antimicrobial agents in foods. Addition of spices in foods not only imparts flavor and pungent stimuli but also provides antimicrobial property^{9, 10}. Natural antimicrobial compounds in spices were found to possess antimicrobial activity^{11, 12}. Although some researchers have studied the antibacterial activity of spices against several species of bacteria, few serotypes of *Salmonella* have been tested. In addition, the antimicrobial property of spices may differ depending on the forms of spices added, such as fresh, dried, or extracted forms.

The objective of the present study was to investigate the antioxidant and antimicrobial properties of five Indian spices in order to rank them on the basis of their antioxidant and antimicrobial activity.

II. MATERIALS AND METHODS

Spices: Turmeric (*Curcuma longa*), cinnamon (*Cinnamomum zeylanicum*), cumin (*Cuminum cyminum*), ginger (*Zingiber officinale*) and garlic (*Allium vineale*) were purchased from local market in Srinagar, Kashmir (J & K State).

Spice extraction

The extract preparation was done according to the method previously described by¹³ with some modification. The spices were ground into powder in a laboratory grinder and sieved into fine powder to be used for extraction. The spice materials were extracted by ethyl acetate solvent. About 10g of finely powdered spices was weighed separately and extracted with solvent ethyl acetate in a soxhlet apparatus for at least 24 hours at 70°C. The solvent with extract was filtered with Whatman no.1 filter paper and centrifuged for 5 minutes at 5000rpm to obtain particle free supernatant. In order to obtain pure extract, the extraction solvent was removed by using rotary evaporator (IKA HB10 basic) at 70°C. Then, solvent free extract was finally stored at 4°C until use.

Determination of Antioxidant Activity 2,2'-Diphenyl-1-picrylhydrazyl (DPPH) Radical Scavenging Method

The antioxidant activity of extracts was measured in terms of hydrogen donating or radical scavenging ability, using the stable radical DPPH¹⁴. The ethyl acetate stock solution (20µL) of the extracts (concentration of stock solutions were 25, 20, 15, 5, 2 and 1mg/ml) was put into an appendroff tubes and 2mL of 6×10^{-5} mol/L ethyl acetate solution of DPPH was added. Absorbance measurements commenced immediately. The decrease in absorbance at 517nm was determined in spectrophotometer after 1 h for all samples. Ethyl acetate was used to zero the spectrophotometer. Percent inhibition of the DPPH radical by the samples was calculated according to the formula of¹⁵.

$$\% \text{ inhibition} = ((A_{C(0)} - A_{A(t)}) / A_{C(0)}) \times 100$$

Where $A_{C(0)}$ is the absorbance of the control at $t=0$ min and $A_{A(t)}$ is the absorbance of the antioxidant at $t=1$ h.

Determination of Ferric Reducing Antioxidant Power (FRAP Assay)

The FRAP assay was done according to the method of¹⁶ with some modifications. The stock solutions included 300mM acetate buffer (3.1g $C_2H_3NaO_2 \cdot 3H_2O$ and 16 mL $C_2H_4O_2$), Ph 3.6, 10mM TPTZ (2,4,6-tripyridyl-s-triazine) solution in 40mM HCL, and 20mM $FeCl_3 \cdot 6H_2O$ solution. The fresh working solution was prepared by mixing 25mL acetate buffer, 2.5 mL TPTZ solution, and 2.5 mL $FeCl_3 \cdot 6H_2O$ solution followed by warming at 37°C before use. Spice extracts (150µL) were allowed to react with 2850 µL of the FRAP solution for 30 min in the dark condition. Readings of the colored product (ferrous tripyridyltriazine complex) were then taken at 593nm. The standard curve was linear between 25 and 800 µM Trolox. Results were expressed in $\mu\text{mol}(FeII)/\text{gDW}$.

Determination of Total Phenolic Contents

The total phenolic contents were estimated according to the Folin-Ciocalteu method of ¹⁷. Singleton *et al.* (1999). To 50 µL sample were added 250 µL of undiluted Folin-Ciocalteu- reagent. After 1 min, 750 µL of 20 % (w/v) aqueous Na₂CO₃ were added, and the volume was made up to 5.0ml with distill water. The controls contained all the reaction reagents except the extract. After 2 h of incubation at 25⁰C, the absorbance was measured at 760 nm and compared to a gallic acid calibration curve. Total phenols were determined as gallic acid equivalents (mg/100g extract) and the values are presented as means of triplicate analysis.

Microbial strain and growth media

A loopful of 24 h surface growth on a Nutrient Agar (NA) and Tryptic Soya Agar (TSA) slope of each bacterial strain was transferred individually to 5 ml of Brain heart Infusion (BHI) broth (pH 7.6, Difco). After incubation at 37⁰C for 24 h, bacterial cells were collected by centrifugation at 3000 rpm for 15 min, washed twice and resuspended in PBS. Turbidity was adjusted to match that of a 0.5 McFarland standard (10⁶ CFU/ml). Then, a 1:10 dilution of the cell suspension was performed to give an inoculum concentration of 10⁷ CFU/ml.

Screening of spice extracts using disk diffusion technique

The disk diffusion test was performed using the standard procedure as described by ¹⁸. The bacteria, *Vibrio vulnificus* was incubated in Nutrient Broth (NB) and *Micrococcus luteus* was incubated in Tryptone Soya Broth (TSB) (Difco) at 37± ⁰C for 24 hr, The inoculums suspension of bacterial stains, *Vibrio vulnificus* (MTCC) and *Micrococcus luteus* (MTCC) was swabbed on the entire surface of Mueller-Hinton agar (MHA, pH 7.3 ± 0.1, Difco). Sterile 6 mm filter paper discs (Schleicher & Schuell) were aseptically placed on MHA surfaces by pressing slightly, and solvent extracts of spices were immediately added to discs in volume of 15 µL respectively. The plates were left at ambient temperature for 15 min to allow excess rediffusion of extracts prior to incubation at 37⁰C for 24 h. Diameters of inhibition zones were measured. Each experiment was done in duplicate. All of the extracts individually were injected into sterile paper discs having a diameter of 6 mm in the amount of 15 µL. Discs injected with pure ethyl acetate and distilled water served as negative control whereas as disc containing 10 µg amoxicillin was placed in the plate as a positive control.

III. STATISTICAL ANALYSIS

Univariate Analysis of variance (ANOVA) was applied to the data to determine differences ($p < 0.05$). To discover where there were significant differences between the levels of the main factor, Least Significant difference was used. The statistical analyses were made using SPSS-17.

IV. RESULTS

The radical scavenging capacity of the spice extracts was tested using the 'stable' free radical, DPPH, FRAP and TPC. Table 1 shows the effective concentrations of each extract required to scavenge DPPH radical and the scavenging values as inhibition (%). It was observed that the extracts analyzed exhibited varying degrees of scavenging capacities. Garlic extract exhibited the highest ($p < 0.05$) radical scavenging effect which was higher than the other extracts. The lowest activity was shown by ginger.

Table: 1 Antioxidant activity of spices using the corresponding concentrations (A=25 mg/ml, B=20mg/ml, C=15mg/ml, D=5mg/ml, E=2mg/ml and F=1mg/ml) measured by DPPH (% inhibition) method.

Spices	Concentration (mg/ml)					
	F	E	D	C	B	A
Turmeric	9.355±0.46	26.891±0.84	51.278±0.23	65.439±0.49	85.531±3.81	89.263±0.15
Cinnamon	7.286±0.15	23.669±0.17	48.578±0.99	54.780±0.17	70.129±0.08	86.408±0.23
Cumin	9.430±.45	22.772±.30	44.458±.47	61.712±.49	75.619±.13	87.440±.27
Garlic	22.763±0.37	31.366±0.55	41.494±0.37	57.472±0.08	67.846±0.14	71.042±0.45
Ginger	3.213±0.37	23.039±0.32	46.895±0.65	63.725±0.16	68.028±0.24	84.749±0.34

Critical Difference, CD ($p < 0.05$)

Conc.: 0.39

Spices: 0.53

Spices*Conc.: 1.30

A concentration dependent ferric reducing capacity was found for all the spice extracts (Table 2). Garlic extract exhibited the strongest ($p < 0.05$) radical scavenging effect which was highest followed by cumin, turmeric, ginger and cinnamon.

Table: 2 Antioxidant activity of spices using the corresponding concentrations (A=25 mg/ml, B=20mg/ml, C=15mg/ml, D=5mg/ml, E=2mg/ml and F=1mg/ml) measured by FRAP (umol(FeII)/gDW) method.

Spices	Concentration (mg/ml)					
	F	E	D	C	B	A
Turmeric	136.291±3.98	155.375±.90	169.125±.50	178.875±1.08	184.208±1.50	237.625±10.60
Cinnamon	91.208±1.01	98.875±2.61	121.625±1.32	163.375±.75	215.041±.52	221.375±.66
Cumin	142.791±6.80	151.125±3.38	167.375±5.95	197.958±12.41	215.541±2.89	246.875±14.72
Garlic	146.375±2.81	191.041±4.62	220.291±5.39	234.625±.25	241.458±1.84	253.625±.75
Ginger	124.125±.50	125.208±.38	141.875±2.61	171.291±2.75	126.541±98.87	230.625±1.08

Critical Difference, CD ($p < 0.05$)

Conc. : 6.23

Spices: 8.44

Spices*Conc : 20.69

Total phenolic contents of the turmeric was highest ($p < 0.05$) among all extracts. Other extracts were in the order of cinnamon, garlic, cumin and ginger (Table 3).

Table: 3 Antioxidant activity of spices using the corresponding concentrations (A=25 mg/ml, B=20mg/ml, C=15mg/ml, D=5mg/ml, E=2mg/ml and F=1mg/ml) measured by TPC (mg/100g) method.

Spices	Concentration (mg/ml)					
	F	E	D	C	B	A
Turmeric	1.416±0.38	25.666±0.80	54.000±4.98	57.583±1.23	67.166±3.02	147.333±3.98
Cinnamon	3.583±0.38	15.166±0.28	34.250±0.90	63.916±2.42	86.666±1.01	122.833±6.59
Cumin	3.666±0.38	10.083±0.38	13.416±0.14	17.833±0.62	37.916±0.62	58.000±1.32
Garlic	3.333±0.62	7.750±1.08	13.250±0.90	53.250±0.66	83.250±1.08	107.500±1.50
Ginger	3.666±0.38	7.416±0.38	2.500±1.00	8.416±0.80	17.166±2.25	35.333±0.76

Critical Difference, CD ($p < 0.05$)

Conc. : 1.06

Spices: 1.44

Spices*Conc : 3.53

The results of the disk diffusion test indicated that spice extracts cumin, garlic, cinnamon, cumin and ginger showed different degrees of growth inhibition at different concentrations depending on the bacterial stains (Table 4). Cinnamon showed the broadest antibacterial activity by inhibiting growth of *V.vulnificus* and *M. luteus* stains tested. Other extracts showed antibacterial activity in order of cumin, garlic, ginger and turmeric.

Table 4: Antimicrobial activity of spices extracted by ethyl acetate against *Vibrio vulnificus* and *Micrococcus luteus* using the corresponding concentrations (A=25 mg/ml, B=20mg/ml, C=15mg/ml, D=5mg/ml, E=2mg/ml and F=1mg/ml).

	Spices	Diameter of inhibition zone (mm)											
		<i>Vibrio vulnificus</i>						<i>Micrococcus lutieus</i>					
		A	B	C	D	E	F	A	B	C	D	E	F
1	Turmeric	7	-	-	-	-	-	8	-	-	-	-	-
2	Cinnamon	12	10	9	8	7	7	12	11	10	9	7	7
3	Cumin	9	9	7	-	-	-	10	9	8	-	-	-
4	Garlic	8	7	-	-	-	-	8	8	-	-	-	-
5	Ginger	8	7	-	-	-	-	9	8	-	-	-	-

Amoxicillin (+ve control)	22	25
Ethyl acetate (-ve control)	Nil	Nil

Antimicrobial activity of the spice extracts as mean of inhibition zone (mm) (30 μ l disc⁻¹)

V. DISCUSSION

The antioxidant activities of spice extracts have been widely demonstrated¹⁹ although the mechanism of such activity is not fully understood. Antioxidants are compounds or systems that delay autoxidation by inhibiting formation of free radicals or by interrupting propagation of the free radical by one (or more) of several mechanisms: (1) scavenging species that initiate peroxidation, (2) chelating metal ions such that they are unable to generate reactive species or decompose lipid peroxides, (3) quenching $\cdot\text{O}_2^-$ preventing formation of peroxides, (4) breaking the autoxidative chain reaction, and/or (5) reducing localized O_2 concentrations²⁰. Several explanations have been provided among them the following: the sequence of free radicals; hydrogen donation; metallic ion chelation; or even acting as substrate for radicals such as superoxide or hydroxyl²¹.

DPPH assay

The DPPH assay measures the ability of the extract to donate hydrogen to the DPPH radical, resulting in bleaching of the DPPH solution. In the present study the values of antioxidant activity were in the order of: cumin>garlic>cinnamon>turmeric>ginger. Antioxidant activities of essential oils from aromatic plants are mainly attributed to the active compounds present in them. This can be due to the high percentage of main constituents, but also to the presence of other constituents in small quantities or to synergy among them²². In present study, the antioxidant activities related to the contents of extracts for five spices belonging to different extracts showed very different antioxidant capacities. Stronger activity is indicated by a higher antioxidant index determined by each of the three different methods: DPPH, FRAP and TPC. Cumin essential oil is better at reducing Fe^{3+} ions than dried or fresh ginger. The major components in cumin volatile oil are cuminal, γ -terpinene, and pinocarveol²³. Garlic and shallots (*Allium ascalonicum*) have antioxidant and free radical-scavenging characteristics and identifiable odors at low concentrations. It is suggested that a combination of the allyl group ($-\text{CH}_2\text{CH}=\text{CH}_2$) and the $-\text{S}(\text{O})\text{S}-$ group is necessary for the antioxidant action of thiosulfinates in garlic extracts²⁴. Curcumin present in turmeric is highly effective in neutralizing free radicals²⁶. At the same concentration, curcumin has about twice the antioxidative activity of the polyphenol resveratrol²⁷. Heating dry ginger, turmeric and their essential oils at 120 °C results in different degrees of retention of antioxidant activity²⁸. Of 42 commonly used essential oils, cinnamon bark, oregano, and thyme have been reported to have the strongest free radical-scavenging abilities²⁹.

FRAP assay

The FRAP method is a simple, very rapid, inexpensive and reproducible method, which can be applied to the assay of antioxidants in botanicals³⁰. In the present study a concentration dependent FRAP activity was found for all the extracts. A possible explanation could be that the antioxidant effect is due to several non-volatile compounds³¹. In an investigation³² found that a 5% water extract from ginger yielded nearly the same antioxidant activity toward lipid peroxidation as of BHT, both applied at a dose of 0.1%. The antioxidant capability of cinnamon essential oil is stronger than its free radical-scavenging capacity³³. However, it is a better superoxide radical scavenger than propyl gallate, mint, anise, BHA, licorice, vanilla, ginger, nutmeg, or BHT³². In a study²⁶ found that turmeric oil has a free radical-scavenging ability comparable to vitamin E and BHT. The results on the antioxidant activity of extracts by FRAP method were found to have highest activity in garlic followed by cumin, turmeric, ginger and cinnamon.

TPC assay

The results of the present study showed that total phenolic content of cumin extract had the highest activity belonging to family of *Apiaceae* whereas, in the spices derived from *Zingiberaceae*, only a small amount of total phenols could be found. Phenolic substances have been reported for most of the examined spices. Main phenolics are quercetin and kaempferol glycosides in cumin and fennel³³. Of 42 commonly used essential oils, cinnamon bark, oregano, and thyme have been reported to have the strongest free radical-scavenging abilities²⁹. Twelve (12) of the 5 gingerol-related compounds and 8 diarylheptanoids isolated from ginger rhizomes exhibit higher antioxidative activity than α -tocopherol. Authors suggest that this is likely dependent upon side chain structures in addition to substitution patterns on the benzene ring³⁴. Thiosulfonates, such as allicin, give garlic its characteristic odor; however, they are not necessarily responsible for all of the various antioxidative and health benefits attributed to it²⁵. In the present study the antioxidant assays showed that all extracts can act as radical scavengers to a certain extent.

Antimicrobial property

Cinnamon (*Cinnamomum zeylanicum*) showed the highest antibacterial activity (12 mm inhibition zone) to the microorganisms tested as compared to other spice extracts. In a study it was found that *C.zeylanicum* was the most effective spice against all of the test strains³⁵. In another study it was found that the oils of cinnamon were the most inhibitory, each having a bacteriostatic concentration of 0.075% or less against all of five pathogens (*S. aureus*, *L. monocytogenes*, *Campylobacter jejuni*, *Salmonella enteritidis*, *E. coli*)³⁶. *Cuminum cyminum* (cumin) seed extracts showed 9-10 mm inhibition zone against the microorganisms. Cumin had an inhibitory effect against *S. aureus* and *M. luteus*³⁷. In a similar investigation, it was reported that cumin exhibited an inhibitory effect against *S. aureus* and *K. pneumoniae* and *P. aeruginosa*³⁸. The results of the present study are in agreement with^{37,38}. *Zingiber officinale* (ginger) extracts showed antibacterial activities (8-9 mm inhibition zone) to the microorganisms tested. It was found that the methanol extracts of the plant were significantly active against the bacteria Gram (+) and Gram (-) and fungi studied³⁹. The extracts were less active against *P. aeruginosa*, which is naturally resistant to antibacterial agents⁴⁰. In a similar study,⁴¹ it was reported that the methanol extracts of *Z. officinale* were active against to all of Gram (+) bacteria. These results were in accordance with the present study. Different antimicrobial activity was explained by⁴² that changes one country to other.

VI. CONCLUSION

Antioxidant activity assessment may require a combination of different methods, and the results in this study confirm the antioxidant activity and antimicrobial property of spice extracts. It is difficult to assess the antioxidant activity of spices on the basis of a single method. The results obtained using three different methods to evaluate the antioxidant activity (DPPH, FRAP and TPC) showed that the spice extracts used in the present study can be considered good sources of natural compounds with significant antioxidant activity. The degree of antibacterial property of spices tested can be put in the following order: cinnamon>cumin>Ginger>garlic>turmeric. The present study indicated that the ethyl acetate extracts of the spices have got profound antibacterial and antioxidant effect and may have potential use in aquaculture.

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Awareness about Spinal Cord Injuries among School Athletes of Kandy Educational Zone, Sri Lanka

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Abstract-Spinal cord injuries (SCI) are most commonly resulting from road traffic accidents, falling from a height, high velocity crashes and certain types of sports accidents. Even though sport related SCI is rare, still it carries a high rate of mortality and morbidity which limits the day-today and sport activities of the athlete because of the altered quality of life that often accompanies such an injury.

In this research, the focus is to evaluate the awareness about SCI among school athletes. Self-administered questionnaires were distributed among 243 school athletes (12-20years) of both genders (males-50.2%, females-49.8%) in 10 schools in Kandy educational zone in Central Sri Lanka. Responses for the questionnaires were analyzed to determine the knowledge regarding anatomy, etiology and clinical features of SCI as well as handling and transferring techniques of an athlete with SCI.

Index Terms- spinal cord injuries, sport injuries, school athletes, injury awareness

I. INTRODUCTION

Spinal cord injury is defined as the occurrence of an acute traumatic lesion of neural elements in the spinal canal (spinal cord and cauda-equina), resulting in temporary or permanent sensory and/or motor deficit. These patients may complain of pain in the neck or back, often radiating because of nerve root irritation. Other than that they may have sensory disturbance distal to neurological level as well as weakness or flaccid paralysis below this level (Grundy, D. et al. 2002).

Spinal cord lesion can be either complete or incomplete. If the lesion is complete from the beginning, recovery is far less likely than in an incomplete lesion. There are recognized patterns of incomplete lesions, and variations of these may present in the emergency department. Those patterns of incomplete lesions can either be recognized as anterior cord syndrome, posterior cord syndrome, central cord syndrome, brown cord syndrome, conus medullaris syndrome or Cauda equina syndrome (Figure 1).

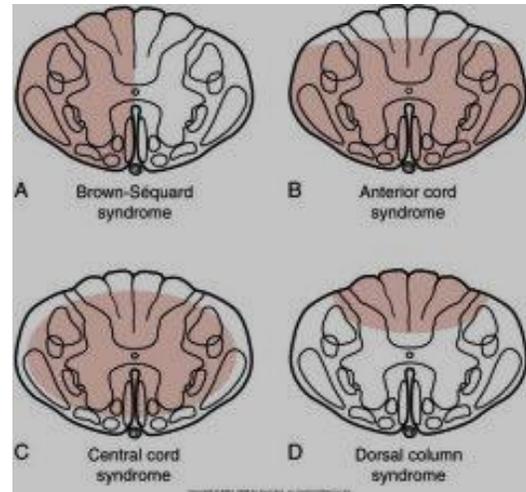


Figure 2 – Cross section of the spinal cord, showing partial spinal cord injury syndromes

SCIs are most commonly resulting from road traffic accidents. Falls from a height, high velocity crashes (Luke, A. and Micheli, L. 1999) and certain types of sports accidents (e.g. diving into shallow water, collapse of a rugby scrum) may also cause SCI (Grundy, D. et al. 2002).

Though prevalence of spinal cord injury while engaging with sport was less, still it carries mortality and morbidity which limits the day-today and sport activities of the athlete (Bailes, J. E. et al., 2007). Therefore, such injury warrants continued attention because of the altered quality of life. Apart from the high cost associated with treatments and rehabilitation, these injuries may cause significant burden to family and community (Illis, L. S, 2004). Many athletes start their sports careers at school age and hence, studying the awareness of spinal cord injuries among school players is timely.

In such injuries, although the effect of the initial trauma is irreversible, the spinal cord is at risk from further injury by injudicious early management (Hughes, R. N. 2003). Therefore, the emergency services such as proper handling and transferring must be established.

It is important to gather data from the spinal cord injury related risk groups and affected groups in order to evaluate the awareness level of them about the condition. Data collection,

analysis and interpretation play an important role in strategies of prevention of injuries. Hence data on injuries, circumstances and the chain of events leading to accidents is thus a key component in the implementation of a prevention policy. But data collection tools are not sufficiently focused on spinal cord injury accidents (Guidelines for prevention of Spinal cord injuries of Asian Spinal Cord Network, 2008).

In this research, the focus was to evaluate the awareness about spinal cord injuries among school athletes. Results of this research can be utilized by injury prevention policy makers, researchers, health sector of the country, athletes and the community.

II. MATERIALS AND METHODS

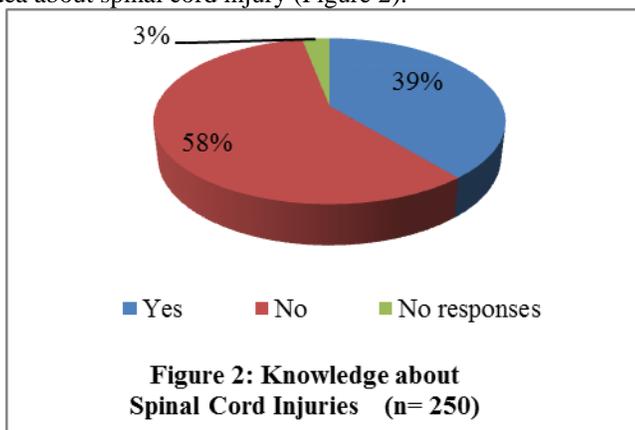
Ten schools from Kandy educational zone (located in Central Sri Lanka) were randomly selected from a list of schools provided by the authorities. From each school, 25 students were randomly selected among those who are involved in various sports activities. Pre-tested self-administered questionnaires were distributed among those 250 athletes (age range: 12-20years) of both genders (males-50.2%, females-49.8%) after obtaining verbal consent. (For minors, consent was obtained from the parents). Ethical clearance was obtained from the Ethical Review Committee, Faculty of Medicine, University of Peradeniya, Sri Lanka.

First, students were inquired whether they knew what spinal cord injury was or not. "Yes" Responses were then assessed to determine whether their knowledge and awareness was on anatomy of the spinal cord injury, etiology of spinal cord injuries, handling and transferring techniques of a spinal cord injured athlete or clinical features of the spinal cord injuries.

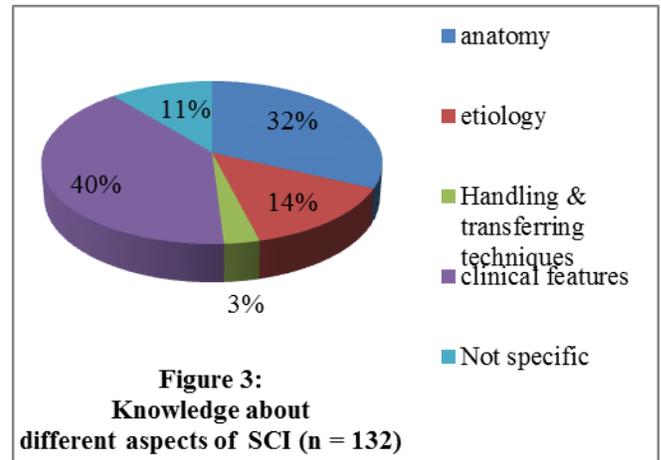
Answers in each category were further analyzed to evaluate the accuracy of their knowledge and to identify the myths regarding spinal cord injuries.

III. RESULTS AND DISCUSSION

From total 250 questionnaires 7(3%) were excluded as they included unclear responses. 145(58%) of school athletes had no idea about spinal cord injury (Figure 2).



One hundred thirty two responses of the 98(39%) students who claimed to have some awareness of spinal cord injuries were categorized according to their knowledge regarding different aspects of SCIs (anatomy, etiology, handling and transferring techniques and clinical features) as shown in the Figure 3 below.



However, further analysis of responses for accuracy revealed that only a small percentage of the total sample (269 responses in 243 questionnaires) possessed accurate knowledge regarding different aspects of SCI (Table I).

Table I: Accuracy of knowledge regarding SCI (total sample)

Category	Number of total responses (out of 269 responses)	Number of correct responses (out of 269 responses)	% of athletes with accurate knowledge
Anatomy of SCI	42	15	5.58%
Etiology of SCI	18	15	5.58%
handling / transferring techniques of SCI patients	4	4	1.49%
clinical features of SCI	53	49	18.21%

More than half of the students (58%) had no idea what spinal cord injury was. Even among the 39% who claimed to have some knowledge about the subject, only a few were aware of accurate facts.

Awareness regarding anatomy of spinal cord injuries was very poor and so as the knowledge regarding etiology and clinical features of SCIs. However, the responses given in relation to handling and transferring techniques of an injured athlete were mostly accurate. Out of all responses, only 30.86% indicated accurate facts regarding SCI.

IV. CONCLUSION

Although this study was limited to a smaller geographical area, the results suggest that the awareness of spinal cord injuries was inadequate among school athletes.

Further studies with wider population should be conducted in relation to this issue and assessing the need of programmes to raise the awareness of the community including the groups at high risk of SCI.

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[6]Guidelines for Prevention of Spinal Cord Injuries. Asian Spinal Cord Network (ASCoN) 2008 First Published 2008© The Asian Spinal Cord Network (ASCoN).

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A Review on Potential of Vermicomposting Derived Liquids in Agricultural Use

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Abstract- Rising demand on fertilizer is closely related with the rising demand of crop as the population increases. Land available to be used for agricultural purposes is limited. With the increase of health awareness of people, organically cultured fruits and vegetables are getting attention and in demand. Although chemical fertilizers are still in extensive use these days, people are getting more aware of the effects brought by these chemicals. Environmental as well as health problems have raised the alarm on the effects of usage of chemical fertilizer and consuming of heavily chemically fertilized crops. Vermicomposting has been getting attention due to its environmental friendly approach. Beside the compost produced, recent interest has been brought up due to the possible use of the liquid by products from this green technology. Several terms have been used to describe the liquids derived from the vermicomposting process. This paper reviews the common terms used for vermicomposting derived liquids, its potential in agricultural use as well as its pros and cons.

Index Terms- Vermicomposting, vermiwash, vermicomposting leachate, vermicompost extract, agricultural use

I. INTRODUCTION

With the drastic increase in population globally, there is no doubt that food supply will have to be increased at the same pace in order to meet the demand. All forms of fertilizers are playing a vital role as maximizing yield of crops has become one of the priorities of the farmers these days. Asia consumed of 61% of world total fertilizer. This makes Asia region the largest consumer of fertilizer in the world, FAO, 2010 [1]. Environmental friendly approach of producing high quality organic fertilizer is one of the major concerns of researchers lately. Vermicomposting technology is a simple technology that has been under the spotlight of sustainable technology in the past decades. With the help of the earthworms' feeding behavior, vermicomposting has the ability to process wastes through degradation and decomposition. Several terms have been defined and coined by researchers to explain the vermicomposting derived liquids based on their preparation method. This environmental friendly approach and the rising demand of the naturally derived fertilizer have brought the interest of preparing this review, as well as to clear the confusion of terms that used to describe these liquids.

II. VERMICOMPOSTING DERIVED LIQUIDS

The beauty of vermicomposting if compared with conventional composting process is that the time span for stabilizing and processing the waste is shorten, even though it does not undergo thermophilic phase of composting. The half digested material that after being processed by earthworm, will later being further decomposed by gut associated microbes and converted into mature compost, Dominguéz and Edwards, 2004 [2]. Earthworms ingest soil, burrow and excrete casts and urine to the soil. In vermicomposting process, earthworms will ingest the substrate introduced into the reactor. There are few terms that can be found in describing vermicomposting derived liquids. The common ones are like vermiwash, vermicomposting leachate /vermi-leachate, worm bed leachate and worm tea. The term vermiwash was coined by Ismail, 1997 [3]. Leachate is generated along with vermicomposting process commonly referred to as vermicomposting leachate or worm-bed leachate, Gutiérrez-Miceli *et al*, 2011 [4] Extract from vermicompost is known as vermicompost extract, AP Pant *et al*, 2009 [5]. The preparations of these vermicomposting derived liquids are different.

A. Vermiwash

In vermiwash production, as introduced by Ismail, 1997 [3], cow dung was used as the substrate for vermicomposting. No garbage or other wastes were suggested to be used. Water percolated through the column of worm action will collect excretory products and mucus secretions of earthworms, as well as the micronutrients from the soil organic molecules, Ismail, 1997 [3]. This produces the liquid (vermiwash) that washed away the valuable plant nutrients and microorganism present in drilosphere. Drilosphere, as defined by Brown *et al*, 2000 [6], is the environment made up of microenvironment in earthworm gut, surface that earthworm in contact with

soil, surface and below ground of the vermicasts, middens, burrows and diapause chambers. Earthworms prefer to consume a mixture of soil and organic matter over pure organic matter. They feed selectively and Judas, 1992 [7] confirmed it by observing its gut content. Earthworms' ability in digesting organic matter and assimilating nutrients from ingested organic matter is varies in species and ecological categories. Lattaud *et al*, 1998, 1999 [8][9]

Concept of the design of vermiwash reactor is well defined and coined by Ismail, 1997 [3]. Various substrates were used in the same design by others as the modification. Vermiwash collects the nutrients as well as microorganism present in the drilosphere through water percolation Ismail, 1997 [3]. Figure 1 shows the earthworm activities and its benefits in vermicomposting process.

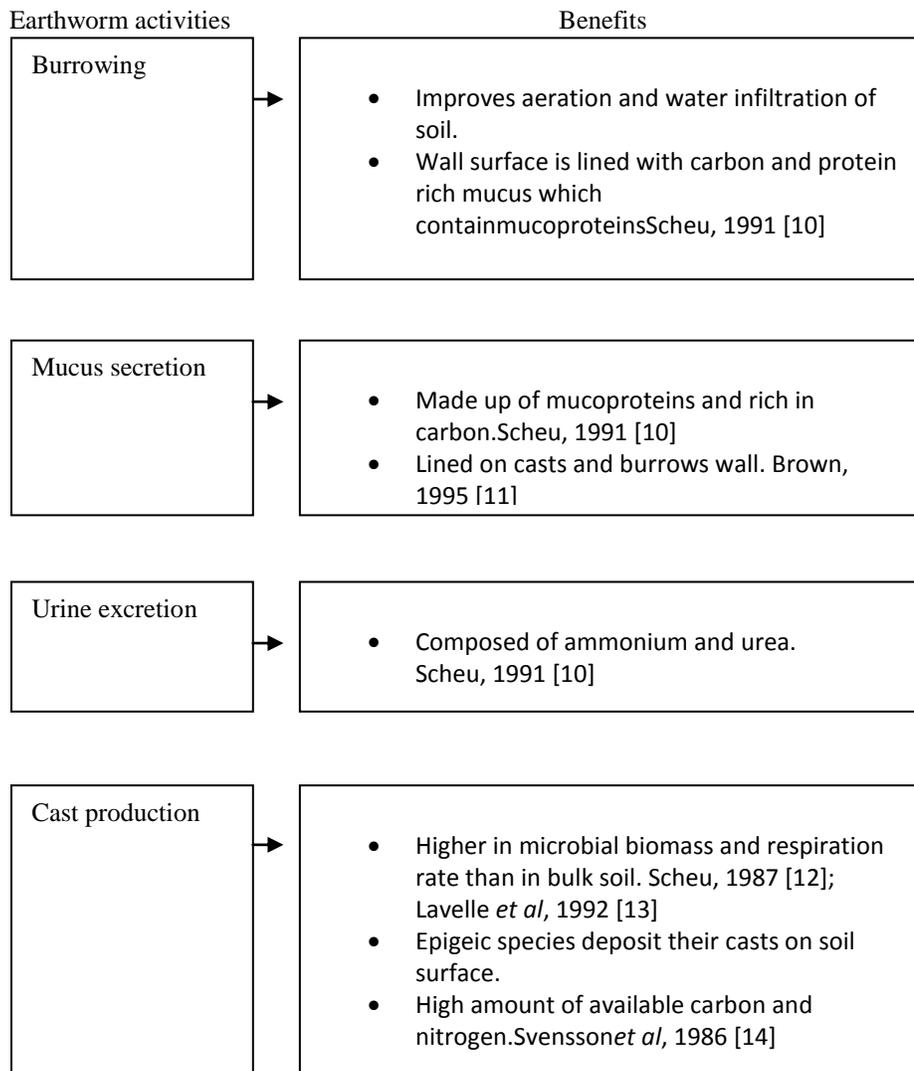


Figure 1: Earthworm activities and its benefits in vermicomposting process.

Table 1 shows a summary of studies on vermiwash carried out from various wastes and the findings when applied to plants. Improvement in growth and higher concentration of chlorophyll and carotenoids were observed. Vermiwash contain valuable plant nutrients as well as indoleacetic acid (IAA).

Table 1: Summary of vermiwash as liquid fertilizer in agricultural use from different types of substrates.

Substrate used for vermiwash	Plant	Findings	Reference
Cow dung and leaf litter	Rice	Maximum leaf and root length, number of leaves and plant height were recorded from pot applied with vermicompost and vermiwash.	Tharmaraj <i>et al</i> , 2011 [15]

Cow dung and coconut leaf litter	Cowpea, Maize and Okra	High concentration of P, K, Ca and Mg were found in vermiwash. Vermiwash from pure cow dung showed highest in N, P, Ca, Mg and indoleacetic acid (IAA) concentration. Seedling vigour index were highest in 1:10 dilution for cowpea.	Gopal <i>et al</i> , 2010 [16]
Animal waste and kitchen waste	-	Results showed potential as a bio-fertilizer for particular nutrient deficient soil by using combination of substrate.	Nath <i>et al</i> , 2009 [17]
Cow manure	Indian Borage (<i>Plectranthusambionicus</i>)	High concentration of potassium (K) concentration was determined. Diluted vermiwash (10%) shows highest in germination percentage, root and shoot length, total chlorophyll and carotenoids content.	Quaik <i>et al</i> , 2012a [18]

B. Vermicomposting leachate

Water was constantly applied to the vermicomposting reactor to ensure the moisture level and excess water in the reactor will be leached out. The concept of the preparation of vermicomposting leachate is that nutrients that have been mineralized and assimilated by earthworms and microorganism during the vermicomposting process will be leached out along side with leachate. Table 2 is a summary of studies carried out on vermicomposting leachate/worm bed leachate. It showed high germination percentage and improvement in growth indices.

Table 2: Summary of studies on vermicomposting leachate/worm bed leachate. Modified from Quaik *et al*, 2012b [19]

Substrates used for vermicomposting leachate	Plant used	Findings	Reference
Sheep manure	Radish (<i>Raphanus sativus L.</i>)	Germination(%), number of leaves, plant height (cm), and shoot dry weight (g) are highest in leachate of 10% dilution. Whereas root dry weight(g) is highest in leachate of 15% dilution	Gutiérrez-Miceli <i>et al</i> , 2011 [4]
Cow dung, vegetable waste and mixture of cow dung and vegetable waste (1:2)	Strawberry (<i>Fragaria x ananassa Duch.</i>)	High leaf area and dry weight of plants were obtained for leachate from cow dung, vegetable waste and mix waste. Foliar application of leachate obtained from mixture of cow dung and vegetable waste showed supremacy in plant growth. Significantly higher fruit yield were obtained if compared to control.	Singh <i>et al</i> , 2010 [20]

Cow manure	Sorghum (<i>Sorghum bicolor</i> (L.) Moench)	Germination index of vermicomposting leachate for crest was 65 ± 7 %. For maximum growth, NPK fertilization is required.	Gutiérrez-Micel <i>et al</i> , 2008 [21]
Cow manure	Maize (<i>Zea Mays</i> L.)	Vermicomposting leachate has to be diluted to 50% to 500ml to get maximum plant growth.	García-Gómez <i>et al</i> , 2008 [22]
Cow dung and green forage	Tomato (<i>Lycopersicon esculentum</i> cv. Momotaro)	Hewitt solution was used as control. Both leachates were used as foliar fertilizer with dilution of 1ml in 500 ml. Treatment with green forage leachate showed highest chlorophyll content as well as plant height. N, P and K content of fruits are highest in the plant fertilized with green forage leachate, followed by cow dung leachate and control.	Tejada <i>et al</i> , 2008 [23]

C. Vermicompost aqueous extract

According to Pant *et al*, 2009 [5], vermicompost aqueous extracts (vermicompost teas) can be extracted through employing non-aerated or aerated method. Non-aerated or passive extraction of extract was by placing vermicompost into a fix amount of volume of water with occasional stirring and allowed to sit for 7 days. For aerated extraction, air was pumped and oxygen level was maintained to above 5mgL^{-1} . Sugar, grain, fish emulsion, kelp tea, humic acid and other products are often added during the process to further enhance the microbial activity of the end-product, Ingham, 2005 [24]. Welke, 2005 [25] reported that compost tea extracted through both aerated and non-aerated method from animal manure showed positive effect on strawberry yield as well as suppression of *Botrytis cinerea*.

III. PROS AND CONS

Vermicomposting technique has been used as one of the environmental friendly technology for waste management as several approaches have been done on stabilizing wastes generated from agricultural activities as well as from other industries. Studies are showing that besides vermicompost, vermicomposting process also produces another eco-friendly by product in liquid form. Potential of these vermicomposting derived liquids has been shown in several studies mentioned above. The chemical-free method of preparation for these liquids is in favor as an approach of producing environmental friendly biofertilizer. One of the advantages of vermicomposting derived liquids is that nutrients present are completely soluble in water due to its preparation method. Hence, it has the potential to be used as a foliar fertilizer. To be used as foliar spray, the nutrient should be water soluble and the salt concentration in it should not be too high till it causes scorching on leaves when sprayed. From the summary of studies carried out with vermiwash, vermicomposting leachate and vermicompost aqueous extract, these biofertilizers showing promising result in various dilutions. Therefore, it showed the potential of using vermicomposting derived liquids as foliar fertilizer (Table 1 and Table 2). On the other hand, foliar fertilizing compensates the loss of fertilizing effect of conventional soil-applied fertilizer through the prevention of leaching. Rate of leaching is different with different composition of soil. For example higher composition of clay present in the soil will have lower leaching rate. Soil water holding capacity will also determine the significance of leaching losses. Certain nutrients such as sodium and magnesium are more prone to leaching in soil with high clay concentration, Mengel and Kirkby 2001 [26]. Leaching not only will cause nutrients loss before being absorbed by plants, it may also cause ground water pollution if the planting site happen to be nearby groundwater source. Despite ground water pollution, run-off may also bring nutrients into nearby stream and river. Nutrients such as nitrates and phosphates will cause eutrophication to nearby water body.

Vermicomposting derived liquids may be added to irrigation system to provide extra nutrients to plant through fertigation which is a technique of combining fertilizing and irrigation. Nutrients that completely soluble in water will have no risk of clogging up the sprayer.

Available plant nutrients that present in these liquids are valuable and have the potential to be used as nutrients solution in hydroponics culture. Quaik *et al*, 2012 [18] reported that diluted vermiwash and vermicomposting leachate when used as nutrient

solution for *Plectranthus ambionicus*, chlorophyll and carotenoids content were higher if compared to control. Hydroponics culture has the advantage of being carried out in space limited area. Hydroponics culture is a soilless cultivation method which is a contribution for crop production in area where lands are inadequate for crop production. By using these plant nutrients rich liquids in hydroponics culture, soil borne diseases and pests can be controlled, Jensen, 2002 [27]. Usage of other fertilizer can be also reduced. However, very limited research has been reported on using these bioliquids in hydroponics culture.

The downside of these liquids is that the nutrient contents of end product are strongly depending on the substrates that were used. Substrates high in heavy metals content may produce liquids that contain high value of heavy metals. One of the concerns about these so called biofertilizers is types of substrates the liquid derived from as it will directly affect the content of the product. On the other hand, the nutrient content presence in these liquids is high but may not be completely enough as study has suggested that NPK fertilizer may have to be added for better yield, Gutiérrez-Miceli *et al*, 2008 [20]. Therefore, using these liquid alone for plant fertilizing may not be enough for promising growth.

The limitation for applying liquid fertilizer directly to soil may not be as efficient as applying solid fertilizer as it may be leached away easily. Soil composition and texture are playing vital role in rate of leaching. The quantity of liquid fertilizer required in order to achieve the result that on par with conventional solid fertilizer may be much higher due to its concentration. Besides that, storage of liquid fertilizers may require larger space if compared.

IV. CONCLUSION

Vermicomposting derived liquids contain valuable nutrients that promote plant growth. Substrates that have been used in these liquids production are mainly animal and agricultural waste. Different terms are used in describing these liquids as there are some differences in preparation. However, controversy is still exists as these liquids are produced from waste substrates especially industrial waste that may contain heavy metals and other harmful elements. Chances of transferring harmful substances from the substrate to the liquids are still unknown. Therefore, further studies are strongly needed especially liquid preparation method as well as on relationship between the substrates and the vermicomposting derived liquids.

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A Study of the Processes Involved in ECG Signal Analysis

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Abstract- ECG Signal Analysis involves various processes and techniques which in the recent years, have yielded better results in terms of accuracy in the diagnosis of heart diseases. This paper deals with some of the recent developments in the processes such as denoising, data compression, feature extraction and classification of the ECG signals. These processes are discussed each with suitable examples.

Index Terms- Artificial Neural Networks, Wavelet Transform, Arrhythmia

I. INTRODUCTION

There is a need for tackling large number of patients with various kinds of heart diseases. Medical science in collusion with Computer Science has, during the recent years, evolved methods that could be used for expert diagnosis by the cardiologists. Electrocardiogram (ECG) is an invaluable tool for diagnosis of heart diseases. The normal ECG waveform with its various segments is shown in Figure.1. With the help of ECG, the electrical activity within the heart can be easily detected from the outside of the body. When the ECG is abnormal it is called Arrhythmia. The patterns of the waveform change due to abnormalities of the heart. The methods used for diagnosis generally involve four essential processes to arrive at the accurate and quick decisions about the kind of heart disease a patient suffers from. They are: 1. Data Compression 2. Denoising 3. Feature Extraction and 4. Classification. In this paper each process is explained with examples from the recent researches using Artificial Neural Network. An Artificial Neural Network, often just called a neural network, is a mathematical model inspired by biological neural networks. A neural network consists of an interconnected group of artificial neurons, and it processes information using a connectionist approach to computation. In most cases a neural network is an adaptive system that changes its structure during a learning phase. Neural networks are used to model complex relationships between inputs and outputs or to find patterns in data[12].

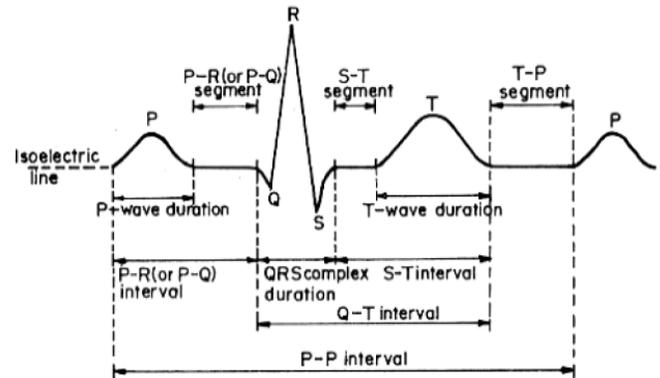


Figure 1: The normal ECG waveform

II. DATA COMPRESSION

Quite a large volume of ECG data produced by monitoring systems over a period of time, need to be compressed for efficient storage. ECG signals are collected both over long periods of time and at high resolution. This creates substantial volumes of data for storage and transmission. Data compression seeks to reduce the number of bits of information required to store or transmit digitized ECG signal without significant loss of signal quality.

In a project taken up by Dr. Anubhuti Kare et al[9], they have developed and implemented a low complexity 'lossy' ECG Encoding Algorithm capable of at least a 2 : 1 compression rate. There are two types of Compression techniques 'lossless' and 'lossy'. Since lossy compression technique gives a better compression rate, this technique has been used. A Coder-Decoder, based on a new emerging Transformation technique called Wavelet Transform coding, has been chosen so as to achieve the compression ratio 2 : 1 .

Wavelet Transforms: A number of alternative time – frequency methods are now available for signal analysis. Of these, the wavelet transform has emerged over recent years as the most favored tool by researchers for analyzing problematic signals across a wide variety of areas in Science, Engineering and Medicine.

It is found that the compression technique using Discrete Wavelet Transform (DWT) is more effective compared to the Discrete Cosine Transform (DCT). The algorithm that has been implemented using Wavelet Transform technique seems to be the best choice for ECG data compression.(Table 1)

Table 1

DCT Compression	DWT Compression
CR = 90%	CR = 95%
PRD about 1%	PRD less than 1%
Algorithm Execution Time about 7 sec	Algorithm Execution Time about 3 sec

III. DENOISING

One of the main problems in biomedical data processing like electrocardiography is the separation of the wanted signal from noises caused by power line interference, external electromagnetic fields, random body movements and respiration. ECG filtering is done so that the desired information is not distorted by interferences or altered in any way.

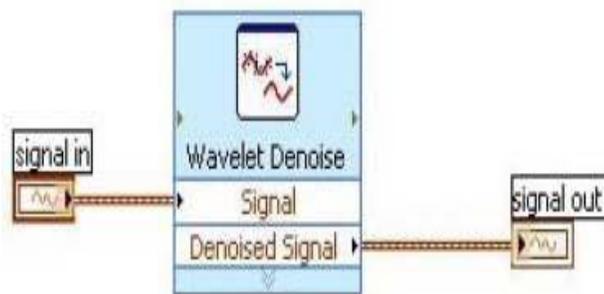


Figure 2: Removing wideband noises from an ECG signal by applying the UWT

For the purpose of filtering ECG, Manpreet [8] uses a combination of Moving Average Method and IIR Notch filter. A moving average filter smoothes data by replacing each data point with the average of neighboring data points. This removes the baseline drift of original ECG signal and thus the power spectral density is removed. The IIR Notch filter is applied to this smoothed signal.

Chinmay Chandrasekar et al [3] have used Adaptive Power line Interference Canceller which is an improved adaptive canceller for the reduction of the fundamental power line interference component and harmonics in ECG recordings. They used RLS (Recursive Least Squares) algorithm which is a special version of the adaptive filter which has less computational complexity and good filtering capacity.

The Figure.3 shows a sample signal before and after noise removal.

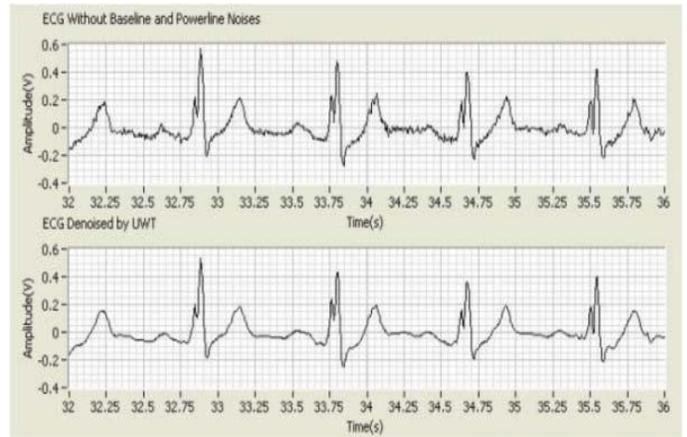


Figure 3: ECG signals before and after UWT de-noising

IV. FEATURE EXTRACTION

An expert Cardiologist will not be able to monitor a large number of cardiac patients efficiently and so computer aided feature extraction and analysis of ECG signal for disease diagnosis has become necessary. The input data will be transformed into a reduced representation set of features (also named features vector). Transforming the input data into the set of features is called *feature extraction*. If the features extracted are carefully chosen it is expected that the features set will extract the relevant information from the input data in order to perform the desired task using this reduced representation.

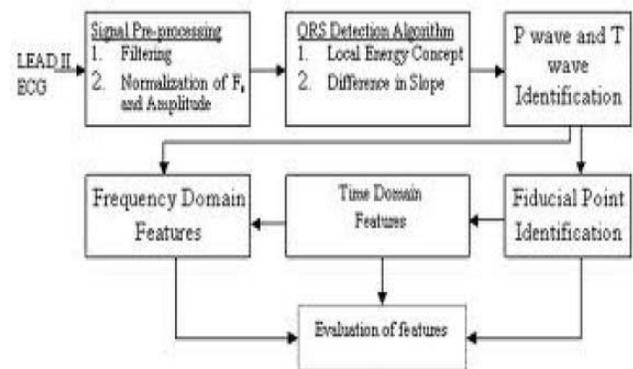


Figure 4.Steps in Feature Extraction

The flowchart in Figure.4 indicates the steps involved in Feature Extraction. For the purpose of diagnosis, we need to extract various features from the preprocessed ECG data, including QRS intervals, QRS amplitude, PR intervals, ST intervals etc., In this kind of analysis, identification and extraction is the first step. The most prominent feature here is QRS complex and the accurate detection of QRS complex forms the basis for the extraction of other features.

There are four approaches to feature extraction viz 1) Syntactic Approach 2) Non Syntactic Approach 3) Hybrid Approach 4) Transformative Approach. Of these the Non Syntactic method is widely used. In the Transformative Approach, the use of Wavelet Transform (WT) in QRS detection

has given accuracy of detection and simplicity in calculations without any need for preprocessing.

Saxena et al [9] developed a combined Wavelet transform Technique to analyze multilead ECG signals for cardiac disease diagnosis. Here two wavelets have been used: One is the Quadratic Spline Wavelet (QSWT) for QRS detection and the other Daubechies Six Coefficient (Db -6) wavelet for P and T detection.

Shahanaz Ayub et al [5] in their extraction of fusion beats of ECG, aim at making the analysis of fusion beats easy so that the patient could be diagnosed for the heart problems in less time and with more accuracy using Artificial Neural Networks. The identification of fusion beats is done using MATLAB based Feed Forward Neural Network. For training and validation of the neural network, the standard MIT – BIH arrhythmia database is used.

The Feed Forward network based on back propagation algorithm with training algorithm, was the best for the analysis of fusion beats because it gives an accuracy of about 96%.

V. CLASSIFICATION

Classification with regard to ECG refers to categorizing the various features of waves extracted from ECG according to the specific heart disease each feature represents, and this classification is done with the help of Artificial Neural Networks. Classification is done generally according to the Table 2 given below. Various characteristic features of the patterns of ECG wave are listed and the corresponding disease to each pattern is also given.

Table 2: Various abnormalities and their characteristic features

S. No	Name of abnormality	Characteristic features
1	Dextrocardia	Inverted P-wave
2	Tachycardia	R-R interval < 0.6 s
3	Bradycardia	R-R interval > 1 s
4	Hyperkalemia	Tall T-wave and absence of P-wave
5	Myocardial	Ischaemia Inverted T-wave
6	Hypercalcaemia	QRS interval < 0.1 s
7	Sinoatrial block	Complete drop out of a cardiac cycle
8	Sudden cardiac death	Irregular ECG.

An ECG contains important pointers to the nature of diseases afflicting the heart. Acharya et al classified cardiac abnormalities into 8 classes. Three parameters were extracted from the heart rate signals and used for this classification.

Acharya et al [6] have used HRV signal as a reliable indicator of heart disease. They used neural network classifier and the fuzzy classifier as diagnostic tools to aid the physician in the analysis of heart diseases. These tools yield results with 80 – 85% accuracy and not 100%.

Table 3 :

Diseases classified by ANN	No.of dataset used for training	No.of dataset used for testing	Percentage of correct classification (10,000 iterations)
Left Bundle Branch Block(LBBB)	28	14	85.7
Normal Sinus Rhythm(NSR)	60	30	90
Pre Ventricular Contraction(PVC)	45	25	88
Atrial	30	25	85

Fibrillation(AF)			
Ventricular Fibrillation (VF)	28	21	81
Complete Heart Block (CBF)	28	21	81
Ischaemic / Dilated Cardiomyopathy	30	18	83.3
Sick Sinus Syndrome (SSS)	30	18	88.9

Surendra Dalu et al [10] have done classification of QRS and ST segment using Long Vector Quantization (LVQ) neural network. As a new approach LVQ which belongs to the class of competitive long networks, was developed particularly for classification problems.

QRS complex:

QRS complex is the electrical wave that signals the depolarization of myocardial cells of the ventricles. The duration of the normal QRS is not greater than 3 mm or 0.06 to 0.12 seconds. If this duration is more than 3 mm it is to be suspected as an abnormal intra ventricular conduction velocity.

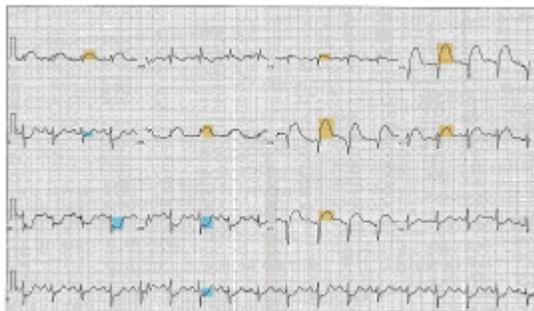


Figure 5: Lead Electrocardiogram showing ST segment elevation (orange) in I a VL and v1-v5 with reciprocal changes (blue) in the inferior leads, indicative of an anterior wall myocardial infarction.

VI. CONCLUSION AND FUTURE WORK

The discussion so far made shows that new techniques are being evolved by researchers in each process involved in signal analysis so that more accuracy is achieved and treatment is given before it is too late. There is scope for future research in each process leading to 100% accuracy.

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Comparative study between Green Cloud Computing and Mobile Cloud Computing

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Abstract- While searching for information about cloud computing over the internet, I came across different computing keywords such as Green Computing and Mobile Computing. After so much of research on all these terms I myself tried to have the clear vision about them.

This paper will help the researchers and administrators to have a clear understanding of Green Computing and Mobile Computing and the differences between Green Cloud Computing and Mobile Cloud Computing. It also defines the security issues and the solution methods to these issues.

I. INTRODUCTION

Computing means any goal-oriented activity requiring, benefiting from, or creating computers. Thus, computing includes designing and building hardware and software systems for a wide range of purposes; processing, structuring, and managing various kinds of information; doing scientific studies using computers; making computer systems behave intelligently; creating and using communications and entertainment media; finding and gathering information relevant to any particular purpose, and so on.

II. GREEN COMPUTING

Green computing is the environmentally responsible and eco-friendly use of computers and their resources. In broader terms, it is also defined as the study of designing, manufacturing/engineering, using and disposing of computing devices in a way that reduces their environmental impact.

Many IT manufacturers and vendors are continuously investing in designing energy efficient computing devices, reducing the use of dangerous materials and encouraging the recyclability of digital devices and paper. Green computing is also known as green information technology (green IT).

Green computing, or green IT, aims to attain economic viability and improve the way computing devices are used. Green IT practices include the development of environmentally sustainable production practices, energy efficient computers and improved disposal and recycling procedures.

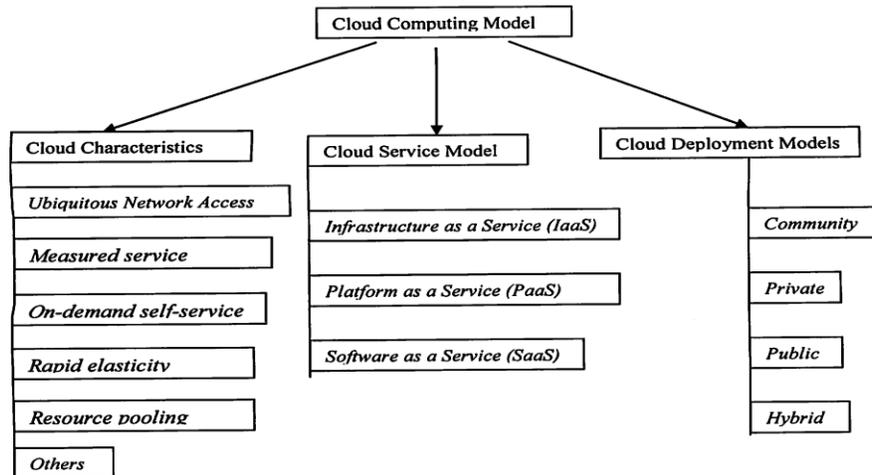
III. MOBILE COMPUTING

Mobile computing is human-computer interaction by which a computer is expected to be transported during normal usage. Mobile computing involves mobile communication, mobile hardware, and mobile software. Communication issues include ad-hoc and infrastructure networks as well as communication properties, protocols, data formats and concrete technologies. Hardware includes mobile devices or device components. Mobile software deals with the characteristics and requirements of mobile applications.

Thus, mobile computing is the ability to use computing capability without a pre-defined location and/or connection to a network to publish and/or subscribe to information. The purpose of this paper is to explore the comparison between Green cloud computing and Mobile Cloud computing and security issues and define which common security solutions are.

IV. GREEN CLOUD COMPUTING

Green cloud is a buzzword that refers to the potential environmental benefits that information technology (IT) services delivered over the Internet can offer society. The term combines the words green -- meaning environmentally friendly -- and cloud, the traditional symbol for the Internet and the shortened name for a type of service delivery model known as cloud computing.



According to market research conducted by Pike Research, the wide-spread adoption of cloud computing could lead to a potential 38% reduction in worldwide data center energy expenditures by 2020. The savings would be primarily achieved by consolidating data centers and maximizing power usage efficiency (PUE), improving recycling efforts, lowering carbon and gas emissions and minimizing water usage in cooling the remaining centers.

Because so much of a data center’s energy expenditures support data storage, the Storage Networking Industry Association (SNIA) has promoted new technologies and architectures to help save energy. Advances in SAS drive technologies, automated data duplication, storage virtualization and storage convergence reduce the amount of physical storage a data center requires, which helps decrease its carbon footprint and lower operating expenditures (OPEX) and capital expenditures (CAPEX).

Because the color green is also associated with paper money, the label *green cloud* is sometimes used to describe the cost-efficiency of a cloud computing initiative

4.1 Benefits of Green Cloud Computing

- Reduced Cost
- Automatic Updates
- Green Benefits of Cloud computing
- Remote Access
- Disaster Relief
- Self-service provisioning
- Scalability
- Reliability and fault-tolerance
- Ease of Use
- Skills and Proficiency
- Response Time
- Increased Storage
- Mobility

4.2 Security Issues in Green cloud computing

The chief concern in cloud environments is to provide security around multi-tenancy and isolation, giving customers

more comfort besides “trust us” idea of clouds. There has been survey works reported that classifies security threats in cloud based on the nature of the service delivery models of a cloud computing system. However, security requires a holistic approach. Service delivery model is one of many aspects that need to be considered for a comprehensive survey on cloud security. Security at different levels such as Network level, Host level and Application level is necessary to keep the cloud up and running continuously. In accordance with these different levels, various types of security breaches may occur.

There are four types of issues raise while discussing security of a cloud.

- Data Issues
- Privacy issues
- Infected Application
- Security issues

4.3 Solution to security issues in Green Cloud Computing

1) Control the consumer access devices:

Be sure the consumer’s access devices or points such as Personal Computers, virtual terminals, gazettes, pamphlets and mobile phones are secure enough. The loss of an endpoint access device or access to the device by an unauthorized user can cancel even the best security protocols in the cloud. Be sure the user computing devices are managed properly and secured from malware functioning and supporting advanced authentication features.

2) Monitor the Data Access:

Cloud service providers have to assure about whom, when and what data is being accessed for what purpose. For example many website or server had a security complaint regarding snooping activities by many people such as listening to voice calls, reading emails and personal data etc.

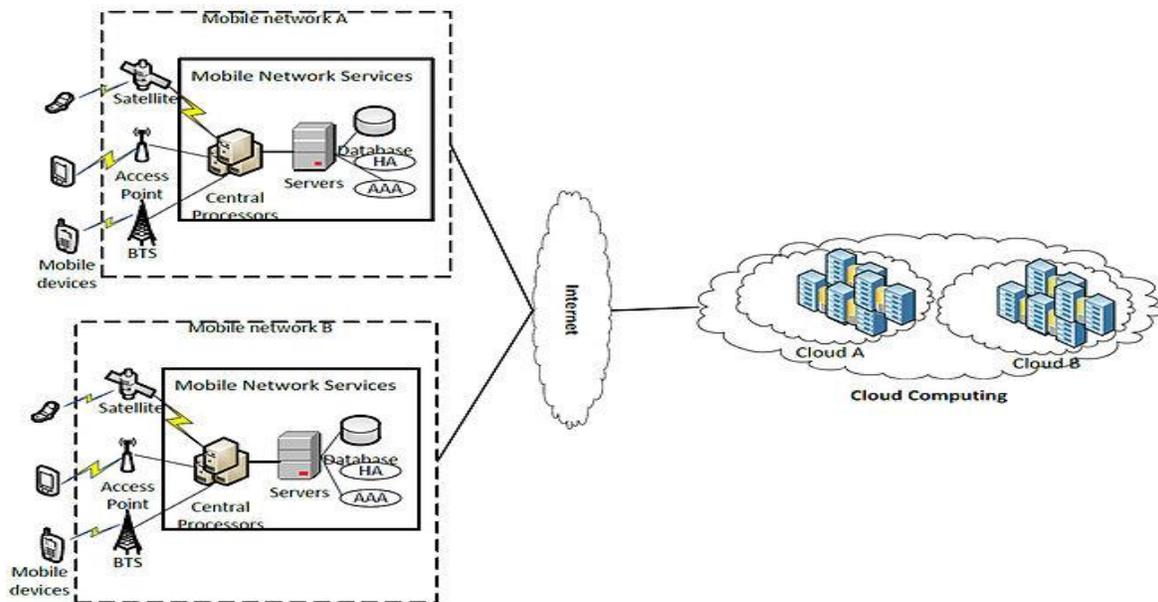
3) Share demanded records and Verify the data deletion:

If the user or consumer needs to report its compliance, then the cloud service provider will share diagrams or any other information or provide audit records to the consumer or user. Also verify the proper deletion of data from shared or reused

devices. Many providers do not provide for the proper degaussing of data from drives each time the drive space is abandoned. Insist on a secure deletion process and have that process written into the contract.

4) Security checks events:

Ensure that the cloud service provider gives enough details about fulfillment of promises, break remediation and reporting contingency. These security events will describe responsibility, promises and actions of the cloud computing service provider.



Mobile apps may use the cloud for both app development as well as hosting. A number of unique characteristics of hosted apps make the mobile cloud different from regular cloud computing. Mobile apps may be more reliant upon the cloud to provide much of the computing, storage, and communication fault tolerance than regular cloud computing does.

5.1 Benefits of Mobile Cloud Computing

- Extending battery lifetime
- Improving data storage capacity and processing power
- Improving reliability

5.2 Security Issues in Mobile cloud Computing

Cloud computing as opposed to standard computing has several issues which can cause reluctance or fear in the user base. Some of these issues include concerns about privacy and data ownership and security. Some of these concerns are especially relevant to mobile devices. In this section, the paper discusses some of these issues, including both incidents involving them and techniques used to combat them.

- Privacy
- Data Ownership
- Data Access and Security

V. MOBILE CLOUD COMPUTING

Mobile cloud computing is the combination of cloud computing and mobile networks to bring benefits for mobile users, network operators, as well as cloud providers. Cloud computing exists when tasks and data are kept on the Internet rather than on individual devices, providing on-demand access.

5.3 Solution to Security issues in Mobile Cloud computing

Individuals and enterprises take advantage of the benefits for storing large amount of data or applications on a cloud. However, issues in terms of their integrity, authentication, and digital rights must be taken care of

1) Integrity:

Every mobile cloud user must ensure the integrity of their information stored on the cloud. Every access they make must be authenticated and verified. Different approaches in preserving integrity for one's information that is stored on the cloud is being proposed.

2) Authentication:

Different authentication mechanisms have been presented and proposed using cloud computing to secure the data access suitable for mobile environments. Some use the open standards and even supports the integration of various authentication methods. For example, the use of access or log-in IDs, passwords or PINS, authentication requests, etc.

3) Digital rights management:

Illegal distribution and piracy of digital contents such as video, image, audio and e-book, programs becomes more and more popular. Some solutions to protect these contents from illegal access are implemented such as provision of encryption and decryption keys to access these contents. A coding or decoding

platform must be done before any mobile user can have access to such digital contents

VI. COMPARISON BETWEEN SECURITY ISSUES AND SOLUTIONS IN GREEN CLOUD AND MOBILE CLOUD COMPUTING

Issues	Green Cloud Computing	Mobile Cloud Computing	Common solution
Data Issues	- lack of control over personal data - Insufficient information regarding how, where and by whom data is being processed.	communications no longer run over a private network; some run over less-secure public carrier networks	Data can be Authenticated before transferring on network.
Privacy Issues	Sensitive data is being stored on cloud which may be private and can be accessed by anybody. Extra password protection needed.	As Data is stored remotely, it leads to concerns that companies will use or sell this information as well as concerns that the information could be given to government agencies without the user's permission	Every access they make must be authenticated assuring that it is their own information and thus verifying its integrity
Security Issues	key risk factor for all cloud computing services, particularly where the data to be transferred to the service provider is sensitive and is to be held offshore	there can be issues of data becoming locked in to a particular service.	Data should be encrypted before sending data on the cloud.

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Data Protection for Cloud Users

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Abstract- Offering strong data protection to cloud users while enabling rich applications is a challenging task. We explore a new cloud platform architecture called Data Protection as a Service, which dramatically reduces the per-application development effort required to offer data protection, while still allowing rapid development and maintenance.

Index Terms- data, security, cloud, disk.

I. INTRODUCTION

Cloud computing promises lower costs, rapid scaling, easier maintenance, and services that are available anywhere, anytime. A key challenge in moving to the cloud is to ensure and build confidence that user data is handled securely in the cloud. A recent Microsoft survey [10] found that "...58% of the public and 86% of business leaders are excited about the possibilities of cloud computing. But, more than 90% of them are worried about security, availability, and privacy of their data as it rests in the cloud."

A. Data Protection and Usability Properties

Integrity: The user's private (including shared) data is stored faithfully, and will not be corrupted.

Privacy: The user's private data will not be leaked to any unauthorized person.

Access transparency: It should be possible to obtain a log of accesses to data indicating who or what performed each access.

Ease of verification: It should be possible to offer some level of transparency to the users, such that they can to some extent verify what platform or application code is running. Users may also wish to verify that their privacy policies have been strictly enforced by the cloud.

Rich computation: The platform allows most computations on sensitive user data, and can run those computations efficiently.

Development and maintenance support: Any developer faces a long list of challenges: bugs to find and fix, frequent software upgrades, continuous change of usage patterns, and users' demand for high performance. Any credible data protection approach must grapple with these issues, which are often overlooked in the literature on the topic.

B. Target Applications

There is a real danger in trying to "solve security and privacy for the cloud," because "the cloud" means too many different things to admit any one solution. To make any actionable statements, we must constrain ourselves to a particular domain. We choose to focus on an important class of widely used applications which includes email, personal financial management, social networks, and business applications such as word processors and spreadsheets. More precisely, we focus on deployments which meet the following criteria:

- Applications that provide services to a large number of distinct end users, as opposed to bulk data processing or workflow management for a single entity;

- Applications whose data model consists mostly of sharable data units, where all data objects have ACLs consisting of one or more end users (or may be designated as public); and developers who write applications to run on a separate computing platform—which encompasses the physical infrastructure, job scheduling, user authentication, and the base software environment—rather than implementing the platform themselves.

C DATA Protection as a Service

Currently, users have to rely primarily on legal agreements and implied economic and reputational harms as a proxy for applications' trustworthiness. Ideally, we would like a robust technological solution as the base. To achieve this, we propose that the two most important things that a cloud platform could do are to:

- make it easy for developers to write performant, maintainable applications that protect user data in the cloud, thereby providing the same economies of scale to security and privacy as for computation and storage;

- enable independent verification both of the platform's operation and the runtime state of applications on it, so users (perhaps directly, but more likely via third-party auditors) can gain confidence that their data is being handled properly.

In the realm of data protection, people often view encryption as a kind of a silver bullet. In reality, encryption is just a tool—albeit a powerful one—to help achieve data protection properties, and not an end in itself. We will discuss two techniques that have received a lot of attention, full-disk encryption and computing on encrypted data, and show how they fall short of achieving our goals.

II. DOES ENCRYPTION SOLVE ALL OUR PROBLEMS?

A. Full-disk Encryption and Computation on Encrypted Data.

To motivate our ultimate proposal, we consider two different approaches to data privacy, full-disk encryption and computation on encrypted data. Full-disk encryption (FDE) refers to encrypting entire physical disks with a symmetric key, often in disk firmware for simplicity and speed. Many standards call for encryption of data at rest, which FDE nominally fulfills. FDE is effective in protecting private data in certain scenarios such as stolen laptops and backup tapes. But does it fulfill our cloud data protection goals in the cloud, where physical theft is not the main threat?

At the other end of the spectrum, modern cryptography offers rich capabilities for computation on encrypted data which were not previously possible. Recently, the first realization of fully homomorphic encryption (FHE) was discovered by Craig Gentry [4]. FHE offers the promise of general computation on ciphertexts. That is, you can take any function on plaintext and transform it into an equivalent function on ciphertext: the server does all the real work, but does not know what the data it is computing on actually is. Naturally, this property gives strong privacy guarantees when computing on private data, but the question of its practicality for general cloud applications still remains.

III. A WAY FORWARD: DATA PROTECTION AS A SERVICE

Lightweight confinement of user data: In an operating system, processes and files are the primary units of access control, and the OS provides suitable isolation for them. Applications are free to do what they like within these boundaries.

In a cloud setting, the unit of access control is typically a sharable piece of user data (e.g., a document in a collaborative editor). We would like some analogous confinement of that data, restricting its visibility only to authorized users and applications while allowing broad latitude for what operations are done on it. This can make writing secure systems easier for programmers, since confinement makes it more difficult for buggy code to leak data or compromised code to give unauthorized access to data. A malicious program may find different ways to exfiltrate data such as employing a side channel or covert channel; our higher priority here is to support benign developers, while making all applications and their actions on users' sensitive data more easily auditable to catch improper usage.

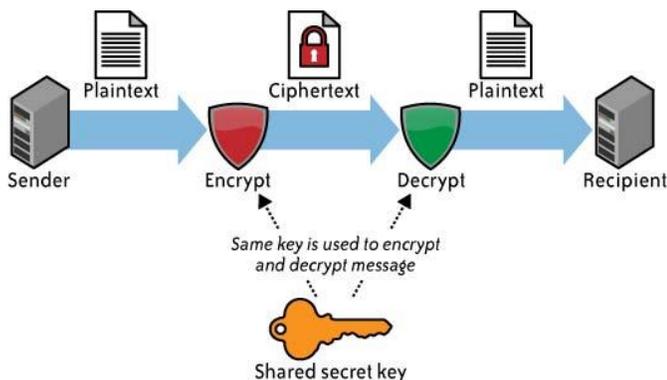


Figure 1 the Encryption Process

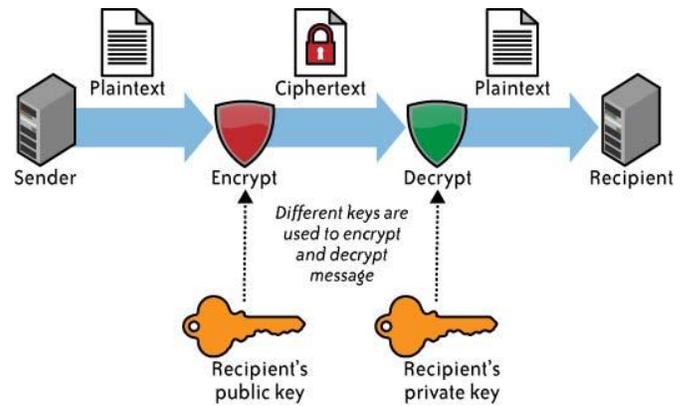


Figure 2 The Decryption Process

Secure support for debugging, maintenance, and batch processing:

These are essential for the proper functioning of virtually all useful applications. Bugs need to be fixed. Data need to be updated and migrated as schemas change. Offline computation is valuable for doing aggregation across users or for precomputation of expensive functions. To reduce the risk of unaudited back-door access, all these should be subject to the same authorization flows and platform-level checks as normal requests, albeit with a separate, appropriate policy.

Verifiable platform-level support:

Support for confinement and auditing should be built into the platform in a verifiable way. This has many advantages: application developers do not all have to reinvent the wheel; the controls maintain independence from application code; third-party auditing and standards compliance are easier; and it allows for hardware support even in a virtualized environment. The cost of examining the platform is amortized across all its users; for a large-scale platform provider, this means significant economies of scale.

A. Data Access Auditing Support

Since the platform mediates all access to the data, authenticates users, and runs binaries, it knows what data is being accessed, by what user, and using which application. It can generate meaningful audit logs containing all these parameters and optionally incorporate additional information from the application layer. There are four basic kinds of actions we can log:

- Ordinary online data accesses occur in response to external requests from users, and take place when a user is online and using an application.
- Access control modification by authorized users. Knowing the provenance of these changes can be helpful for forensics or diagnosing sharing problems.
- Offline/batch access to handle requests while users are offline (e.g., e-mail delivery), to compute aggregates, or to reorganize data such as during schema changes.
- Administrative access for maintenance operations such as debugging.

B. Analysis against Our Data Protection Goals

We assume in this analysis that the platform has been verified to behave correctly with respect to code loading, authorization, and key management, and that there exists a runtime attestation to this effect (made possible by the TPM).

Data protection properties Privacy is ensured by the encryption at rest, and a combination of application confinement and information flow checking. Application confinement isolates faults and compromises within each SEE, while information flow checking ensures that any information flowing amongst SEEs, data capsules, and end users satisfy access control policies. Administrative accesses to data are controlled and audited to provide accountability. Integrity of the data at rest can be obtained by cryptographic authentication of the data in storage, and by audit of the application code at runtime.

Ease of development Access controls, authorization, and auditing capability are common pain points for application developers. Getting these “for free” with the platform is a real improvement in ease of use, and we do not constrain the types of computation that can be performed within an SEE.

Common maintenance tasks and batch processing are provided directly as first-class operations and logged suitably. These too often require one-off work in the development process and can benefit from standardization.

IV. CONCLUSION

As people’s private data moves online, the need to secure it properly becomes ever more urgent. We can rely neither on the physical boundaries of the pre-Internet age, nor, with the cloud, the implicit Protection afforded by data being distributed among individual users’ machines. Implementing data Protection for a cloud application is hard, requiring specialized skills and significant implementation effort. The good news is that the same forces which are concentrating data in enormous datacenters are also the ones which will let us use our collective security expertise more effectively. Adding protections to a single cloud platform can immediately benefit hundreds of thousands of applications and, by extension, hundreds of millions of users. Towards this goal, we have proposed a new paradigm for cloud computing,

Data Protection as a Service, and discussed its key principles and design space. In this paradigm, the cloud platform not only provides the hardware and software stack as in today’s cloud computing, but also dynamic data protection that protects users’ data while enabling rich computation over them. We have focused here on a particular, albeit popular and privacy-sensitive, class of applications, and shown how to protect its data at the platform level. Many other types of applications also need solutions, and many practical questions still remain open.

We pose the following challenges:

- Can we standardize the technology across platforms, so switching between different providers is easy?
- How can we make migration for existing applications as easy as possible?
- How can we minimize the cost of application audits? What kinds of audits are most important to build users’ confidence?

- Can technologies such as Trusted Computing and code attestation be made scalable in the presence of constantly evolving software?
- How can we generalize the ideas here to other classes of applications?

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Study of Testing Strategies and available Tools

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Abstract- Software testing is a process used for evaluating an attributes or capability of program and make sure that it meets the requirements. Now-a-days testing becomes an very important activity in terms of exposure as well in terms of security, performance and usability. If we consider hardware and software licenses, the testing is too expensive task for user. For the automation of Software testing, several tools are available in the markets that are described further in paper.

Index Terms- Software Testing, Correctness Testing, Box Testing, White Box Testing, Grey Box Testing

I. INTRODUCTION

Software testing plays a very significant role in the growth of an enterprise. Over time, the software testing function has become a challenging activity for enterprises due to increasing technological complexities, software sourcing challenges

Typically, software testing is done either internally within the organization, or then is outsourced to software services providers. Testing follows its own evolution cycle. This offered customers a dynamically scalable and economic framework which enabled them to outsource their testing requirements.

II. TESTING

Software testing is activities conducted for finding errors in software. It also verifies and validate whether the program is working correctly with no bugs or not. It analyzes the software for finding bugs. Software testing is not only finds the bugs but also confirms that either the software is working according to the requirement specifications or not.

Software testing will consist of number of steps which is designed to make sure that computer code does what it was designed to do.[1][2]

Software Testing Objectives :

Main goal of testing can be quality assurance, reliability estimation, validation or verification. The other objective of testing includes :

- Testing is the process of executing a program with the intent of finding errors.
- A good test case is one with a high probability of finding an as-yet undiscovered error.
- A successful test is one that discovers an as-yet-undiscovered error.
- The better the software works the more efficiently it can be tested.
- Better the software can be controlled more the testing can be automated and optimized.
- Testing is basically the process to identify the correctness and completeness of the software.[3][4]

Software Testability Checklist

- Operability - the better it works the more efficiently it can be tested.
- Observability - what you see is what you test.
- Controllability - the better software can be controlled the more testing can be automated and optimized.
- Decomposability - by controlling the scope of testing, the more quickly problems can be isolated and retested intelligently.
- Simplicity - the less there is to test, the more quickly we can test.
- Stability - the fewer the changes, the fewer the disruptions to testing.
- Understandability - the more information known, the smarter the testing.

III. TYPES OF TESTING TECHNIQUES

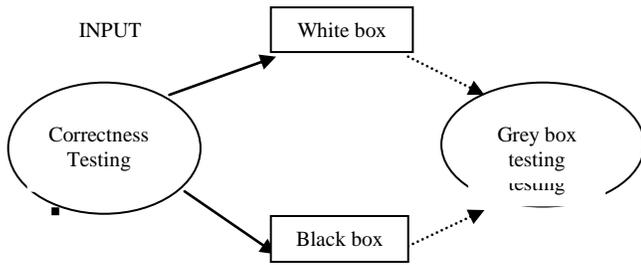
The importance of software testing to software quality cannot be overemphasized. Once source code has been generated, software must be tested to allow errors to be identified And removed before delivery to the customer. While it is not possible to remove every

error in a large software package, the software engineer's goal is to remove as many as possible early in the software development cycle. It is important to remember that testing can only find errors. It cannot prove that a program is bug free.

A. Correctness Testing

The most essential purpose of testing is correctness which is also the minimum requirement of software. Correctness testing tells the right behavior or execution of the system from the wrong one.

Either the White box or Black box point of view can be taken in testing software as a tester may or may not know the details of the software module which is currently under testing.

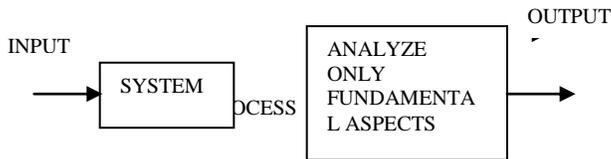


Represent categories of correctness Testing

Black Box Testing

Basically Black box testing is an integral part of Correctness testing but its ideas are not limited to correctness testing only. Correctness testing is a method which is classified by purpose in software testing. Black box testing is based on the analysis of the specifications of a piece of software without reference to its internal working.

The goal is to test how well the component conforms to the published requirement for the component. Black box testing only examines the fundamental aspect of the system. It makes sure that input is properly accepted and output is correctly produced. The black box testing techniques where user involvement is required are user acceptance testing, alpha testing and beta testing.[4]

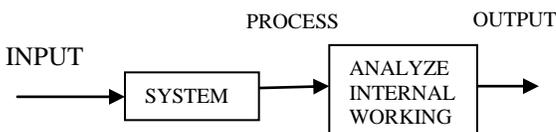


Represent working process of Black Box Testing

White box Testing

White box testing based on an analysis of internal working and structure of a piece of software. White box testing is the process of giving the input to the system and checking how the system processes that input to generate the required output.

It is necessary for a tester to have the full knowledge of the source code. White box testing is applicable at integration, unit and system levels of the software testing process. In white box testing one can be sure that all parts through the test objects are properly executed. [4][6]



Represent working process of White Box Testing

Grey Box Testing

Grey box testing techniques combined the testing methodology of white box and black box. Grey box testing technique is used for testing a piece of software against its specifications but using some knowledge of its internal working as well. [7]

Grey box testing may also include reverse engineering to determine, for instance, boundary values or error messages. Grey box testing is a process which involves testing software while already having some knowledge of its underline code or logic. The understanding of internals of the program in grey box testing is more than black box testing, but less than clear box testing. [2]

B. Functional Testing

This is a type of black box testing that is based on the specifications of the software that is to be tested. The application is tested by providing input and then the results are examined that need to conform to the functionality it was intended for. Functional Testing of the software is conducted on a complete, integrated system to evaluate the system's compliance with its specified requirements. There are five steps that are involved when testing an application for functionality.

- Step I - The determination of the functionality that the intended application is meant to perform.
- Step II - The creation of test data based on the specifications of the application.
- Step III - The output based on the test data and the specifications of the application.
- Step IV - The writing of Test Scenarios and the execution of test cases.
- Steps V - The comparison of actual and expected results based on the executed test cases. [9]

The categories under functional testing are as follows

1.) Unit testing –

Testing of individual software components or modules. Typically done by the programmer and not by testers, as it requires detailed knowledge of the internal program design and code. may require developing test driver modules or test harnesses.

Unit Testing is done at the lowest level. It tests the basic unit of software, which is the smallest testable piece of software, and is often called unit, module, or component interchangeably.

2.) Integration testing –

Testing of integrated modules to verify combined functionality after integration. Modules are typically code modules, individual applications, client and server applications on a network, etc. This type of testing is especially relevant to client/server and distributed systems.

Integration Testing is performed when two or more tested units are combined into a larger structure. The test is often done on both the interfaces between the components and the larger structure being Constructed, if its quality property cannot be assessed from its components.

3.) System Testing –

It tends to affirm the end-to-end quality of the entire system. System test is often based on the functional/requirement specification of the system. Non-functional quality attributes, such as Reliability, security, and maintainability, are also checked.[8]

4.) Acceptance Testing

It is done when the completed system is handed over from the developers to the customers or users. The purpose of acceptance testing is rather to give confidence that the system is working than to find errors.

a.) Alpha Testing

This test is the first stage of testing and will be performed amongst the teams. Unit testing, integration testing and system testing when combined are known as alpha testing. During this phase Spelling Mistakes, Broken Links, Cloudy Directions will be tested in the application.

b.) Beta testing –

Beta Testing typically done by end-users or others. Final testing before releasing application for commercial purpose. This test is performed after Alpha testing has been successfully performed. In beta testing a sample of the intended audience tests the application. Beta testing is also known as pre-release testing. Beta test versions of software are ideally distributed to a wide audience on the Web, partly to give the program a "real-world" test and partly to provide a preview of the next release.

C. Non-Functional Testing

Non-functional testing of Software involves testing the Software from the requirements which are non-functional in nature related but important as well, such as performance, security, user interface etc. Some of the important and commonly used non-functional testing types are mentioned as follows.

1.) *Performance Testing*

Term often used interchangeably with 'stress' and 'load' testing. To check whether system meets performance requirements. Used different performance and load tools to do this.

'Performance Testing' involve all the phases as the mainstream testing life cycle as an independent discipline which involve strategy such as plan, design, execution, analysis and reporting. This testing is conducted to evaluate the compliance of a system or component with specified performance requirement. [4]

Evaluation of a performance of any software system includes resource usage, throughput and stimulus response time.

Goals of performance testing:

- Observing the system resources which are under various loads.
- Measuring response time of end to end transactions.
- Measurement of the delay of network between client and server. [5]

Mistakes which happen during performance testing:

- Ignoring of errors in input.
- Analysis is too complex.
- Erroneous analysis.
- Level of details is inappropriate.
- Ignore significant factors.
- Incorrect Performance matrix.
- Important parameter is overlooked.
- Approach is not systematic. [5]

Typically to debug applications, developers would execute their applications using different execution stream. Which are completely exercised the applications in an attempt to find errors.

Performance testing is categorized in two types shown below.

a.) *Stress Testing*

System is stressed beyond its specifications to check how and when it fails. Performed under heavy load like putting large number beyond storage capacity, complex database queries, continuous input to system or database load.

Stress testing is a testing, which is conducted to evaluate a system or component at or beyond the limits of its specified requirements to determine the load under which it fails and how. Stress testing also determines the behavior of the system as user base increases. [5][4]

b.) *Load Testing*

It is an industry term for the effort of performance testing. The main feature of the load testing is to determine whether the given system is able to handle the anticipated no. of users or not. This can be done by making the virtual user to exhibit as real user so that it will be easy to perform load testing. The main objective of load testing is to check whether the system can perform well for specified user or not.

Two ways for implementing load testing are

1. **Manual Testing:** It is not a very practical option as it is very iterative in nature and it involves. It will Measure response time and Compare results
2. **Automated Testing:** As compared to manual load testing the automated load testing tools provide more efficient and cost effective solutions. Because with automated load testing, tools test can easily be rerun any number of times and decreases the chances of human error during testing. [5]

2.) *Reliability Testing*

Reliability Testing is very important, as it discover all the failures of a system and removes them before the system is deployed. Reliability testing is related to many aspects of software in which testing process is included; this testing process is an effective sampling method to measure software reliability. [4][7]

Robustness testing and stress testing are the variances of reliability testing. By Robustness we mean how software component works under stressful environmental conditions. Robustness testing only watches the robustness problem such as machine crashes, abnormal terminations etc. Robustness testing is very portable and scalable. [7]

3.) *Security Testing*

Security Testing makes sure that only the authorized person can access the program and only the authorized personnel can access the functions available to their security level. Security testing is very helpful for the tester for finding and fixing of problems. It ensures that the system will run for a long time without any major problem. It also ensures that the systems used by any organization are secured from any unauthorized attack.[3]

4.) *Portability Testing*

Portability testing includes the testing of Software with intend that it should be re-useable and can be moved from another Software as well. Following are the strategies that can be used for Portability testing.

Transferred installed Software from one computer to another.

Following are some pre-conditions for Portability testing:

- Software should be designed and coded, keeping in mind Portability Requirements.
- Unit testing has been performed on the associated components.
- Integration testing has been performed.
- Test environment has been established. [6]

IV. TESTING TOOLS

As the software industry grows. It becomes more competitive and advanced for businesses to produce such good quality software. With this reliability and deadlines should also met. Manual testing takes too long time and it can waste the lot of time. With the aid of testing tools this can increase efficiency and get the deadlines met. Testing tool is a form of automated testing. It is basically program to do various testing tasks.

Now-a-days testing is done with the help of various testing tools. The testing tools are categorized according to its software specification. After studying all the testing tools I got all types of software, languages and tools through which the software can be developed.[9]

This categorization of testing tools according to its software specification is shown in the table below:

Sr. No	Testing Tools	Specification
1	Bound Checker	C,C++,.NET,ASP,ASP.NET
2	AQTime	VB,VC++,C++,GCC,Visual
3	DevAdvantages	C#,.NET
4	GJ-Coverage	J2ME,J2SE,J2EE,HTML
5	ABBOT	JAVA GUI's
6	Cactus	Server-Side java code
7	LDRA Testbed	ADA,ALGOL,C/C++,COBOL, FORTRON, PASCAL,PL/M,PL/I
8	AppLoader	CITRIX,JAVA,.NET,ORACLE,SAP, EPIC ECLIPSYS,MCKESSEN,MED ITECH
9	SQA Suite	POWER BUILDER, DEVELOPER/2000
10	SQA TestFoundation	PEOPLESOFT
11	TCMON	ADA83
12	TestWorks	F77,ADA,C,C++
13	CSE-HTML Validator	HTML,XHTML, CSS, LINK, Spelling & Accessibility checker
14	LinkScan	Dead link Detector

15	Datatect	RDBMS including ALE,SYBASE, SQLSERVER,INFORMIX
16	SQL DB Validator	Performs database and data cube verification and validation and works with SQL
17	UtPLSQL	Open source and works on ORACLE PL/SQL

Table: Description of various Testing tools

V. CONCLUSION

In this paper I discussed about the various strategies used for testing along with its tools available for testing. Testing is very vast and hot topic in the field of research .Here I described the necessity of Testing with tools. In future I will include more number of testing techniques in support of different fields where testing is used.

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Study of Nonlinear Behavior of DC Motor Using Modeling and Simulation

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Abstract- DC motors have been widely used in the electromechanical systems due to its simple structure, ease of implementing variable speed control and low cost. In high accuracy servo control system, high control performance of DC motor is needed. DC motors have traditionally been modelled as 2nd order linear system, which ignores the dead nonlinear zone of the motor. Unfortunately, the dead zone caused by the nonlinear friction would bring great effect to servo systems. This paper studies the non linear model of the DC motor and the effects of different types of friction in determining motor dynamics at low speeds using modelling and simulation with MATLAB simulink.

Index Terms- DC Motor Non linearity, Friction, Modeling, MATLAB Simulink

I. INTRODUCTION

Most mechanical systems used in industry are composed of masses moving under the action of position and velocity dependent forces. These forces exhibit nonlinear behaviour in certain regions of operation. For a multi-mass rotational system, the nonlinearities, like Coulomb friction and dead zone, significantly influence the system operation.

A sound knowledge of the system characteristics is of primary importance in any industrial application [1]. For process control and automation purposes, a detailed analysis of the plant with its every component should be performed. Especially, control selection and design for high performance electromechanical systems such as weigh feeders requires the availability of detailed information about the components of the plant, with its linear and nonlinear, static and dynamic characteristics [1,2]. For such systems, the assumption that the nonlinearities are negligible leads to loss in the generality of the results obtained [1].

DC motors, as components of electromechanical systems, are widely used as actuating elements in industrial applications for their advantages of easy speed and position control and wide adjustability range [3]. Consequently, examination of DC motor behaviour constitutes a useful effort for analysis and control of many practical applications [1-3]. In modelling a DC motor connected to a load via a shaft, the general approach is to neglect the nonlinear effects and build a linear transfer function representation for the input-output relationship of the DC motor and the load it drives [1,4]. This assumption is satisfactorily accurate and valid as far as conventional control problems are concerned.

However, when the DC motor operates at low speeds and rotates in two directions, or when it has a wide range of operation and high precision control is needed for the application, the assumption that the nonlinear effects on the system are negligible may lead to intolerably high modelling errors and result in poor control performance [1,3].

This paper basically focuses on nonlinear modelling and proposes an innovative MATLAB model to study of dynamic response of DC motors in open loop for changes in load torque and armature voltage to identify the effects of Coulomb friction and dead zone nonlinearities. The results of the MATLAB model shall prove to be very useful in designing the control strategy for applications involving DC motors

II. NON LINEAR MODEL OF DC MOTOR

Most Electromechanical systems driven by DC motor such as weigh belt feeder exhibits nonlinear behaviour because of motor friction, motor saturation, and quantization noise in the measurement sensors. The dynamics of the system are dominated by the motor. In presence of this non-linear behaviour, it is difficult to tune a PI controller as the friction effects are difficult to predict and vary with the plant load. Modelling is difficult, and control strategies that work in "textbook" cases often fail to work in the real world. Two of the factors that often contribute to this difficulty are friction and backlash. These effects are highly nonlinear, difficult to model and analyze even with a 'fully nonlinear' model, yet cannot be ignored.

The DC motor which is typically employed in electromechanical systems such as weigh feeder for low speed control also has significant friction. Figure below depicts the electrical and mechanical model of a typical shunt wound, separately excited DC motor.

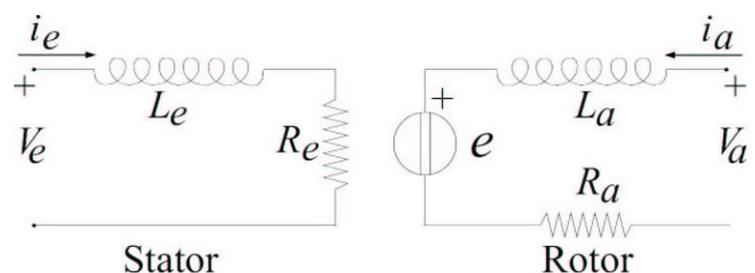


Fig 1: Equivalent circuit of Shunt wound separately excited DC Motor

The equations associated with electrical circuits are given by:

$$V_e(t) = L_e \frac{di_e}{dt} + R_e i_e \quad \text{for the stator side}$$

$$V_a(t) = L_a \frac{di_a}{dt} + R_a i_a \quad \text{for the rotor side}$$

The motor exerts a torque, due to voltages supplied on the stator and on the rotor. The following two equations hold for the back EMF e and the torque T_M :

$$T_M = K i_e i_a$$

$$e = K i_e \omega, \text{ where } K \text{ is the torque constant of the motor}$$

This torque acts on the mechanical structure, which is characterized by the rotor inertia J and the **viscous friction coefficient** F . It has also to be taken into account that in any operating environment a load torque is exerted on the motor; then, if T_L is the load torque, the following equation may be written:

$$T_M - T_L = J \frac{d\omega}{dt} + F \omega$$

where ω is the angular velocity of the motor rotor

By implementing the above equations in a nonlinear block diagram, the result shown in Figure 8 is obtained. In the block diagram, the variable θ represents the rotor angular position. The nonlinear model results in a two-input, one-output map, having a disturbance input T_L

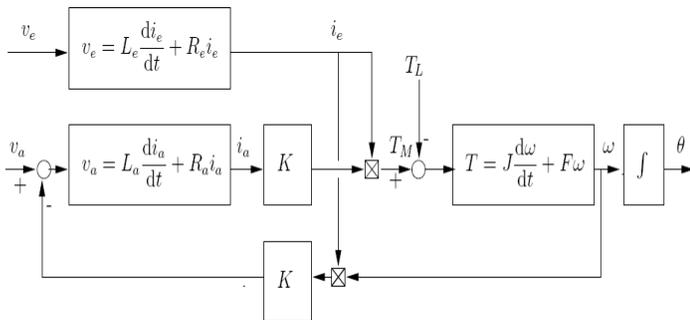


Fig 2: Non Linear Dynamic model of a Shunt wound separately excited DC Motor

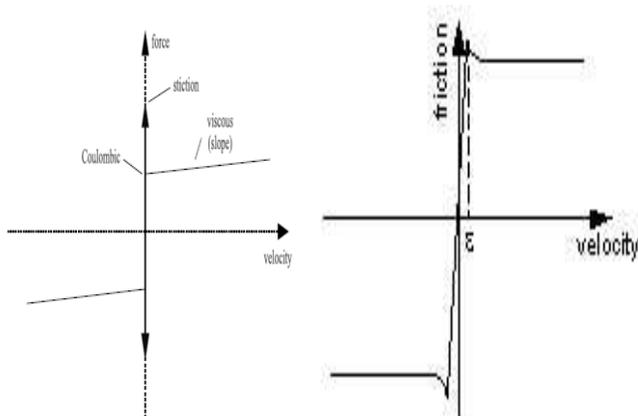


Fig 3: Force Vs Velocity Plot for Friction with ξ representing small threshold value indicating discontinuity

Figure above shows the main characteristics of a mechanical interface with friction. The stiction (or starting friction) is the amount of force required to break the interface loose. Most interfaces with friction also exhibit stiction (or starting friction). Stiction is the effect where, if the interface has remained still for any length of time, the amount of force required to start the relative motion is greater than the amount required to sustain it. The Coulombic (or “dry”) friction is that portion of the running friction that is dependent only on the direction of motion but has constant magnitude. Finally most mechanisms with friction also display some viscous drag that is more or less proportional to velocity.

Further, the speed required by the load is too low as compared to the nominal speed of the motor. In such cases, gears are introduced between the motor and the load, thus reducing by a factor n the angular velocity of the load itself. When a gear is inserted in an actuator system, backlash is experienced on its output due to the coupling between the cogwheels of the gear. This gives rise to nonlinearities and discontinuities in the force/velocity relationships.

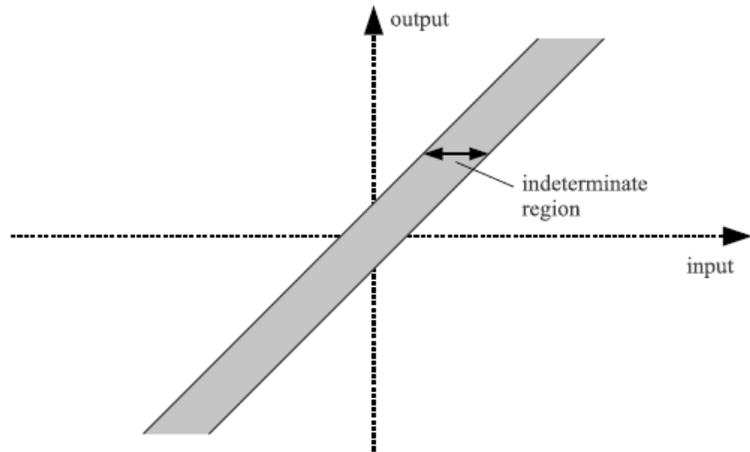


Figure 4: Input Vs Output displacement for an element with Backlash

Figure above shows that backlash presents problems to the system model that are nearly as severe as those presented by friction. In the case of backlash there is a hidden state – the difference between the input and output positions, where there is no change in output for a change in input.

Figure below depicts the nonlinear model in presence of different types of friction and backlash in the drive system consisting of motor and gearbox.

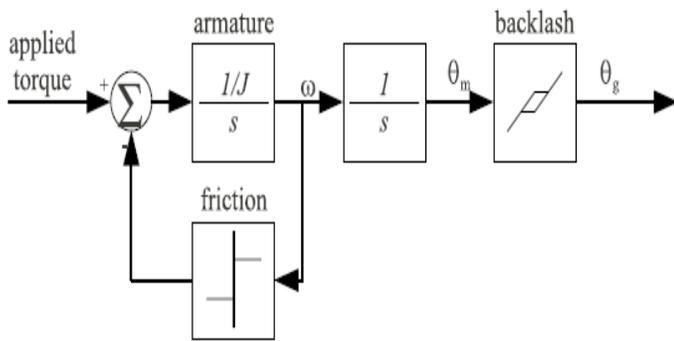


Figure 5: Non linear model with friction and backlash

Typically, in an electromechanical system with DC Motor the friction effects are dominant at low motor speeds and gradually get less prominent with higher motor.

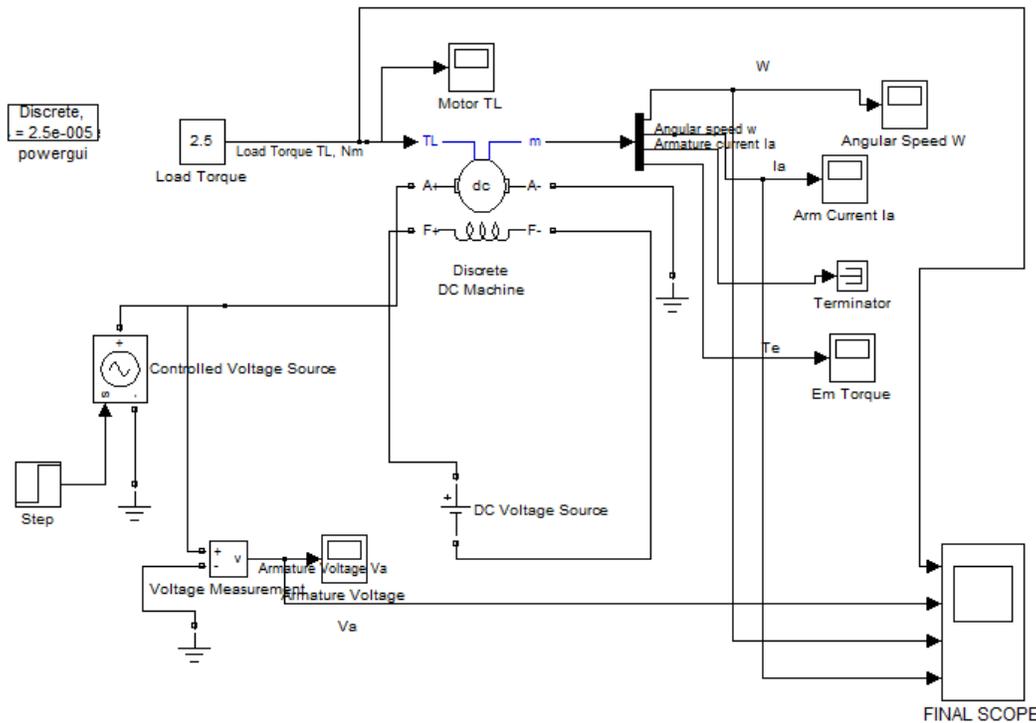
Theoretically in DC motor speed control using armature voltage variation, the relationship between angular speed ω and armature voltage V_a is given by a linear equation:

$\omega = V_a / K\Phi$, as $V_a = E_b$ as drop across armature is small as compared to back emf E_b .

Therefore, if the field flux is held constant, motor speed should vary linearly with V_a . However, in actual practice the motor speed shall be dependant of friction torques opposing the electromechanical torque developed by the motor. The non – linear behaviour of DC motor, especially at low speeds with changes in load torque can be studied using modelling and simulation as depicted in next section.

III. SIMULATION OF DC MOTOR BEHAVIOUR

In order to test the behaviour of a DC motor connected to mechanical load of a machine with step change in load and / or step change on armature voltage, an innovative Simulink model of the DC motor without the conventional PI speed controller (i.e. in open loop) is developed as shown below.



SIMULINK MODEL FOR DC MOTOR WITHOUT CONTROLLER (MOTOR 5HP, 240V, 1750RPM, Field: 150V DC)

In the model the DC motor field excitation is provided with constant DC source and the armature voltage is provided by selecting the controlled voltage source and a DC mode is selected for the same with a step signal as input. The mechanical system is modelled to provide load torque to the DC motor model. The dynamic response of the DC motor (speed and armature current) is captured using scope with step change of armature voltage for different loads. Also the simulation results are tabulated and conclusions are drawn from the results.

TABULATION OF RESULTS OF SIMULATION WITH CONSTANT $V_a (= 50 V)$

Sr. No	Load Torque in N-m	Maximum ω in rad/sec	Time required to reach max speed	Armature Current Ia Amps in steady state
1.	1.0	32	1.25 sec	1.6
2.	1.5	25	1.0 sec	2
3.	2.0	20	1.0 sec	2.25

4.	2.5	15	1.0 sec	3.0
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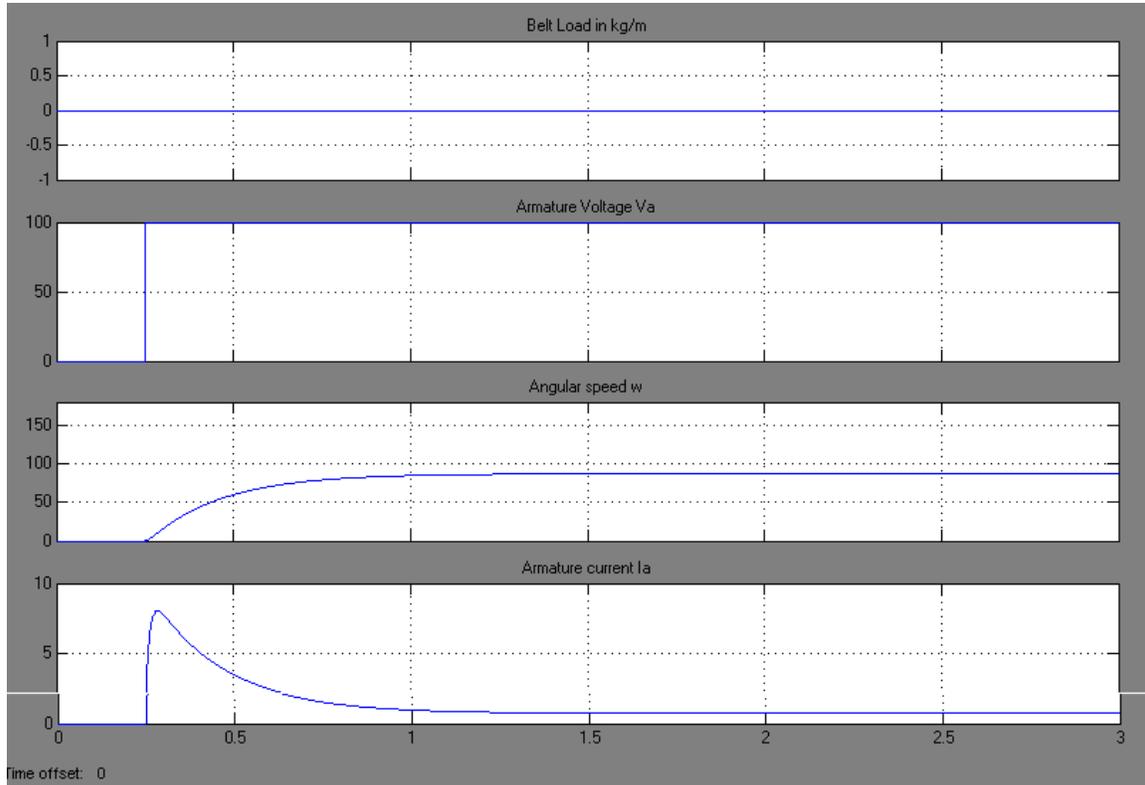
TABULATION OF RESULTS OF SIMULATION WITH CONSTANT LOAD TORQUE (TL= 2.5N-m)

Sr. No	Armature Voltage Va Volts	Maximum ω in rad/sec	Time required to reach max speed	Armature Current Ia Amps in steady state
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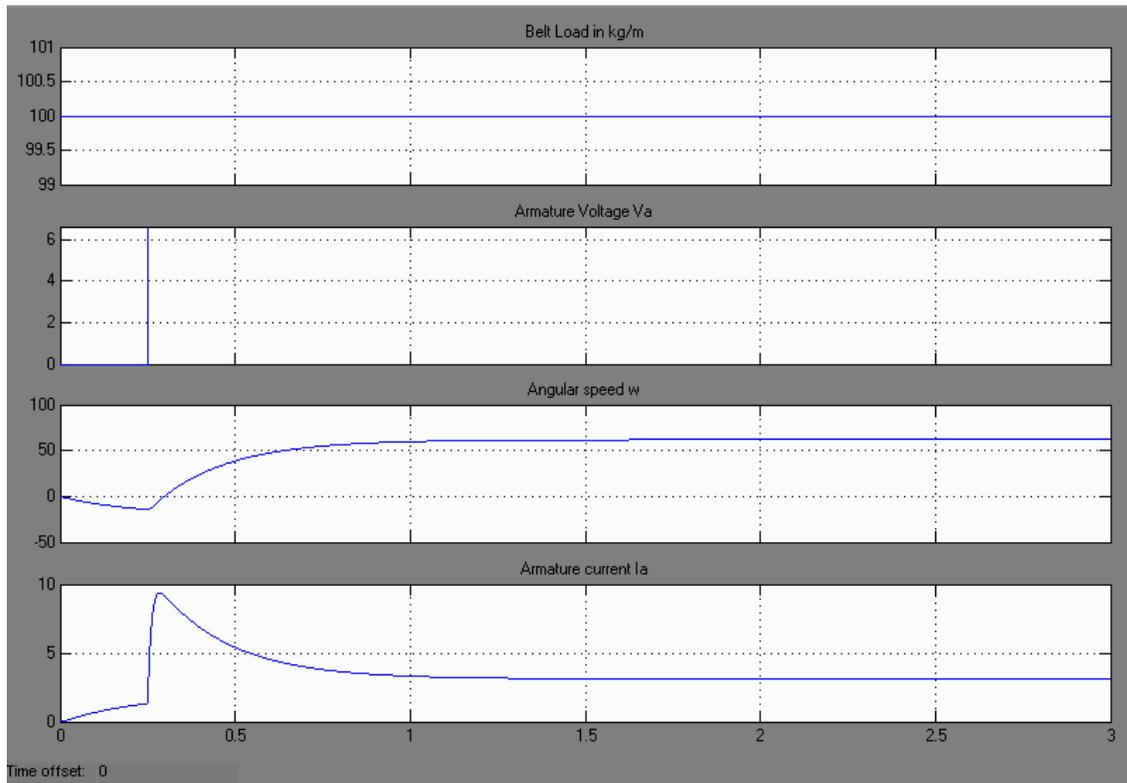
1.	25	0		2.2
2.	50	15	1.25 sec	3.0
3.	100	60	1.10 sec	3.0
4.	150	110	1.00 sec	3.2
5.	200	175	0.75 sec	3.5

Table above gives the clear picture of the Non linear response of DC motor captured using the MATLAB Simulink Model proposed above.

SCOPES FOR SIMULATION OF DC MOTOR RESPONSE IN OPEN LOOP



SCOPE FOR DC MOTOR WITH NO LOAD & Va = 100V DC



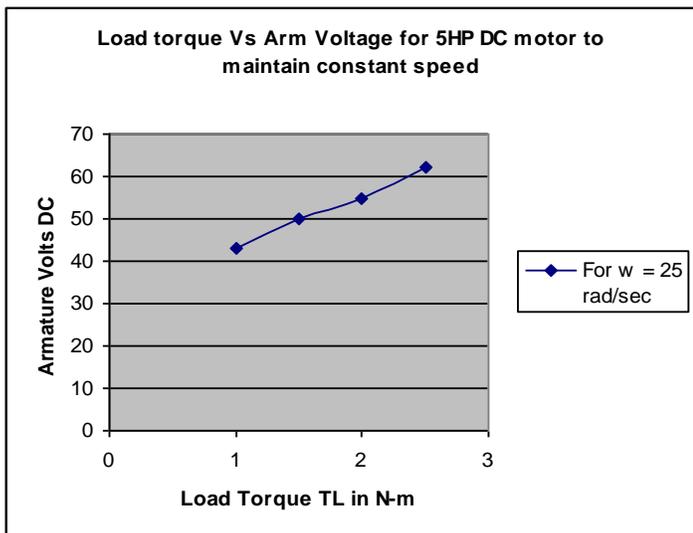
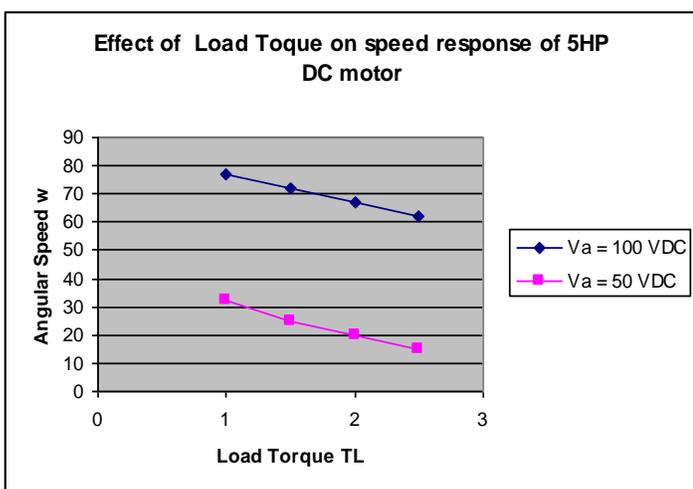
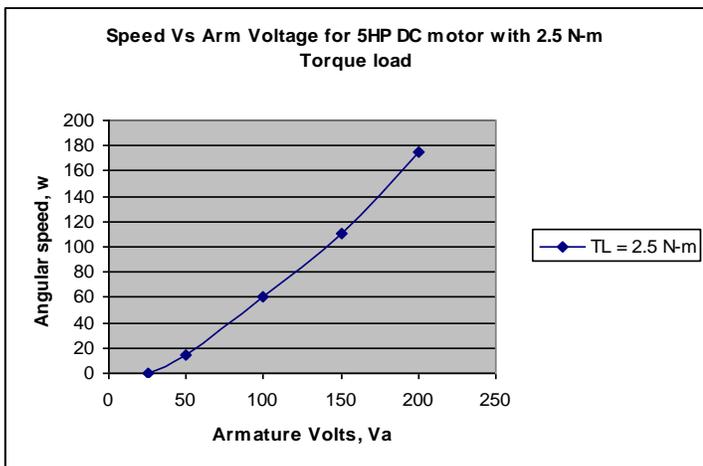
SCOPE WITH STEP CHANGE OF LOAD & $V_a = 100V$ DC

IV. CONCLUSIONS AND ANALYSIS OF RESULTS

Following observations and conclusions can be drawn from the results of the simulations:

1. The response of motor speed and armature voltage is non-linear for 1.5-r2 sec after the step change due to moment of inertia and friction effects (Viscous Friction Coeff $B_m = 0.002953$ N.m.sec and Columb friction torque $T_f: 0.5761$ N.m)
2. The maximum motor speed drops in response to the increase in load torque and also the dynamic response gets sluggish even for the same V_a .

For further analysis, the data captured from the simulation are plotted as X-Y chart to see the co-relation between the variable of DC Motor as shown below.



From the chart 1, it is evident that the response of Armature voltage and speed is not linear for constant field voltage and load torque, and the non-linearity is more pronounced at the lower speeds, as the friction forces are more prominent in that region.

Chart 2 depicts that the motor speeds drops significantly as the load torque changes and also varies with the change in armature voltage. In order to compensate for the drop in the

speed due to change in load torque, the armature voltage needs to be gradually increased to bring the motor back to desired speed.

In order to overcome the Non-linearity of DC motor response the conventional approach is to implement a linear controller with P+I strategy where the integral action is used to incrementally adjust the armature voltage to bring the motor speed to desired level and remove any steady state error as depicted in chart 3.

However, a fixed PI controller tuning at low load may not be suitable for higher load and vice versa in slow speed applications with variable load torque such as in case of belt weigh feeders. In view of these challenges, the performance of PI controller alone is sub-optimal. It is recommended to overcome the shortcomings of conventional PI controller by implementing the adaptive PI controller or Fuzzy logic based PI controller where the gain of PI controller gets adjusted continuously based on dynamic response of the DC motor.

The results of the present study are meant to constitute a starting point for ongoing studies on identification of non linearity in DC motor based electromechanical systems and adaptive and Fuzzy control applications for nonlinear systems.

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A Study on Knowledge, Attitude and Practice on Blood Donation among Health Professional Students in Chennai, Tamil Nadu, South India

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Abstract- Background: Role of youngsters in voluntary blood donation is crucial to meet the demand of safe blood. Therefore understanding the various factors contributing to knowledge, attitude and practice of Voluntary Blood Donation (VBD) among youngsters is important.

Objectives: The present study aims to assess the level of knowledge, attitude and practice regarding blood donation among the health care medical students.

Methods: A cross-sectional study was conducted among 400 health care medical students from Tagore Medical College and Hospital, Matha Medical College and Research Institute, and Tagore Dental College and Hospital Chennai, Tamil Nadu, South India using a structured survey questionnaire.

Results: Overall knowledge on blood donation among respondents was 35.65%, majority of the participants (89.25%) never donated blood in which few of the non-donors had negative attitude (36.41%) like blood donation leads to weakness (12.61%), anemia (19.61%) and 4.2% of non-donors felt that blood donation leads to reduced immunity. Majority of non-donors showed positive attitude (63.59%) by expressing their willingness to donate blood if they were asked to donate blood (32.21%), about 7% of the non-donors don't know the importance of blood donation and 24.37% of non-donors don't know where to donate blood. In this study 10.75% of students had donated blood only once, in which 34.88% of blood donors said no privacy was provided while donation, few (11.63%) had experienced some discomfort after donation and 53.49% of respondent said that they have not tried again.

Conclusion: The present study recommends that even student community needs to be educated about the importance and health benefits; awareness and motivation of blood donation on regular basis and addressing the problems faced during blood donation will strengthen the recruitment and retention of blood donors to donate blood on regular basis.

Index Terms- Blood Bank; Voluntary Blood Donation; Health care professional students

I. INTRODUCTION

Blood can save millions of life. The requirement of blood and blood products in a country depends on the population, health care structure, prevalence of conditions requiring regular transfusions, such as haemophilia and thalassaemia etc.,

availability of surgical centers using modern sophisticated techniques, and awareness amongst clinicians regarding judicious use of blood. However problem regarding a permanent shortage of blood is observed in blood services all over the world.⁽¹⁾ The only source of blood is by blood donation.⁽²⁾ However, recruitment of voluntary, non-remunerated blood donors poses major challenges to transfusion services throughout the world.⁽³⁾ As per World Health Organization (WHO) norms, 1% of the population is generally the minimum needed to meet the country's most basic requirements for blood.⁽⁴⁾ In India, during the year 2006-2007, Voluntary Blood Donation (VBD) was only 54.4% and it increased to 79.4% during the year 2010 - 2011.⁽⁵⁾ The total population of Tamil Nadu State in India comes around 72.1 million as per the census calculation. Annually, Tamil Nadu needs about a minimum of 700 thousand units of blood as per WHO's norms. Every year increase in population along with increase in life expectancy rate, urban development and associated increase in accidents and specialized surgeries requiring blood, the rate of blood usage is on the rises.

Internationally, regular voluntary non-remunerated blood donors, who donate blood out of altruism, are considered safe blood donors. In many countries, continuous efforts are needed to achieve 100% VBD. Even though in Indian law forbidden collection of blood from paid donors, many times health care facilities forced to accept blood from paid donors as there are scarcity of voluntary blood donors.⁽²⁾ It is well established that paid donors constitute a group with high risk behavior leading to greater chances of transfusion transmitted infections in the recipients. In addition blood shortage are experienced in Tamil Nadu state in India during the summer holidays. Hence awareness through education and motivation of the young people about the VBD are an important for recruitment and retention of the voluntary non-numerated blood donors. According to WHO, an estimated 38% of reported VBDs are contributed by people under the age of 25 years. WHO also insist countries to focus on young people to achieve 100% regular voluntary non-numerated blood donation.⁽⁴⁾

Young students are healthy, active, dynamic, resourceful, and receptive and constitute a greater proportion in the Indian population. Those young students have to be encouraged, inspired and motivated to donate blood voluntarily on regular basis.

II. OBJECTIVE OF THE STUDY

This study has carried out to understand the knowledge, attitude, and practice about blood donation among undergraduate health care medical students in Chennai, Tamil Nadu, South India for an effective blood donor recruitment and retention programme.

III. METHODOLOGY

This study was conducted among first year health care medical under graduate students in Tagore Medical College and Hospital, Matha Medical College and Research Institute and Tagore Dental College and Hospital, Chennai, Tamil Nadu State, South India. Four hundred students participated on voluntary basis. A briefing was given to the participants about the objective of this study and assured confidentiality in collection of personal data. A well structured validated and pre-tested questionnaire on knowledge, attitude and practice on blood donation was assessed among students through questions covering nature of donation, requirements for donation; test carried in the blood banks, storage, blood components, usage of blood and health benefits for blood donors. A scoring mechanism was used to understand knowledge level and attitude on blood donation; each correct answer was given one score and in practice reason for not a regular donor was assessed and results were expressed in percentage.

IV. RESULT

In the present study overall knowledge (Table 1) on blood donation among respondents was 35.65%, about 357 of the participants (89.25%) never donated blood and 36.41% of the non-donors have negative attitude (Table 1) like blood donation leads to weakness (12.61%), anemia (19.61%), and reduced immunity (4.2%). About 63.59% of non-donors showed positive attitude (Table 1) by expressing their willingness to donate blood if they were asked to donate blood (32.21%), 7% of the non-donors don't know the importance and health benefits of blood donations and 24.37% of the non-donors don't know where to donate blood. About 43 students (10.75%) have donated blood only once (Table 1), among the blood donors, 34.88 % of blood donors said that no privacy was provided while donation, 11.63% of the donors had experienced some discomfort after donation and 53.49% of respondent said they have not asked again to donate blood.

V. DISCUSSION

Studies to understand the various factors that could change the perception and awareness about blood donation among the student community may come out to be useful for the successful implementation of 100% VBD program in the Tamil Nadu state. The present study assessed the knowledge, attitudes and practice regarding blood donations and transfusion services among the Health care professional medical students in Chennai, Tamil Nadu, India. The main purpose of this study was to identify strategies and factors that influence the recruitment and retention of voluntary non-remunerated blood donors to achieve 100% VBD.

Knowledge on blood donation among students was measured using the following questions; which comprised of respondents' understanding on benefits of blood donation to donors; the general requirements to become an eligible donor, how many times in a year a healthy male and female can donate blood, volume of donated blood, number of days donated blood can be stored; components of donated blood; maximum number of lives saved from the donated blood. The overall knowledge on blood donation among respondents was 35.65%. Present study showed that lack of awareness on blood donation was there even among the health care medical professional students. Hence, a periodic awareness program on blood donation in various educational institutions across India is needed in addition to the medical professional students to achieve a 100% VBD programs. The present study indicates that majority of the participants (89.25%) never donated blood and observed positive attitude (63.58%). The reasons for non-donations were no one has ever asked to donate blood; lack of information on blood donation and its importance and don't know where to donate blood and negative attitude (36.42%) like blood donation makes the person weak, reduce immunity and leads to anemia.⁽⁶⁾ The non-donors with positive attitude should be motivated and awareness about voluntary blood donation should be provided to promote blood donation on voluntary basis, while non-donors with the negative attitude are needed to be educated about the importance and health benefits upon blood donation. Their doubts regarding blood donation should be clarified and they should be motivated to donate blood on regular basis.

This study clearly shows that respondents who donated blood once (10.75 %) are not regular donors because 53.49% donors said no one has asked them to donate blood again. This indicates that these students are willing to donate blood on regular basis but they need constant awareness about importance of blood donation and regular motivation.⁽⁷⁾ About 34.88% of donors pointed out that there was no privacy during blood donation, while few (11.63%) expressed a little discomfort after blood donation. Provision of adequate privacy, awareness, communication materials and advertisements to address the fear factor may strengthen the recruitment and retention of voluntary blood donors to donate blood on regular basis to achieve 100% of blood donation only on voluntary basis.⁽⁸⁾

Present study concludes that students believe that they are less willing to take part in the VBD due to insufficient information. Hence, a periodic awareness program on voluntary blood donation is needed for even among health care medical students. Students should lead from the front to donate blood regularly on voluntary basis and also to take all necessary steps for spreading awareness about the advantages of blood donation not only for the recipient but also for the donor himself could be a motivating factor. Making students aware of recent findings, like frequent and long-term blood donation is associated with a lower risk of cardiovascular events in donors can motivate them to be regular donors. This study will also create awareness on blood donations among the entire student's community. Such studies are needed to be carried out at all district levels across the Tamil Nadu to march towards 100% blood donation only on Voluntary basis in the Tamil Nadu State, which will be spread to other states in India.

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Table No.1 Knowledge, Attitude and Practice on blood donation

KNOWLEDGE	Percentage (%)
Suitable age for blood donation	76.25
Minimum weight for blood donation	72.75
Normal Blood Pressure to donate blood	46.75
Healthy male can donate blood how many times in a year	32.25
Healthy female can donate blood how many times in a year	13.75
Blood volume that donated in every blood donation	14.25
Number of days donated blood stored at 2-4oC	12.5
Separation of blood Components from the donated blood	20
Number of live saved from the each unit of donated blood	22
Blood-borne infections for which the donated blood is tested	36.25
Benefits of blood donation to donors	45.5
Over all percentage of knowledge	35.65
ATTITUDE	89.25
Blood donation makes you weak	Negative (12.61)
Blood donation can leads to anemia	Negative (19.61)
Blood donation can leads to reduce immunity	Negative (4.2)
No one has ever asked to donate blood	Positive (32.21)
Lack of information on blood donation and its importance	Positive(7.00)
Don't know where to donate	Positive(24.37)
PRACTICE - Reason for not a regular donor	10.75
No privacy was provided while donation	34.88
Experienced some discomfort after donation	11.63
No one has asked again to donate blood	53.49

Reception of Assamese words into Boro: Morphological view point

PHUKAN CH. BASUMATARY, PH.D**

Abstract- Here analysis will be made on the mutual reception of linguistic elements (particularly in case of morphological elements) between the two languages spoken within the geographical and cultural context of Assam. The two languages are Boro, a Tibeto-Burman language and on the other hand an Aryan language i.e Assamese. From a structural view point it may be believed that Boro and Assamese have received mutually some morphological elements through the ages. This part will be attempted to highlight in this paper.

Index Terms- Mutual impact, morphology, reception, cross-linguistic, adaptation

I. INTRODUCTION

Scholars hypothesize that the ancestral Tibeto-Burman (TB) linguistic people may be migrated to India through different hilly roots and inhabited by the river valley sometime around 4000 BC. In India TB linguistic people are called Indo-Mongoloid.¹ The Boro linguistic community² shows genetic relationship to the TB languages spoken in Assam and abroad. Scholars have opinions regarding migration root of the Boro linguistic people. There are two diverse opinions: (a) A group of the Boros is thought to have migrated from the Tibet via Myanmar and (b) the other group may be migrated through **Nathula** border root via **Mechi** River and concentrated by different river banks of North Bengal. So a large number of Boro speaking people are found in North Bengal. Even in Bhadrapur area of Nepal, concentration of Boro speaking (Called **Meche**³ themselves) people are found in a large number. Chatterji had a minute observation that the Boro linguistic community who spread over the whole of Brahmaputra valley and North Bengal as well as East Bengal forms a solid bloc in NE India and main bases of the present day population of these tracts. The Bodos appear first to have settled over the entire Brahmaputra valley, and extended West into North Bengal. [Chatterji, 1998: p.46]. AS a result, a good number of words have been mutually diffused into the languages that concentrated in NE India. Even the word 'Bangla' (Bengal) has also been derived from its ancient Bodo term **Ha-bang-la** i.e plenty and wide land. The

¹ Here **TB** denotes Tibeto-Burman group of languages.

² The concentration of Boro linguistic community is found through out the state of Assam and a few adjacent regions like near Tura of Meghalaya, Assam-Arunachal Pradesh border and North Bengal.

³ **Meche** is a generic term that has been used to denote the Boro speaking people of North Bengal. They suppose that Koch, Mech and Lapse of Bengal, Darjeeling and Sikkim are kith and kinfolk. As a result, a large number of common linguistic features are noticed among the linguistic groups.

Boros have, now a day, concentrated through out the length and breadth of Assam. The number of present population is estimated 12, 96,162 (as per 2001 census report).

II. OBSERVATION ON RECEPTION OF MORPHOLOGICAL ELEMENTS

In Assam, the Boro linguistic community has a close attachment with other linguistic communities surrounded by different languages. As a result they have received (mutually) an enormous number of linguistic elements from other sources. Particularly from Assamese, Boro has received a variety of linguistic elements through the process of socialization. It may be observed in the level of lexis, phonology and morphology in particular.

2.1 Reception of Morphological elements

There are some striking morphological units⁴ that frequently used in Boro which have no TB source or genetic relationship with TB group of languages. But comparison may be made with Assamese. This may be noticed in class of words and its formation.

2.1.1 Reception in lexical level

- Nothing to discuss about reception of linguistic elements from Bodo group of languages to Assamese; because, Kakati and many scholars have made a strong comments that Assamese has been influenced by other linguistic communities like TB group of languages in particular.
- Various words generally used in Assamese language have a frequent used in Boro. But they have not originated from TB source. Its genetic relationship may be shown with other Indo-Aryan languages.

(A) Adapted from Assamese: Words related to birds, animals, insects etc.

Br. maslaŋk^har <Ass. mas rōka- the king fisher

Br. sila (kite) (<Proto-Boro. dauliŋ)< Ass. śila

Br. sigun (vulture)< Ass. śogun

Br. badali (padlock)< Ass. baduli

Br. haŋsuŋ (duck)< hāh

Br. P^haruqu (domestic pigeon)< parō etc.

- The above cited words related to birds name are not derived from TB origin; but used in Boro usually.

⁴ Here **unit** means any kind of morphological form/morpheme.

- TB words regarding names of bird have a special feature. Particularly in Boro, the word *dau*⁵ is used before the particular name of birds; e.g: *dau-k^ha* (crow), *dau-bə* (heron), *dau-rai* (peacock), *dau-t^hu* (dove), *dau-sri* (martin) etc.

(B) Words related to animals

The following words (may be) have been adapted from Indo-Aryan Assamese language; e.g: Br. *sial*<Ass. *śial* (fox), Br. *gərai*<Ass. *g^hōra* (horse), Br. *neulai*< Ass. **neul** (mongoose) etc.

Let's see the comparison-

(C)TB structure: words of animal & insect name

TB words related to animals are usually composed of at least two morphological segments. This feature occurs in Boro animal names; e.g: *muḡ-k^hra*> *muḡk^hra* (monkey), *mu-p^hur*> *mup^hur* (bear), *mu-sa*> *muṣa* (tiger), *mi-de*>*muḡider* (elephant), *ma-dab*>*mandab* (squirrel), *mu-suḡu*> *muṣsuḡu* (cow), *muḡi-suḡ*> *muḡisḡu* (buffalo), *muḡ-sruḡm*> *muṣsruḡm* (ant), *muḡ-duḡi*> *muḡduḡi* (porcupine) etc.⁶

In Boro, the word /*mi*/ denotes animal and has relationship with other TB languages. Now a day, the word /*zunar*/ is used; it derives from Assamese word **zontu**.

(D)An exceptional example: ant^hu (knee)

The word /**ant^hu** / used in Boro. Whether it is originated from PTB (Proto-Tibeto-Burman) or Assamese? It is a matter of debate. But easily we can tress out to the conclusion, if it is observed to the basic structure of TB word. In TB/Boro language, the names of body parts are generally composed of two morphological segments i.e two syllabic components. The names of body parts of **Bodo-Garo** group of languages have phonemic prefixes like {*a*-, *u*-, *bi*-, *muḡ*-} that occurred before the names of body parts; e.g: *a-k^hai* (hand), *a-si* (finger), *a-p^ha* (palm), *a-t^hiḡ* (leg), *bi-k^ha* (heart), *muḡ-k^haḡ*(face), *bi-gur* (skin), *bi-bu* (liver) etc. Here the word /**ant^hu**/ is also composed by two morphological segments; e.g: *a-t^hu*>**ant^hu**. Assamese speaking people articulates it as /*ã^hu*/; therefore it is to be supposed to have derived from Boro origin. Thus Br. /*bi-k^ha*/ is comparable to Ass. *buk/buku* (chest)⁷.

(E) Cross linguistic features: Adaptation in Boro

For instances:

/ai/: There is separate basic vocabulary for mother; i.e 'ma' is originated form TB source. (Br. *nuḡ-*ma** –your mother, *bi-*ma**-his/ her mother)

/ali/: The TB source is /*lam*/, becomes in Boro as /*lama*/ (road/way/path).

/giri/: Similar to Assamese /*giri*/, at the same time Boro has equivalent use of the word /*guḡra* ~ *gra*/- means doer, master. E.g: *liḡ-giri* (writer), *buḡ-giri* ~ *buḡ-*guḡra** ~ *buḡra* (speaker) etc.

/sali/: /*p^hrai-sali*/- (school), *sibi-sali* (place of worship), /*t^han-sali*/ (general place of worship of the villagers), /*diḡk^hi-sali*/- (rice husking place) etc. Here /*sali*/ may be the Boro origin; it means place; not equivalent to Assamese 'śal/śali'. But all the first segments are of Assamese origin. Some other examples:

- Br. *duḡi-bana* <*ban/banpani* <Skt. *vany ā* (flood)
- Br. /*abad-ari*/-cultivator (Urdu/Hindi via Bangla to Boro). Here /*abad*/ has no TB origin, but /*ari*/ denote man in Boro.

Thus /*zayga-ari* /- (e.g- mention for comparison), /*sibi-ari*/- (worshiper, devotee) etc.

(F)Use of phrases: cross-linguistic features

- /*man bau*/- pay respect; (<Ass. /*man*/)
- /*bibar mala*/-garland of flower (<Ass. *mala*, Br. *luḡ*)
- /*t^huri bari*/-garden of thatch (<Ass.*bari*)
- /*muṣsuḡu gəli*/-place of cow for taking rest (<Ass. *gohali*)
- /*asan mut^hi*/- bangle worn on the arms (<Ass. *mut^hi k^haru*)
- /*gaḡduḡ huḡ*/- money given as marriage agreement to the family of bride (<Ass. *gadhən*) etc.

2.1.2 Use of affixes

Similarities have found in case of plural suffixes; e.g:

Ass. {-*bor*} ~ Br. {-*p^huḡ*}⁸:

- e.g: Ass. *kitab-bor* (books), Br. *bizab-p^huḡ* (books)
- On the other hand, the word Ass./*raiḡ*/ is also being used in Boro in the sense of plurality; e.g: /*raiḡu-p^huḡ*/

(A)Regarding use of case-marker

(a) Ass. Accusative case-marker {-*kə/ək*}, vs Br. {-*k^huḡ*}

e.g: Ass. /*tomak*/, Br./*nuḡk^huḡ*/, cf. Gr. /*naḡk^hə*/

(b) Ass. Ablative case-marker{-*rə-pəra*}, vs Br. {-*ni-p^hrai*}, e.g: Ass. /*mərpəra*/ cf. Br. /*aḡniḡp^hrai*/

(B)Regarding gender variation⁹

TB process regarding gender variation is a quite simple. Gender distinction is made in case of animate beings. Usually gender variation is realized by using separate sets of words or sometimes by using word of male or female representing separate words with the word of animate beings. Besides these, a variety of suffixes are used in Boro to distinguish male or female

⁵ The term **dau** denotes bird. Here the second syllables of all the words have an onomatopoeia feature; from a morphological view point they may be used as bound base.

⁶ Thus the similar structure is also occurred in all cognates of Boro.

⁷ Ass. word **buku** has Skt. origin; on the other hand, **k^ha** denotes chest/heart in TB origin and it becomes **bik^ha** in Boro.

⁸ It is very much complicated to emphasize that whether Assamese receives or Boro receives from Assamese. To come to the approximate decision, it is very important to mention the examples of Skt. *bəhulə*, Old Ass. {*bəla*, *bəlak*} etc.

⁹ The feminine suffixes {-*i*-, *u*-, *e*-} etc. are used in Boro. It is possible to take place due to impact of Assamese language. Ass. fem. suffixes: {-*i*-, *ni*-, *əni*-, *ri*-} etc.

sex; e.g. mas. /hait^ha/-short man, fem. /hait^hu/- short woman, mas./p^hagla/-mad man, fem./p^hagli/-mad woman, etc.

(C) Regarding use of numeral classifiers

- A lot of numeral classifiers are used in Boro which corresponds closely to Assamese classifiers; e.g. Br. {ak^ha-, p^habu-, zora-, hali-, k^handi-, mut^ha/muṭ^hi-}, Ass. {ak^hi-, pab-, zor-, hal-, k^hon/k^hondɔ-, mut^hi-} etc. Here interesting point is that, in Boro, classifiers are added before numerals while in Assamese these are added after numerals.

E.g:

Ass. /eak^hi kɔl/, /ek^hon tamol/ etc.

Br. /ak^hase t^halir/, k^handise gɔy/¹⁰ etc.

(D) Regarding use of negative prefix¹¹

- Boro has adapted from (through) Assamese a system of negation which is made of using prefix with noun or verb class of words; e.g. be-k^haida, be-dɔk^hɔl, ɔ-subida, ɔ-gian, ni-maɔza, ni-k^hauri etc.
- Thus Assamese has also similar use of prefixes; e.g. be-dɔk^hɔl, be-nam, ɔ-subid^ha, ɔ-sɔmɔi, ni-kin, ɔp-man etc.

(E) Regarding use of derivational suffix

- Boro has received some derivational suffixes in relationship with Assamese that have been used with noun class of words;

Example: {-i, -ua,} etc.

Br. /gian-i/-man of knowledge, /dan-i/-donner, /hal-ua/-cultivator, /sɔrkar-i/-connected to government etc.

Ass. /gian-i/, /dan-i/, /hal-ua/, /sɔrkar-i/, bɔdmas-i, /japan-i/ etc.

{-ari}¹² is also a derivational suffix that is used with verb and noun class of words; Ass. zua-ari>zuari, Br. /bibay-ari/-begger, /abad-ari/-cultivator, /b^harɔt-ari/-Indian, /daɔbay-ari/-traveller etc.

2.1.3 Adaptation of cultural terms: A cross-linguistic features

(A)

Ass. /nakp^huli/> Br. /nakp^huli~ nakbali/-an ornament of nose

Ass. /kanp^huli/>Br. /kan p^huli/ -an ornament of ear

Ass. /gad^hon/>Br. /gaɔɔn huṭ/- money given as marriage agreement to the family of bride

Ass. /sɔra g^hɔr/>Br. /suṭura nɔ/-sitting room

Ass./gɔsai/>Br. /gɔsai/-god (Proto-Br. muṭdai)

Ass. /zati kul/>Br. /zat k^hul/ - family, kith and kin

(B)

Various words are used in folk-literature that has been found correspondences with Assamese words, e.g. /bat^huṭu buṭrai mharaza/, /bagraza/, /bulli buri/, /suk^hubay suk^hu huṇaṇṅuṭu/, /rɔg biadi/, /uraibayduṇ/, /aṅk^huṭu dabilai/, /ɔgini k^hona/, /zerɔ

zuṇ nuṭ/, /daut^hu k^hɔrɔ hena daba/, /zuṭni p^huk^hri/, /bari haga/, /bip^ha guru/, /at^hi mɔṅgɔl sep^hainay/, /guṭsuṭni k^huṭ^ha guṭruṭaɔ/¹³ etc.

Here the terms **buṭrai** (old man), mɔharaza (great king), bagraza (the tiger king), buri (old age woman), suk^hu (calm and peace), rɔg biadi (disease), urai (flying), bilai (give to), ɔgini (fire), zuṇ (people), hena (like as), p^huk^hri (pond), haga (evacuation), guru (religious preceptor), at^hi<at^h (eight), mɔṅgɔl (auspicious), k^huṭ^ha (speech), guṭruṭu (the interior of the heart) etc. are found uses in Assamese and these may be assumed to confluence in Boro by the process of socialization.

III. CONCLUSION

The topic of discussion has a great scope of investigation and analysis. It has an academic importance besides its linguistic significance. More debatable and thought-provoking analysis may be made among the scholars. From an empirical investigation it becomes clear that Boro and Assamese have mutually received linguistic elements at the level of lexis, phonology and morphology.

ABBREVIATION

Br.-Boro

Ass.-Assamese

Fem.-feminine

Skt.-Sanskrit

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¹⁰ Here Skt./k^hondɔ/ > Ass. /k^hon/ > Br. /k^handi/ - (a part, a piece of betel nut) fairly corresponds from structural view point.

¹¹ {be-, ɔ-, ɔp-, ni-} corresponds to each other. As TB language, Boro does not have such type of prefixes.

¹² The derivational suffix {-ari} is used in both the languages; it means man.

¹³ The above cited words are extracted from charms of **Kherai** worship, Boro folk songs and proverbial sayings.

Effect of Very Fast Transient over voltages at high frequency in a Gas Insulated Substation during switching operations

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Abstract- Due to the opening or closing of circuit breakers and disconnect switches in Gas Insulated Substations (GIS), especially in the pumped storage power stations, Very Fast Transient Over-voltages (VFTO) are generated. This paper describes the 500 kV and 750 kV GIS. The variations of VFTO magnitudes at different points in 500 kV and 750 kV GIS during different switching operations have been calculated and compared by using Mat lab/Simulink. In this paper the effective factors on the level of VFTO is investigated and the beneficial approaches for the industry to finding the optimum approaches for VFT mitigation is presented. These factors are included residual charges, resistance, spark resistance and entrance capacitance of transformer.

Index Terms- Gas Insulated Substation; Very Fast Transient Over voltages; residual charges, spark resistance, entrance capacitance, Mat lab/Simulink.

I. INTRODUCTION

The increase in demand for electricity and growing energy density in metropolitan cities have made it necessary to extend the existing high voltage networks right up to the consumers. Stepping down the voltage from transmission to the distribution level at the substation located near the actual consumers not only produces economic advantages, but also ensures reliable power supply. The following are the main reasons for use of gas insulated substation, GIS has small ground space requirements. Gas insulated Substations have easy maintenance (nearly zero Maintenance) Less field erection time & less erection cost. For underground power house of Hydro electric power project where space constraint is a major issue.

This paper describes the 500 kV and 750 kV GIS of the pumped storage power station. The variations of VFTO magnitudes at different points in 500 kV and 750 kV GIS during different switching operations have been calculated and compared by using Matlab/Simulink.

Very Fast Transients (VFT) belong to highest frequency range of transients in power systems. These transients are originated within a gas-insulated substation (GIS) any time there is an instantaneous change in voltage. This generally occurs as the result of the opening or closing of a disconnect switch, but other events, such as the operation of a circuit breaker, the closing of a grounding switch, or the occurrence of a fault, can also cause VFT. These transients have a very short rise time, in

the range of 4 to 100 ns, and are normally followed by oscillations having frequencies in the range of 1 to 50 MHz.

During the operation of the DS, a small capacitor connecting to the breaker will be switched. The velocity of DS contacts is small (generally more than 0.6s), before the completely switching, the arc reignition or prestrike occurs, which is the main cause of VFTO. Figure.1. shows the equivalent circuit of VFTO during switching operation

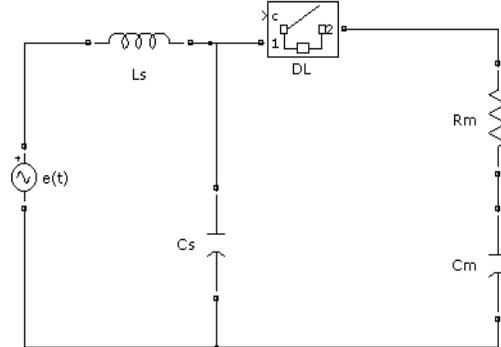


Figure1. The Equivalent Circuit of VFTO during switching operation

L_s is the system equivalent reactance, C_s is the capacitor of system, DL is the circuit breaker, C_m is the bus capacitor and R_m is the leaking resistor of the bus.

During a disconnected operation a number of prestrikes-restrikes occur due to the relatively low speed of the moving contact. During closing as the contacts approach, the electric field between them will rise until sparking occurs. The first strike will almost occur at the crest of the power frequency voltage, due to the slow operating speed. Thereafter current will flow through the spark and charge the capacitive load to the source voltage. As it does, the potential difference across the contacts falls and the spark will extinguish.

II. EQUIVALENT MODELS

The quality of the simulation depends on the quality of the model of each individual GIS component. In order to achieve reasonable results even for longer time periods of some microseconds or for very complex GIS structures highly accurate models for each of the internal equipment and also for components connected to the GIS are necessary. Due to travelling wave nature of VFT, modeling of GIS components

make use of electrical equivalent circuits composed of lumped elements and distributed parameters lines.

A GIS system comprising of an input cable, circuit breakers, Dis-connector Switch, Bus bar, power transformer, surge arrester. To simulate the Very Fast Transient over voltages occur at Disconnect switch in GIS, Matlab is used. The equivalent circuit of GIS is shown in figure 2.

Power transformer with bushing can be modeled by entrance Capacitance where entrance capacitance has been calculated in lightning test. Here the entrance capacitance of power transformer should be kept as a 5000pF. The surge impedance of a transmission Line is 350Ω and travel time is 300m/μs. The GIS Bus Bar can be represented as a lossless π-line for a 50 Hz frequency. The surge impedance is 80 Ω and travel time is 231m/μs [2]. The Cable can be represented as a lossless π- line for a 50 Hz frequency. The surge impedance is 68.8 Ω and travel time is 103.8m/μs. Metal Oxide surge arresters are used to protect medium and high voltage systems and equipment against lightning and switching over-voltages.

The surge impedance of a transmission line can be obtained from the relation

$$Z = 60 \ln \frac{b}{a} \Omega$$

$$C = \frac{2\pi \epsilon_o \epsilon_r}{\ln \frac{b}{a}}$$

Capacitance

$$L = \frac{\mu \ln \frac{b}{a}}{2\pi} \text{ H}$$

Inductance

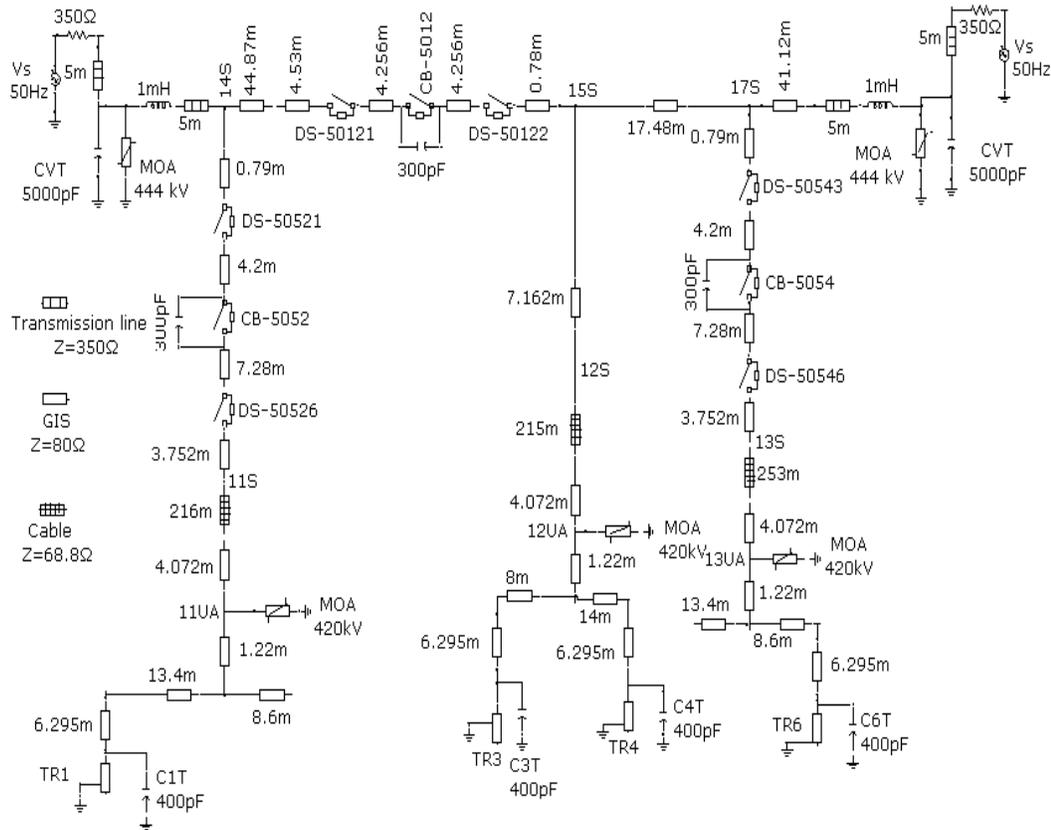


Figure 2. The Equivalent diagram used for simulation

The MO Arrester obeys the equation

$$I = KV^\alpha, \alpha > 1$$

$$\frac{V_i}{V_{ref}} = K_i \left(\frac{I_i}{I_{ref}} \right)^{\frac{1}{\alpha_i}}$$

Where,

I current through arrester

V voltage across arrester

K ceramic constant (depending on arrester type)

α nonlinearity exponent (measure of nonlinearity).

The Characteristics of surge arresters are showed in Table 1 and Table 2

Table1. Characteristics of 444KV surge arrester

Current(A)	Voltage(kV)
0.008	594.0
20.0	674.5
10000	932.0

Table-2 Characteristics of 420 surge arrester

	Voltage(kV)
0.003	20000.0
628.0	1161.0

III. RESULTS & DISCUSSIONS

Against the difference of switch operation mode and their position in GIS sub-station, we take three conditions to calculate Very Fast Transient Over-voltages [VFTO]. Such operation mode has two forms when opened and closed. When open recovery voltage between contacts is much higher and VFTO is higher correspondingly since the other contacts have residual charges. So followed operations are pointed to opened operation of DS.

A. VFTO caused by DS-50543.

When the Disconnect switch-50543 is opened before that the switches DS-50546 and CB-5054 are already opened then the VFTO level at Different points is shown in Table 3&4.

1) For 500 kV GIS

Source voltage is 550 kV.

Table.3: VFTO caused by operating of DS-50543 for 500kV GIS.

Voltage to ground of bus-bar(kV)	V14s	535.1
	V15s	572.4
	V17s	706.3
Voltage to ground of surge arrester (kV)	V11UA	548.5
	V12UA	630.7
	V13UA	0.031
Voltage to ground of Transformer (kV)	VTR1	472.5
	VTR3	476.1
	VTR4	473.2

From data in table 3, we know that when opening of DS-50543 the maximal voltage to ground of bus bar near the switch reaches 1.73p.u.;the maximal voltage to ground of surge arrester reaches 1.54p.u.;the maximal voltage to ground of transformer reaches 1.16p.u.and the corresponding results are as follows.

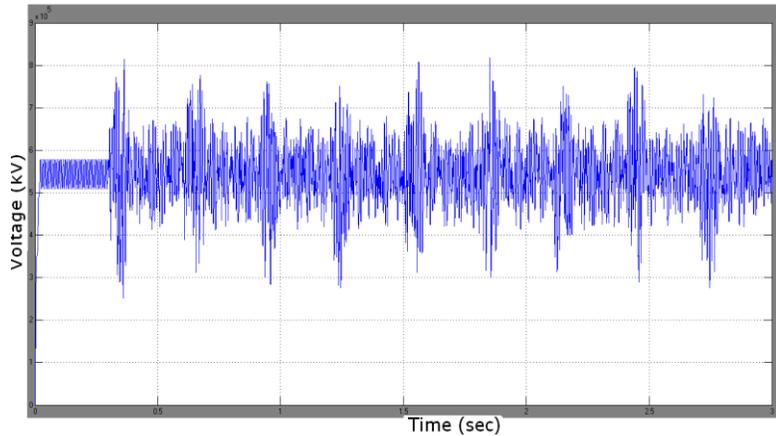


Fig.3. Voltage to ground of bus bar at 14S.when opening of DS-50543 for 500KV GIS

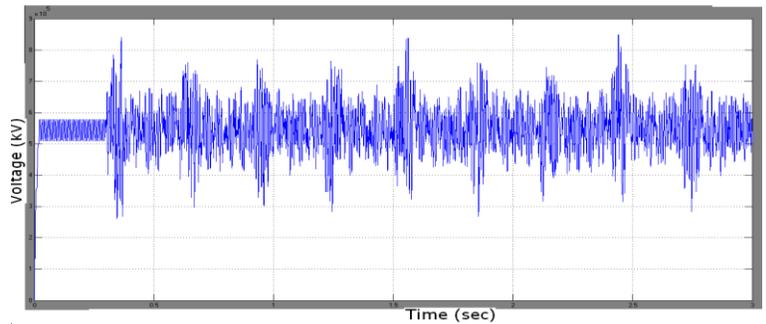


Fig 4. Voltage to ground of bus bar at 17Swhen opening of DS-50543 for 500KV GIS

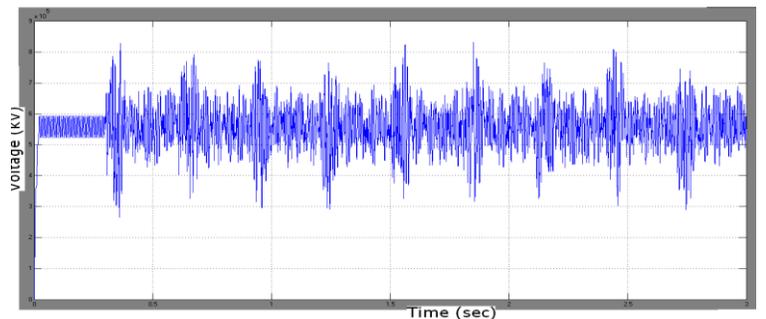


Fig5 Voltage to ground of surge arrester at the end of transformer unit3&4 when opening of DS-50543 for 500KV GIS

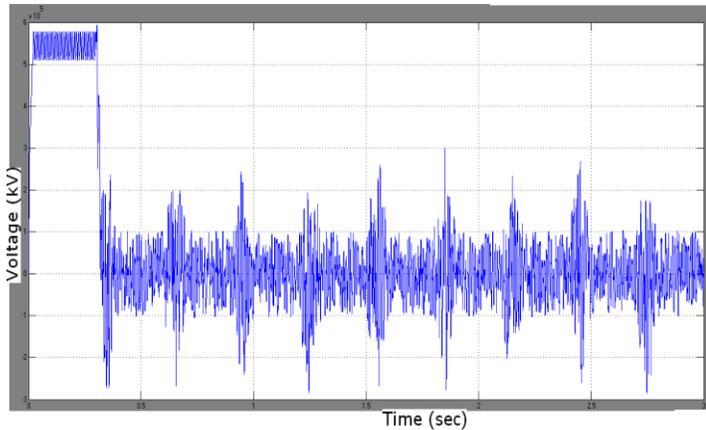


Fig.6. Voltage to ground of surge arrester at the end of transformer unit6 when opening of DS-50543 for 500 KV GIS

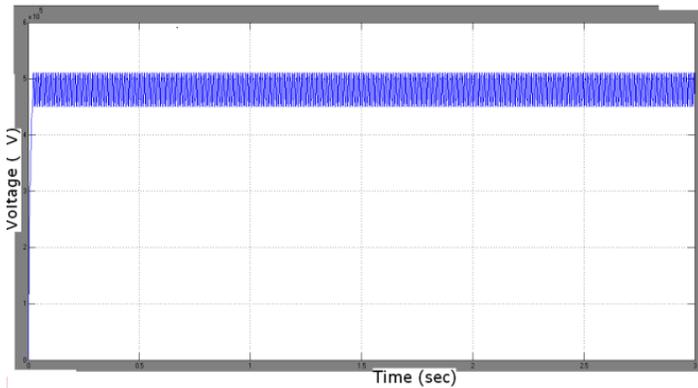


Fig. 7 Voltage to ground of transformer at unit1 when opening of DS-50543 for 500 kV GIS

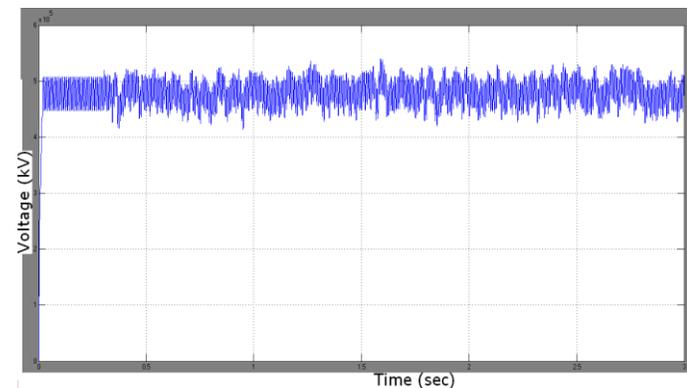


Fig 8 Voltage to ground of transformer at unit 4 when opening of DS-50543 for 500KV GIS

1) For 750 kV GIS
 Source voltage is 750 kV.

**Table-4
 VFTO caused by operating of DS-50543 for 750kV GIS**

Voltage to ground of bus bar (kV)	V14s	729.7
	V15s	780.5
	V17s	963.1
Voltage to ground of surge arrester (kV)	V11UA	748
	V12UA	860.1
	V13UA	0.032
Voltage to ground of Transformer (kV)	VTR1	644.3
	VTR3	649.3
	VTR4	645.2

From data in table 4, we know that when opening of DS-50543 the maximal voltage to ground of bus bar near the switch reaches 1.57p.u.;the maximal voltage to ground of surge arrester reaches 1.40p.u.;the maximal voltage to ground of transformer reaches 1.06p.u.and the corresponding results are as follows.

Fig.9. Voltage to ground of bus bar at 14S. when opening DS-50543 for 750KV GIS

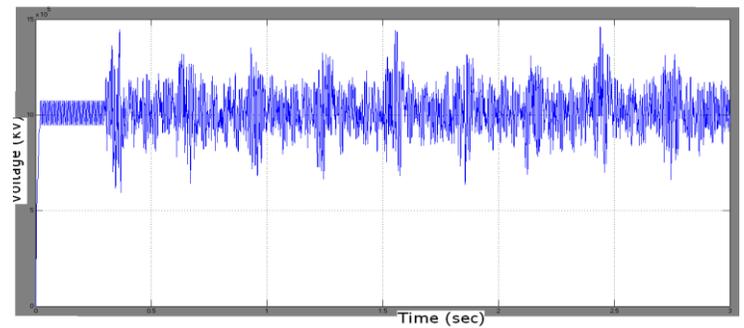


Fig.10. Voltage to ground of bus bar at 17S when opening DS-50543 for 750 KV GIS

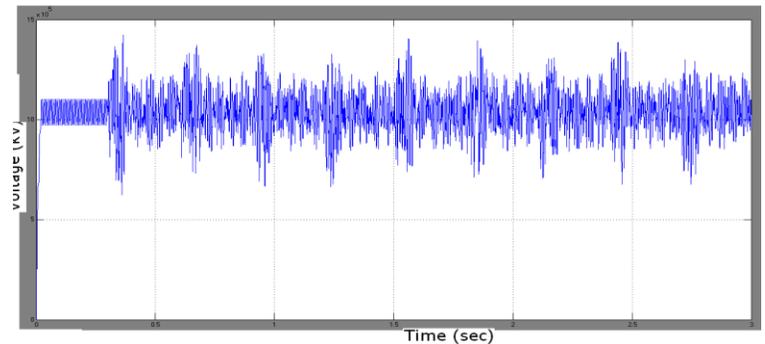


Fig.11 Voltage to ground of surge arrester at the end of transformer unit3&4 when opening DS-50543 for 750 kV GIS.

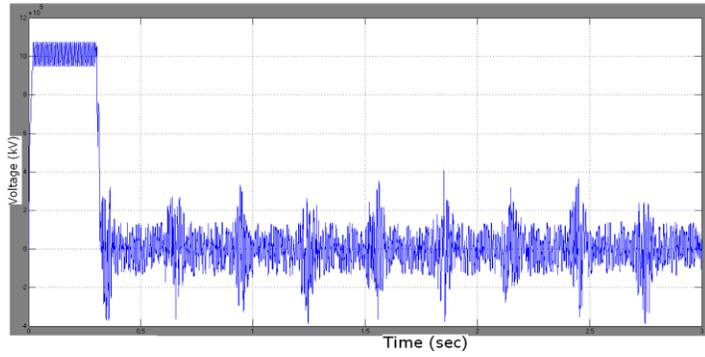


Fig12. Voltage to ground of surge arrester at the end of transformer unit6 when opening DS-50543 for 750 KV GIS

Fig 13Voltage to ground of transformer at unit 3 when opening of DS-50543 for 750 KV GIS

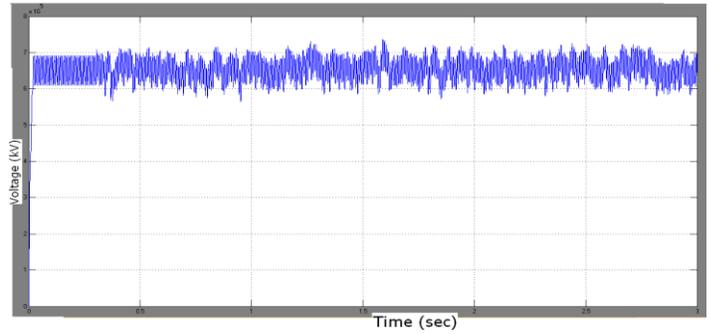


Fig 14Voltage to ground of transformer at unit 4 when opening of DS-50543 for 750 KV GIS

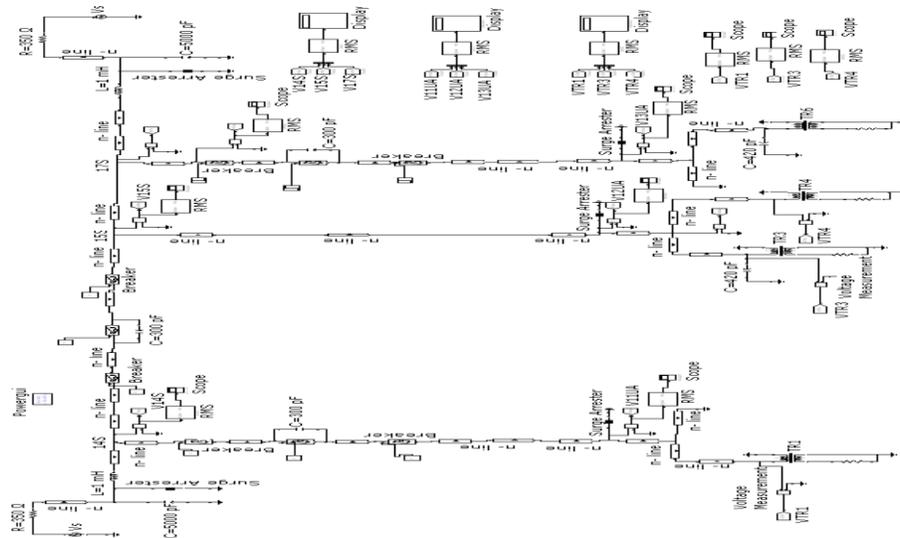
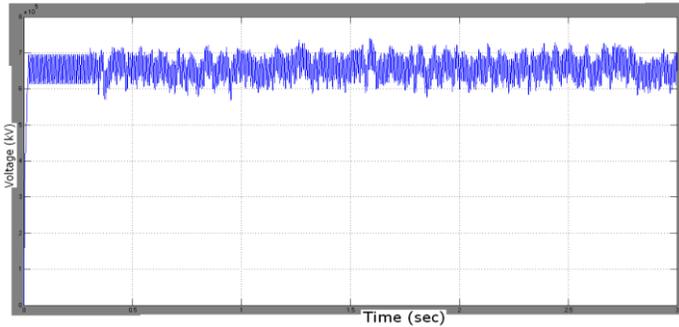


Fig. 15 Equivalent simulink model of GIS when opening of DS-50543

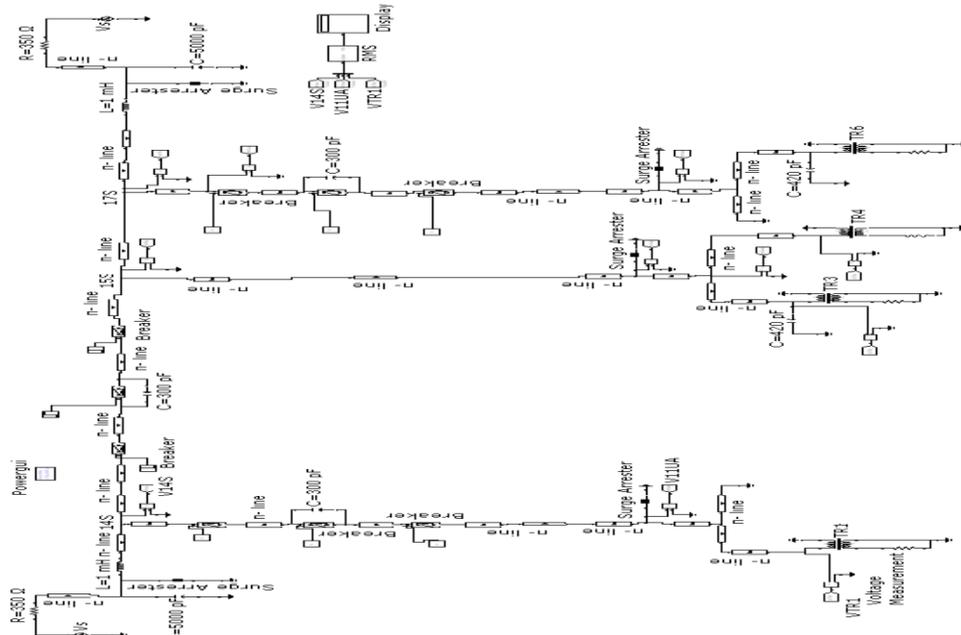


Fig 16

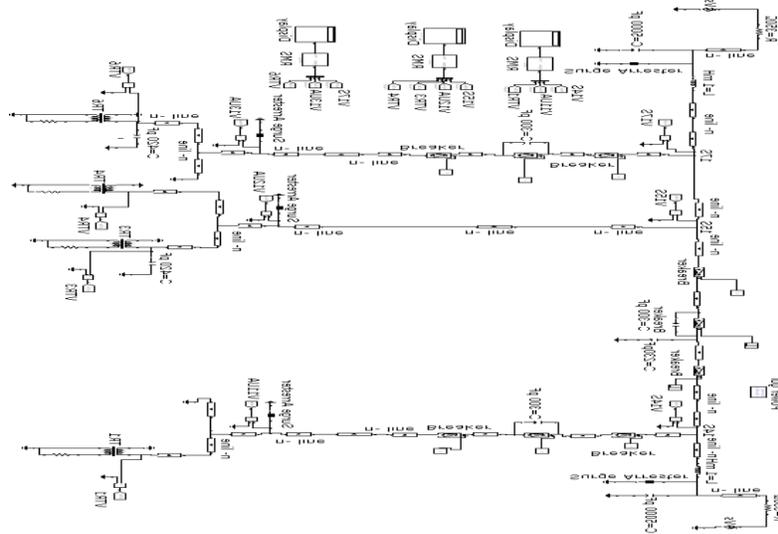


Fig .17 Equivalent simulink model of GIS system when opening of DS-50121 but DS-50122 is closed

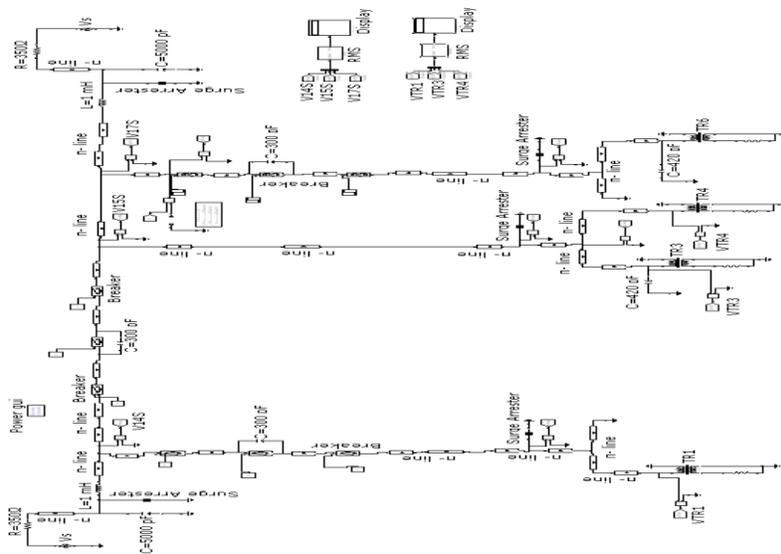


Fig. 18Equivalent simulink model of influence of residual charges on VFTO

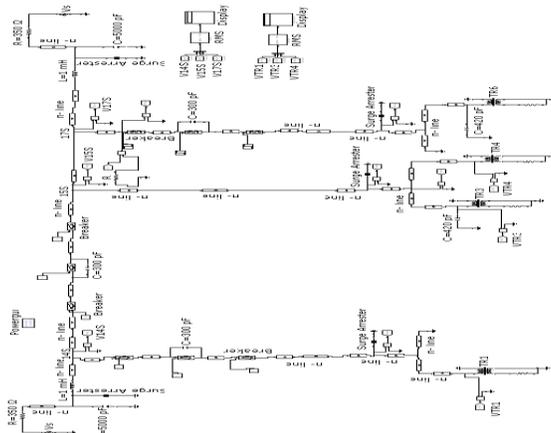


Fig. 19 Equivalent simulink model of influence of resistance on VFTO

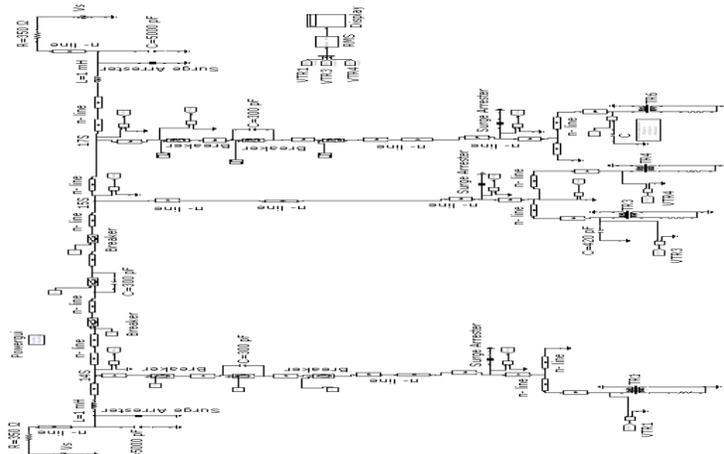


Fig. 20 Equivalent simulink model of influence of entrance capacitance of transformer on VFTO when DS-50543 opened

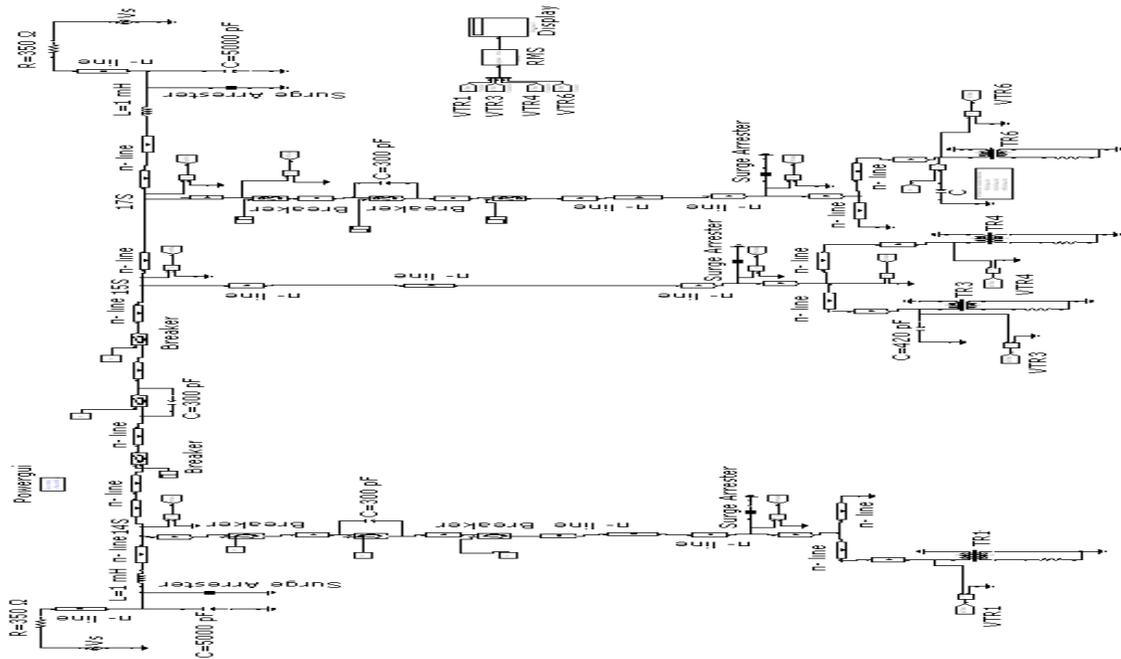


Fig.21 Equivalent simulink model of influence of entrance capacitance of transformer on VFTO when DS-50121 opened

B. VFTO caused by DS-50121 when DS-50122 open

When the Disconnect switch-50121 is opened before that the switches DS-50122 and CB-5012 are already opened then the VFTO level at Different points is shown in Table 5&6.

1) **For 500 kV GIS**

Table-5

VFTO caused by opening of DS-50121 open for 500kV GIS

Voltage to ground of bus bar (kV)	V14s	712.5
Voltage to ground of surge arrester (kV)	V11UA	676
Voltage to ground of transformer(kV)	VTR1	493.9

From data in table 5, we know that when opening of DS-50121 level of over voltages is much higher due to few current shunts circuit. The maximal voltage to ground of bus bar near the switch reaches 1.75p.u.;the maximal voltage to ground of surge arrester reaches 1.65p.u.;the maximal voltage to ground of transformer reaches 1.20p.u

1) **For 750 kV GIS**

Source voltage is 750 kV

Table-6

VFTO caused by opening of DS-50121 open for 750kV GIS

Voltage to ground of bus bar (kV)	V14s	971.5
Voltage to ground of surge arrester (kV)	V11UA	921.9
Voltage to ground of transformer(kV)	VTR1	673.5

VFTO caused by opening of DS-50121 open for 750kV GIS
 From data in table-6, the maximal voltage to ground of bus bar

near the switch reaches 1.58p.u.;the maximal voltage to ground of surge arrester reaches 1.50p.u.;the maximal voltage to ground of transformer reaches 1.09p.u.

C. VFTO caused by DS-50121 when DS-50122 closed

When the Disconnect switch-50121 is opened before that the switches DS-50122 is closed and CB-5012 is already opened then the VFTO level at Different points is shown in Table 7&8.

1) For 500 kV GIS

Source voltage is 550 kV.

From data in table 7, we know that when DS-50122 is still closed VFTO caused by opening DS-50121 will spread all over 500kv GIS

	VTR4	623.3
	VTR6	625.2

From the above tables we can observe that if we increase the supply voltage the transient voltage levels also increased.

IV. EFFECTIVE FACTORS

The level of VFTO is determined by the factors including residual charges, series resistance, spark resistance, entrance capacitance of transformer.

A. Influence of Residual Charges.

When DS opens on line, it may have some charges residual on the line that will influence the level of VFTO. Consider the first condition i.e. when DS-50543 is opened then the residual charges voltages of line side of transformer range from -1.0p.u to 0.5p.u,then the VFTO levels at different points are shown in Table 9,10,11,12

1) For 500 kV

**Table-7
VFTO caused by opening of DS-50121 open when DS-50122 is closed for 500kV GIS**

Voltage to ground of bus bar (kV)	V14s	562.5
	V15s	555.6
	V17s	517.1
Voltage to ground of surge arrester (kV)	V11UA	540.4
	V12UA	552.8
	V13UA	512.1
Voltage to ground of Transformer (kV)	VTR1	470
	VTR3	457.1
	VTR4	457.1
	VTR6	458.4

1) For 750 kV GIS

Source voltage is 750 kV.

From data in table 8, we know that when DS-50122 is still closed VFTO caused by opening DS-50121 will spread all over 750kv GIS.

**Table-8
VFTO caused by opening of DS-50121 open when DS-50122 is closed for 750kV GIS**

Voltage to ground of bus bar (kV)	V14s	767
	V15s	757.7
	V17s	705.2
Voltage to ground of surge arrester (kV)	V11UA	736.9
	V12UA	753.8
	V13UA	698.4
Voltage to ground of Transformer (kV)	VTR1	640.9
	VTR3	623.3

Table-9

Simulation result of residual charges influence on VFTO at bus bars

Residual Charges(p.u.)	Voltage to ground of Bus-bar (kV)		
	V14s	V15s	V17s
-1.0	535.1	572.4	690.6
-0.5	511.5	539.4	632.6
0	488	506.5	568.7
0.5	464.4	473.7	504.7

From data in table-9, we can observe that the residual charges voltage of transformer range -1.0p.u. to 0.5p.u then the voltage to ground of bus bar levels are decreased. The maximal voltage to ground of bus bar at 17s range from 690.6 kV to 504.7 kV. So, the level of VFTO decreases along with the reduction of recovery voltage between contacts. The residual charges has function of suppression of VFTO.

From data in table-10, we can observe that The maximal voltage to ground of transformer at TR4 range from 469.2 kV to 447.9 kV. So, the level of VFTO decreases

Table-10
Simulation result of residual charges influence on VFTO at Transformers

1) For 750kV

Residual Charges(p.u.)	VTR1 [kV]	VTR3 [kV]	VTR4 [kV]
-1.0	472.5	472.2	469.2
-0.5	464.6	464.3	462.1
0	456.6	456.5	455
0.5	448.6	448.7	447.9

Table-11
Simulation result of residual charges influence on VFTO at bus bars

Residual Charges(p.u.)	Voltage to ground of Bus-bar (kV)		
	V14s	V15s	V17s
-1.0	729.7	780.5	949.9
-0.5	697.5	735.5	862.6
0	665.5	690.7	775.5
0.5	633.2	646	688.2

From data in table 11, we can observe that the maximal voltage to ground of bus bar at 17s range from 949.9 kV to 688.2 kV. So, the level of VFTO decreases along with the vary of residual charges. So, the residual charges has function of suppression of VFTO

Table-12
Simulation result of residual charges influence on VFTO at Transformers

Residual Charges(p.u.)	Voltage to ground of Transformer(kV)		
	VTR1	VTR3	VTR4
-1.0	644.3	643.9	639.9
-0.5	633.5	633.2	630.1
0	622.6	622.5	620.5
0.5	611.8	611.8	610.7

The maximal voltage to ground of transformer at TR4 range from 639.9 kV to 610.7 kV. So, the level of VFTO decreases.

B. Influence of Resistance

1) For 500 kV GIS

Table-13
Simulation result of resistance influence on VFTO at bus bars

Resistance(Ω)	Voltage to ground of Bus-bar (MV)		
	V14s	V15s	V17s
100	3127	4373	8486
200	1564	2187	4243
300	1043	1458	2829
500	625.7	875	1698
1000	313.1	437.7	849.1

From table 13, we can observe that if the resistance is changed from 100 Ω to 1000 Ω , then the maximal voltage to ground of bus bar at 17S varied from 8486 MV to 849.1 MV. So, the level of VFTO decreases along with the increasing of resistance.

Table-14
Simulation result of resistance influence on VFTO at Transformers

Resistance(Ω)	Voltage to ground of Transformer (MV)		
	VTR1	VTR3	VTR4
100	1051	1044	951.7
200	525.6	522.4	476.1
300	350.5	348.4	317.5
500	210.5	209.2	190.7
1000	105.5	104.8	95.58

From table 14, we can observe that if the resistance is changed from 100 Ω to 1000 Ω , then the maximal voltage to ground of transformers at TR4 varied from 951.7 MV to 95.58 MV. So, the level of VFTO decreases along with the increasing of resistance.

2) For 750kV

Similarly for 750kV for increasing the series resistance the VFTO levels decreased. The simulation results are shown in the tables 15 &16.

Table-15
Simulation result of resistance influence on VFTO at bus bars

Resistance(Ω)	Voltage to ground of Bus-bar (MV)		
	V14s	V15s	V17s
100	4264	5963	11570
200	2132	2982	5786
300	1422	1988	3858
500	853.3	1193	2315
1000	427	595.9	1158

Table-16
Simulation result of resistance influence on VFTO at Transformers

Resistance(Ω)	Voltage to ground of Transformer (MV)		
	VTR1	VTR3	VTR4
100	1433	1424	1298
200	715.7	712.3	649.2
300	478	475.1	433
500	287.1	285.3	260.1
1000	143.8	143	130.3

C. INFLUENCE OF SPARK RESISTANCE

When restriking transient happens, spark resistance can have effect on damping over voltages. Spark resistance is an exponentially decaying resistance. Table 17, 18, 19 and 20 are the simulation results of the spark resistance influence of VFTO.

1) For 500 kV GIS

Source voltage is 550 kV.

Table-17
Simulation result of spark resistance influence on VFTO at bus bars

Spark Resistance(Ω)	Voltage to ground of Bus-bar (kV)		
	V14s	V15s	V17s
0.1	732.8	783.2	956.3
25	729.7	780.5	950
10	721.3	772.4	931.9
50	689.8	738.8	861.1
100	650	697.1	772.6
200	571.9	613.4	595.5

From data in table 17, we can observe that if the spark resistance is varied from 0.1 to 200 Ω then the maximum voltage to ground of bus bar at 17s varied from 701.3 to 436.7 kV. similarly the maximum voltage to ground of transformer varied from 478.4 to 445.9 kV. So, the VFTO levels decreased along with the increasing the spark resistance.

Table-18
Simulation result of spark resistance influence on VFTO at transformers

Spark Resistance(Ω)	Voltage to ground of Transformer(kV)		
	VTR1	VTR3	VTR4
0.1	472.8	472.7	478.4
25	472.5	472.2	469.3
10	471.4	470.9	468.2
50	466.6	465.5	463.5
100	460.0	458.8	457.6
200	448.6	445.3	445.9

Table-19
Simulation result of spark resistance influence on VFTO at bus bars

Spark Resistance(Ω)	Voltage to ground of Bus-bar (kV)		
	V14s	V15s	V17s
0.1	537.4	574.4	701.3
25	535.1	572.4	696.7
10	528.9	566.4	683.4
50	505.9	541.9	631.5
100	477	511.2	566.6
200	419.4	449.9	436.7

Table-20
Simulation result of spark resistance influence on VFTO at transformers

Spark Resistance(Ω)	VTR1 [kV]	VTR3 [kV]	VTR4 [kV]
0.1	644.7	644.6	652.4
25	644.3	643.9	639.9
10	642.8	642.2	638.4
50	636.3	634.8	632
100	628.1	625.6	624.1
200	611.7	607.2	608.1

D. INFLUENCE OF ENTRANCE CAPACITANCE OF TRANSFORMER

The simulation results transformer entrance capacitance influence of VFTO is shown in tables 21,22,23,24.

1) **When DS-50543 opened**

a) For 500 kV GIS.

Table-21

Simulation result of transformer entrance capacitance influence on VFTO when DS-50543 opened.

Transformer Entrance Capacitance(pF)	Voltage to ground of Transformer(kV)		
	VTR1	VTR3	VTR4
5000	453.3	458.2	456.6
10000	455.8	461.2	458.9
15000	472.4	472.2	469.2
20000	450.9	455.1	454.2
25000	448.4	452	451.9

From data in table-21, we can observe that the entrance capacitance is changed from 5000 to 25000 pF, then the max. voltage to ground of transformer is changed from 456.6 kV to 451.9 kV, So, the VFTO levels decreased along with the increasing the entrance capacitance of transformer.

a) For 750 kV.

Similarly in 750kV, the VFTO levels decreased along with the increasing the entrance capacitance of transformer.

Table-22

Simulation result of transformer entrance capacitance influence on VFTO when DS-50543 opened

Transformer Entrance Capacitance(pF)	Voltage to ground of Transformer(kV)		
	VTR1	VTR3	VTR4
5000	644.2	643.9	639.8
10000	621.5	628.9	625.8
15000	618.2	624.8	622.6
20000	614.8	620.6	619.4
25000	611.5	616.4	616.2

2) When DS-50121 opened(DS-50122 closed)

a) For 500 kV

Table-23

Simulation result of transformer entrance capacitance influence on VFTO when DS-50543 opened

C (pF)	Voltage to ground of Transformer(kV)			
	VTR1	VTR3	VTR4	VTR6
5000	470	457.1	457.1	458.4
10000	458.9	449.7	449.7	451.2
15000	456.6	447	446.9	448.7
20000	454.3	444.2	444	446.3
25000	452	441.4	441.2	443.8

a) For 750 kV

Table-24

Simulation result of transformer entrance capacitance influence on VFTO when DS-50543 opened

C(pF)	Voltage to ground of Transformer(kV)			
	VTR1	VTR3	VTR4	VTR6
5000	640.9	623.3	623.3	625.1
10000	625.8	613.3	613.2	615.3
15000	622.7	609.5	609.4	611.9
20000	619.5	605.7	605.5	608.6
25000	616.3	601.9	601.6	605.2

V. CONCLUSION

The 500 kV and 750 kV Gas Insulated Substation system had been modeled and studied for VFTO's by using Matlab/simulink.

It can be concluded that as the source voltage is increased the VFTO levels also increased and also conclude that the factors residual charges, Spark resistance, resistance and the entrance capacitance have functions of Suppression of VFTO.

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The Journal of Information Literacy: A Bibliometric Study

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Abstract- This paper analyses publication and citation patterns in the Journal of Information Literacy (JIL) an open access journal from 2007-2012. The results show that the number of research articles 68 (51.9%) is highest among other types of publications such as book reviews 36 (27.49), conference papers 27 (20.61%), etc. A majority of contributions 94 (71.75%) emanating from UK and other countries have very meager contribution. Almost all the papers 124 (94.65%) are from academic institutions and a very few papers 7 (5.35) are from non-academic institutions. The citations demonstrated that individual research 90 (68.7%) is much higher than collaborative research. So far as profile of the authors concerned, almost equal number of faculty members and professionals contribute to JIL. The journal maintains all the features in terms of content, structure, citations, credibility of authorship, etc. to be considered as an international journal especially devoted Information Literacy. However, there no information regarding the indexing services which include the journal.

Index Terms- Bibliometrics, Information literacy, Authorship pattern, Citation Analysis.

I. INTRODUCTION

The term Bibliometrics was coined in 1969 by Alan Pritchard who defined it as, “the application of mathematics and statistical methods to books and other media of communication” (Pritchard, 1969). Earlier to this, the term was recognized as *statistical bibliography*. Bibliometrics has been an established area of information research which studies bibliographic attributes of publications especially scientific research. One important aspects of increasing interest in bibliometrics is to evaluate research performance and research trends of individuals and institutions. Ashoor and Chaudhry (as cited in Okafor, 2008) emphasised that bibliometric studies are useful for ascertaining indicators of scientific productivity trends and emphasis among [researchers](#) in different subject fields. For about half a century now single journal bibliometric studies have been carried out worldwide (Biswas, Roy & Sen, 2007). In this kind of study, data is gathered from a single primary, secondary or tertiary journal covering a particular period and analysed from various angles to find out year-wise distribution of articles, authorship pattern, citation pattern, length of articles, institution-wise distribution of articles, and subject-wise break-up of articles and many other bibliographic attributes.

Information Literacy was first introduced by Paul Zurkowski in the year 1974. The National Forum on Information Literacy defines the phrase ‘Information Literacy’ as, “the ability

to know when there is a need for information, and to be able to identify, locate, evaluate and effectively use that information for the issue or problem at hand.” (Ferguson, 2005). Over the years, the dimensions of the term have extended to five primary components: Basic Literacy, Media Literacy, Technology Literacy, and Visual Literacy.

The *Journal of Information Literacy* (JIL) is an international, peer-reviewed journal, published by Chartered Institute of Library and Information Professionals (CILIP) Information Literacy Group, United Kingdom since 2007 (<http://ojs.lboro.ac.uk/ojs/index.php/JIL>). It aims to look into information literacy in all its forms to deal with the interests of various Information Literacy (IL) communities of practice. To this end it publishes articles, book reviews, research studies, conference papers, etc. both from established and new authors in this field all around the world.

II. REVIEW OF LITERATURE

In order to trace the findings of various journal bibliometric studies and to present an analytical view point, the paper included a review of few research papers pertaining to this subject. Tiew, Abdullah and Kaur (2002) explored the *Malaysian Journal of Library & Information Science* for a five year period from 1996 to 2000. In this study, the authors came up with the findings that, the average number of references per article was 22.5 and the average length was 41.2 pages which were purely tentative. The most popular subject was scientific and professional publishing. Most of the contributions were from Malaysian academics and single-authored articles were found from the governing places. The same journal was also studied by Bakri and Willet (2008), covering the period from 2001 to 2006. Here the authors compared the results with the previous study and found that, the number of publications was increased statistically and the significant changes occurred in types of articles, number of references per article and length of the articles. The study also revealed that, the two-authored articles were greater in number and the major contribution was from Malaysian authors.

Warraich and Mahmood (2011) studied the *Pakistan Journal of Library and Information Science* for a six year period from 1995 to 2011. In this study, the authors came up with the findings that most of the authors i.e. 72 (85.71%) contributed only one paper and maximum papers, 54 (48.65%), were from the University of the Punjab, Lahore. Majority of the papers were research papers and 70 percent were written in English language. The study also revealed that, almost 60% of papers’ length ranges 6-20 pages and average length of papers was 8.84 pages.

Lipetz (1999) studied the *Aspects of JASIS Authorship* by examining the volume of five decades from 1955 to 1995. His findings revealed that, the number of scholarly papers published per year in JASIS has grown-up from 21 to 68. The authorship pattern has also grown from 34 to 130 with a doubling time of about 20 years which is similar to the growth pattern of JASIS papers. Authors were collaborated in the formation of new papers and international authors have significantly increased their productivity. Academic affiliation also increased from less than 25% in 1955 to 90% in 1995. From 1955 to 1965, the average number of citations per paper dropped from 8.3 to 7.0; but the ratio increased rapidly thereafter to 30.5 in 1995.

The literature of *D-Lib Magazine* was studied by Park (2010) which covered a period of thirteen years and the data were collected by examining issues from July 1995 to May/June 2008. The findings proved that, two and more author's contribution was highest with a ratio of 57% and most of the authors had a single contribution. The proportion of the male authors was much higher with a ratio of 74% than female contribution. The study also revealed that, authors from the United States contributed 70% of the articles and the average number of references per article was 15.

Young (2006) explored a bibliometric study on *Library Quarterly (LQ)* covering for a period of 48 years from 1956 to 2004 with 4226 articles. The author found that more than 50 percent of the top thirty contributors had served on the editorial board of LQ and a large majority of authors were either from the University of Chicago (doctoral graduates or faculty or both). The study found a correlation between the most highly cited authors within LQ corpus and these authors' citations on the Web of Science. The study also found that LQ continues to receive contributions from nearly one-half of the world's most cited LIS scientists, which infer that the journal is reputable and impactful. Young mentioned several bibliometric measures that could be used in future assessment of LQ such as journal attraction power (the proportion of articles written by authors outside the country), author associativity (collaborative authorship) and consumption index (popularity and citation factors of the journal from both its own and other scholarly journals).

III. OBJECTIVES

This study has been undertaken with the objectives find out:

- i. Year-wise distribution of the papers
- ii. Authorship pattern of the papers
- iii. Average number of references per paper
- iv. Average length of the papers in terms of pages
- v. Geographical distribution of the papers
- vi. Credibility of the authors
- vii. Types of papers

IV. METHODOLOGY

The *JIL* publication data of all the 6 volumes (2007-2012) published so far were downloaded from the journal site <http://ojs.lboro.ac.uk/ojs/index.php/JIL>. In all, there were 131 articles including articles, book reviews, conference papers,

editorials, etc. scanned and data relating to subject, author, author affiliation, geographic distribution, number of references and the number of pages were extracted. Finally, the resulting publication and citation data were loaded into a spreadsheet and SPSS was used for statistical analysis of data.

V. RESULTS AND DISCUSSION

Year-wise Distribution of Papers and Their Lengths

Table 1 depicts the year-wise distribution of papers in the journal. The number of papers published varied from 13 to 26 during the period. The highest number of papers, i.e. 26, was published in 2007 and in 2010 and the lowest number i.e., 13 in 2012. A total of 131 papers were published during the period spread over 12 issues of the journals. On an average, 11 papers were published per issue and 22 per volume. The average length of the articles spotted between 8 and 10 pages with an average of 9 pages per paper.

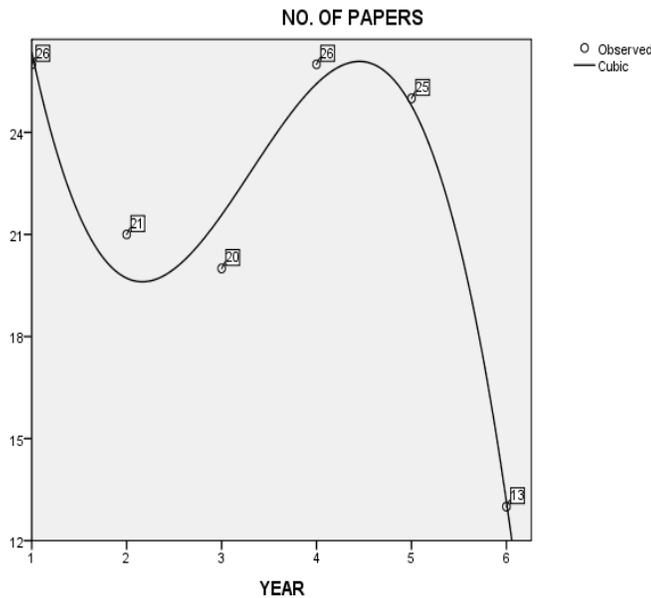
Table 1: Year-wise Distribution of Papers and their Lengths

Year	No. of Papers	Percentage (%)	Length (in pages)	*Average page/article
2007	26	19.84	187	8
2008	21	16.03	212	10
2009	20	15.26	200	10
2010	26	19.84	214	8
2011	25	19.08	236	9
2012	13	9.92	123	10
Total	131	100	1172	9

*Rounded off to the nearest figure

A regression analysis between years and the number of papers in different years shows that the trend follows a cubic pattern (with $F = 17.545$, significant at 0.05 level of significance) ($p > 0.05$). The cubic curve fitted is represented in Figure below which explains 96.3% of the error variance.

Year-wise distribution of Papers following a Cubic Curve



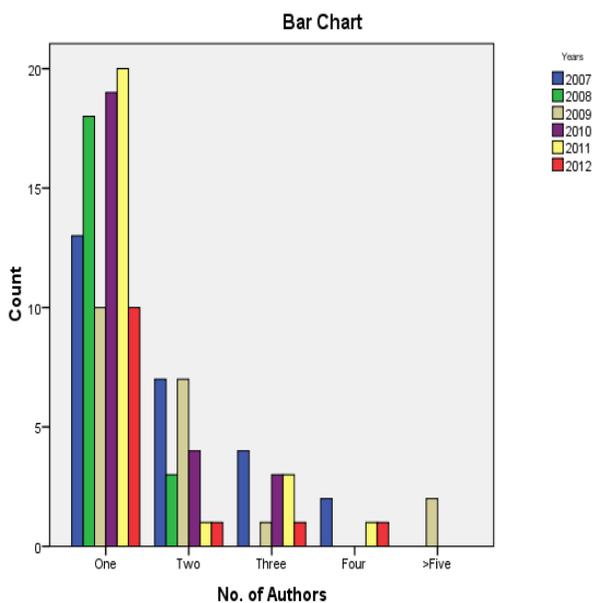
Authorship Pattern

It is seen from Table-2 that the highest number of papers, i.e. 90 (68.7%) are by single authors. Two and three authored contributions count is 23 (17.57%) and 12 (9.16%) respectively. The number of joint contributions by four or more authors is found to be 5 (3.81%). It is evident that, over the years level of collaboration is very low in the case of publications in *JIL*.

Table 2: Authorship Pattern

No. of Author(s)	Contributions in Years						Total Papers	Percentage (%)
	2007	2008	2009	2010	2011	2012		
One	13	18	10	19	20	10	90	68.7
Two	7	3	7	4	1	1	23	17.57
Three	4	0	1	3	3	1	12	9.15
Four	2	0	0	0	1	1	3	3.06
Five	0	0	0	0	0	0	0	0
>Five	0	0	2	0	0	0	2	1.52
Total	26	21	20	26	25	13	131	100

Authorship Pattern



Citation Analysis

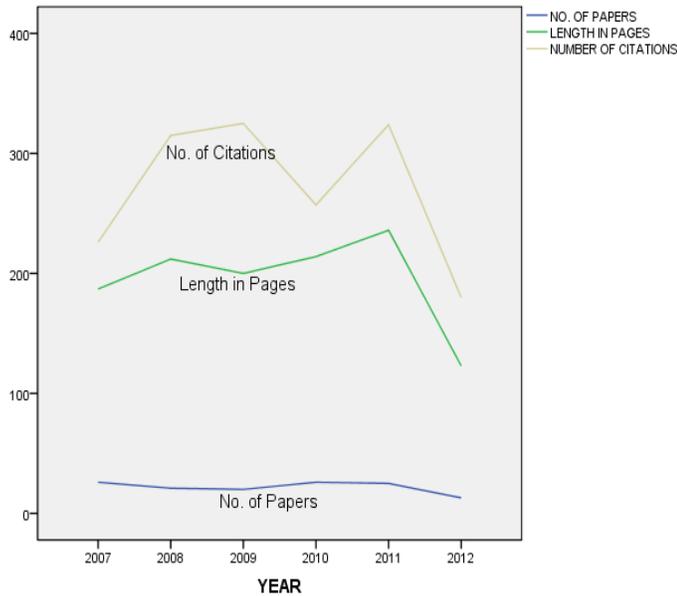
The division of citations for the study period is shown in Table-3. It reveals that a total of 1627 citations are appended to 131 papers. The number of citations per year speckled from a minimum of 180 citations in 2012 to a maximum of 325 citations in 2009. The average number of citations per paper varied from 20 in 2009 to 13 in 2012. On the whole it is 12 per paper.

Table 3: Citation Pattern

Year	No. of Papers	No. of Citations	*Av. No. of Citation/Paper
2007	26	226	9
2008	21	315	15
2009	20	325	16
2010	26	257	10
2011	25	324	13
2012	13	180	13
Total	131	1627	12

*Rounded off to the nearest figure

Distribution of Papers according to No. of Pages, Length of Pages and No. of Papers in Different Years



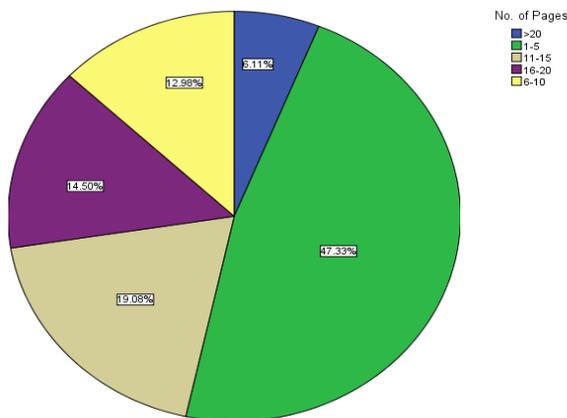
Distribution of Papers According to Pages

So far as the length of the papers are concerned, Table-4 shows that, maximum number of papers 62 (47.32%) are within 1-5 pages followed by 25 (19.08%) papers with 11-15 pages, 19 (14.5%) with 16-20 pages and 17 (12.97%) with 6-10 pages.

Table 4: Distribution of Papers According to Pages

No. of Pages	Contributions in Years						Total Papers	Percentage (%)
	2007	2008	2009	2010	2011	2012		
1-5	12	9	6	13	15	7	62	47.32
6-10	8	1	5	3	0	0	17	12.97
11-15	3	6	6	5	3	2	25	19.08
16-20	3	3	3	5	2	3	19	14.50
>20	0	2	0	0	5	1	8	6.10
Total	26	21	20	26	25	13	131	100

Pie Chart for Distribution of Papers according to Pages



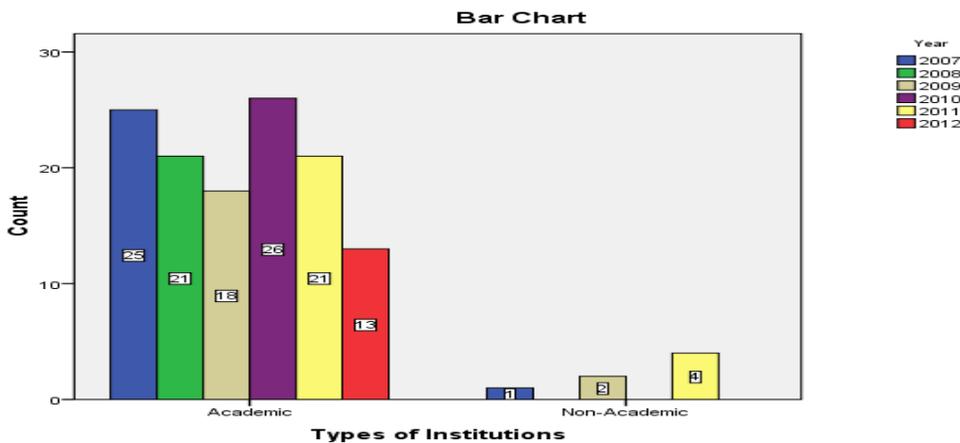
Institution-wise Distribution of Papers

Table-5 shows the papers emanating from different organizations. The highest number of papers totalling 124 (94.65%) has emanated from academic institutions like schools, colleges and universities. Apart from the academic institutions, non-academic institutions/organizations have also accounted for 7 (5.35%) papers.

Table 5: Institutions-wise Distribution of Papers

Types of Institutions	Contributions in Years						Total Papers	Percentage (%)
	2007	2008	2009	2010	2011	2012		
Academic	25	21	18	26	21	13	124	94.65
Non-academic	1	0	2	0	4	0	7	5.35
Total	26	21	20	26	25	13	131	100

Institution-wise Distribution of Papers



Country-wise Distribution of Papers

Table 6 reveals that the papers have emanated from 15 countries. The geographical distribution of papers has been decided on the basis of the affiliation and address of the first author. From the analysis it is observed that the highest numbers

of publications are from U.K. with 94 (71.75%) papers. Next comes U.S.A. with 11 (8.39%) papers followed by Ireland with 8 (6.10%) papers. Canada ranks 3rd in the list with 4 papers (3.05%). It may be noted that the first four countries are responsible for 89.3% of the papers.

Table-6: Country-wise Distribution of Papers

Sl No.	Country Name	Contributions in Years						Total Papers	Percentage (%)
		2007	2008	2009	2010	2011	2012		
1	Australia	0	1	0	0	0	1	2	1.52
2	California	1	0	0	0	0	0	1	0.76
3	Canada	0	2	0	0	2	0	4	3.05
4	Emeritus	0	0	0	0	1	0	1	0.76
5	Fullerton	0	0	0	1	0	0	1	0.76
6	Georgia	0	0	0	1	1	0	2	1.52
7	Ireland	0	1	2	0	5	0	8	6.10
8	Italy	1	0	0	0	0	0	1	0.76
9	Malaysia	0	1	0	0	0	0	1	0.76
10	Netherlands	0	0	0	1	1	0	2	1.52
11	New York	0	1	0	0	0	0	1	0.76
12	Spain	0	1	0	0	0	0	1	0.76
13	Tanzania	0	0	0	1	0	0	1	0.76
14	UK	24	13	16	19	13	9	94	71.75
15	USA	0	1	2	3	2	3	11	8.39
Total		26	21	20	26	25	13	131	100

Table 7: Credibility-wise Distribution of Authors

Credibility-wise Distribution of Authors

Table-7 reveals that the papers published in *JIL* of two broad categories of authors, the faculty members and LIS professionals. Out of 131 papers, 68 (51.91%) are published by LIS professionals and 63 (48.09%) by Faculty members. The year wise productivity of faculty members reveals that the highest number of 13 papers each was published in 2007 and in 2011. Similarly, the LIS professionals have published highest number of 17 papers in the year 2010.

Credibility of Authors	Contributions in Years						Total Papers
	2007	2008	2009	2010	2011	2012	
Faculty Members	13	10	9	9	13	9	63
LIS Professionals	13	11	11	17	12	4	68
Total	26	21	20	26	25	13	131

In order to test the hypothesis, a Chi-square test was conducted to study whether credibility of authors is dependent on

their contributions in different years. The Pearson Chi-square value 4.488 with 5 degrees of freedom is found to be insignificant at 0.05 level of significance ($p > 0.05$). Therefore, we may conclude that the attributes credibility of authors is independent of the contributions in year. The measure of association is found to be 0.182 which quite low.

Distribution of papers by their types

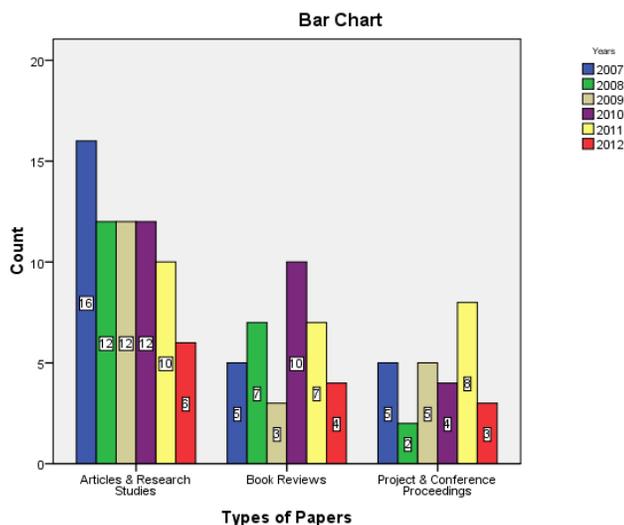
The *Journal of Information Literacy* includes 3 types of articles as depicted in the Table-8. Articles and Research Studies constitute highest number of papers i.e. 68 followed by Book Reviews (36) and Projects with Conference proceeding (27).

Table 8: Distribution of papers by their types

Types of Paper	Contributions in Years						Total Papers
	2007	2008	2009	2010	2011	2012	
Articles & Research Studies	16	12	12	12	10	6	68
Book Reviews	5	7	3	10	7	4	36
Projects & Conference Proceeding	5	2	5	4	8	3	27
Total	26	21	20	26	25	13	131

A Chi-square test was conducted to study the association between types of paper and the contribution in different years. The Pearson Chi-square value 8.413 with 10 degrees of freedom is found to be insignificant at 0.05 level of significance ($p > 0.05$) value and as such the attributes types of papers are independent of the contributions in year. The measure of association is found to be 0.246 which is pretty low.

Distribution of Papers by their Type



VI. GENERAL FEATURES OF THE PAPERS

The special features of the papers on Information Literacy are as follows:

- i. Almost all the papers in *JIL* include an abstract and keywords in English.
- ii. The contributor's bio data with address and affiliation are also given.
- iii. All the papers include references that follow a standard pattern.
- iv. Each issue of the journal includes reviews of books.
- v. In few cases, the details like month and year of receipt of the article are also provided.

VII. SUMMARY

The findings of the study could be summarised as follows:

- i. The number of papers in the journal is not consistent and varies from volume to volume.
- ii. Single-author papers are dominant 90 (68.70%), followed collaborative works by two-author 23 (17.55%) and three-author 12 (9.16%) papers.
- iii. The average number of 12 citations per article indicates that the authors review a considerable amount of literature before writing a paper, which is a healthy sign for good research.
- iv. The papers have an average length of 9 pages, which more or less conform to the international practice.
- v. United Kingdom, where from the journal originates accounts for the highest number of papers.
- vi. The journal publishes articles only in English.
- vii. Most of the papers have emanated from academic institutions.
- viii. Almost all papers included a brief abstract and keywords.

VIII. CONCLUSION

The findings of the study conform that the *JIL* is an international Open Access journal in its true sense as the papers are contributed by authors across the world and peer reviewed publications. In order to be an international journal in the areas of Information Literacy in its true sense, the journal should incorporate contributions from across the globe inspite of focussing only the UK based research. The acceptance rate of 44% shows a very strict reviewing process so that the quality could be assured. The journal should be included with the indexing services in order to enhance its visibility, usability and impact.

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An Interactive Infrared Sensor Based Multi-Touch Panel

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Abstract: This paper contextualizes an idea of implementing an Interactive touch sensitive user interface. It is an optical touch sensing technique and architecture that allows precision sensing of hands, fingers, and other objects within a constrained 2-dimensional plane. This paper gives the details of the touch panel - a hardware and software based architecture for multi-touch sensing. This is a flat-panel optical multi-touch scheme using a linear array of modulated light receivers which surround the periphery of a display to detect touch. It is a point-to-point visual hull sensing technology, meaning it uses much of modulated infrared sensors and many IR LEDs^[4] (940nm) to create a series of invisible light beams that cross the screen. When these beams are being interrupted, it means something has touched the screen, and we can visualize interruption of the beams to reconstruct the visual hull of any objects inside the sensor frame. This way the touch interrupt occurred is first transformed into an image with several scan lines and then many such images make a video clip (which contains the information of the touch point/ Blob) which is then interfaced with the Image processing software for the Blob detection^[15] and Mouse cursor control^[17].

Keywords: CCV(Community Core vision), IR(Infrared), FPS (Frames per second), LCD (Liquid crystal display), AVI(Audio video interface), USB(Universal serial interface), ARM(Advanced RISC Machines), TUIO(Tangible user interface), NUI(Natural User Interface).

I. INTRODUCTION AND MOTIVATION

This technology presents an idea that is basically dedicated to the field of Education. In our day to day life, we see that in the field of education, it involves more user interaction for better understanding. In the village areas and in many schools/ colleges, this has been the requirement that the education needs to be more interactive. But simply due to the lack of resources, it is not yet been possible for us to provide such a solution which is affordable at the Village Level. So the touch technologies now come-up to show innovation in the same.

This application provides a visual touch sensitive interface to the Computer operated device by which user without touching the mouse can easily operate it. Just imagine a person moving and zooming images on a screen, not by mouse but by his

fingers. All this is possible after having implemented, the interface explained as above.

The main goals of this project were to do the following improvements:

1. Ease of handling and affordability at village level.
2. Reducing the size of the whole assembly.
3. Power consumption reduction.
4. Reducing the processing delay.
5. Good frame rate.

A. Technical Background

This implementation is an inspiration from the series of technologies presented in the near past. Microsoft introduced Microsoft Surface which uses the Infrared camera to sense the Blob/Touch Points.

Another one was presented by Microsoft which was used in the "Thin-Sight"-A Multi Touch technology^[2], in which the developers have made the touch sense panel using the Infrared Sensors lying all over the surface of the Touch Sensitive Plane to achieve Multi-Touch Feature.

We hereby use the idea and bring a change in the former idea by reducing the number of sensors used by using the sensors only along the periphery of the surface and not covering the whole surface. Many more like Microsoft Pixel Sense and the Touch User Interface made by NUI Group using CCV (Community Core Vision) software.

These inventions and technologies had their efficient contribution towards the recognition of the touch technologies in the modern world.

B. Prior Art

1) Microsoft Surface 1.0

It is a 30 inch (76 cm) 4:3 rear projection display with integrated PC and five near-infrared cameras that can see fingers and objects placed on the display from below. The cameras vision capabilities enable the product to see a near-IR image of what is placed on the screen, the image is then

captured at approximately 60 Frames per second (FPS). The Surface platform processing could recognize fingers, tags, and blobs.

Figure -1 below shows the Microsoft Surface table and its inner configuration.

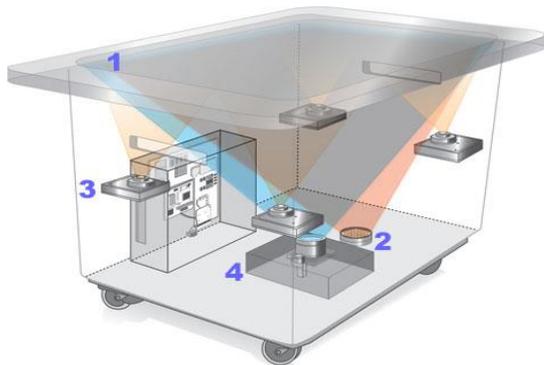


Figure – 1: Schematic of Microsoft's Surface

The parts of the surface table are as follows:

- a) Acrylic tabletop touch surface with a diffuser.
- b) 850nm infrared light source directed at the underside of the touch surface.
- c) Infrared camera.
- d) Texas Instrument's DLP projector.
- e) Desktop computer running a customized version of Microsoft Vista. Source: Microsoft.

2) Community core vision (CCV)

A Project by Natural User Interface (NUI) Group Community Core Vision is an open platform solution for computer vision and machine sensing. It takes an video input stream and outputs tracking data (e.g. coordinates and blob size) and events (e.g. finger down, moved and released) that are used in building multi-touch applications. CCV can interface with cameras and video devices as well as connect to various TUIO enabled applications.

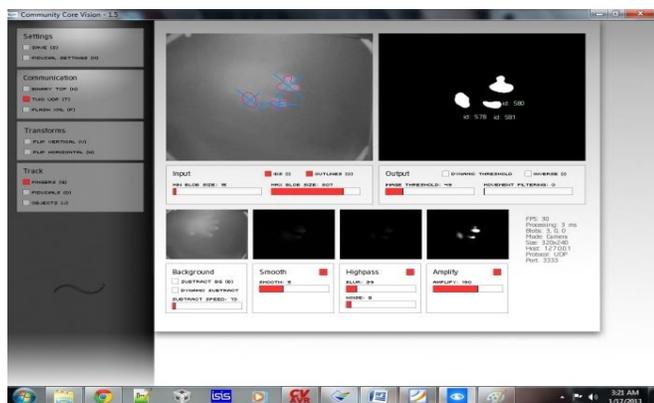


Figure – 2: Screenshot of the CCV Software shows the detection of blob (right) and image seen by infrared camera (left)

3) Thin-Sight

A Multi touch detection approach by Microsoft Research uses the lots of sensors lying on the surface of the touch panel. This sensor matrix is placed just behind any LCD display so as anyone places its finger over the LCD screen the light is reflected back and the position of the touch is then transferred to the image processing software for the optical touch based control. Figure -3 below shows the implementation of the Thin-Sight^[2] (Borrowed from Microsoft Research).

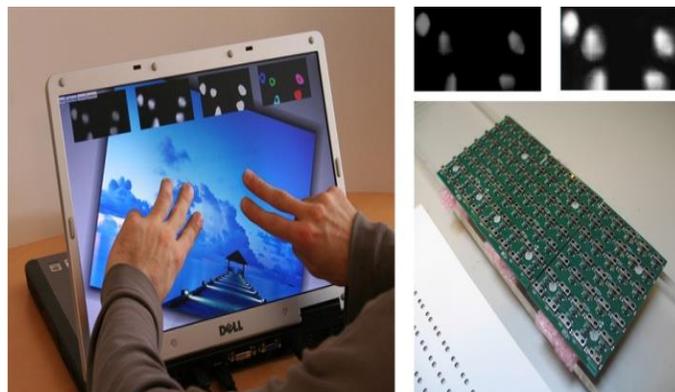


Figure – 3: Thin Sight technology
 (Surface of touch filled completely with the sensors and above it are the detected blob / touch points)

4) Microsoft Pixel-Sense

It allows a display to recognize fingers, objects and hands placed on the screen, enabling vision-based interaction without the use of cameras. The individual pixels in the display see what's touching the screen and that information is immediately processed and interpreted.

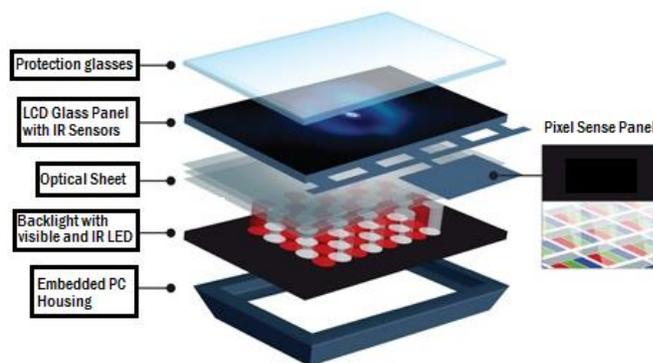


Figure – 4: Microsoft Pixel-Sense

But as it is easy to understand from the details of the implementations above that either Infrared sensors used were in bulk or Cameras were implemented. So we have optimized the design by working over the parameters such as reducing the number of sensors, size of overall hardware, Processing Delay, Frame Rate, Power dissipation, Ease of handling etc.

C.Organization of the report

This paper is organized in the way as explained further. Section- I is the fundamental introduction to the importance of touch technology in relation to our project and the previous work, Section-II describes the problem focused in this project Section II-B gives the detailed timeline of the project implementation. Section II-D describes the hardware implementation and Section II-E on the other hand describes the software implementation. Section III states the problems and tradeoffs. Section IV presents results of the simulation and the testing and presents an analysis on the performance characteristics of the system.

II. PROBLEM STATEMENT

A. Concept

This is a concept of visual interface which deals with the application of the linear array of Infrared sensors [5] along the periphery of a panel which can be made touch sensitive. We need to provide a system which can digital interface to the Stimuli. In the Figure - 5 below, we just attempt to picturize a concept of interactive education.



Figure – 5: Interactive education

In this project we are using an algorithm to first detect the touch point and its corresponding blob using the sensor data received using a USB Interface and we are creating an image from that data using Image Processing library in C-Language.

Now using these frames we create an AVI video file .This video file is utilized by the image processing software Community Core Vision-CCV (from NUI Group) - An open source solution for computer vision and machine sensing. It takes a video input and outputs tracking data (e.g. coordinates and blob size) and events (e.g. finger down, moved and released) that are used in building multi-touch applications. This way we achieve the touch sense as well as the corresponding mouse movements.

B.Prior Work and Learning

In the previous implementations that were seen in Section I-B reveal that the use of Infrared transceiver pair can be efficiently done in the domain of touch detection. As in Thin-Sight [2] and Microsoft Pixel Sense [21] we saw that infrared sensors were used, but sensors all over below the surface of touch; were quite large in number and may increase in their number further with the increasing need of the resolution. So we in our design

have optimized the touch sense panel and found following improvements.

- 1) First of all we have reduced the number of sensors as we are using sensors only along the periphery of the touch panel. Secondly hence also we reduce the power dissipation/consumption for the whole lot of sensors and transmitters.
- 2) Another important parameter that is the processing delay of the system; is also reduced as the number IC's and driver circuitry as well as data acquisition circuitry required is also considerably reduced due to reduction of sensors.

C.Detailed timeline of the project

1) Preparation of the Sensor panel for Touch

The sensor panel comprises the major part of the Sensing circuitry. These sensors are connected along a line to form the two opposite sides of a rectangle just like that of a Laptop or a computer screen. These sensors are built in the form of modules which contain 8 sensors and an IR LEDs. These LEDs are actuated not all at a time but one by one.

TABLE-1 Infrared LED and Receiver

S. No	Component	Product	Manufacturer
1	Infrared RX	TSOP-1738	Vishay
2	Infrared TX	IR-908	Everlight

2) Sensor data acquisition

The touch detection system works on the principle that finger placed in the touch panel obstruct the path of the IR Rays emitted from the periphery of the panel. Due to this the receivers change in their outputs after the reception of reflected IR Rays. The IR Sensors are basically actuated by the 38 KHz Modulated signal to stand out of the noise. At a time only single IR LED is activated using the combination of D – Flip Flop and Tristate buffer which provides accurate clock and synchronized switching of LEDs.

When the touch event takes place on the panel obstructing the path of the IR LED, some sensors do not receive the IR Rays emitted from the LED due to the obstruction caused as above. So we get a type of image as shown below in Figure – 7. Now after data retrieval is our next concern. Now we are having 96 sensors and 12 IR LEDs.

But for the data retrieval from sensors we don't have sufficient I/O pins in the Stellaris ARM Cortex M3 microcontroller. Hence we are using the Shift Registers (SN74165) to increase the I/O pins.

The data is then collected by the 8-Bit Parallel Input Serial Out (PISO) Shift Register. This serial data coming from each shift register in each sensor module (having 8 IR Sensor and 1 IR LEDs) are padded serially in the bit stream which finally reaches the microcontroller and is received using the SSI (Synchronous Serial interface). Now the data is ready for further processing.

3) USB Based Serial Communication with microcontroller

Moving next, our requirement is then to send the data bytes received from each module to the computer. This is accomplished using the USB Based transfer. This transfer is a serial transfer which is carried out using C language supported by the functions in the (LIBUSB.H) certified by GNU. We are using Bulk Transfer scheme because the data in the form of an image (as in Section III-A-4) has to be sent over USB, which is a Long Burst data for which the Bulk transfer is basically meant for. So it is very useful for us in this step.

4) Implementing C Language for the Image creation using the Sensor Matrix data

The data retrieved in the previous step is now utilized for the Image creation which will give us the pictorial representation of where actually in the 2-D Plane of Touch panel was the touch detected. This is done using the C Programming. The (bmp.h)^[23] is a header file which allows us to create, modify, and write BMP image files.

This image is actually made by creating scan-lines i.e. line between a receiver and transmitter made when the communication between them is successful and these scan-lines are made in the image for each possible Rx-Tx pair in the sensor matrix.

A sample image made during our implementation using dummy data in which every possible Rx-Tx pair is communicating successfully as no touch / obstruction is present is shown below in Figure – 6.

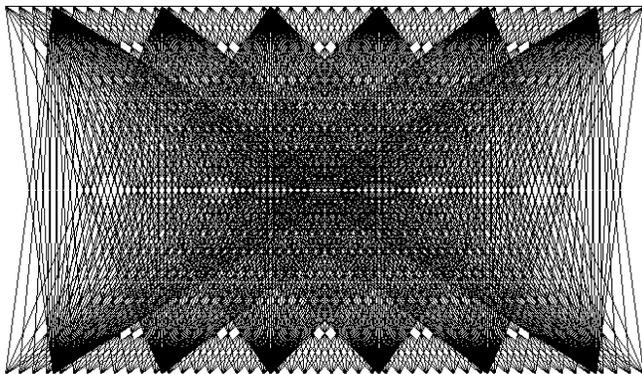


Figure – 6: Scan Lines created when no finger was placed with all LEDs ON

5) Creating AVI(Audio video interleave) Video file from the frames (Images of scan-lines) obtained

We are now ready with the sensor data and frames of images obtained in Section III-A-4. Now we are ready to make a video (AVI Video) by using the frames. Now in case of a Touch sense on the touch panel, for each LED there is generated one image as in Figure- 7 and the required frame is the one obtained by the sensor data (refer Section III-A-4) corresponding to all LEDs actuated because actuation of each LED will create a frame but the final image is that which is obtained after overlapping all the frames obtained corresponding to each LED

lit which will contain a Touch Point visible and all other space is and many such final images are required to make a Video file.

This algorithm is implemented using (bmp.h^[23] and avi.h^[24]) header files and is written for the purpose of converting bmp files to AVI Video . Figure – 7, RED Spot shows the IR LED and the Black semicircles denote the IR Receivers.

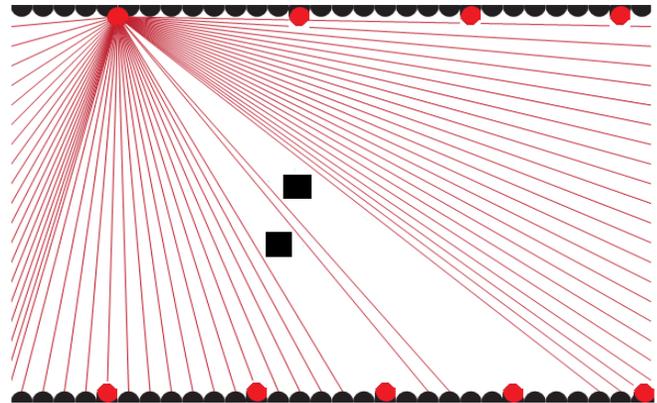


Figure – 7: Finger touch on the panel obstructing the path of IR rays for one IR LED.

6) Creating Video interface with CCV–Community Core Vision

Up to this stage we have a video which now is capable of showing where actually the touch was detected (i.e. Blob) with respect to the Sensor Matrix Frame. This information at this stage is now very useful as these videos are ready to be interfaced and fed to the Image Processing software: CCV–Community Core Vision^[15] - this software takes the video input stream made by the frames of blob detection images as in Section II-C-4 from touch panel and outputs the tracking data which is useful for mouse movements.

So we now have the video being interfaced with the software and now required is a software driver which can synchronize the blob position figured out by CCV^[15] with the mouse movements.

7) TUIO Mouse Driver Implementation^[17]

TUIO is an open framework and platform to support the tangible user interface. The TUIO allows the transmission of meaningful information extracted from the tangible interfaces including touch events and object specifications.

This protocol enciphers the control data from a tracker application (e.g. based on computer vision) and sends it to any client algorithm that deciphers this information.

This combination of TUIO trackers, protocol and client implementations allow the rapid development of tangible multi-touch interfaces. Finally we are now at a stage to successfully run our Touch user interface having mouse moves well synchronized with the Finger movements and gesture.

D. Hardware

1) Overview

The hardware of the project can be broadly classified into two major blocks as stated in the previous sections. One is the Data acquisition circuitry, the other one is the processing and

the third one is the User Interface unit. The Data acquisition block can be further sub-divided into Sensors (for sensing the touch interrupt) and the Shift Registers (for receiving data from sensors). The communication part is handled under USB protocol. The rest part constitutes the User Interface i.e. the multi touch panel which directly interacts with the User.

The following Section III-C-2 will give us a better understanding of the system design.

2) System design and Hardware requisites

The system assembly involves a lot of hardware and their interconnections. The IR LED used in our project is IR-908 High Intensity Diode with 60° radiance angle^[4] because we know that IR rays emitted in the touch panel should cover maximum angle so as to cover as many sensors as possible to make the touch detection more sensitive and accurate hence increasing resolution.

We have seen in the Section III-1-2 that the IR Led requires a modulated signal for the its proper working. Previously we planned to use NE-555 timer for the timing pulse generation but the circuitry could have been more bulky unnecessarily. So it was a better option to use timer of the Microcontroller supplied through a combination of D-Flip Flop^[9] and Buffer^[7] to provide a pulse of required frequency i.e. 38KHz to the IR LEDs as it avoids the problems regarding the voltage fluctuation also and reduces the hardware connection as unlike 555 timer it does not require extra connections to furnish a timing circuitry. This signal is going to be received by TSOP-1738: An IR Sensor which detects signals modulated (with some schemes like RC5, NRZ, Manchester coding) with 38 KHz frequency.

Thus this unique detection technique makes the selection of the Sensors and LED quite profitable and brought us good results in terms of sensitivity.

The processing unit constituted by Stellaris ARM Cortex M3 is a high speed controller that operates at appreciably high speed of 80MHz with 100 DMIPS which is too good for the performance of our system because we have to handle the making of image from the sensor data, and then those images will create video as seen before. Now then after we need to use the video for making synchronism with mouse movements using procedure as in Section II-C-6 and Section II-C-7.

This whole task is enough to provide a sufficient processing delay, thus deteriorating the reliability of the touch detection system. So by considering speed as a factor, Stellaris ARM Cortex M3 was really an intelligent choice. One more point of advantage that it has that there are lots of serial communication channels and many GPIO are also present, so interfacing limitations never came on our way.

3) Schematics

This section shows the two schematics of the sensor module and the IR LED which form the Touch Panel. Figure – 8 shows the Infrared sensor array with 8 Infrared sensors placed in an array and is connected to a Shift register^[8] which takes the 8 bit data from the array of sensors and output them to the microcontroller in the serially padded bits.

Figure – 9 shows the Infrared LED supplied with a 38 KHz signal from microcontroller using the PWM channel through the D Flip Flop^[9] and Tri state bus buffer^[7].

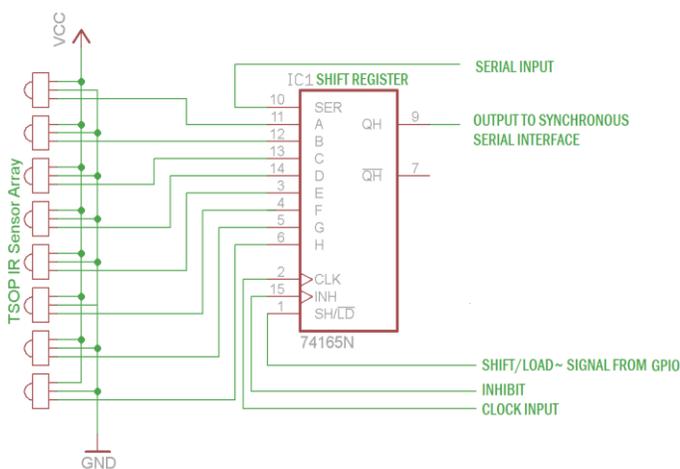


Figure – 8: Infrared sensor array

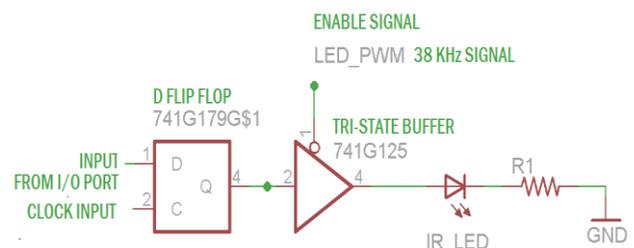


Figure – 9: Infrared Emitter / LED

4) High level design

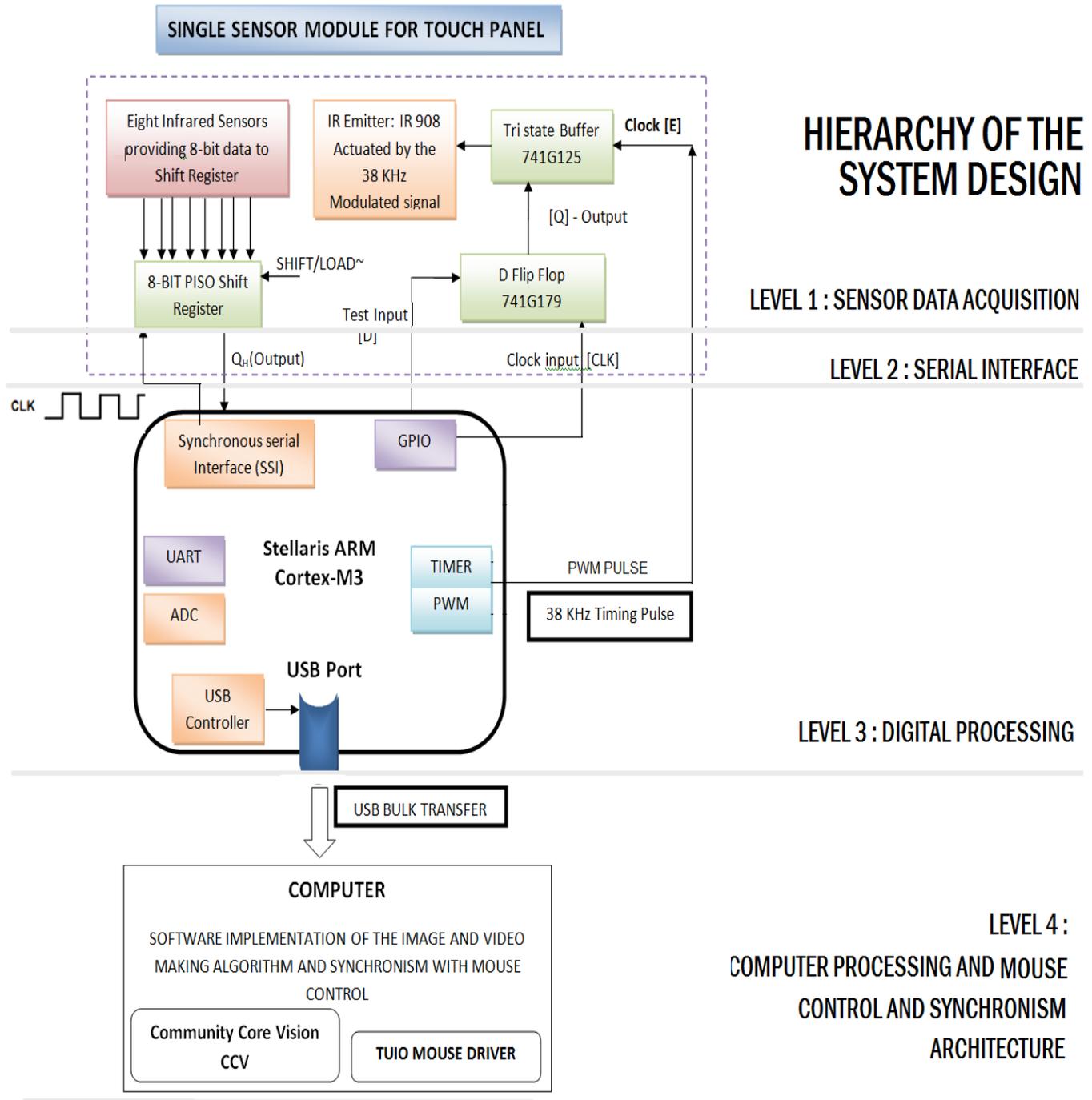


Figure – 10: Top level block diagram

NOTE: The Sensor Module depicted in this diagram is just a single module. Many modules combined altogether in daisy chained architecture constitute Touch Panel (Refer to Figure – 11).

5) Physical arrangement of the Touch panel

a) Touch Panel :

The touch panel shown below in Figure – 11 shows the sensor based touch panel which consists of many Sensor Modules each having one IR LED and 8 – IR Sensor. The 8:1 ratio between receivers and LEDs was chosen as a compromise between

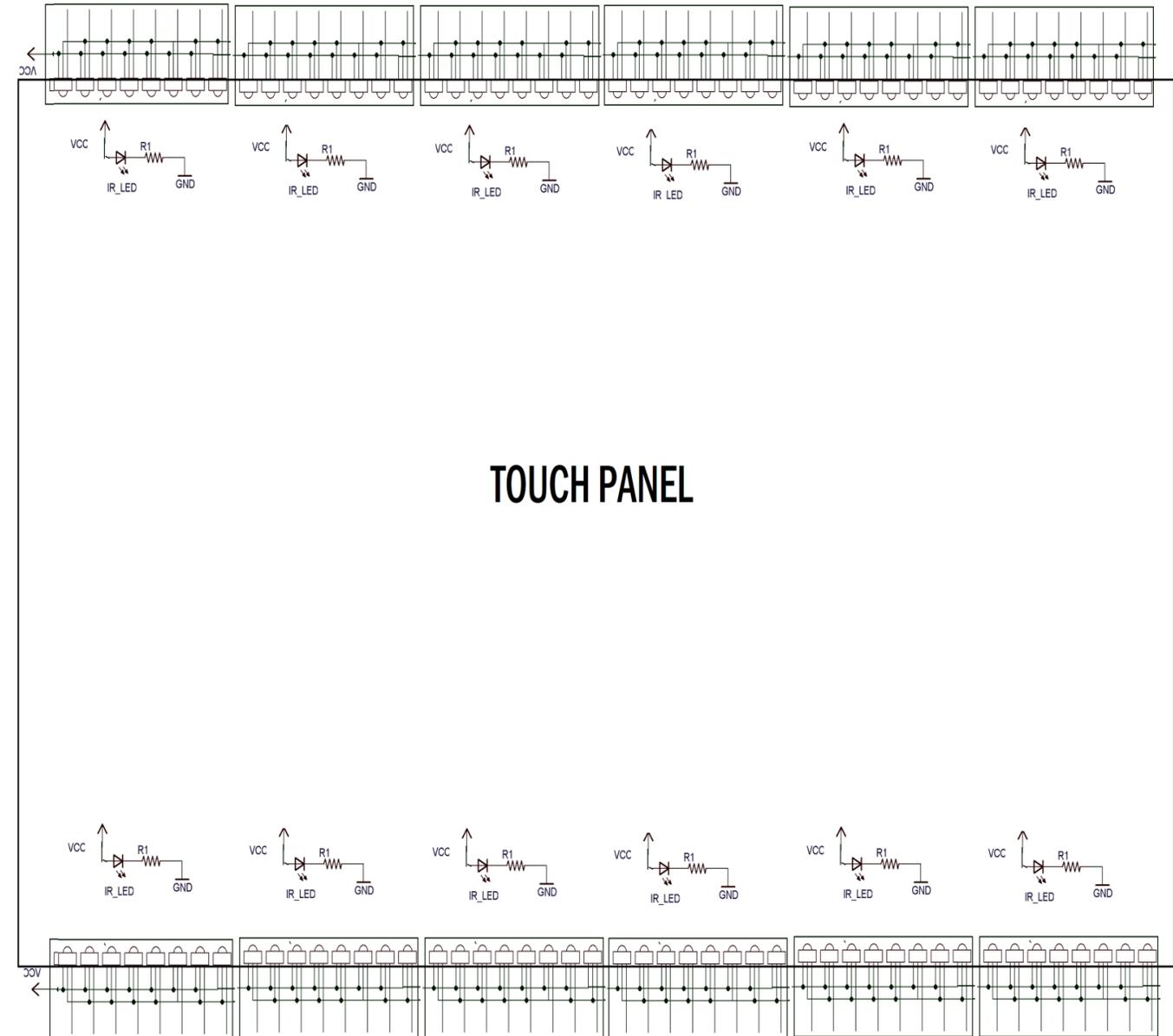


Figure – 11 : Touch Panel

NOTE:

The touch panel shown does not show the details of connections; rather is just helpful in getting an idea of how actually the touch panel looks and the arrangement of sensors/LEDs with respect to the screen.

E. Software

The software foundation and flow of system processing is organized in way as given in the below flow chart Figure -12.

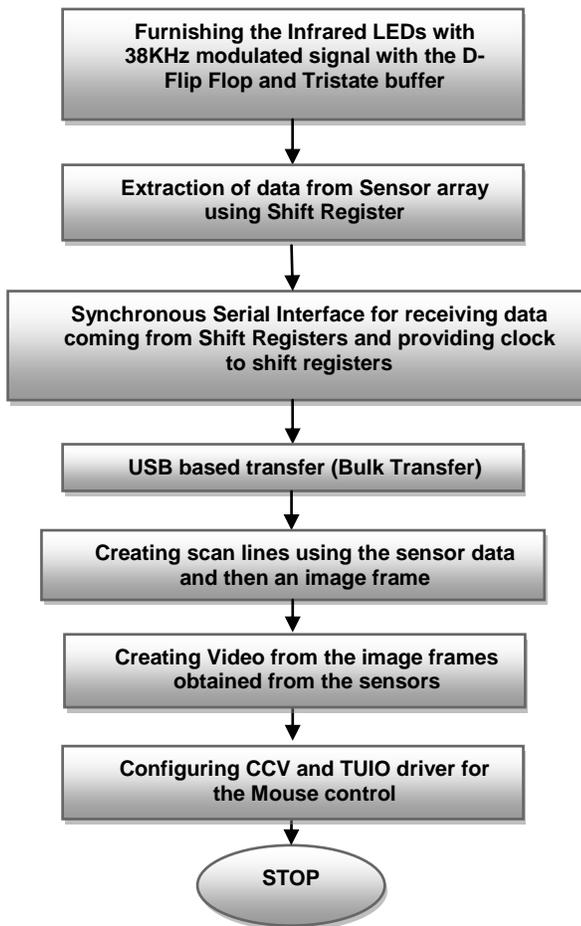


Figure – 12: Flow chart for software implementation

1) Brief steps for the system implementation

- a) Initialization of the memory and the initial status for the IR LED and IR Sensor data.
- b) Initialize the AVI_T – a variable for AVI Output file and also the BMP Structure for the handling the creation of the BMP File.
- c) Initialization of Library “libusb.h” for the USB transfer (refer to Section II-C-3).
- d) Now check if the device that is to be transferred data is connected through the proper Vendor ID and Product ID, if yes then move forward else check again.
- e) Open file (AVI File) for the output.
- f) Set video with width, height, Frames per second (FPS) and compressor length.
- g) Clear the BMP
- h) Call a subroutine to draw scan line on the BMP Frame.
- i) Call a subroutine to convert bmp to AVI frame.
- j) Clear BMP buffer variable.
- k) Check if the maximum limit of the frames to be sent is exceeded. If YES, then END else move to the (Step h).

This way the process repeats.

F. List of the components required

TABLE – II List of the components used

S.No	Component	Manufacturer
1.	SN74LS165A	Texas Instruments
2.	SN74175	Texas Instruments
3.	SN74125	Texas Instruments
4.	UA 7805	Texas Instruments
5.	Stellaris ARM Cortex M3	Texas Instruments

III. Problems and Trade-Offs

A. Common Issues in Optoelectronic Sensing.

Among the wide variety of techniques for optoelectronic touch sensing, most of them suffer from a few common problems which can interfere with a system's success due to the improper working of the ambient light sensitivity is perhaps the most important noise factor in optoelectronic multi-touch systems, followed by active light interference.

B. Clocking of the hardware and bit rate of data acquisition

The clocking of the hardware ICs and other circuitry is point of great concern as well as the bit rate settings because these parameters need to be set properly for the peripheral interfacing. If there is a mismatch or improper clock given to the hardware such as Shift Registers, D- Flip Flop and Buffer, this will prevent the system from doing efficient data acquisition and also will lead to loss of much data due to asynchronous operation.

C. Increasing current load and voltage drop

In this design when the sensor modules were tested independently, there was no problem with the outputs they gave; but when all the sensors were operated simultaneously, they drew such an amount of the current that it was not possible for the sensors to sense and give proper output to be detected. Hence as learning, we understood that a high current drive could be used according to the rating of the sensors for their proper working.

IV. *Results*

So after a detailed analysis and final testing of the project, following test results were appearing:

A. *Performance analysis*

The performance of the touch prototype seemed to be sufficiently good and has a fairly good resolution also but the sensitivity of touch was found slightly weak at the edges of the panel formed by the sensor assembly. The accuracy of the touch actually depended on the angle of dispersion of the IR Rays furnished by the IR emitter. As this angle increases, the part of the screen that is sensible to touch also increases. The Infrared emitters/LEDs in our design use forward current of 20-50mA, so one factor was to look at the powerful voltage and current supply for them.

B. *Functional testing*

During the testing and PCB design, we were aware of the fact that the IR LEDs would require large current. So as for the touch detection we had to switch ON the LEDs, but if all the LEDs were ON simultaneously then a lot of current could have been drawn from the power source, which would let a large power to be dissipated.

Hence we decided in our design to let the LEDs be switched ON one by one. Hence we got rid of the problem.

The performance data was analyzed as follows:

- *Resolution:*

The touch panel gave a good level of sensing for a Laptop sized panel of 15.6 inches.

- *Power:*

The power in this system was found to be optimizable as the clock management feature in the Stellaris ARM Cortex M3 has the ability to switch between the high frequency clock to low frequency clock to offer sleep modes / low power modes.

- *Processing delay:*
This parameter was basically affected by the algorithm implemented and proper serial communication and synchronism. The improvement of this parameter depends on the Clock management and the Bit rate for the serial communication.
- *Frame rate:*
This needs to be set by the user and is generally limited by the capabilities of the processing unit like the rate of the sensor data reading.
- The size of the hardware may vary according to the size of the display

5. Conclusions

A. Summary

The importance of this project is that we have tried to implement an easy to use, portable and cheap multi touch panel. This has special meaning for students who are aloof from an Interactive Education system just due to lack of handsome amount in their pockets. The device is affordable by almost every village level offices and schools. This is going to be profitable because its packaging and assembly doesn't allow unnecessary interference in the normal working of the touch panel. This final project is successful with most of the objectives and goals fulfilled.

We believe that the prototype presented in this paper is an effective proof of concept of a new approach to multi-touch sensing for thin displays. We have shown that how this technique can be integrated with Optical display such as computer/laptop screen. The optical sensing allows potential for rich data to be captured by the display and processed using computer vision techniques^[15]. This allows new type of human computer interface that exploits multi-touch and tangible interaction on displays, making such interaction techniques more practical and deployable in real-world applications.

We have tried to expand the sensing area to cover the entire display, which has been relatively straightforward given the scalable nature of the hardware. In addition to such an incremental improvements we are also exploring new applications and interaction techniques that can truly benefit from multi-touch, multi-user and tangible input. Thus our project can be implemented better using multi-touch interaction for education purposes making such activities more intuitive, engaging, social and fun.

B. Completeness of the project

This project is complete in the sense of application areas where the sensitivity and resolution are not a big issue at all like school education in villages where only the students have to be taught big letters, shapes, pictures and moving or controlling those using fingers. But this project due to its easy structure was not built taking more resolution into consideration as the algorithm implemented to detect touch allows us to detect touch almost finely. So for the purpose of the advanced application like mobile and interactive displays we need to work more on the resolution.

C. Need for the further optimization

We need to work more on the hardware like in our system we found that if the IR sensors that are TSOP 1738^[5] were more small the resolution of the system could have been improved in terms of the touch sensitivity in a better way. We can also try to extend the scope of our software implementation to eliminate the need of the software platform like CCV^[15].

D. Market value of the product

The product needs a good packaging and needs to be slim more. So the product at this level is sufficient in the design point of view and satisfies basic need of a Human computer interaction (HCI) but needs more modeling to hold a good position in the market.

E. Feasibility

The Touch panel is very easy to use and handy because it is nothing but just a flat panel builds around an array of sensor. This just needs to be fit on the front of surface we intend to make touch sensitive like a Computer monitor screen. Low cost of installation and less human interference makes it more user friendly and easy to use. Hence we can expect a good future of such implementation for the domain of Interactive Education which is our main point of concern. One can think that in the bulk production of such modules, the project cost can be further minimized.

Hence it is a profitable, adaptive, affordable and most primarily a feasible solution for the purpose of the Interactive Education as stated in this paper.

F. Future work

1) Sleep modes

These are the modes of the activity to control the power consumption. These include the switching off the main clock and running the system on low frequency clocks in case of the system being left on hold / system is in unused state for a sufficient time.

As soon as the touch interrupt is detected, the clock management automatically gets transferred to the main clock (High frequency clock) and the power is switched on.

2) Three Dimensional Sensing

Future work may investigate 3-D Interaction. By using Infrared modules in non-planar configurations, three dimensional visual-hull sensing is possible. This can be accomplished by stacking multiple planar layers or by using non planar arrangements in any configuration. It has the potential to provide precision for smaller interaction areas.

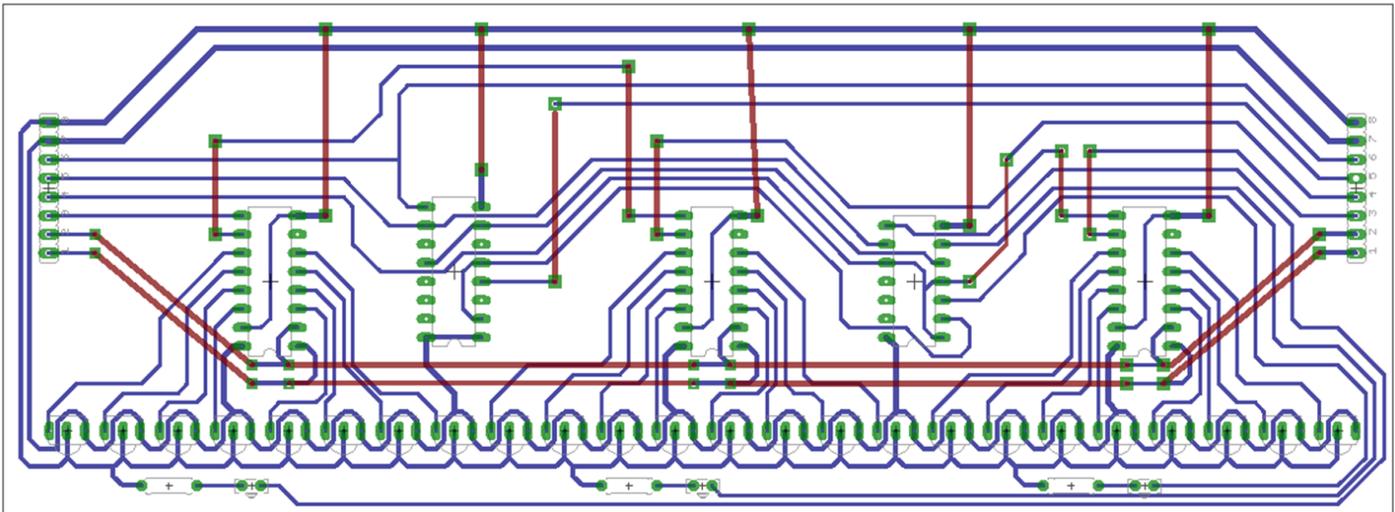


Figure - 73 PCB Design Layout for the Sensor Module

3) Form Factors

Because this touch modules can be arranged into in any number of form factors, possibilities abound. One interesting form factor is using two strips of sensors to create a multi-touch or free-air interaction. There is no need to create a complete polygon of sensors, as the one-to-many relationship between receivers and LEDs enables multi-touch sensing even without enclosing the sides of the sensor.

APPENDIX – A

- *PCB Design for the Sensor Module*

The PCB Designing has been done in CAD Software EAGLE v 6.1.

This board consists of the 3 Sensor Modules assembled together each having 1 Infrared LED at the front of the board and 8 infrared sensors just behind in a linear array. Each 8 sensor assembly is connected to a Shift register [8] and the LED at the front is supplied frequency of 38 KHZ from the timer of Microcontroller and is supplied through a D-Flip Flop [9] and a Tristate Buffer [7].

The blue lines on the below PCB Layout show the copper track to be printed. The Red lines denote the Jumper. The Green pads are the Drillable points like IC Pins, Burg-Strip pins.

S.No.	Component	Manufacturer	Total cost (in Rupee)
1.	SN74LS165A	Texas Instruments	276
2.	SN74175	Texas Instruments	140
3.	SN74125	Texas Instruments	104
4.	UA 7805	Texas Instruments	108
5.	Stellaris ARM Cortex M3	Texas Instruments	750
6.	TSOP 1738	Vishay	1000
	Total cost		INR 2378/-

APPENDIX B – Bill of Materials

List of the components used in our design are as follows:

Table – III Bill of Materials

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Background Papers / Journals:

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[24] AVI Library file – avilib.h:

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Socioeconomic Status of Dengue Patients Receiving Platelet Transfusion: Original Article

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Abstract- Dengue is the most prevalent mosquito borne world wide disease, representing a major social, economic and health burden to many countries. Platelet transfusion is given in those patients who is either bleeding or having haemorrhagic symptoms along with thrombocytopenia. The study was conducted in the Vijayanagar Institute Of Medical Sciences (VIMS), Blood Bank, Bellary between September 2012 to November 2012 for a period of 3 months. A total of 264 patient attenders were interviewed who had come to the blood bank with a requisition for platelet concentrate. By seeing the locality and monthly income, 190(72%) of the individuals belonged to low-socioeconomic group and 74(28%) belonged to high-socioeconomic group. Public health educational campaign targeting hot-spot areas could be a logical approach to minimize the impact of the disease. Judicious use of platelet concentrate is suggested as the disease is more prevalent in low-socioeconomic group.

Index Terms- Platelet transfusion, low socioeconomic group, high socioeconomic group, dengue

I. INTRODUCTION

Dengue is the most prevalent mosquito borne disease world wide, representing a major social, economic and health burden to many countries with limited resources.⁽¹⁾Dengue virus is a flavivirus that affects 50-100 million people annually. Over half of the world's population resides in areas potentially at risk for dengue transmission, making dengue as one of the most important viral disease transmitted by arthropod vectors in terms of mortality and morbidity.⁽²⁾In developing countries like India, Pakistan, Srilanka, Myanmar, preventable disease such as Dengue Fever(DF)/ Dengue Haemorrhagic Fever(DHF) have the potential to cause the greatest mortality rate. The widespread distribution and rising incidence of dengue virus infection is related to a wider distribution of *Aedes Aegypti*.⁽¹⁾ The distribution of dengue and its vectors has expanded dramatically over the last 30 years. There are many factors which contribute in the rise of dengue.⁽³⁾

- **Population Growth:** It is one of the important factor for the increase in dengue. Day to day the population is increasing. The incorporation of land for food production and haphazard deforestation, in combination towards global warming creates the condition for the vector borne diseases like dengue.

- **Unplanned Urbanization:** This factor is vitally important in developing countries like India, due to constant migration from country side to the cities, nearly always accompanied by the lack of water for human consumption, inadequate disposal of liquid and solid wastes leads to the rise in dengue.
- **Air Travel:** Along with internal migration, the marked increase in air travel favours the movement of dengue virus between the endemic areas and the areas free from the disease. Due to people's arrival during the incubation period and subsequent infection of local mosquitos and development of epidemics.
- **Poor sanitary conditions:** The main factor directly or indirectly influencing the magnitude of dengue transmission is the low socio-economic conditions and poor sanitary conditions.

The South-East countries such as India, Thailand, Myanmar are at the highest risk of DF/DHF accounting for nearly half of the global risk. In India, epidemics are becoming more frequent and are straining the limited resources of the public health system. Many dengue cases are self-limiting but bleeding in dengue is one of the most dreaded complications and is associated with higher mortality rate in DFH. Platelet transfusion is given in those patients who is either bleeding or having haemorrhagic symptoms along with thrombocytopenia. There is shortage of blood and blood components in most of the developing world. The resources are inadequate in terms of meeting the ever growing demand of blood components especially platelets. Appropriate use of blood components is required to ensure their availability.⁽²⁾ This study was therefore undertaken to evaluate the socio-economic status of the dengue patients receiving platelet transfusion.

II. MATERIALS AND METHODS

The study was conducted in the Vijayanagar Institute Of Medical Sciences (VIMS) Blood Bank, Bellary between September 2012 to November 2012 for a period of 3 months.

A total of 264 patient attenders were interviewed who had come to the blood bank with a requisition for platelet concentrate. They were interviewed in a local language with a well set of questionnaire as shown in Table-1. People who failed to respond to all the questions or who left before completing the interview were excluded. Socio-economic status was assessed based on the monthly income (>/<Rs.15000) and locality (type of the house, no. of rooms, no. of individuals living in the house,

water stagnation around the house, animal rearing and rented /own house). Both these variables were used in our questionnaire. Every individual was given a total score based on these two variables in order to categorize them into high and low socio-economic groups. Anyone scoring >50% was categorized

as belonging to the high socio-economic group while people scoring <50% were categorized as low socio-economic group. At the end of the interview each respondent was provided a handout with information related to dengue fever.

Table-1 showing the questionnaire for dengue fever

Family background			
Occupation			
Farmer			
Business			
Non govt. Servant			
Government Servant			
Coolie			
Retired			
Unemployed			
Bath room			
Bath room	Y	N	
Stagnant water	Y	N	
Mosquito control			
Mosquito net	Y	N	
Mosquito smoke	Y	N	
Mosquito coil	Y	N	
mosquito bite time			
Morning			
Afternoon			
Evening			
Night			
Animal rearing			
Cowl			
Buffalo			
Ship			
Goat			
Hen			
Are there pigs near your home <input type="checkbox"/>			
Water stagnation around the house.			
Drum			
Barrel			
Pit			
Open syntax tank			
Air cooler			
Tyres			
Coconut bowl			
Gujari wastage			
Bottles			
Garbage			
Whether patient had dengue previously			
If yes, How many months back-			

III. RESULTS

A total of 319 individuals were interviewed in this study. Fifty five (17.24%) had to leave before completion of the

interview. The response rate for the study was 264(82.75%). Data so obtained from these respondents were used for the analysis of the study.

Out of 264 patients who had come for platelet transfusion, 150(56.81%) were males and 114(43.19%) were females. Patients between the age group of 0-10years 93(35.22%) were more followed by 11-20years (30.68%), 21-30 years (21.59%). Majority of the individuals had education upto 10th standard 35.22% and 38.63% of the individuals were working in the non-government sectors as shown in Table-2.

Table-2 showing the basic demographic features:

AGE(years)	0-10 10-20 20-30 30-40 >40 Total	93(35.22%) 81(30.68%) 57(21.59%) 21(7.95%) 12(4.54%) 264(100%)
SEX	MALE FEMALE	150(56.81%) 114(43.19%)
EDUCATION	UPTO 10 th std INTERMEDIATE UNDER-GRADUATE POST-GRADUATE	93(35.22%) 78(29.54%) 78(29.54%) 15(5.68%)
INCOME	<Rs.15,000/month >Rs.15,000/month	214(81 %) 50(19 %)
OCCUPATION	FARMER NON-GOVT. SECTORS GOVERNMENT EMPLOYEE LABOUR RETIRED UNEMPLOYED TOTAL	78(29.54%) 102(38.63%) 39(14.77%) 30(11.36%) 3(1.13%) 15(5.68%) 264(100%)

By seeing the locality and monthly income, 190(72%) of the individuals belonged to low-socioeconomic group and 74(28%) belonged to high-socioeconomic group as shown in Table-3. In the low-socioeconomic group the most important breeding place for mosquitos were reported as drum, gujari wastage and garbage. Air coolers was the most common cause of mosquito breeding in the high-socioeconomic group as shown in Table-3.

Table-3 showing locality

TYPE OF HOUSE	OWN HOUSE RENTED HOUSE HUTS RCC HOUSE TOTAL	36(13.63%) 54(20.45%) 81(30.68%) 93(35.22%) 264(100%)
TYPE OF WATER	BORE WATER CORPORATION WATER FILTER WATER WELL WATER RIVER WATER TOTAL	54(20.27%) 132(50.34%) 22(8.39%) 26(9.79%) 30(11.18%) 264(100%)
WATER STAGNATION AROUND THE HOUSE	DRUM BARREL PIT AIR COOLER TYRES COCUNUT BOWL GUJARI WASTAGE BOTTLES GARBAGE	78(12.32%) 78(12.32%) 48(7.58%) 54(8.53%) 36(5.68%) 57(9.01%) 87(13.74%) 69(10.90%) 69(10.90%)
ANIMAL REARING	COWS BUFFALO SHEEP GOAT HEN NONE	54(15.38%) 81(23.07%) 57(16.23%) 36(10.25%) 36(10.25%) 87(24.78%)

With regards to the knowledge of the preventive practices, 100% of the high-socioeconomic group and 30% of the low-socioeconomic group were aware of mosquito control. When these individuals were questioned about the mosquito bite time, the high-socioeconomic group (81.5%) voted morning whereas low-socioeconomic group (99%) voted through out the day. Previous dengue attack was seen in 12(4.5%) off the patients as shown in Table-4.

Table-4 showing knowledge of dengue preventive measures

MOSQUITO CONTROL	Mosquito Net	78(30.58%)
	Mosquito Smoke	84(31.81%)
	Mosquito Coil	93(35.22%)
	Total	255(100%)
MOSQUITO BITE TIME	Morning	89(33.71%)
	Afternoon	71(26.89%)
	Evening	52(19.69%)
	Night	52(19.69%)
	Total	264(100%)
PREVIOUS DENGUE ATTACK	-	12(4.5 %)

IV. Discussion

Dengue Infection is primarily a mosquito-borne disease found in urban and semi-urban settings. This is a major public health problem in India which is endemic in this area. Seasonal distribution has also been reported with the *Aedes aegypti* population density and DF/DHF incidence being associated with elevated temperature and rainfall in certain regions. In Bellary, epidemics are becoming more frequent and are straining the limited resources of the public health system. Many dengue cases are self-limiting but complications such as haemorrhage and shock can be life threatening. Investigation of sociodemographic, environmental perspectives can provide foresight into the appropriateness of dengue control efforts, and gives answers to unexpected vector control responses and contribute to effective management solutions in an ever changing environment.⁽⁴⁾ Few studies have estimated the economic impact and disease burden of dengue at the national level. In the last two decades, several studies have investigated the risk factors for DF/DHF in an affected communities including those with poor living conditions, social inequalities and illiteracy.⁽⁵⁾ In some cases, a useful set of socio-economic and environmental factors made a central component of analysis of temporal and spatial relationship of dengue incidence.

Among the 264 patients who needed platelet transfusion, 93(35.22%) patients were in the age group of 0-10 years. This is similar to other studies from Indonesia, Thailand and Myanmar.⁽⁶⁾ As per other workers most patients were in the age group of 5-9 years and recorded 60-180 infections/1000 children from 2001 to 2003. In contrast with observations from Asian countries where DHF is limited almost entirely to young children, in the America older age groups are widely involved having reached a peak of 432.7/1,00,000 individuals in the 30-49 year age group in 2002.⁽⁷⁾ In the present study 150(57%) were

males and 114(43%) were females this was similar to the work of Ahmed Itrat et al.⁽²⁾ In this study majority of them were illiterates(education less than 10th standard) with 35.22% and 53.4% of the patients were from rural areas. Majority of the people had heard about dengue, but a good proportion had deficiency in their knowledge about the disease. But study done in Pakistan reported 38.5% of the sample to possess sufficient knowledge of dengue. However, it should be kept in mind that the previous study used slightly different knowledge variables.

Human migration allows multiple exposure to *aedes aegypti* bites among migratory people; in other words, mobile persons have a greater chance of coming into close contact with various bites at multiple locations, especially in public spaces. In the present study we did not come across about this.

The incidence of dengue infection was increased in low socioeconomic group. In such group the *aedes larval* breeding sites in the domestic and peridomestic environment could increase due to poor hygiene and failure to check for breeding and reluctance to have their premises living in landed properties was also associated with a higher DF/DHF incidence as it has been consistently observed that there are more breeding habitats in these premises. The poor living conditions in the low-socioeconomic areas and slums not only contribute to the spread of the disease but also make it difficult for health services to curtail the vector population effectively in these areas. Large numbers of household members were more at risk for significant exposure to dengue transmission compared to small ones. In addition rented house-holders could be less responsible in cleaning up their premises. Living in landed properties was also associated with a higher DF/DHF incidence as it has been consistently observed that there are more breeding habitats in these premises. This findings was supported by the previous study that people gathering with daily activities in a house created the exposure and frequency of the bites with dengue-virus infected *aedes*.⁽⁸⁾

The present study shows the decrease in the prevalence of dengue infection in high-socioeconomic group which correlates with better knowledge scores. They have factors other than a better education influencing their awareness about the particular subject like internet facilities, TV, newspaper and 100% of high socio-economic group were aware of mosquito control. Previous attack in this study was 12(4.5%).⁽⁹⁾ Insufficient knowledge was found to be more in the group where no person in the family had previously been exposed to dengue. We can thus assume that drift of information occur within a family and that knowledge seeking behaviour also improves in such families. Decreased prevalence of poor knowledge was seen as the income increased.⁽¹⁰⁾

In this study, most of the patients 93(35.22%) were using mosquito coil whereas it was mosquito spray 219(54.91%) in the study by Ahmed Itrat et al. Preventive practises regarding dengue were consistent with their knowledge.⁽²⁾

V. Conclusion

Dengue being a mosquito borne disease, is one of the dreaded disease both in developing countries and developed countries. In this study done at VIMS we found out that

majority of the patients were in paediatric age group. People who were living in low socio-economic conditions (72%) were affected more. Until a safe and effective vaccine is available, the cost-effective integrated control measures such as public health educational campaign targeting hot-spot areas could be a logical approach to minimize the impact of the disease. As the prevalence of dengue is more in low socio-economic group the platelet transfusion practice should be used based on the platelet count, haemorrhagic symptoms. At the same time platelet are scarcely available as the life span of platelet is only 6 days, platelet concentrate are expensive hence a judicious use is suggested. Councelling of the patient is very important in dengue.

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A Study on Orientation of Collagen Fibres in Oral Submucous Fibrosis

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Abstract- Oral submucous fibrosis is a chronic debilitating disease of oral mucosa and is characterized by generalized fibrosis of the oral soft tissues which tends to present itself clinically as palpable vertical fibrous bands. Traditionally, stains such as van- Geison and various forms of trichrome have been used to detect collagen fibres in tissues. Thick and thin collagen fibres play a vital role in maintaining connective tissue integrity. However, both these stains fail to reveal thin collagen fibres. A special stain- picosirius red stain (PSR) that stained both thin and thick collagen fibres was used in this study. Thus, the present study is to demonstrate the orientation and color of collagen fibres in different grades of oral sub mucous fibrosis and normal mucosa and observed under polarized microscope. However, correlation to the grading of OSF will help in determining the changes in the connective tissue which precedes the neoplastic change in epithelium.

I. INTRODUCTION

Oral submucous fibrosis is an insidious chronic disease affecting any part of the oral cavity and sometimes pharynx¹ and a well recognized potentially malignant condition of the oral cavity characterized by inflammation and a progressive fibrosis of the lamina propria and deeper connective tissue². This condition was described first by Schwartz (1952) while examining five Indian women from Kenya, to which he ascribed the descriptive term “atrophia idiopathica mucosae oris”. later in 1953, Joshi from Mumbai redesignated the condition as oral mucous fibrosis, implying predominantly its histological nature.³ Other names for this condition are “diffuse oral sub mucous fibrosis, idiopathic scleroderma of the mouth, idiopathic palatal fibrosis, sclerosing stomatitis, and juxta- epithelial fibrosis.”⁴ The WHO definition for an oral precancerous condition- “a generalized pathological state of the oral mucosa associated with a significantly increased risk of cancer,” accords well with the characteristics of the OSF.³ Epidemiological studies show 7% - 13% of OSF transforming into malignancy. The precancerous nature was first mentioned by paymaster who observed development of squamous cell carcinoma in one –third of his OSF patients.¹ oral submucous fibrosis is preceded by symptoms like burning sensation of the oral mucosa, ulceration and pain. The characteristic feature of oral submucous fibrosis is reduced movement and depapillation of the tongue, blanching and leathery texture of oral mucosa and progressive reduction of mouth opening.⁴

The histopathologic grading based on the criteria, which were modified from the original criteria given by Pindborg and Sirsat as given below:

Grade 1: Early hyalinization of juxtaepithelial area, plump young fibroblasts, dilated or congested blood vessels, and presence of inflammatory cells mostly mononuclear lymphocytes, eosinophils and occasional plasma cells.

Grade 2: Moderately hyalinized collagen, less marked fibroblastic response, presence of mostly fibrocytes, constricted blood vessels and inflammatory exudates consists of mostly lymphocytes and plasma cells with occasional eosinophils.

Grade 3: Complete hyalinization of collagen with depletion of fibroblasts in those areas, blood vessels are completely obliterated or narrowed and inflammatory cells are lymphocytes and plasma cells.⁵

One of the clinical symptoms of OSF is trismus, a limitation of mouth opening, this may eventually impair the ability to eat, speak and dental care may be difficult.

Connective tissue consists for the most part of collagen fibres. Collagen provides connective tissue with a unique combination of flexibility and tensile strength but is not very elastic (Junqueira et al. 1993)⁶. Collagen fibres play a vital role not only in maintaining structural integrity, but also in determining tissue function⁷. Regulation is necessary, not only to control the amount of collagen produced but also to control the fibre architecture. The synthesis of collagen is influenced by a variety of mediators including growth factors, hormones, cytokines and lymphokines. A prominent mediator is the TGF- β which stimulates the production of collagens and other matrix components.⁸

In OSF, connective tissue changes are characterized by a deposition of dense collagen fibres. Even though collagen could be stained by various dyes, picosirius red stain was found to be more superior to other stains. It stained finer collagen fibres more intensely and increased their birefringence spectacularly.⁹ Picosirius red special stain was used because the Sirius red, a strong cationic dye, stains collagen by reaching via its sulfonic acid groups with basic groups present in the collagen molecules. Collagen molecules, being rich in basic amino acids, strongly react with acidic dyes. Sirius red is an elongated dye molecule which reacts with collagen and promotes an enhancement of its normal birefringence due to the fact that many dye molecule are

aligned parallel with the long axis of the each collagen molecule.¹⁰

Further an attempt was made to correlate changes in orientation and color of collagen fibres with OSMF and normal mucosa.⁸

II. MATERIAL AND METHODS

Total study group was comprised of 18 paraffin embedded archival blocks of OSF and 10 paraffin embedded archival blocks of normal mucosa as control group. The age group ranging from 17 to 40 years.

From each of the paraffin embedded tissue block, two sections of 5 µm thickness were prepared. One section were stained with haematoxylin and eosin stain, the other with picrosirius red stain. The picrosirius red stained sections were examined using polarizing microscope and the thickness of collagen fibres and their orientation with respect to the epithelium was assessed.

The thickness of the collagen fibres were examined by using Leica research microscope under polarized light and the orientation and thickness of the fibres was assessed.

The thickness of collagen fibres are measured using a micrometer eye piece.

III. RESULTS

Our study revealed the results as follows: In mild cases of OSF, we examined loosely arranged thin collagen fibres in yellowish orange color. In moderate cases of OSF, we examined both thick and thin collagen fibres, where thin fibres showing, yellowish orange color and thick fibres showing, red colored fibres. In advanced cases of OSF, we observed tightly packed bundles of collagen fibres in red color and most of the fibres were seen parallel to the epithelium. In control group, the orientation of collagen fibres were haphazardly arranged with respect to the epithelium

Evaluation using polarizing microscope

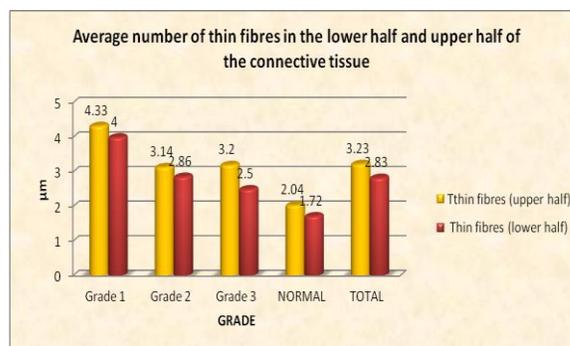
We evaluated polarizing colors of collagen fibres in OSMF and compared with those of control group. In mild case of OSF, the polarizing color of thin collagen fibres is yellowish orange in color. In moderate cases of OSF, the polarizing color of fibres is both red and yellowish orange as this stage contains both thick and thin collagen fibres. In advanced stage of OSMF, it was observed that the polarizing color of thick fibres showed red color. As the disease shows the severity, the color of the collagen fibres gets brighter. The intensity of brightness of collagen viewed with polarized light depends not only on collagen birefringence but also on the orientation of fibres with respect to the polars. However, the tight packing of collagen fibres in severe cases resulted in orange red- red color throughout the sections.

Sl.No	Histopathological grades	Number of cases	Percentages (%)
1	Grade 1 (mild)	12	26.1
2	Grade 2 (moderate)	14	30.4
3	Grade 3 (severe)	10	21.7
4	Normal (control group)	10	21.7
5	TOTAL	46	100.0

Table 1: Total number of OSF cases with respect to the histopathological grading.

Histological grading	Thin fibres (upper half)	Thin fibres (lower half)
	MEAN±SD µm	MEAN±SD µm
Grade 1	4.33±0.65 µm	4.00±0.74 µm
Grade 2	3.14±0.86 µm	2.86±0.77 µm
Grade 3	3.20±0.63 µm	2.50±0.85 µm
NORMAL	2.04±1.55 µm	1.72±1.68 µm
TOTAL	3.23±1.23 µm	2.83±1.30 µm

Table 2: showing average number of thin fibers in the lower half and upper half of the connective tissue



Statistical Analysis: Paired t test. P value =0.006 Significant at 5% level of significance.

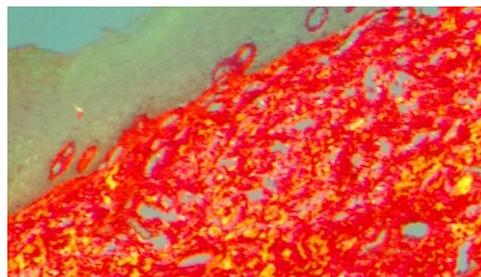


Fig 1: Photomicrograph showing parallel orientation of collagen fibres in grade II OSF patients observed using polarizing microscope.

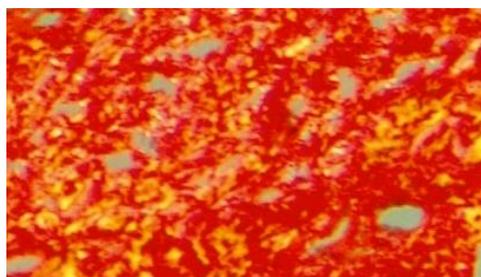


Fig 2: Photomicrograph showing both thin and thick collagen fibres. Thin fibres showing yellow-orange colour and thick fibres showing orange-red colour.

Histological grading	Thick fibres (upper half)	Thick fibres (lower half)
	MEAN±SD µm	MEAN±SD µm
Grade 1	5.33±0.89 µm	6.33±0.65 µm
Grade 2	7.00±0.68 µm	7.29±0.83 µm
Grade 3	12.40±1.58 µm	14.80±1.40 µm
NORMAL	8.97±2.14 µm	8.14±2.28 µm
TOTAL (GRADE 1,2,3 & Normal)	8.17±2.90 µm	8.86±3.49 µm

Table 3: Average number of thick fibres in the lower half and upper half of connective tissue

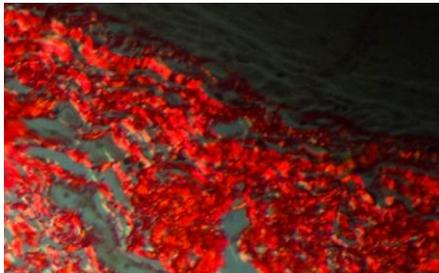


Fig 3: Photomicrograph showing orientation of collagen fibres parallel to the epithelium in grade III OSF

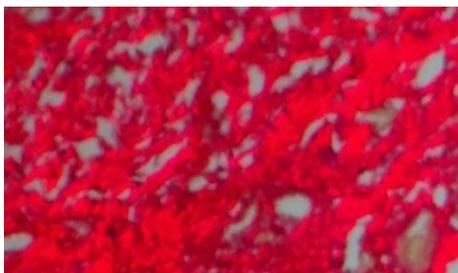


Fig 4: photomicrograph showing thick bundles of collagen fibres in lower half of the connective tissue in orange-red color in grade III OSF

IV. DISCUSSION

Oral Submucous Fibrosis (OSF) is a high risk precancerous condition characterized by changes in the connective tissue fibres of the lamina propria and deeper parts leading to stiffness of the oral mucosa and restricted mouth opening.¹¹

Blanching in oral mucosa clinically may be due to few conditions like scleroderma, anaemia, leukoplakia and OSF, which has a characteristic clinical appearance from early to advanced stages in forms of palpable fibrous bands running vertically in the buccal mucosa.

A larger number of studies have been reported in the literature on changes in oral mucosa in OSF. Still, the question of fibrous bands running vertically and not horizontally has not been addressed when observed clinically.¹²

The present study is aimed histologically to ascertain the direction, quality organisation and packing of collagen fibres in different histopathological grading of OSF.

Our results are consistent with other studies which showed the parallel orientation of collagen fibres with respect to the

epithelium and the intense colour of the collagen fibres in different grades of OSF.^{5,9,12}

The upper half of the connective tissue in grade I OSF cases showed parallel orientation of collagen fibres to the epithelium and more number of thin fibres that are yellow-orange in colour where as the lower half of the connective tissue showed mixture of both thin and thick fibres, in grade II OSF cases showed parallel orientation of collagen fibres to the epithelium and less number of thin collagen fibres compared to thick number of collagen fibres where as the lower half showed thick collagen fibres in orange red in colour as shown in fig.1 and fig.2.

In grade III OSF cases, the upper half and lower half of the connective tissue revealed thick and red- orange collagen bundles that are tightly packed as shown in fig.3.

The difference in colour patterns of collagen fibres could be due to various growth factors and cytokines that cause proliferation of fibroblasts and extracellular matrix resulting in the formation of thick mature collagen. As collagen matures, the change in the proteoglycan content of fibre causes dehydration of the fibres thereby increase in diameter of collagen fibres. The colour red-orange may be due to the tight packing of the collagen fibres. Hence, there is increase in intensity of birefringence and change in the polarizing colours.¹³

The cause for these unidirectional or parallel alignments of collagen fibres may be due to:

1. Chronic stimulation of oral mucosa by irritation or as sequence of mechanical stress where the fibres orient with the direction exerted on them like in the scars, keloid.
2. Due to forces generated by cell-mediated gel contraction.
3. Due to changes in the extracellular matrix imbalance production and degradation.

V. CONCLUSION

Picrosirius stain is most suitable to visualize collagen fibres quantitatively by determining their length in plane of tissue section and for contrast of stained fibres against background which enables qualitative analysis. The application of stain is a relatively simple tool to study the changes in extracellular matrix in particular the structural integrity of collagen fibres induced by stress in diff grades of OSF which in turn causes the neoplastic change in epithelium.

VI. DRAWBACKS AND LIMITATIONS

Though picrosirius red stains very thin collagen fibres in comparison to other collagen stains. Factors like pH, concentration of stain and the duration of staining will attribute to the variation in results. It is not advisable to use the staining technique on tissue preserved in formalin for many number of days. Hence, researchers must aim at ultra structural features of connective tissue in different stages of OSF in future.

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Computerized Tomographic Study of Pneumatisation of Mastoid

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Abstract- Introduction and objective: The mastoid air cell system represents a more or less extensive system of interconnecting air filled cavities arising from the mastoid and walls of middle ear. Based on the density of mastoid air cells it has been described as sclerotic (absence of pneumatisation), diploic type (partially pneumatised), pneumatic (totally pneumatised). The pneumatised type were further described as squamomastoid, perilabyrinthine, petromastoid and accessory (occipital). The knowledge regarding the status of pneumatisation of mastoid process is very essential for otologists while performing surgeries like cochlear implant, drainage of mastoid abscess, middle ear surgeries

Materials and method: In the present study 50 dried skulls of south Indian origin (males =28, females = 22) of age more than 50 yrs were studied in detail by computerized tomography. Hence details regarding pneumatisation were observed in 100 mastoid processes. The extent and type of pneumatisation were recorded and analysed.

Results: observations revealed incidence of squamomastoid type was seen in 74 cases, petromastoid type in 12 cases, perilabyrinthine in 12 cases, sclerous type in 2 cases and accessory nil.

Conclusion: Mastoid process is frequently approached by otologists to perform mastoidectomy, cochlear implant placement in neural deafness and in some of the middle ear surgeries.

Index Terms- mastoid process, pneumatisation, cochlear implant

I. INTRODUCTION

The mastoid air cell system has been recognized as an important contributor to the patho physiology of inflammatory diseases.¹ The pneumatisation has been linked to hereditary and genetic factors. Ventilation of middle ear as an essential predictor of the functional results following middle ear reconstruction. Based on the density of mastoid air cells it has been described as sclerotic (absence of pneumatisation), diploic type (partially pneumatised), pneumatic (totally pneumatised). The pneumatised type were further described as squamomastoid, perilabyrinthine, petromastoid and accessory.² The parts containing attic, aditus, antrum and labyrinth constitutes periantral triangular zone. It covers the spaces which represent the centre of activity in initiation and promulgation of pneumatisation.³ The present study aim in studying pneumatisation of mastoid process which is frequently

approached by otologists to perform mastoidectomy, cochlear implant placement in neural deafness. Hence a pre-operative CT scan assists the otologists for planning and for surgical interventions.

II. MATERIALS AND METHOD

In the present study 50 dried skulls of south Indian origin (males =28, females = 22) of age more than 50 yrs were studied in detail by computerized tomography. Initially all the skulls were scanned at vikram hospital with 3D axial multislider CT scan axial and coronal images were obtained and details regarding pneumatisation were observed in 100 mastoid processes. The extent and type of pneumatisation were recorded and analysed.

III. RESULTS

Table1: Study of mastoid process by CT scan in 50 dry skulls (M=28, F = 22)

Type	Right		Left	
	Male	Female	Male	Female
Petromastoid	5	3	3	1
Squamomastoid	20	15	20	19
Perilabyrinthine	3	3	5	1
sclerous	-NIL	1	NIL	1
Accessory	-	-	---	---



Image 1: squamo-mastoid type



Image2 : petrous type

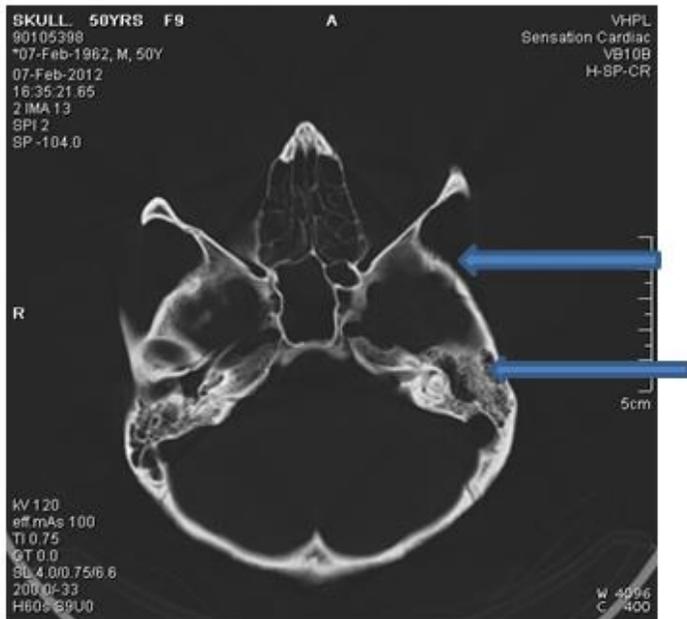


Image 3 : perilabyrinthine type

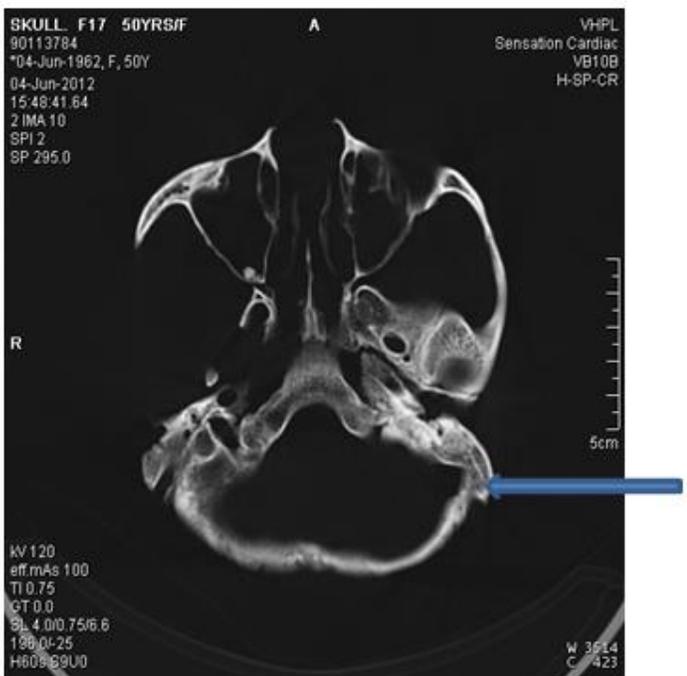


Image 4 : Sclerous Type

IV. DISCUSSION

In the present study **Petromastoid** type 8 in males(5 Right ,3 left) and 4 in females (3 Right ,1 left) , **Squamomastoid** type is prominent, 40 in males(20 in right , 20 in left)and 34 in females (15 in right and 19 in females), **Perilabyrinthine** type 8 in males(3 Right ,5 left) and 4 in females (3 Right ,1 left) ,**Sclerous** type 2 in female (1right ,1left) **Accessory** not observed in any skull.

Kim J and others studied volumes of the mastoid air cells (right and left) using 3D reconstruction of C T scan of PNS . Their study revealed volumes of male subjects were larger than those of females. There was a positive correlation between the pneumatisation of mastoid air cells and that of sphenoid sinus. ⁴ Koji yamashita et al studied the size of mastoid air cells and tympanic cavity using high resolution CT. 100 temporal bones of 50 patients with cholesteatoma and 50 control subjects were included. Both the volume and cross –sectional area of cavities of combined mastoid air cells and tympanic cavity in the affected side of the patients with cholesteatoma were significantly smaller than those in unaffected side($p < 0.001$) . both the volume and cross-sectional area of the cavities of combined mastoid air cells and tympanic cavity of both affected and unaffected sides of patients with cholesteatoma were significantly smaller than contralateral affected side.⁵

Samuel A and others studied temporal bone dissection in 10 cadavers. The landmark of importance for the dissection was the mc ewens triangle. Anatomic features encountered during the dissection were noted and recorded. Cribifossae and wide marrow mastoid cavity were noted in 17 temporal bones, highly pneumatisation mastoid air cells and incus were seen in 14 each , tympanic remnant was seen in 13 and stapes in 6. Temporal bone dissection provides an avenue in understanding the anatomic features and the variation that may pose a challenge in cochlear implant and other otologic surgeries.⁶

Mastoidectomy is one of the *key steps* in placing a cochlear implant. Here a mas-toidectomy allows access to the surgeon to the middle ear through the facial recess. **Open mastoidoepitympanectomy** involves complete exenteration of the mastoid air cell and is indicated in poorly pneumatized and ventilated ears with limited access and exposure .⁷

V. CONCLUSION

Well aerated mastoid cavity indicates easier surgical intervention across the facial nerve recess. CT mastoid is useful to indicate a low lying dura or an anteposed sigmoid sinus when operation is being contemplated on a sclerotic mastoid. Both CT and MRI should be used, as they delineate in different manners of cochlear and middle ear antomy, look for labyrinthine ossification and malformations. The knowledge regarding the status of pneumatisation of mastoid process is very essential for otologists while performing surgeries like cochlear implant , drainage of mastoid abscess, middle ear surgeries.

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Design and Implementation of 8X8 Truncated Multiplier on FPGA

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Abstract- Multiplication is frequently required in digital signal processing. Parallel multipliers provide a high-speed method for multiplication, but require large area for VLSI implementations. In most signal processing applications, a rounded product is desired to avoid growth in word size. Thus an important design goal is to reduce the area requirement of the rounded output multiplier. This paper presents a method for parallel multiplication which computes the products of two n-bit numbers by summing only the most significant columns with a variable correction method. This paper also presents a comparative study of Field Programmable Gate Array (FPGA) implementation of 8X8 standard and truncated multipliers using Very High Speed Integrated Circuit Hardware Description Language (VHDL). Truncated multipliers can be used in finite impulse response (FIR) and discrete cosine transforms (DCT). The truncated multiplier shows much more reduction in device utilization as compared to standard multiplier. Significant reduction in FPGA resources, delay, and power can be achieved using truncated multipliers instead of standard parallel multipliers when the full precision of the standard multiplier is not required.

Index Terms- Digital Signal Processing (DSP), Field Programmable Gate Array (FPGA), Truncated Multiplier, Variable correction method, VHDL

I. INTRODUCTION

Parallel multipliers provide high speed method for multiplications, but require large area for VLSI implementation. In most signal processing applications, rounded product is required to avoid growth in word size. Thus an important aim is to design a multiplier which required less area and that is possible with the truncated multiplier. In the wireless multimedia word, DSP systems are ubiquitous. DSP algorithms are computationally intensive and test the limits of battery life in portable device such as cell phones, hearing aids, MP3 players, digital video recorders and so on. Multiplication is the main operation in many signal processing algorithms hence efficient parallel multipliers is desirable. A full-width digital $n \times n$ bits multiplier computes the $2n$ bits output as a weighted sum of partial products. A multiplier with the output represented on n bits output is useful, as example, in DSP data paths which saves the output in the same n bits registers of the input. A truncated multiplier is an $n \times n$ multiplier with n bits output. Since in a truncated multiplier the n less significant bits of the full-width product are discarded, some of the partial products are removed and replaced by a suitable compensation function, to trade-off accuracy with hardware cost. As more columns are eliminated, the area and power consumption of the arithmetic unit are

significantly reduced, and in many cases the delay also decreases.

The trade-off is that truncating the multiplier matrix introduces additional error into the computation. Recent advancements in VLSI technology and in particular, the increasing complexity and capacity of state-of-the-art programmable logic devices have been making hardware emulations possible. The underlying key of the emulation system is to use SRAM-based field programmable gate arrays (FPGAs) which are very flexible and dynamically reconfigurable. In many cases implementation of DSP algorithm demands using Application Specific Integrated Circuits(ASICs).The development cost for Application Specific Integrated Circuits(ASICs) are high, algorithms should be verified and optimized before implementation. The Digital Signal Processing (DSP), image processing and multimedia requires extensive use of multiplication. The truncated multipliers can easily be implemented using Field Programmable Gate Array (FPGA) devices.

In FPGAs, the choice of the optimum multiplier involves three key factors: area, propagation delay and reconfiguration time. An FPGA is a digital integrated circuit that comes in a wide variety of size and with many different combinations of internal and external features. The state-of-the-art FPGAs consist of relatively small blocks of programmable logic. These blocks, each of which typically contains a few registers and a few dozen low level, configurable logic elements, are arranged in a grid pattern and tied together using programmable interconnects. The truncated multipliers can be designed using either constant correction method or variable correction method.

CONSTANT CORRECTION METHOD

In constant correction method design the lower N columns of a parallel multiplier are truncated and a correction is then added to the remaining most significant columns. The Constant Correction Methods (CCM) uses a constant value, independent on the actual values of the inputs, in order to estimate the LSP minor.

The multiplier output can be written as:

$$PCCM = \text{truncn}(SMSP + SLSP \text{ major} + \text{constant}) \text{ ----- (1)}$$

where $SLSP$ major is the weighted sum of the elements of the LSP major.

In this technique the LSP is eliminated and is substituted by a constant term, calculated considering only the lose carries. This approach reduces up to 50% the area of the full-width multiplier, but introduces a rather large error, which rapidly increases with n , resulting impractical in most applications.

VARIABLE CORRECTION METHOD

The basic design of the multiplier is the same as that of a constant correction fixed width multiplier. The least significant N-2 partial product columns of a full width multiplier are truncated. The partial product terms in the N- 1 column are then added to the partial product terms in the Nth column using full-adders. This is done in order to offset the error introduced due to truncation of least significant N- 2columns. The correction term that is generated is based on the following arguments,

- 1) The biggest column in the entire partial product array of a full-width multiplier is the Nthcolumn.
 - 2) The Nth column contributes more information to the most significant N-1 columns than the rest of the least significant N-1 columns. The information presented could be made more accurate if the carry from the N- 1th column is preserved and passed onto the Nth column.
 - 3) Adding the elements in N- 1th column to the Nth column provides a variable correction as the information presented is dependent on input bits. When all the partial product terms in the N-1th column are zero, the correction added is zero. When all the terms are one, a different correction value is added.
- The accuracy of truncated multipliers can be significantly improved using variable correction truncated multipliers that compensate the effect of the dropped terms with a non constant compensation function. The multiplier output is computed as:

$$P_{VCM} = \text{truncn} (SMSP + SLSP \text{ major} + f(IC) + K_{\text{round}}) \quad (2)$$

where f(IC) is a suitable compensation function.

The objective of this paper is to present a comparative study of variable truncated and standard multiplier by implementing the 8x8-bit respective multiplier using Spartan-3AN FPGA device. This paper is organized as follows. In section II, the mathematical basis of truncated multiplication is briefly discussed. Section III presents the FPGA design and implementation results and finally conclusion is provided in section IV.

II.MATHEMATICAL BASIS OFTRUNCATED MULTIPLIER

Considering the multiplication of two n-bit inputs A and B, a standard multiplier performs the following operations to obtain the 2n bit product P.

$$A = \sum_{i=1}^n a_i 2^{-i} \quad (3)$$

$$B = \sum_{j=1}^n b_j 2^{-j} \quad (4)$$

$$P = \sum_{i=1}^{2n} p_i 2^{-i} = \sum_{i=1}^n \sum_{j=1}^n A_i B_j 2^{-i-j} \quad (5)$$

where ai,bi and Pi represent the ith bit of A, B and P, respectively. The output of the 8x8 truncated multiplier can be written as below.

$$A = \sum_{i=1}^n a_i 2^{-i} \quad (6)$$

$$B = \sum_{j=1}^n b_j 2^{-j} \quad (7)$$

$$P = AB = \sum_{i=1}^n p_i 2^{-i} \quad (8)$$

Fig.1 shows the block diagram of standard 8x8 multiplier. Fig. 2 shows the architecture of standard 8x8-bitparallel multiplier, where HA and FA are the half and full adders respectively.

III. FPGA DESIGN AND IMPLEMENTATION RESULTS

The design of standard and truncated 8x8 bit multipliers are done using VHDL and implemented in a Xilinx Spartan 3AN XC3S700AN (package: fgg484, speed grade: -5) FPGA using the Xilinx ISE 9.1i design tool. Fig. 1 shows the block diagram of standard multiplier. The internal RTL schematic of the standard 8x8 multipliers shown in fig.3.The behavioural simulation presents the utilization of MSB as the required value in truncated multiplier for example, $255 \times 255 = (65025)_{10} = (1111111000000001)_2 = (11111110)_2 = (254)_{10}$ is obtained in the simulation result of truncated multiplier.

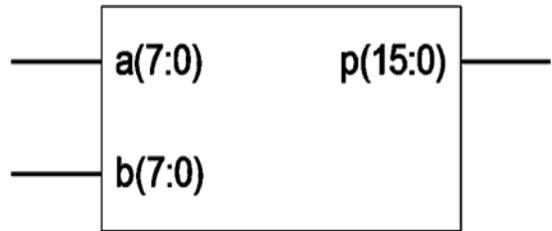


Fig.1 Block dig. of standard 8x8 multiplier

Fig.4 shows the block diagram of truncated 8x8 multiplier.Fig.5 shows the architecture of truncated 8x8 multiplier. The internal RTL schematic of truncated 8x8 multiplier is shown in fig.6.The total equivalent gate count in case of standard 8x8 multiplier is 702 and that is improved to 456 using truncated 8x8 multiplier. The power consumption incase of standard 8x8 multiplier is 419mW and that is also improved to 156mW using truncated 8x8 multiplier. The number of occupied slices used in truncated multiplier is also improved. In case of standard 8x8 multiplier it is 60 and in truncated 8x8 multiplier it is 42.

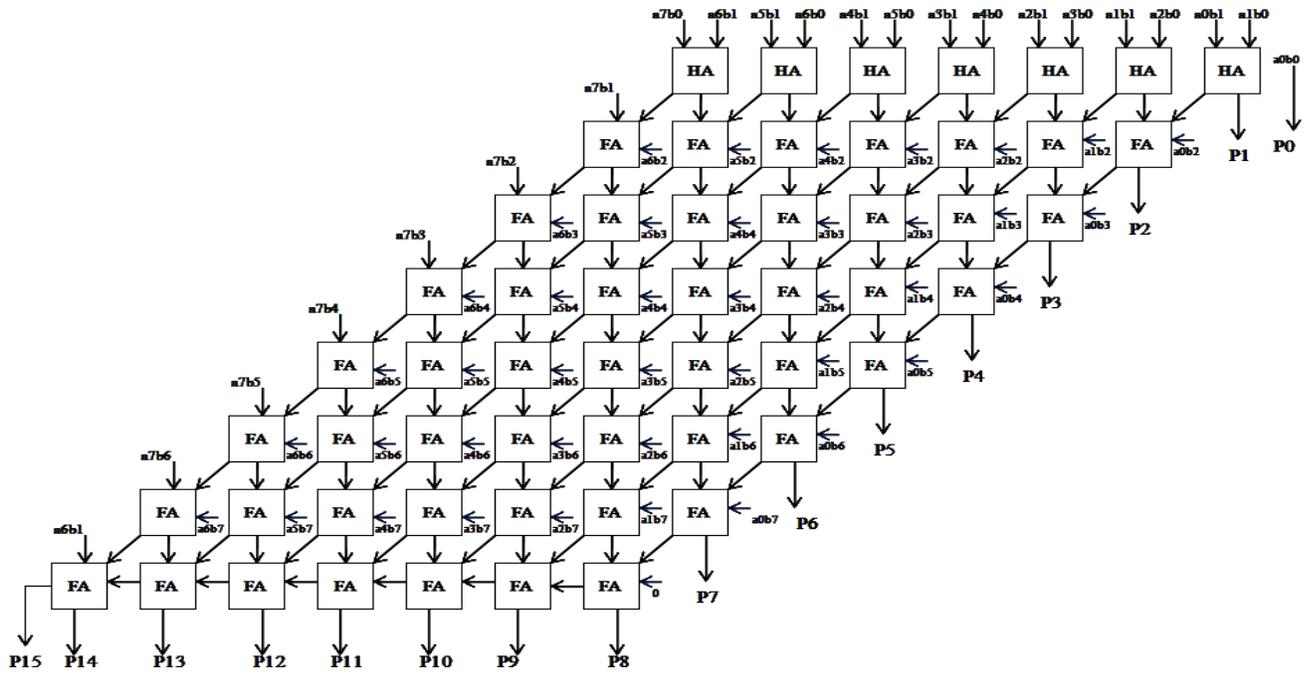


Fig.2 Architecture of 8x8 standard multiplier.

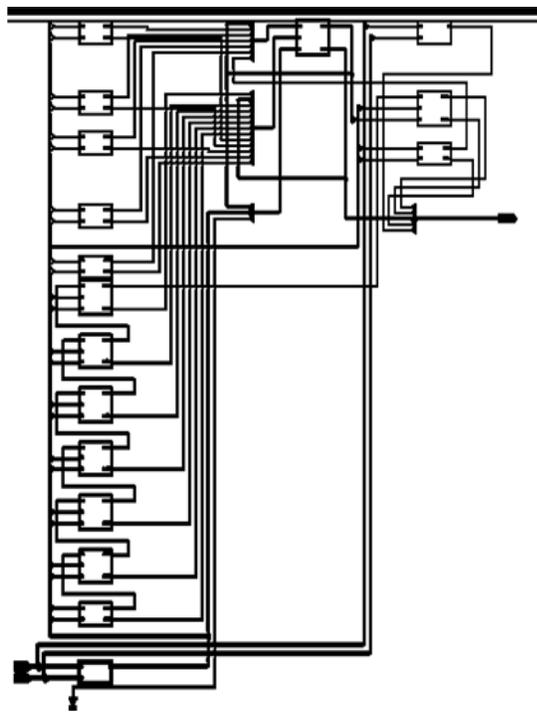


Fig.3 RTL schematic of standard 8x8 multiplier.

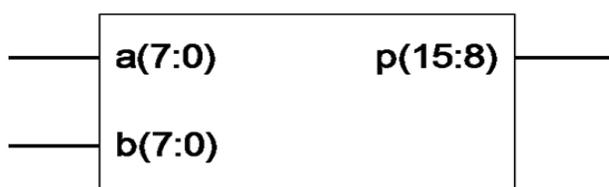


Fig.4 Block dig. of truncated 8x8 multiplier.

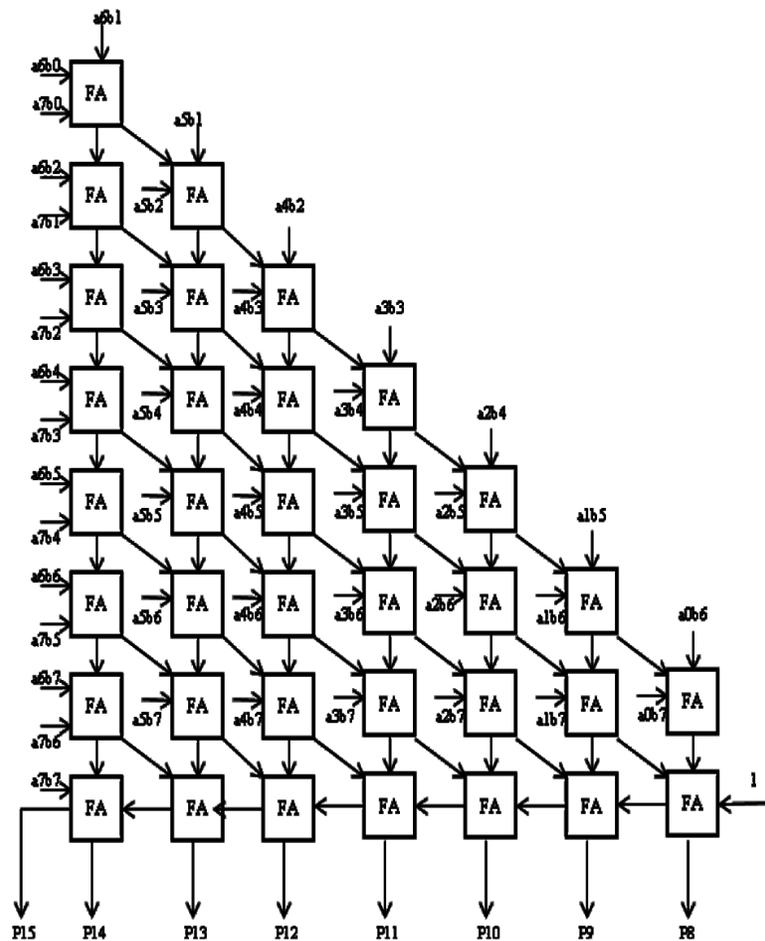


Fig.5 Architecture of truncated 8x8 multiplier.

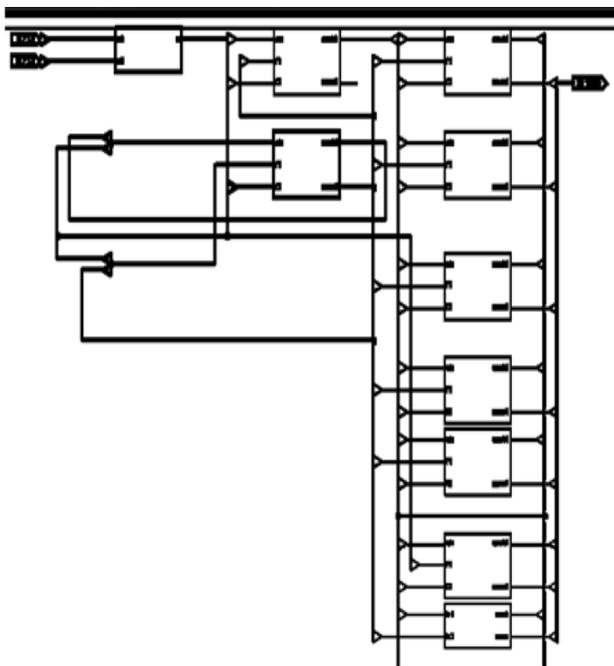


Fig.6 RTL Schematic of truncated 8x8 multiplier.

TABLE I

FPGA RESOURCE UTILIZATION FOR STANDARD AND TRUNCATED 8X8 MULTIPLIER

Device(SPARTAN 3AN) XC3S700ANFGG484-5		
	STANDARD	TRUNCATED
Total equivalent gate count	702	456
JTAG gate count for IOBs	1536	1152
Power(mW)	419	156
Four input LUTs	117/4704	76/4704
Number of occupied slices	60/2352	42/2352
Number of bonded IOBs	32/176	24/176

CONCLUSION

In this paper we have presented hardware design and implementation of FPGA based parallel architecture for standard and truncated 8x8 multipliers utilizing VHDL. Both the design were implemented on Xilinx Spartan 3AN XC3S700AN FPGA device. The aim is to present a comparative study of the standard and truncated 8x8 multipliers. The truncated multiplier as compared to standard multiplier shows much more reduction in device Utilization. The power consumption of standard 8x8 multiplier is 419mW and that to truncated 8x8 multiplier power consumption is only 156 mW. The truncated 8x8 multiplier uses only 42 slices out of 2352 slices. Truncated multiplication provides an efficient method for reducing the power dissipation and area of parallel multipliers.

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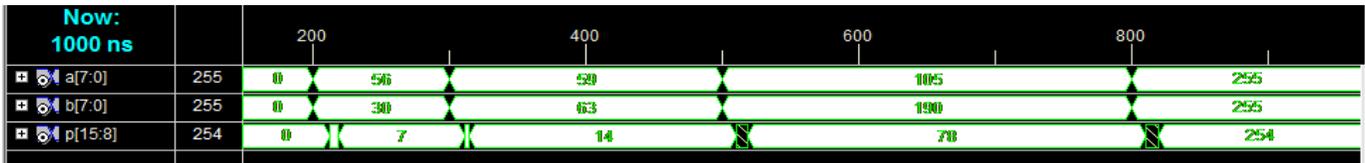
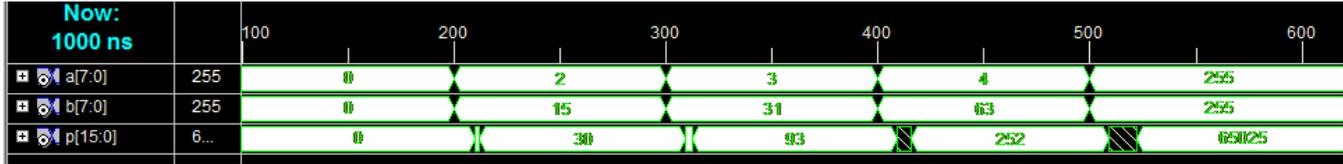
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SIMULATION RESULTS OF STANDARD AND TRUNCATED MULTIPLIERS



Risk-taking Behaviors among Youth in Dimapur, Nagaland

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Abstract- The present study assesses the prevalence and pattern of risk-taking behavior among youth aged 15-24 years in Dimapur, Nagaland. Using a self administered questionnaire, we collected information on risk-taking behavior from 300 youth. Simple bivariate analysis was used in the study.

Prevalence of current use of tobacco and alcohol use is high among youth. It is observed that young people start initiating into risk-taking behavior, early, during their teenage years. Initiating to smoking behavior is found to happen earlier than initiating into alcohol use or initiating sexual act (18.2 years). There is a gender differential in terms of engaging in risk-taking behaviors. Boys are found to initiate into risk-taking behavior earlier than girls and represent more in risk-taking behaviors. Childhood exposure to alcohol use is also found to be significantly associated with alcohol use pattern.

Programs should aim at reducing early childhood exposure to alcohol by addressing the avoidance of consumption or use of alcohol in the presence of childhood. There should also be programs that educates youth about various adverse effects of engaging in risk-taking behavior and to impart refusal skills.

Index Terms- Youth, risk-taking behavior, Nagaland.

I. INTRODUCTION

Risk can be defined as “the appraised likelihood of a negative outcome for behavior” (Zuckerman, 1994). With risk defined as the chance of loss, risky behaviors have been characterized as that behavior that entails the possibility of subjective loss (Furby and Beyth –Maron, 1990). Risk taking are “volitional, purposive, goal-oriented and carry potential for harm” (Lightfoot, 1997). Irwin (1990) has defined adolescent risky-taking behaviors as those behaviors, undertaken volitionally, whose outcomes remain uncertain with the possibility of an identifiable negative health outcome. It follows that risk-taking is engaging in risky behavior. The term risk-taking behavior has been used to link, conceptually, a number of potentially health-damaging behaviors including, among others, substance use, precocious or risky sexual behavior, delinquency etc. The behaviors are considered risk-taking because of their initiation include premature sexual behavior or alcohol/other substance use.

Virtually all young persons have the potential of engaging in risky behaviors. Risk behaviors can directly or indirectly, compromise the well-being, the health, and even the life course of the young people. In addition, once these behaviors are

established during adolescence and young adulthood they often remain as major contributors to the health problem of adults. Potential negative consequences of these behaviors include unwanted pregnancy, sexually transmitted disease, HIV/AIDS, severe disability and death. Health damaging or risky behaviors must be examined as determinants of health status. Global trends suggest that the new HIV infections among young people are on the rise. Currently, young people aged 15–24 accounts for 41 per cent of new HIV infections in people aged 15 and older (UNAIDS 2010). At this juncture, understanding the behavior to bring about change or reduce risk remains the only alternative.

Young people, in their phase of growing up are characterized by curiosity and their penchant to experimentation, including engaging in activities which involve an element of risk. Adolescence is often perceived as a period of experimentation, exploration and curiosity (Newcomb and Bentler, 1989). It is also a critical period of physical and mental growth. Yet the skills of self-control are not fully developed. It is a challenging time with regard to psychosocial development. These factors expose young people to the harmful effects of alcohol and narcotics use and to the risk of their use becoming abuse. The struggle to find and test one’s own identity, to ‘fit in’, and to build self-esteem often takes place through experimentation in different areas of behavior, including sexual relations (Ashford, et al 2001). An additional characteristic of youth culture is that young people are turning more towards one another and less towards traditional cultural arbiters (Ziehe, 2000). Another crucial component of risk among young people’s sexual behavior is the use of alcohol and other drugs. Studies have shown association between substance use and high-risk sexual behaviors with increased rates of sexual intercourse, having multiple sexual partners and lower use of condom, particularly for users of illicit stimulant drugs (Lowry, et al 1994, Bailey, et al 1999, Poulin and Graham, 2001, Stueve and O’Donneel, 2005; Elkington, et al 2010). Many studies have found that early age at first sex is associated with (though again, not necessarily causing or caused by) drug and/or alcohol use. Substances linked with early sexual initiation include alcohol, marijuana, and cocaine (Floyd & Latimer, 2010; Santelli et al., 2004; Van Gelder, et al 2011) and addictive substances generally, including cigarettes (Nkansah-Amankra, et al, 2011).

In West, most studies on Risk-taking Behavior is constructed and defined within the developmental context of young people. Risk-taking among youth as a study in Asian countries gained its attention only recently. In India, though there are studies relating to risk-taking behaviors, many have studied

in isolation on particular dimension. Studies on drug use/substance use and risky sexual behavior, was mainly focused on Intravenous Drug users, street children, migrants, slum population, gender/region specific, focused only on school/college going youth etc. which does not truly portray the general youth population (Moni Nag, 1996; Jejeebhoy, 1998; Abraham and Kumar, 1999; Verma and Hemkothang, 2002; Gutpa and Singh, 2002). There is clearly a need to understand risk behavior pattern across varying cultural context and their causative factors. Little is yet known about youth's behavior which places them at risk for negative consequences (STI/HIV).

Nagaland is of course going through transition and social change, influenced by western life-style and modernization. Free-mixing nature of youngsters, longer period of dependence, unemployment and late marriages with penchant to seek fun, has its negative impact as well. It makes the youngsters more vulnerable to engage in risk-taking behaviors. There are numerous behavioral and social health risks besetting the Youth in Nagaland- youth drug/alcohol use and abuse, abortions etc. However there is no data to catalogue the concern for health risk behavior. With available data being limited, especially concerning the youth of Nagaland, an understanding of the meaning of risk taking in youth culture, from the youth perspective, is essential to successful prevention and intervention of health-compromising risk-behavior.

It is true that no all young people equally indulge in activities that might jeopardize their health and safety and that circumstance of some youth seem to deter them from taking risk, while the situation of others act to facilitate involvement in potentially hazardous practices. Risk-behaviors that is experimented out during adolescence is not necessarily abandoned in adulthood have important implications for individual psychology and physical health, both in short and long term. Because these activities entail substantial economic and social costs to the health and well-being of individuals and also to society, it is important to understand the extent of young people's involvement in them. The broad aim of the present paper is to explore the risk-taking behaviors of youth, with the specific objective to explore the prevalence and pattern of different risk-taking behaviors among youth in Dimapur.

II. RESEARCH METHODOLOGY

The unit of analysis in this study is ethnic male and female 'Naga' youth aged between 15-24 years, who are unmarried and unemployed at the time of the study. In the absence of sampling frame of risk-taking behavior among youth, the approach adopted to select youth was a stratified random sampling of secular colleges in Dimapur for selecting college going youth and stratified random sampling of communities for selecting non-college going youth. A total of 300 youth, which included college going youth (200) and non-college going youth (100), was considered in the study. Out of the pre-determined 200 college going youth, 80 youth were selected from pre-university level and 120 youth from graduate level were selected taking into consideration the streams of education- 60 were science students, 100 arts students and 40 commerce students. A total of 100 Non-college going youth was selected, through a list of non/out of college youth aged 15-24 years from community based youth

organizations functioning at society and church level. A sample of 25 youth from each of the selected 4 segment/locality ($25 \times 4 = 100$) was included in the study.

Data collection:

The data collected in this study are of mixed form, containing both quantitative and qualitative data. To describe both personal or behavioral characteristics and their relationships, quantitative data was collected from 300 individual youth, using structured self administered questionnaires. Qualitative data was collected to elicit information on various aspects of youth's behavior, their decision-making process and their motives/reasons behind those decisions or behavior.

Statistical Analysis

In this paper, simple univariate and bivariate are used. For the Bivariate analyses, the associations between the risk-taking behavior (viz alcohol use, drug use, engaging in sex, engaging in any substance use (excluding use of smokeless tobacco) was assessed. Chi square test was used to examine the bivariate associations.

Measurements and variables used

Risk-taking behavior: For the purpose of study, risk-taking behavior is the collective term used for engaging in smokeless tobacco, smoking tobacco, drinking alcohol, other substance use and engaging in sex. Each of the behavior was dichotomized as either risk absent 'No' (0) or risk present 'Yes' (1). In this paper - current use of tobacco/alcohol/other substance is defined as having smoked/used alcohol in the past 30 days. Only for engaging in sex, the reference period is in the last three months. Ever use is defined as use of tobacco/alcohol/other substance at any point of time in life.

III. RESULTS

Pattern of Tobacco use (Smokeless tobacco and cigarettes)

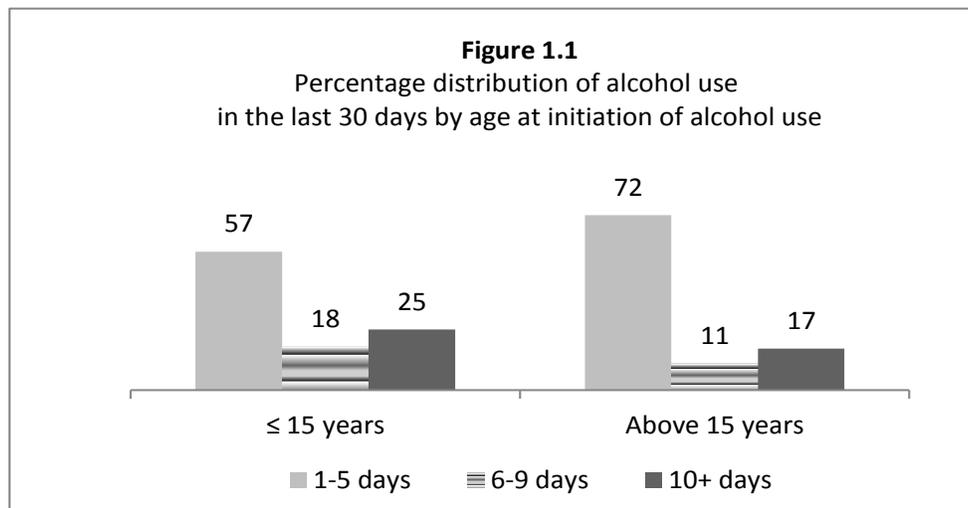
It is evident from Table 1.1 that among the study group, 64 percent of youth had ever smoked cigarettes and 31.3 percent of youth are currently smoking. Fifty-four percent of youth are currently using smokeless tobacco products, for example like - chew pan, *talab*, *gutkha*, *sada* etc. Within the tobacco users, as expected boys/male tobacco users are more compared to girls/female tobacco users. Similarly, the frequency of taking smokeless tobacco for more than 3 times in a day during the last 30 days is more among males/boys than females/girls. Among those who currently smoke, boys dominate in the behavior of smoking cigarettes. The mean age of initiation for smoking is 13.9 years (ranging from a low of 4 years to 23 years), and for smokeless tobacco it is 15.7 years (ranging from 8 years to 22 years). The corresponding mean age for boys being 13.6 years and 15.4 years respectively while for females it is 14.6 years and 16.3 years respectively, indicating that boys initiate into smoking and use of tobacco products earlier than girls (table not shown).

Pattern of alcohol use

As shown in Table 1.2, sixty-seven percent of youth had ever used alcohol, 46.3 percent of youth are currently using alcohol. Thirty percent of youth, in the last 30 days had used

Table 1.1 Pattern of tobacco use					
Percentage of youth by their status of tobacco use, frequency of tobacco use in the last 30 days and the percent distribution by sex within tobacco use behavior					
	Percentage (%)	Percent distribution of sex within tobacco use behavior			Number of youth
		Male	Female	Total	
Ever tasted smokeless tobacco (<i>chew pan,talab/gutkha</i> etc)					
Yes	57.0	62.6	37.4	100.0	171
No	43.0	33.3	66.7	100.0	129
Currently using smokeless tobacco					
Yes	53.7	61.5	38.5	100.0	161
No	46.3	36.7	63.3	100.0	139
During the past 30 days, u took smokeless tobacco					
0 times	46.3	36.7	63.3	100.0	139
1-2	5.3	37.5	62.5	100.0	16
3-9	15.0	60.0	40.0	100.0	45
10-19	20.3	55.7	44.3	100.0	61
20-29	5.7	70.6	29.4	100.0	17
30+	7.3	90.9	9.1	100.0	22
Ever smoked cigarettes					
Yes	64.3	63.2	36.8	100.0	193
No	35.7	26.2	73.8	100.0	107
Currently smoking					
Yes	31.3	80.9	19.1	100.0	94
No	68.7	35.9	64.1	100.0	206
Total	100.0	50.0	50.0	100.0	300
Among those who are currently smoking, Number of cigarettes smoked per day in the past 30 days?					
Less than 1 cigarette	39.4	67.6	32.4	100.0	37
2-5 cigarettes	40.4	81.6	18.4	100.0	38
6-10 cigarettes	18.1	100.0	0.0	100.0	17
11-20 cigarettes	2.1	100.0	0.0	100.0	2
Total	100.0	50.0	50.0	100.0	94

Table 1.2 Pattern of alcohol use					
Percentage of youth by their status of alcohol use, frequency of alcohol use in the last 30 days and the percent distribution by sex within tobacco use behavior					
	Percentage (%)	Percent distribution of sex within alcohol use behavior			Number of youth
		Male	Female	Total	
Ever tasted any form of alcohol					
Yes	67.0	82.7	51.3	100.0	201
No	33.0	17.3	48.7	100.0	99
Currently drinking alcohol					
Yes	46.3	63.3	29.3	100.0	139
No	53.7	36.7	70.7	100.0	161
No days alcohol used in the last 30 days					
0	53.7	36.7	70.7	100.0	161
1-5	30.3	38.7	22.0	100.0	91
6-9	6.7	10.0	3.3	100.0	20
10-30	9.3	14.7	4.0	100.0	28
Total	100.0	50.0	50.0	100.0	300



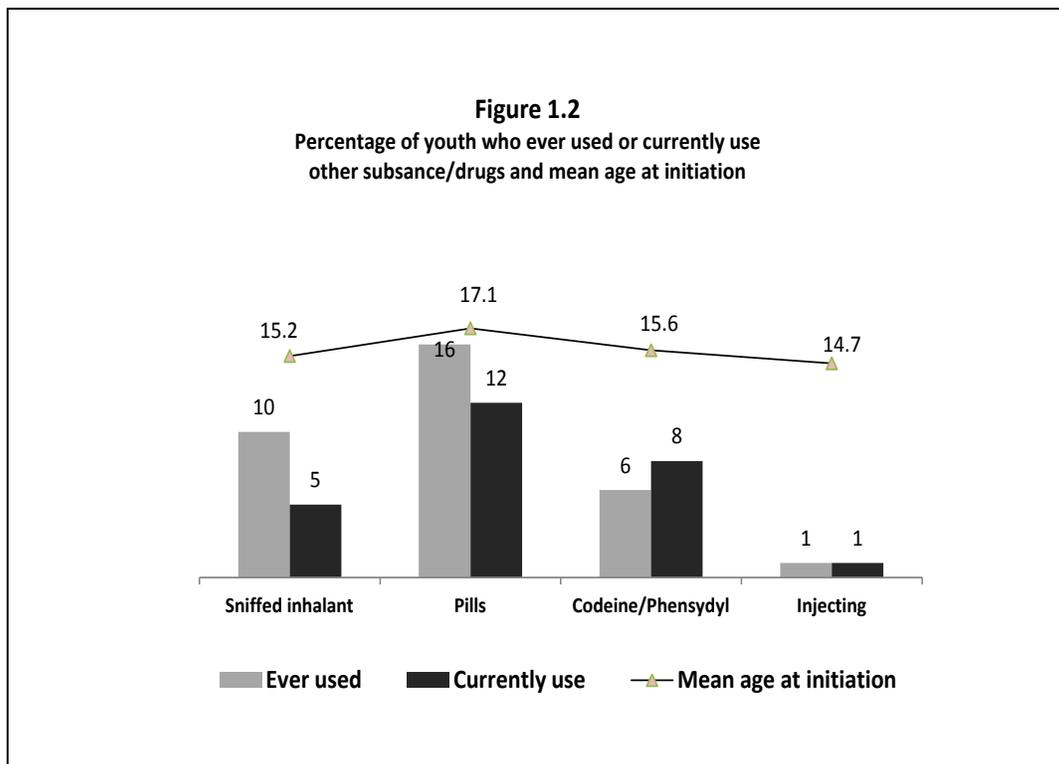
alcohol for 1 to 5 days, 6.7 percent of youth for 6-19 days, and 9.3 percent of youth had used alcohol for 10-30 days in the last month. The mean age of initiating alcohol use is 15.6 years; for boys being 15.3 years and 16.1 years for females. It indicates that boys initiate into drinking earlier than girls. Among youth, who are currently engaging in alcohol use in the last 30 days, 65.5 percent of them are have used alcohol for 1-5 days, 14.4 percent of youth have used alcohol for 6- 9 days and twenty percent of youth have used alcohol for 10 days or more (table not shown).

Age at Initiation of alcohol use and alcohol use (Figure 1.1) shows that, those youth who first initiated alcohol use, at the age of 15 years and below, are more likely to report, using alcohol for more than 10 days (25 percent) in the past month compared to those who initiated later after 15 years of age (17 percent). Similarly use of alcohol for 6-9 days in the past month is slightly higher among those who initiated alcohol use early (≤ 15 years) than those youth who initiated alcohol use after 15 years of age.

Table 1.3 Childhood exposure to alcohol and pattern of alcohol use
 Among those you have ever used alcohol, the percent distribution of alcohol use pattern by childhood exposure to alcohol

Childhood exposure to alcohol	Age at alcohol initiation ***		Currently use alcohol***		Frequency of alcohol use in the last 30 days***			Number of youth
	≤ 15 years	15+ years	Yes	No	1-5 days	6-9 days	10+ days	
	Low	26.7	73.3	43.3	56.7	56.7	26.7	
Medium	34.2	65.8	63.2	36.8	36.8	44.7	18.4	76
High	54.7	45.3	82.1	17.9	17.9	51.6	30.5	95
Total	42.8	57.2	69.2	30.8	30.8	45.3	23.9	201

Chi square significant level ***P<0.001;**P<0.05;*P<0.01



The findings from Table 1.3 also reveals that pattern of drinking among young people is significantly associated with childhood exposure to alcohol use. Among those who had ever used alcohol, initiating into alcohol use early before 15 years of age is significantly higher among youth with high childhood exposure to alcohol. Over half of youth (54.7 percent) who had high childhood exposure had initiated into alcohol use \leq 15 years. Current use of alcohol is significantly higher among youth with high childhood exposure to alcohol (82.1 percent). Similarly, the frequency of alcohol use in the last month is significantly linked with childhood exposure to alcohol. Those youth with high childhood exposure to alcohol were more likely to engage in alcohol use for ten or more days (30.5 percent) compared to youth with medium (18.4 percent) and low exposure to alcohol (16.7 percent). Childhood exposure to alcohol, shows statistically significant association at $P < 0.001$ with age at alcohol initiation, current use of alcohol and frequency of alcohol use in the last month.

Patterns of other substance/drug use

Other than smoking cigarette, using smokeless tobacco products or drinking alcohol, youth in Nagaland also use substance/drugs. These substances includes sniffing of inhalants like dendrite, using ganja/ pills etc. Substance use is measured in this study with respect to the consumption of five specified substances excluding tobacco use or alcohol use. The substance use ranges from inhaling volatile substance like dendrite/glue to use of pills, ganja heroine or injecting drugs. Substance/drug use is categorized into ever use of substance (subject's lifetime use of substance) and current use of substance with reference to use of substance in to last month. As evident from Table 1.4a and Figure 1.2, among different types of lifetime substance use, use of pills is more common (16 percent), followed use of ganja (13 percent) and use of inhalants (10 percent). Six percent of youth have ever used heroine/cocaine and negligible few (1.3 percent) have ever injected drugs. The mean age of initiating substance use, is 15.2 years for using inhalants, 16.7 years for use of ganja, 17.1 years for use of pills and 18.0 years for injecting non medical drugs. It is also found that boys started using the substance at slightly younger age than girls. Among those who reported ever use of substance/drug use, higher level of use is found among boys or male youth.

Table 1. 4a Ever use of other substance/drug use					
Percentage of youth by ever use of different substance and the percent distribution of sex within ever use of other substance/drug use behavior					
Ever of other substance/drug use	Percentage (%)	Percent distribution of sex within ever use of other substance/drug use behavior			Number of Youth
		Male	Female	Total	
Have you ever tried sniffing glue/inhaled anything to get high					
Yes	10.3	80.6	19.4	100.0	31
No	89.7	46.5	53.5	100.0	269
Have you ever tried pills					
Yes	16.0	72.9	27.1	100.0	48
No	84.0	45.6	54.4	100.0	252
Have you ever tried heroine/cocaine/powder/crack					
Yes	6.3	68.4	31.6	100.0	19
No	93.7	48.8	51.2	100.0	281
Have you ever tried Ganja					
Yes	13.3	82.5	17.5	100.0	40
No	86.7	45.0	55.0	100.0	260
Have you ever tried injecting non-medical drugs					
Yes	1.3	100.0	0.0	100.0	4
No	98.7	49.3	50.7	100.0	296
Table Total	100.0	50.0	50.0	100.0	300

Table 1.4b Current use of other substance/drugs use					
Percentage of youth by current use of other substance/drugs and the percent distribution of sex within current use of other substance/drug use behavior					
Current substance/drug use behavior	Percentage (%)	Percent distribution of sex within current use of other substance/drug behavior			Number of youth
		Male	Female	Total	
Currently sniff glue/inhaled anything to get high					
Yes	5.3	75.0	25.0	100.0	16
No	94.7	48.6	51.4	100.0	284
During the past 30 days , on how many days did you sniff glue or other inhalants to get high					
0 days	94.7	48.6	51.4	100.0	284
1-3 days	4.3	69.2	30.8	100.0	13
3-9 days	1.0	100.0	0.0	100.0	3
Currently use pills					
Yes	12.3	70.3	29.7	100.0	37
No	87.7	47.1	52.9	100.0	263
During the past 30 days , on how many days did you use pills					
0 times	87.7	47.1	52.9	100.0	263
1-2	4.0	75.0	25.0	100.0	12
3-9	4.7	64.3	35.7	100.0	14
10-19	2.0	66.7	33.3	100.0	6
20-29	1.3	75.0	25.0	100.0	4
30+	0.3	100.0	0.0	100.0	1
Currently use codeine (phynsedyl)/cocaine/powder/crack/ Ganja etc					
Yes	7.7	73.9	26.1	100.0	23
No	92.3	48.0	52.0	100.0	227
During the past 30 days ,on how many days did you use cocaine/powder/crack/Ganja/brown/white etc					
0 times	92.3	48.0	52.0	100.0	277
1-2 days	3.0	77.8	22.2	100.0	9
3-9	2.7	87.5	12.5	100.0	8
10-19	1.3	50.0	50.0	100.0	4
20-29	0.7	50.0	50.0	100.0	2
Currently injecting non-medical drug					
Yes	1.3	75.0	25.0	100.0	4
No	98.7	49.7	50.3	100.0	296
During the past 30 days ,on how many days did you inject drugs/non-medical drugs					
0 days	98.7	49.7	50.3	100.0	296
1-2	1.3	75.0	25.0	100.0	4
Total	100.0	50.0	50.0	100.0	300

Regarding current use of substance (Table 1.4b) and Figure 1.2, five percent of youth are found to currently sniff inhalants like dendrite, 12 percent of youth are currently using pills, eight percent of youth are found to currently use codeine/phensydl and one percent of youth are found to inject drugs. Among the current substance users, boys or males dominates in all the different types of substance use.

Regarding use of substance in the last one month (current use of substance), twelve percent of youth had used pills like spasmoproxyvon (SP), relief pain (RP); 7.7 percent had used cocaine/powder/ganja etc.; five percent of youth had sniffed glue/inhalant to get high and 1.3 percent of youth had injected drugs/non-medical drugs in the last one month. As explicable,

among the current users of substance, higher level of use of substance in the last one month is found more among male youth/boys compared to female youth/girls.

Pattern of Sexual Behavior

As seen in Figure 1.3, twenty-five percent of youth have ever engaged in sexual intercourse and 16 percent have engaged in sexual behavior in the past 3 months preceding the survey. The mean age at first sexual intercourse is 18.2 year, while it is 17.9 years for males and 18.8 years for females. Boys initiate d into sexual activity a year younger than girls. Among those youth who had ever engaged in sexual intercourse, 65.3 percent of youth are found to have engaged in sexual intercourse in the past three months preceding the survey (Table 1.5a).

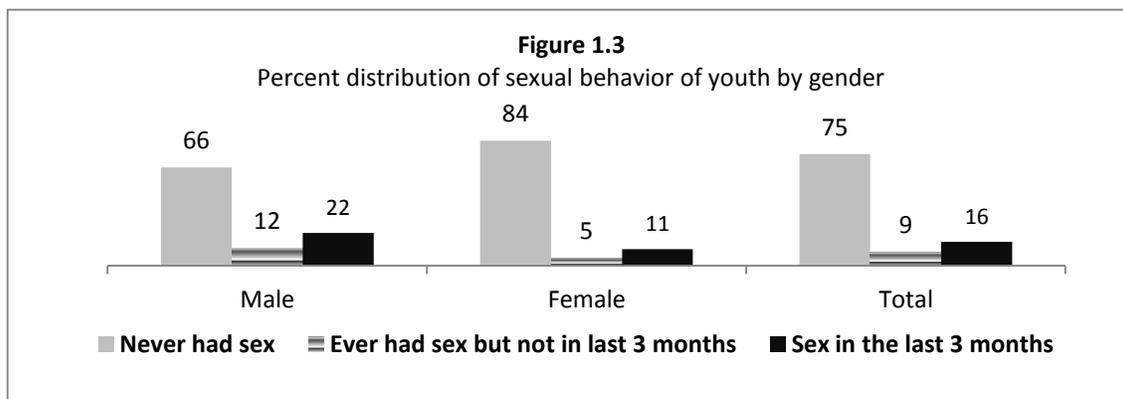


Table 1.5a Sexual behavior
Among youth who had ever experienced sex, percentage of different sexual behavior characters in the last 3 months, and percent distribution of sex within different sexual behavior

Sexual behavior characters in the last 3 months	Percentage (%)	Percent distribution of sex within different sexual behaviors			Number of Youth
		Male	Female	Total	
Currently engage in sex					
Yes	65.3	69.2	30.8	100.0	49
No	34.7	67.3	32.7	100.0	26
No of sexual partners					
None during the past 3 months	34.7	69.2	30.8	100.0	26
1	45.3	64.7	35.3	100.0	34
2+	20.0	73.3	26.7	100.0	15
Use of protection/condom during sex					
Yes	30.7	73.9	26.1	100.0	23
No	69.3	65.4	34.6	100.0	52
Kind of relationship with partner at the moment of last sexual intercourse					
Stable	61.3	58.7	41.3	100.0	46
Unstable	38.7	82.8	17.2	100.0	29
Use of substance before the sexual intercourse					
Yes	57.3	72.1	27.9	100.0	43
No	42.7	62.5	37.5	100.0	32
Total	100.0	50.0	50.0	100.0	75

Among those who reported to have more than two sexual partners in the last 3 months, seventy three percent of them were boys/male youth and 26.7 percent of them were girls. Similarly, among those who reported no use of protection during last sex, to be in unstable relationship or use of substance before sexual act, boys or male youth outnumbered girls or female youth.

Context of sexual debut

Findings from Table 1.5b shows that, among those who had ever engaged in sex, majority of them had sex for the first time with their, boyfriend or girlfriend (66.7 percent). Twenty one percent to youth had engaged in sex for the first time with their friend. Negligible few of them had engaged in first sex with stranger, relative or with sex worker. Sex with sex worker or with stranger is reported only by boys/male. For majority of the young people, the first partner to have sex with had been their boyfriend/girl friend, for 62 percent of males, their first sexual partner had been their girlfriends whereas less than two-fifths (38%) of females had first had sex with a boyfriend. Only one male each and no females reported that their first partner had been a sex worker or a stranger.

Regarding location/place of sex during the first sexual encounter, the most common place or location is partner’s house (32.0 %) followed by hotel (26.7%). Twenty four percent of youth reported having experienced first sex at their own home while negligible few had sex for the first time at party (4.0 %). Among those who reported having first sex in hotel, a significantly greater proportion of them were boys/males (75.0 percent) than girls/females (25.0 percent). The most common reason cited, for having sex for the first time was desire to have sex (46.7 percent), the first sex was chance, it just happened (41.3 percent), to express love (37.4 percent) and engage in sex out of curiosity or experience (table not shown).

As evident from figure 1.5, the motive/reasons for engaging in sexual activity differed sharply by gender. A significantly greater number of females (62.5 percent) than males (11.8 percent) said that they had engaged in sex for the first time due to pressure from partner. Similarly girls/females were more likely (54.2 percent) to give reasons related ‘to prove love’ than boys (29.2 percent). On the other hand, greater proportion of male/boys than of females/girls had first had sex for reasons related to sexual desire (60.8 percent), fun/pleasure/enjoyment (37.3 percent) and curiosity or to gain experience (39.2 percent).

<u>Table 1.5b Context of sexual debut</u>						
Among youth who had ever experienced sex, percentage of youth by circumstances of sexual debut and percentage distribution of sex/gender within circumstances of sexual debut.						
Circumstances of sexual debut	Percentage	Percentage distribution of sex/gender within circumstances of sexual debut			Number of youth	
		Male	Female	Total		
Partner during first sex						
Boyfriend/Girl friend	66.7	62.0	38.0	100.0	50	
Friend	21.3	75.0	25.0	100.0	16	
Sex worker	1.3	100.0	0.0	100.0	1	
Stranger	6.7	100.0	0.0	100.0	5	
Relative	4.0	66.7	33.3	100.0	3	
Location/place of first sex						
Own house	24.0	61.1	38.9	100.0	18	
Partner’s house	32.0	70.8	29.2	100.0	24	
Friend’s house	13.3	60.0	40.0	100.0	10	
Hotel	26.7	75.0	25.0	100.0	20	
Party	4.0	68.0	32.0	100.0	3	
Total	100.0	50.0	50.0	100.0	75	

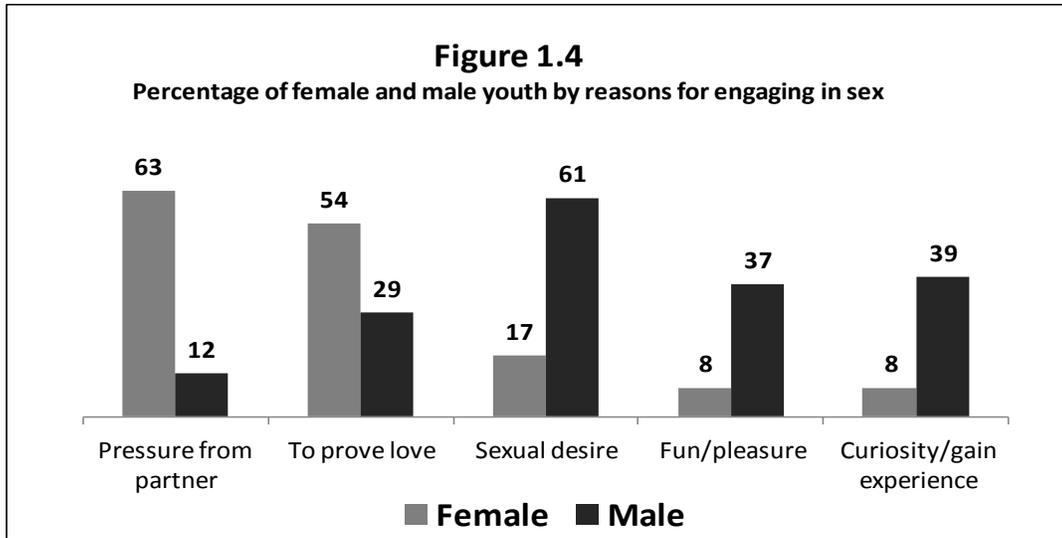
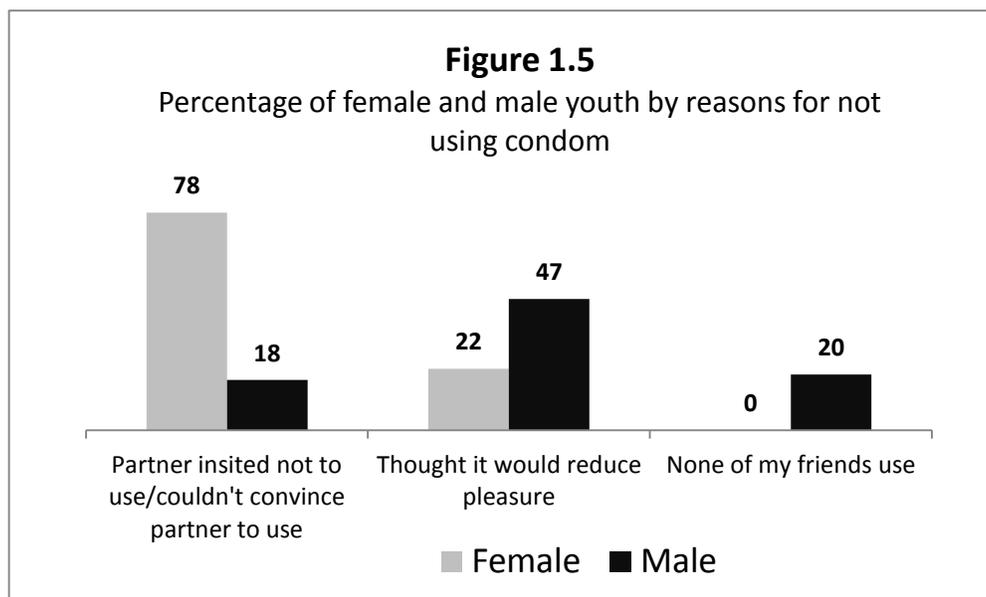


Table 1.5c Reasons for not using condom
 Among those who had not used condom during the last sex, percent distribution of reasons given for not using condom

Reasons for not using condom	Yes	No
Sex suddenly happened/condom was not available at the time of act	96.2	3.8
Uncomfortable to carry a condom	40.4	59.6
Thought it would reduce pleasure	38.5	61.5
Partner insisted not to use/couldn't convince partner to use condom	38.5	61.5
None of my friends use condoms	13.5	86.5
Felt shy/embarrassed to buy condom	11.5	88.5
It is a hassle to put on condom	11.5	88.5
Did not know how to use condom	3.8	96.2



Barriers of condom use

Table 1.5c shows that, among those who had not used condom, the most common reason cited for none use of condom is that 'sex suddenly happened/ condom was not available at the time of sexual act'. Two in five youth told that they had not used condom, because it was uncomfortable to carry a condom and thirty nine percent of youth had cited reasons that they did not use condom because they thought it would reduce pleasure. About two-fifths of youth, cited reasons related to 'unwillingness of the partner to use condom or not being able to convince the partner to use condom'.

As evident from Figure 1.5, there are differentials in reasons cited for non use of condoms by sex/gender. Girls are more likely (77.8 percent) to report 'unwillingness of partner to use condom or not being able to convince the partner to use condom' compared to boys (17.6 percent); while boys were more likely to give reasons relating to reasons like - 'thought that it would reduce pleasure (47.1 percent) compared to females (22.2 percent). It is also found among the boys that, their friend's behavior have an influence on their condom use behavior. Twenty percent of youth had not used condom because none of youth's friends use condom. In focus-group discussion, participants never cited poor access, as a reason for nonuse or inconsistent use of condoms; almost no one considered the method expensive and everyone was aware of condoms. Most girls apparently believe that their relationships are unwavering and do not seem worried about the risk of acquiring an STD and does not find a need to rely on condoms to protect themselves against disease. Although condoms are viewed primarily as contraceptive rather than prophylactics, they are frequently perceived by youth of both sexes as a promiscuous/ extramarital contraceptive method. The other reason for barriers to condom use reflects unease with the method stemming from its occasional association with illicit sex. Likewise, comments made by male focus-group participants reveal that the experience of friends influence their evaluation of condoms. The notion of preserving male comfort is a common theme in the focus-group transcripts; many boys complain that condoms interfere with sexual pleasure. Undoubtedly, condoms have several negative relational and sensational attributes, as borne in other research (Woodson and Koo, 1999). Some boys may use this argument as an excuse to forgo condom use, whereas others may equate condoms with unfaithfulness to avoid using them. Because both boy and the girl assume that their partner is sexually faithful and because other contraceptive options exists, a perceived need for condom use within stable relationship is lacking, which adds to the explanation of the method's limited use, despite its accessibility and affordability.

"It is not a necessity for me to use (a condom) all the time. It's not like I'm going to use it every time I'm going to have intercourse as it often unplanned or unexpected sex (and might not carry a condom). Moreover, I don't have to bother much about impregnating a girl, as I can have control over withdrawing and ejaculating outside of vagina" (Male respondent, aged 21 years).

"Ours is a stable relationship, we have been going around for three years now. I cannot suggest condom use to my partner, because it might raise his suspicion of me being unfaithful or he might also feel that I do not trust him and he may also leave me for another girlfriend, if his sexual pleasures are not gratified" (Female respondent age 22 years).

"Even though my girlfriend insists on using condom during sex, I do not like using condom, as it does not give me any sensation. I do not enjoy sex with condom. We usually end up having sex without condom" (Male respondent age 22 years).

"Though I know the importance of condom use, I cannot convince my boyfriend to use condom as he is 5-6 older to me. Even though, I feel guilty to avoid him getting angry, I place my boyfriend's pleasure as priority and end up having sex with my boyfriend without condom" (Female respondent age 19 years).

IV. DISCUSSION AND CONCLUSION

It is observed that young people start initiating into risk-taking behavior, such as initiation of tobacco use, smoking, and alcohol use early, during their teenage years. Initiating to smoking behavior is found to happen earlier than initiating into alcohol use or initiating sexual act (18.2 years). Similar to the findings of other research, we found that self reported life time use (ever use) and current use of alcohol or tobacco is more common than use of other illicit drugs. There are also gender differentials in terms of engaging in risk-taking behaviors. Boys are found to initiate into risk-taking behavior earlier than girls and represent more in risk-taking behaviors. Peer related reasons (peer pressure, because of friends drinking/to be part of group) were among the most common reasons cited for tobacco/alcohol use for the first time use. The most common reasons cited for having sex for the first time are by chance- 'sex just happened', highlights serious program attention. In such settings, it would be unlikely that young people would engage in safe sex with protection. There is also gender difference in reasons cited for engaging in sex. A significantly greater number of girls/females than boys/males said that they had engaged in sex due to pressures from partner and to prove love; whereas for boys it was related to fun/pleasure/enjoyment or curiosity or to gain experience. Our findings clearly suggest that females are more likely to find themselves caught between opposing pressures from their boyfriends and from society at large. Majority of girls reported that they had been persuaded to engage in their first sexual experience through a partner's subtle pressure and promises of a permanent relationship. Normally, this generation is well aware of this disease (AIDS) and how it can be prevented, but couples in stable relationship may not find a need to rely on condoms to protect themselves against this disease. Childhood exposure to alcohol use is also found to be significantly associated with alcohol use pattern; programs should aim at reducing early childhood exposure to alcohol by addressing the avoidance of consumption or use of alcohol in the presence of children.

It is important to provide young people with objective information, to prevent them from engaging in risk-taking behaviors and educate youth about various adverse effects of engaging in risk-taking behavior.

To change values and norms, youth should be taught about the life skills, the advantages of abstaining from risk-taking behavior or using condoms and they also be taught refusal skills/focus on self-efficacy to refuse substance, sex and to use condoms etc; intention to abstain from sex or to restrict sex or partners. Since the concept of self-efficacy relates to 'empowerment issues', focusing on improving the self-efficacy and working on building self confidence and refusal skills would have important application for working with vulnerable youth. Norms based interventions to ensure safe sexual practices should also focus on promoting condom as dual protection.

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Problems of Solid Waste Management in Indian Cities

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VI. INTRODUCTION

“**Solid waste**” refers to the refuse, the solid and semi solid waste matters of a community except the night soil. Solid waste contains organic as well as inorganic matters. Solid waste management includes the entire process of dealing with solid waste, starting from the collection from the primary source to ultimately disposing off it hygienically, so that it may not be a nuisance or create any harmful effect on near by community. The solid waste management involves, management at waste generation level, storage at the source of generation, primary collection, street cleansing, temporary storage at locality level, regular and periodic transportation of this temporarily collected waste to disposing sites and treatment plants.

As per **Municipal solid waste Management and Handling rules -2000**, solid waste management is in the obligatory function of urban local bodies, but in actual practice the solid waste management is given the last priority and the duties are either not performed or poorly performed consequently the city has to face numerable problems related to environment and sanitation.

As per the reports of the committee constituted by the Hon'ble Supreme Court of India in March 99, the lack of financial resources, inefficient institutional arrangement, inappropriate technology, weak legislative measures and unawareness in public towards solid waste management has made the service most unsatisfactory and inefficient.

The solid waste management approach in India is extremely inefficient, using old and obsolete system, technology for storage collection processing, treatment and disposal. There is no formal organized system of segregation of biodegradable and non biodegradable solid waste. The recovery and recycling of waste is only done by scavengers and scrap dealers which is highly hazardous to those which are involved in this job.

I. THE ENTIRE SOLID WASTE MANAGEMENT CAN BE DIVIDED IN FOLLOWING ACTIONS

1. Generation of Solid waste
2. Collection of solid waste at primary source
3. Street Cleansing
3. Transportation of solid waste to the secondary/ locality storage/community bins
4. Storage of solid waste at locality level
5. Transport of solid waste to dumping sites and treatment plants
6. Treatment and Dumping of Solid Waste
7. Traditional approaches of dealing with solid waste

II. GENERATION OF SOLID WASTE

Following are the **major sources of generation of waste at urban level**

- 1- Solid waste from **Residential Areas, Institutional/Community areas**
- 2- Solid waste from **vegetables markets (retail & wholesale)**
- 3- Solid waste from **Hotels, and restaurants**
- 4- Solid waste from **commercial areas**
- 5- Biomedical waste from **hospitals and dispensaries**
- 6- Waste from **domestic / stray animals /dairies**
- 7- Solid waste from **Industries**
- 8- Waste from street cleansing
- 9- Miscellaneous

III. QUANTITY OF GENERATION OF WASTES IN INDIAN CITIES

- The **per capita solid waste** generation in few Indian cities

City Waste Generation Rates:

- **Delhi** .60 Kg Per Capita Per Day
- **Banglore** .53 Kg Per Capita Per Day
- **Calcutta** .51 Kg Per Capita Per Day
- **Hyderabad** .35 Kg Per Capita Per Day
- **Sonapat** .343 Kg Per Capita Per Day
- **Hardwar** .40 Kg Per Capita Per Day
- **Meerut** .45 Kg Per Capita Per Day

Source: *Reports concerned Municipal Corporations/Committees*

- The **waste generation in small cities is lesser than larger cities**.
- The amount of **solid waste generation** is also directly related to the **economic status of families**.
- As per studies conducted by Tata Energy Research Institute, **higher income group generate more solid waste than middle and lower income groups**.
- The **lower income groups in New Delhi generate less than 1/3rd of solid waste than their higher income counter parts**.
- As per studies conducted, in smaller cities of population about 3 lakhs the **generation of biodegradable waste (50 – 65%) is more than non biodegradable waste (35 – 50 %)**. The

biodegradable waste can be easily reduced to manures by composting plant

that the **organic matter in India solid waste is higher**, due to the presence of a **large percentage of vegetative matter**. This is attributed to the fact that Indians eat fresh vegetables and fruits in contrast to the consumption of tinned / pre – cooked food in developed countries .

IV. COMPOSITION OF SOLID WASTE IN INDIA

The comparative study of the solid wastes composition for cities in industrialized countries and Indian cities reveals

V. COMPOSITION OF WASTES OF LARGE CITIES IN INDIA

Component % by Wet weight	Ahmedabad	Bangalore	Bombay	Calcutta	Delhi	Kanpur
1. Paper and card	5.15	1.5	3.20	0.14	5.88	1.35
2. Metals	0.80	0.1	0.13	0.66	0.59	0.18
3. Glass	0.93	0.2	0.52	0.24	0.31	0.38
4. Textile	4.08	3.1	3.26	0.28	3.56	1.57
5. Plastic , leather 6. And Rubber	0.69	0.9	-	1.54	1.46	0.66
7. Wooden matter	1.5	0.2	17.57	-	0.42	1.0
8. Husk and straw						
9. Bones etc	0.12	0.1	0.5	0.42	1.14	0.21
10. Stones etc	8.77	6.9	-	16.56	5.98	18.38
11. Fine earth, ash etc	29.01	12.0	15.45	33.58	22.95	22.93
12. Fermentable	48.95	75.0	59.37	46.58	57.71	53.34
Density of Refuse (kg /cu.m)	-	578	-	600	-	500

Source: Reports concerned Municipal Corporations/Committees, Nath, K.J. 1984

Ash and fine earth	30-50
Total organic fractions	30-50

VI. COMPOSITION OF WASTES OF SMALL CITIES IN INDIA

Source: Reports Municipal Committee, Sonipat

Case Study of ingredients of Waste Generated at Sonapat

Component	Percentage
Paper	3.0-10
Plastic	1.0-5.0
Metals	0.4-1.0
Glass	0.3-10

Case study of Waste Generated at Hardwar

Components	Percentage	Quantity Produced per day (Metric Tonnes)	Recyclable@10%
Paper	10	14.2	1.42
Plastics	5.0	7.125	0.7125
Metals	1.0	1.42	0.142
Glass	1.0	1.42	0.142

Source: Reports Municipal Committee, Hardwar

Case study of Waste Generated at Hardwar: Cost /ValueOf Recyclable Items

Component	Recyclable Quantity /day (in kgs)	Rate Per kg (in Rs)	Total value (in Rs)
Paper	1,420	2.00	2840.00
Plastic	712.5	8.00	5700.00
Metal	142	5.00	710.00
Glass	142	0.75	71.00
Total			9321.00

Source: Reports Municipal Committee, Hardwar (2004)

VII. SOURCES OF WASTE GENERATION IN THE CITY OF SONEPAT

S. No.	Sources of waste generation	Waste generation Per day (MP)	Percentage to the Total
A	Local Inhabitation		
1	House holds	59.04	74.96
2	Shops and commercial Establishment	1.04	2.08
3	Grain and vegetable Markets	6.50	7.61
4	Construction and Demolition Waste	3.00	3.80
5	Institutional and Medical	3.50	4.57
6	Industrial	4.00	5.07
	Sub Total (A)	77.08	98.10
B	Floating Population	1.30	1.90
	Sub – Total (B)	1.30	1.90
	Grand Total	78.38	100.00

Source: Reports Municipal Committee, Sonipat

Quantity of waste generation in Indian Cities

Population Range	Average per Capita Value (Grams/Capita/Day)
Less than one lakh	210
One lakh to five lakhs	210
Five lakhs to ten lakhs	250
Ten lakhs to twenty lakhs	270
Twenty lakhs to fifty lakhs	350
More than fifty lakhs	500

VIII. PROBLEMS OF STORAGE OF SOLID WASTE AT THE SOURCE OF GENERATION

- In most of the cities in India , **the scientific and systematic storage of waste at source is not in practice .**
- The waste is normally **thrown in nearby vacant areas ,government vacant land ,drains, streets etc .**
- Because of waste thrown on the street **the environment becomes ugly** and unhygienic , so even in case of regular cleaning be Municipal Workers

also, the city can not be kept clean for more than 2-3 hours .

- At sources people generally **don't arrange to provide proper dustbins** , in residential , institutional and commercial areas .
- In case of open drains and large drains passing across the city , people throw waste and these **drains are clogged** , width of **large drains are reduced** because of continuous **dumping**
- People generally use following items to collect waste at source : buckets ,polythene packets, plastic bins , metal bins with and without lids .

- People generally **don't take the waste to the designated points** they carry it to nearby roads , railway tracks , open plots etc and generally people avoid walking to the designated disposal points .
- So when **wind blows the heap of solid waste get carried away by wind and spread** in large areas and when there are rain the problem get aggravated.
- There is **no system of keeping the Bio degradable and non Bio degradable waste separately**
 - **No processing** of the waste is done in most cities . Very few cities have the organizational and administrative set – up to subject the waste to treatment process like composting and that too on a very limited scale . Most of the wastes are disposed by the concerned agency at an open dump without going in to the details of either site or wastes. **There is no adherence to any standards or norms for disposal and the sites is not scientifically managed .**
 - **The land filling practice in most Indian cities is one of the most unscientific and unhygienic practices with serious environmental implications .** The wastes are brought to the site and dumped . There are no consideration for leach ate , gases and cove. The land fill sites are mostly accessible to scavengers , animals and vectors .

STREET CLEANISING

The **major sources of street waste** in the city are –

- 1- Natural waste comprising of dust , decaying vegetation , fallen trees leaves , blossoms , seeds , plants and animals .
- 2- Road traffic waste like oil , rubber , accidental spillage of load of vehicles , animals dropping construction waste etc .
- 3- Waste from near by areas / population from residential area , commercial areas , industrial areas etc .
- 4- Litter thrown by pedestrians waste from houses , hotels , establishments , excreta of animals , pets like pigs ,cattle , dogs etc .
- 5- Waste produced by street hawkers , road side vegetables vendors , slum dwellers .

PROBLEMS OF DEALING WITH THE SOLID WASTE NEAR THE SOURCE OF GENERATION AND TEMPORARY COLLECTION POINTS

- Sweepers generally restrict themselves **only to the sweeping of the streets and cleaning of drains .**
- Sweepers **avoid door stop collection** of wastes in some areas , private sweepers collect the waste and deposit it to the collection points .

- As per the provision of **state Municipal acts the sweepers are required to collect waste from the door step during street sweeping on daily basis .**
- **No initiative** are generally **taken in monitoring the community** and citizen to cooperate with the municipal sweepers by bringing the waste produced in the households and commercial establishments to the sweepers or up to the community bins.
- **Municipal rules** engage workers for **eight hours in a day** with a provision of cleaning in morning as well as in the evening where as in actual practice only cleaning happens in one time ie. Morning and **work is generally done from 2-3 hours .**
- **Municipal manpower and financial resources are very less contextual to the gravity of problem,** and available resources **are not properly used.**

TRANSPORTATION OF WASTE TO THE COMMUNITY BINS

Transportation of waste from the source to the community bin is the responsibility of scavengers deployed for the purpose and door to door collection is required to be done but in actual situation this work is either **done by people themselves or by privately employed workers, scavengers.** Generally the vehicles used for the purpose are bin hand carts, simple hand carts, tricycles,etc

COMMUNITY BINS: TEMPORARY STORAGE OF WASTE AT LOCALITY LEVEL -

- For approximately an area of about 5-10 acre there is 1-2 temporary storage of waste .
- these storage boxes are Dalao (50' x 6' x 3') mild steel containers (6'x 4'x 3') , mild steel containers (3'x 3' x3')

IX. TRANSPORTATION OF WASTES

The main objective of transportation is to **clear waste** from the city and dispose it off at the disposal site . It is the responsibility of the local body to ensure the city to be clean by transporting the waste **from various temporary storage points** to the **dumping grounds** with the help of transportation fleet maintained by the local body . The movement of waste from the households ,street sweeping , etc . to the temporary storage collection points is the collective responsibility of the sweepers and the citizens of the city .

Transportation of waste involves the following activities :

- **Movement** of vehicles to various **temporary storage points .**
- **Manual loading** of waste using baskets and other lifting tools .

- Lifting of waste from the open yards on the way to the disposal site and
- **Transportation to the disposal site .**

It is very essential to synchronize the whole operation of collection of waste with the transportation for effective management of the waste and for achieving economy in the process .

Process of Transportation of Waste :- In India generally the smaller cities have adopted open transport system for transporting the waste from the temporary storage points to the disposal site .Wastes are collected from various temporary storage points and open collection points and are loaded to the transport vehicles manually . Manual loading is found to be time consuming and reducing the productivity of the vehicles and man power deployed for the purpose . Further , manual loading and handling of wastes are posing threat to the health of sanitary workers , as the wastes were found highly contaminated . As a result ,the waste is generally seen lying in heaps or scattered at the unscientifically designed temporary waste storage points giving unsightly appearance besides causing nuisance and unhygienic conditions .

Ideally for the **manual loading** , the man power requirement is about **3 sanitary workers including Driver** . One sanitary worker shall fill the basket with the waste and another to dump into the cargo of the vehicle . For lifting operation, the sweeper who is in operation near the storage site may be used . However in case of **Sonipat** , it was observed that 4 sanitary workers including driver accompany each vehicle . It was also observed that one sanitary worker would fill the basket, another to help him to lift the waste to the vehicles and third person to unload the waste into the vehicle and level the waste inside the vehicle . There is no Driver available with Municipal Council Sonipat . The posts are vacant and have not been filled from last years . Presently the sanitary workers themselves drive the tractors .

TREATMENT AND DUMPING OF SOLID WASTE

- The main objective of treatment and disposal is to clear waste from the disposal site in an environment friendly manner with little/ non serious implication on the health and hygiene of the micro and macro environment. It is responsibility of the local body to ensure safe disposal of the waste generated with in the its jurisdiction. The urban local bodies have generally adopted **dumping as method of the disposal** of the waste as on today. Currently the waste is not treated in systematic and scientific manner. As a result the whole area in and around the disposal site has become un hygienic and posing serious threat to the public health
- In case of Sonapat city municipal council has **not specified any solid waste dumping yard**, the area where the waste is dumped are near vegetable markets and along the railway line ,again causing threat to nearby areas

- In city of **Hardwar** all the solid waste collected is **dumped in low lying areas adjacent** to the **Eastern Ganga Canal** on the banks of river Ganges on land belonging to irrigation department. The **hazardous waste of Hardwar** are also **dumped along** with all other wastes by the bank of river Ganges and adjacent to the canal,. This low lying area is approximately 1.5 kms long and varies in width from 75 to 100. Meters.
- There is **no monitoring facility** at the disposal sites, neither there is any provision of fencing/ boundary wall, there is no arrangement for protective measures like impervious lining materials cover material etc to protect. the canal/ river from contamination
- No consideration has been given to **pollution control**

PROBLEMS OBSERVED IN THE PROCESSING AND RECOVERY OF SOLD WASTE

- 1 Generally in Indian cities the **formal processing and recovery units are not established**
2. Recovery and **recyclable activities restricted** to small and medium kabadiwallas
3. Involvement of **small children and old people** employed for sorting and segregating waste.
5. **No protective clothing** /consideration for rag pickers / scavengers
6. Generally in Indian cities **financial implications of recovery and recycling has not been studied** or considered to use solid waste for the purpose of finance generation

STRUCTURES OF MIUNICIPAL TEAM WORKING FOR SANITARY CLEANING

In Indian towns the entire municipal area of town is divided in to sanitary divisions having 100-1000 acres of land depending on size of cities, population densities,locations,available facilities and manpower. In each of the sanitary divisions one Safai Daroga is posted under whom 5-10 scavengers / workers perform the cleaning work .Over these safai darogas there are sanitary inspectors and chief sanitary inspector responsible for the cleanliness and total hygienic environment of city.

SIGNIFICANT FEATURES OF SOLID WASTE DISPOSAL SYSTEM : A CASE OF MEERUT

Meerut is a city with population of about **12 lakhs**

- Presently the amount of **solid waste produced** by city is **600 M.ton per day**.
- Responsibility of collecting and disposing off **solid waste** is of **Municipal corporation** .
- Present capacity of **Municipal Corporation** is deal with **only 450 M ton** , and the entire waste is **dumped in out skirts of city** .
- **No proper study** has been conducted to actually examine the **nature of & ingredient of the waste** .

- The waste contains mainly from **industrial waste , waste from hospital / medical institution , commercial waste and residential waste .**
- City has great potential for involving **private parties** and the **solid waste can be used commercially and for public use** , though some attempt are being made to **increase the capacity of collection and disposing off by 150 M ton .**
- **By year 2021 , there will be 1150 M ton solid waste** where as presently Municipal Corporation has **capacity** of dealing with **450 M ton.**

- All dumping grounds are located in south and south eastern side of city , more dumping grounds are **required towards N, NE, NW sides .**
- Location of one of the yard in village **Ghosipur** having residential density of **450 ppa which are not compatible .**
- **Special provision in zonal development plan** are also required to develop these spaces in a way so that they do not create any problem to near by land uses.

The **facilities available** with **Municipal Corporation** are-

- 1- JCB –3 no.
- 2- Leader – 3 no.
- 3- Truck – 3 no.
- 4- Small truck –6 no.
- 5- Truck - 9 no.
- 6- Inspectors –6 no.
- 7- Safai karamchari –1923 no.

Source: Report Municipal Corporation Meerut

Status of Availability of Staff

	Post available	actual strength
Health officer	1	nil
Mukhya safai nirikshak	12	3
Safai nirikshak	40	7
Safai karam chari	7440	1905
Bhisti	163	nil
Malaria karam chari	27	7
Dog squad	35	5
Doctors	2	1
Compounder	12	5
Midwife	6	3

Source: Report Municipal Corporation Meerut

- Out of **70 Municipal wards** of city , **15 wards have no system for solid waste disposal , 27 have partial system and 28 wards are fully attended.**
- **Detailed policy / activity frame work** is required for collection , of waste , segregating of harmful Industrial waste , Bio degradable waste and non degradable waste .
- At least **four locations are required to collect the waste** and with **private-public joint venture** waste should be used commercially .
- Few efforts have been made to address the problem of solid waste by allocating **three location at village Ghosipur , Rali Chauhan and Itehra** ,Also there is a mention of installation of a **modern plant for treating harmful medical waste.**

X. CASES OF MEGA CITIES

- In **Bangalore** again the most common method of disposal is open dumping of the wastes in the land fill sites . Bangalore has 14 such sites where the solid wastes are dumped in open heaps without any processing or treatment . There are two composting plants which can process 200 metric tones of SW per day and 300 metric tones of SW per day , however both the plants are operating much below capacity and process only one – third of their capacity .
- In **Calcutta** solid wastes are disposed by both land filling and open dumping – there are more than 40 such disposal grounds in additions to small private land filling sites . These sites receive from 500 to 10 metric tones of solid wastes per day , depending on there size .
- The situation in **other Indian cities** too is not drastically different from that in the cities discussed above and thus the need for urgent intervention , in terms of suitable long and short term plan proposals by planners for addressing the issue , and a pragmatic approach by policy and decision makers to facilitate sustainable solid waste management programmes , to prevent any further misshape like Surat . Our cities can sustain their environment and the vagaries of development only if an all – encompassing holistic approach to town and country planning is adopted and implemented .
- In **Delhi** around 5339 **Community Bins** have been placed at community level in two colors blue and red for biodegradable and non biodegradable wastes but since people are not serious in putting waste in correct bins and rather the waste is thrown in out of the bin, so the problem of solid waste is increasing day by day.

SOLID WASTE MANAGEMENT OF CITIES THROUGH PRIVATISATION EXISTING MODELS

- In city of **Baroda** ,resident welfare association are playing magnificent role regarding solid waste management of the city .
 - RWA arranged door to door campaign to generate public interest , it appointed volunteers to manage the program and appointed sweepers .
 - Rs 3- Rs 5per household from slum areas and Rs 30 per month per house hold is collected from other residential area , more money was paid by commercial establishments in order to transport regularly the solid waste from generation point to primary collection point
 - They generated an orderly system of door to door collection of waste and transporting it to the community bins .
 - In **Kochi** in 1994 the work of collecting waste from the community bins ,and transporting it to the disposal sites was awarded to a private agency called PEMS (Popular Environment Management Services) through a contract for five years .
 - The corporation installed 350 metal bins as community waste collection points and provided 6-7 waste collection vehicles to PEMS on rent .
 - Operation and maintenance of the vehicles is the responsibility of PEMS .which ensures maintenance and efficiency of the vehicles .
- All personals were employed by PEMS and collection carried out in 12 hours .shift per day .pems changed the co operation Rs 100 per cubic metre of the waste disposed at site designated and monitered by the corporation .PEMS was responsible for collecting and dumping 130 tonnes out of the total 400 tonnes of solid waste generated in Kochi in 1994 .
- PEMS collected the waste from fix points the routs were predestinated .The vehicles collect the waste from the community collection bins by hydraulic lifting and dispose the waste at the disposal sites .All secondary collection , transportation and disposal are carried out at night .
 - However , the **high percentage of organic portion** in the Indian waste makes it suitable to biological processes like composting .
 - In some of the large Indian cities **composting of Municipal solid wastes** (MSW) has been taken up on a commercial scale .
 - In Faridabad (Haryana) and Chennai the respective **Municipalities have given contracts to private companies for producing marketable compost from the solid waste being generated in there area .**
 - The **incentives to the private companies** includes allotment of **land of lease , assurance of a fixed quantity of waste every day , subsidy on the purchase of equipment and tax holidays for specified periods on the income from sale of the produce from the plant .**
 - In **Delhi** the work of providing **community bins and maintaining** them has been privatized in few areas/ zones but still no significant result has been observed in comparisions to other areas

TRADITIONAL APPROACHES IN DEALING WITH THE SOLID WASTE IN INDIA

- **The solid waste in Indian cities makes it unsuitable for processing operations like incineration , pyrolysis , etc . due to the high percentage of non combustibles and moisture in the waste .**
- There are number of indeginious methods developed in India which are very suitable in our situations and are profit generating, one such method is very famous in which the solid waste is first sieved to remove larger particles, constituents, further the waste is dried and screened to remove the sand plastic and metallic etc and converted in to small pellets
- A binder could be used for pelletisation or the lignin in the vegetables matter in the garbage it self can also serve as a binder .The pellets are dried in a rotary hot air drier to around 8 to 10 percent moisture level and are then ready for use , the **pellets have a heating value of 4000 kcal / kg and a bulk density of 500 kg / cum** due to the high amount of biomass present in the Indian refuse .
- The **fuel pellets** are an **excellent domestic fuel** , since they burn without a smoke in contrast to charcoal and fire wood .Due to high heating value lesser quantity of the fuel can produce better heating in lesser time , this process will not only reduce the nuisance of ill disposed garbage but also be economical in terms of saving precious fossil fuels and fire wood .The **pellets** can also be used in **small thermal power plants .**

- Another **indigenous treatment method** developed from traditional Indian treatment processes for wastes is the **Vermicomposting** process developed and systematized by Bhawalker Earthworm Research Institute in Pune. This cost effective method needs no complex equipment and negligible energy inputs. This process utilizes the ability of the earthworms to disintegrated the biodegradable portion of the municipal solid waste. The earthworm's gut provides ideal temperature, pH and oxygen concentration for the speedy growth of useful aerobic bacteria and actinomycetes and thus has a very high microbial density about 1000 times greater than in the surrounding soil. The worm also produces enzymes which break complex biodegradable matter present in the garbage into simpler compounds which are used by the microorganism.
- The **earthworm** is capable of feeding on the waste and reducing its size to 2 microns size thus providing a greater surface area for microbial action. The blood hemoglobin in worms has a very high oxygen affinity and is thus available for the micro-organism in high concentrations. The oxygen rich micro-environment accelerates the aerobic decomposition and eliminates the anaerobic micro-organism.
- The micro-organism in the earthworm's gut produce useful compounds like antibiotics, vitamins, plant-growth hormones etc. which are all present in its vermicastings. They also destroy all the pathogens in the ingested waste thus rendering the vermin casting safe. These **vermicastings** make good bio-fertilizers. This is one of the cheapest and easiest methods of processing organic fraction of the solid waste. **Vermicomposting** can be effectively used to process wastes even at the community level in both urban and rural areas due to the simplicity and low cost of the process. But segregation of the biodegradable/organic fraction of the waste is a pre-requisite.

LEGISLATIVE ASPECTS OF SOLID WASTE MANAGEMENT : CASE OF HARYANA

Most of the Municipal Acts, in Indian cities have some provisions for the management of solid wastes.

The **Haryana Municipal Act, 1973**, deals with the issue of solid waste management under '**Scavenging and House Scavenging**'. Sections 152 through 168 of the Act are dedicated to the subject.

The provisions of the act makes the removal of offensive matter mandatory for residents, they can be served notice for this purpose by the Municipality. The act also bans the dumping of earth and solid wastes on to the streets, into drains, sewers and irrigation channels. Such offences are punished with a fine under the act. The act also abolishes the practice of scavenging and carrying of night soil by persons on their head.

XI. RECOMMENDATIONS

- There is a dire need to **educate and make aware the people** to change their habits, so as to store waste at source, and dispose off the waste as per the direction of Municipal council and effectively participate in the activities of Municipal council.
- **Clear guidelines** relating to the kind of storage receptacles, segregation of waste etc. should be issued, offenders should be penalized.
- There should be **segregation of non biodegradable/recyclable waste** at sources or at secondary collection point and methods like composting should be used for biodegradable waste.
- There should be segregation of waste at the city level also for disposing the recyclable waste and hazardous waste properly.
- The food waste, vegetable and **organic waste** produced at source which are biodegradable should be stored in **non corrosive container** preferably with cover/lid.
- Dry and **recyclable waste** should be stored in bag/sacks made of plastic/paper/cloth etc.
- All the domestic **hazardous waste**, electronic equipment waste should be stored in bags/sacks and should be disposed in **notified safe areas**.
- **Separate community bins** should be provided for **dry and wet** waste.
- For commercial areas and hotels the dustbins should be **containers** not more than **100 lts** in size with handles on top or on sides with rim at base.
- In case of **vegetable markets large containers** complementing the transportation system should be provided.
- For waste in meat and fish markets the containers should be **non corrosive** and not more than 100lts.
- **Biomedical waste** from hospitals and nursing homes should be treated as per the provisions contained in Government of India, Ministry of Environment and Forest Biomedical wastes (Management and Handling) Rules -1998.
- Wastes from construction sites, **Demolition waste** should be **with in the premises** and not at all abstracting the road.
- **Door step** collection of waste by municipal workers and commercial areas should be ensured.
- All waste should be **segregated in bio degradable, non biodegradable waste** before primary collection.
- **Transportation to temporary source** should be by handcarts/tricycles with detachable containers of 20 to 40lts capacity.
- For **street cleansing** sweeping operation should be broadly clarified as per the cleansing requirements.
- The time of **sweeping** operation should be **synchronized** with that of **generation** by dividing the city in to sweeper beats.

- Shovels should be used to pick the **heaped waste** and transfer to the containers .
- For temporary storage and in case of **community bins** , containers should be **metal mobile containers** in place of cylindrical cement . bins , masonry tanks and space should be provided to accommodate 3-10 cubic meter size .
- In order to **reduce waste at dumping site** , Incinerators , composting methods can be used .
- There is a dire need for community participation and design and development of appropriate system of primary collection of waste so as to synchronize with the storage at source as well as temporary storage collection point
- The **dumping** should be done generally in **low lying areas** of city , open land available in out skirt of city .
- Every dumping site should be **away from residential area** or habitation .
- Dumping sites should preferably be **barren land**
- Sites should have **proper access** .
- Sites should have **provision for workers** shelter stay , tools , equipment , electronic weigh bridge etc
- **Private initiative** is required in treatment and disposal solid waste .
- There are requirement of **state legislation** , rules or controls governing the solid waste management .

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Low Complexity and High Accuracy Fixed Width Modified Booth Multiplier

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Abstract- In many high speed Digital Signal Processing (DSP) and multimedia applications, the multiplier plays a very important role because it dominates the chip power consumption and operation speed. In DSP applications, in order to avoid infinite growth of multiplication bit width, it is necessary to reduce the number of multiplication products. Cutting off n-bit Less Significant Bit (LSB) output can construct a fixed width multiplier with n-bit input and n-bit output. However, truncating the LSB part leads to a large number of truncation errors. In order to avoid truncation error, error compensation circuit is designed with less truncation error and less hardware overhead. A new error compensation circuit by using the dual group minor input correction vector to lower input correction vector compensation error is proposed. As compared with the conventional multiplier, the proposed fixed width modified booth multiplier performs not only with lower compensation error but also with lower hardware complexity, especially as multiplier input bits increase. In the proposed fixed width multiplier, the truncation error can be lowered compared with the direct truncated multiplier and the transistor count can be reduced compared with the full length multiplier.

Index Terms- Fixed Width Multiplier, Modified Booth Multiplier, Error Compensation Circuit, Partial product Generator, CSA Tree.

I. INTRODUCTION

Multiplier plays an important role in today's digital signal processing and various other applications. With advances in technology, many researchers have tried and are trying to design multipliers which offer either of the following design targets high speed, low power consumption, regularity of layout and hence less area or even combination of them in one multiplier thus making them suitable for various high speed, low power and compact VLSI implementation. Multiplication involves two basic operations, the generation of partial products and their accumulation. The former operation is generally implemented by AND gates and the latter is implemented by several CSA stages. Basically each CSA stage consists of n CSA cells that take three inputs of the same weight and generates two outputs. Each CSA stage sums up one additional partial product, and the intermediate partial product is kept in so called carry save form. As there is no carry propagation in a CSA stage, the total delay is independent of the number of bits of a partial product but depends on the number of partial products. Therefore, an important objective in the design of a multiplier is

to reduce the number of partial products. The most popular partial product recoding scheme is known as the modified Booth recoding.

In this paper, an enhanced error compensation design for fixed width modified booth multiplier is proposed. The proposed modified booth multiplier consists of partial product generator, CSA Tree and the circuit is simplified using De Morgan's law. A new error compensation circuit by using the dual group Minor Input Correction (MIC) vector to lower Input Correction (IC) vector compensation error is designed. By the symmetric property of MIC, fan-in can be reduced to half and hardware in up-MIC and down-MIC can be shared. Then, the hardware complexity of circuit is lowered. De Morgan's simplification is performed to decrease the transistor count of the compensation circuit [1]. In [2] a high-accuracy error compensation circuit for the fixed-width modified Booth multiplier is proposed. To reduce the truncation error, the partial product matrix of Booth multiplication is modified and an effective error compensation function is derived that makes the error distribution be more symmetric to and centralized in the error equal to zero, leading the fixed width modified Booth multiplier to very small mean and mean-square errors. In addition, a simple compensation circuit mainly composed of the simplified sorting network is also proposed. Compared to the previous circuits, the proposed error compensation circuit can achieve a tiny mean error and a significant reduction in mean-square error. In [6] Truncated multipliers compute the most-significant bits of the n x n bits product. This paper focuses on variable-correction truncated multipliers, where some partial-products are discarded, To reduce complexity, and a suitable compensation function is added to partly compensate the introduced error. The optimal compensation function, that minimizes the mean square error, is obtained in this paper in closed form.

II. FUNDAMENTAL OF MODIFIED

BOOTH MULTIPLIER

Let us consider the multiplication operation of two n-bit signed numbers $A = a_{n-1}a_{n-2}\dots a_0$ (multiplicand) and $B = b_{n-1}b_{n-2}\dots b_0$ (multiplier). The two's complement representations of A and B can be expressed as follows:

$$A = -a_{n-1}2^{n-1} + \sum_{i=0}^{n-2} a_i 2^i, \quad B = -b_{n-1}2^{n-1} + \sum_{i=0}^{n-2} b_i 2^i. \quad (1)$$

By modified Booth encoding which groups the bits of the multiplier into triplets, can be expressed as,

$$B = \sum_{i=0}^{n/2-1} M_i 2^{2i} = \sum_{i=0}^{n/2-1} (-2b_{2i+1} + b_{2i} + b_{2i-1}) 2^{2i} \quad (2)$$

The Modified Booth Encoding Table is follows as

Table I - Modified Booth Encoding Table

b_{2i+1}	b_{2i}	b_{2i-1}	Operation	neg_i	two_i	one_i	$zero_i$	car_i
0	0	0	+0	0	0	0	1	0
0	0	1	+A	0	0	1	0	0
0	1	0	+A	0	0	1	0	0
0	1	1	+2A	0	1	0	0	0
1	0	0	-2A	1	1	0	0	1
1	0	1	-A	1	0	1	0	1
1	1	0	-A	1	0	1	0	1
1	1	1	-0	1	0	0	1	0

III. PROPOSED FIXED WIDTH MODIFIED BOOTH MULTIPLIER

The proposed width modified booth multiplier consists of partial product generation circuit. It generates the partial products when the multiplication is performed. Then CSA Tree and De Morgan's circuit is present.

A. PARTIAL PRODUCT GENERATION CIRCUIT:

If the Multiplicand and multiplier are of n-bits then the partial product generator generates (0.....n/2-1) n/2 number of one dimensional partial product bits. Figure 1 shows the partial product generation diagram.

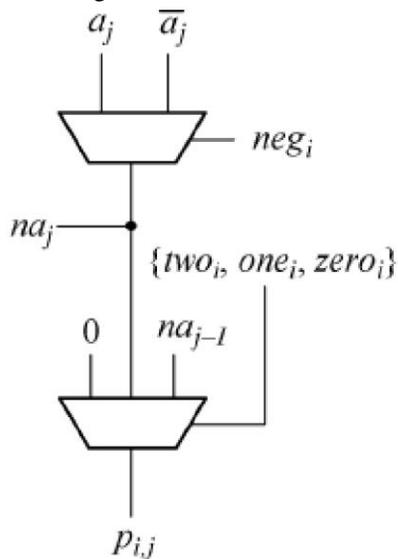


Figure 1: Partial Product Generation Circuit

B.CSA TREE

A Carry Save Adder is just a set of one bit full adders, without any carry chaining. Therefore, an n-bit CSA receives three n-bit operands, namely A(n-1)..A(0), B(n-1)..B(0), and CIN(n-1)..CIN(0), and generates two n-bit result values, SUM(n-1)..SUM(0) and COUT(n-1)..COUT(0).

The most important application of a carry save adder is to calculate the partial products in integer multiplication. This allows for architectures, where a tree of carry save adders (so called *Wallace tree*) is used to calculate the partial products very fast. One 'normal' adder is then used to add the last set of carry bits to the last partial products to give the final multiplication result. Usually, a very fast carry look ahead or carry select adder is used for this last stage, in order to obtain the optimal performance.

There are many cases where it is desired to add more than two numbers together. The straightforward way of adding together m numbers (all n bits wide) is to add the first two, then add that sum to the next, and so on. This requires a total of m - 1 additions, for a total gate delay of O(mlg n) (assuming lookahead carry adders). Instead, a tree of adders can be formed, taking only O(lgm · lg n) gate delays. Using carry save addition, the delay can be reduced further still. The idea is to take 3 numbers that have to add together, x + y + z, and convert it into 2 numbers c + s such that x + y + z = c + s, and do this in O(1) time. The reason why addition cannot be performed in O(1) time is because the carry information must be propagated. In carry save addition, refrain from directly passing on the carry information until the very last step. Illustration of the general concept with a base 10 example as follows:

To add three numbers by hand, typically align the three operands, and then proceed column by column in the same fashion that have perform addition with two numbers. The three digits in a row are added, and any overflow goes into the next column. Observe that when there is some non zero carry, then really adding four digits (the digits of x,y and z, plus the carry).

The carry in signal is considered as an input of the CSA, and the carry out signal is considered as an output of the CSA. The computation can be divided into two steps, first compute S and C using a CSA, then use a CPA to compute the total sum. From this example, the carry signal and the sum signal can be computed independently to get only two n-bits numbers has been observed. A CPA is used for the last step computation and the carry propagation exist only in the last step.

C. DEMORGAN'S LAW

In propositional logic and Boolean algebra, De Morgan's laws are a pair of transformation rules that are both valid rules of inference. The rules allow the expression of conjunctions and disjunctions purely in terms of each other via negation. De Morgan's laws are used to simplify Boolean equations so that equations can be build only involving one sort of gate, generally only using NAND or NOR gates. This can lead to cheaper hardware.

In set theory, de Morgan's laws relate the three basic set operations to each other; the union, the intersection, and the complement.

If A and B are subsets of a set X, de Morgan's laws state that

$$(A \cup B)^c = A^c \cap B^c$$

Here, \cup denotes the union, \cap denotes the intersection, and A^c denotes the set complement of A in X.

Above, de Morgan's laws are written for two sets. In this form, they are intuitively quite clear. For instance, the first claim states that an element that is not in A B is not in A and not in B. It also states that an elements not in A and not in B is not in A B. In extensions of classical propositional logic, the duality still holds (that is, to any logical operator that can always find its dual), since in the presence of the identities governing negation, one may always introduce an operator that is the De Morgan dual of another. This leads to an important property of logics based on classical logic, namely the existence of negation normal forms: any formula is equivalent to another formula where negations only occur applied to the non logical atoms of the formula. The existence of negation normal forms drives many applications, for example in digital circuit design, where it is used to manipulate the types of logic gates, and in formal logic, where it is a prerequisite for finding the conjunctive normal form and disjunctive normal form of a formula. Computer programmers use them to simplify or properly negate complicated logical conditions. They are also often useful in computations in elementary probability theory.

IV. EXPERIMENTAL RESULTS

The experimental result shows us the Error comparison of Normal Conventional Multiplier and Proposed Multiplier is shown in the table2.

Table 2: Comparison of Normal Conventional Multiplier and Proposed Multiplier

INPUTS		NORM AL MULTI PLIER	PROPO SED MULTI PLIER	ERROR VALUE		REDUCED ERROR
X	Y			DIR ECT	PROP OSE D	
101 010	101 010	01101 1	011100	36	28	8
110 101	110 101	10101 1	101100	57	7	50
110 101	101 010	10001 0	100011	50	14	36
111 111	111 111	11111 0	111110	1	1	0
011 001	110 111	01010 1	010110	31	33	2
			AVER	35	16.6	18.4

			AGE			
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V. CONCLUSION

In this proposed fixed width modified booth multiplier, a new error compensation circuit is designed and there is less truncation error. In this approach the partial products are reduced and it results in lower hardware complexity and less partial products.

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An Hybrid Authentication System Using Biometrics and Text Compression

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Abstract- Today, the Internet has melted into our daily lives with more and more services being moved on-line. While we enjoy the convenience, we are putting ourselves at risk. Most current commercial websites will ask their users to input their user identifications (IDs) and corresponding passwords for authentication. Once a user's ID and the corresponding password are stolen by an adversary, the adversary can do anything with the victim's account, leading to a disaster for the victim. As a consequence of increasing concerns over such risks, how to protect users' passwords on the web is becoming more and more critical. To solve this we propose an hybrid authentication system with fingerprint using Efficient Biohashing algorithm to maintain very low error rate than existing algorithms and text compression using AES algorithm.

Index Terms- Authentication system, Biometrics, Biohashing Algorithm, Biohash code, AES algorithm.

I. INTRODUCTION

Biometric have the benefit that it bases recognition on an intrinsic aspect of a human being who is to be authenticated to be physically present at the point of the authentication. Denial of service occurs because of high false rate rejection. Multimodal biometrics can reduce the probability of denial of access without sacrificing the false acceptance performance. In order to solve the problem of high false rejection, a novel two-factor authenticator based on iterated inner products between tokenized pseudo-random number generated by an Hash key and the user specific fingerprint features; in this way, a set of user specific compact codes can be produced which is named "BioHash code".

Direct mixing of pseudo-random number and biometric data is an extremely convenient mechanism with which to incorporate physical tokens. The main drawback of this method, is the low performance when an "impostor" B steals the Hash key or the pseudo-random numbers of A and tries to authenticate as A. When this problem occurs, the performance of BioHashing can be lower than that obtained using only the biometric data.

In this paper, we propose an Efficient BioHashing approach which results more robust than the base method also when an "impostor" steals the Hash key (worst case). Experimental analysis showed the weakness of the base approach in the length of the BioHash code which is bounded by the dimension of the feature space and we propose improvement in algorithm to overcome this problem.

II. RELATED WORK

BIOHASHING:

1. Generates a sequence of real numbers with the help of a given secret hash key to produce a set of pseudo random vectors $ri \in R^n, i=1, \dots, m$. They are linearly independent, eventually discarding wrong ones since they are a basis of space. We adopt the Blum-Blum-Shub method eventhough there are a variety of pseudo-random bit algorithms.

2. Then applying the Gram-Schmidt ortho-normalisation procedure to transform the basis ri into an orthogonal set of vectors or $i=1, \dots, m$.

3. Compute the inner product between the biometric feature vector x and ori ($\langle x|ori \rangle$), $i = 1, \dots, m$ and compute bi ($i = 1, \dots, m$) as

$$bi = \begin{cases} 0 & \text{if } \langle x|ori \rangle \leq \tau \\ 1 & \text{if } \langle x|ori \rangle > \tau \end{cases}$$

Where τ is a preset threshold

The hash key is different among different users and different applications and is given to the user during the enrollment. The resulting bit vector b , named as "BioHashCode", is compared by the Hamming distance for the similarity matching.

III. ANALYSIS

Our ideas to boost the performance of the BioHashing approach are based on these two considerations:

* Increasing the dimension of the hash code for improving the system security.

* Biohashing is an instable classifier.

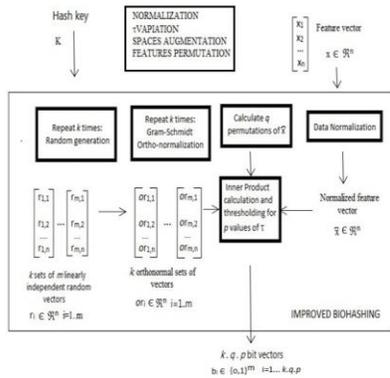
IV. EFFICIENT BIOHASHING ALGORITHM (MODIFIED BIOHASHING ALGORITHM)

An improved version of the Biohashing method leads to Effective Biohashing algorithm as follows,

- **NORMALIZATION** : In this normalization, the biometric vectors normalized by their module before applying the BioHashing procedure, such that the scalar product $\langle x|ori \rangle$ is within the range $[-1,1]$
- **τ VARIATION**: Instead of using a fixed value τ we use many values for τ and we combine with the "SUM rule"

the scores obtained varying τ between τ_{\max} and τ_{\min} with p steps of $\tau_{\text{step}} = (\tau_{\max} - \tau_{\min})/p$

- **SPACES AUGMENTATION:** Since the dimension of the projection space m cannot be increased, so we use more projection spaces to generate more BioHash codes per user. Let k be the selected number of projection spaces to be used, the BioHashing method is repeated k time on the same biometric vector in order to obtain k bit vectors $b_i, i=1, \dots, k$. Then the verification is carried out by combining the classification scores obtained by each bit vector (Hash code). The random generation can be performed repeatedly, thus requiring a single Hash key \mathbf{K} , in such a way that the random generator is not reinitialized by a new key until the complete generation of the k bases is not performed.
- **FEATURES PERMUTATION:** Another way to generate more BioHash codes and without creating more projection spaces of the feature coefficients in \mathbf{x} during the projection calculation: we use q bit vectors. As above the verification is carried out by combining the classification scores obtained by each bit vector.



The result of Efficient BioHashing procedure, if all the above solutions are exploited, is a set of $k.p.q$ BioHash codes b_i , which are compared by the Hamming distance.

V. EXPERIMENT

Fingerprints:

The fingerprint databases $Db1, Db2, Db3$ and $Db4$ provided in FVC 2002 have been used for the experiments. We adopt the procedure named Finger-Code [21] for feature extraction algorithm, which requires to determine a reference point and region of interest for the fingerprint image, using a bank of Gabor filters and to compute the average absolute deviation from the mean of grey values in individual sectors in filtered images to define the feature vector. The result is a feature vector of a fixed size $n = 640$ which can be compared by the Euclidean distance.

For the verification task based on sole biometric data we adopt the method proposed in Ref. [22]. In our verification stage, the comparison of two fingerprints must be based on the same core point.

However, the comparison can only be done if both fingerprint images contain their respective core points, but 2 out

of 8 impressions for each finger in FVC2002 [20] have an exaggerate displacement. In our experiments, as in Ref. [22], these two impressions were excluded, and hence, there are only 6 impressions per finger yielding 600 fingerprint images in total for each database. For the performance evaluation we adopt the equal error rate (EER) [16].

Table 1:
EER obtained of the fingerprint data sets using the following parameters: $m=100, _max =0.1, _min =-0.1, p =5, k =5, q =5$ (BEST hypothesis)

Method	Db1	Db2	Db3	Db4
BIO	5.5	5.2	18.3	8.4
BASE	1	0.8	5.4	1.4
 VAR	0.9	0.6	4.6	1.4
SPAUG	0.5	0.4	3	0.8
FEATPERM	0.5	0.4	3	1
BIO + SPAUG	1	1	5	1.5

Table 2:
EER obtained of the fingerprint data sets using the following parameters: $m=100, _max=0.1, _min=-0.1, p=5, k=5, q=5$ (WORST hypothesis)

Method	Db1	Db2	Db3	Db4
BIO	5.5	5.2	18.3	8.4
BASE	15	15	27	20
 VAR	13	12	27	15.5
SPAUG	11	10	25	14
FEATPERM	11	10	25.1	14.4
BIO + SPAUG	7	6.8	22	9.1

The tests reported in tables 1 and 2 are aimed to compare the Efficient BioHashing method with the BioHashing (BASE) and the simple verification method based on sole biometric data (BIO). We test three configurations of the efficient method where the NORMALIZATION is always present: with "VAR" we denote the simple VARIATION solution, with "SPAUG" and with "FEATPERM" the other two solutions coupled with VARIATION. Since the last two solutions are quite similar each

to other and do not produce sensible variations of performance we did not test them together. The last configuration we tested (BIO + SPAUG) is a combination by the SUM rule of the method-based sole on the biometric features and our best efficient BioHashing. We perform experiments both in the best hypothesis (BEST), when never an impostor steals the Hash key, and in the worst (WORST) and very unlikely hypothesis that always (in each match) an impostor steals the Hash key.

In conclusion, our experiments show that:

Our efficient BioHashing approaches (in all the proposed variants, and in particular in the best configuration SPAUG) dramatically improve the performance of the BioHashing method, mainly in the worst case that always an impostor steals the Hash key.

The fusion of the non-hashing verification approach and our SPAUG method (BIO + SPAUG) can be a good compromise: it reaches a nearly 0 EER in the best and most probable hypothesis of no-stealing of Hash keys and it improve the performance of a pure "BioHashing method" in the worst hypothesis of key stealing.

VI. CONCLUSION

Biometrics has the great advantage of basing recognition on an intrinsic aspect of a human being and thus requiring the person to be authenticated to be physically present. Unfortunately, biometrics also suffers from some inherent limitation: high false rejection of valid users, when the system works at a low false acceptance rate. We have proposed a modified BioHashing approach based on the several solutions for augmenting the length of the hash code, which gains performance improvement also in the worst case when always an impostor steals the Hash key. Moreover, we have shown that the fusion between our efficient BioHashing and a method trained using "only" the biometric data allows the performance to be further efficient.

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TECHNOLOGY AWARENESS & ENVIRONMENT FRIENDLY BEHAVIOUR IN ADOLESCENTS

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Abstract- Nature is so fascinating and embodies the spirit of its creator. The soft green leaf moving gently in the breeze, the drop of dew quivering on the petal of a rose, all are so enthralling, No less in the child with his hazel eyes, silken hair, rosy cheeks, toothless mouth and tender skin. His father the man too is very handsome and perhaps most unique creation of God. God has created all things alone with nature as well as man. Man depended, depending and would depend on the plants, animals and other natural resources for food, clothing, housing, medicine and what not! But unlimited exploitation of nature by man disturbed the ecological balance to that extent that has threatened the survival of man himself.

Environmental problems cannot be solved within a day or two. It requires rigorous efforts at school level. The present study examined the effect of socio and psychogenic factors on environmental friendly behaviour among today's youth. In order to make them realize their own responsibilities toward environment, this is a crucial time to realize that environmental sensitivity and environment friendly behaviour should be cultivated among masses particularly among youth. Environment friendly behaviour is any action of an individual or a group directed towards the remediation of environmental issues/ problems.

Thus, environmental education policies fund both teacher training and worker training initiatives. Teachers must be trained to effectively teach and incorporate environmental studies in their curricula. On the other hand, the current workforce must be trained or re-trained so that they can adapt to the new green economy. Environmental education policies that fund training programs are critical in educating citizens to prosper in a sustainable society.

"Sow a thought, and you reap an act. Sow an act, and you reap a habit, and you reap a character. Sow a character, and you reap a destiny." Charles Reade

I. INTRODUCTION

It is a common attitude in the environmental movement that technology is something to be avoided. Throw away of technology, but the truth remains that we are tool making creatures. We have close animal relatives who use tools to this day and they still manage to live in harmony with nature while using appropriate technology. Primates use sticks and rocks, birds use sticks and otters use rocks. When we observe this in nature we can conclude that using tools and technology is neither good nor bad. It is the use to which they are put along, with the way they are implemented, that makes their impact good or bad. However some people think we should just to get rid of it all.

Unless we want to return to the trees it is impossible to remove all technology. The fire we use for heat, the shoes we wear on our feet, and the clothes that cover our bodies are all examples of technology. The use of tools is a part of our existence as human beings. They have been a piece of our lives ever since our ancestors started their first intentional fire. Technology flows through our history like the golden threads of a beautiful tapestry. We have let the tapestry get dirty and now it needs cleaning up.

The dirt on our tapestry is the result of technologies use by humans. When we were a young species we didn't know how to clean up the messes we were leaving behind. We didn't understand that pouring stuff in the water would kill us later. We didn't understand that planting the same crop in the same place each year affected the quality. We certainly didn't know that burning wood was putting pollution into the air. However we have learned better. But, in the course of learning, we let people take control who didn't care. They used the methods and products for their own selfish needs and didn't care about the effect on other people.

It is this lack of caring that lies at the core of our environmental problems. So many of our problems from war to racism to abuse to crime find fertile ground here. It is fed by the economic system which encourages the amassing of personal profit at the expense of others. In order to prevent further environmental degradation we need to change this. Only when we have truly modified our mentality and approach to life can lasting changes be made. Any changes we make in the meantime will certainly suffer from that short-sighted approach to life. Technology will always be a part of us but we have to approach it in a rational and compassionate way.

In India we have environmental awareness and Knowledge but not transferring of into our behaviour which is a very serious issue. Only change in human behaviour can reduce the environmental problems. Environmental problems cannot be solved within a day or two. It requires rigorous efforts at school level. The present study examined the effect of socio and psychogenic factors on environmental friendly behaviour among today's youth. In order to make them realize their own responsibilities toward environment, this is a crucial time to realize that environmental sensitivity and environment friendly behaviour should be cultivated among masses particularly among youth. Environment friendly behaviour is any action of an individual or a group directed towards the remediation of environmental issues/ problems.

II. STATEMENT OF THE PROBLEM

The present problem undertaken by the investigator can be stated as *EFFECT OF TECHNOLOGY AWARENESS ON ENVIRONMENT FRIENDLY BEHAVIOUR IN ADOLESCENTS*.

III. OBJECTIVES OF THE STUDY

The following objectives are lay down with the reference to the present study:

1. To study the Environmental Friendly Behaviour of youth.
2. To study the Environmental Friendly Behaviour of youth sex wise.
3. To know the Effect of Technology Awareness on Environmental Friendly Behaviour.

IV. HYPOTHESES OF THE STUDY

H1 No significant difference will be among environmental Friendly Behaviour of male and female Youth.

H2 No significant effect of Technology Awareness on Environmental Friendly Behaviour.

The present study will have following limitation in present investigation:

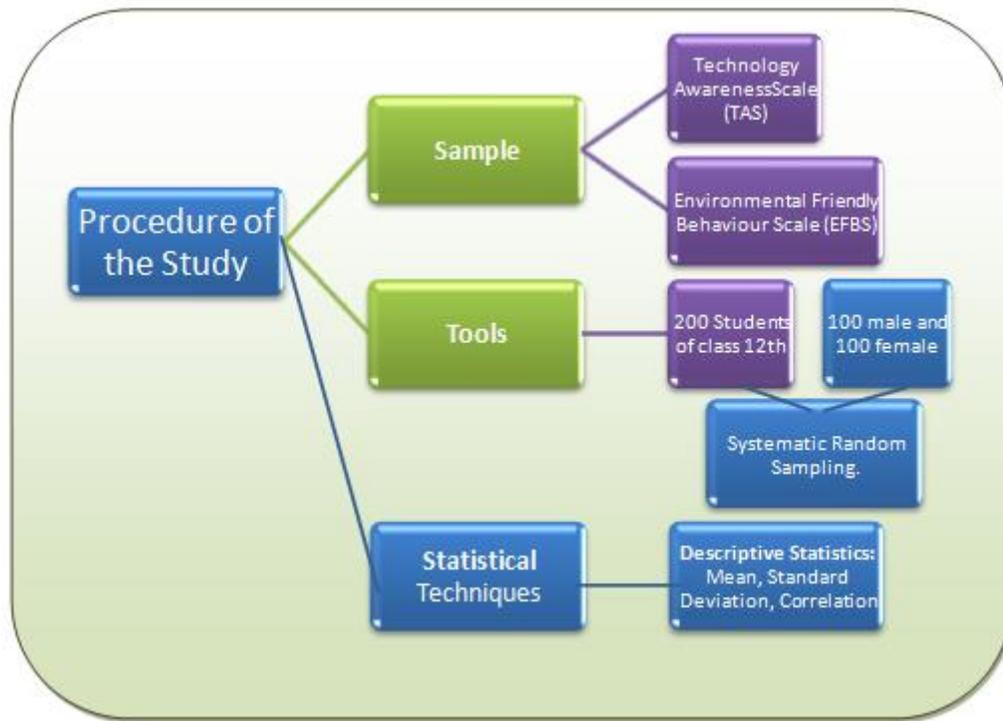
Age Group- Age group Between 16 to 18 years.

Educational Level- The higher secondary school students of 12th standard of both sexes.

Institutional Area- The higher secondary schools of Agra city.

V. PROCEDURE OF THE STUDY

The present study will have following Procedure in present investigation:



VI. TOOLS

In any specific study, the selection of tools largely depends upon the nature of the problem under study and the kind of data necessary. Research instruments should be selected in accordance with the objectives of the study, information required and applicability to the specific age group of the subjects to be studied.

The following tools will be used the collection of data.

S.No.	List of Tools	Made by	Age Group	Reliability	Validity
1	Technology Awareness	Self constructed	16 to 18	.77	-
2	Environmentally Friendly Behaviour Questionnaire.	Self constructed	16 to 18	.81	-

VII. FINDINGS OF THE STUDY

The following findings are lay down with the reference to the present study:

1. The Environmental Friendly Behaviour of youth is finding high in senior secondary students of Agra city. The behaviour of students is quite satisfactory.
2. The Environmental Friendly Behaviour of girl is more eco friendly than girls because they have the habits of cleanliness and constructive behaviour rather than boys.
3. The Effect of Technology Awareness on Environmental Friendly Behaviour is find positive it increases with the knowledge of technology, technology safer use increase the eco friendly behaviour of senior secondary students of Agra city.

VIII. SIGNIFICANCE OF THE STUDY

Environmentalists and educational planners can frame the syllabus of environmental education which can enhance the emotional and attitude in the youth students thus environmental friendly behaviour will be develop among future citizens.

Teachers make their teaching strategies and methods to enhance environmental friendly behaviour will be developing among future citizens. Teacher's can play a pivotal role in transmitting knowledge and creating awareness about the environment and help to tackle the local and global environmental issues. For all the people if eco-friendly behaviour is developed among students, it will also make all the people sensitive towards nature environmental degradation and they can frame their behaviour pro environmental friendly. All types of pollution will be decreased quality of environment will be sustained and our planet Earth will be saved. The present study is taken up to assess the level of environmental friendly behavior among higher secondary school students. Environmental education helps to produce citizens who are environmentally knowledgeable and skilled. It leads them towards maintaining a dynamic equilibrium between quality of life and quality for the environmental growth and development.

IX. CONCLUSION

Thus, environmental education policies fund both teacher training and worker training initiatives. Teachers must be trained to effectively teach and incorporate environmental studies in their curricula. On the other hand, the current workforce must be trained or re-trained so that they can adapt to the new green economy. Environmental education policies that fund training programs are critical in educating citizens to prosper in a sustainable society.

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Factors Affecting Friction Coating on Stainless Steel 304

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Abstract- Low carbon steels are widely used for structural applications because of its ease in fabrication and the moderate strength it posses. However, its pure corrosion resistance at normal atmosphere is a matter of serious concern.

I. INTRODUCTION

Fusion welding based coating techniques generally suffers from dilution and thermal spraying results in mechanical bonding rather than metallurgical bonding. Friction surfacing is a relatively new technology which is capable of producing coatings with zero dilution and good metallurgical bonding. This is attained because no melting is involved in this process.

Research so far has revealed that in friction surfacing the mechtrode force (F), mechtrode rotation speed (N) and substrate traverse speed (V_x) are of critical importance for the final quality of the coating and bond.

- Development of a methodology for in-process precision measurement of temperature, torque, bonding time, spindle rotation speed and force.
- Development of an empirical model involving process parameters V_x , F, N and coating quality state variables C_{bs} , Ct, Cw.



Fig. 1.4 Friction surfacing machine

II. LITERATURE REVIEW

M.Chandrasekaran, S.Jana carried out friction surfacing with stainless steel 304.

V.I.Vitanov, I.I.Voutchkov studied the three state variables, that reflect coating quality were considered as a subject for

optimization and in this context a target for process parameter selection which are coating thickness, coating width, coating bond strength.

Louda showed the examples of thin coatings application in automotive industry and commercial. Thereby gave economic, ecologic savings and maintain its environmental stewardship in the global market

Tau V.R, Durodola B.M, Ajayi O.O, Loto C.A carried out the zinc deposition on mild steel with different parameters. Finally the coating surface examined with ion beam scanning electron microscope and x ray diffraction methods.

III. COATING APPLICATIONS

Use of thin coatings in automotive industry gives economic and ecological savings. This is evoking by reducing of weight of used construction elements and currently by increasing of their service life and with that connected elevating of nano materials manufacture qualities.

3.1 DECORATIVE COATINGS

Product range of decorative coatings covers technologies for the entire spectrum of decorative and functional surface treatment for various materials including steel, aluminum and even plastics. At the present time are applications plastics as well as metal, from car wheels to bumpers and door handles to radiator grills. Decorative coatings can be made from:

- Plating on Plastics
- Copper
- Precious metal

Plastic and plastic composite materials continue to be popular because of the way they combine the advantages of both worlds. Plastics are light, corrosion-free and can be formed to virtually any shape. Even complex components can be cost effectively produced in volume. A metal surface gives plastics a high quality, decorative appearance. This is why the advantages of plating on plastics are being appreciated in more and more industries.

The most popular type of decorative copper plating processes is Acid Copper. The high ductility of the acid coppers minimizes thermal expansion and flexing problems. Acid Copper is suitable for applications on zinc, brass and aluminium, bronze, steel, various other metal alloys, or most other commonly plated substrates. The copper deposit is easily buffed as is often required for intricate cast aluminium parts such as aluminium wheels. Acid Copper is versatile and very easy to operate. It is extremely bright, even in low current density areas, to make finding problems easier. In high current density areas the system is very resistant to burning.

Gold has the unique visual attraction and durability that makes it ideal for a wide range of applications, as gold is also an excellent conductor and almost totally resistant to corrosion and wear. It makes a reliable coating for technical and industrial purposes such as those in the electrical and electronics industry.



Fig. 3.1 Decorative coatings

3.2 FUNCTIONAL COATINGS

3.2.1 Corrosion Resistant (Zinc coating)

As functional coatings corrosion protection coatings for a global industry with high environmental demands are used. Corrosion protection coatings concerned with Zinc coating.

Due to the increasing expectations of consumers, the international automotive industry is required to extend vehicle warranties. Thus improvements in corrosion protection are becoming increasingly important. E.g. zinc-iron processes provide superior corrosion resistance even for complex shaped parts through uniform thickness distribution, and these highly bendable layers also allow machining. Zinc coatings enhance performance and extend component service life through improved corrosion resistance.

3.2.2 Wear Resistant (Nickel coating)

Nickel plating systems provides ideal wear performance for a variety of applications such as brakes, fuel systems, planetary gears, valve stems and steering components.

These processes offer a high level of flexibility to deliver just the right hardness and affinity to lubricants to reduce the wearing of highly mobile parts and to perform optimally as part of the total system of components.

Electroless nickel coatings are resistant to oxidation, chemically insensitive and in certain instances can be made non-magnetic and solderable. These products are not only used to produce wear resistant surfaces for a variety of auto-motive parts, they are also used to enhance tool life and overall quality for automotive manufacturing, especially in processing and stamping plants.

Electroless nickel coatings are highly resistant to corrosion, hard and resistant to wear, resistant to oxidation, chemically insensitive, non-magnetic and solderable.

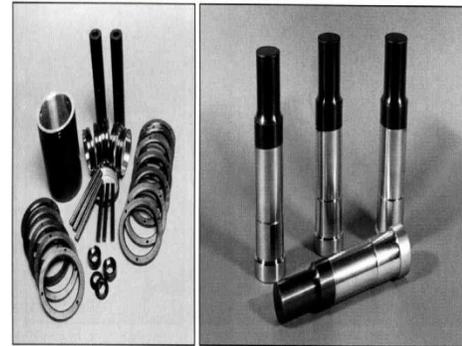


Fig. 3.2 Functional coatings

3.3 APPLICATIONS

3.3.1 Brake Calipers

Cast iron brake calipers are an important component within modern braking systems. For improved corrosion protection and enhanced appearance they are electrolytically zinc plated. Other cast iron applications include steering knuckles, which can be electroplated for enhanced corrosion protection.

3.3.2 Fluid Delivery Tubes

Fluid delivery tubing for automobiles like power steering, air conditioning as well as brake and fuel lines are usually made of low carbon steel and therefore require a corrosion resistant coating. For productivity reasons, many fluid delivery tubes are processed in straight conditions and are submitted to a post forming process. To achieve best inner tube corrosion resistance without any risk of particle formation even with alcoholic fuels, the parts can be electroless nickel and followed by alkaline ZnNi plated.

3.3.3 Fasteners

Fasteners - nuts, bolts, screws, washers, etc. this is the stuff that holds things together. The finish of a fastener is critical to its function. Most fasteners are coated to protect against corrosion and to achieve special properties such as controlling the amount of torque required to tighten a threaded fastener. With increasing demands for higher corrosion protection the use of ZnNi on fasteners is steadily increasing.

3.3.4 Shocks Rods

Piston Rods used for shock absorbers strut rods and gas springs need a hard chromium plated surface to provide excellent wear and corrosion resistance as well as a low coefficient of friction. The components are placed on vehicles at locations where they are subject to considerable environmental impacts such as corrosive salt-water solutions from de-icing of road surfaces and from stones hitting against them from the road.

3.3.5. Piston Rings

Piston rings provide a seal between the engine piston and the cylinder wall. Since the advent of hard chromium plating on these components the service life of the rings has been dramatically improved. Hard chromium provides excellent wear resistance and low coefficient of friction that is especially important in engine applications.

3.3.6. Engine Valves

Engine valve systems are hard chromium plated to provide excellent wear and a low coefficient of friction. The need to replace these components has been greatly reduced since the advent of this kind of surface coating.

3.3.7 Car Door Handles

The automotive industry demands ever reduced weight and resulting fuel savings, which is an important aspect in car manufacturing. By combining comparably low weight and production expenses of plastic parts with perfect metallic appearance, plating on plastics (POP) is the ideal solution.

3.3.8 Plated Aluminium Wheels

Worldwide, almost 50% of new cars are fitted with cast aluminium wheels. While the standard finish is likely to be paint or powder coating, there is an increasing demand for the bright nickel/chromium plated finish.

3.3.9 Fuel Injection Housing

Injection pumps used in diesel engines are mostly made of cast aluminium plated with an electroless nickel coating. Diesel cylinder liners are hard chromium plated to provide excellent wear resistance and a low coefficient of friction.



Fig. 3.3 Coating application

IV. FRICTION SURFACING

4.1 PROCESS DEFINITION

- It is defined as the solid state deposition process which involves rotating rod pushed against a horizontally moving plate
- It is used for wear resistance, corrosion resistance coating and for reclamation of worn engineering components.
- Axial load, rotating speed on the mechatrode and traverse speed on the substrate are the process parameters involved in this coating process.

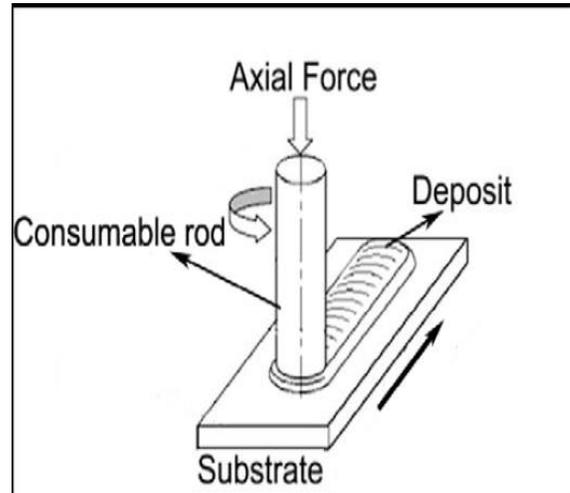


Fig. 4.1 Friction surfacing

4.2 MATERIALS USED

The following table summarizes the details of the materials which were used during friction surfacing process.

PROCEDURE

Step 1: Making to a proper dimension

Initially the mild steel plate was of 500*500*5 mm dimension. After cutting the raw material with gas arc cutter, it became 70*150*5 mm which is perfect for our electrolytic container.

Step 2: Rough finishing by emery paper

Initially the mild steel material got from shop is fully corroded. But with corroded surface electrolysis is not possible, so it must be removed. Emery is a type of paper that can be used for sanding down hard and rough surfaces. Even after hard rubbing with emery paper the mild steel plate is still corroded. Hence fine finishing with surface grinding machine is a must after rough finishing.

Step 3: Fine finishing with surface grinding

This is used to get a fine finish over the roughly finished surface obtained by emery paper. Surface grinding machine is being used.

Step 4: Applying ACETONE solution over the surface

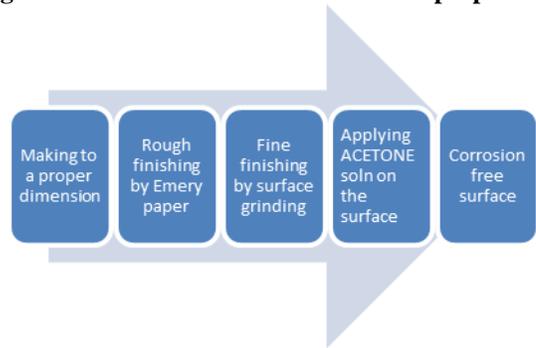
A small contact time period is enough for atmospheric air to cause corrosion on a mild steel surface. Unlike in electro plating, friction surfacing process cannot occur after surface grinding process. So cleaning with acetone is necessary to remove corrosive particles in tiny holes of the surface.

Step 5: Corrosion free surface

SET NO	Load (KN)	ROTATIONAL SPEED (RPM)	TRAVERSE SPEED (mm/sec)
01	10	800	1.2
02	12	1200	2.4
03	14	1600	3.6



Fig.4.3 Photos before and after material preparation



Finally we get a mild steel plate without any corrosive layer. After the fine finishing process followed by acetone cleaning, our material is completely ready to use in machine bed for friction surfacing.

Fig. 4.2 Material preparation (Friction Surfacing)

	Object Name	Dimensions		Quantity
		Length (mm)	Thickness/ Diameter (mm)	(No's)
	Stainless Steel304	100	20	3
Emery Paper	Mica Sheet	100*100	-	3



4.4 PARAMETERS INVOLVED AND THEIR EFFECTS

1.The load given on mechatrode in KN is directly proportional to the bonding efficiency. In higher loads the external energy required to form a coating is less.

2.The rotating speed given on mechatrode in RPM is directly proportional to the time taken for palstisation of metals. In higher rotating speeds plastisation occurs easily.

3.The traverse speed given on base metal in mm/sec is inversely proportional to the coating thickness. In lower traverse speed heat affected zone will be more. **SS304 on mild steel**

4.The load was kept constant; the other parameters like rotational speed and traverse speed were varied in steps to get the coating. Table4.3 Work involved in friction surfacing of SS304 on M.S

Table4.4 Work involved in friction surfacing of SS304 on M.S through MINTAB 16.1.0 SOFTWARE

LOAD(KN)	ROTATIONAL SPEED	TRANSVERSE SPEED	TRAIL 1	TRAIL 2	TRAIL 3	MEAN
10	800	1.2	84.6	85.4	84.8	84.9333
10	1200	2.4	85.3	84.8	84.6	84.9000
10	1600	3.6	85.4	84.8	84.6	84.9333
12	800	2.4	64.5	65.4	64.8	64.9000
12	1200	3.6	64.4	64.8	65.3	64.8333
12	1600	1.2	64.3	64.8	65.3	64.8000
14	800	3.6	84.9	84.8	84.6	84.7667
14	1200	1.2	84.8	84.6	85.3	84.9000
14	1600	2.4	84.7	84.6	85.4	84.9000

08-02-2013 09:27:46

Welcome to Minitab, press F1 for help.

Taguchi Design

Taguchi Orthogonal Array Design

L9(3**3)

Factors: 3

Runs: 9

Columns of L9(3**4) Array

1 2 3

Results for: Worksheet 2

Taguchi Design

Taguchi Orthogonal Array Design

L9(3**3)

Factors: 3

Runs: 9

Columns of L9(3**4) Array

1 2 3

Results for: Worksheet 3

Taguchi Design

Taguchi Orthogonal Array Design

L9(3**4)

Factors: 4

Runs: 9

Columns of L9(3**4) Array

1 2 3 4

Results for: Worksheet 4

Taguchi Design

Taguchi Orthogonal Array Design

L9(3**4)

Factors: 4

Runs: 9

Columns of L9(3**4) Array

1 2 3 4

Results for: Worksheet 5

Taguchi Design

Taguchi Orthogonal Array Design

L9(3**3)

Factors: 3

Runs: 9

Columns of L9(3**4) Array

1 2 3

Results for: Worksheet 6

Taguchi Design

Taguchi Orthogonal Array Design

L9(3**3)

Factors: 3

Runs: 9

Columns of L9(3**4) Array

1 2 3

Taguchi Analysis: TRAIL 1, TRAIL 2, ... versus LOAD(KN), ROTATIONAL S, ...

Response Table for Signal to Noise Ratios
Nominal is best ($10 \cdot \text{Log}_{10}(\bar{Y}^2/s^2)$)

Level	ROTATIONAL		TRANSVERSE	
	LOAD(KN)	SPEED	SPEED	SPEED
1	44.52	48.51	44.57	
2	49.42	50.15	44.48	
3	47.95	43.24	52.85	
Delta	4.90	6.91	8.37	
Rank	3	2	1	

Response Table for Means

Level	ROTATIONAL		TRANSVERSE	
	LOAD(KN)	SPEED	SPEED	SPEED
1	117.2	116.6	116.0	
2	116.1	116.0	116.1	
3	115.2	115.9	116.4	
Delta	2.0	0.6	0.4	
Rank	1	2	3	

Main Effects Plot for Means

Main Effects Plot for SN ratios

Taguchi Analysis: TRAIL 1, TRAIL 2, ... versus LOAD(KN), ROTATIONAL S, ...

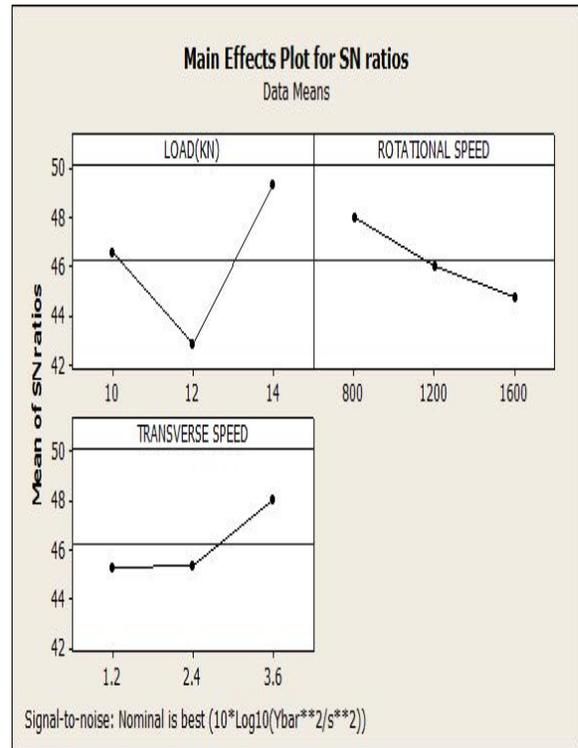
Response Table for Signal to Noise Ratios
Nominal is best ($10 \cdot \text{Log}_{10}(\bar{Y}^2/s^2)$)

Level	ROTATIONAL		TRANSVERSE	
	LOAD(KN)	SPEED	SPEED	SPEED
1	46.61	48.03	45.29	
2	42.81	46.01	45.42	
3	49.37	44.75	48.08	
Delta	6.56	3.29	2.78	
Rank	1	2	3	

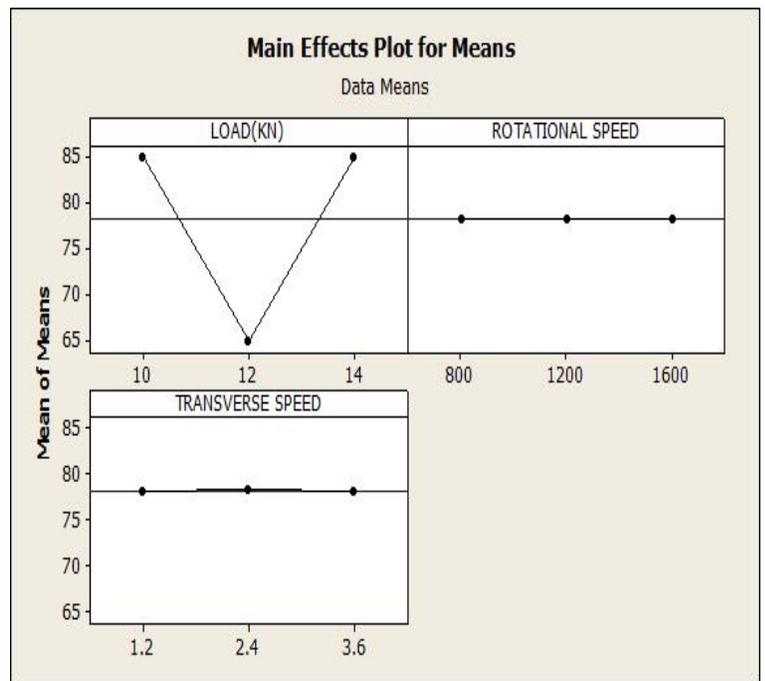
Response Table for Means

Level	ROTATIONAL		TRANSVERSE	
	LOAD(KN)	SPEED	SPEED	SPEED
1	84.92	78.20	78.21	
2	64.84	78.21	78.23	
3	84.86	78.21	78.18	
Delta	20.08	0.01	0.06	
Rank	1	3	2	

Main Effects Plot for Means



Main Effects Plot for SN ratios



Main Effects Plot for Means



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Fig. 4.5 Image of a M.S plate after friction surfacing using SS 304

V. CONCLUSION

For friction surfacing three different set of parameters were applied to get the minimum thickness. Hence it does not cause weight increases in coated substances. On mild steel plate both stainless steel 304 and stainless steel 316 has given a proper coating. But with copper as a mechatrode it forms flash rather than coating. Because of easy deformation of metal when copper rod is used, the coating will not form.

For electro plating, with time of contact of work piece in electrolytic bath as a parameter minimum thickness obtained. On mild steel plate coating successfully obtained by copper, zinc and nickel but not with stainless steel. Since pure metal only gives coating in electro plating.

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Adaptive Cryptosystem for Digital Images Using Fibonacci Bit-Plane Decomposition

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Abstract- In this paper, we introduce a novel encryption algorithm based on Fibonacci numbers. In addition, novel bit-plane decomposition for Fibonacci weights is also discussed that offers cryptographic benefits. The new lossless image encryption algorithm is presented can encrypt an image using this new decomposition method for privacy protection. Further, it has two levels of encryption that could address both pay-per-view applications or secured communication simultaneously. Simulation results and analysis verify that the algorithm shows good performance in image encryption.

General Terms - Image Scrambling, Security, Secured Communication

Index Terms- Image scrambling, encryption, fibonacci bit-plane decomposition, secured communication

I. INTRODUCTION

In the current digital era, the rapid escalations in digital multimedia and network have paved ways for people around to acquire, utilize and share multimedia information. The need for intellectual property right protection has become a new research area involving statistics, cryptography, information hiding, and computer vision as some of the techniques [1]. Since, the information that could benefit or educate groups (or individual) can also be used against such groups (or individual). Hence forth, the information security has evolved as an important and urgent issue not only for individuals but also for business and governments. Digital image & video scrambling has evolved as a hot topic among the researchers of digital data security.

Cryptography is science that protects data by transforming it into a digital form which is not discernible to an attacker without the secret key [2]. A perfect image cryptosystem is not only flexible in the security mechanism, but also has high overall performance. Thus, besides the above characteristics, the image security also needs to address the following problems [3]:

1. Encryption system should be computationally secure. It must require an extremely long computation time to break, for example. Unauthorized users should not be able to read privileged images.
2. Encryption and decryption should be fast enough not to degrade system performance. The algorithms for encryption and decryption must be simple enough to be done by users with a personal computer.
3. Minimal distortion between the decrypted image and original image.

4. Security mechanism should be flexible.
5. Security mechanism should be as widespread as possible. It must be widely acceptable to design a cryptosystem like a commercial product.

L Chuanmu. et.al. [4] proposed a secured image encryption method based on the hyper chaotic map to meet the constraints of secured multimedia transfer system. The basic principle of this method is the permutation of the pixel location within the image decided by a chaotic map generated from a chaotic pseudo random binary sequence. F. Hani Ali et.al [5] propose the use of cyclic shift and bit wise XOR operation as new approach to replace the lookup table. The principle benefit of using this new approach over the transform from Rijndael block cipher is speed. Y. Zhou. et.al. [6] introduces two new multimedia scrambling algorithms based on the P-recursive sequence. The algorithms can be used to scramble two or three dimensional multimedia data in one step. Furthermore, a security key parameter p may be chosen as different or the same values providing partially or fully encrypting multimedia data. Generalized Fibonacci transformations with application to image scrambling are presented in detail by authors in [7-9].

The remainder of this paper is organized as follows. In Section 2, we introduce the existing Fibonacci based decomposition and propose a novel decomposition method. Section 3 introduces the new approach formula where traditional cyclic shift been replaced by constraint based cyclic shift methodology. Section 4 deals with proposed system framework and the basic steps involved. Section 5, presents the simulations results associated with proposed algorithm.

II. FIBONACCI BIT-PLANES

Digital imagery is commonly found in 8-bit format, grayscale or indexed images (i.e. PNG, GIF) as well as in 24-bit true color format (i.e. BMP, TIF), which is a combination of three 8-bit color layers. The 8-bit format is widely used for its conformity with memory configuration in hardware and the efficiency of the binary standard formulated by the Euclidian algorithm. A string of 8 binary values is multiplied with a sequence containing the first 8 powers of 2 i.e. {1, 2, 4, 8, 16, 32, 64, 128}. The resultant products are then summed together to calculate the represented pixel value.

One way to design a robust algorithm is to find an alternate representation of the pixel value that could offer cryptographic benefits. In addition, we discuss by a novel encryption algorithm based on localized cyclic shift based image scrambling system.

2.1 Fibonacci Number Set

Fibonacci numbers are a sequence of values that are generated using a fixed pattern. The values in these number sequences are smaller than those found in the typical number power of two's, thus requiring a binary string longer than eight in order to allow representation of pixel values up to 255 [10]. Fibonacci codes may be defined as follows.

$$f(i) = \begin{cases} 0 & i < 0 \\ 1 & i = 0 \\ f(i-1) + f(i-2) & i > 0 \end{cases} \dots (1)$$

The sequences displayed give the exact number of values that are necessary in order to represent pixel values in the range of [0,255] i.e., [1,1,2,3,5,8,13,21,34,55,89,144, 233]. The natural number A may be expressed using the number $F(i)$

$$A = \sum_{i=0}^{n-1} a_i F(i) \dots (2)$$

Where the string $a_i \in \{0,1\}$, there is a correspondence between A and sequence code. The string a_i , having a length of n , represents A in the form

$$A \leftrightarrow (a_0, a_1, a_2, \dots, a_{n-2}, a_{n-1}) \dots (3)$$

But this correspondence is not unique as there are numerous possibilities. For example, the number 40 has the following different combinations for a given Fibonacci sequence.

$$\begin{aligned} 40 &= [1\ 0\ 0\ 0\ 1\ 0\ 0\ 0\ 1\ 0\ 0\ 0\ 0]_{2f} = [0\ 1\ 0\ 0\ 1\ 0\ 0\ 0\ 1\ 0\ 0\ 0\ 0]_{2f} \\ &= [1\ 0\ 0\ 0\ 1\ 0\ 1\ 1\ 0\ 0\ 0\ 0\ 0]_{2f} = [0\ 1\ 0\ 0\ 1\ 0\ 1\ 1\ 0\ 0\ 0\ 0\ 0]_{2f} \\ &= [1\ 0\ 1\ 1\ 0\ 0\ 1\ 1\ 0\ 0\ 0\ 0\ 0]_{2f} = [0\ 1\ 1\ 1\ 0\ 0\ 1\ 1\ 0\ 0\ 0\ 0\ 0]_{2f} \\ &= [1\ 0\ 1\ 1\ 1\ 1\ 0\ 1\ 0\ 0\ 0\ 0\ 0]_{2f} = [0\ 1\ 1\ 1\ 1\ 1\ 0\ 1\ 0\ 0\ 0\ 0\ 0]_{2f} \\ &= [1\ 0\ 1\ 1\ 0\ 0\ 0\ 0\ 1\ 0\ 0\ 0\ 0]_{2f} = [0\ 1\ 1\ 1\ 0\ 0\ 0\ 1\ 0\ 0\ 0\ 0]_{2f} \end{aligned}$$

From the above example, it is evident that a unique normalized representation for Fibonacci number sets is vital for security based applications. Dey. S [10 - 11] designed a set of dictionary of unique representation for pixel values between [0 - 255] based on Zeckendorf's theorem to overcome the unique representation issue. Unfortunately, the receiver requires the prior knowledge of unique representation dictionary set for lossless recovery of the encrypted data. Hence to design a lossless encryption system, we need a novel data modeling operator so that we could eliminate the use of dictionary set at the receiver.

2.2 Normalized Fibonacci Set

Most of the common normalized decompositions based on the Fibonacci numbers set is based on Zeckendorf's theorem [12]. **Zeckendorf's theorem** states that every positive integer can be represented uniquely as the sum of *one or more* distinct Fibonacci numbers in such a way that the sum does not include any two consecutive Fibonacci numbers. Thus based on the Zeckendorf's theorem the possible combinations for the number 40 are

$$40 = [1\ 0\ 0\ 0\ 1\ 0\ 0\ 0\ 1\ 0\ 0\ 0\ 0]_{2f} \quad [0\ 1\ 0\ 0\ 1\ 0\ 0\ 0\ 1\ 0\ 0\ 0\ 0]_{2f}$$

Further to attain a normalized decomposition, monotonic Fibonacci weights (i.e. {1,2,3,5,8,13,21,34,55,89,144,233}) are considered that would yield normalized Fibonacci decomposition as follows

$$40 = [0\ 1\ 0\ 0\ 1\ 0\ 0\ 0\ 1\ 0\ 0\ 0\ 0]_{2f} \leftrightarrow [1\ 0\ 0\ 1\ 0\ 0\ 0\ 1\ 0\ 0\ 0\ 0]_{2f}$$

This decomposition provides normalized representation, but we could identify the need of new and novel unique normalized representation system for encryption method to enhance cryptographic benefits. This notion motivated us to investigate various coding techniques and develop a novel normalized representation that helps us in various image processing applications. Further this frame would enhance the cryptographic benefits of the proposed scheme as the size of the key would increase.

2.3 Proposed Normalized Fibonacci Set

In this section, we introduce a novel unique normalized representation system for Fibonacci weights.

Theorem 1[13]: Any natural number can be uniquely represented by set of Fibonacci weights based on the following representation

$$\max_{rep} \{ \sum_{i=0}^{n-1} 2^i * a_j \}$$

For Max representation: ... (4)

$$\min_{rep} \{ \sum_{i=0}^{n-1} 2^i * a_j \}$$

For Min representation: ... (5)

Where, a_j is the one the j representations possible for a pixel value in the number system, "n" indicates the length of

$$\max_{rep} \quad \min_{rep}$$

representations, and rep / rep is the maximum or minimum value associated with Euclidean distance of the representation. Normalized Fibonacci decomposition based on proposed theorem would yield the following for the number 40:

$$\begin{aligned} 40 &= [0\ 1\ 0\ 0\ 1\ 0\ 0\ 0\ 1\ 0\ 0\ 0\ 0]_{fmax} \\ &= [1\ 0\ 1\ 1\ 1\ 1\ 0\ 1\ 0\ 0\ 0\ 0\ 0]_{fmin} \text{ for non monotonic weights} \\ &= [0\ 1\ 1\ 1\ 1\ 1\ 0\ 1\ 0\ 0\ 0\ 0\ 0]_{fmin} \text{ for monotonic weights} \end{aligned}$$

The bit-plane decomposition of the images can be best explained based on the image representation. Figure 1, illustrates the red layer decomposition of the cover image based on the Max Fibonacci decomposition (fmax). Figure 2, illustrates the red layer decomposition of the cover image based on the Min Fibonacci decomposition (fmin) for monotonic weights.

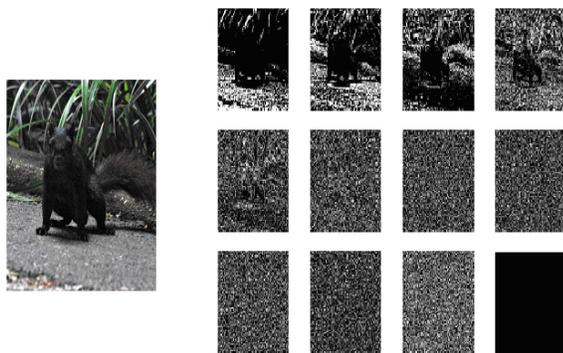


Figure 1. Bit-plane decomposition using the max Fibonacci weights

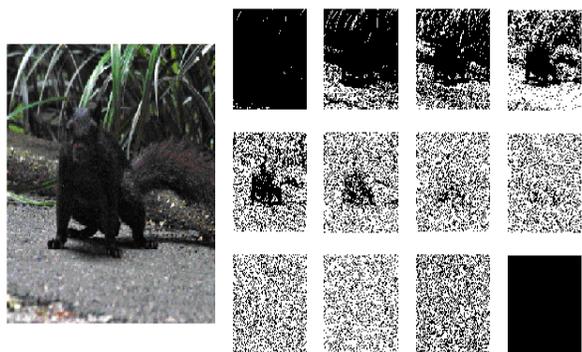


Figure 2. Bit-plane decomposition using the min Fibonacci weights

III. CYCLIC SHIFT

A cyclic shift is the operation of rearranging the entries in a tuple, either by moving the final entry to the first position, while shifting all other entries to the next position, or by performing the inverse operation. Circular shifts are used often in cryptography in order to permute bit sequences of the data. The cyclic shift operation over the Fibonacci bit-planes can be better understood using Table 1. From Table 1, it is evident that the regular cyclic shift could not be applied over the Fibonacci based sequences as they would result in irradiant sequences i.e.

- Either sum of the shift sequence would yield a value outside the range of [0 - 255] Or
- Either the shift sequence would not validate the normalized constraints.

Hence to overcome these issues, we propose a constraint based cyclic shift that could be effectively employed in the framework. Further it would also provide cryptographic benefits to the proposed system.

TABLE 1
CYCLIC SHIFT VALUE FOR 239 BASED ON FMAX

Shift code	Cyclic Shift Sequence	Value
0	[0 1 0 0 1 0 0 0 0 0 0 1]	239

1	[1 0 1 0 0 1 0 0 0 0 0 0]	11
3	[0 0 1 0 1 0 0 1 0 0 0 0]	28
4	[0 0 0 1 0 1 0 0 1 0 0 0]	45
7	[0 0 0 0 0 1 0 1 0 0 1 0]	191
9	[1 0 0 0 0 0 0 0 1 0 1 0]	124
11	[0 0 1 0 0 0 0 0 0 0 1 0]	324

3.1 Constrained Cyclic Shift

In this section, we introduce a novel cyclic shift framework based on constraints that could address the issues discussed earlier. The proposed constraints that are induced over the cyclic shift are as follows

1. a_1 is always zero, thus monotonic Fibonacci weights are considered
2. If $a_1 = a_{12}$, then two coefficients are shifted in cyclic order. This ensures the shifted sequence is within the normalized constraints.
3. If the Shift value outside the range [0 -255] then the shift is skipped to the next shift. This ensures the value of the shifted sequence is within the range

These constraints will create ambiguity within the decryption algorithm, thus proper decoding key is essential for retrieving the information. The constraint based cyclic shift operation over the Fibonacci bit-planes can be better understood using Table II.

TABLE II
CYCLIC SHIFT VALUE FOR 239 BASED ON FMAX

Shift code	Cyclic Shift Sequence	Value
0	[0 1 0 0 1 0 0 0 0 0 0 1]	239
1	[0 1 0 1 0 0 1 0 0 0 0 0]	17
3	[0 0 0 1 0 1 0 0 1 0 0 0]	45
4	[0 0 0 0 1 0 1 0 0 1 0 0]	52
7	[0 1 0 0 0 0 0 0 1 0 1 0]	200
9	[0 1 0 0 1 0 0 0 0 0 0 1]	239
11	[0 0 1 0 1 0 0 1 0 0 0 0]	28

IV. PROPOSED SYSTEM

In this section, we introduce a novel encryption algorithm based on Fibonacci numbers that incorporates the concepts discussed in the earlier sections. The general structure of the encryption process is presented in the Figure 3.

The basic components of the proposed encryption framework are presented as follows

Inputs: - *Cover Image*. The cover image may be of any image format using the 8-bit, power of two's representation. The

proposed algorithm may also be applied on 24-bit, each color layer images treated as an individual 8-bit image.

Fibonacci Weights. Monotonic Fibonacci numbers are used as bit-plane weights. These sequence numbers can be replaced by any non redundant natural numbers weights.

System I: - Pre-processing System. This system consists of following components i.e. pixel pre-processing block, proposed representation block (Fmax or Fmin) and corresponding bit-plane decomposition. This system could take any digital media (images, binary data & etc) can pre-process to get pixel value (range 0-255) and decompose based on Fmax, Fmin representation. The mode of representation and weights employed would be transformed as a key to stored, for successful reconstruction of the encrypted image (without loss of integrity or quality).

System II: - Encryption System. This consists of the following components i.e. encryption process and cyclic shift

constraints. In this paper, we focus on the cyclic shift as the encryption process to illustrate its effects on Fibonacci based decomposition. From section III, we realized that a simple cyclic shift operation would not result is lossless encryption approach. Hence to realize and maintain the lossless nature of the encryption algorithm, we introduce constraints on the cyclic shift.

Outputs: - *Crypto Image and Crypto Key.*

The decryption process is a straightforward process where all necessary parameters are dictated based on the crypto-key. Cover image is reconstructed without any loss or integrity from the encrypted image given as input.

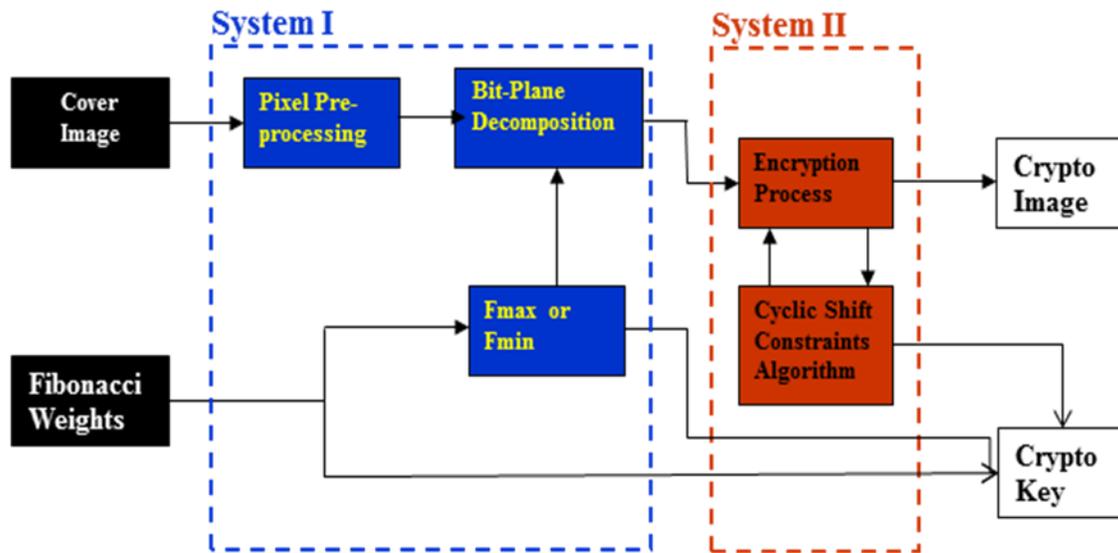


Figure 3. The general structure of the encryption process

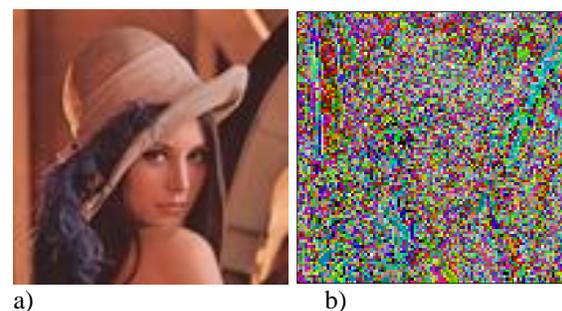
V. COMPUTER SIMULATIONS

In this section, the simulations results of proposed security system are presented. Computer simulations were simulated using MATLAB software package. Analysis was done using 100 color images of varying sizes, texture and contour (simulations are presented for 5 images). These images were taken using 2 digital cameras Nikon D100 and Canon EOS Digital Rebel and modified in Photoshop to attain a smooth histogram.

Initial investigation to test robustness, was based on the visual randomness of the encrypted images from the original image in consideration. Figure 4, shows the visual randomness of the cover image after a cyclic shift (code = 3) fmax and a cyclic shift (code = 5) fmin.

Table III, shows the percentage pixel change in each layer of "Lena" image for all the possible shift codes. In addition, shift code '4' shows maximum distortion between the cover and

encrypted image on average of the three layers. Figure 5, introduces the histogram comparison for various shift codes (i.e. 4, 6, 8) over the "Sarkis" image using proposed encryption algorithm. Table IV, shows the percentage pixel change in each bit-plane of "Lena" & "Sarkis" image for shift code '4'.





c)

Figure 4. a) Original image b) Encrypted via cyclic shift (code = 3) c) Encrypted via cyclic shift (code = 5)

TABLE III

Percentage Pixel change in each layer of Lena for each Shift code

Shift Code	R	G	B
1	50.866	68.5615	65.5436
2	69.1407	75.3127	68.5037
3	83.5613	89.4482	72.4209
4	86.4494	88.8537	75.8502
5	79.7377	83.8537	81.6119
6	71.5777	79.0445	87.9407
7	59.9112	75.0346	81.5545
8	58.5200	77.0777	79.0613
9	59.1331	77.8064	76.6423
10	64.8669	83.3201	79.3222
11	75.6144	87.6402	84.9092

TABLE IV

Percentage change in the for each bit-plane for both images

Bit planes	Lena	Sarkis
1	92.61	94.72
2	92.79	95.74
3	93.24	94.95
4	93.04	95.04
5	93.47	95.15
6	93.36	95.60
7	94.22	95.26
8	100	99.67

Furthermore, the attacker may employ the brute-force attack that tries all possible permutations to construct the perfect master share for a protected image. If the protected image of size 512x512 pixels, the number of required trials to construct the perfect master is $2^{512 \times 512}$, that is computationally infeasible for current computers.

VI. CONCLUSION

In this paper, we introduced a novel encryption algorithm based on Fibonacci numbers. In addition, novel bit-plane decomposition for Fibonacci weights was also discussed that offers cryptographic benefits to the proposed system. This lossless image encryption algorithm can employed for privacy protection and could address both pay-per-view applications or secured communication simultaneously. Simulation results and analysis verified that the algorithm shows good performance in image encryption.

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Implementation of Spectrum Analyzer using GOERTZEL Algorithm

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Abstract- Spectrum analysis is very essential requirement in instrumentation and communication signal interception. Spectrum analysis is normally carried out by online or offline FFT processing. The Goertzel algorithm is a digital signal processing (DSP) technique for identifying frequency components of a signal. While the general Fast Fourier transform (FFT) algorithm computes evenly across the bandwidth of the incoming signal, the Goertzel algorithm looks at specific, predetermined frequency. The FPGA being capable of offering high frequency data paths become suitable for realizing high speed spectrum analysis algorithms. The objective of this thesis is implementing Goertzel algorithm as high Q band pass filter on FPGA reconfigurable architecture. A digital frequency synthesizer produces frequency sweep which will drive the digital mixer. The digital mixer output is given to the Goertzel algorithm block. This algorithm output will be given to peak detection logic. The peak detector block output will be used for spectrum computation. The top level module integrates all these modules with appropriate clock and control circuitry. The results will be demonstrated by applying the deterministic signals such as sine wave and also with random band limited signals. It will be aimed to achieve 32 steps in the band of operation for spectrum computation on Spartan 3E low cost FPGA.

Index Terms- Goertzel algorithm, Spectrum analysis, FPGA, Fast Fourier transform (FFT) algorithm

I. INTRODUCTION

The challenges with FFT based spectrum analyzers makes implementation of spectrum analysis difficult. Spectrum of a signal reveals the elements of the signal, and also the performance of the circuit producing them. Spectrum analyzer is a frequency-selective, peak-responding voltmeter which displays the amplitude of a sine wave. Spectrum analyzers are able to measure a large variety of input signals and in this way they are an invaluable tool for the RF design development and test laboratories, as well as having many applications for specialist field service.

Goertzel algorithm plays important role in the electronics industry for analyzing the frequency spectrum of radio frequency (RF) and audio signals and has some preferred properties such as high speed, low area and low power consumption. Goertzel algorithm is a recursive filter that aims at specified frequency in the spectrum. Spectrum analysis from the input signal has been replaced by the active development of a wide range of very

specialized techniques and most of the existing spectrum analyzers are highly specific to a certain input signal and some research is pursued to integrate these techniques.

II. SPECTRUM ANALYSIS

The spectrum is the basic measurement of an FFT analyzer. It is simply the complex FFT. The spectral magnitude of the given frequency component is calculated by squaring and adding the sine and cosine coefficients for that frequency and taking the square root, giving the modulus of the complex FFT value. The phase spectrum, corresponding to the argument of the complex FFT value, can in principle be determined from the sine and cosine coefficients. (In most practical applications of the FFT, only the magnitude spectrum is of interest and phase information is not required). The magnitude is a real quantity and represents the total signal amplitude in each frequency bin, independent of phase. If there is phase information in the spectrum, i.e. the time record is triggered in phase with some component of the signal, then the real (cosine) or imaginary (sine) part or the phase may be displayed. The phase is simply the arctangent of the ratio of the imaginary and real parts of each frequency component. The phase is always relative to the start of the triggered time record.

Fourier's theorem states that any waveform in the time domain can be represented by the weighted sum of sine's and cosines. The FFT spectrum analyzer samples the input signal, computes the magnitude of its sine and cosine components, and displays the spectrum of these measured frequency components. For one thing, some measurements which are very hard in the time domain are very easy in the frequency domain. Consider the measurement of harmonic distortion. It's hard to quantify the distortion of a sine wave by looking at the signal on an oscilloscope. When the same signal is displayed on a spectrum analyzer, the harmonic frequencies and amplitudes are displayed with amazing clarity. Another example is noise analysis. Looking at an amplifier's output noise on an oscilloscope basically measures just the total noise amplitude. On a spectrum analyzer, the noise as a function of frequency is displayed. It may be that the amplifier has a problem only over certain frequency ranges. In the time domain it would be very hard to tell. Many of these measurements were once done using analog spectrum analyzers. In simple terms, an analog filter was used to isolate frequencies of interest. The signal power which passed through the filter was measured to determine the signal strength in certain frequency bands.

By tuning the filters and repeating the measurements, a spectrum could be obtained.

Types of Spectrum Analyzers:

- 4.1 Scan Based SA
- 4.2 Real time FFT Based SA
- 4.3 Goertzel based SA

A. Scan Based SA

A.1 Introduction

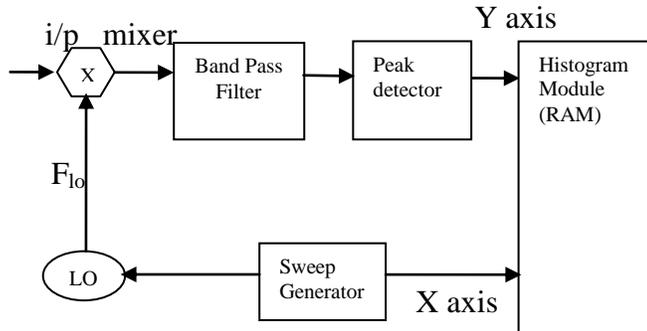
Scan based FFT algorithms are generally software based. Hardware implementation of FFT processor implies huge MAC & storage memory, which are expensive and occupy large chip area.

The main Advantages are fast capture of waveform, able to capture non-repetitive events, able to analyze signal phase.

Disadvantages are frequency limitations, Cost and Speed is less.

B. Real-Time FFT Based SA B.1 Introduction

To find spectrum at real time we go for real time based spectrum analyzers. Real time spectral extraction algorithm is shown in fig. All paragraphs must be indented. All paragraphs must be justified, i.e. both left-justified and right-justified.



B.1. Real time spectrum analyzer

As shown in block diagram it requires Local oscillator, sweep generator, high Q-band pass filter and peak detector. Initially, mixer combines the input test signal and reference signal from the local oscillator. The output modulated signals will have the sum and difference frequency signals. Mixer output will have $f_{LO} + f_{in}$ and $f_{LO} - f_{in}$ frequencies. The center frequency of BPF is set to the difference frequency. The main function of FIR filter and peak detector is to extract the amplitude component of the input. For narrow bandwidth very high Q- FIR filter with hundreds of taps is required.

Comparison

Modern pulsed systems use advanced waveform and modulation characteristics to obtain greater range resolution, enhanced clutter suppression and superior target recognition. Specifically, performance improvements are achieved using

signals with wide bandwidths, low duty-cycles, high linearity and sophisticated modulation. The basic tool for characterizing signals is the spectrum analyzer or signal analyzer, it measures the power content of signals as a function of frequency. Traditional spectrum analyzers use a swept-tuned architecture to achieve high dynamic range and wide frequency measurement ranges.

Advances in digital signal processing have resulted in two significant technological developments: The inclusion of digital IFs in traditional swept-tuned spectrum analyzers, and The emergence of Fast Fourier Transform (FFT)-based analyzers as an alternative to the traditional spectrum analyzer architecture.

The inclusion of digital IFs in traditional spectrum analyzers has greatly enhanced the accuracy, repeatability and speed of these instruments. FFT-based signal analyzers provide unprecedented modulation analysis capability and can result in much faster measurements in some cases, but much slower measurements in other cases.

Selecting the optimal measurement approach requires some knowledge of the instrument capabilities and signal under test. To understand how the instrument's architecture affects the displayed frequency response, measurement speed and dynamic range, the spectral responses of a wideband low duty-cycle radar waveform will be compared using swept-tuned and FFT-based analysis techniques. Some signal analyzers contain both swept and FFT capabilities, allowing a direct comparison of these two techniques within the same instrument. Some signal analyzers can also be used as a vector signal analyzer for measurement of phase profiles, modulation, transient analysis and spectrograms.

FFT-based spectrum analyzer is well for continuous signals but is less effective for pulsed signals due to measurement efficiency. The time required by the analyzer to retune between each segment of the desired spectrum is long relative to the short time data is sampled for each FFT computation. The result is a low probability of intercepting the signal, especially for signals with low duty cycles.

In the swept analyzer, the sweep time was slowed to increase the number of times the pulsed energy was intercepted during the sweep. This approach will not work with an FFT-based spectrum analyzer as it may not even have a sweep time control.

An alternate approach to improving a pulsed RF measurement for an FFT-based spectrum analyzer is to reduce the RBW setting. As the RBW is reduced, the measurement slows, increasing the probability of intercept. If the RBW is reduced enough, missing the signal is no longer an issue since the analyzer sees the spectral components of the signal as continuous waveforms, the sum of which forms the pulsed signal. With a narrow RBW setting, the FFT-based spectrum analyzer actually becomes more efficient at measuring spectrum than a swept analyzer; reducing the RBW to measure a pulsed RF signal has its costs in both measurement speed and dynamic range. For signals within the instrument's analysis bandwidth, an FFT-based signal analyzer can provide rich analysis when implemented as a vector signal analyzer. A vector signal analyzer measures both the magnitude and phase of the signal over time and frequency.

	Scan-based Spectrum Analyzer	FFT-based Spectrum Analyzer
Dynamic Range	Excellent	Excellent
Speed	Fair	Excellent
Modulation Analysis	Optional	Excellent
Transient Analysis	Zero-span	Excellent

Table1. Comparison of Scan and FFT based Analyzers

III. IMPLEMENTATION METHOD

GOERTZEL Algorithm

The proposed method, enables an individual DFT coefficient to be generated using a simple recursive filter which incorporates a second-order digital resonator, calculate the spectrum at the specific and appropriate frequency from the given input signals and with good frequency resolution. The spectrum analysis using Goertzel Algorithm helps to reduce power and chip area requirement.

The key concept in Goertzel Algorithm is to replace the general FIR filter based spectrum analyzer with fixed center frequency filter for identifying the specified frequency spectral components of a signal.

For a length of N, the Goertzel series is

$$H_k(z) = \frac{1 - W_N^k z^{-1}}{1 - 2 \cos\left(\frac{2\pi k}{N}\right) z^{-1} + z^{-2}}$$

Where $k=0,1,2,\dots,N$
And $W_N^k = e^{-2i\pi k/N}$

$$H(z) = \frac{Y(z)}{X(z)} \quad H(z) = \frac{Y(z)}{S(z)} * \frac{S(z)}{X(z)}$$

The Goertzel algorithm computes a sequence, $s(n)$, given an input sequence, $x(n)$:

$$S(n) = x(n) + 2\cos(2\pi\omega) s(n-1) - s(n-2)$$

Where $s(-2) = s(-1) = 0$ and ω is some frequency of interest, in cycles per sample, which should be less than 1/2. This effectively implements a second-order one addition and one subtraction per input sample. For real inputs, these operations are real.

The Z transform of this process is

$$\frac{S(z)}{X(z)} = \frac{1}{1 - 2 \cos(2\pi\omega) z^{-1} + z^{-2}} = \frac{1}{(1 - e^{+2i\pi\omega} z^{-1})(1 - e^{-2i\pi\omega} z^{-1})}$$

Applying the Fourier transform

$$\frac{Y(z)}{S(z)} = 1 - e^{-2i\pi\omega} z^{-1}$$

Will give an overall transform of

$$\frac{S(z) Y(z)}{X(z) X(z)} = \frac{Y(z)}{X(z)} = \frac{1 - e^{-2i\pi\omega} z^{-1}}{(1 - e^{+2i\pi\omega} z^{-1})(1 - e^{-2i\pi\omega} z^{-1})} = \frac{1}{1 - e^{+2i\pi\omega} z^{-1}}$$

The time-domain equivalent of this overall transform is

$$y(n) = x(n) + e^{+2i\pi\omega} y(n-1) \\ = \sum_{k=-\infty}^n x(k) e^{+2i\pi\omega(n-k)} = e^{+2i\pi\omega n} \sum_{k=-\infty}^n x(k) e^{-2i\pi\omega k}$$

Which becomes, assuming $x(k) = 0$ for all $k < 0$

$$y(n) = e^{+2i\pi\omega n} \sum_{k=0}^n x(k) e^{-2i\pi\omega k}$$

The equation for the $(n+1)$ -sample DFT of x , evaluated for ω and multiplied by the scale factor $e^{+2i\pi\omega n}$.

Applying the additional transform $Y(z)/S(z)$ only requires the last two samples of the s sequence. Consequently, upon processing N samples $x(0)\dots x(N-1)$, the last two samples from the s sequence can be used to compute the value of a DFT bin, which corresponds to the chosen frequency ω as

$$[24] \quad (\omega) = y(N-1) e^{-2i\pi\omega(N-1)} \\ (s(N-1) - e^{-2i\pi\omega} s(N-2)) e^{-2i\pi\omega(N-1)}$$

For $\omega N = k$, k - an integer,
This simplifies to

$$X(\omega) = (s(N-1) - e^{-2i\pi\omega} s(N-2)) e^{+2i\pi\omega} = e^{+2i\pi\omega} s(N-1) - s(N-2)$$

In either case, the corresponding power can be computed using the same cosine term required to compute s as

$$X(\omega) X'(\omega) = s(N-2)^2 + s(N-1)^2 - 2\cos(2\pi\omega) s(N-2) s(N-1)$$

To compute a single DFT bin for a complex sequence of length N , it requires $2N$ multiplications and $4N$ additions/subtractions within the loop, as well as 4 multiplications and 4 additions/subtractions to compute

$X(\omega)$, for a total of $2N+4$ multiplications and $4N+4$ additions/subtractions (for real sequences, the required operations are half that amount). In contrast, the Fast Fourier transform (FFT) requires $2\log_2 N$ multiplications and $3\log_2 N$ additions/subtractions per DFT bin, but must compute all N bins simultaneously. When the number of desired DFT bins, M , is small it is computationally advantageous to implement the Goertzel algorithm, rather than the FFT. Approximately, when

$$M < \frac{5}{6} \log_2^2 N$$

If N is not an integral power of 2 in FFT algorithm then zero-padding to the samples would result as,

$$M < \frac{5N_{padded}}{6N} \log_2(N_{padded})$$

The Goertzel algorithm can be computed as samples come in. The below figure is the corresponding second order recursive calculation flow. Goertzel algorithm needs only two real multiplications and three real additions to pick up the amplitude of the specified frequency component.

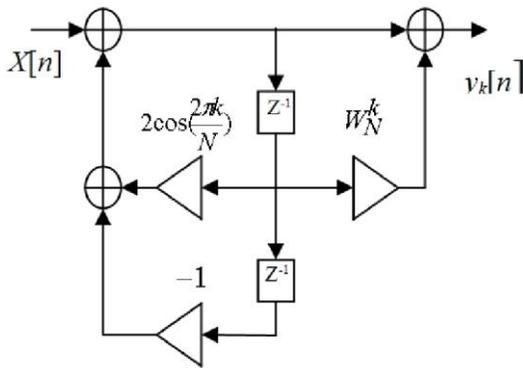


Fig.1. Calculation flow of the second order recursive algorithm

BLOCK DIAGRAM

The figure shows the system function block of a real-time sweep spectral extractor using Goertzel Algorithm

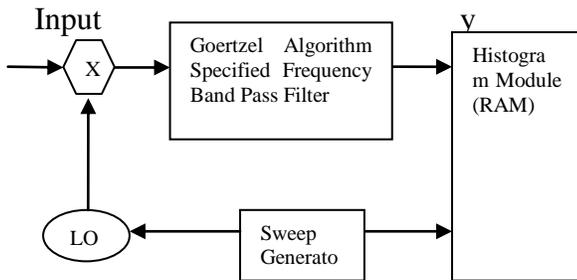


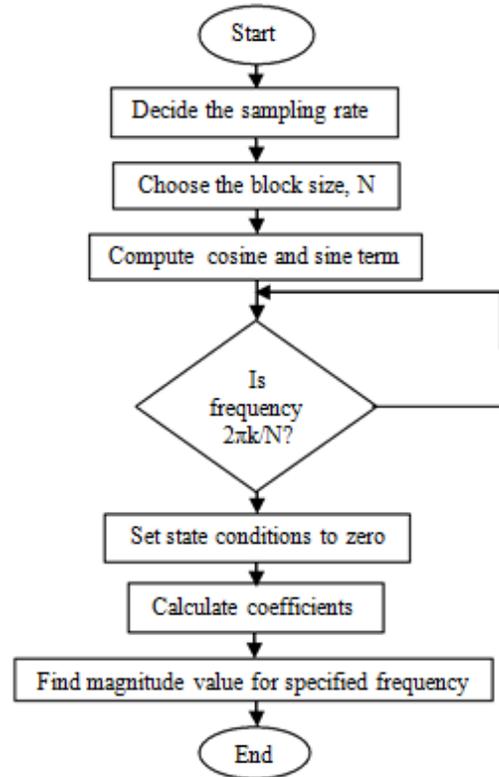
Fig.2. Functional block of a real-time sweep spectral extractor with Goertzel algorithm

The mixer is the key to the success of the analyzer. Mixers are able to operate over a very wide range of signals and offer

very low levels of spurious responses. It combines the input test signal and reference signal from the local oscillator. The output modulated signals will have the sum and difference frequency signals. Mixer output will have $f_{LO} + f_{in}$ and $f_{LO} - f_{in}$ frequencies. The local oscillator within the spectrum analyzer is a key element in the whole operation of the unit. Its performance governs the overall performance parameters of the analyzer. It must be capable of being tuned over a very wide range of frequencies to enable the analyzer to scan over the required range. It must also have a very good phase noise performance. If the oscillator has a poor phase noise performance then it will not be able to make narrowband measurements. The local oscillator generates signal. The local oscillator signal frequency will be always higher than input signal frequency. Generally,

$$f_{LO} = f_{in} + f_{IF}$$

The band pass filter attenuates the unwanted frequencies and allows only required frequency. The band pass filter is set at the difference frequency (f_{IF}) to get the selected frequency component. The filter restricts the bandwidth so that the frequency resolution is effectively increased. The sweep generator drives the sweep of the local oscillator and also the display. The signal from local oscillator will be mixed with the input signal. In this way the horizontal axis of the display is directly linked to the frequency and the histogram will have the information of the frequency for which the spectrum has been analyzed. Histogram module is implemented with RAM. It performs histogramming of the spectrum magnitude values with respect to the sweep frequency information and stores the result.



Top Level Module

The top level module gives detail description of the block diagram in fig 3.2. The DDS based LO generates the Numerically Controlled Oscillator (NCO) that will be one of the input signals to the mixer and the other input to mixer is the input test signal. The mixer will combine these two signals and generates a signal which is the difference between these two signals. The output signal of the mixer is at a frequency that the Goertzel algorithm is working and the Goertzel algorithm will identify the frequency components of the signal.

The Goertzel algorithm will generate the frequency components of a signal in terms of the real and imaginary parts that will be applied to the input of the magnitude calculator followed by peak detector which determines the peak of the signal.

The FPGA Spectrum analyzer controller controls all the blocks like frequency bin counter and sample counter. The sample counter counts the samples, when ever this counter reaches the maximum value the frequency bin counter is incremented by one and the sample counter again starts counting until the entire spectrum is covered by the frequency bin counter. The Phase Increment generator generates the corresponding Phase increments for the DDS Core.

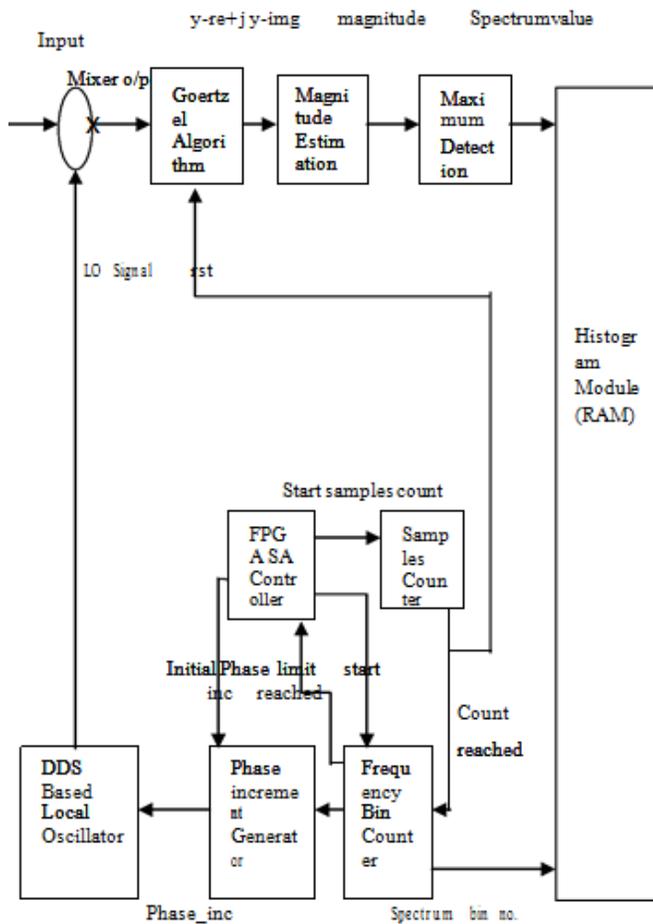


Fig.3. Top level Block Diagram of real time spectral extractor using Goertzel Algorithm

Concurrent Processing Architecture

Introduction

Goertzel Algorithm can be performed parallel for increasing the speed of operation. The block diagram for concurrent processing is as shown below.

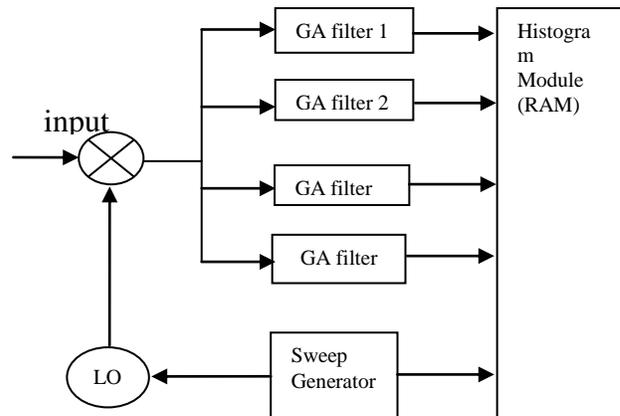


Fig.4. Concurrent processing architecture for sweep spectral extractor

Concurrent processing architecture is used for finding spectrum of different frequencies at same time. The parallel implementation of Goertzel Algorithm increases the performance speed. Each GA filter is set at different frequency for multiple frequency spectrum calculation.

Advantages and Disadvantages

Advantages

- 1. Parallel processing increases speed.
- 2. Resolution is more.

Disadvantages

- 1. Circuit complexity is more.
- 2. Less area efficient.

IV. RESULTS

In results we compare MATLAB result with VHDL result. The following result is in Chipscope. Here the results are given for 100 KHz and 180 KHz sine waves

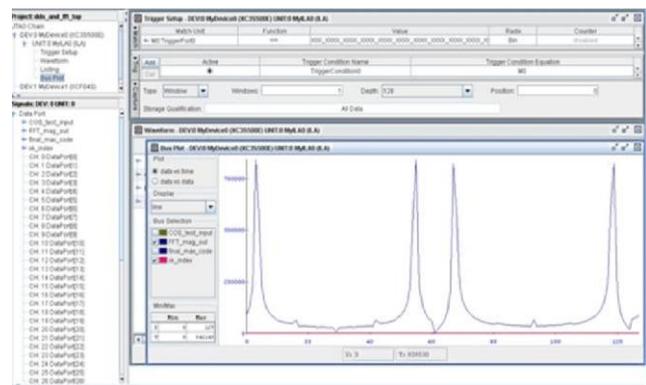


Fig.5. Goertzel algorithm spectrum analyzer result

Matlab Implementation output

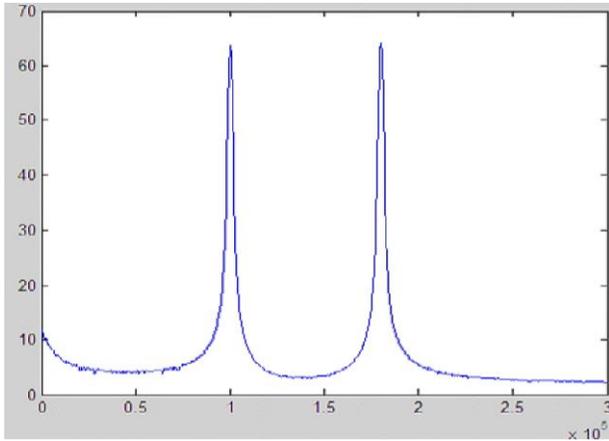


Fig.6. Goertzel Algorithm based spectrum analyzer using MATLAB

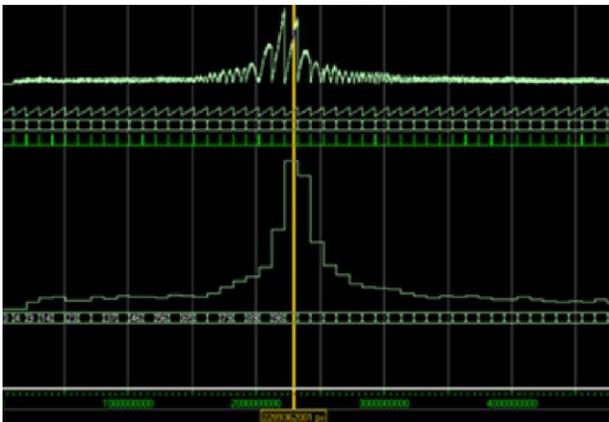


Fig.7. Simulation result of FPGA Top level Module

V. CONCLUSION

The research field of electronics is unlimited in dimensions and the emphasis has been on the evolving trend of the knowledge-based spectrum analysis techniques and their use in signal interception. Spectrum analyzing methods are particularly used for speech, music, biological signals, impulse response of wireless channel and environmental noises. Extraction of a concerned spectrum from sweep of frequencies is a challenging task due to large variations and complexity of the FFT based spectrum analyzer. Currently research is proceeded either heuristically or experimentally to devise spectrum analyzer systems generally applicable to single frequency domains. Goertzel algorithm methods are usually consisting of two main steps: a pre-processing step consisting in required frequency selection (or frequency extraction) and the second step consisting in magnitude of frequency itself. An analyzer which incorporates the spectrum extraction based on Goertzel algorithm with minimization of area and power consumption. Goertzel algorithm for DTMF detection in communication field is proposed. The experimental results shows that the proposed process of using Goertzel algorithm based spectrum analyzer will successfully find the spectrum of a specified frequency with high resolution efficiently

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Selecting Attribute to stand out in the Competitive World

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Abstract- Mining of frequent item sets is one of the most fundamental problems in data mining applications. My proposed algorithm which guides the seller to select the best attributes of a new product to be inserted in the database so that it stands out in the existing competitive products, due to budget constraints there is a limit, say m , on the number of attribute that can be selected for the entry into the database. Although the problems are NP complete. The Approximation algorithm are based on greedy heuristics. My proposed algorithm performs effectively and generates the frequent item sets faster.

Index Terms- Association rules, Data mining, Mining frequent itemsets.

I. INTRODUCTION

In recent years there has been development of ranking functions and efficient top- k retrieval algorithms which help the users in mining Frequent itemsets which plays a major role in many data mining applications. Examples include: users wishing to search databases and catalogs of products such as homes, cars, cameras, or articles such as news and job ads. Users browsing these databases typically execute search queries via public front-end interfaces to these databases. Typical queries may specify sets of keywords in case of text databases or the desired values of certain attributes in case of structured relational databases. The query answering system answers such queries by either returning all data objects that satisfy the query conditions, or may rank and return the top- k data objects, or return the results that are on the query's skyline. If ranking is employed, the ranking may either be simplistic—e.g., objects are ranked by an attribute such as Price; or more sophisticated—e.g., objects may be ranked by the degree of “relevance” to the query.

Attributes selection:

There are two types of users of these databases. Buyers of products who search such database trying to locate objects of interest, while the latter type of user are sellers of products who insert new objects into these databases in the hope that they will be easily discovered by the buyers i.e it must stand out in the existing competitive products. To understand it a little better consider the following scenario : If a real estate seller wants to give an add on the news paper about sale of flats, He has to choose the best features of the flats, that are the most of the customers are interested. If he has given an add with some features (or attributes), and if no customer is interested on those features, then the add may not add value to his advertisement. If he has a system, that can suggest top k attributes (or features) of the product, then he can give a very good add, and that add will be referred by more number of customers. General problem also

arises in domains beyond e-commerce applications. For example, in the design of a new product, a manufacturer may be interested in selecting the 10 best features from a large wish-list of possible features—e.g., a homebuilder can find out that adding a swimming pool really increases visibility of a new home in a certain neighborhood. *The problem here is selecting the proper and the best attributes of the flats, to give a good advertisement that is more number of customers are interested.*

To define our problem more formally, we need to develop a few abstractions. Let D be the database of products already being advertised in the marketplace (i.e., the “competition”). Let Q be the set of search queries that have been executed against this database in the recent past—thus Q is the “workload” or “query log.” The query log is our primary model of what past potential buyers have been interested in. For a new product that needs to be inserted into this database, we assume that the seller has a complete “ideal” description of the product. But due to budget constraints, there is a limit, say m , on the number of attributes/keywords that can be selected for entry into the database. Our problem can now be defined as follows.

II. PROBLEM FRAMEWORK

Given a database D , a query log Q , a new tuple t , and an integer m , determine the best (i.e., top- m) attributes of t to retain such that if the shortened version of t is inserted into the database, the number of queries of Q that retrieve t is maximized.

PRELIMINARIES

First we provide some useful definitions

Boolean database

Let $D = \{t_1 \dots t_N\}$ be a collection of Boolean tuples over the attribute set $A = \{a_1 \dots a_M\}$, where each tuple t is a bit-vector where a 0 implies the absence of a feature and a 1 implies the presence of a feature. A tuple t may also be considered as a subset of A , where an attribute belongs to t if its value in the bit-vector is 1.

Table 1: Database

Ca r ID	A C	Fo ur Do or	T ur bo	Po wer Doo r	Rem ote keyl esse ntry	An tilo ck Bre aks	Au to Tra ns	GP S Sys tem	Po wer Bre aks	Si de ba gs
T1	0	1	0	1	0	0	0	1	0	1
T2	0	1	1	0	0	1	0	0	0	1
T3	1	0	0	1	1	0	1	1	1	0
T4	1	1	0	1	1	1	0	0	1	0
T5	1	1	0	0	0	1	0	0	0	1
T6	0	1	0	1	1	0	0	1	0	1
T7	0	0	1	1	0	0	0	1	0	0

Table 2: Query Log Q

Ca r ID	A C	Fo ur Doo r	T u r bo	Po wer Doo r	Rem ote keyl esse ntry	An tilo ck Brea ks	Aut o Tra ns	GP S Sys tem	Po wer Bre aks	Si de ba gs
Q1	1	0	0	1	1	0	1	0	0	1
Q2	1	1	0	0	0	0	0	0	0	0
Q3	1	1	1	0	1	0	0	1	0	0
Q4	1	1	1	1	0	0	0	0	0	0
Q5	1	1	1	1	0	1	0	0	1	0
Q6	1	1	1	0	0	0	0	0	0	0
Q7	1	1	1	1	0	1	0	0	1	0
Q8	1	1	1	0	1	0	0	0	0	0
Q9	0	0	0	0	0	0	0	0	0	1

Table 3: New Tuple T to be inserted

Ca r ID	A C	Fo ur Doo r	T u r bo	Po wer Doo r	Rem ote keyl esse ntry	An tilo ck Brea ks	Aut o Tra ns	GP S Sys tem	Po wer Bre aks	Si de ba gs
T	1	1	1	1	0	0	0	0	0	0

Tuple domination.

Let t1 and t2 be two tuples such that for all attributes for which tuple t1 has value 1, tuple t2 also has value 1. In this case, we say that t2 dominates t1.

Tuple compression.

Let t be a tuple and let t' be a subset of t with m attributes. Thus, t' represents a compressed representation of t. Equivalently, in the bit-vector representation of t, we retain only m 1s and convert the rest to 0s. *Query log.* Let Q = {q1 . . . qS} be collection of queries where each query q defines a subset of attributes. The following running example will be used throughout the paper to illustrate various concepts

Conjunctive Boolean - Query Log (CB-QL): Given a query log Q with Conjunctive Boolean Retrieval semantics, a new tuple t, and an integer m, compute a compressed tuple t' having m attributes such that the number of queries that retrieve t' is maximized. Intuitively, for buyers interested in browsing products of interest, we wish to ensure that the compressed version of the new product is visible to as many buyers as possible.

Selecting the threshold value:

There are two alternate approaches to setting the threshold. One approach is essentially a heuristic, where we set the threshold to a reasonable fixed value dictated by the practicalities of the application. threshold enforces that attributes should be selected such that the compressed tuple is satisfied by a certain minimum number of queries. For example, a threshold of 1 percent means that we are not interested in results that satisfy less than 1 percent of the queries in the query log.

III. RELATED WORK

A large corpus of work has tackled the problem of ranking the results of a query. In the documents world, the most popular techniques are tf-idf based ranking functions, like BM25, as well as link-structure-based techniques like Page Rank if such links are present (e.g., the Web). In the database world, automatic ranking techniques for the results of structured queries have been proposed. Also there has been recent work on ordering the displayed attributes of query results.

Both of these tuple and attribute ranking techniques are inapplicable to our problem. The former inputs a database and a query, and outputs a list of database tuples according to a ranking function, and the latter inputs the list of database results and selects a set of attributes that “explain” these results. In contrast, our problem inputs a database, a query log, and a new tuple, and computes a set of attributes that will rank the tuple high for as many queries in the query log as possible.

Although the problem of choosing attribute is related to the area of feature selection, our work differs from the work on feature selection because our goal is very specific—to enable a new tuple to be highly visible to the database users and not to reduce the cost of building a mining model such as classification or clustering.

PINCER SEARCH ALGORITHM

Most of the algorithms used for mining maximal frequent itemsets perform fairly well when the length of the maximal frequent itemset is small. However, performance degrades when the length of the maximal frequent itemset is large, since in the bottom-up approach, the maximal frequent itemset is obtained only after traversing all its subsets.

The Pincer-search algorithm (Lin and Kedem, 1998, 2002), proposes a new approach for mining maximal frequent itemsets. It reduces the complexity by combining both top-down and bottom-up methods for generating maximal itemsets. The bottom-up search starts from 1-itemset and proceeds upto n-itemsets as in Apriori while the top-down search starts from n-itemsets and proceeds upto 1 itemset. Both bottom-up and top-down searches identify the maximal frequent itemsets by

Segmentation involves dividing the data source into a number of equal-sized segments. After segmenting, the segments are prioritized based on its support count (horizontal count). Once the priority is set, the segments are mined for maximal itemsets in the order of their priority. These steps are discussed in detail below.

Segmentation of the Transactional data source

The transactional data source is divided into a number of equal-sized segments. The segment size can be determined depending on the minimum threshold, *min_sup*.

$$\text{Number of equal-sized segments} \leq \frac{100}{\text{Min_sup \%}}$$

With such partitioning, the number of transactions in a segment will not be less than *min_sup %* of the total transactions, $|D|$. Each segment is associated with a new data structure called Item Support Vector (ISV) kept in main memory which contains the support of each individual item in that segment. The structure of an ISV is given in Table 5.

Table 5: Item support vector(ISV)

Item	I1	I2	In
Count				

For example by segmenting the data source given in Table 1 with each segment size=3, the ISV for segment1 is given in Table 3. During the first scan of the data source, all the ISVs are filled up. The counts of individual items in a segment are recorded in the appropriate segment's ISV. Finally, the overall support of each item can be calculated from the contents of all ISVs

Table 6: item support vector for segment 1

Item	A	B	C	D	E	F	G	H	I	J
Count	3	2	1	1	2	0	1	1	0	1

For example, the overall support of an item 'a' can be calculated by adding the counts of the item 'a' in all ISVs. For this example, the support of 'a' is 8. Only those items having its overall count greater than the specified minimum support are considered for mining MFS.

Prioritization of segments:

Unlike other approaches, the data source is not scanned sequentially for identifying the MFS. Here the proposed method makes use of the contents of ISVs to guide the search selectively. The contents of ISVs reveal the possible combination of items in their respective segments. Before initiating the second scan, the sum of count values of all the frequent items in each segment is calculated. It is called the horizontal count, h_i , where $i=1,2,\dots,n$. Horizontal count for a segment is calculated by adding the counts of different items in its ISV excluding the infrequent items. Then, these horizontal count values are arranged in descending order and the segments are then prioritized. The segment having the highest horizontal count value is given the highest priority. A segment with highest priority is considered first for mining. A segment with second highest priority is considered next and the mining continues until all the maximal frequent itemsets are identified.

As an illustrative example, the same data source given in the Table 2 is taken. It is divided into three segments. The transactions of the data source are from an ordered domain $I = \{a, b, c, d, e, f, g, h, i, j\}$. The minimum support is kept as 3. Therefore only the items a, b, c, d, and e are used to calculate h_i . The ISVs and the horizontal and vertical counts for the data source given in Table 7 with its segment size equal to 3 are given in Table 7.

Table 7: Item support vectors of the data source

	Item										
Segment	a	b	c	d	e	f	g	h	i	j	Horizontal
ISV1	3	2	1	1	2	0	1	1	0	1	9
ISV2	3	3	3	2	0	1	0	0	1	0	11
ISV3	2	2	2	1	1	1	0	0	1	1	8
Vertical count	8	7	6	4	3	2	1	1	2	2	

The data source is scanned in the order of Segment2, Segment1, and Segment3 since their horizontal counts of ISVs are 11, 9, and 8 respectively. The purpose of segment based scanning is to concentrate on the dense areas of the data source to look for MFS.

IV. MINING OF SEGMENTS

The mining process uses two table data structures to locate MFS called *Maximal Frequent Table* and *Maximal Frequent Candidate Table* respectively. Each table maintains patterns and their corresponding counts. The transactions are read from the data source one by one. The frequent items in a transaction called *pattern* alone are considered and recorded in the tables. Mining can be done in the data source as follows :I Start scanning the

segments in the order of their priority i.e., descending order of *hi*. For each segment apply the following

1. Read a transaction *t*, when the segment is not empty
2. Consider frequent items alone (pattern)
3. Check for the pattern in *Maximal Frequent Table*
 - a. If *Maximal Frequent Table* is null, goto step 4.
 - b. If the new pattern is a subset of an already existing pattern then goto step 1.
 - c. If the new pattern is similar to an already existing pattern, then increment the count of the already existing pattern by one and goto step 1.
 - d. If the new pattern is a superset of an already existing pattern then increment the count of the existing pattern by one and goto step 4.
4. Check for the pattern in *Maximal Frequent Candidate Table*
 - a. If the incoming pattern is similar to an existing pattern then increment its count by one
 - b. If the incoming pattern is superset of an existing pattern then increment the count of its sub pattern by one and insert the new pattern into *Maximal Frequent Candidate Table* with its count initialized to 1.
 - c. If the incoming pattern is a subset of an existing pattern then insert the new pattern into *Maximal Frequent Candidate Table* with its count initialized to the sum of the supports of its supersets in *Maximal Frequent Candidate Table* plus one.
 - d. If the incoming pattern is a new pattern, record the new pattern in the *Maximal Frequent Candidate Table* and initialize its count to one.
 5. If any of the patterns in the *Maximal Frequent Candidate Table* has reached the minimum support threshold, move that pattern to *Maximal Frequent Table*. Simultaneously prune all its sub patterns from the *Maximal Frequent Table*.

Determine all the common frequent patterns from the patterns in *Maximal Frequent Candidate Table* and calculate its support which is equal to the sum of the support of its supersets in *Maximal Frequent Candidate Table*. Add it to the *Maximal Frequent Table* when its support passes the minimum threshold.

Example:

For the data source given in Table 2 mining is done as follows
Step 1:

After mining segment 2:

Maximal Frequent Table contains {abc :3}

Maximal frequent candidate table contains the items{abcd:2}

After mining segment 1:

Maximal Frequent Table contains the itemsets {abc : 4}

Maximal Frequent Candidate Table contains the items {ade:1,abce:1,abcd:2}

After mining segment 3:

Maximal frequent table contains the itemsets {abcd:3}

Maximal frequent candidate table contains the items {ade:1,abce:2 }

STEP II:

Common frequent patterns in maximal frequent table{ae:3}

Maximal frequent table contains the itemsets {abcd:3, ae:3}

Finally all the MFS are available in maximal frequent table

Thus it is seen that the proposed technique generates the same MFS as those generated by the Pincer approach of (Lin and Kedem,2002).

V. PERFORMANCE EVALUATION

The experiment was conducted on a Pentium IV computer with a CPU clock rate of 2.8 GHz, 2 GB RAM running Windows Operating System. The data sources for the experiment were generated synthetically. Three data sources 10K, 50K, and 100K were generated to study the performance of the proposed work. Table 5 shows the characteristics of each data source. The performance of the proposed approach has extensively been studied to confirm its effectiveness.

Table 8: Summary of sample data sources taken for performance study

Name	T	I	D
Data source 1	10	3	10K
Data source 2	10	3	50K
Data source 3	10	3	100K

The MFS generated by the proposed technique has been found to be identical to the MFS generated by the Pincer Approach.

Tables 6, 7, and 8 simply compare the performance of the proposed technique with the Pincer technique

Figure 2 displays the diagrammatic representation of these results.

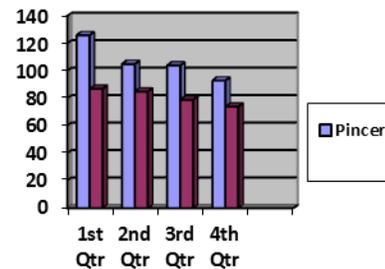


Figure 2: Performance comparison on data source T10.I3.10k

VI. CONCLUSIONS

While the problems considered in this paper are novel and important to the area of ad hoc data exploration and retrieval, we observe that our specific problem definition does have limitations. After all, a query log is only an approximate surrogate of real user preferences, and moreover, in some applications neither the database, nor the query log may be available for analysis; thus, we have to make assumptions about the nature of the competition as well as about the user preferences. Finally, in all these problems, our focus is on deciding what subset of attributes to retain of a product

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A Study of Location Monitoring in Mobile System

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Abstract- This paper also proposes a generic framework for monitoring continuous spatial queries over moving objects. The framework distinguishes itself from existing work by being the first to address the location update issue and to provide a common interface for monitoring mixed types of queries. We propose algorithms for query evaluation/reevaluation and for safe region computation in this framework. In this paper we address two issues first issue We show that existing approaches may fail to provide spatial anonymity for some distributions of user locations and describe a novel technique which solves this problem and second issue We propose Prive, a decentralized architecture for preserving the anonymity of users issuing spatial queries to LBS. Mobile users self organize into an overlay network with good fault tolerance and load balancing properties. The most important concept of PAM, it is used to the frequently encountered type of query in geographic information system is to find the k nearest neighbor objects to given point in space. In a mobile service scenario, users query a server for nearby points of interest but they may not want to disclose their locations to the service.

Index Terms- Spatial Relations, Database server, Query index, Object index, KNN query

I. INTRODUCTION

With the advent of mobile and ubiquitous computing, monitoring continuous spatial queries over moving objects has become a necessity for various daily applications, [4] such as fleet management, cargo tracking, child care, and location aware advertisement. The fundamental problem in a monitoring system is when and how a mobile client should send location updates to the server because it determines three principal performance measures of monitoring—accuracy, efficiency, and privacy. In the literature, very few studies on continuous query monitoring are focused on location updates. Two commonly used updating approaches are periodic update (every client reports its new location at a fixed interval) and deviation update (a client performs an update when its location or velocity changes significantly). The application servers register spatial queries of interest at the database server, which then continuously updates the query results until the queries are deregistered. There are two predominant costs that determine the system performance: the wireless communication cost for location updates and the query evaluation cost at the database server.

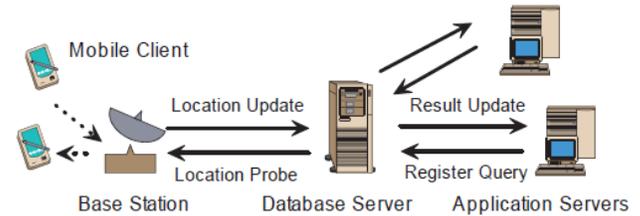


Fig1: The System Architecture

In this paper, we propose an innovative and generic monitoring framework to overcome these problems by taking a systematic approach. Figure 2. Shows a simple example where there are two moving objects a and b and two registered queries Q1 (an NN query) and Q2 (a range query). The current results of these two queries are {a} and {a, b} respectively, which will not change if a and b are in their safe regions S_a and S_b (the shaded boxes). As an example in Figure 1.2, when a moves out of S_a to a new location a' , the result of Q1 becomes undecided as either of the two objects could be the nearest neighbor. To resolve the ambiguity, the server has to probe some objects (in this example, b) to request an immediate location update (this is called a server-initiated probe and update).

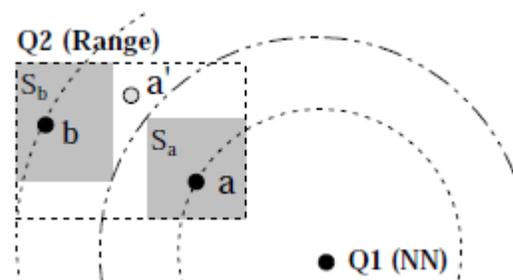


Fig 2: Example of Safe Regions

II. THE FRAMEWORK OVERVIEW

In this case, In this section, we first make some assumptions on the system model, and then introduce the framework by describing the structure and behaviors of the database server. The next two sections will show the detailed query evaluation/reevaluation and safe region computation algorithms at the database server. To simplify the system model, we make the following assumptions:

At the database server, all registered queries can be fit into main memory whereas not all the moving objects can. This is a common and fair assumption in monitoring continuous spatial

queries [2]. The database server handles location updates sequentially. In other words, no location updates take place during the processing of a new query or another location update. Although this is not a prerequisite for this framework, it is a reasonable assumption to relieve us from considering the read/write consistency.

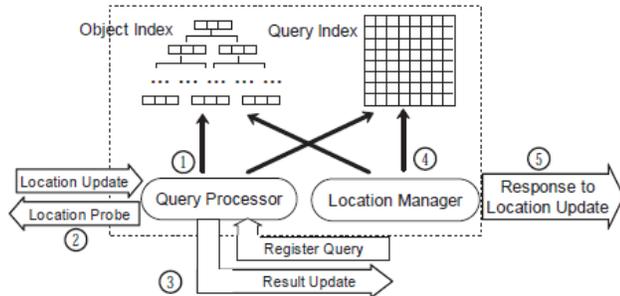


Fig 3: The Database Server Structure

In fact, in reality communication incurs a measurable update propagation delay and thus the exact client location and the location maintained at the database server are not always synchronized. The violation of this assumption affects the monitoring accuracy, which will be measured in the experiments.

The communication cost between every client and the database server is constant. Throughout this paper, C_i denotes the cost for one source-initiated location update and C_p denotes the cost for one server-initiated location probe and update.

Mobile clients are able to detect their locations, through positioning technologies such as GPS.

2.1 The Database Server

As depicted in Figure 3, the database server has four components: the on-disk index for the moving objects, the in memory index for the queries, the location manager, and the query processor. Upon receiving a location update, the query processor first reevaluates those queries affected by this update based on the indexes. During the reevaluation, the query processor might need to probe some objects for server-initiated location updates to determine the query results. The updated query results are then reported to the application servers which register these queries. Afterwards, the location manager computes the new safe regions for this object and the probed objects, also based on the two indexes. Finally, these new safe regions are sent back to the corresponding clients as the responses for their location updates. The server's behaviors upon a new query being registered are similar: it goes through, except that in, the query is evaluated from scratch instead of being reevaluated incrementally.

2.2 The Object Index

The object index stores the current safe regions of all the objects. While many spatial index structures can serve this purpose, this paper employs the well-known R-tree based index [2]. Since the safe region changes each time the object updates its location (either client-initiated or server initiated), the index

should be optimized to handle frequent updates. The existing study on this issue can be adopted in this framework.

2.3 The Query Index

For each query, the database server stores: (1) the parameters of the query (e.g., the rectangle of a range query, the query point and the k value of a kNN query), (2) the current query results and, (3) the quarantine area of the query. The quarantine area is such areas that as long as all result objects stay inside it and all non-result objects stay outside it, the results of this query do not change. This area is used to identify the affected queries upon a source-initiated location update. For a range query, the quarantine area is simply the query rectangle; for a kNN query, the area can be any circle centered at the query point and completely covering the k-th NN_{o_k} but not the k + 1-th $NN_{o_{k+1}}$. In other words, the radius of the circle should be equal to or greater than $\Delta(q, o_k)$, the maximum distance between the query point q and the safe region of o_k , but less than $\delta(q, o_{k+1})$, the minimum distance between q and the safe region of o_{k+1} . In this paper, we set the radius as the midpoint of these two distances.

III. QUERY EVALUATION AND REEVALUATION

Algorithm 1 Overview of Database Behavior

- 1: while receiving a request do
- 2: if the request is to register query q then
- 3: evaluate q (probe objects' locations if necessary);
- 4: compute q's quarantine area and insert it into the query index;
- 5: return the results to the application server;
- 6: else if the request is to deregister query q then
- 7: remove q from the query index;
- 8: else if the request is a location update from object p then
- 9: determine the set of affected queries;
- 10: for each affected query q' do
- 11: reevaluate q' (probe objects' locations if necessary);
- 12: update the results to the application server;
- 13: recompute q's quarantine area and update the query index;
- 14: update the safe region of p;
- 15: update the safe region of any probed object;

3.1 Evaluating New Range Query

Processing a new range query on safe regions is very similar to that on exact object locations. We start from the index root and recursively traverse down the index entries that overlap the query rectangle until reaching the leaf entries where the safe regions are stored. If the safe region of an object is fully covered by the query rectangle, the object is a result. Otherwise, they overlap and the object must be probed to resolve the ambiguity.

3.2 Evaluating New kNN Query

Evaluating an order-sensitive kNN query on safe regions is more complicated than that on exact object locations. We adopt the best-first search (BFS) as the paradigm for this algorithm. Similar to the original BFS, we maintain a priority queue which stores intermediate or leaf index entries (i.e., object locations). The object location is in the form of either a safe region or the exact point (after the server probes it). The key to sort the elements in the queue is the (minimum) distance to the query point q . The searching algorithm is the same as the original BFS except when a leaf entry, object p , is popped from the queue. If p is already represented by a point, it is returned as a result immediately. Otherwise p , represented by a safe region, is held until the next object u is popped. Then, the maximum distance between p and q ($\Delta(q, p)$) is compared with the minimum distance between u and q ($\delta(q, u)$). If the former is shorter, p is guaranteed closer to q than any other objects in the queue. As such, p is returned as a result. However, if the former is longer, the query result is undecided based on the safe regions. Therefore, p is probed and p together with its exact location is inserted back to the priority queue. And u is also inserted back to the queue. The algorithm continues until k objects are returned as results. In addition, in order to find the radius r of the quarantine area for this query, the algorithm pops one more element from the queue and the value of r is the midpoint between the keys of the k -th NN and the last popped element. It is worthwhile to note that this algorithm guarantees that the object is not probed until it is about to be returned.

```

11: probe p;
12: enqueue hp, d(q, p)i back to the queue;
13: continue;
14: if u is represented by a safe region then
15: hold u;
16: else
17: insert u into C;
18: else if u is an index entry then
19: for each child entry v of u do
20: enqueue hv, _(v, q)i into the queue;
21: dequeue one more element to u;
22: r = (_(q, Ck) + _(q, u))/2;
23: return C and r;
    
```

IV. SAFE REGION COMPUTATION

The safe region of a moving object p (denoted as $p.sr$) designates how far p can reach without affecting the results of any registered query. As queries are independent of each other, we define the safe region for a query Q as the rectangular region in which p does not affect Q 's result. $p.srQ$ is essentially a rectangular approximation of Q 's quarantine area or its complement. Obviously, $p.sr$ is the intersection of individual $p.srQ$ for all registered queries. To efficiently eliminate those queries whose $p.srQ$ do not contribute to $p.sr$, we require $p.sr$ (and $p.srQ$) to be fully contained in the grid cell in which p currently resides. By this means, we only need to compute $p.srQ$ for those queries whose quarantine areas overlap this cell as the $p.srQ$ for any rest query is the cell itself. These overlapping queries are called relevant queries and are exactly pointed by the bucket of this cell in the query index

V. CONCLUSION

We are currently deepening our research on this aspect, introducing other measures of similarity. This paper proposes a generic framework for monitoring continuous spatial queries over moving objects. The framework distinguishes itself from existing work by being the first to address the location update issue and to provide a common interface for monitoring mixed types of queries. Based on the notion of safe region, the location updates are query aware and thus the wireless communication and query reevaluation costs are significantly reduced. We provide detailed algorithms for query evaluation/reevaluation and safe region computation in this framework. Enhancements are also proposed to take advantage of two practical mobility assumptions: maximum speed and steady movement. To evaluate the performance, we thoroughly conduct a series of experiments and compare the proposed framework with the optimal monitoring and the traditional periodic monitoring schemes.

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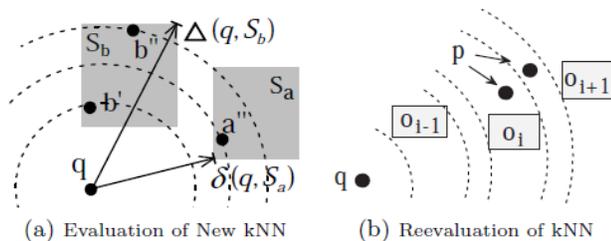


Fig 4: Processing a kNN Query

Algorithm 2 Evaluating a new kNN Query

Input: root: root node of object index

q: the query point

Output: C: the set of kNNs

r: the radius of the quarantine area

Procedure:

- 1: initialize the priority queue;
- 2: enqueue hroot, _(q, root)i into the queue;
- 3: while |C| < k and queue is not empty do
- 4: dequeue the top element to u;
- 5: if u is an object location then
- 6: if there is an object p held then
- 7: if $\Delta(q, p) \leq \delta(q, u)$ then
- 8: insert p into C;
- 9: else
- 10: enqueue hu, _(q, u)i back to the queue;

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EMERGENCY RESPONSE SYSTEM

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Abstract— In today's world we are faced with many different types of emergencies in the indoor environment. Response to such emergencies is critical in order to protect resources including human life.

With advancements in wireless communication and the development of multifunctional sensors, has lead to the birth of a new technology named Wireless Sensor Networks.

This paper, presents an emergency response system which is easy to deploy and with low cost and the flexibility of reporting emergencies to the users in various forms, such as live streaming video feeds on a computer screen, an audio alert using APR 9600 and also a mobile device is used to set or reset any specified parameters of devices when required.

In this paper we present a design for such a system using temperature sensors as a proof of concept. The design for this system can be realized using Adhoc Network protocols.

Index Terms- PIC microcontroller, Protocols, APR, Sensor Networks, Network models, Sensors.

INTRODUCTION

Today's world we are faced with increasingly many types of emergencies in our environments. One example which stands out is the disastrous variation in parameters such as temperature of blast furnaces which has plagued our steel manufacturing industries and industries alike. In addition, industries with poor infrastructure may not be able to minimize loss of resources and human life in times of unnatural catastrophes. The objective of this project is to design a wireless sensor network using Zigbee/MiWi to respond to any emergency and inform appropriate individuals in a timely and cost effective manner so that the required device parameters which are out of a pre specified range can be set or reset by the user.

The project further aims to enable ease of installations of variety of sensors and networking possibilities with a variety of networks

Wireless Sensor Network

A wireless sensor network is as a wireless network which consists of equally distributed autonomous devices using sensors capable of monitoring the physical conditions such as temperature, voltage, sound, pressure, or motion, at various sites especially for machinery's in factories [2]. In addition to one or more sensors, each node here is typically equipped with a web camera, a communications device, a small microcontroller, and an energy source. Depending on the size of the sensor network and the complexity required of individual sensor nodes the network cost is determined. Size and cost constraints on sensor nodes result in corresponding constraints on resources such as memory, bandwidth, computational speed and energy source [1].

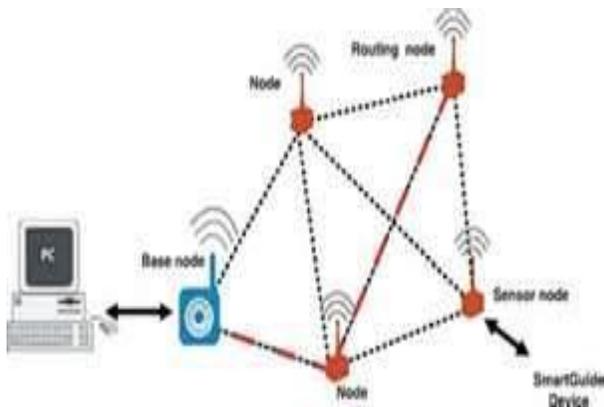


Figure1: Wireless Sensor Network Architecture

Emergency response system

Illegal Variations Intimation System

In Wireless Emergency Notification System (WENS) by Inspiron Logistics an authorized person chooses a group to notify emergency. The WENS system tries every 5 seconds, indefinitely, until the message is delivered. WENS can track each and every message with a delivery receipt and subsequent report [4]. This gives factory officials a way to know that the message was delivered. The WENS system has a proprietary service called an Imaging and Video Delivery System (IVDS). IVDS provides the industry community with the ability to send images and video to campus police [4].

Wireless Illegal Variation Intimation System uses True audio alert and video of the specified site and is the top recommendation for implementing a industry-wide notification solution. [1].

Since TCP is used here it is a reliable transmission. This provides the industrial community with the ability to send video to the appropriate person [17].

Mobile Device Video streaming

This method is an active emergency response and hence competes with others in its time efficiency. The videos of the monitored area which the PC obtains from the web cameras are displayed on the monitor. Video from single camera or multiple cameras can be viewed simultaneously. In case the authorized person is not present at the site these video images are further streamed to his mobile device which is connected to the PC through WAN using GPRS. The authorized person has the ability or options to set or reset the monitored device parameters from his mobile device [16].

Audio Alert

Mainly APR9600 is used for audio notification for multiple purpose [15].The APR9600 samples incoming voice signals and stores the instantaneous voltage samples in non-volatile FLASH memory cells. Each memory cell can support voltage ranges from 0 to 256 levels. During playback the stored signals are retrieved from memory, smoothed to form a continuous signal, and then amplified before being fed to an external speaker.

In case of emergencies the PC plays a voice alert which was previously recorded. Depending on the given alert the parameters are adjusted to suite the specifications required.

Internet

By using the internet the alerts can be updated on the websites of a campus (monitored area), which has the various procedures to be taken in case of emergency.

Response Time

Based on the study from this project [2], in the event of any emergency it will take few seconds after the variation occurred for us to hear an alert from the system. The response time of the authorized person or the client depends on severity of abnormality, load, and time taken for their detection [3]. The average response time to such emergency in industries is the range of few seconds to one or two minutes. Effort is being made to reduce response time to as short as possible such as easy reporting platforms and installation of smart sensors, increase patrol of the devices by monitoring the required site continuously [3].

Given below are some key factors that we need to focus on to develop a Wireless Emergency Response System [3] using appropriate sensors:

- Effectiveness of the sensors such as temperature sensor, to detect deviation in device parameters, from their specified normal range.
- Reduce the data loss which occurs while the video is being converted to byte form and transmitted from web cameras to the authorized person's mobile device.
- Reduce the transmission delay between sensing and reporting of information from the sensor to the PC.
- Overall notification delay to end user.

Implementation goal

The project will utilize open hardware for realizing its goals. Specifically we intend to use APR9600 solution to conduct a feasibility study. The reason to choose this is to have a cost effective and a robust design. The eventual goal is for the project to use PC's as the 'sink' in order to collect data from various sensors and provide them in a user friendly fashion. This data can then be stored appropriately as well. The PC also outputs an audio alert to notify the user the variations in parameters that are deemed as emergency based on a preexisting criterion. Client software can be developed and can be programmed to play video. This project will focus on variation in any specified device temperature emergency in any industrial devices using temperature sensors that are used to conduct the feasibility study of the system.

Protocols Used

General Network Model

A network is a combination of hardware and software that sends data from one location to another. The hardware consists of the physical equipment that carries signals from one point of the network to another. The software consists of instruction sets that make possible the services that we expect from a network ^[15].

The network model having seven layers performs various functions. It is given in figure2 below.

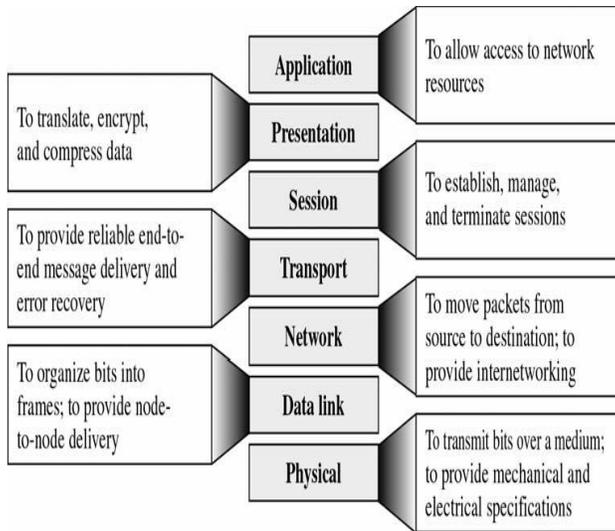


Figure2: Layers of Network model and their functions.

General Packet Radio Services

General Packet Radio Services (GPRS) is an enhancement to GSM or TDMA (IS-95) network. That's why GPRS is often touted as a 2.5G technology. GPRS has two important entities:

Servicing GPRS support node (SGSN) and Gateway GPRS support node (GGSN). GPRS is typically deployed in two phases.

A GPRS software upgrade can be performed efficiently.

- GPRS typically supports up to 100 users with one to eight channels. GPRS supports broadcast and multisessions. GPRS requires an investment in new infrastructure. A desirable characteristic of GPRS protocol is that each layer can be reused to support features in different GPRS nodes.

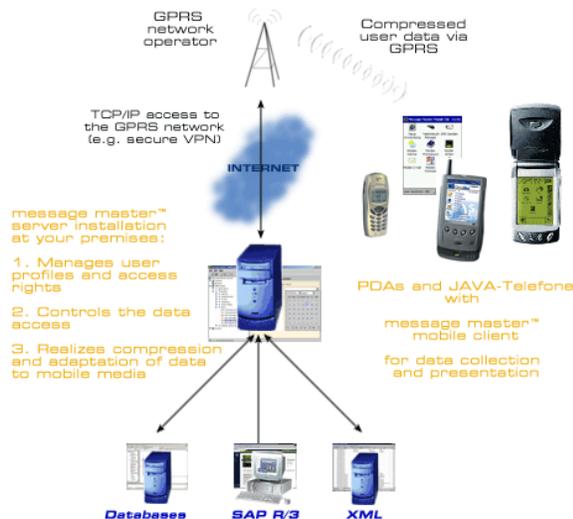


Figure3: GPRS network.

- Several potential GPRS applications have been identified: Vertical applications for specific data communication requirements of companies and Horizontal applications for individual users [16].

File Transfer Protocol

File Transfer Protocol (FTP) is a standard network protocol used to copy a file from one host to another over a TCP-based network, such as the Internet.

FTP URL syntax is described in RFC1738 [20], taking the form [17]:

ftp://[<user>[:<password>]@]<host>[:<port>]/<url-path> (1)

FTP sets the rules for transferring files between computers. FTP is built on a client-server architecture and utilizes separate control and data connections between the client and server. UDP cannot be used when FTP is made use. The primary objective in the formulation of File Transfer Protocols was to make file transfers uncomplicated

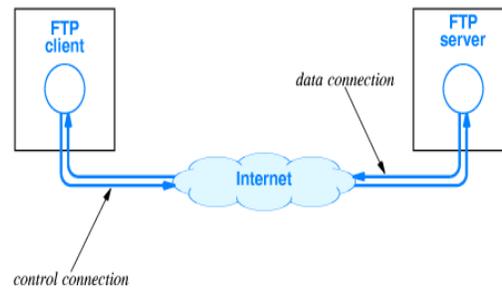


Figure4: FTP Client and server connection.

Transmission Control Protocol

The Transmission Control Protocol (TCP) provides full transport-layer services to applications. TCP is a reliable stream transport protocol [21].

TCP transmits data in full-duplex mode and socket programming is done in TCP for this purpose [22].

To provide different services TCP has several features

- **Numbering System:** There are two fields called the sequence number and acknowledgement number. These two refer to the byte number.
- **Flow Control:** The receiver of the data controls the amount of data that are to be sent by the sender. The numbering system allows TCP to use a byte-oriented flow control.
- **Error Control:** To provide reliable service, TCP implements an error control mechanism.



Figure5: Data transmission using TCP.

- Congestion Control: The amount of data sent by a sender is not only controlled by the receiver (flow control), but is also determined by the level of congestion in the network.

Internetworking Protocol

Internetworking Protocol (IP) is a transmission mechanism used by the TCP/IP protocols. It is a best-effort delivery service [18]. IP transports data in packets called datagram's, each of which is transported separately [17].

IP provides several services:

- Addressing: IP headers contain 32-bit addresses which identify the sending and receiving hosts.
- Fragmentation: IP packets may be split, or fragmented, into smaller packets. This permits a large packet to travel across a network which can only handle smaller packets.
- Packet timeouts: Each IP packet contains a Time To Live (TTL) field, which is decremented every time a router handles the packet. If TTL reaches zero, the packet is discarded, preventing packets from running in circles forever and flooding a network.
- Type of Service: IP supports traffic prioritization by allowing packets to be labeled with an abstract type of service.

Options: IP provides several optional features, allowing a packet's sender to set requirements on the path it takes through the network (source routing), trace the route a packet takes (record route), and label packets with security features.

Network And Hardware Used

The main hardware components which are used in this proposed system are PIC16f877 and APR9600. The IEEE 802.11-WLAN is also made use of for video transmission using FTP and also ZIGBEE is used in WSN. These are briefed below.

IEEE 802.11 - WLAN/Wi-Fi

Wireless LAN (WLAN, also known as Wi-Fi) is a set of low tier, terrestrial, network technologies for data communication. The WLAN standard's operates on the 2.4 GHz and 5 GHz Industrial, Science and Medical (ISM) frequency bands. It is specified by the IEEE 802.11 standard and it comes in many different variations like IEEE 802.11a/b/g/n. The application of WLAN has been most visible in the consumer market where most portable computers support at least one of the variations [14].

APR9600: Single Chip Voice Recording and Playback Device

One of our main design goals is to be able to interface APR9600 devices to a PC [15]. The APR9600 device offers true single-chip voice recording non-volatile storage and play back capability for 40 to 60 seconds. The device supports both random and sequential access of multiple messages. Its main features are as follows:

- Single-chip, high-quality voice recording and playback solution.

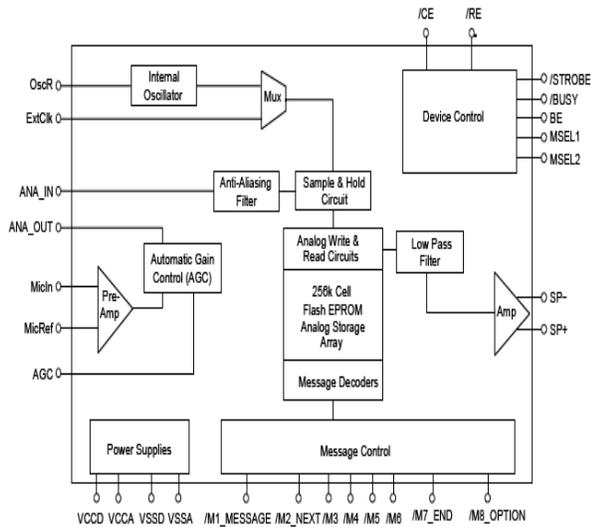


Figure6: APR9600: Block Diagram

- User-friendly, easy-to-use operation.
- Low power consumption.
- Non-volatile flash memory technology.
- User-selectable messaging options.
- Operating current: 25mA typical.
- Standby current: 1µA typical
- Chip enable pin for simple message expansion.

Zigbee

ZigBee is a specification for a suite of high level communication protocols using small, low-power digital radios based on the IEEE 802.15.4 standard for WSN. ZigBee devices can be interfaced to the computer or other end points [8]. We need a ZigBee modem in order to connect to user understandable digital interface, such as the computer. Zigbee Modems connect to the USB port of the computer, and mounts on a COM port (a standard serial port). The ZigBee provisions for devices to communicate with each other using a Mesh, Tree or star topology.

As a result, ZigBee modems can be used to talk to many ZigBee devices and we can choose which device we want to talk to at any time. There are two ZigBee modules, series 1 and series 2. A ZigBee Series 2 Modem is needed to talk to ZigBee Series 2 devices. ZigBee Series 2 offers a new feature called mesh networking. Mesh networking allows our computer to talk to devices that are out of range by talking to devices that are in between [23].

One of the main design goals of our emergency response system is to have a cost effective WSN.

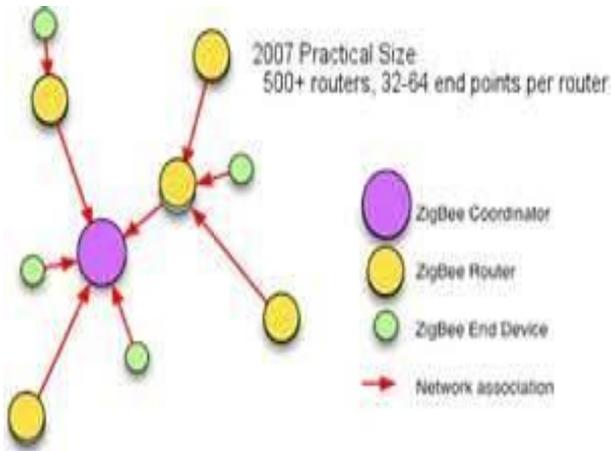


Figure7: Zigbee Network Architecture

Currently blue tooth offers short personal area coverage however it does not offer the Mesh or Tree networking of ZigBee. Bluetooth is also an IEEE 802.15 WPAN standard and also uses the 2.4-GHz unlicensed frequency band. Like ZigBee Bluetooth also uses small form factors and low power.

PIC16f877 Microcontroller.

Microcontroller is nothing but microprocessor with memory in-built. It is used for specific purpose. Peripherals are connected internally [5].

TABLE I. KEY FEATURES OF PIC16F877.

Key features of microcontroller	PIC16f877
Operating Frequency	DC-20 MHz
Resets (and delays)	POR,BOR(PWRT,OST)
FLASH Program Memory(14 bit words)	8K
Data memory(bytes)	368
Interrupts	14
I/O Ports	Ports A,B,C,D,E
Timers	3
Capture/compare/PWM modules	2
Serial communications	MSSP,USART
Parallel communications	PSP
10-bit Analog-to-Digital Module	8 input channels
Instruction set	35 instructions
EEPROM Data Memory	256

Network Structure For WSN

Wireless networks can have two distinct modes of Operation: Ad hoc and infrastructure. Infrastructure wireless networks usually have a base station which acts as a central coordinating node. The base station is usually AC provided in order to enable access to the Internet, an intranet or other wireless networks. The bottle neck of this over ad hoc networks is that the base station is a central point of failure.

Sensors

A sensor node is also typically known as a 'mote'. Sensor nodes are conventionally made up of four basic components as shown in figure8.

A sensor node in a sensor network is capable of gathering sensory information, processing and communicating with other connected nodes in the network. The microcontroller in the sensor performs tasks such as data processing and controls the functionality of other components in the sensor node.

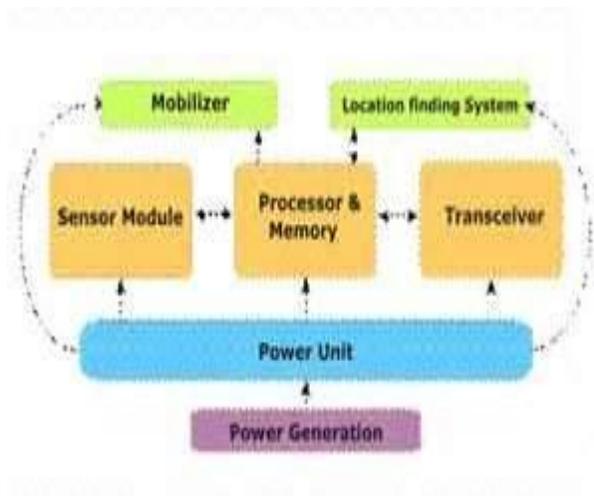


Figure8: Sensor Node Architecture

Most of the sensor nodes make use of the ISM band which gives free radio, a huge spectrum allocation and global availability. The Radio Frequency (RF) based communication is the most relevant form of communication that fits to most of the WSN applications. The WSN use the communication frequencies between about 433 MHz and 2.4 GHz.

Batteries are the main source of power supply for sensor nodes[8].They are also classified according to electrochemical material used for electrode such as NiCd (nickel-cadmium), NiZn (nickel-zinc), Nimh (nickel metal hydride), and Lithium-Ion.

Temperature Sensing

We take temperature sensing using LM35, as a case study to show the validity of WSN in the field of emergency responses. A temperature sensor produces a voltage that is proportional to the temperature of the die in the device. This voltage is supplied as one of the single-ended inputs to the Analog to Digital Converter (ADC) multiplexer. When the temperature sensor is selected as the ADC input source and the ADC initiates a conversion, the resulting ADC output code can be converted into a temperature in degrees. The increase of temperature in the blast furnace/room due to rise in fuel levels or due to exothermic reactions between Carbon and Oxygen to form Carbon dioxide, will increase the voltage of the sensor. In order to find the ambient temperature, the temperature increase due to self-heating must be subtracted from the result. The chief factors

that contribute to the amount of device self-heating are: power supply voltage, operating frequency, the thermal dissipation characteristics of the package, device mounting on the PCB, and airflow over the package [6]. The temperature increase can be calculated to the first order by multiplying the device's power dissipation by the thermal dissipation constant of the package. One method is to initiate a conversion soon after applying power to the device to get a 'cold' temperature reading, and then measure again after about a minute of operation, to get a 'hot' temperature reading [6]. The difference between the two measurements is the contribution due to self-heating.

Equation to calculate the temperature:

The temperature sensor produces a voltage output which is proportional to the absolute temperature of the die in the device. The relationship between this voltage and the temperature in degrees C is shown in Equation 1 [13].

$$V_{temp} = (2.86 \frac{mV}{C}) \times Temp + 76mV \quad (1)$$

V_{temp} = the output voltage of the temp sensor in mV

Temp = the die temperature in degrees C

The temperature sensor voltage is not directly measurable outside the device. Instead, it is presented as one of the inputs of the ADC multiplexer, allowing the ADC to measure the voltage and produce an output code which is proportional to it [13]. The code produced by the ADC in left-justified single-ended mode is proportional to the input voltage as follows:

$$CODE = \frac{V_{in} \times GAIN}{VREF} \times 2^{16} \quad (2)$$

CODE = the left-justified ADC output code

Gain = the gain of the ADC's PGA

VREF = the value of the voltage reference, which is around 2.43 V if the internal VREF is used.

Substituting Equation 1 into Equation 2,

assuming Gain=2 and VREF = 2.43V,

solving for Temp and rearranging, we obtain an output temperature which in terms of CODE and a pair of constants.

$$Temp = \frac{(CODE-41857)}{154} \quad (3)$$

Temp = the temperature in degrees C

CODE = the left-justified ADC output code.

Sensor Unit

The project will be utilizing Zigbee and temperature sensor (LM35) and APR 9600. The temperature sensor has a wide range of applications and is designed for monitoring sensitive environments.

Product specifications for Temperature Sensor :

- Type: Precise integrated-circuit temperature sensor.
- Power: 1mW
- Range: -55 to + 150°c
- Meshing capability: Range extended with APR 9600 technology
- Compatible Receivers: USB, RS232, GSM/GPRS

- Reporting Interval: Programmable 6s to 18h
- Logging: Up to 6 weeks data logged when out of range
- Other parameters: Reports calibration and service dates as well as device description, serial number and part number
- Memory type: Non volatile memory retains data permanently.



Figure9: Temperature sensor.

Some important features of LM35:

- Calibration: Calibrated directly in ° Celsius (centigrade).
- Has an accuracy of $\pm 1/4^{\circ}\text{C}$ at 25°C , $3/4^{\circ}\text{C}$ across full range
- Has resolution of 0.01°C . It is calibrated directly in °Celsius (centigrade).
- Has low cost due to wafer-level trimming.
- Operates from 4 to 30 volts.
- Has low self-heating, 0.08°C in still air.
- Can be easily deployed in sensor networks.

APPLICATIONS OF EMERGENCY RESPONSE SYSTEM USING SENSOR

Early detection of deviations in parameter values

Autonomous early detection of an emergency is a primary way of minimizing damages or life threatening events on campus. If any parameter such as temperature deviates from its prespecified range immediately the authorized user is intimated about these abnormal and unacceptable variations.

We model the emergency detection problem as a node k -coverage problem ($k \geq 1$) in wireless sensor network [4]. Constant-factor centralized algorithms are used to solve the node K problem.

Real Time Video Streaming

WSN are attached with web cameras to record a certain area in the building. This system can be used as a surveillance network. Existing research discusses optimizing image segmentation algorithms based on image properties without manual intervention [14]. These methodologies compute image properties such as average edge gradient strength, inter- vs. intra-cluster distances using image color features, and color purity of resultant regions, to train a neural network that maps these to ground-truth labeling on the acceptability whether it is good or bad of the solution in the resultant segmentation. There are methodologies that perform extremely well by correctly predicting the optimal parameters of image segmentation algorithms used [11]. Improvement of

data quality: Images viewed by human operators can be enhanced by the computer so that contraband appears in stark contrast to its surroundings so that humans can easily detect it [10].

Automated detection of dangerous explosives: The methodology will depend on the modality of gathering data. In the case of video images, the system will have to automatically process such data to enhance its quality, segment objects of interest and then use some features to characterize the resulting regions. However, if the data for analysis is a one-dimensional signal or spectra, the task involves template matching where test spectra are matched with known templates. The data could be simply a measurement or a point in n-dimensional feature space that needs

WSN can be attached with the camera, to record a certain area. This system can be then used as a surveillance network. Existing research discusses optimizing image segmentation algorithms based on image properties without manual intervention [10].

Self Powered Sensors

With current advancements in alternative energy the sensors used in this system can be powered with battery or solar powered. Such systems can benefit outdoor sensing and indoors where there are huge skylights or open areas with access to sunlight. Power consumption is a problem currently being addressed in WSN. Using such systems we can benefit in many ways.

Solar powered sensors can provide value to WSN for emergency response by prolonging the life-times of the sensing nodes and may give long lasting shelf-life.

Experimental results have proved that certain prototypes like the MPWiNodeX, can manage simultaneously energy from Solar, wind and for charging a NiMH battery pack, resulting in an almost perpetual operation of the evaluated ZigBee network router. In addition to this, the energy scavenging techniques double up as sensors, yielding data on the amount of solar radiation, water flow and wind speed, a capability that avoids the use of specific sensors.

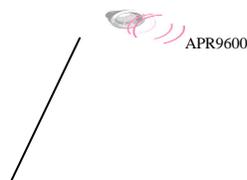
Comparison With Other Systems

Existing Systems

However a part of this technology has been used in other types of emergency situations such as forest fire detection, navigation during emergency situations, wireless internet information system for medical response in disasters and many more. And currently some home appliances such as air conditioners, lights, microwave ovens can be set on or off from remote places using remote controllers. And also cars can be run using remote controller from far off distances.

Proposed System

There is currently no such system which is specially developed for small industrial emergencies wherein the required device parameters, here in case of temperature, can be set or reset by the authorized person from any far off location by just using his mobile device which has some extra features programmed in it. Also the video feeds of images of monitored site from more than one web camera can be streamed to the authorized person's mobile device.



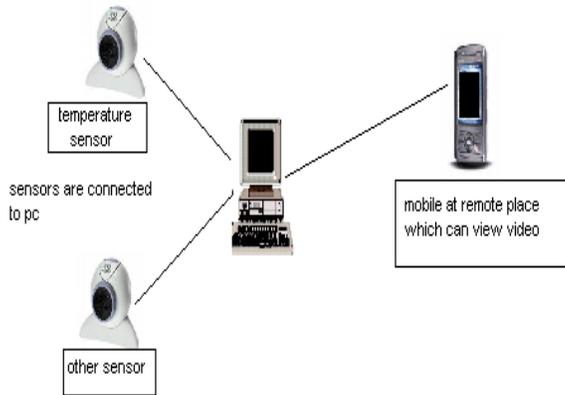


Figure10: Model of proposed system.

Disadvantages And Implementation Issues

The disadvantages of the system will be inherited from the APR9600 and ZIGBEE. Another problem in response to emergency situation which hugely depend on the validity of the threat or situation of a real emergency in which emergency service can cut cost by not responding to false emergencies and their time can be better utilized to fight or manage real emergencies.

CONCLUSION

It is feasible to construct a Sensor Network for intimation of deviation of specified parameter from their prespecified normal range values using LM35 and APR9600. Moreover there is a range of sensing applications. This system has the potential to reduce the response time in a cost-effective way. This system is robust, few more efficient methods can be incorporated to validate the threat by adding some additional options to the sensors.

Currently this system will be focusing on two aspects of the abnormality detection which is deviation of temperature or voltage from their normal range which occurs mostly in many industries across the states. The system can be further developed to detect other emergencies such as fuel tank monitoring, Hydro power plant, forest fire, human tracking, Wildlife monitoring, traffic monitoring, Industrial quality control, Observation of critical infrastructures, Smart buildings, intelligent communications and so on.

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Design For Secure Data Sharing In A Cloud Storage Environment By Using Luby Transform Codes

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Abstract- The cloud data processing is the vision of the data processing as value, in which cloud consumer possibly its data into the cloud environment over enjoying the first-class quality servers and the fast nets, into which applications store and into the services of a divided pool of configurable operational resources. The advantages of the cloud data processing technology of the cloud cover need self-service mode, everywhere net entrance, independent resources of the location, which combine, fast resource elasticity, wages per the use, which on price estimation - resides, the transfer of the risk, etc... It is large flexibility and economic savings is motivated individuals and the enterprises to outsource to their local complex cloud data environment administration system in the cloud. The security of the data in the cloud is at present a very hot topic. Most enterprises, which still possess sensitive metadata, hesitates „handed over “its data to the cloud. Data security is one of the principal reasons for this dislike. However substantial security is to guarantee resources, which use and therefore expensively. On the other hand it gives customers, who demand only warranties of basic security, since their data are less sensitive. This project can have taken place in two parts: like a first part of the project for the analysis of the present problems and the approaches of data security in the cloud; and as the second subproject for a detailed analysis of the development of a model for the treatment of data security in the cloud.

Index Terms- Encryption, Cloud storage, Cloud computing

I. INTRODUCTION

The enterprise data which the transformation, store extremely large volumes information processing in a local area network are to a high degree expensive. For to continue volume's information required data storage devices of the high capacity such as memory net of fastening memory (NAS), storage area nets, and memory servers supply high speed, high availability data storage, which is accessible over interface standard. Beyond that data storage devices have many weaknesses, including are they very expensively to be brought to have a limited lifetime its require your support and Recovery systems, and storage system required ecological conditions, requires personnel, to handle and use considerable quantities of energy for energy and cooling systems. Bewölken your data storage offerers, like Google, Microsoft, Amazon, IBM, make yourself available very cheaply, practically unlimited data storage in the remote facilities. The data, which are stored with these offerers, are accessible over the Internet. Costs on the scale make possible for offerers to supply the data storage which is to a high degree cheaper as the equivalent data

storage systems. Cloud data storage has many reconciliations. It is, requires no installation of the system (server), does not need a not replacing and maintenance, has supported and Recovery systems, has no committed personnel, requires no ecological conditions, requires no personnel and does not require energy not for energy or the cooling cheaply. Cloud data storage has however some important disadvantages, including security questions, achievement, availability, integrity, incompatible interfaces and lack of standards. In this paper address, this paper the problem of the safe and reliable data outsourcing in a cloud environment investigates these difficult questions.

1.1 THE CLOUD DATA STORAGE SYSTEM MODEL

The figure 1 shows a systematic model looking a the cloud data storage service which makes available for share data separating services as well as efficient data recovery and repair service including four different entities: Data owner, data user, cloud server, and third server. The data owner springs the encrypted fragments of the file m to N as a storage server to indicate cloud servers.

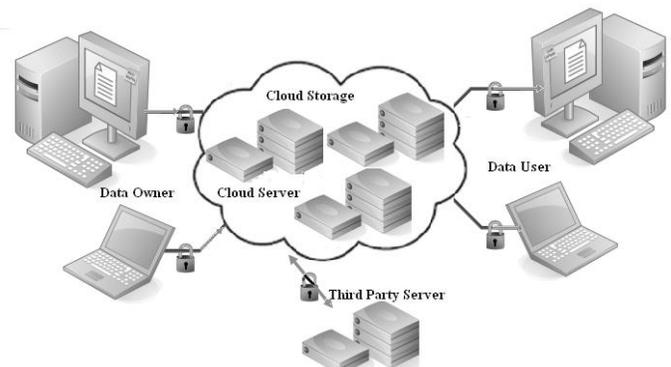


Figure1: Cloud data storage system Model

If the data owner the holds of the data contents confidentially which require file can be M first encrypted before the encoding. Separated data are added by metadata like verification tags to make available integrity control-ability. After the data separating a data user some k storage server can select to retrieve coded segments, and to regain the file m which can be further deciphered, in case of that the file encrypted is. In the meantime, the third server checks regularly the integrity of data supplied in cloud servers. Fruitless cloud servers can be repaired with the help of other healthy cloud servers. In this available model many threats have, the cloud server is looked as "curious and-

vulnerable". Specifically the cloud server is vulnerable to Byzantine failures and outside attacks. While Byzantine failures can be done by hardware mistake or the clouds maintenance staff, outside attacks could be in the interval of physical disasters, how fire and earthquake to the willful chopping of opponents. After the opponent wins the control of the cloud data server, it can seize the soiling offensive or the replay-attack which has to the purpose to break the tongue independence under coded data, the data supplies on the spoilt cloud server with old coded data substituting. If the cloud server is not spoiled, it follows properly the called protocol specification, but it will try, to derive and to analyze data in his storage and interaction during the protocol execution to learn additional information. This represents a threat against the security of cloud user data supplied in the server. Our suggested new model of the system conquered by a lot of screenplay like to make available sure and reliable clouds data storage services should reach our design at the same time achievement guarantees during the data recovery and repair.

1.2 LUBY TRANSFORMS COMPUTING SYSTEMS

The figure 2 shows that Luby transform systems. Luby change codes the codes are correct classical by fountain codes which are close-optimum Ausradierung. Luby figures encoding around in particular come round round this problem, a disposable protocol basically accepting. The sender encodes and sends a packet after the packet of the information. The receiver values every packet as it will receive. If there is a mistake, the wrong packet is rejected. But the packet is saved as a piece of the news. In the end, the receiver has enough valid packets to rebuild the complete news. When the complete news has been received successfully, the receiver gives signs that the transference is concluded. The figure 2 shows, that to Luby at the cloud storage surroundings system being based Coding system reshaping. In this system is by many scales reliably as the reply-funded system. Data users can regain complete M of original packets, while they retrieve the same number of code packets of every K combination from n to servers, and, therefore, every server must supply only the coded packets from m / k which are looking at the property of the optimum trade of the profusion dependability of it. However, his square deciphering complexity does it very ineffectively for data users attains data during the data recovery again. In addition, are the news costs to repair a fruitless storage server, the size of the complete original data in the optimized code-founded cloud data distributed storage system immediately. The encoding process begins, the uncodingmessage into N blocks roughly of the same length sharing. Then coded packets are generated with the help of a pseudo-accidental number generator. The degree $d, 1 \leq d \leq n$, the following packet is chosen in the random. Exactly d blocks of the news are chosen by chance. If Wednesday is the Ith block of the news, the data part of the following packet is estimated at eq 1

$$M_{i1} \oplus M_{i2} \oplus \dots \oplus M_{id} \dots\dots\dots 1$$

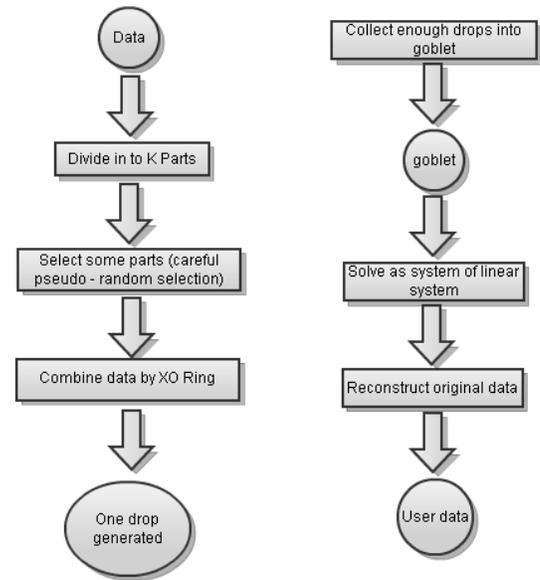


Figure 2 :Luby Transform Coding System – Encoding and decoding

Where $\{i_1, i_2, \dots, i_d\}$ they by chance elective indications are for the D blocks enclosed in this packet. A prefix will have in the encoded packet tag on, defining how many blocks and are in the news how many blocks been real impossibly - in the data part of this packet, and the list of indications $\{i_1, i_2, \dots, i_d\}$. In the end, a form is applied by mistake recognition code on the packet, and the packet is sent. This process continues, until the receiver signal gives that receive the message and successfully decoded has become. The deciphering process uses " exclusively or " operation to retrieve the coded message. If the present packet is not clean, or if it repeats a packet which has already been worked on, the present packet is rejected. If the stream received cleanly packet, is from the degree $d > 1$, it is worked on first against all completely decoded blocks in the news which stands area of Queue, Stored in a buffer area when his diminished degree is bigger than 1. If a new, clean packet of the degree $d = 1$ (block M_i), will receive it is moved to the news queueing area, and then is compared against all packets of the degree $d > 1$ living in the buffer. This is exclusive - ored in the data part of every buffered packet which was encoded, using Wednesday, there is the degree of this fitting packet decremented, and the list of indications for this packet is adjusted to reflect the application of M_i If this process unlocks a block of the degree $d = 2$ in the buffer, this block is reduced to the degree 1 and moves on his part to the message queueing area, and then worked on against the packet which remain in the buffer. When all N blocks of the message have been moved to the news queueing area, the receiver gives signal to the transmitter that the message has become successfully decoded.

2. DISTRIBUTED STORAGE SYSTEMS BASED ON OPTIMAL ERASURE CODES

Security data secret, available encoding technologies or data access controlling patterns can be used before the encoding process which keeps the cloud server from trying to investigate

separated data. In relation on the data integrity of transforming to Itself Luby Coding system uses different cryptographic tags to resist the soiling attack during the data repair and recovery procedure. Lubytransforms Coding system is security also against the replay-attack which is presented in the net coding founded distributed storage system. To seize the replay-offensive, the opponent corrupts first some storage servers and supports code packets supplied on these servers. After several rounds of the data repair the opponent corrupts the same storage servers like before, and then uses new coded packets with specific old packets. Because the verification tag does not bind only the storage server id and the packet ID, the freshness of the packet, the used old packets could pass the integrity examination. Consequently such substitute does coded packets supplies in specific K combinations from n to storage servers linearly reliably, and the data rescue would fail if all the others are spoiled n - k storage server. Really if the data repair-mechanism is sketched to generate new packets which have passed away from the old packets supplied in the same storage server, every coding -founded cloud data distributed storage system is vulnerable anyhow for such kind of the attack. In other words, the functional repair itself has the possibility to break decodability. By the unresemblance of transforming to Itself Luby Coding system the precise repair method uses where the recently generated packets are the same as those before supplied packets. The replay-attack becomes invalid, because there is no difference between old and new packets in the same storage server. In addition, Luby Coding system Change examines the data decodability from every K combination of storage servers before separating which assures that the original decisions investigate the problem of the sure and reliable cloud storage with the efficiency consideration the data repair as well as data recovery in this paper , for the first time, we, and develop, a Luby code-founded clouds storage service. In addition, Luby Coding system Change examines the data decodability from every K combination of storage servers before separating which assures that the original decisions investigate the problem of the sure and reliable cloud storage with the efficiency consideration the data repair as well as data recovery in this paper , for the first time, we, and develop, a Luby code-founded clouds storage service.

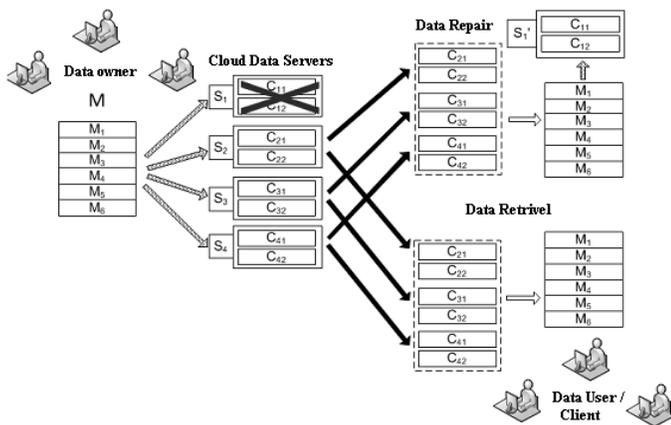


Figure 3: Distributed storage systems

To allow the efficient deciphering for data users in the data recovery procedure, we accept low complexity second lieutenant-codes to add data redundancy in distributed cloud servers. Our suggested Coding system of Luby transform makes available efficient data recovery for data users to be the quick faith reproduction using, the algorithm decoder, and with relief the data owner of the load, on-line, public data integrity control allowing and precise repair using. The achievement analysis and experimental results show that to Itself Luby transformed, Codiersystem has a comparable storage and news costs, but a lot of quicker data recovery than the Ausradierung code-founded solutions. It introduces less warehouse charges, much quicker data recovery, and comparable news costs which compare themselves to link up.

2.1 LUBY TRANSFORM – SOURCE CODE

```
public class Encode : IEncode
{
    #region Member Variables
    readonly IList<byte> blocks;
    readonly int degree;
    readonly Random rand;
    readonly int fileSize;
    const int chunkSize = 2;
    #endregion
    #region Constructor
    public Encode(byte file)
    {
        rand = new Random();
        fileSize = file.Length;
        blocks = CreateBlocks(file);
        degree = blocks.Count() / 2;
        degree += 2;
    }
    #endregion
    Drop IEncode.Encode()
    {
        int selectedParts = GetSelectedParts();
        byte data;

        if (selectedParts.Count() > 1)
        {
            data = CreateDropData(selectedParts, blocks, chunkSize);
        }
        else
        {
            data = blocks[selectedParts[0]];
        }
        return new Drop { SelectedParts = selectedParts, Data = data };
    }
    private byte CreateDropData(IList<int> selectedParts,
        IList<byte> blocks, int chunkSize)
    {
        var data = new byte[chunkSize];
        for (int i = 0; i < chunkSize; i++)
        {
            data[i] = XOROperation(i, selectedParts, blocks);
        }
    }
}
```

```

return data;
    }
private byte XOROperation(intidx, IList<int>selectedParts,
IList<byte> blocks)
    {
varselectedBlock = blocks[selectedParts[0]];
byte result = selectedBlock[idx];

for (inti = 1; i<selectedParts.Count; i++)
    {
result ^= blocks[selectedParts[i]][idx];
    }
return result;
    }
public class Drop
    {
publicIList<int>SelectedParts { get; set; }
public byte Data { get; set; }
    }
Decode Client
private string ReceiveMessage()
    {
varblocksCount=
encodeServiceClient.GetNumberOfBlocks();
varfileSize = encodeServiceClient.GetFileSize();
varchunkSize = encodeServiceClient.GetChunkSize();
IList<Drop> goblet = new List<Drop>();
for (inti = 0; i<blocksCount + overHead; i++)
    {
var drop = encodeServiceClient.Encode();
goblet.Add(drop);
    }
varfileData = _decoder.Decode(goblet, blocksCount, chunkSize,
fileSize);
returnEncoding.ASCII.GetString(fileData);
    }
byteIDecode.Decode(IList<Drop> goblet, intblocksCount,
intchunkSize, intfileSize)
    {
var matrix = BuildMatrix(goblet, blocksCount, chunkSize);
matrixSolver.Solve(matrix);
intcolumnsCount = matrix.GetLength(1);
byte result = new byte[fileSize];
for (inti = 0; i<result.Length; i++)
    {
result[i] = (byte)matrix[i, columnsCount - 1];
    }
return result;
    }
    
```

2.2 THE PROPOSED SECURE AND RELIABLE STORAGE CLOUD

We present the LT code-founded secure and reliable cloud data storage service where n storage server {S_l | 1 ≤ l ≤ n} is used to make available the data storage service for the data owner and data users. Our data integrity technology is partially adopted by the BLS signature in POR. Let e : G × G → GT be a bilinear map, where g is the generator of G, with a BLS hash function H : {0, 1} → G. The data owner generates a random number η ← Zp

and s random numbers u₁, . . . , u_s ← G. The secret key sk is {η}, and the public key is pk = {u₁, . . . , u_s, v}, where v ← gη.

2.3 Data distribution from the data owner to multiple cloud serve

The separating data should pre process on data and distribute them to multiple cloud servers. The file m becomes first in M of original packets, the M₁ also splits ..., m_m, by the same size of |M | M of bits. After the robust solution degree distribution in second lieutenant's codes M of original packets becomes by exclusively - or (XOR) operations linked to generate nα coded packets where α the number of packets is separated to every storage server and sentence to m/k • (1+ε) To protect the data secret, sensitive data encrypted could be before the encoding process. Available data access controlling mechanisms can be used to hold the cloud server, to try to investigate separated data. For every coded packet, 1 ≤ l ≤ n, 1 ≤ i ≤ α, three kinds of auxiliary data are added, i.e., the Coding vector, the verification tags and retrieval tag. The Coding vector is the M of bit vector where every bit represents whether the suitable original packet is connected in tone or not. The retrieves tags respected by Eq.2, the coded packet should check in the data recovery, and also in the data repair if necessary.

$$ali \leftarrow (H(|i| |Cli)) \eta \in G \text{ -----2}$$

2.4 DATA RETRIEVAL FROM CLOUD STORAGE TO CLIENT

Data users can regain the original data, while they access everybody k from n to cloud servers in the data recovery. The data user gets first all coding tags and the Codieranhängsel supplies in well-chosen k to cloud servers again, and carries out the examination in Eq. 3 If the examination operation on some coding tag fails, the data user sends reports to the third server and accesses a substitute storage server.

$$e(H(|\Delta l| | \dots | \Delta l \alpha), v) \text{ -----3}$$

2.5 INTEGRITY CHECK BETWEEN CLOUD STORAGE SERVER AND THIRD PARTY SERVER

Around the integrity of data supplies of the storage servers to control, the third server performs regularly the integrity control every storage server. The third server pecks first by chance a₁ on a₁, . . . , a_α, b₁, . . . , b_t ← Zp and then sends them to every storage server. Of l the of storage server integrated symbols {μ_l} 1 ≤ l ≤ s see and a uniform integrated tag in Eq4 estimate. Note that corresponds l_{th} the coded packet of the l_{th} in every storage server, and b_j to the j_{th} segment corresponds in every coded packet.

$$\mu_{il} = \sum_{i=1}^{\alpha} \sum_{j=1}^t a_i b_j C_{lij}, \quad \varsigma_l = \prod_{i=1}^{\alpha} \prod_{j=1}^t \sigma_{lij}^{a_i b_j} \text{ ----- 4}$$

2.6 DATA REPAIR FROM DATA DISTRIBUTION AND DATA RETRIEVAL

Of itself it is thought general that all available coding constructions must access the original data to generate coding packets what means that the communication costs of the data repair are same for the codes of the size of the complete original data. Therefore, a frank data repair-method is to regain all original data packets, whenever a storage server is corrupted. But such method will introduce a lot of costs the calculation as well as communication. In Luby figures Coding system. A repair server S. Is used to the efficiently repair corrupt storage servers. Although other storage services can also integrate the repair server, even more arithmetic-stressed costs during the data recovery introductory as a LubyCoding system reshaping being based on optimum codes or the network . Achievement complexity analysis of storage services being based on different profusion technologies.

TABLE 1

	Network coding	Read –solomon	LTCS
Server Storage	$O((2n/(k+1)) \cdot iMi)$	$O((1+n/k) \cdot iMi)$	$O((1+n(1+\epsilon)/k)$
Encoding computing	$O(2nm^2/(k+1))$	$O(nm^2/k)$	$O((nm(1+\epsilon)\ln m)$
Retrieval communication	$O(iMi)$	$O(iMi)$	$O(iMi)$
Retrieval computing	$O(m^2)$	$O(m^2)$	$O(m \ln m)$
Repair Communication	$O(2T/(k+1) \cdot iMi)$	$O(T(1/k+1/n) \cdot iMi)$	$O(T((1+\epsilon)/k+1/n)$

3. SECURITY ANALYSIS FOR CLOUD STORAGE ENVIRONMENT

To protect data, can be used confidentiality, available encryption technologies or data access controlling patterns before the encoding process which keep the cloud server from trying to investigate outsourced data. In relation on the data integrity of transforming to Itself Luby Coding system uses different cryptographic tags to resist the attack during the data repair and recovery procedure. Luby change Coding system is surely also against the replay-attack which is presented in the net coding founded cloud data distributed storage system.

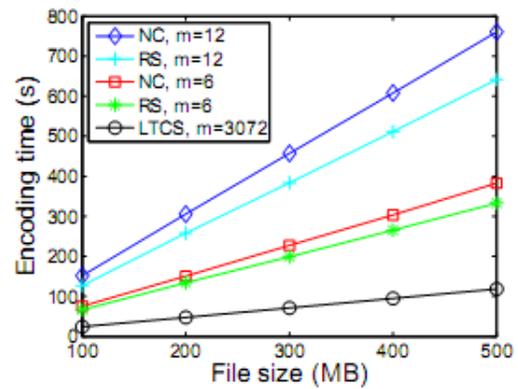
3.1 PERFORMANCE ANALYSIS COMPARISON OF VARIOUS TECHNIQUES BETWEEN DATA STORAGE AND RETRIEVAL

We demonstrate the achievement of storage services being based on different profusion technologies by the theoretical complexity analysis as well as by experimental appraisal. We put the same desired dependability level like net coding –founded distributed storage system RDC-NC, where $n = 12, k = 3$. Other frames are put in the consideration of the specific qualities of the net (the NC), pipe coding which Solomon (RS), and second lieutenant's codes encodes. The data owner discovers the Deco is weakening in the encoding procedure to insure of data availability. To check groups whole k - combinations of N , the data owner (n/k) terms of the faith reproduction must carry out, the algorithm decoder. For the efficiency purpose this deciphering process can be partially carried out where only encoding vectors follow the deciphering steps and data packets are not enclosed. If there a combination exists which cannot regain all original packets, the data owner n encoding of vectors regenerates according to LT

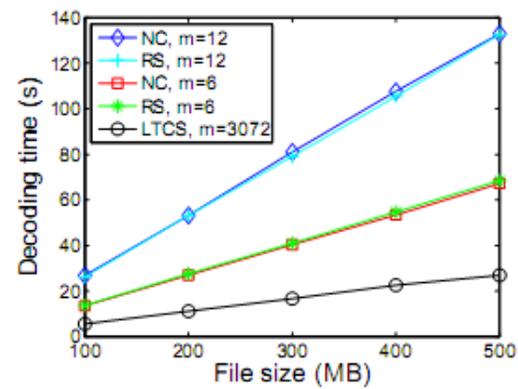
Codes and discovers them again where $\alpha = M(1 + \epsilon) / k$. As soon as completely (n/k) combinations.

3.2 DATA RETRIEVAL FROM CLOUD STORAGE TO A THIRD PARTY SERVER

The availability in the data recovery is ensured by the decodability discovery b for data separating and the precise repair of spoilt data. Recall that the data user k a, i.e. M (i.e) $m(1 + \epsilon)$, retrieves to encode vectors from k to storage servers. Around the integrity of data supplies in a storage server to check, the third server must carry out that the integrated challenge in Luby formed Coding system Around what signifies only two bilinear map technologies which are carried out to check coded packets. If the repair server is corrupted, transforming themselves Luby Coding system get β encoded again, coded packets for each of d to healthy storage servers to regain all original packets. In such case the communication complexity from d to healthy storage servers is to the repair server $O(d \cdot \beta \cdot |M|/m)$, i.e., $O((1 + \epsilon) \cdot |M|)$, where $d \leq k, \beta \leq a$. If the repair server is not corrupted or has been repaired.



(a) Encoding



(b) Decoding

4. CONCLUSION

In this paper we examined and directed the basic problem from secure and reliable data outsourcing in the clouds. We direct the problem of the secure and reliable cloud storage with efficiency consideration from the data repair as well as from data recovery. The quicker deciphering has a close optimum code specifically using, figures Luby codes in our storage service sketched for it during the data recovery than available solutions. To minimize the data, repair complexity, we occupy the precise repair method to efficiently attain the precise form of some spoilt data again. Our suggested clouds storage service puts better whole efficiency of the data recovery and repair at the possession than available counterparts. It also reduces exceptionally costs and completely releases the data owner from the load to be on-line, public integrity control and precise repair allowing. Then we get only mine of the coded packets again which help for the deciphering. Therefore, the communication costs during the data recovery from Luby change Coding system the same is (M) as the network founded storage system where every M of coded packets.

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Determinants of Induced Abortion at Referral District Hospital and Preventive Steps to Reduce Them

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Abstract- Aims and objectives- To study the trends of induced abortion at district hospital, to study the determinants of induced abortion, to reduce the factors responsible for induced abortion.

Material and methods –Retrospective study of 10 year duration of patients undergoing induced abortion .Total 1212 patients were studied. **Key words** – induced abortion, health education, women’s autonomy. **Conclusion**-Except medical grounds all other grounds can be minimized to significant extend. It requires vigilance, health education, sex education, and couple counselling.

Index Terms- induced abortion, health education, women’s autonomy

I. INTRODUCTION

Human groups have since early times, developed attitudes against the willful destruction of foetus; at the same time they have also recognised its permissibility in exceptional circumstances .In India prior to 1972, abortion was illegal , but

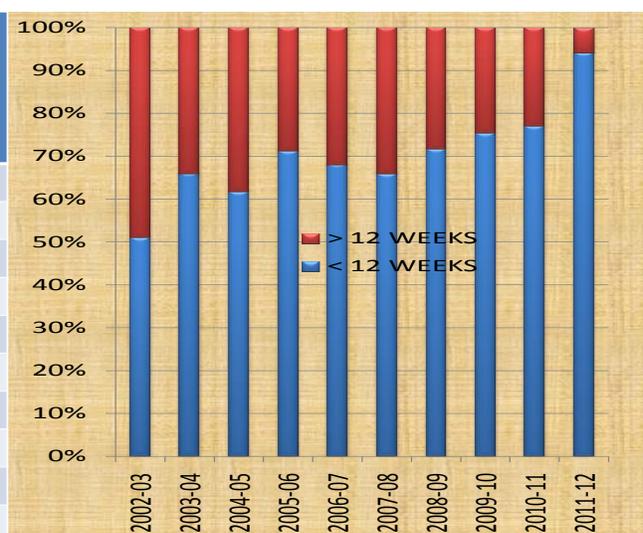
after the report of Shantilal Shah (1964) an act was implemented now known as Medical termination of pregnancy act (MTP act) all over India from November 1 ,1976. Since then the number of induced abortion has been rising tremendously. Because of its great safety & even greater impact on population control the importance of induced abortion cannot be undermined.

II. MATERIAL AND METHODS

This is a retrospective study of 10 year duration May 2002 to April 2012 conducted at government hospital , sangli.Total 1212_women undergoing abortions were studied according to their ages, parity, grounds for abortion , their socioeconomic positions ,their depth of knowledge regarding MTP and contraceptive methods were analyzed. Post abortion contraceptive method was also highlighted. The adolescent pregnancies_especially unmarried females were questioned and counselled accordingly.

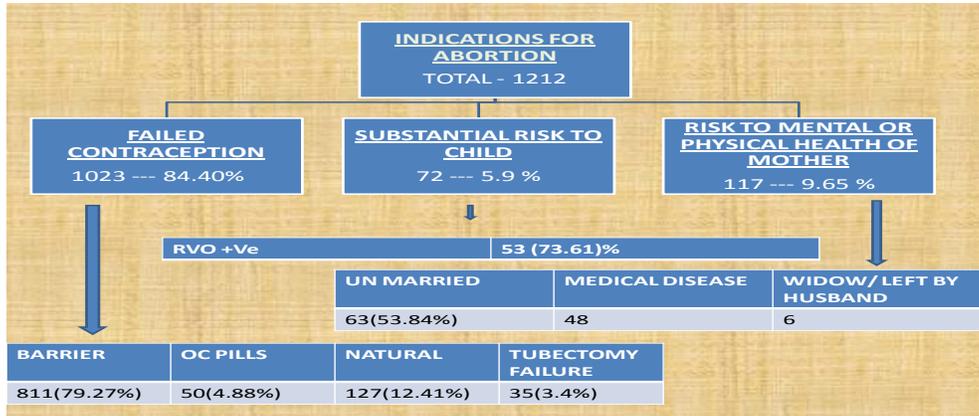
III. OBSERVATIONS

YEAR	TOTAL NUMBER OF ABORTIONS	< 12 WEEKS	> 12 WEEKS
2002-03	149	76	73
2003-04	153	101	52
2004-05	167	103	64
2005-06	170	121	49
2006-07	138	94	44
2007-08	120	79	41
2008-09	92	66	26
2009-10	110	83	27
2010-11	61	47	14
2011-12	52	49	3



Total number of induced abortions have been reduced in our institute. The above graph shows the declining trends of induced abortion in our institute in relation more than 12 weeks.

Grounds under which these abortions were carried out were as follows



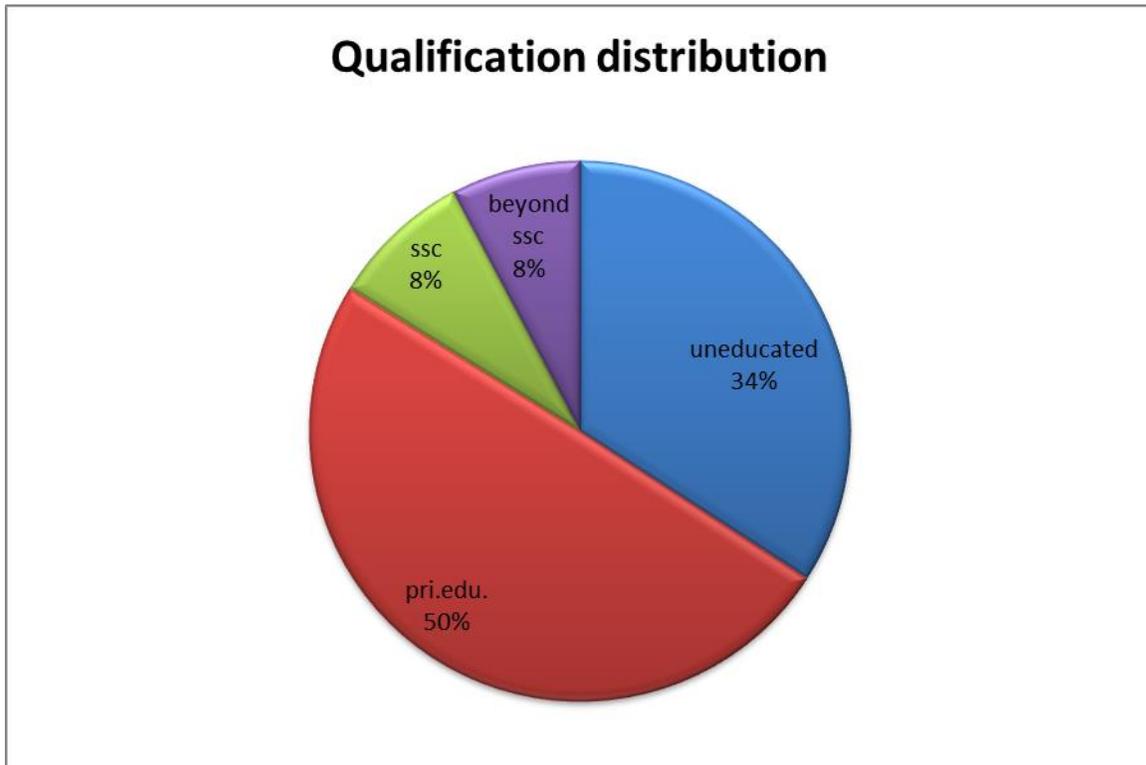
Distribution according to age and parity is tabulated as

15-19	20-24	25-29	30-34	>35
3.87%	43.39%	32.75%	13.86%	6.1%
G1	G2	G3	G4 and above	
6.43%	24.25%	52.31%	16.99%	

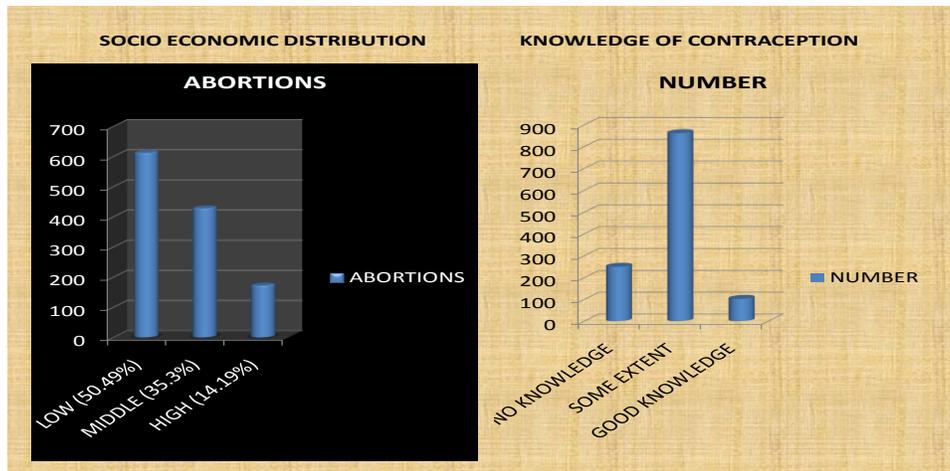
Future contraception opted by couples

Temporary contraception (IUD)	292	24.09%
Permanent contraception (sterilisation)	841	69.38%
counselling	75	6.18%

Qualification wise distribution of patients



Socioeconomic positions and knowledge regarding contraception and mtp



Patients from rural areas 582(48.01%) and from urban areas 640(51.99%).

IV. RESULTS

Total number of induced abortions in this duration were 1212. The total number of abortions have been declined in our institute from 149 per year to 52 per year. The number of patients undergoing first trimester abortion have been steadily rising from 51% to 94.23% while second trimester abortions have reduced from 48.99% to 5.76%.

The commonest ground for termination of pregnancy was failed contraception. Most couples were using barrier contraception (79.27%) next was natural methods 12.41%, o.c. pills (4.8%) The number of tubectomy failure was (3.42%). Maternal ground for termination of pregnancy (risk to physical or mental status of mother) constituted 117(9.65%) out of which unmarried mothers comprised 63(53.84%) while others as medical disease of mother (41.02%) and widow left by husband 6 (5.12%). Continuation of pregnancy had substantial risk to baby constituted 72 patients out of 1212. 53 (73.61%) were with seropositive mothers; others included congenitally anomalous fetus, drug exposures (26.65%).

The observations concluded that age group 20-30 years constituted major bulk for termination of pregnancy (75.14%) while gravid a3 with two living issues were commonest (52.31%) to approach to district hospital for termination of pregnancy. We had 49.66% patients with primary education and uneducated were 34.15%; total being 83.81%. Patients with low socioeconomic and middle socioeconomic positions were 50.49% & 35.31% respectively while 14.19% were from high socioeconomic position. We did not find much difference between rural and urban area; 48.01% & 51.99% respectively.

Patients with no knowledge about MTP and contraception constituted 249(20.54%) while patients with some knowledge were 861(71.03%) and good knowledge 102(8.41%). 69.38% patients opted sterilisation as future method of contraception while 24.09% opted for intrauterine device. 6.18% were counselled for future sexual behaviour while 3 patients refused any contraception, one had conceived and then underwent sterilisation procedure, while one absconded.

V. DISCUSSION

The subject of abortion i.e termination of pregnancy is charged with emotion, superstition and religious beliefs. Indian law recognises the fetus as a special aggregation of cells with a potential of independent life and in this way protects the right of unborn child. With the establishment of MTP act, a woman in India can legally have abortion of unwanted child on some particular grounds. As this study is carried out at government district hospital it is reflection of that part of society which is at most need of such kind of services. In our study the number of patients for induced abortion is declined from 2002 (149) to 2012(52) The historical abortion data of India Shows a steady rise in number of abortion from 1972 (24,300) per year to 25,29,979 in 2012.

In our institute the patients approaching for induced abortion before 12 weeks has been rising steadily while more than 12 weeks has declined. Bonne Scott Jones, JD¹ mention that many women need access to abortion care in the 2nd trimester. Several studies indicate that the factors causing woman to delay abortion until second trimester include cost and access barriers, late detection of pregnancy and difficulty in deciding whether to continue the pregnancy or not^{2,3}. As there is risk associated with pregnancy increases with weeks of gestation, one study found that the risk of death increased by 38% for each additional week of gestation throughout the pregnancy.⁴ The medical termination of pregnancy act and its amendments to remove the provisions which are discriminatory to women has significantly reduced the incidence of second trimester abortions. Most patients approaching for induced abortion are in the age group of 20-30 years, multiparous and from low socioeconomic positions. Patients with primary education constituted 49.66%. R Kongo, Noorani kK.J.,⁶ state that prevalence of poverty, illiteracy and multiparity are strong determinants of induced abortion. The low education & lower socio economy throws a woman into low levels of personal autonomy & she experiences significant difficulties in using family planning services.

Promotion of health education ,sex education at most primitive areas will definitely influence a woman to control her pregnancy according to her wish.

Despite the use of effective contraceptive methods , the majority of women requesting for termination became pregnant during use of these methods. This data reflects lack of compliance.⁷ Although geographical access to family planning services remains a problem , the principle reasons for non use of contraception is lack of knowledge , fear of side effects , social and familial disapproval. The health programmes are likely to be successful when they reach beyond conventional boundaries of service provision to influence and alter the cultural and familial factors that limit voluntary contraceptive use.⁸

In our study the other ground for induced abortion was adolescent unmarried girl .The problem of adolescent pregnancies constitute a major social domain . Growing expansion of communication and transportation networks , urbanisation & in migration of population to urban areas,is creating a different sociocultural environment which is conducive to more social interactions between young girls and boys. Rising age of marriage has now opened a window of opportunity for premarital and unsafe sexual activity amongst young people.⁹ It is very common among school girls ignorant of contraception.¹⁰ .We not only advocate introduction of sex education in schools but also provision of contraception in school. Postabortal counselling must be taken into consideration..

HIV positive status of mother is one of the highest of all medical grounds for termination of pregnancy. Even with the invention of Antiretroviral regimens and ICTC programmes, offering the option of termination of pregnancy to prevent the least chance of transmission of disease to newborn can't be undermined.¹¹

The termination of pregnancy on any ground is not much comfortable to mother. It carries emotional and ethical issues, especially when termination is carried out for congenitally anomalous baby or teratogenic exposure to a normal fetus . The ultimate decision regarding pregnancy outcome and management including termination belongs to pregnant couple.Clinicians will only council however the responsibility of clinicians is to help couple to make their own decisions based upon their personal, moral and cultural values¹².

VI. CONCLUSION

The induced abortion for unwanted pregnancy should be only backup method but not a primary method of birth control. Except medical grounds all other grounds for induced abortions can be reduced to a significant extend. It requires vigilance, health education at grass route level, adolescent sex education in schools, postpartum clinics couple counselling. The autonomy of female must be respected throughout as she is the ultimate to enjoy or suffer.

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Review on Comparison of FACTS Controllers for Power System Stability Enhancement

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Abstract- In recent years, power demand has increased substantially while the expansion of power generation and transmission has been severely limited due to limited resources and environmental restrictions. Transient stability control plays a significant role in ensuring the stable operation of power systems in the event of large disturbances and faults, and is thus a significant area of research. Flexible AC transmission systems (FACTS) controllers have been mainly used for solving various power system steady state control problems. FACTS devices are capable of controlling the active and reactive power flows in a transmission line by controlling its series and shunt parameters. This paper presents a review of comparison of different FACTS controllers in the power system for stability enhancement. Benefits of FACTS controllers to power system are also discussed.

Index Terms- FACTS, SSSC, SVC, TCSC, UPFC, Line losses and cost comparison.

I. INTRODUCTION

Flexible AC transmission system is an evolving technology to help electric utilities [4]. Its first concept was introduced by N.G Hingorani, in 1988 [7]. The solutions to improve the quality of supply in the electrical networks with go through the applications of the developments in semiconductor power devices, that is to say, the utilization of static power converters in electrical energy networks. The technological advances in power semiconductors are permitting the development of devices that react more like an ideal switch, totally controllable, admitting high frequencies of commutation to major levels of tension and power [7].

Recent development of power electronics introduces the use of FACTS controllers in power systems. FACTS controllers are capable of controlling the network condition in a very fast manner and this feature of FACTS can be exploited to improve the voltage stability, and steady state and transient stabilities of a complex power system. This allows increased utilization of existing network closer to its thermal loading capacity, and thus avoiding the need to construct new transmission lines. The well known FACTS devices are namely SVC, STATCOM, TCSC, SSSC and UPFC.

II. FLEXIBLE AC TRANSMISSION SYSTEM (FACTS) DEVICES

It is well known fact that for reactive power compensation FACTS devices can be used. Table 1 gives an idea about the cost of various reactive power sources including all FACTS devices.

The main disadvantage of FACTS devices is expensive cost to provide smooth and fast response to secure power system during normal and steady state operations.

Table.1: Cost comparison of various facts device [8].

Sl. No	FACTS Device	Cost (Rs/kVar)
1.	Shunt Capacitor	432
2.	Series Capacitor	1080
3.	SVC	2160(controlled portions)
4.	TCSC	2160(controlled portions)
5.	STATCOM	2700
6.	UPFC Series Portions	2700 (Through power)
7.	UPFC Shunt Portions	2700(controlled portions)

FACTS controllers may be based on thyristor devices with no gate turn-off or power devices with gate turn-off capability. FACTS controllers are used for the dynamic control of voltage, impedance and phase angle of high voltage AC transmission lines. The basic principles of the following FACTS controllers are discussed briefly.

A. Static Var Compensator (SVC)

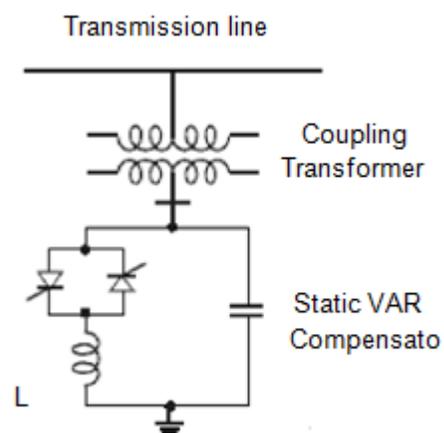


Figure 1 Basic structure of SVC

SVC is a static Var compensator which is connected in parallel to transmission line. SVC acts as a generator/load, whose output is adjusted to exchange capacitive or inductive current so as to maintain or control specific power system variables. Static Var systems are applied by utilities in transmission applications for

several purposes. The primary purpose is usually for rapid control of voltage at weak points in a network. Installations may be at the midpoint of transmission interconnections or at the line ends. SVC is similar to a synchronous condenser but without rotating part in that it is used to supply or absorb reactive power. The basic structure of SVC is shown in Fig. 1. The SVC is connected to a coupling transformer that is connected directly to the ac bus whose voltage is to be regulated. From Fig. 1, SVC is composed of a controllable shunt reactor and shunt capacitor(s). Total susceptance of SVC can be controlled by controlling the firing angle of thyristors. However, the SVC acts like fixed capacitor or fixed inductor at the maximum and minimum limits [1,3].

B. Thyristor Controlled Series Capacitor (TCSC)

TCSC is series type compensator, used to increase power transfer as well as to enhance system stability. TCSC controllers use TCR in parallel with segments of series capacitor bank. The combination of TCR and capacitor allow the capacitive reactance to be smoothly controlled over a wide range and switched upon command to a condition where the bi-directional thyristor pairs conduct continuously and insert appropriate reactance into the line. The basic structure of the device is shown in Fig. 3.

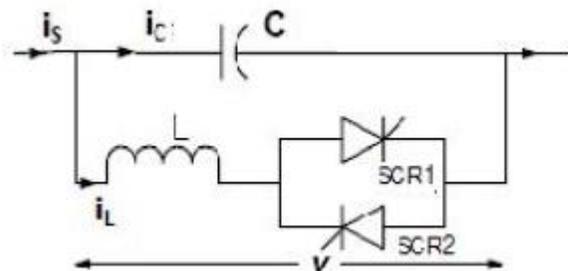


Figure 2 Configuration of a TCSC

The TCSC consists of three main components: capacitor bank C, bypass inductor L and bidirectional thyristors SCR1 and SCR2. The total susceptance of the line is controlled by controlling the firing angle of the thyristors [1,2,3].

C. Static Synchronous Series Compensator (SSSC)

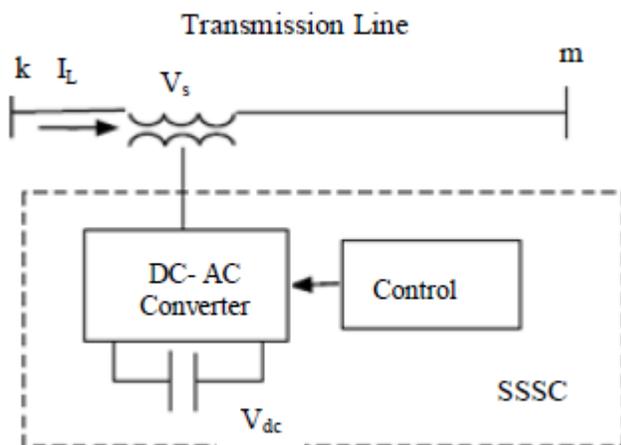


Figure 3 Simplified diagram of a SSSC

SSSC is connected in series with a power system. It has a voltage source converter serially connected to a transmission line through a transformer. It can be considered as asynchronous voltage source as it can inject an almost sinusoidal voltage of variable and controllable amplitude and phase angle, in series with a transmission line. The injected voltage is almost in quadrature with the line current. A small part of the injected voltage that is in phase with the line current provides the losses in the inverter. Most of the injected voltage, which is in quadrature with the line current, provides the effect of inserting an inductive or capacitive reactance in series with the transmission line. The variable reactance influences the electric power flow in the transmission line. The basic configuration of a SSSC is shown in Fig. 3[1,3,6].

D. Unified Power Flow Controller (UPFC)

Among the available FACTS devices, the Unified Power Flow Controller (UPFC) is the most versatile device that can be used to enhance steady state stability, dynamic stability and transient stability. The basic configuration of a UPFC is shown in Fig. 4. The UPFC is capable of both supplying and absorbing real and reactive power and it consists of two ac/dc converters. One of the two converters is connected in series with the transmission line through a series transformer and the other in parallel with the line through a shunt transformer. The dc side of the two converters is connected through a common capacitor, which provides dc voltage for the converter operation. The power balance between the series and shunt converters is a prerequisite to maintain a constant voltage across the dc capacitor. As the series branch of the UPFC injects a voltage of variable magnitude and phase angle, it can exchange real power with the transmission line and thus improves the power flow capability of the line as well as its transient stability limit. The shunt converter exchanges a current of controllable magnitude and power factor angle with the power system. It is normally controlled to balance the real power absorbed from or injected into the power system by the series converter plus the losses by regulating the dc bus voltage at a desired value [7,9].

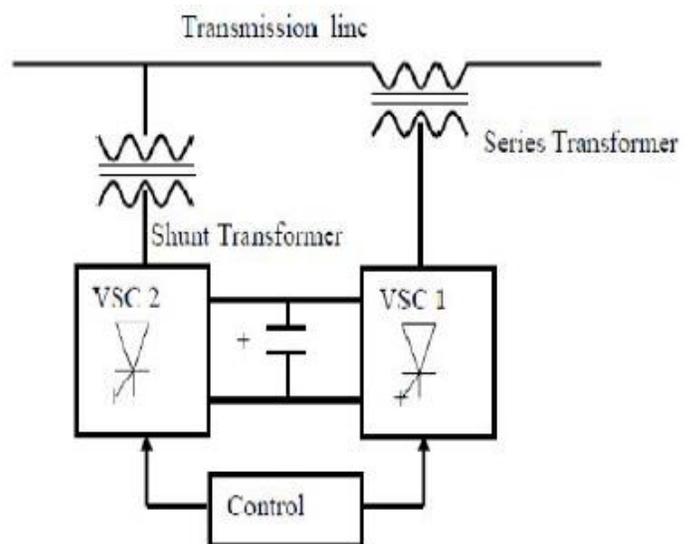


Figure 4: Unified Power Flow Controller (UPFC)

III. COMPARISON BETWEEN UPFC, SVC, TCSC, AND SSSC FOR POWER SYSTEM STABILITY ENHANCEMENT

Table 2 shows the comparison of FACTS devices of two-area power system with series and shunt FACTS devices. Series FACTS device connected between bus 2 and 3 in a single circuit long transmission line as shown in Fig. 5. The shunt FACTS device is connected parallel to bus number 2 as shown in Fig. 6. From table 2 it is investigated that the SSSC is requires more time for stability enhancement. TCSC FACTS device UPFC is the effective device for load flow, voltage control and stability enhancement of inter-area power system.

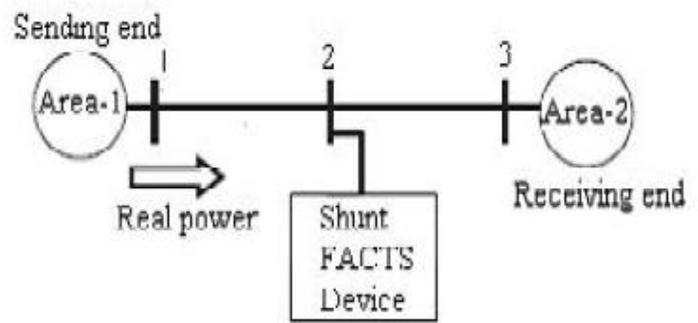


Figure 6 Two-area power systems with shunt FACTS device

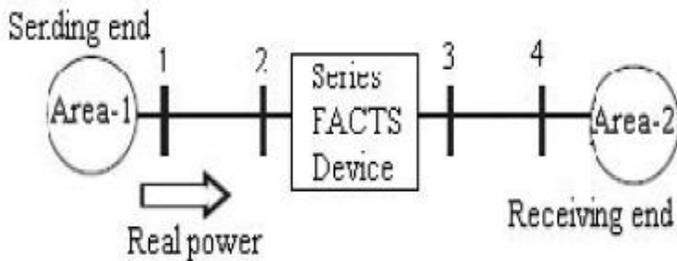


Figure 5 Two-area power systems with series FACTS device

Table 3 shows Simulation studies were done for different FACTS devices on IEEE 5 bus power system to find line losses [5]. TCSC, SVC and UPFC are placed in different bus and losses at each step are determined. It observed that placing TCSC in between bus 2 and bus 5 losses are reduced. It is best location for TCSC is to minimize the losses. For SVC the best location is between bus 2 and bus 3 to minimize the losses. UPFC is placed at different locations and optimal location for UPFC is between bus 5 and bus 4 to minimize the losses. UPFC regulates the voltage of the bus as well as regulates the active and reactive power of the buses and the lines losses within specified limits.

Table 2: Comparison between FACTS Devices for Power System Stability Enhancement [1,2,6]

S. No.	FACTS Device	Power System Stability Enhancement	Load flow	Voltage control	Transient stability	Dynamic stability	Time (sec)
1	UPFC	YES	High	High	Medium	Medium	0.6
2	TCSC	YES	Medium	Low	High	Medium	1.5
3	SVC	YES	Low	high	Low	Medium	7
4	SSSC	YES	Low	High	Medium	Medium	11

Table 3: Comparison between FACTS Devices for Power System Stability Enhancement

BUS		Line losses with TCSC		Line losses with SVC		Line losses with UPFC	
From	To	Real power loss	Reactive power loss	Real power loss	Reactive power loss	Real power loss	Reactive power loss
2	3	6.47328	-11.66943	6.6734	-9.5535	4.79012	-16.85673
2	4	6.53247	-12.03645	6.8625	-8.9328	4.70994	-17.10167
2	5	6.32411	-23.88476	11.3428	5.5864	5.02372	-15.57745
3	2	6.47642	-11.66949	6.7284	-9.6334	2.92428	-23.45038
3	4	6.12821	-10.85432	6.3158	-10.3962	5.04984	-16.31023
4	2	6.53872	-12.03452	6.9372	-8.9694	2.91293	-23.4464
4	3	6.12834	-10.85342	6.4121	-10.4043	2.91293	-23.4464
4	5	6.15325	-10.87238	6.1319	-11.1986	6.22885	-12.66832
5	2	6.32984	-13.85347	11.294	4.7654	1.37279	-28.66214
5	4	6.15096	-10.87543	6.1234	-11.2188	1.37279	-28.66214

IV. CONCLUSION

FACTS are powerful devices to improve the voltage profile and power system enhancement. In this paper, comparison of different FACTS devices with respect System Stability Enhancement is carried out and gives a idea about the FACT devices. It is found that the performance of the UPFC is higher for power system stability improvement is compared with the other FACTS devices such as SVC, TCSC, and SSSC respectively. The UPFC has settling time in post fault period is found to be around 0.6 second and maximum loss can be reduced compared to other FACTS device.

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A Novel Approach for Fetal ECG Extraction –Blood Pressure Patient Using Adaptive Neuro-Fuzzy Inference Systems Trained With PSO

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Abstract- Fetal ECG is an important parameter in medical field. Fetal Electrocardiogram (FECG) identifies the congenital heart problems at the earlier stage. Fetal Electrocardiogram (FECG) signal is extracted from blood pressure mother's abdomen. FECG signal is recorded at the thoracic and abdominal area of blood pressure mother's skin. The thoracic ECG is considered to be completely maternal ECG (MECG) of blood pressure mother. The abdominal ECG is considered to be a combination of blood pressure mother's ECG signals and foetus's ECG signals and random noise. The maternal component of abdominal ECG is a nonlinear transformed version of the Maternal ECG. The method Adaptive Neuro-Fuzzy Inference System (ANFIS) is used to identify the nonlinear transformation of maternal ECG. For identifying the nonlinear transformation and the FECG is extracted by subtracting the non linear version of the MECG signal from the abdominal ECG signal. ANFIS is trained with particle swarm optimization for better quality of signal. This method can be validated on both real and synthetic ECG signals. The results demonstrate the effectiveness of extracting the FECG from blood pressure mother's maternal ECG.

Index Terms- Fetal Electrocardiogram, Adaptive neuro fuzzy inference system, particle swarm optimization.

I. INTRODUCTION

During pregnancy period, mother having blood pressure, it can also affect the fetus. Care should be taken to prevent the fetus from mother's blood pressure. Fetal Electrocardiogram (FECG) signal is used to monitor the health condition of fetus by physicians. It is used to find heart problem at the early stage and take better action in critical situation. Fetal Electrocardiogram gives the electrical signal of fetal heart. There are two method to obtain Fetal Electrocardiogram signal such as invasive method and non invasive method. In invasive method, FECG signal is recorded from electrode which is placed on fetus head through mother's womb. This method may leads to problem for mother (bloodshed) and fetus (infection). Comparing to first method, second method is best and it can be used nowadays.

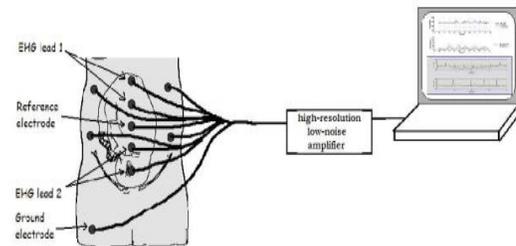


Figure 1: Non-invasive method recording of AECG signal

In non invasive method, two set of electrodes are placed on blood pressure mother's body. The first set of electrode is placed on the thoracic area. This gives the original maternal ECG (MECG). The second set of electrode is placed on the abdomen area of the blood pressure mother.

Figure 1 demonstrates the AECG signal recording. This AECG signal contains Fetal ECG with the altered MECG along with other contaminated noises. The other contaminated noises are maternal electromyogram (EMG) signal, baseline wandering, powerline interference, electrodes noise and recording system noise. Powerline interference, electrodes and recording system noises are eliminated by using low noise amplifier. The Electromyogram (EMG) signal can be eliminated by using classical low pass filtering techniques. The wavelet based methods are used to reduce the baseline wandering. Therefore, it is safe for eliminating altered maternal ECG component in the combined signal; estimated FECG signal can be obtained. Many signal-processing techniques are introduced to extract the FECG signal. These techniques include adaptive filters [2], correlation techniques [13], Adaptive noise cancellation [5], singular-value decomposition (SVD) [12], wavelet transform [8], [11], neural networks [7], blind source separation (BSS) [5] and independent component analysis (ICA) is considered among the most recent and successful methods used for FECG extraction [8]. ICA requires multiple electrodes for successful separation of the FECG. Practically, it is difficult to predict the signal components in the abdominal signals.

In this paper, we introduced ANFIS network trained with PSO method for estimating the FECG signal from one abdominal ECG signal and one thoracic

ECG signal. We use ANFIS network to identify the nonlinear align of thoracic MECG mixed with the abdominal ECG signal. This nonlinear transformation between the two signals allows for cancelling the maternal component from the abdominal signal and hence offers an estimate of the FECG

signal. We show the results on synthetic ECG data and real ECG data.

This paper is organized as follows: The following section, we will analysis the schema of our work and theory of ANFIS

II. EXTRACTING FECG SIGNAL THROUGH NON-INVASIVE METHOD

The objective of non-invasive method is to extract FECG signal from signal recorded at blood pressure mother abdomen (AECG). AECG signal contains FECG signal, altered MECG signal and noises. The maternal components are distorted because it is travel from mother’s heart to abdomen. This type of distortion can be taken as non-linear transformation of MECG signal. In order to improve the result of FECG signal, we need to weaken the power of MECG signal and decrease the effects of noises. We should able to recognize the altered MECG signal.

The aim purpose of proposed method is to identify the non-linear transformation. By indentifying the non-linear transform and it is applied on MECG signal which is recorded in thoracic region, we can obtain the estimation of MECG signal in blood pressure mother’s abdomen region. By subtracting these MECG signal from AECG, we can get the FECG signal. Figure 2 shows the recording of thoracic and abdominal signals.

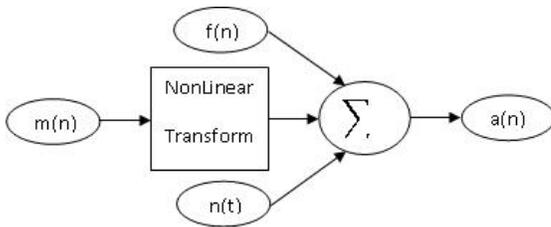


Figure 2. Recording of thoracic and abdominal signals

This method uses two recorded signal, one is recorded at thoracic region $m(n)$ and another one is recorded at abdomen region $a(n)$ of blood pressure mother. Figure 2 summarized the following equations:

$$a(n) = \tilde{m}(n) + f(n) + n(n)$$

$$\tilde{m}(n) = T\{m(n)\}$$

where $m(n)$ and $a(n)$ are the signals recorded at thoracic and abdominal areas respectively. $n(n)$ indicates the sum of noises in the recorded signal. $\tilde{m}(n)$ is the distorted version of $m(n)$ signal due to non-linear transformation T . $\tilde{m}(n)$ represents altered MECG signal components in the recorded AECG signal. As mentioned above, the distortion resulted from non-linear transformation is created because the signal is recorded far away from the signal’s source. We use ANFIS network trained with PSO for estimating the non linear transformation. This transform will operate on $m(n)$ and produce the signal $\tilde{m}(n)$, which is aligned with distorted maternal component $a(n)$. By removing the aligned maternal component in $a(n)$ and then estimate the FECG signal from $a(n)$.

III. ADAPTIVE NEURO-FUZZY INFERENCE SYSTEM

Adaptive Neuro-Fuzzy Inference System is the combination of artificial neural networks and fuzzy inference systems. The complex system requires more sophisticated tool to model the system behaviour. Mathematical tool is not an appropriate tool for modelling the system. By contrary, Fuzzy inference system can able to model the qualitative aspects of human knowledge by using fuzzy if-then rules. This type of fuzzy modelling was proposed by Takagi and sugeno. For better understanding, we need some basic aspects of this approach. Therefore, J.-S.R.Jang prescribed a new method called ANFIS. The purpose of ANFIS is to automatically realize the fuzzy system by using the neural network. In ANFIS, Fuzzy Sugeno models are involved in framework of adaptive system to facilitate the learning and adaptation method.

1) ANFIS structure

The ANFIS approach learns the rules and membership functions from data. ANFIS is an adaptive network. An adaptive network is network of nodes and directional links. Associated with the network is a learning rule. It’s called adaptive because some, or all, of the nodes have parameters which affect the output of the node. These networks are learning a relationship between inputs and outputs. The ANFIS architecture is shown in Figure 3. The circular nodes represent nodes that are fixed whereas the square nodes are nodes that have parameters to be learnt.

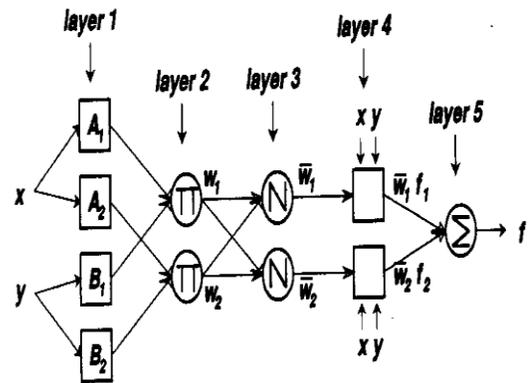


Figure 3 ANFIS architecture for first order Takagi-Sugeno model

Two fuzzy if-then rules under Takagi-Sugeno (TS) model are given as follows:

$$\text{If } x \text{ is } A_1 \text{ and } y \text{ is } B_1 \text{ THEN } f_1 = p_1x + q_1y + r_1$$

$$\text{If } x \text{ is } A_2 \text{ and } y \text{ is } B_2 \text{ THEN } f_2 = p_2x + q_2y + r_2$$

2) LAYER OF ANFIS STRUCTURE

Layer 1

The output of each node is:

$$O_{1,i} = \mu_{A_i}(x) \quad \text{for } i = 1,2$$

$$O_{1,i} = \mu_{B_{i-2}}(y) \quad \text{for } i = 3,4$$

So, the $O_{1,i}(x)$ is essentially the membership grade for x and y

The membership functions could be anything but for illustration purposes we will use the bell shaped function given by

$$\mu_A(x) = \frac{1}{1 + \left| \frac{x - c_i}{a_i} \right|^{2b_i}}$$

Where a_i, b_i, c_i are parameters of membership function. These are the premise parameters.

Layer 2

Every node in this layer is fixed. This is where the t-norm is used to 'AND' the membership grades - for example the product: $O_{2,i} = w_i = \mu_{A_i}(x)\mu_{B_i}(y), i = 1,2$

Layer 3

Layer 3 contains fixed nodes which calculate the ratio of the firing strengths of the rules:

$$O_{3,i} = \bar{w}_i = \frac{w_i}{w_1 + w_2}, i = 1,2$$

Layer 4

The nodes in this layer are adaptive and perform the consequent of the rules:

$$O_{4,i} = \bar{w}_i f_i = \bar{w}_i (p_i x + q_i y + r_i)$$

The parameters in this layer (p_i, q_i, r_i) are to be determined and are referred to as the consequent parameters.

Layer 5

There is a single node here that computes the overall output:

$$O_{5,i} = \sum_i \bar{w}_i f_i = \frac{\sum_i w_i f_i}{\sum_i w_i}$$

This then is how, typically, the input vector is fed through the network layer by layer. We now consider how the ANFIS learns the premise and consequent parameters for the membership functions and the rules

3) ANFIS learning method

In ANFIS, training and updating the parameters is one of the main problems. There are number of possible approaches based on hybrid learning algorithm which uses a combination of gradient Descent and Least Squares Estimation (LSE). This provides a very high level description of algorithm. It can be shown that the network described if the premise parameters are

fixed, the output is linear in the consequent parameters. Split the total parameter set into: set of total parameters(S) is the sum of set of premise (nonlinear) parameters (S1) and set of consequent (linear) parameters (S2).So, ANFIS uses two pass hybrid learning algorithm:

Forward pass: Here S1 is unmodified and S2 is computed using a LSE algorithm.

Backward Pass: Here S2 is unmodified and S1 is computed using a gradient descent algorithm such as back propagation.

So, the hybrid learning algorithm used to adapt the parameters in the adaptive network. ANFIS can be trained by hybrid learning algorithm, it has more complexity and slow convergence time. This complexity and convergence time can be reduced by using Particle swarm optimization (PSO) for training ANFIS.

IV. PARTICLE SWARM OPTIMIZATION

PSO is a robust stochastic optimization technique based on the simulation of the social behavior of birds within a flock. It was developed in 1995 by James Kennedy and Russell Eberhart . It uses a number of particles that constitute a swarm moving around in the search space looking for the best solution. Each particle is treated as a point in a N-dimensional space which adjusts its "flying" according to its own flying experience as well as the flying experience of other particles. The PSO algorithm is given as follows:

1. For initialization, at $t = 0$, the swarm $P(0) = \{ P_1, P_2, \dots, P_k \}$. For, $i = 1, \dots, k$, the position of particle $P_i \in P(0)$, $\vec{x}_i(0)$ is random within the hyperspace and initial velocity $\vec{v}_i(0)$ of particle P_i is given for each i . (We assume that the swarm has k particles.)

2. Evaluate the performance of each particle, using its current position $\vec{x}_i(t)$. $F(\vec{x}_i(t))$ is the fitness of particle i at time step t .

3. Compare the performance of each particle to its best Performance:

If $F(\vec{x}_i(t)) < pbest_i$, then $pbest_i = F(\vec{x}_i(t))$ and $\vec{x}_{pbest_i} = \vec{x}_i(t)$

4. Compare the performance of each particle to the global best particle:

If $F(\vec{x}_i(t)) < gbest$, then $gbest_i = F(\vec{x}_i(t))$ and $\vec{x}_{gbest_i} = \vec{x}_i(t)$

5. Change the velocity vector for each particle as follows: $\vec{v}_i(t+1) = \vec{v}_i(t) + \rho_1(\vec{x}_{pbest_i} - \vec{x}_i(t)) + \rho_2(\vec{x}_{gbest_i} - \vec{x}_i(t))$

6. Move each particle to a new position

$$\vec{x}_i(t+1) = \vec{x}_i(t) + \vec{v}_i(t)$$

7. Go to step 2, and repeat until convergence is achieved.

The random numbers ρ_1 and ρ_2 are defined as $\rho_1 = r_1 c_1$ and $\rho_2 = r_2 c_2$, where $r_1, r_2 \in U(0, 1)$ and c_1 and c_2 are acceleration constants. The effect of the random variables ρ_1 and ρ_2 on the particle trajectories, and asserted that $c_1 + c_2 \leq 4$ [15]. If $c_1 + c_2 > 4$, velocities and positions explode toward infinity.

1) ANFIS Trained with PSO

Two parameters of ANFIS are premise and consequent parameters that are needs to be updated. Each parameter has three sets of values that is (a_i, b_i, c_i) and (p_i, q_i, r_i) . Each premise parameter has N genes and the consequent parameter has $(I+1).R$ genes where N is the number of membership functions, R is the number of rules applied and I is the dimension of input data. Initially, parameters are considered randomly and then these values are applied to PSO algorithm for updating the values. Each iteration, one parameter is updated. In final stage, optimised value of parameters will be obtained for each training pair.

V. PROPOSED ALGORITHM FOR FECG SIGNAL EXTRACTION

In our proposed method, we uses two signals to extract FECG signal, one is $m(n)$ another is $a(n)$. These signals are segmented into N-samples along with overlapping frames for ANFIS training. The overlapping frames are considered as $N/2$ samples. The ANFIS inputs are vector whose values are obtained from $m(n)$ framing process. The ANFIS output is the frame obtained from $a(n)$. These parameters are adjusted separately for each pair of vector. After training each pair of vector is given as ANFIS input. The desired output is transformed version of $m(n)$ that is $\tilde{m}(n)$. Now, FECG is obtained by subtracting $a(n)$ from $\tilde{m}(n)$.

VI. RESULT AND DISCUSSION

To extract the FECG signal from our proposed algorithm. The result of proposed algorithm is tested on both synthetic and real signal. For constructing the training data, each of thoracic and abdomen signal can be framed with overlapping signal. We can synthesize the thoracic and abdominal signals for comparing the performance of proposed algorithm. Figure 4 and 5 shows the results of proposed algorithm on synthetic ECG and real ECG signals respectively.

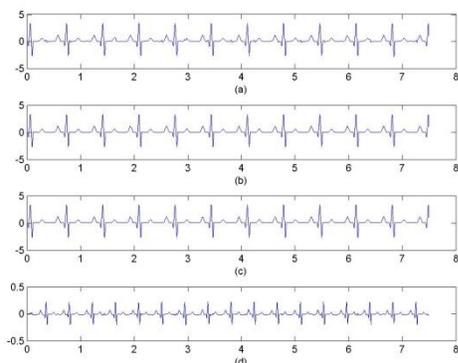


Figure 4. Proposed algorithm result for synthetic signal (a) synthetic abdominal ECG (b) synthetic thoracic MECG (c) synthetic estimated thoracic MECG (d) synthetic extracted FECG

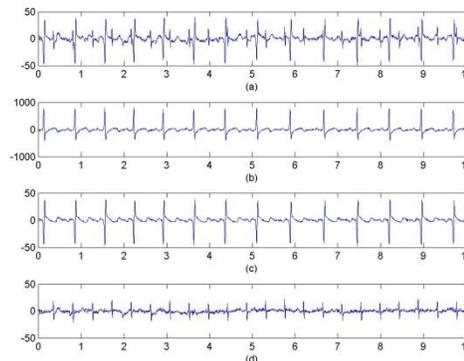


Figure 5 .proposed algorithm result for real signal (a) real abdominal ECG (b) real thoracic MECG (c) real estimated thoracic MECG (d) real extracted FECG.

The results of proposed algorithm can be compared based on quantity criterion which is Percentage Root –Mean Square Difference (PRD), is used to determine the similarity between original FECG and extracted FECG signal. Calculate the PRD values in the following equation:

$$PRD = \frac{\sum_{i=1}^N (x_{ori}(i) - x_{rec}(i))^2}{\sum_{i=1}^N (x_{ori}(i))^2} \%$$

where ori and rec is the parameter of original and extracted signal. Table 1 contain PRD values of proposed algorithm.

Table 1. Comparing the performance of the proposed algorithm using PRD values

ALGORITHM	PRD
ANFIS	0.5320
ANFIS+PSO	0.4734

VII. CONCLUSIONS

This paper presents ANFIS network for training PSO algorithm. It is used to extract fetal ECG signal from two recorded ECG signal at thoracic and abdomen region of blood pressure mother. Abdominal ECG contain nonlinear transform version of MECG This non linear transform of MECG can be determined by using ANFIS. The training method of ANFIS can affect the efficiency of signal. So, we can use PSO as a new tool for training ANFIS network. The result of using PSO is to reduce complexity and fast convergence. To find the non linear transform of MECG by removing the altered MECG from AECG and then get good approximation FECG signal.

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Contribution of Sericulture to Women's Income in Assam -A Case Study in Goalpara District of Assam, India

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I. INTRODUCTION

Income is the most crucial index for accelerating economic growth and development in any meaningful developmental strategy. In the Indian socio-economic context, income generation assumes great significance for women, especially rural women. Women constitute more than fifty per cent of the world's population, one third of the labour force, and perform nearly two thirds of all working hours. Women's income in a family is of paramount importance for nutritional, economic and educational upliftment of the family. Changing times has brought new interests and responsibilities into a women's life and it is now admitted that women's income is indispensable not only for survival of individual families but for maintenance of wider socio-economic system (Batish and Naurial, 2003).

In fact, women in general are found to bear double burden in the development process – one on the domestic front and the other on the economic front. It is found that women are engaged in work when other members of the family are enjoying rest (Gupta and Gupta, 1987). The continuous increase in prices has also pushed women to income generating activities within or outside the household to maintain an economically sound family. It is found that India is the home to 12.7 crore working women and 90 per cent of them are working in the unorganized sector (Census of India, 2001). However, it is found that although women are engaged in various fields, the participation of women is mostly found in marginal and casual employment due to inadequacy of skills, illiteracy, restricted mobility and lack of individual status (Chari, 1983).

Women are also mostly engaged in the unorganized sector (Mehta and Sethi, 1977). They are overwhelmingly concentrated in agro-based/household based activities (where they often serve as unpaid family labour) such as dairying, fisheries, small animal husbandry, handlooms, handicrafts and sericulture. Again, in many countries, even in India, women are often paid two-third or even half of the wages earned by men for the same task (FAO, 1995).

Assam, one of the seven states of North East India, is a region of immense diversity. For thousands of years, people and communities have met and mingled here, and customs and cultures have merged and in the process a composite and rich culture has evolved. Development, or the lack of it, has contributed to the disquiet that characterizes the states of North East, including Assam. The region is marked by low agricultural productivity, poor infrastructure, tenuous communications and low levels of industrial activity (Assam Human Development Report, 2003). There is recognition of the fact that Government

should play a special role in promoting development; however the gap is increasing. Bordering six states and two countries, Assam accounts for about 2.4 per cent of the country's geographical area. Its 26.64 million people (2001 Census) are 2.59 per cent of the country's population, and its population density of 340 persons per square kilometer is marginally higher than the average density for the country (324 persons per square kilometer).

Goalpara is one of the most under-developed district of Assam. It ranks 18th in the Human Development Index amongst the 23 districts of Assam. Its headquarter is the only urban area of the district. The primary sector provides employment to about 75 per cent of its population whereas the share of the secondary and tertiary sectors stands at 5.2 and 19.6 per cent respectively (2001 Census). The number of registered factories in the district stands at 29 in 2000.

Thus, though agriculture employs 75 per cent of the population in Goalpara, it has not been able to lead to much economic development of the region. In such a situation, sericulture is one such activity that can not only increase the income of the people, but can also generate employment opportunities, particularly for women. Sericulture in Goalpara district existed almost as a practice amongst the people since a long time. The silk in general and muga in particular has been closely associated with rituals and traditions and thus silk production and its usage has been an important household activity.

Sericulture refers to the conscious mass-scale rearing of silk producing organisms to obtain silk (P Vijay Kumar et al). Sericulture suits both marginal and small-scale landholders because of its low investment, high assured returns, short gestation period and rich opportunities for enhancement of income and creation of family employment round the year.

Sericulture being a cottage industry provides ample work for the women in rural areas, while their male counterparts look after agriculture. Its unique nature of work proves to be an ideal activity for women who can engage themselves in this activity in addition to their regular tasks of taking care of family. Moreover, most its operations do not require hard labour, except digging and ploughing (Sandhya Rani, 1998). Silk worm being delicate has to be handled with care. Thus, the entire process needs skill and patience, which suits women well.

The present study tries to assess the income generating activities women participate in sericulture in the Goalpara district of Assam. Sericulture can play an important role in Goalpara's economy by improving the income of the region. In fact, Goalpara district has been given the Geographical Identification Mark because its climate is suitable for silkworm rearing.

Sericulture is a highly remunerative ash crop with rich dividends. It is the only cash crop, which provides frequent and attractive returns in the tropical states of the country throughout the year. The net returns in case of Mulberry sericulture (when a farmer has one acre of Mulberry plantation using family labour) is estimated at about Rs 48,000/- per annum, which is substantially high compared to that of other tropical crops (Dandin, et al., 2005).

Sericulture industry is, therefore, well suited to the small and marginal farmers who are below poverty line (Sandhya Rani, 1998). The major portion of income from sericulture is captured by the primary producers, i.e., farmers (54.6 %) who produce cocoons, followed by the traders (17.8%), weavers (12.3%), twistors (8.7%) and reelers (6.6%) (P. Vijay Kumar et. al). The average income of the rearer depends on the area of land holdings, rearing of silkworms, technology adoption and available infrastructure. Moreover, in sericulture, nothing goes waste. Its by-products are useful in many ways. Mulberry leaves and shoots left by the silkworms form fodder for cattle and increases their milk yield. The maligned pupae are used in the preparation of dog biscuits, oil, etc. The oil and protein powder extracted from the dead pupae can be utilised in manufacturing soaps and baking industries respectively. It forms a rich food in poultry, fishery and piggery. The silkworms excreta can be used as manure. The rational utilization and disposal of such by-products helps the sericulturists to enhance their economic gains (Sandhya Rani, 1998). The creation of employment and income in silk reeling units is dealt with in Radha Krishna et al (2000) where they found that an acre of irrigated mulberry generates as much as one lakh rupees per year through transactions of cocoons and provide full employment to a minimum of 5 men throughout the year. Thus, there is an urgent need to evaluate income sources available to the people, particularly women, in the study area.

The broad objective of this study is to determine the contribution of sericulture as an income source of women in the Goalpara district of Assam. The subsidiary objective is the examination of constraints associated with sericulture in the study area with a view to giving recommendations on how to improve sericulture production in the study area.

II. METHODOLOGY

Area of Study

Goalpara is one of the most under-developed district of Assam. It ranks 18th in the Human Development Index amongst the 23 districts of Assam. Its headquarter is the only urban area of the district. The primary sector provides employment to about 75 per cent of its population whereas the share of the secondary and tertiary sectors stands at 5.2 and 19.6 per cent respectively (2001 Census). The number of registered factories in the district stands at 29 in 2000.

Sampling Procedure and Sampling Size

Multi stage sampling procedure is used for the study. Goalpara district is divided into eight blocks, viz., Rongjuli, Kuchdhowa, Matia, Krishnai, Balijana, Kharmuza, Lakhipur and Joleswar. The second stage of selection was the purposive selection of two blocks (Rongjuli and Kuchdhowa). The basis of selection was acreage under sericulture. A total of seven villages, three from Rangjuli Block and four villages from Kuchdhowa have been considered for the study.

In the final stage of selection, a random sample of 30 women from each village was selected for the study. The study was carried out keeping in mind the difficulties in getting information related to income of women and appropriate care was taken to ensure that the information collected was as accurate as possible.

Methods of Data Analysis

The data collected was classified and put in tabular form for analysis purpose. Simple statistical tools like averages and percentage distribution has been used to analyse the data. All the income items are expressed in rupees at current prices.

III. RESULTS AND DISCUSSIONS

Table 1: Distribution of Women According to Source of Income in the Study Area

Sl No	Source of income	No. of respondents	Percentage (%)
1	Agriculture	21	10
2	Service sector	17	8.10
3	Sericulture	116	55.24
4	Petty Trade	8	3.81
5	Wage Income	19	9.05
6	Livestock	24	11.43
7	Others	5	2.38
8	Total	210	100

Source: Computed from Field Data

Table 1 shows the occupational structure of the respondents. Women are engaged in mostly sericulture activities in the study area. As has been mentioned earlier, sericulture has existed in Goalpara district almost as a practice amongst the people since time immemorial. Only 10 per cent of the women derive their income from agriculture, in spite of the economy being dependent on agriculture. The table also shows that 11.43 percent of the women in the study area derive their income from

livestock rearing, which is also a household activity. It is to be noted that the manufacturing sector is almost non-existent. Women engaged in the service sector are mostly engaged in the recent employment opportunities given by the National Rural Health Mission (NRHM), working as ASHA workers and a few in the nearby schools of the locality.

Table 2: Amount of Income Derived From Different Income Sources

SI No	Source of income	Average household income (Rs)	Percentage (%)
1	Agriculture	20,000/-	37.4
2	Service sector	6000/-	10.89
3	Sericulture	12800/-	23.24
4	Petty Trade	3,880/-	7.04
5	Wage Income	4300/-	7.81
6	Livestock	4500/-	8.17
7	Others	3000/-	5.45
8	Total	55,080/-	100

Source: Computed from Field Data

Table 2 shows the average household income of the sample household. As can be seen from the table, agriculture contributes the highest percentage (37.40) percent of the income of the households, followed by sericulture contributing 23.24 per

cent. Higher income from agriculture is due to the reason that the men in the sample households mostly are engaged in agriculture as their prime occupation, whereas the women folk are engaged in other activities, including sericulture.

Table 3: Participation of Women in Various Sericulture Activities

SI No.	Sericulture Activity	% of Women Participation (Som and Eri Cultivation)
1	Land Preparation	25
2	Collection of Planting Material	10
3	Procurement of Fertilizers and Manure	10
4	Planting	78
5	Application of Manure	65
6	Application of Fertilizer	70
7	Pest and Disease Management	20
8	Transportation of Leaf	40
SI No.	Sericulture Activity	% of Women Participation (Silkworm Rearing)
1	Chowki Rearing	88
2	Leaf Preservation	80
3	Maintenance of Hygienic Conditions	94

4	Pest and Disease Management	50
5	Maintenance of Environmental Conditions	70
6	Bed Cleaning	88
7	Spinning	90
8	Harvest Sorting	94
9	Marketing	6
10	Finance and Account Keeping	8

Source: Computed from Field Data

Women engage themselves in different sericulture activities. The contribution of women sericulturists in different activities is shown in Table 3. Involvement of women is high in all activities except those activities which involve going out from their homes like collection of planting material, procurement of

fertilizers and materials, marketing and finance and account keeping. Activities like maintenance of hygienic conditions, spinning, bed cleaning, chowki rearing, harvest sorting and planting are mostly done by the women in the study area.

Table 4: Expenditure incurred in one hectare muga and eri cultivation and the returns expected from that hectare of muga and eri production

Expenditure (Muga)	Expenditure (Eri)
Cost of 1150 som tree = Rs 5 X 1150 = Rs 5750/-	Castor, the food plant of eri worms, grows wild.
Seed produced in one hectare = 2 kg	Production of egg in one hectare = 700 gram
Processing charges for one kg seed = Rs 10,000/-	Processing charge of 700 gm egg = Rs 5100/-
Processing charges for two kg seed is 2 X 10000 = Rs 20,000/-	
Total cocoon produced in one hectare land is 1,40,000	Total cocoon produced in one hectare land is 1,05,000
Maintenance cost for one year = Rs 15,000/-	Maintenance cost for one year = Rs 8,000/-
Total Cost = Rs 40,750/-	Total Cost = Rs 13,100/-
Returns (Muga)	Returns (Eri)
As a reeling cocoon, the unit price is Re 1/-	Price per thousand cocoon = Rs 280/-
Then, total return is 1 X 1,40,000 = Rs 1,40,000/-	The price of 1,05,000 cocoon = Rs 29,400/-
As a seed cocoon, the unit price is Re 3/-	
Then, total return is 3 X 1,40,000 = Rs 4,20,000/-	

Source: Source: Computed from Field Data

Table 4 shows the expenditure incurred in one hectare muga and eri cultivation and the returns expected from that hectare of muga and eri production respectively.

The left side of table 4 shows the expenditure incurred and the expected returns when one hectare land is brought under muga cultivation. The right side of the table similarly shows the expenditure incurred in one hectare land under eri cultivation and the expected returns from that hectare. From the table it is clear that returns from sericulture are very high with a low investment. An income of Rs 1,40,000/- or Rs 4,20,000/- can be generated by an investment as low as Rs 40,750/- in case of muga cultivation. In case of Eri silk, the returns are as high as Rs 29,400/- from an

investment of Rs 13,100/- in one hectare of land. On an average, a sericulturist can grow three crops of Eri in a year. This shows that if sericulture is taken up as a primary occupation, the income of the households in the study area is likely to increase manifold. Development of sericulture in these areas will not only generate income but also create employment opportunities without disturbing the ecology and the environment.

Table 5: Distribution of respondents according to problems faced in sericulture activities

Sl No	Problems	No of Women	Rank
1	Pests and diseases	64	1st
2	Non availability of laying	50	2nd
3	Fluctuations of cocoon prices	46	3rd
4	Climatic disturbances	13	4th
5	Shortage of skill workers	12	5th
6	Lack of investment	12	5th
7	Shortage of rearing equipments	6	6th
8	Exploitation by middlemen	4	7th
9	Transportation problem	2	8th
10	Shortage of pesticides	1	9th

Source: Computed from Field Data

Various reasons have been cited by the respondents for non adoption of sericulture as a primary occupation inspite of its high income generating capacity. The problems faced are ranked in Table 5. The main problems faced by the respondents consist of pests and diseases (especially in case of muga), non availability of laying and fluctuations of cocoon prices.

In view of the problems faced by the women in sericulture activities such as pests and diseases, high fluctuations in cocoon prices, non availability of layings, climatic disturbances, inadequate finance for investment, exploitation by middlemen, transportation problem, shortage of skilled workers, shortage of rearing equipments and other related problems, some measures can be taken for the overall development of sericulture and ensuring active participation of women in sericulture. For example, the Government should take necessary policy decisions to safeguard the farmers from the fluctuations in cocoon prices. Various women friendly technologies have been developed by the Central Silk Board, which should be disseminated through proper extension services. Technology, which enhance skills of women and increase their productivity, should be adopted. Women generally are not involved in marketing of the products.

However, participation of women in marketing will motivate the women producers on the quality aspects, which influence demand in the market. Marketing knowledge should be provided for women with proper incentives. Proper training can also be imparted to women to increase productivity. Access of women sericulturists to institutional credit can also help in increasing production and income from sericulture and contribute to the well being of the family. Institutional credit can actually be given to attract more women to participate more enthusiastically and effectively in sericulture.

Sericulture can be considered as one of the most remunerative occupation for all categories of farmers, from a small/marginal farmer with meager resources to a large farmer. The return from this activity is quick with a short gestation period. The technologies involved are also simple, easy to adopt and within the reach of the rural poor. Sericulture has the added advantage of having diverse activities and hence the entire family

can get involved in the production process, creating employment and income opportunities.

The study shows that sericulture can emerge as the most important opportunity in generating women's income in the study area. It is the least resource intensive activity, which also does not require high education. In fact, a very low investment leads to high returns. Most of the activities related to sericulture, particularly rearing of eri can be done indoors. Another advantage of sericulture is that, it is an activity, which does not depend on season, but can be carried out throughout the year. Goalpara being an agricultural region with an almost non existent secondary and tertiary sectors, development of sericulture here (Goalpara) can help in creating employment and a steady source of income. Thus, if sericulture is taken up as a full time activity in the study area, it will go a long way in increasing the income of the respondents and raising their standard of living.

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Market Behavior and Price Discovery in Indian Agriculture Commodity Market

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Abstract- This study analyses the market behavior and price discovery in Indian Agriculture Commodity Markets. Commodity future trading was permitted in 2003. The commodity derivatives market in India has witnessed a phenomenal growth. The functioning of future market came under scrutiny during 2008-2009 due to price rise and the role of futures market in stabilizing spot prices was widely studied.

The study considered average monthly spot and future prices of nine agriculture commodities viz. wheat, chana, soybean oil, jute, mentha oil, rubber, potato, crude palm oil and cardamom trading on MCX and NCDEX during 2009-2010.

Granger causality test have been used to test the price discovery i.e., the effect of future market on spot market and vice-versa. The market behavior was studied with the help of backwardation and contango.

The result of the study says that the price discovery mechanism is quite different for different commodities but it suggests that causality can be used in forecasting spot and futures prices. Most of the commodities showed bi-directional causality between spot and future prices. The contango and backwardation helps in identifying the hedging opportunities in the market.

The research field taken for the study is Indian Agriculture Commodity Market.

I. INTRODUCTION

“FUTURES markets are an anomaly to those economists who study them least, an anachronism to those who study them a little more, and an annoyance to those who study them most.”

Commodity futures trading in India commenced more than 100 years back. Major enactment to this effect was in the form of Forward Contract Regulation Act (FCRA), 1952. But, the situation has not matured due to the virtual banning of futures trading since the early 60s till late 80s when the scarcity environment prevailed. Presently, it has become very popular among the traders and retail investors, the reason that they provide the investors with a better opportunity of diversifying their portfolios in addition to what the bonds, shares, and real estates offer.

The other justification for opening up and rejuvenating commodities futures markets in India during the beginning of the current millennium has been to create infrastructure which will help farmers to access the market as well-informed players. Price discovery and price risk mitigation are the main objectives of commodity futures markets, which enables the farmers to take rational decisions about cropping and marketing of their produce to increase their farm income. This creates incentives and resources for investment in agricultural operations to improve productivity. The National Agricultural Policy 2000 (NAP), sought to “enlarge the coverage of futures markets to minimize the wide fluctuations in commodity prices as also for hedging their risk”. The endeavour ought to be to extend futures trade to all agri-commodities in course of time. **The Guru Committee (2001)** emphasized the role of futures trading for price risk management and marketing of agricultural produce.

Future market should be able to generate prices that express future expectations on cash prices and should be able to transmit that information effectively across the market. Effective price discovery requires the direct participation of several players in commodity market: farmers/producers, intermediaries, wholesalers, investors and other players. Price discovery depends heavily on physical market infrastructure, as well as handling costs, storage costs, transportation costs, tax rates and other factors.

Futures prices discovered on the platform of exchanges can provide an important input to all decision makers, be they farmers, processors, warehouse keepers, traders or policy makers. Futures prices indicate democratically observed price expectations at future dates. These prices if efficiently determined, disseminated and accessible to all concerned - can pave the way for optimal decision making and resource allocations. If farmer gets advance information about the price of the produce that is likely to prevail at the time of harvest he can plan his crop and investment accordingly. Also, as the harvest time approaches, the prices likely to prevail much after harvest can guide him to take decision to sell or hold back his produce at the time of harvest. Thus, given his capacity and availability of other enabling infrastructure such as warehousing, finance etc. he will be able to exercise his marketing option in such a way as to maximize his income realization from his produce.

According to V. Shunmugam, Chief Economist at the Multi Commodity Exchange of India Ltd., commodity futures help policy makers take better preventive measures by indicating price rises beforehand. Apart from the basic functions of price discovery and price risk management, futures contracts have a number of other benefits like providing liquidity, bringing transparency and

controlling black marketing. Futures contracts can easily be converted into cash, i.e. they are liquid. By buying or selling the contract in order to make profits, speculators provide the capital required for ensuring liquidity in the market. They provide certainty of future revenues or expenditures, hence ensuring concrete cash flows for the user. Futures markets allow speculative trade in a more controlled environment where monitoring and surveillance of the participants is possible. Hence, futures ensure transparency. The transparency benefits the farmers as well by spreading awareness about prices in the open market. Futures also help in standardization of quality, quantity and time of delivery, since these variables are agreed upon by the participants and specified in the futures contract.

II. FUTURES TRADING IN INDIA

It is believed that commodity futures have existed in India for thousands of years. Kautilya's 'Arthashastra' alludes to market operations similar to modern futures markets.

However, organised trading in commodity futures in India commenced in the latter part of the 19th century at Bombay Cotton Trade Association Ltd. (established in 1875). The number of commodity markets in the pre-independence era was limited, and there were no uniform guidelines or regulations. The legal framework for organising forward trading and the recognition of Exchanges was only provided after the adoption of the Constitution by a central legislation called Forward Contracts (Regulation) Act 1952.

Through a notification issued on 27 June 1969, by exercising the powers conferred upon the Central Government by the Securities Contracts Regulation Act 1956, forward trade was prohibited in a large number of commodities, leaving only 7 commodities open for forward trade. The decline in traded volumes on stock markets led to the evolution of an informal system of forward trading by the Bombay Stock Exchange in 1972, but this created payment crises quite often. In 1994, the Kabra Committee recommended the opening up of futures trading in 17 commodities, excluding wheat, pulses, non-basmati, rice, tea, coffee, dry chilli, maize, vanaspati and sugar.

After the Securities Laws (Amendment) Bill was passed in 1999, the Central Government lifted the prohibition on forward trading in securities on 1 March, 2000.

The National Multi Commodity Exchange (NMCE) was the first exchange to be granted permanent recognition by the Government, where futures trading commenced on 26 November, 2002. The Multi Commodity Exchange of India (MCX) was established in November 2003 and the National Commodity and Derivatives Exchange Limited (NCDEX) commenced operations in December 2003. Today, futures trading are permissible in 95 commodities in India. There are 25 recognised futures exchanges with more than 3000 registered members. Trading platforms can be accessed through 20,000 terminals spread over 800 towns/cities.

In terms of value of trade, agricultural commodities constituted the largest commodity group in the futures market till 2005-06. Since 2006-07, bullion and metals has taken this place. Between April 2007 and January 2008, agriculture futures amounted to Rs. 7.34 lakh crore, 23.22 per cent of all commodity futures. The total value of trade of the Indian Commodity Futures Market during the year 2010-11 stood at Rs. 119.49 lakh crore. The Market registered a growth of 54% during the year, as compared to the value of trade of Rs. 77.65 lakh crore during 2009-10. The value of agriculture commodities traded in the Commodity Exchanges stood at Rs. 14.56 lakh crore growing at a rate of 20% over the previous year. The top five commodities traded in the Futures Market during 2010-11 were Silver, Gold, Crude oil, Copper & Nickel. The top five agri commodities traded in the futures market were Soya oil, Guar seed, Chana, Rape/Mustard seed and Soya bean seed.

III. PAST STUDIES

The literature on price discovery is extensive. Many studies are based on the Garbade-Silber framework, along with Granger Causality, Co integration, and Error Correction Models to determine the relationship between futures and cash prices. An attempt has been made to review the existing literature on the concerned topic based on the nature of asset considered in the study.

Yang et al. (2001) attempted to study price discovery performance of future market for storable and non storable commodities. They found that asset storability does not affect the price discovery function; although it may bias futures market estimates. They conclude that futures markets can be used as a price discovery tool in both types of markets

Thomas and Karande (2001) examined efficiency of the castor-seed futures markets in India. The examination included identifying the flow of information between futures and spot prices across two different markets.

Mattos and Garcia (2004) investigated the relationship between cash and future prices in Brazilian agricultural markets, focusing on the effect on the trading activity on the price discovery mechanism. Their results suggested that higher trading activity is not linked to the presence of long-run equilibrium relationship between cash and futures prices, while in thinly-traded markets, long-run nor short-run interactions are significant.

Kumar and Sunil (2004) investigated the price discovery in six Indian commodity exchanges for five commodities. For their study they have used the daily futures and comparable ready price and also engaged the ratio of standard deviations of spot and future rates for empirical testing of ability of futures markets to incorporate information efficiently. Besides, the study has empirically analyzed the efficiency of spot and future markets by employing the Johansen Co integration Technique. They found that inability of future market to fully incorporate information and confirmed inefficiency of future market. However, the authors concluded that the Indian agricultural commodities future markets are not yet mature and efficient.

Sahi (2006) studied the impact of introducing future contracts on the volatility of the underlying commodities in India. He found that unexpected increase in future activity in terms of rise in volumes and open interest has caused increase in cash price volatilities, suggesting that futures trading had a destabilizing effect on spot price commodities.

Iyer and Mehta (2007) found the cash market for two commodities (chana and copper) to be a pure satellite of the futures market in the pre-contract expiration weeks, and for four commodities (chana, copper, gold and rubber) in the expiration weeks.

Nath and Lingareddy (2007) in their study have attempted to explore the effect of introducing futures trading on the spot prices of pulses in India. Favoring the destabilization effect of futures contract, their study found that volatilities of urad, gram and wheat prices were high during post-futures period than that in the pre-futures period as well as after the ban of futures contract.

Sen and Paul (2010) have clearly suggested that future trading in agricultural goods and especially in food items has neither resulted in price discovery nor less of volatility in food prices. They observed a steep increase in spot prices for major food items along with a granger causal link from future to spot prices for commodities on which futures are traded.

IV. METHODOLOGY

The sample used in the study consist of nine agriculture commodities which are actively traded on NCDEX in the study period of 1st April 2009 to 31st March 2010, selected according to the availability of data. The data consisted of the monthly average of closing spot prices and future prices of each of the sample commodities, which was collected from NCDEX website and other commodity database.

The market behavior was studied with the help of backwardation and contango. Contango refers to the percentage of times, future prices are higher than spot prices and backwardation refers to the percentage of times spot prices are higher than future prices.

With the help of data collected the Granger causality test have been used to test the price discovery i.e., the effect of futures market on the spot markets and vice-versa.

Granger causality (or "G-causality") was developed in 1960s and has been widely used in economics since the 1960s. The granger causality is a statistical hypothesis test for determining whether one time series is useful in forecasting others. Granger causality measures whether one thing happens before another thing and helps predict it. In the Granger-sense x is a cause of y if it is useful in forecasting y1.

Conceptually, the idea has several components:

- Temporality: Only past values of X can "cause" Y.
- Exogeneity: Sims (1972) points out that a necessary condition for X to be exogenous of Y is that X fails to Granger-cause Y.
- Independence: Similarly, variables X and Y are only independent if both fail to Granger-cause the other.

In Granger Causality Method, two models are estimated, a unrestricted model and a restricted model. A simple F test is used to determine if the added variable in the unrestricted model results in significantly smaller sum of squared residuals.

P-values from this F test are reported rather than the F statistic itself.

The Unrestricted Model:

$$\Delta S_t = \alpha + \beta \Delta f_{t-1} + \gamma \Delta S_{t-1} + e_t$$

The Restricted model:

$$\Delta S_t = \alpha + \gamma \Delta S_{t-1} + e_t$$

If, by adding the change in futures price as an explanatory variable, the sum of squared errors is significantly smaller than in the restricted model, then we conclude that changes in futures position lead changes in spot price.

A second set of equations is also estimated, but in these the change in futures price is the dependent variable and change in spot price as the added independent variable in the unrestricted model. From these, we can test if a change in spot price leads a change in futures price.

V. FINDINGS

Chana prices showed a prevalent pattern of contango (58.33%), with spot prices significantly lower than futures prices. In terms of price discovery, there was significant effect of futures prices on spot prices.

Wheat prices were also found to show a mixed pattern, with equal incidence of contango and backwardation, with no significant difference between spot and futures prices on average. In terms of price discovery, there was significant effect of futures prices on spot prices.

Cardamom prices were also found to show a mixed pattern, with equal incidence of contango and backwardation, with no significant difference between spot and futures prices on average. In terms of price discovery, there was significant effect of futures prices on spot prices.

Soyabean oil prices showed a prevalent pattern of contango (58.33%), with spot prices significantly lower than futures prices. In terms of price discovery, there was significant effect of futures prices on spot prices.

Jute prices were found to show backwardation (58.33%), with spot prices significantly higher than futures prices. In terms of price discovery, it was found that there was no significant effect of futures prices on spot prices and of spot prices on futures prices.

Mentha oil prices were found to exhibit chronic backwardation, both with high incidence of backwardation (91.67%). In terms of price discovery, it showed the same result as of jute. It was found that there was no significant effect of futures prices on spot prices and of spot prices on futures prices.

Rubber prices showed a highly prevalent pattern of contango (91.67%), with spot prices significantly lower than futures prices. In terms of price discovery, there was significant effect of futures prices on spot prices.

Potato prices were also found to show a mixed pattern, with equal incidence of contango and backwardation (50%), with no significant difference between spot and futures prices on average. In terms of price discovery, there was significant effect of futures prices on spot prices.

Crude palm oil prices were also found to show a mixed pattern, with equal incidence of contango and backwardation (50%), with no significant difference between spot and futures prices on average. In terms of price discovery, there was significant effect of futures prices on spot prices.

In terms of market behaviour, it was found that the commodities that showed contango to a marked extent, with average spot prices significantly lower than average futures prices, were as follows: chana (58.33%), rubber (91.67%), soyabean oil (58.33%), but the difference in their average spot prices and their average futures prices was not statistically significant. On the other hand, the commodities that showed significant backwardation, with average futures prices significantly lower than average spot prices, were as follows:- jute (58.33%), mentha oil (91.67%). It was found that some commodities, viz. crude palm oil, wheat, potato, cardamom showed mixed tendencies of contango and backwardation, with no significant difference in average spot prices and average futures prices.

VI. CONCLUSIONS & IMPLICATIONS

The price discovery mechanism is quite effective for most commodities, but may not be very effective for some commodities. In particular, causality in commodities markets can be used to either hedge or speculate price movements: if changes in spot prices drive changes in futures prices, efficient hedging strategies can be formulated; whereas if changes in futures prices drive changes in spot prices, efficient speculation strategies can be formulated. Further, causality can be used in forecasting commodity spot and futures prices.

As majority of Indian investors are not aware of organized commodity market; their perception about is of risky to very risky investment. Many of them have wrong impression about commodity market in their minds. It makes them specious towards commodity market. Concerned authorities have to take initiative to make commodity trading process easy and simple. Along with Government efforts, NGO's should come forward to educate the people about commodity markets and to encourage them to invest in to it. There is no doubt that in near future commodity market will become Hot spot for Indian farmers rather than spot market. And producers, traders as well as consumers will be benefited from it. But for this to happen one has to take initiative to standardize and popularize the Commodity Market.

There are some limitations inherent in the present study. The study was limited to the period from 1st April 2009 to 31st March 2010. Further, the number of commodities was limited to only nine from only one commodity exchange and some important commodities could not be taken as data was not sufficiently available for them. Finally, data availability was a major issue; the data that was available was in some cases recorded once, and in other cases recorded twice daily. Therefore, only the prices which were nearest to the closing time were chosen.

Several natural processes such as seasonal cycles based on harvests, monsoons, depressions, and other weather events would also be expected to have an impact on price discovery in commodity markets; this is another area that needs to be studied. The asset storability also plays an important role in price discovery. This factor can also be considered for further study in this area.

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Handicrafts of Bahawalpur (South Punjab) Pakistan

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Abstract- Saraiki region possesses an ancient history, primeval civilization and cultural heritage. This soil has connections with at primordial era when even the human civilization had not awakened. When the man was inhabiting his dwellings on the banks of the river and watercourses, then the man of earlier period made inconsistent advancement towards the civilized life. Then the human civilization development started dreaming about civilization and culture the initial stages of awareness in the nomadic life after getting out of the dark and narrow caves, then as a step of development not only the process of agriculture forced the man to abandon nomadic life but also gave them a sense of protection and security from the unfavorable conditions of hunting, the feeling of insecurity and the struggle for his survival. Afterwards he implemented the milk of cattle, honey, fruits, and vegetables as alternative food for the meat of hunted animal: And adopted it as a source of economy on addition to alternative food. The necessity of human indigence, instinct and collaboration brought the human beings, victim of the scattered man in search of food, close to each other to lay foundations of a human society with the vision of an earlier collective and integrated human congregation. Hence the man advances towards the destiny of evolution and civilization by crossing over the various stages cultural development through wisdom of wakefulness. The entry into the era of agriculture and later on through the discovery of fire, access to the age of copper and bronze, the formulation of the rules and regulations after coming out the earlier traditions and customs, earlier domain of economic, political, trade and social factors presented the human civilization and culture in a universal and interconnected form. As a consequence of this factor the great civilizations of Egypt, Mesopotamia and Indus valley got birth. It was the miracle of this human evolution that the art and craft also commenced along with the human civilization.

The cave art and the motifs engraved on the rocks started to be transferred on walls and canvas of animal skin. The Indus valley where the rocks and stones didn't exist, the numerous master pieces of art were lost in sand dunes. The ancient era buried these antiques under the ruined settlements and some where these were vanished at the hands of wear and tear of the passing time. These tragedies occurred in the Indus valley in the case of art on a large scale, where there were no rocks, mountains or stony soil, and if there was something then that had been created on muddy walls and structures made up of clay. Then in case of the reminiscent of ancient times and past traditions search of the heritage of the arts and great treasures of craft of the past would have been laudable of not abandoned.

Well now let's make a little attempt to peep into the creative world of contemporary art to search for the heritage of existing arts on the Saraiki soil.

On our soil neither there are the cave of Ajanta nor the miracles of architecture, pyramids Egypt, or the antiques created by the sculptors of Gandhara and Taxila civilization are buried in this region. We can only explore the initial traditions in the background of the existing arts of this region, which blessed our soil with the heritage of amazing creative miracles.

The main reason of the unavailability of the heritage of arts is that this soil remained under the constant threat of the foreign invaders, who attacked this prosperous and fertile region frequently and demolished and destroyed the libraries, pieces of art and high quality significant models of architecture. Moreover if any antique pieces of art existed there then these could not remain protected from these foreign conquerors. But still the ancient families boasting of the possession of numerous antiques are witness to the fact that in the past this region had been the inheritor of the artistic and creative exploits of the experts of fine arts.

However this tragedy is a fact that at present we are empty-handed and a begging with reference to the art. However we put a sight in some significant aspects of artistic elegance of this region.

Now we come to the handicrafts of Bahawalpur, an art which comes into being due to necessity, the residents of the outskirts area of Bahawalpur work day and night to fulfill their needs, but even in these necessities the element of creativity is found their choice of colours and designs is not less than a veteran artiste. The most of the requisite items are crafts and a variety of crafts are being manufactured by them at home. The role of the women in this regards is very vital. The males of the family supply the material to the maximum or do the marketing of finished goods. The artisans of this region mostly accomplish their work at home instead of the factories and whole of the family is involved in a particular task. The women of the family are executing more work in their homes. These handicrafts include Chunri, handmade fans, the trays made up of date palm leaves Chhabbi, peerhay (stools for sitting), Gindi,(made with patches of clothes) the embroidery on clothes, mukesh (silver faber) work on clothes and dupattas(scarf) top the list of such items. Where as in the manufacturing of Khussa (traditional footwear), silver jewelry. The male members of the family are involved. While with clay, pitcher, Surahs and pattri(ready flour for making bread) are made along with the active participation of their females.

These items not only are initial requirement but also are used for decoration purpose and also for the fulfillment of artistic desire. If we review the crafts with concentration, then it is revealed that their use of colour scheme and designs are not inferior to any expert if art. The main reason of this factor is that successive generations are involved in this activity for the preservation of this particular art.

For example the designs and colours of these items reflect the art taking birth and associated with this soil to some or great extent, displaying the growing plants and trees, wild bushes, flowers, birds, animals on the clothes, handmade fans rug, Khais (a piece of rugged clothes) clay pottery or handmade silver jewellery of Cholistan, this factor can be observed.

The thing which attracts me the most are the colours of Cholistan. These colours sometimes refer to the scorching sunshine to Cholistan desert sometimes of the cool sand and at other times. To the chilly winter. These hues sometimes give the feelings of delight and at other times bring the state of grief.

I. INTRODUCTION

Now let's review the handicrafts of Cholistan:

CHUNRI

Chunri is the most popular handicraft of Bahawalpur. It is not only liked in other cities of Pakistan but is also exported. Chunri is liked by the women of ever age group and is used as a dress wear in all seasons. The local population sends Chunri as a gift to cities outside Bahawalpur and foreign countries. It is a centuries old handicraft and with the passage of time the designs and colours if Chunri have attained modernism. Earlier it used to be manufactured in dark colours but now it is also available in light colours. The dresses of Chunri are made in cotton, lawn. Linen, crepe, crinkle, china silk and china chiffon.(fig1-2-3)



.(figs- 1-2-3)

COLOURS

The dresses are made in green, maroon, red, orange, yellow, blue, skin, brown and black colours.(fig-4)



(fig-4 different colours of chunry)

DESIGNING

- White plane cloth is used to make a Chunri. If the cloth is of cotton then it is wrapped in four folds and if it is silky then it is given two folds.
- The sketch of the free hand designing is drawn on the cloth by lead or coloured pencil by the women.
- After designing the cloth is marked with stitching of needle and cotton thread and almost 10 to 12 folds are given to the thread for its strengthening.(fig-5)
- After that this cloth is given the shape of a small ball, and its wings are dipped in different colours which are restricted to two or three colours. The marks of 1 to 2 inches long are called "Chaun"
- The cloth is again tied with the thread after the completion of Chaun.
- The points where, either on the side or sheet of the cloth, the borders are required, is warped in a polythene bag and is tied strongly with thread.
- Now the cloth is ready for base colour.



(fig-5, cloth is ready for base colour)

CLOTH DYEING(for base colour)

- The water is boiled on the burner and then the Caustic Soda along with Bleaching powder is mixed in it than the colours in powder form are also mixed. The mixture is stired with the stick continuously. After mixing of colours is complete then the cloth is laid for drying for which 15 to 20 minutes are required.
- Now the clothes are rinsed in fresh water and are dyed in shade. The clothes are scattered in sand in the winter to get dried quickly.



(fig- clothing dying for base colour)

RED COLOUR

- The dyeing of red coloured cloth is quite different and is given below:
- Maroon and black colours are put in caustic soda and boiled water and after getting them cooked are put off from the burner and are kept to get cool.
- The cloth is well dipped in hot water and when it gets dried then the manufactured colour the cloth is dipped. Which has cooled now it is kept in the same position for 15 to 20 minutes and afterwards the maroon (salt GP) is added to the fresh water.
- The cloth must be dipped in it after putting in fresh air for sometime. The red cloth is redy. Now it is dipped and kept to get dried.
- If the Chunri is desired to be coloured green and red, then first it must be dyed in green followed by red colour.
- After the cloth is dried then the thread is untied



(figs-dyeing of red colour cloth)

KHUSSA

Khussa (traditional footwear) is the specific identity of Bahawalpur. A number of families are associated with this industry Khussa. Khussa is used extensively in marriage ceremonies and special function. The other foot wears other then khussa are, kolhapuri, sleeper with golden embroidery and plain sandals are very popular. Khussa is very popular among men, women and children of all ages.

In the earlier times there used be just plain Khussas, but with the passage of time not only the designs and colours of Khaussas displayed modernism, but the Khussa with golden embroidery (Tilay dar Khussa), dubkay wala Khussa and other varieties of Khussas also started to be stitched.

The tanneries are in Multan; hence the leather is brought from Multan.



(fig- different style of khussa's)

METHOD TO MANUFACTURE KHUSSA

In ancient time the leather of buffalo and goat was used in manufacturing Khussa, but now only the leather of cow is used.

- First of all the leather is cut in small pieces. And the upper (in local dialect) is cut with a underlying marked piece of hard board, which is called as "Andaza" locally.
- After cutting the upper a piece of channel cloth is stuck with gum. This gum is made up of flour or Maida (meal).



(figs- method to manufacture khussa)

STICHIND

At very first stage bottom most larger (base) of khussa is prepared from cultured leather. Two to Three layers of khussa base are placed one on the other and stitching of khussa with the help of tools Ar. Needle is started

THAPPAI (with wooden hamer)

The khussa is then pressed with the help of wooden hammer to align it as per mold (sancha) temporarily placed inside khussa. (sancha is made of wooden material according to the shape of khussa)

TOOLS

The following tools are used for khussa.

- Stone Brick
- Rambhi
- Chedna
- Ar
- Needle
- Mangli

SIZE

Ladies & Gents :- 7 to 12 inch

Children :- 7 to 11 inch

GINDI

Gindi is a very beautiful and colourful handicraft, which is a specification of this region. Gindi is made only the region of Bahawalpur, Multan and Sindh. Where it is commonly known as Rilli. In the accomplishment of this handicraft, the women folk are greatly involved. Gindi is a handicraft used extensively in the rural areas, while as a bed sheet and cushion it is also used in the urban areas. It is greatly used as decoration piece in the cities. The Gindi style bed sheets, quilts, pillows, the prayers mat and cover of the cushions are made due to their popularity as a traditional handicraft.



(figs- gindi)

METHODS TO PREPARE A GINDI

There are different colours used in the making of a Gindi and these areas, red, blue, green, orange, black and white colours.

- It is made up of a plain cloth of various colours and sometimes the designed cloth is also used.
- The cloth is cut in to different designs which are square, rectangular and triangular in shape.
- These pieces are joined with the needle and thread work.
- When all each pieces are stitched together then after achieving the required size, a sheet of only in colour is sewn as underlining.

HANDY FANS AND CHABIAN

The handy fans and chhabian are handicrafts of common use and are among the necessities of every house hold in the villages, while these are also in the urban areas as traditional items. The fans and chhabian are made up of the leaves of date palm tree. Some other items like morha (chair), Chatai (mat); Musallah (prayer Mat), thulla and rope of the cot are also made from these leaves. The branches of date palm tree are plucked along with the fruit in the months of July / August. From the leaves of the outer branches of the date palm, the rope of the cot, mats, prayer mat etc, are made. While fans, chhabian, morha, pachhi(vasket) are manufactured from the leace of inner branches, commonly known as Gachhey.



(figs- handy fan and chhabian)

DYING OF DATE-PALM LEAVES

The leaves sought from the inner branches are kept in the outer for drying. And later on are dyed. The white leaves are also used. The colours mostly used are yellow, pink, green, blue and purple

CLAY POTTERY

The pottery made with clay include pitcher. Long necked pitcher, tumbler, bowl, cooking vessel, and pattri are very

popular. This type of pottery is used commonly in the villages,



while only pitchers are used to some extent in the cities.

(fig- clay pottery)

The person who makes clay pottery is called a Kamhar (potter) and the generations of potters continue to prepare pottery to become skilled in this art. Whole of the family is involved in the creation of clay pottery. The role of women in this regard is very significant and they perform their responsibilities from the making of clay to the baking of the molded items. Moreover they also render their service in the shifting and baking in addition to the heating the furnace. This is confined to only women.

PREPARE THE CLAY

Clay is used in preparing the pottery. The clay is thrashed very finely. After that it is stained in a stainer and is kneaded with feet by pouring in the water. Two to three persons knead the clay at a time. Expertise is required to prepare the clay and three to four days are spent in preparing proper clay for the making of pottery. The finalized clay turns for use in a week's time. After wards hundreds of pottery items can be prepared.

again put in the wheel and is rotated with the hands. Again it is rubbed and the flower pot becomes neat.



(fig- preparing the clay)

POTTER WHEEL

The role of Chak in the process of making clay pottery is very important. The pots are given a particular shape by putting them on a wheel. The roll of clay is pasted on the wheel like a roll of flour and the wheel is driven with the help of feet, while the hands of the artisan are continuously running on the pot and a particular shape is given to it. The pot is manufactured within two to three minutes.

MAKING OF FLOWER POT

Two kilo clay is required for making a flower pot. After keeping it on the wheel for giving it a shape, it is kept in the sun for two days to dry. The prepares 300ro 400 flower pots in a day the flower pot if refined with the help of a eraser. Then the pot is



(figs- making a flower pot)

MAKING A PITCHER

At least one week is required for the making of a pitcher. The clay is put on wheel for the manufacturing if a pitcher. Then it is given the shape of a vase and is put in the sides. Afterwards on the very next day the vase is changed in to the shape of a pitcher. The following method is adopted for the shape of a pitcher.

The pitcher is put on the pitcher stand. With one hand the pitcher is rotated and with the other hand the pitcher is pressed



with the help of a wooden tool. With the other hand it is set with the help of a cemented stone. Then kanver is applied inside the pitcher. And until the thickening of the pitcher this process is continued. It takes about four to five minutes.

FILMING OF CLAY

After designing the pitcher with three colours the film of red clay petchhi is put in it. This clay is the specification of Rohi CHolistan. After putting the film the shining sand of the river is sprayed on the pitcher.



(fig- making pitcher)

SOURCES OF COLOURING PITCHER

BLACK: it is also called Gairvi. This colour is retained from the Kala Poka Stone, which is brought from Sakhi Sarwar

RED: This colour is obtained from the friction of Lal pola, stone which also comes from Sakhi Sarwar

WHITE: This colour is obtained from the burning of animal bones. It is also rubbed in the stone and then water is added. These colours are applied on pitchers, bowls, long necked pitcher and Khumray.



(figs- filming of clay)



BAKING OF POTTERY

The manufacturing of the pottery in the furnace and baking is a very long and painful process. About four hundred to five hundred pots at a time. First of all dry leave branches are gathered and this heap of waste is put in the furnace. After that the prepared pottery is set and the dried cow dung is spread over the pottery so that the fire may not scatter here and there. So after setting the furnace is burnt with the help of wood and it is left for continuous 48 hour burning. The duty of various persons is changed to monitor the fire burning through day and night. After

two to three days of baking of pots the waste is cleaned. Then the pots are pulled out from the garbage.

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(figs- baking of pottery)

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Modified Resonant Transition Switching for Buck Converter

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Abstract-A modified resonant transition switching technique for Buck converter using coupled inductor is proposed in this paper. The principle of operation of this converter is analysed in detail. An additional winding is added on the same core of the main inductor for the purpose of commutation. By using current control, Zero Voltage Switching (ZVS) conditions are ensured over wide load range. The main inductor current is kept in continuous conduction mode (CCM) with small ripple, which allows high output power and small filter parameters. Also, the switching frequency is kept constant when load changes. The simulation results are presented and they verify the analysis.

Index Terms-ZVSPWM converters, Coupled inductor, current control, continuous conduction mode

I. INTRODUCTION

Switched Mode Power Supplies [SMPS], have become the natural choice for most of the power supply problems, owing to their higher efficiency, they are widely used in industrial, residential and aerospace environments. The basic requirements are small size and high efficiency.

'Frequency goes up, size comes down', is a belief that has been the main motivating factor for switching at high frequencies so high switching frequency is necessary to achieve small size. Most of the present commercial SMPS, operate with a switching frequency of around 50 kHz, using Hard Switching PWM topologies. Consider a step down converter in fig1

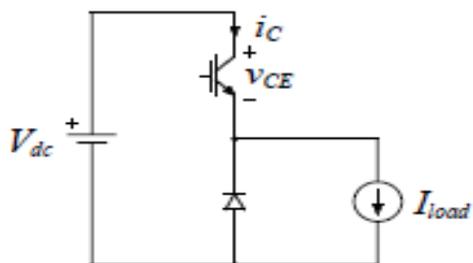


Fig.1 step down converter

If we use hard pulse width technique then IGBT have to sustain high power during transition as shown in fig2

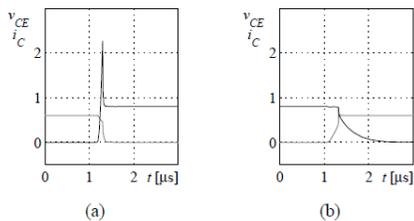


Fig.2 transient response

To solve this problem soft switching technique need to be used. soft switching must satisfy two conditions, (a) switch transitions should occur only when either the device current or device voltage is zero. (b) energy stored in parasitic elements are fully recovered.

They can be broadly classified as Zero Current Switching [ZCS] Converters and Zero Voltage Switching [ZVS] converters. In the ZCS converters, the Current through the device is brought to zero by external means, just prior to turn-off. Thus the turn-off losses as well as the voltage spikes due to stray inductance are totally eliminated. During the turn-on process, the current rise is slowed down, again by external means, so that the device voltage falls to zero before the current becomes appreciable. In the ZVS converters, the device voltage is brought to zero just prior to turn-on, thus totally eliminating the turn-on losses. During turn-off, the rate of voltage rise is limited, so that the device current falls to zero before the voltage rises substantially.

Some soft switching techniques are (a) snubber circuit (b) Resonant switch (c) Resonant Transition converter
 In snubber circuit: are effective, to a limited extent, in reducing the device stress during switching transitions. However, they do not appreciably reduce the switching losses, as they only shift the power loss from the switches to the snubber resistors.
 In resonant switch: The Resonant Switch Converters are obtained by simply replacing the controllable switch (es) in PWM converters, with the Resonant Switch. The Resonant Switch is a sub circuit consisting of semiconductor switches and resonant LC elements. The resonant elements shape The device current/voltage waveforms, so that the switching's can be done under favourable conditions But This type has some limitation peak current and peak voltage stress, conduction losses is high .
 In Resonant Transition converter as in fig3

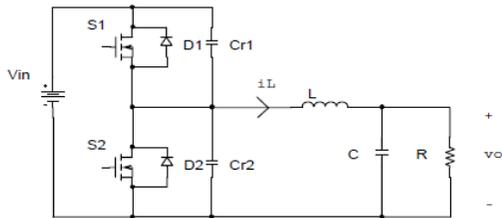


Fig.3 ZVS Buck converter using coupled inductor

The drawback of ZVRT converters is large ripple in the inductor current, which makes the conduction loss higher compared with the conventional PWM converters. Also, it needs large filter parameters. Since all output filter capacitors have Equivalent Series Resistor (ESR), large ripple current will generate high loss in the capacitors. High ripple current will also cause high magnetic core loss. For the sake of efficiency, the inductor current should have small ripple. This technique is only suitable in low power applications.

In the modified ZVRT converters, the switching current can still be bi-directional so that ZVS conditions are retained and at the same time, the main inductor current is in continuous conduction mode with small ripple. The proposed technique helps to overcome the drawbacks of the ZVRT converter discussed above.

In this paper, the operational modes of the proposed Buck converter is analysed in detail. To achieve ZVS conditions in the switches and fast response, hysteresis current control is used in this converter. By using this method, the bi-directional current has the average value determined by the output of the voltage loop, hence by output power while its minimum value is always less than zero to achieve ZVS conditions. Also, the switching frequency is kept constant when the load changes.

II. PRINCIPLES OF OPERATION OF THE PROPOSED SOFT SWITCHING TECHNIQUE

The proposed ZVS-Buck converter is shown in fig.4 Inductor L_2 and L_1 are tightly coupled on the same ferrite core. The polarities of the inductor L_2 and L_1 are marked as in the schematic circuits to ensure that the voltage across the coupled inductor (L_2) can be used as the commutation source for soft switching for MOSFETs. The inductor L_r is small while the main inductor L_1 is comparatively large. Current i_r is controlled to be bidirectional (positive and negative) while the output current i_1 has small ripple. The waveforms for i_1 and i_r for Buck converter are shown in Fig.4

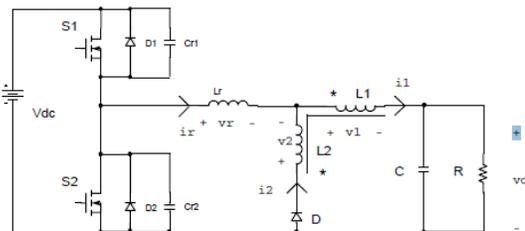


Fig.4 ZVS Buck converter using coupled inductor

Current i_r is controlled to be bidirectional (positive and negative) while the output current i_1 has small ripple. The waveforms for i_1 and i_r for Buck converter are shown in Fig 5

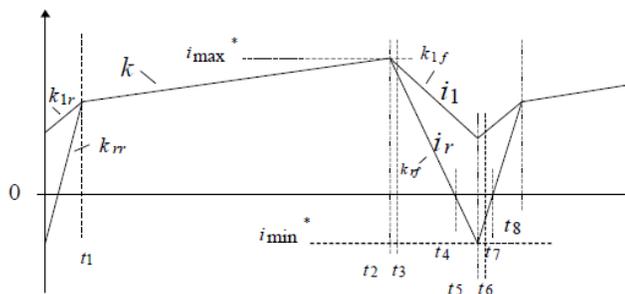
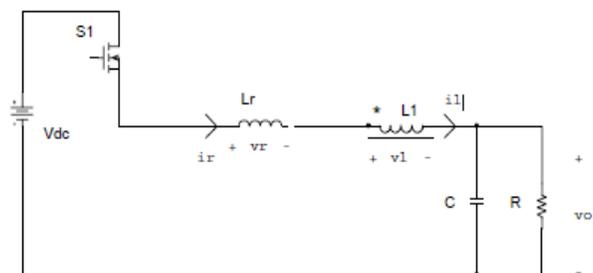


Fig.5 Waveforms of i_r and i_{l1}

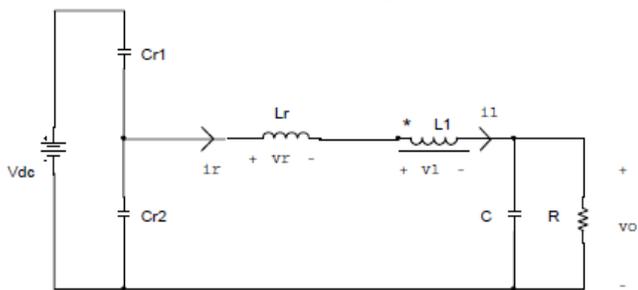
The current i_r is bi-directional, which ensures ZVS conditions for the two MOSFETs. Small ripple current in $L1$ allows higher output power and lower requirements of the output filter capacitors. As an example, the Buck converter is analysed. There are seven modes in one switching cycle. The equivalent circuits for these modes are shown in Figure.

Mode 1 [$t1 - t2$]: at time $t1$, $S1$ is turned on and D is off. Inductor Lr is in series with $L1$. The current i_{l1} will rise linearly. When the current reaches the current reference i_{max} that is determined by the output of voltage regulation loop, $S1$ is turned off.



(a) Mode 1: S_1 conducts

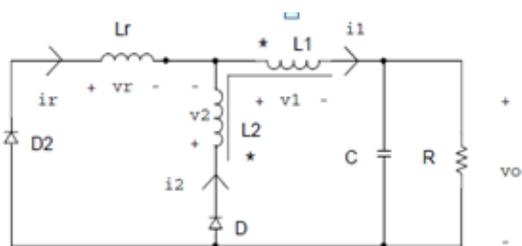
Mode 2 [$t2 - t3$]: When $S1$ is turned off at $t2$, resonance occurs between the inductor Lr and snubber capacitors ($Cr1$, $Cr2$). During this interval, $Cr1$ is charged and $Cr2$ is discharged. At time $t3$, the voltage across $Cr2$ becomes zero and $D2$ begins to conduct.



(b) Mode 2: Lr , $Cr1$ and $Cr2$ resonant

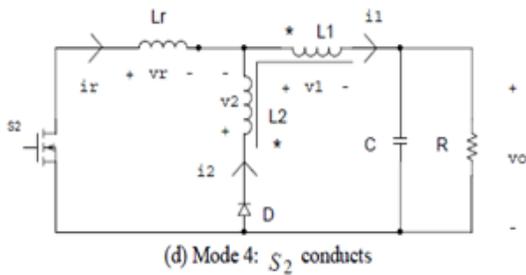
Mode 3 [$t3 - t4$]: When $D2$ conducts, the voltage across the output inductor ($v1$) changes its polarity. Because inductors $L2$ and $L1$ are tightly coupled, $v2$ is negative. The current in Lr begins to decrease due to the voltage across $L2$. Because Lr is comparatively small, its current will decrease

much faster than that of $L1$. As long as $D2$ is on, the gate signal can be applied to $S2$ so that $S2$ can be turned on at zero voltage.

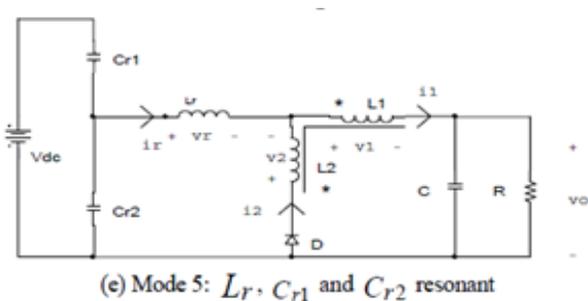


(c) Mode 3: D_2 conducts

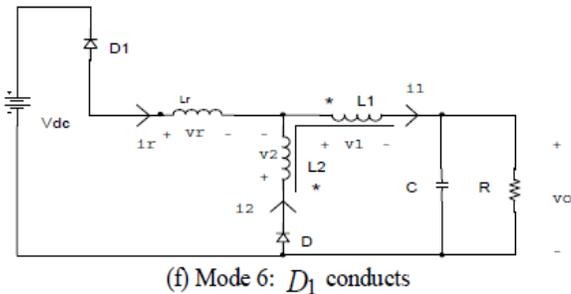
Mode 4 [$t4 - t5$]: at time $t4$, i_r reduces to zero and $S2$ begins to carry current. The current i_r rises in opposite direction. When i_r reaches the current reference i_{min} at time $t5$, $S2$ is turned off. The value of i_{min} is set by controller to make sure that the energy stored in L_r is large enough to charge and discharge the snubber capacitors thoroughly so that ZVS conditions can be satisfied.



Mode 5 [$t5 - t6$]: When $S2$ is turned off, resonance occurs between the inductor L_r and the snubber capacitors (C_{r1} and C_{r2}). This mode is similar to **Mode 2**. Capacitor C_{r1} is discharged while C_{r2} is charged. At time $t6$, the voltage across C_{r1} becomes zero.



Mode 6 [$t6 - t7$]: $D1$ begins to conduct. During this duration, i_r and i_1 begin to increase. The conduction of $D1$ makes it possible for $S1$ to be turned on at zero voltage. At time $t7$, i_r will be equal to zero.



Mode 7 [$t7 - t8$]: i_r and i_1 continue to increase. At time $t8$, the current i_r will be equal to i_1 so that current in inductor $L2$ becomes zero.

III. CONTROL STRATEGY

As discussed above, to achieve ZVS conditions, the current i_r should be bi-directional. Since the voltage mode control has low response it can't be used in this case. So inductor current control method is used here.

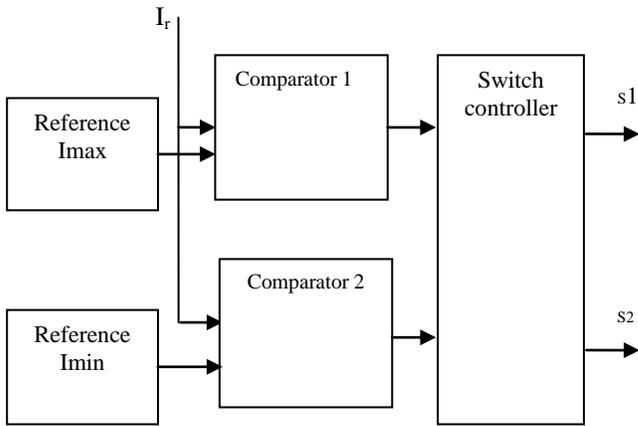


Fig.6 Block diagram for circuit diagram

The current I_r , through the inductor L_r is compared with the reference values I_{max} and I_{min} . When $I_r \geq I_{max}$ then $S1$ is turned OFF and $S2$ is turned ON. When $I_r \leq I_{min}$ then $S2$ is turned OFF and $S1$ is turned ON. Thus controls for the MOSFETs are achieved in an easier way than the existing control schemes by this method as in fig6.

IV. SIMULATION RESULTS

The converter is simulated using simulation software MATLAB version 7.10.0.

Components	Simulation value
Switches, S1,S2	Ideal
Diode	Ideal
Capacitance, C	$10^{-10} \mu\text{F}$
Resonant inductor, L_r	$4.2 \mu\text{H}$
Inductor, L_2	$10 \mu\text{H}$
Main inductor, L_1	$100 \mu\text{H}$

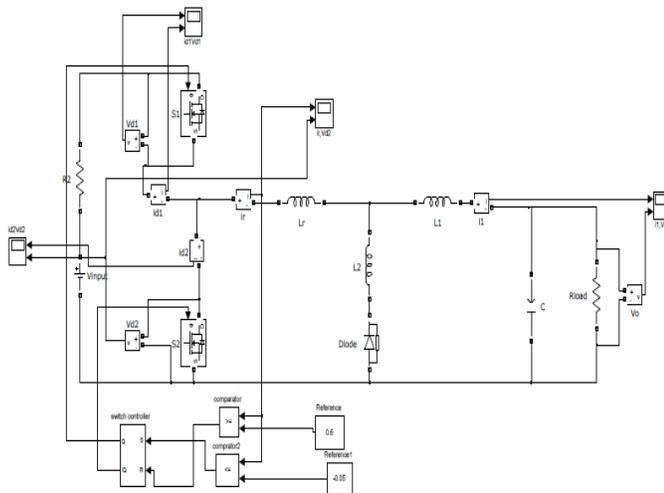


Fig.7 Matlab simulation model

Output Waveforms

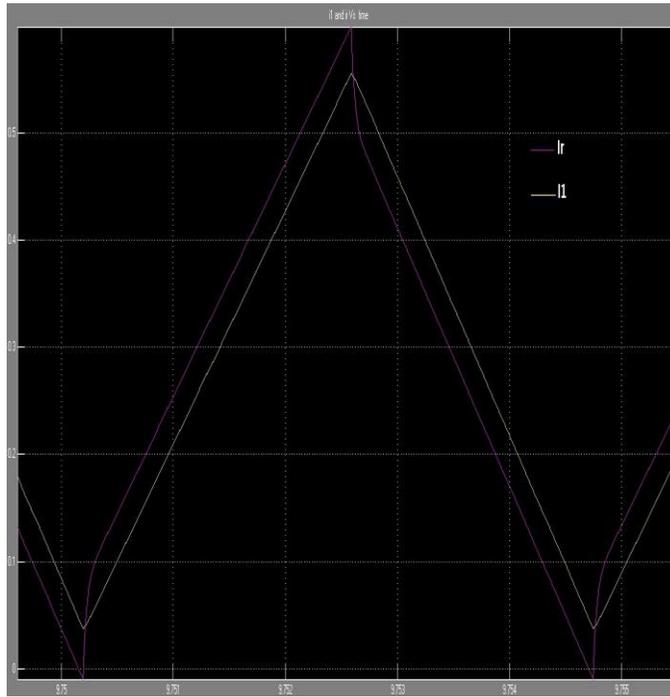


Fig :8 Waveforms of i_r and i_l

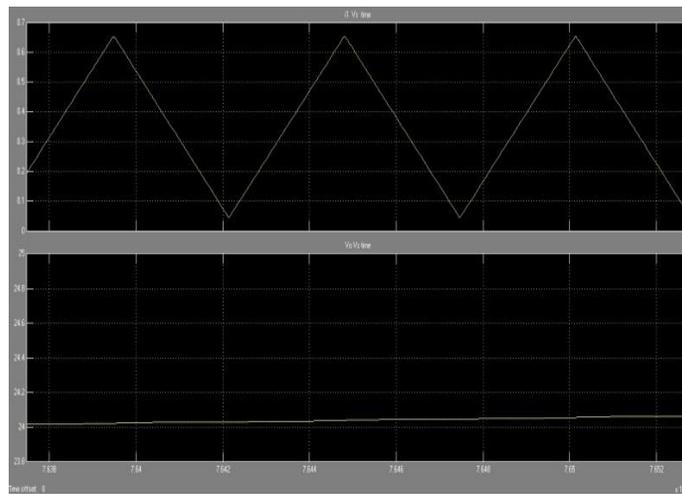


Fig:9current through main inductor(I_1) Vs time and output voltage(V_0) Vs time

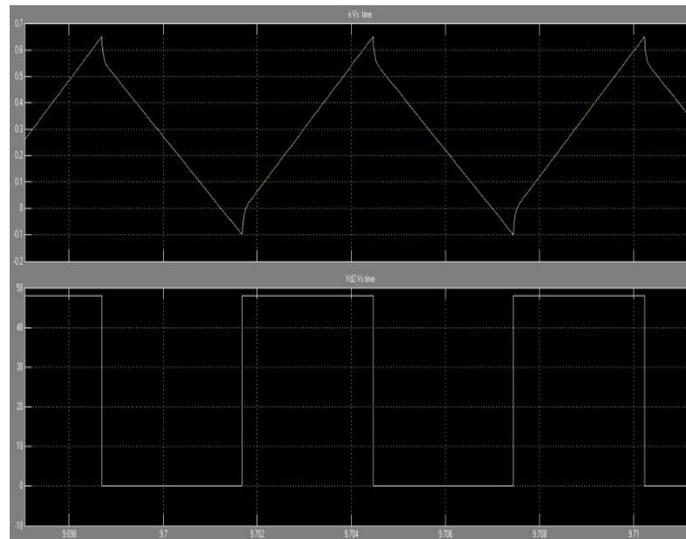


Fig:10 current through resonant inductor(I_r) Vs time and voltage across switch,S2 (V_{d2}) Vs time

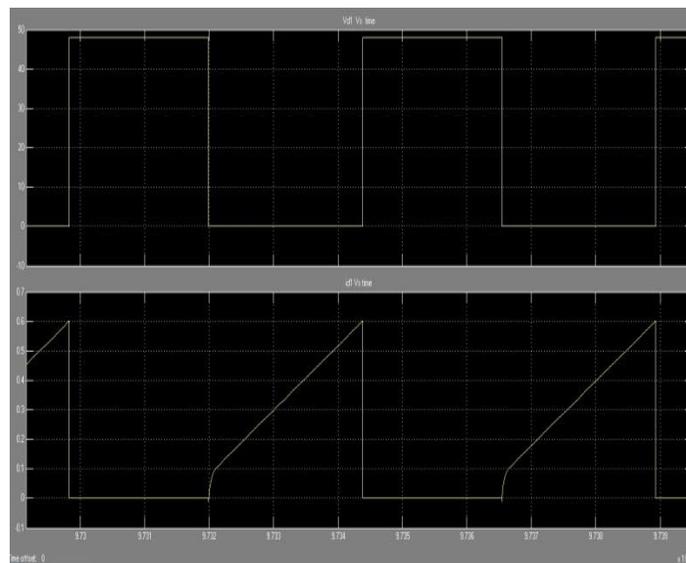


Fig :11 voltage across switch,S1 (V_{d1}) Vs time and current through switch S1(I_{d1}) Vs time

V. CONCLUSION

In this paper a soft switching technique for buck converter is proposed. This technique allows the main inductor current to operate in continuous conduction mode (CCM) with small ripple current and at the same time ensures ZVS conditions of the switch. A modified current control is used in this converter to achieve ZVS condition. The modes of operation are analyzed in detail. MATLAB results(fig8,9,10,11) of the converter is presented in the paper, they agree with the analysis. Because of soft switching conditions high efficiency could be obtained in this converter. Continuous main inductor current will allow high power application and reduced filter size. Feature investigation is underway for boost converter.

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Analysis of Fuel Injection System in Blast Furnace with the Help of CFD Software Approach

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Abstract- This paper described the combustion characteristics of pulverized coal injection (PCI) in the blow pipe tuyere assembly using injection patterns are simulated, to improving the practical performance of the blast furnace. In these study a three dimensional mathematical models has been developed based on computational fluid dynamics software gambit & fluent. The model was capable of handling steady state, three dimensional multi phase flow of pulverized coal injection. The model was applied to simulate the flow pattern of the pulverized coal inside the tuyere. The information including mean temperature distribution and combustion characteristics has been obtained in details.

Index Terms- Pulverized Coal Injection (PCI), Tuyere, Gambit & Fluent, Lance.

I. INTRODUCTION

The blast furnace is fundamentally a vertical shaft varying in height from 24 to 33 meters with a diameter at the hearth of about 8.5 m^[4]. It is the most widely used iron making process. The total volume is more than 1400 cubic meters. The blast furnace has charging arrangements at the top and a means of running off the pig iron and slag at the bottom. Air is blown in near the bottom of the furnace, and this increases the speed of combustion and maintains the necessary higher temperature. Pulverized coal injection has assisted the steel industry to lower operating costs, extended oven life and lower green house emissions. A tuyere is a tube, nozzle or pipe through which air is blown into a furnace or hearth Air or oxygen is injected into a hearth under pressure from bellows or a blast engine or other devices. This causes the fire to be hotter in front of the blast than it would otherwise have been, enabling metals to be smelted or melted or made hot enough to be worked in a forge^[7]. This applies to any process where a blast is delivered under pressure to make a fire hotter.



Fig.1 pulverized coal injection system^[5]

Shan-Wen Du^[1] solved the Navier–Stokes equation, the thermal-energy-balance equation with conjugated heat transfer, and the mass transfer equation at steady state to predicts the decrease in temperature of the eroded hearth of the blast furnace Chen ching –wen^[2] Modified single lance injection into double lance injection for pulverized coal injection (PCI) system they developed a three-dimensional mathematical model on computational fluid dynamics software PHOENICS to simulate the fluid flow phenomena inside blast furnace tuyere D.Maldonad^[3] validated three-dimensional numerical model of the blowpipe/tuyere/raceway for various plant-specific investigations of blast parameters such as oxygen enrichment, blast temperature and atomic oxygen-to-carbon ratio. The methodology combines 3-D CFD model, which is used to predict the hot face temperature for a given inner profile, 1-D heat transfer model, which is used to predict fine tune the inner profile. The conclusion was made that many of the research is already done in hearth portion. From this, the conclusion is made to study some other part of the blast furnace except hearth, then after getting deep into the blast furnace, a point was made that only a few researchers did study in the tuyere portion.

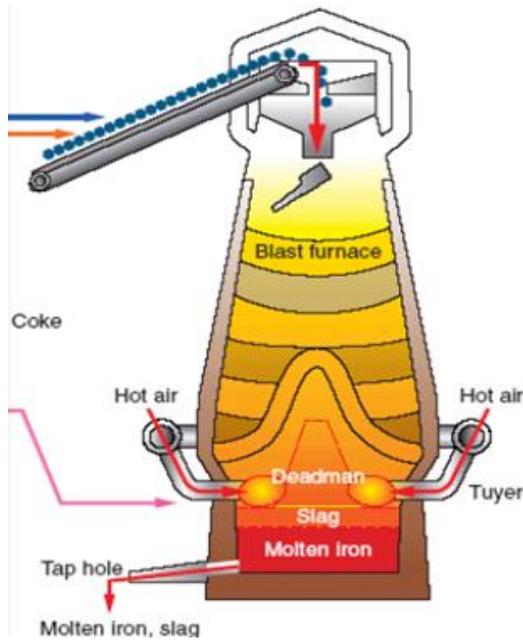


Fig. 2 schematic diagram of blast furnace [8]

II. SIMULATION PROCEDURE

The model geometry is based on a commercial blast furnace. The main dimensions of the model geometry are shown in Table (1). The lance, blowpipe and tuyere are in actual dimensions, the raceway is designed in the shape of a ‘balloon’, rather than a divergent ‘tube’, as used elsewhere [3]

Tuyere Length	3.59 cm
Inner dia. of tuyere or outlet of the blowpipe	12.46cm
Outer diameter of tuyere	10.5cm
Lance inlet angle	7deg.
Inner dia. Of lance	.95cm
Outer dia. of lance	1.89cm
Lance length	15.3cm

Table 1 Design parameter

Boundary condition is taken for analysis of blast furnace Tuyere is shown in below [6]:

- Inlet velocity — lance inlet
- Pressure inlet --- tuyere inlet
- Mass flow rate --- tuyere
- Pressure outlet --- tuyere out

Using slandered IGES format to developed the model and analysis [4]:

- Grid check
- Choosing models :- k-epsilon model, steady flow, considering energy equation as well as radiation,
- Species selection: - transport and reaction: - By this proximate analysis is done in partial combustion species.

NOMENCLATURE [11]

A_p	particle projected area, m ²
C_1, C_2	turbulent model constants
C_D	drag coefficient
C_p	particle heat capacity, J kg ⁻¹ K ⁻¹
D	external diffusion coefficient of oxygen in Gibb model, m ² s ⁻¹
f_D	drag force from a particle, N
H	enthalpy, J kg ⁻¹
$[i]$	molar fraction of reactant species i
k	turbulent kinetic energy, m ² s ⁻²
\dot{m}	mass transfer rate from a particle, kg s ⁻¹
n_p	particle number per unit volume, m ⁻³
q	Heat transfer from a particle, W
Re	Reynolds number
T	temperature, K
T_c	activation energy in Gibb/Field model, K
T_s	constant in Gibb model, 6240 K
U	mean (true) velocity of gas, m s ⁻¹
u, v, w	gas velocity components, m s ⁻¹
ν_i	stoichiometric coefficient of species i.
W_i	reaction rate of species i (per unit volume), kg m ⁻³ s ⁻¹
Y_i	mass fraction of species i

Greek letters

α	Volume/internal surface area ratio in Gibb model
α_1, α_2	volatile yield
ϵ	Turbulent dissipation rate, m ² s ⁻³
ϵ_p	Particle emissivity
k	thermal conductivity, Wm ⁻¹ K ⁻¹
σ_k, σ	turbulence model constant
σ_B	Stefan–Boltzmann constant, 5.67x 10 ⁻⁸ Wm ⁻² K ⁻⁴
ϕ	mechanism factor in Gibb model
ρ	density, kg m ⁻³
γ	volume porosity ($\gamma = 1$ for cavity)
μ	dynamic viscosity, Pa s
μ_t	turbulent viscosity, Pa s
Γ_i	molecular diffusivity of species i, kgm ⁻¹ s ⁻¹

Subscripts

g	gas
p	particle

Mathematical model**Governing equations for the gas and particle phases^[11]**

Phase Mass	$\nabla \cdot (\rho U) = \sum_{n_p} m$
Momentum	$\nabla \cdot (\rho U U) - \nabla \cdot (\mu + \mu_t) ((\nabla U) + (\nabla U)^T) = -\nabla (P + \frac{2}{3} \rho K) + \sum_{n_p} f_D$
Energy	$\nabla \cdot (\rho U H - (\frac{\gamma}{C_p} + \frac{\mu_t}{\sigma_H}) \nabla H) = \sum_{n_p} q$
Gas species I	$\nabla \cdot (\sigma U Y_i - (\tau_i + \frac{\mu_t}{\sigma_{Y_i}} - (\Gamma_i + \frac{\mu_p}{\sigma_{Y_i}}) \nabla Y_i)) = W_i$
Turbulent kinetic	$\nabla \cdot (\rho U k - (\mu + \frac{\mu_t}{\sigma_k}) \nabla k) = (P_k - \sigma \varepsilon)$
Turbulent dissipation Rate	$\nabla \cdot (\rho U \varepsilon - (\mu + \frac{\mu_t}{\sigma_\varepsilon}) \nabla \varepsilon) = \frac{\varepsilon}{K} (C_1 P_k - C_2 \sigma \varepsilon)$
For a particle in the Particle phase Mass	$\frac{dm_p}{dt} = -m$
Momentum	$m_p \frac{dm_p}{dt} = -f_D$ $-f_D = \frac{1}{8} \pi d_p^2 \rho C_D U - U_p (U - U_p)$
Energy	$m_p C_p \frac{dt_p}{dt} = -q$ $-q = \pi d_p \lambda N U (T_g - T_p) + \sum \frac{dm_p}{dt} H_{react} + A_p \varepsilon_p (\pi l - \sigma_{BT}^4)$

Where

$$\mu_t = C_\mu \sigma \frac{k^2}{\varepsilon}; P_K = (\mu + \mu_t) \nabla U \cdot (\nabla U)^T; C_D = \max\left(\frac{24(1+0.15 Re^{0.687}}{Re}, 0.44)\right); i = O_2, CO_2; CO; VM, H_2, H_2O$$

In the present model, one single computational domain covers the lance, blowpipe, tuyere, raceway and coke bed, so that the effects of operational conditions and coke bed properties on coal combustion could be directly evaluated in real time. The blowpipe- tuyere-raceway region is treated as a cavity. The coke bed is treated as a porous media. The model includes the following physical and chemical processes:^[15]

1. Turbulent gas-particle flow.

- Coal combustion (devolatilization, volatile combustion, and char reactions).
- Coke combustion and gasification.

Assumptions are made in this model for simplicity:

- coal and coke particles are spherical;
- there is no break-up or coalescence of particles;
- Liquid flow in the raceway-coke bed region is not considered.

CFD APPROACH TO SLOVE PROBLEM

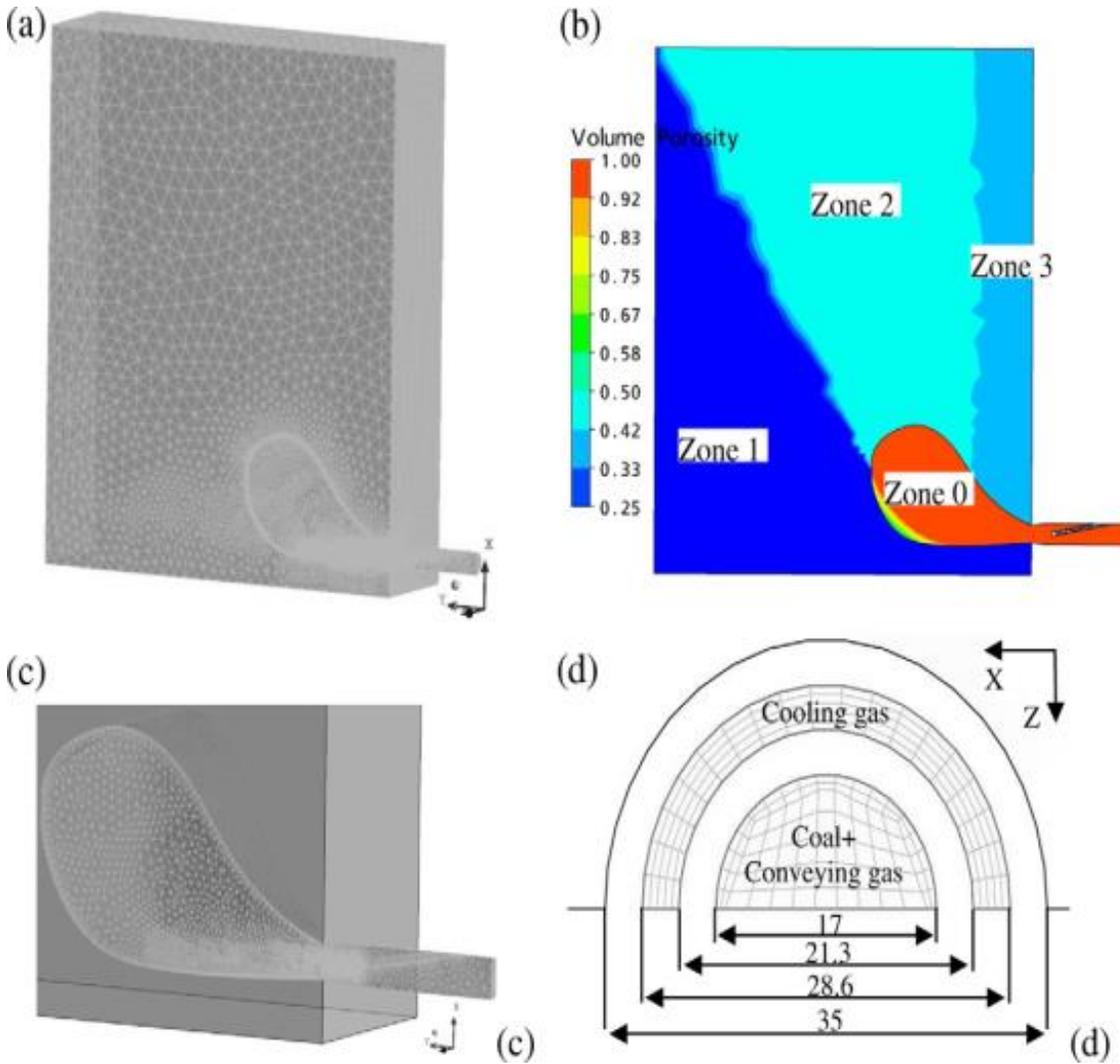


Fig. – 3 Geometry of the model: (a), the whole Model; (b), porosity distribution; (c), blowpipe and raceway; and (d), lance tip. The detailed dimensions are ^[11].

III. RESULT

After the simulation process some graphs show the results between temperature, velocity and mass

friction 3d view of mean mass fraction and mean density

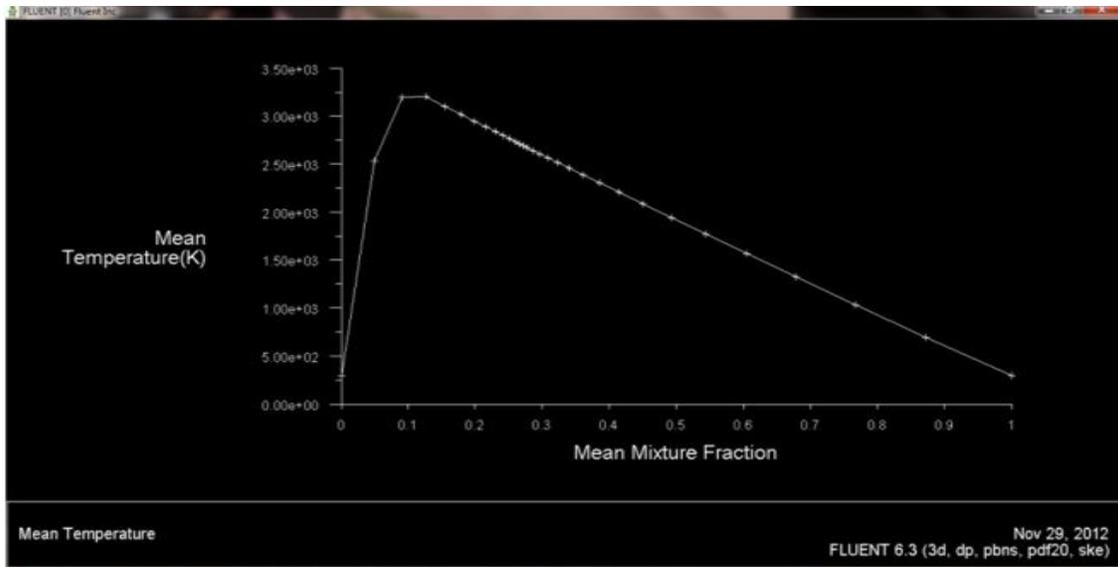


Fig.4 relation between Mean temperature and Mean Mixture Fraction

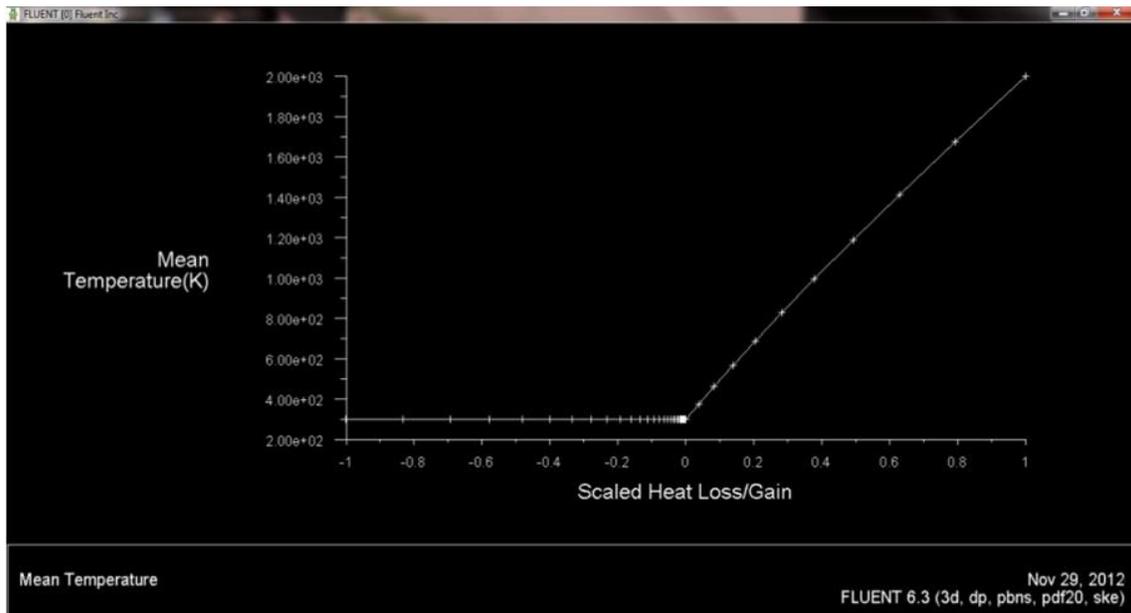


Fig. 5 relations between heat loss/gain and Mean Temperature

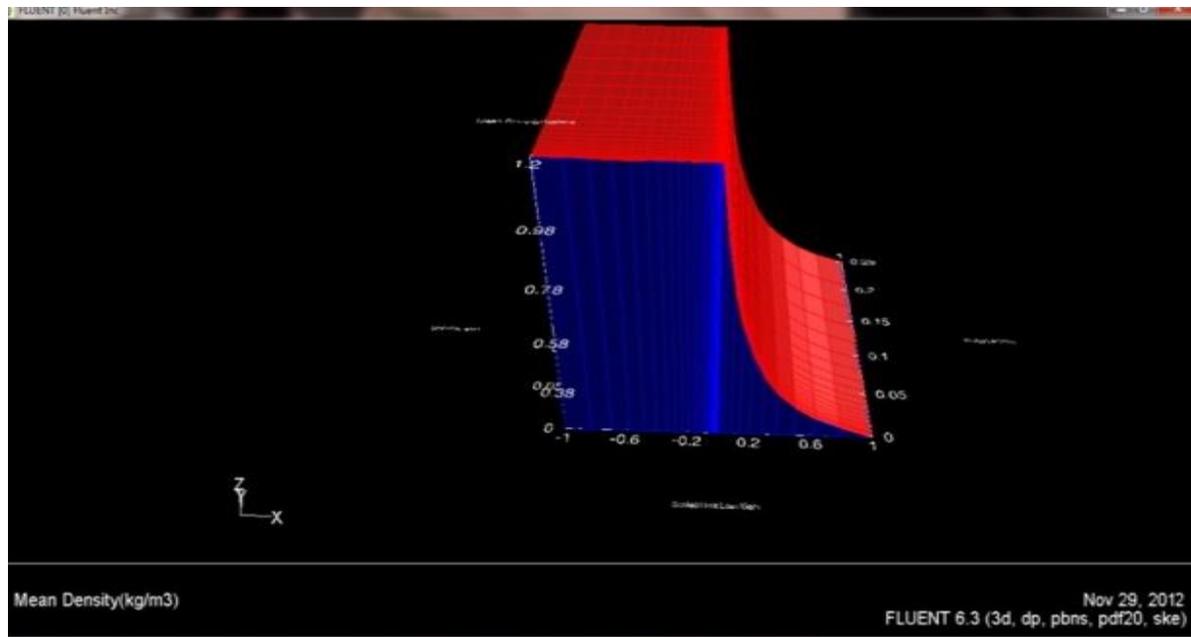


Fig. 6, 3D view of mean mass fraction and mean density

After the simulation the results are in graphical form which show the results in different areas of the furnace under different boundary conditions. The simulation procedure is based on an algorithm which is predefined in this CFD software.

IV. CONCLUSION

Because the melting point of iron is 1539°C, for this we need higher temperature at the end. This is possible only when the higher temperature air blast is passed over the iron ore.

The PCI is coming from the lance system and while it comes out of the lance a high temperature air blast is passed through it so, the PCI coming from the lance gets combusted and generating a high temperature at the end of the tuyere. Here, a less angle of 7° is used because the higher the angle, higher will be the erosion of the wall because if the length of the lance is more and more angle is there, so, a high velocity will be injected on the wall. So, that the erosion of the wall takes place, that is the reason for short length and low angle of the lance.

A three-dimensional integrated model of coal/coke combustion is developed and then applied to the lance-blowpipe-tuyere-raceway coke bed region in a BF. Compared with other results which are based on mathematical modeling, these results are better as they are based on a software approach. The present model is thus useful in predicting the optimum particle size distribution and injection velocity for any given operating and physical conditions of the PCI.

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Evaluation of Optimal Parameters for machining with Wire cut EDM Using Grey-Taguchi Method

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Abstract- The main objective of this work is to demonstrate the optimization of Wire Electrical Discharge Machining process parameters for the machining of H13 HOT DIE STEEL, with multiple responses Material Removal Rate (MRR), surface roughness (Ra) based on the Grey-Taguchi Method. Taguchi's $L_{27}(2^1 \times 3^8)$ Orthogonal Array was used to conduct experiments, which correspond to randomly chosen different combinations of process parameter setting, with eight process parameters: TON, TOFF, IP, SV WF, WT, SF, WP each to be varied in three different levels. Data related to the each response viz. material removal rate (MRR), surface roughness (Ra) have been measured for each experimental run; With Grey Relational Analysis Optimal levels of process parameters were identified. The relatively significant parameters were determined by Analysis of Variance. The variation of output responses with process parameters were mathematically modeled by using non-linear regression analysis. The models were checked for their adequacy. Result of confirmation experiments showed that the established mathematical models can predict the output responses with reasonable accuracy.

Index Terms- Grey-Taguchi method, MRR, H13, WEDM

I. INTRODUCTION

One of the important non-traditional machining processes is Wire Electro Discharge machining (WEDM), used for machining difficult to machine materials like composites and inter-metallic materials. WEDM involves complex physical and chemical process including heating and cooling. Increased use of newer and harder materials like titanium, hardened steel, high strength temperature resistant alloys, fiber-reinforced composites and ceramics in aerospace, nuclear, missile, turbine, automobile, tool and die making industries, a different class of modern machining techniques such as Wire Electrical Discharge Machining (WEDM) have emerged. These techniques satisfy the present demands of the manufacturing industries such as better finish, low tolerance, higher production rate, miniaturization etc.

In WEDM operations, material removal rate determine the economics of machining and rate of production, surface roughness is the measure of quality. Proper selection of process parameters is essential to obtain good surface finish and higher MRR. In setting the machining parameters, particularly in rough cutting operation, the goal is - the maximization of MRR, minimization of SF. The machine tool builder provides machining parameter table to be used for setting optimal machining parameters, but in practice, it is very difficult to utilize the optimal functions of a machine owing to there being too many adjustable machining parameters. This process relies heavily on the experience of the operators.

With a view to alleviate this difficulty, various investigations have been carried out by several researchers for improving selection of optimal parametric values for the MRR, Surface Finish [1-5]. However, the problem of selection of machining parameters is not fully depending on machine controls rather material dependent. To improve manufacturing processes with single performance characteristic, the optimal selection of process parameters Taguchi method has been extensively adopted. Traditional Taguchi method cannot solve multi-objective optimization problems. To overcome this, the Taguchi method coupled with Grey relational analysis has a wide area of application in manufacturing processes [6- 11]. To deal with a poor, incomplete, and uncertain system there is a need for a crucial mathematical criteria, Deng (1982) [12] proposed grey relational analysis to fulfill that need. With the grey relational analysis, a grey relational grade is obtained to evaluate the multiple performance characteristics. As a result, optimization of the complicated multiple performance characteristics can be converted into the optimization of a single grey relational grade. The grey-Taguchi method was established for combining both grey relational analysis and the Taguchi method. This approach can solve multi-response optimization problem simultaneously.

In the present work, a simple but reliable method based on statistically designed experiments is suggested the multi-response optimization of WEDM process for machining of H13 Hot die tool steel using combination of Grey Relational analysis and Taguchi design method to achieve higher Material Removal Rate (MRR), lower surface roughness (Ra). With few experimental runs data is collected with randomly chosen factor combinations. Then a quadratic model has been fitted to identify the process and to establish

approximate interrelation among various process parameters as well as response variables. Finally, the analysis of variance (ANOVA) and necessary confirmation tests were conducted to validate the experimental results.

II. EXPERIMENTATION AND DATA COLLECTION

2.1. Work Material and tool/cutting tool material

Hot die steel H13 has been considered in the present set of research work. In the recent past H13 gained dominance, where high strength and/or hardness is required at elevated temperatures. The work piece material chemical composition of the is shown in Table 1 Brass wire of 0.25 mm diameter was used as tool electrode in the experimental set up. This is a diffused wire of brass of type ELECTRA_Duracut.0.25 mm diameter stratified wire (Zinc coated copper wire) with vertical configuration has been used and discarded once used. High MRR in WEDM without wire breakage can be attained by the use of zinc coated copper wire because evaporation of zinc causes cooling at the interface of work piece and wire and acoating of zinc oxide on the surface of wire helps to prevent short-circuits (Sho et al., 1989).

The table 1: the chemical composition of H13 Hot Die tool steel.

Material	C	Cr	Mn	MO	Si	V	S	P	Fe
H13	0.395	5.25	0.35	1.475	1.00	1.00	0.0025	0.0125	Balance %wt

2.2. Schematic of machining

All the experiments were conducted on SPRINTCUT (AU) WITH PULSE GENERATOR ELPULS 40A DLX CNC Wire-cut EDM machine. In this machine, all the axes are servo controlled and can be programmed to follow a CNC code which is fed through the control panel. All three axes have an accuracy of 1µm. Through an NC code, machining can be programmed. The size of the work piece considered for experimentation on the wire-cut EDM is 25 mm x 5 mm x 5 mm. A small gap of 0.025 mm to 0.05 mm is maintained in between the wire and work-piece. The high energy density erodes material from both the wire and work piece by local melting and vaporizing. The di-electric fluid (de-ionized water) is continuously flashed through the gap along the wire, to the sparking area to remove the debris produced during the erosion. A collection tank is located at the bottom to collect the used wire erosions and then is discarded. The wires once used cannot be reused again, due to the variation in dimensional accuracy.

2.3. Process parameters and design

Input process parameters such as PulseOntime (TON), PulseOfftime (TOFF), PeakCurrent (IP), SparkgapVoltageSetting (SV), Wiretensionsetting (WT), WireFeedratesetting (WF), ServoFeedSetting (SF), Flushingpressureofdielectric fluid (WP) used in this study are shown in Table 2. Each factor is investigated at three levels to determine the optimum settings for the WEDM process. These parameters and their levels were chosen based on the review of literature and as per the few preliminary pilot experiments that were carried out by varying the process parameters to find their significance and relevance to the response parameters.

Table: 2 wire EDM input parameters and their levels

Sl.No.	PARAMETERS	SYMBOL	LEVEL1	LEVEL2	LEVEL3	UNITS
1	PulseOntime	TON	115	131	--	µsec
2	PulseOfftime	TOFF	53	58	63	µsec
3	PeakCurrent	IP	130	180	230	Amper
4	SparkgapVoltageSetting	SV	20	30	40	Volts
5	Wiretensionsetting	WT	2	3	4	Kg-f
6	WireFeedratesetting	WF	4	5	6	m/min
7	ServoFeedSetting	SF	500	1300	2100	mm/mi
8	Flushingpressureofdielectricfluid	WP	2	3	4	Kg/cm ²

In this study most important output performances in WEDM such as Material Removal Rate (MRR), Surface Roughness (Ra) were considered for optimizing machining parameters. The surface finish value (in μm) was obtained by measuring the mean absolute deviation, Ra (surface roughness) from the average surface level using a Computer controlled surface roughness tester. The Material Removal Rate (MRR) is calculated [13] as, $MRR = k t v_c$ Where, k is the Kerf width (mm), t is the thickness of work piece (mm), v_c is the Cutting speed (mm/min).

III. PARAMETRIC OPTIMIZATION

3.1 Data generation as per Taguchi L27 (3^8) OA design

The WEDM process consists of three operations, a roughing operation, a finishing operation, and a surface finishing operation. The performance of various types of cutting operations is judged by different measures. In rough cutting operation both metal removal rate and surface finish are of primary importance. In finish cutting operation, the surface finish is of primary importance. Dimensional accuracy is highly dependent on cutting width. This means that the rough cutting operation is more challenging because three goals must be satisfied simultaneously. Hence, the rough cutting phase is investigated in the present approach considering three performance goals like MRR, SF.

As per the design catalogue (Peace, 1993) prepared by Taguchi, L27($2^1 \times 3^7$) Orthogonal Array design of experiment has been found suitable in the present work. Experiments have been carried out using Taguchi's L27($2^1 \times 3^7$) Orthogonal Array (OA) experimental design which consists of 27 combinations of eight process parameters. It considers eight process parameters (without interaction) to be varied in three discrete levels. Based on Taguchi's L27($2^1 \times 3^7$) Orthogonal Array design, the predicted data provided by the mathematical models can be transformed into a signal-to-noise (S/N) ratio.

The characteristic that higher value represents better machining performance, such as MRR, 'higher-the-better', HB; and inversely, the characteristic that lower value represents better machining performance, such as surface roughness is called 'lower-the-better', LB. Therefore, HB for the MRR, LB for the SF have been selected for obtaining optimum machining performance characteristics. The loss function (L) for objective of HB and LB is defined as follows:

$$L_{HB} = \frac{1}{n} \sum_{i=1}^n \frac{1}{y_{MRR}^2}$$

$$L_{LB} = \frac{1}{n} \sum_{i=1}^n y_{SF}^2$$

Here y_{MRR}, y_{SF} represent response for metal removal rate, surface finish and cutting width respectively and n denotes the number of experiments. The S/N ratio can be calculated as a logarithmic transformation of the loss function as shown below. The optimal setting would be the one which could achieve highest S/N ratio. The S/n ratios for the experimental results shown in Table3. S/N ratio for MRR = $-10 \log_{10}(L_{HB})$; S/N ratio for SF = $-10 \log_{10}(L_{LB})$.

Table3 S/ N RATIO VALUES

CONTROL FACTORS									S/N RATIOS	
SINo	TON	TOFF	IP	SV	WF	WT	SF	WP	MRR S/N	Ra S/N
1	1	1	1	1	1	1	1	1	35.89394	-1.43764
2	1	2	2	2	2	2	2	2	42.03823	-4.13652
3	1	3	3	3	3	3	3	3	45.99407	-6.06392
4	1	1	1	1	1	2	2	2	40.14760	-3.31527
5	1	2	2	2	2	3	3	3	44.73276	-5.62067
6	1	3	3	3	3	1	1	1	41.41705	-3.16725
7	1	1	1	2	3	1	2	3	41.05234	-3.10672
8	1	2	2	3	1	2	3	1	44.52931	-5.77839
9	1	3	3	1	2	3	1	2	39.91621	-3.22736
10	1	1	1	3	2	1	3	2	44.10623	-4.84088
11	1	2	2	1	3	2	1	3	38.58736	-2.15086

12	1	3	3	2	1	3	2	1	43.56661	-5.13445
13	1	1	2	3	1	3	2	1	41.51712	-4.20333
14	1	2	3	1	2	1	3	2	45.16939	-5.88050
15	1	3	1	2	3	2	1	3	39.07445	-1.79810
16	1	1	2	3	2	1	1	3	38.33068	-2.00741
17	1	2	3	1	3	2	2	1	42.74788	-4.55773
18	1	3	1	2	1	3	3	2	44.55022	-5.50552
19	2	1	2	1	3	3	3	1	49.09923	-5.97706
20	2	2	3	2	1	1	1	2	46.41234	-4.32941
21	2	3	1	3	2	2	2	3	48.02734	-4.99354
22	2	1	2	2	3	3	1	2	45.46097	-3.41696
23	2	2	3	3	1	1	2	3	48.46029	-5.79178
24	2	3	1	1	2	2	3	1	49.28949	-6.06392
25	2	1	3	2	1	2	3	3	49.49535	-6.56759
26	2	2	1	3	2	3	1	1	45.43859	-3.17230
27	2	3	2	1	3	1	2	2	48.19310	-5.22526
28	2	1	3	2	2	2	1	1	46.01640	-4.08615
29	2	2	1	3	3	3	2	2	47.64865	-4.78614
30	2	3	2	1	1	1	3	3	49.67074	-6.48565
31	2	1	3	3	3	2	3	2	49.62710	-6.49799
32	2	2	1	1	1	3	1	3	45.19889	-3.29972
33	2	3	2	2	2	1	2	1	48.29575	-5.44148
34	2	1	3	1	2	3	2	3	47.92865	-5.43219
35	2	2	1	2	3	1	3	1	48.87371	-5.96396
36	2	3	2	3	1	2	1	2	46.39099	-4.06867

However, traditional Taguchi method can optimize a single objective function; it cannot solve multi-objective optimization problem (Datta et al., 2006; Moshat et al., 2010). MRR, SF can be optimized individually by using this Taguchi technique. But it may so happen that, the optimal setting for a response variable cannot ensure other response variables within acceptable limits. But the aim is to go for such an optimal parameter setting so that all the objectives should fulfill simultaneously (maximum MRR, minimum SF) in one go. This can be achieved using grey based Taguchi method as discussed below. This method can convert several objective functions into an equivalent single objective function (representative of all desired response characteristics of the product/process), which would be maximized next.

3.2 Grey Relation Analysis (GRA)

Dr. Deng proposed the Grey theory. The theory is very much applicable to a system in which the model is unsure or the information is incomplete. It provides an efficient solution to the uncertainty, multi-input and discrete data problem. The process involves Grey relational analysis, Grey modeling, prediction and decision making of the system for which model is unsure [8]. In grey relational analysis, the first step is to normalize experimental data ranging from zero to one. The process is known as grey relational generation. Based on normalized experimental data, calculation of grey relational coefficient, to represent the correlation between the desired and actual experimental data, is the second step. Then, final step is determination of overall grey relational grade which is done by averaging the grey relational coefficient corresponding to selected responses. The overall performance characteristic of the multiple response process depends on the calculated grey relational grade. By this approach a multiple response process optimization problem is converted into a single response optimization problem with overall grey relation grade being the objective function. Then by evaluating the optimal parametric combination, it would result into highest grey relational grade. To maximize overall grey relational grade the optimal factor setting for can be performed by Taguchi method.

In grey relational generation, the normalized data i.e. Ra surface finish corresponding to lower-the-better (LB) criterion can be expressed as [13]:

$$x_i(k) = \frac{\max y_i(k) - y_i(k)}{\max y_i(k) - \min y_i(k)}$$

For MRR should follow higher-the-better criterion (HB), which can be expressed as:

$$x_i(k) = \frac{y_i(k) - \min y_i(k)}{\max y_i(k) - \min y_i(k)}$$

where $x_i(k)$ is the value after grey relational generation, $\min y_i(k)$ is the smallest value of $y_i(k)$ for the k th response, and $\max y_i(k)$ is the largest value of $y_i(k)$ for the k th response. The normal ideal sequence for the responses is $x_0(k)$ (where $k=1,2,3,\dots,27$). The grey relational coefficient $\xi_i(k)$ can be expressed as follows:

$$\xi_i(k) = \frac{\Delta_{\min} + \psi\Delta_{\max}}{\Delta_{0i}(k) + \psi\Delta_{\max}}$$

Where Δ_{0i} = difference of absolute value $x_0(k)$ and $x_i(k)$; ψ is the distinguishing coefficient $0 \leq \psi \leq 1$; usually taken as 0.5 Δ_{\min} = the smallest value of Δ_{0i} ; Δ_{\max} = the largest value of Δ_{0i} . In GRA the grey relational grade is to reveal the degree of relation between the 27 sequences $x_0(k)$ $x_i(k)$, ($k=1,2,3,\dots,27$). After averaging the grey relational coefficients, the grey relational grade γ_i can be computed as:

$$\gamma_i = \frac{1}{n} \sum_{k=1}^n \xi_i(k),$$

Where γ_i is the grey relational grade and n is the number of performance characteristics. The best process sequence is taken as reference sequence $x_0(k)$. The intense relational degree between the reference sequence $x_0(k)$ and the given sequence $x_i(k)$ corresponds to the higher value of grey relational grade. Hence, higher grey relational grade means that the corresponding parameter combination is closer to the optimal.

3.3 Grey-Taguchi technique for multi-objective optimization

Generated data (Table4) have been normalized first (grey relational generation). The normalized data for each of the parameters of process output viz. MRR, Ra have been furnished in Table 5.

Table 5. Normalized S/N data (Grey relational generation)

SINo	MRR	Ra	SINo	MRR	Ra
1	0	0	19	0.95852	0.88489
2	0.44599	0.5261	20	0.76349	0.5637
3	0.73313	0.90182	21	0.88071	0.69316
4	0.30875	0.36601	22	0.69443	0.38584
5	0.64157	0.81541	23	0.91214	0.84877
6	0.4009	0.33716	24	0.97233	0.90182
7	0.37443	0.32536	25	0.98727	1
8	0.62681	0.84616	26	0.69281	0.33814
9	0.29196	0.34888	27	0.89274	0.73833
10	0.5961	0.66341	28	0.73475	0.51628
11	0.1955	0.13903	29	0.85323	0.65274
12	0.55693	0.72063	30	1	0.98403
13	0.40816	0.53913	31	0.99683	0.98643
14	0.67327	0.86606	32	0.67541	0.36298

15	0.23086	0.07027	33	0.9002	0.78048
16	0.17687	0.11107	34	0.87355	0.77867
17	0.4975	0.60821	35	0.94215	0.88233
18	0.62832	0.79297	36	0.76194	0.51288

Table 6. Evaluation of Δ_{0i} for each of the responses

SINo	MRR	Ra	SINo	MRR	Ra
Ideal sequence	1	1	Ideal sequence	1	1
1	1	1	19	0.04148	0.11511
2	0.55401	0.4739	20	0.23651	0.4363
3	0.26687	0.09818	21	0.11929	0.30684
4	0.69125	0.63399	22	0.30557	0.61416
5	0.35843	0.18459	23	0.08786	0.15123
6	0.5991	0.66284	24	0.02767	0.09818
7	0.62557	0.67464	25	0.01273	0
8	0.37319	0.15384	26	0.30719	0.66186
9	0.70804	0.65112	27	0.10726	0.26167
10	0.4039	0.33659	28	0.26525	0.48372
11	0.8045	0.86097	29	0.14677	0.34726
12	0.44307	0.27937	30	0	0.01597
13	0.59184	0.46087	31	0.00317	0.01357
14	0.32673	0.13394	32	0.32459	0.63702
15	0.76914	0.92973	33	0.0998	0.21952
16	0.82313	0.88893	34	0.12645	0.22133
17	0.5025	0.39179	35	0.05785	0.11767
18	0.37168	0.20703	36	0.23806	0.48712

Grey relational coefficients for each performance characteristics have been calculated and furnished in Table 7. This calculation requires the estimation of quality loss Δ_{0i} of each response from its best suited value which is obtained from Table 6. These grey relational coefficients for each response have been accumulated to evaluate overall grey relational grade. Equal weight age has been given to all the responses ($\Psi = 0.5$). The mean response Table for the overall grey relational grade is shown in Table 8.

Table 7. Grey relational coefficient, Grey Grade for each response

Sl No	Grey Coeff MRR	Grey Coeff Ra	Grey Grade	Sl No	Grey Coeff MRR	Grey Coeff Ra	Grey Grade
1	0.3333	0.3333	0.3333	19	0.7964	0.7419	0.7692
2	0.4262	0.4952	0.4607	20	0.407	0.4313	0.4192
3	0.6066	0.8256	0.7161	21	0.5764	0.5189	0.5477
4	0.3732	0.423	0.3981	22	0.3469	0.3502	0.3486
5	0.5345	0.7158	0.6252	23	0.6488	0.6863	0.6676
6	0.4072	0.4122	0.4097	24	0.8543	0.7712	0.8128
7	0.3968	0.408	0.4024	25	0.9273	1	0.9637
8	0.5245	0.7514	0.6380	26	0.3457	0.3469	0.3463
9	0.3676	0.4166	0.3921	27	0.6021	0.5626	0.5824
10	0.5047	0.58	0.5424	28	0.3796	0.4106	0.3951
11	0.3384	0.3506	0.3445	29	0.5251	0.492	0.5086
12	0.4816	0.6246	0.5531	30	1	0.9658	0.9829
13	0.4102	0.5022	0.4562	31	0.984	0.9727	0.9784
14	0.5575	0.7763	0.6669	32	0.3912	0.451	0.4211

15	0.3486	0.3333	0.3410	33	0.6018	0.6436	0.6227
16	0.3333	0.3333	0.3333	34	0.5427	0.6416	0.5922
17	0.3333	0.4579	0.3956	35	0.7308	0.7919	0.7614
18	0.3333	0.6152	0.4743	36	0.5714	0.8205	0.6960

Within selected experimental domain the most significant factor becomes SF. Next to SF TON, IP, TOFF, WT, WF, SV, WP are the parameters in order to influence on responses.

IV. ANALYSIS OF VARIANCE (ANOVA)

The results obtained from the experiments were analyzed using Analysis of Variance to find the significance of each input factor on the measures of process performances, Material Removal Rate, surface roughness. Using the grey grade value, ANOVA is formulated for identifying the significant factors. The results of ANOVA are presented in Table 8.

Table 8: The mean response Table for the overall grey relational grade

Level	TON	TOFF	IP	SV	WF	WT	SF	WP
1	0.4713	0.5427	0.4908	0.5576	0.5836	0.5603	0.3983	0.5411
2	0.6342	0.5212	0.5716	0.5306	0.5281	0.5809	0.5156	0.5389
3		0.5942	0.5958	0.5700	0.5465	0.5169	0.7442	0.5781
Delta	0.1629	0.0730	0.1050	0.0394	0.0555	0.0640	0.3459	0.0392
Rank	2	4	3	7	6	5	1	8

The optimal parameter setting has been evaluated from the Figure 3. The optimal setting comes:

Parameter	TON	TOFF	IP	SV	WF	WT	SF	WP	
Optimal level	2	3	3	3	3	2	3	3	Grey Method
Initial level	2	3	2	1	1	1	3	3	Orthogonal
Math model									

V. CONFIRMATION EXPERIMENT

The confirmation test for the optimal parameter setting with its selected levels was conducted to evaluate the quality characteristics for WEDM of H13. Experiment 30 (Table7) shows the highest grey relational grade, indicating the optimal process parameter set of TON2, TOFF3, IP3, SV3, WF3, WT2, SF3, WP3 has the best multiple performance characteristics among the nine experiments [15], which can be compared with results of confirmation experiment for validation of results. Table 9 shows the comparison of the experimental results using the initial

(TON2, TOFF3, IP2, SV1, WF1, WT1, SF3, WP3) and optimal (TON2, TOFF3, IP3, SV3, WF3, WT2, SF3, WP3)WEDM parameters onH13. The response values obtained from the confirmation experiment are MRR = 304.46 mm³/min, Ra = 2.11µm . The Material Removal Rate shows an increased value of 13.2 mm³/min, the Surface Roughness shows a reduced value of 2.11µm to 2.01µm respectively. The corresponding improvement in Material Removal Rate, Surface Roughness 5.97%, 4.74% respectively.

Table 9. Results of the confirmation experiment for MRR and Ra

Initial Othor Result	Experimental	Prediction	Prediction
	Orthogonal Array	Grey theory Design	mathematical model
TON2, TOFF3, IP2, SV1, WF1, WT1, SF3, WP3		TON2, TOFF3, IP3, SV3, WF3, WT2, SF3, WP3	
MRR 304.46		MRR 322.66	MRR 313.76
Ra 2.11		Ra 2.01	Ra 2.07

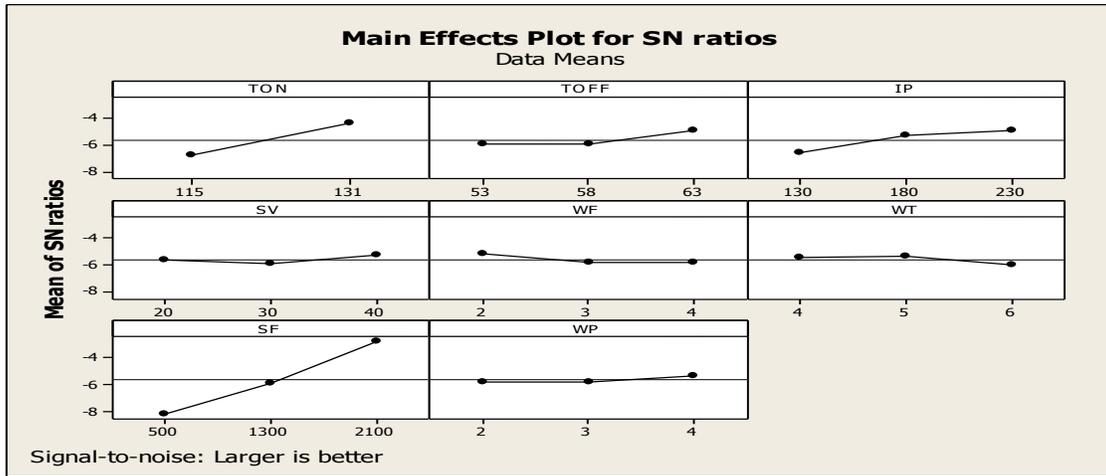


Figure 3. Evaluation of optimal parameter setting

VI. DEVELOPMENT OF MATHEMATICAL MODELS

The experimental results are used to obtain the mathematical relationship between process parameters and machining outputs. The coefficients of mathematical models are computed using method of multiple regressions. In this study, SPSS, Minitab15 (Software Package for Statistical Solutions), for regression analysis custom made software created by the author was used for the regression analysis. This software is used to test several models, viz., linear, exponential, power series (user-defined). Out of all models tested, the model that has high coefficient of multiple determination (r^2) value is chosen. The adequacy of the models and the significance of coefficients are tested by applying analysis of variance. The relationship between response variable(s) and process parameters can be expressed as:

$$Y = c \times \text{TON}^a \times \text{TOFF}^b \times \text{IP}^c \times \text{SV}^d \times \text{WF}^e \times \text{WT}^f \times \text{SF}^g \times \text{WP}^h$$

where Y is the output response(s) c, a, b, c, d, e, f, g, h - regression variables. TON, TOFF... – Process parameters the material removal rate MRR is expressed as:

$$\text{MRR} = 1.18\text{E-}12 \times \text{TON}^{5.159} \times \text{TOFF}^{0.8001} \times \text{IP}^{0.2703} \times \text{SV}^{0.1226} \times \text{WF}^{1.69\text{E-}02} \times \text{WT}^{0.1212} \times \text{SF}^{0.3638} \times \text{WP}^{-1.54\text{E-}02} \quad (r^2 = 0.998)$$

$$\text{The surface roughness Ra is expressed as: Ra} = 4.25\text{E-}04 \times \text{ON}^{0.9163} \times \text{TOFF}^{0.2935} \times \text{IP}^{0.1964} \times \text{SV}^{3.04\text{E-}02} \times \text{WF}^{-4.64\text{E-}02} \times \text{WT}^{5.61\text{E-}02} \times \text{SF}^{0.2234} \times \text{WP}^{-0.03624} \quad (r^2 = 0.996)$$

The high correlation coefficients (r^2) indicate the suitability of the function (model) and the correctness of the calculated constants. Equations were used successfully to estimate the machining outputs without experimentation.

VII. CONCLUSION

In this study an attempt has been made to establish mathematical models to highlight parametric influence on two selected process responses: material removal rate, surface roughness. Application of grey based Taguchi technique has been utilized to evaluate optimal parameter combination to achieve maximum MRR, minimum roughness value; with selected experimental domain. This method is very reliable for solving multi-objective optimization problem; for continuous quality development of the process/product. In the research study it has been assumed that all

response features are uncorrelated i.e. they are independent to each other. The response correlation if it exists may be considered in future research. From the study it is evident that this method greatly simplifies the optimization of complicated multiple performance characteristics and since it does not involve any complicated mathematical computations, this can be easily utilized by the Manufacturing world.

While applying the Grey-Taguchi method using L36 orthogonal array. it is observed that the Material Removal Rate increased, Surface Roughness reduced, which are positive indicators of efficiency in the machining process. Thus, it can be concluded that the Grey-Taguchi Method, is most ideal and suitable for the parametric optimization of the Wire-Cut EDM process, when using the multiple performance characteristics such as MRR (Material Removal Rate), Surface Roughness for machining the H13 or for the matter for any other material. A Mathematical relations between the machining parameters and performance characteristics established by the regression analysis method. The established mathematical models can be used in estimating the material removal rate, surface roughness without conducting experiments.

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PIERRIE ROBIN SYNDROME - CASE REVIEW

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Abstract- A case study was carried out of 3 consecutive patients with the Pierre Robin Sequence diagnosed with significant upper airway obstruction at birth with retrognathia, micrognathia, U shaped palate and glossoptosis; followed till three months of their age, treated successfully by conservative prone position management only.

Index Terms- Pierre Robin sequence, upper airway obstruction, prone position treatment.

I. INTRODUCTION

Pierre Robin syndrome is a congenital abnormality characterized by the presence of a combination of mandibular hypoplasia (micrognathia or small jaw), glossoptosis (leading to airway obstruction) and, often, labio palatine clefting. Over the years there have been several names given to the condition, including Pierre Robin Syndrome, Pierre Robin Triad, and Robin Anomalad. Based on varying features and causes of the condition, either “Robin Sequence” or “Robin Complex” may be an appropriate description for a specific patient. Pierre Robin was a French physician who first reported the of small lower jaw, cleft palate, and tongue displacement in 1923.

II. CASE HISTORY

2 female and 1 male infant were born at term presented with respiratory distress at birth referred to our department from neonatal intensive care unit. On examination patients were having smaller jaw which was slightly posteriorly placed (figure 3).patients were unable to protrude their tongues, with tongue falling back and U-shaped palate (figure 2) .On supine position patients were having noisy breathing with supraclavicular, suprasternal and intercoastal retractions showing laboured breathing with use of all accessory muscles of respiration with mild cyanosis, which was apparent immediately after birth. Oxymetry shows oxygen desaturation into the mid 80s and capillary pco₂ was increased. out of 3 babies two female babies were first child of their parents and one male baby was second but his sibling was not having the history of the same problem.

All three patients were treated successfully by conservative, prone or lateral position treatment with oxygen supplementation by mask. However, one of the three patients required nasopharyngeal tube placement for initial one week (figure 1) later on patient responded well to only prone or lateral position with oxygen supplementation by mask. In all 3 patients feeding was done by nasogastric tubes for initial one month, later on breast feeding was started. The mothers were advised to pump breast milk to aid their infants in breast feeding. Bottle feeding was accomplished by using a long cross cut nipple and with slight pressure at the angle of the mandible with infant in the prone or side lying position .At the end of three months all three patients were normal, with normal weight for age with normal breast feeding with no choking spells and no distress on supine position.

Parents were explained the probable risk of having the same disease in their next babies.

III. DISCUSSION

Pierre Robin Sequence or Complex (pronounced “Roban”) is the name given to a birth condition that involves the lower jaw being either small in size (micrognathia) or set back from the upper jaw (retrognathia). As a result, the tongue tends to be displaced back towards the throat, where it can fall back and obstruct the airway (glossoptosis). Most infants, but not all, will also have a cleft palate deformity either involving soft palate i.e U-shaped or involving both soft and hard palate i.e V-shaped (figure 4), but none will have a cleft lip.

PRS is not generally diagnosed with ultrasound before birth because a profile view of the fetus is difficult to achieve.(19) An autosomal recessive disorder, the incidence of PRS is reported to be 1 in 80000 to 1 in 200000 live births.(20)

A greater incidence in girls is attributed to the fact that the palate takes approximately 1 week longer to fuse completely in girls. It is important to understand that Robin Sequence/Complex can occur by itself (described as “isolated”) or as a feature of another syndrome. Parents who have had one child with isolated Robin Sequence probably have between a 1-5% chance of having another child with this condition. There have not yet been enough large-scale studies to make more accurate predictions.When Robin Sequence/Complex is observed in patients with Stickler Syndrome, Velocardiofacial Syndrome, or Treacher Collins Syndrome, genetic/chromosomal factors will influence whether more affected children will be born. Robin Sequence/Complex also occurs in children with environmentally-induced (“teratogenic”) syndromes such as Fetal Alcohol Syndrome and Fetal Hydantoin Syndrome. It is extremely important that an infant born with Robin Sequence/Complex be evaluated by a geneticist, who will thoroughly investigate the possibility of an associated syndrome.

The pathogenesis of the syndrome is attributed to mechanical compression of the mandible, genetic growth disturbance, teratogen exposure, and growth arrest due to an in utero insult. The basic cause appears to be the failure of the lower jaw to develop normally before birth. At about 7-10 weeks into a pregnancy, the lower jaw grows rapidly, allowing the tongue to descend from between the two halves of the palate. If, for some reason, the lower jaw does not grow properly, the tongue can prevent the palate from closing, resulting in a cleft palate. It has been postulated that when the mandible is too small it fails to accommodate the descent of the tongue into the mouth; consequently, the tongue remains positioned between the sides of the developing palate, thus preventing complete fusion. . The small or displaced lower jaw also causes the tongue to be positioned at the back of the mouth, possibly causing breathing difficulty at birth. This “sequencing” of events is the reason why the condition has been classified as a deformation sequence. For some patients, these physical characteristics may result from another syndrome or chromosomal condition.

In our case, marked micrognathia is associated with reduction of the buccal space and glossoptosis. As usual in this malformation, the tongue size is normal but buccolingual disproportion is due to micrognathia, increasing the glossoptosis. High thin palate is evidenced by nuclear magnetic resonance. In Pierre Robin sequence, the neurodevelopmental outcome is normal(4).

In several cases in which mandibular hypoplasia is prominent, the tongue tends to encroach on the airway leading to breathing and feeding difficulties, bouts of cyanosis, and choking spells, as mentioned by Robin(16) to whom the first use of the term "glossoptosis" is attributed. Airway obstruction, and related hypoxia, carries a high mortality risk in Pierre Robin sequence. Children with craniofacial anomalies may present as obstructive sleep apnoea syndrome even in the first weeks of life(9,11,13,14,18).

A history of repetitive broncopneumonia in the first months of life suggests it is related to swallowing impairment. The level of obstruction in the pharynx, appeared as the narrowing of the posterior air space and evidenced in the cephalometrics. This technique provides useful information on bony and soft tissue abnormalities of the upper airways in obstructive sleep apnoea syndrome patients(1,8,10,15,17). Polysomnography determined the obstructive nature of the apneas, quantified its severity and the secondary systemic impairment. This information is fundamental in the evaluation of the Pierre Robin sequence apneas(3,5). Apneas in these patients are predominantly obstructive(3,5,6,11,12).

Patients with Pierre Robin sequence and related craniofacial anomalies who present with respiratory sleep symptoms and daytime sleepiness should be completely worked out including: radiologic, polysomnography and multiple sleep latency test(MSLT) evaluation in order to determine the sites and severity of obstruction, as well as systemic impairment(2,3,6,7). Such evaluation should guide treatment planning. Robin Sequence/Complex, like most birth defects, varies in severity from child to child. Some children may have more problems than others.

Problems in breathing and feeding in early infancy are the most common. Parents need to know how to position the infant in order to minimize problems (i.e., not placing the infant on his or her back). For severely affected children, positioning alone may not be sufficient, and the pediatrician may recommend specially-designed devices to protect the airway and facilitate feeding. The sequelae associated with the syndrome may range from respiratory difficulties (obstructive sleep apnea), nutritional difficulties (regurgitation, gastroesophageal reflux), speech and hearing problems (otitis media, difficulty in speech), crowding of the dentition, and facial asymmetry.

Feeding difficulties arise because the presence of cleft prevents creation of the negative intraoral pressure necessary to withdraw milk from the breast or the bottle. A small jaw and posterior placement of the tongue further impedes effective mechanical sucking movements and chronic airway obstruction further increases the work of breathing. To counter the feeding difficulties, the mothers may be advised to pump breast milk to aid their infants in breast feeding. Bottle feeding can be accomplished by using a long cross cut nipple and with slight pressure at the angle of the mandible with infant in the prone or side lying position. The compression of the nipple against the bone allows greater expression of milk. Frequent burping is also recommended. Some children who have severe breathing problems may require a surgical procedure to make satisfactory breathing possible. The pediatrician or ear, nose, and throat specialist will also carefully monitor the baby for ear disease. Virtually all children with cleft palate are prone to build-up of fluid behind the eardrum. The placement of ventilation tubes in the eardrums may be recommended to reduce fluid build-up. Since ear infections can cause temporary hearing loss that can affect speech and language development, the infant's hearing should also be monitored from early infancy by an audiologist.

The rate of catch-up growth of the jaw is dependent on the cause of the PRS. A majority of children with isolated PRS achieve normal or near-normal mandibular size within a few years of birth(21). In many patients, the lower jaw (mandible) grows rapidly during the first year of life. In some children, the jaw may grow so quickly that by the time the child is approximately four to six years of age, the profile looks normal. Children who do not experience this “catch-up” growth may require surgery on their jaws. It is not fully understood why children's jaws grow at varying rates. The cleft palate, if present, needs to be surgically closed. The timing of the surgery depends on the child's individual growth and development, but it is generally done at 1 to 2 years of age. Because children with cleft palate are at higher risk for delayed or defective speech development, they should be monitored by a speech pathologist throughout their childhood.

Several methods of treating babies with Pierre Robin sequence have been described since the condition itself was first documented in 1923. The main aim of treatment has been to relieve upper airway obstruction. Treatment methods used range from positioning of the baby to invasive surgery. Treatment concentrates on the relief of airway obstruction with a nasopharyngeal airway (NPA) and nutritional support of the babies until they grew out of their respiratory and feeding difficulty.(22) .

Immediately after delivery, because of the micrognathia and, therefore, relative glossoptosis, many children have airway distress. This can require emergency treatment. As the body will always prioritize breathing over eating, many infants have difficulty in achieving adequate caloric intake. A cleft palate further adds to the feeding difficulties. The primary concern in airway compromise is

its life-threatening aspect. Most neonates have an isolated defect that is not part of a syndrome, for which the airway and feeding complications are usually greater. The great majority of neonates can be treated in the prone position (face down as in our case). Devices or procedures such as oral airways, palatal prostheses, continuous positive airway pressure or endotracheal intubation, mechanical ventilation, and tracheostomy can be avoided.

These neonates also need to be fed in a prone position, but they can be fed by mouth. Again, very few infants need long-term gavage feeding tubes or other devices. The vast majority of nonsyndromic neonates, those who are breathing without assistance and orally feeding while in a prone position, can be discharged home after a few days in the hospital. The mandible is expected to eventually grow; hence, the severe airway obstruction and the feeding issues are expected to decrease. The infant continues to need feeding and speech assessments, and breathing capacity needs to be monitored. Eventually, the cleft palate needs closure, and a long-term orthodontic care is required;

Secondary to the micrognathia/retrognathia, airway obstruction may be mild or severe. Severe obstruction may require immediate intervention with a very difficult intubation. A mild obstruction can normally be handled in a very conservative manner with positional changes. By putting a baby in the prone position, gravity pulls the tongue forward and results in a larger airway passage.

In patients who consistently maintain CO₂ levels above 50, a surgical procedure is appropriate. Three surgical procedures are used to treat Robin sequence: tongue-lip adhesion/glossopexy, tracheostomy, and distraction osteogenesis of the mandible.^(2,3) Distraction osteogenesis is a relatively new technique for treating airway obstruction in Robin sequence. Mandibular distractional osteogenesis offers a definitive structural resolution of micrognathia.



Figure1. Patient with nasopharyngeal airway



"U" shaped cleft palate "Y" shaped cleft palate

Figure2. Showing retrognathia and micrognathia

IV. CONCLUSION

Primary management of airway insufficiency in patients with PRS can be managed in a prone position mostly however some may require nasopharyngeal airway placement, prolonged intubation, tongue-lip adhesion, mandibular distraction osteogenesis and tracheostomy. The present study confirmed that proper conservative management can be used to manage most of the patients with PRS. However, early mandibular distraction should be considered when indicated in patients with respiratory insufficiency to avoid tracheostomies or successfully decannulating tracheostomies. Multidisciplinary care that includes a neonatologist, a neonatal nurse

specialist, members of the otorhinolaryngologist team, and the parents is the best approach in the complex care of neonates affected with Robin sequence and Robin complexes.

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Design and Development of Solar Assisted Bicycle

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Abstract — As we all know the fuel prices especially the petrol is rising steadily day by day. Again the pollution due to vehicles in metro cities & urban areas is increasing continuously. To overcome these problems, an effort is being made to search some other alternative sources of energy for the vehicles. Again, it is also not affordable to purchase vehicles (mopeds, scooters or motorcycles) for all the class of society. Keeping this in mind, a search for some way to cater these economically poor people as well as to provide a solution for the environmental pollution was in progress. The solar assisted bicycle developed is driven by DC motor fitted in front or rear axle housing & operated by solar energy. The solar panels mounted on the carriage will charge the battery & which in turn drive the hub motor. When the bicycle is idle, the solar panel will charge the battery. This arrangement will replace the petrol engine, the gear box & the fuel tank in case of a two wheeler or a chain sprocket, chain & gear shifting arrangement of a conventional bicycle being used by most common man. [9] As a part of dissertation work, the solar assisted bicycle is fitted with a dc hub motor on front axle of a bicycle with power rating of 250W and with a travelling speed of around 25-30 kmph. It is provided with a pair of lead acid batteries of 35 Ah each, a photovoltaic solar panel with capacity of 20 watt, a voltage regulator of 24v 10 Amp, accelerator and motor controller of 24v 25Amp. There is also a provision for charging of the battery with 220-240V, AC wall outlet supply, in case of poor solar supply due to cloudy weather. [4]

The hub motor is a conventional Dc motor. The rotor (Fig.2) is outside the stator with the permanent magnets mounted on inside. The stator (Fig.3) is mounted and fixed onto the axle and the hub will be made to rotate by alternating currents supplied through batteries. Hub motor generates high torque at low speed, which is highly efficient and which doesn't need sprockets, brackets and drive chains. This means they are very reliable and have a long life. The main characteristic of Brushless DC Machines is that they may be controlled to give wide constant power speed ranges. [10][11][12]



Fig 2: Hub Motor Rotor



Fig 3: Hub Motor stator

Index Terms - Solar Assisted Bicycle (SAB), Hub Motor, SolarPanel, Motor Controller, Voltage Regulator.

I. METHODOLOGY

The solar assisted bicycle consist of following components (fig.1) – hub motor, solar panel, voltage regulator, lead acid battery, motor controller, accelerator, bicycle^[9].

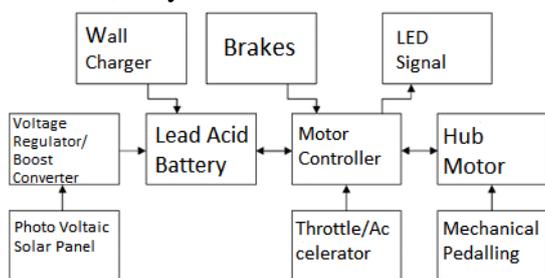


Fig 1-Block diagram of solar assisted bicycle

A. Hub Motor

Table 1: Specifications of Hub Motor

Type of Motor	Hub motor
Design of Motor	BLDC (Brushless DC)
Power Rating	250W
Torque	12 N-m
Speed (rpm)	300
Rated Voltage (V)	24
Efficiency (%)	≥80
Noise(dB)	<65
Weight(kg)	4

B. Solar cells/Panels

As the title suggests the bicycle is operated by solar energy. The lead acid battery is charged with solar

energy with the help of a solar cell. Solar cells convert the energy of sunlight directly into electricity through the use of the photovoltaic effect. The photovoltaic effect involves the creation of a voltage into an electromagnetic radiation.

The photoelectric and photovoltaic effects are related to sunlight, but are different in that electrons are ejected from a material's surface upon exposure to radiation of sufficient energy in photoelectric, and generated electrons are transferred to different bands of valence to conduction within the material, resulting in the build-up of voltage between two electrodes in photovoltaic.

Solar cells are electrically connected and fabricated as a module with a sheet of glass on top to allow light to pass and protect the semiconductor from the weather. To obtain a desired peak DC voltage we will add solar cells in series, and to obtain a desired peak current, the solar cells are put in parallel position (Fig.4).



Fig 4: Solar panel

Table 2: Specifications of solar cell

Maximum Power (Watt)	20
Charging Current (Amp)	2
Open Circuit Voltage (V)	21.6
Max Power Voltage (V)	17
Short Circuit Current	1.316
Power Measured at Standard Test Condition	1000W per m2 at 25°C
Lifespan	25 years
Size	500mm × 338mm. × 35mm

C. Voltage Regulator

It is essential to regulate the voltage output from the solar panel before it is supplied to the battery. A voltage regulator is a power converter with an output DC voltage greater than the input DC voltage. This is used to regulate an input voltage to a higher regulated voltage.

The output of the solar panel is not always be stable due to fluctuations in intensity of sunlight, angular changes with respect to the direction of sunlight, as well as other environmental factors. This is the voltage regulator/Boost Converter comes into SAB. The output of the solar panel is the input of the boost converter, which then outputs into the battery for charging. Because the output of the solar panel will be varying constantly, we need a voltage regulator/boost converter that will take an input from a wide range of voltages and output a specific, constant voltage

value.

A voltage regulator/boost converter is a power converter that will take in a DC voltage and output a higher value DC voltage. Our voltage regulator/boost converter requires output of the solar panel, which can range from 0V to 27.2V, and output for charging of the battery.

We were initially attracted to the SPV Instruments (Fig.5, Fig.6) Module because it has the characteristics of taking in an input range of 9.6V to 13.2V and outputting 24V at a maximum of 2-3 amps .This SPV has an area of 2.5 square inches so it is also small in size, which makes it very feasible to be placed anywhere on the bicycle. We go thought the battery voltage & we need to supply 24V in order to charge it. [6]

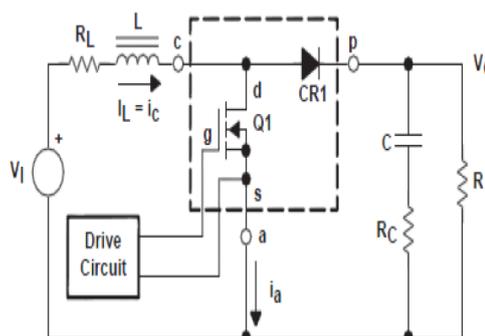


Fig 5: Circuit Diagram Of Voltage Regulator



Fig 6: Voltage regulator/Boost converter

Output Voltage	24 V
Open Circuit Voltage	26.8 V
Amp- Hour Rating	10 A

Table 3: Specification Of Solar Charger

D. Lead Acid Battery

Lead acid batteries (Fig.7) are one of the most popular types of battery in electronics. Although slightly lower in energy density than lithium metal, lead acid is safe, provided certain precautions are met when charging and discharging. This have a many advantages over other conventional types of batteries, the lead acid battery is the optimum choice for a solar assisted bicycle.

Current supplied from battery indicates the flow of energy from the battery and is measured in amperes (or

Amps) (Fig.10). The higher the current flow faster the battery will discharge. A battery is rated in ampere-hours (abbreviated Ah) and this is called the battery capacity. (Fig.9)

This project revolves around supplying and utilizing energy within a high voltage battery (Fig.8). It demands for a battery with longer running hours, lighter weight with respect to its high output voltage and higher energy density. Among all the existing rechargeable battery systems, the lead acid cell technology is the most efficient and practical choice for the desired application. The battery chosen for this project was a high capacity lead acid battery pack designed specifically for vehicles. Plastic casing is provided to house the internal components of the battery. [1] [3]

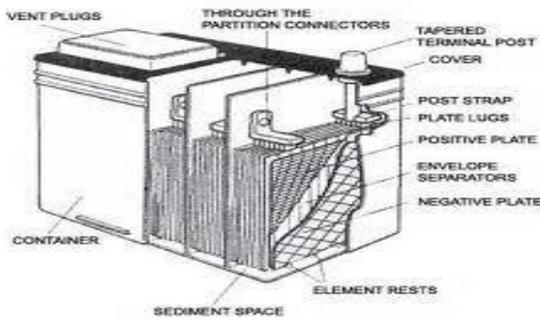


Fig 7: Parts of Lead Acid Battery Cell



Fig 8: Lead Acid Battery

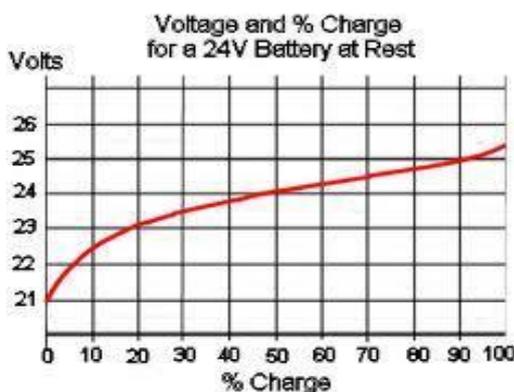


Fig 9: Voltage and % of Charge of Lead acid battery

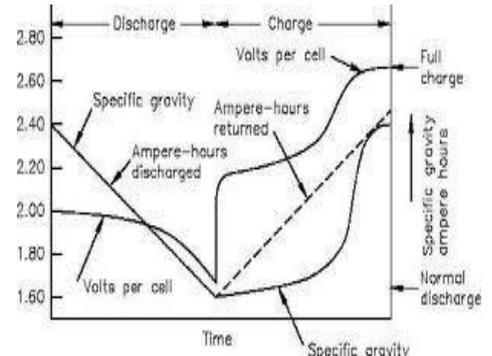


Fig 10: Charge per cell of Lead acid battery

Table 4: Specifications of Lead Acid Battery

Type of Battery	Sealed Lead Acid
Size (l x w x h)	210x140x356 mm.
Number of Batteries	Two Batteries connected in series
Voltage	12 V
Amp-Hour Rating	35 Ah
Charge Termination	When battery charge reaches 25.8 V
Standby Battery Voltage	25.4 V
Open Circuit Voltage (Volts)	2.87 V
Charging Time	8-9 hours
Weight	8 Kg
Safety	Good
Cycle Life (no. Of cycles)	400
Operating Temperature °C	-10 to 60

E. Motor Controller

The motor controller (Fig.12) is an important component of the system. It is essential to control the amount of power supplied and to drive the BLDC hub motor. The controller converts the DC voltage from battery to an alternating voltage with variable amplitude and frequency that drive the hub motor at different speeds(Fig.11). It basically consists of MOSFET transistors and small microprocessor that vary from detecting any malfunctions with the motor hall sensors, the throttle, to protect functions against excessive current and under-voltage, which are ideal for protecting the system. [5]

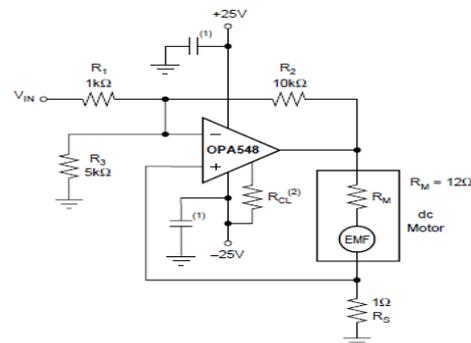


Fig 11: Circuit Diagram of Motor Controller



Fig 12: Hub Motor Controller

Table 5: Specifications of Motor Controller

System Voltage (V)	24
Max. Load Output Current	25
End Of Charge Voltage (V)	27.4
Boost Charge Voltage(V)	28.8
Ambient Temperature (°C)	0-50
Weight(gm.)	180
Dimensions(1×w×h)(mm)	130×88×39

F. Accelerator/Throttle

The maximum speed of a bicycle is 30 kmph. It is required to vary the speed depending upon the road conditions & traffic. Therefore an accelerator or a throttle (Fig.13) is necessary.

Throttle allows us to drive the motor from zero speed to full speed. The throttle is fitted on right side of the handle bar and is connected to controller. The throttle converts DC voltage from battery to an alternating voltage with variable amplitude and frequency that drives the hub motor at different speeds. It consists of MOSFET transistors and a small microprocessor.

This throttle is technically referred to as a Hall Effect type. The throttle has three wires contains a black, red, and green. The supply voltage is via red and black wires and is usually around 4 volts. Green wire voltage increases as the throttle is turned.



Fig 13: Throttle/Accelerator

Table 6: Specifications of Accelerator/Throttle

Supply Voltage (V)	24
Return Voltage (V)	4
Max. load output current (A)	25
Handle Bar Diameter(mm)	22
Three wires red, green, black	May differ from works. Fits for 24v supply

G. Solar Bicycle

” The solar assisted bicycle (Fig.14) is driven by DC motor fitted in front axle housing & operated by solar energy. The solar panel mounted on the carriage is charge the battery & which in turn drive the hub motor. When the bicycle is idle during the day, the solar panel will charge the battery. The system will make bicycle operate more efficiently

The basic configuration of an solar bicycle drive consists of a controller that controls the power flow from the battery to the electric motor. This power flow acts in parallel with the power delivered by the rider via the pedal of the bike. The rider of an solar bicycle can choose to rely on the motor completely, pedal and use the motor at the same time or pedal only (use as a conventional bicycle).

This arrangement replaces the petrol engines, the gear box and the fuel tankin case of a two wheeler or chain sprockets, chains & gear shifting arrangement of a conventional bicycle being used by most common man.^[9]

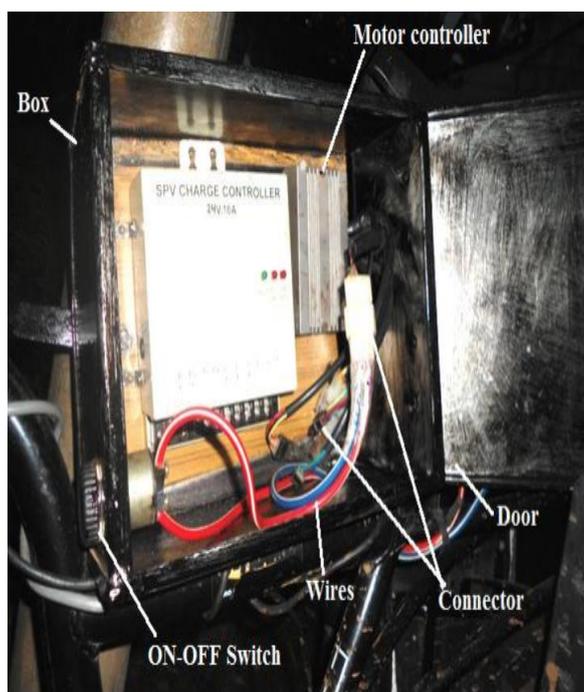


Fig 14: Solar Bicycle

Table 7: Specifications of a bicycle

Drive	Dual Powered (motor and pedal driven)
Weight	40 Kg
Riders Weight	80 kg
Load capacity	120 kg
Size	1410×540×1040 mm

II. RESULTS AND DISCUSSION:

Parameter	Solar Assisted Bicycle	Moped	Ordinary Bicycle
Max. Speed Limit (km/h)	25-30	45-50	10 to 15
Drivers pedalling requirement	No	No	Yes
Initial unit cost	16470	35000	3000
Operating cost for 40 km traveling in Rs.	Nil	45	Nil
Weight	40 kg	80 kg	15 kg
Max. Traveling distance at a stretch in km	35-40	150	15-20
fuel used per 100 km	Nil	2 L	Nil
Charging (oil- filling) time	6-7 hr. For 74W, 15A solar panels. & 16-18 hr. For 20W, 02A Solar panels.	Not applicable	Not applicable
Type of energy used	Solar	Petrol	Muscle power
Driving noise (dB)	noiseless	65- 70	noiseless
Driver's license required	No	Yes	No
Helmet Required	No	Yes	No
Age Limit	No	Yes, over 18	No
Engine size	Not applicable	100-125 cc	Not applicable

III. CONCLUSION

Solar assisted bicycle is modification of existing bicycle and driven by solar energy. It is suitable for both city and country roads, that are made of cement, asphalt, or mud. This bicycle is cheaper, simpler in construction & can be widely used for short distance travelling especially by school children, college students, office goers, villagers, postmen etc. It is very much suitable for young, aged, handicap people and caters the need of economically poor class of society. It can be operated throughout the year free of cost. The most important feature of this bicycle is that it does not consume valuable fossil fuels thereby saving crores of foreign currencies. It is ecofriendly & pollution free, as it does not have any emissions.

Moreover it is noiseless and can be recharged with the AC adapter in case of emergency and cloudy weather. The operating cost per kilometer is minimal, around Rs.0.70/km. It can be driven by manual pedalling in case of any problem with the solar system. It has fewer components, can be easily mounted or dismounted, thus needs less maintenance.^[7]



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Face Recognition Using Neural Networks

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Abstract— Face recognition from the images is challenging due to the wide variability of face appearances and the complexity of the image background. This paper proposes a novel approach for recognizing the human faces. The recognition is done by comparing the characteristics of the new face to that of known individuals. It has Face localization part, where mouth end point and eyeballs will be obtained. In feature Extraction, Distance between eyeballs and mouth end point will be calculated. The recognition is performed by Neural Network (NN) using Back Propagation Networks (BPN) and Radial Basis Function (RBF) networks. The recognition performance of the proposed method is tabulated based on the experiments performed on a number of images.

Index Terms— Face Detection, Face Localization, Feature Extraction, Neural Networks, Back propagation Network, Radial Basis

I. INTRODUCTION

Face recognition is an interesting and successful application of Pattern recognition and Image analysis. Facial images are essential for intelligent vision-based human computer interaction. Face processing is based on the fact that the information about a user's identity can be extracted from the images and the computers can act accordingly. Face detection has many applications, ranging from entertainment, Information security, and Biometrics [1]. Numerous techniques have been proposed to detect faces in a single image.

To build fully automated systems, robust and efficient face detection algorithms are required. The face is detected once a person's face comes into a view [2]. Once a face is detected, the face region is cropped from the image to be used as "Probe" into the knowledge to check for possible matches. The face image is pre-processed for factors such as image size and illumination and to detect particular features [3]. The data from the image is then matched against the knowledge [4]. The matching algorithm will produce a similarity measure for the match of the probe face into the knowledge.

This paper proposes a new face recognition method where local features are given as the input to the neural network. First, the face region is extracted from the image by applying various pre-processing activities. The method of locating the face region is known as face localization. The local features such as eyes and mouth

are extracted from the face region. The distance between the eye balls and the distance between the mouth end points are calculated using the distance calculation algorithm. Then the distance values between the left eye and the left mouth end point, the right eye and the right mouth end point, the left eye and the right mouth end point, the right eye and the left mouth end point are calculated. These values are given as the inputs to the neural network. Back propagation algorithm is used for training the values. Then the network is simulated using the features taken from the test set of images. The simulated result is given as the input to the Radial Basis Network for the function approximation. The output from the Radial Basis Network is considered as the recognition result.

II. FACE RECOGNITION SYSTEM

The proposed system consists of a face localizer, a feature extractor and a neural network classifier. The block diagram is shown in Figure 1.

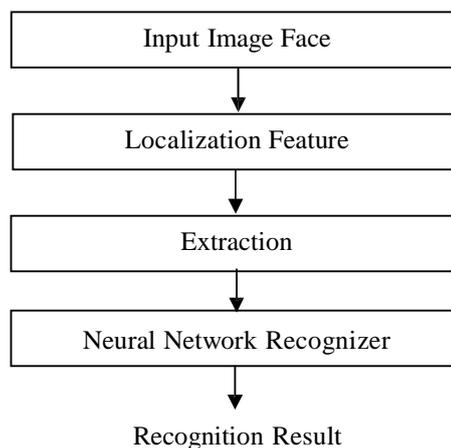


Fig 1: Block Diagram of Face Recognition System

Input image is acquired by taking photographs using the digital camera. These images are taken in color mode and saved in JPG format.

However, the proposed method is suitable for working with any file format.

H. Face Localization

Face localization aims to determine the image position of a single face. This is a simplified detection problem with the assumption that an input image consists only one face [5]. Various pre-processing

activities are done in this phase to make the raw data into usable format. The procedure below explains the proposed face localization technique.

1) *Image Conversion*: The input image is first converted into the gray-scale image. The gray-scale image is then converted into its binary form. The execution sequence of this step is shown in Figure 2.

2) *Dilation*: The dilation process removes the noise encountered in the binary image. Hence, the dilation operation is performed on the binary image obtained. The gray-scale image is then converted into its binary form. Then, the dilated image is mapped on to the gray scale image using intensity calculation formula below.

Let I_m denotes the intensity of mapped image I_d denotes the intensity of the dilated image and I_g denotes the intensity of the gray scale image.

$$I_m(i, j) = \begin{cases} I_g(i, j) & \text{if } I_d(i, j) = 1 \\ 0 & \text{otherwise} \end{cases}$$

The execution sequence of this step is shown in Figure 3.

3) *Image Cropping*: The mapped image is converted into binary image and the required face region is cropped from the binary image. The execution sequence of image cropping is shown in Figure 4.

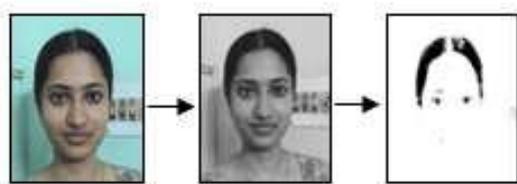


Figure 2: Image Conversion in Face localization phase

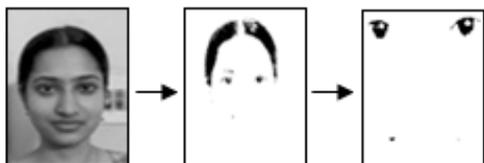


Figure 3: Image Cropping in Face localization phase

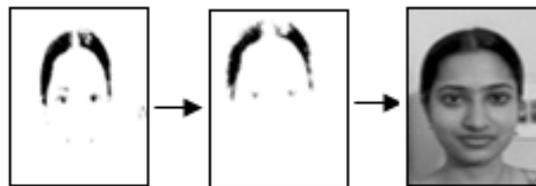


Figure 4: Dilation in Face localization phase

I. Feature Extraction

The Feature Extraction is carried out by taking the features such as eyes, mouth, nose, ears etc. Generally, there are two methods of representation about facial features: One is the local facial features such as eyes, nose and mouth are located; the other is about the whole facial features as expressing with a rectangle area containing eyes, nose and mouth. In this paper, the two features, eyes and mouth are taken into consideration. The proposed feature extraction algorithm is explained below.

1. Divide the localized face column wise into two equal parts.
2. For each row 'r' do steps 3 and 4.
3. The first black pixels encountered on either side are taken as (x_1, y_1) and (x_2, y_2) respectively.
4. Calculate the distance between those points using the formula:

$$\text{Distance} = \text{Sqrt}((x_2 - x_1)^2 + (y_2 - y_1)^2)$$

5. From step 4, two sets of non-zero distance vales corresponding to eyes and mouth are obtained.
6. Find the maximum of the distances for each non-zero set. They represent the distance between the eyeballs and the distance between the mouth end points.
7. Using the pixels corresponding to that maximum distance, calculate the following:
 - i. Distance from the left eyeball to the right eyeball.
 - ii. Distance from the left mouth end point to the right mouth end point.
 - iii. Distance from the left eyeball to the left mouth end point.
 - iv. Distance from the right eyeball

to the right mouth end point.

v. Distance from the left eyeball

vi. Distance from the right eyeball to the left mouth end point.

8. The six values calculated above are given as the inputs to the neural network recognizer.

J. Neural Network as a Recogniser

After extracting the features from the given face image, a recognizer is needed to recognize the face image from the stored database. Neural network can be applied for such problems [7, 8, 9]. This paper proposes a recognition method, which uses two networks: Back Propagation Network (BPN) and Radial Basis Function Network (RBF) [10]. Back propagation can train multilayer feed-forward networks with differentiable transfer functions to perform function approximation, pattern association, and pattern classification. The BPN is designed with one input layer, one hidden layer and one output layer. The input layer consists of six neurons the the inputs to this network are feature vectors derived from the feature extraction method in the previous section. The network is trained using the

to the right mouth end point.

samples.

The Back propagation training takes place in three stages:

1. Feed forward of input training pattern
2. Back propagation of the associated error and
3. Weight adjustment.

During feed forward, each input neuron (p_1) receives an input value and broadcasts it to each hidden neuron, which in turn computes the activation and passes it on to each output unit, which again computes the activation to obtain the net output. During training, the net output is compared with the target value and the appropriate error is calculated. From this, the error factor is obtained which is used to distribute the error back to the hidden layer. The weights are updated accordingly. In a similar manner, the error factor is calculated for units. After the error factors are obtained, the weights are updated simultaneously. The output layer contains one neuron. The result obtained from the output layer is given as the input to the RBF.

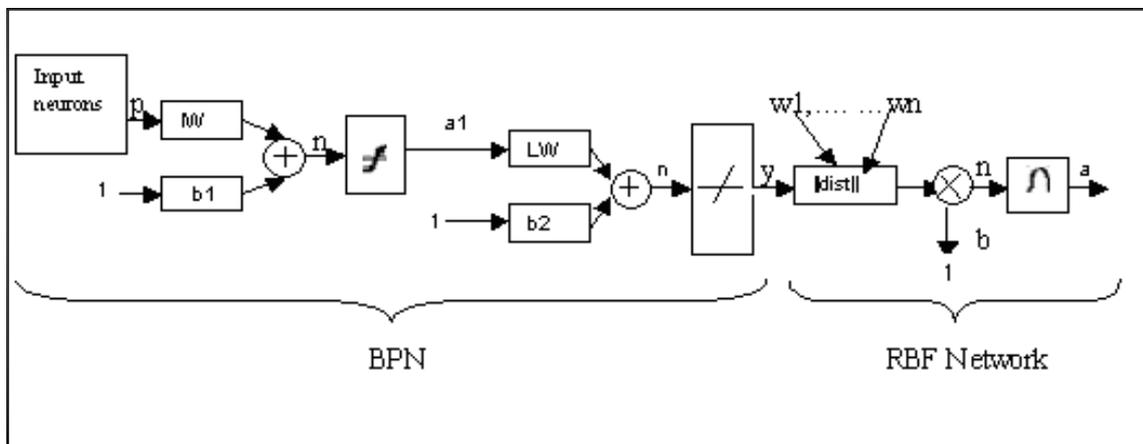


Figure 5: Combined Framework of BPN and RBF

RBF uses the gaussian function for approximation. For approximating the output of BPN, it is connected with RBF. The Radial Basis Function neural network [11, 12] is found to be very attractive for the engineering problems They have a very compact topology

- They are universal approximators
- Their learning speed is very fast because of their locally tuned neurons [6].

The RBF neural network has a feed forward architecture with an input layer, a hidden layer and an output layer.

In this paper, a RBF neural network is used as recognizer in face recognition system and the inputs to this network are the results obtained from the BPN.

Following are the explanations of the notations used in Figure 5.

- p – Set of input neurons
- b – bias
- b1, b2 – bias
- IW – Weight between Input and hidden layers
- LW – Weight between hidden and Output layers
- Y – Output of BPN
- Wi – Weight vector to RBF

III. RESULTS

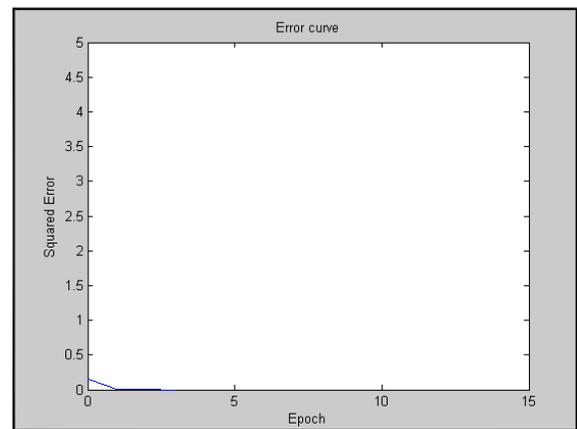
The effectiveness of the proposed face localization method and the distance calculation algorithm are demonstrated using MATLAB. The face database consists of 90 images. Out of 90 images, 64 images are taken for training the networks. The number of epochs versus the squared error graph is shown in Figure 6.

Then the neural networks are tested with the remaining images. The BPN network accepts 2 unknown faces and it recognizes all the known faces. The combined model of BPN+RBF recognizes all known faces and accepts 1 unknown face (false acceptance). The time consumption and the recognition rate are tabulated in Table I

Network	Total Images	Training +Testing time(in seconds)	False Acceptance	Recognition rate (in %)
BPN	90	3.6549	2	96.66%
BPN+RBF	90	3.6492	1	98.88%

Figure 6: Error rate versus number of Epochs

TABLE I
 COMPARISON OF BPN+RBF FRAMEWORK OVER BPN



IV. CONCLUSIONS

In this paper, a new face localization technique is proposed and a new feature extraction algorithm is developed for human face recognition. The neural network model is used for recognizing the frontal or nearly frontal faces and the results are tabulated. A new neural network model combined with BPN and RBF networks is developed and the network is trained and tested. From these results, it can be concluded that, recognition accuracy achieved by this method is very high. This method can be suitably extended for moving images and the images with varying background.

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Framework for Secure Virtualized Environment

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Abstract- The adoption and diffusion of the cloud are threatened by unresolved security issues. Our proposed work is to protect the integrity of the guest virtual machines and infrastructure components while remaining fully transparent to virtual machines and to cloud users. Various attacks like Denial of services(DOS), Honeypots, password hacking by the hackers affects the availability, integrity and confidentiality of the cloud. The proposed work is to provide a security framework for the cloud. The effectiveness of the system against the attack is tested.

Index Terms- Attacks, Cloud Computing, Security, Virtualization

I. INTRODUCTION

Cloud computing is a model for enabling convenient, on demand network access to share a pool of configurable computing resources, that can be rapidly provisioned and released with minimum management. In cloud there is a significant work load consolidation. Instead of installing all software for each computer, the users have to load one application. That application would allow users to log into a web based service, which hosts all the programs the user would need. Cloud model promotes availability and is composed of essential characteristics.

Cloud computing promotes three delivery models. They are SaaS, PaaS, IaaS. If users don't want any configuration, just want to upload files and leave website to run, then software as a Service is used. Its advantages are easy backups, flexible pricing and portability. A preconfigured operating system but a reasonable amount of control over the rest of the configuration, PaaS is used. Its advantages are minimizing the developers maintenance time while still providing a considering amount of customization and configuration. Virtualization applications can be moved onto different hardware quickly in response increased demand. If users want an operational server with total control over the operating system and configuration, Infrastructure as a Service is used. Its advantage is that the user can effectively have clean installed of the required environment available at all times.

Virtualization, a technique of dividing resources of a computer into multiple execution environments, by applying one or more technologies such as software practioning, time sharing, partial or complete machine simulation, emulation and so on.

The benefits of virtualization are increased server utilization, simplify legacy software migration, host mixed operating systems per physical platform, stream line test and development, isolate software faults, relocate existing partitions, create dedicated or as needed partitions can apply different settings to each partition.

The contribution of our work is to provide a secure virtualized environment for the cloud. The attackers access the configuration

files and make the services unavailable, try to illegally enter into the system by hacking the users passwords by recognizing the keystrokes and do active attack by modification of messages. Hence thereby the integrity, confidentiality and availability of the system got affected. The proposed system identifies the users who do malicious actions, and block the user preventing access of the system.

II. RELATED WORK

As virtualization has become more popular, concern over the technology's security has grown [4]. Traditional security techniques often don't work well with virtualization so vendors are trying different approaches. This paper focuses the dynamic property of virtual machines. The primary is since the VM's are created and deleted according to the usage, new VM's are installed automatically so the protection has to be provided systematically. Machines may go for the migration so protection has to be provided in the migrated place. Malware is probably the most significant computer threat to enterprises and businesses [1]. To address the exposure gap left by antivirus products an emerging category desktop security products that use the application sandboxing attempts to address malware threats by containing the malicious behavior. This paper describes how virtualization environment can itself be a trusted sandboxing environment. It describes about a systematic review on the security effects of virtualization[3]. The virtualization technology has a clear positive effect on availability, but the effect on confidentiality and integrity is less positive. Cloud computing adoption and diffusion are threatened by unresolved security issues that affect both the cloud provider and the cloud user[2]. This paper shows how virtualization can increase the security of the cloud computing by protecting the integrity of the guest VM's and the cloud infrastructure components. In particular this paper proposed a novel architecture called Advanced Cloud Protection System(ACPS) and aimed at guaranteeing increased security to cloud resources. Cloud computing is a break through technology that will continue to unleash new innovations and bring new efficiencies and advantage to the business.[6] Enterprises face limitations in using the cloud for high performance and mission critical applications such as ERP. This paper seeks to clear up some misperceptions and help people to make better choices. Analysis technique both use virtual machine and emulation environment provides system restoring capabilities to automate the analysis of malware sample.[5] VM aware malware hides its nature in the system and shows its malicious effects and attacks the system. The work in this paper is the analysis, and evaluation of malware analysis framework for bare metal systems in a fast and rebootless system. Virtualization is essential to cloud computing yet its security vulnerabilities in the cloud environment have not been sufficiently studied.[9] The

analysis of cloud security focuses on how the attacks in virtualization affect different cloud service models. This paper deals with analyzing the nature of three major attacks Spoofing, VM Hopping, VM Mobility. Security is a great issue for many organization to move into the cloud.[10] The main work in this paper is to design new security technologies to cope up with the security challenges of cloud regarding enterprise. The cloud should be provided with security not only at the infrastructure level instead the security should be provided in such a way that it should be beyond infrastructure and into infostructure and metastructure. In this paper they have discussed four technology patterns. Organization fully focuses on securing system from malware and intrusion. Many virtualized systems run on same machine so we need different security level.[7] It distributes the host machine resources to each program running on virtualized OS. Virtualized machines communicate with the help of network connections. This paper discusses about the configuration management problem and virtualization security tools. Virtual machine are software entities emulate machine's functionality. Hypervisor control these machines.[8] hypervisor are categorized into, Directly on top of hardware: Non Hosted Integrated with the host OS: Hosted. The hypervisor over a VM provides a trusted computing base provides intrusion detection, integrity protection and malware analysis. This paper focuses on guarding the hypervisor layer. Malware attackers take a snapshot of a virtual machine and use the copy and pretend like a virtual machine[12]. The work focused here is the detection and mitigation techniques of attacks. They have mentioned an application called VM Safe, it is a compliant security application acts as a virtual machine and provides security to host machine. Protecting users from various attacks. Offers virtual environment the capability to monitor, inspect and filter packets in the hypervisor. It managed servers and virtual network the same level of visibility.

III. IMPLEMENTATION

A. HTACCESS File:

A **.htaccess** (hypertext *access*) file is a directory-level configuration file supported by several web servers. The original purpose of .htaccess reflected in its name was to allow per-directory access control, for example requiring a password to access the content. Nowadays however, the .htaccess files can override many other configuration settings including content type. A .htaccess file is often used to specify security restrictions for a directory, hence the filename "access". The .htaccess file is often accompanied by a .htpasswd file which stores valid usernames and their passwords. Users allow or deny to block other users by IP address or domain. Also, use to block bad bots, rippers and referrers.

B. Hash Values:

A hash function is any well defined procedure or mathematical function that converts a large, possibly variable sized variable sized amount of data into a small datum, usually a single integer that may serve as an index to an array. The values returned by the hash function are called as hash values, hash codes, hash sums, checksums or simply hashes.

Pseudocode: To Compute Hash Value

```
var int[64] r, k
```

```
r[ 0..15] := {7, 12, 17, 22, 7, 12, 17, 22, 7, 12, 17, 22, 7, 12, 17, 22}
r[16..31] := {5, 9, 14, 20, 5, 9, 14, 20, 5, 9, 14, 20, 5, 9, 14, 20}
r[32..47] := {4, 11, 16, 23, 4, 11, 16, 23, 4, 11, 16, 23, 4, 11, 16, 23}
r[48..63] := {6, 10, 15, 21, 6, 10, 15, 21, 6, 10, 15, 21, 6, 10, 15, 21}
```

//Use binary integer part of the sines of integers (Radians) as constants:

for i from 0 to 63

```
    k[i] := floor(abs(sin(i + 1)) × (2 pow 32))
```

end for

//(Or just use the following table):

```
k[ 0.. 3] := { 0xd76aa478, 0xe8c7b756, 0x242070db, 0xc1bdceee
}
k[ 4.. 7] := { 0xf57c0faf, 0x4787c62a, 0xa8304613, 0xfd469501
}
k[ 8..11] := { 0x698098d8, 0x8b44f7af, 0xffff5bb1, 0x895cd7be
}
k[12..15] := { 0x6b901122, 0xfd987193, 0xa679438e, 0x49b40821
}
k[16..19] := { 0xf61e2562, 0xc040b340, 0x265e5a51, 0xe9b6c7aa
}
k[20..23] := { 0xd62f105d, 0x02441453, 0xd8a1e681, 0xe7d3fbc8
}
k[24..27] := { 0x21e1cde6, 0xc33707d6, 0xf4d50d87, 0x455a14ed
}
k[28..31] := { 0xa9e3e905, 0xfcefa3f8, 0x676f02d9, 0x8d2a4c8a
}
k[32..35] := { 0xffffa3942, 0x8771f681, 0x6d9d6122, 0xfde5380c
}
k[36..39] := { 0xa4beea44, 0x4bdecfa9, 0xf6bb4b60, 0xbebfb7c0
}
k[40..43] := { 0x289b7ec6, 0xeaa127fa, 0xd4ef3085, 0x04881d05
}
k[44..47] := { 0xd9d4d039, 0xe6db99e5, 0x1fa27cf8, 0xc4ac5665
}
k[48..51] := { 0xf4292244, 0x432aff97, 0xab9423a7, 0xfc93a039
}
k[52..55] := { 0x655b59c3, 0x8f0ccc92, 0xffeff47d, 0x85845dd1
}
k[56..59] := { 0x6fa87e4f, 0xfe2ce6e0, 0xa3014314, 0x4e0811a1
}
k[60..63] := { 0xf7537e82, 0xbd3af235, 0x2ad7d2bb, 0xeb86d391
}
```

//Initialize variables:

```
var int h0 := 0x67452301 //A
```

```
var int h1 := 0xefcdab89 //B
```

```
var int h2 := 0x98badcfe //C
```

```
var int h3 := 0x10325476 //D
```

//Pre-processing: adding a single 1 bit

append "1" bit to message

/ Notice: the input bytes are considered as bits strings, where the first bit is the most significant bit of the byte. [37]*

```
//Pre-processing: padding with zeros
append "0" bit until message length in bit  $\equiv 448 \pmod{512}$ 
append length mod (2 pow 64) to message
```

```
//Process the message in successive 512-bit chunks:
for each 512-bit chunk of message
    break chunk into sixteen 32-bit words  $w[j], 0 \leq j \leq 15$ 
```

```
//Initialize hash value for this chunk:
```

```
var int a := h0
var int b := h1
var int c := h2
var int d := h3
```

```
//Main loop:
```

```
for i from 0 to 63
    if  $0 \leq i \leq 15$  then
        f := (b and c) or ((not b) and d)
        g := i
    else if  $16 \leq i \leq 31$ 
        f := (d and b) or ((not d) and c)
        g := (5i + 1) mod 16
    else if  $32 \leq i \leq 47$ 
        f := b xor c xor d
        g := (3i + 5) mod 16
    else if  $48 \leq i \leq 63$ 
        f := c xor (b or (not d))
        g := (7i) mod 16
    temp := d
    d := c
    c := b
    b := b + leftrotate((a + f + k[i] + w[g]), r[i])
    a := temp
```

```
end for
```

```
//Add this chunk's hash to result so far:
```

```
h0 := h0 + a
h1 := h1 + b
h2 := h2 + c
h3 := h3 + d
```

```
end for
```

```
var char digest[16] := h0 append h1 append h2 append h3
//((Output is in little-endian)
```

```
//leftrotate function definition
```

```
leftrotate (x, c)
```

```
return (x << c) binary or (x >> (32-c));
```

C. Cryptographic Hashing:

Used for data verification, user verification and authentication. A strong cryptographic hash function has the property of being very difficult to reverse the result of the hash and hence reproduce the original piece of data. Cryptographic hash function are used to hash users passwords and have the hash of passwords stored on the system rather than having the password it stored. Cryptographic hash values are also seen as irreversible compression functions being able to represent large quantities of data with a single ID in which they are useful in seeing whether or not the data has been tampered with any other illegal perspectives.

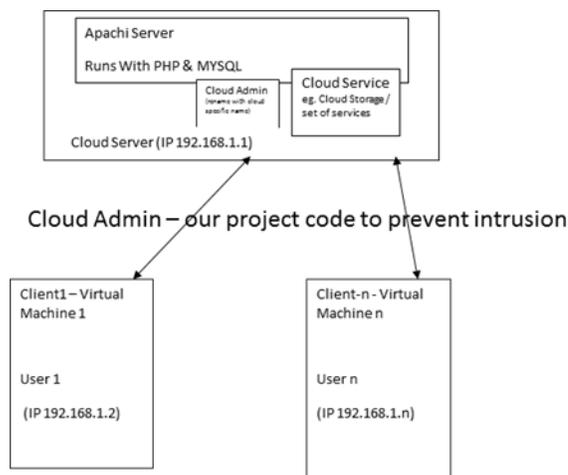


Fig1 : Working model of the system

IV. DETECTION OF ATTACK

A. Providing Integrity by Detecting The Data Modification Attack:

If the attacker tries to access the .htaccess file which is the configuration file for the Apache server and if the attacker modifies those configuration files for abnormal memory usage and connection attempts, the services in which the server provides will be unavailable to the legitimate users. The proposed system calculates the hash values for all the configuration files and stores the hash values in the hash DB. With the help of hash values we can find the integrity of those files has been affected or not. Every time the system compares the hash values and if the already computed hash values and the current hash values are different the integrity is affected. If the hash values are not different then the integrity has not been affected. Once the system finds that the integrity has been affected the system detects which user modifies the files and once he logs on the alert will be sent and he is stopped to use the services. The system has a Warning detector reports the status of the data and stores the status in the warning pool. The components that are monitored are library files and configuration files.

B. Providing Confidentiality Through Keystroke Timing

Keystroke dynamics is part of larger class of biometrics known as behavioral biometrics. Their patterns are statistical in nature. The reality here is that behavioral biometrics use a confidence measurement instead of traditional pass or fail measurements. The system calculates the keystroke timing for the users passwords. Once the user log again it verifies the keystroke of the corresponding password. If both the timing matches the user is allowed to access the virtual machine services.

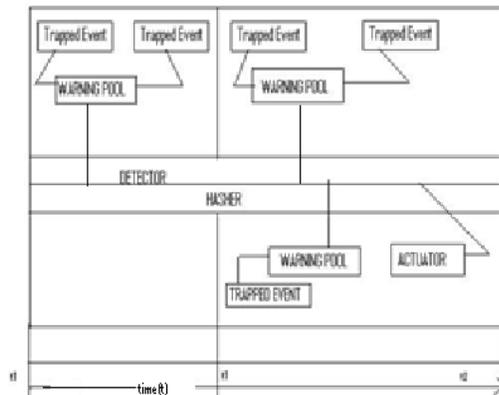


Fig 2: Timing Analysis On The Attack Detection

C. Detection of Attacker:

If the user of the virtual machine tries to access or modify the unauthorized files, the alerts will be sent to the administrator by the system, the IP address from which the attacker attacks the files will be stored in the warning detector. The system blocks the user and alerts him once the user logs on into the system. The system replaces the affected files.

V. EFFECTIVENESS

The detection capabilities of our system are assessed against known attack techniques. However, since source code for many attacks is not publicly available, we performed our test by simulating attack steps. The system is effective to maintain confidentiality of the individual users files through the keystroke timing, and detects the modification of data thereby the integrity is preserved.

VI. CONCLUSION

The system prevents the attacker to stop the server and it detects the attacker who modifies the configuration files and makes the services unavailable and it also provides confidentiality by preventing him from illegal connection attempts to the services. Hence thereby the integrity, confidentiality and availability of the services is preserved.

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Medical Image Colorization using Optimization Technique

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Abstract- Colorization is a term used to describe a computerized process for adding color to black and white pictures, movies or TV programs. This process can also be used to convert the gray scale medical images to their colorized version, as color increases the visual appeal of an image and it also makes medical visualization more attractive. In the medical field, there used plenty of images especially X-Rays like dental, chest, leg, hand X-Rays and MRI Images. In this paper, we apply colorization based on optimization to colorize medical images and also evaluate its performance in terms of information loss using three proposed correlation coefficient parameters.

Index Terms- medical images ,colorization of medical images, information loss to colorize medical images, binary integrated edge curve.

Mathematics Subject Classification: 49N10

Computing Classification System: I.4.6

I. INTRODUCTION

Imaging technology in medicine made the doctors to see the interior portions of the body for easy diagnosis. It also helped doctors to make keyhole surgeries for reaching the interior parts without really opening too much of the body. In traditional medical imaging modalities, color and texture information can add considerable information for diagnostics. Presently, multimodal images of a patient are unregistered and referenced independent of each other, or registered and fused into a single hybrid volume. Doctors and other medical professionals need to be able to visualize and interrogate, on a per-patient basis, a wide variety of 2D and 3D data representations that can be created from non-invasive imaging modalities, such as MRI and CT. Intensive use of the multimedia technology is rapidly progressing and digital images will soon be common not only in medical practice, but also in medical education and research activities. In the medical field, exact recording and reproducing of colors are essential because recent investigations have shown that inappropriately reproduced colors may incidentally cause erroneous diagnoses [3].

Colorization is the art of adding color to a monochrome image or movie. The idea of ‘coloring’ photos and films is not new. Computer-assisted process was first introduced by Wilson Markle in 1970 for adding colors to black and white movies. In the last few years, several advanced and effective techniques for images and videos have been proposed. These techniques are based on: luminance keying and color transfer [1], image analogies [2], motion estimation [3], segmentation [4], color prediction [5], probabilistic relaxation [6] and chrominance blending [7], among many other techniques. Color based classification is widely used in all areas. In traditional medical imaging modalities, color and texture information can add considerable information for diagnostics [8]. Changes in color are more easily perceived than changes in shades of gray and therefore this procedure makes the interpretation and understanding of the image easier. During colorization process a scalar value representing pixel’s intensity is being replaced by a vector in a given color space. Since the mapping between intensity and color has no inherently correct solution, human interaction and external information usually plays a large role [4].

A major difficulty with colorization, however, lies in the fact that it is an expensive and time-consuming process. Interactive image segmentation is important and has widespread applications in computer vision, computer graphics and medical imaging.

In this paper we apply optimization based colorization technique on medical images to obtain satisfactory colorized medical images in very short time and with small amount of work. Optimization is used for finding the minimum of dissimilarity measure or the maximum of similarity measure. The paper is organized as follows: In section I the basics of colorization using optimization is discussed. Section II discusses about the method of applying colorization algorithm on medical images. The performance criteria used to measure the effectiveness of colorization on medical images is also discussed. In Section III results and analysis are discussed. Section IV concludes the paper.

II. OPTIMIZATION COLORIZATION TECHNIQUE

In this section we describe a new interactive colorization technique that requires neither precise manual segmentation, nor accurate tracking. The technique is based on a unified framework applicable to both still images and image sequences. The user indicates how each region should be colored by scribbling the desired color in interior of

the region, instead of tracing out its precise boundary as shown in Fig 1 (b). Using these user supplied constraints, the optimization based technique [11] automatically propagates colors to the remaining pixels in the image sequence. Levin *et al.* solved an optimization problem that minimizes a quadratic cost function of the difference of color between a pixel and it's weighted average neighborhood

colors [11].

Since, the color is provided simply by marking the scribbles on the operated image, remember that both mark image and operated image have same size. Then swatching based colorization is applied on the mark image. In this optimizatoin technique, chrominance value of each pixel's nearest pixels is checked. If the chrominance value of pixels is same then the color applied on mark image is spreaded through the nearest pixels untill the pixels value matches and then it create the fuzzy color boundary. The algorithm is given as input an intensity volume $Y(x; y; t)$ and outputs two color volumes $U(x; y; t)$ and $V(x; y; t)$. Thus, $Y(\mathbf{r})$ is the intensity of a particular pixel and we wish to minimize the difference between the color $U(\mathbf{r})$ at pixel \mathbf{r} and the weighted average of the colors at neighboring pixels. These two terms together form the cost function (energy) associated with the registration and the aim of the optimization method is to minimize it. In literature such methods can be referred to as energy minimization method. To minimize cost functions $J(U)$ & $J(V)$ as shown in equations (1) & (2), the weighting functions as shown in equation (3) are used.

$$J(U) = \sum_r (U(r) - \sum_{s \in N(s)} W_{rs} U(s))^2 \tag{1}$$

$$J(V) = \sum_r (V(r) - \sum_{s \in N(s)} W_{rs} V(s))^2 \tag{2}$$

W_{rs} is a weighting function that sums to one, large when $Y(\mathbf{r})$ is similar to $Y(\mathbf{s})$, and small when the two intensities are different. Similar weighting functions are used extensively in image segmentation algorithms (e.g. [Shi and Malik 1997; Weiss 1999]), where they are usually referred to as affinity functions. We have experimented with the following simplest weighting function given in equation (3), which is commonly used by image segmentation algorithms and is based on the squared difference between the two intensities:

$$W_{rs} \propto \exp^{-\frac{(Y(r)-Y(s))^2}{2\sigma^2}} \tag{3}$$

In YUV color space, where Y is the monochromatic luminance channel, which refers to simply as intensity, while U and V are the chrominance channels, encoding the color. Here, r, s are neighboring pixel according to U and V plane. And σ is variance for pixel around r. Here, Figure 1(a) shows gray image and figure 1(b) shows scribble image and 1(c) shows color image



Figure 1(a) Gray Image, (b) Scribbled Image, (c) Colorized Image

III. PROPOSED METHODOLOGY

In this section, we present the proposed methodology for colorization of medical images. We also evaluated the colorized image by converting the colored image into gray scale image and check for any information loss. To evaluate the colorized image for information loss, we proposed two performance parameters based on histogram and binary edge curve. We compute the information loss and if the information loss is tolerable, the colorized image is stored in colorized image database for future use, otherwise the colorization process is redone by adjusting the swatches.

Table 1: Proposed methodology

No.	Steps
1.	Read the medical image for which colorization needs to be performed.
2.	Apply the swatches or scribes on the image which needs to be colorized using paint like application.
3.	Apply colorization using optimization algorithm
4.	Evaluate the colorized image using the following proposed performance parameters . <ol style="list-style-type: none"> 1. Histogram based correlation coefficient <ul style="list-style-type: none"> • Canny edge detection based correlation coefficient • Binary Integrated edge curve based correlation coefficient.
5.	If the information loss is tolerable, put the image into colorized image database for future use, otherwise redo the colorization by adjusting the swatches.

To evaluate the performance of colorization algorithm in terms of information loss, we find the following three correlation parameters from original and gray converted image of colorized image.

1. Histogram correlation coefficient given by

$$C_H = \text{corr}(H_I, H_C) \quad (4)$$

Where, H_I is histogram of the original operated image I and H_C is the histogram of the gray converted image of colorized image.

2. Canny edge detection based correlation coefficient given by

$$C_{CA} = \text{corr}(C_I, C_C) \quad (5)$$

Where, C_I is Canny edge detected image of original image I and C_C is the Canny edge detected image of the gray converted image of colorized image.

3. Binary integrated edge curve based correlation coefficient given by

$$C_B = \text{corr}(B_I, B_C) \quad (6)$$

Where, B_I is binary integrated edge curve [12] of Canny edge detected image of original image I and B_C is the binary integrated edge curve of Canny edge detected image of the gray converted image of colorized image. After applying Canny edge algorithm, we plot the binary integrated edge intensity curve. This binary integrated edge intensity curves requires some smoothing. Moving average filter with best suitable window size is used for smoothing.

The maximum positive correlation is 1.00. If the coefficient is, say, .80 or .90, we know that the corresponding variables closely vary together in the same direction; if it is -.80 or -.90, they vary together in opposite directions. If it is zero or near zero correlation means simply that two things vary separately.

IV. RESULTS AND ANALYSIS

The proposed method works fast enough to allow the user for interactive work without noticeable delays and achieving real-time preview. The proposed method gives good colorization results for gray scale medical images of different type. In Fig. 2 we can observe the colorization results of dental, leg, chest, hand, MRI images. In columns from the left to right, the original gray scale images, the ones scribbled with color and resultant images after colorization are shown.

The important feature of the proposed technique is that the intensity of the original gray scale image is always preserved and the color information provided by a user can be hidden, so that no changes in the original image are introduced. In this way the color information can be used as a tool enabling the physician to point at important structures by coloring the region of interest.

We work on forty images of different areas of medical images and apply the proposed methodology. The performance parameters are computed and are listed in Table 2. We get the average (median) C_H of 0.4218 (0.4235), average (median) C_B of 0.76 (0.79) and average (median) C_{CA} of 0.696 (0.697). Out of forty images, we obtain 24 images having more than 0.75 correlation coefficient (C_B). Figure 3 shows the images used to find the performance measurement for a leg MRI image.

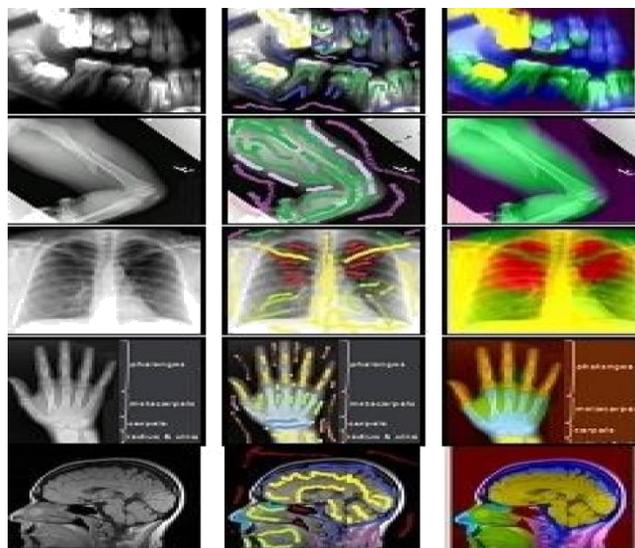


Figure 2: Colorization results. In columns from the left: gray scale images, scribbled images and the colorization result.

In Fig.3 we applied the proposed technology take an MRI operated image, scribbled with color and resultant images after colorization. To check the information loss we again converted this colored image into grayscale image and then we find the histogram correlation factor, canny edge correlation factor and binary edge correlation factor. By this correlation factors we find that whether this colored image is use in medical or not.

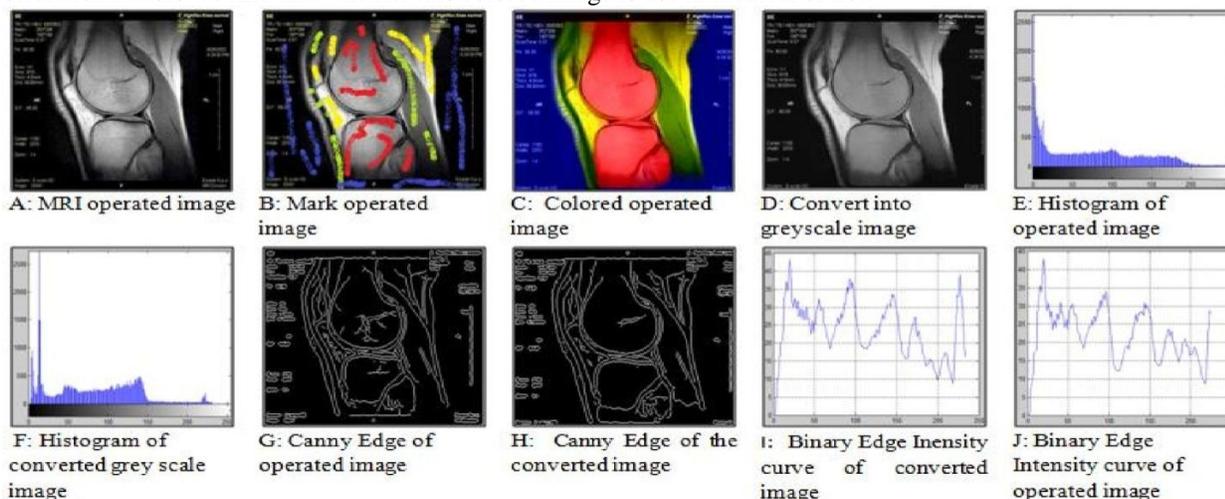


Figure 3: Result of the sagittal MRI image

Table 2: Images and their correlation factor between histogram, Canny edge curve and binary edge curve.

Sr No	Area of Medical Image	Image	C_H (Correlation factor of Histogram)	C_B (Correlation factor of Binary Edge Curve)	C_{CA} (Correlation factor of Canny Edge)
1.	Hand X-Ray Images	1	0.9606	0.7418	0.8500
2.		2	0.0598	0.7963	0.6352
3.		3	0.2661	0.9550	0.8553
4.	MRI Images	1	-0.0048	0.8149	0.8212
5.		2	-0.0101	0.9168	0.7978
6.		3	0.9192	0.6906	0.6047
7.		4	0.0096	0.6935	0.7989
8.		5	0.0570	0.9711	0.8004
9.	Chest X-Ray Images	1	0.1542	0.9244	0.7037
10.		2	-6.8646e-004	0.6557	0.7482
11.		3	0.6498	0.9754	0.8404
12.	Leg X-Ray Images	1	0.0695	0.6119	0.7840

13.		2	0.7412	0.8524	0.8321
14.		3	0.0012	0.9796	0.6588
15.	Leg X-Ray Images	4	0.7642	0.9193	0.7953
16.		5	0.0286	0.5433	0.5810
17.		6	0.0167	0.7818	0.7515
18.		7	0.8976	0.8623	0.8876
19.		8	0.9081	0.7852	0.7801
20.	Dental X-Ray Images	1	0.5177	0.4455	0.4973
21.		2	0.5657	0.4679	0.6477
22.		3	0.1859	0.7841	0.6333
23.		4	0.6488	0.4648	0.6155
24.		5	0.9365	0.4768	0.5867
25.		6	0.5962	0.7130	0.5826
26.		7	0.6434	0.8684	0.6144
27.		8	0.4463	0.9164	0.6750
28.		9	0.9912	0.7737	0.8668
29.		10	0.5612	0.9151	0.4772
30.		11	0.7864	0.7059	0.6910
31.		12	0.0637	0.7219	0.5227
32.		13	0.2455	0.7095	0.6685
33.		14	0.8243	0.8421	0.7139
34.		15	-0.0038	0.8875	0.4713
35.		16	0.3084	0.6550	0.5766
36.		17	0.4323	0.7615	0.4717
37.		18	0.0996	0.8144	0.8203
38.		19	0.3344	0.8619	0.6432
39.		20	0.4148	0.7606	0.7179
40.		21	0.7866	0.6455	0.8235
	Average		0.421823	0.76657	0.696083
	Median		0.42355	0.78295	0.69735

V. CONCLUSION

Due to colorization the visual appeal of images is increased. In medical field there are plenty of images in different areas like MRI, radiographic images, ultrasound images. Here we colorized the medical images using optimization technique. The results of experiments performed on various grayscale medical images indicate that the presented approach yields interesting results and can be successfully used for visualization purposes without loss of information. Due to colorization technique does not introduce any changes in the intensity of the original image the user can always use the original image without the chromaticity component. The colorized results can be used for various diagnostic purposes serving as a versatile visualization tool.

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The overview of Horticultural growth the role of horticulture in Tamenglong District: a survey account of ten villages in the Tamenglong District, Manipur State

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I. OVERVIEW OF HORTICULTURE

This paper is devoted to an overview of literatures so far review related to role of horticulture in relation to historical background, international, national, regional and state issues with special reference to Tamenglong district. Distinguished scholars, thinkers, horticultural scientists, government and non-governmental organization have mentioned on the importance of horticulture and its allied activities. Intensive and comprehensive overviewed is done concerning to hilly and mountainous regions along with rural development issues. This chapter tries to see the gap in the literature and also throw some light on the already existed literature on the topic of my research areas and an attempt is made to assess what is left undone, so that new things and current research issues can be connected with the present times. It also includes the survey account of ten villages in Tamenglong District, Manipur.

II. HISTORICAL BACKGROUND OF HORTICULTURE

Sargent [1973] highlighted that in primitive stages of agricultural development, agriculture remained the main occupation of the people. In the transitional stage of economic development, agriculture carried immense burden in the drive for economic growth. However, during maturing phase the main emphasis still remains on the maintenance of balance role for agriculture, but horticulture becomes more important. This is due to commercialization of crops around the world. Fruits and vegetables have become greater importance in the past few year in the process of agricultural development. This is so because of the high increases in income derived by the cultivation of fruits and vegetables crop as compared to annual cereal crops. In addition; fruits and vegetables crop are being the sources of protective foods, brought awareness to the masses.¹⁴ In this context, Chaturvedi [2008] an enthusiastic thinker Swami Vivekanandji reported that man is born to conquer nature. This does not mean that man is in conflict with the nature. It simply meant that man is expected to make use of blessing of nature and for that he makes use of his faculties to draw from nature whatever advantages he can. He further said that the secret of nature is 'proceeding piteously' remember every plant takes its own time to bear fruits while the gardener must water it patiently

¹⁴ Prof. R.P. Chaturvedi (2008) 'How to add new Dimensions to your personality', Upkar Prakarsan publications, Agra-2, 2008

for days and months. Mahatma Gautama Buddha very aptly said, "Speech and action go ill together, Nature is continuously in action, yet is mute".¹⁵ One factor behind the colonization of many regions by European countries was the desired to establish access to horticultural products like beverage crops (tea, coffee, cocoa), herbs and spices. G.P. Mishra [1982] in his book states that in the wake of technological transforming in the rural areas, the greater intensity of input packages demands higher investment. The increasing demand for credit from all sources become encouraging in views of the impetus given to the process of transformation from primitive agriculture to commercial agriculture. Lewis H. Nancy [1997] also put forward the views of Aristotle, ".....The mean of life must be provided beforehand by nature; for the business of nature is to furnish food to that which is born, and the food of the offspring always remains over in the parents. Wherefore, the art of making money out of fruits, vegetables, and animals is always numerals. In the light of his thought, the art of gardening and growing of more vegetables and fruits crops (horticultural crops) which can bring about development of the rural as well as urban to stand on its own productivity, producing marketed surplus for the market is needed in this demand driven world.¹⁶ Another French economist namely Sismondi also stated man as "Acquiring dominion over nature". He believes that wealth consists in such dominion and that it increases huge resources which are yet to be exploited fully. In the state of Manipur hills too, there are large areas that can be brought under exploitation for cultivation of garden and horticultural crops. Thereby, resources can be optimally used to expand employment opportunity, ensuring better income and better nutritional level in the state. The Physiocrats believes in the rule of nature. It is a system of thought based upon a believed in the existence of natural's law which must be followed, if men are to obtain their highest well being. This system was also rightly called as agricultural system and its allied activities called by Adam Smith. Vauban view labor, that in agriculture and subsidiary occupation especially horticulturists seem most important.¹⁷

¹⁵ Lewis H. Hancy, 'History of Economic thought' First Edition 1979, Surjeet publications, New Delhi.

¹⁶ Ibid p.6

¹⁷ P.S. Birthal, A.K. Jha, P.K. Joshi and D.K. Singh (2006) 'Agriculture Diversification in North Eastern Region of India: Implication for growth and Equity'. Indian Journal of Agricultural Economics, vol. 6, July to September 2006.

III. INTERNATIONAL ASPECTS OF HORTICULTURE

Horticultural activities also been widely prevailing all over the world, The Horticultural Development Company is a levy funded body which serves the commercial horticultural Industry in England, Scotland and Wales. This company used to fund high quality, essential applied research, development and technology transfer. All projects are approved by expert panels that represent each sector of the industries, encompassing over 300 different crops. [<http://www.hd.UK>, Dated 40/08/2010]. P.S. Birthal, A.K. Jha, P.K.Joshi and D.K. Singh [2006], hold the opinion that agricultural diversification as pathways for agricultural development. They maintained that demand for high value products such as fruits, vegetables, etc. has been increasing rapidly in the domestic as well as in the global markets. They closely examine the on-going process of market liberation and globalization in the domestic as well as in the global markets which are moving towards integration. Diversification led to growth and generates enormous income and employment opportunities for the farmers, small holders and rural laborers. Moreover, vegetables and fruits crops production are labor intensive, have low gestation period and generate quick and higher rate of yield per unit of land and laborⁱ. The republic of Congo also recognized the role of urban and peri-urban horticulture in ensuring food and nutritional securities and alleviating urban poverty.ⁱⁱ

IV. EXAMINING HORTICULTURE IN INDIAN CONTEXT

Horticulture research and development was at a very low ebb till the third five year plan and received meager attention even thereafter, however, the plan investment in horticulture research and development increases significantly since the seventh five-year plan which resulted in considerable strengthening of R & D infrastructure.ⁱⁱⁱ

Dr. Gautam Kalloo [2006] rightly pointed out that the horticulture sector has emerged as a potential player in the Indian economy, contributing 30% to GDP in agriculture from mere 8.5% area under horticulture crops as well as means of diversification in overall development of agriculture. Today, we are heralding towards Golden Revolution, as we have achieved tremendous increase in horticultural production as well as export potential, with increased returns to farmers and nutritional security to the masses.^{iv} On this regards, Dr. T.V. Ramana [2008] also says that India is the largest producer of fruits and vegetables. Vegetables are essential components of food. As per the socio-economic norms of the Indian society, a tray of meal contains the dishes made up of fresh, cooked or preserved vegetables. The role of vegetables is popular diet, especially where rice or roti and curry or chilly dishes predominates. Vegetable crops provide a better opportunity to farmers for diversification of their farming scenario and as part of agriculture, helps in improving productivity of land and generating employment. It also improves the socio-economic status to the farmers and provides nutritional security to the family members and other people as well. Being highly remunerative and labor intensive production of vegetable is better suited to small farms, especially where irrigation water is available. It may control the daunting challenges of food,

nutritional, and socio-economic security of the households through adopting consumer related commercial crops. Horticulture, especially fruits and vegetables offer good opportunity for income of the vegetable growers.^v In areas with lesser rainfall S.C. Tewari [1987] suggested that horticulture crops would play a major role in times to come. He cites several examples which are: cultivation of pomegranate near Poona, citrus and mango cultivation in Punjab and production of acid fruits in Rajasthan and Haryana-were cited in the discussion. The participants from Punjab also emphasized that labor being scarce in that area and horticultural crops being highly payoff crops in those areas where jhum cultivation is in vogue could prove immensely helpful in ameliorating not only the socio-economic status of the people but also the ecosystem. On this regards, The National Horticulture Mission (NHM) with effect from 2005-2006 stress on the holistic growth of Horticulture by adopting an area based regionally differentiated cluster approach. The main objectives of the mission are to enhanced production and productivity of horticultural crops, to reduce post-harvest losses, to improve nutritional security, increase farmer income and generate employment opportunities for the unemployed youth.^{vi} India with its wide variability of climate and soil is highly favorable for a large number of horticultural crops. It is the fastest growing sectors within agriculture. It contributes in removal of poverty; help nutrition security and has ample scope for farmers to increase their income and ensured nutritional securities and also help in sustaining large number of agro-based industries which generates huge employment. Our country has emerged as the world largest producers and exporter of tea, coffee, cash and spices, only 2 per cent of horticulture produce is proceed, 0.4 per cent is exported, and 22 per cent is lost or get wasted in market chain. Exports of fresh and proceed fruits, vegetables, cut flowers, dried flowers have also been picking up. India plans to increase the production to 300 million tons by 2012.^{vii} R. Swarup, B.K. Sekha and G.S. Vaidhya (1987) maintained that the uniqueness role of fruits played in developing countries like India; both in economics as well as social sphere for improving income and nutritional status particularly of rural masses along with small and marginal farmer are seen. The maintaining of orchards helps in maintaining ecological balances too. Further, horticulture is as such labor intensive crop therefore; production of these commodities ought to be encouraged in a labor abundant and capital scarce country like ours.^{viii} ICAR [2005] considered vegetables as potential crops for improving nutrition, food security and also to generate employment in the country. Vegetables, being rich source of nutrients can play significant role for improving the nutritional intake especially of pre-dominantly vegetarian population. Thus, the vegetable production has increase from 75 million tons in 1996-97 to 94 million tons in 2002, which account for about 14.4 percent of world production.^{ix} N. Rai, D.S. Yadaav (2005) also said that vegetables are sold at higher rate than cereals and grains. If they are sold at a cheaper rate in the peak production season, then it is due to their high yield; they have high monetary value. During rainy season, some vegetables give very good income in comparing to grain and fodder crops. Market gardeners create substantial income from intensive cultivation of limited lands. Thus, vegetables are importance source of farm income but for this, they must be sown early in the season. So

that they are available quiet early in the market ^x H.P. Singh [2008] discuss the issues on investment in horticulture in ninth plan (IX) and tenth plan(X), horticulture has played an immense role as highly productive in transforming an agrarian economy in many states, further stated an insight for reversing the trend of ever declining farmer's income and above all addressing the nutritional security and environmental concerns. The significant change in the last two decades have been that horticulture has moved from rural confine to commercial production leading to use of technologies management.^{xi} But to carry out this art of cultivation money plays an important role in it. Prof. U.K.R.V. Rao [1982] says 'credit is the life bloods of any program me. Therefore, credit is a matter of concern for every developmental work.

Vauban viewed labor in agriculture and subsidiary occupation like horticulture as horticulturalists seems most important. It was in 1954, that some concrete steps were taken up to strengthen horticultural research by setting few regional centre initiating co-ordinate schemes such as citrus die back, the use of growth regulator etc. A landmark was the organization of a small division made a significant impact by vegetable improvement projects and several improved varieties were released. Another development which leads to laying sound institutional basis for agricultural and horticultural research was the re-organization of a small division of horticulture in the Indian Agriculture Research Instituted during the second five years plan. The division made a significant impact by vegetable improvement projects and several improved varieties were released. Another significant development which leads to laying sound institutional basis for agriculture and horticultural research was the re-organization of the Indian Council of Agriculture Research in 1965.This resulted in the abolition of different commodity like coconut, areca nut, cashew nut and spices taking over entire research work directly under the council. In 1968, Indian Institute of horticultural research was set up; this institution serves as a focal centre of research on all horticultural crops and also co-ordinate the work on many important fruits. P.N. Mathur [1987] discuss the use of technology in the 'Operational Research Project' mostly confine to analysis of constraints in the transfer of technology, namely socio-economic, technological, cultural, institutional legislative etc., the special ORPs for the development of tribal farmers belonging to backward communities which form the core of the farming system. These projects are the vegetable and fruit production technologies. Similarly, the Lab to Land programs, which enables scientists to work with small marginal farmers including vegetable and cultivation as one of the important technological input.

The table 2.1 and 2.2 depicts the projected demand and area under horticultural crops in India. Its show that more demand is needed for more production by 2020 we would have to produce lots say fruits and vegetables to be 98.00MT and 220.00MT respectively and other crops in the same manner. And also the horticultural crops areas are expanding too; yet not as is expected. We need more land and intensive cultivation so as to expand the area under such crops to meet the future demand

Table 1.1 Projected demands of horticulture crops during 2020-21

Commodity	Production(MT)			Growth rate (%)
	1998-99	2011-12	2020-21	
1. Fruits	44.04	81.00	98.00	7.8
2. Vegetables	87.53	185.00	220.00	9.2
3. Spices	2.91	5.50	650.00	8.0
4. Coconut	10.27	20.00	24.00	8.4
5. Cashewnut	0.46	1.70	2.0	25.1
6. Cocoa, others	3.00	6.80	9.50	11.1

Source: Indian Horticulture p.1000 (ICAR)

Table1.2 Change in area under horticulture groups in India, 1990-2004(in '000ha)

Commodity	1990-95	1995-2000	2000-2004	1990-2004	Change in area
1. Fruits	483	512	1095	2090	28.75
2. Vegetables	258	915	506	1163	16.00
3. Flowers	29	16	18	63	0.87
4. Spices	211	284	2655	3150	43.33
5. Plantation crops	435	129	240	804	11.06
6. Horticulture	900	1856	4514	7270	100.00

Source: Ibid p.1001 (cited in Kumar and Mittal, 2003; Kumar et.al. 2004)

V. EXAMINING IN NORTH EAST INDIA

Dharendra Nath Borthakur (1992) elaborately pointed out and explores the overall potential and growth of Horticulture in North East Region. He maintains that North East region of India offers a favorable set of climatic conditions for cultivation of various types of horticultural crops such as fruits, vegetables, flowers, tuber and rhizomatous and spices etc. In case of fruits, the range varies from highly temperate types like walnut, apple, orange etc. to sub-temperate as well as tropical fruits and despite the scope for cultivation wide range of horticultural crops, the development of horticulture has not picked up as desired because of a number of constraints i.e. lack of proper marketing, problems of transport, processing adequate technology as well as the weak extension support in the field of horticulture.^{xii}

Analyses and discussion

Profile of the survey villages in Tamenglong District:

The ten villages that had been survey during September to December 2012 In Tamenglong District in Manipur State Viz. Tajeikaiphun, Puiloun, Longiang, Chiuluon, Farmland, Dailong, Piuleklong, Phallong, Namtiram and Siguilong. The total geographically areas of the survey villages are found to be 1029 sq.km approx. Interview to village chief or secretary were done to collect detailed information of villages and households information were collected through the head of every households. The study reveals that some villages are very old

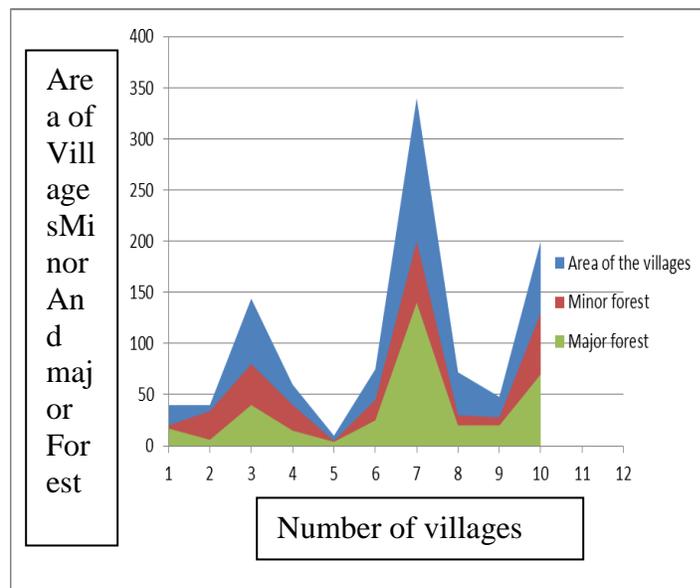
more than 2000 years of its village establishment and horticultural crops are grown at courtyard or backyard normally grown with fruits and vegetables crops since their fore-father days and were carried on till today. Every village has well defined demarcated boundary of its own. Some villages were found to locate at a very remote distance from district headquarter and sub-divisional headquarter. This in fact, has become a major problem in distribution of horticultural products for sale outside. For instance one village is located at 300 km away from subdivision headquarter. In all the villages' unexploited forest are still available. The area of the minor forest and major forest are 612sq.km, and 57sq.km, respectively. Mature forests have been reducing at a faster pace in the present days as compare to the past. So much concerted effort from government and public is the need of the hour. The areas of the villages, areas of the minor and major forests are given in table 1.1 and fig. 1.1 below; The survey reveal heavily availability of land for farming as indicated by areas of the villages,

Table: 1.3. Land profile (Village level studies)

Area of the villages	Minor forest	Major forest
40	20	17
40	34	6
144	80	40
60	40	15
10	5	4
75	45	25
340	200	140
72	30	20
48	28	20
200	130	70

Source: Compiled From Survey Data

Fig.3.1. Land profile in area graph



Transportation

These villages have steep and terrain with hilly mountains, having few pocket of valley between hill ranges. Most of the villages have unpaved way. People mostly transported agricultural and agricultural goods by human being on foot. They moved around village in foot only. There were no motor able road and no bus and sumo counter were found. The inter-villages and intra-village roads is at a rudimentary stages. This proves to be major hurdles for marketing of their horticultural produce. Therefore, total failure of road infrastructure all around an all the rural places of the state.

Demography and communication

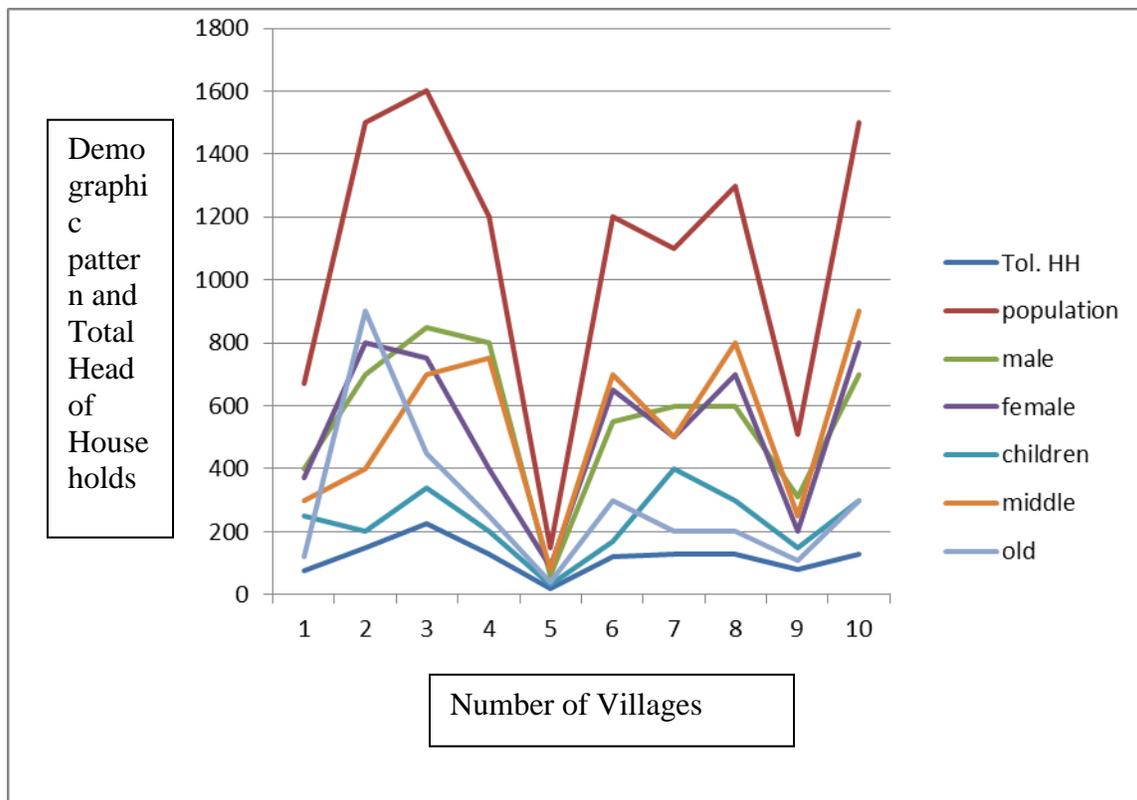
The total numbers of household in all survey villages were found to be 1191. All together the population is 10730, where males are 5570 and females are 5260. The male population is larger than the females' counterpart. These prove to be a boon for agricultural and horticultural activities. Children and Old age people are found to be 5380 and 2870 respectively. In the areas of communication; Communication facilities are a distance dream for many of the populace, few villages have proper Government post office and is the only vital mode of communication available. Out of ten villages, 6 villages were found having telephone landline connection and 4 villages were not. All the villages do not have access to Internet facility. But, cell phones are in used in all villages but network are accessible only at some places. The Demography patterns of all villages are given in table 1.2 and fig. 1.2 below; it's revealed from the data that workable population of the age group 15 to 45 are more in number including female as well as male. And interestingly male are slightly larger than the female. This is a significant factor that can be responsible for future growth of the horticultural sector.

Table: 1.4. Demography pattern

Total number of households	Total Population	Male Population	Female Population	Children Population	Middle age Population	Old age Population
76	670	400	370	250	300	120
150	1500	700	800	200	400	900
226	1600	850	750	340	700	450
130	1200	800	400	200	750	250
19	150	60	90	30	80	40
120	1200	550	650	170	700	300
130	1100	600	500	400	500	200
130	1300	600	700	300	800	200
80	510	310	200	150	250	110

Source: Compiled from Survey Data

Fig. 1.4 Demography pattern of survey villages



Identification of economic infrastructure

There have been no major and minor economic infrastructures in all the survey villages. There were none existence of bank and banking facilities in all villages. Four villages were found having local markets and 6 villages does not have even a market. People main occupations were cultivators and horticulturists. Some other occupation like carpentry, fishing, hunting, trader, retail shops, private school teacher, civil paid labour, soldier, police, shopkeeper, etc were found in a small proportion. Government employee are numbering one to twenty in almost every villages. Some saw mill, rice mill, small cottage

and handcraft equipment and industries are found. It is usually own and operated by individual who are having traditional skill and knowledge in that very handcraft.

Land system

Land accessible for farming is available in plenty. The areas of land available are 507sq.km. Parts of land are homestead land and barren land. Land ownership comprises mainly in three forms Individual Ownership, Community Ownership and Clan Ownership. In 9 villages no land alienation problems were found but one village have encountered such problem because of encroachment by other people. Land viable

for horticulture crops is abundantly available. It is found to be 459sq.km, in area that can be used for horticultural crops; villagers were continuing jhum cultivation but were no longer productive. They have been doing because of lack of alternative occupation for their livelihood and is no longer a highly rewarding activities anymore. The respondents in all the survey villages said, they can stop jhum as and when alternatives activities like horticultural activities are at their reached. They also want Government and Ngos too; to give them awareness and encourage farming financially, technologically and to build up skills of the farmer in pursuing towards highly rewarding activity like growing commercial and cash crops especially horticultural crops. And some villages were also cultivating wet land but in a small proportion due to unsuitability of the terrain, steep and undulating Mountains. About 64 Sq.km in area are used for wet farming. All kinds of fruits, vegetables, plantation, commercial, flowers, medicinal herbs have tremendously found viable and productive in the region. People are found heavily practicing horticultural activities in a smaller scale with the small saving of their family. Credit facilities and loans are absent completely to grow crops as large entrepreneur.

Irrigation

Six villages were found having no irrigation facility but only four villages have irrigation facilities even these are from natural sources like river, stream and rain etc. The villages used untreated water for drinking as well as for washing and bathing. The water is normally of hard and soft water which is rich in acidity contained as a consequence of which most people had suffered from stomach problem. Water is abundant, being rainiest district with heavy precipitation during rainy season. They would not have water scarcity problem both for field and family; if they conserve rainwater. But such facilities are not available till this survey. Drastic and major attention can be paid towards irrigation, safe drinking water and for field and farm by government and policy maker of the state.

Flora and Fauna

Varieties of wild animal four footed, reptiles, insects, worms, bird are enormously found. Animals like fox, hornbill, tiger etc, are even found in the past decades but now they are on the verge of extinction. So, also migratory birds are seen, during winter season in some villages. Numerous wild orchids and medicinal herbs are used by practitioners who are skill in traditional medicines'. Mushroom of mostly of fungi bacteria are found in every village. Reptiles like python, cobra, others spices are founds and lot of birds like hornbill, kites, eagles, parrot, mynah, cuckoos, etc are also available. Numerous frogs, turtles and water animals and many others animal are still in the forest. These animals are mercilessly killed and hunted for meat, skin, and bone etc.

People, culture, health care and nutrition

The people mostly who inhabited in Tamenglong district are Zeliangrong Nagas, administered by villages republic and normally ruled by elders (Gerontology). They have got various accounts of folk song and folk tales having distinctive and elegant culture with no thief or robbery, people are innocent and hardworking. Beggars are out of sight people lived by a way of

egalitarian society with high moral values and crimes are very few. They have rich culture which are seen in traditional dress and ornaments of men, women and old people, usually made and design for various occasions and feasting. Women are highly respected but normally submissive to husband. There were few instances of domestic violent and harassments meted to womenfolk. Hardly, written materials are available because people normally learnt by oral basis. Folk song and folk tales relates to romance, amity, battles, harvest, sowing, farming, patriotic, legend, moral value, etc. These people are normally freedom loving people and normally do not bow down to external rule or encroachment within their village periphery. They are open minded and simple people, rarely no family or household made fencing around the house.

Everyone is allowing visiting and going free, this inter-mixing of all and oneness is common features of their life. These people are deprived of health care facility and their food and dietary habit are very low. No good hospital, no doctor and nurse in most villages. Few villages have avail of such opportunities. Therefore, people died of even minor diseases, pregnant women die off during child birth, normally children are malnourished and their growths are stunted and retarded. People mostly consume home grown fruits and vegetables including roots and fibrous substances and all kind of wild green leafy vegetables. Luckily, they consume lot of green and fresh fruit and vegetables free from chemical Like NPK.

Forest Products Consumption and horticultural crops grown in the villages:

The people depend on forest for survival, dwelling, food and for fuel. They depend mainly for timber for house construction, wood for firewood, canes and bamboos for small scale industries and cottage industries products like basket, winnowing fan, and bamboo mat etc. Even for meat they preferred wild meat.

The survey revealed that tremendous scope and potentiality for production of horticulture crops in greater scale.

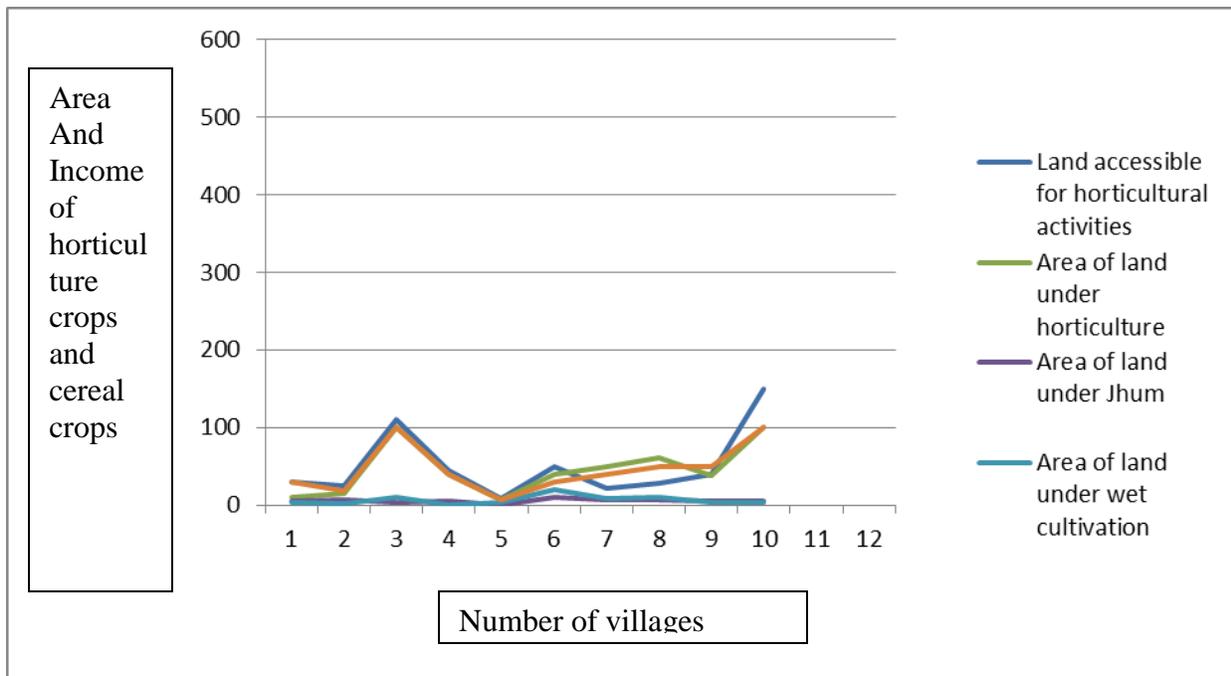
All kinds of horticulture crops are viable and earn an additional income to every household. Yet, majority of the households are not producing for market but only for self consumption and to earn just an extra-income for the family. There are about 464 sq. km of land that can be utilized for the growing. There are lot of central sponsored schemes for rapid expansion of horticulture in the region; but not any schemes reaches them on time and much farmer are without such schemes. It is reported by farmer that fruits, vegetables, woody perennial plants, floriculture, plantation crops, ornamentals, orchids, cash crops, and medicinal herbs are very much favorable to their land and topography of their land, climate, weather and sunshine. So people are eagerly waiting for such project to take up in a larger scale. The land availability figures are also shown in table 1.3 and fig. 1.3 bellows; the data revealed that enough land are available for horticulture expansion than wet and Jhum cultivation. The availability of land in averages were follows; 6.4 sq.km for wet land, 46.4sq.km for horticulture potentiality, 50.7 sq.km area for accessibility of horticulture, 49.9sq.km of land under horticulture crops and 5.2 sq.km of land under Jhum.

Table 1.5 Potentiality of Land for horticulture

Area of land under wet cultivation	Potentiality of land for horticulture	Land accessible for horticultural activities	Area of land under horticulture	Area of land under jhum cultivation
3	30	30	10	5
2	18	24	15	6
10	100	110	100	3
0	40	45	40	5
4	6	8	6	0
20	30	50	40	10
8	40	22	50	6
10	50	28	60	7
4	50	40	38	5
3	100	150	100	5

Source: Survey data (Village Level)

Fig.1.5. Potentiality and availability of land for horticulture shown in line graph



Storage facility

Out of ten survey villages, eight of them have no storage facilities and only two have got it. Mostly, they constructed a separate hut to store the horticultural produce. These products were sometimes spoiled by rodent and rat. But most people usually store beneath bed, on the corner of corridor, in the backyard and in the kitchen roof where fire smokes are reaching. This is one area that should be look into for further development of horticulture in the region.

Educational institution

Only 17 Governments Institution mainly primary and middle school were found in the surveyed villages only one private institution are found. This indicates a deplorable way of educating the rural people. Many people could not get proper

education in their formation age so even those who have talent no longer get education and people have no tastes and liking for education. This has been a setback for improving their living standard. Even majority of the farmer don't know the three R's i.e. reading, writing and arithmetic.

Historical account

Every village has some sort of historical account of village's formation, dwelling and historical sites which is important to them. Most common monument founds are caves, megaliths, stone inscription, Village gates, ritual spots etc., and also in olden times some villages have informed about the existence of extra-ordinarily strong men and women of their times.

Employment status and credit availability

In all the villages people are found getting job in the government as well as in private. But the number of employed varies from merely 10 to 20; out of some 90 to 150 households in every villages. Very few people are occupied in A-class jobs and many who are employed are in C-grades and D-grades. The total people employed are 417 persons and 20 are in private jobs as revealed from ten villages. This small proportion of people cannot do much for the progress and development of an area or locality so, it is felt a strong need to give them every person self employed by way of exploiting the resources available within the villages and thereby creating jobs avenue at their own places. Normally, the working hour is 9 to 10 hours as reported. Credit facilities are nil, the only money that is circulated is own saving and day today wage earning of the villagers. Therefore, availability of credit is necessary for them; to take up any venture which needs to be addressed by the government of the land. Assessment of climate change, the climate has slowly and gradually transforming from good to bad. It is revealed that all the villages were found complaining of the hotness of the weather as compare to the past decades. Even weather condition during a day is complicated to decide. However, pollution of land, water and air is not observed; but these need to be scientifically proved by an expert. Productivity and fertility of the crops, land and soil have depleted and eroded. Trees are cut rampantly. Landslides are common in every rainy season. All these factors revealed that there is no seriousness on conserving nature and protecting environment from destruction. Matured forest which is larger than the minor forests in the past have now indicates the opposite. Minor forest is far more than that of mature one, Water, pond, small river and lake, etc., were becoming dry and pond are becoming shallow and fresh water are becoming scarce. Therefore, the survey confirm, environment are very much venerable and remain an issue within building rural ecology cycle. This sustainable environment agenda will be rightly address when more awareness is given to all and sundry to the villagers.

Research Methodology

A Structured Questionnaire were administered in ten Villages of the District, Information were seek from either chairman or secretary of the respective villages. The surveys were done purposively after pilot studies being carried out. 180 households were also interviewed as sample size, 20 households were picked up from the large villages and ten households from smaller villages. Three villages each were taken for survey from two large subdivision and two villages each were chosen from smaller subdivision. The districts have four subdivisions. Therefore, the survey is a complete description with equal representations. Therefore, the finding will reveal the actual status of the horticulture status, scope and potentiality in the district.

VI. CONCLUSION

The study confirmed that the district Tamenglong which is remotest and backward among 500 backward districts in the country has been surviving primarily on Jhum cultivation as main occupation. This occupation has no more rewarding as

usually done in the past decades. So people have been on a look out for more rewarding activities' like horticulture activities in the region. People have been rising horticultural crops with own saving and government did not pay much attention. So necessarily they remain backward. The survey confirmed that the horticulture sector would be the only lifeline for this people. Since, they have tremendous land, potentiality and viability for growing all kinds of horticulture crops. The upcoming Tran-Asian Railway connecting jiribam to tupul via Imphal to Myanmar connecting South East and South West Asian countries is a green signal for future growth. So also the International Highway I & II that would change the market structure of the entire north East and South East Asian countries. Therefore in such scenario, the district has no way to stay backward anymore as it used to be now. This way employment, income and standard of living and will gradually change the economy structure of the district and people will be more prosperous by undertaking this best alternative form of cultivation, in this market integration and globalised world.

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