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Collision Avoider Using Lane Departure Warning

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Abstract- Today, one of the largest areas of research and development in the automobile industry is road safety. Many deaths and injuries occur every year on public roads from accidents that technology could have been used to prevent. The latest vehicles sold boast many safety features that have helped to lower the number of accidents on the roads. Even today, a person has to manually monitor the vehicles coming from behind through their rear view mirrors and any sort of mistake while monitoring can lead to fatal accidents. Several systems for Obstacle Detection and assist are present namely Lane Departure Warning, Reverse Assist, Drift assist, Blind Spot Monitoring etc. All these systems exist in the high end vehicles but as we know that a driver driving a low end car also has a life that is precious too. So, a system should exist that must be present in these vehicles so that they can avoid themselves from being getting trapped in the mishap. This concept is completely new. This system is mostly used at the time of overtake on highways. If the distance of the vehicle coming from behind is in your vicinity, then our vehicle is not allowed to overtake the vehicle in front of us. If the distance of the vehicle coming from behind is outside the vicinity then our vehicle is allowed to overtake the vehicle in front of us. Here we will also calculate the drift in the vehicle and avoid it from getting collided.

Index Terms- Lane Departure Warning, Obstacle Detection, Arm processor, PIC Controller

I. INTRODUCTION

ACCORDING to the National Highway Authority of India (NHAI), 41% of the total traffic accident casualties are the results of the abnormal lane switching/departure on the road, which is also the major cause of the traffic accident in the list. Driving under toxication, tiredness, inattention, and etc. are among the common causes of abnormal lane departures. Thus, developing a method to keep the vehicles on the normal lane and path is a core issue of the research and development of the intelligent transportation system. A Lane Departure Warning system is a utility which can assist drivers to maintain proper driving within the lane and also warns them when the vehicle is departing from the current lane so that the driver is reminded in time to make appropriate actions, such as checking the neighboring objects and signaling the turning lights. The system can also alarm the drivers with lights and sounds to recover the drivers from unexpected/abnormal driving situations as mentioned earlier so as to minimize the accidents caused by this kind of abnormal driving. In the earlier studies of the Lane Departure Warning system, a powerful computing machine and large size memory are required to conduct the heavy calculation of the computer vision and graphic processing algorithms [2]. This kind of hardware platforms cannot be applied directly to the

general vehicles for real life operation because of the issues of cost, size, durability, reliability, and etc. In order to develop a realizable implementation of the Lane Departure Warning system, this study has to find a easier method but still reliable approach so that it can be conducted in the embedded system which costs less resources and space and can be accepted by the general drivers and carmakers.

There are methods of image processing used to detect the Lane departure but as we know it's an expensive approach and also it has several constraints like an LCD should be present to display the drift and hence, we are here trying to implement this system which should have a very low cost and should be applicable in all the vehicles. Instead of image processing technique we will achieve the Lane Departure Warning using sensors.

Here, in this system we are trying to implement two technologies namely Obstacle Detection System and Lane Departure Warning. By combining these two technologies, we are going to create a system that will help you to avoid the collision on high speeds. Overall speaking, to implement a real time Lane Departure Warning system on the embedded platform, an easier approach has to be developed which motivates this study. In this paper, the system functionality and hardware structure will be reviewed first, followed by the concept of lane recognition method developed by this study. The project is mainly divided into following modules that are combined together to achieve the desired goal of Obstacle Detection. They are as follows:

1. *Lane Departure Warning:* If a vehicle unintentionally departs from its lane then the driver is notified.
2. *Obstacle Detection:* The basic aim is to achieve avoidance of collision.
3. *Blind Spot Monitoring:* There are several spots in the vehicles from which the driver cannot see. So in order to avoid the collision these spots have to be monitored.

Manufacturers of road vehicles have also been working to reduce the number of accidents. They have used the latest of today's technology to make vehicles that are much safer than their predecessors. Advances in computers, materials, electronics, and other areas have allowed them to decrease the number of accidents that their vehicles are involved in, and improving the chance of the occupants walking away from an accident without injury. Today, many buyers of new vehicles list safety as one of the highest priorities when choosing a car. Manufacturers have long known this, and use safety as one their main selling points for their products, as can be seen in most Volvo, Mercedes Benz, or Renault advertisement. A new and fast growing area of vehicle safety is collision detection and avoidance. This has only come about lately from the advances made in computer technology, image processing, electronics, and the falling price of the cost of the hardware. Companies like Mercedes Benz utilize a radar system ("Pre-safe") on the S series

cars that can detect obstacles in the path of the vehicle, and apply the brakes faster than the driver can. It also uses this system to have adaptive cruise control. This allows the car to regulate its speed according to the car in front under cruise control.

Our method is based on ARM processor and several sensors that will work in real time to acquire the information from the surrounding environment and pass this information to the processor for processing and decision making and thus will guide the driver if the overtake is allowed or not.

In section II related work is discussed. In section III Hardware implementation is described. In section IV Lane Departure warning is described. In section V Obstacle Detection and Blind Spot Monitoring is discussed. The conclusion is presented in section VI.

II. RELATED WORK

In recent year, Din-Chang Tseng and Chun-Wei Lin have used DSP based embedded system devices. Since the computing power and memory size of the embedded system are not as good as those on a personal computer, special techniques have been applied in the algorithm to enhance the performance of lane recognition while maintain the reliability of the results. Furthermore, the edge enhancing filter can washout the foreign objects in the region of interest and keeps the lane markings with tilt/slope pattern. Using these two tools as the basis, the applied algorithm can detect the event of lane departure and alarms the warning to assist drivers for driving safety on the road. The system is implemented and tested on a DSP based embedded platform which can perform the required processes in real time under various weather conditions. This paper describes a lane recognition method for the lane departure warning system of smart vehicles and the algorithm implemented in a dual core ADIBF561 600MHz DSP embedded system to verify the functionality. The key function of the Lane Departure Warning (LDW) system is to help the drivers continuously monitor the lane markings on the roads. When drivers behave abnormally, because of tiredness, illness, or inattention, the vehicles will move away from the center of lanes unexpectedly. The Lane Departure Warning system can emit lights and/or sounds warnings to alert the drivers to correct their driving to avoid possible traffic accidents. However, to avoid a false alarm, the system will not alert if the turning light is signaled by the drivers while switching lanes, which is deemed as a normal operation.

Diarmaid O Cualain, Dr. Martin Glavin have worked on both Lane Departure Warning and Obstacle Detection using Blind Spot Monitoring to create a system that will help the driver to keep the vehicle in the lane and avoid any unwanted lane changes. They have done several studies regarding the Lane Departure Warning and have used image processing technique for the same. For Lane Departure Warning they have used Clustering Algorithm to find the amount of deviation that arises when a vehicle deviates from its position and then depending on the cluster center the corrective action is taken. And for the Obstacle Detection System and Blind Spot Monitoring they have used Edge detection Algorithm. Advances in computers, materials, electronics, and other areas have allowed them to decrease the number of accidents that their vehicles are involved in, and improving the chance of the occupants walking away

from an accident without injury. Today, many buyers of new vehicles list safety as one of the highest priorities when choosing a car. Manufacturers have long known this, and use safety as one of their main selling points for their products, as can be seen in most Volvo, Mercedes Benz, or Renault advertisement. Here in the paper, several automobile manufacturers have been discussed where these technologies are being used. Many automobile manufacturers are starting to equip their vehicles with video cameras positioned at various places around the body of the vehicle. This is done in a bid to remove any "blind spots" that he or she may have when driving or reversing. The cameras are also finding applications in other areas of road safety. Honda has developed a system that utilizes one of these mounted beside the rear-view mirror that recognizes the lane the vehicle is travelling in. It applies this information in steering to keep the vehicle centered in the lane.

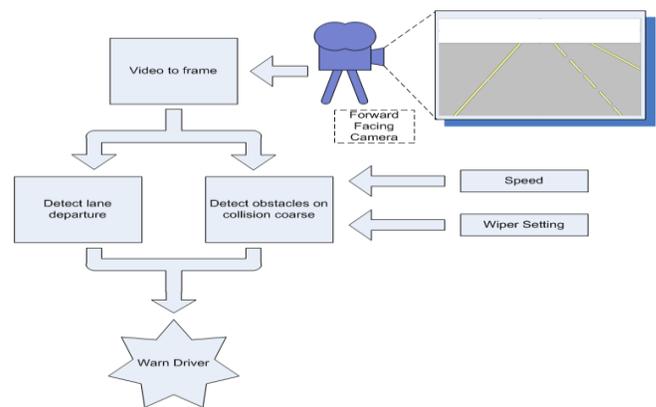


Fig 1: The basic description

Zehang Sun, George Bebis and Ronald Miller have worked on vehicle detection using optical sensors. In this paper they have shown that with the use of optical sensors the vehicle detection gets much easier. Also as we know, the most common approach to vehicle detection is using active sensors such as lasers, RADAR, or millimeter-wave radars. They are called active because they detect the distance of an object by measuring the travel time of a signal emitted by the sensors and reflected by the object. Their main advantage is that they can measure certain quantities (e.g., distance) directly requiring limited computing resources. Prototype vehicles employing active sensors have shown promising results. Optical sensors, such as normal cameras, are usually referred to as passive sensors because they acquire data in a non-intrusive way. One advantage of passive sensors over active sensors is cost. Also, the majority of methods reported in the literature follow two basic steps: (1) Hypothesis Generation (HG) where the locations of potential vehicles in an image are hypothesized, and

(2) Hypothesis Verification (HV) where tests are performed to verify the presence of a vehicle in an image

Thus we have seen that lot of work is being done in the passenger safety and vehicle collision avoidance but all these features and systems are present only in the high end cars and none of such safety features are available in the low end cars anywhere. Also the proposed system combines two techniques to

create a much efficient system for vehicle detection and collision avoidance.

III. HARDWARE SET-UP

The system for object detection and Lane Departure Warning is based on ARM. The data is acquired using the sensors that are IR and Ultrasonic sensors. Also, if there is a collision the message is passed to the emergency services or the kin of the passenger with the use of GSM informing about the crash. ARM processor used is LPC 2138 along with the peripherals and a speaker system for the announcements. In order to get the speed, here, we are using the RF module and the speed will be displayed on the LCD panel. the block diagram for the system is as followed in Figure 1.

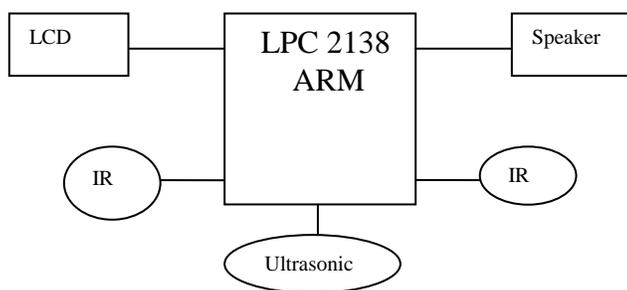


Fig 2: Hardware used in implementation

IV. LANE DEPARTURE WARNING

A lane departure warning system is a technique designed to warn a driver when the vehicle is moving out of its lane (unless a turn signal is on in that direction) on freeways and arterial roads. These systems are designed to reduce accidents by looking into the main causes of collisions: driver error, distractions and drowsiness. There are two main types of systems:

1. Systems which warn the driver if the vehicle is leaving its lane (visual, audible, and/or vibration warnings).
2. Systems which warn the driver and, if no action is taken, automatically take steps to ensure the vehicle stays in its lane.

Lane warning/keeping systems are based on:

1. Video sensors are used (placed behind the windshield, typically integrated beside the rear mirror)
2. Laser sensors (placed on the front of the vehicle)
3. Infrared sensors (placed either behind the windshield or under the vehicle)

As we know, this system has been implemented in several cars by various automobile makers. This technology was first used by BMW motors. It helps driver to avoid any unintentional lane change and thus prevents collision.

V. BLIND SPOT MONITORING

A collision avoidance system is an automobile safety system is made to reduce the affect of an accident. It is also known

as precrash system, forward collision warning system or collision mitigating system; it uses radar and sometimes laser and camera sensors to detect an imminent crash. Once the detected, these systems either provide a warning to the driver or take action without any driver input (by braking or steering or both). This system is often used with a Blind Spot Monitoring technique.

A blind spot monitor is a vehicle-mounted sensor device that can detect other vehicles placed towards driver's side and rear. Warnings may be visual, audible, vibrating or tactile. Also, blind spot monitors may be even more than just monitoring the sides. It can be "Cross Traffic Alert," "that alerts driver backing out of a parking space when traffic is approaches from the sides.. This method was first given by George Platzer in a 1995 paper. The method takes some time getting used to it. Hence trained drivers are used to calculate the time and distance, and thus, this method is cheap for testing of the expensive technology instead of automating the drive test. Thus based on the calculated time, drivers can take the time to set up and use their mirrors properly.

George Platzer received a patent for the blind spot monitor, and it has been incorporated into various products associated with Ford Motor Company. The blind zone mirror has been touted as "an elegant and relatively inexpensive solution "to this problem. BLIS stands for *Blind Spot Information System*, a system of developed by Volvo. This system was first introduced on the 2007 Volvo S80 sedan and produced a visible alert when a car entered the blind spot while a driver was switching lanes, using two door mounted lenses to check the blind spot area for an impending collision. The system utilizes two ultrasonic sensors for the vehicle to detect objects, including other vehicles, pedestrians and other possible obstacles, in the blind-spot area. The information feedback received from these sensors is transferred to a processing unit. Once any object is detected within a predefined area or a specified distance, the application alerts the driver that the object is in the blind-spot.

The rear-view mirror is unhelpful when an overtaking car is in the blind spot. In this contribution we describe the software implementation of an algorithm to monitor vehicle overtaking processes. The original sequence is pre-processed using the Sobel edge detection. This system helps drivers to avoid a crash with a vehicle in the neighbouring lane by continuously screening the blind spots to the side of the vehicles. The blind spot is the area not covered by the driver's line of sight and mirrors. This is particularly dangerous when changing lanes on a multi-lane road. Blind Spot Monitoring uses radar, camera or ultrasonic technologies to monitor the blind spot area of the vehicle. If a moving object is detected within the specified zone, a warning signal is issued. Warning signals vary from one version of the system to another and include visual, audio or haptic signals.

VI. CONCLUSION

Thus, we can combine the techniques of Lane Departure Warning, Obstacle Detection and Blind Spot Monitoring to create a system that would be much efficient as far as a single technology is concerned. This technology can be effectively implemented in lower segment vehicles and the class of the vehicle will hold no importance for this technology to be

implemented. So, by using it, we can assure the reduction in the number of mishap that do occur on the highways and make driving a pleasure instead of worry.

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Dynamics and Adjustments of Malay-Muslim Cross-Border Rice Traders in Narathiwat Borderland, Thailand

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Abstract- Muslims had been living in Thai and Malaysian borderland and interacting across the borders even before the two states were officially established. After WWII (1946 A.D. or 2489 B.E.), the Thai government monopolised rice export and set the rice price two or three times lower than the price in Malaysia and Singapore. A significant price difference was a starting point of unofficial rice trade which turned into a multitude of trading activities in the past 67 years. Cross border rice trade faced difficulties with strict border controls from Thai and Malaysian authorities. As a result, the traders needed to adjust and negotiate with the law by using various trading strategies including a network of relatives, friends, people from a similar racial group, Ant Army smugglers, the patron-client system, trust, a change of role from a trader to a network coordinator to reduce investment cost and risks, and partnerships between networks to share job roles and trading points.

Index Terms- Dynamics and adjustments, Malay-Muslim cross-border rice trader, Borderland

I. INTRODUCTION

Malay-Muslims have been living in the borderland of Narathiwat Province in Thailand and have been trading with the borderlanders in Kelantan, Malaysia for a long time. The cross-border trading in this region has a long history. In the earlier days, oxen and ox-carts were used in the trading. When the rice trade began, human labour was used to carry rice across the Thai-Malaysian border.

Several factors made Malay-Muslim cross border rice trade possible; firstly the similarities in language, religion, belief, customs, rituals, folk and games, secondly kinship both by bloodlines and marriage, thirdly a geographical feature of Golok river which dries up in the summer allowing people to walk across, and finally a better rice quality and lower price of rice grown in Thailand. These strengths encouraged the borderlanders to continue the trading, adjust, and employ group or network strategies to negotiate with the Thai and Malaysian government policies and border controls.

The relationship in the Malay-Muslim cross-border rice trade comprised both vertical and horizontal relationships. The vertical relationship was a personal engagement in kinship systems while the horizontal relationship was formed through trust among professionals in the network. The relationship made the cross border rice trade thrive and the trade was considered a

good part-time job for the locals. Rice trade had indicated the prosperity of the borderland community until the Malaysian government launched a policy to make Kedah State a major agricultural state and introduced various strategies to promote the industry such as the irrigation system, profit sharing and compensation scheme, construction of a paddy museum, sanction on rice import, and reinforcement on border controls. Moreover, the aggravation of political unrest in Thai Southernmost provinces since 2004 (2547 B.E.) resulted in stricter border controls. Several checkpoints were closed. This did not affect only the cross border rice trade, but also the employment of young male labourers carrying rice across the border. Day labourers used to be a first step to employment for the youth in the village. When hours, days, and trips of work were reduced, with low education at the primary level, the labourers struggled to earn enough to support their families. Some decided to find work in Malaysia. Some became members in the local Muslim rice retailers' network.

The phenomenon in the borderland communities was found very striking. This study would then explore the dynamics and adjustments of Malay-Muslim cross-border rice traders in Narathiwat Borderland, Thailand.

II. LITERATURE REVIEW

Studies of social phenomena and movements of the borderlanders have become of the interest in mid 90s (Faist, Thomas. 2004, p.1) especially in terms of cross border exchanges and transactions.

Cross border transactions were carried out in two ways; transactions through custom clearance and transactions without custom clearance which could be legal transactions or illegal transactions depending on intentions and circumstances. Cross border trade between Thailand and Malaysia was carried out through four channels. The first channel was a temporary permitted area which was open to promote humanity and local relationship and to accommodate goods and services exchanges and border commuting. The second channel was temporary crossing point which was open to mainly benefit Thai economy. Its temporality had a definite time frame and had no threat to the national security. The third channel was a permanent crossing point formally agreed by the two countries' governments for trading, commuting, and international relations. The last channel was a natural pass which was a geographical feature of the borderland convenient for border crossing. This channel was not

officially permitted by the two states and was used as a point for illegal transactions (Jittima Kuptanon. 2005, p.1-3). It was noticed that the border points between Thailand and Malaysia had been used for migration, communication, trade, resource exchanges, and labour exchanges for a very long time.

It was found that illegally exported goods at Narathiwat borderland were rice, fresh fruits, clothing, and plastic and aluminum products. The smuggling routes were the Golok river route along Amphor Waeng, Amphor Su-Ngai Golok, and Amphor Tak Bai, the automobile route, and the train route by Ant Army group (smugglers). The illegal trading was difficult to intercept by the officials for many reasons. Firstly, it was due to a unique geographical feature of a river which allowed people to commute to each other by boat. Secondly, it was due to family and kinship systems of the people in the borderland. People had been trading for a long time and smuggling was seen to be an honest profession to earn a living. Suppression of the activities would affect the lives of so many villagers, most of whom were Muslim. Thirdly, there were an insufficient number of officials to patrol. Lastly, every day there were seven train journeys across the border and the smugglers could spread across different trains waiting to get on the train near the departure time or using different stations (Chapa Chittpratoom. 1997, p. 68–86 and Ati Kusagayavong. 2001, p 58, 76,145).

The studies of cross border trading in other regions of Thailand such as the Thai-Lao borderland found that the factors which encouraged unofficial cross border trade were a high rate of import duty, families and kinship systems, networking systems, personal relationships, and trust among the groups. The trade did not only rely on the network and informants, but also on the bribery culture of the officials which included regular fees and one-off convenience fees. The trade could survive with support from some officials who coordinated across the border as well as support from local officials such as a village sheriff. The illegal trades were commonly found at a temporarily permitted area (Prasert Rangkla. 2007, p.14; Bank of Thailand, Northeastern Region Office. 2003, p.87,94; Noppamas Komkum and Sirijit Rattanadara. 1989, p. 124 and Kanjana Chottawon. 2001: p. 48-81).

It can be summarised that the characteristics of unofficial cross-border trade in Thailand were firstly the use of a network system to transport goods to the destination, secondly negotiation strategies, thirdly trade and duty policies which encouraged illegal trade, fourthly the power of officialdom in the borderland, and finally the exploitation of legal loopholes to accommodate the industry.

III. METHODOLOGY

In the study, data was mainly collected from fieldwork experience by an observation, individual and group interviews, group conversation, and case study stories. 17 subjects of the study were interviewed. The subjects were divided in seven groups; 1) business investors and retailers 2) trade coordinators 3) Ant Army group (smugglers) 4) informants or sources 5) local officialdom 6) community leaders including village sheriff and deputy sheriff 7) Imams (Islamic worship leaders)

To collect the data, the researcher did a survey in the Thai borderland area which was connected with Kelantan border in

Malaysia. The survey was done on foot along Golok riverbank from Amphor Tak Bai, Amphor Su-Ngai Golok, and Amphor Waeng, in Narathiwat Province. From the survey, more than 30 rice trade points, some of which were in a temporary shelter, were found along the 92 kilometre trip. The initial interview from the field trip revealed interesting information about the dynamics and adjustments of Malay-Muslim cross border rice traders.

IV. HISTORY OF CROSS-BORDER RICE TRADE IN NARATHIWAT BORDERLAND

Four Districts in Narathiwat Province namely Amphor Tak Bai, Amphor Su-Ngai Golok, Amphor Waeng, and Amphor Sukirin borders Kota Baheu, Rantau Panjang, and Pasia Mas in Kelantan, Malaysia. The Golok river lies on the border between Thailand and Malaysia. It is 95 kilometre long. The river originates between Amphor Waeng and Amphor Sukirin, then flows through Amphor Su-Ngai Golok and flows into the Gulf of Thailand at Amphor Tak Bai (Border Patrol Police Sub-division 43, 1992: p.11).

People from both sides of the Golok River had been commuting to each other before Thailand relinquished its claims over Kelantan, Terengganu, Kedah and Perlis to Great Britain in 1909 (2452 B.E.). A.L. Peter Gosling (1981: p. 27-36) documented, “traditional trading activities involved an exchange of natural products from the domestic consumption in the region which were superabundant. The trade was operated by the local traders who were not under constraint of political rules.” This was corroborated by an account of an elderly person from Barn Dorn Bay (interviewed on the 25th of March 2008) who said that when he was young a Malay barque came up to Kanchanadit (a district in the province Surat Thani) to exchange brass for rice. This indicated that rice had been abundant in the South of Thailand as Suwaphan Sanitwong Na Ayuthaya (1990: p. 11-148) stated “Rice mills were found throughout the south of Thailand. In 1923 (2466 B.E.), 25% of rice was exported to Singapore and Melayu as it was believed that Thai rice had better quality than rice from Burma, Indonesia, and Vietnam.” During the colonial period in 1917 (2460 B.E.), the Thai government constructed the southern railway line through the Jantulee rainforest to Su-Ngai Golok canal to connect with the Malay railway line (Thaksin Salatan, 1983: 51-59). The name “Jantulee” rainforest was named after a type of a very big tree taking two or three grown people holding hands to fully encircle. Jantulee also means “so dense that the noise cannot pass through” (“Knowing Su-Ngai Golok”, Dan Tai Journal 18(14); August 2000:42-43). In a local Malay dialect, “Tulee” means deaf, which can also be compared to the density of the forest.

The railway connection between Thailand and Malaysia affected the coastal trading between Pattani, Kelantan and Terengganu. The construction of the roads along the east coast of Malaysia encouraged goods transportation in automobiles instead of sea trading (A.L. Peter Gosling 1981: p. 27-36) while, in fishing, sailboats were also replaced by motorboats.

Fifteen years later in 1932 (2475 B.E.), the Thai government established Su-Ngai Golok checkpoint at Su-Ngai Golok train station to facilitate import and export trade services by train

between Thailand and Malaysia (Chapa Chittpratoom.1997:68-86). Su-Ngai Golok was then upgraded as a municipality district in 1940 (2483 B.E.).

After the declaration of independence in 1957 (2500 B.E.), the Federation of Malaya was formed in 1963 (2506 B.E.) (Patya Saihoo. 1966:37-53). At the time, people could still commute across the border freely. Commodities were traded. Border markets were established to accommodate a larger demand of trades. A former retailer in a border market commented, "My family had been trading rice since I was very young. It started from a very small casual trading. Then more and more buyers came from Malaysia. More people became traders too. It finally became a big market. When the market was closed down in 1997 (2540 B.E.), I stopped the trading." (interviewed on the 11th of April 2008).

In 1965 (2508 B.E.), the Thai and Malaysian governments increased the degree of strictness in border controls by using the existing legislation and through the cross-border agreements. The first agreement which was signed in 1965 (2508 B.E.) (Dollaya Tiantong, 22 (1); 2001:32-42) focused on six areas as follows; 1) the controls of smuggling and fishing 2) the controls of movements of citizens 3) cooperation in national security through training, information exchange, visits of state leaders, and military collaboration 4) social and economic development 5) joint development plan for the overlapping claims over the land 6) joint support for hardship and disaster. The border control policy focused on national security while the cooperative borderland development policy was designed to support macro trading and export.

When trading and tourism in border districts had grown, the Thai and Malaysian governments had an agreement to construct Su-Ngai Golok bridge, a road bridge crossing Golok river, allowing people from both countries to commute to each other (Chapa Chittpratoom.1997:68-86).

30 years later in 2008 (2551 B.E.), another bridge crossing Golok river was built connecting Buketa village in Waeng District, Narathiwat Province, Thailand with Bukit Bunga town in Kelantan, Malaysia. However, a lot of people still used unofficial crossing points to commute to each other. The borderland played a bigger role than being a boundary of the nation. It was a cultural space for the locals.

Although several official crossing points were established, local Malay-Muslim rice traders always sought for alternative routes along the Golok river to continuously affiliate with the cross-border trade networks.

V. DYNAMICS AND ADJUSTMENTS OF MALAY-MUSLIM CROSS BORDER RICE TRADERS IN NARATHIWAT BORDERLAND, THAILAND

In the past 67 years, the Malay-Muslim unofficial rice traders in the borderland of Narathiwat province have been negotiated with the changes of border controls policies. The dynamics and adjustments are divided into five eras.

1. State rice trade monopoly and the beginning of unofficial rice trade (1946 – 1971 approx.)

After WWII in 1946 (2489 B.E.), Thailand was forced to pay the war reparations to Britain with 1.5 tons of rice. To make such a great payment, the Thai government had to monopolise

rice trade and had full control over rice export to be able to buy rice from its domestic market at low price (Narong Phetprasert et al., 2005: 14-15). The government only allowed Khlong Toei Port to be the only export point in the country. This encouraged people to hoard rice and smuggle it across the border.

The rice trade administration was centralised in Bangkok with committee members to authorise rice trade activities. Thai rice mills' society, Rice traders' society, and Rice exporter' society were set up. The government regulated rice control and rice movement law. The regulations made it impossible for the rice producers (the mills) and the rice traders (exporters) to make profits. Therefore, an underground trade was set up during and after the war. Smuggling activities were introduced such as smuggling by sea to Singapore (Chawalit Angwittayatorn, 2001: 190-191). A lot of rice smuggling activities from Thailand to Malaysia spread throughout the borderline.

Rice traders started to establish their trading networks. The Ant Army group employed every strategy to negotiate with the government policy to prohibit unauthorised traders to export rice. Two routes were used to conduct unofficial cross-border rice trade; the train route from Su-Ngai Golok to Pasir Mas in Kelantan, and the train route from Bang Nara River, Tak Bai River, and Golok River to the Gulf of Thailand and Singapore as a final destination. Several factors contributed to the rice smuggling.

Firstly, the rice monopoly and control in 1946 (2489 B.E.) resulted in low rice price in the domestic market while the rice price in other countries was about £40 higher. In Malaysia rice was sold at £200-500 per ton while in Thailand the government bought rice from the farmers at £13-15 per ton (Narong Phetprasert et al., 2005: 15). The high rice price in Malaysia tempted the traders in Thailand to hoard and smuggle rice to Malaysia. This unofficial cross-border activity required speed and a lot of labour. A new profession called Ant Army was introduced (*the word Ant Army was used by police officers to call young people in the village who got together to work as a labourer smuggling rice for the cross border rice trade network. Each Ant Army group consisted of approximately 8 people. The group usually had its own group name*).

Secondly, after the rice smuggling activities especially in Narathiwat had grown, in 1949 (2492 B.E.) there was rice shortage in the Thai domestic market. The rice price in the country increased. The official retail price was 220 Baht per sack with 40 Baht delivery charge or 50 Baht in the monsoon season. However, most retailers would hoard some rice to sell through the backdoor at 600-800 Baht per sack (Voramai Kabilsingh, 2005: 45, 69, 73)

Therefore, the government introduced a new policy to revoke the export control and to use the premium duty system. In the premium duty system, if the export amount of rice was high, the duty rate would be high and if the export amount was less, the duty rate would also be less (Narong Phetprasert et al., 2005: 16). The premium duty system was intended to make the domestic rice price independent from the global market and make the price in the country remain relatively low. (Somboon Siriprachai, 1988: 61 – 97). However, the new policy stimulated a higher volume of rice smuggling activities at the southern border of Thailand because the traders could avoid

paying high duty rate and could gain more profits from the unofficial price.

Thirdly, Malay-Muslims living in the southern borderland had been doing rice farming as a profession while in Malaysia rice was only farmed in [Terengganu](#), Kelantan, Perak, [Kedah](#), and [Perlis](#). Malaysia had always been importing rice from Thailand. Therefore, when the Thai government monopolised the rice export, the demand of rice consumption in Malaysia was then higher resulting in an increase of rice price in Malaysia. The demand in Malaysia encouraged the growth of smuggling activities. Plenty of traders were found in the border towns. Ant Army workers were plenty as well.

With the cross-border rice smuggling and rice shortage problem, the Thai government was compelled to introduce a stricter export control rules. In 1966 (2509 B.E.), the Ministry of Economics issued an announcement (no.7) to prohibit the export of rice seeds, brown rice, white rice, glutinous rice, broken rice, rice bran, or any rice products from the Kingdom of Thailand.

After rice export was prohibited, the seaports and fishing ports in Narathiwat were full of illegal activities. The smuggling was even done by using a raft. Some elderly people who lived near the seaports said, "Bang Nara River at night time was shaken by the boats carrying rice to Malaysia. The traffic was heavy from the sunset to the sunrise. The trade brought the local traders and officialdom a lot of wealth. (An interview with the mayor of Narathiwat Municipality and some elderly people, conducted between the 17th -19th of July 2008).

While the smuggling activities were thriving, to combat with the smuggling, the strict controls at Su Ngai Golok checkpoint and Su Ngai Padi checkpoint were reinforced. For sea control, the government's enactment in 1979 (2522 B.E.) allowed the navy to have a power of arrest. The control measures, however, could not stop the Ant Army groups who operated throughout the borderland.

2. The boom of cross border rice trade (between 1972 and 1975 (2515-2518 B.E.))

Between 1972 and 1975, the rice price in Malaysian market was three times higher than in Thailand. Chinese traders relocated their warehouses to the area close to the border and bought rice from retail traders with a proposition of doubled profits. When the Ant Army group bought the rice at 350 Baht per sack and sold it to the Chinese trader, they would be paid at 700 Baht per sack (one sack contained 100 kilogram of rice). If a kilogram of rice was bought at 8-9 Baht, the Chinese trader would double the price. When the rice was successfully smuggled to Malaysia, the price per kilogram would be 20 Baht. However, if it was caught, all the investment would vanish.

The rice retailer tended to use a motorcycle to smuggle rice at night time. The headlight would be turned off. A minor route in the district would be used to avoid the police patrol. Rice would be transported to a village near the train station. Then the Ant Army would use the train to carry rice to Su Ngai Golok station. Some Ant Army groups handed over the rice at the train carriage. Some delivered it at Golok riverbank while some continued on the boat to Malaysia. The profit would be greater if the delivery was closer to the buyer, yet the risk was greater too. Some of the smugglers were intercepted in the middle of Golok river.

The rice trade network consisted of Buddhist Thais, Chinese Thais, and Muslim Thais. The trading ranged from a retailer selling only 20 kilograms of rice to selling 2-4 sacks using a motorcycle or a truck to transport. At least two deliveries were done every night. If the delivery was done by a truck, it was likely that a bribe was given the police officers to secure the delivery. A retailer with a small delivery tended to take more risks because they did not pay a bribe. The rice was secure once it was in the Chinese trader's store. It was known that the police officers would leave it alone.

During this time, even primary or secondary students seriously got involved in rice trade because they potentially earned about 1000 Baht a day. A lot of rubber tappers, food sellers, and even government employers became full time rice traders. Some did it as a second career after a day job. It was said the cash flow in the village was very good.

3. The end of automobile routes and the beginning of the train routes for the Ant Army (between 1977- 1996 (2520-2539 B.E.))

The smuggling through automobile routes started to be less popular in 1977 (2520 B.E.) while the train routes through Yala and Su-Ngai Golok became very vibrant. A high rank government official revealed, "Rice traders consisted of government employees, retailers, villagers, and young people. They were called the Ant Army. Rice was transported across the border every day. The government officials were the key players to facilitate the delivery. For the smuggling through the river routes, a Kolek fishing boat was used to transport the rice with a payment of 30 Baht per sack. The seaports were divided into zones controlled by custom officers or police officers who shared profits from the traders. The automobile routes were operated with complex code system by using cards with different pictures on for example a fish card or a monkey card. Motorcycles were used in the delivery to take over some parts of the journey to avoid the search at the checkpoints. When the rice was handed to the first trader, the first trader would hand it to the second trader to transport to an agent at the border who packed the rice in small bags for the Ant Army to carry them across the border by train. On the train, the Ant Army had to find a place to hide the bags. They might have to pay the train conductors for an exclusive hiding place for example 300 Baht for a toilet space. Pattani Province does not border any town in Malaysia so it was used as a temporary storage. Rice from Narathiwat was transported back to Saiburi District in Pattani to keep the activity a low profile before arranging a delivery across the border. While the patrol was strict in Narathiwat, the rules were lax in Yala. The Balor train station in Yala, which is close to Rueso District in Narathiwat was a popular rice distribution point for the traders. When rice was sold in the Thai domestic market at 400-500 Baht a sack and it could be sold at 1200 Baht a sack in Malaysia, even with some overhead expenses the profit was still immense. The free market was unlikely to happen when the rice price difference in the two neighbouring countries was high" (Seni Madagagul et al. 1974 : p. 5-12).

Cross-border rice trade activities through the train routes including carrying, hiding, and moving around were exciting, frightening, and chaotic. During the year 1975- 1981 (2518-2524 B.E.), the Ant Army was fully operated. Rice could be

transported on the train in a very short time before the train left the station. Any possible hiding places on the train such as the toilet, the roof, and under the train were fully used. Most of the Ant Army workers were teenagers who took great risks every day holding on the train and being searched by the officials. The Ant Army workers employed several tactics to avoid the search. Some tied the rice sacks under the train with a tin of acid which could harm the officials to put them off searching under the train. Female smugglers employed different tactics to the male counterparts. Some tied the rice bags to the abdomen to make them look pregnant. Some wore a sarong, put the rice bag in the sarong, and sat on it through the train journey. The train police officers tended to ignore them although once in a while the officers might pull them off the seat to tease them. The tease and the scream made the local train journey colourful.

An former rice retailer (interviewed on the 19th of June 2009) shared his train smuggling experience during the year 1975- 1984 (2518-2527). Living in Su Ngai Golok, he got up early in the morning to take the train from Su Ngai Golok station. More than 30 Ant Army workers spread out on different carriages. When the train arrived at Yala station, the Ant Army workers went to buy rice from a Chinese trader who was generally called "Tee". Each of them bought 2-3 sacks of rice at 800 Baht a sack. The rice would be delivered to the train station by the Chinese trader's employees. The Ant Army hid the rice on the train and transported it back to Su Ngai Golok. On the train, they pretended not to know each other and made sure they did not look suspicious. When they arrived at Su Ngai Golok station, the youngsters would carry the rice to the Chinese trader's warehouse. The youngsters were paid 40 Baht a sack. Most of Chinese traders were female. They were generally called "Jay". When the rice was stored in Jay's warehouse, it was secure. Jay would then contact the trader in Malaysia. Each Chinese trader in Thailand would have their own Malaysian contact and they would not poach other traders' contacts. In Malaysia there was no search point. If the smugglers could deliver the rice across the Thai border, the mission was accomplished and definitely yielded profits.

The Ant Army continued to use the train routes to operate cross-border rice trade. In 1983 (2526 B.E.), Thaksin Salatan (1983:51-59) explained that "commodities were regularly smuggled in Su Ngai Golok. Some were packed in small bags and transported by the Ant Army. The commodities were delivered to Malaysian traders who waited at the train station before it reached the final destination at Su Ngai Golok. Both adults and youngsters carried bags of rice from Yala or Tanyongmat. Sometimes, the Ant Army workers had to run away as they were about to be intercepted by the police. Along the Golok river, which is a boundary between Thailand and Malaysia, there were several small docks used to transport commodities from Thailand to Malaysia. In Su Ngai Golok municipality there were more than 10 docks. An auction for dock operation took place. The auction advantage usually went to an owner of the land on the riverbank. Dock operation guaranteed wealth for the owner.

For smuggling activities around Bang Nara river in Narathiwat, after the Royal Irrigation Department built a small dam in 1988 (2531 B.E.), people were no longer able to commute

by the river. This ended the Bang Nara river route for rice smugglers.

After having monopolised the rice market for 30 years, in 1986 (2529 B.E.) the government decided to allow free market competition in rice industry (Ammar Siamwalla and Direk Patamasiriwat, 1989: 139-154). In 1991 (2534 B.E.) the Ministry of Commerce's regulation (no.1) on rice export allowed private rice traders to export rice. This made train smuggling become less popular and the Ant Army workers decided to adjust their smuggling strategies or look for another job.

4. The Renaissance of the locals when the rice "store" is on the borderline (early 1997-2003 (2540 -2546 B.E.))

In Early 1997 (2540 B.E.), the Malay-Muslims completely changed their cross border rice trade strategy. As the transportation in the country was more convenient, Thai rice traders put their "stores" (the term the local used to call a warehouse) on the borderline of Golok river and once the Malaysian investor gave a signal, the rice could be transported across the river immediately. This kind of smuggling was successful because the local Muslim smugglers shared the same ethnic and cultural identities with the Malaysian traders. There were a lot of Malay-Muslim traders along the border towns. They were members of big Chinese investors. One of the big investors revealed, "I had two big warehouses. I started the business in 1997. I stored my own rice and rice from other investors too. I had two 6WD trucks to transport rice to my network. I had 20 Muslim traders in my network. (interviewed on the 8th of May 2009)

Using a store or a warehouse was a type of rice trade aiming to transport rice to Malaysia or to Singapore via Malaysia. Each rice sack contained 100 kilograms of rice. An former investor explained, "A "store" trade was operated in two ways; a trader collected the rice and made the delivery before coming back to make a payment or a big investor hired a network coordinator to deal with the Muslim traders. The network coordinator did not need a lot of budget. It was important to pay the traders and to build trust between the investors from the two countries. Other trade agreements would be carried about among the investors." (interviewed on the 19th of October 2010).

A Muslim trader who had a store in a village on Golok riverbank informed, "The cross border trade was the most prosperous during 2000-2001. Every night, 1000 sacks of rice were transported to Malaysia. The border patrol on the Malaysian border was not as strict as it is now." (interviewed on the 27th of April 2009).

A Muslim trader had about eight Ant Army workers in his team. Each operation required different numbers of teams to do the job according to an amount of rice transported in each journey. Some investors might need 10 teams or nearly 100 Ant Army workers to transport the commodities. An Ant Army worker explained about the operation, "I was the team leader. I had seven people in my team. We transported goods at night time or at dawn. We collected the goods from the warehouse, put them on the truck, and then moved them onto the boat. When the boat was docked on the Malaysian riverbank, we moved the goods and put them on the truck. We were paid 25 Baht per a

sack of 50 kilograms. If it was a 100 kilogram sack, we got 50 Baht.” (interviewed on the 2nd of May 2009)

In 2001 (2544 B.E.), Thai and Malaysian governments developed their border agreement to solve border problems, one of which about the goods smuggling activities (Dollaya Tiantong. 2001, p. 32-44). The agreement did not affect the “store” operation much. There were still several warehouses on Golok riverbank. A Malay-Muslim investor mentioned, “I had a rice store on the riverbank like other people in the same profession because it was convenient to transport goods to Malaysia. The Malaysian investor’s workers would take the goods from the Malaysian riverbank and put them on the truck. Another team would take over the operation and sent them to Singapore. (interviewed on the 2nd of March 2009)

5. The era of cross border rice trade difficulties (2004 (2547 B.E.) -present)

Due to the political unrest in the southernmost provinces since 2004 (2547 B.E.), the Thai and Malaysian governments demanded stricter border controls. The Malaysian government provided more officials to the border checkpoints. Border patrol police and soldiers worked with custom officers to increase the patrol along Golok river. An Ant Army explained, “The border patrol along the Malaysian border is more frequent. It is much more difficult to transport rice across the river. At the same time, because of the political unrest, there are more soldiers in the village. The villagers were told by the soldiers not to keep stores near the riverbank. The stores had to be demolished and the rice was moved to store in the villagers’ houses instead. The villagers who agreed to store the rice for the investors would receive a fee at two Baht per sack.” (interviewed on the 2nd of March 2009) Malay-Muslim traders had to adjust their trade strategies under the change of border policies from the two states. While the Thai government encouraged free market competition, the Malaysian government demanded stricter controls over rice trade.

Unofficial rice trade during 1997- 2007 survived all difficulties with the border controls by adjusting their business strategies into two aspects.

Firstly, the trade took place at an unofficial market. The market was only known among the locals. The rice retailers in the market were the former investors selling rice to customers from Malaysia. The amount of sale increased on the market day. A rice retailer said, “Thai customers do not have the same purchasing power like the Malaysians. With Malaysian customers, we can sell 10 sacks of rice a day or about 1000 kilogram a day. My shop assistants are my relatives. They help pack the rice into bags, some of which have a Malay label on while some have a Thai label on. We sell white rice, glutinous rice, and black glutinous rice.”

An observation revealed that there were a few rice shops in every village along Golok river with the boundary to Malaysia. Rice sold in the shop was sent from an investor in Su Ngai Golok or Tak Bai. A shop owner explained, “We charge a Malaysian customer for a delivery to boat at the rate of 10 Baht per 25 kilograms. The customers from Malaysia cross the river by boat to buy rice and other types of goods all day. On Friday, the shop is busy. We may have 2-3 thousands customers. The boat taxi is operated by the riverbank landowner. The taxi fare is 20 Baht per trip. Shop owners have to pay a monthly bribe to the Thai officials. If the delivery has to go through the checkpoint, the

convenience fee must be paid. (interviewed on the 1st of May 2009)

Secondly, Muslim traders joined the city or the district investor’s network in Narathiwat. Facing difficulties with border controls, the networks started to work in partnership to share resources such as labour, information, and technology. Mobile phones were employed to communicate with each other. Ant Army workers tried to find new routes and tactics to avoid being intercepted by the officials.

Malay-Muslim cross-border rice traders built and expanded their networks across the borderland to transport rice across the border. A Muslim investor explained, “If we have rice in our “store” or in a villager’s house, we need to distribute it to Malaysia as quickly as possible to avoid an increase of expenses and a risk of flooding. Therefore, if our store in Waeng district cannot distribute the rice in the local area, we will then have to contact our network to distribute the rice in another area. On the other hand, when suitable, other investors from Tak Bai or Su Ngai Golok may want to distribute their rice at Waeng dock as well. (interviewed on the 31st of August 2010)

An Ant Army worker also shared his experience, “We have to get up early and get together to do the delivery. There are 15 people in the group. The employer (investor) uses the telephone communication to call for an assembly. The time of assembly cannot be informed in advance depending on when it is safe to do the delivery. If there is a Malaysian soldier patrol, the delivery will be called off. The delivery is usually done when the soldiers change shifts. Some soldiers are more flexible than others especially those from different religions. Before the assembly, the investor in Malaysia will be informed of the operation by radio communication. When it is safe, the Ant Army group will start the delivery. All will get on the truck and get off at the store. The workers help putting rice on the truck and travel to the dock. A boat is used to transport rice across the river. Once rice arrives at the Malaysian border, the Malaysian workers will take over the operation. (interviewed on the 18th of October 2010)

Another Ant Army worker reflected on the difficulties of the cross-border rice trade, “After there was the political unrest in the south of Thailand, there was a lot of tension in the borderland especially in Narathiwat. Everything is stricter and more difficult. The cross-border rice trade must be well-prepared. The network prepares a pickup truck and at least two boats because time is limited. When the source informs that the soldiers are coming, it means they are only 6-7 kilometres far from the operation. The operation must be called off. The rice has to be transported back. (interviewed on the 20th of October 2010)

As the cross-border rice trade has become a bigger network, the Muslim traders feel they are not in the position to quit because it will affect the operation of the whole network. A trader revealed, “I have thought about quitting so many times because of the long waiting time to make a delivery. I am not an investor and I am paid only on commission. There is always a risk of making a loss even for the investors themselves. However, I have no choice. It is a network. If I stop, it will affect other parts of the network.” (interviewed on the 19 of December 2010)

Most traders and members of a big investor have changed their job role to a coordinator after the cross-border rice trade faced more and more difficulties.

VI. CONCLUSION

Dynamics and adjustments of Malay-Muslim cross-border rice traders in Narathiwat borderland reflected how Malay-Muslims used a collaboration of relatives and friends in the community to work with each other and share profits.

Cross-border rice trade was considered a profession for the borderlanders as well as a work experience for youngsters in the village. The career was a symbol of economic prosperity of the region. It also showed a tight-knitted horizontal relationship between networks and between Ant Army workers.

The relationship at the network level depended on profits as well as trust upon each other. Fair shares of profits and duties were vital to the success of the network. The network does not only support its members in terms of wages, but they also look after each other. The relationship in the network was beyond an employer and employees. With stricter border controls policies the networks required to work together to share labour force and trading points.

The Ant Army operation was an opportunity for young people to learn to work and make friends. They gained both work experience and social skills. A good work relationship led to social support between each other.

Dynamics and adjustments of Malay-Muslim cross-border rice traders reflected capacity of the Malay-Muslims in the borderland such as skills in network management, area management, and negotiation skills. An unofficial cooperation like this implicated a complex cultural system of kinship and ethnic identity.

Moreover, the strengths of Malay-Muslim cross-border rice trade network were trust and promises between the members and between the networks. This characteristic was important to the survival of the trade even though they have faced with stricter rules and regulations concerning border controls.

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Assess the Geriatric Problems among Inmates of Old Age Home

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Abstract- Ageing is a natural process. In the words of seneca "old age is an incurable disease". Anon says that science makes them live longer yet our civilization finds less use for them. Persons of 65 years of age older are typically referred to as elderly. It is said that nobody grows old merely by living a certain number of years. Years wrinkle the skin, but worry, doubt, fear, anxiety and self distrust wrinkle the soul. While ageing merely stands for growing old, senescence is an expression used for the deterioration of the biologic efficiency that accompanies ageing. These changes are for the most part deleterious and eventually lead to the death of the organism.

The aim of the study was to assess the geriatric problems among inmates of old age home. The data were generated by using structured interview schedule; random sampling technique was adopted to select 50 subjects. The data obtained were analyzed by using both descriptive and inferential statistics on the basis of objective of the study. Demographic data containing sample characteristics were analyzed using frequency and percentage. Association between selected demographic variable with geriatric problems are calculated using chi-square test.

The results shows that level of physiological problems among the 50 old age people are, 78% have mild physiological problems, 20% have moderate physiological problems and 2% have severe physiological problems; Level of psychological problems are, 22% have mild psychological problems, 54% have moderate psychological problems and 24% have severe psychological problems; Level of psycho-social problems are, 26% have mild psycho-social problems, 66% have moderate psycho-social problems and 08% have severe psycho-social problems and Level of overall geriatric problems are, 68% have mild geriatric problems and 32% have moderate geriatric problems and no severe cases has been noticed.

This study revealed that the old age people are having mild physiological, moderate psychological, moderate psycho-social problems and over all mild geriatric problems. Thus assumption of the researcher is accepted as there will be geriatric problems among inmates of old age home.

Index Terms- A Geriatric Problems; Inmates of Old Age Home

I. INTRODUCTION

YOU DO NOT HEAL OLD AGE; YOU PROTECT IT; YOU PROMOTE IT; YOU EXTEND IT. -SIR JAMES STERLING ROSS

Among the total elderly population, those who live in rural areas constitute 78%. Sex ration in elderly population, which was

928 as compared to 927 in total population in the year 1996, is projected to become 1081 by the year 2016 as compared to 935 in the total population. According to geriatric census report around 73% of the patients belonged to the age group of above 65 years old are have majority of health problems such as Hypertension followed by Arthritis, Diabetes, Asthma, Cataract and Anemia. About 68% of the patients said that the attitude of people towards the elderly was that of neglect.

In recent years, physicians and other health care workers have increasingly specialized in the field of medicine dealing with elderly patients called GERIATRICALS. As age increases, there is a decline in the function of virtually every organ system. Some medical authorities believe that, starting at age 30, there is a 1% decrease in organ function per year. This can make it difficult to distinguish between a normal decrease in organ function due to ageing and a decrease caused by an acute condition.

The older adult's population is currently the fastest growing segment of the nation. Concern for rapidly increasing aging population is an international dilemma. Nearly 36% of all emergency medical calls involve the elderly. Therefore it is important for healthcare workers to be familiar with the health care considerations for this age group. Hence nurse who care for older adults must be aware of the unique physical, psychological, legal, ethical and economic issues surrounding the aging process.

Objectives of the present study is to assess the demographic status of the inmate of old age home; to assess the geriatric problems among inmates of old age home; to find out the association between geriatric problems with selected demographic variables.

Material and methods for the study non-experimental descriptive survey approach is used with descriptive survey design.

Setting of the study was home for the old age at Secunderabad.

Population and sample 50 inmates of old age home from a selected home for the old age 60 to more than 80 years of age selected by random sampling, a sampling frame of the inmates of old age home of the two homes for the old age were prepared and every 2nd inmate was selected for the study till 50 inmates were selected.

Variables under Study geriatric problems among the inmates of selected old age home as an Independent Variable and Age, sex, education status, marital status, source of income, type of family, religion, duration of stay and visitors was Dependent Variable.

After an extensive review of literature, discussion with the experts and the research personal experience structured interview schedule to assess the geriatric problems among old age home at new bhoiguda, secunderabad. Tool consists of 3 parts physiological, psychological and psychosocial. The first draft of physiological questionnaire consists of 20 questions, second psychological questionnaire consist of 10 questions and psycho social consist of 10 questions. It is divided into 3 to assess mild, moderate and severe problems of inmates of old age home. Based on the pilot study with 3 subjects, suggestion from experts, modification and rearrangement of few items were done.

Result was organized, analyzed and presented in six sections section-I frequency and percentage distribution of demographic variable of geriatric clients; Section-II frequency and percentage distribution of physiological problems; Section-III frequency and percentage distribution of psychological problems; Section-IV frequency and percentage distribution of psycho-social problems; Section-V frequency and percentage distribution of overall geriatric problems; Section-VI association between geriatric problems with selected demographic variables.

SECTION- I

TABLE – 1
 Frequency and percentage distribution of demographic variable of geriatric clients
 N=50

Sl. No.	Characteristics	Category	Respondents	
			Number	Percentage
1.	Age (years)	60-69 years	10	20
		70-79 Years	19	38
		More than 80years	21	42
2.	Gender	Male	27	54
		Female	23	46
3.	Religion	Hindu	8	16
		Muslim	1	2
		Christian	41	82
4.	Educational qualification	Illiterate	22	44
		Schooling	23	46
		Degree	5	10
5.	Income source	Independent	20	40
		Dependent	30	60
6.	Marital status	Married	25	50
		Unmarried	5	10
		Divorced	5	10
		Widow/widower	14	28
		Separated	1	2
7.	Type of Family	Nuclear	22	44
		Joint	19	38

		Large	9	18
9.	Duration of stay in Old age home	0-3yrs	31	62
		4-6yrs	10	20
		7-10yrs	09	18
11.	Visitors	Yes	32	64
		No	18	36

SECTION- II

TABLE – 2
Frequency and Percentage distribution of physiological problems
N=50

LEVEL OF SCORE	FREQUENCY	PERCENTAGE
MILD [0-20]	39	78
MODERATE [21-30]	10	20
SEVERE [31-40]	1	2
TOTAL	50	100

SECTION-III

TABLE - 3
Frequency and Percentage distribution of psychological problems
N=50

LEVEL OF SCORE	FREQUENCY	PERCENTAGE
MILD [0-6]	11	22
MODERATE [7-13]	27	54
SEVERE [14-20]	12	24
TOTAL	50	100

SECTION-IV

TEBLE - 4
Frequency and Percentage distribution of psycho-social problems
N=50

LEVEL OF SCORE	FREQUENCY	PERCENTAGE
MILD [0-6]	13	26

MODERATE [7-13]	33	66
SEVERE [14-20]	4	08
TOTAL	50	100

SECTION-V

TABLE - 5
Frequency and Percentage distribution of overall geriatric problems
N=50

LEVEL OF SCORE	FREQUENCY	PERCENTAGE
MILD [0-6]	34	68
MODERATE [7-13]	16	32
SEVERE [14-20]	00	00
TOTAL	50	100

SECTION-VI

Association between geriatric problems with selected demographic variables.

TABLE - 6
Association with physiological problems
N=50

Variables	Chi-square	Degree of freedom	p- value	Inference
Age	0.4505	2	5.991	NS
Sex	0.087	1	3.811	NS
Education status	7.783	3	7.815	NS
Marital status	2.585	4	9.49	NS
Source of income	0.002	1	3.811	NS
Type of family	1.499	2	5.991	NS
Religion	1.403	3	7.815	NS
Duration of stay	13.51	2	5.991	Significant
Visitors	01259	1	3.811	NS

TABLE - 7
Association with psychological problems
N=50

Variables	Chi square	Degree of freedom	P value	Inference
Age	11.55	2	5.911	Significant
Sex	0.33	3	7.815	NS
Education status	0.457	3	7.815	NS
Marital status	5.649	4	9.49	NS
Source of income	1.55	1	3.811	NS
Type of family	1	2	5.991	NS
Religion	0.941	3	7.815	NS
Duration of stay	0.84	2	5.991	NS
Visitors	0.16	1	3.811	NS

TABLE - 8
Association with psycho-social problem
N=50

Variables	Chi square	Degree of freedom	P value	Inference
Age	11.55	2	5.991	Significant
Sex	0.539	1	3.811	NS
Education status	4.33	3	7.815	NS
Marital status	8.45	4	9.49	NS
Source of income	0.436	1	3.811	NS
Type of family	4.752	2	5.991	NS
Religion	1.18	3	7.815	NS
Duration of stay	2.6	2	5.991	NS
Visitors	0.646	1	3.811	NS

II. DISCUSSION

In the present study, the finding reveals that the proportion of inmate of old age home majority belongs to age group of more than 80 years (42%); According to gender 54% were males and 46% were females; 44% were illiterate, 46% did schooling and 10% were degree holders; 50% were married, 10% were unmarried, 10% were divorced, 28% were widow and 2% were separated; According to source of income 40% were independent and 60% were dependent; 44% belongs to nuclear family, 38% belongs to joint family and 18% belongs to large family; 16% were Hindu, 2% were Muslim and 82% were Christians; 62% belongs to the period of less than 3 yrs, 20% belongs to the period of 4-6 yrs and 18% belongs to the period between 7-10 yrs; 64% had visitors and 36% don't have visitors.

Level of physiological problems among the 50 old age people, 78% have mild physiological problems, 20% have

moderate physiological problems and 2% have severe physiological problems.

Level of psychological problems among the 50 old age people, 22% have mild psychological problems, 54% have moderate psychological problems and 24% have severe psychological problems.

Level of psycho-social problems among the 50 old age people, 26% have mild psycho-social problems, 66% have moderate psycho-social problems and 08% have severe psycho-social problems.

Level of overall geriatric problems among the 50 old age people, 68% have mild geriatric problems and 32% have moderate geriatric problems and no severe cases has been noticed.

The study findings show that only the duration of stay had a significant association with physiological problems. Obtained chi square value is 13.51 and p value is 5.991 for duration of stay,

here chi square value is more than the p-value so chi-square value is significant. Thus null hypothesis is rejected, so there is a association with chi-square and demographic variables. The study findings revealed that the age, sex, education status, marital status, income source, type of family, religion and visitors had no significant association with physiological problems among inmates of old age home.

The study findings depict that only the age had a significant association with psychological problems. Obtained chi square value is 11.55 and p value is 5.991, here chi square value is more than the p-value so chi-square value is significant. Thus null hypothesis is rejected, so there is a association with chi-square and demographic variables. The study findings revealed that the sex, education status, marital status, income source, type of family, religion, duration of stay and visitors had no significant association with psychological problems among inmates of old age home.

The study findings revealed that only the age had a significant association with psychosocial problems. The obtained chi square value is 11.55 and p value is 5.991 for age, here chi square value is more than the p-value so chi-square value is significant. Thus null hypothesis is rejected, so there is a association with chi-square and demographic variables. The study findings revealed that the sex, education status, marital status, income source, type of family, religion, duration of stay and visitors had no significant association with

III. CONCLUSION

From the study the investigators found that the old age people in the selected old age home suffer from mild to moderate geriatric problems.

The duration of stay has great influence in their level of physiological problems. The age also plays a major role in their level of psychological problem and psychosocial problems. We come to know that people in their old age home suffer from physiological, psychological and psychosocial problems and it has influence over demographic variables such as age and duration of stay.

NURSING IMPLICATIONS

Nursing Practice:

The nurses working in the geriatric sections in the hospital have primary responsibility of integrating mental health care along with general health care. This will serve not only to the individual but also to the family.

Nursing Administration:

- Necessary administrative support to be provided for the nurse administrator to organize and implement geriatric health care services.
- The nurse administrator should organize the workshop, conferences, and seminars for the nursing students.

Nursing Education:

The present study has implication on nursing education in focusing attention on nurses in involvement in giving

rehabilitative care in the hospitals and to give more importance to prevention of geriatric problems.

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Effect of body mass index on cardiorespiratory fitness in young healthy males

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Background: Low cardiorespiratory fitness in young adults has emerged as an important factor for developing cardiovascular comorbidities later in middle age. Increased body fatness as predicted by body mass index is an additional factor for developing cardiovascular diseases.

Objective: The objective of this study was to determine the cardiorespiratory fitness in terms of VO_2 max in young healthy males and to study the relation between body mass index and cardiorespiratory fitness.

Methodology: One hundred young healthy male subjects in the age group of 18 to 22 years were included in this study group. Body mass index was measured as weight (in kilograms) divided by height (in meters) squared. Cardiorespiratory fitness in terms of VO_2 max was assessed by following the protocol of Queen's College Step Test (QCT).

Results: There was a significant negative correlation between body mass index (BMI) and VO_2 max (ml/kg/min) ($r = -0.48$, $p < 0.01$).

Conclusion: The results suggest the striking effect of body fat on cardiorespiratory functions. Excessive amount of body fat exerts an unfavorable burden on cardiac function and oxygen uptake by working muscles. Low cardiorespiratory fitness in young adults with increased body fat could be a factor for developing cardiovascular comorbidities later in middle age.

Index Terms: VO_2 max, QCT, body mass index, cardiorespiratory fitness

I. INTRODUCTION

Cardiovascular diseases are a leading cause of mortality and morbidity worldwide. The prevalence of cardiovascular disease (CVD) has increased substantially over the past few decades in younger population. Unfavorable cardiovascular risk profiles are found in youth with low levels of cardiovascular fitness and high percentage of body fat. Numerous clinical studies have established a strong association between low cardio respiratory fitness and mortality (1, 2, 3). Numerous risk factors for CVD including hypertension, diabetes and hypercholesterolemia are suspected to be influenced by fitness (4, 5) and these factors may mediate the association between low cardiorespiratory fitness and mortality. Cardiovascular diseases account for a large proportion of mortality in adults older than 45 yrs (6). Maximal oxygen uptake (VO_2 max) is the highest rate of oxygen consumption attained during maximal or exhaustive exercise. VO_2 max is internationally accepted parameter to evaluate cardio respiratory fitness (7). The use of direct method to measure VO_2 max is restricted because of its exhausting and difficult experimental protocol and absence of well-equipped laboratory. Earlier studies have established the use of Queen's College Step Test to predict VO_2 max indirectly (8). Obesity is an independent risk factor for cardiovascular disease. Energy dense cheap foods, labor-saving devices, motorised transport and sedentary work in the present time has led to obesity. Obesity can be assessed in several ways. Measurements of body weight (anthropometry) are used to reflect body fat in clinical settings as these measurements provide rapid and cheap way to estimate body fat (9). Earlier studies have demonstrated the importance of low cardio respiratory fitness in young adulthood as a factor for developing cardio respiratory comorbidities later in middle age (10). This study is designed to evaluate cardio respiratory fitness in terms of VO_2 max and its relation with body mass index in young healthy male subjects.

II. MATERIAL AND METHODS

The study group comprised of 100 young healthy males in the age group of 18 to 22 yrs.

1. Inclusion criteria

- a. Males
- b. Age between 18-22 yrs
- c. Otherwise healthy

2. Exclusion criteria

- a. Male subjects below 18 and above 22yrs
- b. History of cardiac disease
- c. History of lung disease
- d. Smoking
- e. Not on regular medications affecting cardiovascular and respiratory system
- f. Not undergoing any physical conditioning programme.

100 apparently healthy male subjects in the age group of 18-22 yrs from Kolar town were selected for the study. They were asked to fill a questionnaire to assess their physical activity status (11). The experimental protocol was fully explained to the participants to allay apprehension. They refrained from any energetic physical activity for 2 to 3 hours before the test. Informed consent was taken from all the subjects. The study was approved by institutional Ethical Committee.

Experimental Design

Data was collected by calculating body mass index and assessing VO₂max indirectly by Queen’s college Step test. Weight was measured using calibrated weighing machine in light clothing and bare feet and height was measured using measuring scale in centimeters which was fixed to the wall. Body mass index was calculated using Quetlet’s index: BMI=Weight (kg) / height (m²).

Queen’s College Step Test

Step test was performed using a stool of 16.25 inches (41.30cms) height. Stepping was done for a total duration of 3 minutes at the rate of 24 cycles per minute which was set by a metronome. After completion of the exercise the subjects were asked to remain standing comfortably and the carotid pulse rate was measured from the 5th to 20th second of recovery period. This 15 second pulse rate was converted into beats per minute and the following equation was used to predict VO₂max.

$$VO_2max \text{ (ml/kg/min)} = 111.33 - (0.42 \times \text{pulse rate in beats per min})$$

All experiments were performed at room temperature.

Statistical Analysis

The results were expressed as mean ± standard deviation (SD). A p value of < 0.05 was considered statistically significant. Statistical Analysis was done by using Statistical package of social & sciences. Pearson correlation was used to correlate BMI and VO₂max (ml/kg/min).

III. RESULTS

100 young healthy males in the age group of 18-22 years (19.38 ± 1.49yrs) were subjected to Queen’s College Step Test. Cardio respiratory Fitness in terms of VO₂max was evaluated and then the effect of Body mass index (22.04± 3.96 kg/m²) on cardio respiratory Fitness was studied. There was a significant negative correlation between BMI and VO₂max (ml/kg/min), (r=-0.48, p<0.01) (table 1). There was a significant positive correlation between BMI and QCT pulse rate (bpm), (r=0.63, p<0.01) (table 2).

Table 1. Correlation between BMI and VO₂max

	Variable	VO ₂ max
BMI	r	-0.48
	p	<0.01

Figure 1. Scatter diagram showing the relationship between BMI and VO₂max

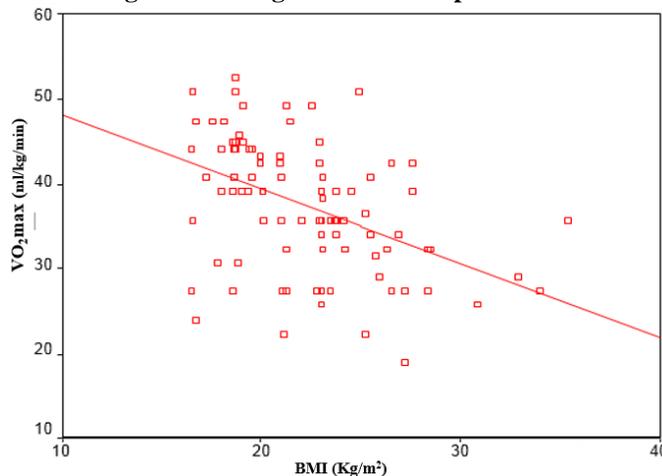
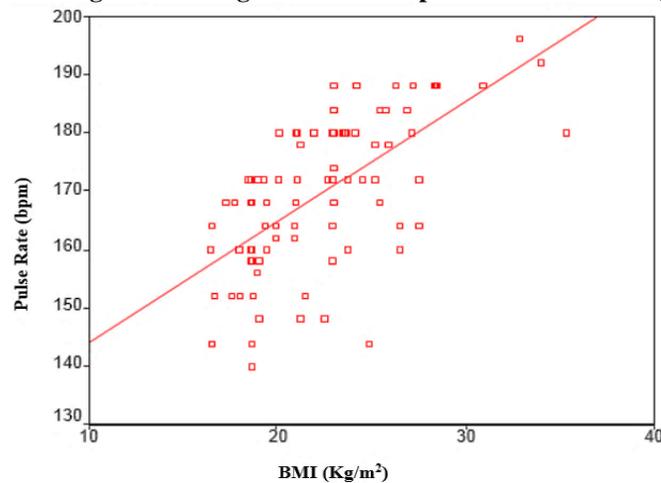


Table 2. Correlation between BMI and QCT pulse rate

	Variable	QCT Pulse rate
BMI	r	0.63
	p	< 0.01

Figure 2. Scatter diagram showing the relationship between BMI and QCT pulse rate



IV. DISCUSSION

VO₂max is a measure of the functional limit of cardio respiratory system and single most valid index of maximal exercise capacity. The absolute value of VO₂max is one of the indices of an individual's cardiorespiratory fitness to transport oxygen to working muscles. Earlier studies have used VO₂max values in ml/kg/min to assess the level of cardio respiratory fitness.

Chatterjee et al in 2005 used Queens College step test in their study to assess cardiorespiratory fitness in obese and non-obese boys aged 10-16 yrs and it was found that VO₂ max per kg of body weight was relatively less in obese subjects indicating reduced aerobic capacity. They concluded that during exhaustive exercise, the excessive hyperactive body musculature fails to uptake sufficient amount of oxygen due to deposition of proportionately high amount of fat mass (12). It was found that during of weight reduction program in obese, their VO₂max (ml/kg/min) increased due to withdrawal of fat induced inhibitory action toward oxygen utilization by body musculature (13). In obese individuals there is increase in type II muscle fibers and decrease in type I muscle fibers which may have important effect on reduced oxygen uptake. Bandyopadhyay A studied cardiorespiratory fitness in obese girls and found that VO₂max was less in obese girls. This was probably due to hindering effects imposed due to excess deposition of fat (14). P Setty et al 2012 in their study used treadmill exercise test in adults and found that there was negative correlation between obesity and cardiorespiratory fitness (15). Similar results were observed by Welch et al (16), Ozcelick et al (17) & Rowland et al (18).

Norman et al in 2005 studied influence of excess adiposity on exercise fitness and performance in overweight children and adolescents by cycle ergometry fitness test and found that overweight and non-over weight adolescents had similar absolute cardiorespiratory fitness but the functional impairment was significantly associated with increased energy demands needed to move their excess bodyweight (19). Several previous studies have found no significant differences in VO₂max between obese and non-obese. Patkar and Joshi in 2011 compared CRF between obese and non-obese subjects and concluded that cardiorespiratory efficiency was not affected in obese group as compared to normal weight group, however ability to do exhausting work was less in obese (20).

In this study we found a significant negative correlation between BMI and VO₂max (ml/kg/min) ($r = -0.48, p < 0.01$). This indicates the striking effects of increasing BMI on Cardio respiratory fitness. This is in line with the findings of the earlier studies (12-15).

Chatterjee et al reported significantly higher value of peak heart rate during QCT in obese group which indicates greater cardiac load among them. Overweight individuals have increased sympathetic nerve firing rate than normal subjects. Obesity results in a state of chronic volume overload because heart is required to pump blood through large and relatively low resistance depot of adipose tissue. Increased preload and stroke volume is associated with hypertension. Overweight and hypertension leads to thickening of ventricular wall and larger heart volume and thus greater likelihood of cardiac failure.

In this study we found a significant positive correlation between BMI and QCT pulse rate during Queen's college step test ($r = .63$ & $p < 0.01$).

V. CONCLUSION

In this study, there was a significant negative correlation between BMI and VO₂max (ml/kg/min) which suggests possible effect body fat on cardiorespiratory functions. It also demonstrates the importance of low cardiorespiratory fitness in young adults with increased body fat which could be a factor for developing cardiovascular comorbidities later in middle age. BMI can be used in clinical settings to estimate body fat as it is a rapid and inexpensive method. Queen's College Step Test is a valid method for the estimation of VO₂max in young males. Additional study including detailed measurement of cardiac function is needed to clarify whether cardiac impairment (or initial stages of impairment) exists. Given the current obesity trend and observations of a decline in

daily energy expenditure among the people, improving cardiorespiratory fitness in young men by engaging in physical activities is important.

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A Cross-Sectional Study to See the Incidence of Needle Prick Injury amongst Health Care Workers in a Tertiary Care Hospital

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Abstract- Needle prick injury poses a significant healthcare hazard amongst the health care workers. There is an increased risk of occupational transmission of blood borne pathogens subsequent to accidental needle prick injuries. Various studies indicate that the incidence of needle prick injury is on rise in the community of healthcare providers. The study was conducted for 120 hours in the department of anaesthesia, general surgery, gynaecology, orthopaedics and trauma centre of a tertiary care hospital to determine the incidence of needle prick injury, awareness amongst various health care workers about transmission of hepatitis B & HIV the two most dreaded diseases subsequent to needle prick injuries and awareness for post exposure prophylaxis and availing the same. Incidence of needle prick injury, awareness of complication and post exposure prophylaxis if taken were recorded on a semi-structured proforma. Awareness level is high in all the four groups, maximum in junior residents (100%) while minimum in ward boys (73.33%). Immunization status is least in ward boys (36.67%) with only 13.33% complete immunization. Level of Hepatitis and HIV status evaluation is low in all the four groups, but least in ward boys (6.67%).

Index Terms - Biomedical Waste Management, Hepatitis B, Immunisation, Needle Prick Injury, Post-Exposure Prophylaxis

I. INTRODUCTION

Biochemical waste also known as infectious waste or medical waste, is defined as any waste which is generated during the diagnosis, treatment or immunization of human beings or animals in research activities pertaining there to or in the production or testing of biological and including categories mentioned in schedule I.

The large volumes of health care waste if not managed properly can lead to a global hazard. This could not only lead to the spread of highly contagious diseases but the hazardous chemical waste produced by the use of items can cause considerable damage to the ecosystem and the environment. Thus health care waste, if not managed properly will be a cause in ushering of “disasters in making” by causing air, water, soil

pollutions and helping in emergence of antibiotic resistant strains of microbial ingress of pollutants in the food chain and thus becoming a part of human consumption.

India already has biomedical waste management regulations (biomedical waste Management and Handling rules, 1998) but their implementation and enforcement throughout the country has been inconsistent. Best segregation practices and techniques for health care waste management are not yet fully operational in most of the hospitals and other health care institutions. The lack of segregation at the site of origin has been observed which causes mixing of infectious and non-infectious waste. Further improper disposal and management of sharps can result in inadvertent needle stick injury as well as spread of HIV, Hepatitis and other infectious disease.

A *needle-stick injury* is a percutaneous piercing wound typically set by a needle point, but possibly also by other sharp instruments or objects also. Commonly encountered by people handling needles in the medical setting, such injuries are an occupational hazard in the medical community. Despite their seriousness as a medical event, needle-stick injuries have been neglected: most go unreported as injured healthcare workers(HCW) may not take the time to report, down play the risk or fear stigmatization and professional consequences.

A needle stick injury is the most important risk factor for transmission blood-borne diseases such as Hepatitis B, Hepatitis C and the Human Immunodeficiency Virus (HIV). Needle-stick injuries are a common event in the healthcare environment. When drawing blood, administering an intramuscular or intravenous drug, performing procedures involving sharps, the needle can slip and injure the healthcare worker. Needle recapping and failure to place used needles in approved sharps containers is also a very common event. Generally needle-stick injuries cause only minor bleeding or visible trauma, even in the absence of bleeding the risk of viral infection remains. Needle-stick injuries may occur not only with freshly contaminated sharps, but also, after some time, with needles that carry dry blood. While the infectiousness of HIV and HCV decrease within a couple of hours, HBV remains stable during desiccation and infectious for more than a week.

Global Incidence: Over 3.5 million individuals have sustained needle prick injury. It is estimated that annually as a consequence there are 66,000 infections with HBV, 16,000 with HCV, and 1,000 with HIV worldwide. Among healthcare workers most

susceptible are physicians/surgeons, nurses, technicians, ward boys and sweepers. Non-existent waste management system in most of the healthcare facility, non-existent steam lined post-exposure prophylaxis system, lack of awareness of consequences and reporting of needle prick injury being not mandatory are related with high incidence.

The present study was carried out to record the incidence of needle prick injuries amongst the health care workers, their immunization status ; awareness of needle-prick injury hazards/ preventive measures, post exposure prophylaxis taken or not.

II. METHODOLOGY

The study was conducted in the Department of anesthesia, orthopedics & general surgery of King George’s Medical University, Lucknow. This cross-sectional study was carried out in the month of October 2013

The study was conducted in 120 hours. 30 resident doctors, 30 nurses, 30 ward boys and 30 OT technicians from department of anesthesia, orthopedics & general surgery were included in the study.

Four groups were made:

Group A: Doctors (30 junior residents, 15 from anesthesia and 15 from orthopedics)

Group B: Nursing Staff (30 nurses, all females)

Group C: Ward boys (30 from orthopedics and general surgery)

Group D: OT technician (30 from orthopedics and surgery OT)

Incidence of needle prick injury, immunization for hepatitis-B vaccination and awareness for possible complications and preventive measures amongst HCW were recorded on Semi structured pro forma and analyzed.

Percentage of HCW sustaining needle prick injury; % HCW immunized/non immunized; percentage HCW aware of complication and preventive measures were recorded and analyzed.

III. RESULTS

Needle prick injury was sustained by 60% of nurses (fig.1) followed by resident doctors (50%) and ward boys (50%). Lowest incidence was observed among OT technicians (30%). Incidence was highest amongst the nurses.

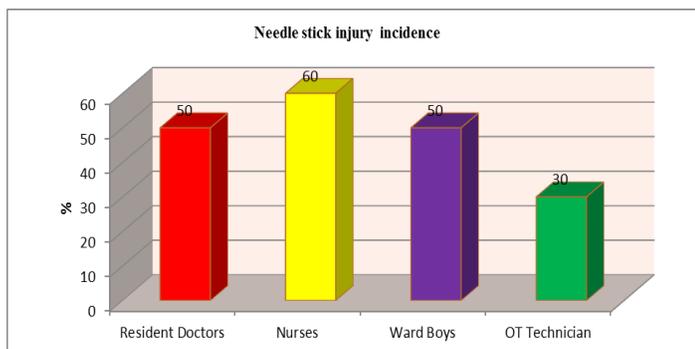


Figure 1: Percentage of health care workers with needle prick injury

All the four groups were inquired about the about hepatitis B vaccination status and data revealed that highest numbers of hepatitis B non-immunized health care workers were ward boys (63.33%) followed by nurses (43.33%). Fairly large % of resident doctors (73.34%), and OT technician(73.34%) were immunized with Hepatitis B vaccine. (fig.2)

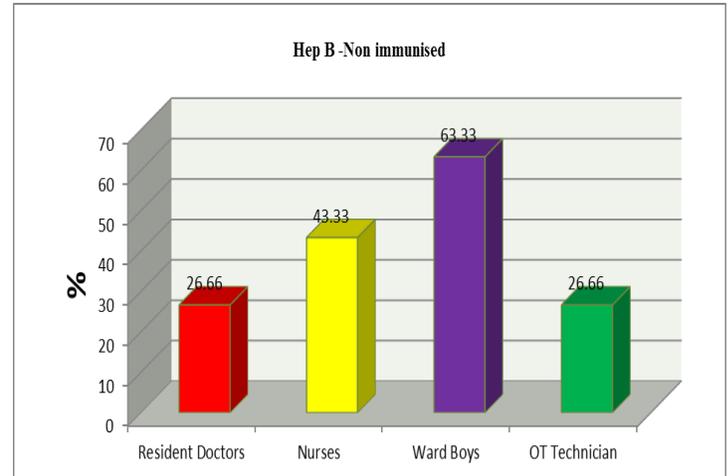


Figure 2: Percentage of Hepatitis B non-immunization in all the four groups of health care workers.

(23.33%) of ward boys, (20%) OT technicians and (13.33%) nurses were partially immunized. Least number of incomplete immunization was observed in resident doctors (3%). (fig.3)

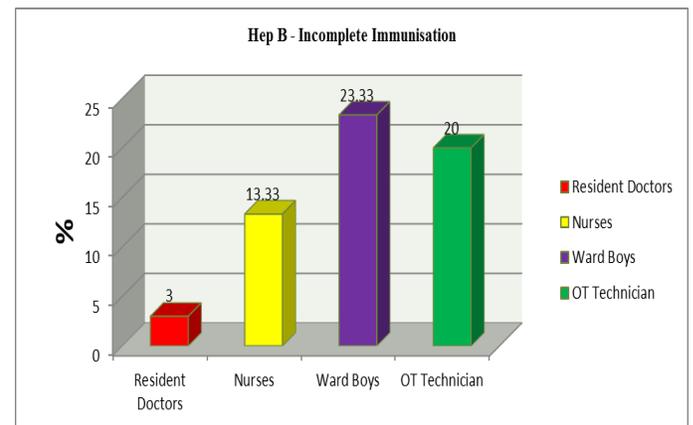


Figure 3: Percentage of incomplete immunization of Hepatitis B in all the four groups

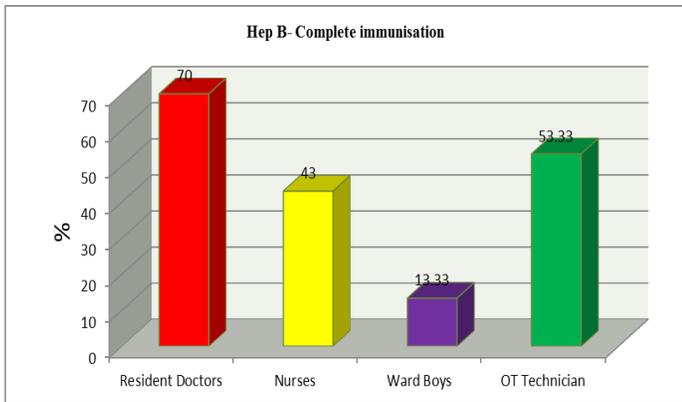


Figure 4: Percentage of complete hepatitis B immunization in all the four groups

As shown in figure highest number of complete immunization status was seen in resident doctors (70%) followed by OT technicians (53.33%) and nurses (43%) and ward boys (13.33%).

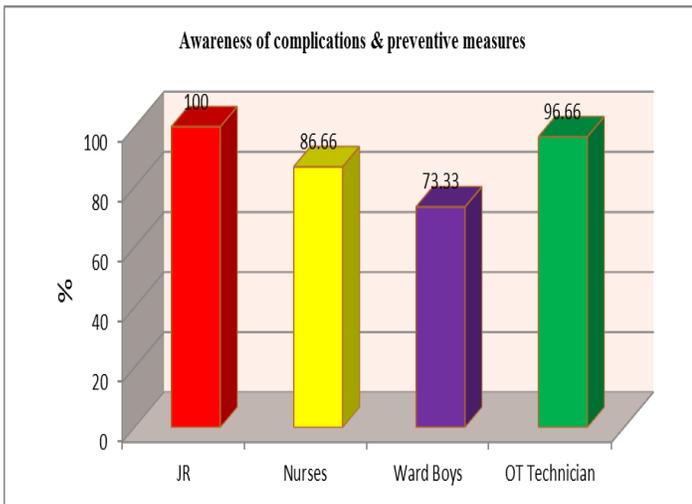


Figure 5: Awareness of complications and preventive measures in all the four groups

As shown in figure 100% resident doctors were aware of complications and preventive measures of needle prick injuries followed by OT technician (96.66%), nurses (86.66%) and ward boys (73.88%).

IV. CONCLUSION

Waste management system should be implemented stringently in all healthcare facilities. There should be institutional ongoing training programs for awareness/sensitization about hazards and post-exposure prophylaxis subsequent to needle prick injury especially in healthcare workers working in accident prone areas. Reporting of needle prick injury should be mandatory. Post exposure prophylaxis system should be streamlined. Baseline immunization of one and all involved in providing healthcare should be mandatory. A wise strategy could be to immunize one and all at the entry point to the institution.

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Stability and Control Analysis in Twin-Boom Vertical Stabilizer Unmanned Aerial Vehicle (UAV)

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Abstract- Flying and handling qualities are substantially dependent on, and this paper is described it, in terms of the stability and control characteristics of UAV. It is essential to be able to describe and quantify the stability and control parameters completely.

It is absolutely essential to understand the relationship between the aerodynamics of the airframe and its stability characteristics to prolong the flight endurance and effective deployment. And this paper is described the stability analysis based on the dynamic model of the twin boom double vertical stabilizer UAV.

Key words – Stability and control, UAV, Dynamic stability, dynamic model

I. INTRODUCTION

The purpose of Stability and Control Analysis is to evaluate the dynamic stability and time response of the UAV for such a perturbation in open loop behavior and Static stability analysis enables the *control displacement* and the *control force* characteristics to be determined for both steady and manoeuvring flight conditions.

A well designing UAV has to be fulfilled the stability for the appropriate condition. In this analysis will test and analyze the outputs parameters of UAV (i.e– displacements, velocities and accelerations) on various flight conditions.

In this paper will further discuss, how to replace the conventional , time consuming process of model making and testing in wind tunnel by using sophisticated XFLR5 numerical simulation software[4] which can generate and manipulate data significantly on computational aerodynamic.

II. METHODOLOGY

The methodology of this analysis is based on stability and control theories and the purpose of it is to improve the dynamic model through the stability analysis. The dynamic model was simulated on XFLR5 open source simulation software[4] for the given input control commands and the generated flight data (fig.1) through this method were used for the stability analysis[10].

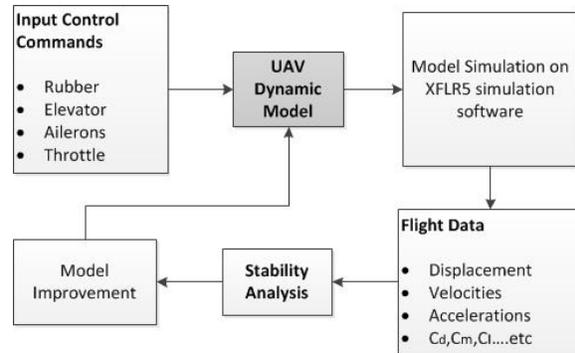


Fig.1 Structure of methodology

And also the results were compared with the stability norms and the theories in aerodynamic. When it was confusing with the stability and control standard the airframe structure and input commands have also been changed and adjusted to fulfill the stability requirements. This exercise was repeated till the results were optimal and stable to the best flying qualities.

A. Aerodynamic model

The aerodynamic equations of this UAV are very important to discuss the stability and control behavior in different flying condition. Because of the aerodynamic complexity of the conditions applying to the airframe in a compressible flow field it is difficult to derive other than the very simplest mathematical models to describe those conditions. Thus for analytical application, as required in aerodynamic derivative estimation, mathematical modeling is usually limited to an approximate description of the effects of compressibility on the lifting surfaces of it only. In particular, the ease with which the aerodynamic properties of a wing in compressible flow can be estimated is dependent, to a large extent, on the leading edge flow conditions.

The dynamic model has been built by using Lagrange –Euler formalism based on potential and kinematic energy concept[6]. Main purpose of this analysis is to improve the model through stability analysis.

$$\Gamma_i = \frac{d}{dt} \left(\frac{\delta L}{\delta \dot{q}_i} \right) - \frac{\delta L}{\delta q_i} \quad (1)$$

$$L_{(q,\dot{q})} = E_{c_{Trans}} + E_{c_{Rot}} - E_p \quad (2)$$

Where,

q_i : generalized coordinates

Γ_i : generalized force given by non-conservatives forces

$E_{c_{Trans}}$: Total translational kinetic energy

$E_{c_{Rot}}$: Total rotational energy

E_p : Total potential energy

The kinetic energy due to the translation is :

$$E_{c_{Trans}} = \frac{1}{2} m \dot{x}^2 + \frac{1}{2} m \dot{y}^2 + \frac{1}{2} m \dot{z}^2 \quad (3)$$

Then the kinetic energy due to the rotation is [6] ;

$$E_{c_{Rot}} = \frac{1}{2} I_{xx} \omega_x^2 + \frac{1}{2} I_{yy} \omega_y^2 + \frac{1}{2} I_{zz} \omega_z^2 \quad (4)$$

Then the total kinetic energy:

$$E_T = \frac{1}{2} \left(m \dot{x}^2 + m \dot{y}^2 + m \dot{z}^2 + I_{xx} \omega_x^2 + I_{yy} \omega_y^2 + I_{zz} \omega_z^2 \right) \quad (5)$$

The potential energy can be expressed by:

$$V = -m \cdot g \cdot Z = -mg \left(\begin{matrix} -\sin\theta \cdot x + \sin\theta \cos\theta \cdot y \\ + \cos\theta \cos\theta \cdot z \end{matrix} \right) \quad (6)$$

Where ω_x , ω_y , ω_z are the rotational speed that can be expressed as a function of the roll, pitch and yaw rate $(\dot{\phi}, \dot{\theta}, \dot{\psi})$ [4]:

$$\omega_x = \dot{\phi} - \psi \sin\theta \quad (7)$$

$$\omega_y = \dot{\theta} \cos\theta + \dot{\psi} \cos\theta \sin\theta \quad (8)$$

$$\omega_z = -\dot{\theta} \sin\theta + \dot{\psi} \cos\theta \cos\theta \quad (9)$$

The force equation for the linear momentum can be derived from the Lagrangian formation as follows :

$$\frac{d}{dt} \left(\frac{\delta L}{\delta \dot{x}} \right) - \frac{\delta L}{\delta x} = F_x \quad (10)$$

$$\frac{d}{dt} \left(\frac{\delta L}{\delta \dot{y}} \right) - \frac{\delta L}{\delta y} = F_y \quad (11)$$

$$\frac{d}{dt} \left(\frac{\delta L}{\delta \dot{z}} \right) - \frac{\delta L}{\delta z} = F_z \quad (12)$$

Then the motion equation for the angular [5] momentum can be derived as follows;

$$\frac{d}{dt} \left(\frac{\delta L}{\delta \dot{\psi}} \right) - \frac{\delta L}{\delta \psi} = \tau_\psi \quad (13)$$

$$\frac{d}{dt} \left(\frac{\delta L}{\delta \dot{\theta}} \right) - \frac{\delta L}{\delta \theta} = \tau_\theta \quad (14)$$

$$\frac{d}{dt} \left(\frac{\delta L}{\delta \dot{\phi}} \right) - \frac{\delta L}{\delta \phi} = \tau_\phi \quad (15)$$

The non-conservative forces and moments come from the aerodynamics as per Lagrange-Euler approach. On this UAV, five parts are considered to calculate the aerodynamics. They are mainly on left and right wings, elevator, and two vertical stabilizers (fig.2).

The airframe is considered as a rigid body associated with the aerodynamic forces generated by the propeller and the wing. This

model is obtained under the assumptions that the center of mass and the body fixed frame origin are coincided; The structure is supposed to be rigid and symmetric (diagonal inertia matrix); The wind speed in the Earth frame is set to zero so that the relative wind on the body frame is only due to the UAV speed.

Total forces and moments on the UAV are [2],

$$f_t \parallel = f_{propeller} + \sum_{i=1}^5 (f_{i\ lift} + f_{i\ drag}) \quad (16)$$

$$M_t \parallel = \sum_{i=1}^5 M_i + f_{i\ lift} \times r_i + f_{i\ drag} \times r_i \quad (17)$$

$$f_{propeller} = f(\dot{x}, U_i) \quad (18)$$

$$f_{i\ lift} = C_{i\ lift} \frac{\rho}{2} S_i v^2 \quad (19)$$

$$f_{i\ drag} = C_{i\ drag} \frac{\rho}{2} S_i v^2 \quad (20)$$

$$M_i = C_{i\ mom} \frac{\rho}{2} S_i v^2 \cdot chord_i \quad (21)$$

Where - U_i is control input

Isolating the acceleration and applying the small angle approximation as it shows linearity for very short time, where the rotational speed in the solid basis are equal to Euler's angles rates. Then,

$$\ddot{x} = \frac{F_{tot,x}}{m} - g \sin\theta \quad (22)$$

$$\ddot{y} = \frac{F_{tot,y}}{m} + g \sin\theta \cos\theta \quad (23)$$

$$\ddot{z} = \frac{F_{tot,z}}{m} + g \cos\theta \cos\theta \quad (24)$$

$$\ddot{\phi} = \frac{I_{yy} - I_{zz}}{I_{xx}} \dot{\psi} \dot{\theta} + \frac{M_{tot,x}}{I_{xx}} \quad (25)$$

$$\ddot{\theta} = \frac{I_{zz} - I_{xx}}{I_{yy}} \dot{\psi} \dot{\phi} + \frac{M_{tot,y}}{I_{yy}} \quad (26)$$

$$\ddot{\psi} = \frac{I_{xx} - I_{yy}}{I_{zz}} \dot{\theta} \dot{\phi} + \frac{M_{tot,z}}{I_{zz}} \quad (27)$$

The fundamental goal of this dynamic modeling is to bring the required numerical outputs (fig.1) for flight motion for the given inputs conditions [1].

B. Model Testing on XFLR5 Simulation Environment

In this model testing, the time consuming process of model making and testing in wind tunnel was replaced by using sophisticated XFLR5 numerical simulation software which can generate and manipulate data significantly on computational aerodynamic.

The output parameters of UAV (i.e- displacements, velocities and accelerations) have been tested on various flight conditions and the model verified on its stability and control in the XFLR5 simulation software [11]. And the results are discussed in the next chapter.

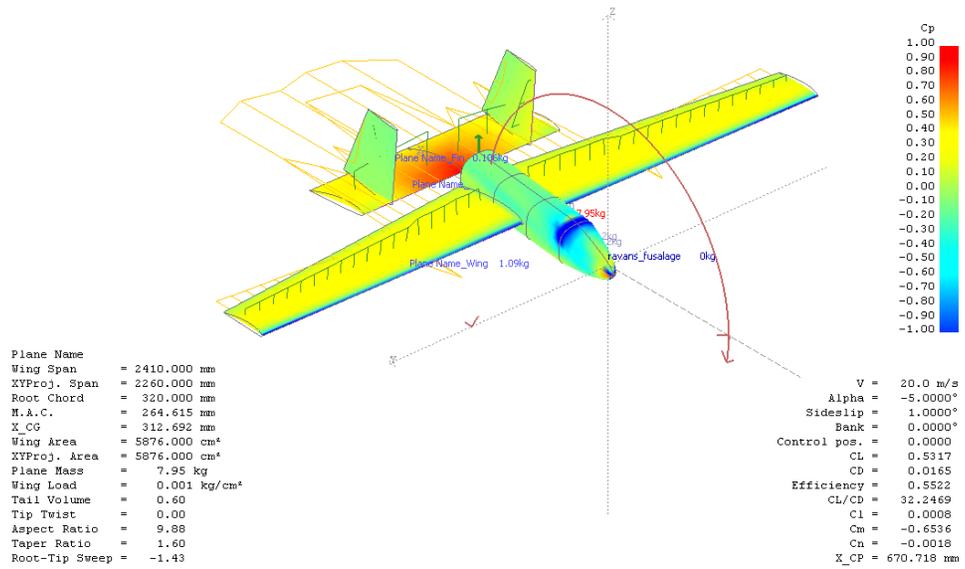


Fig.2-Forces and moments are on the airframe

III. MODEL IMPROVEMENT THROUGH STABILITY

This stability test was done for model improvement for the existing twin boom vertical stabilizer UVA. It wasn't fulfilled the trimmed condition in terms of, basic stability and control characteristics. The major issue that it had was the center of pressure and the center of gravity was confused with natural point. Therefore, a small transient upsets from equilibrium it couldn't stable in climbing.(Fig.3).Obviously, the gradient is zero from -5° to 5° and it was positive at 7° in the previous model. Therefore it is unstable while it is climbing.

To control the downwash lag the elevator incidence angle was changed from 5° to 16° and the wing incidence angle was changed from 15° to 8° .The condition for longitudinal static stability can be determined by plotting pitching moment coefficient C_m , for variation in incidence α . The nose up disturbance increases α and takes the aircraft to the out-of-trim point where the pitching moment coefficient becomes negative and is therefore restoring. Clearly, a nose down disturbance leads to the same conclusion. As indicated, the aircraft is stable when the slope of this plot is negative[5].

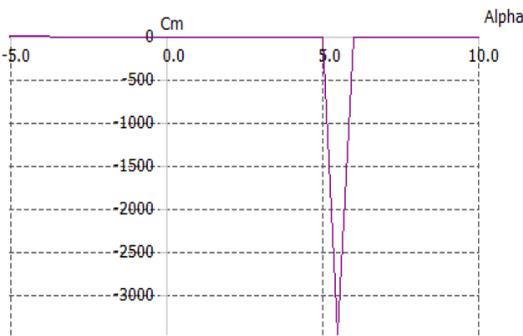


Fig.3-Pitch angle Vs Moment coefficient in UAV before the model improve

Flying condition and handling qualities are interpreted to describe in terms of, stability and control characteristics of the UAV. In this application, flight model has been tested for four natural longitudinal stability modes and four natural lateral stability modes on XFLT5 simulation environment. There are two symmetric phugoid and two short period modes for longitudinal motion and one spiral, one roll damping and also two Dutch roll modes for lateral motion[5].

As for the longitudinal stability modes, whenever the UAV is disturbed from its equilibrium trim state the lateral-directional stability modes will also be excited. Again, the disturbance may be initiated by Autopilot, a change in power setting, airframe configuration changes, such as flap deployment, and by external influences such as gusts and turbulence.

The following graphs have been generated using UAV air frame geometry and aerodynamic stability predictions are based on it. The magnitude of the gradient (Fig-4) determines the degree of stability in the airframe for a given disturbance in alpha (AoA). The corresponding pitching moment C_m curve is showing negative slope (fig.4) in stable aircraft. Therefore, when the angle of attack is changed the tendency to return to its stable position is high in this UAV[5].

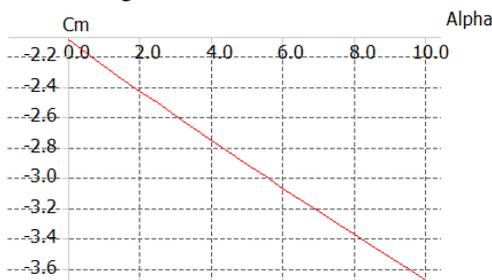


Fig.4-Pitch angle Vs Moment coefficient in UAV after the model improvement

It is shown below that the condition for UAV to possess static stability at a given trim condition is that the gradient of the C_l Vs Alpha (AoA) plot is positive. Obviously, a very large range of values of the gradients is possible and the magnitude of the gradient determines the degree of stability possessed by this UAV. Variation in the degree of longitudinal static stability is illustrated in Fig.5. This means, the tendency of center of gravity to move forward from natural point of the air frame is high[1].

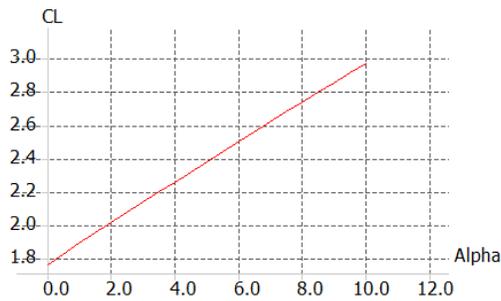


Fig.5- Pitch angles Vs Lift coefficient in UAV

A. Root Locus Plot for UAV

Root Locus interpretation for the UAV lateral and longitudinal modes are shown below and analyzed the pitch attitude feedback on UAV at the same flight condition [1].

The typical root locus graphs are plotted for four natural lateral modes (fig.6) and four natural longitudinal (fig.7) modes. These illustrate the negative damping constants in both modes then also the degree of stability is more [11].

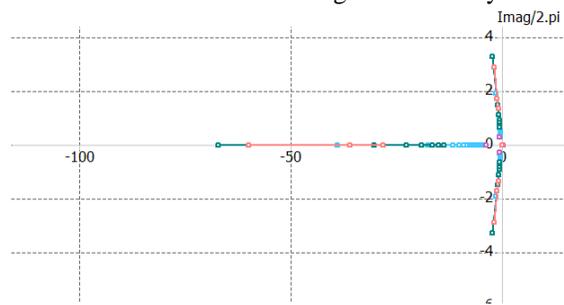


Fig. 6- Lateral mode

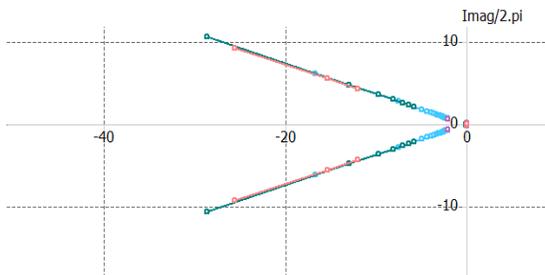


Fig.7- Longitudinal mode

B. Short Term Response for the Dynamic Model

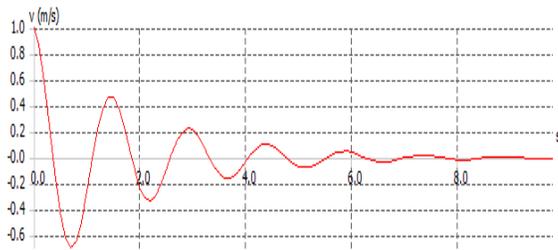
The UAV handling qualities are mainly concerned with the dynamics of the initial, or transient, response to controls [1]. Thus since the short term dynamics are of the greatest interest and it is common practice to conduct handling quality studies using reduced order dynamic models derived from the full order equations of motion [9].

The advantage of this approach is that it gives maximum functional visibility to the motion drivers of greatest significance. The lateral behavior is described by four variables.

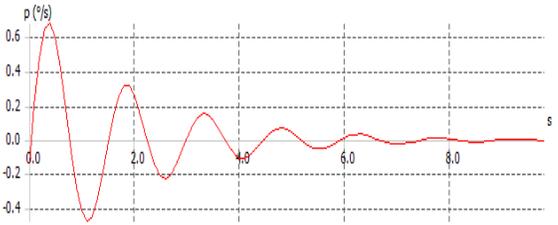
The spring lateral stability analysis has been done for this UAV on XFLR5 simulation software environment. When it was flying in steady state position at an altitude of 8000 ft the head angle turned down from 2° due to the unexpected perturbation and the spiral lateral mode stability is described as follows. When the UAV was in its steady state, the roll rate and the yaw rate were equal to zero. But, for the sudden deviation of the head angle these were fluctuating and progressively returned to zero with in very short period. The results are shown in fig .8.

A well designed UAV should be tested for twenty odd different modes for the stability. Among these twenty, four natural longitudinal and four natural lateral modes are the most important[4]. The procedure for investigating and interpreting the other lateral modes and longitudinal modes of this UAV are much similar to lateral spiral mode. Therefore it is not repeated at the same level of detail in this

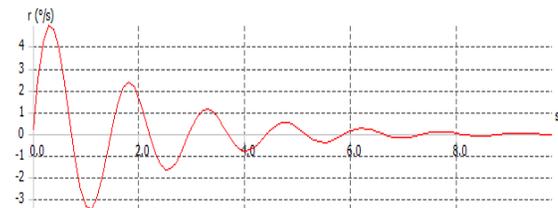
paper because of the pages limitation. But this UAV has tested for the twenty odd stability modes and it has shown a good stability in open loop after few flight geometrical changes.



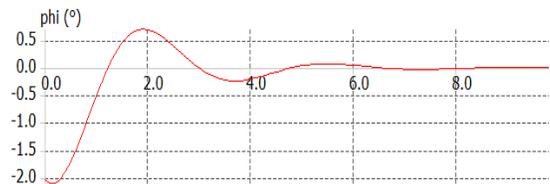
Lateral speed variation $v = dy/dt$ about the steady state value $V = (U_0, 0, 0)$



Roll rate deviation $P = d\theta/dt$



Yaw rate variation $r = d\psi/dt$



Heading angle variation ϕ

Fig.8 – Air frame response for spring lateral stability mode

IV. CONCLUSIONS

Through this stability analysis, model of this UAV and its stability could be increased from its previous position. And this is very important practice for any newly developed UAV to avoid the unnecessary money waste and to decrease the period of time for the project.

But, there are some limitations in this method because of high non-linear behavior of the flight dynamic modeling. Therefore the smart autopilot is crucial to overcome this problem and achieve a long flight endurance and quality fly.

V. ACKNOWLEDGEMENT

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Review for ARM Based Agricultural Field Monitoring System

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Abstract- The paper “ARM Based Agricultural Field Monitoring System using GSM” is mainly focused on modernizing the irrigation technology in agriculture and also to provide adequate irrigation in particular area. The set up consists of mainly ARM7TDMI core and GSM. GSM serves as an important part as it is responsible for controlling the irrigation on field and sends them to the receiver through coded signals. GSM operates through SMS and is a link between ARM processor and centralized unit. ARM7TDMI is an advanced microprocessor and forms the heart of the system. Our project aims at modernizing the agricultural technology by programming the components and building the necessary hardware to automate farming. This project is mainly used to detect the exact field condition as well as weather conditions in real time. The information is given on user request in the form of SMS. GSM modem is controlled with the help of standard set of AT (Attention) commands. These commands are used to control majority of the functions of GSM modem.

Index Terms- GSM modem, AT commands, ARM7TDMI, irrigation.

I. INTRODUCTION

This paper deals with the irrigation industry. Automated irrigation is an interesting application, for real time irrigation of agricultural environment for advancement of agriculture. ARM7TDMI processor is general purpose microprocessor in embedded world which is used in industrial level applications. GSM, as we know, is the most widely used mobile technology, using a simple Subscriber Identity Module (SIM), it has taken the world of mobile communication to new heights. It is based on a simple architecture. With the introduction of new technologies like CDMA, GSM has stood its strength due to its efficiency and simplicity. In our project, we are basically concentrating on following applications such as:

To continuously monitor and control the soil moisture.

To continuously monitor and control the water level of well.

To monitor the dew point content, temperature and humidity so as to forecast the weather condition.

To control the whole system through GSM modem.

It gives the detail information about the field condition to the user through SMS. Maintain faithful irrigation of the farm

field by constant monitoring 3-phase supply and other field parameters. The system consists of a centralized unit, much like a mobile base station, consisting of the subscriber number which forms the link between the user and the device. The whole system works in the form of network being connected to the centralized unit as a node. The centralized unit is connected to many such nodes for receiving and sending the data. The user communicates with the central unit by sending and receiving SMS, which will be received with the help of the SIM card on GSM device. From GSM it is sent to ARM7. Again ARM7 also continuously receives the data from sensors in the form of codes. Which after processing, this data is displayed on LCD. The communication between all devices takes place through RS232. Thus, whenever the system receives the activation command from the subscriber it checks all the field conditions and gives a detailed feedback to the user and waits for another activation command to start the motor, in the form of SMS. The motor is controlled by a simple manipulation in the internal structure of the starter coil. The starter coil is indirectly activated by means of a transistorized relay circuit. Once the motor is started, a constant monitoring on soil moisture and water level is done and as soon as the soil moisture is reached to sufficient level the motor is automatically turned off & a message is sent to subscriber that the motor is turned off.

II. LITERATURE REVIEW

[8] In this paper we have discussed about how to utilize the sensor in the paddy crop field area and gives proposed architecture for real time paddy crop field monitoring with zigbee wireless sensor network analyzed about real time readings of temperature and humidity sensor deployed in real time. Result shows that zigbee wireless sensor network is efficient for paddy crop field monitoring. Now we are working in the part how to resend the packets when packet loss occurs and also doing simulation work for more number of nodes implementing in the paddy crop field environment. The proposed work gives efficient monitoring of paddy crop field monitoring.

[9] The project is thus carried out using ARM7TDMI core with the help of GSM technologies. This project finds application in domestic agricultural field. In civilian domain, this can be used to

GLOBAL SYSTEM FOR MOBILE COMMUNICATION (GSM)

A GSM modem is a wireless modem that works with a GSM wireless network. Modem is controlled by computer using AT commands. Both GSM modems and dial-up modems support a common set of standard AT commands. We can use the GSM modem just like a dial-up modem. But the main difference between them is a dial-up modem sends and receives data through a fixed telephone line while a wireless modem sends and receives data through radio waves. GSM is one of the most vital components in our set up since all the communication between the users and centralized unit takes place through this modem. GSM communicates with ARM through I2C bus. A GSM modem can be an external device or a PC Card. Typically, an external GSM modem is connected to a computer through a USB cable or a serial cable. Similar to a GSM mobile phone, this GSM modem requires a SIM card from a wireless carrier in order to operate.

4 AT Commands According to GSM07.05

The GSM 07.05 commands are for performing SMS and CBS related operations. SIM300 II supports both Text and PDU modes.

4.1 Overview of AT Commands According to GSM07.05

Command	Description
AT+CMGD	DELETE SMS MESSAGE
AT+CMGF	SELECT SMS MESSAGE FORMAT
AT+CMGL	LIST SMS MESSAGES FROM PREFERRED STORE
AT+CMGR	READ SMS MESSAGE
AT+CMGS	SEND SMS MESSAGE
AT+CMGW	WRITE SMS MESSAGE TO MEMORY
AT+CMSS	SEND SMS MESSAGE FROM STORAGE
AT+CMGC	SEND SMS COMMAND

V. ADVANTAGES

In paddy crop field we have to irrigate the land completely. We have to irrigate depending upon the soil, ups and downs of the land and where it needs. At present, there is no mechanism to find where irrigation is needed. In this paper, we made sensor network for monitoring the crop field area by deploying water sensors in the land to detect the places where the water level is low. From those results we irrigate that particular place only. From the above methodology we can conserve water and minimize the problem of water logging in the land. We used humidity sensor to sense the weather. Using this the farmer can get idea about the climate. If there is any chance for rainfall, the farmer need not water the crop field. With this we can conserve water and also power. In present irrigation system the fertilizer level is increasing, which affects people. Using pH sensors we get the information about the soil and analyze the acid content, by which we can apply required fertilizers to the place where it needs, and avoid over fertilization of the field area. Temperature

is a randomly varying quantity in the environment of paddy farm. Using temperature sensors we can detect the temperature, and provide water to the crop in cultivated area.

VI. FUTURE SCOPE OF THE PROJECT

- The future scope of this project is enhanced application with the addition of the required features. One such application is to detect the soil parameter and suggesting the proper fertilizer and its feed time. Such Sensors can be incorporated in the design. It can also be designed to detect the particular disease on the plant and suggest the proper curative measures on it.
- In the same way one can predict the exact weather if the system is made to communicate with the nearer weather station through satellite communication.

VI. CONCLUSION

Thus, project is proposed out using ARM7TDMI core with the help of GSM technologies. This project finds application in domestic agricultural field. This can also be used to ensure faithful irrigation of farm field in civilian domain, as well as for horticulture and floriculture areas, since we have the option of finding out moisture level of soil in a particular area

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A NML-HDL Snake Clock Based QCA Architecture

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Abstract- The international technology roadmap of semiconductors suggests that quantum-dot cellular automata (QCA) technology might be possible CMOS substitute [4]. MQCA are attractive due to their compactness and extremely small power dissipation. This led to focus on nanomagnetic logic (NML). The nature of these circuits is much different from that of CMOS circuits [1].

In this paper we studied a VHDL behavioral model for NML circuits, which allows the evaluation of not only the logic behavior but also its power dissipation. It is based on technology solution called "Snake-clock."

Index Terms- Microprocessor, Nanomagnetic logic (NML), Null conventional logic (NCL), Power dissipation, Quantum-dot cellular automata (QCA), Very high speed integrated circuits hardware description language (VHDL).

I. INTRODUCTION

Quantum-dot cellular automata is a recent technology in which logic states are not stored as a voltage levels but as the position of individual electrons. QCA gives binary information by utilizing a bistable charge configuration instead of a current switch [2]. Currently it has two modes of implementations molecular QCA [8], [9] and magnetic QCA [10], based on domain nanomagnets, with only two stable magnetization states.

Another aspect of NML is that in order to propagate a signal without errors [16], an external field is applied which drives the cell in an intermediate unstable state lowering the potential barrier between the two stable magnetization values. When the field is removed magnets arrange themselves in ferromagnetic or antiferromagnetic manner depending upon the magnets relative placement. This magnetic field is called "clock". The necessity of clock signal and generated clock zones create a problem of "layout-timing." This problem can be unbearable in case of circuits with large number of gates and connections; hence there is solution termed as delay insensitive null convention logic (NCL) [22].

The various terms related to the paper are described in section II. Various circuits with advancements are mentioned in section III. The results of this literature survey are collected in section IV. The section V deals with the conclusion of this NML technology.

II. TERMINOLOGY

A. QCA

In quantum dot cellular automata, a QCA cell

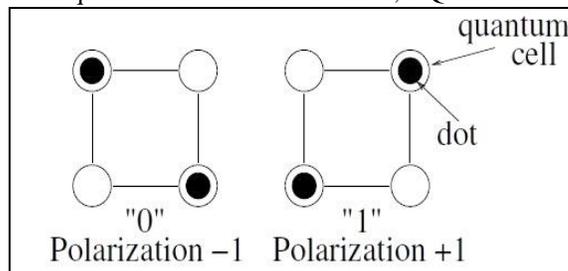


Figure 1: QCA cell [2]

consists four dots that are positioned at corners of a square.

A quantum dot is a site in a cell which a charge can be situated. The cell consists of two extra mobile electrons that can quantum mechanically tunnel between dots; but not cells. As shown in [Fig. 1] the two possible charge configurations are used to represent binary '0' & '1'[2].

In the molecular QCA the molecule has a bistable charge configuration in which binary information can be encoded. One molecule can be switched by a neighboring molecule [8], satisfying the key requirement for QCA operation. The simulation of molecular QCA wire is done in [9]. The magnetic QCA has received considerable attention because molecular QCA are currently far from technology reality; however the magnetic QCA or nanomagnetic logic (NML) allows fabrication of fully magnetic circuits with very low power consumption [2].

B. NML

Ferromagnetic and antiferromagnetic ordering in coupled nanostructures has recently received a considerable attention. These magnetic systems are adiabatically clocked by external magnetic field that enables the structures to relax their ground state from an initial metastable state. Certain arrangements of antiferromagnetically coupled dots are able to perform logical functionality called MQCA operation or NML. Recent experiments have shown correlation of 4-7 dots in a chain of single domain nanomagnets [10].

The basic cell is a single domain nanomagnet with aspect ratio which leads to shape anisotropy. This characteristic lets nanomagnets to have only two stable magnetizations, which represent the two logic values '0' & '1' [Fig. 2(a)]. The magnetization vector is parallel to the long side called as *easy axis* [13]. The magnetic field applied along short side which is

called as *hard axis*.

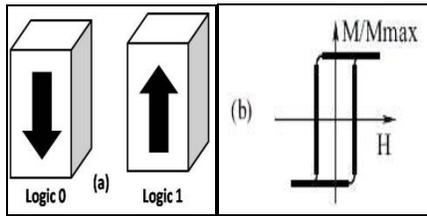


Figure 2: NML. (a) Single domain nanomagnets (b) Hysteresis loop of nanomagnets [13].

These two cells are separated by a potential barrier. When the field is applied the nanomagnets are forced into an unstable state, with the magnetization directed along the hard axis. The magnetic field is generated by a current flowing through a wire plates under magnets plane, and ferrite yoke is used [5]. As soon as the magnetic field is removed the magnets recognize themselves in an antiferromagnetic or ferromagnetic order [Fig. 3]. The alternating behavior of this field is the reason why it is called as “*clock*” [1]. Therefore, a complex circuit is divided into small structures called clock zones, which has small number of cells [13].

B. SNAKE CLOCK

As the external field is called clock, as it is iteratively switched on and off and allows the evaluation phase, even though it has not the “traditional” function of a clock signal. Hence the investigators have developed a solution to clock distribution, “snake-clock”, which is more feasible for the multiple-phases clock [15] distribution, allows information propagation without losses in nanomagnets arrays [3].

The three phase snake-clock has *RESET*, *SWITCH*, and *HOLD* which is shown in [Fig. 4 (a)] both time and space. In [Fig. 4 (b)] the behavior of nanomagnets grouped in the corresponding clock zones is shown. In [Fig. 4 (c)] the top view of clock zones is shown. By this only *snake* like propagation is possible. Same can be observed by [Fig. 4 (d), (e)] [3].

C. NULL CONVENTIONAL LOGIC (NCL)

The use of a multiphase clock leads to the layout

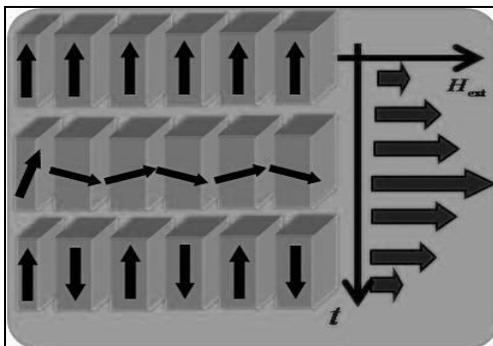


Figure 3: Magnets are forced in the unstable state when the magnetic field is applied [1].

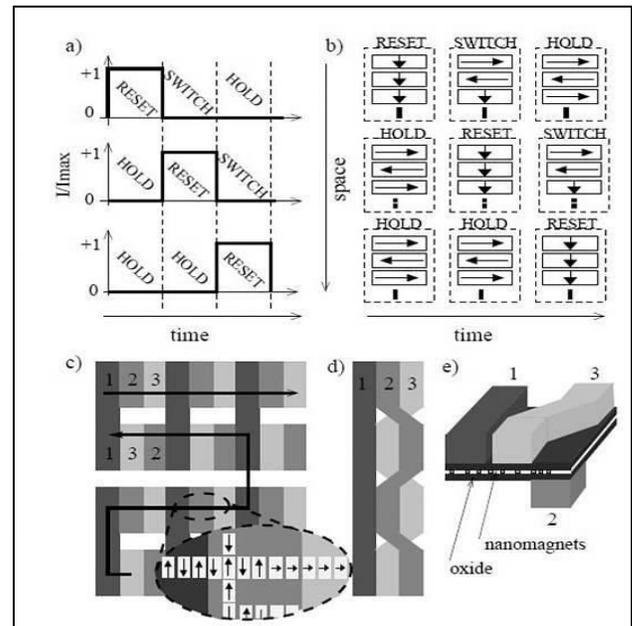


Figure 4: Snake Clock Organization [3], [4].

timing problem. As stated in [3] every clock zone is equivalent to a D-latch, where at every clock cycle the output copies the input value. Therefore, the propagation delay of a NML wire depends upon the number of clock zones the wire passes through. If different inputs signals of a gate arrive after an unequal number of clock cycles, the circuit will not work.

There is a solution called NCL [22]; which is an asynchronous delay-insensitive logic. Signals are coded using two bits, and they can assume two different states: NULL state when they are at same time 0; and DATA state which represents the logic value (01 means logic 0 and 10 means logic 1). The circuit passes from NULL to DATA only when all the inputs change from NULL to DATA and maintains its status until at least one input is in the DATA state. Before a new data can be accepted from a logic gate; every input must reach to the NULL state. Only at this point a new cycle can start. This ensures the circuit operations also in presence of a considerable difference in the propagation delay among the inputs [21].

III. CIRCUITS AND ADVANCEMENTS

A. BASIC STRUCTURES

Many works in the literature analyze the behavior of the basic blocks of this NML technology. The basic QCA cell can be combined to form a structure like a wire called “*QCA wire*” [2]. Similarly various types of QCA devices can be constructed using different physical cell arrangements. One of the basic logic gates in QCA is the “*Majority Voter*” with logic function $MV(A, B, C) = AB + AC + BC$. Majority voter can be realized by 5 QCA cells as shown in [Fig. 5] [13].

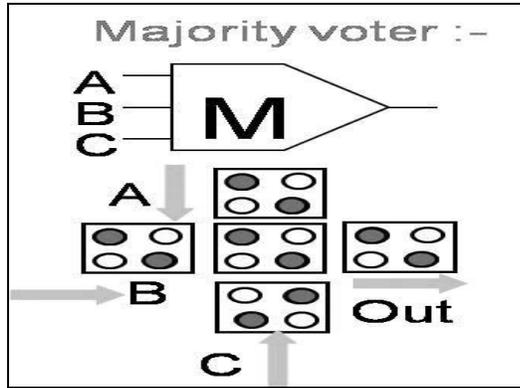


Figure 5: Majority voter: symbol and structure [2].

B. ADVANCEMENTS

From this basic gate various implementations are done like *QCA shift register* [7]. The QCA latch is made up of three aluminum islands connected by tunnel junctions as shown in [Fig. 6]. A clock signal is applied to the middle dot to vary the potential on it so that it acts as a barrier for tunneling between the dots. Inputs are applied to the top and the bottom dots of latch by external input voltages. When no clock is applied and all the dots are neutral; the latch is in NULL state and holds no data.

As the clock signal is applied, the barrier height increases, and the polarization of the latch takes on a definite value determined by the input. This is called as “Active” state. When the barrier height is large enough to suppress switching over the relevant time scale, hence the latch is in “locked” state. A shift register consists of a line of latches where each latch, in its locked state, acts as an input to the next. Binary information is transferred sequentially along the line from one latch to the next by applying a sequence of phase-shifted clock signals to successive latches. The clocking sequence and the resulting potentials in the shift register [7] are shown in [Fig. 7].

As moving further advancement in QCA designing; *QCA Adder* and *QCA Multiplier* are designed [14] by the investigators. They states that when circuits implemented using QCAs then there is significant complexity in interconnections and wire delay occurs.

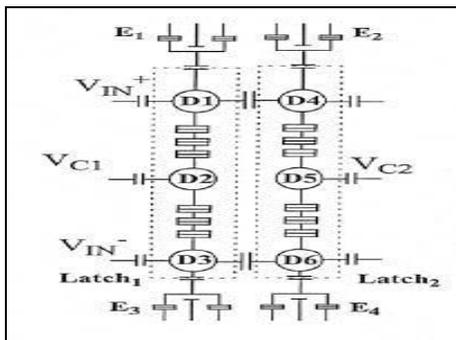


Figure 6: Schematic diagram of QCA shift register [7].

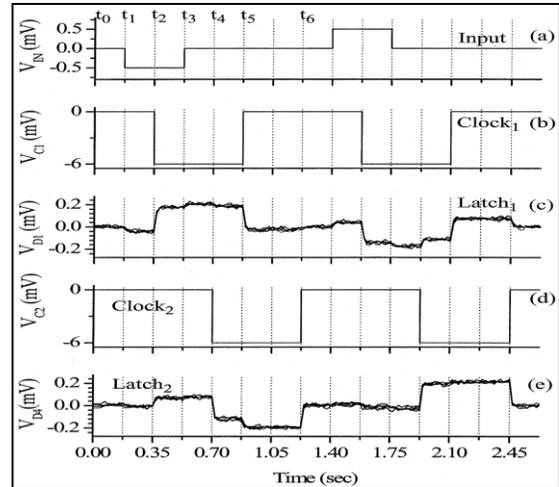


Figure 7: Operation of QCA shift register. (a) Input V_{IN} is applied to L_1 . (b) Clock V_{C1} to latch L_1 . (c) Output of L_1 measured by the potential on dot D_1 . (d) phase-shifted clock V_{C2} applied to latch L_2 . (e) Output of L_2 measured by the potential on dot D_4 [7].

In QCA, if the complexity increases, the delay may increase because of the increased cell counts and wired connections. They implemented new designs of Adder, the carry flow adder; [14] and serial parallel Multiplier network based on filter networks.

To prove the advancement in the QCA technology the comparison table between carry-look-ahead (CLA) adders and carry flow (CFA) adders is given in [Table I].

For the circuit layout and functionality checking, a simulation tool for QCA circuits was required. Hence a tool which is a product of an ongoing effort to create a rapid and accurate simulation layout tool for quantum-dot cellular automata (QCA) is developed known as QCADesigner [17]. QCADesigner is capable of simulating complex QCA designs on standard platforms. QCADesigner is a CAD tool designed specifically for QCA logic design and simulation. This tool allows the ability to layout and; verify a variety of QCA systems to users. This functionality occurs due to standard CAD features and various QCA specific simulation engines are provided in QCADesigner.

Table I: Adder comparisons [14]

	Complexity	Area	Delay
CLA4	1575 cells	$1.74\mu\text{m} \times 1.09\mu\text{m}$	$3\frac{2}{4}$ clocks
CLA8	3988 cells	$3.50\mu\text{m} \times 1.58\mu\text{m}$	$6\frac{2}{4}$ clocks
CLA16	10217 cells	$7.02\mu\text{m} \times 2.21\mu\text{m}$	$10\frac{1}{4}$ clocks
CLA32	25308 cells	$14.06\mu\text{m} \times 3.05\mu\text{m}$	19 clocks
CLA64	59030 cells	$28.20\mu\text{m} \times 3.73\mu\text{m}$	$31\frac{2}{4}$ clocks
CFA4	371 cells	$0.90\mu\text{m} \times 0.45\mu\text{m}$	$1\frac{2}{4}$ clocks
CFA8	789 cells	$1.79\mu\text{m} \times 0.53\mu\text{m}$	$2\frac{2}{4}$ clocks
CFA16	1769 cells	$3.55\mu\text{m} \times 0.69\mu\text{m}$	$4\frac{2}{4}$ clocks
CFA32	4305 cells	$7.09\mu\text{m} \times 1.03\mu\text{m}$	$8\frac{2}{4}$ clocks
CFA64	11681 cells	$14.15\mu\text{m} \times 1.71\mu\text{m}$	$16\frac{2}{4}$ clocks

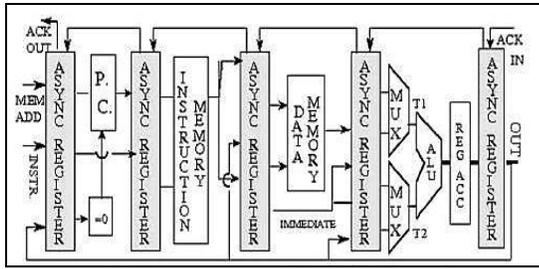


Figure 8: Architecture of microprocessor a NML [1].

Further improvements in QCA architectures are done gradually from a basic QCA cell to a NML microprocessor. The complete 4-bit microprocessor is a realistic architecture which was implemented in [1]. The processor architecture is simple but it can handle many types of operations: arithmetic, logic, memory read and write, and different kinds of jump. The microprocessor was chosen because it involves all types of logic circuits like combinational, sequential, etc. It represents the ideal testbench for the NML technology evaluation. The overall architecture of microprocessor is shown in [Fig. 8] [1]. There are four main blocks: a program counter (PC) which generates the address for the parallel instructions; a serial memory (4 words of 4 bits) for data storing; and finally a data-path block for the arithmetic operations. Two multiplexers select the ALU source operands, and an accumulator register stores ALU results. A comparator block maintains the conditional jumps. The comparator output is connected back to the jump enable of program counter.

C. POWER DISSIPATION

The energy dissipated during the magnetization reversal of larger size magnets is well known to be equal the area of the hysteresis loss as stated above. This “hysteresis loss” originates from the irreversible change of complex domain pattern. Macro scale magnets dissipate power when their domain structures quickly rearrange in the presence of a varying external magnetic field. The energy dissipated from the microscopic model is the same as the area of hysteresis curve [12]. The energy of nanomagnet is shown in [Fig. 9].

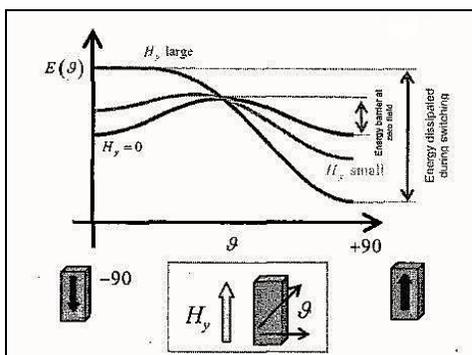


Figure 9: The energy of a nanomagnet [12].

Power losses in the NML circuits depend on two main components; power dissipated by nanomagnets during their switching phase, and power dissipated by clock wires during the reset field generation. During the switching the nanomagnet follows a hysteresis cycle as shown in [Fig. 2(b)]. The area of this hysteresis cycle is proportional to the energy spent for switching. This energy must be supplied to the nanomagnet by the source that generates the magnetic field, and this is normally dissipated in the form of heat.

The second one is the power dissipated by clock wires. This can be separated in two components: 1) the power dissipated because of the Joule effect and 2) the power stored in the wire inductance. The power dissipated by Joule effect represents the main contribution, mainly because a high value of current is necessary to generate a magnetic field strong enough to force a reset. The energy dissipated by the clock depends on the length of the wire, which is a function of the circuit area, affected by the circuit complexity and layout.

For the NML microprocessor a power model is made in [1] as shown in [Fig. 9]. The model is based on five key points as stated below;

- 1) It is embedded in the architecture description: Each block includes not only the logic sub-blocks but also the functions for evaluating the two power contributions.
- 2) It is hierarchical: A block of level N uses data on the number of magnets from sub-blocks of level $N - 1$, and generates information to be propagated to the higher $N + 1$ hierarchical level.
- 3) Given a block i in the architecture, a power estimator evaluates power consumption for current block i as a function of the number of nanomagnets in block i .
- 4) In the architecture of level N , a nanomagnet sum is enabled using the number of nanomagnets of all the included blocks of level $N - 1$ as input. This sum is extended to each clock zone.
- 5) An overhead factor is used to take into account the routing complexity. If the sub-blocks have a total sum of magnets equal to M , the connection among them could require an additional number of magnets. This overhead is estimated and is multiplied by M . The value of this factor is different for each hierarchy level.

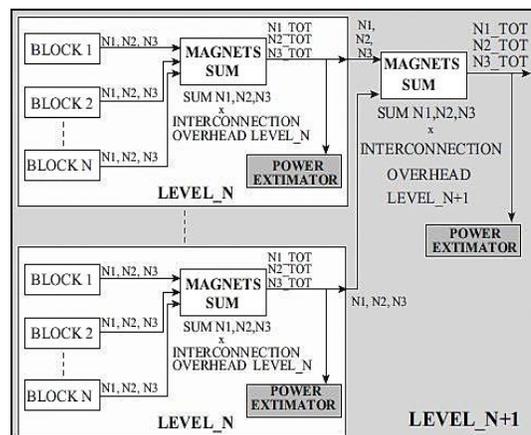


Figure 10: Hierarchical power model for microprocessor [1].

IV. RESULTS

As per the literature survey; many investigators provided a perspective of current-state nanoelectronic devices, which may a solution to the increasingly challenging manufacturing domain of conventional CMOS.

The [Fig. 11] shows the results of Majority voter; each map represents a combination of widths and lengths that corresponds to proper operation [13]. [Fig. 11(a)] shows the impact of sizes variation only of the Majority voter LEFT input magnet. It also shows that the aspect ratio should better remain near 2 or higher for a good rejection to process variations. [Fig. 11(b)] shows the influence of the sizes variations of DOWN input magnet on the whole gate behavior. The influence of UP input magnet is not recorded because it has the same behavior for symmetry. [Fig. 11(c)] shows the effect of the sizes variations of CENTRAL input magnet, which is responsible for the logic computation. [Fig. 11(d)] shows the influence of the same process variation applied to all magnets together.

To evaluate how the changes in the horizontal and vertical distances values affect performance, the 50% delay of the gate was measured. In case of NML technology, it is the delay between the 50% of the variation of the clock signal and the 50% of the variation of the magnetization of the CENTRAL block as shown in [Fig. 12] [13].

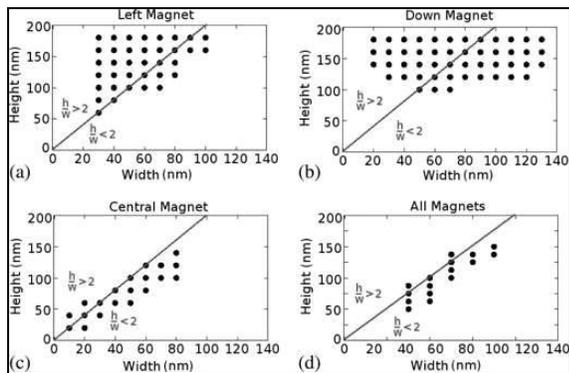


Figure 11: Majority voter working area considering process variations [13].

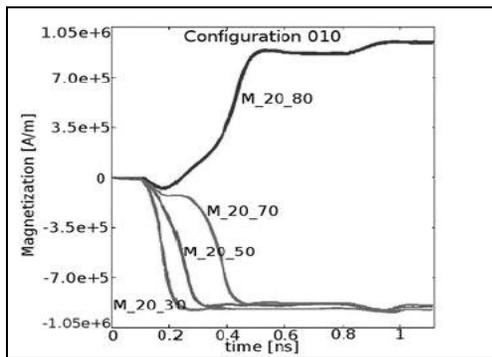


Figure 12: Timing variation of central magnet [13].

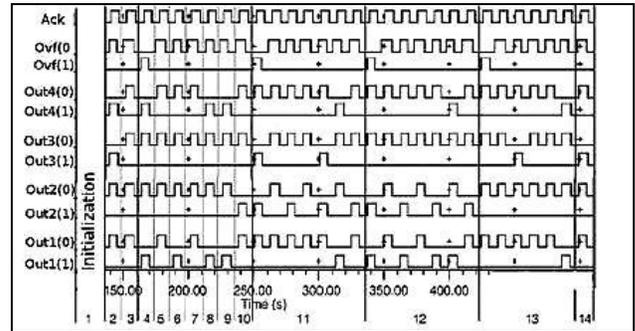


Figure 13: NML microprocessor modelsim simulation [1].

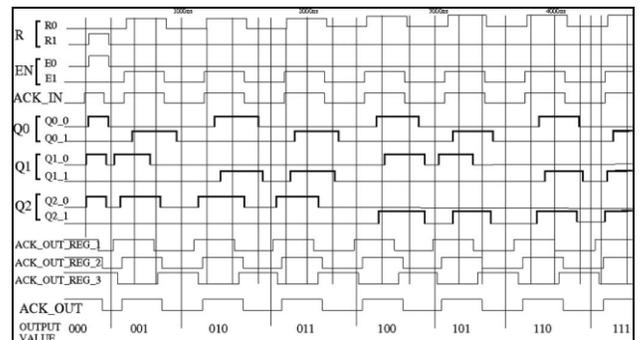


Figure 14: NCL counter simulation results [4].

Moving further with the complex circuit implementations; the QCADesigner came into focus. The QCADesigner needed because; the main problem in implementing more accurate simulations is the lack of experimental data for QCA systems with larger number of cells. The simulation results of NML microprocessor [1] are shown in [Fig. 13] using QCADesigner.

The null convention logic (NCL) counter is based on the generic structure of an NCL finite-state machine. A memory register is used to store the present state, and a combinational circuit generates a future state [4]. NCL register don't have a memory function. Their aim is to implement the asynchronous communication protocol to guarantee delay insensitivity. The NCL counter simulation results are shown in [Fig. 14]. In this all the outputs switch from DATA state to NULL state and vice versa. The bold lines in the [Fig. 14] show when one of the bits assumes a DATA configuration. The entire structure works using "snake-clock".

V. CONCLUSION

We studied various techniques developed by many investigators of nanomagnetic logic (NML) or magnetic quantum-dot cellular automata (QCA) circuits. These circuits are good for operation as they dissipate very low power as compared to traditional CMOS devices. We also come to know the terms like null conventional logic (NCL) and multiple phase clock i.e. snake clock.

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Evaluating Cloud Technology Solutions for Business Development and Business Strategies

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Abstract- The presence of cloud computing as a tool in business is getting a reaction almost as though it's something new. There's a lot of attention being paid to advances mostly as a result of affordable, scalable SaaS solutions. These solutions allow for a mobility and ease of access for which older systems didn't allow. Given that they're a symptom of the newer cloud computing push, they're of course serving to earn accolades for the cloud that it did not have previously. Cloud computing offers your business many benefits. It allows you to set up what is essentially a virtual office to give you the flexibility of connecting to your business anywhere, any time. With the growing number of web-enabled devices used in today's business environment (e.g. smart phones, tablets), access to your data is even easier. There are many benefits to moving your business to the cloud. Business can scale up or scale down your operation and storage needs quickly to suit your situation, allowing flexibility as your needs change. Rather than purchasing and installing expensive upgrades yourself, your cloud computer service provider can handle this for you. Using the cloud frees up your time so you can get on with running your business. Business applications are moving to the cloud. It's not just a fad—the shift from traditional software models to the Internet has steadily gained momentum over the last 10 years. Looking ahead, the next decade of cloud computing promises new ways to collaborate everywhere, through mobile devices. On the other hand, the best cloud solutions can be designed to help enterprises become the builder and broker of services, maintaining control, building value, and leveraging the power of private and public clouds. In conclusion, the paper emphasizes that, as most enterprises are creating a hybrid service portfolio comprising services from many sources, it is critical that business management must align the right model to the right service in order to build, consume, and manage appropriate cloud services in an effective and secure way.

Index Terms- Cloud Technology Developments, Cloud Computing Business Services, Cloud Solutions, Business benefits and Strategies

I. INTRODUCTION

In the last five years, enterprises have increasingly embraced cloud technology to help them innovate and transform their business. Cloud-based applications that automate sales processes, HR management, collaboration, email and file sharing are growing fast and enabling businesses to meet their needs in a shorter timeframe than ever before. Cloud technology has been described as an umbrella term to specify a range of sophisticated on demand computing services initially offered by commercial providers, such as Amazon, Google, and Microsoft. It denotes a model on which a computing infrastructure is viewed as a cloud, from which businesses and individuals access applications from anywhere in the world on demand. The main principle behind this model is offering computing, storage, and software as a service [1].

Cloud solutions offer a range of economic benefits to their users and to the economy as a whole. In particular, it has the potential to free businesses from having to spend more capital on IT. And it also enables businesses to be far more agile in their use of technology, no more waiting for many weeks to install new IT capacity when capacity can be scaled up through a self-service portal (Bakshi, 2009). At the same time, cloud security risks are occurring with increased frequency. Though the risks from malicious hacks to insider threats can seem rising, a holistic approach to cloud information and data protection can help companies reduce the risks of adopting the cloud (Browne, 2010; Karadsheh and Alhawari, 2011).

As an evolving paradigm, cloud technology can be adopted as a service model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction. Many researchers in the academic and business spheres have attempted to define exactly what cloud technology is and what www.theinternationaljournal.org > RJEBS: Volume: 01, Number: 12, October-2012 Page 8 unique characteristics it presents. Buyya, Broberg, and Goscinski have defined it as follows: "Cloud is a parallel and distributed computing system consisting of a collection of inter-connected and virtualized computers that are dynamically provisioned and presented as one or more unified computing resources based on service-level agreements (SLA) established through negotiation between the service provider and consumers [2]." Chee and Franklin have stated that "cloud computing is an information-processing model in which centrally administered computing capabilities are delivered

as services, on an as-needed basis, across the network to a variety of user-facing devices [3].” Cloud technology can be adapted as a service-delivery model to instantiate new business flexibility and scalability. Beyond the potential economic benefits, perhaps the most important attribute of cloud computing services is that they enable completely new business and technology solutions with enhanced business value. Certainly, there are numerous issues to be considered and perhaps addressed as the computing industry transitions to a new IT infrastructure.

II. EVALUATING CLOUD SERVICES, BUSINESS BENEFITS AND VALUE

There are several studies evaluating the economic impact of cloud computing based on economic models. The Centre for Economics and Business Research (Hogan, 2010) developed in 2010 an economic model to estimate the impact of widespread adoption of cloud computing on the five major economies of the EU (France, Germany, Italy, Spain, UK). According to this study, cloud computing (including public, private and hybrid) had the potential to generate over €763 billion of cumulative economic benefits over the period 2010 to 2015, corresponding to 1.57% of total cumulative GDP of the five economies over the same period. Cloud computing adoption was also expected to yield annual net new jobs of 446 thousand across the five economies by 2015.

In analyzing the economical benefits of cloud solutions, economist Federico Etro presents two possible scenarios (Etro, 2011): slow diffusion of the new technology leading to a 1% reduction of the fixed production costs, and rapid adoption leading to a 5% rapid reduction in the fixed costs. In the first scenario, cloud computing is expected to generate additional GDP growth in the main EU economies of approximately 0.1% a year; in the rapid adoption scenario, GDP growth could go up to 0.4% in the medium run (up to 5 years). According to Etro, the most relevant benefit of cloud adoption is the generalized reduction of the fixed costs of entry and production, in terms of shifting fixed capital expenditure (CAPEX) in ICT into operative costs (OPEX) depending on the size of demand and production. This contributes to reduce the barriers to entry, especially for the SMEs, with a strong potential impact on the creation of new enterprises, new jobs, and the exploitation of new business opportunities. Therefore, this mechanism could lead to the permanent creation of up to 400,000 new SMEs in Europe. In the phase of introduction of cloud computing, the creation of new jobs could vary between 300,000 jobs in the slow adoption scenario and 1 million jobs in the rapid adoption scenario.

Cloud solutions offer customers a range of business benefits beyond cost savings. As a recent IDC survey has found (Bradshaw and others, 2012), the business benefit most widely seen or expected is an increased effectiveness of mobile working. Generally, cloud applications can be accessed from anywhere with an Internet connection and increasingly this means via a mobile device; in fact mobile access is increasingly a standard feature of cloud applications but much less so for the installed base of conventional on-premise applications. Productivity also increased due to the user interfaces on cloud services often being easier to use than the software they are replacing. It can be seen that the seller return shipping insurance significantly increases consumer propensity to buy regardless of their regulatory focus (see Fig. 1).

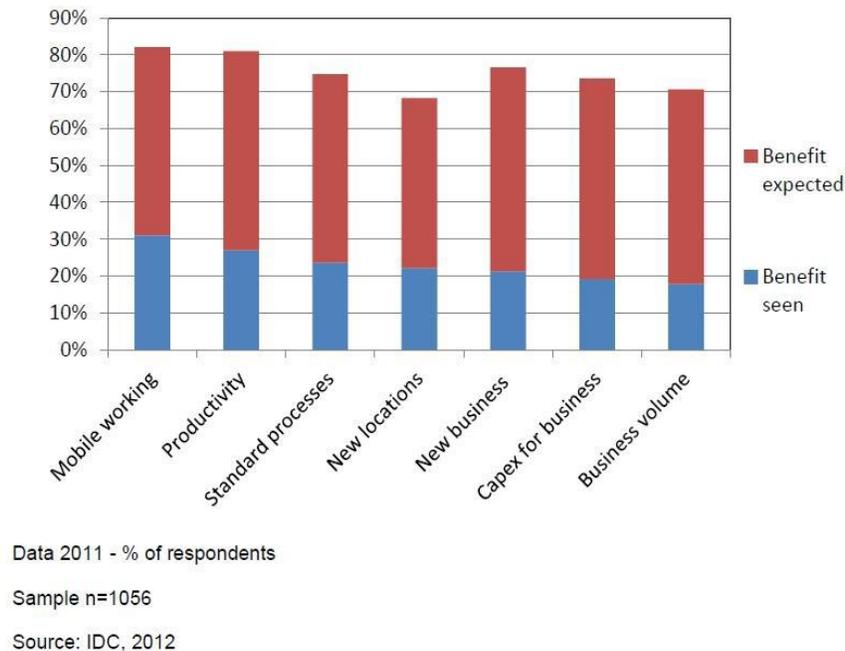


Fig. 1: Business Benefits Seen and Expected

Other cloud benefits impact business organization and market approach (Zhang, 2012). "Standard processes" means that, through using a common cloud service, the different parts of the business are better able to ensure that core processes are executed in a standard way. "New locations" means that the cloud makes it easier to open up offices in new areas, and "new business" means that cloud has enabled the opening up of new business lines, through making it possible to "turn on" the required services rather than having to go through extended provisioning and implementation processes. "Capex for business" means that it was possible to switch capital expenditure from IT to the business – a corollary to cost savings. "Business volume" means that organizations were able to increase revenues.

III. CLOUD SOLUTIONS AND BUSINESS STRATEGIES

At the foundation of cloud solutions and applications is the broader concept of infrastructure convergence and shared platforms (see Fig. 2).

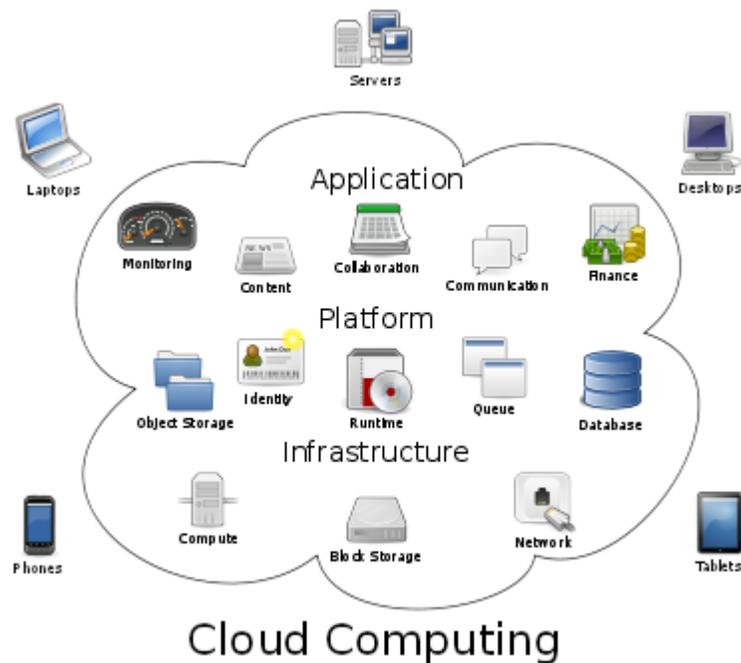


Fig. 2 Cloud Computing Environment

This type of data exchange and networking environment allows enterprises to get their applications up and running faster, with easier manageability and less maintenance, and enables an enterprise to more rapidly adjust IT resources to meet fluctuating and unpredictable business demand.

Cloud computing is a new model of consuming and delivering IT and business services. It enables users to get what they need, as they need it, from advanced analytics and business applications to IT infrastructure and platform services, including virtual servers and storage. It can provide significant economies of scale and greater business agility, while accelerating the pace of innovation [4].

Many business leaders have posed the question of whether the business adoption of cloud technology is just a new form of outsourcing. In fact, cloud solutions, in terms of their sourcing, management, and risk/opportunity profiles, more closely resemble managed services. Broadly, a managed service is the practice of transferring day-to-day management responsibility as a strategic method for improved effective and efficient operations including production support and life-cycle management activities. Managed services and outsourcing are conceptually similar; however, the difference is in how they are structured and the degree to which they are customized. IT outsourcing has become a metaphor for a complex and highly structured transfer of operational and management processes to a third-party provider [5]. A managed service is the selection of a standard offering to source out a specific set of responsibilities or activities. In this way, managed/hosted services attempted to drive better costs through standardization, in contrast to the traditionally one-off structure of outsourcing deals. In this regard, public cloud services are a next logical step from hosted services, in the standardization of cloud services.

Cloud computing and solutions, in their many forms and flavors, will continue to evolve rapidly and assume increasingly critical roles within organizations as these technology platforms mature. Further, it is important to note that most organizations will use a combination of public, private, and hybrid cloud services. The hybrid cloud infrastructure is a composition of two or more distinct cloud infrastructures (private, community, or public) that remain unique entities, but are bound together by standardized or proprietary

technology that enables data and application portability. Many enterprises and organizations have used managed services successfully; conversely, outsourcing remains a somewhat loaded term within the computing industry as many organizations have had somewhat mixed results with the strategy. At the risk of oversimplifying, the more standardized nature of managed services and solutions is a major part of their success. Building once and delivering many is a much more efficient process for a service provider than building once and delivering once. As business executives and IT leaders approach a potential public cloud services contract, leveraging the organization's experience and best practices with managed services contracts such as standardization, service-level definition, and contract management would enhance outcomes [6].

The availability of public cloud services sourcing, provisioning, and delivery options creates critical new enterprise questions and opportunities for business and technology architecture. When selecting external public cloud service options, it is not just about technology architecture, but the implications for other aspects of the computing infrastructure. At issue is how the technology infrastructure and business processes interact to shape operations, service delivery, and employee enablement. As the industry is still in the early phases of public IT cloud services evolution, the architectural implications are still evolving. Virtually all IT leaders and business executives within buyer organizations have been exposed to the term “cloud computing”, but as industry best practices, nomenclature and industry offerings continue to evolve rapidly, internal discussions, strategy formulation, and sourcing evaluations can often be confusing and frustrating. Because lower cost is often cited as a chief advantage of cloud computing, business executives often seek to embrace new options without a fully reasoned discussion of options [7].

Securing information within a cloud computing environment requires three levels of security: network security, host security, and application security. These security needs are also present within in house infrastructure, and are impacted directly by access policies and workflows of an entity which owns and manages its resources. When an entity moves to cloud computing there are security challenges at each of the three levels, as well as those dealing with the operation of the business and the individuals involved in the system's deployment and management. Although these security challenges are exacerbated by cloud computing, they are not specifically caused by it [8].

International legal issues also need attention. When data are moved into the cloud, providers may choose to locate them anywhere on the planet. The physical location of data centres determines the set of laws that can be applied to the management of data. For example, specific cryptography techniques could not be used because they are not allowed in some countries. Similarly, country laws can impose that sensitive data, such as patient health records, are to be stored within national borders.

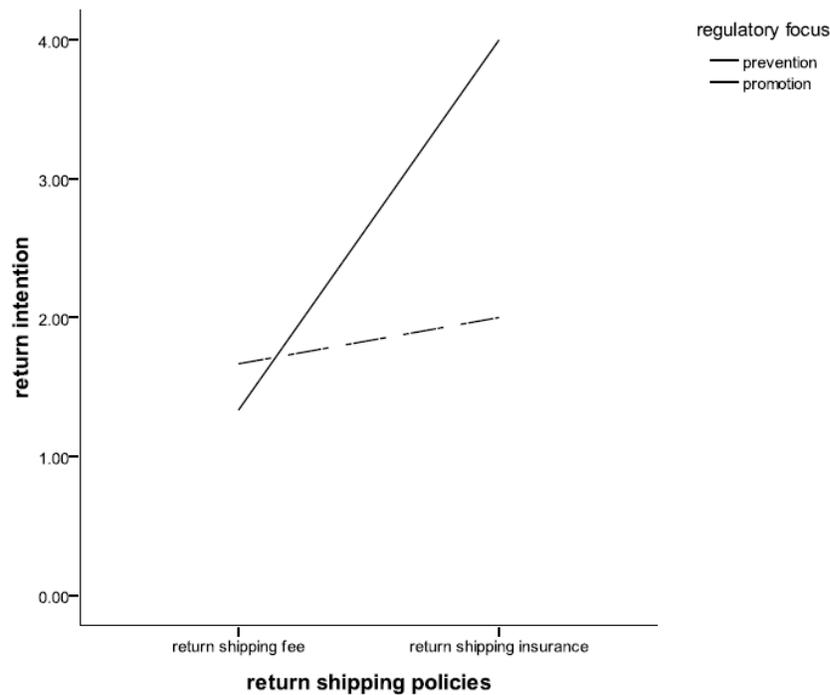
IV. CHANGING INFRASTRUCTURE MANAGEMENT FOR BUSINESS INNOVATION

Many of today's IT systems for business and e-commerce purposes were created before social and mobile took over the world. Legacy technologies require complex software stacks and frequent upgrades, along with ongoing hardware maintenance. Many IT departments realize that they don't want to be in infrastructure maintenance mode (Buyya and others, 2010). They are moving to the cloud so they can focus on solving business issues, not infrastructure ones. Cloud platforms instantly deliver services that can take weeks to build out on legacy systems. Developers never have to install servers, data centers, databases, or software stacks. Instead, they move straight to the business logic and user experiences that differentiate brands and innovate for customers (see Fig. 3).



Fig. 3: Cloud Solutions for Business Innovation

Many business professionals focus on cost savings to evaluate the success of their cloud-based collaboration initiatives. Indeed, the cloud can reduce costs, dramatically. But this is not the only core driver behind most organizations' push for business promotion and development. Instead, strategic objectives tend to include greater innovation, organizational dexterity, customer satisfaction, employee engagement or related intangibles (Sasikala, 2011).



Cloud applications can be deployed moments after purchase, giving users quick access to innovation as it is developed. The delivery model provides near-infinite capacity for scaling up or down based on changing requirements, so businesses pay for what they use, and utilization can be matched with real business requirements. For IT managers, access to cloud applications and platforms means that they can match their onsite datacenter resources with components that are cloud sourced to provide a more complete technology portfolio for their users. Most importantly, the cloud means IT organizations have a powerful new asset to help them keep promises to their most important customer — their business units.

As companies don't want to make large investments in technologies that go unused, the best way forward is to go around educating the business professionals on the functionality and value of cloud solutions and then get buy-in. In this way, the enterprise gets the greatest return on investments, and the business appreciates the value in cloud services. To take a more effective approach to business innovation, enterprises can go at the pace as needed to develop new strategies for adopting cloud solutions to handle the process of changing infrastructure management.

v. ASSESSING CLOUD SECURITY RISKS

One of the critical issues in evaluating cloud solutions is data security. Cloud-based services today can be compared to Internet banking. Consumers were initially afraid that online banking would make them more vulnerable to fraud or identity theft. Now that online security technologies have improved, online banking is actually safer than getting paper statements in the mail. Likewise, using a cloud-based service supplier instead of operating one's own internal system can be a major step toward becoming liberated from serious security risk issues (Browne, 2010; Karadsheh and Alhawari, 2011).

It is important to understand the four key components of data security: availability, integrity, confidentiality, and traceability. Data availability ensures continuous access to data even in the event of a natural or man-made disaster or events such as fires or power outages. Data integrity ensures that the data is maintained in its original state and has not been intentionally or accidentally altered. Data confidentiality means information is available or disclosed only to authorized individuals, entities, or IT processes. And data traceability means that the data, transactions, communications, or documents are genuine and that both parties involved are who they claim to be (Bonneau and Prebusch, 2010).

It is cost prohibitive for many individual business systems to support the investment in the equipment, technology, personnel, and ongoing training required to deliver the highest level of data security. Converting to best-in-class cloud-based services allows enterprises to achieve industry-leading data security, including data availability, integrity confidentiality and traceability. This security is delivered through the physical infrastructure of the data center, the hosted application that manages data, and the policies and procedures that govern data access, audit trails, remote monitoring, incident management, and business continuity. As the standards

for data security rise, it is time to evaluate cloud-based services from a world-class provider. Selecting the best cloud-based services provider for business development needs allows this technology to prevent the enterprise from security problems.

VI. CONCLUSION

The world is changing. A new reality is emerging for enterprises and organizations of every size from every part of the planet. It's called the cloud, a profound evolution of the computing industry with revolutionary implications for business and society, creating new possibilities and enabling more efficient, flexible and collaborative computing models. Technology adopting processes are often time consuming and often involve multiple organizational constituencies with various agendas. Business executives remain acutely focused on cloud projects that create business differentiation, accelerate time to market, or enable new capabilities with potential business impact. Business leaders are often focused on platforms, sourcing options, or delivery models that fuel capability as well as improve cost efficiency.

A cloud-based approach to business helps enterprises accelerate business results, improve business processes and stimulate innovation. Additional benefits include, but are by no means limited to, breaking down barriers between time zones and functions and enhancing mobile workforce productivity. As for the next frontier, business professionals are looking outside their organizations to focus on improving collaboration with external groups such as customers, suppliers and partners. And all such actions, enterprises are leading to significant gains in competitive advantage.

What is particularly striking is the more cloud solutions in evidence, the higher the marks conferred in terms of achieving value through innovative business strategies. Greater familiarity and more department head involvement, in essence, leads to higher confidence that collaborative strategies create value and that cloud solutions are helping get it done. Optimized business integration with risk management strategies quite simply leads to better performance. And as this paper shows, the cloud is by far the most effective means of leveraging business innovation and development. Consequently, now is the time for more business professionals to follow the trends to evaluate and implement value-added cloud solutions.

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A novel method to detect Inter turn shorts in SRM stator using K means Clustering and SVM classification

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Abstract- This paper presents a novel method of detection of inter turn shorts based on k means clustering technique. The percentage of inter turn shorts are classified using SVM (Support vector machines). Switched reluctance motors are very popular in these days, because of ease in manufacturing and operation. Though an electronic circuit can detect the faults like open and short, interturn short classification cannot be done effectively with electronic circuitry. More over an intelligent method can easily identify the fault and classify and hence the root cause of the fault may be guessed and rectified using this method of classification. The information used to include this intelligence in the system is just flux waveforms. Inter turn shorts are very critical for a long run operation of the motor. Moreover, the early detection minimizes the faulty operation time and ensures the plant stability and saves the life of motor too. Hence a system to detect the inter turn faults under a simulation model has been proposed in this paper.

Index Terms- Inter turn shorts, k-means clustering, SRM (Switched reluctance motor), SVM (Support Vector Machines)

I. INTRODUCTION

The special feature of SRM is that, a particular phase of SRM is not influenced by the other phase and is very negligible. Hence, the motor continues to rotate even at faulty conditions but it might not produce the exact required output parameters based on mechanical aspects. So, early detection of the faults in SRM is mandatory. The applications of SRM in aircraft and industrial automations applications are enormous and need a perfect flaw free operation to obtain the required electrical and mechanical outputs from the motor [1]. The absence of rotor windings and permanent magnets in rotor makes the manufacturing of SRM easy and hence the SRM is very popular in market based on commercial aspects too. The salient pole configuration of the SRM is responsible for ripples in torque, any how that can be minimized using the works in [2] and [3]. The major issue with faulty operation is that, though the motor continues to rotate, the mechanical forces become imbalanced and the mechanical power decrease proportional to the number of phases disconnected from the circuit.

Fault tolerant systems are abundant in market, in which the motor can continue with its operation even at faulty conditions like, open, short and phase to phase shorts as given in [4]. The author of [4], proposed a fault tolerant circuit topology to detect the various faults and ensure motor operation even at faulty conditions. In [5], an evolutionary ANN had been used to model a faulty SRM drive system and validations had been obtained.

James A. Haylock et al, in [6], proposed a turn to turn short that had been identified through a simple mathematical subtraction of the healthy phase current and the turn shorted current and then multiplying by the turns ratio. But this method suffers from a current sensing device and sufficient intelligence is not covered in this work.

The work done in [7], would be highly followed in our work, is related to the various waveforms obtained at various faulty conditions. Iqbal Husain et al, has simulated the torque ripples, drive stress, and various other dynamic responses. This paper would be a main source for all other further AI based fault detection systems. Performance analysis and dynamic response calculation in [8], addresses high power SRM in the order of 1MW may be utilized for high power applications by making small changes in manufacturing and control circuits.

In [9], FEM and ANN had been used to model the characteristics of SRM under normal and faulty operations. But such models were unable to classify the various faults, so remedial action could not be taken against the faults. The authors of this paper feel that apart from the fault detection, fault classification becomes essential in order to impart intelligence to the machines.

In [10], SRM drive system and a case study had been performed by A.A. Arkadan et al, to detect the faults using FEM and GA based ANN. Current waveforms and torque waveforms had been considered in this work to detect the faults. M.bouji et al, in [11], introduced fuzzy inference system in order to detect the faulty conditions. They had used FEM and space model to implement an intelligent system. 97% of accuracy had been obtained in their work. In the work done in [12], a neuro genetic approach was performed to show the feasibility of using these AI techniques for fault detection. As in [13], certain works had been done using fuzzy controller to detect the fault scenarios in SRM operation. The papers [1], [14]-[19], discussed about the various power converters and faults likely to occur and methods to detect the faults. In [19], a new method called as MCPT was proposed for a double stator switched reluctance motors. The faults were detected with the help of phase currents and flux distribution. To the best of the authors' knowledge, clustering algorithms and SVM based classification techniques had not been used in SRM fault detection.

This paper has been organized as follows: Section II and III, describes the concept behind the K means clustering and SVM classification techniques respectively. Section IV discusses about the proposed method and the simulation outputs are discussed in section V.

II. K MEANS CLUSTERING

Clustering is a method of grouping similar data into various groups based on the amplitude of the data points. This is an iterative scheme to find the local minimal solution. This clustering method is based on the Lloyd's algorithm [20]. Optimal placement of the center at centroid is the technique behind this algorithm. Let us suppose that N numbers of data points are the outcome of an experiment. These data points are clustered into K number of clusters, with each cluster consisting the number of elements which depends on the value of the data points. Mathematical investigation of k means algorithms is beyond the scope of this paper and this is clearly given in [21], and the scope of this paper is confined to the application of k means algorithm. In our work, the feature vectors for detecting inter turn faults are extracted from using this k means clustering. The corresponding waveforms and results are shown in section V.

III. SVM BASED CLASSIFICATION

The basic idea behind the SVM classification technique is to identify the class of the input test vectors. This is a supervised learning algorithm, where the training vectors are used to train the system to map these training vectors in a space with clear gaps between them using some standard kernel functions and the input test vectors are mapped on to the same space to predict the possible class [22], [23]. The linear kernel scenario is shown in figure 1.

Given some training data D, a set of n points of the form

$$D = \{(x_i, y_i) \mid x_i \in \mathbb{R}^p, y_i \in \{-1, 1\}\}_{i=1}^n$$

where the y_i is either belonging to the class 1 or class -1, indicating the class to which the point X_i belongs. Each X_i is a p-dimensional real vector. Here it is needed to find the maximum-margin hyperplane that divides the points having $y_i=1$ from those having $y_i=-1$. So any hyperplane can be written as the set of points X.

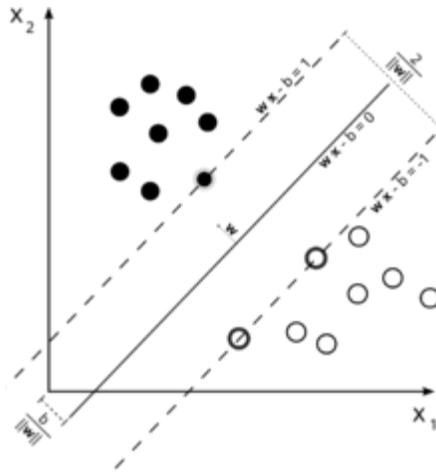


Figure 1. SVM Scenario

The points X satisfies the maximum-margin hyperplane and margins for an SVM trained with samples from two classes. Samples on the margin are called the support vectors.

$$w \cdot x - b = 0$$

where \cdot denotes the dot product and \mathbf{W} is the normal vector to the hyperplane. The parameter $b/\|\mathbf{w}\|$ determines the offset of the hyperplane from the origin along the normal vector \mathbf{W} .

If the training data are linearly separable, then two hyperplanes can be selected in such a way that they separate the data and there are no points between them, and then tried to maximize their distance. The region bounded by them is called "the margin". These hyperplanes can be described by the equations

$$w \cdot x - b = 1$$

and

$$w \cdot x - b = -1$$

At the testing phase, the data points X_i are separated using the following constraints,

$$w \cdot x_i - b \geq 1 \text{ for } x_i \text{ of the first class or } w \cdot x_i - b \leq -1 \text{ for } x_i \text{ of the second class.}$$

IV. PROPOSED FAULT DETECTION METHOD

There exist two types of motoring operation based on the health of motors, Normal operation and faulty operation. These modes of operation are well discussed in [1]. The major contribution in this work is to detect the inter turn shorts. This integrated method of detecting the fault is achieved through an efficient method of feature selection and classification. For the detection of inter turn short, the flux values are clustered to find the mean value of the data points and number of data points in each class. This is done using k means clustering to get the cluster mean and the number of elements in the cluster. These clustered values are classified using SVM (Support Vector machines).

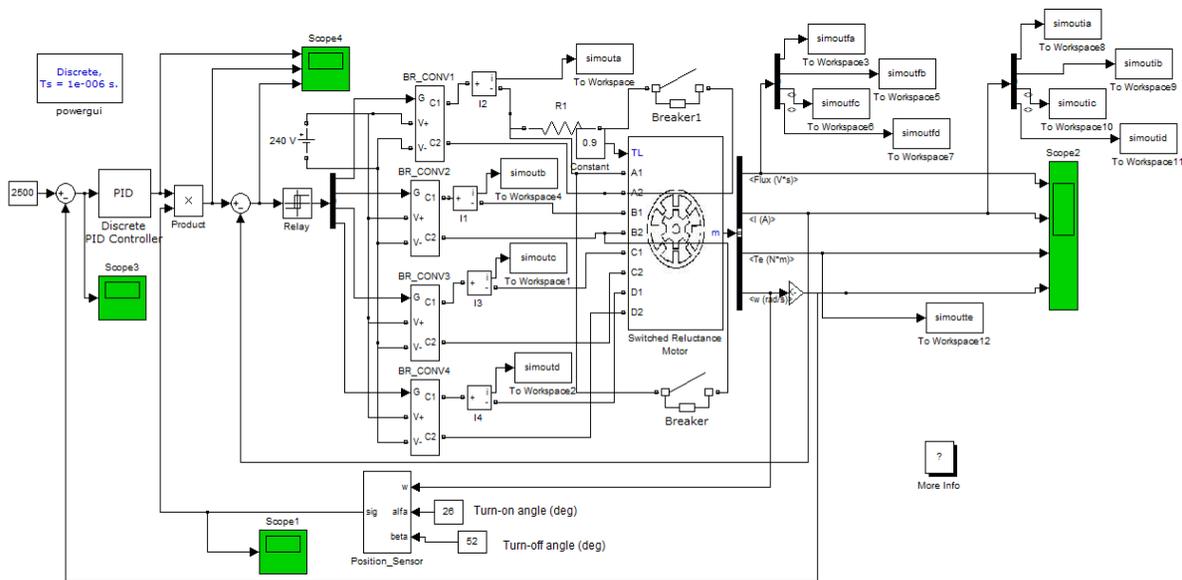
An SRM of 8/6 is run at steady state with the specifications shown in appendix. A simulation model as shown in the figure 2 was constructed and simulated with inter turn faults. The saved values of the line fluxes were exported in MATLAB for further stage to classify to know the percentage of inter turn shorts in a particular phase of the SRM.

V. RESULTS AND OUTPUTS

Figure 3 shows the output of the SRM drive with a speed of 2000 rpm. The parameters like, Flux, Stator current, Torque variations, and Speed are shown. This is the output obtained at healthy conditions of the drive.

A. Healthy Condition

A Matlab simulink model has been designed, and simulated with all the switches at perfect healthy conditions. The parameters have been shown at steady state. Load torque is set as 0.9.



Fault detection in Current-controlled 8/6 Switched Reluctance Motor drive

Figure 2: Simulation model

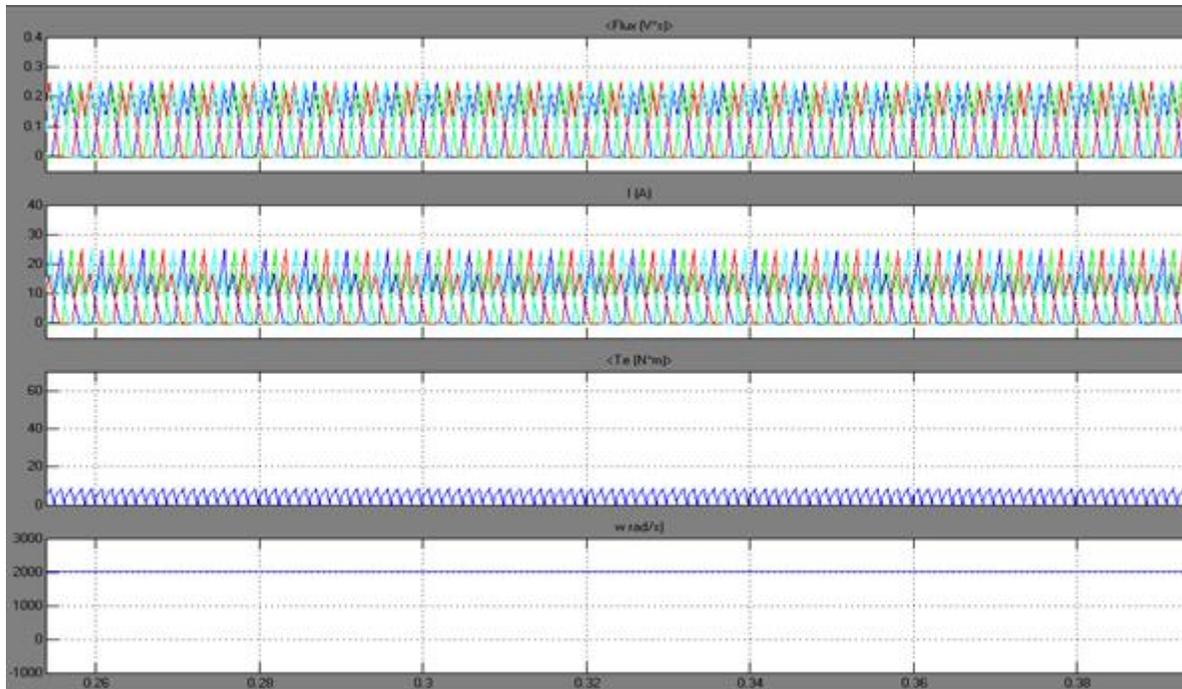


Figure 3: Steady State Waveforms of Flux, Current, Torque and Speed at healthy condition

B. Inter turn short conditions

Inter turn shorts may occur in an SRM, due to environmental conditions or due to aging of the motors. Though motor continues to run with inter turn shorts, the problem could become serious because of ripples in torque. Inter turn shorts were created between the times 0.15 s to 0.2 s, with five different classes like 0-10% , 30-40%, 50%, 80-90% and 90-100%. The flux waveforms were observed and clustered using k means algorithm with number of clusters $k=5$.

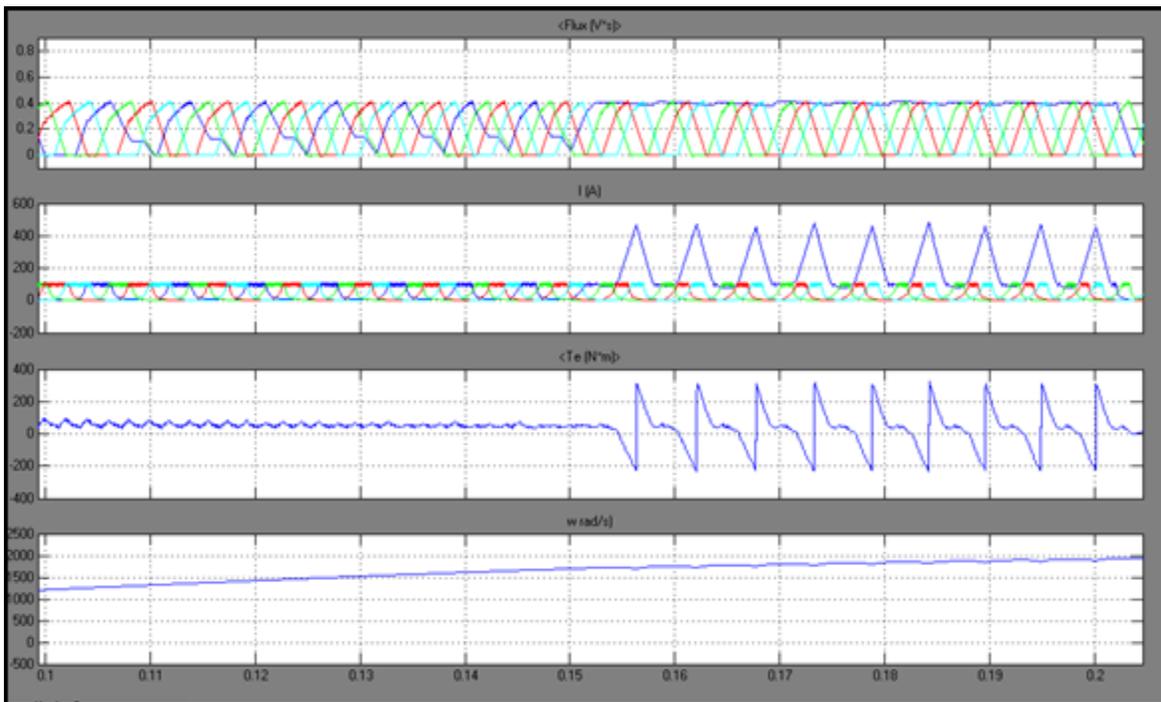


Figure 4: Waveforms of Flux, Current, Torque and Speed at inter turn short

It is observed that, when the inter turn short percentage increases, the flux wave try to saturate, anyhow this saturation amplitude differs based on the amount of shorted turns. This amplitude change in particular interval is exported to k means algorithm and clustered into 5 groups. The number of elements in each group purely depends on the amount of the flux saturation. This is well classified using a multi class Support Vector Machines. In the proposed work, inter turn shorts were considered in phase A alone. The faulty waveforms are shown in the figure 4.

VI. CONCLUSION

In this paper, a new method of inter turn short detection has been proposed. SVM network is first trained with various training sets and tested with arbitrary values of test sets. The classification was exact and the ranges of percentage of inter turn shorts were detected correctly.

APPENDIX

For the simulated SRM, the following are the specifications.

Configuration: 8/6
Pn: Output power 1.1kW
Vs: Stator voltage 240 V
fs: Stator frequency 50 Hz
Rs: Stator resistance 0.05 ohms
J : Inertia 0.05 kg.m.m
F: Friction 0.02 N.m.s
Lu: Unaligned inductance 0.67 mH
La: Aligned inductance 23.6 mH
Ls: Saturated aligned inductance 0.15 mH
Im: Maximum current 450 A
 Φ_m : Maximum flux linkage 0.486 V.s

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The preferred spelling of the word “acknowledgment” in American English is without an “e” after the “g.” Use the singular heading even if you have many acknowledgments.

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E-Mail Phishing - An open threat to everyone

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Abstract- We cannot imagine a day without a computer especially without Internet. E-Mail is one of the primary ways through which we communicate. We not only use it every day for official communication but also to be in touch with our friends and relatives. As E-Mail plays a vital role in communication globally for communication and sharing of data as well. The security issues also have increased. The major problem or the attack on E-Mail by the hackers nowadays is known as E-Mail Phishing. It is the right time to secure the data communicated over mail even on trusted network. Cyber criminals craft these emails to look convincing, sending them out to literally millions of people around the world. The criminals do not have a specific target in mind, nor do they know exactly who will fall victim. They simply know the more emails they send out, the more people they may be able to fool. In this paper we are analyzing the various ways in which the Phishing is achieved, the possible solutions and the awareness along with some tips to be away from a victim of Phishing attacks are discussed.

Index Terms- Phishing, Cyber Security, E-Governance, Cyber Crime

I. INTRODUCTION

Email is one of the most widely and commonly used internet services. We not only use it everyday for official communication but also to be in touch with our friends and relatives. Phishing was a term originally used to describe email attacks that were designed to steal your online banking username and password. However, the term has evolved and now refers to almost any email-based attack. Phishing uses social engineering, a technique where cyber attackers attempt to fool you into taking an action. These attacks often begin with a cyber criminal sending you an email pretending to be from someone or something you know or trust, such as a friend, your bank or your favorite online store. These emails then entice you into taking an action, such as clicking on a link, opening an attachment or responding to a message. As E-Mail plays a vital role in communication globally for communication and sharing of data as well. The security issues also have increased. The mail infrastructure employed on the internet primarily consists of email servers using SMTP to accept messages from clients, transport those messages to other servers, and deposit them into a user's server-based inbox. In addition to email servers, the infrastructure includes email clients. Clients retrieve email from their server-based inboxes using POP3 or IMAP. A client communicates with email servers using SMTP. Basically the basic email system is not secure as the protocols used to support email do not employ encryption. Thus, all the messages are transmitted in the form in which they are submitted to the email server. In addition to this email phishing problem, password

cracking is also a problem in email system, crackers try to indulge into email system by compromising the password using well known attacks such as dictionary attacks and others.

Phishing websites can be achieved easily by sending a spoofed link. It impersonates legitimate counterparts to lure users into visiting their websites. Once users visit a phishing website then the phishing website may steal users' private information or cause drive-by downloads. Here the main problem we have to address is not only the website phishing but also the root cause i.e Email Phishing. This paper will strive to identify the phishing mail at the maximum level by implementing some added security layers.

Phishing has becoming a serious network security problem, causing finical lose of billions of dollars to both consumers and e-commerce companies. And perhaps more fundamentally, phishing has made e-commerce distrusted and less attractive to normal consumers

In addition, email itself can be used as an attack mechanism using DoS attack known mail-bombing resulting the legitimate messages can not be delivered. Spam: sending unwanted, inappropriate, or irrelevant messages. It is often difficult to stop spam because the source of the messages is usually spoofed. These attacks often begin with a cyber criminal sending you an email pretending to be from someone or something you know or trust, such as a friend, your bank or your favorite online store. These emails then entice you into taking an action, such as clicking on a link, opening an attachment or responding to a message. Cyber criminals craft these emails to look convincing, sending them out to literally millions of people around the world. The criminals do not have a specific target in mind, nor do they know exactly who will fall victim. They simply know the more emails they send out, the more people they may be able to fool.

II. RELATED WORK

1. Dr.anthony yingjie fu in Ph.D thesis titled "web identity security: advanced phishing attacks and counter measures-2006. He has mentioned that it is possible to detect phishing web pages by evaluating the visual similarity of web pages.

Visual assessment approach, semantic assessment approach, human computer interaction enforcement, and web page originality verification.

2. Mr.Shalendra Chhabra in his MS thesis titled "Fighting Spam, Phishing and Email Fraud" has mentioned that He illustrated and explained CRM114 usage for small-, medium-, and large-scale enterprises (for filtering up to one million client email accounts). He presented the internals of a system using CRM114, implementing the concept of Internet postage known as the CAMRAM. He described a unified model of spam filtration followed by all the spam filters currently available in the market. He also presented the Markov Random Field model

and Nick Littlestone's Winnow-based machine learning techniques for spam-filtering, which have shown significant improvements in accuracy over the Naïve Bayesian filtering technique.

3. Mr. Madhusudhanan and co in their research paper titled "Phishing Email detection based on structural properties" have illustrated that phishing mails can be classified easily before it reaches the inbox using their prototype.

III. PROPOSED WORK

Upon researching on all the existing method to classify phishing emails before it reaches the users' inbox we have been planning to match original emails website image with the suspected email's webpage image using image processing concept in future.

Phishing attacks work one of four ways:

- **Harvesting Information:** The cyber attacker's goal is to fool you into clicking on a link and taking you to a website that asks for your login and password, or perhaps your credit card or ATM number. These websites look legitimate, with exactly the same look, imagery and feel of your online bank or store, but they are fake websites designed by the cyber attacker to steal your information.

- **Infecting your computer with malicious links:** Once again, the cyber attacker's goal is for you to click on a link. However, instead of harvesting your information, their goal is to infect your computer. If you click on the link, you are directed to a website that silently launches an attack against your computer that if successful, will infect your system.

- **Infecting your computer with malicious attachments:**

These are phishing emails that have malicious attachments, such as infected PDF files or Microsoft Office documents. If you open these attachments they attack your computer and, if successful, give the attacker complete control.

- **Scams:** These are attempts by criminals to defraud you. Classic examples include notices that you've won the lottery, charities requesting donations after a recent disaster or a dignitary that needs to transfer millions of dollars into your country and would like to pay you to help them with the transfer. Don't be fooled, these are scams created by criminals who are after your money.

List of phishing techniques

Phishing

Phishing is a way of attempting to acquire information such as usernames, passwords, and credit card details by masquerading as a trustworthy entity in an electronic communication.

Spear phishing

Phishing attempts directed at specific individuals or companies have been termed spear phishing. Attackers may gather personal information about their target to increase their probability of success.

Clone phishing

A type of phishing attack whereby a legitimate, and previously delivered, email containing an attachment or link has had its content and recipient address(es) taken and used to create

an almost identical or cloned email. The attachment or Link within the email is replaced with a malicious version and then sent from an email address spoofed to appear to come from the original sender. It may claim to be a resend of the original or an updated version to the original. This technique could be used to pivot (indirectly) from a previously infected machine and gain a foothold on another machine, by exploiting the social trust associated with the inferred connection due to both parties receiving the original email.

Whaling

Several recent phishing attacks have been directed specifically at senior executives and other high profile targets within businesses, and the term **whaling** has been coined for these kinds of attacks.

Link Text in Email Differs From Link Destination

In fraudulent email, the link that was present in the email is usually different than the actual destination. For example, the email looks as though it is going to send the user to "http://account-registration.com," but instead sends the user to <http://www.membership.com>. `http://account.earthlink.com`

Reply Address Differs From the Claimed Sender

In some fraudulent emails messages, the email claims to be from a credible reputable company, but the email is set to reply to a fraudulent reply address. The following are some examples from fraudulent emails:

From: Greenland Security Dept. From: IobBank
Reply-To: greenland80@1-base.com
Reply-To: Iobbank41@colleageclub.com

Approaches to Prevent Phishing Attacks

There are several (technical or non-technical) ways to prevent phishing attacks:

- 1) Educate users to understand how phishing attacks work and be alert when phishing-alike e-mails are received.
- 2) Use legal methods to punish phishing attackers
- 3) Use technical methods to stop phishing attackers. In this paper,
- 4) Detect and block the phishing Web sites in time
- 5) Enhance the security of the web sites
- 6) Block the phishing e-mails by various spam filters:

IV. PROTECTING YOURSELF

In most cases, simply opening an email is safe. For most attacks to work you have to do something after reading the email (such as opening the attachment, clicking on the link or responding to the request for information). But to be safer if you are using GMAIL then follow this.

Always use 2-factor authentication if are a Gmail user which prevents unauthorized access to your email inbox also forbids legal issues on which the crackers will make in your name if your mail password is compromised. Recently gmail has released an android application called "Google Authenticator"

Which does not require internet connection. We can add n number of accounts. It generates verification code for every 60 seconds. When you sign in to Google, you will have to enter your username and password as usual. Then another screen appears asking for another level of securing your mail for OTP like verification code which usually will be sent to our registered mobile number but due to network failure we may face some difficulties in getting this verification code. To avoid this only they have introduced these Google authenticator apps on android market. When you are asked for code you will be able to get one from this apps.

This apps is very useful at the initial level to prevent illegal mails sent /read from our mail.

Here are some indications if an email is an attack:

- Be suspicious of any email that requires “immediate action” or creates a sense of urgency. This is a common technique used by criminals to rush people into making a mistake.

- Be suspicious of emails addressed to “Dear Customer” or some other generic salutation. If it is your bank they will know your name.

- Be suspicious of grammar or spelling mistakes; most businesses proofread their messages carefully before sending them.

- Do not click on links. Instead, copy the URL from the email and paste it into your browser. Even better is to simply type the destination name into your browser.

- However your mouse over the link. This will show you the true destination where you would go if you actually clicked on it. If the true destination of the link is different than what is shown in the email, this may be an indication of fraud.

- Be suspicious of attachments and only open those that you were expecting.

- Just because you got an email from your friend does not mean they sent it. Your friend’s computer may have been infected or their account may have been compromised, and malware is sending the email to all of your friend’s contacts. If you get a suspicious email from a trusted friend or colleague, call them to confirm that they sent it. Always use a telephone number that you already know or can independently verify, not one that was included in the message. If after reading an email you think it is a phishing attack or scam, simply delete the email. Ultimately, using email safely is all about common sense. If something seems suspicious or too good to be true, it is most likely an attack. Simply delete the email.

Computer Related Crimes Covered under IPC and Special Laws:

1. Email spoofing Sec 463 IPC
2. Web-Jacking Sec. 383 IPC
3. E-Mail Abuse Sec.500 IPC

A Growing Problem in Phishing

The phish attack volume increased 33% in April to 36,557 attacks, continuing the growth trend from March. Phish attacks had been in general decline from August 2009 to February 2010, but now look set to return to the seasonal growth trend that has historically peaked in late Summer/early Fall . In August 2009,

for example, the high point of fast-flux phish attacks Produced 60,678 incidents. As shown in Figure. 1, the monthly attacks from April 2009 to April 2010 averaged 45,605. Phish attack volume has not returned to the level seen in April 2009, but note that this chart does not include branded malware attacks, which cybercriminals are likely to have launched during periods of lower phish volumes.

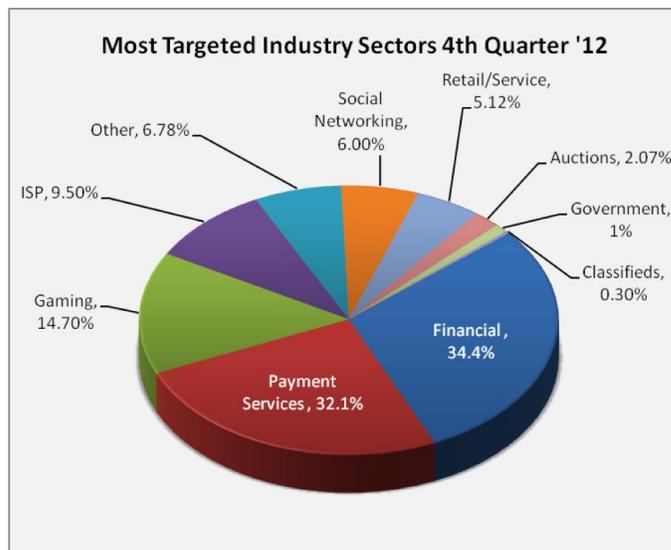
Table 1: Phishing statistics for year 2006

YEAR-2006	Valid Phishes	Invalid Phishes
Oct	3678	7061
Nov	10044	18130
Dec	11309	20352

Table 2: Phishing statistics for year 2007

YEAR-2007	Valid Phishes	Invalid Phishes
Jan	18077	30509
Feb	19947	25647
Mar	10515	11620

Phishers Shift to Target Online Game Players



Phishing attacks against online game players saw a massive increase, from 2.7 percent of all phishing attacks in Q3 to 14.7 percent in Q4. Financial services continued to be the most-targeted industry sector in the fourth quarter of 2012 with payment services close behind.

4th Quarter '12 Phishing Activity Trends Summary

- During Q4, about 30 percent of personal computers worldwide were infected with malware. More than 57 percent of PCs in China may have been infected, while PCs in European nations were infected least often.

- Except for October 2012, the number of phishing sites declined every month from April 2012 through December 2012.

April 2012 saw 63,253 unique phishing sites detected, falling to 45,628 in December 2012.

- The APWG received reports of 28,195 unique phishing sites in December. December's total was 31 percent lower than the high of 40,621 reports in August 2009.

- Use of crime ware dipped slightly in this quarter from the previous, as did the use of data stealing malware. The use of other malware has increased by a statistically significant amount from the previous quarter.

V. CONCLUSION

As communication mode in this IT era is EMAIL. All kinds of communication made must be ensured. To address this problem we have given an awareness to let the common people about the Phishing issues and its consequences. Many researchers have provided various solutions to find, prevent and avoid phishing. We are on the process of developing new method which overcomes all the demerits of the existing phishing solutions. In addition to providing new solutions it is very important to give the awareness of this issue. In this paper we have given awareness with a demonstration. For security reason we have not given any phishing mail in detail but will demonstrate on the day of presentation. There we can show you the mails having come from Barack Obama, George bush and from anyone we want to receive. These are to name few only. Actually these people have been taken only for the education purpose. Also we will show you some methods to identify their originality. Soon we will implement our own prototype to distinguish phishing mails using classification and clustering technique before it reaches the inbox using their prototype. Our research presently focuses on developing a search engine that would find the phishing link.

VI. FUTURE ENHANCEMENT

In future as research moves further will show the world that all kinds of phishing mails are eradicated. In email server itself these kinds of mails are ignored and corresponding actions will be taken by corresponding officials.

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Formulation and In Vitro Evaluation of Sustained Release Tablets of Venlafaxine Hydrochloride by Porous Osmotic Technology

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Abstract- The present study involves the development of porous osmotic tablets of Venlafaxine Hydrochloride in order to release the drug in sustained and predictable manner. Venlafaxine Hydrochloride is a unique antidepressant that differs structurally from other currently available antidepressants. Short biological half life, low bioavailability and frequent administration of drug led for rational development of 300mg sustained release osmotic tablets of Venlafaxine Hydrochloride that releases the drug and maintain the plasma drug concentration for more than 8hrs. The method of preparation of these SR osmotic tablets follows osmotic bursting pump model. Polymers like hydroxy propyl methyl cellulose (HPMC) K15M with lactose as diluents, magnesium stearate as glidant and talc as lubricant were selected for sustaining the drug release. The drug to polymer ratio was 1:1. The tablets were prepared by wet granulation method. A film coating with a semi permeable membrane of 2% m/v cellulose acetate in acetone was done to the core tablets. Hence, the developed formulation provides advantages of less steps of manufacturing procedure, no need of laser drilling, and economical all of these made the procedure easily amenable to mass production using conventional tablet machines. All polymers and excipients used in optimized formula were found to be compatible with the drug and it was confirmed by FT-IR studies. Drug release from the developed formulations was independent of pH and dependent only on osmotic pressure. Kinetic modeling of in vitro drug release data follows first order release plot.

Index Terms- Osmotic bursting pump, Sustained release formulation, Venlafaxine Hydrochloride, Organic osmagent, Wet granulation.

I. INTRODUCTION¹

Osmotic pressure is a most important colligative property where the concentration of solution is independent of solute property. Osmotic pressure of a solution is the external pressure that must be applied to the solution in order to prevent it being diluted by the entry of solvent via a process known as Osmosis. In other words, Osmosis refers to the process of movement of solvent from lower concentration of solute towards higher concentration of solute across a semi permeable membrane. Such membrane is only permeable to solvent molecule. Because only solvent can pass through the semi permeable membrane, the driving force for the osmosis arises from the inequity of the

chemical potentials of the solvent on opposing side of the membrane.

Advantages²

Osmotic pumps offer many advantages over other controlled drug delivery system:

- Osmotic system is independent of pH and other physiological parameters to a large extent.
- Reduce rate of rise of drug concentration in blood.
- Sustained & consistent blood levels within the therapeutic window.

Disadvantages³

- Less flexibility in accurate dose adjustment.
- Poor In vitro In vivo correlation (IVIVC)
- Increased potential for first pass clearance.

Principle of Osmosis^{2,4,5}

Abbe Nollet first reported osmotic effect in 1748, but Pfeffer (1877) had been pioneer of quantitative measurement of osmotic effect. He measured the effect in 1877 by utilizing a membrane, which is selectively permeable to water but impermeable to sugar. The membrane separated sugar solution from pure water.

Pfeffer observed a flow of water into the sugar solution that was halted when a pressure P was applied to the sugar solution. Pfeffer postulated that this pressure, the osmotic pressure (π) of the sugar solution is directly proportional to the solution concentration and absolute temperature.

Van't Hoff established the analogy between the Pfeffer results and the ideal gas laws by the expression:

$$\pi = n_2 RT \text{-----(1)}$$

Where n_2 represents the molar concentration of sugar (or other solute) in the solution, R depicts the gas constant, and T the absolute temperature.

The Van't Hoff equation presents a good means for calculating the osmotic pressure of solutes across perfect semi permeable membranes and is accurate for low solute concentrations. But in case if the membrane is not completely semi permeable and permits passage for solute along with solvent, the osmotic pressure calculated by equation will be more when compared with experiment value. Concentrated solutions also show deviations from these ideal equations.

A number of researchers (Reid, 1966; Hughes, 1961) have discussed, modified and brought about more accurate expression of this equation. Another method of obtaining a good approximation of osmotic pressure is by utilizing vapour pressure

measurements and by using the expression:

$$\pi = RT \ln(P_0/P) / v \text{ -----(2)}$$

Where,

P_0 = vapour pressure of the pure solvent

P = vapour pressure of the solution

V = molar volume of solvent

As vapour pressures can be measured with less effort than osmotic pressure, this expression is frequently used. Osmotic pressure for soluble solute is extremely high. This high osmotic pressure is responsible for high water flow across semi permeable membrane. The rate of water flow dictated by osmotic pressure can be given by equation:

$$Dv/dt = A\theta\Delta\pi/l \text{ -----(3)}$$

Where,

Dv/dt = water flow across the membrane area A and thickness l with permeability θ .

$\Delta\pi$ = Depicts the difference in osmotic pressure between the two solutions on either side of membrane.

This equation is strictly applicable for perfect semi permeable membrane, which is completely impermeable to solutes.

Osmotic Drug Delivery System ⁶

- Elementary Osmotic Pump
- Push-Pull Osmotic Pump (PPOP)
- Controlled Porosity Osmotic Pump (CPOP)
- Monolithic Osmotic Systems
- Colon Targeted Oral Osmotic System (OROS-CT)
- Sandwiched Osmotic Tablets (SOTS)
- Bursting Osmotic Pump
- Liquid-Oral Osmotic (L-OROS) System
- Osmotic Matrix (OSMAT)

Formulation aspects ⁶

The various formulation factors affecting drug release from oral osmotic pumps are:

- **Drug solubility:**

Solubility of the drug selected for osmotic formulation is a very important factor as the solubility is directly proportional to the release kinetics from the osmotic system. Drugs with high and low water solubility do not form a good candidate for osmotic delivery. If needed, the solubility of drug in the core can be modulated by incorporating suitable solubility modulators to control the release of drug from the osmotic system. Assuming a tablet core of pure drug, the fraction of core released with zero-order kinetics is given by the following equation:

$$F(z) = 1 - S/\rho \text{ -----(4)}$$

Where, $F(z)$ is the fraction released by zero-order kinetics, S is the solubility of drug (g/cm^3).

- **Coating Membrane:**

The choice of a rate-controlling membrane is an important aspect in the formulation development of oral osmotic systems. , the importance of rate controlling membrane in the drug release can be recognized. The polymers used for coating of the osmotic system should be semi-permeable in nature. Therefore, any polymer that is permeable to water but impermeable to solute can be used for this purpose. The polymers commonly used for this purpose are cellulose esters such as cellulose acetate, cellulose diacetate, cellulose triacetate, cellulose propionate and cellulose acetate butyrate.

Cellulose acetate films are insoluble yet semi permeable and allow water to pass through the coating. Water permeability of cellulose acetate films depends on the amount and type of acetylation on the cellulose backbone. As the acetyl content increases, the permeability decreases, solvent resistance increases and the glass transition temperature increases. To ensure that the coating is able to resist the pressure within the osmotic system, thickness of membrane is usually kept between 200-300 μm . is the density (g/cm^3) of the core tablet. Drugs with a solubility of $\leq 0.05 g/cm^3$ would be released with $\geq 95\%$ zero-order kinetics.

- **Osmotic Pressure:**

Drugs selected as candidate for formulation as an osmotic system, should possess osmotic pressure. The release rate of drug from osmotic system is directly proportional to the osmotic pressure of the core formulation. If the drug does not possess sufficient osmotic pressure, an osmagent like sodium chloride, glucose, sucrose, glycine, etc. can be added in the core formulation to control the release of drug from the osmotic system.

- **Delivery Orifice:**

Release of drug from osmotic system is carried out with the help of delivery orifice, thus the size of delivery orifice is a critical factor in controlling the release of drug. The size of the delivery orifice has to be optimized as a small delivery orifice may affect zero order kinetics; but if the delivery orifice is too small, the hydrostatic pressure may not be relieved causing deformation of the system or unpredictable drug release profile, while if delivery orifice is too large, solute diffusion may take place. There are mathematical calculations that can be used to calculate the optimum size of the delivery orifice. Delivery orifice is made in the osmotic system either by mechanical drilling or by laser drilling in the semi permeable membrane of theo-osmotic system. In case of CPOP, the in situ pore formation takes place depending on the concentration of the pore-forming agent in the coating solution

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Antidepressants ^{7,8}

Antidepressants are psychiatric medications given to patients with depressive disorders to alleviate symptoms. They

correct chemical imbalances of neurotransmitters in the brain which probably cause changes in mood and behavior. Antidepressants may be used for a wide range of psychiatric conditions, including social anxiety disorder, anxiety disorders, and dysthymia (mild chronic depression).

Serotonin and nor adrenaline Reuptake Inhibitors (SNRIs)

A class of drugs used to treat major depression, mood disorders, and possibly but less commonly [ADHD](#) (attention deficit hyperactivity disorder), [obsessive compulsive disorder](#), anxiety disorders, menopausal symptoms, [fibromyalgia](#), and chronic neuropathic pain. SNRIs raise levels of serotonin and nor epinephrine, two neurotransmitters in the brain - they both play a key role in stabilizing mood.

Examples of Serotonin Nor epinephrine Reuptake Inhibitors are: [Duloxetine \(Cymbalta\)](#), Venlafaxine ([Effexor](#)) and Desvenlafaxine (Pristiq). [Desvenlafaxine was found to be especially helpful in alleviating the symptoms of major depression in menopausal or pre-menopausal women](#), according to a study carried out by a team at Virginia Commonwealth University.

The first and most commonly used SNRI. It was introduced by Wyeth in 1994. The reuptake effects of Venlafaxine are dose-dependent. Venlafaxine selectively inhibits the neuronal re-uptake of neither serotonin, nor epinephrine and to a lesser extent dopamine. It has minimal affinity for muscarinic, histamine or α_1 -adrenergic receptors. It appears to be as effective as standard antidepressants with a lower incidence of the anti cholinergic side effects.

II. MATERIALS AND METHODOLOGY

1. Materials: Venlafaxine hydrochloride, HPMC K₄M, K15M, E15M, Cellulose acetate, Sodium CMC, Mannitol, Lactose, Acetone, PEG-400, PVP K30, Magnesium stearate, Talc.

2. Equipments: Digital balance (Essen, Bangalore), p^H meter, UV Spectrophotometer, Dissolution Apparatus (Lab India), Multi station tablet punching machine (Karnavati, RIMEK mini press), R&D coater (VJ instruments), Mechanical stirrer (REMI), Glassware (Borosil).

Analytical Methods

1. Determination of λ_{max} of Venlafaxine Hydrochloride in 0.1N Hcl and pH 6.8 Phosphate buffer:

Dissolve 8.5ml of Hcl in 1000ml of distilled water. 1mg of venlafaxine Hcl was accurately weighed and was dissolved in the 10ml of 0.1N Hcl solution. The resulting stock solution containing 10mcg/ml was scanned between 200-400nm. The similar procedure was carried out for pH6.8 buffer solution.

2. Construction of calibration curve of Venlafaxine Hydrochloride in buffer solution:

Accurately weigh 100mg of Venlafaxine Hcl and dissolve it in 100 ml of phosphate buffer. This is regarded as the stock 1 solution with 1000mcg/ml. Then take 5ml of the above solution and place it in 50 ml of the buffer which is regarded as stock 2 solution with 100mcg/ml. Lastly take 1ml of the stock 2 solution and mix it with 10 ml of the buffer which is regarded as stock 3 solution with 10mcg/ml. This stock solution was scanned between 200-400nm. Further, more serial dilutions can also be made for accurate results.

Pre-formulation Studies⁹

Pre-formulation testing is the first step in the rationale development of dosage forms of a drug. It can be defined as an investigation of physical and chemical properties of drug substance, alone and when in combined with excipients. The overall objective of the pre-formulation testing is to generate information useful to the formulator in developing stable and bio availability dosage forms which can be mass produced.

- i. Bulk Density (D_b)
- ii. Tapped Density (D_t)
- iii. Angle of Repose (Θ)
- iv. Carr's index (or) % Compressibility
- v. Hausner ratio

Formulation Development of SR Osmotic Tablets of Venlafaxine Hcl¹⁰

The formulation development in the present study was done by osmotic bursting pump. The solubility characteristics were considered more important in the development of a formulation.

1. Preparation Of Core Tablets

Accurately weighed quantities of ingredients were passed through sieve No. 85. All the ingredients, except lubricant (Magnesium stearate), glidant (Talc) and binder polyvinylpyrrolidone (PVP), were manually blended homogeneously in a mortar by way of geometric dilution. The mixture was moistened with aqueous solution of 10% (m/V) PVP, and granulated through sieve No. 18 and dried in a hot air oven at 60^o c for sufficient time (3 to 4 hours) so that the moisture content of the granules reached 2-4%. The dried granules were passed through sieve No. 26 and blended with talc and magnesium stearate. The homogeneous blend was then compressed into tablets (300 mg each) using 9mm diameter, deep concave punches. The compression force was adjusted to give tablets with approximately 4.5-5kg/cm² hardness on a Monsanto tablet hardness tester.

2. Coating Of Core Tablets

Core tablets were film coated with either a semi permeable membrane of 2% (m/V) cellulose acetate (CA) in acetone with castor oil (20%, m/m, total solid CA) as plasticizer using a conventional laboratory model, stainless steel, 10-cm pear shaped, baffled coating pan.

a. Preparation of coating solution:

Required quantity of cellulose acetate was accurately weighed and dissolved in a beaker containing acetone using mechanical stirrer. The stirring was continued till a clear solution was formed. PEG 400 was separately dissolved in a beaker containing measured quantity of water and was added slowly to cellulose acetate mixture with stirring.

b. Coating procedure:

Core tablets of Venlafaxine Hcl were placed along with placebo tablets the coating pan was rotated at 60 rpm and heated air was passed through the tablet bed. Coating process was

started once the outlet temperature reached 28°C. Coating solution was sprayed at the rate of 12-14 ml/min and optimizing the air pressure was kept at 30-35 lb/in². The outlet temperature was maintained at 28°C by keeping the inlet temperature at 45-50 °C. Coating was continued until desired weight gain was obtained on active tablets. In all cases active tablets were dried at 60°C for 16 h before further evaluations.

Formulation Chart

The drug Venlafaxine Hcl was formulated in 12 different formulations with different polymers and excipients ratio's (1:1, 1:2 and 1:0.5). The weight of the tablet is 300mg which are tabulated as follows:

The formulations F1-F3 contained drug and K4M polymer and lactose in 1:1, 1:2 and 1:0.5. The formulations F4-F6 contained drug and K15M polymer and lactose with the same ratios mentioned above. F4 is regarded as the optimized formulation.

Ingredients (mg)	Core Tablet		
	F1,F4(1:1)	F2,F5(1:2)	F3,F6(1:0.5)
Venlafaxine Hcl	75	75	75
HPMC K4M, K15M	75	150	37.5
PVP(K30)	Q.S	Q.S	Q.S
Lactose	144	69	181.5
Magnesium Stearate	3	3	3
Talc	3	3	3

Table 1: F1-F6 with different Drug: Polymer Ratio's

The formulations F7-F9 contained drug with sodium CMC and lactose, whereas the formulations F10-F12 contained drug with E15 polymer and mannitol in the same ratios as mentioned earlier.

Ingredients (mg)	Core Tablet		
	F7,F10(1:1)	F8,F11(1:2)	F9,F12(1:0.5)
Venlafaxine Hcl	75	75	75
Sodium CMC/E15	75	150	37.5
PVP(K30)	Q.S	Q.S	Q.S
Lactose/Mannitol	144	69	181.5
Magnesium Stearate	3	3	3
Talc	3	3	3

Table 2: Formulations With Different Drug: Polymer Ratio's

Ingredients	Coating Ratio's		
	C1(W/V)	C2(W/V)	C3(W/V)
Cellulose Acetate	2%	2%	2%
PEG 400	5%	5%	5%
Acetone	90:10	90:10	90:10

Table 3: Coating Composition

Post Formulation Parameters:

1. **Weight variation:**

20 tablets were selected randomly from the lot and weighted individually to check for weight variation.

2. **Hardness:**

Hardness or tablet crushing strength (fc), the force required to break a tablet in a diametric compression was measured using Monsanto tablet hardness tester. It is expressed in kg/cm².

3. **Thickness:**

Three tablets were selected randomly from each batch and thickness was measured by using Vernier Caliper in kg/cm².

4. **Friability (F):**

Friability of the tablet determined using Roche friabilator. The friability (F) is given by the formula

$$F = \frac{W_{initial} - W_{final}}{W_{initial}} \times 100$$

5. **In-Vitro drug release:**

Release of the drug *in vitro*, was determined by estimating the dissolution profile.

Dissolution test: USP II Paddle apparatus was used and paddle was allowed to rotate at 50 rpm, acid buffer 0.1N HCL for 2 hrs, 6.8 pH buffer for 6 hours, (each 900 ml) was used as a dissolution medium.

6. **Assay:**

10 tablets were weighed and triturated. The tablet triturate equivalent to 8 mg of the drug was weighed accurately, dissolved in phosphate buffer and diluted to 100 ml with the same. Further dilutions were done suitably to get a concentration of 10 µg/ ml with phosphate buffer. Absorbance was read at 224 nm against the reagent blank, and the concentrations of Venlafaxine Hcl in µg/ ml was determined by using the regression equation.

III. RESULTS & DISCUSSION

Analytical methods for drug estimation

Table 4: Calibration Curve of Venlafaxine Hcl in 0.1 N Hcl at 228nm

S.No	Concentration (mcg/ml)	Absorbance
1.	5	0.18
2.	10	0.312
3.	15	0.458
4.	20	0.619
5.	25	0.849
6.	30	1.061

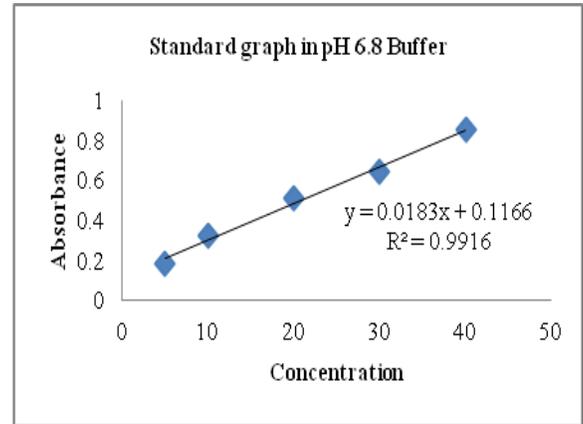


Fig.2. Standard Graph of Venlafaxine Hcl in pH 6.8 Phosphate Buffer

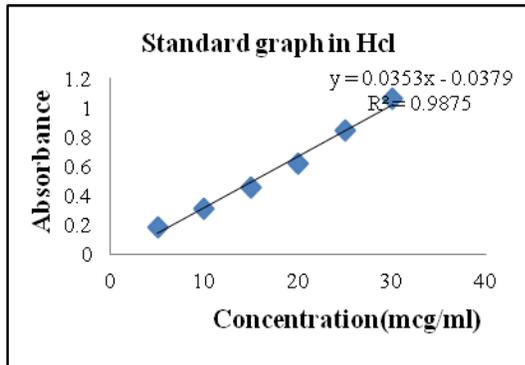


Fig.1. Standard Graph of Venlafaxine Hcl in 0.1N Hcl

Table 5: Calibration Curve of Venlafaxine Hcl in pH 6.8 Phosphate Buffer at 224nm

S.No	Concentration (Mcg/Ml)	Absorbance
1.	5	0.181
2.	10	0.32
3.	20	0.51
4.	30	0.645
5.	40	0.849

Table 6: Pre- Compression Results

Pre-Compression Parameters					
Formulations	Bulk Density (gm/cm ²)	Tap Density (gm/cm ²)	Carr's Index (%)	Hausner Ratio	Angle of Repose(θ)
F ₁	0.212	0.234	8.55	1.10	23.45
F ₂	0.231	0.245	5.71	1.06	24.54
F ₃	0.256	0.301	14.95	1.17	25.50
F ₄	0.264	0.312	15.38	1.18	26.33
F ₅	0.231	0.292	20.98	1.26	25.45
F ₆	0.227	0.275	17.45	1.21	26.34
F ₇	0.245	0.286	14.33	1.16	25.06
F ₈	0.265	0.306	13.39	1.11	25.35
F ₉	0.243	0.298	18.45	1.18	24.38
F ₁₀	0.285	0.331	13.89	1.17	25.60
F ₁₁	0.273	0.265	16.55	1.12	23.22
F ₁₂	0.257	0.242	13.25	1.09	24.58

Table 7: Post Compression Results

Formulation	Weight Variation(Mg)	Hardness (Kg/Cm ²)	Thickness (Mm)	Friability (%)	Assay (%)
F1	298±1.13	4.33±0.21	2.1±0.07	0.34	98.21
F2	301±1.17	4.76±0.20	2.0±0.05	0.49	98.34
F3	299±1.11	4.25±0.23	2.2±0.02	0.34	101.4
F4	300±1.15	4.98±0.22	2.2±0.1	0.47	99.34
F5	299±1.12	4.86±0.21	2.0±0.03	0.34	99.25
F6	302±1.15	4.63±0.21	2.1±0.03	0.49	98.38
F7	298±1.19	4.90±0.23	2.4±0.06	0.47	99.32
F8	300±1.14	4.43±0.22	2.3±0.02	0.36	98.67
F9	302±1.12	4.95±0.24	2.3±0.01	0.44	98.25
F10	299±1.15	4.58±0.23	2.1±0.07	0.39	99.37
F11	298±1.18	4.32±0.21	2.2±0.05	0.43	98.52
F12	298±1.16	4.71±0.22	2.2±0.04	0.38	99.78

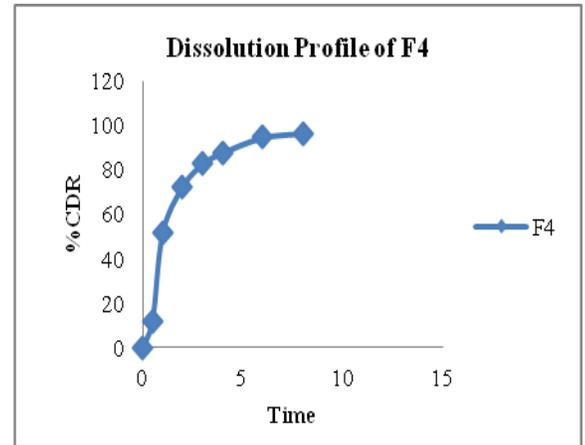


Fig.3.Dissolution Profile of Optimized F4

Drug Compatibility Studies:

In vitro Dissolution Profile of Venlafaxine Hydrochloride Osmotic Formulation F4

Time	F4
0	0
0.5	12.01
1	34.5
2	56.5
3	72.5
4	87.8
6	94.6
8	96.5

Table 8: Dissolution Profile of F4

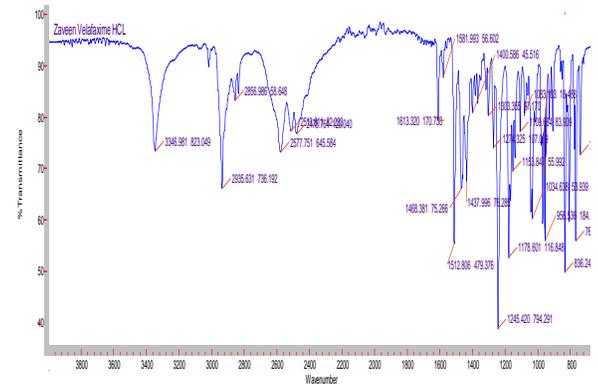


Fig.4. FTIR of Venlafaxine Pure Drug



Fig 5: FTIR of Optimized Formulation F4

Drug/ Polymer	O-H Stretch	C-H Aromatic	C-H Aliphatic	C-O Stretch
Venlafaxine Hydrochloride	3346.98	2935.63	2856.98	1083.63
HPMC K ₁₅ M	3345.35	2936.58	2581.88	1034.59
Lactose	3344.86	2936.45	-	1033.93
Magnesium Stearate	3346.31	2917.26	2850.64	1036.80
Optimized Formulation F4	3344.76	2851.17	2580.81	1033.27

Table 9: IR Peaks of Venlafaxine Hcl and Excipients

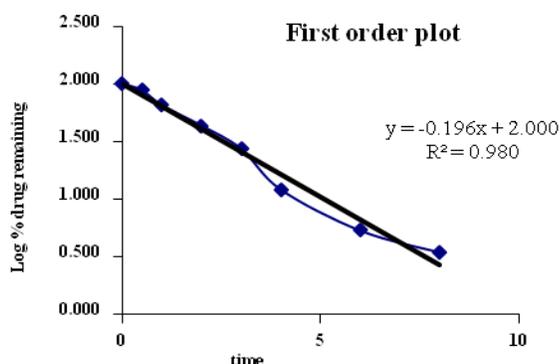


Fig.6. First Order Release of Optimized Formulation F4

Evaluation Parameters for osmotic Tablets of Venlafaxine Hcl

1. Pre-compression parameters:

The values for angle of repose were found in the range of 23°-26°. Bulk densities and tapped densities of various formulations were found to be in the range of 0.21 to 0.28 (gm/cc) and 0.23 to 0.33 (gm/cc) respectively. Carr's index of the prepared blends fall in the range of 5.7% to 20.9%. The Hausner ratio fall in the range of 1.06 to 1.26. From the result, it was concluded that the powder blends had good flow properties and these can be used for tablet manufacture (Table 6).

2. Post compression Parameters

• Weight variation test

Tablets of each batch were subjected to weight variation test, difference in weight and percent deviation was calculated for each tablet and was shown in the Table 5.4. The average weight of the tablet is approximately in range 298 to 302, so the permissible limit is ±5% (250mg or more). The results of the test showed that, the tablet weights were within the pharmacopoeia limits (Table 7).

• Hardness test:

Hardness of the three tablets of each batch was checked by using Monsanto hardness tester and the data's were shown in the Table 7. The results showed that the hardness of the tablets is in range of 4.00 to 5.00 kg/cm², which was within IP limits.

• Thickness:

Thickness of three tablets of each batch was checked by using Vernier Caliper and data shown in Table 7. The result showed that thickness of the tablet is raging from 2 to 2.5.

• Friability:

Tablets of each batch were evaluated for percentage friability and the data's were shown. The average friability of all the formulations lies in the range of 0.5 % which was less than 1% as per official requirement of IP indicating a good mechanical resistance of tablets (Table 7).

• In vitro dissolution studies:

Finally, the tablets were evaluated for *in vitro* dissolution studies in acid buffer (pH-1.2) for 2 hours followed by pH 6.8 buffer for 6 hours. The results were shown in the Table 8.

Formulations F1- F3 contained Venlafaxine hcl and K₄M polymer in different ratio's i. e 1:1, 1:2 and 1:0.5 but could not release maximum amount of drug from formulations till 8 hrs of dissolution study. Formulations F4-F6 contained Venlafaxine Hcl and K₁₅M in different ratio's and a sustained drug release till 8 hours of dissolution study was carried out. Formulation F4 has showed maximum amount of drug released with drug release of 98.7% at 8th hour, so it is chosen as an optimized formulation. Formulations F7-F9 contained Venlafaxine Hcl and Sodium CMC wherein, complete release of the drug was found within 6 hours of dissolution study. The reason may be due to increase in concentration of pore forming agent (10%). Formulations F10-F12 contained the drug, HPMC E15 and Mannitol prepared by direct compression technique. The drug got completely solubilize within 2 hours.

• Assay:

The percentage drug content of Venlafaxine Hcl osmotic tablets was found to be between 98-102%, which was within the acceptable limits. This result indicates that there was uniform distribution of the drug throughout the batch.

IV. CONCLUSION

The sustained release tablets of Venlafaxine Hydrochloride were prepared by porous osmotic technology. Osmotic bursting pump technique was implemented to prepare sustained release tablets of Venlafaxine Hydrochloride. 12 Venlafaxine Hcl sustained release tablets were successfully formulated with HPMC K4M, K15M, E15, Sodium CMC and Mannitol in different concentrations of 1:1, 1:2 and 1:0.5. Out of which F4 was the optimized formulation. An optimum concentration of drug and polymer HPMC K15M in 1:1 ratio was able to provide the desired release with innovator profile requirement. Developed formulation is expected to reduce the frequency of administration thereby reduces the chance of adverse effect associated with frequent administration of Venlafaxine Hcl tablets.

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Enhancement of Solubility of Poorly Soluble Drug Using Drug Solution Dropping Technique

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Abstract- The objective of the present study is to improve dissolution rate of poorly soluble drug from tablet by drug-solution-dropping-technique. Carvedilol was used as a model drug. Carvedilol is a nonselective beta-adrenergic blocking agent with α_1 -blocking activity and is indicated for the treatment of hypertension and mild or moderate heart failure of ischemic or cardiomyopathic origin. Dichloromethane was used to prepare carvedilol drug solution. The drug solution was dropped on tablet by using microsyringe. Blank tablets were prepared by direct compression (DC) method by using dicalciumphosphatedihydrate as diluents. Different types and concentration of superdisintegrants were used. The different superdisintegrants used were sodium starch glycolate, croscarmellose sodium and crospovidone. The tablets were subjected to thickness, weight variation test, drug content, hardness, friability and invitro release studies. The results were found within the limits. The USP paddle method was selected to perform the dissolution profiles carried out by USP apparatus 2 (paddle) at 50 rpm in 900 ml of 0.1 N HCL. Dissolution profiles of the prepared tablet from the blank tablets were compared to carvedilol tablet prepared by the conventional direct compression method. The surfaces of carvedilol drug-solution-dropping-tablets were characterized by scanning electron microscope. Their morphologies revealed the smoother but not being clear to point out carvedilol particles on the surface of the tablet. FTIR studies showed that there was no interaction between drug and excipients. Hence it can be concluded that drug solution dropping technique can be regarded as a novel technique to improve dissolution properties of potent drugs belonging to BCS class II.

Index Terms- Carvedilol, Drug-Solution-Dropped-Tablets, Enhancing solubility, super Disintegrants.

I. INTRODUCTION

Solubility is the phenomenon of dissolution of solid in liquid phase to give a homogenous system. Solubility is the phenomenon of dissolution of solid in liquid phase to give a homogenous system. Solubility is one of the important parameter to achieve desired concentration of drug in systemic circulation for pharmacological response to be shown. Poorly water soluble drugs often require high doses in order to reach therapeutic plasma concentrations after oral administration (Kumar SK et.al, Int J of Pharma and Bio Scie.2010; 1: 83-89). Low aqueous solubility is the major problem encountered with formulation development of new chemical entities. Any drug to be absorbed must be present in the form of an aqueous solution at the site of

absorption. The absorption rate of poorly water-soluble drug, formulated as an orally administered solid dosage form, is controlled by its dissolution rate in fluid at the absorption site. The dissolution rate is often the rate-determining step in drug absorption. Therefore, the solubility and dissolution behavior of a drug are the key determinants of the oral bioavailability. These two aspects form the basis of the biopharmaceutical classification system (BCS) (Dahan A et.al. The AAPS Journal, 2009; 11: 66-68). Carvedilol is a member of the class-carbazoles (BCS class II drug), is both a beta blocker (β_1 , β_2) and alpha blocker (α_1) and is indicated for the treatment of hypertension and mild or moderate (NYHA class II or III) heart failure of ischemic or cardiomyopathic origin. (Bristow MR, American J of Cardiology.2007; 81: 26L- 40L). Over the last few years, various approaches aimed to enhance Carvedilol include dissolution properties using complexation, solid dispersions, particle size reduction, co-solvency etc (Himami bajaj et.al, int J of Pharma and Bio Sciences. 2011; 2: 204-210).

II. MATERIALS AND METHODOLOGY

Materials: Dicalcium Phosphate, Croscarmellose Sodium, Sodium Starch Glycolate, Crospovidone, Carvedilol, Magnesium Stearate (Bright labs).

Equipment: Tablet compression machine Mini press I (Karnavathi, Rimek), Hardness Tester OSSCO (Monsanto Hardness Tester), Friability Test Apparatus INCO (Instrument & chemicals. Pvt. Ltd, India), Tablet Dissolution Test Apparatus TDT 08L (Electro lab USP), UV Visible Spectrophotometer SL 164 (ELICO, Double beam UV, Visible Spectrophotometer), Balance AUX 220 (Shimadzu Digital balance), Hot air oven.

Preformulation studies: Preformulation involves the application of biopharmaceutical principles to the physiochemical parameters of drug substance are characterized with the goal of designing optimum drug delivery system.

Drug Excipients compatibility studies were carried out by mixing the drug with various excipients in different proportions (in 1:1 ratio were prepared to have maximum likelihood interaction between them) was placed in a vial and closed with rubber stopper and sealed properly. Studies were carried out in glass vials at Accelerated conditions, $40^\circ\text{C} \pm 2^\circ\text{C} / 75\% \text{ RH} \pm 5\% \text{ RH}$ and a storage period of 12 weeks. After storage, the sample was compared with control at $2-8^\circ\text{C}$ and observed physically for liquefaction, caking, and discoloration.

Analytical method development for Carvedilol

a) Determination of absorption maxima

A spectrum of the working standards was obtained by scanning from 200-400nm against the reagent blank to fix absorption maxima. The wavelength was found to be 240nm. Hence all the further investigations were carried out at same wavelength.

b) Preparation of standard graph in 0.1 N HCL

10 mg of Carvedilol was dissolved in methanol 10 ml, volumetric flask make up to 1000 ml of 0.1 N hydrochloric acid, from this primary stock 1 ml was transferred to another volumetric flask made up to 10 ml with 0.1 N hydrochloric acid to produce 1, 2, 4, 6, 8 µg/ml respectively. The absorbance was measured at 240 nm by using a UV spectrophotometer.

Preparation of drug solution dropping tablets

a) Preparation of drug solution: For the preparation of drug solution dropped tablets a volatile solvent is chosen in which the drug shows the maximum solubility. Carvedilol shows maximum solubility in di chloromethane, about 50 mg of drug was soluble in 1 ml of the solution.

b) Preparation of blank tablet

1) By direct compression method: For the preparation of blank tablets dicalcium phosphate was used as a filler and magnesium stearate was used as a lubricant. The super

disintegrant used was croscarmellose sodium in the concentration of 5% and 7.5%. Initially the required amount of dicalcium phosphate was weighed and was blended with magnesium stearate of calculated quantities. To the homogenous powder super disintegrant i.e. croscarmellose sodium was added. The mixed powder was then compressed on instrumented single stroke tableting machine. The obtained blank tablets had a flat surface with 650mg weight. In the similar manner various concentrations of other super disintegrants like sodium starch glycolate and crospovidone were used. In all the formulations there had been the usage of varied concentrations of super disintegrants.

2) Drug-Solution-Dropping-Tablets (DSDT): The prepared drug solution was taken in to a micro syringe and was dropped on the surface of direct compressed blank tablets. All of the treated tablets were prepared in an oven at 50°C in hot-air oven for half an hour. After the drying of the tablets the tablets are again compressed to get smooth surfaced tablets.^{13, 14}

Preparation of conventional tablets: In the preparation of conventional tablets firstly dicalcium phosphate is weighed and magnesium stearate is added to it. This is triturated to make fine powder and to this super disintegrant is added. This is mixed well and finally the drug is added. This is mixed well and finally the drug is added. The powder is punched in a tablet compressing machine to get a flat surface tablets.³⁷

Formulation (mg)	DF1	DF2	DF3	DF4	DF5	DF6
Dicalcium phosphate	602.5	602.5	602.5	586.25	586.25	586.25
Magnesium stearate	15	15	15	15	15	15
Drug (Carvedilol)	50	50	50	50	50	50
Croscarmellose sodium	5%	-	-	7.5%	-	-
Sodium starch glycolate	-	5%	-	-	7.5%	-
Crospovidone	-	-	5%	-	-	7.5%

Table 1: Composition of Drug-Solution-Dropped-Tablets

Evaluation of drug-solution-dropping-tablets

Pre compression parameters: Measurement of micromeritic properties of powders are studied by following methods: Angle of repose, Bulk density, Tapped density Compressibility Index, Hausner's ratio.

Post compression parameters:

Thickness -The thickness of drug solution dropping tablets was determined by using Digital micrometer. Ten individual tablets from each batch were used and the results averaged.

Hardness- The hardness of prepared tablets was determined by using Monsanto hardness tester and measures in terms of kg/cm².

Friability The friability values of the tablets were determined using a Roche-type friabilator. Accurately weighed

six tablets were placed in Roche friabilator and rotated at 25 rpm for 4 min.

Weight Variation- Twenty tablets were randomly selected from each batch and individually weighed. The average weight and standard deviation three batches were calculated. It passes the test for weight variation test if not more than two of the individual tablet weights deviate from the average weight by more than the allowed percentage deviation and none deviate by more than twice the percentage shown. It was calculated on an electronic weighing balance.

Assay -The content of drug in five randomly selected drug solution dropped tablets of each formulation. The five tablets were grinded in mortar to get powder; this powder was dissolved in 0.1 N HCL by sonication for 30 min and filtered through filter paper. The drug content was analyzed spectrophotometrically at

240 nm using spectrophotometer. Each measurement was carried out in triplicate and the average drug content was calculated.

Disintegration test -Six tablets are taken randomly from each batch and placed in USP disintegration apparatus baskets. Apparatus was run for 10 minutes and the basket was lifted from the fluid, observe whether all of the tablets have disintegrated.

Dissolution test of Carvedilol drug solution dropping tablets- Drug release from carvedilol drug solution dropped tablets was determined by using dissolution test United States Pharmacopoeia (USP) 24 type II (paddle). The parameters used for performing the dissolution were 0.1 N HCL as the dissolution medium of quantity 900 ml. The whole study is being carried out at a temperature of 37°C and at a speed of 50 rpm. 5 ml aliquots of dissolution media were withdrawn each time at suitable time intervals (10, 15, 30, 45, 60 minutes.) and replaced with fresh medium. After withdrawing, samples were filtered and analyzed

after appropriate dilution by UV spectrophotometer. The concentration was calculated using standard calibration curve.

FTIR: FTIR analysis was done on the optimized formula. Five mg of substance was taken on Agate Pestle. It was thoroughly titrated with 100mg of Potassium Bromide. A pellet was made out of the mixture and introduced in the instrument. Resolution of 4cm⁻¹, scanning was done in the range of 400-4000 cm⁻¹.¹⁵

SEM: Particle morphology from tablet was revealed by SEM (scanning electron microscope). The accelerating voltage was set at 10 kV and magnification at 100x - 1500x. The samples were in the aluminum stub with two-faced glue paper and coated with gold before SEM analysis.

III. RESULTS & DISCUSSION

Formulation code	Angle of Repose (θ)	Loose Bulk Density(g/ml)	Tapped Bulk Density(g/ml)	Carr's Index (%)	Hausner's Ratio
DF1	23.14±0.03	0.480±0.03	0.564±0.02	13.30±0.03	1.15±0.02
DF2	23.90±0.02	0.439±0.04	0.514±0.02	12.83±0.03	1.13±0.02
DF3	21.20±0.03	0.449±0.02	0.521±0.01	13.82±0.02	1.16±0.02
DF4	24.86±0.04	0.431±0.03	0.504±0.02	14.48±0.02	1.17±0.01
DF5	22.10±0.03	0.462±0.02	0.524±0.03	11.83±0.03	1.13±0.02
DF6	22.90± 0.02	0.459± 0.04	0.534± 0.02	14.04±0.03	1.16±0.02

Table 2: Precompression parameters of tablets

Post compression parameters of all tablets

Evaluation Parameters	DF1	DF2	DF3	DF4	DF5	DF6
Hardness (kg/cm ²)	4.3± 0.3	4.6± 0.4	4.5± 0.2	4.4± 0.4	4.9± 0.3	4.9± 0.2
Disintegration time (sec)	140± 5	170± 5	160± 4	120± 4	150± 4	130± 3
Thickness (mm)	2.6± 0.03	2.7± 0.02	2.9± 0.02	2.5± 0.04	2.8± 0.01	3.0± 0.01
Weight variation (mg)	698.8± 0.5	699.8± 1.3	702.1± 3.3	700.3± 0.3	703.5± 1.7	704.7± 2.8
Friability (%)	0.54	0.45	0.34	0.26	0.34	0.25
Content uniformity (%)	98.0± 0.2	98.0± 0.8	99.0± 0.2	99.8± 0.5	99.5± 0.6	98.2± 0.5
Drug release (30 min)	85.03	70.02	65.01	99.08	80.02	75.01

Table 3: Evaluation parameters of drug solution dropped tablets

Evaluation Parameters	CF1	CF2	CF3	CF4	CF5	CF6
Hardness(kg/cm ²)	4.5± 0.2	4.8± 0.3	4.7± 0.4	4.9± 0.2	4.9± 0.3	4.8± 0.2
Disintegration time (sec)	260± 3	270± 4	280± 3	240± 9	260± 3	270± 4
Thickness(mm)	2.8± 0.03	2.9± 0.02	3.2± 0.01	3.0± 0.04	2.9± 0.01	3.1± 0.01
Weight variation (mg)	699.1± 0.5	700.8± 1.4	705.1± 0.8	702.4± 1.7	705.5± 0.4	705.7± 1.3
Friability (%)	0.31	0.25	0.63	0.32	0.47	0.72
Content of uniformity (%)	99.0± 0.6	98.9± 0.9	98.6± 1.2	99.8± 0.2	98.8± 0.8	97.5± 0.6
Drug release (30 min)	65.09	46.04	41.04	67.11	49.15	40.06

Table 4: Evaluation parameters of conventional tablets

Drug compatibility studies

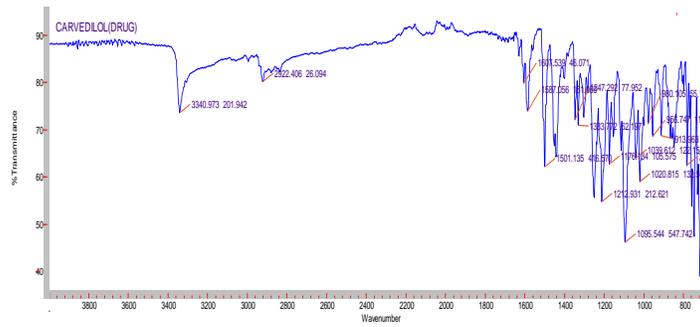


Fig 1: FTIR of Pure drug



Fig 2: FTIR of Drug+excipients (Optimized formula DF4)

Drug/ Polymer	N-H, O-H Stretching	C-O Stretching	C=C Stretching	=C-H Bending
Carvedilol	3340.97	1095.54	1501.13	783.57
Optimized Formulation (DF4)	3341.23	1096.12	1501.69	783.54

Table 5: FTIR Absorption bands

Inference It is inferred that FTIR results of drug and drug+excipients showed that there was no incompatibility between drug and excipients.

SEM analysis The SEM morphology of the surface of carvedilol-solution-dropping-tablets of optimized formulation were tested are shown in figure. It shows the particles adhered close together. The DSDT surface looked smoother, the surface of DSDT looked like the multiple layer of sheet and carvedilol

particles had not been seen. The S.E.M method could not clearly point out the carvedilol particle on the tablet surface and under tablet surface of DSDT from other excipients. It may be possible that the carvedilol solution dropped penetrated into the pores of the tablet. It proves the uniform distribution of drug into the blank tablet.

DSDT-Drug-Solution-Dropped-Tablets

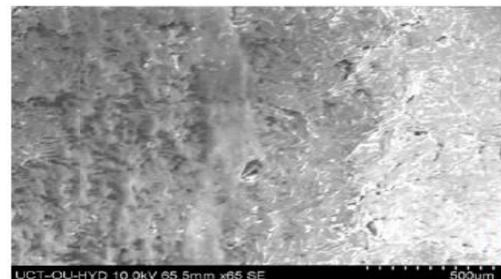


Fig 3: SEM analysis of formulation DF4

Inference SEM results have shown that there is no drug on the surface it proves the uniform distribution of drug into the tablet.

DISCUSSION

Preformulation studies

Drug-Excipient compatibility study at 40°C/75% RH

After 4 weeks of study physical appearance of these compositions were made and compared with the initial observations. After the storage, the samples were observed physically for liquefaction, caking, and discoloration. Physical mixture of drug and other tablet excipients after storage period of 4 weeks at 40°C/75% RH shows no physical changes. Hence the selected excipients are likely to be suitable for the preparation of drug solution dropped tablets (Table 2).

Standard graph of Carvedilol Different standard concentrations and their absorbance values were determined. At all concentration levels the standard deviation value was, supported by high regression value (0.9992).

Formulation studies

Powder flow is a complicated matter and is influenced by so many interrelated factors; the factors' list is long and includes physical, mechanical as well as environmental factors. Therefore, in our study, because of the subjective nature of the individual types of measurements as indicators of powder flow, three flow measurement types were employed; the angle of repose, Carr's index (compressibility index), and Hausner's ratio.

As the angle of repose (θ) is a characteristic of the internal friction or cohesion of the particles, the values of the angle of repose will be high if the powder is cohesive and low if the powder is non cohesive, those having higher angles of repose were considered as non-acceptable.

Powders showing Carr's index (%) up to 21 are considered of acceptable flow properties. In addition to Carr's index, Hausner found that the ratio were related to the inter particle friction so, he showed that powders with low inter particle friction, had ratios of approximately 1.25 indicating good flow. The values are shown in table 2.

Post compression parameters of all tablets

DF4 formulation showed higher dissolution profiles when compared to the rest of the formulations in less time. This may be due to the amount of super disintegrant and increase in the surface area which aid in absorbing excessive amount of liquid in physical mixture.

Drug solution dropped formulations (DF4) containing dicalcium phosphate and crospovidone showed lowest drug release profiles when compared to other formulations. But these formulations are showing excellent flow properties.

In all the formulations it is observed that among various concentrations (i.e., 5%, 7.5%) the formulations with 7.5% of super disintegrant which showed best dissolution in croscarmellose sodium.

DF4 formulations prepared with croscarmellose sodium at optimized formula, this formulation showed the more dissolution in less time compared with sodium starch glycolate and crospovidone.

From the above results DF4 formulation is the best formulation hence further stability studies were done and the release were compared with marketed formulation. All the drug

solution dropped tablets were showing acceptable content uniformity and dissolution profiles.

The most important observation in the drug solution dropped formulations had higher drug dissolution rate than the conventional formulations.

In addition, the study on drug solution dropped tablets verified that drug solution dropped tablets due to their increased wetting properties and surface of drug available for dissolution demonstrated significantly higher drug release rates than those of conventionally made, directly compressed tablets containing micronized drug particles.

Moreover, it was previously established that the higher dissolution rates displayed by drug solution dropped tablets, in comparison with conventional tablets, may also imply enhanced oral bioavailability due to increased wetting properties and surface of drug available for alternative for the formulation of water-insoluble drugs into rapid release tablets dissolution. The values are shown in table 3.

Therefore, they proved that drug solution dropped technique can be a promising technology.

Drug compatibility studies

FTIR The characteristic absorption bands of carvedilol are shown. It is clear from the results; there is no appreciable change in the positions of characteristic bands of the drug when mixed with other excipients. Hence, it can be concluded that the drug maintains its identity without going any chemical interaction with the polymers used. The values are shown in table 5, and figures 1, 2.

SEM The SEM morphology of the surface of carvedilol-solution-dropping-tablets of optimized formulation were tested, shown in figure. It shows the particles adhered close together. The SEM method could not clearly point out the carvedilol particle on the tablet surface and under tablet surface of DF from other excipients. It may be possible that the carvedilol solution dropped penetrated into the pores of the tablet. It proves the uniform distribution of the drug into the blank tablet. The values are shown in figure 3.

IV. CONCLUSION

Of all the drug solution dropped formulations prepared DF4 was found to be optimized formulation as it showing desired release along with acceptable physical properties.

DF4 was showing 99.5% release where as conventional formulation was showing 75.4% release in 30 mins. So optimized formulation is showing better release which is due to the enhanced dissolution behavior which is useful for hypertension and congestive heart failure patients for immediate action. FTIR studies showed that there is no significant interaction between drug and excipients. The SEM method could not clearly point out the carvedilol particle on the tablet surface. It may be possible that the Carvedilol solution dropped penetrated into the pores of the tablet. It proves the uniform distribution of drug into the blank tablet.

From the above discussions it can be concluded that DF4 formulation having 7.5% super disintegrant i.e. croscarmellose sodium is the best formulation among others. Hence it can be appealed for further research.

Hence it can be concluded that, Drug solution dropped tablets act as a new technique to solve the problem of solubility and dissolution faced by many drugs belonging to BCS class II.

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Study on Obesity in Women- An Epidemiological Approach

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Abstract- Obesity is a nutritional disorder spanning all ages and is one of the most severe problems of the 21st century. The current study was conducted to understand and analyze obesity, factors influenced by obesity [like body mass index (BMI), body fat percent (B.F %), blood pressure (B.P), fasting glucose, fasting insulin & lipid profile] and the role of environment & genetics in causing obesity using pedigree analysis and bio statistical methods on a study population.

Index Terms- Body mass index, Lipid profiles, Multifactorial inheritance, Null hypothesis, Obesity.

I. INTRODUCTION

Obesity is a major contributor to morbidity and mortality, and its prevalence has increased markedly in the last 30 years. This is thought to have occurred due to the increased availability of energy-dense foods and the reduced requirements for physical exertion during work and domestic life. It has also been demonstrated that obesity is partially genetically regulated. Obesity has become a colossal metabolic impairment causing serious public health concern with dramatic increase in health care costs. Hence there is a need to study the various aspects of obesity to arrive at a solution.

Obesity is defined as abnormal or excessive fat accumulation that may impair health. It is viewed as a syndrome rather than a single disease. It results in morbidity and mortality as it is associated with other diseases like diabetes mellitus, cardio vascular disease, sleep apnea, endometrial cancer, colon cancer etc. In obese women, the relative risk of uterus, cervix and breast cancer is higher than non-obese women. Genetic conditions known to be associated with predilection for obesity includes Prader-willi syndrome, Bardet-Biedl syndrome & Chon syndrome.

In the past decade calculations of body mass index (BMI) and body fat percent (B.F %) have evolved as standard measurements used to co-relate weight with morbidity and mortality. Obesity with its complications is costly to society. An estimated \$52 billion is the direct medical cost spent each year for treating obesity and related diseases. The above amount is expected to rise as the prevalence of obesity continues to rise. Thus, worldwide obesity prevalence is a cause for concern in the developed and the developing nations.

The aim of the current study was to establish the co-relation between obesity and different factors like BMI, BF%, blood pressure (BP), fasting glucose, fasting insulin and lipid profiles; to estimate the influence of external environment like food habits and physical activity on obesity and to analyze the inheritance of obesity in families.

II. MATERIALS AND METHODS

a. Study population:

All subjects were female & from St. Ann's college for women, Hyderabad, India. A survey was conducted & a total of 60 obese & 60 non obese subjects aged from 17-19 years volunteered for our research. For pedigree analysis 300 nuclear families were identified. All the subjects received information about the research and signed a consent form.

b. Clinical evaluation:

The age, body height, weight and tape measurements of all the 120 subjects were recorded and the body mass index (BMI) was calculated as the weight in kilograms divided by the square of the height in meters. Total body fat percent (BF %) was estimated from standard body composition analyzer available in internet (www.lowcarbdiets.about.com).

After overnight fasting, blood samples of 30 subjects (18 obese & 12 non-obese) were collected & blood pressure (B.P), fasting glucose, fasting insulin & lipid profile [total cholesterol (T. Ch.), triglycerides, cholesterol high density lipoprotein (Ch. HDL), cholesterol low density lipoprotein (Ch. LDL), cholesterol very low density lipoprotein (Ch. VLDL), T. Ch. /Ch. HDL ratio] were estimated by hiring services from United Hospitals, Hyderabad, India.

c. Effect of external environment:

To evaluate the role of external environment in obesity, the 120 subjects were inquired about their food habits & amount of physical activity in their daily life .To analyze the food habits of the subjects, they were asked to choose among three categories namely nutritious, moderate & junk. For physical activity, they were asked to answer in a yes or no pattern.

d. Pedigree analysis :

To analyze the inheritance of obesity, pedigrees of 300 nuclear families (two generation) with a total of 1184 individuals were made. All the individuals diagnosed with obesity were considered as affected & the rest as normal. The pedigrees were divided into three categories based on the mating type (father x mother of propositus) namely, normal x normal (N x N), normal x affected (N x A) or affected x normal (A x N) & affected x affected (A x A). Percentage of progeny affected for each category was calculated using segregation analysis & the results were interpreted on the basis of Mendelian laws.

e. Statistical analysis:

All the results were interpreted using statistical methods. Results for BMI, B.F %, B.P, fasting glucose, fasting insulin and lipid profile were estimated using 'Student's t test' by calculating mean, standard error and t value for each character. Analysis of the effect of food habits and physical activity on obesity was done by using 'Pearson's chi-square analysis' and 'Yate's chi-square analysis' respectively.

A t-test is any statistical hypothesis test in which the test statistic follows a student's t distribution if the null hypothesis is supported. It can be used to determine if two sets of data are significantly different from each other. A chi-square test is any statistical hypothesis test in which the sampling distribution of the test statistic is a chi-squared distribution when the null hypothesis is true.

In statistical inference of observed data of a scientific experiment, the null hypothesis refers to a general or default position that there is no relationship between two measured phenomena or that a potential influencing factor has no effect. Rejecting or disproving the null hypothesis and thus concluding that there is a relationship or a measurable effect is pivotal in the modern practice of science.

f. List of formulas:

1. Mean-

$$\bar{X} = \frac{\sum X}{N}$$

2. Variance-

$$s^2 = \frac{\sum X^2 - \frac{(\sum X)^2}{N}}{N - 1}$$

3. Standard deviation-

$$s = \sqrt{\frac{\sum X^2 - \frac{(\sum X)^2}{N}}{N - 1}}$$

4. Standard error-

$$s_{\bar{X}} = \frac{s}{\sqrt{N}}$$

5. t value-

$$t = \frac{|\bar{x}_1 - \bar{x}_2|}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}$$

6. Pearson's chi-square-

$$\chi^2 = \sum \frac{(O - E)^2}{E}$$

7. Yate's chi-square-

$$\chi^2_{Yates} = \frac{N(|ad - bc| - N/2)^2}{N_S N_F N_A N_B}$$

III. RESULTS AND FINDINGS

Table 1: BMI & B.F% of obese and non-obese subjects

S.No.	Character	Obese		Non obese		't' value
		Mean	Standard error	Mean	Standard error	
1	BMI	24.605	0.245	20.088	0.099	4.719
2	B.F%	38.907	0.582	23.766	0.354	12.788

Degrees of freedom = N1+N2-2
 = 60+60-2 =118

t value for 118 degrees of freedom at 5% loss of significance =1.658

Null Hypothesis: No correlation between obesity & the above factors

If t value is <1.658 –Accept the null hypothesis

If t value is >1.658 –Reject the null hypothesis

Since the t value for BMI & B.F% was found to be >1.658, null hypothesis was rejected.

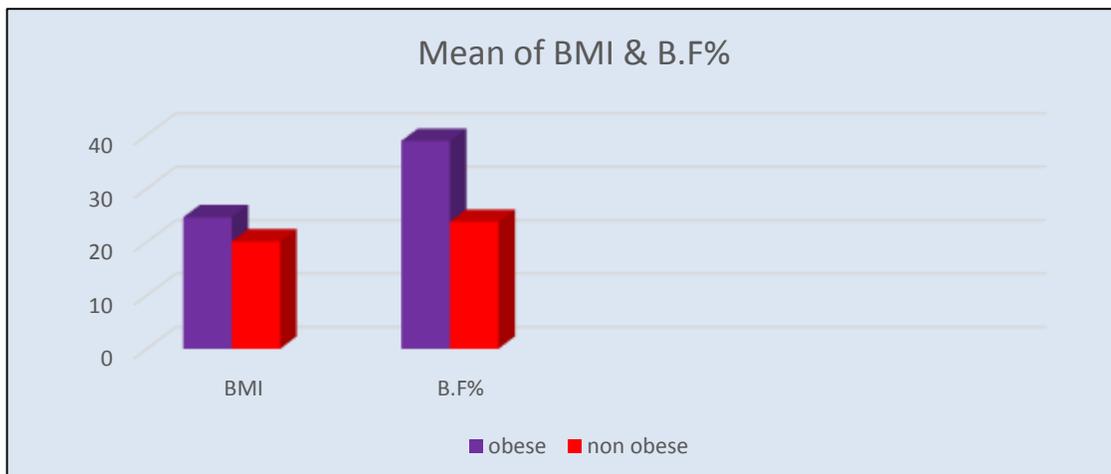


Figure 1: Mean of BMI & BF% of obese & non obese subjects

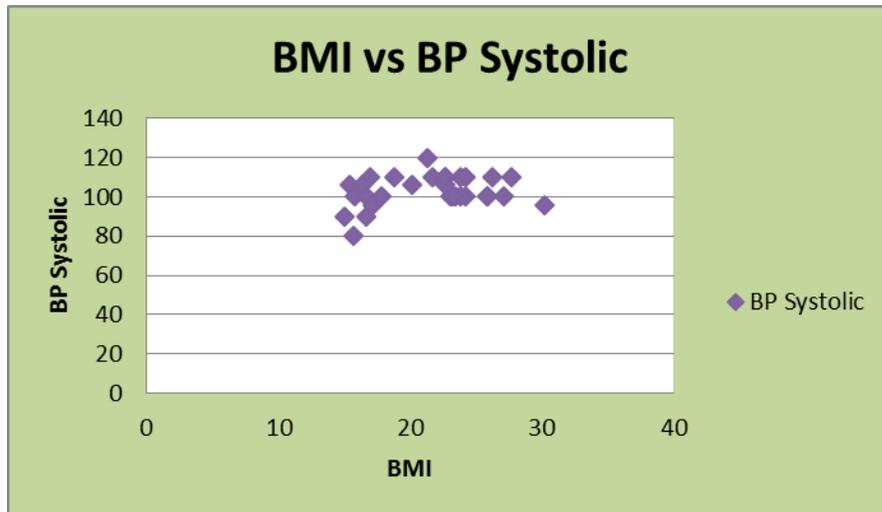


Figure 2: BMI Vs BP Systolic

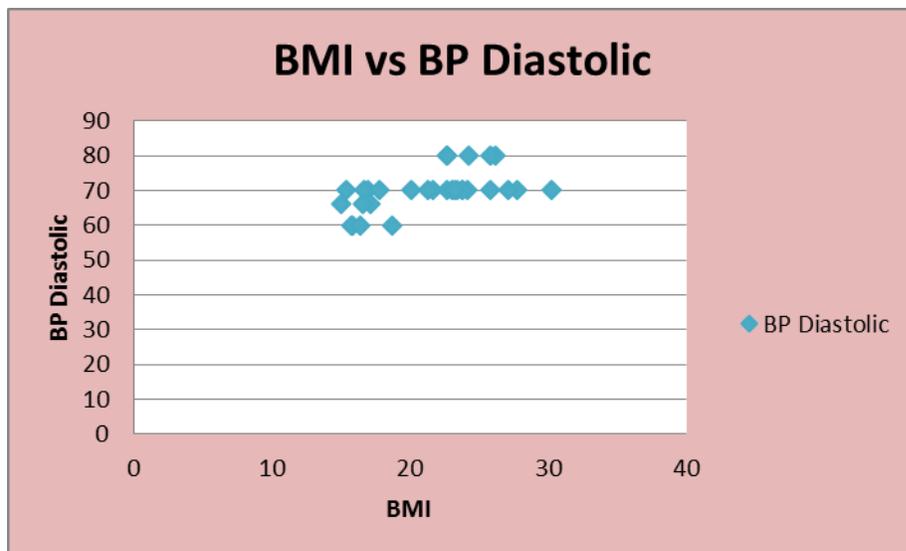


Figure 3: BMI Vs BP Diastolic

Table 2: BP, fasting glucose, fasting insulin & lipid profiles of obese & non obese subjects

S.No.	Character	Obese		Non obese		't' value
		Mean	Standard error	Mean	Standard error	
1	Blood pressure	4.406	0.025	3.461	0.048	17.871
2	Fasting glucose	155.37	2.127	143.943	3.542	2.766
3	Fasting insulin	24.63	1.267	12.329	1.058	7.443
4	Total cholesterol	288.03	6.520	280.429	5.619	0.883
5	Triglycerides	153.04	10.119	113.571	6.854	3.229
6	Ch.HDL	83.7	6.108	83.571	2.125	0.019
7	Ch.LDL	184.5	5.126	175	5.868	1.219
8	Ch.VLDL	31.4	2.015	23.571	1.388	3.199
9	T.Ch/HDL Ch. Ratio	8.19	0.225	6.671	0.195	5.098

Degrees of freedom = $N_1 + N_2 - 2$
= $18 + 12 - 2 = 28$

t value for 28 degrees of freedom at 5% loss of significance = 1.701

Null Hypothesis: No correlation between obesity & the above factors

If t value is < 1.701 – Accept the null hypothesis

If t value is > 1.701 – Reject the null hypothesis

For the following factors, null hypothesis was accepted since the t value was found to be < 1.701

1. Total Cholesterol
2. Ch. HDL
3. Ch. LDL

For the following factors, null hypothesis was rejected since the t value was found to be > 1.701

1. B.P
2. F.G
3. F.I
4. Triglycerides
5. Ch. VLDL
6. T. Ch./Ch. HDL Ratio

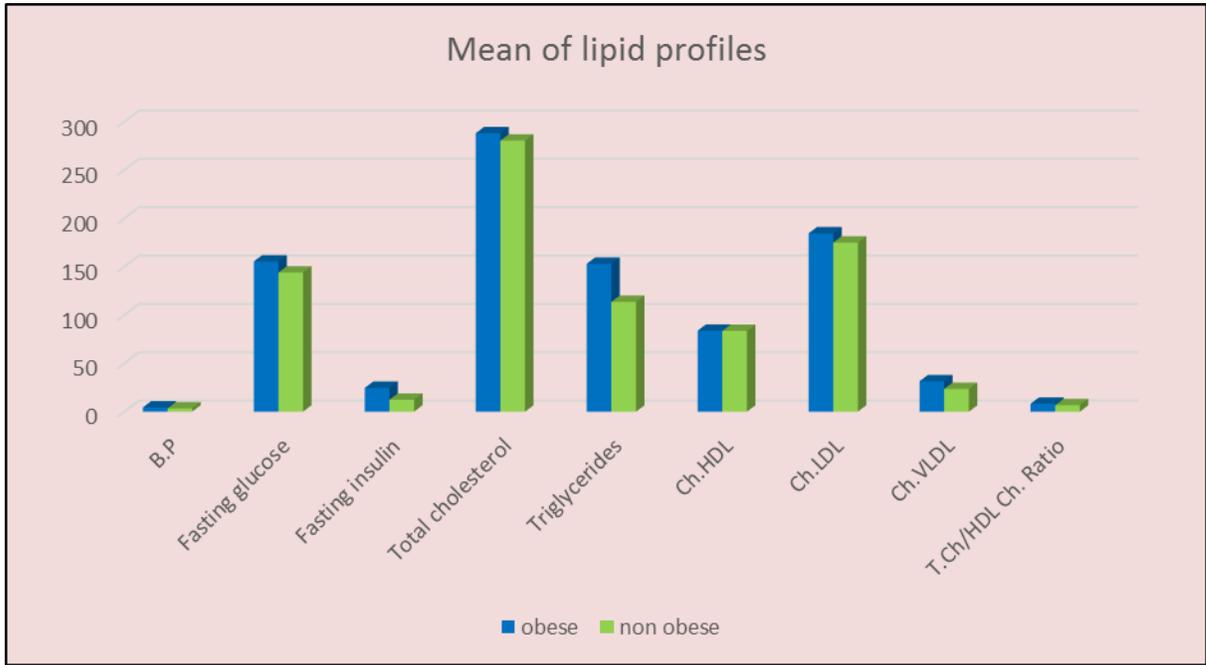


Figure 4: Mean of Lipid Profiles of obese & non-obese subjects

Table 3: Effect of Food Habits

Type of food	Obese	Non obese	Row Total
Nutritious	0	16	16
Moderate	38	17	55
Junk	48	1	49
Column Total	86	34	Grand Total=120
	χ^2	57.36384	

Degrees of freedom = (Row total-1) (Column total-1)
 = (3-1) (2-1) = 2

χ^2 value for 2 degrees of freedom at 5% loss of significance = 5.991

Null Hypothesis: No effect of food habits on obesity

If χ^2 value is <5.991–Accept the null hypothesis

If χ^2 value is >5.991–Reject the null hypothesis

Since the χ^2 value was >5.991, null hypothesis was rejected.

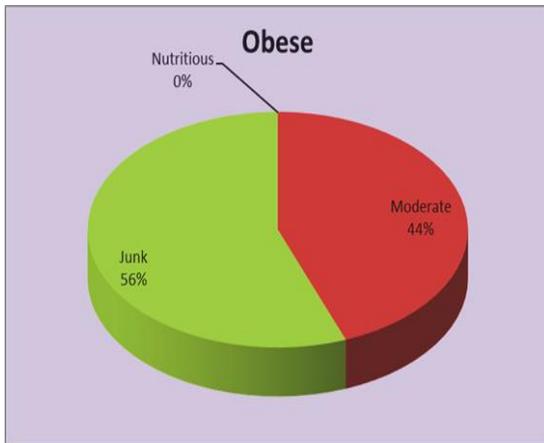


Figure 5: Food habits of obese subjects

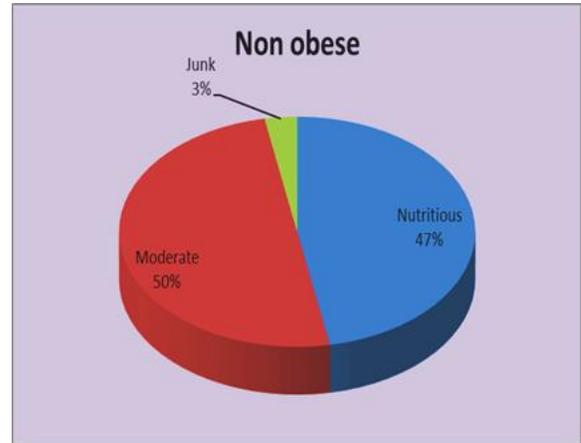


Figure 6: Food habits of non-obese subjects

Table 4: Effect of Physical activity

Exercise	Obese	Non obese	Row Total
Yes	10	30	40
No	76	4	80
Column Total	86	34	Grand Total=120
	χ^2	67.84	

Degrees of freedom = (Row total-1) (Column total-1)
 = (2-1) (2-1) = 1

χ^2 value for 1 degrees of freedom at 5% loss of significance = 3.841

Null Hypothesis: No effect physical activity on obesity

If χ^2 value is <3.841–Accept the null hypothesis

If χ^2 value is >3.841–Reject the null hypothesis

Since the χ^2 value was found to be >3.841, null hypothesis was rejected.

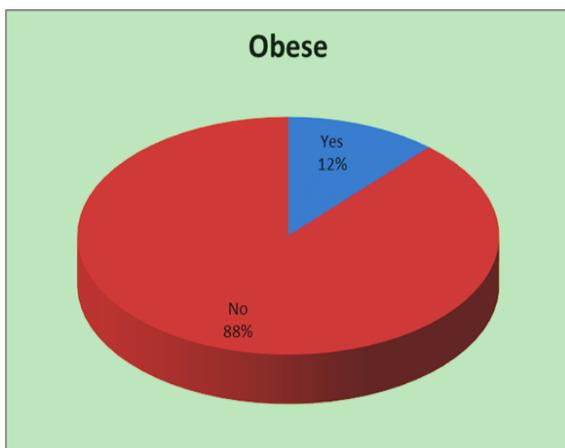


Figure 7: Answers of obese subjects about physical activity

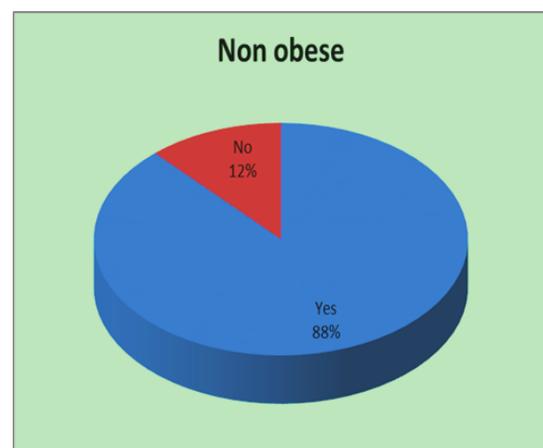
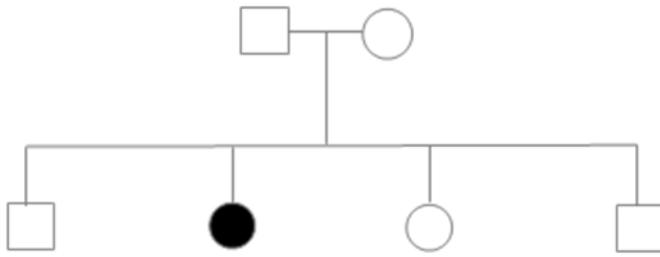
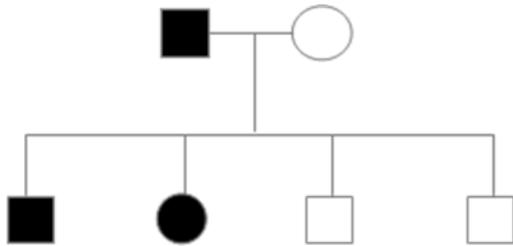


Figure 8: Answers of non-obese subjects about physical activity

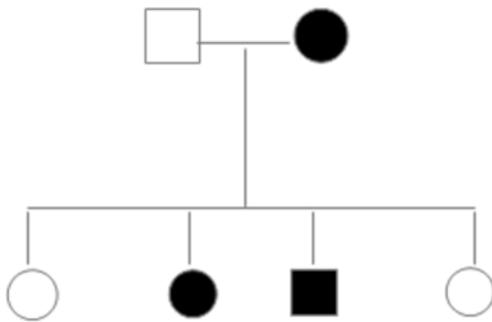
1. N_xN



2. A_xN



3. N_xA



4. A_xA

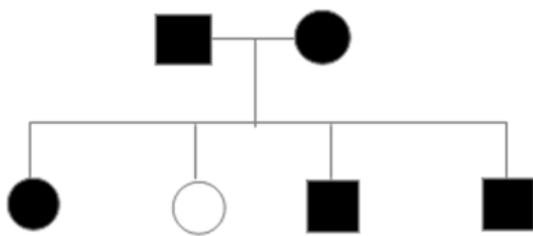


Figure 9: Sample pedigrees

Table 5: Pedigree Analysis

S.No.	Mating type (M x F)	Total frequency	No. of progeny affected	Total progeny	% of progeny affected
1	N x N	100	62	241	25.70%
2	N x A & A x N	100	66	187	35.30%
4	A x A	100	87	156	55.80%

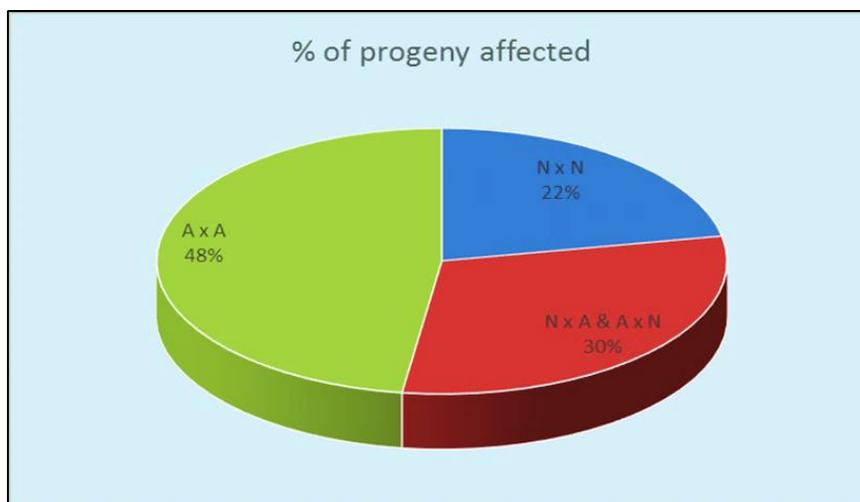


Figure 10: Percentage of progeny affected

IV. DISCUSSION

Obesity is a leading preventable cause of death worldwide, with increase in prevalence in adults, especially women and children, and authorities view it as one of the most serious public health problems of the 21st century.

The BMI is used in a wide variety of contexts as a simple method to assess how much an individual's body weight departs from what is normal or desirable for a person of his or her height. Obesity leads to excess fat deposition due to which a person's bodyweight is at least 20% higher than it should be. This results in an increase in BMI value. However, the BMI measurement can sometimes be misleading as it does not measure the % of body fat. Hence BF% is a more accurate measure of fitness level since it calculates a person's relative body composition without regard to height or weight. The 't' values of BMI and B.F % were found to be much higher than the table value (4.719>1.658, 12.788>1.658 respectively). Thus it can be concluded that a strong correlation exists between obesity, BMI and B.F%. It has been observed that obese subjects show higher BMI & B.F% values. This is in accordance with the already established method of using BMI & B.F% to identify obese subjects.

Obesity is known to increase the risk of elevated blood pressure. The 't' value of B.P was found to be much higher than the table value (17.871>>1.701). This shows that obesity leads to high B.P. However our present study could not support the fact that a linear relationship exists between BP & BMI. The fasting blood glucose & insulin levels of obese subjects were observed to be more than non-obese subjects (t value for blood glucose =2.765 & for insulin =7.443). Hence the current study supports the fact that obesity elevates blood glucose & insulin levels. This is the cause for diabetes in severely obese people.

A lipid profile is a measurement of various lipids that are found in the blood. It is a known fact that obese patients suffer from high cholesterol levels in their blood which in turn leads to cardiovascular disorders. In the current study, values of triglycerides, Ch. VLDL & T. Ch./Ch.HDL ratio were found to be higher in obese subjects ('t' values 3.229, 3.199 & 5.097 respectively) which indicates that a direct relationship exists between them & obesity. Such elevated lipid levels in blood might result in diabetes & coronary diseases. However any definite relationship between obesity and total Cholesterol, Ch. HDL & Ch. LDL could not be observed. High Total Ch. Levels in obese subjects were not observed may be due to the fact that the sample population contained subjects belonging to teenage & these obese subjects might develop high Total. Ch. levels in future.

The origin of obesity is complex and is it thought to be affected by the behavior and lifestyle of the individual. The current study reveals that food habits & physical activities influence obesity to a great extent (χ^2 values 57.364 & 67.84 respectively). Eating food

rich in fat content & having high calorie value is one of the major causes of obesity. The excess fat gets deposited in adipose tissue resulting in increase in body weight. Thus obesity is caused due to lack of energy balance i.e. more energy input than energy output. Leading a sedentary lifestyle also leads to obesity as the excess calories are not burned up. The study also showed that obese subjects lead a very inactive lifestyle as they get tired soon. Apart from food habits & physical activities, metabolism, surrounding environment, health conditions and medicines are also known to influence obesity.

Like many other medical conditions obesity is the result of an interplay between genetic and environmental factors. Although genetic deficiencies are currently considered rare, variations in these genes may predispose one to common obesity. Recent research has revealed that several genes contribute to obesity. From the current study, it can be concluded that obesity follows multifactorial inheritance in which inheritance of the phenotypic characteristic is attributable to two or more genes. Unlike monogenic traits, these traits were not found to follow a particular pattern of Mendelian inheritance.

V. CONCLUSION

The current study shows considerable evidence that obesity causes a significant increase in BMI, B.F %, B.P, fasting glucose, fasting insulin, triglycerides, Ch. VLDL & T.Ch./HDL Ch. ratio. Obesity could be a multifactorial trait, influenced by more than one gene and triggered by internal and external environmental factors like food habits & physical activity.

VI. ACKNOWLEDGMENT

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OBSERVATIONS ON HALF-COMPANION PELL-NUMBERS

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Abstract- Pell number together with Half companion Pell number have been analysed. Some identities among these numbers are presented.

Index Terms- Pell number, Half companion Pell number.

I. INTRODUCTION

Number is the essence of Mathematical calculation. Varieties of numbers have variety of range and richness. Many integers exhibit fascinating properties, they form sequences, they form patterns and so on [1-21]. In this communication we consider twin sequences Pell numbers and Half companion Pell numbers and some identities relating themselves.

II. PROPERTIES

$$1. H_{n+2} = 3H_n + 4P_n$$

Proof:

$$\begin{aligned} H_{n+2} &= \frac{(1 + \sqrt{2})^{n+2} + (1 - \sqrt{2})^{n+2}}{2} \\ &= \frac{(1 + \sqrt{2})^n (3 + 2\sqrt{2}) + (1 - \sqrt{2})^n (3 - 2\sqrt{2})}{2} \\ &= 3 \frac{(1 + \sqrt{2})^n + (1 - \sqrt{2})^n}{2} + 2\sqrt{2} \frac{(1 + \sqrt{2})^n - (1 - \sqrt{2})^n}{2} \\ &= 3H_n + 4P_n \end{aligned}$$

$$H_{n+2} = 3H_n + 4P_n$$

$$2. P_{n+2} = 3P_n + 2H_n$$

Proof:

$$\begin{aligned} P_{n+2} &= \frac{(1 + \sqrt{2})^{n+2} - (1 - \sqrt{2})^{n+2}}{2\sqrt{2}} \\ &= \frac{(1 + \sqrt{2})^n (3 + 2\sqrt{2}) - (1 - \sqrt{2})^n (3 - 2\sqrt{2})}{2\sqrt{2}} \\ &= 3 \frac{(1 + \sqrt{2})^n - (1 - \sqrt{2})^n}{2\sqrt{2}} + 2\sqrt{2} \frac{(1 + \sqrt{2})^n + (1 - \sqrt{2})^n}{2\sqrt{2}} \\ &= 3P_n + 2H_n \\ P_{n+2} &= 3P_n + 2H_n \end{aligned}$$

$$3. P_n^3 = \frac{1}{2^3} [P_{3n} - 3(-1)^n P_n]$$

Proof:

$$\begin{aligned} P_n^3 &= \left[\frac{(1 + \sqrt{2})^n - (1 - \sqrt{2})^n}{2\sqrt{2}} \right]^3 \\ &= \frac{1}{8} \left[\frac{(1 + \sqrt{2})^{3n} - (1 - \sqrt{2})^{3n}}{2\sqrt{2}} + 3(-1)^n \frac{(1 + \sqrt{2})^n - (1 - \sqrt{2})^n}{2\sqrt{2}} \right] \\ &= \frac{1}{8} [P_{3n} - 3(-1)^n P_n] \\ P_n^3 &= \frac{1}{2^3} [P_{3n} - 3(-1)^n P_n] \end{aligned}$$

$$4. P_n^5 = \frac{1}{2^6} [P_{5n} - 5(-1)^n P_{3n} + 10P_n]$$

Proof:

$$\begin{aligned} P_n^5 &= \left[\frac{(1 + \sqrt{2})^n - (1 - \sqrt{2})^n}{2\sqrt{2}} \right]^5 \\ &= \frac{1}{128\sqrt{2}} [(1 + \sqrt{2})^n - (1 - \sqrt{2})^n]^5 \\ &= \frac{1}{64} \left[\frac{(1 + \sqrt{2})^{5n} - (1 - \sqrt{2})^{5n}}{2\sqrt{2}} - 5(-1)^n \frac{(1 + \sqrt{2})^{3n} - (1 - \sqrt{2})^{3n}}{2\sqrt{2}} + 10 \frac{(1 + \sqrt{2})^n - (1 - \sqrt{2})^n}{2\sqrt{2}} \right] \\ &= \frac{P_{5n} - 5(-1)^n P_{3n} + 10P_n}{64} \end{aligned}$$

$$P_n^5 = \frac{1}{2^6} [P_{5n} - 5(-1)^n P_{3n} + 10P_n]$$

$$5. P_n^7 = \frac{1}{2^9} [P_{7n} - 7(-1)^n P_{5n} + 21P_{3n} - 35(-1)^n P_n]$$

Proof:

$$\begin{aligned} P_n^7 &= \left[\frac{(1 + \sqrt{2})^n - (1 - \sqrt{2})^n}{2\sqrt{2}} \right]^7 \\ &= \frac{1}{2^9} \left[\frac{(1 + \sqrt{2})^{7n} - (1 - \sqrt{2})^{7n}}{2\sqrt{2}} - 7(-1)^n \frac{(1 + \sqrt{2})^{5n} - (1 - \sqrt{2})^{5n}}{2\sqrt{2}} + 21 \frac{(1 + \sqrt{2})^{3n} - (1 - \sqrt{2})^{3n}}{2\sqrt{2}} - 35(-1)^n \frac{(1 + \sqrt{2})^n - (1 - \sqrt{2})^n}{2\sqrt{2}} \right] \\ &= \frac{1}{2^9} [P_{7n} - 7(-1)^n P_{5n} + 21P_{3n} - 35(-1)^n P_n] \end{aligned}$$

$$P_n^7 = \frac{1}{2^9} [P_{7n} - 7(-1)^n P_{5n} + 21P_{3n} - 35(-1)^n P_n]$$

Remark:

From the relations 3, 4, and 5 a general representation for P_n^{2r+1} is obtained as follows:

$$P_n^{2r+1} = \frac{1}{2^{3r}} \left[P_{(2r+1)n} - (2r+1)C_1(-1)^n P_{(2r-1)n} + (2r+1)C_2 P_{(2r-3)n} - (2r+1)C_3(-1)^n P_{(2r-5)n} + \dots \right]$$

Also the general representation for P_n^{2r} is

$$P_n^{2r} = \frac{1}{2^{3r-1}} \left[H_{2rn} - 2rC_1(-1)^n H_{(2r-2)n} + 2rC_2 H_{(2r-4)n} - 2rC_3(-1)^n H_{(2r-6)n} + \dots + \frac{2rC_r}{2} (-1)^{k(n+3)-2} \right]$$

where $P_{-sn} = 0, s = 0, 1, 2, 3, \dots$

$$6. H_n^3 = \frac{H_{3n} + 3(-1)^n H_n}{2^2}$$

Proof:

$$\begin{aligned} H_n^3 &= \left[\frac{(1+\sqrt{2})^n + (1-\sqrt{2})^n}{2} \right]^3 \\ &= \frac{1}{8} \left[(1+\sqrt{2})^n + (1-\sqrt{2})^n \right]^3 \\ &= \frac{1}{4} \left[\frac{(1+\sqrt{2})^{3n} + (1-\sqrt{2})^{3n}}{2} + 3(-1)^n \frac{(1+\sqrt{2})^n + (1-\sqrt{2})^n}{2} \right] \\ &= \frac{H_{3n} + 3(-1)^n H_n}{4} \end{aligned}$$

$$H_n^3 = \frac{H_{3n} + 3(-1)^n H_n}{2^2}$$

$$7. H_n^5 = \frac{H_{5n} + 5(-1)^n H_{3n} + 10H_n}{2^4}$$

Proof:

$$\begin{aligned} H_n^5 &= \left[\frac{(1+\sqrt{2})^n + (1-\sqrt{2})^n}{2} \right]^5 \\ &= \frac{1}{32} \left[(1+\sqrt{2})^n + (1-\sqrt{2})^n \right]^5 \\ &= \frac{1}{16} \left[\frac{(1+\sqrt{2})^{5n} + (1-\sqrt{2})^{5n}}{2} + 5(-1)^n \frac{(1+\sqrt{2})^{3n} + (1-\sqrt{2})^{3n}}{2} + 10 \frac{(1+\sqrt{2})^n + (1-\sqrt{2})^n}{2} \right] \\ &= \frac{H_{5n} + 5(-1)^n H_{3n} + 10H_n}{16} \end{aligned}$$

$$H_n^5 = \frac{H_{5n} + 5(-1)^n H_{3n} + 10H_n}{2^4}$$

Remark:

From the relations 6 and 7a general representation for H_n^{2r+1} is obtained as follows:

$$H_n^{2r+1} = \frac{1}{2^{2r}} \left[H_{(2r+1)n} + (2r+1)C_1(-1)^n H_{(2r-1)n} + (2r+1)C_2 H_{(2r-3)n} + (2r+1)C_3(-1)^n H_{(2r-5)n} + \dots \right]$$

Also the general representation for H_n^{2r}

$$H_n^{2r} = \frac{1}{2^{2r-1}} \left[H_{2m} + 2rC_1(-1)^n H_{(2r-2)n} + 2rC_2 H_{(2r-4)n} + 2rC_3(-1)^n H_{(2r-6)n} + \dots + \frac{2rC_r}{2} (-1)^{k(n+2)-2} \right]$$

where $H_{-sn} = 0, s = 0, 1, 2, 3, \dots$

8. $H_{2n} = 2H_n^2 - (-1)^n$

Proof:

$$\begin{aligned} H_{2n} &= \frac{(1 + \sqrt{2})^{2n} + (1 - \sqrt{2})^{2n}}{2} \\ &= \frac{\left[(1 + \sqrt{2})^n + (1 - \sqrt{2})^n \right]^2 - 2(1 + \sqrt{2})^n (1 - \sqrt{2})^n}{2} \\ &= 2 \left[\frac{\left[(1 + \sqrt{2})^n + (1 - \sqrt{2})^n \right]^2}{2} \right] - (-1)^n \\ &= 2H_n^2 - (-1)^n \end{aligned}$$

$$H_{2n} = 2H_n^2 - (-1)^n$$

9. $H_{2n} = 4P_n^2 + (-1)^n$

Proof:

$$\begin{aligned} H_{2n} &= \frac{(1 + \sqrt{2})^{2n} + (1 - \sqrt{2})^{2n}}{2} \\ &= \frac{\left[(1 + \sqrt{2})^n - (1 - \sqrt{2})^n \right]^2 + 2(1 + \sqrt{2})^n (1 - \sqrt{2})^n}{2} \\ &= 4P_n^2 + (-1)^n \end{aligned}$$

$$H_{2n} = 4P_n^2 + (-1)^n$$

10. $P_{2n} - 2H_n P_n = 0$

Proof:

$$\begin{aligned} P_{2n} &= \frac{(1 + \sqrt{2})^{2n} - (1 - \sqrt{2})^{2n}}{2\sqrt{2}} \\ &= \left[(1 + \sqrt{2})^n + (1 - \sqrt{2})^n \right] \left[\frac{(1 + \sqrt{2})^n - (1 - \sqrt{2})^n}{2\sqrt{2}} \right] \\ &= 2H_n P_n \end{aligned}$$

$$P_{2n} - 2H_n P_n = 0$$

11. $P_{2n} = 2P_n (H_{n+1} - 2P_n)$

Proof:

$$\begin{aligned} P_n H_{n+1} &= \left[\frac{(1 + \sqrt{2})^n - (1 - \sqrt{2})^n}{2\sqrt{2}} \right] \left[\frac{(1 + \sqrt{2})^{n+1} + (1 - \sqrt{2})^{n+1}}{2} \right] \\ &= \frac{1}{4\sqrt{2}} \left[(1 + \sqrt{2})^{2n} - (1 - \sqrt{2})^{2n} + \sqrt{2}((1 + \sqrt{2})^n - (1 - \sqrt{2})^n)^2 \right] \\ &= \frac{1}{2} \left[\frac{(1 + \sqrt{2})^{2n} - (1 - \sqrt{2})^{2n}}{2\sqrt{2}} + \frac{\sqrt{2}((1 + \sqrt{2})^n - (1 - \sqrt{2})^n)^2}{2\sqrt{2}} \right] \end{aligned}$$

$$= \frac{1}{2} [P_{2n} + 4P_n^2]$$

$$P_{2n} = 2P_n(H_{n+1} - 2P_n)$$

12. $H_n^2 + H_{n+1}^2 = 2(H_{2n} + P_{2n})$

Proof:

$$\begin{aligned} H_n^2 + H_{n+1}^2 &= \left[\frac{(1 + \sqrt{2})^n + (1 - \sqrt{2})^n}{2} \right]^2 + \left[\frac{(1 + \sqrt{2})^{n+1} + (1 - \sqrt{2})^{n+1}}{2} \right]^2 \\ &= \frac{1}{4} \left[(1 + \sqrt{2})^{2n} + (1 - \sqrt{2})^{2n} + 2(-1)^n + 3(1 + \sqrt{2})^{2n} + 2\sqrt{2}(1 + \sqrt{2})^{2n} + 3(1 - \sqrt{2})^{2n} - 2\sqrt{2}(1 - \sqrt{2})^{2n} - 2(-1)^n \right] \\ &= \frac{1}{4} \left[4((1 + \sqrt{2})^{2n} + (1 - \sqrt{2})^{2n}) + 2\sqrt{2}((1 + \sqrt{2})^{2n} - (1 - \sqrt{2})^{2n}) \right] \\ &= \frac{1}{4} \left[8 \frac{(1 + \sqrt{2})^{2n} + (1 - \sqrt{2})^{2n}}{2} + 8 \frac{(1 + \sqrt{2})^{2n} - (1 - \sqrt{2})^{2n}}{2\sqrt{2}} \right] \\ &= 2(H_{2n} + P_{2n}) \\ H_n^2 + H_{n+1}^2 &= 2(H_{2n} + P_{2n}) \end{aligned}$$

13. $H_{n+1} = H_n + 2P_n$

Proof:

$$\begin{aligned} H_{n+1} &= \frac{(1 + \sqrt{2})^{n+1} + (1 - \sqrt{2})^{n+1}}{2} \\ &= \frac{1}{2} \left[(1 + \sqrt{2})^n + \sqrt{2}(1 + \sqrt{2})^n + (1 - \sqrt{2})^n - \sqrt{2}(1 - \sqrt{2})^n \right] \\ &= \frac{1}{2} \left[(1 + \sqrt{2})^n + (1 - \sqrt{2})^n + \sqrt{2}((1 + \sqrt{2})^n - (1 - \sqrt{2})^n) \right] \\ &= H_n + 2P_n \\ H_{n+1} &= H_n + 2P_n \end{aligned}$$

14. $P_{2n} = H_n(H_{n+1} - H_n)$

Proof:

$$\begin{aligned} H_{n+1}H_n &= \left[\frac{(1 + \sqrt{2})^{n+1} + (1 - \sqrt{2})^{n+1}}{2} \right] \left[\frac{(1 + \sqrt{2})^n + (1 - \sqrt{2})^n}{2} \right] \\ &= \left[\frac{(1 + \sqrt{2})^n + (1 - \sqrt{2})^n}{2} \right]^2 + \sqrt{2} \left[\frac{(1 + \sqrt{2})^n + (1 - \sqrt{2})^n}{2} \right] \left[\frac{(1 + \sqrt{2})^n - (1 - \sqrt{2})^n}{2} \right] \\ &= H_n^2 + P_{2n} \\ P_{2n} &= H_n(H_{n+1} - H_n) \end{aligned}$$

15. $H_{2n} = 2H_{n+1}P_{n+1} - 3P_{2n}$

Proof:

$$H_{n+1}P_{n+1} = \left[\frac{(1 + \sqrt{2})^{n+1} + (1 - \sqrt{2})^{n+1}}{2} \right] \left[\frac{(1 + \sqrt{2})^{n+1} - (1 - \sqrt{2})^{n+1}}{2\sqrt{2}} \right]$$

$$\begin{aligned}
 &= \frac{1}{4\sqrt{2}} \left[((1 + \sqrt{2})^{n+1})^2 - ((1 - \sqrt{2})^{n+1})^2 \right] \\
 &= \frac{1}{4\sqrt{2}} \left[(1 + \sqrt{2})^{2n} (3 + 2\sqrt{2}) - (1 - \sqrt{2})^{2n} (3 - 2\sqrt{2}) \right] \\
 &= \frac{3}{2} \left[\frac{(1 + \sqrt{2})^{2n} - (1 - \sqrt{2})^{2n}}{2\sqrt{2}} \right] + \frac{1}{2} \left[\frac{(1 + \sqrt{2})^{2n} + (1 - \sqrt{2})^{2n}}{2} \right] \\
 &= \frac{1}{2} [3P_{2n} + H_{2n}] \\
 H_{2n} &= 2H_{n+1}P_{n+1} - 3P_{2n}
 \end{aligned}$$

III. CONCLUSION

To conclude one may search for other patterns and their related properties.

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Spuriously Elevated HbA1c Result

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Abstract- Glycosylated haemoglobin (HbA1c) is routinely used test to monitor long term glycaemic control in diabetic patients. It is well known that genetic variants and chemically modified derivatives of haemoglobin can profoundly affect the accuracy of HbA1c measurements. The degree of interference depends on the HbA1c assay method, type & quantum of haemoglobin variant present in a given sample. Here, we report a rare case showing disproportionately high HbA1c value in a 69 years old female patient with carcinoma breast (adenocarcinoma) with hypertension.

Index Terms- Diabetes, Genetic variants, Haemoglobin, HbA1c.

I. INTRODUCTION

Glycated haemoglobin (HbA1c) is a biochemical test that has been routinely used in the management of diabetes mellitus to monitor long-term glycaemic control¹. While boronate affinity chromatography & immunoassays estimate HbA1c based on structure of haemoglobins others like HPLC & electrophoresis are based on the charge of haemoglobin. The gold standard method today for measuring HbA1c for most clinical laboratories is a "mini-column" utilizing ion exchange chromatography (HPLC).²⁻³ In our lab we use Biorad D – 10 and Biorad variant turbo, both of which in addition to estimation HbA1c can also detect haemoglobin variants and chemical modifications of haemoglobin that commonly interfere with estimation of glycated haemoglobin fractions.

In addition, pathologic conditions affecting red cell half-life, drugs like aspirin and penicillin, metabolites of alcohol can also positively bias the results of HbA1c generated by HPLC.³

II. CASE REPORT

A 69 years old female patient, known case of ca breast (adenocarcinoma) right side T₃N₀M₀, taking regular chemotherapy with letrozole and radiotherapy, came for regular follow up. She was a known case of dyslipidemia and hypertension since 2 years; recently diagnosed with type II diabetes. Patient was on regular treatment with metformin, telmisartan and rosuvastatin.

Fasting blood sugar (FBS) –122 mg/dl & Post prandial blood sugar (PPBS) was 215. Serum urea- 23mg/dl, serum creatinine- 0.6mg/dl, serum sodium- 138mmol/l and serum potassium- 4.2mmol/l.

On estimating the glycated haemoglobin in this patient by Bio-Rad D-10 & Variant turbo for estimating glycated

haemoglobin, it showed a value of 60.9 gm % which was unusually high and was disproportionate to patient's blood sugar levels. Both of these machines also are designed to identify most of haemoglobin variants known to interfere with glycated haemoglobin. As this sample did not show any known variants/chemical modifications it was reanalyzed by immunoturbidimetry using Cobas 6000 which showed the HbA1c value of 8.25 gm%.

III. DISCUSSION

HbA1c was originally a term for an ion exchange chromatographic peak and is now defined as irreversibly glycated haemoglobin molecules at one or both N-terminal valines of the β chains. Biorad D-10 & Variant turbo utilizes the principle of cation exchange chromatography to estimate glycated haemoglobin. The overestimation of glycated haemoglobin can be because of haemoglobin variants with amino acid substitutions on globin chains leading to their charge differences. These charge differences can alter retention time of the non glycated variants causing them to co-elute with glycated fraction leading to overestimation of HbA1c. Examples for such positive interferences include silent variants like Hb Raleigh (b1Val3Ala), Hb Graz (b2His3Leu), Hb Sherwood Forest (b104Arg3Thr), Hb South Florida (b1Val3Met) and Hb Niigata [bN-Methionyl-1(NA)Val3Leu]. In cases of Hb Raleigh, Hb South Florida, and Hb Niigata, the substitution at the NH₂ terminus leads to the formation of acetyl-Hb in vivo, providing a basis for falsely elevated HbA1c.⁴ The presence of haemoglobin (Hb) C or S trait has been shown to affect the HbA1c assays leading to overestimation of HbA1c. Cation-exchange chromatography for HbA1c is also subject to interference by labile HbA1 and HbF as both of them can co elute with HbA1c.⁵ HbF has γ chains, for which the N-terminus is a glycine residue which acetylates readily.^{5,6} In addition to genetic variants, glycated haemoglobin results can be affected by chemical modifications of Hb. These modifications may resemble glycated haemoglobin physically and chemically, which lead to inaccurate determinations of glycated Hb, particularly when charge differences are used for separation of haemoglobin. Carbamylated Hb, increased in uremic patients, is the most commonly encountered derivative. High concentrations of acetylated Hb are seen with rare mutations at the amino terminus of the beta-globin chain that enhances the formation of acetyl-Hb in vivo.⁷

These variant haemoglobins thus interfere only in the assays that are based on charge but not the assays which are based on structure of haemoglobin/antigenic characteristics thus we

thought of estimating haemoglobin using immunoturbidimetry which is not a charge based and uses antibodies that target N-terminal glycosylated amino acids on the β chain to quantify Hb A1c, and the Hb A1c percentage is calculated from the Hb A1c and Hb concentrations.⁸

HPLC can separate actual HbA1c fraction present in the sample from some haemoglobin variants and chemically modified haemoglobins unlike other methods which also measures these as “glycosylated” fractions; thus overestimating the glycosylated haemoglobin. Hemoglobinopathies, such as β -thalassemia, sickle cell disease, homozygous HbC disease & HbSC disease, frequently show increased amounts of minor Hb species, i.e., HbA₂ and HbF, which are known to interfere with estimation of glycosylated haemoglobin by chromatographic methods (HPLC).²

HPLC BIORAD variant turbo program can indicate the presence of haemoglobin variants under variant window or as separate additional peaks and alarms against reporting of spuriously high results.

As this patient had normal urea levels, no clinical features or lab reports suggestive of abnormal HbF presence he might be harbouring a rare silent Hb variant which might have interfered with HbA1c estimation. In such circumstances, estimation by immunoturbidimetry method may be more valid for estimation of HbA1c.

IV. TAKE HOME MESSAGES

1. HbA1c assays can be divided into methods that use molecular charge (CE-HPLC and electrophoresis) and methods that use molecular structure (immunoassays, boronate & affinity chromatography).

2. Hb variants (or their glycosylated forms) may interfere with HbA1c assays based on cation exchange-HPLC but D-10/Variant turbo has been designed to identify the presence of variants under variant window or as additional peaks and warns against reporting of spuriously high values.

3. If spurious HbA1c result is seen on HPLC, the interference by Hb variants should be suspected, and the interpretation of Hb A1c results should be based on the patient's medical history and other laboratory results. Additionally, efforts should be made to identify the Hb variant, and alternative Hb A1c methods that do not show interference by variants like immunoturbidimetry should be used to report the results.

V. LIMITATIONS

In this case Hb electrophoresis was not performed separately for confirmation assuming that machines used are capable of identifying common variables that interfere with HbA1c estimations.

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The Evaluation of Program Implementation of Comprehensive Emergency Obstetric Neonatal Care (CEONC) in Wahidin Sudiro Husodo Hospital in the Achievement of the MDG's 2015

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Abstract- Based on the report of Indonesian millennium development goals (MDGs) in 2010, the maternal mortality rate still has to become special concern. Maternal mortality rate per 100,000 live births in 1991 is 390 in 2007 to 228, while the target achievement in 2015 is 102. Wahidin Sudiro Husodo Hospital (RSWS) is one of the top referral hospital Comprehensive Emergency Obstetric Neonatal Care (CEONC) services in South Sulawesi. In order to improve the achievement of the MDG's, especially a decrease in maternal and child mortality rates, the Ministry of Health issued Comprehensive Emergency Obstetric Neonatal Care (CEONC) guidelines on hospital. Based on the research result of South Sulawesi Provincial Health Office is only 17.8 % of hospitals met the criteria of CEONC. The purpose of this study is to evaluate the achievement of hospital performance management in implementing Comprehensive Emergency Obstetric Neonatal Care (CEONC). This research is a quantitative study with examining the case study method. The results indicated that the performance achievement of 86.79 % perinatology unit which means there is still a gap of 13.21 %. While the magnitude of obstetric units or performance of 81.44 % is still a gap of 18.56 %. It is recommended for the low achievement in service performance CEONC in hospital where achievement of performance targets ideal is 100 % then all the parties concerned should prioritize and collaborate in the improvement of the implementation of the national action program to support the achievement of the MDG's by 2015.

Index Terms: Evaluation, comprehensive care program, the MDG's

I. INTRODUCTION

From all of the MDGs, the reduction of maternal mortality rate is low globally. In Indonesia, the maternal mortality rate (MMR / Maternal Mortality Rate) decreased from 390 in 1991 to 228 per 100,000 live births in 2007. MDG target by 2015 is 102 per 100,000 live births, so that it takes hard work to achieve these targets (Bappenas, 2010). In the future, the effort on increasing maternal health can be prioritized especially on expanding the quality of health care and comprehensive obstetric care, improving family planning services and dissemination of communication, information and education to the community.

The maternal mortality rate (MMR) and Neonatal Mortality Rate (AKN) in Indonesia is still the highest among ASEAN countries. While it is relatively slow decline in numbers, (AKI from 1994 to 307/100.000 390/100.000 1997 and AKN from 282/1000 live births to 21.8 in 1997). One of the major obstacles slow declines in MMR and AKN in Indonesia is a barrier to the provision of and access to emergency obstetric and neonatal care (DGYanmed, 2008). Based on the report of achievement of the Millennium Development Goals Indonesia in 2010, the maternal mortality rate still needs special attention. Maternal mortality rate per 100,000 live births in 1991 amounted to 390 in 2007 to 228, while the target achievement in 2015 amounted to 102 (Bappenas, 2010)

In Indonesia the causes of maternal death are hemorrhage and infection eclampsia, obstructed labor and complications abortion. Death cause was bleeding mostly due to the retention of this placenta. This is indicated that management of the third stage is less adequate. Whereas maternal mortality due to infection of an indicator of less the good prevention and management infection. Death of mother due to complications of abortion is the result of unwanted pregnancies (KTD).

Programs to reduce maternal mortality and infant (maternal neonatal) and improving maternal and infant care problems that have the labor and complications of preterm birth is very required. Therefore, it is necessary to obtain the support factor CEONC special skills of health workers and maternal and infant health care quality in Hospital.

Obstetric and neonatal care is a regional effort to provide services for pregnant women and newborns in an integrated manner in the form of services Comprehensive Emergency Obstetric Neonatal (CEONC) at the Hospital of Obstetrics and Neonatal Emergency Services Association (BEONC) at the health center (PUSKESMAS) level. 24 Hours CEONC hospital is part of the referral system in the emergency services in maternal and neonatal, who was instrumental in reducing maternal and infant mortality of new baby birth. Key of CEONC success is the availability of appropriate health personnel competence, infrastructure, facilities and reliable management.

Results of research conducted in Yogyakarta indicates that there are still many obstacles encountered in the implementation of the program at the hospital CEONC. In order to improve the quality of health care in Yogyakarta Province, Provincial Health Office D.I Yogyakarta in cooperation with the Quality of Health Services conducted a study beginning CEONC activities aimed to look into the readiness of hospital emergency obstetric referral hospital in DIY. This was conducted in 10 hospitals were randomly selected, and the result gives the following picture (Quality of Health Care Agency of Yogyakarta, 2006):

1. SOP is used as a reference in the service / is still plenty of action has not been found in a particular service unit.
2. The lack of trained personnel in a hospital emergency room referral in accordance with the services provided by the unit.
3. Have not found the presence of the midwife in emergency scheduling at each hospital.
4. Most hospitals have not yet visited who work full-time.
5. System acceptance referral from the referrer and feedback to the referrer does not have a clear path.
6. There is no feedback system acceptance of referral to the referring hospital and / or vice versa.
7. Activities that do not have this specific portion in program evaluation for quality guard.
8. Not infrequently found that access to the maternity ward was difficult, it is probably due to spatial design hospitals that have not right/ appropriate.
9. No procedure / system of hospitals reporting to the local health service.
10. Still found some hospitals that do not have a regular schedule in order to develop a midwife - BEONC.
11. Drug storage without labels.
12. The need for blood in hospitals are generally supplied directly from the nearest PMI, this is done because of the availability of blood bank at the hospital has not been found.
13. Have not found the routine evaluation schedule for ambulance provided.

At the level of South Sulawesi Province Neonatal Care Management Comprehensive Emergency Obstetric Complications (CEONC) in the hospital is still very low, based on data submitted by the South Sulawesi Provincial Health Office amounted to only 17.8 % of hospitals met the criteria CEONC. (Kadinkes South Sulawesi Province, 2012).

One of hospitals that became the main reference CEONC services in South Sulawesi is Wahidin Sudiro Husodo hospital in Makassar. Role of Wahidin Sudiro Husodo hospital in Makassar in achieving the MDG 's by 2015 is enormous decreased, especially in maternal and child mortality. Regarding to some of the problems above, it is necessary to do a study to evaluate the implementation of the CEONC program in Wahidin Sudiro Husodo hospital in Makassar. The purpose of this study is to evaluate the implementation of the Neonatal Comprehensive Emergency Obstetric Care (CEONC) in Wahidin Sudirohusodo Hospital Makassar.

II. MATERIAL AND METHODS

2.1 Study Area

The experiment was conducted at the Wahidin Sudiro Husodo Hospital on the Perinatology Unit and the Obstetrics Unit is CEONC program implementation unit at the hospital.

2.2 Research design, Sample and Data Collection

This research is examined as a case study with a quantitative approach which assessing the achievement of performance standards implementation CEONC Program in Hospital using questionnaires, field observation and document study.

Then, in assessing the factors inhibiting the implementation of the field program conducted with a qualitative approach by conducting in-depth interviews with informants responsible for key of CEONC programs in Wahidin Sudiro husodo Hospital Makassar.

III. RESULTS AND DISCUSSION

Implementation of comprehensive care program in Wahidin Sudiro Husodo Hospital Makassar divided into two units implementing the program and obstetric Perinatology unit.

Table 1.Result of performance evaluation of the implementation of the Perinatology Unit of CEONC programs in Wahidin Sudiro husodo Hospital Makassar in 2013.

No	Monitoring Point	Required	Actual Value
A. STANDAR INPUT			
1	Hand washing area	12	8
2	Areas Resuscitation and Stabilization in Neonates Space / ER	35	33
3	Special care units	58	54
4	intensive care units	65	53
5	Lactation Area	7	7
6	Washing Incubator	5	4
Total		182	159
Percentage		87.36%	
B. MANAGEMENT STANDARD/ MANAGEMENT			
1	References	1	1
2	Medical Records	3	3
3	Human Resource Management	18	17
4	Management quality	5	1
5	Maintenance Management	3	3
TOTAL		30	25
Percentage		83.33%	
OVERALL TOTAL		212	184
Performance Percentage		86.79%	

Source: Primary Data, 2013

Assessment of performance in this study were divided into two standards that includes: Standard Input includes Hand Wash Area, Area Resusuitasi and Stabilization in Space Neonatal / ICU, Special Care Unit, Intensive Care Unit, Area Lactation, Washing Area Incubators, and Management Standards, among others: Reference, medical records, human resources, Quality Management, Maintenance Management overall assessed on each of the program implementation unit of CEONC programs in Wahidin Sudiro Husodo Hospital Makassar.

Based on Table 1 above it can be seen that for the total performance of CEONCprograms new perinatology achieve massive performance of 86.79 % with the expected ideal number which is equal to 100 % or there is still a gap of 13:21 %.

Table 2. The results of the performance evaluation of the implementation of the comprehensive care of Obstetrics Unit of Wahidin Sudiro Husodo Hospital, Makassar in 2013

No	No point Monitoring	Required	Actual Value
A. STANDARD INPUT			
1	Efforts PI (Processing Area + Wash Hand Tool)	12	9
2	Space Stabilization	34	30
3	Delivery Room	21	14
4	Intensive Care	27	26
5	Surgery Room	67	59
Total		161	138
Percentage		85.71%	
B. STANDAR PENGELOLAAN /MANAJEMEN			
1	References	5	5
2	Medical Records	3	2
3	Human Resource Management	17	9
4	Management quality	5	1
5	Maintenance Management	3	3
Total		33	20
Percentage		60.61%	
OVERALL TOTAL		194	158
Performance Percentage		81.44%	

Source: Primary Data , 2013

Achievement of the obstetric unit performance is still below the unit Perinatology. Based on the table above it can be seen that for the total performance of the program in CEONC unit new perinatology achieve massive performance of 81.44 % with the expected ideal number which is equal to 100% or there is still a gap of 18.56 %.

In perinatology unit on standard input unit which includes hand washing area, an area in the room resuscitation and stabilization of neonates / ER, a special care unit, intensive care unit, and lactation and washing areas incubator, the required value is equal to 182 but the achievement of a new perinatology units at 159 or amounted to 87.36 %.

Similarly, the standard input on the obstetric unit which includes (Hand washing Area + Processing Equipment), stabilization room , birthing room , intensive care and operating rooms , the values obtained for only 138 of the total value of which amounted to 161 ideal new or achievement of 85.71 %.

The low of performance achievement of both unit caused the standard input contains a lot of standard equipment, consumables, medicines and building where the development process Wahidin sudiro Husodo hospital initially patchy still not meet the standards in terms of space and equipment ideal for hospital general and in particular CEONC program. This can be seen in excerpts interviews respondents:

*"Start of construction of the CEONC building has not been in accordance with the proper layout or in accordance with the guidelines, is still patchy"(EM)
 "Already built, dismantled again since the beginning of development is not true"*

"After the construction of the building is finished, I asked why there is no installation such as oxygen, suction, and other" (EM). "We have limited land area" (EM.)

In addition it is necessary to improve and develop the huge financial support from the hospital, but of course not all can be accommodated as well as the many other priorities that should be done with limited funds. This can be seen in the following interview:

"... it will be fixed, no funds, run out of funds" (EM) "Funding assistance from the Headquarter is still limited" (EM) "The isolation room still has a negative pressure, maybe the cost is too big so it cannot be fulfilled" (EM)

In the standards management that includes a reference management, medical records, human resource management, quality management and maintenance management, the unit value required perinatology is 30 but new achievement perinatology units by 25 or by 83.33 % while for obstetric units get a value of 20 of the total value of 33 or attainment of an ideal is still very low , amounting to 60.61%.

Related problems faced by HR management is related to the lack of power in terms of both quantity and quality as the respondents expressed as follows:

"Our human resources in terms of quantity and quality was still lacking" (EM). " If it's NICU ratio of nurse is 1 patients 1 nurse , we cannot fulfill that, we nurse our patients 5, 2-3 only to watch the day or night " (EM)"We make the calculation, we need 32 people now that we've got only 24"

"We actually need pharmacy; there is one in this new year but not in a full-time status to manage parental nutrition" In terms of quantity and quality, culture, motivation and performance is still low, especially nurses, this can be seen in the results of the interview as follows:

"Even if we have a little of HR personnel, but HR should be cultured, cultured as nurses" (EM) "If 8 hour shift then should be 8 hours all subjects, but our nurse casually in and out, without permission

"If the night watch , nurses go to bed and sometimes sleep in the perfect place, nobody knows where they are" Availability of Standard Operating Procedure is still very limited in terms of amount and still need to be improved, it can be seen from the following interview:

"We have made the SOP since 2007 to 2010, but for now may have to be revised but we have not had time to make it" (EM)

"One thing we cannot do it all well, SOP, the data, because we do not have a secretary, administrative, as required"

System monitoring and evaluation and reporting system is still an obstacle, such as data reporting, monthly, quarterly and yearly has not been done.

" During the time of Kars accreditation from KARS team I just found out that there are perinatal activities and maternal to the health ministry , there formula RL 3.4 and RL.3.5"

"So far, the RM person who manages it, but after I checked with our data, very much difference" "No administrative staff to take care of reporting"

When asked about what programs need to be developed to improve CEONC in Wahidin Sudiro Husodo Hospital respondents answered:

"Referral information network system, need to be developed ... it's so good is if there is a midwife willing to send referrals will sound an alarm tone and the tone will not stop alarming until it is answered, so it will be missed he would send an emergency mother, later answered what is acceptable "da" tone place and if there is no management of emergencies will be answered and directed to another hospital"

" ... If there is a case would be sent, the RS will be ready"

" If we're good, we should be ready for training places, it is still in Jakarta who hold"

"The most important of all is the data, I cannot manage my data properly, there must be a special person who understands about managing health about it"

Based on some of the interview eabove it can be seen that in terms of the input, that should be the primary concern of the hospital is a data management and health information on the activities CEONC RS, it is becoming important because good data management will become a source of making more accurate planning and materials to evaluate the program.

Based on the results of research conducted then formulated several recommendations related services CEONC in Wahidin sudiro Husodo hospital in Makassar :

- a. In making planning and development activities both in terms of provision of infrastructure such as buildings and equipment should always be guided by the standards of facilities and infrastructure at the hospital CEONC set by the Ministry of Health.
- b. Increasing CEONC is a national event which is one of the national strategy to reduce Maternal Mortality and Child in Indonesia for the achievement of the MDG 's 2015 and Wahidin sudiro Husodo hospitalis is a referral center in eastern part of Indonesia. It needs a great support from the hospital management on this program in particular in the allocation of funding.
- c. Need to increase the work motivation and work culture to all the service personnel, especially nurses continually by conducting training in which is not only focused on patient care skills but the ability to present the best service so that later they can do a good job, discipline and responsibility .
- d. Monitoring and evaluation systems need to be developed by conducting regular performance appraisal system to all staff as a material for developing programs of reward and punishment which is expected to increase motivation, discipline and employee's satisfaction.
- e. The need for the specialized administrative recruitment for data management and CEONC reporting regularly
- f. The need for the development of an integrated information system so that the data validation and reporting can be more accurate.
- g. As a referral center in eastern Indonesia, especially in the province of South Sulawesi,Wahidin sudiro Husodo hospital should develop networks and integrated with other hospitals which will help in patient referral system.

CONCLUSION

CEONC performance achievement in the unit perinatalogiy in Wahidin sudiro Husodo hospital in Makassar achieve the scale performance of 86.79 % with the expected ideal number which is equal to 100 % or there is still a gap of 13:21 %. While the new obstetrics unit achieve massive performance by 81.44 % or there is still a gap of 18.56 %

SUGGESTION

It is recommended for the low achievement in service performance CEONC Wahidin sudiro Husodo hospital where achievement of performance targets ideal is 100 % then all the parties concerned should prioritize and collaborate in the improvement of the implementation of the national action program to support the achievement of the MDG's by 2015.

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Measurement of Serum Levels of Calcium, Phosphorus and Parathormone to Study the Prevalence and Pattern of Mineral Bone Disorder in Chronic Kidney Disease Patients

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Abstract- Background: Chronic kidney disease (CKD) is an international health problem affecting 5-10% of the world population. There occur changes in serum and tissue concentrations of phosphorus, calcium and parathormone (PTH) in CKD, leading to pathological changes in bones.

Objectives: To study the prevalence of mineral bone disorder (MBD) in CKD stage 3 to stage 5D patients using calcium, phosphorus & parathormone (PTH) as parameters; & to correlate the biochemical abnormalities with clinical disease.

Methods: Study was conducted between May 2011 to Dec 2012 at IPGMER & SSKM hospital, Kolkata in 190 patients with CKD stages 3-5D. In all patients, serum levels of calcium, phosphorus & parathormone were estimated and results analysed.

Results: 60% patients had normal calcium levels. 38.9% patients had hypocalcemia. 45.3% patients had hyperphosphataemia. 69.5% patients had raised serum parathormone levels.

Index Terms- Chronic kidney disease, mineral bone disorder, calcium, phosphorus, parathormone.

I. INTRODUCTION

Mineral bone disorder (MBD) is one of the most important complication of chronic kidney disease (CKD) [1]. As renal function declines, biochemical abnormalities involving calcium & phosphorus metabolism lead to pathological changes in bones which can predispose to bone pain & fractures, thus increasing the morbidity and mortality in CKD patients.

In CKD patients, the ability of the kidneys to appropriately excrete phosphate load is diminished, leading to hyperphosphatemia, elevated parathormone (PTH), & decreased 1,25-dihydroxyvitamin D [1,25(OH)₂D]. The conversion of 25-hydroxyvitamin D [25(OH)D] to 1,25(OH)₂D is impaired, thus reducing intestinal calcium absorption & increasing parathormone (PTH). The kidney fails to respond adequately to PTH, which normally promotes phosphaturia and calcium reabsorption.

In recent years, it has been found that these biochemical abnormalities not only lead to bone disease, but also predispose to vascular calcification & increased risk of cardiovascular morbidity & mortality.

Therapy is focused on correcting these biochemical & hormonal abnormalities in an effort to limit the consequences.

So, this study was undertaken to know the prevalence of mineral bone disorder (MBD) in CKD stages 3 to 5D, & to correlate biochemical abnormalities of calcium, phosphorus & parathormone with clinical disease.

II. MATERIALS AND METHODS

This is a prospective single centre study conducted at Department of Nephrology at IPGMER & SSKM Hospital, Kolkata. Study period-May 2011 to Dec 2012.

All Patients from age 12 years to 65 years of both male and female sex with CKD stages 3-5D [2,3,4] attending opd / admitted in nephrology ward are included in study.

Inclusion criteria - All patients of 12-65 years of either sex with proven CKD stage 3 to 5D.

Exclusion criteria-

- 1) Patients suffering from systemic diseases like SLE (systemic lupus erythematosus) / RA (rheumatoid arthritis),
- 2) Patients on steroids and other drugs which have effect on bone,
- 3) Patients with primary bone diseases.

Detailed history and physical examination was done with reference to bone pain, fractures, and patients were subjected to following investigations:

- 1) Serum calcium (corrected for albumin)
- 2) Serum phosphorus
- 3) Intact Parathyroid hormone assay (IPTH), and Other routine investigations for kidney disease.

III. INVESTIGATIONS

- 1) Serum Calcium was measured by colorimetric assay by OCP method.

OCP METHOD : Principle: Calcium is an alkaline medium combines with O-cresolphthalein to form a purple coloured complex. Intensity of the colour formed is directly proportional to the amount of calcium present in the sample.

Calcium + ocp → purple coloured complex.

Normal reference range value :

Serum/plasma - 8.5 to 10.5mg/dl

2) S.phosphorus measured by colorimetric assay by Modified Gommorri's method.

Principle:

Phosphate ions in an acidic medium reacts with ammonium molybdate to form a phosphomolybdate complex. This complex reacts with metal and is reduced to a molybdenum blue complex. Intensity of the molybdenum blue complex formed is directly proportional to the amount of inorganic phosphorous present in the sample.

Phosphorous + Ammonium molybdate -> Phosphorous molybdate complex.

Phosphomolybdate complex+ Metal -> Molybdenum Blue complex.

Normal reference range:

Serum : 2.5 to 4.5 mg/dl

3)iPTH(intact parathormone) - measured by 2 site immunoradiometric assay(2nd generation assay)

Principle: This elisa kit applies the competitive enzyme immunoassay technique utilizing a monoclonal antibody for the target antigen and a target antigen HRP conjugate. The assay sample and buffer are incubated together with target antigen HRP conjugate precoated plate for one hour. After the incubation period the wells are decanted and washed five times. The wells are then incubated with a substrate for HRP enzyme. The product of the enzyme - substrate reaction form blue coloured complex. Finally a stop solution is added to stop the reaction, which will then turn the solution yellow. The intensity of colour is inversely proportional to the target antigen concentration since the target antigen from samples and target antigen HRP conjugate compete for the antibody binding site. Since the number of sites is limited, as more sites are occupied by the target antigen from the sample, fewer sites are left to bind the conjugate. A standard curve is plotted relating the intensity of the colour to the concentration of standard. The target antigen concentration in each sample is interpolated from this standard curve[5].

CKD3-5D normal range= reference limits of particular assay.

CKD 5D:-normal range= 2 to 9 times upper reference limit for assay.

Statistical methods: variables are presented as distributions (i.e., frequencies and percentages) using microsoft excel.

IV. RESULTS

190 patients with chronic kidney disease stage 3-5D were tested for evidence of mineral bone disorder. Out of 190 patients, two thirds were males and one third were females. Majority of patients were middle aged. 47% patients were diabetic and 84% patients had hypertension.

CKD Stage 3:

Out of 190 patients, 30 patients were in CKD stage 3. Majority(80%) had calcium levels in normal range. 20% had calcium below normal. 86.7% patients had phosphorus levels

within normal range. In 13.3% patients phosphorus was elevated. 53.3% patients had normal ipth levels, whereas in significant number(46.7%) of patients ipth was elevated above normal range.

CKD Stage 4 :

Out of 190 patients, 58 patients were in CKD stage 4. In 38(65.5%) patients calcium was within normal range. 31% patients had low calcium levels and 3% patients had hypercalcemia. In 72.4% patients, phosphorus was within normal range. While 27.6% patients had hyperphosphataemia. 69% patients had ipth above normal range and in only 31% patients ipth was normal.

CKD Stage 5 : Out of 190 patients, 70 patients were in CKD stage 5. In 54% patients, calcium was within normal range. While a significant number of patients (46%) had hypocalcemia. Phosphorus was above normal in 60% patients and in 40% it was within normal range.

CKD Stage 5D:

Out of 190 patients, 32 patients were in CKD stage 5D. Hypocalcemia was noted in 56% patients. Phosphorus was elevated in 75% patients and normal in rest. iPTH was elevated in 44% patients and below normal in 37% patients. Only 19% patients had ipth in normal range.

V. DISCUSSION

Abnormalities of mineral metabolism occur early in chronic kidney disease[6]. Recently, increased attention has been focused on endocrine abnormalities in patients with CKD as a way to explain some of these associations[7]. Mineral bone disorder(MBD) was common in our patients with CKD. Calcitriol deficiency plays a major role in the development of secondary hyperparathyroidism(HPTH), as 1,25(OH)₂D deficiency promotes parathyroid gland hyperplasia & increased PTH synthesis through loss of the ability to upregulate vitamin D receptor expression within parathyroid cells[8].The end result is elevated serum PTH & abnormal calcium and phosphorus balance. Beginning in CKD stage 3, secondary hyperparathyroidism was the earliest change noted which was present in nearly half of patients. As CKD progressed prevalence of hyperparathyroidism increased to involve more than 90% patients in CKD stage 5. Also, the severity of hyperparathyroidism was more as CKD stage progressed.

Adynamic bone disease as evident by low ipth levels was uncommon in nondialytic population but affected more than one third of patients on dialysis..

Elevated PTH & hyperphosphatemia were recently identified as risk factors for mortality in dialysis patients[9]. Serum calcium and phosphorus abnormalities were uncommon in CKD stages 3& 4(<1/3rd), but were seen in more than half to two thirds of patients as they entered stage 5 and dialysis. Hypercalcemia was rarely seen. Levels of calcium correlated inversely with iPTH levels. Phosphorus levels correlated positively with iPTH levels. Median calcium & phosphorus values were within normal ranges, and increases in iPTH began to occur from CKD stage4 [6].

Hyperparathyroidism presents early in CKD & worsens with progression of CKD stages. There is an increase in the

prevalence of hyperparathyroidism from CKD stage 4. Hyperparathyroidism was present in 69% patients in CKD stage 4 & 91.4% patients in CKD stage 5 which was similar to Levin A et al. study [6] in which 56% patients in CKD stage 4 had hyperparathyroidism.

Literature on the prevalence of these abnormalities with current assays is limited. A study by Levin et al., one of the largest multi center study found that calcium & phosphate levels do not change till advanced stages of CKD. Hyperparathyroidism presents early in CKD & worsens with progression of CKD stages.

VI. CONCLUSION

Abnormalities of mineral bone metabolism are common in CKD patients. Hypocalcemia & hyperphosphataemia are noted in later CKD stages & worsen with disease progression. Hence, this shows the importance of early recognition of abnormalities, understanding of their patho-physiological consequences, & planning management strategies to prevent their progression. Thus, reducing the cardiovascular morbidity & mortality.

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Table/fig- 1: Baseline characteristics :

Parameters		Number(n=190)	Percent(%)
Age(years)	20-40years	42	22.1
	41-60years	95	50.5
	61-80years	53	27.9
Sex	Male	128	67.4
	Female	62	32.6

Table/fig- 2 : Distribution of cases according to serum calcium levels in CKD stages 3 to 5D :

CKD stages	Calcium (mg/dl)			Total
	<8.5	8.5-10.5	>10.5	
CKD stage3	6(20.0%)	24(80.0%)	0	30
CKD stage4	18(31.0%)	38(65.5%)	2(3.4%)	58
CKD stage5	32(45.7%)	38(54.3%)	0	70
CKDstage5D	18(56.3%)	14(43.8%)	0	32
Total	74(38.9%)	114(60.0%)	2(1.1%)	190

Data presented as No. of patients (%)

Table/fig-3: Distribution of cases according to serum phosphorus levels in CKD stages 3 to 5D :

CKD stages	phosphorus (mg/dl)		Total
	2.5-4.5	>4.5	
CKD stage 3	26(86.7%)	4(13.3%)	30
CKD stage 4	42(72.4%)	16(27.6%)	58
CKD stage 5	20(40.0%)	42(60.0%)	70
CKDstage 5D	8(25.0%)	24(75.0%)	32
Total	104(54.7%)	86(45.3%)	190

Data presented as No. of patients (%)

Table/fig- 4 : Distribution of cases according to serum ipth levels in CKD stages 3 to 5D :

CKD stages	Intact PTH levels			Total
	Below normal	Normal	Above normal	
CKD stage 3	0	16(53.3%)	14(46.7%)	30
CKD stage 4	0	18(31.0%)	40(69.0%)	58
CKD stage 5	3(4.3%)	3(4.3%)	64(91.4%)	70
CKDstage 5D	12(37.5%)	6(18.8%)	14(43.8%)	32
Total	15(7.9%)	43(22.6%)	132(69.5%)	190

Data presented as No. of patients (%)

Wireless Charging of Far-Field Wireless Sensor with Variable Duty Cycle

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Abstract- This paper shows far-field wireless powering for low-power wireless sensors. Sometimes in many applications where the sensors are used, is difficult or impossible to change the batteries of sensor unit because we don't know the exact position of the sensors or sensors are mobile. Here expected radio-frequency (RF) power densities is in the range of 20–200- $\mu\text{W}/\text{cm}^2$, overall size of sensor is small which transmit data at low duty cycles. For these type of applications low-power nondirective wireless powering is appropriate for sensors. The power is provided to the sensor platform through an antenna which receives incident electromagnetic waves in the gigahertz frequency range. This antenna gives the energy to a rectifier circuit which charges a storage device (e.g., thin-film battery) through an efficient power management circuit. The entire platform, including sensors and a low-power wireless transmitters are controlled through a low-power microcontroller. For low incident power density levels, code sign of the RF powering and the power management circuits is required for optimal performance. The power management circuitry are presented with integrated antenna rectifiers operating in the 1.96-GHz cellular and in 2.4-GHz industrial – scientific – medical (ISM) bands.

Index Terms- Rectifier, Radio frequency (RF), Rectenna, Sensor, Wireless power transmission.

I. INTRODUCTION

Over 100 years ago, wireless power transmission concept began with the ideas and demonstrations by Tesla. But Tesla was not successful at implementing his wireless power transmission systems for commercial use. In the 1920's and 1930's the experiments and researchers of Tesla's in Japan and the U.S. promoted wireless power transmission. In the 1950's the modern era of wireless power transmission began with the advancement of high-power microwave tubes by Raytheon Company, Waltham, MA. A 15-kW average power-band cross-field amplifying tube was developed in 1958, which measured overall dc-to-RF efficiency of 81%. In 1960's the first receiving device is emerged for efficient reception and rectification of microwave power. A rectifying antenna, or rectenna, was developed which consist of a half-wave dipole antenna with a balanced bridge or single semiconductor diode placed above a reflecting plane. From the 1960's through the 1970's the

conversion efficiency of the rectenna continued to increase at 2.45 GHz. Conversion efficiency is determined by the amount of microwave power that is converted into dc power by a rectenna element.

The greatest conversion efficiency ever achieved by a rectenna element in 1977 by Brown, Raytheon Company. A 90.6 % conversion efficiency was recorded using a GaAs–Pt Schottky barrier diode, with a 8W input microwave-power level. The dipole and transmission line of this rectenna element used aluminum bars for their construction. Later, a rectenna design was developed with a printed thin-film at 2.45 GHz where conversion efficiencies of 85% were achieved. In 1991 researchers at ARCO Power Technologies, Inc., Washington, DC, developed a 72% efficient rectenna element at 35 GHz to reduce the transmitting and rectenna aperture areas and increase the transmission range. However, components required for generating high power at 35 GHz are expensive and inefficient. To decrease the aperture sizes without sacrificing component efficiency, technology development at the next higher ISM band centered at 5.8 GHz. This frequency is attractive for beamed power transmission over 2.45 GHz due to smaller component sizes and a greater transmission range.

In many applications the electronic devices operate in conditions where it is difficult costly, inconvenient, or impossible to change a battery or provide wired power. Some examples are sensors for health monitoring of patients [1], [2], aircraft structural monitoring [3], [4], sensors in hazardous environments, sensors for covert operations, etc. This paper focuses on improving efficiency of providing power wirelessly to a low-power wireless sensor platform with an electrically small antenna. In this paper "Low power" refers to less than 200 $\mu\text{W}/\text{cm}^2$ of incident power density of an electromagnetic wave in the radio-frequency (RF) range of the spectrum [5].

We specifically consider frequencies that are in unlicensed industrial–science–medical (ISM) bands, such as 2.45 GHz. The codesign methodology for the power reception circuit and power management circuit is developed to achieve highest system efficiency. The block diagram is as shown in fig. 1 where both communication and powering were performed independently in the 2.45-GHz industrial-scientific-medical (ISM) band. Different frequencies can also be used, as in [10], where 5.8 GHz was used for powering and 2.45 GHz for data transmission. Previous work in this field ranges from very high power values, e.g., powering a helicopter for up to 10 h of flight with a high-power microwave beam [11] to reception of very low radio-wave power densities in the 5- $\mu\text{W}/\text{cm}^2$ range with large aperture antennas

[12]. These and other related applications, e.g., [13]–[15], were aimed at directive power beaming where a narrow-beam antenna transmits power in a well-defined direction toward the power receiving device. The antenna arrays deliver power to a single rectifier, whereas in the work presented here, there is one rectifier per antenna element.

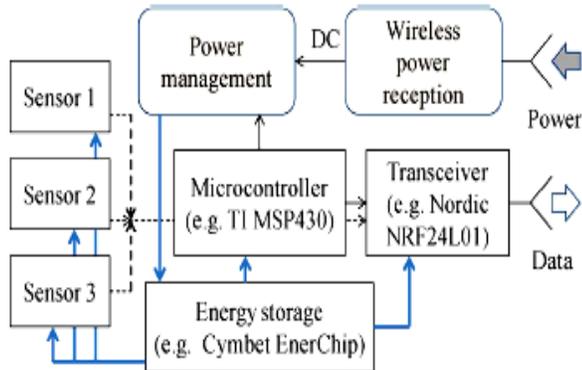


Figure 1: Block Diagram of Wireless Powering System.

As shown in the block diagram the function of antenna is to received RF power from the transmitter and provide it to the rectifier circuit. The rectifier is then rectified it i.e. to convert received RF power into DC power. The power management circuit works as a buffer between wireless power reception block and energy storage device. This circuit matches the impedance between wireless reception block and energy storage device. It receive the DC power from rectenna and provide it to the energy storage block i.e. charges the battery or capacitor available in energy storage block. The energy storage unit provides stored energy to sensor, transceiver and microcontroller unit. The function of transceiver unit is to transmit and receive the data. Here both power transmission antenna and transceiver use same frequency band i.e. 2.45 GHz ISM band. Separate frequency band can also be used. The microcontroller unit controls the operation of whole wireless powering system. It continuously check the power available in the energy storage device and power required from the power management circuit and according to that control the duty cycle of the operation and prevent the system from damaging.

Far-field powering implies plane-wave propagation between antennas at longer range. It can be done without line of sight, and is less sensitive to the orientation and position relative to the transmitting antenna. The work in this brief addresses a method for improved far-field powering efficiency at low incident power densities by the integrated design of the power reception device and the power management circuit. An antenna integrated with a rectifier is known as “rectenna” receives arbitrarily polarized radiation at one or more of the chosen frequencies at levels below $200 \mu\text{W}/\text{cm}^2$. A digitally controlled power converter manages the dc output in such a way that it always presents close to an optimal dc load to the energy storage device, which provides power to the microcontroller, sensor, and data transceiver. Data transmission is the most power-consuming task and is not continuously done. If there is not enough stored energy, the data cannot be transmitted and there is a danger of

damaging the storage device. Therefore, the available rectified RF power and the available energy stored are monitored in a closed-loop system and adjust the duty cycle of data transmission.

II. RECEPTION OF RF POWER

In the far field a plane-wave incident from a transmitter is used to deliver power remotely to the sensor. The relevant input quantity is power density S_{RF} , and the received power at the antenna terminals will be $S_{\text{RF}}A_{\text{eff}}$, where A_{eff} is the antenna effective area, usually smaller than its geometric area. Therefore, the rectified power available to be delivered to the storage element (battery or capacitor) is

$$P_{\text{DC}}(\theta, \varphi) = \eta_{\text{RF}} - \text{DC}_{(\text{PRF})} \cdot A_{\text{eff}}(\theta, \varphi) \cdot S_{\text{RF}}(\theta, \varphi)$$

where the rectification efficiency is a function of received RF power due to the nonlinearity of the rectification process. In addition, the above quantities depend on frequency, and the quantity should be integrated over all incidence angles (θ, φ) . When the diode rectifier is impedance matched to the antenna at the predicted power level since the diode impedance varies with power level then the highest rectification efficiency is obtained. The impedance for optimal rectification is not the same as that for an optimal reflection coefficient and needs to be characterized using nonlinear modeling or measurements. In the method presented here, both a nonlinear model using harmonic balance in Agilent’s ADS tool and an experimental model using a load-pull method are performed and compared. Varying RF power levels are incident on the rectifier while the RF impedance is changed with the tuner and the dc load impedance varied at a given frequency. For each RF power and dc load, contours of constant rectified dc power are measured as the RF impedance presented to the rectifying element varies from practically a short to an open one. An example of measured data for a Skyworks Schottky SMS-7630-79 diode single-ended rectifier is shown in Fig. 3 for two dc loads and constant input RF power of 0 dBm. The plots show the imaginary and real parts of the reflection coefficient of the diode referenced to a 120- Ω normalization impedance value for plotting convenience and given by:

$$\rho = (Z_{\text{rectifier}} - 120) / (Z_{\text{rectifier}} + 120).$$

The data in Fig. 2 are useful for optimizing the RF impedance presented to the diode for a given power level for the design of the RF portion of the circuit. However, in order to design the power management circuit that takes the variable rectified power and optimally charges a storage element, the data are plotted, as A photograph of the back side of a linearly Polarized patch antenna designed for the 1.96 - GHz cell phone band is shown in Fig. 3(a). The antenna and matching circuit is fabricated on a Rogers 4350b 0.762-mm-thick substrate, and the antenna patch dimensions are 38 mm \times 39 mm, with a coaxial feed 15-mm offset from the center. A Skyworks Schottky diode is connected to the antenna with a matching circuit. The antenna is simulated using Ansoft HFSS, with good agreement to measured data. Dual-polarized antennas are also possible, as shown in [10], where each diode rectifies power received in one polarization. In

a realistic outdoor multipath environment, polarization is random, thus rectifying two orthogonal polarizations independently, and adding the resulting dc power increases overall efficiency [5]. The patch antenna ground plane results in preferential radiation in the half-space above the ground, but

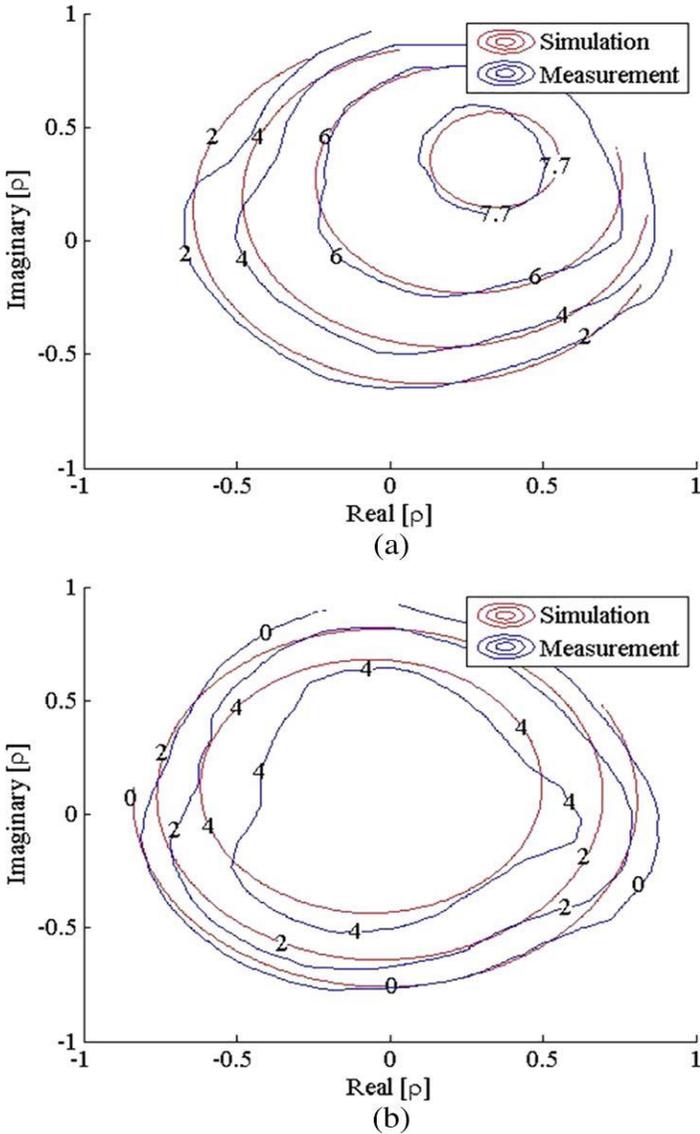


Figure 2: Measured and simulated constant dc power contours of the real and imaginary parts of the RF reflection coefficient of the diode for (a) $RL = 460 \Omega$ and (b) $RL = 60 \Omega$.

omnidirectional arrays of dipoles such as the one shown in Fig. 3(b) are also possible although not a topic of this brief.

The measurements of the integrated rectifier and antenna are performed in an anechoic chamber. The procedure for characterizing the rectenna consists of the following steps.

- 1) Calibrate power densities at the plane of the rectenna with calibrated antenna of gain G_R

$$S = P_R 4\pi / \lambda_2 G_R \quad (1)$$

- 2) Calculate RF power incident on rectenna, assuming that the effective area is equal to the geometric area of the antenna, which is an overestimate

$$P_{RF} = S \cdot AG \quad (2)$$

- 3) Measure dc power as a function of dc load resistance.

- 4) Calculate RF to dc conversion efficiency, which will be an underestimate

$$\eta_{RF-DC} = P_{DC(RL)} / P_{RF} \quad (3)$$

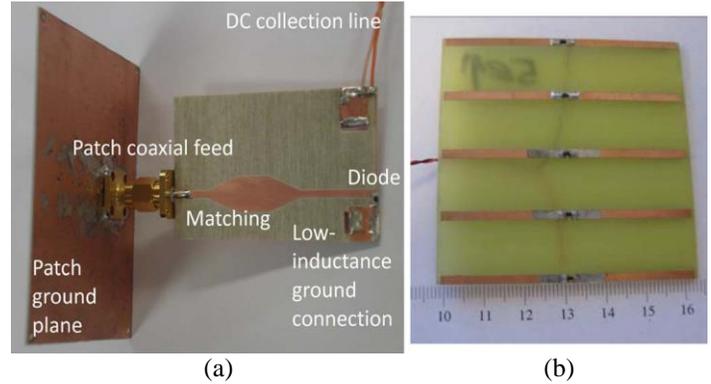


Figure 3: (Left) Photograph of a 1.96-GHz linearly polarized patch antenna with a diode connected through a microstrip matching circuit.

When quantifying rectenna efficiency for aperture-type antennas such as a patch, the total input RF power is not easy to quantify from either measurements or simulations in a free space situation. While the antenna gain, and thus effective area, can be easily found from full-wave electromagnetic simulations, the rectifier loading is not taken into account and the gain is usually calculated for a $50\text{-}\Omega$ feed impedance value. Care must be taken when calculating the RF-to-dc conversion efficiency of rectennas since P_{DC} is a function of antenna gain.

III. ANTENNA DESIGN

The design of the proposed antenna and its parameters are depicted in Fig. 4. The parameters of the antenna were obtained using finite element commercial software [16]. The square patch antenna ($A = 33.6 \text{ mm}$) is printed on a 3.175-mm-thick Duroid 5880 ($\epsilon_r = 2.2$) top substrate. The single microstrip feeding line is printed on a 1.524-mm-thick Arlon 25 N ($\epsilon_r = 3.38$) substrate at the backside of the antenna. The crossed slots etched on the ground plane are accurately centered below the radiating element. Four coupling points localized between the patch antenna and the microstrip feed line and are serially fed by the microstrip feeding line. Due to the quarter-wavelength distance between the coupling points, a 90 phase difference appears.

The antenna is fed on Port 2. At a given time, the opposed coupling points on Slot 2 have a peak of magnetic excitation current in phase while the opposed coupling points on Slot 1 have a null of magnetic current. After a quarter-period, the excitation currents are totally inverted. Opposed coupling points have a null of magnetic current on Slot 2 and are maximum on Slot 1. This provides two linear perpendicular polarizations with a phase difference of 90. The polarization emitted by the antenna

is then LHCP. The sense of the polarization is achieved by selecting one of the two excitation points, terminating the other with a 50-ohm resistive load. The RHCP is obtained if the excitation point is located on Port 1.

The antenna is first designed separately from the rectifying circuit. Due to the superimposed layers of the antenna, an air gap of 120 μm above the ground plane has been taken into account in simulations. The DCP antenna is fed using a 50-ohm characteristic

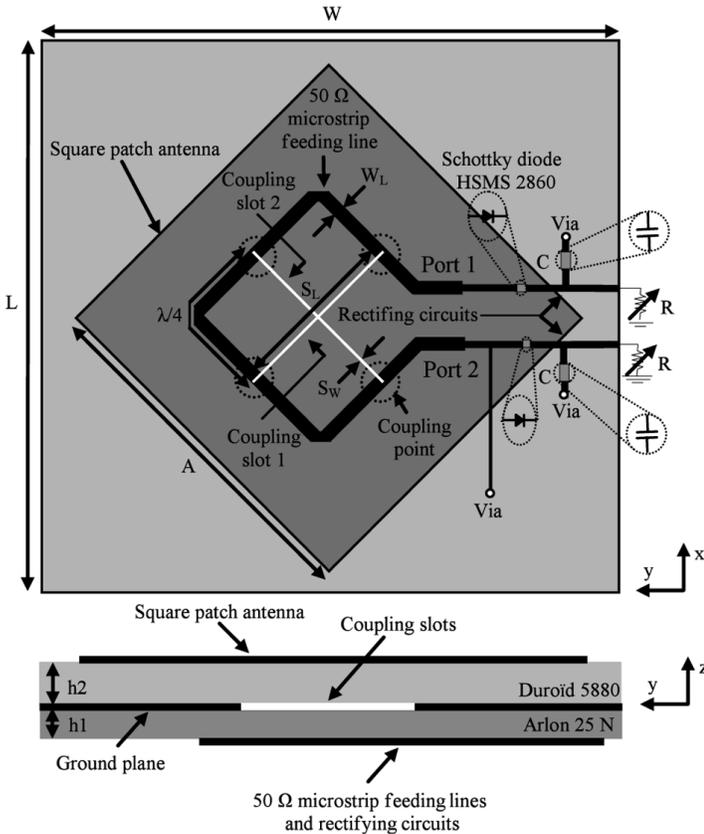


Figure 4: Layout of the DCP Rectenna.

impedance microstrip line. The measured CP antenna gain is 5.7 dB at 2.45 GHz when the RF generator is connected on Port 2. In this configuration, numerical simulations give 6.8 dB LHCP gain and -25.24 dB RHCP gain. The LHCP gain is here significantly higher than the RHCP one and then confirms the sense of the polarization emitted by the antenna. At 4.9 GHz, the simulated LHCP gain is -10.14 dB. The measured isolation between feeding ports is -20 dB, assuming that both accesses are correctly isolated.

The DCP has good circular polarization characteristics in a large range of elevation angles. This property is particularly attractive and can enhance the efficiency of the rectenna in the case of recycling ambient RF energy with arbitrary polarized radiations and angle of incidences. Radiations patterns have been measured in an anechoic chamber at 2.45 GHz in the xz plane with a linearly polarized horn antenna as an emitter. Due to the circular polarization properties, copolar and cross-polar components have nearly the same level. They exhibit a measured difference of 0.7 dB at its broadside.

IV. DESIGN OF RECTIFIER

A study of different rectifier designs is done and the voltage doubler rectifier configuration is chosen [17]. Fig. 5 and fig .6 shows the conventional voltage doubling rectification circuit and the proposed floating-gate rectification circuit. For the floating-gate rectification circuit, floating-gate devices are used to create a gate-source bias to reduce the threshold voltage loss of the MOS transistor.

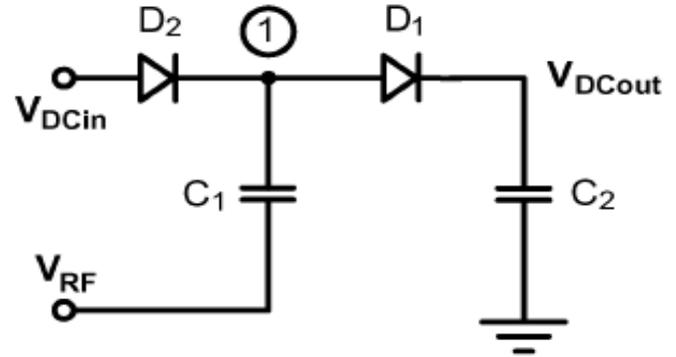


Figure 5: Conventional Voltage Doubler Rectifier.

A. Conventional Voltage Doubler Rectifier

The voltage doubler rectifier structure is considered for the design of the RF-DC power conversion system because it rectifies the full-wave peak-to-peak voltage of the incoming RF signal and it can be arranged in cascade to increase the output voltage. The voltage doubler rectifier in Fig. 5 consists of a peak rectifier formed by D_1 and C_2 and a voltage clamp formed by D_2 and C_1 . The voltage clamp and the peak rectifier are arranged in cascade configuration to provide a passive level shift in voltage before rectification. In the negative phase of the input, current flows through diode D_2 while D_1 is cutoff. The voltage across diode D_2 stays constant around its threshold voltage and the voltage at node 1 is charged to V_{th2} . At the negative peak, the voltage across capacitor C_1 is $V_{amp} - V_{th2}$ (where V_{amp} is the amplitude of the input signal.) In the positive phase of the input, current flows through diode D_1 while D_2 is in cutoff. The voltage across capacitor C_1 remains the same as the previous phase because it has no way to discharge. At the positive peak, the voltage across D_2 is $2V_{amp} - V_{th2}$. Since D_1 is conducting current to charge C_2 , the voltage at the output is a threshold voltage below that across D_2 , i.e., the voltage at the output V_{out} is $2V_{amp} - V_{th2} - V_{th1}$.

B. Floating-Gate Voltage Doubler Rectifier

The floating gate devices may be designed to passively reduce the threshold voltage of the rectifier circuit. In a floating gate device, when charge is injected into the floating gate of the transistor, it remains in the gate oxide because of the high impedance provided by the oxide layer. There are previous methods designed to compensate for the threshold voltage drop in voltage rectification circuits [18], [20]. The threshold reduction method shown in [18] requires the input voltage to be

sufficiently large to start up the circuit. This method also requires a bias resistor R_b which generally has resistance in the megaohm range (i.e., large physical size). Although the static power dissipated from this resistor is minimal, it causes a bias voltage much less than the desired threshold voltage. The voltage drop across a diode tied transistor under 10 nA bias is much different than one drawing 10 A of current, this voltage difference is typically 100 mV for every decade of current difference, yielding an effective threshold of a few hundred millivolts. The threshold reduction technique in [19] suffers from the same constraint, as it

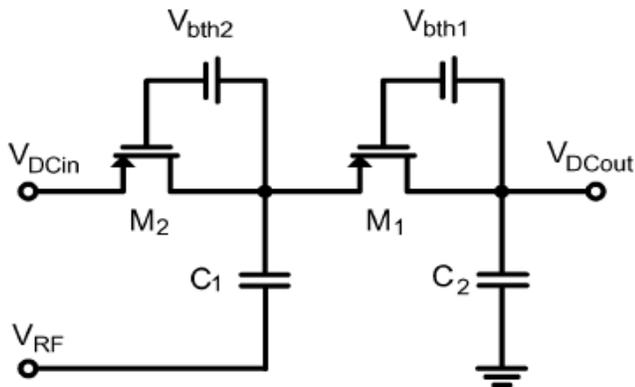


Figure 6: PMOS Floating-Gate Rectifier.

uses diode-tied transistors biased at 2 nA to generate bias voltages for diode-tied transistors drawing current in the microamp range. This method would also require extra circuitry to generate a voltage bias and differential clock which requires a secondary battery. Zero-threshold transistors may also be used for voltage rectification but they only have zero threshold for a small current range. The floating-gate rectifier technique allows the threshold of the rectifier circuits to be programmed and can be optimized to operate over a wide range of currents. For the floating-gate rectifier circuit, the overall rectifier architecture is the same as the voltage doubler rectifier circuit. The diodes D_1 and D_2 are replaced by diode-tied floating gate transistors. The gate oxide is a very good insulator which keeps the charge from leaking off in the floating gate [21]. To design a floating gate device in a standard CMOS process, a MOS capacitor is placed in series with the gate of the diode tied transistor as shown in Fig. 6. The gate of the diode-tied transistor and the gate of the MOS capacitor are connected together to form a high-impedance node to trap charges in the floating gate. The charge in the floating gate is therefore fixed which results in a fixed voltage bias across the MOS capacitor. The charges that are trapped inside the floating gate device act as a gate-source bias to passively reduce the effective threshold voltage of the transistor.

The floating-gate devices need to be initially programmed to reduce the threshold voltage of the rectifier, thus enhancing the power conversion efficiency. The charge on the floating gate can be injected via Fowler – Nordheim (F-N) tunneling when the rectifier is not operating, or it can be charged by injecting a relatively large sinusoidal signal to the input of the rectifier at any time. The F-N tunneling technique charges the floating gate to the desired voltage much faster, but the amount of charge is harder to control and also, additional circuitry is needed to inject

or remove charge from the floating gate. Similar to programming a non-volatile Flash EEPROM, the programming node is driven by a high-voltage pulse to force a sharp bend in the energy band diagram of the floating-gate device. This enables charge to enter the insulated floating-gate by means other than the mechanism of F-N tunneling. The applied programming sinusoidal input voltage has amplitude larger than the threshold voltage of the transistor used for rectification. Charge is injected into the floating gate via the parasitic capacitance between the gate-source and gate-drain junction of the transistor and by hot electron effects. The large sinusoidal signal is externally generated and applied directly to the input of the rectifier until the output reaches an optimal point. If the floating-gate node is over charged, a negatively biased sinusoidal wave may bring it back to the optimal point. The sinusoidal signal can be applied in pulses with peak voltages between 5–6 V with 2.5–3.0 V DC bias or by a continuous train of signals at lower voltages and bias, depending on the duration of the pulse train. The programming pulse does not need to be sinusoidal, but as the pulse is applied to the input node which is high, the pulse will be transformed to more of a sinusoidal signal. By applying a sinusoidal signal, the amplitude of the applied pulse can be better controlled. In this work, all floating-gate programming nodes are capacitively coupled and can be programmed simultaneously from the same programming pin, with all other circuitry grounded, via a F-N tunneling technique, and by the application of the sinusoidal signal at the input nodes when the rectifier is operating. The floating-gate rectifier is programmed with iterations of 20 pulses with a 5 ms trigger, 5 V amplitude and 2.5 V DC offset and repeated until the output voltage is at the maximum point for a wide range of currents. If the floating - gate is over charged, 10 deprogramming pulses with 5 ms trigger time, - 6 V and - 3.0 V DC offset are injected at the programming node to recover charge on the floating-gates.

With the floating-gate device, the threshold voltages of the diode-tied transistors M_1 and M_2 are reduced by creating a gate-source bias. The gates of transistors M_1 and M_2 in Fig. 6 are high-impedance nodes so any charge trapped in the floating gates can be retained for a long time. Retaining charge in floating-gate devices is critical to the useful lifetime for the power conversion circuit under discussion. With the 70 angstrom oxide thickness in the 0.25 μ m CMOS process, the device retains charge in the floating gate in excess of 10 years for normal operation at room temperature [22]. However, the performance of the rectifier circuit may reduce slightly as charge is leaked from the floating gate. During fabrication, the residual charge trapped in the floating gate may also affect the threshold voltage of the rectifier circuit, hence the floating gate must be programmed to account for these residual charges. Removal of residual charge may be done initially with the F-N tunneling method, which is a high-voltage pulse applied to a separate control gate of the floating-gate device.

V. POWER MANAGEMENT CIRCUIT

The purpose of the power management circuit is to act as a buffer between the rectenna power source and the energy storage

device to act as an ideal buffer in the harvesting application, the converter must perform three functions:-

- 1) create at its input port the optimal impedance match to maximize the rectenna efficiency η_R over the full range of incident power densities $P_{R\text{Finc}}$.
- 2) Transfer the harvested energy with ideally no loss to the energy storage element over the full range of rectenna output voltages V_{dc} and energy storage charge states.
- 3) monitor the energy storage and provide charge control and protection as appropriate for the energy storage used (battery or capacitor). Since the efficiency of the rectenna depends on the matching behavior of the converter, and the efficiency of the converter depends on the operating conditions of the rectenna

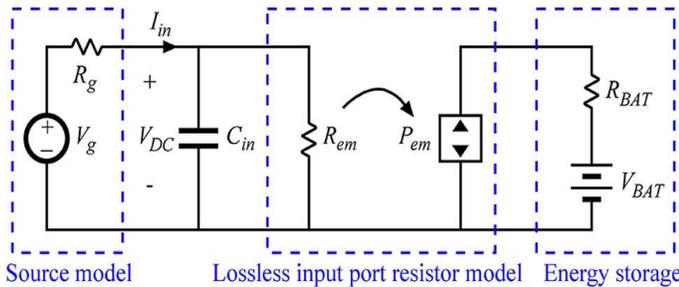


Figure 7: Ideal Lossless Input Port Resistor Model of the Power Converter.

and the energy storage device, it is best to codesign these blocks for the given application and expected condition.

A. Matching to the Rectenna

The first function of the converter is to maximize the rectenna efficiency by creating a converter input port that emulates the optimal load impedance of the rectenna. To provide a measure of the converter performance in this area, it is useful to define a matching efficiency η_M as :-

$$\eta_M = \frac{P_{R,dc}}{P_{R,dc,max}}$$

where $P_{R,dc,max}$ is the rectenna dc output power with an optimal load. The filter integrated in the rectenna creates a dc port and reduces the rectenna model from the perspective of the power converter to a Thevenin equivalent, and the rectenna output impedance reduces to an equivalent resistance. Thus, the optimal load to the rectenna is a dc resistance, apparent in the measurement results, where the load value at maximum rectified power is about 300 W over a wide range of incident power densities. The ideal converter behavior is depicted in Fig.7 The converter is modeled with an input port that emulates a resistor R_{em} and an output port that transfers all of the power from the input port to the energy storage device, shown as a battery model. This behavior is similar to that commonly used in power converters for alternating current/direct current (ac–dc) power conversion with power factor correction (PFC), although the PFC goal and the high voltage and power levels in those applications are entirely different from the harvesting application.

The challenge in the low-power harvesting application is to perform the behavior of with minimal control circuit overhead so

that the control losses can be kept small when compared to the power being processed. This rules out many of the advanced control circuits and techniques commonly applied at higher power levels. A boost converter is selected to provide the required step up from typical rectenna voltages of tens to hundreds of millivolts to typical battery voltages, from 2 to 4 V.

B. Boost Converter as A Resistor Emulator

The technique applied in fig.8 is to operate a boost converter as an open-loop resistor emulator, thus allowing the converter to naturally track the rectenna MPP, $P_{rect_out_max}$, with very little control overhead. Once the converter has been tuned to match the optimal load resistance for the rectenna, maximum power can be harvested $P_{rect_out_max} \approx P_{rect_out}$ over a wide range of incident RF power densities S_{RF} without modifying the converter behavior. The initial tuning operation to set the converter emulated

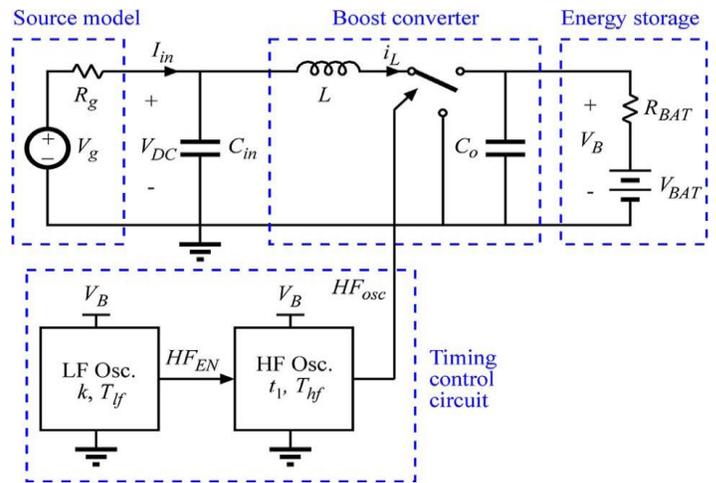


Figure 8: Boost Converter Implementation

resistance could be performed once in the manufacturing process or as an infrequent recalibration procedure. The choice of parameter settings for the given converter is based on the expected range of input power levels, desired emulated resistance, and output voltage. A power converter design example is given here together with details on each of the major design steps for providing an interface between the patch rectenna of with output characteristics shown and a 4.2-V thin-film battery.

C. Selection of Control Component

To control the converter, an HF oscillator and an LF oscillator are used with emphasis on the selection of components with the lowest power consumption. The HF resistor-set oscillator (LTC6906) has a fixed duty cycle (50%). This duty cycle ensures DCM operation for $V_o/V_{in} > 2$. When powered on at the beginning of each LF period, there is a settling time t_{settle} before the output of the oscillator is enabled. This output drives the MOSFET in the converter. Therefore, adjusting the frequency $1/T_{hf}$, changes the value $t_1 = T_{hf} / 2$ of and thus the emulated resistance seen by the input source. The power consumption of the LTC6906 HF oscillator is the value used as P_{PWM} in the

power loss calculations. To perform the pulsing operation of the converter, a LF oscillator is built around a low power comparator (LMC7215). This oscillator has an adjustable positive duty cycle D_{lf} that affects the k parameter. The HF oscillator is directly powered from the LF oscillator output. Given a converter input power level, changes in power loss are calculated and are swept over a range of values and is solved for so that the approximate desired $R_{em} = 750 \text{ ohm}$ is achieved. After these simulations are run at different power levels, the converter efficiency $\eta_{converter}$ is analyzed as a function of t_1 and L . Next, the calculations are rerun with the fixed L to select the appropriate t_1 . The value of k is then determined by the desired R_{em} . The selection is optimized for the lower power levels due to the emphasis of this work on demonstrating RF energy harvesting at very low S_{RF} . Parameters t_1 and k are chosen to be 18 s and 0.06, respectively. The key to achieving a good match to the rectenna is found in the timing control circuit and the resulting inductor current waveform i_L . The boost converter operates by transferring energy through the inductor L , and as a result, the low-frequency behavior of the input and output ports is determined by averaging current waveforms. As shown in Fig. 9. two types of waveforms can be generated. In both waveforms, the converter is run in a pulsed mode, where multiple high-frequency periods T_{hf} are repeated consecutively, then the converter is turned off with no gating signals for a percentage k of a low-frequency period T_{lf} . The sequence is then repeated every low-frequency period T_{lf} . Fig. 3.9 (a) shows a discontinuous conduction mode (DCM) waveform with a fixed T_{hf} and a third time interval t_3 where there is no current in the inductor. It is Shown the DCM mode results in an input port emulated resistance of :-

$$R_{em,DCM} = 2.L.T_{hf}.(M-1) / t_1^2 . k .M$$

Where M is the ratio between the output and input voltages of the converter $M = V_B / V_{dc}$. Thus, the averaged or low frequency model of the boost converter in DCM is an emulated resistance R_{em} given by above equation, and the resistance value is controlled by the timing control circuit parameters t_1 , k , and T_{hf} . These parameters can be selected to optimize efficiency over a desired range of voltages and power levels. Fig. 3.9 (b) shows a critical conduction mode (CRM) waveform, where period T_{hf} is defined by the zero crossing of i_L and there is no t_3 . The emulated resistance in CRM is given by :-

$$R_{em,CRM} = 2. L / t_1. k$$

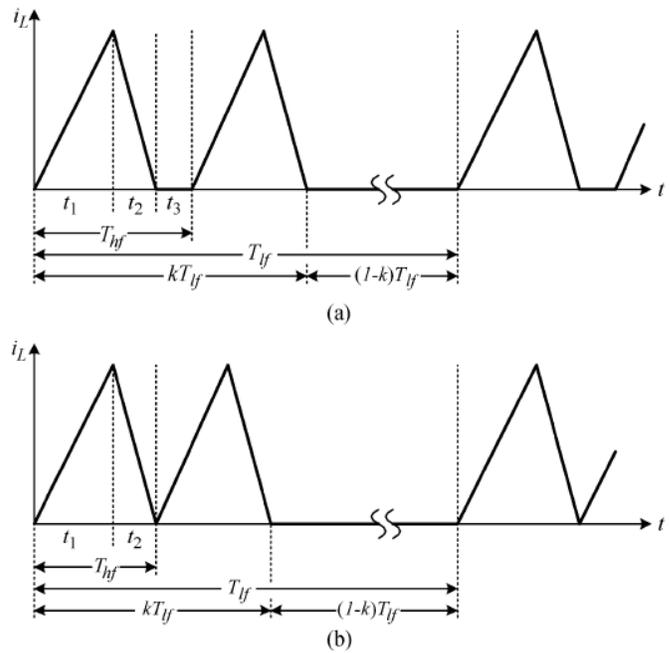


Figure 9: Inductor Current i_L Waveforms of the Power Converter for Two Operating Modes: (a) DCM and (b) CRM.

Two important results in above equation are that the emulated resistance is independent of the input and output voltages and it can be shown that with no t_3 interval the converter operation is more efficient. However, CRM operation requires either active inductor current sensing or prediction of time t_2 , both of which require additional timing control overhead.

VI. CONCLUSION

A rectenna design and optimization methodology utilizing reciprocity theory and combining EM simulation and harmonic balance is proposed. The Thevenin equivalent circuit parameters of the rectenna in the receiving mode are efficiently computed from EM simulation of the antenna in the transmit mode. A compact dual-polarized aperture-coupled patch rectenna was designed, able to receive arbitrarily polarized signals by combining the dc output from two voltage doublers connected at two orthogonal polarizations.

Low-power RF rectennas are shown to exhibit maximum power points at near constant optimal dc load resistance over a decade of output power. A boost converter topology operating in open-loop fixed-frequency DCM is used to achieve near constant emulated resistance with simple open-loop control based on low-power timing circuits. The converter control variables are selected based on a detailed efficiency analysis to minimize power losses and achieve the desired emulated resistance. The proposed resistor emulation approach to low-power energy harvesting provides a simple solution for maximizing output power in harvesting applications with variable source power.

Microcontroller and other discrete components can be used to construct a smart power converter capable of extracting near maximum power from a rectenna. The design can also be easily scaled to different power levels by changing the size of the rectenna array. High conversion efficiency will be maintained due to the adaptive optimization algorithms. A rectenna emulator

circuit was designed to show how the developed low – frequency model can be used to emulate any rectenna design as well as in testing and debugging power management circuitry.

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Case Report: Cystic Hygroma in an Adult, a Dilemma of Difficult Intubation

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Abstract- Cystic hygroma is benign tumor usually present in the neonate or in early infancy. Swelling usually occurs in neck and may involve the parotid, submandibular area, tongue and floor of mouth. It is a common condition in pediatric age group. But very rare in adult patients^[1]. Cystic hygroma is a real challenge to the anesthetic in regard to airway management when presents in cervical region because tumor can extent from mouth to thoracic region^[2]. Huge neck swelling revealed a dilemma of difficult intubation, but all neck swelling are not always difficult to intubate. In our both the cases the swelling was huge but we have intubated under general anesthesia with the help of mackintosh laryngoscope.

Index Terms- Cystic hygroma, neck swelling, intubation, general anesthesia.

I. CASE REPORT

A Case no. 1

A 60 yrs. male presented to general surgery department in King George Medical University, Lucknow, with chief complain of swelling in the neck since 10 years initially it was approximately 2x2 cm in size which suddenly increase to present size 15 x 14 cm within 5 month of duration. Swelling was extending mandible to sternum. Patient had no complained of respiratory distress & difficulty in swallowing. Patients did not give any history of upper respiratory tract infection or trauma. On examination margins of swelling were well define, swelling was mobile non tender, non-pulsatile, non-compressible, cystic in consistency, fluctuant. Tans illumination test was positive and there was no bruit on auscultation. There was no tracheal deviation and venous engorgement. Patient was admitted to general surgery ward and proper workup was done. Thyroid functions were normal. USG, CT Scan, MRI, Aspiration of cystic fluid done and send for histo-pathological examination. X-chest and neck was normal. CT scan showed normal placed thyroid gland with cystic mass in front of neck. X-ray chest and neck, CT scan chest and neck showed no mediastinal extension and tracheal compression. Cystic hygroma was confirmed and planned for surgical excision.

Pre anesthetic checkup was done. Airway was assessed. Mallampatti grade was I. extension of neck was 30°, flexion of neck was not fully possible, sternal distance cannot be assessed. Indirect laryngoscopy was done showing mobile vocal cords. Informed written and oral consent was taken. Next day patient was transfer to operation theater. A trolley for anticipated

difficult intubation was prepared, expert anesthetic was present in the operation theater was present, surgeon was also present. All ASA monitors were attached. Patient was pre medicated with 0.2 mg Glycopyrrolate, 1 mg Medazolam, 50 mcg Fentanyl was given. Patient was induced with inj. Propofol. After giving propofol bag and mask ventilation was possible. Inj. Succinyl choline was given with the help of mackintosh laryngoscope we have successfully intubated the patient. ET Tube was confirm with EtCO₂ and auscultation method inj. Vecuronium was given ET tube was secured; patient was maintained on oxygen nitrous and isoflurane. After excision intra operative period was uneventful patient was reversed with neostigmine and Glycopyrrolate. Patient was successfully extubated and shifted to post-operative care unit and observed for 24 hours. Surgical Excision was performed successfully histopathology revealed cystic lymphangioma. Post-operative period was uneventful.



Fig.1: A huge neck swelling

Case report-2

A 22 years old female patient presented with an asymptomatic swelling involving left site of neck for since five & half month reported in general surgery department of King George's Medical University, Lucknow, India. Swelling was small in size initially swelling was small in size, which gradually increased to size of 11cm x 13cm extended from submandibular area to clavicle of left side. There was no previous history of

upper respiratory tract infection or trauma. All margins were well defined, swelling was non tender, mobile, non-pulsatile, cystic in consistency, non-compressible, fluctuant. Trans-illumination test was positive and no bruit was on auscultation. No tracheal deviation and venous engorgement. There was no history of respiratory distress and dysphagia. Patient was admitted to hospital and workup of patient was done, an ultra sound scan was carried out which revealed a septated cystic swelling, multi-loculated of 6cm x 3cm in size in whole length of left sternocleidomastoid muscle, CT scan was done showed no tracheal deviation mediastinal extension, MRI of neck was done, which revealed a 11.5cm x 13.7cm mass, margin for smooth, extending from root of neck to submandibular gland deep to left sternocleidomastoid muscle, and lateral to major arteries and veins of neck. Fine needle aspiration cytology revealed clear lymphoid fluid. X- ray chest showed no tracheal deviation , constrictionandmediastinal extension. CT scan showed no tracheal deviation. Cystic hygroma was diagnosis patient was planned for surgical excision.

II. ANESTHETIC MANAGEMENT

Pre anesthetic checkup was done patients mouth opening was 3 fingers. Mallapatti grade was I, neck extension was 90 degree flexion was 18 degree. Sterno mental distance was 12.5 cm. indirect laryngoscopy was done, showed mobile vocal cords USG, CT Scan, MRI does not showed any tracheal deviation, tracheal compression, mediastinal extension. In the operation theatre all monitors were attached and trolley for anticipated difficult intubation was prepared, Patient was pre oxygenated with 100% oxygen for 3 minutes. Patient was pre medicated with 0.2 mg glycopyrolate, 50 mcg fentanyl, and 1 mg midazolam. Inj propofol was given ventilation was possible with bag and mask, sch was given 50mg .laryngoscopy was done; Patient was incubated without any difficulty with the help of Mc coy no.3 laryngoscope blade. Patient was maintained on oxygen and nitrous oxide, and vecuronium. After surgery patient was extubated after reversal with neostigmine and glycopyrolate. Patient was shifted post-operative care unit and observed for post-operative complications. Patient has recovered fully without any post-operative complication. After 24 hour patient was shifted to general surgery ward.



Fig. 2: A large swelling in neck region



Fig 3: X-ray neck showing no tracheal compression



Fig.4: CT scan showing large cystic swelling showing fluid inside it



Fig.5: Huge Cyst after excision
DISCUSSION

Cystic hygroma is a benign congenital malformation of the lymphatic system which occur as a result of sequestration or obstruction of developing lymph vessels. This condition is approximately 50-60% appear before the end of 1st year of life, & 80-90% before the end of 2nd year of life^[2, 3]. Cystic hygroma is a one of the deferential diagnosis of swelling in neck commonly well recognized in pediatric age group patient^[5]. But it is a very rare condition seen in adults & uncommon deferential diagnosis of swelling in neck in adulthood. As sac has no communication with lymphatic by the time swelling appears, the lymph is absorbed and is replace by thin watery fluid (mucus) secreted by endothelium hence it is called hydrocoele of neck.

Differential diagnosis of cervical masses are like Inclusion cyst (sublingual and submandibular salivary cysts), thyroglossal duct cyst, congenital vascular malformation, branchial cleft cyst, cystic hygroma, laryngocele, teratoma bronchogenic cyst., bacterial lymphadenitis, mycobacteria tuberculosis, viral lymphadenitis, haemangioma, lymphangioma, thyroid nodule or goiter, parathyroid adenoma, lipoma, fibroma, neurofibroma, sebaceous cyst, aneurysm, salivary gland tumor, metastatic carcinoma, sarcoma, or melanoma in a lymph node, lymphoma, carotid body tumor, glomus jugular tumor, soft tissue, bone, or cartilage sarcoma, primary major salivary gland tumor, malignant melanoma, adnexal carcinoma of the skin, thyroid cancer, parathyroid cancer, direct extension of a head and neck neoplasm into the neck, histiocytosis/plasmocytoma, Carcinoid^[6]

Cystic hygroma is soft, cystic, fluctuant, partially compressible swelling. Lymphangioma is a multilocular swelling consisting aggregation of multiple cysts. These cysts may intercommunicate and sometimes may insinuate between muscle planes, hence it gives the sign of compressibility. However complete reducibility is not a feature. The swelling is brilliantly trans illuminant because it contains clear fluid. Due to infiltrative nature, it may extend to anterior part of neck, cross the midline, may reach in check, mediastinum, axilla and rarely involve brachial plexuses, recurrent laryngeal nerve^[7, 8].

Surgical excision is the treatment of choice. All loculi or cysts should be removed. Careful search has to be made for extension of lymphangioma through the muscle planes so as to avoid recurrence. Surgical sequels are incomplete excision, neural injury persistent lymph odema, lymphocele, lymphorrhoea^[9,10] Sclerotherapy was being used earlier but tissue planes are distorted. Thus injection is not favored at present^[11, 12]. Aspiration of hygromas is useful only to decompress when they are compromising the airway. Lymphangiomas are radio resistant so radiation therapy is avoided.

Cystic hygroma is a challenge to an anesthetic because it can extend from mouth to mediastinum because of this airway management and post-operative period is difficult to manage. Post operatively patient can present with respiratory distress. So to avoid complications a proper pre anesthetic checkup, airway assessment, arrangement of difficult airway cart should be done. An expert anesthetic, surgeon should be present inside the operation theater at the time of intubation. A planned program for intubation should be prepared. Vigilant monitoring during intra op and post-op should be done.^[2]

Pre operatively history and examination for respiratory distress cough tachypnea retraction inspiratory or expiratory stridor should be ruled out. Inspiratory stridor is due to

supraglottic obstruction and expiratory stridor is due to sub glotic or intra thoracic obstruction, size and extend of neck mass should be carefully define intra thoracic extension should be ruled out with the help of X-ray and CT scan. Pre operatively a written and informed consent should be taken and risks should be discuses with the patient^[2].

Proper airway assessment should be done. mouth opening should be at least II large finger breadths in adults, nasal patency should be check, teeth should be examine, temporal mandibular joint should be examine for any restricted movements, thyromental length should be more than 6 cm, mallampatti grade are usually associated with easy intubation. Any sign for difficult ventilation should be recognize like presence of beard lack of teeth, history of snoring should be rule out, atlanto-occipital joint extension should be measure, >35° is normal, sternomental distance <12 cm is associated with difficult intubation inter-incisor distance <3.8 cm predicts difficult airway. Lateral cervical x-ray, cervical film is needed with head in neutral position for effective madibular length atlanto-occipital gap, anterior and posterior depth of the mandible, C1-C2 gap. Fluoroscopy for cord mobility, tracheomalacia, UGS for assessment of anterior mediasternal mass, deferential diagnosis of mass, cyst in neck, abscess, lymphadenopathy, cellulitis, CT scan and MRI for any congenital anomalies, vascular airway compression, video optical intubation stylets for proper visualization of glottis and aids in intubation^[2].

Difficult airway cart should be available full range of nasal and oral airways, laryngeal mask airways laryngoscope, cricothyrotomy kit should be available, an expert anesthetic should be present inside the OT at the time of induction for help. A surgeon should be present at the time of induction for tracheostomy if needed. Pre medication with glycoparrolate in a dose of 0.005 – 0.01 mg/kg/body weight should be given for drying the secretion^[17].

Awake intubation should be planned if difficult airway is assessed. The principle behind is safe induction of anesthesia and maintenance of spontaneous ventilation if difficult airway is predicted, tracheostomy is always difficult to performed and troublesome if performed in emergency. Fiber optic is first choice for intubation, it can be performed via oral or nasal route with or without help of oral, nasopharyngeal or laryngeal mask airway, if fiber optic is not available awake blind intubation is preferred. For emergency Cricothyrotomy or tracheostomy should be prepared^[17].

Although in our case, there was a huge neck swelling, which is an indication of difficult intubation. In our case, all other parameters of airway assessment for laryngoscopy and intubation were normal. There was no tracheal compression, tracheal deviation and mediastinal extension. The swelling was filled with fluid which was not causing any tracheal compression. We have decided to intubate this patient under general anesthesia with full preparation of difficult airway management. We have successfully intubated both the patients under general anesthesia with McIntosh laryngoscope. Intra operative period and post-operative period was uneventful. Patients fully recovered and discharged.

III. CONCLUSION

Cystic hygroma is a rare lesion in adulthood. It is a great challenge to anesthesiologist. For proper management and to avoid complications proper pre-operative evaluation, informed consent, proper workup should be done. To avoid morbidity and mortality proper airway management with the help of experienced anesthesiologist should be done. Difficult airway cart should be ready; surgeon should be available for emergency tracheostomy. Cystic hygroma when presenting as a large neck swelling is not always difficult to intubate. It is a dilemma of difficult intubation when presenting as a large swelling.

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Collaborative E- Learning Algorithm for Domain Knowledge Acquisition using Unbiased Matching

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Abstract- The need to acquire domain knowledge at a fast pace cannot be overemphasized. Domain knowledge acquisition is not limited to any particular field, but rather, is a requisite path to giant strides in the sciences, technology and academics. Apart from being a major goal at all levels of academics, knowledge acquisition is inevitable in some fields of computing such as Artificial Intelligence and Expert Systems, where system construction is hinged on the ability of the system developers to elicit knowledge from the domain experts. Collaborative e-learning is a positive deviation from the traditional learning paradigm, in that knowledge is shared between the participants, through information technology. However, one of the challenges of collaborative learning is how to organize the team of learners, so as to maximize the learning impacts. Another important issue is, how to devise empirical strategies, for measuring the impact of e-learning methodologies. This work proposes a collaborative e-learning algorithm called the Community Bi-Partition Learning Model (CBLM). The algorithm applies a computational technique known as unbiased matching, to partition a learning community in order to speed up the process of knowledge acquisition. A validation approach for measuring the impact of the e-learning algorithm is also presented.

Index Terms- Collaborative e-Learning, Community Bi-Partition, Domain Knowledge, Knowledge Acquisition.

I. INTRODUCTION

According to [1], the illiterates of the 21st century are not those who cannot read and write, but those who cannot learn, unlearn, and relearn. Advancements in information and communication technology have caused a paradigm shift in the way knowledge is acquired or shared. A lot of research and industrial interests are increasingly focusing on such knowledge concepts as collective intelligence, collaborative learning, and so on. No wonder, Wikipedia could create the world's largest knowledge reservoirs from thousands of collective contributors worldwide [2]. The work being presented here is a collaborative e-learning algorithm for fast tracking domain knowledge acquisition. Though it was experimented on Project Management as a knowledge domain with a learning community of minimal size, this model is expected to work for a larger community, in diverse fields of learning.

E-learning is defined by [3], as the use of information and computer technologies to create learning experiences. Some of the common e-learning strategies enumerated by [3] are standalone courses, virtual-classroom courses, learning games and simulations, embedded e-learning, blended learning, mobile learning, and knowledge management. A number of researchers have identified some problems related to e-learning. The necessity for improved peer-to-peer learner-matching in a collaborative learning environment was emphasized by [4]. Another issue of importance raised by [5] is how to measure the value of e-learning experience using information technology. This paper tries to tackle these issues using community bi-partition, based on unbiased matching.

II. THE PROPOSED ALGORITHM

The Community Bi-Partition Learning Model (CBLM) is designed with the view of enhancing the process of domain knowledge acquisition through collaborative e-learning. The algorithm aims to increase the overall learning pace of a knowledge seeking community. The impact of a learning system is measured in terms of its ability to spread domain knowledge to an increased population of a learning community, at the shortest possible time. Like other collaborative learning systems, this model encourages knowledge sharing, which is an inevitable strategy for passing knowledge from the 'more knowledgeable' to the 'less knowledgeable' members of a learning community. For the sake of clarity, some relevant definitions will be presented here.

A *community* is a group of people interacting, in order to achieve a common goal [7]. A *learning community* is therefore, a group of people who have come together to learn, so as to acquire a particular domain knowledge. It is necessary to mention that a community could interact physically, or online. For instance, a group of selected employees of an organization participating in management training, or a group of undergraduates on excursion training, are both examples of a learning community.

The term is also used interchangeably with 'knowledge seeking community'. A *learner* is any member of a learning community. The term *graduation* depicts the completion of the learning process. In other words, graduation is the point where the participants are believed to have acquired the domain knowledge. The essence of learning as summarized in the block diagram in Fig 1, is therefore to transform a knowledge seeking community into a knowledgeable (graduate) community.

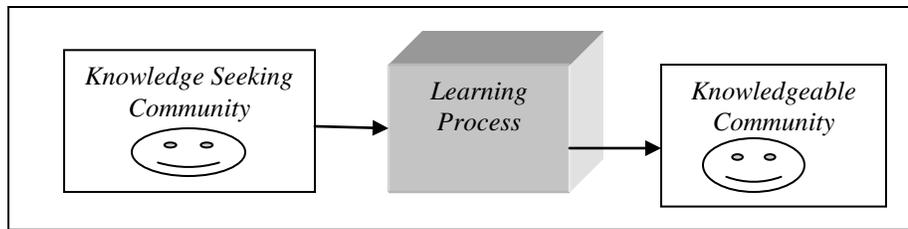


Figure 1: Block Diagram for the Essence of Learning

The *population* of a learning community is the total number of learners enrolled into the learning process. *Domain knowledge* [8] is the knowledge related to a particular niche area. For instance, a learning community may delve into the study of Aircraft Engineering, Tropical Infectious Diseases, Banking Operations, Linear Algebra, and so on. The term *homogenous* refers to a community that is in its natural form. On the contrary, a *partitioned community* is one that has been partitioned [9], using a requisite *bi-partition algorithm*. Such an algorithm breaks the learning community into two partitions - the more knowledgeable (*MK*) set and the less knowledgeable (*LK*) set respectively. After bi-partition, a computational technique called *unbiased matching* is applied to pair up the members of the *MK* set with an appropriate member of the *LK* set, in order to maximize the e-learning impact in the community. The term *unbiased matching* stems from the fact that the matching operation is fairly *autonomous*. In other words, the process of drawing the *MK* and *LK* pairs is neither based on an external human intervention, nor any form of random computer operation. On the contrary, it is purely based on the individual performances of the learners in a preliminary assessment test. The detailed system designs and model runs of the overall algorithm will be presented at this point.

III. THE SYSTEM DESIGN AND MODEL RUNS

A. Workflow Design

The workflow design for the proposed system is shown in Fig. 2. The diagram is made up of four main symbolic components. These are, the rectangular boxes (HL-Com, GL-Com, and PL-Com) representing the three community variations, the cuboids (C-Room, P-Exam, B-PartOP and PMC-Room) representing a variety of learning operations, the cylindrical figure (X-Result) which is an output data representing the pre-partition examination results, and eight arrows, labeled R, X, 1, ..., 6, which indicate the model flow. The term pre-partition examination depicts an assessment, whose result forms the basis for community bi-partitioning.

As shown in the workflow, the three communities HL-Com, GL-Com, and PL-Com represent the homogeneous learning, the graduate learning, and the partitioned learning communities respectively. The homogeneous learning community is made up of the people enrolled into the collaborative e-learning from onset, while the graduate learning community comprises of the knowledgeable community; that is those who have graduated. On the other hands, the partitioned learning community is the structured community, arising from the bi-partition operation. The unbiased matching operation is usually performed on the partitioned community. It is important to note that the community population P_C does not change, unless someone drops out of the learning community prior to graduation.

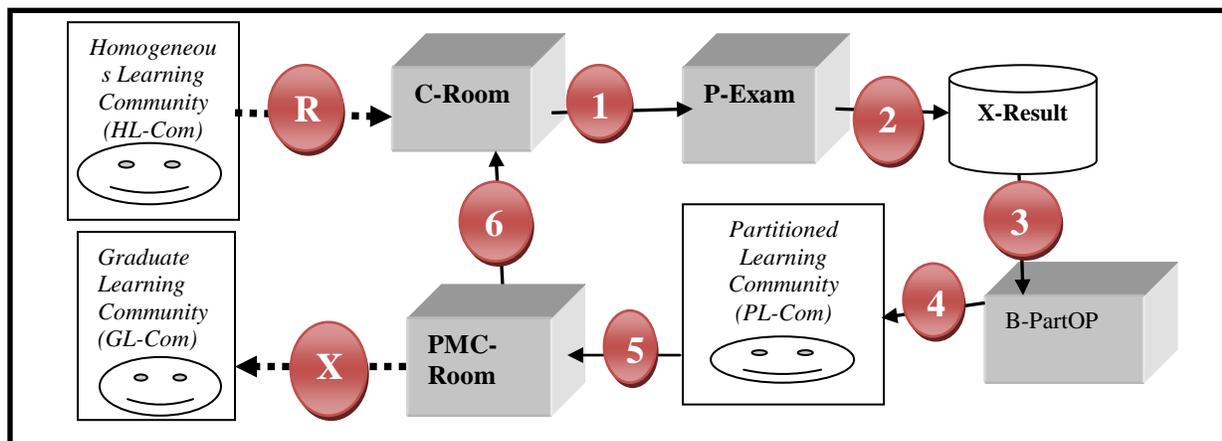


Figure 2: The Community Bi-Partition Learning Model Workflow

As shown in the workflow diagram, the HL-Com is enrolled into the system through the entry path R, while the graduates GL-Com leave the system through the exit path X. On entry into the e-learning system, HL-Com passes through the C-Room operation, which

represents the class room. This is an active e-learning session, after which there is a preliminary examination, P-Exam. The assessment result, X-Result is used as an input into the bi-partition operation, B-PartOP, which transforms the original homogenous community into the partitioned learning community, PL-Com. After the unbiased matching, the learners undergo a post match learning operation called PMC-Room (post match class room). This is a one-on-one revision of the previous e-learning contents by the unbiased partners. The essence of the PMC-Room is, to ensure that domain knowledge is passed from the more knowledgeable (MK) to the less knowledgeable (LK) members of the community.

It is important to state that the arrow links from 1 to 6 form what is termed in this research as a *single session* of e-learning. The overall e-learning duration could comprise of a number of learning sessions. The current research is based on three e-learning sessions.

B. Experimental Design and Model Runs

The experimental design diagram is shown in Fig. 3. A total of 30 university undergraduates, within the age brackets of 18 to 25 years were randomly selected, and enrolled for the collaborative e-learning experiment. This population forms the homogenous learning community.

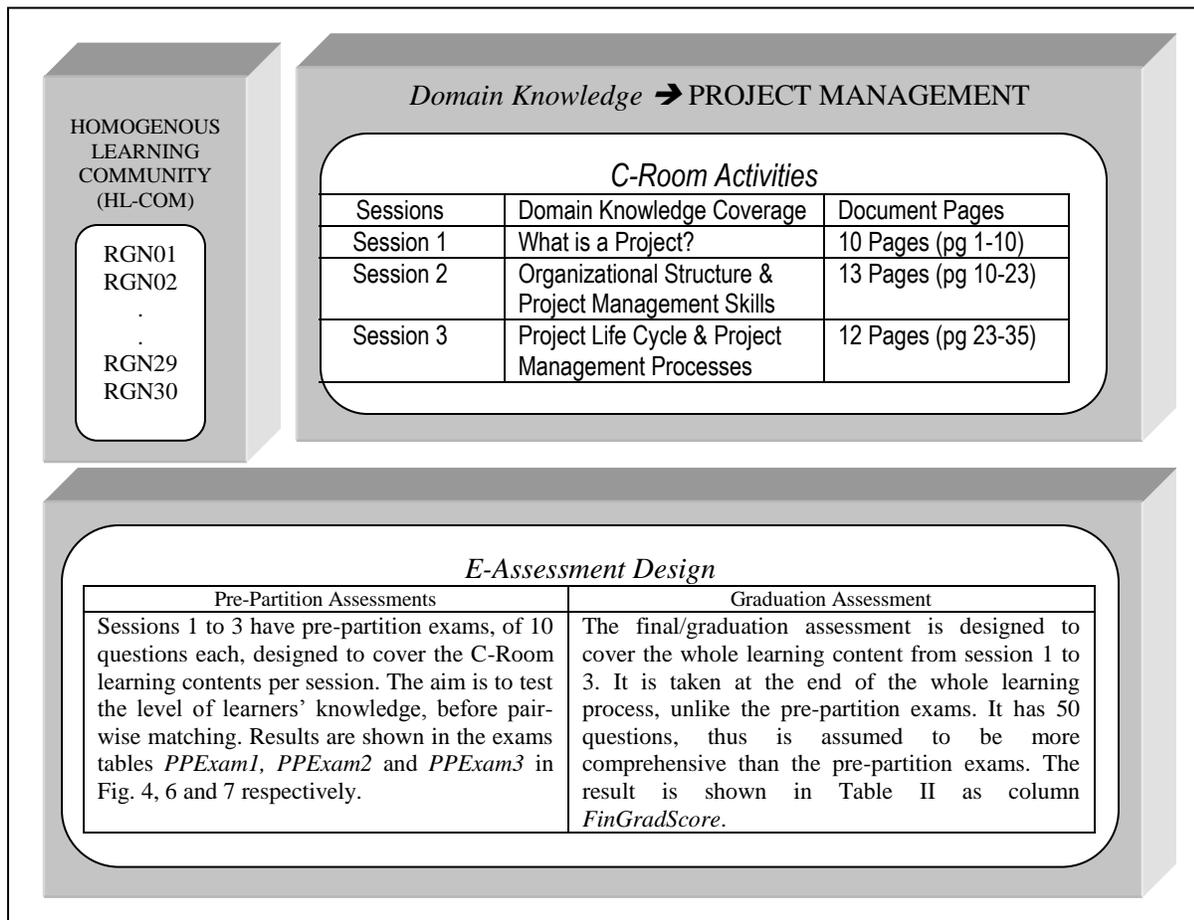


Figure 3: Collaborative e-Learning Experimental Design

As indicated in the diagram, the learners are assigned unique registration numbers RGN01, RGN02, ... RGN30, which remain permanent, throughout the learning duration. The chosen knowledge domain for the experiment is Project Management. The learning content for this experiment is drawn from a Project Management Professional (PMP) Certification book by [6]. The soft copy of this document was downloaded in PDF format. This online text book has 614 pages; though, only Chapter 1 which is made up of 35 pages was used for the learning experiment. The collaborative e-learning duration was divided into three sessions, with each session covering specific areas of the knowledge domain, as already indicated in Fig. 3.

The results of the first e-learning session are shown in Fig. 4. The examination table *PPEXam1* consists of two columns - RegNum for the learners' registration numbers, and *EScol1* for the corresponding pre-partition exam scores.

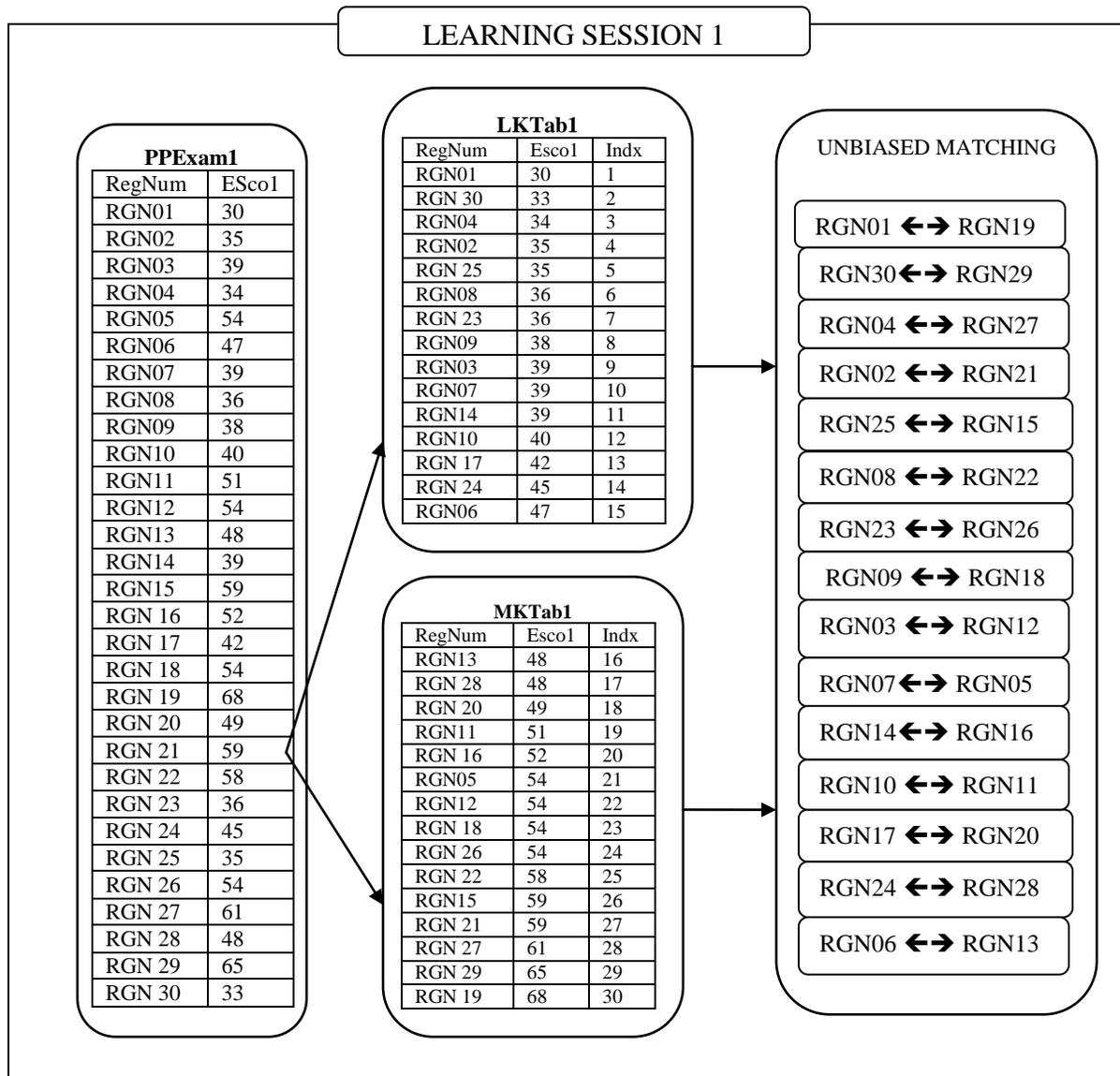


Figure 4: Experimental Result of Learning Session 1

The system takes PPEXam1 as an input, and then creates an intermediary version of the table, having three columns. The third column which is designated as *Indx*, sorts the pre-partition scores in an ascending order of magnitude. The resulting intermediary table is then partitioned into two separate tables, using the two bi-partition rules. The first bi-partition rule, which is shown in equation (1), determines the number of teams that could be formed. Here the key parameter is, whether the population size of the learning community P_C is numerically odd or even. The second bi-partition rule, which is shown in Fig. 5 as a pseudo code, partitions the homogenous learning community (HL-Com) into two groups - the *LK* and *MK* sets.

$$NLT = \begin{cases} \frac{P_C}{2}, & \text{If } P_C \text{ is EVEN} \\ \frac{(P_C - 1)}{2}, & \text{If } P_C \text{ is ODD} \end{cases} \quad (1)$$

where P_C is the population size and *NLT* is the number of learning teams.

As already mentioned, the *LK* set consists of the lowest knowledgeable persons, while the *MK* consists of the most knowledgeable persons in the class. The classification of learners into these sets is purely on the basis the pre-partition assessment result. Thus, a

learner could be in one set in a particular session, and then drop into the opposite set in another session, depending on the prevailing performance. The two sets for the e-learning session 1 are tables LKTab1 and MKTab1 respectively, as shown in Fig. 4.

```

LKPartition Set Formation
  If PC is EVEN,
    LKPartition = { All the Learners with indices 1 to N/2 }
  ElseIf PC is ODD then
    LKPartition = { All the Learners with indices 1 to (N-1)/2 }
    PLUS the Triplet Partner having indices N
  EndIf

MK Partition Set Formation:
  If PC is EVEN,
    MKPartition = { All the Learners with indices [N/2]+1 to N }
  ElseIf PC is ODD then
    MKPartition = { All the Learners with indices (N+1)/2 to (N-1) }
  EndIf
    
```

Figure 5: Pseudo Code for the Bi-Partition Rule 2

The strength of the overall model is that the system always takes cognizance of the most knowledgeable, and the least knowledgeable set of learners, thus ensuring that knowledge is shared through the process of unbiased matching. The formation of the matching pairs is based on the *unbiased matching equation* given by equation (2).

$$Indx_{LK} + Indx_{MK} = P_C + 1 \quad (2),$$

where $Indx_{LK}$ is the index of the partner from the LK set, $Indx_{MK}$ is the index of the partner from the MK set, and P_C is the numerically even population size.

The *verification table*, satisfying the unbiased matching equation for the session 1 experiment is Table I. Given the population size of the learning community $P_C = 30$, the pair-wise indices for the LK and MK partitions always adds up to 31, which is the same as $P_C + 1$.

Table I: Matching Verification Table

$Indx_{LK}$	1	2	3	4	5	6	.....	15
$Indx_{MK}$	30	29	28	27	26	25	.....	16
$Indx_{LK} + Indx_{MK}$	31	31	31	31	31	31	.....	31
$P_C + 1$	31	31	31	31	31	31	.....	31

The matching equation (2) takes a modified format, when the population size is odd. This second matching equation, otherwise called the *unbiased triplet rule* is given by equation (3). Thus, apart from forming the pair-wise partners as earlier discussed, one of the teams is promoted to a triplet, having three partners.

$$Low(Indx_{LK}) + SecHigh(Indx_{MK}) + High(Indx_{MK}) = 2 * P_C \quad (3)$$

where the symbol *Low* stands for ‘the lowest’, *SecHigh* stands for ‘the second highest’, and *High* stands for ‘the highest’ indices respectively.

The interpretation of equation (3) is that the learners with the lowest index from LK set, the second highest index from MK set, and the highest index from MK set form the unbiased triplets. Furthermore, the sum of their corresponding indices is always equal to double the community population size P_C . For instance, if the community population size is $P_C = 89$, which is an odd number, then the unbiased triplets consists of the learners, having the indices $Indx=1$, $Indx=88$ and $Indx=89$ respectively.

The computational implementation of unbiased matching for a numerically odd population size involves the following steps. After the indexing operation, the system excludes the highest indexed learner from the community, thus giving rise to an intermediary population size $(P_C - 1)$, which is even. The bi-partition rules in equations (1) and (2) are used to form the pair-wise partners. Thereafter, the learner with highest index, who was originally excluded, is then promoted to join the first pair-wise partners, thus giving rise to a single triplet partner, in line with equation (3).

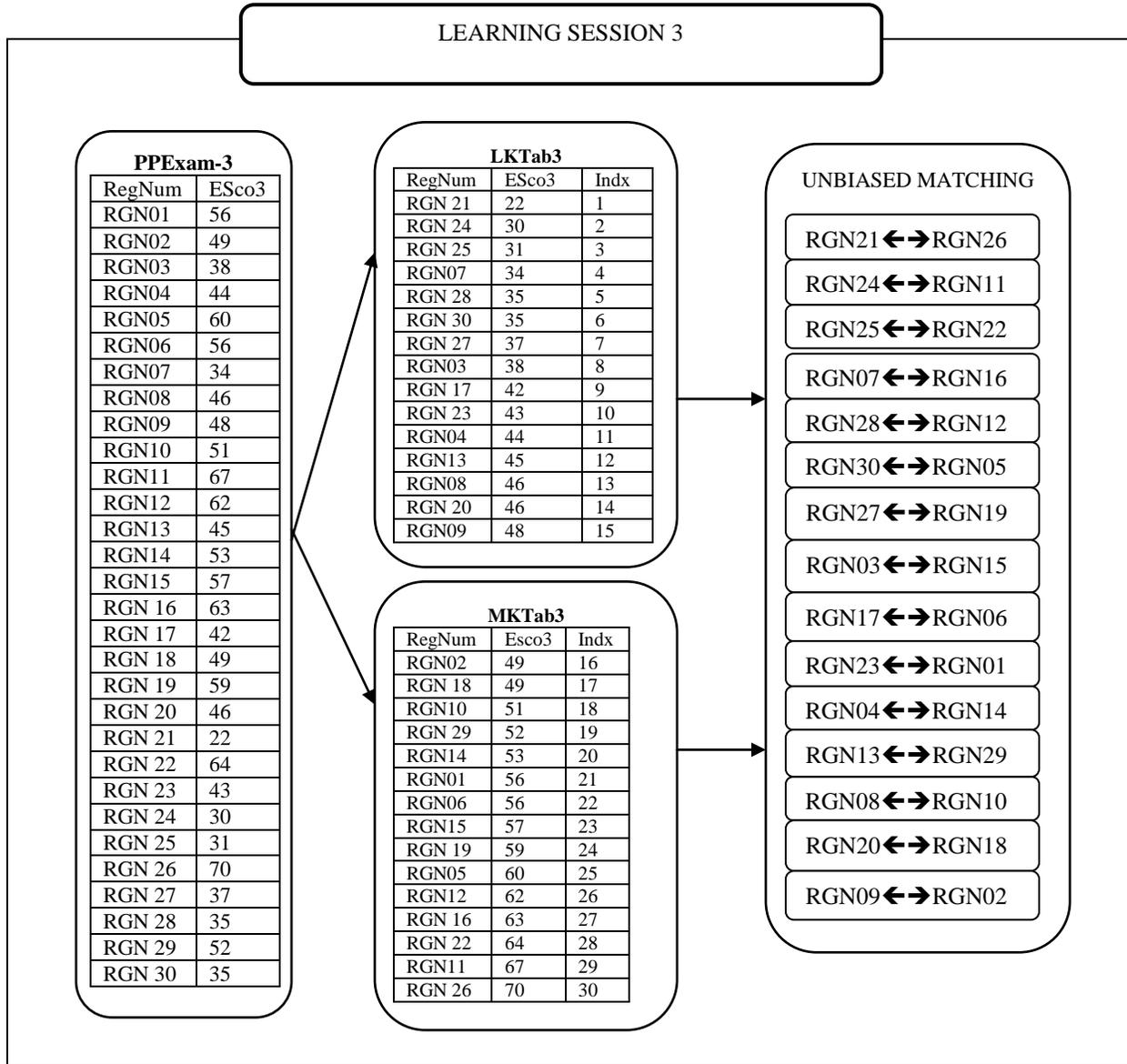


Figure 7: Experimental Result of Learning Session 3

IV. SYSTEM ANALYSIS AND VALIDATION OUTPUTS

The workflow for validating the system performance is shown in Fig. 8. The strategy adopted is to first, derive the average pre-partition score using equation (4).

$$AvgPreGradScore = \frac{ESco_1 + ESco_2 + \dots + ESco_5}{S_N} \quad (4)$$

where $ESco_1, ESco_2, \dots, ESco_5$ are the pre-partition scores per session, which have been shown in Fig. 4, 6 and 7 respectively; S_N is the number of e-learning sessions, which is 3 in the current study.

Next, the graduate learning community (GL-Com) is passed through a final graduate assessment test, designated as G-Exam in the workflow. The result of this is designated as *FinGradScore*.

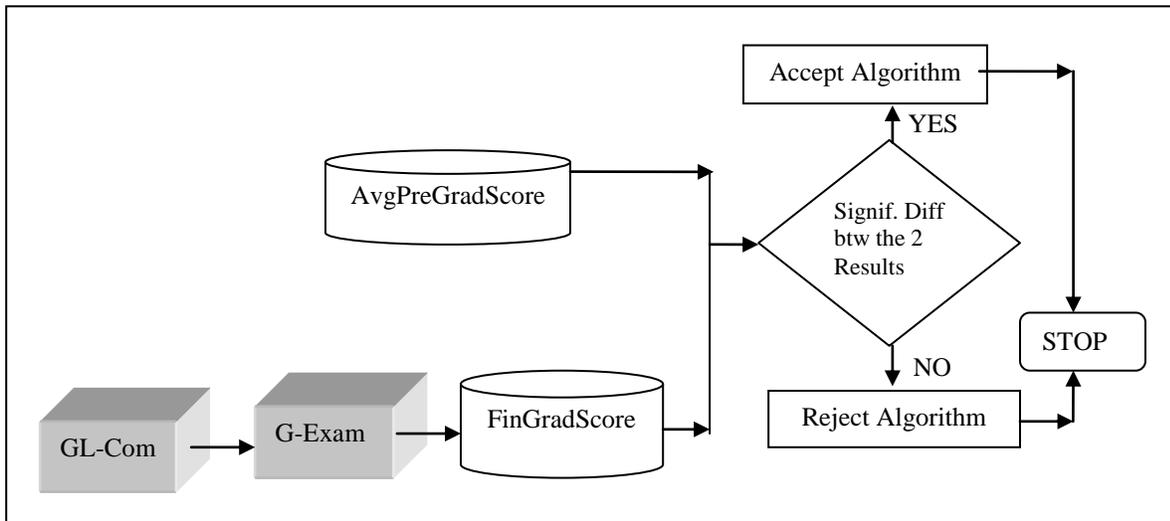


Figure 8: Model Validation Workflow

The basis of system validation is therefore, to compare the *AvgPreGradScore* with the *FinGradScore*. Since the *AvgPreGradScore* measures the level of competence before graduation, while *FinGradScore* represents the learner’s competence after graduation, it is expected that there should be a significant difference between the two scores. The Global Assessment Table (GAT) shown as Table II is used for a number of performance analysis, as will be discussed.

A. Least IQ Improvement Analysis

The term ‘*Least IQs*’ in this research refers to each of the learners who had the lowest domain knowledge, for each of the learning sessions. These are the learners who had the lowest indices in each of the LK sets, based on the pre-partition exams. From the tables LKTab1, LKTab2 and LKTab3 in Fig. 4, 6 and 7, the learners in this category are, RGN01 for session 1, RGN24 for session 2 and RGN21 for session 3 respectively. The Least IQ Improvement Analysis is used to investigate whether there was significant value added to the learners, after completion of the knowledge acquisition training. To measure the impact of collaborative e-learning, the *AvgPreGradScore* is compared with the *FinGradScore* for all the Least IQs. The assessment scores for the learners in the *Least IQs* detailed in the Global Assessment Table (GAT), are used to plot the improvement analysis chart shown in Fig. 9. From the chart, each of the learners in the *Least IQ* category improved their domain knowledge by at least 20 units as a result of the learning process.

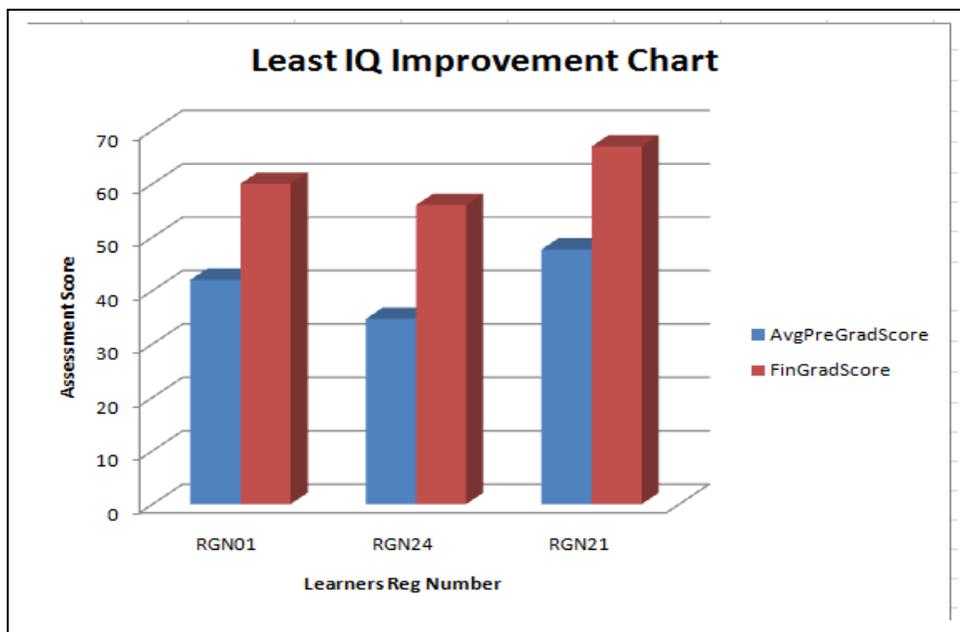


Figure 9: Least IQ Improvement Analysis Chart

B. Low Consistency Improvement Analysis

The term ‘Low Consistency’ in this research refers to the set of learners who, may not necessarily be among the *Least IQs*, but were however consistently in the LK set, throughout the duration of the e-learning. From the experimental data, the three learners RGN09, RGN25 and RGN30 remained in the LK tables LKTab1, LKTab2 and LKTab3, throughout the learning period. Thus, they are in this category. Fig. 10 is the analysis chart depicting the level of improvement for the learners in the ‘Low Consistency’ category.

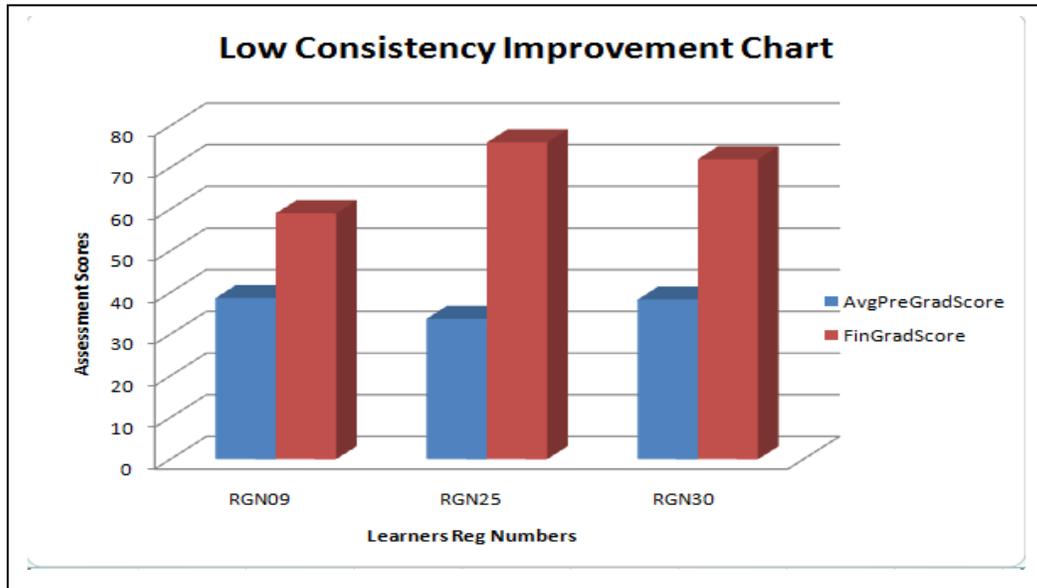


Figure 10: Low Consistency Improvement Chart

This improvement analysis chart is also derived from the Global Assessment Table (GAT), by comparing the *AvgPreGradScore* with the *FinGradScore* for learners concerned.

C. Global Gap analysis

A gap analysis was done, by comparing the *AvgPreGradScore* with the *FinGradScore* for the whole community. The result of this is shown in Fig. 11, where the x-axis is calibrated as the registration numbers, while the y-axis represents the assessment results. As indicated in the figure, the blue coloured graph represents the *AvgPreGradScore*, while the red coloured one represents the *FinGradScore* plot. The fact that there is a clear demarcation or gap between the two graphs for the whole community implies that, there is a global improvement after the learning process.

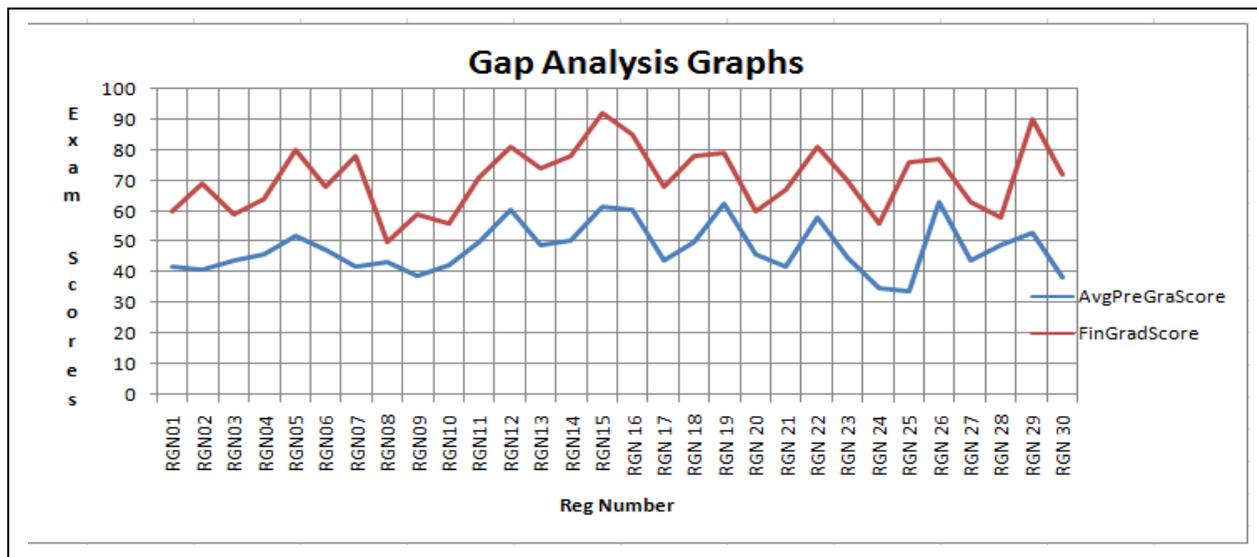


Figure 11: Gap Analysis Result

V. DISCUSSION AND CONCLUSION

Apart from encouraging collaborative learning and knowledge sharing through the implementation of a matching algorithm, this work also presents practical strategies for validating e-learning models. Fig. 12 is a final output which summarizes the overall benefit of this work to a learning community. The figure which is termed as Collaborative e-Learning Benefit (*Celeb*) Graph is derived by plotting the *Diff* column of the Global Assessment Table (GAT) against the corresponding learners' registration numbers. The *Diff* column calculates the overall difference between the *AvgPreGradScore* and the *FinGradScore* for the whole e-learning duration.

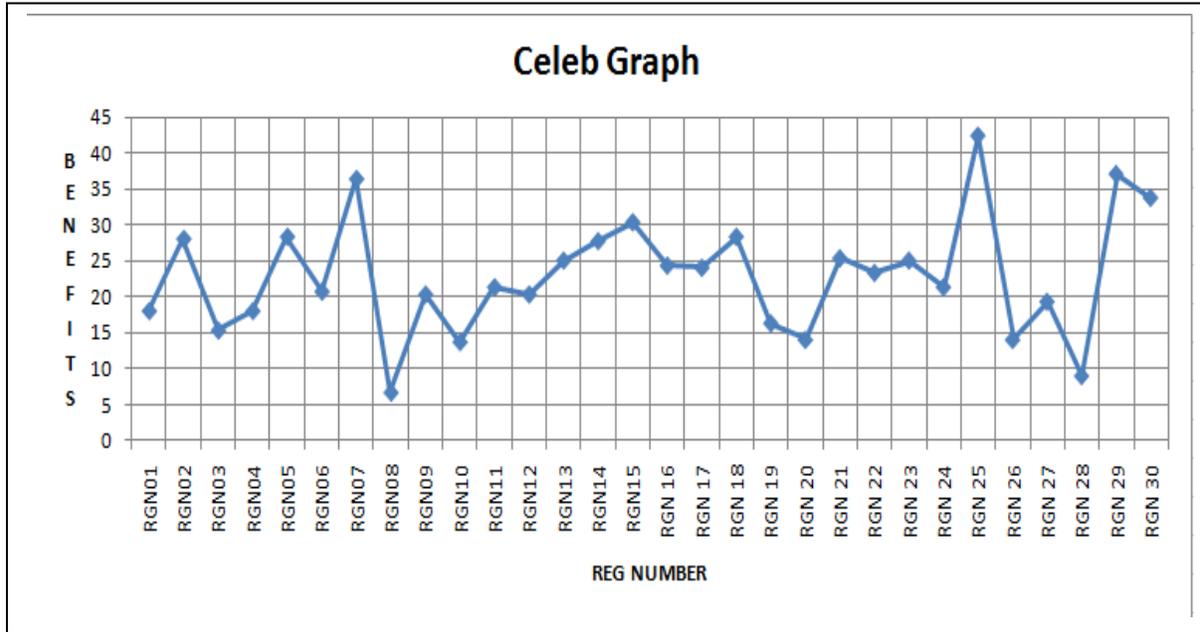


Figure 12: Benefit Analysis Result

Based on the Celeb graph, one can easily pinpoint that RGN25 has the highest benefit from the domain knowledge acquisition, followed by RGN29 and RGN07 in that order. In conclusion, this algorithm is has been fully presented in such a way that it can be easily implemented in a number of computing environments. It is also possible to adapt it in diverse learning environments, including academic institutions, business training organizations, among others.

Table II: Global Assessment Table (GAT)

Reg	E1	E2	E3	AvSc	FgS	Diff
RGN01	30	40	56	42.0	60	18.0
RGN02	35	39	49	41.0	69	28.0
RGN03	39	54	38	43.7	59	15.3
RGN04	34	60	44	46.0	64	18.0
RGN05	54	41	60	51.7	80	28.3
RGN06	47	39	56	47.3	68	20.7
RGN07	39	52	34	41.7	78	36.3
RGN08	36	48	46	43.3	50	6.7
RGN09	38	30	48	38.7	59	20.3
RGN10	40	36	51	42.3	56	13.7
RGN11	51	31	67	49.7	71	21.3
RGN12	54	66	62	60.7	81	20.3
RGN13	48	54	45	49.0	74	25.0
RGN14	39	59	53	50.3	78	27.7
RGN15	59	69	57	61.7	92	30.3
RGN16	52	67	63	60.7	85	24.3
RGN17	42	48	42	44.0	68	24.0
RGN18	54	46	49	49.7	78	28.3
RGN19	68	61	59	62.7	79	16.3
RGN20	49	43	46	46.0	60	14.0
RGN21	59	44	22	41.7	67	25.3
RGN22	58	51	64	57.7	81	23.3
RGN23	36	56	43	45.0	70	25.0
RGN24	45	29	30	34.7	56	21.3
RGN25	35	35	31	33.7	76	42.3
RGN26	54	65	70	63.0	77	14.0
RGN27	61	33	37	43.7	63	19.3
RGN28	48	64	35	49.0	58	9.0
RGN29	65	42	52	53.0	90	37.0
RGN30	33	47	35	38.3	72	33.7

Key to GAT Columns: Reg=RegNum, E1=ESco1, E2=ESco2, E3=ESco3, AvSc=AvgPreGradScore, FgS=FinGradScore

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The Impact of the Arabic Language Curriculum of the International Islamic University Malaysia on Students' Behaviors

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Abstract- Curriculum in an academic setting plays a vital and triadic role based on the interrelationships of the content, students and instructors. There are fundamental components of curriculum which are objective, content, method and evaluation which constitute basis for the overall development of the students. Putting all the components of curriculum together, it should be tailored towards achieving all-important objectives of education. The Arabic language curriculum of the International Islamic University (IIUM) is designed for fostering various aspects of language skills. Undoubtedly, Arabic language is unique as it shapes the behaviours of the students in an academic setting. However, little investigation of the impact of the Arabic language on the students' behaviours is done recently. This paper primarily aims at exploring the impact of the Arabic Language Curriculum of the International Islamic University Malaysia (IIUM) on the students' behaviors. The methodology used in the study is quantitative research design. The data was obtained through the distribution of the questionnaire to the total number of seventy (75) respondents. The reliability of the instrument was done using Cronbach Alpha for internal consistent. The data analysis was done by using SPSS. The findings show that the Arabic language curriculum of the International Islamic University Malaysia have positive impact on the moral and ethical teachings and its effects on the holistic character development of the students could not be underrated. It is thereby recommended that the Arabic language of IIUM should be reviewed constantly in order to integrate moral and ethical values in to the content of what the students are learning.

Index Terms- Arabic, Language, Culture, Behaviour, Curriculum, Students.

I. INTRODUCTION

This primary objective of this paper is to investigate the impact of the Arabic Language Curriculum of the International Islamic University Malaysia (IIUM) on the students' behaviors. Curriculum in an academic setting plays a vital and triadic role based on the interrelationships of the content, students and instructors. There are fundamental components of curriculum which are objective, content, method and evaluation which constitute basis for the overall development of the students. Putting all the components of curriculum together, it should be tailored towards achieving all-important

objectives of education. The International Islamic University Malaysia is one of many universities worldwide which promote the study of Arabic language among Muslim youths. The Department of Arabic Language and Literature established in 1990. It offers several language programmes and campus activities organized. The department attracted many local and international students to the university who chose to specialize in the discipline which integrates modern educational approaches and technologies into the teaching and learning. Also, students are allowed to attend cross faculty programmes by opting for elective courses in Human Sciences and Islamic Revealed Knowledge. Its programme consists of core courses in Arabic Language and Literature, electives, and required courses in Human Science ssuch as Communication, History and Civilization, Political Science, Psychology, and Sociology in order to expose the students to a variety of academic studies and approaches.

The Arabic Language curriculum aims at producing a new generation of scholars who understand Arabic Language and Literature in all its ramifications and who are capable of reading, writing, comprehending, and formulating their own critical thoughts in modern standard Arabic.

Based on the above explanations, this paper examines the impact the Arabic Language curriculum on the specific behaviour of the students in order to assess to which extent the programme's objectives were achieved. Thus, the research is arranged as follows: the next section discusses IIUM's Arabic curriculum follow by definition of curriculum, cultural of IIUM Arabic students, the objective of the Arabic language curriculum, data analysis and conclusion and recommendations.

1.2 Literature Review

This part explains the literature review of the present research paper. It covers different aspects such as: meaning of curriculum, Arabic Curriculum of the International Islamic University Malaysia, Cultural behavior of Students and objectives of IIUM Arabic Language and Literature Bachelor Degree Programme. Finally, the conclusion is drawn from the literature review.

1.2.1 Meaning of Curriculum:

The term 'curriculum' is derived from the Latin verb 'currere' which connotes rapid movement and competition (Abdur-Rahman, 2002). However, no consensus has been reached on what is exactly meant by curriculum. Several definitions have been suggested by various scholars over time

depending on their own perspectives and orientations. According to the *Al-Mu'jam al- Wasit of Majma' al-Lughah, mihaj* (curriculum) literally means “a clear path” (Cairo,2008).Technically, it means the path to be followed in order to achieve a goal or objective (Abdur-Rahman, 2002). Al-Wakil (1991) gave its obsolete meaning as “comprehensive knowledge, sciences, understanding and thinking imparted on a student in form of a subject.” This is closely related to the view expressed by Husniy Abdul Bari in his treatise *The History of School Curriculum* in which he defined curriculum as “the sum total of the experience that a student acquires or ought to acquire under the instruction of a teacher” (Abdul Bari, 2006). Ibrahim Muhammad ‘Ata held a contrary view and opined that “curriculum is not a subject to be given to students for memorization or to be sung in order to achieve a set objective but a set of items given to students in order to arouse his [or her] feeling of reality and urge to remember them each time he [or she] needs them.”

Muhammad ‘Izat Abdul Mawjud and others as quoted by Abdus Salaam AbdurRahman Hamid in his work *Curriculum in the Past and Contemporary Time* define curriculum as a comprehensive experience and activities that a school impacts onto its students under its instruction with the aim that students internalize its contained teachings and influences their cultural behaviour. It should also positively affect their social cultural development which is the ultimate aim of education. Curriculum is similarly fashioned in a way that suits the cultural norms an institution intends for its students (Hamid, 2002). Munirah Hassan al-Sa’di added to this definition the aspect of integration coupled with teaching aids and capacity and methods by means of which all of these elements are combined into a single unit (al-Sa’di, 1981). Salahudeen ‘Arafat Muhammad quoted Gelathorn Allen A as follows:

The appropriate comprehensive modern meaning of curriculum is a programme or agenda prepared towards controlling teaching in schools. Sometimes, it is prepared in form of book which could be read or studied by students at different levels with reference to semester bases as was learnt by the teachers in their days and as noted by some scholars to be used in an environment or society which also impact to a large extent on the curriculum (Muhammad, 2006).

All these above cited definitions may aid in the subsequent examination of the Arabic language curriculum of IIUM in terms of examining its specific design, its aims and objectives, and the means employed towards achieving the set objectives. The academic programme dedicated to the study of the Arabic language at the International Islamic University Malaysia is Bachelor of Human Science in Arabic Language and Literature. The courses are designed based on semester bases with a maximum of three contact credit hours per week. Every student is allowed to register for a maximum of 17 credit contact hours in the first and second semester and 12 in the short or third semester. The total cumulative credit hours of the Bachelor’s degree programme lie between 149 and 151 credit hours. 30 credit hours are allocated for basic courses such as Creative Thinking and Problem Solving, Sciences of the Qur’an, Sciences of Hadith, Introduction to *Fiqh*, etc. Another 51 credit hours consist of core courses like Advanced Arabic Language, Arabic

Syntax, Arabic Morphology, etc., and another 30 credit hours are electives to be taken at the Faculty of Human Sciences departments such as Sociology & Anthropology (SOSA), Communications (COMM), History & Civilization (HIST), Political Science (PSCI), and Psychology (PSYC), or from other departments such as Kulliyah of Information Science and Technology (KICT), Kulliyah of Economics (KENMS), Ahmad Ibrahim Kulliyah of Law (AIKOL), and Institute of Education (INSTED), by selecting subjects which are to be either introductory courses, elective or general language skills such as Introduction to Communication, Introduction to History and Civilization, Introduction to Political Science, Introduction to Psychology, Introduction to Economics, Information Technology, Parenting, Consumer Law, Environmental Law, Malay Language (Bahasa Melayu), Qur’an Recitation (*tilawah*), etc. It is mandatory for all students to fulfill these requirements in order to graduate. The main purpose is to expose the students to the different sciences and their theoretical and practical approaches in order to produce well rounded who can be easily integrated into the labour market (IIUM Undergraduate Prospectus, 2007).

1.2.2 Arabic Curriculum of the International Islamic University Malaysia

Any curriculum is specifically designed to achieve well defined objectives in accordance with the philosophy of the institution running the programme, having in view of the targeted students in particular and society at large. This is why educationists consider the curriculum as a vital element in the process of imparting knowledge to the younger generation. According to Ahmad bin Ibrahim (2005), “Quality education is to produce scholars who possess certain knowledge, skills, and exposure to what is needed by them and required or needed by their society; having power or technical know-how to invent, think and innovate as well as having knowledge about happenings around them”. He also observed that products of such institutions had to have certain focus, praiseworthy character, well adjusted cultural behaviour, as well as humanitarian and patriotic ideals (Ibrahim, 2005). A correct and precise understanding of the term curriculum is important before examining any curriculum in more detail.

1.2.3 Cultural behavior of Students and objectives of IIUM Arabic Language and Literature Bachelor Degree Programme

Under cultural behaviour is understood the sum total of observable acts which are exclusively based on the students’ character as imparted through the curriculum designed by an institution of learning. Such cultural behaviour may manifest itself in the thought patterns of the students, their religious consciousness, their forms of interaction with fellow human beings, their conception of the world, and also their ability to successfully interact within a social environment other than their own, particularly in terms of communication skills. The University’s curriculum is designed to facilitate the spiritual, moral, and intellectual development of the students and to ensure that students are guided in their thought, character, and perception and able to secure a living that allows them to live a

happy and fulfilled life. All these aspects must be integrated in order to achieve a comprehensive or holistic education (Rashid, 1993).

It is pertinent at this junction to state the aims and objectives of the Arabic Language programme at IIUM in order to evaluate its impact on the students' cultural behaviour. The following are the objectives of Arabic language Programme in IIUM:

- 1- To produce graduates who are competent in reading and writing Arabic materials.
- 2- To produce graduates who are able to communicate effectively in standard Arabic.
- 3- To produce graduates who are able to outline and describe the major intellectual contributions of past and present scholars in the area of Arabic linguistic and literary studies.
- 4- To produce graduates who are able to apply the results of Arabic scholarship in enhancing their ability to deal with issues of life.
- 5- To produce graduates who are able to think critically and creatively.
- 6- To produce graduates who are able to outline the elements of the Islamic worldview and relate them to their daily undertaking.
- 7- To produce graduates who are able to serve Islam and the Muslim community at large, especially in the context of their chosen careers.
- 8- To produce graduates who are aware of the importance of the empirical method in developing knowledge and assigning practical solutions to academic problems.
- 9- To produce graduates who are quality-conscious in carrying out future undertakings.

10- To produce graduates who are familiar with IT applications useful to their context.

11- To produce graduates who are equipped with the necessary skills for continual self-improvement and lifelong learning.

In conclusion, from the literature review, the general meaning of curriculum, Arabic curriculum in IIUM, cultural behaviour of IIUM Arabic Language students and the objectives of IIUM's Arabic language Programme have been extensively elaborated.

1.3 Methodology

This part explains the methodology employed in this paper. The research design used in this paper is quantitative research design. Other aspects that are taken into account in this paper are: population and sample, instrument, validity and reliability of the instrument, procedure for data collection, procedure for data analysis and finally the conclusion is drawn. The target population of the paper comprised undergraduate students of the International Islamic University Malaysia. It has been indicated that the total accumulated numbers of Arabic Language students of International Islamic University Malaysia in 2009/2010, Semester 2, were 278. 186 of the students were female compared to 56 male students. Similarly, 36 of the students of Arabic language were international students and 242 locals (Malaysians). Table 1.1 shows the undergraduate Students in Arabic Language and Literature, Semester 2, 2009/2010:

Table 1.1
Details of Undergraduate Students in Arabic Language and Literature, Semester 2, 2009/2010.

Male	Female	Total	Male	Female	Total	
Malaysian			International			Grand total
56	186	242	9	27	36	278

Source: The Admissions and Record Division, IIUM Main Campus. 24/9/2010.

Based on the above population, the convenient sampling technique was employed where the total number of seventy five (75) was selected among the Arabic Language students of IIUM. Furthermore, the instrument used in this paper is questionnaire. The questionnaire is self-constructed. There are three divisions in the questionnaire namely: Demographic information of respondents, items of Arabic language and items on the impact of Arabic language curriculum. In the first part, there are six aspects in the demographic information of respondents. In the second part, there are seven (7) items of Arabic language. In the third part, there are twelve (12) items measuring the impact of Arabic language. There was a 5 likert scale namely: Strongly Disagree (SD), Disagree (D), Undecided (UD), Agree (A) and Strongly Agree (SA).

Likewise, validity and reliability are taken into consideration in this paper. For the validity of the instrument, the opinion of the experts were sought to ensure that the items measured the two main constructs identified in the instruments.

On the other hand, the reliability of the items was carried out. The reliability test of the surveyed items was carried out through Cromach's Alpha. The Crombach's Alpha describing the curriculum items was .683 while the Cromach's Alpha measuring the items on the impact of the curriculum on the students was .898. The results from the Cromach's Alpha indicated that the instrument was reliable to be used in this paper.

Basically, for the procedure for data collection, the questionnaires were distributed to the respondents at the IIUM whereby the distributed questionnaires were returned at the stipulated time. For the procedure for data analysis, statistical package for social science (SPSS version 16.0) was employed. At this stage, the data collected during the research were analyzed considering frequency, summary statistics such as percentage, mean, and standard deviation (Landau, 2004, p. 28).

1.4 Statistical Analysis, Results and Discussions

In this part, the statistical analysis, findings and discussions of the Demographic background of respondents, curriculum and its impacts on students' behaviour are presented.

1.4.1 Demographic background of respondents

According to Marrja (2008), a good sample is what is desired to be selected from the entire population of interest. Thus, the sample of this research was selected among the undergraduate students of the IIUM Arabic Language Department. Due to certain restraints affecting the administration of the survey, the questionnaire was only given out to 75 students. The demographic data of the surveyed participants were as follows:

Table 1.2
Demographic Distribution of Respondents

Items		Frequency	percentage
Sex	Male	7	9.3%
	Female	68	90.7%
	Total	75	100%
Marital Status	Single	66	88%
	Married	7	9.3%
	Total	73	97.3%
Years of Study	Year One	12	16%
	Year Two	18	24%
	Year Three	26	34.7%
	Year Four	19	25.3%
	Total	75	100%
Purpose of Studying Arabic	Religion	31	41.3%
	Education	37	49.3%
	Arabic civilization	4	5.3%
	Parents Obedience	3	4.0%
Total	75	100%	
Nationality	Local	71	94.7%
	International	4	5.3%
	Total	75	100%
Mode of Study	Full Time	74	98.7%
	Part Time	1	1.3%
Total		75	100%

Table 1.2 shows that the majority of the respondents were female (90.7%) and 9.3% were male. This shows that the population of female students in the Arabic Language Department was higher than that of male students. Also, 88% were single, 9.3% were married and 2.7% were engaged to be married. The majority of respondents (34.7%) were in their third year of study, 25.3% in their fourth year, 24% in their second year, and the remaining 16% in their first year. These percentages indicated that the respondents were not equally but relatively well spread across all levels of studies which thus promised a result which adequately reflected the entire student population.

The majority of the respondents (49.3%) were majoring in Arabic for educational purposes, 41.3% for religious purposes,

5.3% for cultural purposes, and the rest (4.0%) did so because their parents had asked them to.

Altogether 98.7% of the respondents were local students (Malaysian), while only 5.3% were internationals. Hence, it was clear that the result would reflect foremost the views of the local population and any conclusions drawn or policies implemented on the basis of such result would be more applicable to the local student population. The same percentage of students was also comprised of full time students, while only 1.3% studied part-time.

1.4.2 Descriptive Statistics of Curriculum

The descriptive statistics employed in this survey addressed the degree of performance, frequency and percentage, means and standard deviations of the respondents. Each question of any item

was given five response options in the questionnaire which were “strongly disagree” (SD), “disagree” (D), “undecided” (UN), “agree” (A) and “strongly agree” (SA). Although five different response options guaranteed a differentiated response result, it was decided to simplify the findings by merging “strongly disagree”, and “disagree”, as well as “strongly agree” and “agree”.

The Table 2.1 shows the cumulative total percentage, means and standard deviation of the responses to the items which measured the description of the IIUM undergraduate Arabic language curriculum. More than three quarter (78%) of respondents agreed that the Arabic curriculum appropriately catered for the overall needs of the students, while 9.3% were undecided, and only 12% disagreed with the statement. Thus, considering the total frequency shown in Table 2.1 above, it could be concluded that more than half of the respondents agreed that the Arabic curriculum was appropriate. The average mean score was calculated as 3.68 and the standard deviation as .869 which was considered moderately acceptable in the educational context.

Moreover, 86.7% of respondents agreed that the curriculum relevantly addressed the moral and spiritual needs of the students. Only 16.7% were undecided, and 2.7% disagreed with the statement. The majority of the respondents (97.4%)

agreed that it helped realize the students’ potential, none of the respondents disagreed, and only a couple of them (2.7%) remained undecided.

Similarly, a large number of respondents (81.4%) agreed that the Arabic curriculum content emphasized on Muslim unity and universal brotherhood. Only 16% of the respondents remained undecided and only a couple of them (2.7%) disagreed with the statement. Most of the respondents (77.3%) also asserted that the Arabic curriculum enriched its students socially and culturally and prepared them for the challenges ahead. Here, also only a couple of the respondents (2.7%) disagreed, while another 20% remained undecided.

61 or 81.3% of the respondents agreed that the Arabic curriculum incorporated elements of Islamic civilization and other civilizations and the constructive interplay between them. 6.7% of the students decided to remain neutral, and the remaining 2.7% disagreed with the statement. Lastly, an overwhelming majority of 90.7% of the respondents agreed that it also incorporated elements of leadership, socialization and integration. Again, only a few respondents (6.7%) remained undecided, and the rest (2.7%) disagreed with the statement. Table 2.1 shows Description of Arabic Curriculum (AC) of (IIUM):

Table 2.1
Description of Arabic Curriculum (AC) of (IIUM)

Items	D	UN	A	Mean	SD
1. The Arabic curriculum in university appropriately caters for the overall needs of the students.	12.0%	9.3%	78.7%	3.69	.869
2. The curriculum is relevantly addressing the moral and spiritual needs of the students.	2.7%	16.7%	86.7%	4.02	.696
3. The curriculum is helpful in realizing the students’ potential.	-	2.7%	97.4%	4.16	.436
4. The Arabic curriculum is tailored towards realizing the unity and universal brother hood encapsulated in Islam.	2.7%	16.0%	81.4%	3.93	.643
5. The curriculum enriches the students socially and culturally and prepares them for the challenges ahead.	2.7%	20.0%	77.3%	3.88	.656
6. It incorporates elements of Islamic and other civilizations and the constructive interplay between them.	5.4%	13.3%	81.3%	3.82	.742
7. It incorporates elements of leadership, socialization and integration.	2.7%	6.7%	90.7%	4.04	.579
Average				3.934	.660

1.4. 3 Descriptive Statistics on the Impact of Arabic Curriculum on Students

In regard to the set of items that measured the impact of the Arabic Language curriculum on the students’ cultural behaviour, an over whelming majority of 92% of the respondent sagreed that it positively affected their listening skills, while 6.7%remained undecided. and only 1.3%disagreed with the statement. Another 78.7% of the respondents agreed that their speaking skills had improved through the Arabic curriculum, another 13% remained undecided, and 8.0%disagreed with the statement.

In reference to the third item of is section of the questionnaire, a total of 89.4%agreed that the curriculum had contributed to their improved reading skills, another 9.3% were undecided, and only 1.3% of the respondents disagreed with the statement. 78.7% of the respondents agreed that their writing skills had improved through the curriculum, while 16%were uncertain, and only 5.3%disagreed with the statement.

Altogether 77.4% of the respondents agreed that the curriculum greatly influenced the relationship/interaction with their fellow classmates, while 20%remained undecided, and only

2.7%disagreed. A total of 76% of the respondents agreed that the curriculum had exposed them to Arabic culture and tradition, 22.7% were uncertain, and 4.0%disagreedwith the statement. Furthermore, 72% of the students agreed that they had learned a lot about Islamic civilization and its historical development, whereas 24% remained undecided, and the remaining 4.3%disagreedwith the statement.

Similarly, 77.4% of the respondents agreed that the curriculum exposed them to other cultures and civilizations, another 17.3% remained undecided, and 5.3%stated their disagreement with the statement. 84% of the respondents agreed that the curriculum improved their moral behaviour and respect for others, while the remaining 16% were uncertain. Likewise, 84% agreed that the curriculum had made a great impact on their religious commitment, while 14%remained undecided, and another 1.3%disagreed with the statement.

Finally, an impressive 97.3% of the respondents agreed that they enjoyed studying Arabic Language in IIUM, while only 1.3% was uncertain, and another 1.3% disagreed. Table 2.2 illustrates the Impacts of Arabic Curriculum (AC) of (IIUM) on Students Cultural Behaviour:

Table 2.2
Impacts of Arabic Curriculum (AC) of (IIUM) on Students Cultural Behavior

Items	D	UN	A	Mean	SD
The Arabic curriculum improves my listening skills.	1 1.3%	5 6.7%	69 92%	4.16	.658
My speaking skills improve through the curriculum.	6 8.0%	10 13.0%	59 78.7%	3.94	.836
My reading skills improved through the curriculum	1 1.3%	7 9.3%	67 89.4 %	4.14	.630
The curriculum improves my writing skills.	4 5.3%	12 16%	59 78.7%	3.98	.846
The curriculum has greatly Influenced the relationship/ interaction with my fellow classmates.	2 2.7%	15 20%	58 77.4%	3.89	.669
The curriculum has exposed me to Arabic culture and tradition	1 1.3%	17 22.7%	57 76%	3.92	.673
I have learned a lot about Islamic civilization and its historical development.	3 4.0%	18 24.0%	54 72%	3.82	.723
The curriculum has exposed me to other cultures and civilizations.	4 5.3%	13 17.3%	58 77.4%	3.81	.729
It improves my moral behaviour - and the respect I have for others.	-	12 16%	63 84%	4.02	.592

The curriculum has a great impact on my religious commitment.	1 1.3%	11 14.7%	63 84%	4.10	.689
I enjoy studying Arabic Language in IIUM.	1 1.3 %	1 1.3%	73 97.3%	4.37	.587
Average				4.013	.693

1.5 Conclusion

In conclusion can be said that the research finding shows that the Arabic Curriculum of IIUM did exercise a measurable positive impact on the students' cultural behaviour. This is reflected by the overwhelming majority of positive responses for all items ranging from 72% to 97%. This position is affirmed by the responses in relation to its specific impact on cultural behaviour.

Furthermore, the research finding also suggests that the IIUM Arabic curriculum has greatly impacted the students' cultural behaviour. The majority of the respondents affirmed that its contents were related to the students' cultural behaviour. Therefore, the degree of performance in the above Table 2.2 indicates the overall positive impact and enriching effect the Arabic Language curriculum exercises on its students' personal development. However, since the majority of respondents were local students, the result only reflects the opinion of this specific group and cannot be generalized to reflect the opinion of foreign students. If the majority of Arabic Language students consisted of foreign students, the result may have varied significantly.

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Some Studies on Strength Properties of Light Weight Cinder Aggregate Concrete

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Abstract- In this present experimental investigation an attempt is to be made to study the strength properties of light weight cinder aggregate cement concrete in different percentage proportions of 0, 25, 50, 75 and 100 by volume of light weight aggregate concrete can be prepared. By using this the properties such as compressive strength, split tensile strength, modulus of elasticity, density and shear stress etc., are studied by casting and testing around 105 samples consisting 15 no of plain cube specimens of size 150 x 150 x 150mm, 60 no of (Double Centered Notch) DCN specimens of size 150x150x150mm and 30 no of cylinders of size 150mm dia. and 300mm height.

Index Terms- Cinder, light weight aggregate, compressive strength, tensile strength, density, DCN specimens and Youngs modulus

I. INTRODUCTION

The advancement in the new construction materials has lead to develop high strength materials, which are generally selected to reduce the weight of the construction. Also the developments in the stress analysis methods enable a more reliable determination of local stresses in the materials, which permit safety factors to be reduced resulting in further weight savings. This induces low margins of safety for the structures designed with high strength materials. But the service stresses with aggressive environment may be high enough to induce cracks, particularly if pre existing flaws or high stress concentrations are present within the materials. As the residual strength of any structural material under the presence of cracks is low, when small cracks exists, the structures designed with high strength materials may fail at stresses below the highest service stresses for which they are designed.

II. REVIEW OF LITERATURE

A brief review of available studies related to the present strength properties of cementitious materials is presented.

According to Clarke, J.L (1) Tensile strength of concrete is important when considering cracking. Light weight aggregate concrete presents a flexural and tensile splitting strength slightly inferior to that of normal weight concrete of the same compressive strength.

Thorenfeldt, E reported that (2) Light Weight Aggregate Concrete has a faster hardening factor in the initial setting phase than conventional concrete, normally

reaching 80 % of the 28 day strength within 7 days. The strength growth from 28 to 90 days is generally low and decreases with increasing concrete strength level. This is assumed to be a consequence of the strength limiting effect of the light weight aggregate.

As per Bryan, Dennis. S. P (3), Natural lightweight aggregates may be defined as inherently low density natural mineral materials. The primary user is the construction industry where weight reduction equates to cost savings. Principal products in which natural lightweight aggregate is utilized because of its lower density include lightweight Portland cement concrete and lightweight concrete masonry units. In addition, due to location, some natural lightweight aggregates compete with normal weight constructions aggregates for uses such as road base and common backfill material.

P.S. Raghuprasad, et.al (4), concluded that with the advent of industrial revolution and mass construction in various parts of the world, the pollution levels and the scarcity of materials have reached the peak. The coarse aggregate in the conventional solid concrete blocks were replaced partially with cinder (12 mm) and tested for compressive strength at the age of 3 days, 7 days and 21 days. From the results of investigation, it can be concluded that solid blocks with 15% replacement of coarse aggregate by cinder records more strength than the conventional one.

M. A. Caldarone and R. G. Burg (5), Structural lightweight concrete is defined as concrete made with low-density aggregate having an air-dry density of not more than 115 lb/ft³ (1850 kg/m³) and a 28-day compressive strength of more than 2500 psi (17.2 MPa). This paper presented the test results of very low-density structural lightweight concrete mixtures developed in the laboratory for the purpose of finding a suitable mixture for use on a historic building rehabilitation project. Mixture parameters included a specified compressive strength of 3000 psi at 28 days and an air-dry density approaching 70 lb/ft³. Various constituent materials, mixture proportions and curing methods were examined. The result of this research exemplifies the feasibility of achieving very low densities with structural concretes.

Watekins and Liu (6) conducted the finite element analysis technique simulating in-plane shear mode, Mode II, was used to analyse fracture behaviour in a short shear beam specimen in plain concrete and fracture toughness, K_{IIC} values were determined.

Owens, P.L. (7) had stated that Light weight aggregate concrete was used for structural purposes since the 20th

century. As per this study, the Light weight aggregate concrete is a material with low unit weight and often made with spherical aggregates. The density of structural Light weight aggregate concrete typically ranges from 1400 to 2000 kg/m³ compared with that of about 2400 kg/m³ for normal weight aggregate concrete.

N. Siva lingaRao, et.al (8), concluded that 60 percent replacement of conventional aggregate with cinder by volume along with cement replaced by 10 percent of silica fume by weight, yields the target mean strength of M20 concrete. It is worth to be noted that there is a slight increase in strength and other properties due to extended curing periods and the unit weight of the cinder concrete is varying from 1980Kg/m³ to 2000Kg/m³ with different percentages of cinder. It is also noted that there is a decrease in density after extended curing periods.

Prakash Desayi, Raghu Prasad B.K, and Bhaskar Desai.V, (9,10,11,12,13 & 14) arrived at Double Central Notched specimen geometry which fails in predominant Mode-II failure. They also made finite element analysis to arrive at stress intensity factor. Using this DCN geometry lot of experimental investigation using cement paste, mortar, plain concrete was carried out. Details of this geometry are presented in fig. 3.

III. MATERIAL PROPERTIES

The materials used in the present investigation are Ordinary Portland cement of 53 grade having a specific gravity of 3.07 with initial and final setting times of 33 minutes and 489 minutes respectively. Locally available river sand passing through IS 4.75mm sieve with specific gravity 2.6 and fineness modulus 4.10 is used. Natural granite aggregate passing through IS 20mm sieve with specific gravity 2.68 and compacted density 1620 Kg/m³ is used. Cinder passing through IS 20mm sieve with specific gravity 2.05 and compacted density 1050 Kg/m³ is used as aggregate. A view of constituent materials is shown in plate. 1

3.1 PROPERTIES OF CINDER:

The surface of the cinder is usually rough and highly porous due to mineral structure. No physical testing is usually performed to quantify the angularity of the material, however it is visually classified as having 100% crushed face. The water absorption for cinder is around 1.5%. This significant difference is thought to be the main reason of reduction in strength and durability of concrete made with cinder. Low specific gravity of cinder in comparison with natural aggregate resulted in the concrete made with cinder to be lighter than normal concrete.

IV. EXPERIMENTAL INVESTIGATION

An experimental study has been conducted on concrete with partial replacement of conventional coarse aggregate by another light weight aggregate i.e. Cinder with few different volumetric fractional additions ranging from 0% to 100%. Concrete of M₂₀ design mix is used in the present investigation. In addition to presenting conventional strength properties such as cube compressive strength, split tensile strength, modulus of elasticity by casting and testing standard cubes and cylinders. Mode-II fracture studies are also conducted and results are presented; making use of cinder aggregate in different proportion.

4.1 CASTING OF SPECIMENS:

The M₂₀ concrete mix is designed using ISI method which gives a mix proportion of 1:1.55:3.04 with water cement ratio of 0.50. Five different mixes which are designated as follows:

TABLE: 1.

Name of the Mix	Replacement of Coarse Aggregate by Volume percentage		No of specimens cast
	Natural Aggregate	Cinder Aggregate	
C-0	100	0	21
C-25	75	25	21
C-50	50	50	21
C-75	25	75	21
C-100	0	100	21
		Total	105

To proceed with the experimental program initially steel moulds of size 150x150x150 mm were cleaned brushed with machine oil on all inner faces to facilitate easy removal of specimens afterwards. First fine aggregate and cement were added and mixed thoroughly and then conventional coarse aggregates with partially replaced Cinder was mixed with them. All of these were mixed thoroughly by hand mixing. Each time 3 no of cubes, 12 no of DCN specimens and 6 no of cylinders were cast. The notch depths provided were 45,60,75 and 90mm running throughout the width of the specimen. Thus the values of a/w ratio were 0.3, 0.4, 0.5, and 0.6 where 'a' is the notch depth and 'w' is the specimen depth 150mm. The distance between the notches is kept constant at 50mm and width of the notch was 2mm. The two supports in the form of square steel bars were formed throughout the width of the specimen slightly away from the notches. The load was applied within the notches.

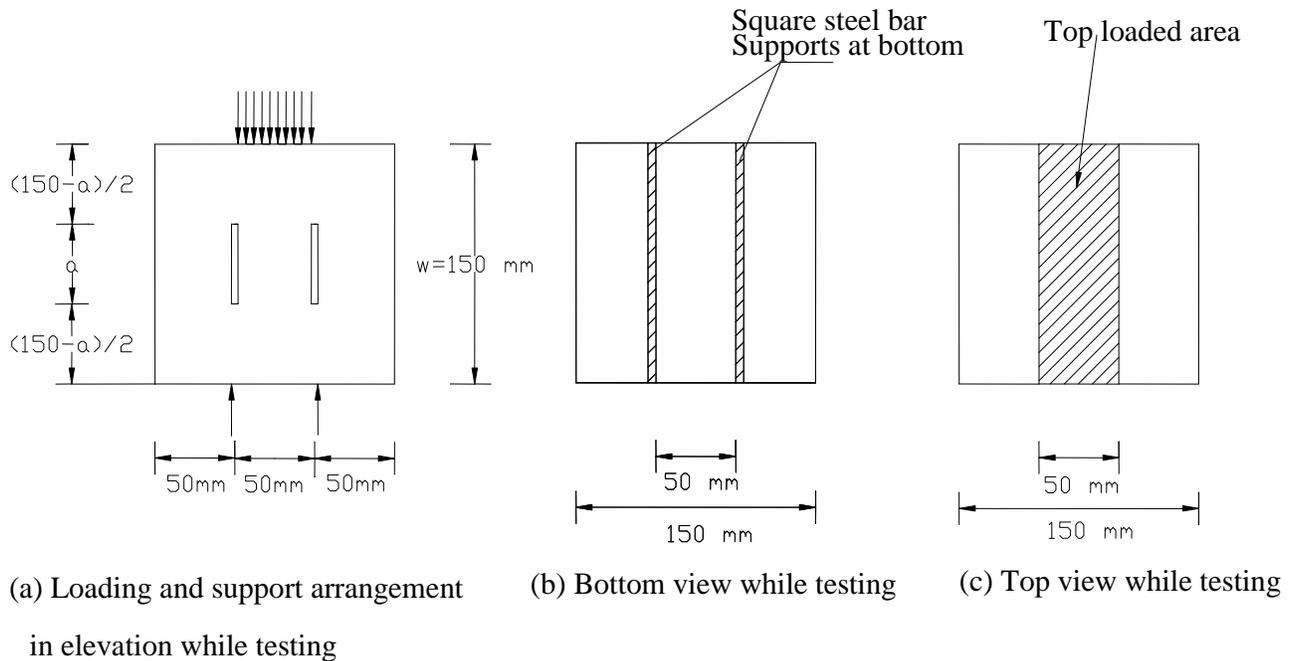


FIG.1. DETAILS OF DCN TEST SPECIMEN GEOMETRY

For all test specimens, moulds were kept on the plat form and the concrete was poured into the moulds in three layers each layer being compacted thoroughly with tamping rod to avoid honey combing. Finally all specimens were vibrated on the table vibrator after filling up the moulds up to the brim. The vibration was effected for 7 seconds and it was maintained constant for all specimens and all other castings. However the specimens were demoulded after 24 hours of casting and were kept immersed in a clean water tank for curing. After 28 days of curing the specimens were taken out of water and were allowed to dry under shade for few hours.

V. TESTING OF SPECIMENS

The cube and cylindrical specimen is kept vertically between the compressive plates of the testing machine. The load is applied uniformly until the specimens fails, and ultimate loads are recorded. The test results of cube and cylinder compressive strengths are furnished in table 2 and 3 respectively. This test setup is presented in plate 2 & 4 respectively. An attempt to find out the modulus of elasticity has been done by the 3000KN automatic compression testing machine with 0.5KN/sec rate of loading. The results of modulus of elasticity are furnished in table no 6. The cylindrical specimen was kept horizontally for finding the split tensile strength. The test setup is shown in plate 6. The compression test on the DCN cubes was conducted on 3000KN digital compression testing machine. The rate of loading applied is 0.5 KN/sec. For testing DCN specimens of size 150x150x150mm, notches were introduced at one third portion centrally as shown in fig. 1 during casting. The loading arrangement along with frame setup used for DCN specimen is shown in plate 8. Uniformly distributed load

was applied over the central one third part between the notches and square cross section steel supports were provided at bottom along the outer edges of the notches, so that the central portion could get punched/sheared through along the notches on the application of loading.

5.1 DISCUSSION OF CRACK PATTERN AND TEST RESULTS:

In case of cubes under compression test initial cracks are developed at top and propagated to bottom with increase in load and then the cracks are widened at failure along the edge of the cube and more predominantly along the top side of casting and failure of the specimen as shown in plate 3. In case of cylinders under compression cracks are developed at top and bottom and with increase in load the cracks are widened at central height and the test set of specimen as shown in plate 5. In case of cylinders subjected to split tensile strength the cylinder is splitted into two pieces and the failure of the specimen as shown in plate 7. The failure of the DCN specimen are presented in plate 9 and crack patterns obtained for DCN specimen geometry for the four notch depths and cement concrete mixes are presented in Plates 10 to 14. During testing, for most of the specimens initial hair line cracks started at the top of one or both the notches, and as the load was increased further, the cracks widened and propagated at an inclination and sometimes to the middle of the top loaded zone. Simultaneously the cracks formed at the bottom of one or both the notches and propagated downwards at visible inclination. In some cases cracks branched into either side at the two edges of the supporting square bar at the bottom or at the edge of the loaded length at top or at both places.

5.1.1 INFLUENCE OF CINDER ON CUBE COMPRESSIVE STRENGTH:

The variation of compressive strengths and percentage of increase or decrease verses percentage of Cinder addition are shown in fig.2 and it is observed that with the addition of Cinder the cube compressive strength decreases continuously up to 100% replacement of Granite by Cinder, but more than the target mean strength of M₂₀ concrete i.e., 26.6 N/mm² has been achieved even when the natural granite aggregate is replaced with 75% of cinder aggregate as tabulated in table 2. In addition for C-100 mix, the design strength of M₂₀ concrete is achieved.

5.1.2 INFLUENCE OF CINDER ON CYLINDER COMPRESSIVE STRENGTH:

The variation of compressive strengths and percentage of increase or decrease verses percentage of Cinder addition are as shown in fig 3 and it is observed that with the addition of Cinder the cylinder compressive strength decreases continuously up to 100% replacement of Granite by Cinder as tabulated in table 3. The ratios of cube and cylinder compressive strengths are tabulated in table 4.

5.1.3 INFLUENCE OF CINDER ON SPLIT TENSILE STRENGTH ON CYLINDER SPECIMENS:

With increase in percentage of replacement of granite by Cinder aggregate, the split tensile strength is found to decrease continuously up to 100% as shown in fig 4, and the values are tabulated in table no .5

5.1.4 INFLUENCE OF CINDER ON YOUNG’S MODULUS (E):

With increase in percentage of replacement of granite by Cinder aggregate, the E value is found to decrease continuously up to 100% as shown in fig 5 & 6. These values are tabulated in table no 6. The youngs modulus is calculated by two approaches. i.e. by I.S.Code method¹⁵ and using an

empirical formula for light weight concrete¹⁶. The values calculated using both these approaches are observed to match more or less satisfactorily.

5.1.5 INFLUENCE OF CINDER ON DENSITY:

The variation of density and percentage of increase or decrease in density verses percentage of Cinder are shown in fig 7. From the fig, it is observed that with the addition of Cinder the density of the specimens decreases continuously up to 100% replacement of Granite by Cinder, and the values are tabulate in table no 7.

5.1.6 INFLUENCE OF CINDER ON IN-PLANE SHEAR STRENGTH:

All the DCN specimens with different a/w ratios i.e., 0.3, 0.4, 0.5, and 0.6 and with different percentages of cinder i.e., 0%, 25%, 50%, 75%, 100%, were tested with load in Mode-II (in-plane shear).

- a) The variations of ultimate loads and the % of increase or decrease in ultimate loads versus percentage of cinder are presented in the fig 8 and percentage of decrease in ultimate load are presented in fig 9. These are presented for different a/w ratios (i.e., 0.3, 0.4, 0.5, 0.6). From these diagrams it is observed that with the increase in percentage of cinder and a/w ratio ultimate load decreases and also percentage decrease in ultimate load is increasing.
- b) Super-imposed variations of ultimate shear stress, percentage increase or decrease in ultimate stress in in-plane shear Versus percentage of cinder for different a/w ratios (i.e., 0.3,0.4,0.5,0.6) is presented in fig 10. It is observed that the in plane shear stress at ultimate load is decreased with increasing percentage of cinder.

TABLE 2: CUBE COMPRESSIVE STRENGTH RESULTS

S.No	Name Of The Mix	Percentage Volume Replacement Of Coarse Aggregate (%)		Compressive Strength (N/mm ²)	Percentage Of Increase Or Decrease In Compressive Strength
		Natural Aggregate	Cinder Aggregate		
1.	C-0	100	0	41.08	0.00
2.	C-25	75	25	34.03	-17.16
3.	C-50	50	50	30.49	-25.78
4.	C-75	25	75	27.49	-33.08
5.	C-100	0	100	24.53	-40.29

TABLE 3: CYLINDER COMPRESSIVE STRENGTH RESULTS

S.No	Name of the mix	Percentage Volume Replacement Of Coarse Aggregate (%)		Cylinder compressive strength (N/mm ²)	Percentage Of Increase Or Decrease In Compressive Strength
		Natural Aggregate	Cinder Aggregate		
1.	C-0		0	28.01	0.00
2.	C-25		25	22.52	-19.60

3.	C-50		50	20.60	-26.45
4.	C-75		75	15.51	-44.63
5.	C-100		100	15.00	-46.45

TABLE 4: RATIO OF CYLINDER COMPRESSIVE STRENGTH TO CUBE COMPRESSIVE STRENGTH

S.No	Name of the mix	% of Cinder	Cylinder compressive strength (N/mm ²)	Cube compressive strength (N/mm ²)	Ratio of cylinder to cube compressive strength
1.	C-0	0	28.01	41.08	0.68
2.	C-25	25	22.52	34.03	0.66
3.	C-50	50	20.60	30.49	0.68
4.	C-75	75	15.51	27.49	0.56
5.	C-100	100	15.00	24.53	0.61

TABLE 5: SPLIT TENSILE STRENGTH RESULTS

S.No	Name of the mix	Percentage volume replacement of coarse aggregate (%)		Split tensile strength (N/mm ²)	Percentage of Increase or Decrease in split tensile strength
		Natural aggregate	Cinder aggregate		
1.	C-0	100	0	3.58	0.00
2.	C-25	75	25	3.11	-13.13
3.	C-50	50	50	2.93	-18.16
4.	C-75	25	75	2.63	-26.54
5.	C-100	0	100	2.38	-33.52

TABLE 6: YOUNG'S MODULUS

S. No	Name of the mix	Percentage volume replacement of coarse aggregate (%)		Young's modulus $E=5000\sqrt{f_{ck}}$ (N/mm ²)	Young's modulus $E=k_1k_2 \times 1.486 \times 10^{-3} \times \sigma_b^{1/2} \times \gamma^2$ (N/mm ²) $K_1=0.95, K_2=1.026$
		Natural aggregate	Cinder aggregate		
1.	C-0	100	0	3.20×10^4	3.28×10^4
2.	C-25	75	25	2.92×10^4	2.93×10^4
3.	C-50	50	50	2.76×10^4	2.61×10^4
4.	C-75	25	75	2.62×10^4	2.45×10^4
5.	C-100	0	100	2.48×10^4	2.15×10^4

TABLE 7: DENSITY RESULTS

S.No	Name of the mix	Percentage volume replacement of coarse aggregate (%)		Density (kg/m ³)	Percentage Of Increase Or Decrease In Density
		Natural aggregate	Cinder		
1.	C-0	100	0	2563	0.0
2.	C-25	75	25	2501	-2.42
3.	C-50	50	50	2402	-6.28

4.	C-75	25	75	2366	-7.69
5.	C-100	0	100	2262	-11.74

TABLE 8: ULTIMATE LOAD IN MODE-II FOR DCN SPECIMENS WITH a/w RATIOS = 0.30, 0.40, 0.50, 0.60.

S.No	Name of mix	% volume replacement of coarse aggregate		a/w=0.30		a/w=0.40		a/w=0.50		a/w=0.60	
				Ultimate load (KN)	% increase or decrease in ultimate load	Ultimate load (KN)	% increase or decrease in ultimate load	Ultimate load (KN)	% increase or decrease in ultimate load	Ultimate load (KN)	% increase or decrease in ultimate load
		Natural	Cinder								
1.	C-0	100	0	144.00	0.00	105.00	0.0	83.00	0.0	62.00	0.0
2.	C-25	75	25	125.67	-12.73	104.00	-0.95	81.33	-2.01	56.67	-8.60
3.	C-50	50	50	104.33	-27.55	87.00	-17.14	72.33	-12.86	50.33	-18.82
4.	C-75	25	75	96.67	-32.87	67.00	-36.19	50.33	-39.36	38.33	-38.18
5.	C-100	0	100	69.00	-52.08	58.00	-44.76	48.00	-42.17	29.00	-53.23

TABLE 9: IN-PLANE SHEAR STRESS AT ULTIMATE LOAD FOR DCN SPECIMENS WITH a/w RATIOS = 0.30, 0.40, 0.50, 0.60.

S.No	Name of mix	% volume replacement of coarse aggregate		a/w=0.30		a/w=0.40		a/w=0.50		a/w=0.60	
				Ultimate load (KN)	In-plane shear stress in N/mm ²	Ultimate load (KN)	In-plane shear stress in N/mm ²	Ultimate load (KN)	In-plane shear stress in N/mm ²	Ultimate load (KN)	In-plane shear stress in N/mm ²
		Natural	Cinder								
1.	C-0	100	0	144.00	4.57	105.00	3.89	83.00	3.69	62.00	3.45
2.	C-25	75	25	125.67	3.99	104.00	3.85	81.33	3.61	56.67	3.15
3.	C-50	50	50	104.33	3.31	87.00	3.22	72.33	3.21	50.33	2.80
4.	C-75	25	75	96.67	3.07	67.00	2.48	50.33	2.24	38.33	2.13
5.	C-100	0	100	69.00	2.19	58.00	2.15	48.00	2.13	29.00	1.61

PLATES



PLATE 1: INGREDIENTS OF CONCRETE



PLATE 4: TEST SET UP FOR CYLINDER COMPRESSIVE STRENGTH BEFORE TESTING

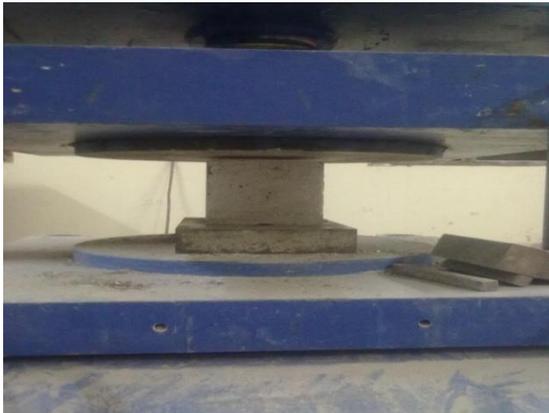


PLATE 2: TEST SETUP FOR CUBE COMPRESSIVE STRENGTH TEST BEFORE TESTING



PLATE 5. VIEW SHOWS THE CYLINDER AFTER TESTING



PLATE 3: VIEW SHOWS THE CUBE COMPRESSIVE STRENGTH TEST AFTER TESTING



PLATE 6: TEST SET UP FOR CYLINDER SPLIT TENSILE STRENGTH BEFORE TESTING



PLATE 7. VIEW SHOWS THE SPLIT TENSILE STRENGTH AFTER TESTING



PLATE 8. TEST SET UP FOR MODE-II FRACTURE



PLATE 9. VIEW SHOWS THE MODE-II FAILURE OF NOTCHED CUBE



PLATE 10. VIEW SHOWS THE CRACK PATTERNS AFTER TESTING OF C-0 SPECIMENS

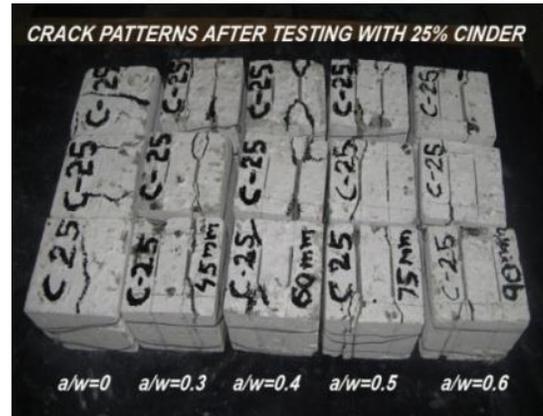


PLATE 11. VIEW SHOWS THE CRACK PATTERNS AFTER TESTING OF C-25 SPECIMENS

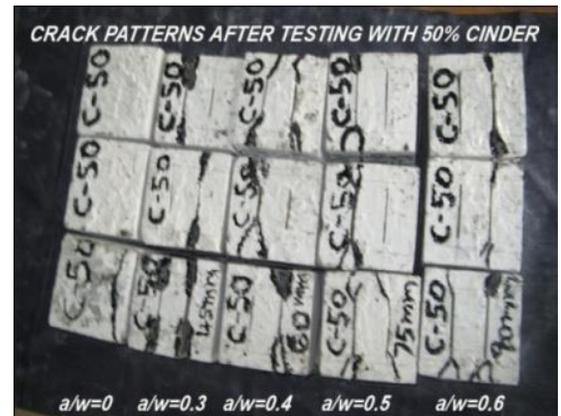


PLATE 12. VIEW SHOWS THE CRACK PATTERNS AFTER TESTING OF C-50 SPECIMENS

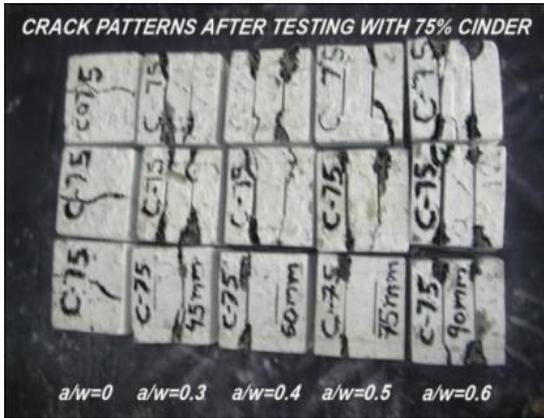


PLATE 13. VIEW SHOWS THE CRACK PATTERNS AFTER TESTING OF C-75 SPECIMENS

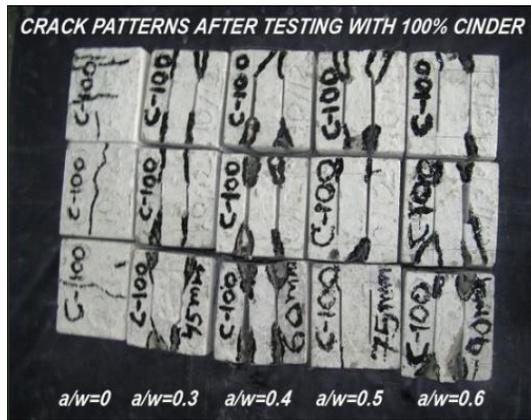


PLATE 14. VIEW SHOWS THE CRACK PATTERNS AFTER TESTING OF C-100 SPECIMENS

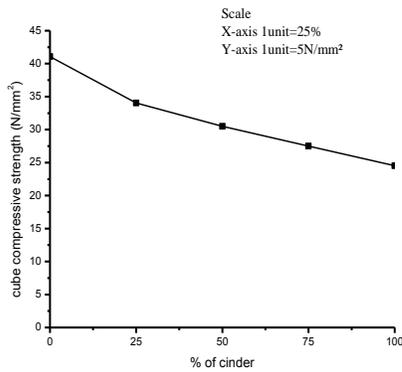


FIG 2: VARIATION BETWEEN CUBE COMPRESSIVE STRENGTH AND PERCENTAGE REPLACING NATURAL AGGREGATE BY CINDER AGGREGATE

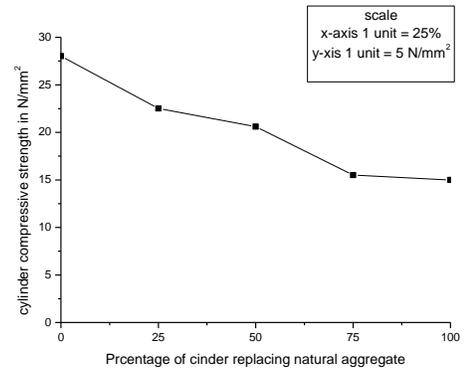


FIG 3: VARIATION BETWEEN CYLINDER COMPRESSIVE STRENGTH AND PERCENTAGE REPLACING NATURAL AGGREGATE BY CINDER AGGREGATE

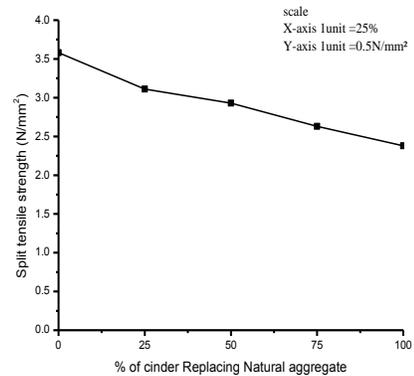


FIG 4: VARIATION BETWEEN SPLIT TENSILE STRENGTH AND PERCENTAGE REPLACING NATURAL AGGREGATE BY CINDER AGGREGATE

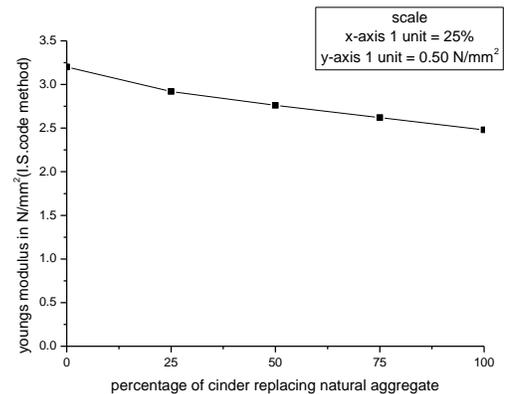


FIG 5: VARIATION BETWEEN YOUNGS MODULUS AND PERCENTAGE REPLACING NATURAL AGGREGATE BY CINDER AGGREGATE (I.S.CODE METHOD)

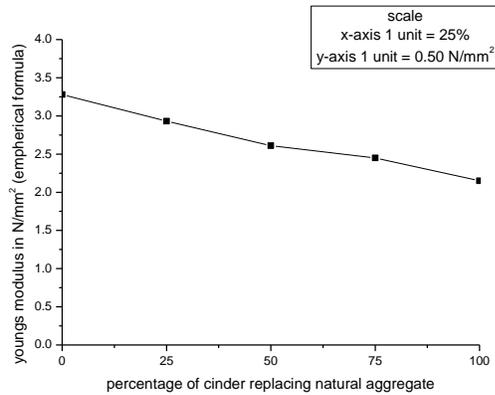


FIG 6: VARIATION BETWEEN YOUNGS MODULUS AND PERCENTAGE REPLACING NATURAL AGGREGATE BY CINDER AGGREGATE

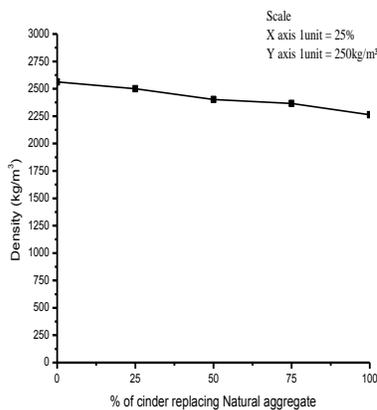


FIG 7: VARIATION BETWEEN DENSITY AND PERCENTAGE REPLACING NATURAL AGGREGATE BY CINDER AGGREGATE

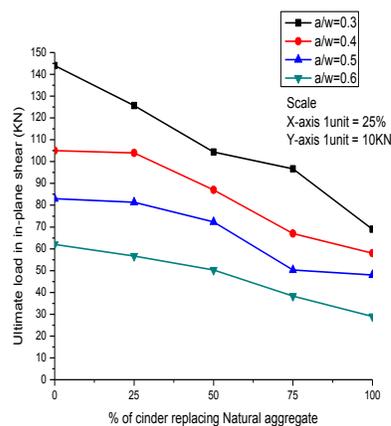


FIG 8: VARIATION BETWEEN ULTIMATE LOAD IN IN-PLANE SHEAR AND % OF CINDER REPLACING NATURAL AGGREGATE WITH a/w RATIOS =0.3,0.4,0.5,0.6

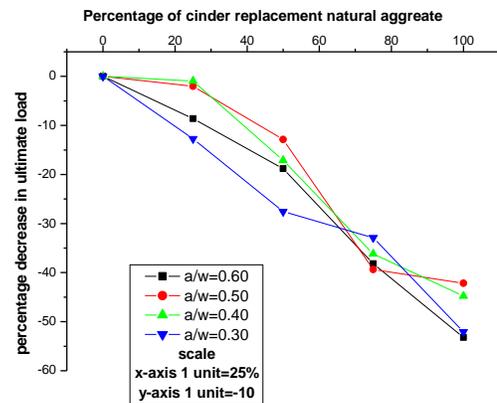


FIG 9: VARIATION BETWEEN PERCENTAGE OF ULTIMATE LOAD IN IN-PLANE SHEAR AND % OF CINDER REPLACING NATURAL AGGREGATE WITH a/w RATIOS =0.3,0.4,0.5,0.6

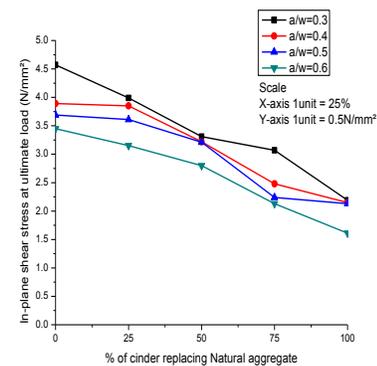


FIG 10: SUPER IMPOSED VARIATION BETWEEN IN-PLANE SHEAR STRESS AT ULTIMATE LOAD AND % OF CINDER REPLACING NATURAL AGGREGATE WITH a/w=0.3,0.4,0.5,0.6

VI. CONCLUSIONS

From the limited experimental study of the following conclusions are seen to be valid:

1. From the study it is concluded that the cube compressive strength is decreased continuously with the increase in percentage of cinder and also the percentage of decrease in cube compressive strength is increased continuously with increasing cinder. However even with 75% replacement of conventional aggregate by cinder aggregate more than target mean strength of concrete is achieved.
2. From the study it is concluded that the cylinder compressive strength is decreased continuously with the increase in percentage of cinder and also the percentage of decrease in cylinder compressive strength is increased continuously with increasing cinder.
3. From the study it is concluded that the split tensile strength is decreased continuously with increase in percentage of cinder and also the percentage of decrease

in split tensile strength is increased continuously with increasing cinder

4. From the study it may be concluded that the young's moduli have decreased continuously with the increase in percentage of cinder
5. From the analysis of test results it is concluded that the results arrived from I.S.code formula are satisfactorily matching with the results arrived from the empirical formula.
6. From the study it may be concluded that the densities have decreased continuously with the increase in percentage of cinder.
7. The cinder aggregate is no way inferior to the natural aggregate.

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Robust Watermarking Technique using Hybrid Wavelet Transform Generated from Kekre Transform and Discrete Cosine Transform

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Abstract- This paper presents a novel image watermarking technique using Kekre's algorithm to generate hybrid wavelet transform DKT_DCT from Kekre transform and Discrete Cosine Transform. In the proposed technique, 256x256 hybrid transform is generated using 16x16 Kekre transform and 16x16 DCT whereas, 128x128 hybrid wavelet transform is generated using 32x32 Kekre transform and 4x4 DCT matrix. Generated DKT_DCT transform is applied to host and watermark in three different ways: column wise, row wise and full transform. Performances of these three ways of applying transform are compared against various image processing attacks namely image cropping, image compression, adding noise and image resizing attacks. Column DKT_DCT transform is most robust for compression and resizing attack whereas row DKT_DCT wavelet transform is most robust for cropping, JPEG compression attack and binary distributed run length noise attack for increased run length. Column and row DKT_DCT transform show exceptionally better performance than full DKT_DCT wavelet transform. Also column DKT_DCT transform is observed to be better than column DCT wavelet transform for above mentioned attacks and row DKT_DCT wavelet is better than row DCT wavelet for binary distributed run length noise attack showing the strength of hybrid wavelet transform over wavelet transform generated from same component orthogonal transform matrices.

Index Terms- Binary distribution, column transform, Gaussian distribution, hybrid wavelet transform, image watermarking, Kekre transform, row transform, run length noise.

I. INTRODUCTION

Due to well-developed image processing tools, altering digital contents or claiming ownership of digital contents is not difficult. Digital image watermarking is very popular technique of protecting ownership of digital data in today's world. In digital watermarking, hidden information about owner of digital contents is stored in the contents to be transmitted. According to domain used for hiding the watermark in digital images, it can be distinguished as spatial domain and frequency domain watermarking. In spatial domain, modifications are introduced in pixel values of an image directly. Hence it is easy to implement but also more susceptible to common image processing attacks as direct changes in pixel values can be easily sensed by human visual system. In frequency domain watermarking, image is first transformed using underlying transform and then these frequency coefficients are altered in order to embed the watermark. Discrete Cosine Transform (DCT) based watermarking techniques are proposed by Wai Chu in [1], by Adrian G. Bors and Ioannis Pitas in [2], and by Rajesh Kannan Megalingam et. Al in [3]. Dr. B. Eswara Reddy et. Al in [4], Nagaraj V. Dharwadkar & B. B. Amberker in [5] and Yiwei Wang et. Al in [6] have presented Discrete Wavelet Transform (DWT) based image watermarking while Ruizhen Liu and Tieniu Tan in [7] and Bhagyshri Kapre et. Al in [8] have proposed Singular Value Decomposition (SVD) based watermarking. Mix of these transforms is also widely used in watermarking. While embedding watermark in transformed host images, normally low frequency coefficients are not selected because they carry maximum energy of an image and thus represent smoothness of image. Hence changes to these low frequency components can be easily detected by human visual system. On the other hand, changes to the frequency coefficients which correspond to texture and edges of an image are not easily detected by human visual system. Therefore, such high frequency coefficients are selected for watermark embedment. However these high frequency coefficients are easily eliminated under certain attacks like lossy compression performed on watermarked images. Hence in transform domain watermarking, the trend is to select middle frequency coefficients for embedding the watermark which makes the watermark invisible and also withstands various image processing attacks thereby making it robust.

In proposed method, the hybrid wavelet transform DKT_DCT, generated from Discrete Kekre Transform (DKT) [9] and DCT is used. 256x256 size and 128x128 size DKT_DCT transform matrix is generated from (16, 16) size and (32, 4) size DKT and DCT matrices respectively. Column wise, row wise and full transform of host and watermark images is taken. Middle frequency coefficients are selected to embed the watermark. To improve the imperceptibility, compressed watermark is embedded after normalizing and scaling. Robustness of proposed technique is tested against cropping, compression, resizing and noise addition attacks. Remaining paper is organized as follows. Section II gives review of related work in watermarking field. Section III briefly

describes Kekre transform and Hybrid wavelet transform. Section IV presents proposed watermarking method. Section V comments on performance of proposed technique against various image processing attacks. Section VI ends the paper with conclusion.

II. RELATED WORK

Yan Dejun, Yang Rijng, Li Hongyan, and Zheng Jiangchao in [10] proposed a robust digital image watermarking technique based on Singular Value Decomposition (SVD) and Discrete Wavelet Transform (DWT). Spatial relationship of visually recognizable watermark is scattered using Arnold transform. Further, security is enhanced by performing chaotic encryption using chaotic Logistic Mapping. Host image is decomposed into four frequency bands using wavelet decomposition. LL frequency band is decomposed into non-overlapping 4x4 blocks and SVD is applied to each block. Largest singular value of each block is modified with the help of watermark. Inverse SVD followed by inverse DWT is applied to get watermarked image. Reverse steps are followed to recover the watermark from watermarked image. PSNR and Normalized Cross Correlation (NCC) are the metrics used to measure imperceptibility and robustness of the technique. In [11], Yan Dejun, Yang Rijng, Yu Yuhai and Xin Huijie proposed a blind image watermarking scheme based on intermediate significant bit and DWT. The DWT is used to embed the formatted watermark into the host image. In order to maintain the image quality and robustness, the watermark is embedded into the significant bit-plane of the LL sub band. While embedding watermark within the 8th bit-plane (Least significant bits) gives best image quality, embedding within the 1st bit-plane (Most significant bits) gives worst image quality. Through experiments, the 4th bit-plane of the LL sub band is selected to insert watermark, so that, the image quality is acceptable, and the bit in which the watermark is embedded will be kept after JPEG-2000 compression. A novel semi-fragile watermarking scheme in DWT domain for image authentication and tamper localization is proposed in [12] by Wei Wang, Aidong Men, Bo Yang. Watermark is generated from LL1 component of two level wavelet decomposed image. Image feature matrix is calculated using HL2, LH2 and HH2 sub-bands. Using this feature matrix and adaptive threshold, watermark is generated. Logistic map is used to encrypt the watermark. Middle frequency sub-bands are divided into 2x2 non-overlapping blocks. A secret key is used to determine the embedding positions in order to increase the security. To embed one bit of watermark relationship among two bits of 2x2 blocks is adjusted. By comparing extracted watermark and extracted feature matrix of an image this scheme was able to distinguish malicious attacks from non-malicious tampering of image contents. In [13], Olcay Duman and Olcay Akay presented watermark embedding and detecting method for blind and robust digital image watermarking. Host image is decomposed into four frequency bands using DWT. HL sub band is used for watermark embedding. HL band is divided into 8x8 blocks and Fractional Fourier Transform (FrFT) is applied to each block. The orders of FrFT are used as encryption keys in extraction process. Two separate pseudorandom sequences are generated according to standard normal distribution. Binary watermark is then inserted into host image by multiplying these sequences by gain factor and adding it to FrFT coefficients of HL2 band. In [14], a novel watermarking scheme for image authentication in DWT domain is presented by Chuanmu Li and Haiming Song. In this scheme, the binary watermark is generated by a chaotic map. Using a secret key, some perceptually significant coefficients from detail sub-bands of 3-level DWT of the host image are selected. The watermark is embedded by adjusting the values of ordered coefficients in different orientation. The scheme is invisible and robust against various image processing attacks. A robust multiwatermarking scheme was proposed by Yaxun Zhou, Wei Jin in [15]. According to their scheme, three independent binary watermarks are embedded in a grayscale digital image. To embed multi-watermarks simultaneously, to improve the quality of watermarked image and robustness of extracted watermarks, the three 2-D watermarks were first recombined into a 3-D watermarking sequence. The approximation sub image of the original digital image in the Discrete Wavelet Transform (DWT) domain was decomposed into non-overlapping blocks and the blocks with best abundant texture information were selected according to the size of binary watermark. Finally, the multi-watermark embedding was carried out by modifying the fractional part values of these selected block pixels based on the proposed discrete operation rule. It was observed that, one of multi-watermarks is robust enough against the common image processing such as noise addition, filtering, and JPEG compression, while the other two watermarks are immune to any image attacks. In [16], Bhagyshri Kapre and M. Y. Joshi proposed a DWT-SVD based watermarking scheme in YUV color space of image. In their proposed scheme, image is decomposed into RGB color space and then converted into YUV color space. Y components are then subjected to wavelet decomposition. Each band obtained after wavelet decomposition is subjected to SVD. These singular values are used to embed watermark. Image is converted to RGB color space after embedding watermark. Robustness is tested against attacks like salt and paper noise, cropping and histogram equalization. Kaushik Deb, Md. Sajib Al-Seraj, Md. Moshikul Hoque and Md. Iqbal Hasan Sarkar proposed combined DWT-DCT based watermarking technique for copyright protection in [17]. In the proposed method, watermark bits are embedded in the low frequency band of each DCT block of selected DWT sub-band. The weighted correction is also used to improve the imperceptibility. The extracting procedure is reverse of the embedding operations without the reference of the original image. A robust and geometric invariant digital watermarking scheme for gray-level images is proposed in [18] by Xiao-Chen Yuan and Chi-Man Pun. The scheme carries out watermark embedding and extraction based on histogram in DWT domain. For watermark embedding, the original image is decomposed into the approximation and details sub-bands. Pixels of the approximation sub-band are grouped into m blocks, each of which has the same number of intensity levels, thus the block histogram is generated; with the block histogram, pixels are moved to form a specific pattern in the intensity-level histogram distribution, indicating the watermark. For watermark extraction, the watermarked image is decomposed into the approximation and details sub-bands; then the pixels in the approximation sub-band are grouped into blocks in the similar manner. According to the histogram distribution in each block, the watermark is extracted.

H. B. Kekre, Tanuja Sarode, Shachi Natu presented a DWT-DCT-SVD based hybrid watermarking method for color images in [19]. In their method, robustness is achieved by applying DCT to specific wavelet sub-bands and then factorizing each quadrant of

frequency sub-band using singular value decomposition. Watermark is embedded in host image by modifying singular values of host image. Performance of this technique is then compared by replacing DCT by Walsh in above combination. Walsh results in computationally faster method and acceptable performance. Imperceptibility of method is tested by embedding watermark in HL2, HH2 and HH1 frequency sub-bands. Embedding watermark in HH1 proves to be more robust and imperceptible than using HL2 and HH2 sub-bands. In [20] and [21] Kekre, Sarode, and Natu presented DCT wavelet and Walsh wavelet based watermarking techniques. In [20], DCT wavelet transform of size 256*256 is generated using existing well known orthogonal transform DCT of dimension 128*128 and 2*2. This DCT Wavelet transform is used in combination with the orthogonal transform DCT and SVD to increase the robustness of watermarking. HL2 sub-band is selected for watermark embedding. Performance of this proposed watermarking scheme is evaluated against various image processing attacks like contrast stretching, image cropping, resizing, histogram equalization and Gaussian noise. DCT wavelet transform performs better than their previously proposed DWT-DCT-SVD based watermarking scheme in [19] where Haar functions are used as basis functions for wavelet transform. In [21], Walsh wavelet transform is used that is derived from orthogonal Walsh transform matrices of different sizes. 256*256 Walsh wavelet is generated using 128*128 and 2*2 Walsh transform matrix and then using 64*64 and 4*4 Walsh matrix which depicts the resolution of host image taken into consideration. It is supported by DCT and SVD to increase the robustness. Walsh wavelet based technique is then compared with DCT wavelet based method given in [20]. Performance of three techniques is compared against various attacks and they are found to be almost equivalent. However, computationally Walsh wavelet was found preferable over DCT wavelet. Also Walsh wavelet obtained by 64*64 and 4*4 is preferable over DCT wavelet and Walsh wavelet obtained from corresponding orthogonal transform matrix of size 128*128 and 2*2. In [22], other wavelet transforms like Hartley wavelet, Slant wavelet, Real Fourier wavelet and Kekre wavelet were explored by H. B. Kekre, Tanuja Sarode and Shachi Natu. Performance of Slant wavelet and Real Fourier wavelet were proved better for histogram Equalization and Resizing attack than DCT wavelet based watermarking in [20] and Walsh wavelet based watermarking presented in [21].

III. KEKRE TRANSFORM AND HYBRID WAVELET TRANSFORM

Now it is the time to articulate the research work with ideas gathered in above steps by adopting any of below suitable approaches:

A. Kekre Transform

Kekre's transform matrix [23] has the advantage that it need not be of size having integer power of 2. It can be of any size NxN. All diagonal and upper diagonal elements of Kekre transform are 1 whereas; all lower diagonal elements except the elements just below the diagonal are zero. Kekre transform matrix of size 5x5 is shown below for example.

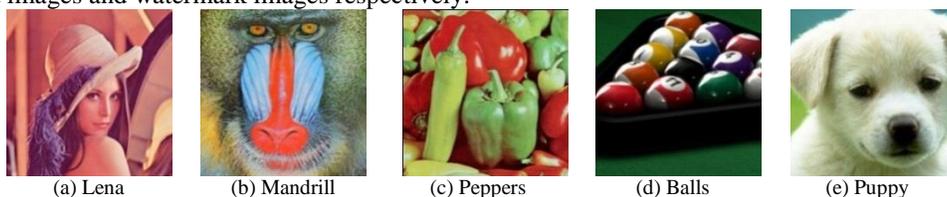
1	1	1	1	1
-4	1	1	1	1
0	-3	1	1	1
0	0	-2	1	1
0	0	0	-1	1

B. Hybrid Wavelet Transform

H. B. Kekre, Tanuja Sarode and Sudeep Thepade introduced the concept of hybrid wavelet transform in [24]. An idea behind use of hybrid wavelet transform is to explore the good properties of two different transforms by combining them into hybrid wavelet transform. Use of hybrid wavelet transforms generated from Discrete Cosine Transform, Discrete Walsh Transform, Discrete Hartley transform and Discrete Kekre transform have been explored by authors very successfully for image compression. Hybrid wavelet transform is also proved better in other image processing applications like image retrieval in [25] and biometrics applications like palm print identification in [26].

IV. PROPOSED TECHNIQUET

In the proposed technique, hybrid wavelet transform called Discrete Kekre Transform_Discrete Cosine Transform (DKT_DCT) is generated using Kekre transform and Discrete Cosine Transform as component orthogonal matrices. After trials for different combinations of DKT and DCT sizes, two combinations of DKT and DCT are selected for generation of DKT_DCT matrix. In order to generate 256x256 DKT_DCT transform matrix, both DKT and DCT of size 16x16 are chosen whereas, to generate 128x128 DKT_DCT matrix, DKT of size 32x32 and DCT of size 4x4 has been selected. Proposed technique has been experimented on ten 256x256 color bitmap images taken as host images and five 128x128 color bitmap images taken as watermarks. Figure 1 and Figure 2 below show these host images and watermark images respectively.



(a) Lena

(b) Mandrill

(c) Peppers

(d) Balls

(e) Puppy



Figure 1: Host images used for experimental work



Figure 2: Watermarks used for experimental work

A. Watermark Embedding Procedure:

- Step 1.** Separate the host image into its Red, Green and Blue channel and apply column DKT_DCT wavelet transform to each channel.
- Step 2.** Separate the watermark into its Red, Green and Blue channel and apply following steps to each channel and apply column DKT_DCT wavelet transform to each channel.
- Step 3.** Compress the watermark by compression ratio 2.67. This is maximum compression ratio for which image distortion is imperceptible.
- Step 4.** Normalize and then weight the watermark by suitable weight factor so as it increases the watermark strength and makes it visually imperceptible after embedment into host image. Weight factor selected in proposed method is 25.
- Step 5.** Embed this weighted normalized watermark in middle frequency band of corresponding channel of host image by replacing host image coefficients there.
- Step 6.** Take inverse column DKT_DCT wavelet to obtain watermarked image.
- Step 7.** Calculate average absolute pixel to pixel difference i.e. Mean Absolute Error (MAE) between host and watermarked image to measure the imperceptibility.

B. Watermark Extraction Procedure:

The reverse of embedding procedure is followed to recover the watermark from watermarked image. The watermarked image may also be subjected to image processing attack like cropping, compression, resizing or noise attack. Steps of extraction procedure are as follows:

- Step 1.** Separate the watermarked image into its Red, Green and Blue channel and apply following steps to each channel.
- Step 2.** Take column DKT_DCT wavelet transform of each channel of watermarked image.
- Step 3.** Extract the middle frequency coefficients of each plane of watermark from corresponding planes of watermarked image.
- Step 4.** Weight and then denormalize these coefficients using same weight factor and normalization coefficients used in embedding procedure.
- Step 5.** Take inverse column DKT_DCT transform of these extracted coefficients to recover the compressed watermark embedded in host image.
- Step 6.** Calculate average absolute pixel to pixel difference i.e. Mean Absolute Error (MAE) between embedded and extracted watermark to measure the robustness.

V. RESULTS OF PROPOSED TECHNIQUE

Figure 3 below shows watermarked images obtained by full, column and row DKT_DCT wavelet transform and watermarks extracted from them respectively. Various attacks are performed on watermarked images to test the robustness of proposed technique. It is observed that the MAE between original and compressed watermark in column DKT_DCT wavelet transform (MAE=15.40) is less than the MAE (MAE= 26.642) obtained when column DCT wavelet is used. This indicates that better compressed watermark is embedded in case of column DKT_DCT transform.

Host image	Original watermark	Compressed watermark	Watermarked images			Extracted watermark		
			Full transform	Column transform	Row transform	Full transform	Column transform	Row transform

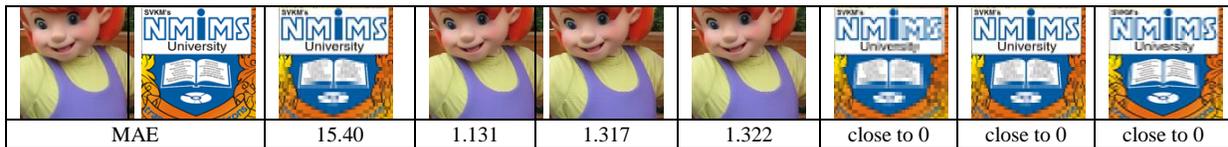


Figure 3: Original host and watermark images, compressed watermark and watermarked images and extracted watermarks using full, column and row DKT_DCT wavelet.

A. Attacks performed on watermarked images and their results:

Cropping:

Watermarked images are cropped at four corners with cropped portion of size 16x16 and 32x32. Also 32x32 size square is cropped at the center of watermarked image. Result images for host image ‘face’ and watermark ‘nmims’ are shown below for three types of cropping using full, column and row DKT_DCT wavelet transform. Figure 4 indicates that, row transform gives the smallest MAE value for extracted watermark. Also the MAE between watermarked and cropped watermarked image is smallest in case of row DKT_DCT wavelet which indicates better imperceptibility.

Attack	Watermarked image after attack			Extracted watermark from attacked watermarked image		
	Full transform	Column tr.	Row transform	Full transform	Column tr.	Row transform
Crop 16x16						
MAE	2.734	2.501	1.25	8.005	2.623	2.20
Crop 32x32						
MAE	5.75	5.75	5.75	18.53	9.716	8.291
Crop 32x32 at center						
MAE	2.087	2.087	2.087	2.341	0.681	0.333

Figure 4: Result images for 16x16, 32x32 cropping at corners and 32x32 cropping at center using Full DKT_DCT wavelet, column DKT_DCT wavelet and Row DKT_DCT wavelet.

Figure 5 shown below compares the full, column and row DKT_DCT wavelet under 16x16 cropping attack. It can be clearly seen from Figure 5 that, for all host images, row DKT_DCT wavelet gives least MAE value between embedded and extracted watermark. These values are almost four times less than the MAE value given by full DKT_DCT wavelet and 1.18 times less than column DKT_DCT wavelet. Thus for 16x16 cropping, row DKT_DCT wavelet performs best, whereas in DCT wavelet, column DCT wavelet performs best.

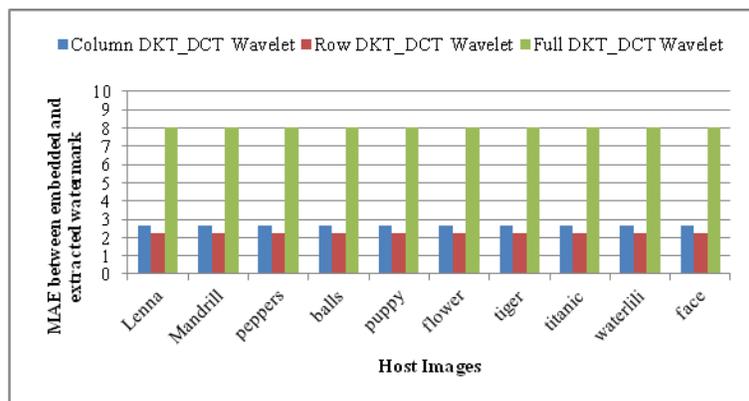


Figure 5: Comparison of MAE values between embedded and extracted watermark for cropping 16x16 square at corners using Full, Column and Row DKT_DCT wavelet

Figure 6 below shows the comparison of full, column and row DKT_DCT wavelet transform for 32x32 cropping done at corners of an image. Once again row DKT_DCT wavelet gives best performance among three. It gives twice better performance than full and 1.17 times better performance than column DKT_DCT wavelet transform.

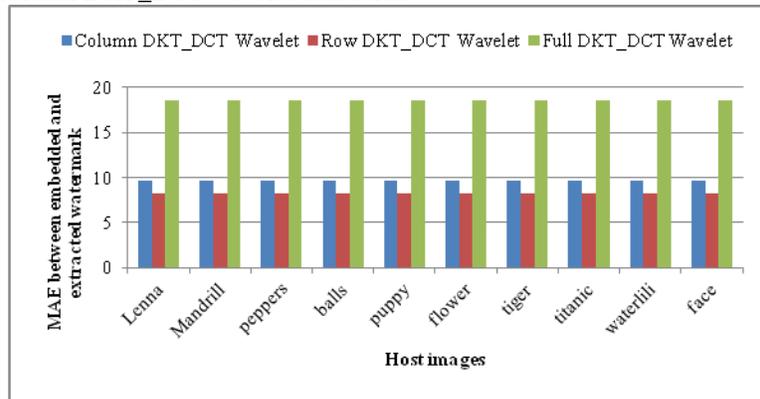


Figure 6: comparison of MAE values between embedded and extracted watermark for cropping 32x32 square at corners using Full, Column and Row DCT wavelet

Figure 7 shows the performance comparison of row, column and full DKT_DCT wavelet under cropping attack where 32x32 size portion of an image is cropped at the center of an image. Here also row transform shows highest robustness among the three. Robustness achieved by row DKT_DCT wavelet transform is twice better than column transform and approximately seven times better than full DKT_DCT wavelet transform.

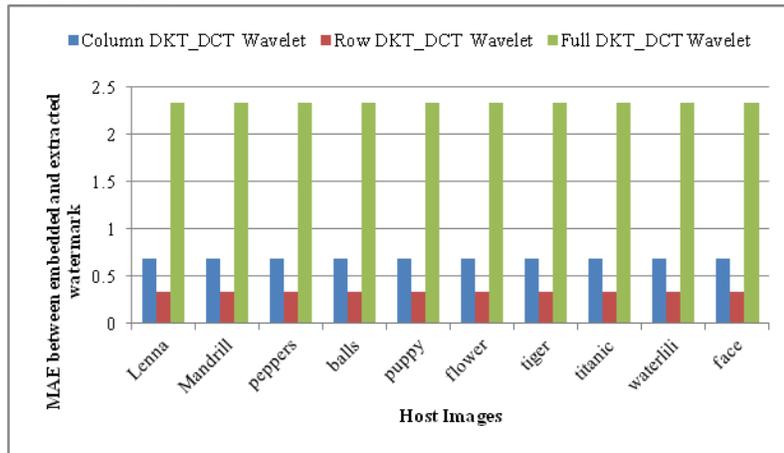


Figure 7: Comparison of MAE values between embedded and extracted watermark for cropping 32x32 square at center using Full, Column and Row DCT wavelet

Compression attack:

Watermarked images are compressed using orthogonal transforms DCT, DST, Walsh with compression ratio 1.14 and using DCT wavelet transform with compression ratio 1.95. Simulation results for compression attack are shown in Figure 8.

Transform used	Watermarked image after attack			Extracted watermark from attacked watermarked image		
	Full transform	Column tr.	Row transform	Full transform	Column tr.	Row transform
DCT wavelet						
MAE	2.191	1.564	1.544	27.202	0.783	1.958
DCT						
MAE	0.756	0.765	0.688	137.241	16.50	17.975

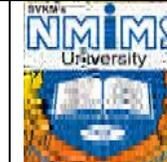
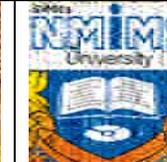
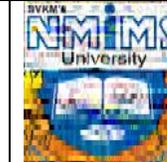
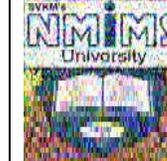
DST						
MAE	0.804	0.813	0.739	139.93	16.889	18.339
Walsh						
MAE	1.33	1.35	1.27	211.61	27.348	38.77
JPEG						
MAE	0.003	0.003	0.003	336.20	97.07	58.19

Figure 8: result images for compression using DCT wavelet, DCT, DST, Walsh and JPEG compression with MAE between host and watermarked image and MAE between embedded and extracted watermark.

Figure 9 shows performance comparison of full, column and row DKT_DCT wavelet under compression using DCT wavelet. Row transform gives 14 times better robustness whereas column transform gives 34 times better robustness than full transform. Column transform also shows 2.5 times better performance than row DKT_DCT wavelet. Thus in all column DKT_DCT wavelet transform shows best performance in the form of robustness.

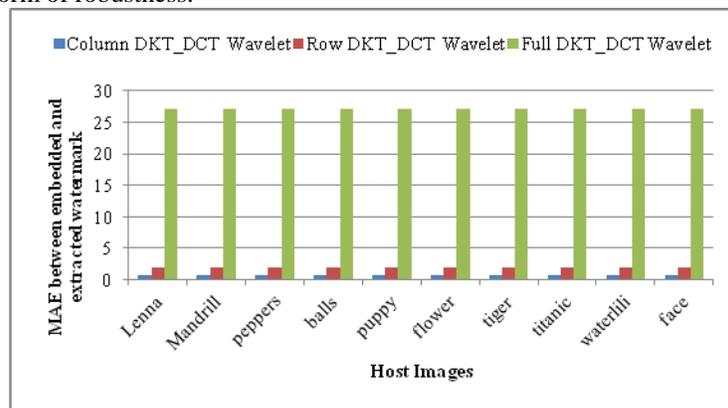


Figure 9: Performance comparison of column, row and full DKT_DCT wavelet transform under DCT wavelet based compression in terms of MAE between embedded and extracted watermark

Figure 10 below shows performance of full, column and row DKT_DCT wavelet under compression attack using DCT.

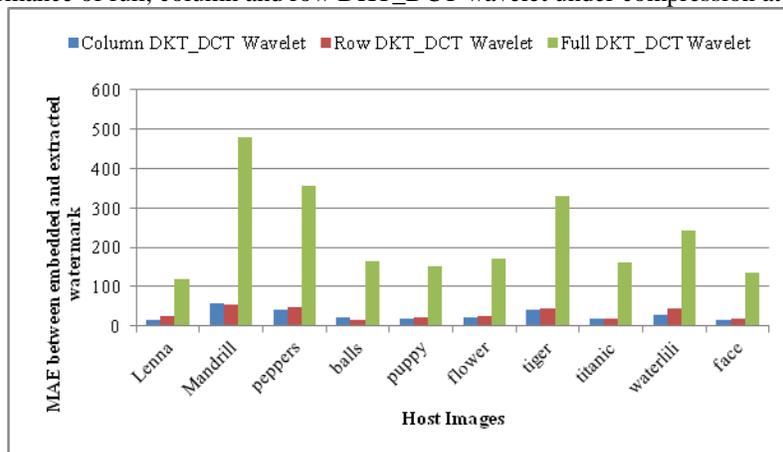


Figure 10: Performance comparison of full, row and column DKT_DCT wavelet for compression attack using DCT

From Figure 10 it can be observed that full DKT_DCT wavelet does not sustain against compression using DCT. Among row and column DKT_DCT wavelet transform, column DKT_DCT wavelet transform proves to be more robust.

Figure 11 shows the comparison of MAE values between embedded and extracted watermark under compression using DST. Column DKT_DCT wavelet once again proves better than row and full DKT_DCT wavelet. Full DKT_DCT wavelet does not withstand DST based compression attack.

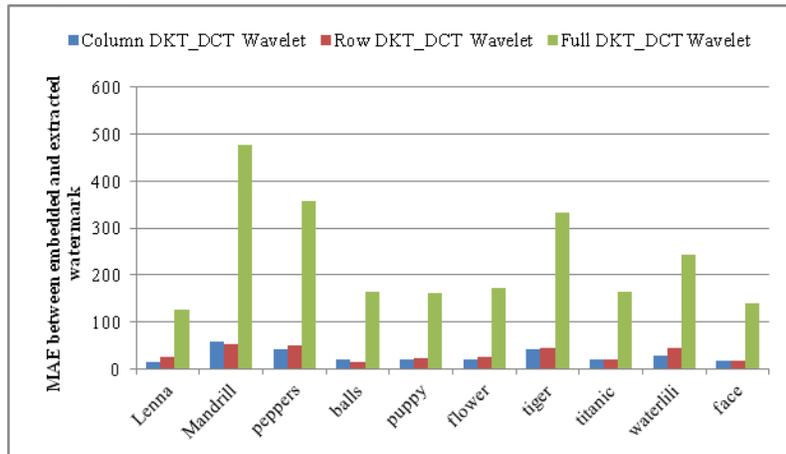


Figure 11: Performance comparison of full, row and column DKT_DCT wavelet for compression attack using DST

Figure 12 shows comparison of three approaches of applying DKT_DCT wavelet under compression using Walsh transform. Here also column DKT_DCT wavelet transform shows best performance in terms of robustness whereas, full DKT_DCT wavelet fails to sustain against Walsh based compression.

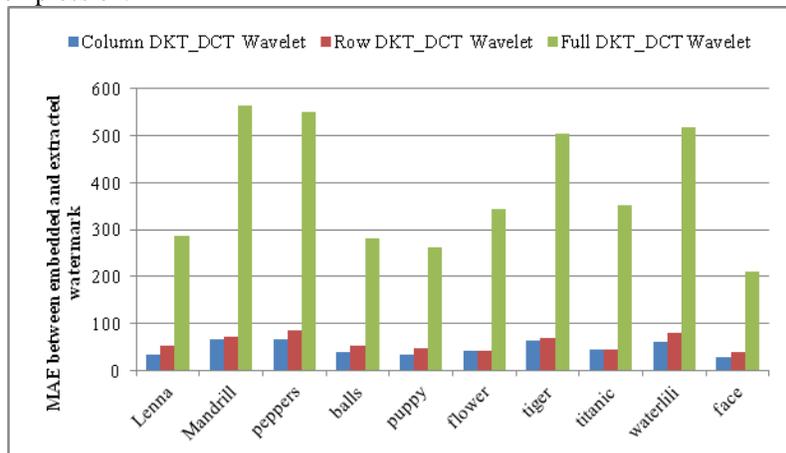


Figure 12: Performance comparison of full, row and column DKT_DCT wavelet for compression attack using Walsh

Resizing attack:

In resizing attack, watermarked images are manipulated by using bicubic interpolation. Two types of resizing attacks are performed. In the first type (Type 1), image is first increased in size by four times of its original size and then reduced back to its original size. In second type (Type 2), image is doubled in size and then reduced back to its original size. Watermarked images after resizing and watermarks extracted from them are shown in Figure 13 for full, column and row DKT_DCT wavelet along with corresponding MAE values below them.

Attack	Watermarked image after attack			Extracted watermark from attacked watermarked image		
	Full transform	Column	Row transform	Full transform	Column transform	Row transform
Original-four times-original						
	0.769	0.777	0.773	128.670	19.818	21.292

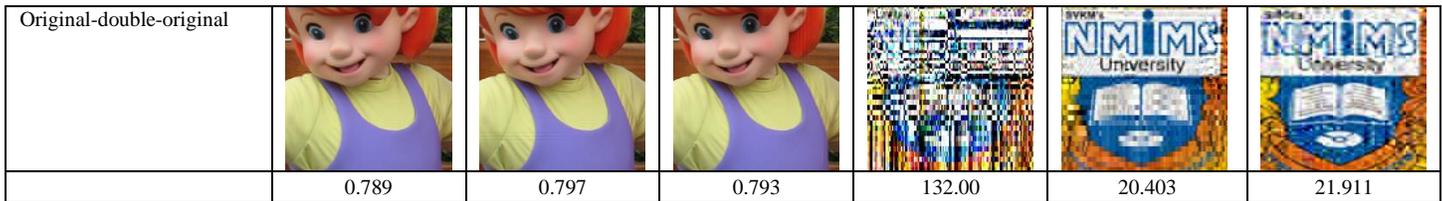


Figure13: watermarked images after resizing and watermarks extracted from them for full, column and row DKT_DCT wavelet with corresponding MAE values

Comparison of MAE values between embedded and extracted watermark for various host images under resizing attack of type 1 and type 2 are shown in Figure 14 and Figure 15 respectively.

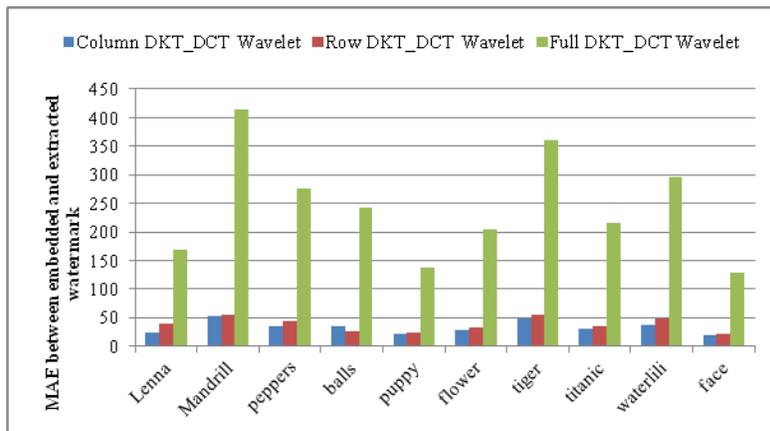


Figure 14: comparison of MAE values between embedded and extracted watermark in Type 1 resizing attack using column, row and full DKT_DCT wavelet transform.

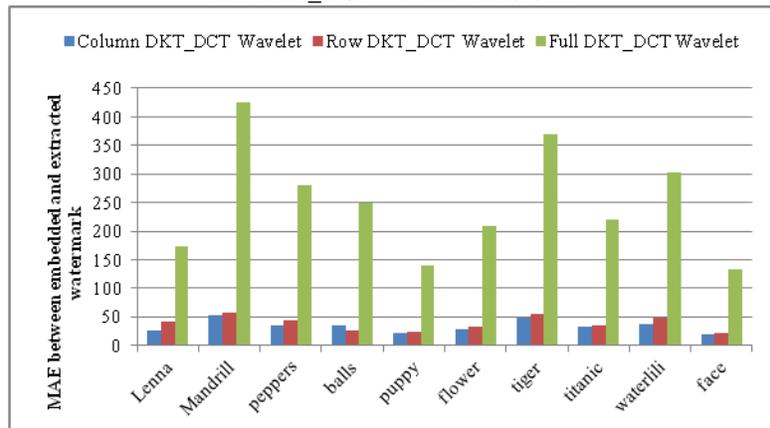


Figure 15: comparison of MAE values between embedded and extracted watermark in Type 2 resizing attack using column, row and full DKT_DCT wavelet transform.

From Figure 14 and Figure 15, it is clearly seen that for all host images except 'balls', column DKT_DCT wavelet gives the smallest MAE values i.e. best robustness. Also type 1 resizing shows slightly less MAE values than Type 2 resizing attack. Performance shown by full DKT_DCT wavelet transform is not acceptable.

Noise attack:

Two types of noises are generated namely binary distributed noise and Gaussian distributed noise and added to watermarked images to test their robustness. In binary distributed noise, magnitude is -1 or 1 while in Gaussian distributed noise, magnitude ranges between -2 to 2. In binary distributed noise, different run length i.e. run length 1 to 10, 5 to 50 (in multiples of 5) and 10 to 100 (in multiples of 10) are tried to check its effect on robustness. Figure 16 shows the watermarked image 'face' after adding these noises and watermark 'nmims' extracted from it with corresponding MAE values.

Attack	Watermarked image after attack			Extracted watermark from attacked watermarked image		
	Full transform	Column transform	Row transform	Full transform	Column transform	Row transform

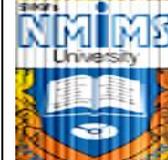
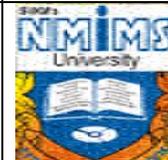
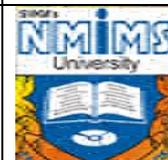
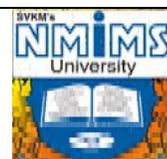
Binary run length (run 1 to 10)						
	MAE=1	MAE=1	MAE=1	1198.62	Close to 0	15.505
Binary run length (run 5 to 50)						
	MAE=1	MAE=1	MAE=1	1200.692	43.27	9.677
Binary run length (run 10 to 100)						
	MAE=1	MAE=1	MAE=1	1200.468	50.30	5.634
Gaussian Run length						
	MAE=0.746	MAE=0.746	MAE=0.746	32.68	2.296	45.068

Figure 16: result images for ‘face’ watermarked image with ‘nmims’ watermark after adding binary distributed noise of different run length and Gaussian distributed run length noise and watermarks extracted from it

From Figure 16, it is observed that MAE values between embedded and extracted watermark for full DKT_DCT wavelet transform are exceptionally high for all types of run lengths of binary distributed noise. For column DKT_DCT wavelet, when run length of binary distributed noise is 1 to 10, MAE between embedded and extracted watermark is close to zero. As we increase run length, MAE is observed to be increased. However there is no specific trend observed in changes in MAE values. For some host images it is increased and for some images it falls with increased run length. However, for row DKT_DCT wavelet transform, a sharp decrease is observed with increase in run length of binary distributed noise. Thus for binary distributed noise, with run length between 10 to 100, row DKT_DCT transform gives highest robustness by showing least MAE between embedded end extracted watermark. Column DKT_DCT gives best performance for run length 1 to 10.

Figure 17 shows the graph comparing MAE values between embedded and extracted watermark for Gaussian distributed run length noise when full, column and row DKT_DCT wavelet transform is used.

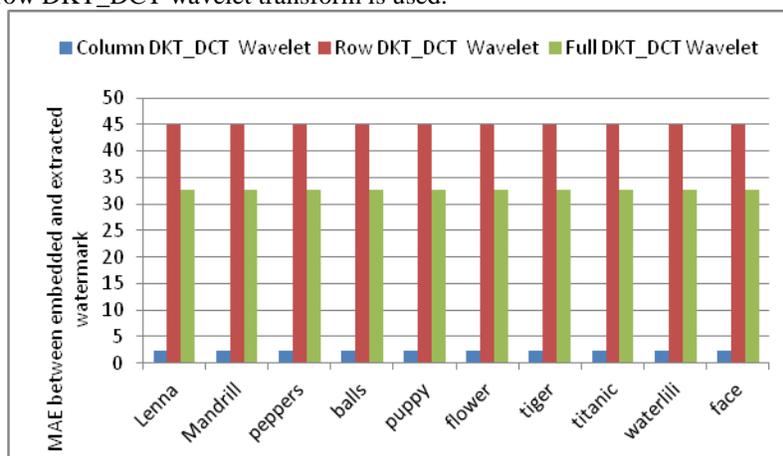
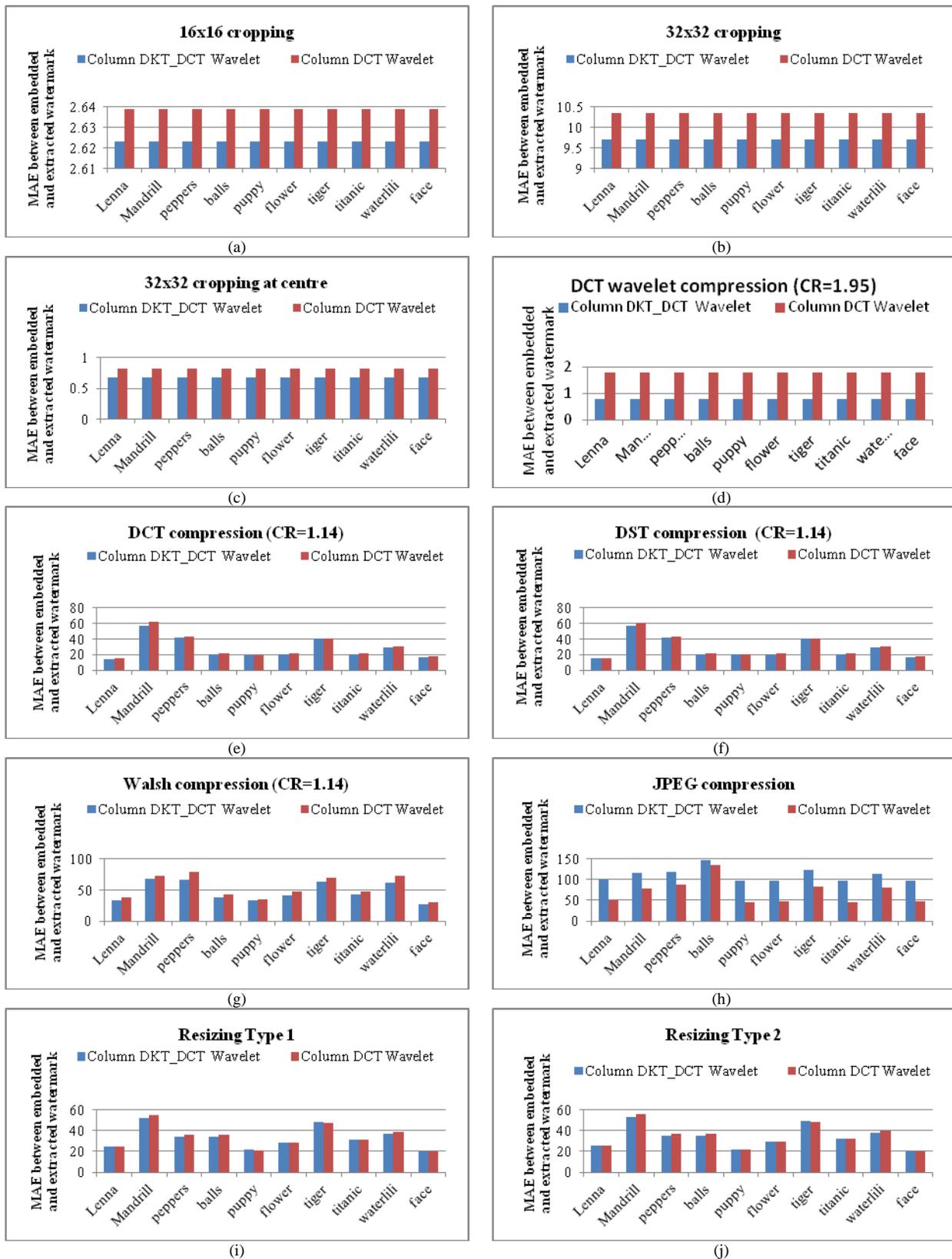


Figure 17: comparison of MAE values between embedded and extracted watermark by full column and row DKT_DCT wavelet under Gaussian distributed noise attack

From Figure 17, it can be observed that for Gaussian distributed noise, column transform of DKT_DCT is most robust. It gives 20 times better performance than row DKT_DCT wavelet and 15 times better performance than full DKT_DCT wavelet transform. When performance of column DKT_DCT wavelet is compared with column DCT wavelet for cropping, compression, resizing and Gaussian run length noise attacks, column DKT_DCT wavelet is found to be more robust than column DCT wavelet. For binary

distributed run length noise with run from 5 to 50 and between 10 to 100, row DKT_DCT wavelet is more robust as compared to row DCT wavelet transform. These comparisons are shown in following Figure 18.



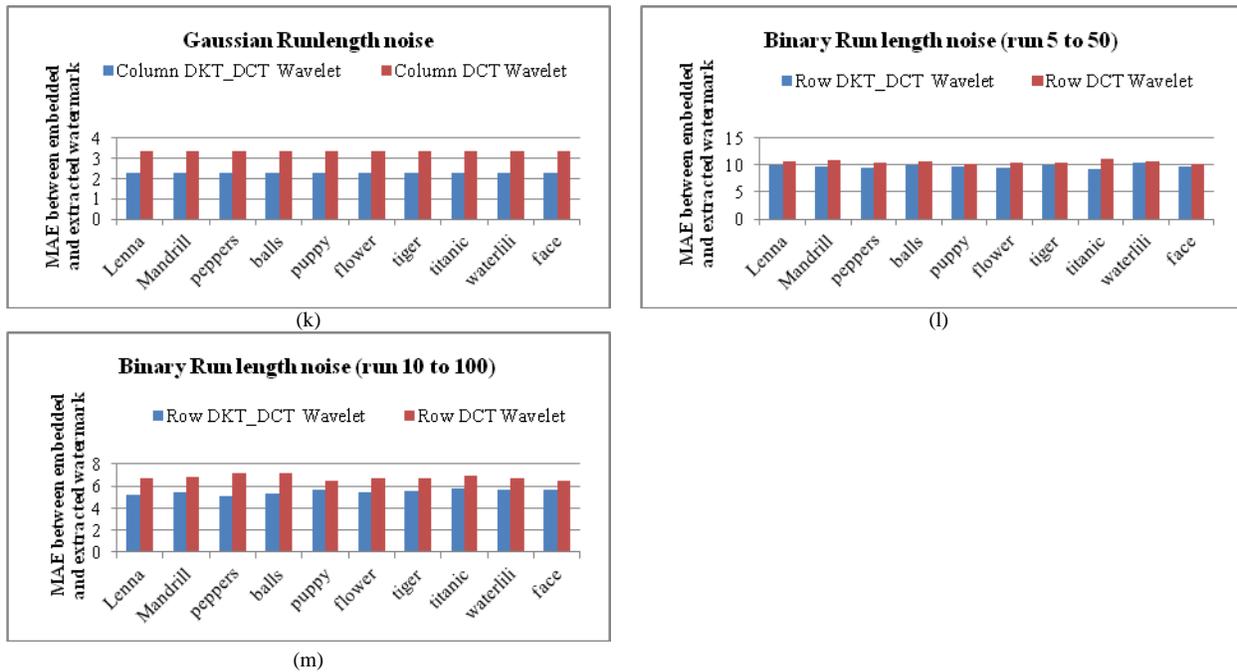


Figure 18: Performance comparison of column DKT_DCT hybrid wavelet and column DCT wavelet under (a) 16x16 cropping (b) 32x32 cropping (c) 32x32 cropping at center (d) Compression using DCT wavelet (e) compression using DCT (f) compression using DST (g) Compression using Walsh (h) JPEG compression (i) Resizing Type 1 (j) Resizing Type 2 (k) Gaussian Run length noise (l) Binary distributed run length noise (run 5 to 50) (m) Binary distributed run length noise (run 10 to 100)

VI. CONCLUSION

There is no specific trend observed for MAE between host and watermarked images for column, row and full DKT_DCT wavelet transform. Although it is image dependent, the variation in error is minimal for full, column and row transform. This MAE value corresponds to imperceptibility. Therefore the performance of column, row and full DKT_DCT wavelet is judged based on robustness i.e. their responses to various attacks on watermarked images. For majority of attacks tested in the proposed work, column and row DKT_DCT wavelet transforms give significantly better robustness than Full DKT_DCT wavelet transform.

For cropping attack, row DKT_DCT wavelet shows strong robustness as compared to column and full DKT_DCT wavelet. For cropping 16x16 size portion at four corners of watermarked image, row transform is four times more robust than full transform and 1.18 times more robust than column transform. For cropping 32x32 size portions at corners of image, row transform gives twice better performance than full and 1.17 times better performance than column DKT_DCT wavelet transform. For cropping 32x32 portions at center of an image, robustness achieved by row DKT_DCT wavelet transform is twice better than column transform and approximately seven times better than full DKT_DCT wavelet transform. Thus for cropping attack, performance of row DKT_DCT wavelet transform is best closely followed by column DKT_DCT wavelet transform.

For compression attack, DCT wavelet, DCT, DST and Walsh transforms are used to compress watermarked images. In case of compression using DCT wavelet, row transform gives 14 times better robustness whereas column transform gives 34 times better robustness than full transform. Column transform also shows 2.5 times better performance than row DKT_DCT wavelet. For compression using DCT, DST and Walsh, full DKT_DCT wavelet fails to sustain against the attack. However, row and column transforms show much better robustness. Among them column transform shows strong robustness for all above mentioned compressions. For JPEG compression with quality factor 100, though the performance is not very good, row DKT_DCT wavelet shows least MAE values among the three.

For resizing attack of type 1 and type2, column DKT_DCT wavelet has strong robustness. For binary distributed run length noise, column transform is most robust when run length from 1 to 10 is used. With increase in number of run length, performance of column transform degrades but it keeps on fluctuating without showing consistency in degradation. In contrast, row DKT_DCT wavelet shows consistent improvement in robustness with increase in length of run used in binary distributed noise. For Gaussian distributed noise, column transform gives 20 times better performance than row DKT_DCT wavelet and 15 times better performance than full DKT_DCT wavelet transform and hence most robustness.

Comparing the performance of DKT_DCT wavelet column transform with DCT_DCT wavelet column transform [27], it is observed that, performance of DKT_DCT wavelet is far better. A conclusion section is not required. Although a conclusion may review the main points of the paper, do not replicate the abstract as the conclusion. A conclusion might elaborate on the importance of the work or suggest applications and extensions.

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in

Infantile Pseudohypoparathyroidism

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Abstract- A case of 35 day old infant is presented who had late onset seizure associated with hypocalcemia, hyperphosphatemia, and raised parathyroid hormone. The infant did not have any stigmata of pseudohypoparathyroidism. The hypocalcemia was initially resistant to calcium therapy, but responded to vitamin D analog therapy. The diagnosis of 'pseudohypoparathyroidism' was entertained.

Index Terms- Pseudohypoparathyroidism; Hypocalcaemic convulsions

I. INTRODUCTION

Pseudohypoparathyroidism (PHP) is a heterogeneous group of disorders characterized by hypocalcemia, hyperphosphatemia, increased serum concentration of parathyroid hormone (PTH), and insensitivity to the biological activity of PTH.¹ A Medline search revealed very few case reports of PHP presenting as late onset hypocalcemia. We report a case of pseudohypoparathyroidism that presented in infantile period with hypocalcemic convulsions.

II. CASE REPORT

A thirty five-day-old male infant presented with a history of multiple episodes of clonic convulsions on thirty fifth day of life. The child, born to a 23-years-old multigravida at term, Birth weight (2.75 kg) cried soon after birth and was on exclusive breast feeds. The parents were healthy with normal stature and with history of third degree consanguinity. Antenatal period was uneventful.

The baby when admitted weighed 3.715 kg, with head circumference of 37 cm. Anterior fontanelle was at level and there was no dysmorphic facies or gross congenital malformation. Rest of the systemic examination including ophthalmological examination was normal.

Provisional diagnosis of metabolic seizure was made and investigations revealed blood glucose 90 mg/dL and Blood urea was 24 mg/ dL, Sr.creatinine was 0.4mg/dl, Sr.Albumin was 3.5g/dL Lab parameters revealed hypocalcemia, hyperphosphatemia, raised parathormone, Vitamin D level was not deficient. The values of calcium, phosphorus, magnesium, ALP, parathormone and Vitamin D are shown in the adjacent table Other electrolytes were within normal limits and septic screen was negative. Ultrasound skull and abdomen did not reveal any abnormality. X-ray chest was normal. ECG showed prolonged QT interval with no arrhythmia. Thyroid profile was normal. Child was started on I.V. Calcium gluconate and repeat calcium and phosphorous was done after 3 days which revealed Sr.Calcium(6.8mg/dl), Sr.Phosphorus(8mg/dl)

Serum Metabolites	Values mg/dl	Reference range mg/dl
Calcium	5.4	8.4-10.2
Phosphorus	11.0	3.8-6.5
Magnesium	2.8	1.6-2.3
Alkaline phosphatase	572 U/L	150-400 U/L
Parathormone	138.7 pg/ml	14-72 pg/ml
Vitamin D	30.56 nmol/L	<25 nmol/L is deficient

Sr.Calcium and Sr.Phosphorous and Alkaline Phosphatase of mother were normal. In view of persistent hypocalcemia, hyperphosphatemia and high serum parathormone levels, diagnosis of Pseudohypoparathyroidism was made, and the child was treated with calcium supplementation and calcitriol 0.25 µg/day. Child was discharged and advised to come for follow up.



CT Brain Showing Normal Study.

III. DISCUSSION

In 1942, Fuller Albright first introduced the term pseudohypoparathyroidism to describe patients who presented with PTH-resistant hypocalcemia and hyperphosphatemia. In

PHP, the parathyroid glands are normal or hyperplastic histologically, and neither endogenous nor administered PTH raises the serum levels of calcium or lowers the level of phosphorus.

Pseudohypoparathyroidism is divided into 2 main types. Type I is characterized by low or absent renal cyclic adenosine monophosphate (CAMP) production in response to parathormone (PTH). Type II responds to PTH with normal increase in urinary CAMP but shows absent or subnormal phosphaturic response². Type I is further subdivided into 2 subtypes, A and B. In sub type A, the affected patients have a genetic defect of the a subunit of the stimulatory guanine nucleotide binding protein (G α), with most of them having distinctive morphological abnormalities collectively called "Albright's hereditary osteodystrophy".¹ In this type, hypocalcemia rarely develops before 3 years.³ Subtype I B patients have normal levels of G protein activity with defect in PTH receptor expression or a defect in catalytic subunit of adenyl cyclase.

In the present case, the infant presented with hypocalcemic convulsions. Hypomagnesemia, septicemia, renal failure were ruled out. There were no predisposing factors for hypocalcemia like prematurity, birth asphyxia. Elevated levels of serum parathormone levels further ruled out hypoparathyroidism. A case of four day old neonate with pseudohypoparathyroidism has been reported previously in 2006⁷. Other cases reported were mostly of 8 -13 year old age group.

Since this infant presented at 35 day of life, we are reporting this case due to its rarity. The child is on oral calcium supplementation and calcitriol and is seizure free and under follow up. All patients with severe symptomatic hypocalcemia should be initially treated with intravenous calcium. Administration of oral calcium and 1 alpha hydroxylated vitamin D metabolites, such as calcitriol, remains the mainstay of treatment and should be initiated in every patient with a diagnosis of PHP. The goals of therapy are to maintain serum total and ionized calcium levels within the reference range to avoid hypercalciuria and to suppress PTH levels to normal. This is important because elevated PTH levels in patients with PHP could cause increased bone remodeling and can lead to hyperparathyroid bone disease. To conclude any child presenting with late onset hypocalcemic seizure, parathormone levels are to be checked along with Vitamin D.

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A SURVAY OF DIGITAL IMAGE PROCESSING AND ITS PROBLEM

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Abstract- This paper describes the basic technological aspects of Digital Image Processing with special reference to satellite image processing. Basically, all satellite image-processing operations can be grouped into three categories: Image Rectification and Restoration, Enhancement and Information Extraction. The former deals with initial processing of raw image data to correct for geometric distortion, to calibrate the data radio metrically and to eliminate noise present in the data. The enhancement procedures are applied to image data in order to effectively display the data for subsequent visual interpretation. It involves techniques for increasing the visual distinction between features in a scene. The objective of the information extraction operations is to replace visual analysis of the image data with quantitative techniques for automating the identification of features in a scene. This involves the analysis of multispectral image data and the application of statistically based decision rules for determining the land cover identity of each pixel in an image. In this review paper an analysis of their problems as well as their computation will be presented.

Index Terms: Digital image processing (DIP), signal to error ratio (SER), multilayer perceptron (MLP), phase lock loops (PLL), decision feedback adaptive equalizer (DFE), Resonance Imaging (MRI).

I. INTRODUCTION

Image processing is a rapidly growing area of computer science. Its growth has been fueled by technological advances in digital imaging, computer processors and mass storage devices. Fields which traditionally used analog imaging are now switching to digital systems, for their exibility and affordability. Important examples are medicine, _lm and video production, photography, remote sensing, and security monitoring. These and other sources produce huge volumes of digital image data every day, more than could ever be examined manually. Digital image processing is concerned primarily with extracting useful information from images. Ideally, this is done by computers, with little or no human intervention. Image processing algorithms may be placed at three levels. At the lowest level are those techniques which deal directly with the raw, possibly noisy pixel values, with denoising and edge detection being good examples. In the middle are algorithms which utilise low level results for further means, such as segmentation and edge linking. At the highest level are those methods which attempt to extract semantic meaning from the information provided by the lower levels, for example, handwriting recognition. The literature abounds with algorithms for achieving various image processing tasks. However, there does not appear to be any unifying principle guiding many of them. Some are one dimensional signal processing techniques which have been extended to two dimensions. Others apply methods from alternative disciplines to image data in a somewhat inappropriate manner. Many are the same basic algorithm with parameter values tweaked to suit the problem at hand. Alternatively, the parameters are optimized with respect to a suitable training Image processing is a rapidly growing area of computer science. Its growth has been fueled by technological advances in digital imaging, computer processors and mass storage devices.

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The literature abounds with algorithms for achieving various image processing tasks. However, there does not appear to be any unifying principle guiding many of them. Some are one dimensional signal processing techniques which have been extended to two dimensions. Others apply methods from alternative disciplines to image data in a somewhat inappropriate manner. Many are the same basic algorithm with parameter values tweaked to suit the problem at hand. Alternatively, the parameters are optimized with respect to a suitable training Many existing image processing algorithms already make partial use of the local segmentation concept. It is possible to examine these algorithms with respect to the local segmentation model they use. This helps to make their strengths and weaknesses more apparent. Even popular techniques, such as linear and rank _lters, can be framed in terms of their application of local

segmentation. In most cases the segmentation is implicit rather than explicit. That is, the choice of which pixels belong together is performed in a systematic, but sometimes roundabout manner. The SUSAN image processing system, developed by Smith and Brady, originally considered using explicit segmentation, but eventually chose to allow all pixels to have partial membership in the centre pixel's segment. Image denoising is particularly suited to demonstrating the utility of local segmentation. Denoising is the process of removing unwanted noise from an image. A denoised image is an approximation to the underlying true image, before it was contaminated. A good denoising algorithm must simultaneously preserve structure and remove noise. Obviously, to do this the algorithm must be able to identify what structure is present. Local segmentation specially attempts to separate structure from noise on a local scale. Denoising would therefore be a good application with which to test different approaches to local segmentation. Local regions only contain a small number of pixels. It is unlikely that there would be more than a few segments present at such a scale, so unconnected, homogeneous groups of pixels are likely to part of the same global segment.

In the present context, the analysis of pictures that employ an overhead perspective, including the radiation not visible to human eye are considered. Linear processing techniques are very important tools that are used extensively in digital signal image processing. Their mathematical simplicity and the existence of a unifying linear systems theory make their design and implementation easy. Moreover, linear processing techniques offer satisfactory performance for a variety of applications. However, many digital image processing problems cannot be efficiently solved by using linear techniques. An example where linear digital image processing techniques fail is the case of non-Gaussian and or signal dependent noise filtering (e.g. impulsive noise filtering).

Such types of noise appear in a multitude of digital image processing applications. Impulsive noise is frequently encountered in digital image transmission as a consequence of man-made noise sources or decoding errors. Signal- dependent noise is the photoelectron noise of photo sensing devices and the film-grain noise of photographic films [1]. Speckle noise that appears in ultrasonic imaging and in laser imaging is multiplicative noise; i.e. it is signal-dependent noise. Another example where linear techniques fail is the case of nonlinear image degradations. Such degradations occur during image formation and during image transmission through nonlinear channels [4], [5]. The human visual perception mechanism has been shown to have nonlinear characteristics as well [1], [2].

Linear filters, which were originally used in image filtering applications, cannot cope with the nonlinearities of the image formation model and cannot take into account the nonlinearities of human vision. Furthermore, human vision is very sensitive to high-frequency information. Image edges and image details (e.g. corners and lines) have high-frequency content and carry very important information for visual perception. Filters having good edge and image detail preservation properties are highly suitable for digital image filtering. Most of the classical linear digital image filters have low-pass characteristics [17]. They tend to blur edges and to destroy lines, edges, and other fine image details. These reasons have led researchers to the use of nonlinear filtering techniques. Nonlinear techniques emerged very early in digital image processing. However, the bulk of related research has been presented in the past decade. This research area has had a dynamic development. This is indicated by the amount of research presently published and the popularity and widespread use of nonlinear digital processing in a variety of applications. Most of the currently available image processing software packages include nonlinear techniques (e.g. median filters and morphological filters). A multiplicity of nonlinear digital image processing techniques have appeared in the literature. The following classes of nonlinear digital image signal processing techniques can be identified at present:

- 1) order statistic filters
- 2) homomorphic filters,
- 3) polynomial filters,
- 4) mathematical morphology,
- 5) neural networks, and
- 6) nonlinear image restoration.

One of the main limitations of nonlinear techniques at present is the lack of a unifying theory that can encompass all existing nonlinear filter classes. Each class of nonlinear processing techniques possesses its own mathematical tools that can provide reasonably good analysis of its performance. Cross-fertilization of these classes has been shown to be promising. For example, mathematical morphology and order statistic filters have as well, most of the reported work has been applied to digital image processing. We shall focus our presentation on digital image processing applications, in order to render it more concise.

In the following, we shall focus on the description of the order statistics techniques. Although such techniques have been applied to digital signal processing.

Since its first use, several modifications and extensions of the median filter have been proposed. Many of them have solid theoretical foundations from the theory of robust statistics [3],[5]. However, there are also filters based on order statistics that have ad hoc structures, due to the lack of a powerful unifying theory in the area of nonlinear filtering. Several efforts have been made in the past decade to provide a unifying theory in the area of order statistics filtering. Some fruitful results based on threshold decomposition (to be described later) are expected to provide useful design and implementation tools. In general, filters based on order statistics have good behavior in the presence of additive white noise or impulsive noise, if they are designed properly. Many of them have good edge preservation properties. The adaptation of order statistics filters is a very important task. It is well known that image characteristics (e.g. local statistics) change from one image region to the other. Noise characteristics usually vary with time. Thus, digital image filters based on order statistics must be spatially and/or temporally adaptive. Furthermore, the characteristics of the human visual

system (e.g. edge preservation requirements, local contrast enhancement) lead to spatially adaptive digital image filter structures as well. Another reason for the adaptation of the order statistics filters has to do with the difficulties encountered in the optimal design of such filters for certain characteristics of signal and noise. Although order statistics filters are based on rich mathematical foundations, such design algorithms do not exist or are difficult to implement. One of the main reasons for the popularity and wide spread use of certain filters based on order statistics is their computational simplicity. Their computation can become faster if appropriate fast algorithms are designed. Several such algorithms have appeared in the literature, especially for the fast (serial or parallel) implementation of the median filter. Another research activity is the design of special VLSI chips for order statistics filtering. A number of chips for fast median and max/min filtering have been presented in the literature. The related efforts for fast filter implementation are reviewed in this paper as well[12].

II. PROBLEMS IN DIP

Now in this paper we discuss about the problems in DIP.

A. Edge Detection

Edge detection, a region- splitting approach, produces an edge map that contains important information about the image. The memory space required for storage is relatively small, and the original image can be restored easily from its edge map. Many methods have been proposed for edge detection in digital images proposed a method for edge based image segmentation using Object Localization and Border Detection Criteria proposed a method for edge detection using Adaptive Neuro-Fuzzy System.

The system consists of a MultiLayer Perceptron (MLP)-like network that performs image segmentation by adaptive thresholding of the input image proposed a method for edge detection using Fast Multilevel Fuzzy Edge Detection proposed a method for edge detection using wavelets for SEM images. This method facilitates nanoscale edge detection and characterization by providing a systematic threshold determination step. SAR Image Despeckling Using Edge Detection and Feature Clustering in Bandelet Domain proposed. proposed a method for edge enhancement using Wavelet Transform for Automatic Edge Detection in SAR Images. This method uses a novel technique for automatic edge enhancement and detection in synthetic aperture radar (SAR) images proposed a method for Retinal Image Analysis Using Curvelet Transform and Multistructure Elements Morphology by Reconstruction.

Beamlets and multiscale image analysis proposed proposed a method for an efficient FPGA implementation of MRI image filtering and tumour characterization using Xilinx System Generator [10] proposed a method for Architecture for filtering images using Xilinx System Generator proposed a method for Implementation and Evaluation of Image Processing Algorithms on Reconfigurable Architecture using C-based Hardware Descriptive Languages. Beamlet transform and multiscale linear feature extraction proposed. An overview of MRI Brain classification using FPGA implementation proposed. FPGA implementation of image compression using bottom-up approach of Quad tree technique proposed by [7],[8].

B. Signal To Error Ratio (SER)

Extracted logo image and received image after both watermarking process are analysed in terms of signal to error ratio. Effect of various scaling factors can be seen on the values of signal to error ratio (SER) for both received output image and extracted logo image. '.bmp' image to generate watermark embedded image by inserting a logo '.bmp' image with non zero scaling factor.

Types of noise: The previous example illustrated the manner in which an image may be affected by noise during the acquisition process. The properties of the noise introduced at each capture step are likely to vary. However, there are three standard noise models which model well the types of noise encountered in most images: additive, multiplicative, and impulse noise.

C. Additive Noise

The Let $f'(x,y)$ be the noisy digitized version of the ideal image $f(x,y)$ and $n(x,y)$ be a noise function, which returns random values coming from an arbitrary distribution. Then *additive noise* can be described by

$$f'(x, y) = f(x, y) + n(x, y)$$

Additive noise is independent of the pixel values in the original image. Typically $n(x,y)$ is symmetric about zero. This has the effect of not altering the average brightness of the image, or large parts thereof. Additive noise is a good model for the thermal noise within photo-electronic sensors.

D. Multiplicative noise

Multiplicative noise, or speckle noise, is a signal dependent form of noise whose magnitude is related to the value of the original pixel [9]. It describes one simple form it can take, but a more complex function of the original pixel value is also possible. Multiplicative noise is an approximation to the noise encountered in images recorded on [10] and from synthetic aperture radar.

The previous example illustrated the manner in which an image may be affected by noise during the acquisition process. The properties of the noise introduced at each capture step are likely to vary. However, there are three standard noise models which model well the types of noise encountered in most images: additive, multiplicative, and impulse noise.

E. Impulse Noise

Impulse noise has the property of either leaving a pixel unmodified with probability $1-p$ or replacing it altogether with probability p . Restricting $n(x,y)$ to producing only the extreme intensities 0 or $z-1$ results in salt-pepper noise. The source of impulse noise is usually the result of an error,

$$f'(x, y) = \begin{cases} n(x, y) & \text{with probability } p \\ f(x, y) & \text{with probability } 1 - p \end{cases}$$

in transmission or an atmospheric or man-made disturbance[15].

F. Quantization Noise

Quantization noise is due to the quantization of pixel values during the analog to digital conversion. For example, imagine an analog image with brightness values ranging from 0 to 10. If it is quantized to accuracy 0.1 the digitized image will have 101 distinct grey levels. A given intensity z could have originally been anywhere in the range $(z, z+0.05)$. This uncertainty in the true value of z is called quantization noise

G. The Noise Function

Usually the properties of the noise function $n(x,y)$ do not vary with x and y . A spatially invariant stochastic process is referred to as being *stationary*. The noise function could theoretically take any form, but many standard probability distributions have been found useful. For additive noise, the Gaussian and Laplacian distributions. The standard case of impulse noise uses a uniform distribution on $(0, z-1)$. The most common noise model used in this thesis is an additive zero-mean Gaussian of unknown variance, independently and identically distributed for each pixel. The application to alternative noise models is also considered. Some algorithms developed for additive noise can be adapted to multiplicative noise by logarithmically transforming $f(x,y)$ applying the algorithm, and then applying the inverse transform.

A. Aliasing

As just demonstrated, the sample values obtained from a sinusoid which has been sampled fewer than two times per period will be identical to those obtained from a sinusoid with a longer period. This ambiguity about which original function produced the set of samples is called aliasing in sampling, but similar effects show up whenever periodic functions are multiplied or added. In other disciplines, these go by different names such as beats, Moiré fringes, and heterodyning. To illustrate, consider the product of two sinusoidal functions with the different periods X_1 and X_2 (and thus spatial frequencies $(\xi_1 = 1/X_1, \xi_2 = 1/X_2)$, which may be written as the sum of two sinusoids with different spatial frequencies: $\cos [2\pi\xi_1x] \cdot \cos [2\pi\xi_2x] = 1/2\cos [2\pi(\xi_1 + \xi_2)x] + 1/2\cos [2\pi(\xi_1 - \xi_2)x]$ (note that the converse is also true; the sum of two sinusoids with the same amplitude and different frequencies may be written as the product of two sinusoids). The second term in the expression for the product oscillates slowly and is the analog of the aliased signal.

B. Doppler Shift And Frequency Domain Spreading

Motion of transmitter, receiver, channel boundary and media introduce in Doppler shift and frequency domain spreading. It is defined as a delay-Doppler double spreading channel [1]. Its characteristics change with time and location, its bandwidth is very limited, and there are many noise sources and interferences. Only with an effective integration of several signal procession methods can low BER (Bit Error Rate) be achieved.

Signal processing for high speed underwater acoustic image transmission includes two main parts, one is underwater coherent communication signal processing, another one is the robust image compression algorithm. To transmit data in underwater acoustic channel at high speed, coherent communication is the first choice because of its high bandwidth efficiency. In this paper only MPSK (M-ary Phase Shift Keying) modulation is discussed.

One main technical point of coherent communication is adaptive equalization. In 1990s, developed a new coherent communication receiver consists of multi-channel decision feedback adaptive equalizer (DFE), adaptive combiner and 2nd order digital phase lock loops (PLL) [6].

III. APPLICATION OF DIGITAL IMAGE PROCESSING

Digital Image Processing is applied in the fields of Computer vision, Face detection, Feature detection, Lane departure warning system, Non-photorealistic rendering, Medical image processing, Microscope image processing Morphological image processing, Remote sensing, etc.

A. Computer Vision

Computer vision is the science and technology of machines that see. As a scientific discipline, computer vision is concerned with the theory for building artificial systems that obtain information from images. The image data can take many forms, such as a video sequence, views from multiple cameras, or multidimensional data from a medical scanner [22].

As a technological discipline, computer vision seeks to apply its theories and models to the construction of computer vision systems. Examples of applications of computer vision include systems for:

- Controlling processes (e.g., an industrial robot or an autonomous vehicle).
- Detecting events (e.g., for visual surveillance or people counting).
- Organizing information (e.g., for indexing databases of images and image sequences).
- Modeling objects or environments (e.g., industrial inspection, medical image analysis or topographical modeling).

- Interaction (e.g., as the input to a device for computer-human interaction).

Sub-domains of computer vision include scene reconstruction, event detection, video tracking, object recognition, learning, indexing, motion estimation, and image restoration.

B. Face Detection

Face detection is a computer technology that determines the locations and sizes of human faces in arbitrary (digital) images. It detects facial features and ignores anything else, such as buildings, trees and bodies. Face detection can be regarded as a specific case of object-class detection; in object-class detection, the task is to find the locations and sizes of all objects in an image that belong to a given class. Examples include upper torsos, pedestrians, and cars. Face detection can be regarded as a more general case of face localization; in face localization, the task is to find the locations and sizes of a known number of faces (usually one). In face detection, one does not have this additional information. Early face-detection algorithms focused on the detection of frontal human faces, whereas newer algorithms attempt to solve the more general and difficult problem of multi-view face detection. That is, the detection of faces that are either rotated along the axis from the face to the observer (in-plane rotation), or rotated along the vertical or left-right axis (out-of-plane rotation), or both.

C. Feature Detection

In computer vision and image processing the concept of feature detection refers to methods that aim at computing abstractions of image information and making local decisions at every image point whether there is an image feature of a given type at that point or not. The resulting features will be subsets of the image domain, often in the form of isolated points, continuous curves or connected regions. [23],[24].

D. Digital Video

In electrical engineering and computer science, video processing is a particular case of signal processing, where the input and output signals are video files or video streams. Video processing techniques are used in television sets, VCRs, DVDs, video codecs, video players and other devices. For example—commonly only design and video processing is different in TV sets of different manufactures. [24],[25].

E. Remote Sensing

Remote sensing is the small or large-scale acquisition of information of an object or phenomenon, by the use of either recording or real-time sensing device(s) that are wireless, or not in physical or intimate contact with the object (such as by way of aircraft, spacecraft, satellite, buoy, or ship). In practice, remote sensing is the standoff collection through the use of a variety of devices for gathering information on a given object or area. Thus, Earth observation or weather satellite collection platforms, ocean and atmospheric observing weather buoy platforms, the monitoring of a parolee via an ultrasound identification system, Magnetic Resonance Imaging (MRI), Positron Emission Tomography (PET), X-radiation (X-RAY) and space probes are all examples of remote sensing. In modern usage, the term generally refers to the use of imaging sensor technologies including: instruments found in aircraft and spacecraft as well as those used in electrophysiology, and is distinct from other imaging-related fields such as medical imaging. [24].

IV. CONCLUSION

The image processing require large amount of processing power. In the distributed environment where network latency significantly affects the power of execution the particular operations. There is need some security algorithms in distributed image processing in client server architecture. In the proposed work jpeg encoder and jpeg decoder will added for high performance with security in this architecture.

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Role of Women in Decision-Making process in Agriculture Sector: A Case Study of District Fatehabad

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Abstract- Decision-making is a fundamental process that incorporates all the functions of family resource management. Rural women perform all the duties of household, attending to farm labour, caring of domestic animals but in spite of discharging all the duties of household, no recognition is given to her immense contribution. But her involvement in decision-making process of household remained in a very low position as all important decisions are made by head of the family or the male members because majority of the females have not provided opportunities to get education due to have the policy of discrimination against the females of the family. Inferior educational status keeps women in secluded position because of the less access to information about their rights. So, women's suggestions often do not get much credit in agriculture sector and important family matters. So, the main purpose of this study is to collect information regarding women's participation in decision-making process related to agriculture sector of Fatehabad district of Haryana State. In order to analyse the decision-making power of women, a total of 100 respondents have been selected from two blocks of district Fatehabad during 2011-12 to 2012-13. For the purpose of analyses, logical tools, percentage, average has been employed. The study revealed that women's participation in different aspects of decision-making process of agricultural sector have not recorded up to the mark. The situation has become more badly in case of the decisions related to opting the measures to increase the production, buying activities, expenditure activities. It is suggested on the basis of the results that there is an urgent need to motivate the females to have the accurate knowledge about their legal rights. The high level of education and workshops, extension lectures can work for the betterment of women in the direction of increasing the decision-making power of females in the regions.

I. INTRODUCTION

The role of women has always been a multi-dimensional and significant as women have performed well in case of agricultural activities, domestic activities, marketing activities as far as labour requirement is considered. The decision-making process is an important segment of every household because the functioning of family resource management depends on the efficiency of decision-making progress. So, women's involvement in decision-making process has been of great importance because women play an important role in every household activity and gives excellent performance most of the time. It may be related to household activity or for the decision-

making at household or any other level. In rural society, there has been noticed a considerable fluctuation regarding the decision-making power of women. The state like Punjab and Haryana show positive role of women in decision-making process in many of the families. But it has become insignificant and negligible in rural families due to illiteracy of women. The contribution of rural women has not taken seriously because it is considered very disgraceful to accept the decision of women. This is because the abilities of women have been neglected and undermined as the responsibility of forming the policies is always regarded the job of male traditionally. How far, the role of women in decision-making process has been noticed in positive manner is the major concern of our study. To know the actual situation of women, their role in decision-making in different agricultural activities need to be properly looked into. So, women's involvement in decision-making process related to agricultural activities have assessed by taking-up following objectives:

II. MAIN OBJECTIVES OF THE STUDY

- 1) To assess the contribution of women in the decision-making related to different expenditure activities of agriculture sector.
- 2) To observe the role of women in decision-making process of buying activities of agriculture sector.
- 3) To measure the extent of decision-making power of women related to opting measures to increase production.
- 4) To examine the role of women in decision-making in respect of livestock management and storage activities.

III. METHODOLOGY

In order to achieve the objectives, two blocks i.e., Block-1 and Block-2 of the district named Fatehabad have been selected randomly. village Bhodia Khera has been selected from Block-1 and Thuian has been selected from the Block-2. A total number of 50 respondents from each village has been selected randomly. So, A total of 100 agricultural women labourers has been selected by using the multistage random sampling during the time period from 2011-12 to 2012-13 through out scheduled questionnaire and interview and high sampling procedure. For the purpose of analysis, logical tool and techniques tools have been used as follows:

IV. ANALYTICAL TOOLS AND TECHNIQUES

For the purpose of analysis, logical tool and techniques such as per centage, average and other required method tools has been used. The formula for calculating the simple arithmetic mean is as follows:

$$\bar{X} = \frac{\sum x}{N}$$

Where, \bar{X} = sum of the values of the variables considered
 N= number of observations

V. RESULTS AND DISCUSSION

The furnished results related to decision making power of rural women in respect of the Expenditure activities, Buying Activities, Opting measures to Increase the production, livestock management activities and Storage activities have been analyzed and presented through following heads:

Distribution of the Respondents according to the Participation in Decisions related to the Expenditure Activities

Table: 1 Distribution of the Respondents according to the Participation in Decisions related to the Expenditure Activities in Block-1

Activity	Nil	Only consulted	Opinion considered	Final decision
Money to be spend on purchase of machines	17(34)	13(26)	17(34)	3(6)
Money to be spent on purchase of seeds	16(32)	16(32)	15(30)	3(6)
Money to be spent on purchase of implements	26(52)	14(28)	10(20)	0(0)
Paying wages to labourers	21(42)	21(42)	7(14)	1(2)

Distribution of the Respondents according to the Participation in Decisions related to the Expenditure Activities in Block-2: Table 2 shows the distribution of the respondents according to the participation of women in decision making process in the family related to the expenditure activities in block -2. The position of women in rural Fatehabad’s Block-2 has once again found very worse as very minimal proportion of women’s accepted the fact that they have been able to convert their views

in Block-1: Extend of rural women's participation in decisions related to the expenditure in Block-1 of fathehabad district is presented through the table1. The role of women related to the spend of money on purchasing of machines has been found quite minimal as 6% women have found taken decision independently regarding the purchase of machine .The role of women regarding the money spend to be on purchase of seeds, money to be spending on purchase of implements and paying wages to labour can also not be appreciated. In respect of the money spent on the purchase of implements and paying money to the laboures, 42 percent women have accepted the fact that they have not even consulted while making decision related to this item. The results also show that 34 percent, 30 percent, 20 percent, and 14 percent women have agreed to the fact that their opinion are considered while making decisions related to the money spending on the purchase of machines, money to be spent on purchase of seeds, money to be spent on purchase of implements and paying wages to labourers respectively.

into final decision in the family regarding expenditure aspects of different items in the family. 22 percent , 32 percent, 30 percent and 56 percent women have only consulted regarding the decision making process about the spending of money on purchase of machines, seed, implements and paying wages to labours. So, the minority of the respondents have reported to have strong decision –making power in the spending of money in Block-2 of district Fatehabad.

Table 2: Distribution of the Respondents according to the Participation Decision related to the Expenditure Activities in Block-2

Activity	Nil	Only consulted	Opinion considered	Final decision
Money to be spend on purchase of machines	21(42)	11(22)	15(30)	3(6)
Money to be spent on purchase of seeds	26(52)	16(32)	7(14)	1(2)
Money to be spent on purchase of implements	15(30)	15(30)	16(32)	4(8)
Paying wages to labourers	5(10)	18(36)	18(36)	9(18)

Distribution of the Respondents according to the Participation in Decisions related to the Expenditure Activities in district Fatehabad: The extent of rural women participation in various decision making activities related to expenditure in Fatehabad is presented through the table 3. The role of rural women of district Fatehabad once again noticed insignificant as only 6 percent of the respondents have reported that they have taken the final decision regarding money to spend on purchasing machines whereas 32 percent, 31 percent, 17 percent, 16 percent

have key role in the decision making process as their opinion have been considered while making decision related to the spending money on machines ,seeds ,implements and paying wages to labour but as far as considered to the money spend to be on purchase of implements, the respondent's role has been considered quit minimal. So, almost same picture has been emerged at district Fatehabad as found earlier in table for Block-1 and Block-2

Table 3: Distribution of the Respondents according to the Participation Decision related to the Expenditure Activities in district Fatehabad

Activity	Nil	Only consulted	Opinion considered	Final decision
Money to be spend on purchase of machines	38(38)	24(24)	32(32)	6(6)
Money to be spent on purchase of seeds	31(31)	31(31)	31(31)	7(7)
Money to be spent on purchase of implements	52(52)	30(30)	17(17)	1(1)
Paying wages to labourers	44(44)	39(39)	16(16)	1(1)

Distribution of the Respondents according to the Participation Decision related to the Buying Activities in Block-1: Table 4 shows furnished results related to the major decisions related to the buying and selling activities in Block-1 of Fatehabad district. It is observed that 4 per cent women have observed to take final decision regarding purchase of lands independently, 2 per cent women have taken final decision in

respect of the purchase of land independently. In case of decision related to the purchase of small type of agricultural implements and purchase of insecticides and weedicides, no respondent has observed to take final decision independently. 70 per cent respondents replied that they have nil decision making power in making decisions regarding purchase of insecticides and weedicides.

Table 4 : Distribution of the Respondents according to the Participation in Decisions related to the Buying Activities in Block-1

Activity	Nil	Only consulted	Opinion considered	Final decision
Purchase of lands	18(36))	19(38)	11(22)	2(4)
Purpose for which land is to be purchased	20(40)	18(36)	11(22)	1(2)
How much land to be purchased	21(42)	16(32)	12(24)	1(2)
Type of machine to be purchased	21(42)	13(26)	15(30)	1(2)
Purchase of type of small agricultural implements	26(52)	12(24)	12(24)	0(0)
Purchase of insecticides and weedicides	35(70)	13(26)	2(4)	0(0)

Distribution of the Respondents according to the Participation in Decisions related to the Buying Activities in Block-2: Table 5 shows the distribution of the respondents according to the decisions related to buying activities in Block-2. Purchase of insecticides and weedicides has been recognized as the area in which nil women's participation has been noticed. No single woman has to be noticed to taking final decision regarding purchase of insecticides and weedicides. As far as the purchase of lands is considered of Block-2 in Fatehabad district, 52 per cent women have no decision making power, 22 per cent women

have consulted only while making decision to the related component, 12 per cent respondents accepted that their opinion have considered and the rest of the 10 per cent have full authority to take final decision related to the purchase of lands. Table also reveals that decision regarding to the purchase for which land to be purchased have taken by only 10 per cent women independently and majority of the respondent have not involved in the decision related to the quantity of land to be purchased, type of machine to be purchased and type of small agricultural implements.

Table 5 : Distribution of the Respondents according to the Participation in Decisions related to the Buying Activities in Block-2

Activity	Nil	Only consulted	Opinion considered	Final decision
Purchase of lands	28(56)	11(22)	6(12)	5(10)
Purpose for which land is to be purchased	29(58)	10(20)	6(12)	5 (10)
How much land to be purchased	32(64)	9(18)	5(10)	4(8)
Type of machine to be purchased	22(44)	15(30)	9(18)	4(8)
Purchase of type of small agricultural implements	19(38)	15(30)	13(26)	3(6)
Purchase of insecticides and weedicides	37(74)	11(22)	2(4)	0(0)

Distribution of the Respondents according to the Participation in Decisions related to the Buying Activities in fatehabad district: Table 6 reveals that decision-making power regarding purchase of land, machine, small agricultural implements, insecticides and weedicides. 68 per cent of the respondents have nil decision making power related to purchasing of insecticides and weedicides and the same holds true for the purchase of land, machine and small agricultural

implements. 30 per cent women have been consulted while making decision related to purchase of land in fatehabad district. So, the respondents have given no importance especially making decisions related to buying activities in both of the blocks selected for the study and also in the rural fatehabad district of Haryana presented the worst and devastating situation of rural women in the district.

Table 6: Distribution of the Respondents according to the Participation in Decisions related to the Buying Activities in fatehabad district

Activity	Nil	Only consulted	Opinion considered	Final decision
Purchase of lands	47(47)	30(30)	17(17)	6(6)
Purpose for which land is to be purchased	49(49)	28(28)	7(7)	6(6)
How much land to be purchased	53(53)	25(25)	17(17)	5(5)
Type of machine to be purchased	43(43)	28(28)	24(24)	5(5)
Purchase of type of small agricultural implements	45(45)	27(27)	25(25)	3(3)
Purchase of insecticides and weedicides	68(68)	24(24)	6(6)	2(2)

Distribution of the Respondents according to the Participation in Decisions related to opting Measures to Increase Production in Block-1: The analysis of the data related to opting measures to increase production presented in table 7. It is revealed from the figures that only 4 per cent women have shown their right to take final decision in the family related to level of crop production, 44 per cent have been consulted during the decision-making process. Regarding cropping pattern to be followed, once again, 4 per cent women have taken the

independent final decision, 54 per cent respondents have accepted the fact that they have been consulted during the decision making process but the position in rural area got worsened noticeably as no women have been found to take independent decisions regarding the method of sowing, using plant protection measures, type of fertilizers to be used, installation of tube wells. So, the male dominants in decision making process related to opting different measures of increasing production in agriculture sector in Block-1 of Fatehabad District.

Table 7 : Distribution of the Respondents according to the Participation in Decisions related to opting Measures to Increase Production in Block-1

Activity	Nil	Only consulted	Opinion considered	Final decision
Level of crop production	10(20)	22(44)	16(32)	2(4)
Cropping pattern to be followed	7(14)	27(54)	14(28)	2(4)
Method to be used for sowing	13(26)	28(56)	9(18)	0(0)
Using plant production measures	28(56)	18(36)	4(8)	0(0)
Type of fertilizers to be used	32(64)	15(30)	3(6)	0(0)
Installation of tube well	26(52)	14(28)	10(20)	0(0)
New implements to be used for Production	23(46)	16(32)	9(18)	2(4)

Distribution of the Respondents according to the Participation in Decisions related to opting Measures to Increase Production in Block-2: The women's participation in decision-making related to the opting measures to increase production in Block-2 is presented through table 8. The figures present a very depressed picture of women related to the decision-making power in agriculture sector of Block-2 in fatehabad district. No women have shown power to take final decision independently regarding all the components except for the new implements to be used for production. But in decision-making process related to the implements to be used for

production, only 2 percent women have found themselves sufficient able to take final decision independently. 72 per cent women have no say in the decision for the type of fertilizers have used. 56 percent women have shown nil decision-making power for the installation of tubewell. 58 per cent respondents have no involvement in the decisions regarding the new implement to be used for production. 48 per cent women have accepted the fact that their opinion has been considered while making decisions related to the cropping pattern of the agriculture sector of the Block-2 of Fatehabad district.

Table: 8 Distribution of the Respondents according to the Participation in Decisions related to opting Measures to Increase Production in Block-2

Activity	Nil	Only consulted	Opinion considered	Final decision
Level of crop production	10(20)	18(36)	22(44)	0(0)
Cropping pattern to be followed	8(16)	18(36)	24(48)	0(0)
Method to be used for sowing	15(30)	27(54)	8(16)	0(0)
Using plant production measures	25(50)	23(46)	2(4)	0(0)
Type of fertilizers to be used	36(72)	13(26)	1(2)	0(0)
Installation of tube well	13(26)	15(30)	12(24)	0(0)
New implements to be used for production	29(58)	15(30)	5(10)	1(2)

Distribution of the Respondents according to the Participation in Decisions related to opting Measures to Increase Production in district fatehabad: The distribution of the respondents according to the participation in decision related to different variables of opting measures is reflected through table 9. The level of the crop production has shown nil decision making power of 21 per cent respondents. 40 per cent women have been consulted during the decision-making process. 38 per cent respondents have noticed as a group of women whose opinion have been considered by their husbands regarding

making decisions related to the level of crop production. Almost same picture has emerged in case of the cropping pattern, method of sowing but the situation have become more depressed in case of plant production measures, type of fertilizers to be used and new implements to be used for production as 53 per cent, 68 per cent and 52 per cent women have nil power to take decisions related to above three types of components. However, 55 per cent respondents have accepted the fact that they have only consulted during the adoption of method for the sowing in fatehabad District.

Table 9 : Distribution of the Respondents according to the Participation in Decisions related to opting Measures to Increase Production in district fatehabad

Activity	Nil	Only consulted	Opinion considered	Final decision
Level of crop production	20(20)	40(40)	38(38)	2(2)
Cropping pattern to be followed	15(15)	45(45)	38(38)	2(2)
Method to be used for sowing	28(28)	55(55)	17(17)	0(0)
Using plant production measures	53(53)	41(41)	6(6)	0(0)
Type of fertilizers to be used	68(68)	28(28)	3(3)	1(1)
Installation of tube well	49(49)	29(29)	22(22)	0(0)
New implements to be used for production	52(52)	31(31)	14(14)	3(3)

Distribution of the Respondents according to the Participation in Decisions related to the Livestock Management Activities in Block-1: The women's role in the activities related to the livestock activities is presented in table 10. A better situation has been observed in this area of decision making. More than 50 per cent of the respondents have shown full control on the decision regarding the number of livestock to be kept, selling of livestock. Only 12 per cent and 8 per cent respondents have no

involvement in the decision related to the same variables. But cultivation of fodder for livestock has been the area in which only 6 per cent women have been seen taking final decision independently. 40 per cent respondents have consulted during the decision-making process in respect of cultivation of fodder for livestock but 38 per cent women opinion's has also given consideration for their decision-making ability.

Table 10 : Distribution of the Respondents according to the Participation in Decisions related to the Livestock Management Activities in Block-1

Activity	Nil	Only consulted	Opinion considered	Final decision
Buying of livestock	4(8)	6(12)	18(36)	22(44)
Number of livestock to be kept	3(6)	5(10)	16(32)	26(52)
Selling of livestock	4(8)	10(20)	20(40)	26(52)
Cultivation of fodder for livestock	5(10)	20(40)	19(38)	6(12)

Distribution of the Respondents according to the Participation in Decisions related to the Livestock Management Activities in Block-2: The women's decision-making power in agriculture sector can be analyzed with the help of the data presented in the table 11. The picture has become positive in Block-2 as no woman has found in Block-2 who have "no say" in respect of buying of livestock, number of livestock to be kept,

selling of livestock, only cultivation of fodder for livestock has been registered the area in which 5 per cent women replied that they have no say in the decision-making process. But 50 per cent women accepted that they have taken independent decisions related to buying of livestock and decisions related to the number of livestock to be kept. So, Block-2 of the district gets a better representative of rural women of the fatehabad district.

Table 11 : Distribution of the Respondents according to the Participation in Decisions related to the Livestock Management Activities in Block-2

Activity	Nil	Only consulted	Opinion considered	Final decision
Buying of livestock	0(0)	6(12)	19(38)	25(50)
Number of livestock to be kept	0(0)	4(8)	21(42)	25(50)
Selling of livestock	0(0)	6(12)	24(48)	20(40)
Cultivation of fodder for livestock	5(5)	23(56)	16(32)	6(12)

Distribution of the Respondents according to the Participation in Decisions related to the Livestock Management Activities in fatehabad district: The distribution of the respondents related to their decision-making power in livestock management activities is depicted through table 12 and reveals the position of women regarding livestock management activities as far as the buying of livestock is considered, 47 per cent women have the right to take independent final decision. In relation to buying of livestock, 37 per cent have reported to be considered by the husband while making decisions. In respect of the number of livestock to be kept, 51 per cent respondents have shown full involvement in the decision-making process. 37 per

cent respondent's opinions have also been considered during the decision-making process. Only 44 per cent respondent's opinion has considered by their husband at the time of selling of livestock. But the decision-making power of rural women have depreciated as only 12 per cent of the respondents have to be observed to having taking decision without the interruption of the husband related to the cultivation of fodder for the livestock. So, the main conclusion can be drawn for the decisions regarding livestock management activities that women have performed well under this head, in comparison to the decision-making in respect of different crops production activities.

Table 12 : Distribution of the Respondents according to the Participation in Decisions related to the Livestock Management Activities in fatehabad district

Activity	Nil	Only consulted	Opinion considered	Final decision
buying of livestock	4(4)	12(12)	37(37)	47(47)
number of livestock to be kept	3(3)	9(9)	37(37)	51(51)
selling of livestock	4(4)	16(16)	44(44)	36(36)
cultivation of fodder for livestock	10(10)	43(43)	35(35)	12(12)

Distribution of the Respondents according to the Participation in Decisions related to Storage Activities in Block-1: Decision-making power of women related to storage activities is reflected through the furnished results presented in table 13. It is found that male once again have dominated in comparison to females as Only 18 per cent women of rural area have found participated actively in the decision making process related to the quality to be stored. 54 per cent respondents have

considered while making decisions related to the quantity to be sold but the percentage of the respondents who have only been consulted has been estimated at 18 per cent when decision in respect of crop to be stored is taken. So, the decision has once again been taken by males and the same holds true for the place selection where the crop should be stored and the decision related to the method of the storage has been no exception of it.

Table 13 : Distribution of the Respondents according to the Participation in Decisions related to Storage Activities in Block-1

Activity	Nil	Only consulted	Opinion considered	Final decision
Quantity to be stored	5(10)	9(18)	27(54)	9(18)
Crop to be stored	13(26)	14(28)	15(30)	8(16)
Place where the quantity should be kept	1(2)	21(42)	18(36)	10(20)
Method of the storage	4(8)	18(36)	12(24)	6(12)

Distribution of the Respondents according to the Participation in Decisions related to Storage Activities in Block-2: Distribution of the respondents according to their participation level is presented in table 14. A little bit improved scenario has been shown by the figures in the representative table. Regarding quantity, place, crop and method of storage, 24 per cent, 20 per cent, 26 per cent and 10 per cent respondents have treated themselves independent to take final decisions for

the same activity. 50 per cent, 36 per cent and 24 per cent respondent's opinion has been noticed to be considered by their male partners. Regarding the quantity, crop and place of storage, only 2 per cent in each category replied that they have no power to take decisions related to the relevant area. But the per centage of the respondents has increased in case of the adoption of the method related decision as 20 per cent women have found no say in this regard in Block-2

Table 14 : Distribution of the Respondents according to the Participation in Decisions related to Storage Activities in Block-2

Activity	Nil	Only consulted	Opinion considered	Final decision
Quantity to be stored	1(2)	12(24)	25(50)	12(24)
Crop to be stored	1(2)	14(28)	25(50)	10(20)

<i>Place where the quantity should be kept</i>	1(2)	18(36)	18(36)	13(26)
<i>Method of the storage</i>	10(20)	18(36)	12(24)	5(10)

Distribution of the Respondents according to the Participation in Decisions related to Storage Activities in district Fatehabad: The data presented in the table 15 depict that 21 per cent, 18 per cent, 23 per cent, and 11 per cent respondents have been observed full engaged in the decision-making power related to the quantity to be stored, crop to be stored, about the place and method of the storage. Per centage of the respondents has been recorded as 52 whose opinion has been considered in

the decision making in respect of quantity to be stored. But this per centage has been decreased in case of crop to be stored as 50 per cent women's views have been considered while selecting the crop which has to be stored, the number has fallen by more margin for the third variable i.e., place as only 36 per cent women have accepted the fact that their opinion has been considered by their spouse.

Table: 15 Distribution of the Respondents according to the Participation in Decisions related to Storage Activities in district fatehabad

Activity	Nil	Only consulted	Opinion considered	Final decision
<i>Quantity to be stored</i>	6(6)	21(21)	52(52)	21(21)
<i>Crop to be stored</i>	4(4)	28(28)	50(50)	18(18)
<i>Place where the quantity should be kept</i>	2(2)	39(39)	36(36)	23(23)
<i>Method of the storage</i>	14(14)	46(46)	29(29)	11(11)

VI. CONCLUSION AND POLICY IMPLICATIONS

On the basis of the study, conclusion can be drawn that the women's participation as a planner and managers in the agriculture sector of the district fatehabad has not recorded up to the mark. The situation has noticed worse in some area like making decision related to opting measures to increase production and buying activities. So, some steps should be taken up to upgrade the managing power of agricultural women. Some suggestions are given for this as under:

Policy Implications:

- 1) The educated women from the rural background should be involved in the training programme, workshops to motivate the rural agricultural women labourers for enhancing their role in decision making and management of the farm.
- 2) Efforts should be made to make the male of our society sufficient open-minded to accept the ability of the women in the field of planning and managing in case of farm related activities.
- 3) Financial institutions should provide credit facility on concessional terms so that women can invest her managing skill in the different allied activities of agriculture.
- 4) The efforts in the direction of legal rights of women on land holdings can be instrumental to increase their decision-making power on the farm.
- 5) The involvement of females should be increased at every level of planning and decision-making to exploit the potential of the full population of India.

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Low Birth Weight in Omdurman Maternity Hospital

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I. INTRODUCTION

Approximately, thirty million children worldwide are born with low birth weight every year, representing 23.8% of all births (WHO, 2009).

The World Health Organization (WHO) has defined LBW as a weight at birth of less than 2500g (5.5 pounds). This definition of low birth weight (LBW) was endorsed by the first World Health assembly in 1948. This practical cut-off for international comparison is based on epidemiological observation that infants weighing less than 2500g are approximately twenty times more likely to die than heavier babies. LBW is more common in developing than developed countries. A birth weight below 2500g contributes to range of health outcomes. Reducing LBW incidence by at least one third between 2000- 2012 is one of the major goals in 'world fit for children' the declaration and plan of action adopted at the United Nations general assembly especial session on children on 2002. The reduction of low birth weight forms an important contribution to the Millennium Development Goals (MDGs) for reducing the child mortality (UNICEF, 2004).

Low birth weight (LBW) is a risk factor for a variety of adverse health outcomes, particularly among babies with very low birth weight. Such babies face many of the health problems associated with premature births.

Birth weight is one of the most important individual factors influencing the neonatal death rate. Prematurity (born before 37 weeks of gestation) and intrauterine growth retardation (a condition where fetal growth has been constrained) are the two main causes of low birth weight. Both depend on the duration of gestation and on the adequacy of maternal nourishment and other factors in utero (Behrman & Kliegman, 2002).

Low birth weight is associated with impaired immune function, poor cognitive development, and high risks of developing acute diarrhea or pneumonia. It also affects the infant mortality rate, especially in premature babies. Infant mortality rates are 6 times higher if the birth occurs between weeks 34-36 of gestation, and 40 times higher if the birth occurs before week 34 of gestation. Birth weight is also associated with infant and child morbidity. Low birth weight (LBW) represents the third leading cause of death in children in developing countries, and is the most significant predictor of death, health, growth, and development (Institute of Medicine, 1985).

Therefore, LBW may result from short gestation (prematurity) or from intra uterine growth retardation, or a combination of both. Prematurity is more common in industrialized countries, while intrauterine growth retardation is common in developing countries. It is estimated that of the 22 million cases of LBW deliveries that occur every year, 20 million are in developing countries (Mahjub, et. al, 1997).

Infants weighing 2000-2499 g at birth are 4 times more likely to die during their first 28 days of life than infants who weigh 2500-2999 g, and 10 times more likely to die than infants

weighing 3000-3499 g Low birth weight infants are 5 times more likely than normal birth weight infants to die later in the first year and account for 20 percent of post neonatal deaths . (Judith & laura, 2000).

This research is an attempt to assess the problem of low birth weight at Omdurman Maternity Hospital focusing on causes, risk factors, and management of this major health and nutritional problem.

Justification:

Birth weight is a powerful predictor of infant growth and survival. An infant born with a low birth weight begins life immediately at a disadvantage and faces extremely poor survival rates. Approximately, every ten seconds an infant born in developing countries dies from diseases or infections that can be attributed to low birth weight.

Despite that, there is improvement in maternal and child health services in developing countries including Sudan, yet high prevalence of low birth weight has been documented. This draws the researchers' attention to investigate about the risk factors associated with low birth weight and to provide some recommendations to improve the situation.

Objectives:

General objective:

To determine the risk factors of low birth In Omdurman Maternity Hospital in the period From June 2010 to February 2011.

Methodology:

Study Area:

This study was cross sectional study carried out in Omdurman Maternity Hospital. The hospital had been established in the year 1957 as the first specialized hospital in Sudan, for the purpose of providing more care and medical services to mothers and newly born babies. Also, it is considered to be the main training center for the midwives. It is located in South Western area of Omdurman. At the beginning, it started with one building for delivery with 34 beds. Different sections had been then added to the first building, such as nursery of the newly born infants in 1977, the major operation theater in 1979, sterilization room in 1982, and private rooms in 1993.

Study Population:

Population of this study includes all mothers who gave birth to low birth weight infants in the hospital during the study time (June to December). In the process of selection of the mothers, no choice of socioeconomic status, education level, ethnicity, and religion had been made.

Sampling Methods: Purposive sampling was used for sample selection. All mothers of low birth weight infants during the period of the study were included in this research.

Sample Size: One hundred and fifty low birth weight babies were included with their mothers in this study. All the available children who show criteria of admission were included in this study.

Methods of Data Collection: Two methods of data collection were used in this study:

1/ Questionnaire (appendix-1): Interview following structural questions which included:

- A- Information about socio demographic variables.
- B- Medical and obstetric information.
- C- Life style factors.
- D- Food Frequency data.

2/ Anthropometric measurements include:

- A- Height of the mothers.
- B- Weight of the mothers.

C- Weight of the babies.

3.9. Method of Data Analysis:

Statistical analyses were performed using Statistical Package for Social Sciences (SPSS) version 12 program. Descriptive analyses were performed including frequencies of all variables and percentages and chi-square test to determine the relationship between birth outcomes and certain maternal, fetal and socio- demographic factors. A statistical significance was set at P value < 0.05.

II. RESULTS AND DISCUSSION

Table (1) Age of the respondents:

Maternal age	Frequency	Percentage
< 20 years	31	20.7%
20-30 years	92	61.3%
31 - 40 years	24	16.0%
> 40 years	3	2.0%
Total	150	100.0%

Table (2) Weight of new born and maternal age:

Maternal age	Weigh of new born							
	< 1kg		1-1.4 kg		1.5-1.9kg		2-2.4kg	
	F	%	F	%	F	%	F	%
< 20 years	3	11.5%	19	28.4%	6	17.6%	3	13.0%
20-30 years	18	69.2%	40	59.7%	20	58.8%	14	60.9%
31 - 40 years	5	19.2%	7	10.4%	7	20.6%	5	21.7%
> 40 years	0	0.0%	1	1.5%	1	2.9%	1	4.3%
Total	26	100.0%	67	100.0%	34	100.0%	23	100.0%

P value=0.1

Table (1) shows that, the majority of the respondents (61.3%) were in the age group between 20-30 years, and only (2.0%) of them their ages were more than 40 years. No significant correlation was found between weight of new born and maternal age (p=0.1). It was observed that, low birth weight was more prevalent among the mothers of age group between 20-

30 years. The present study is not in line with previous studies which proved that pregnancy of mothers of less than 20 years have increased risk of low birth weight infants. On the other hand, the risk of preterm birth is shown to increase as maternal age increases above 30 years compared to 25-29 years old (Miller, et. al, 1996).

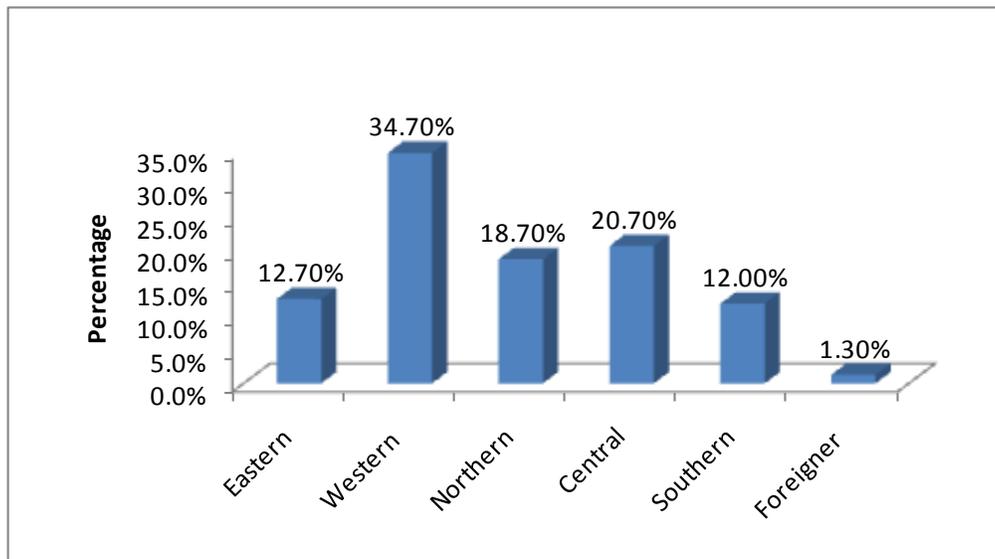


Figure (1) Mothers original place

The above figure shows that, the highest percentage of the mothers came from Western Sudan (34.7%), (20.7%) of the mothers were from Central Sudan, (18.7%) belonged to the Northern regions, (12.7%) came from the Eastern of Sudan, and the others (12.0%) of them came from the Southern part of

Sudan. It was observed that, the lowest percentage of the mothers was found among the foreigners who came from the neighboring countries (1.3%). This result reflected that, LBW problem was common in all parts of Sudan.

Table (3) Occupation of mother and father:

Occupation	Respondents	frequency	percentage
Mother's occupation	Housewife	127	84.7%
	Student	9	6.0%
	Professional	10	6.7%
	Labor	4	2.7%
	Total	150	100.0%
Father's occupation	Laborer	93	62.0%
	Free business	40	26.7%
	Professional	11	7.3%
	Merchant	6	4.0%
	Total	150	100.0%

As shown in Table (3), the majority of the studied women were found to be housewives (84.7%), and only (2.0%) of them were laborers. Regarding their husbands, (62.0 %) of them were laborers, while only (4.0%) were merchants. Duration of work, type of work, and workplace activities are important factors related to pregnancy. Many attempts have been made to explain

the effects of work on pregnancy outcomes. Some women continue to hide their pregnancy due to fear of losing their job and even continue to perform hard activities in addition to their domestic responsibilities. Stress associated with prolonged strenuous work may initiate labor (Simpson, 1993).

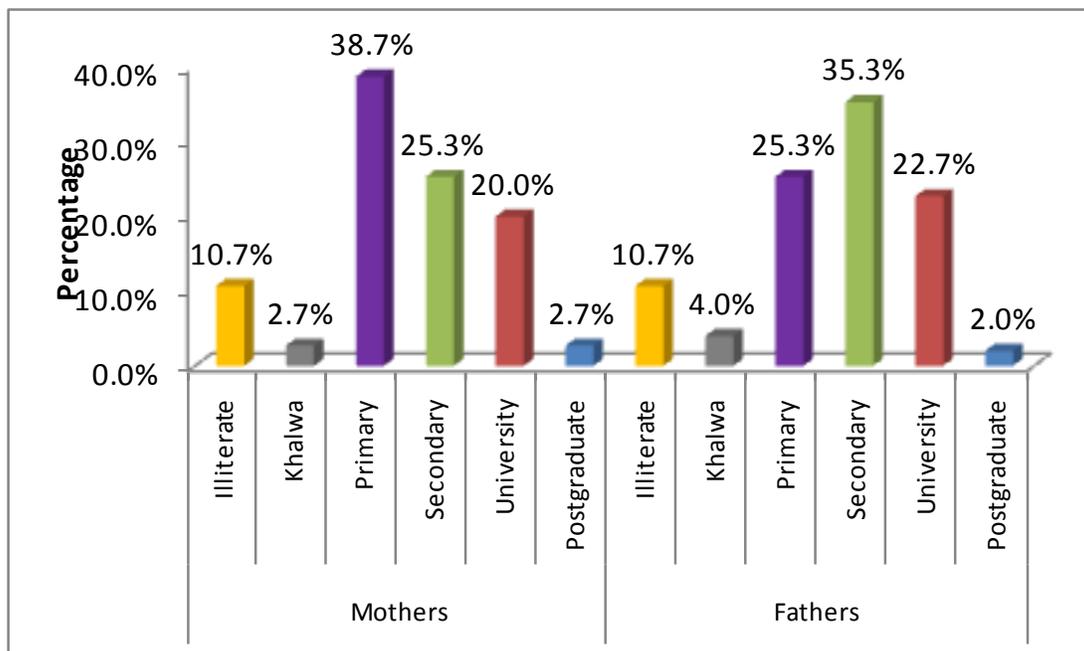


Figure (2) Educational level of mothers and fathers

Figure (2) shows that, (38.7%) and (25.3%) of the mothers and fathers in the present study had primary level of education, only (2.0%) of the fathers had postgraduate studies while (10.7%) of them were illiterate. One of the risk factors for giving birth to a LBW neonate is the mother's level of education.. Currie & Moretti, (2003) found that one year of maternal education reduces both the probabilities of low birth weight and premature birth by 1 percentage point. Another study

found that, mother's education had a significant independent effect on birth weight, with literate mothers having bigger babies than the illiterates, on average. However, it is also possible that the effect of education on birth weight is, to some extent, a reflection of other influences such as maternal nutrition which can also be enhanced by better income opportunities for educated mothers or couples (Oni, 1986).

Table (4) Age of menarche:

Age of Menarche	Frequency	Percentage
10-13 years	72	48.0%
14-17 years	78	52.0%
Total	150	100.0%

Regarding age of menarche, table (4.4) shows that (52.0%) of mothers' menarche age ranged between 14- 17 years, while (48.0%) of them ranged between 10- 13 years. In literature, Coall

(2003) found that women who had early menarche were more likely to produce LBW babies.

Table (5) Birth interval:

Birth interval	Frequency	Percentage
Less than one year	79	52.7%
1-2 years	38	25.3%
2.1-3 years	20	13.3%
More than 3 years	13	8.7%
Total	150	100.0%

Regarding birth interval, table (4.5) reveals that more than half of the infants' mothers had pregnancy intervals of less than one year (52.7%), (25.3%) had pregnancy intervals between 1-2

years, (13.3%) between 2.1-3 years, and (6.7%) of the subject mothers reported for more than 3 years' birth intervals. The small inter-pregnancy interval between the birth of one child and

conception of the next appears to be one of the factors associated with preterm birth (less than 37 weeks), low birth weight (less than 2500 g), and growth restriction (Bujold & Gauthier, 2010). The present study findings are similar to researchers findings which revealed that infants born to women who conceived less than six months after giving birth had a 40% increased risk for

being born prematurely and a 61% increased risk of low birth weight, compared with infants born to mothers who waited 18 months to 2 years between pregnancies. The analysis suggests that better pregnancy spacing could have a dramatic impact on neonatal complications and deaths.

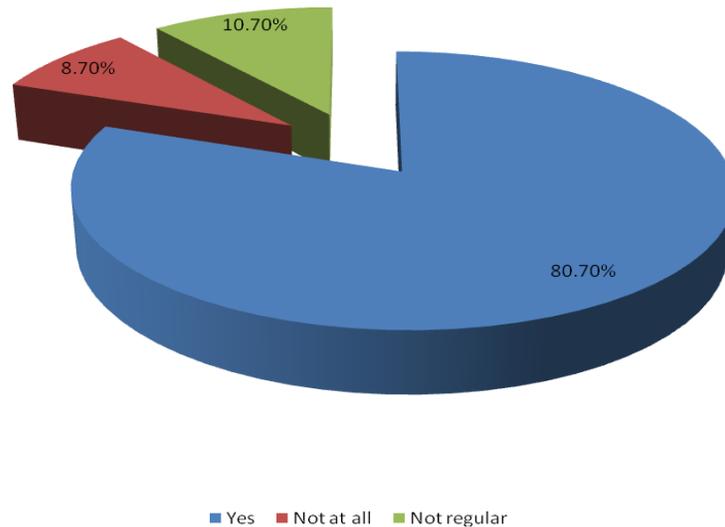


Figure (3) Regular visits to antenatal care unit

Figure (3) shows that, the majority of the women in this study (80.7%) had regularly visited antenatal care units and only (8.6%) did not. The rest (10.7%) of the mothers had irregular visits to the antenatal care during the period of pregnancy. Despite that, the LBW was found to be high among mothers who had been regularly visited the antenatal care units, which means

that they did not receive high quality care. An important reduction in the incidence of low births could be expected if women could attend an adequate number of antenatal care visits. This confirmed by study proved that women with optimal antenatal care and perfect care during their pregnancies have babies with normal birth weights (Mbugbaw & Gofin, 2010).

Table (6) Level of hemoglobin during pregnancy:

Hemoglobin (Hb)	Frequency	Percentage
Unknown	5	3.3%
< 50%	14	9.3%
50-70%	48	32.0%
71-80%	71	47.3%
> 80%	12	8.0%
Total	150	100.0%

Table (6) showed that, (47.3%) of the respondents had hemoglobin level ranged between (71-80%), (32%) had hemoglobin level ranged between (50-70%), (3.3%) their level was less than (50%) while only (8.0%) of the respondents had hemoglobin level of more than (80%). In this study, it seems that the hemoglobin level has no great effect on the maternal

outcomes. Despite that the majority of mothers their blood level is high but still they delivered LBW. This result differs from study demonstrated that, mothers who delivered preterm LBW babies had significantly lower hemoglobin levels at delivery when compared with those who had normal birth weight deliveries (Lawoyin, 1997).

Table (7) Bleeding during current pregnancy:

Time of bleeding during pregnancy	Frequency	Percentage
1st trimester	6	4.0%

2nd trimester	10	6.7%
3rd trimester	10	6.7%
No bleeding	124	82.7%
Total	150	100.0%

Table (8) Correlation of weight of newborn and bleeding during pregnancy:

Time of bleeding during pregnancy	Weigh of new born							
	< 1kg		1-1.4 kg		1.5-1.9kg		2-2.4kg	
	F	%	F	%	F	%	F	%
1st trimester	0	0.0%	6	9.0%	0	0.0%	0	0.0%
2nd trimester	0	0.0%	8	11.9%	0	0.0%	2	8.7%
3rd trimester	2	7.7%	8	11.9%	0	0.0%	0	0.0%
No bleeding	24	92.3%	45	67.2%	34	100%	21	91.3%
Total	26	100.0%	67	100.0%	34	100.0%	23	100.0%

P value=0.4

Table (7) explained that, the majority of the respondents did not experience bleeding during pregnancy (82.7%), (6.7%) experienced bleeding both at 2nd or 3rd trimesters while (4.0%) have experienced bleeding during the first semester. In table (4.8), no significant correlation was found between weight of newborn and the occurrence of bleeding during pregnancy (P

value= 0.4). The present study was different from previous studies which revealed that, vaginal bleeding occurs in (20% to 30%) of confirmed pregnancies during the first 20 week of gestation and associated with other adverse pregnancy outcomes such as low birth weight, preterm birth, stillbirth, and prenatal death (Phillip, 2009).

Table (4.9) Uterus diseases:

Diseases of the uterus cervix	Frequency	Percentage
Yes	30	20.0%
No	120	80.0%
Total	150	100.0%

Table (10) Previous preterm labor:

Previous preterm	Frequency	Percentage
Yes	42	28.0%
No	108	72.0%
Total	150	100.0%

The majority of the mothers (80.0%) as shown in table (4.9) had no abnormalities in uterus and cervix, only 20.0% showed uterus and cervix abnormalities. Table (4.10) explained that, previous preterm labor was found among (28.0%) of the

respondents. Pervious study found that diseases in the uterus and cervix were associated with a higher incidence of preterm births (Ramsay & Goldenberg, 2001).

Table (11) Gestational age:

Gestational age	Frequency	Percent
< 37 weeks	90	60.0%
37 - 42 weeks	54	36.0%
> 42 weeks	6	4.0%
Total	150	100%

Table (11) shows that, most of the infants were born before 37 weeks of gestational age (60%), (36%) of them between 37-42 weeks of gestation while only (4.0%) of them were born after 42 weeks of gestation. Study by Mansour, et. al, (2002) found

that, infants who were born before 37 weeks of gestational age were 16 times at higher risk of having low birth weight than babies who were born at 37-42 weeks of gestation.

Table (12) Diseases associated with low birth weight:

Diseases associated with low birth weight	Frequency	Percentage
None	84	56.0%
Preeclampsia	2	1.3%
Hypertension	23	15.3%
Urinary tract infections	21	14.0%
Anemia	8	5.3%
Malaria	12	8.0%
Total	150	100.0%

Table (13) Weight of newborn and diseases associated with LBW babies:

Diseases associated with low birth weight	Weigh of new born							
	< 1kg		1-1.4 kg		1.5-1.9kg		2-2.4kg	
	F	%	F	%	F	%	F	%
None	16	61.5%	30	44.8%	24	70.6%	14	60.9%
Preeclampsia	0	0.0%	2	3.0%	0	0.0%	0	0.0%
Hypertension	6	23.1%	12	17.9%	0	0.0%	5	21.7%
UTIs	4	15.4%	11	16.4%	6	17.6%	0	0.0%
Anemia	0	0.0%	6	9%	0	0.0%	2	8.7%
Malaria	0	0.0%	6	9%	4	11.8%	2	8.7%
Total	26	100.0%	67	100.0%	34	100.0%	23	100.0%

P value=0.02

In table (12), the most common diseases among the mothers in the present study were hypertension (15.3%), UTIs (14.0%), malaria (8.0%) and anemia (5.3%). Table (4.13) also shows the significant correlation was found between weight of new born and diseases prevalent among their mothers (p value=0.02). These diseases stated in many previous studies as determinants of low birth weight babies. In the present study prevalence of low birth weight were more among hypertensive mothers and mothers with urinary tract infections. The finding is in line with the previous studies which revealed that, pregnant women with urinary tract infections had more low birth weight babies than pregnant women without urinary tract infections (Uncu, et. al, 2002).

High blood pressure during pregnancy is at higher risk of having a low birth weight infant, when compared to normal blood pressure during pregnancy. Moreover, infants who were born to mothers with preeclampsia had weights less than infant were born to the mothers without preeclampsia. This diagnosed when the mother have high blood pressure, positive protein in urine and edema (Mansour, et. al, 2002).

Regarding anemia, as stated in the literature, maternal anemia diagnosed prior to mid pregnancy has been associated with increased risk of preterm delivery (Scholl & Reially, 2000).

For malaria, results of many studies stated that malaria in pregnant women is a major determinant of low birth weight (Onis, 2001).

Table (14) Drugs taken during pregnancy:

Drugs taken during pregnancy	Frequency	Percentage
None	6	4.0%
Folic acid	100	66.7%
Aspirin	6	4.0%
Antibiotics	19	12.7%
Vitamins	19	12.7%
Total	150	100.0%

Table (15) Weight of newborn and drugs taken during pregnancy:

Drugs taken during pregnancy	Weigh of new born							
	< 1kg		1-1.4 kg		1.5-1.9kg		2-2.4kg	
	F	%	F	%	F	%	F	%
None	0	0.0%	2	3.0%	4	11.8%	0	0.0%
Folic acid	19	73.1%	47	70.1%	24	70.6%	10	43.5%
Aspirin	0	0.0%	6	9.0%	0	.0%	0	0.0%

Antibiotics	3	11.5%	8	11.9%	4	11.8%	4	17.4%
Vitamins	4	15.4%	4	6.0%	2	5.9%	9	39.1%
Total	26	100%	67	100%	34	100%	23	100%

P value=0.002

Table (14) shows that, (96.0%) of the mothers had taken drugs during pregnancy such as folic acids (66.7%), antibiotics (12.7%), vitamins (12.7%), and aspirin (4.0%), while only (4.0%) of them did not use any type of drugs. In table (4.15), significant correlation was found between the use of drugs during pregnancy and weight of new born ($p=0.002$). A study had shown that, uses of iron and folic acid supplements appeared to affect birth weight. Mothers who took supplements appeared to have low percentage of LBW babies. While the use of certain

medications such as antibiotics and aspirin by the mother during pregnancy was associated with having a LBW baby, the association being statistically significant (Kramer, 1991). In this study more than three quarters of the studied mothers had been used to take vitamins and minerals supplements (79.4%) needed during pregnancy. Poor socioeconomic status of families and unavailability and inaccessibility of antenatal care services could be blamed to cause this result.

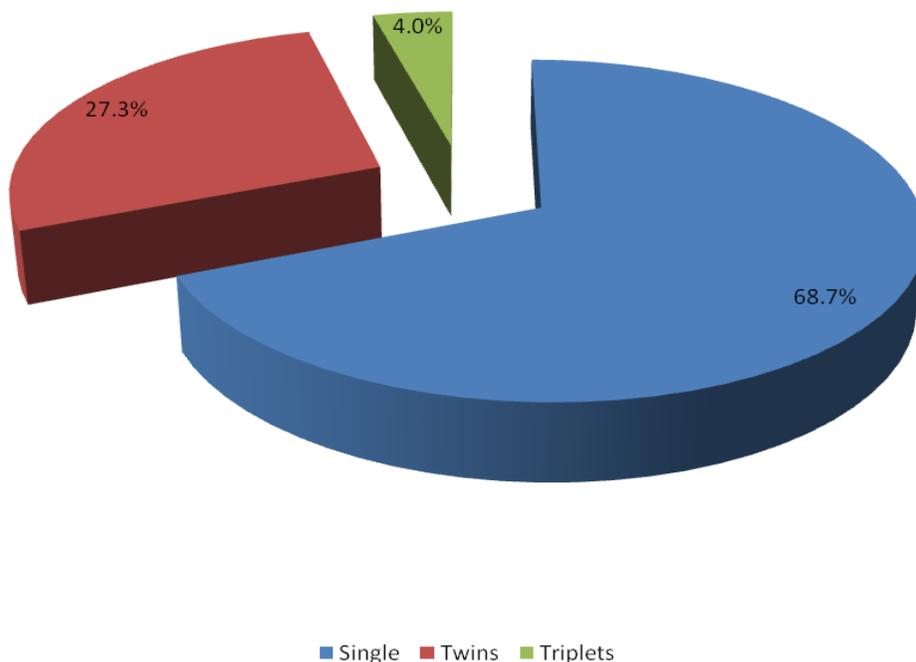


Figure (4) Type of outcome

In figure (4), the present study demonstrated that (68.7%) of the mothers had single outcome, (27.3%) had twins whereas only (4.0%) had triplets outcome. The risk of giving birth to a LBW infant increased significantly in multiple gestations as stated in many studies. Multiple pregnancies ([twins](#), triplets, etc.) are

significant factors in preterm births. Study by Gardener, et.al, (1995) found that, (54%) of twins were delivered preterm versus (9.6%) of singleton births. Triplets and more are even more endangered.

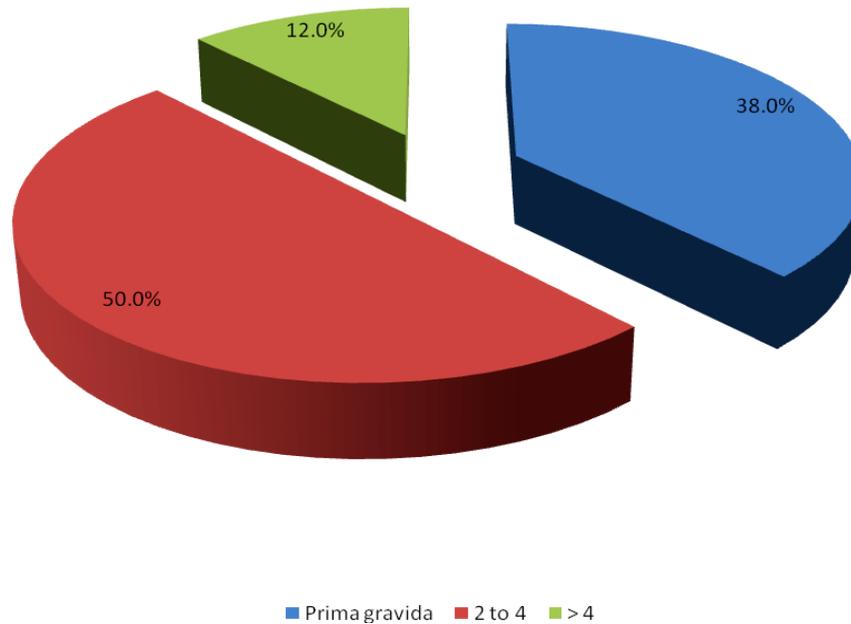


Figure (5) Number of deliveries

The above figure demonstrates that, half of the mothers were multigravid with 2-4 children and (12.0%) of them have more than four children. (38.0%) of the studied mothers were primagravid. The present study was similar to study revealed

that, prima gravid mothers were comparatively at lower risk of delivering LBW babies (18.4%) as compared to multi-gravid mothers (28.9%) (Sharma, et.al, 2009).

Table (16) Weight of newborn:

Weight of new born	Frequency	Percentage
< 1kg	26	17.3%
1-1.4 kg	67	44.7%
1.5-1.9kg	34	22.7%
2-2.4kg	23	15.3%
Total	150	100.0%

Regarding birth weight of new born, table (4.16) demonstrated that (44.7%) of the new born weight ranged between 1-1.4 kg, (22.7%) their weight ranged between 1.5-1.9 kg, and (15.3%) ranged between 2 -2.4 kg.

Table (17) Type of delivery:

Type of delivery	Frequency	Percentage
Normal	77	51.3%
Cesarean	73	48.7%
Total	150	100.0%

Table (17) found that, nearly half of the mothers delivered through cesarean section (48.7%).The chance of the baby and his mother survival may increase through cesarean section. A survival advantage observed among very low birth weight infants

delivered through cesarean section independent of a number of maternal medical and labor complications, and demographic risk factors (Malloy, 2008).

Table (18) Mothers' weight (in kg):

Mother's weight(in kg)	Frequency	Percentage
< 50	18	12.0%
50-60	46	30.7%
61-70	53	35.3%
> 70	33	22.0%
Total	150	100.0%

Table (19) Weight of newborn and mothers' weight:

Mother's weight (in kg)	Weigh of new born							
	< 1kg		1-1.4 kg		1.5-1.9kg		2-2.4kg	
	F	%	F	%	F	%	F	%
< 50	2	7.7%	6	9.0%	4	11.8%	6	26.1%
50-60	8	30.8%	22	32.8%	12	35.3%	4	17.4%
61-70	8	30.8%	25	37.3%	10	29.4%	10	43.5%
> 70	8	30.8%	14	20.9%	8	23.5%	3	13.0%
Total	26	100.0%	67	100.0%	34	100.0%	23	100.0%

P value=0.03

Table (18) shows that, (35.3%) of the mothers' weight ranged between 61-70 kg, (30.7%) of the mothers their weights ranged between 50-60 kg, (22.0%) of them their weights were more than 70 kg, and (12.0%) of those mothers' weights were less than 50 kg. In table (4.19), a significant correlation was found between newborn weight and mothers' weight (P=0.03).

Numerous studies have clearly established a good correlation between birth weight and maternal weight. Previous study revealed that, poorly nourished mothers with pre pregnancy weight below 45kg was found to have a significant risk for deliver low birth weight infants (P=0.001) (Sharma, et. al, 2009).

Table (20) Mothers' height (in cm):

Mother's height (in cm)	Frequency	Percentage
< 150	46	30.7%
> 150	104	69.3%
Total	150	100%

Table (21) Correlation between mothers' height and newborn weight:

Mother's height (in cm)	Height of new born							
	< 1kg		1-1.4 kg		1.5-1.9kg		2-2.4kg	
	F	%	F	%	F	%	F	%
< 150	10	38.5%	22	32.8%	10	29.4%	4	17.4%
> 150	16	61.5%	45	67.2%	24	70.6%	19	82.6%
Total	26	100.0%	67	100.0%	34	100.0%	23	100.0%

P value=0.01

Regarding mothers' height, (69.3%) of the mothers' heights were more than 150 cm, and the other (30.7%) of them were below 150 cm. In table (4.21), a significant correlation was found between increased maternal height and low weight of new born babies (P=0.01). Maternal height is a result of genetic factors, environmental effects and nutrition. The exact mechanism of how a maternal height influences pregnancy outcome is not clear.

The present study was different from study stated by Ghosh, et.al, (2000), who found that mothers who were less than 150 cm in height were more prone to have low birth weight infants. Reasons behind this result may include inadequate nutrition, poor levels of education and occupation, inaccessible health and nutrition care services.

Table (22) Smoking habit

Smoking use	Frequency	Percentage
Yes	2	1.3%
No	130	86.7%
Passive smoking	18	12.0%
Total	150	100.0%

Table (4.22) shows that, (86.7%) of the mothers did not use to smoke, and (12%) of them were exposed to smoking while only (1.3%) of them were smokers. This is confirmed with recent studies demonstrated that pregnant women who exposed to passive smoking have higher risks of delivering a child with

congenital abnormalities, smaller head circumferences, and low birth weight (Salmasi, et. al, 2010).

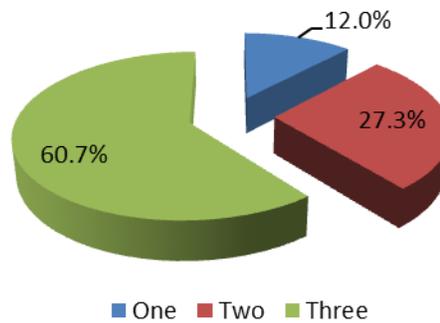


Figure (6) Number of meals per day

Figure (6) shows that, (12.0%) of the mothers had taken one meal per day, (27.3%) had taken two meals per day, while (60.7%) of the mothers had taken three meals per day or more. Some women during pregnancy suffer from [heartburn](#) or other

eating disorders and advised to eat small frequent meals. Nutritional deficiencies usually associated with birth defects and several health and nutritional consequences for both infants and their mothers (Lundy & Janes, 2001).

Table (23) Food frequency:

Food items	Daily	2times/ week	Once/week	Monthly	Never	Total
	%	%	%	%	%	%
Cereals						
Rice	0.0%	36.7%	25.3%	38.0%	0.0%	100%
Bread	100.0%	0.0%	0.0%	0.0%	0.0%	100%
Kisra	25.3%	24.7%	0.0%	12.0%	38.0%	100%
Legumes						
Bean	24.7%	50.0%	12.7%	12.7%	0.0%	100%
Lentils	0.0%	50.0%	25.3%	12.0%	12.7%	100%
Meats						
Beef	37.3%	.0%	50%	0.0%	12.7%	100%
Lamb	24.7%	25.3%	50%	0.0%	0.0%	100%
Chicken	0.0%	37.3%	37.3%	0.0%	25.3%	100%
Fish	0.0%	25.3%	25.3%	12.7%	36.7%	100%
Egg	25.3%	36.7%	0.0%	38.0%	0.0%	100%
Milk and milk products						
Milk	62.0%	.0%	12.7%	12.7%	12.7%	100%
Yoghurt	12.7%	24.7%	25.3%	12.7%	24.7%	100%

Cheese	36.7%	0.0%	12.7%	25.3%	25.3%	100%
Vegetables						
Cooked vegetables	62.7%	24.7%	0.0%	12.7%	0.0%	100%
Fresh vegetables	87.3%	0.0%	0.0%	0.0%	12.7%	100%
Drinks						
Fresh natural juices	50.0%	12.0%	0.0%	12.7%	25.3%	100%
Coffee	12.7%	12.7%	0.0%	0.0%	74.7%	100%
Tea	12.0%	12.7%	12.0%	25.3%	38.0%	100%
Soft drinks	12.7%	0.0%	24.7%	0.0%	62.7%	100%
Fruits						
Fresh fruits	36.7%	25.3%	12.7%	25.3%	0.0%	100%

The process of pre-pregnancy nutrition is a process of "building up" the immune system in preparation of pregnancy, and is known as being one of the major factors in determining the success rate of conceiving healthy children. Inadequate nutrition is the most commonly implicated cause of impaired foetal growth (Lundy & Janes). Table (4.23) demonstrated frequency of food consumed by the mothers in the present study.

It was observed that bread, milk and its products, stewed and fresh vegetables, and fresh juices were more consumed by the subject mothers more than the other types of food. Milk is an important source of dietary calcium and an association was observed in epidemiological studies from Ethiopia where the high calcium content in the diet has led to reduced incidence of preeclampsia and eclampsia (Atallah, et. al, 2002).

Lamb and beef were more consumed than the other types of meat among the subject mothers. White meat and red meat were classified under the most expensive types of food in Sudan, as most of the people cannot afford. Pregnant women need food contain protein of high biological value to face the fetal demand.

Regarding consumption of vegetables, mothers in the present study consumed fresh vegetables more than cooked vegetables, this reflected the women' knowledge of the nutritive values of fresh vegetables which is considered as protective foods and good source of vitamins, minerals, and fibre. Half of the women in the present study have been used to drink natural fruits juices. Drinking of juices is highly recommended for the pregnant woman. From our observation these mothers do not reveal the right amount food they consumed otherwise they would deliver normal weight infants.

III. CONCLUSION AND RECOMMENDATIONS

Low birth weight affects a large number of births annually and is one of the leading health problems of the world.

The factors that causing low birth weight are so many and vary from community to another and they may be interdependent on each others. It was concluded that, low birth weight solutions require package of interventions ,and that these need to be incorporated into all antenatal health care programs including safe motherhood programs, reproductive health programs and integrated management of childhood illness programs.

The study recommended multiple approaches including ,early and regular prenatal care ,hospitals or clinics should provide high quality care services, mothers should be advised on good nutrition before and during pregnancy which serves as one of the pillars of a healthy status, and effective health education

programs for mothers should be organized using different mass media. More researches are needed in the area of low birth weight to guide education effort to modify behaviors leading to birth of low weight babies.

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COOPON for Selfish Attack Detection in Cr Ad-Hoc Networks

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Abstract- Cognitive radio is an opportunistic communication technology designed to help unlicensed users utilize the maximum available licensed bandwidth. Selfish cognitive radio attacks are a serious security problem because they significantly degrade the performance of a cognitive radio network. The proposed work provides selfish cognitive radio attack detection technique, called COOPON, which will detect the attacks of selfish Secondary Users by the cooperation of other legitimate neighboring SUs. The COOPON algorithm make use of the autonomous decision capability of an ad-hoc communication network based on exchanged channel allocation information among neighboring SUs.

Index Terms- cognitive radio, secondary user

I. INTRODUCTION

Selfish CR attacks are carried out by sending fake signals or fake channel information. If a SU recognizes the presence of a PU by sensing the signals of the PU, the SU won't use the licensed channels. In this case, by sending faked PU signals, a selfish SU prohibits other competing SUs from accessing the channels. Another type of selfish attack is carried out when SUs share the sensed available channels. There has been some research on selfish attack detection in conventional wireless communications. On the other hand, little research on the CR selfish attack problem has been done so far. Selfish attacks are different depending on what and how they attack in order to pre-occupy CR spectrum resources. The various selfish attacks present in networks has been illustrated in fig1.1

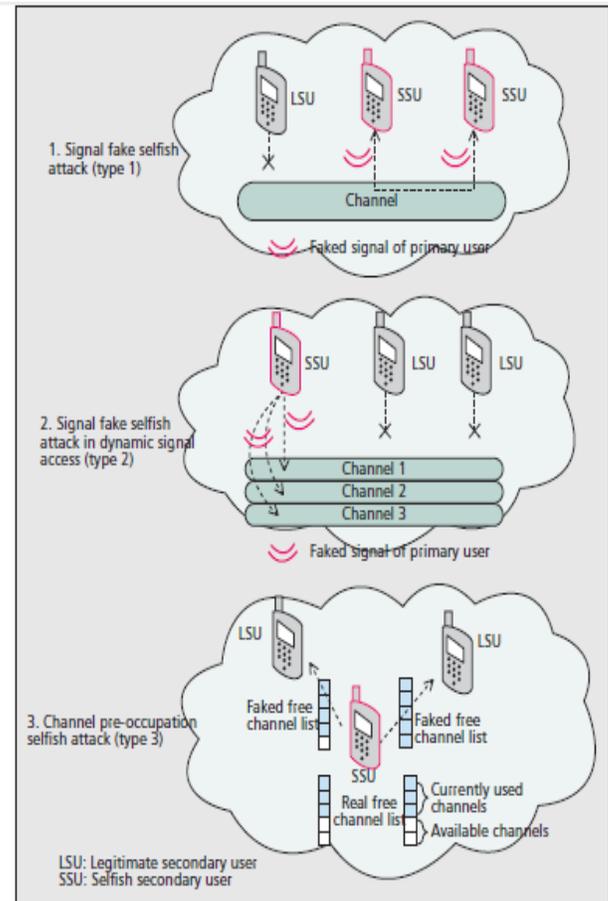


Fig 1.1 Types Of Attacks

1.1 Types of Selfish Attacks

1.1.1 Attack Type 1

A Type 1 attack is designed to prohibit a legitimate SU (LSU) from sensing available spectrum bands by sending faked PU signals. The selfish SU (SSU) will emulate the characteristics of PU signals. A legitimate SU who overhears the faked signals makes a decision that the PU is now active and so the legitimate SU will give up sensing available channels. This attack is usually performed when building an exclusive transmission between one selfish SU and another selfish SU regardless of the number of channels. There must be at least two selfish nodes for this type of attack.

1.1.2 Attack Type 2

Type 2 attacks are also a selfish SU emulating the characteristics of signals of a PU, but they are carried out in dynamic multiple channel access. In a normal dynamic signal access process, the SUs will periodically sense the current

operating band to know if the PU is active or not, and if it is, the SUs will immediately switch to use other available channels. In this by launching a continuous fake signal attack on multiple bands in a round-robin fashion, an attacker can effectively limit legitimate SUs from identifying and using available spectrum channels.

1.1.3 Attack Type 3

Type 3, called a channel pre-occupation selfish attack, attacks can occur in the communication environment that is used to broadcast the current available channel information to neighboring nodes for transmission. We consider a communication environment that broadcasting is carried out through a common control channel (CCC) which is a channel dedicated only to exchanging management information. A selfish SU will broadcast fake free (or available) channel lists to its neighboring SUs. Even though a selfish SU only uses three channels, it will send a list of all five occupied. Thus, a legitimate SU is prohibited from using the two available channels.

1.2 Attack and Detection Mechanism

We consider a cognitive radio ad-hoc network. Ad-hoc networks have distributed and autonomous management characteristics. Our proposed detection mechanism in COOPON is designed for an ad-hoc communication network. We make use of the autonomous decision capability of an ad-hoc communication network based on exchanged channel allocation information among neighboring SUs.

the dedicated channel. We notice that T-Node 2 reports that there are two channels currently in use, while N-Node 3 reports that there are three currently in use, which creates a discrepancy. N-Node 4 also receives faked channel allocation information from the target node. On the other hand, all other exchanged information pairs, T-Node/ N-Node 1 and T-Node/N-Node 2, are correct. Thus, all of the 1-hop neighboring SUs will make a decision that the target SU is a selfish attacker.

Our proposed COOPON selfish attack detection method is very reliable since it is based on deterministic information. We focus on selfish attacks of SUs toward multiple channel access in cognitive radio ad-hoc networks.

II. LITERATURE REVIEW

2.1 Multi-hop Cognitive Mesh Networks

Manuj Sharma, Anirudha Sahoo, and K. D. Nayak proposed a Channel Selection under Interference Temperature Model in Multi-hop Cognitive Mesh Networks. Here a cognitive radio-based wireless mesh network is considered.

Each mesh node senses the channels of a target primary system to identify the spectrum opportunities, and uses them for its own data transmission. Interference temperature model is used to define the occupancy and availability of a channel. A cooperative algorithm based on interference temperature model is proposed for computation of available channels by mesh nodes. Cases for mesh nodes with fixed transmission power and adaptive transmission power are considered separately. Link and end-to-end routing metrics are proposed to select appropriate channels from the computed set of available channels.

2.2 Adaptive Spectrum Sharing

Haythem A. Bany Salameh, Marwan Krunz, and Ossama Younis introduced a Cooperative Adaptive Spectrum Sharing in Cognitive Radio Networks. The cognitive radio (CR) paradigm calls for open spectrum access according to a predetermined etiquette.

Under this paradigm, CR nodes access the spectrum opportunistically by continuously monitoring the operating channels. A key challenge in this domain is how the nodes in a CR network (CRN) cooperate to access the medium in order to maximize the CRN throughput. Typical multichannel MAC protocols assume that frequency channels are adjacent and that there are no constraints on the transmission power. However, a CRN may operate over a wide range of frequencies, and a power mask is often enforced on the transmission of a CR user to avoid corrupting the transmissions of spectrum-licensed primary-radio (PR) users. To avoid unnecessary blocking of CR transmissions, distance-dependent MAC protocol for CRNs is proposed.

The protocol, called DDMAC, attempts to maximize the CRN throughput. It uses a novel probabilistic channel assignment mechanism that exploits the dependence between the signal's attenuation model and the transmission distance while considering the traffic profile. DDMAC allows a pair of CR users to communicate on a channel that may not be optimal from one user's perspective, but that allows more concurrent transmissions to take place, especially under moderate and high traffic loads. Simulation results indicate that, compared to typical

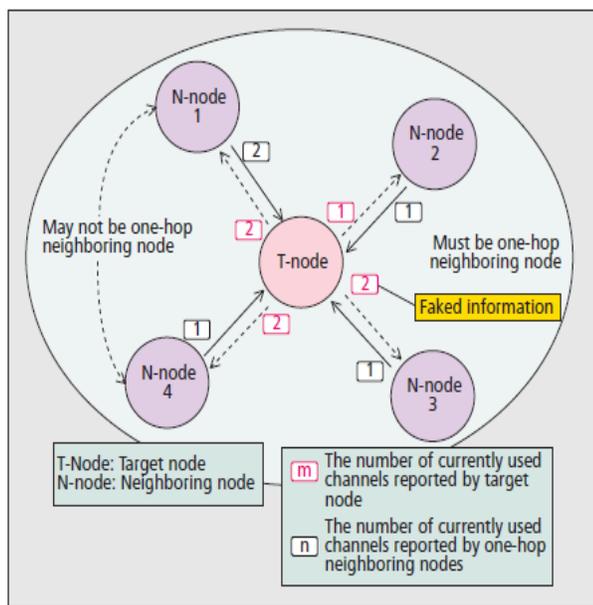


Fig 1.2 Selfish attack detection mechanism.

In Fig 1.2, the target node, T-Node, is also a SU, but other 1-hop neighboring SUs, N-Node 1, N-Node 2, N-Node 3, and N-Node 4, will scan any selfish attack of the target node. The target SU and all of its 1-hop neighboring users will exchange the current channel allocation information list via broadcasting on

multichannel CSMA-based protocols, DDMAC reduces the blocking rate of CR requests by up to 30%, which consequently improves the network throughput.

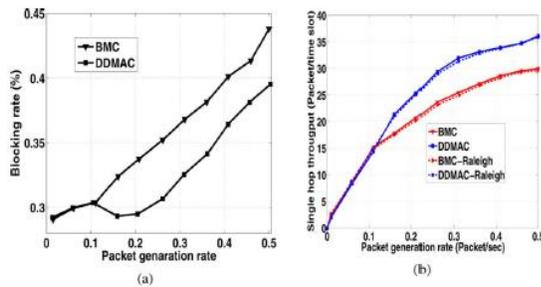


Fig 2.1 Performance of a CRN.

2.3 Distributed Relay-Assignment

Ahmed K. Sadek, Zhu Han, Senior Member and K.J. Ray Liu, Fellow introduced a method called Distributed Relay Assignment Protocols for Coverage Expansion in Cooperative Wireless Networks.

One important application of cooperative communications is to extend coverage area in wireless networks without increasing infrastructure. However, a crucial challenge in implementing cooperation protocols is how to select relay-source pairs. So addressing this problem based on the knowledge of the users' spatial distribution which determines the channel statistics.

Considering two scenarios at the destination node, when the receiver uses MRC and when no-MRC is used. First we characterizing optimal relay location to minimize the outage probability. Then propose and analyze the performance of two schemes: a distributed nearest neighbor relay assignment in which users can act as relays, and an infrastructure-based relay-assignment protocol in which fixed relay nodes are deployed in the network to help the users forward their data. The outage probabilities of these two schemes are derived. Also deriving universal lower bounds on the performance of relay-assignment protocols to serve as a benchmark for our proposed protocols. Numerical results reveal significant gains when applying the proposed simple distributed algorithms over direct transmission in terms of coverage area, transmit power, and spectral efficiency. At 1 percent outage probability, more than 200 percent increase in coverage area can be achieved, 7 dBW savings in the transmitted power, and the system can operate at 2 b/s/Hz higher spectral efficiency.

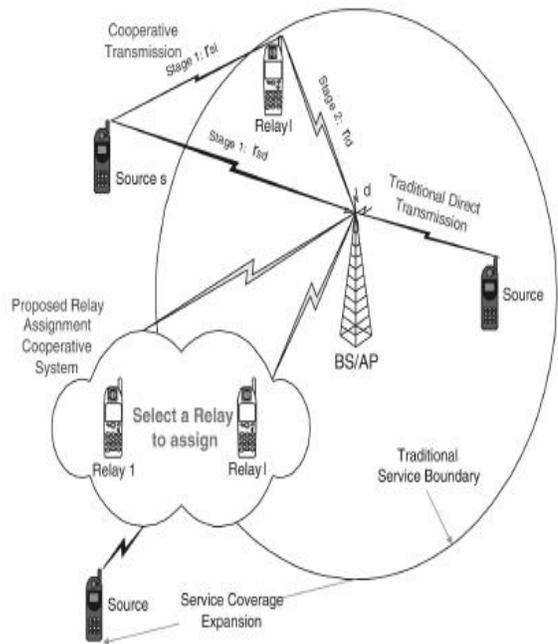


Fig 2.2 Illustrating the difference between the direct and cooperative transmission schemes, and the coverage extension prospected by cooperative transmission.

2.4 Intrusion Detection System

Zubair Md. Fadlullah, Hiroki Nishiyama, and Nei Kato, Tohoku University Mostafa M. Fouda, Tohoku University and Benha University proposed a method called Intrusion Detection System (IDS) for Combating Attacks Against Cognitive Radio Networks.

Cognitive radio networks (CRNs) present a promising solution to solve the scarcity of the radio spectrum, they are still susceptible to security threats. Until now, only a few researchers considered the use of intrusion detection systems (IDSs) to combat these threats against CRNs.

In this article CRN based on IEEE wireless regional area network (WRAN) and describe some of the security threats against It are considered. For the secondary users in the CRN to quickly detect whether they are being attacked, a simple yet effective IDS is then presented. Our proposal uses non-parametric cumulative sum (cusum) as the change point detection algorithm to discover the abnormal behavior due to attacks. The proposed IDS adopts an anomaly detection approach and it profiles the CRN system parameters through a learning phase. So this proposal is also able to detect new types of attacks. As an example, we present the case of detection of a jamming attack, which was not known to the IDS beforehand. The proposed IDS is evaluated through computer based simulations, and the simulation results clearly indicate the effectiveness proposal.

The importance of designing appropriate intrusion detection systems to combat attacks against cognitive radio networks. Also, we proposed a simple yet effective IDS, which can be easily implemented in the secondary users' cognitive radio software. Our proposed IDS uses a non-parametric cusum algorithm, which offers anomaly detection. By learning the normal mode of operations and system parameters of a CRN, the

proposed IDS is able to detect suspicious (i.e. anomalous abnormal) behavior arising from an attack.

released by FCC. The experiment results show the efficacy and efficiency of the approach.

Wired IDS issues	Wireless IDS issues
Wired security defenses are not required to deal with layer 1 and 2 attacks targeting wireless communications, such as reconnaissance, man-in-the-middle attacks, and jamming attacks.	Misconfigured and/or rogue base stations can expose the entire wireless network to layer 2 attacks, which cannot be detected by traditional layer 3 firewalls.
Wired intrusion detection and prevention systems often rely on deep packet inspection.	Wireless intrusion detection systems do not have this luxury as the wireless user usually communicates with the base station over encrypted connections.
Firewalls and network address translation (NAT) can ensure that outsiders cannot directly see the internal end-users connected to the wired network let alone capture their traffic.	Malicious wireless users are free to capture all traffic in the air, and can attempt to directly inject traffic, jam the end-users, and probe their vulnerabilities.

Fig 2.2 Issues / requirements of wired and wireless intrusion detection systems.

2.5 Privacy Preserving Dynamic Spectrum Auction

Sheng Liu, Haojin Zhu, Rong Du, Cailian Chen, Xiping Guan Shanghai Jiao Tong University Shanghai, China proposed a method called Location Privacy Preserving Dynamic Spectrum Auction in Cognitive Radio Network.

Dynamic spectrum auction offers the flexibility and capability for bidders to request and acquire unoccupied channels from spectrum license holders. Compared with the conventional auction, spectrum auction allows various buyers to utilize the same channel simultaneously based on their locations, which is denoted as spectrum reusability.

Here considering a novel kind of attack, which could compromise location privacy of bidders by observing the bid items as well as bid price. To thwart this attack, we introduce a new Location Privacy Preserving Dynamic Spectrum Auction (LPPA) scheme which consists of two components: Privacy Preserving Bid Submission protocol (PPBS) and Private Spectrum Distribution protocol (PSD). Based on the prefix membership verification scheme, PPBS allows the auctioneer to construct the conflict relationship between different users and obtain the maximum value of bids on various channels without leaking users' location information. Furthermore, PSD is proposed to efficiently distribute the spectrum among bidders and securely charge the winners with the help of periodically available TTP (Trusted Third Party). To demonstrate the effectiveness of the proposed scheme, we implement our attack and scheme on data extracted from Google Earth Coverage Maps

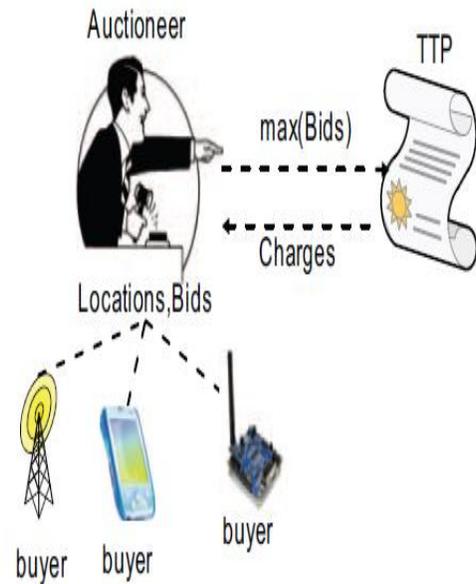


Fig 2.3 The architecture of our auction scheme

III. RESULT AND TABULATION

In order to investigate how much selfish su density influences detection accuracy, the experiment was carried out with 4 secondary user. Fig 3.1 we can see that the number of sus has a trivial effect on coopon's detection rate. However, the detection rate is very sensitive to selfish su density. When the density of selfish sus in the cr network increases, the detection accuracy decreases rapidly. The reason why this problem occurs is that it is a higher possibility that more than one selfish su exists in a neighbor with higher selfish node density, and in turn, they can exchange wrong channel allocation information. Obviously it is a higher possibility that a wrong decision can be made with more faked exchanged information.

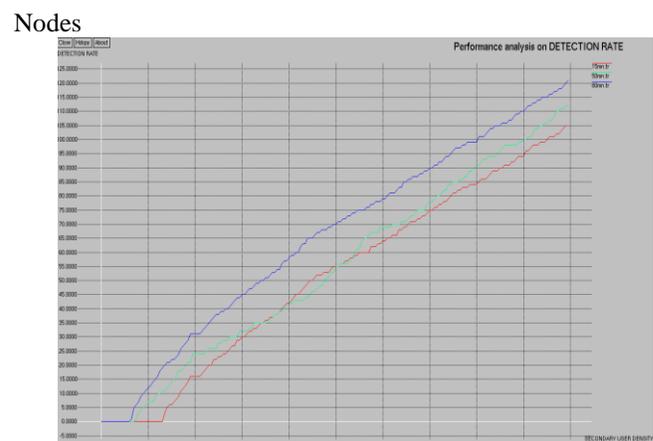


Fig 3.1 Detection Rate In Nodes

The experimental results in Fig 3.1 give an insight into how the number of nodes in a neighbor will influence selfish detection accuracy. Intuitively, if we have more neighboring nodes in a neighbor, detection accuracy may be less negatively affected, because we can have a possibility to receive more correct channel allocation information from more legitimate SUs.

IV. CONCLUSION

By using the deterministic channel allocation information, COOPON which gives very highly reliable selfish attack detection results by simple computing. The proposed reliable and simple computing technique can be well fitted for practical use in the future. A new approach is designed for cognitive radio ad-hoc networks. This make use of ad-hoc network advantages such as autonomous and cooperative characteristics for better detection reliabilities. For future work cryptographic model and game theory to do theoretical analysis of more than one selfish SU in a neighbor, which gives less detection accuracy.

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An Efficient Algorithm for Improving QoS in MANETs

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Abstract- A Mobile Adhoc Network is a collection of independent mobile nodes that can communicate to each other via radio waves. The mobile nodes that are in radio range of each other can directly communicate, whereas others needs the aid of intermediate nodes to route their packets. Each of the node has a wireless interface to communicate with each other.

These networks are fully distributed, and can work at any place without the help of any fixed infrastructure as access points or base stations, All networking functions such as routing and packet forwarding, are performed by nodes themselves in a self-organizing manner. For these reasons, securing a mobile ad-hoc network is very challenging.

We propose Ant Colony Optimization Technique along with Swarm Intelligence Mechanism to ensure the Quality of Service parameters and also to enhance the MANET security.

Index Terms- Ant colony optimization, AntQoS, QoS colony, self-organizing QoS framework, swarm intelligence.

I. INTRODUCTION

As the number of Internet users continues to grow, network performance requirements must increase right along with them. In addition, many of the latest online services require high amounts of bandwidth and network performance. Network performance is an element of concern both for the user and the service provider. Internet service providers need to apply techniques and technologies to provide the best service possible before their competitors beat them to it.

So we make use of QoS. Quality of service (QoS) refers to a network's ability to achieve maximum bandwidth and deal with other network performance elements like latency, error rate and uptime. Quality of service also involves controlling and managing network resources by setting priorities for specific types of data (video, audio, files) on the network. QoS is exclusively applied to network traffic generated for video on demand, IPTV, VoIP, streaming media, videoconferencing and online gaming.

The primary goal of quality of service is to provide priority to networks, including dedicated bandwidth, controlled jit supply the elemental building blocks that will be used for future business applications in campus, wide area networks and service provider networks.

There are three fundamental components for basic QoS implementation:

1. Identification and marking techniques for coordinating QoS from end to end between network elements
2. QoS within a single network element.
3. QoS policy, management, and accounting functions to control and administer end-to-end traffic across a network.

1.1 QoS parameters:

Different applications have different requirements regarding the handling of their traffic in the network. Applications generate traffic at varying rates and generally require that the network be able to carry traffic at the rate at which they generate it. In addition, applications are more or less tolerant of traffic delays in the network and of variation in traffic delay. Certain applications can tolerate some degree of traffic loss while others cannot. These requirements are expressed using the following QoS-related parameters:

- Bandwidth - the rate at which an application's traffic must be carried by the network
- Latency - the delay that an application can tolerate in delivering a packet of data.
- Jitter - the variation in latency
- Loss - the percentage of lost data

If infinite network resources were available, then all application traffic could be carried at the required bandwidth, with zero latency, zero jitter and zero loss. However, network resources are not infinite. As a result, there are parts of the network in which resources are unable to meet demand. QoS mechanisms work by controlling the allocation of network resources to application traffic in a manner that meets the application's service requirements.

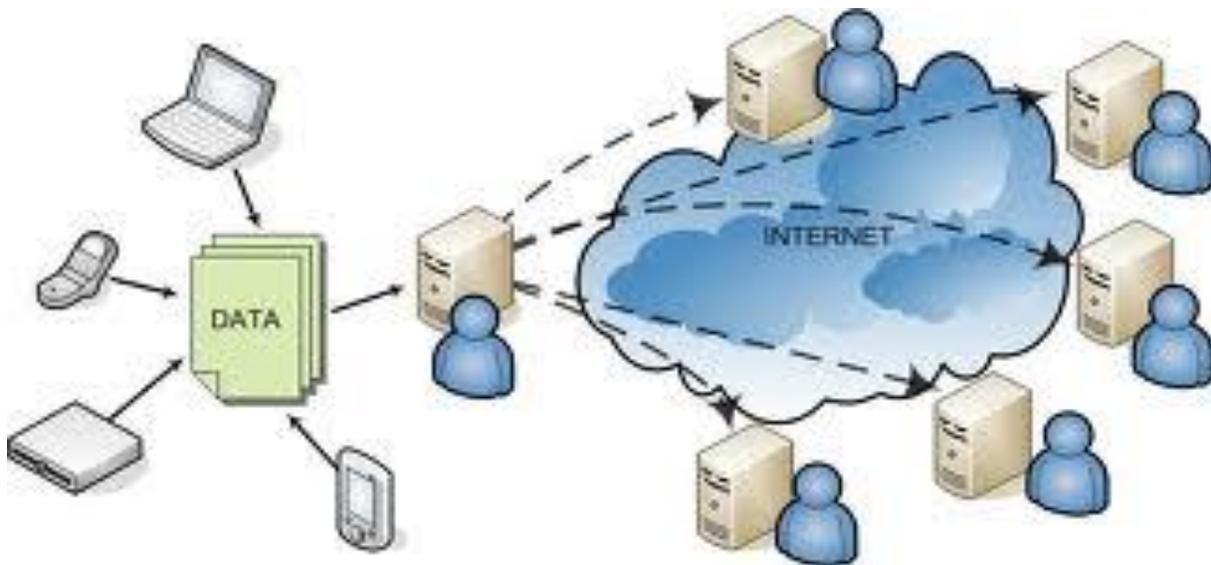


FIG: QUALITY OF SERVICE

II. LITERATURE SURVEY

In recent years, a large number of MANET routing algorithms have been proposed. These algorithms all deal with dynamic aspects of MANETs in their own way, using reactive or proactive behavior or a combination of both.

The proposed algorithm in this paper is hybrid one was said by Jianping Wang, Eseosa Osagie, Parimala Thulasiraman and Ruppa K.Thulasiram, "HOPNET "A hybrid ant colony optimization routing algorithm for mobile ad hoc network,"

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III. EXISTING FRAMEWORK

Unfortunately nodes in MANETs are limited in energy, bandwidth. These resources constraints pose a set of non trivial problems; in particular, routing and flow control.

The Internet Engineering Task Force (IETF) had standardized Integrated Services (IntServ) and Differentiated Services (DiffServ) for promising QoS-enabling frameworks.

IntServ provides end-to-end QoS guarantees to individual flows by performing per-flow resource reservation, but does not scale well for larger networks due to the perflow management.

DiffServ enhances the network scalability by aggregating individual flows into different traffic classes through the pre-defined QoS parameters per class, but does not perfectly guarantee.

The required QoS for individual flows. New attempts such as IntServ over DiffServ [1], DiffServ wit EAC [2], and DiffServ with MPLS-TE [3] had been made to combine the strengths of IntServ and DiffServ. Although these researches may accomplish their goals, class-based QoS mechanisms have some non-trivial engineering and technical issues:

- 1) how many classes should be provided,
- 2) how can QoS paramters be defined for each class,
- 3) what are best business models for each class, and
- 4) how can resource utilization be increased using the

isolated resources per class.

And also the complexity increases due to various characteristics like dynamic topology, time varying QoS requirements, limited resources and energy etc. QoS routing plays an important role for providing QoS in wireless ad hoc networks. The biggest challenge in this kind of networks is to find a path between the communication end points satisfying user's QoS requirement.

An algorithm of ant colony optimization for mobile ad hoc networks has been described in [5]. But the QoS issues end-to-end delay, available bandwidth, cost, loss probability, and error rate is not considered in [5].

A hybrid QoS routing algorithm has been proposed in [6]. In [6], the authors used ant's pheromone update process approach for improving QoS.

But the authors described only bandwidth. Other QoS issues are not considered in [6]. Shahab Kamali. et.al [7] implemented a new ant colony based routing algorithm that uses the information about the location of nodes.

The problem of finding multiconstrained paths has high computational complexity, and thus there is a need to use algorithms that address this difficulty.

IV. PROPOSED FRAMEWORK

4.1 Ant Colony Optimization:

Ants have inspired a number of methods and techniques among which the most studied and the most successful is the general purpose optimization technique known as ant colony optimization.

Ant colony optimization (ACO) takes inspiration from the foraging behavior of some ant species. These ants deposit pheromone on the ground in order to mark some favourable path that should be followed by other members of the colony.

Ant colony optimization exploits a similar mechanism for solving optimization problems.

In ACO, a number of artificial ants build solutions to the considered optimization problem at hand and exchange information on the quality of these solutions via a communication scheme that is reminiscent of the one adopted by real ants.

Different ant colony optimization algorithms have been proposed. The original ant colony optimization algorithm is known as Ant System.

The main differences between the behavior of the real ants and the behavior of the artificial ants in our model are as follows:

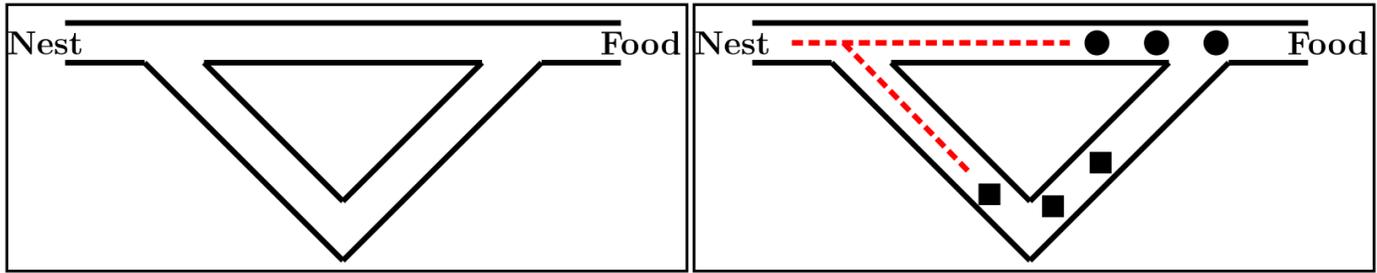
(1) While real ants move in their environment in an asynchronous way, the artificial ants are synchronized, i.e., at each iteration of the simulated system, each of the artificial ants moves from the nest to the food source and follows the same path back.

(2) While real ants leave pheromone on the ground whenever they move, artificial ants only deposit artificial pheromone on their way back to the nest.

(3) The foraging behavior of real ants is based on an implicit evaluation of a solution (i.e., a path from the nest to the food source).

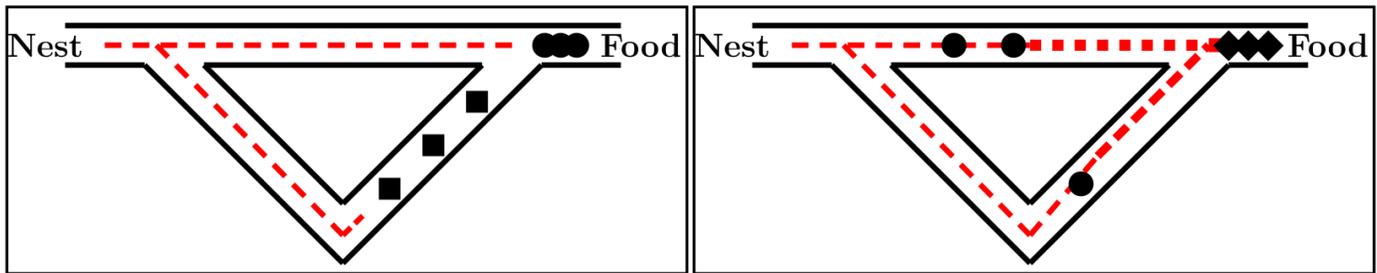
By implicit solution evaluation we mean the fact that shorter paths will be completed earlier than longer ones, and therefore they will receive pheromone reinforcement more quickly.

In contrast, the artificial ants evaluate a solution with respect to some quality measure which is used to determine the strength of the pheromone reinforcement that the ants perform during their return trip to the nest.



(a) All ants are in the nest. There is no pheromone in the environment.

(b) The foraging starts. In probability, 50% of the ants take the short path (symbolized by circles), and 50% take the long path to the food source (symbolized by rhombs).



(c) The ants that have taken the short path have arrived earlier at the food source. Therefore, when returning, the probability to take again the short path is higher.

(d) The pheromone trail on the short path receives, in probability, a stronger reinforcement, and the probability to take this path grows. Finally, due to the evaporation of the pheromone on the long path, the whole colony will, in probability, use the short path.

Fig. An experimental setting that demonstrates the shortest path finding capability of ant colonies. Between the ants' nest and the only food source exist two paths of different lengths. In the four graphics, the pheromone trails are shown as dashed lines whose thickness indicates the trails' strength

4.1.1 General Characteristics of ACO algorithms for routing:

- The following set of core properties characterizes ACO instances for routing problems:
- 1) Providing traffic-adaptive and multipath routing.
 - 2) Relying on both passive and active information monitoring and gathering.
 - 3) Making use of stochastic components.
 - 4) Not allowing local estimates to have global impact.
 - 5) Setting up paths in a less selfish way than in pure shortest path schemes favoring load balancing.
 - 6) Showing limited sensitivity to parameter settings.

Along with ACO, Swarm Intelligence Technique is used to improve the QoS Parameters.

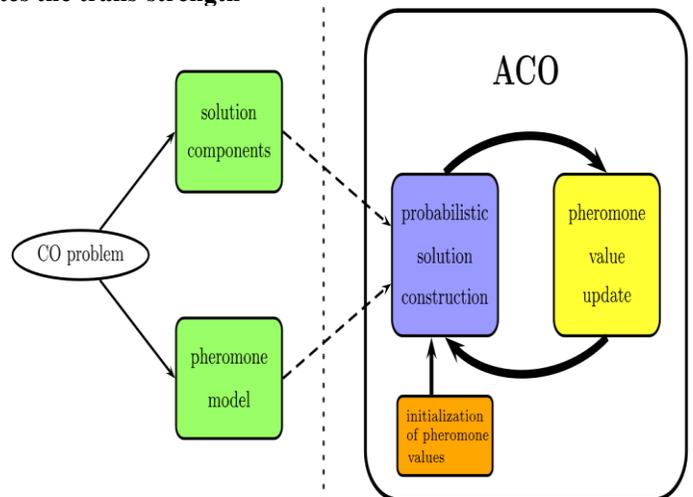


Fig.: The working of the ACO metaheuristic

Along with Ant Colony Optimization, Swarm Intelligent mechanism is used to enhance the QoS and provide the efficiency of network thoroughly.

4.2 Swarm Intelligence:

Swarm Intelligence (SI) is a growing new discipline that views intelligence as a function of social interactions between individuals. SI is based on the study of social insects like ants and bees, which as individuals are quite simple but have intelligent group behavior. Implementations are outperformed by evolutionary computation methods such as Particle Swarm Optimization (PSO).

4.2.1 Particle Swarm Intelligence:

A successful swarm intelligence model is Particle Swarm Optimization (PSO). PSO draws inspiration from the sociological behaviour associated with bird flocking. It is a natural observation that birds can fly in large groups with no collision for extended long distances, making use of their effort to maintain an optimum distance between themselves and their neighbours.

4.2.2 Particle Swarm Optimization Metaheuristic:

Particle Swarm Optimization (PSO) is a heuristic optimization technique. It is inspired by the intelligent, experience-sharing, social flocking behaviour of birds. PSO is a population-based search strategy that finds optimal solutions using a set of flying particles with velocities that are dynamically adjusted according to their historical performance, as well as their neighbours in the search space. While ACO solves problems whose search space can be represented as a weighted construction graph PSO solves problems whose solutions can be represented as a set of points in an n-dimensional solution space. The term particles refers to population members, which are fundamentally described as the swarm positions in the n-dimensional solution space. Each particle is set into motion through the solution space with a velocity vector representing the particle's speed in each dimension. Each particle has a memory to store its historically best solution (i.e., its best position ever attained in the search space so far, which is also called its experience).

The secret of the PSO success lies in the experience-sharing behaviour in which the experience of each particle is continuously communicated to part or the whole swarm, leading the overall swarm motion towards the most promising areas detected so far in the search space. Therefore, the moving particles, at each iteration, evaluate their current position with respect to the problem's fitness function to be optimized, current fitness of themselves to their historically best positions, as well as to the other individuals of the swarm (either locally within their neighbourhood as in the local version of the PSO algorithm, or globally throughout the entire swarm as in the global version of the algorithm). Then, each particle updates its *experience* (if the current position is better than its historically best one), and adjusts its velocity to imitate the swarm's global best particle (or, its local superior neighbour, i.e., the one within its neighbourhood whose current position represents a better solution than the particle's current one) by moving closer towards it. Before the end of each iteration of PSO, the index of

the swarm's global best particle (or, the local best particle in the neighbourhood) is updated if the most recent update of the position of any particle in the entire swarm (or, within a predetermined neighbourhood topology) happened to be better than the current position of the swarm's global best particle (or, the local best particle in the neighbourhood).

The original version of the PSO algorithm is essentially described by the following two simple —*velocity* and —*position* update equations, shown respectively.

- $vid(t+1) = vid(t) + c1 R1(pid(t) - xid(t)) + c2 R2 (pgd(t) - xid(t))$
- $xid(t+1) = xid(t) + vid(t+1)$

Where:

- *vid* represents the rate of the position change (velocity) of the *i*th particle in the *d*th dimension, and *t* denotes the iteration counter.
- *xid* represents the position of the *i*th particle in the *d*th dimension.
- It is worth noting here that ***xi*** is referred to as the *i*th particle itself, or as a vector of its positions in all dimensions of the problem space.
- The n-dimensional problem space has a number of dimensions that equals to the numbers of variables of the desired fitness function to be optimized.
- *pid* represents the historically best position of the *i*th particle in the *d*th dimension (or, the position giving the best ever fitness value attained by ***xi***).

4.2.3 Basic flow of PSO :

- 1) Initialize the swarm by randomly assigning each particle to an arbitrarily initial velocity and a position in each dimension of the solution space.
- 2) Evaluate the desired fitness function to be optimized for each particle's position.
- 3) For each individual particle, update its historically best position so far, ***Pi***, if its current position is better than its historically best one.
- 4) Identify/Update the swarm's globally best particle that has the swarm's best fitness value, and set/reset its index as ***g*** and its position at ***Pg***.
- 5) Update the velocities of all the particles using *equation* (1).
- 6) Move each particle to its new position using *equation* (2).
- 7) Repeat steps 2–6 until convergence or a stopping criterion is met (e.g., the maximum number of allowed iterations is reached; a sufficiently good fitness value is achieved; or the algorithm has not improved its performance for a number of consecutive iterations).

V. PERFORMANCE EVALUATION

By proposing Ant Colony Optimization and Swarm Intelligence Technique they can be successfully applied to the successfully applied to a wide-range of optimization problems. This ranges from fundamental combinatorial problems, such as sequential ordering problems, assignment problems, scheduling problems, the maximum clique problem, graph coloring, assembly line balancing and vehicle routing problems, to more

recent continuous, multi-objective or dynamic problems in machine learning, data mining, telecommunication networks and bioinformatics.

VI. ADVANTAGES OF SWARM INTELLIGENCE

Scalability: SI systems are highly scalable; their impressive abilities are generally maintained when using groups ranging from just sufficiently few individuals up to millions of individuals.

Adaptability: SI Systems respond well to rapidly changing environments, making use of their inherit auto-configuration and self-organization capabilities.

Collective Robustness: SI Systems are robust as they collectively work without central control, and there is no single individual crucial for the swarm to continue to function (due to the redundancy of their individuals).

Individual Simplicity: SI systems consist of a number of simple individuals with fairly limited capabilities on their own, yet the simple behavioural rules at the individual level are practically sufficient to cooperatively emerge a sophisticated group behaviour.

VII. CONCLUSION

The ACO and PSO can be analyzed for future enhancement such that new research could be focused to produce better solution by improving the effectiveness and reducing the limitations.

More possibilities for dynamically determining the best destination through ACO can be evolved and a plan to endow PSO with fitness sharing aiming to investigate whether this helps in improving performance. In future the velocity of each individual must be updated by taking the best element found in all iterations rather than that of the current iteration only. In future, this work can be extended for multicasting by using swarm intelligence with other QoS objectives such as load balancing, energy conservation, etc.

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Multi Converter Based Power Quality Improvement in Renewable Energy System Using UPQC Compensator

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Abstract- This paper investigates the power quality improvement on green energy source at generating side and grid side of power system. Now a day's increasing the utility of power due to industrials and cultivations, such that problems also increases the sag, swell, real power, reactive power, transients and harmonics it will causes the disturbances in power system, to overcome this problems in this paper use the matrix and boost converter at one of the renewable energy generating side and unified power quality conditioner (UPQC) in grid system. The modeling and simulation with renewable energy sources connected one of the 50 bus system using unified power quality conditioner (UPQC).digital simulation using MATLAB/SIMULINK is done and the results are presented .The effect of UPQC on real power, reactive power, sag, swell, transients and harmonics is also presented.

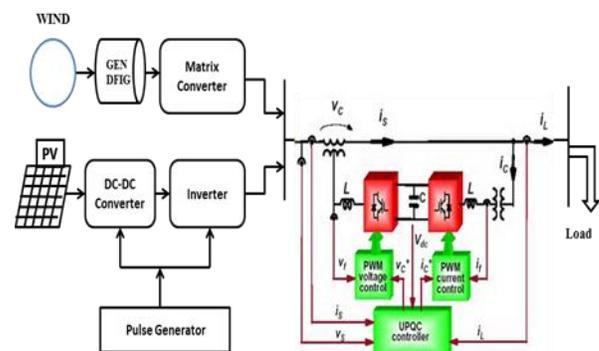
Index Terms- Wind and Solar Energy, DFIG, Matrix Converter UPQC, voltage fluctuation, weak Grid.

I. INTRODUCTION

The renewable energy sources wind and solar connected to the grid through (matrix and boost) converters. The wind energy obtained from the kinetic energy of air due to temperature and pressure of land and water. The DFIG is variable wind from kinetic energy convert to electrical energy with help of mechanical turbine and varying the rotor excitation through the back to back converter from the grid power. Above super synchronous speed operation it fed power from both stator and rotor to the grid with constant voltage and frequency matches with grid. The matrix converter uses the matrix of switches so that any of the input phase voltage can be connected to any of output of load phases, there is exactly one switch for each of possible connection between supply and load. Its provides bidirectional power flow, sinusoidal input/output currents, and controllable input power factor. The pv panel absorb the solar radiation from the sun by maximum power point tracking and converted to dc current by using of photovoltaic method. By using of the boost increase the voltage level and gives to the inverter through the dc link, it will smooth the voltage level. The inverter operates based on the power electronics switches to turn ON and OFF of the switches depend upon the grid power matches, it synchronization with grid. Whenever heavy load is connected tapping from the grid voltage sag, swell, real, reactive power and also harmonics problems occur to overcome this FACTS controller device compensation to overcome this

problems .In this paper the unified power quality conditioner used to overcome the problems.

II. BLOCK DIAGRAM



III. OPERATING PRINCIPLE OF UPQC

Due to the extensive use of power electronic based equipments/loads almost in all areas, the point of common coupling (PCC) could be highly distorted [1]-[3]. The switching ON/OFF of high rated load connected to PCC may result into voltage sags or swells on the PCC. There are several sensitive loads, such as computer or microprocessor based AC/DC drive controller, with good voltage profile requirement; can function improperly or sometime can lose valuable data or in certain cases get damaged due to these voltage sag and swell conditions. One of the effective approaches is to use a unified power quality conditioner (UPQC) at PCC to protect the sensitive loads. A UPQC is a combination of shunt and series APFs, sharing a common dc link. It is a versatile device that can compensate almost all power quality problems such as voltage harmonics, voltage unbalance, voltage flickers, voltage sags & swells, current harmonics, current unbalance, reactive current, etc. The Unified Power Quality Conditioner (UPQC) has evolved to be one of the most comprehensive custom power solutions for power quality issues relating to non-linear harmonic producing loads and the effect of utility voltage disturbance on sensitive industrial loads. To investigate the performance of the proposed control schemes for the UPQC, simulations are carried out and validated with experimental results.

IV. SYSTEM CONFIGURATION

The system configuration for UPQC is shown in the Fig.1. The voltage at PCC may be or may not be distorted depending on the other non-linear loads connected at PCC. Also, these loads may impose the voltage sag or swell condition during their switching ON and/or OFF operation. The UPQC is installed in order to protect a sensitive load from all disturbances. The UPQC consists of two voltage source inverters connected back to back, sharing a common dc link. Each inverter is realized by using six IGBT switches. One inverter is connected parallel with the load, acts as shunt APF, helps in compensating load harmonic current, reactive current and maintain the dc link voltage at constant level. The second inverter is

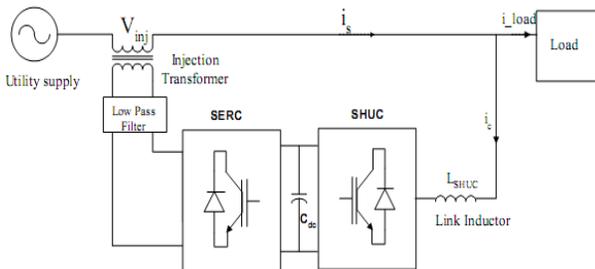


Fig.1 Block Diagram of UPQC

connected in series with the line using series transformers, acts as a controlled voltage source maintaining the load voltage sinusoidal and at desired.

V. STEADY STATE POWER FLOW ANALYSIS

The UPQC is controlled in such a way that the voltage at load bus is always sinusoidal and at desired magnitude. In the following analysis the load voltage is assumed to be in phase with terminal voltage even during voltage sag and swell condition. In this particular condition, the series APF could not handle reactive power and the load reactive power is supplied by shunt APF alone [5].

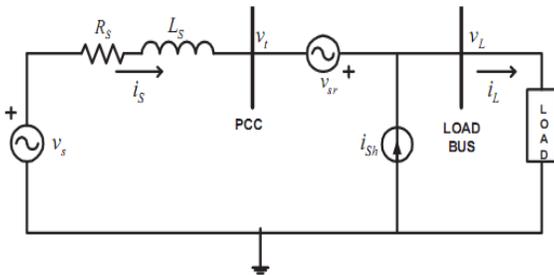


Fig.2 Equivalent Circuit of a UPQC

The source voltage, terminal voltage at PCC and load voltage are denoted by \$V_s\$, \$V_t\$ and \$V_L\$ respectively. The source and load currents are denoted by \$i_s\$ and \$i_L\$ respectively. The voltage injected by series APF is denoted by \$V_{sr}\$, whereas the current injected by shunt APF is denoted by \$i_{sh}\$. Taking the load voltage, \$V_L\$, as a reference phasor and suppose the lagging power factor of the load is \$\cos \Phi_L\$ then we can write; [5]

$$V_L = V_L \angle 0^\circ \quad (1)$$

$$I_L = I_L \angle -\Phi_L \quad (2)$$

$$V_t = V_L(1+k) \angle 0^\circ \quad (3)$$

Where factor \$k\$ represents the fluctuation of source voltage, defined as,

$$k = \frac{V_t - V_L}{V_L} \quad (4)$$

The voltage injected by series APF must be equal to,

$$V_{sr} = V_L - V_t = -k V_L \angle 0^\circ \quad (5)$$

The UPQC is assumed to be lossless and therefore, the active power demanded by the load is equal to the active power input at PCC. The UPQC provides a nearly unity power factor source current, therefore, for a given load condition the input active power at PCC can be expressed by the following equations,

$$P_t = P_L \quad (6)$$

$$V_t \cdot i_s = V_L \cdot i_L \cdot \cos \phi_L \quad (7)$$

$$V_L(1+k) \cdot i_s = V_L \cdot i_L \cdot \cos \phi_L \quad (8)$$

$$i_s = i_L / (1+k) \cdot \cos \phi_L \quad (9)$$

The above equation suggests that the source current \$i_s\$ depends on the factor \$k\$, since \$\phi_L\$ and \$i_L\$ are load characteristics and are constant for a particular type of load. The complex power absorbed by the series APF can be expressed as,

$$S_{sr} = V_{sr} \cdot i_s^* \quad (10)$$

[9]

$$P_{sr} = V_{sr} \cdot i_s \cdot \cos \phi_s = -k \cdot V_L \cdot i_s \cdot \cos \phi_s \quad (11)$$

$$Q_{sr} = V_{sr} \cdot i_s \cdot \sin \phi_s \quad (12)$$

\$\phi_s = 0\$, since UPQC is maintaining unity power factor

$$P_{sr} = V_{sr} \cdot i_s = -k \cdot V_L \cdot i_s \quad (13)$$

$$Q_{sr} \approx 0 \quad (14)$$

The complex power absorbed by the shunt APF can be expressed as,

$$S_{sh} = V_L \cdot i_{sh}^* \quad (15)$$

The current provided by the shunt APF, is the difference between the input source current and the load current, which includes the load harmonics current and the reactive current. Therefore, we can write;

$$i_{sh} = i_s - i_L \quad (16)$$

$$i_{sh} = i_s \angle 0^\circ - i_L \angle \phi_L \quad (17)$$

$$i_{sh} = i_s - (i_L \cdot \cos \phi_L - j i_L \cdot \sin \phi_L) \quad (18)$$

$$i_{sh} = (i_s - i_L \cdot \cos \phi_L) + j i_L \cdot \sin \phi_L \quad (19)$$

$$P_{sh} = V_L \cdot i_{sh} \cdot \cos \phi_{sh} = V_L \cdot (i_s - i_L \cdot \cos \phi_L) \quad (20)$$

$$Q_{sh} = V_L \cdot i_{sh} \cdot \sin \phi_{sh} = V_L \cdot i_L \cdot \sin \phi_L \quad (21)$$

When a sag is detected such that \$|V_{s2}| < |V_{s1}|\$ (rated), then for UPQC-Q, \$V_{inj}\$ is calculated from as. [21]

$$V_{inj2} = (V_{s1} - V_{s2})$$

Now from PWM method \$\sqrt{2} V_{inj} = MI (V_{dc}/2)\$, where \$MI\$ is the desired modulation index (\$MI\$). Therefore,

$$MI = (2\sqrt{2} \cdot V_{inj}) / V_{dc}$$

If x is the p. u. sag to be mitigated, minimum dc link voltage would be $V_{dc} = 2\sqrt{2} * \sqrt{x(2-x)} * V_{s1}$, for maximum value of $MI = 1$ (taking the injection transformer turns ratio to be 1:1).

VI. CONTROL SCHEMES FOR UPQC

The control strategy is basically the way to generate reference signals for both shunt and series APF. The effectiveness of the UPQC depends on its ability to follow the reference signals with a minimum error to compensate the voltage sag and swell or any other undesirable condition. The series APF acts as a controlled voltage source. The shunt APF acts as a control source for maintaining the DC link voltage. The shunt APF also provides required var to the load such that the power factor at PCC is unity and only fundamental active power is supplied by the source. The voltage injected by series APF can be varied from 0° to 360° . The series injected voltage has to be in phase (out of phase) with PCC voltage to compensate voltage sag/swell.

VII. SIMULATION RESULTS

The IEEE 50 bus system is modeled using matlab and it is simulated using the blocks of simulink. Each line is represented by the respective impedance. The generators in the network are represented as voltage sources and Renewable energy source. The load at the load bus is represented as combination of R and L. The stimulant model of 50 bus system is shown in Fig. 1. The voltage of bus 21 is shown in Fig. 2. Real and reactive powers at bus 21 are shown in Figures 3 and 4. Total harmonic distortion at Fig 5. The MATLAB simulink model of IEEE Fifty bus system with Unified power quality conditioner compensator is shown in Fig.6. Voltage, real, reactive and total harmonic distortion wave foam at Fig.7,8,9,10. The wind model and its wave foams at Fig.11,12. The matix converter and its wave foams at Fig.13,14. The modeling of upqc ,solar mode,output of solar,boost converter with solar model and its wave foam shows at Fig.15,16,17,18,19.

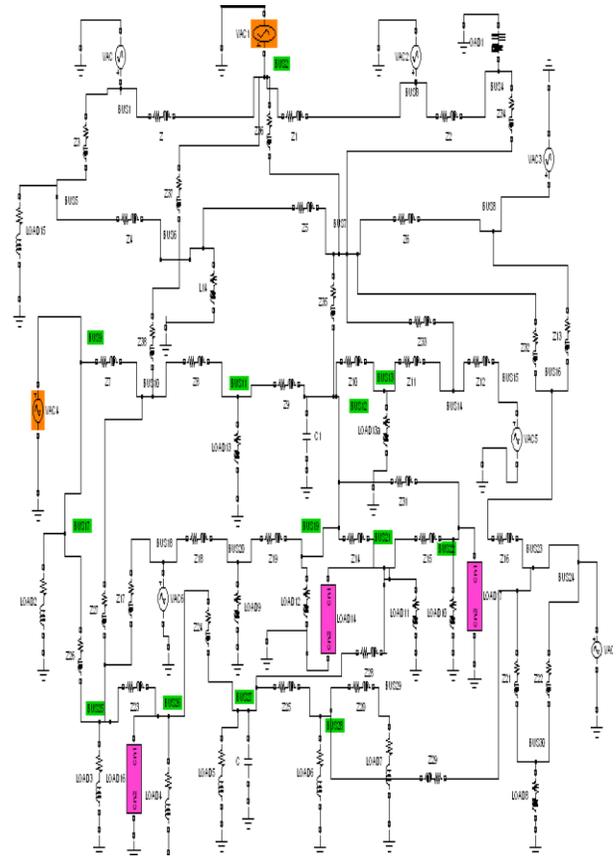


Fig.1. Modeling Of Fifty Bus System Without Upqc

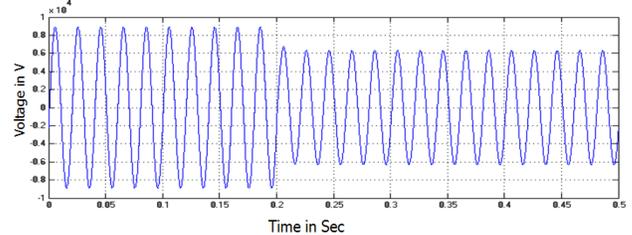


Fig.2. Voltage At Bus-21

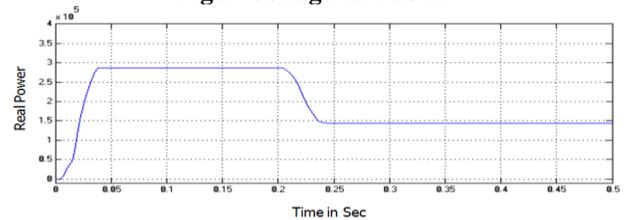
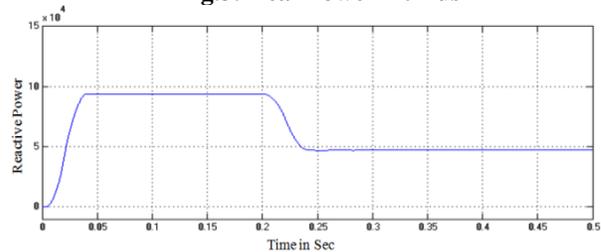


Fig.3. Real Power At Bus 21



Reactive Power At Bus 21

Fig.4.

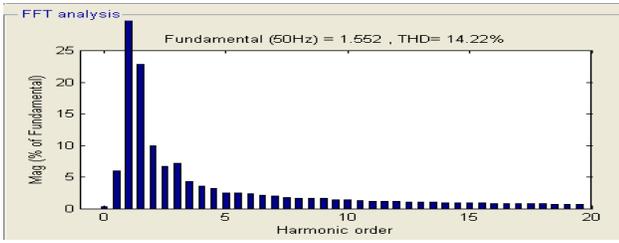


Fig.5. Total Harmonic Distortion(THD)

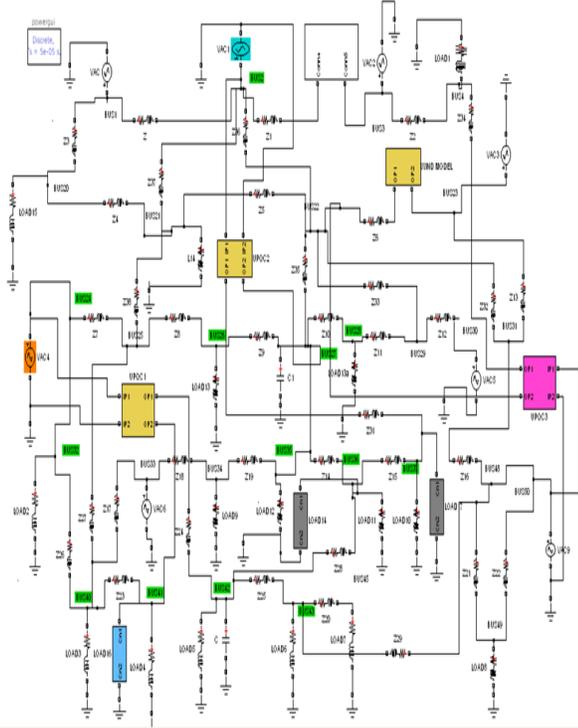


Fig.6. Modelling Of fifty Bus System With Upqc

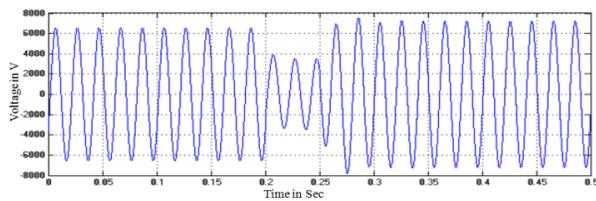


Fig.7. Voltage At Bus 12

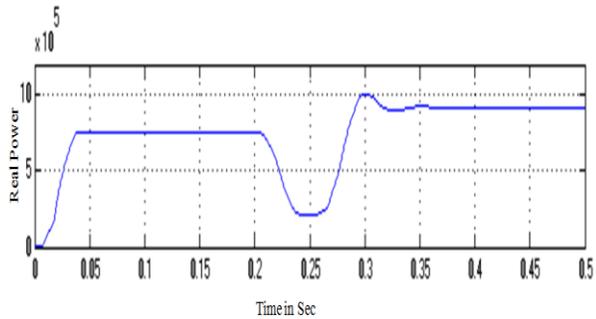


Fig.8. Real Power At Bus 12

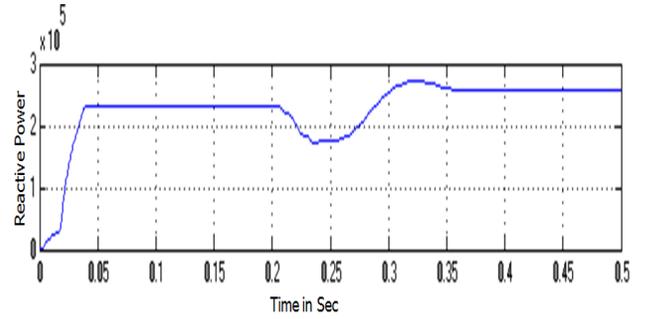


Fig.9. Reactive Power At Bus 12

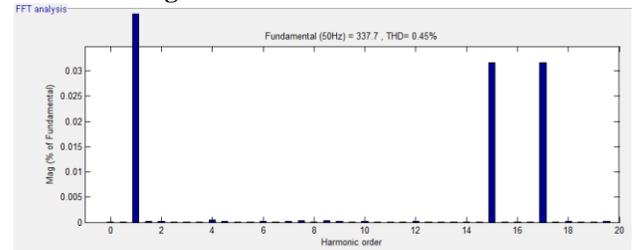


Fig.10. Total Harmonic Distortion (THD)

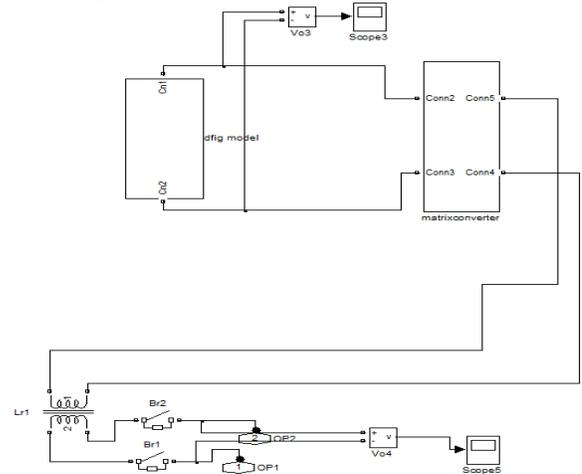


Fig.11. Wind modeling

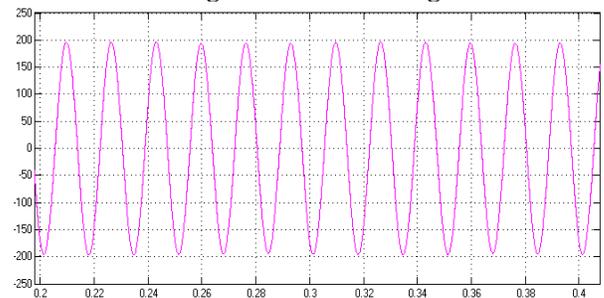


Fig.12. Wind output voltage

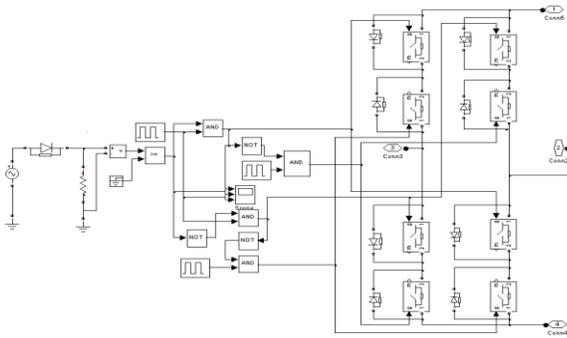


Fig.13. Matrix converter model

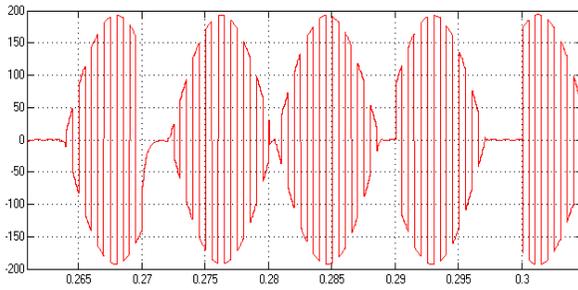


Fig.14. Matrix converter output voltage

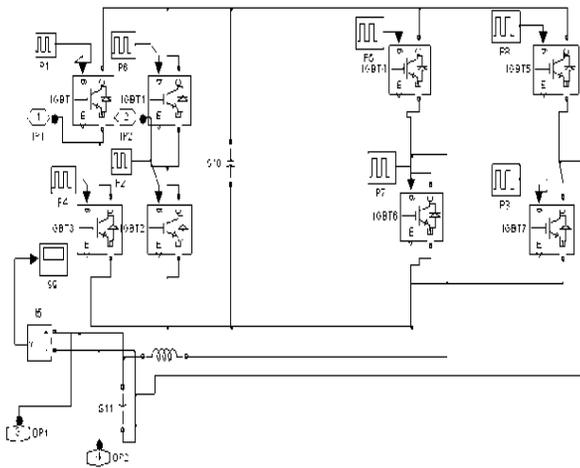


Fig.15. Modeling Of UPQC

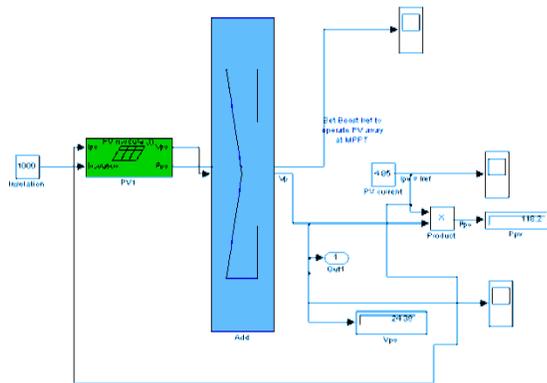


Fig.16. Solar model

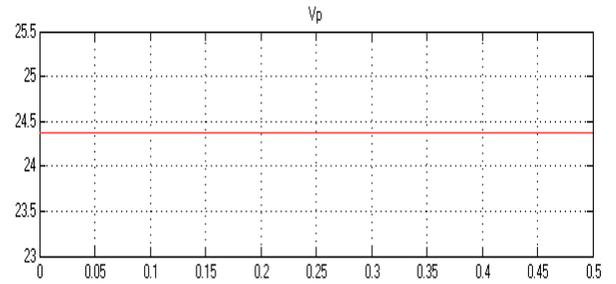


Fig.17. Solar output voltage

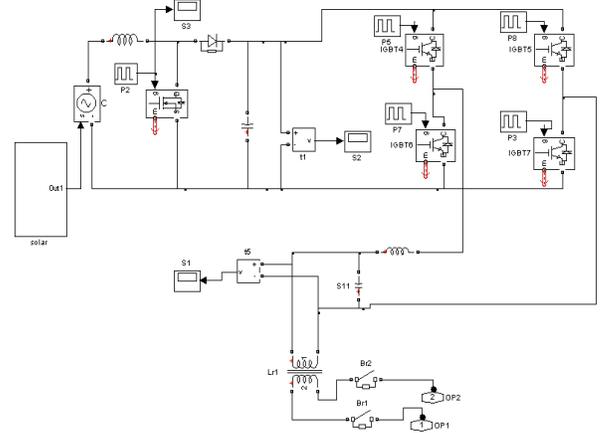


Fig.18. Solar with boost converter

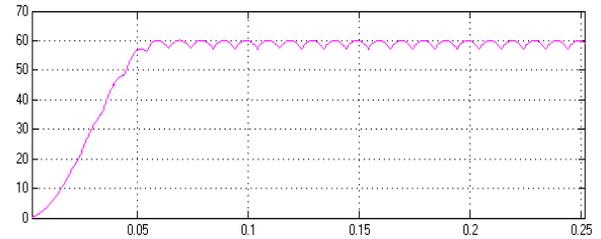


Fig.19. Solar output voltage after boost converter

VIII. TABLE COMPARISON

BUS NO	REAL POWER WITHOUT UPQC (MW)	REAL POWER WITH UPQC (MW)	REACTIVE POWER WITHOUT UPQC (MVAR)	REACTIVE POWER WITH UPQC (MVAR)
BUS1	0.277	0.275	0.304	0.352
BUS2	0.263	0.272	0.301	0.348
BUS3	0.42	0.575	1.32	1.801
BUS4	0.378	2.431	2.210	2.788
Bus-5	0.321	0.442	2.23	2.791
Bus-6	0.311	0.378	2.27	2.810
Bus-7	0.321	0.358	2.26	2.842
.
Bus-50	1.681	2.781	2.89	2.987

IX. CONCLUSION

A 50 bus system is modeled and simulated with and without UPQC. It has been found that the UPQC is controlling the flow of power at capable of a desired point on the transmission line. It is also observed that the UPQC injects a fast changing voltage in series with the line. Based on obtained simulation results the performance of the UPQC has been examined in a 50 bus system, and applications of the UPQC will be extended in future to a complex system to investigate the problems related to the various problems of power issues in the power systems.

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Tradition to Proselytization: An Ethnographic account of Tangkhul Naga in North-East India

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Abstract- Religion as a system of beliefs usually involving the worship of supernatural forces or beings continues to have major influence upon the human society. The paper is an outcome of intensive ethnographic fieldwork to explain the traditional religion of a tribe in North-East India called Tangkhul Naga who had traditional religion with relative isolation which according to the definition given by E.B. Tylor (1929) would have been polytheism but during the reign of British in India, Christianity swept over the entire region and this tribal community has since then embraced Christianity.

Index Terms- Proselytization Hao, Kameo, animism, polytheism, monotheism

I. INTRODUCTION

“Ukhrul, a large village situated in the centre of the Tangkhul hill tribe were being left much to their ignorant wills and ways. No census had ever been taken of this tribe. There was no written language, almost every village has its own dialect, and not a soul in the whole tribe knew anything of even the rudiments of education. An old piece of paper was grabbed and look upon as a curiosity. The majority of the people have never left their mountain in fastnesses, even to visit another tribe or the people of the valley. They were completely ignorant of the outside world. The villagers were independent and democratic. Clannishness, the fear of evil spirits, a blind belief in the efficacy of monthly and annual feasts, ignorance, gross superstition, sin- all these held people in thrall” (Solo 2010: 83). Wrote the man in his diary, who set his foot in hilly terrain Ukhrul for the first time way back in 1896 and who finally changed the whole Tangkhul tribe into a new faith, new life by bringing a new religion to the people.

Tangkhul Naga constitutes the major bulk of the population among the hill tribes of Manipur State of India. They occupy the Ukhrul District which constitutes 4409 sq km out of the total 22,356 sq km of Manipur. They are mongoloid stock speaking Tibeto-Burman dialect and the district carves an international boundary with Myanmar (Burma) (Shimray 2007).

II. THEORETICAL FRAMEWORK

Religion as one of the basic institution (Srivastava 1997) is a system of beliefs usually involving the worship of supernatural forces or beings. Religious beliefs provide shape and meaning to one's perception of the universe. In other words, it is the religion that people lean on to, when inexplicable things happen which is

beyond their control. For most religious people, their beliefs about the supernatural are at the very core of their worldview. Thus religion is a set of beliefs and practices generally held by an individual and community involving adherence to codified beliefs and rituals. Religion is both personal and communal faith stemming from shared conviction. Therefore it is an abstract set of ideas, values or experiences developed as a part of cultural matrix.

Sir James Frazer (1932) said, there is probably no subject in the world about which opinions differ so much as the nature of religion, and to frame a definition of it which would satisfy everyone must obviously be impossible. All that a writer can do is, first to say clearly what he means by religion and after wards to employ the word consistently in that sense throughout his work (Frazer 1932: 224).

According to Sinha (1977) religion is a subject of great concern even in an advanced society of today where futility of science has often compelled man to search for God, or a supernatural power so that his faith in the order of things is not absolutely lost. Science is based essentially on the cause effect theory and certain natural laws or axioms. Religion is based on simple faith imbued with a sense of supernaturalism. Religion in preliterate societies exercises a more profound influence over man's thoughts and behaviour who ultimately surrender all their actions to him (Sinha1977:11).

My area of research interest was also on religion among the Tangkhul Naga tribes who occupy the North-Eastern part of India. The people had a religion called Hao but with the coming of Western missionaries, the people have now embraced Christianity. A paradigm change in their faith which become an important area of research.

Weber (1922) said it is not possible to define religion, to say what it "is," at the start of a presentation such as this. Definition can be attempted, if at all, only at the conclusion of the study. The "essence" of religion is not even our concern, as we make it our task to study the conditions and effects of a particular type of social action. The external courses of religious behaviour are so diverse that an understanding of this behaviour can only be achieved from the viewpoint of the subjective experiences, notion, and purposes of the individuals concerned--in short, from the viewpoint of the religious behaviour's. To define religion for the people of Tangkhul was easy if the definition was to be given based on the Christian faith they have at present but to define it from the traditional religion the people had, was one tough thing. There was no god, there was no name to their religion, rather only the spirits which also vary from village to village. The outcome of my six months effort to study their religion can be analysed in the following way.

Sinha (1977) who wrote about the religion of the North-East India said; the religion, as discovered in the North-Eastern cultural region is different from what it is in other parts of tribal India. There are as many as thirty tribes speaking some fifty different dialects and living in these far stretched regions of North-East Frontier, spread over some thirty thousand square miles in what I call a continuous cultural belt. Each tribe here has its own distinct religion which they have maintained over ages, uninfluenced by any cultural traits. They have some elements of religion in common, such as naturism or animism propelling a belief in the hierarchy of functional gods, deities and spirit reigning over them in a kind of kingdom and in a soul-substance hovering around their life. They have a basic philosophy of religion which binds them all and invokes their faith in the supernatural. Their whole religion can be better studied as forming a part of some great cultural system (Sinha 1977: 6).

III. METHODOLOGY

The research article is part of the fieldwork conducted for Ph.D thesis so the first authorization and permission comes from the University through the Ph.D supervisor and the Head of the Department.

On reaching the field, all the informants were informed from the beginning and in the process of collecting data that their identity will be protected and such none of their names will figure at any time of my research publication but the rapport established to the level that many people from the tribe had no problem even if their name figured.

The topic of research being on religion, observation played an important role, observing the people in the religious settings, in the religious festivals, and their normal day to day life sometimes compelling me to be part of the event but that only helps me find the answer to the present converted Christianity so to look back into a religion that had been abolished, oral narration played an important role. There were elders among the tribe who were living a traditional life and are now living a converted Christian life. Sitting down with them for days converting them into months yielded enormous amount of data on the traditional religion called *Ha*. Even to a small tribal community like the Tangkhul Naga, literacy and migration has its impact so administering questionnaire consisting both open-ended and close-ended was an important part of the five years research. From a mere interaction to structured interview was another blend that was used trying to confine to the topic. Other methodology that shaped the whole research includes genealogy, life history etc.

IV. TRADITIONAL RELIGION OF THE TANGKHUL NAGA

The Tangkhul people had no script and were illiterate. Every village was almost a close entity in itself. Leave about the contact with outside world they hardly had any contact with their neighbouring villages as people hunted head. The villages were organised in such a way that there were friendly neighbours from which they can marry and enemy neighbours from which they hunted head. They had a religion locally known as *Hao*. During my research for the meaning of this religion it was found that

there is no religion as *Hao*, the people themselves had never given any term to the religion they follow and there was no name as to what they worship. It was the spirits that people worshipped and was known by the term *Kameo*. *Hao* was an external term given by the Kings of Meitei who live in the plain of the State Manipur (India). This reminded me of the so called Tribes, the people of Tankhul Naga also came under the Scheduled Tribe of Indian constitution. The people had no idea that they came under Scheduled Tribes as the people were living their own self-sufficient and self-sustenance economy (Zeliang 2005).

On the religion of Tangkhul Naga tribe, Hodson (1989) wrote; among the Tangkhuls the deity *Kamyou* is approached by sacrifice when men are ill. Yet they have *maibas* (priest), true magicians, who kill a fowl and then pick a small stone out of the side of the patient, who then gets well. When I saw this performance, both men were nearly naked, the sick men lay on the ground in a high fever. The *maiba* killed the fowl and declared that the omens were favourable. He then knelt on the man, pummelled him unmercifully for about five minutes, suddenly made a dart at him and produce from a small bleeding wound in the side a tiny stone about the size of a pea, which the *maiba* told me was a '*lai*' which had caused the sickness. I could not see how and where the *maiba* secreted the stone, as he had only a loin cloth on at the time, nor could I make out the mutterings of the *maiba* as he bent over his patient. Perhaps the violent massage did it, or it may have been a case of faith healing but the man was decidedly better in a short while. (Hodson 1989: 136). The sacrifices are made for the purpose of effecting a cure are dogs, fowls, eggs or pigs. It is perhaps more than a mere coincidence that the omens are taken by means of these creatures (Hodson 1989:137).

Hao was neither referred to religion nor to the Tangkhul Naga alone but to all the tribes living in the hills of Manipur such as Kuki, Kabui, Maring, Mao, Paoumai, etc who had their own traditional religion. Therefore *Hao* is associated with the hill tribes. But with the coming of Christianity this term has come to use for those who practice their traditional religion and called them as *haomi* (People of *Hao*).

The people in those days worship different spirits called *kameo*. Human being has soul but *Kameo* lives in the form of spirits was the belief of Tangkhul Naga. It is not just one spirit but many spirits, in many forms according to different location. The concept of religion given by E.B Tylor (1929) seems to fit the people of Tangkhul Naga. He defined religion as "the belief in spiritual beings" and argued that these beliefs exist in all known societies (Tylor 1929:424). It is this spiritual beings given by Tylor (1929) which the people of Tangkhul called *kameo* who lives in the form of spirit.

According to Tylor (1929) religion originated as they belief in soul which is also designated by the term *animism* (*anima* means soul). Therefore, animism was the ancient form of religion. He said evolution of religion has passed through the development processes of animism to polytheism and finally to monotheism (Tylor 1929: 424). *Hao* religion was polytheism in its sense that the spirit (*kameo*) that the people worship were many that a particular *kameo* might not be given any specific name rather it is the place that *kameo* is associated with and they are named according to the place. The spirit that lives in the field

is called field spirit (*lui kameo*), the spirit that lives in the mountain will be called mountain spirit (*Kaphung kameo*), so is the river spirit (*kong kameo*), house spirit (*shim kameo*), etc.

Therefore every place is associated with a spirit and if there is a place there will be a spirit of that place who is supposed to be feared and propitiated. It is for this many *kameo* that the people who witness *Hao* and who are now living a converted Christian life recollect those days as days of offering, killing, sacrifice taking away the best domesticated animal, offering the biggest animal, giving away the biggest share, offering the best harvest, etc.

The amazing finding for me was that, the spirit of those days were not revered rather it was the fear of spirit harming the people that makes the people to offer, sacrifice. It was the fear of destroying the paddy field, holding hostage of the human soul which makes them propitiate and offer sacrifices instead of love and reverence. It was this risk of harming in any form that the people could not afford to take.

Sir James Frazer (1932) said "by religion, then, I understand a propitiation or conciliation of powers superior to man which are believed to direct or control the course of nature of human life" (Frazer 1932:222). This spirit who lives in different forms were much superior to men, they have the power to harm and to heal which is something beyond the inexplicable force of mankind and for the people of Tangkhul it is this superior to man spirit that controls the human life.

Another interesting finding was the concept of God, though the people worship this spirit the concept of supreme being was present from the beginning even to a small tribe like Tangkhul though it was not in concrete term as the first missionary William Pettigrew wrote in his diary in 1905

"*The Tangkhul Nagas, like all the other tribes in these hills, believe in the supreme being, known by the name Varivara, who made the world but is not much interested in its inhabitants. Far more important to the average man are the numerous kameos 'demons' who are supposed to inhabit every hill and stream. Every illness and every failure of the crops is put down to the influenced of some demon; propitiating them consumes the whole of hill man's existence*" (Solo 2010:39).

The supreme god which is not seek after is also called by different name called '*Kazing Ngalei Kasa Akhava*' –God, the creator of Heaven and Earth, '*Varivara*' '*Kazingwung*' '*Ngaleiwung*' '*Ameowa*', etc. The reason why the people could not address this God directly is that 'HE' is so great that it was incomprehensible to the mind of the ancestors or call upon His name in vain. True to this reverential, the *Varivara* is less associated with the people of Tangkhul and thus it is for this reason that people lives with the sacrifices and offerings to the spirits instead of god. The name of the supreme god is seldom taken and is invoked in instances when it is much beyond their control. If a rich man or a strong man makes fun or take advantages of the poor or the weak, then the poor one or the weak would curse in the name of supreme god saying let the supreme god take note of this and be the judge (Zimik 2003: 14). *Varivara* remained unclear and less seeks after until Christianity brought the concept of Jesus who brought *Varivara* closer to the people. The people had crude ideas of sin and sacrifices of animals such as Indian boar (*seichang*), pig, dog, chicken seems

to be sufficient in their estimation to cover many sins (Solo 2010: 45).

So it is the spirits that people are associated with in their daily and every spheres of life which was enveloped the people making them propitiate and offer sacrifices. Geertz (1996) said "religion is 1) a system of symbols which acts to (2) establish powerful, pervasive, and long-lasting moods and motivations in men by (3) formulating conceptions of a general order of existence and (4) clothing these conceptions with such an aura of factuality that (5) the moods and motivations seem uniquely realistic" (Geertz 1996: 4), for the people of Tangkhul the concept of spirit ruling the people, harming and healing was what they were living with.

As mentioned above, the numbers of spirits were so many but some of the most important and common ones are given below:

1. *Shim Kameo* (Spirit of House) who lives in the house and all the offering has to be done to this spirit relating to the family and house. It is hanged in the middle of the main room in a pot covered by a piece of clothes where few feathers are inserted in it as a dress for the spirit.
2. Mountain spirit (*Kaphung Kameo*) the spirit that lives in the mountain.
3. River spirit (*Kong Kameo*) the spirit that lives in the river or any stream.
4. Spirit of the forest (*Khara Ngahong Kameo*).
5. Spirit of sickness (*Kazat Kameo*) the spirit that makes the people sick and that makes the people get well.
6. Spirit of field (*Lui Kameo*) the spirit that destroys the field, etc.
7. *Kokto* is the spirit that lives at the entrance of another world where the departed soul goes called *Kazeiram*. Every human soul after dying and separating from body must face *Kokto* to go to *Kazeiram* (Rimai 1978).

With this number of spirits, every festivals and rituals of the people were associated with one or the other spirit. Looking at the number of spirits it is polytheism of E.B. Tylor (1929) who said "evolution of religion has passed through the development processes of animism to polytheism and finally to monotheism (Tylor 1929:424). It can be said that this very tribal community known as Tangkhul Naga were undergoing a process of evolution in religion where Christianity brought an end to the basic three steps given by E.B.Tylor.

V. COMING OF CHRISTIANITY

It was in the year of 1896 when an American missionary called William Pettigrew sets its foot in this semi-isolated head hunting tribal community only to bring a sea of change. A change so drastic that missionaries often called 'darkness to dawn'. With the untiring work of William Pettigrew in the process to preach the gospel of Jesus Christ the people were also taught about reading and writing and it was him who decided to use roman script for this people (Imchen 2002)

Therefore with the coming of the missionary came the western education. Michael (2010) said the greatest benefit of the converted Christians was the education, which was not an exception to the people of Tangkhul. As far as education is

concerned to the hill tribes of Manipur, the people of Tangkhul were the first to receive the Western education which makes the tribe of Tangkhul one of the most progressive tribe. With the total population of 183,115 (2011 Census India) the people are now proud in saying that they are one of the most educated people among the tribes of Manipur. According to Census India (2011) report, the literacy rate of Manipur State is 79.8 % but the literacy rate of Ukhrul district is 81.08 % which is also higher than most of the other hill districts. This high rate of literacy is attributed to the district being the birth place of Christianity and Western education in Manipur State which transformed the whole tribe into something they had never foreseen.

With the coming of Western education and Christianity the people were suddenly exposed to outside world. The missionary somehow convinced the people that Christian was a better life in all spheres and ask the people to completely abandon their traditional religion, not only the religious aspects but there was a strong propagation to completely destroy and abandon their traditional culture and practices saying that their tradition was a barbaric, uncivilised and primitive, only to realise the uniqueness of their culture by the younger generations down the line. What we see now is a conscious effort to revive and preserve their traditional culture but not to be mistaken with religion. As far as religion is concerned it is Christianity that gave them peace, a new hope and Christianity is so deeply rooted that reviving their traditional religion is not something the present generation can foresee as Ruivah mentioned in his book "*Social Change among Tangkhul Naga*" they however try to retain the original traditional spirit of enjoying the festivals by following the traditional way minus animistic rites and rituals" (Ruivah 1993: 79).

Today the people of Tangkhul are almost Christians in total and it would not be long before the whole population become Christians when all the elders who hold on to their traditional religion passed away. But with the coming of Baptist missionary, it also open the way for other Christian denominations to come and the total population of Tangkhul in the present generation is divided into Baptist (65%) Catholics (20 %) Seven Day Adventist (5 %) and non- Christians and others (10%) (Ruivah 1993: 215).

VI. CONTINUITY AND CHANGE

The changes though drastic and wide but it should not be assumed that there is no continuity, rather it is the continuity which has a strong link with the past as Robinson (2010) said 'while converts may develop a greater sense of self esteemed, their actual lives are little altered' (Robinson 2010: 11). This makes the society like Tangkhul Naga to have continuity and indigenization of Christian religion which I could not ignore during my research. The people with the coming of education and exposure to the outside world now dress up their speech and behaviour in the clothes of Christian life but underneath they are the same people with some attached goals fully recognizable from within their traditional culture. It is within this culture that people hold on to their traditional values giving them a sense of unity and belongingness which is making them realise the importance of their unique culture.

The continuity in culture is strong and even getting stronger but on religious account this continuity is diminishing. Some of the most important continuity ones from the religious aspects are as follows:

1) Continuity in belief system

The myths and symbols of *hao* is not something to be followed after converting to Christianity. Except for those who are very religious, one prominent continuity was seen in the belief system. It is a struggle for many individuals with the belief system of the traditional life, in the way they think, the symbols and meaning they conceived are very much influenced by the way of traditional thoughts that signifies the meaning everything around them which is strictly against the Christian faith.

2) Continuity in the importance of priest

The priest in the days of yore was called *khunong* who played an important role among the Tangkhul society. The priest was feared and respected for the fact that it was the priest who propitiate, who in other sense communicates the *kameo* and the role of priest is ever increasing even with the coming of Christianity and they now called him *yaokahoma* (shepherd).

3) Continuity in offering

In those days when they were *hao*, they had to pay a certain portion of their product to the *kameo* giving the best fruit, the best product and after converting to Christianity they pay ten percent of their income to the Church. If any family or individual avoided or pay less than what they ought to, they became the talk of the village. Even if the people had not seen such breaches they believe that the one who is omnipresent can see everything.

4) Continuity in conflict resolution

When the magnitude of the conflict is high it is the traditional judgement system that they invoke. One example is called *Tara Kajang* which means submersing in the water with the concept that let nature or the mother earth judge them.

5) Continuity in burial

The Tangkhul people bury the dead since time immemorial by performing different rituals for the deceased and after the coming of Christianity the people still bury with the ritual performed according to the Christian faith.

6) Continuity in life after death

The people of Tangkhul believe in the existence of soul which is a part of human body but if anybody die the soul separates from the human body. In the days of yore the soul goes to *kazeiram* but after converting to Christianity they believed the soul goes to paradise until the second coming of Jesus Christ.

7) Continuity in festivals and rituals

The Tangkhul Naga today has come a long way from purely agriculturist to embarking modern education system. It was said that during the era of conversion when strong movement of Christianity was sweeping across the Tangkhul hills. Some traditional cultures got swept away too as they broke and threw away all that has to do with the tradition. Yet there is huge continuity blended with the Christian faith to suit the religious framework of the Christianity today.

One strong area of continuity is seen in the festivals which are still celebrated even after converting to Christianity. The whole spirit and concept of festival remains the same with the change in the way religion play its part. Some continuity in festivals are:

- 1) *Luir*- The seed sowing festival.
- 2) *Yarra*- This is ante-cultivation festival.
- 3) *Mangkhap*- This is a post-trans-plantation festival.
- 4) *Tharreo*- Pre-harvest festival where they plucked the best fruits and brought to the Church for offering.
- 5) *Chumph*- This is a festival of thanksgiving (Khamuiwo 1999).

In the days of yore all these festivals and rituals would have been associated with propitiation of spirit and drinking of rice beer but this propitiation and offering along with drinking of rice beer is strictly prohibited after converting to Christianity. Ruivah (1993) said “they, however, try to retain the original traditional spirit of enjoying the festival by following the traditional way minus animistic rites and rituals” (Ruivah 1993: 79). However some festivals could not be brought forward after converting to Christianity as it has to do with propitiating the spirit and some of such festivals which retains only in the memory of the people are:

- 1) *Rakhon kakhon*

A ritual of cleaning the pond, and spirit telling them where to cultivate the following year as they practice shifting cultivation.

- 2) *Thisham*

Ritual of commemoration of the dead, the final rite performed by the family for the dead. It falls around the month of January. On this day the soul of the dead is departed from this world.

- 3) *Kashong kahao*
- 4) *Mawonzai*
- 5) *Tharshat*

All these animistic rituals were supplemented by addition of new Christian festivals which is now playing an important part of their life such as Christmas, Good Friday, Easter Sunday, etc. Apart from all these continuity, there are many areas of continuity such as, village administration, shawl presentation on the occasion of marriage or death, giving the meat share to the in-laws etc, but these continuity has less importance in the role of religion so their detail account has not been inculcated here. For instance fear of the evil spirit harming them are not completely erased from their belief system. There are many mountains, stones, lakes, streams, trees that the people think are still possessed by the evil spirit and demolishing them or even trespassing will invite dire consequences in the form of sickness or even dead.

VII. CONCLUSION

We can say that with the coming of Christianity there have been changes in almost every aspects of life including their social, political and world view with the people having more or less continuous contact with the outside world and now they are not immune from dynamic change affecting their traditional way of life. Their traditional religion called *Hao* remained only as folklore for this new educated generation of the Tangkhul community.

Morris (2006) quoting the definition given by Southwold wrote that religion as a social institution is neither a static or

unitary phenomenon; but as widespread institution, it is characterized by a number of dimension, or what Southwold, in his polythetic approach to religion, describes as attributes. These include the following: rituals practices; an ethical code; a body of doctrines, beliefs. Scriptures, or oral traditions; patterns of social relations focus around a ritual congregation, church or moral community; a hierarchy of rituals specialists; a tendency to create a dichotomy between the sacred and profane; and finally, an ethos that gives scope for emotional or mystical experience (Morris 2006: 2).

For the people of Tangkhul, the change is in the God they worship, which is the vital force of religion but the spirit, the commitment continue to run and religion continues to have the maximum impact to this small tribal community.

Inspite of the change in the God they worship continuity persist in those area which is permitted by the new faith. Those traditional festivals which are permitted within Christian faith continues to have an important place in the contemporary which will never die off; instead its importance will only grow with the people gaining more conscious about their unique culture. We can see this from the fact that in almost every occasions and functions people are asked to wear their traditional dress, perform traditional dances called *pheichak* and traditional song called *haola*. This is a conscious effort from the young learned ones to revive and preserve their culture and not very long from now, their cultures and tradition will be revived only to be preserved for future references.

Morris (2006) continues to say that Christianity is reputed to be the largest of the world religions and is found, in one form or another, throughout the world. It is estimated that around thirty – two percent of the world population is Christians – around 2 billion people, half of whom are adherents of the Roman Catholics faith. Still an important influence in western Europe and north America, Christianity has always had a strong missionary impetus and since the sixteenth century has spread throughout much of what is now described as the ‘developing world’- Asia, Latin America, Africa and Oceania. Christianity has thus been closely implicated in both the rise and spread of capitalism and in the colonial encounter itself. Although Christianity is claimed as a transcendental truth of universal significance, it has been communicated in diverse historical and socio-cultural context and has thus given rise to a bewildering number of denominations, sects, churches, and movements. Besides the roman catholic church and the eastern orthodox church (which has more than 200 million adherents) and such established Christian churches as the Anglican, Methodist, Apostolic, Lutheran, and Baptist churches, there exist throughout the world many thousands of different independent Christian churches. With the resurgence of charismatic and Pentecostals form of Christianity, there has been, in recent decades, a huge expansion of Christianity in many part of Africa, Asia and Latin America – as we shall later note. (Morris 2006: 146)

The impact and the result of these western missionaries are felt even to this small terrain hill of India. As far as religion is concerned the conversion is rooted so strong that people have no intention of going back to their traditional religion. The people of Tangkhul are infact grateful to the ones who have ushered this new religion and this gratitude is echoed in the line of Luikham

(1998) who said “every earthly kingdom rises and fall but on this forsaken land which our Creator has cherished so long to glorify the world, the mighty kingdom has been established for eternity in whose honour we at the height of joy which words fail to express” (Luikhham 1998: 4). The Church today, beside teaching Bible also acts as an instrument to make people conscious about their social obligations in the society. The belief and commitment never run dry, worshiping in almost everything they do or in almost everywhere they go. The worship and commitment continues, though there is a change on who they worship. The people now have what Tylor called, a monotheistic religion with the belief in one supreme God called *Varivara* which is the Christian faith.

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Comparative Analysis of Systemic Versus Local Antifungal in the Treatment of Vaginal Candidiasis: A Prospective Study

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Index Terms- vulvovaginal candidiasis, clotrimoxazole, fluconazole

I. INTRODUCTION

Vaginal candidiasis is one of the commonest gynaecological disorder encountered in prepubertal, pubertal, reproductive and perimenopausal life of women. This particular entity contributes to the maximum burden in gynaecological out patient department. Roughly 72% women have vaginal candidiasis once in their life and recurrence is common (Bero 2005). This particular disease is known to cause intense pruritis disabling women in her day to day life.

Plenty of anti-fungals are available for oraland intra-vaginal treatment of uncomplicated vulvovaginal candidiasis in the form of imidazoles, nystatin, clotrimoxazole, fluconazole etc. Various RCTs have been conducted to compare the efficacy of one antifungal over the other. In ourstudy we too have tried to compare the efficacyof oral fluconazole with vaginal clotrimoxazole.

The primary objective of this study was to assess the relative effectiveness of oral versusintra-vaginal anti-fungals for the treatment of uncomplicated vulvovaginal candidiasis.

The secondary objectives were –

- To assess the cost-effectiveness of both the drugs
- To assess various side effects and safety of both
- To look into the reasons which route of administration of antifungal has a better compliance.

Inclusion Criteria

- Trial compared an oral anti-fungal with an intra-vaginal anti-fungal.

- Subjects were non pregnant women (aged 16 years or more) with uncomplicated vulvovaginal candidiasis.

- The diagnosis of vulvovaginal candidiasis was made by clinical examination and mycologically (i.e. a positive culture and/ or microscopy for yeast).

- Subjects who were HIV positive, immunocompromised, pregnant, breast feeding or diabetic were excluded from the study.

- The primary outcome measure was clinical cure.

Key words:

II. MATERIAL AND METHODS

Present study was carried out in the department of Obstetrics and Gynecology of Sri Guru Ram Rai Institute of Medical Health Sciences, Dehradun, Uttarakhand, India. The study was prospective and was conducted over the period of one and half years. Total 200 subjects were included in the study. Two groups of 100 women each were made. One group received oral fluconazole tablet 150 mg each as a single dose therapy. Second group received vaginal pessary of clotrimazole 100mg once daily at bed time for 6 days. Patients were followed after 10 days as short term assessment (first follow up visit). Later second and third follow up was done after fortnight of first and second follow up as long term assessment. Relief in symptoms and clinical examination for negative candidial discharge was taken as criteria for cure of the disease.

III. RESULTS

The distribution of age, parity and socioeconomics status in both the groups can beseen in table I.

Table I : Distribution of age, parity and socioeconomic status of women

Groups	Age	Parity	* Socioeconomic Status				
			Low	Low Middle	Middle	Upper Middle	Upper
I	<20 yrs	P0	1	2	0	1	0
		P1	10	9	5	6	5
	20-40 yrs	P2	7	8	5	4	5
		P3	4	6	5	1	2
		P0	4	5	6	2	1
		P1	2	2	1	1	2
>40 yrs	P2	2	1	2	1	0	
	P3	2	1	2	1	0	
II	<20 yrs	P0	3	1	0	1	0
		P1	12	6	2	5	4
	20-40 yrs	P2	5	10	2	2	5
		P3	6	4	4	1	0
		P0	4	5	1	1	3
		P1	2	2	1	0	3
>40 yrs	P2	2	2	1	0	3	
	P3	2	1	1	0	1	

*Socioeconomic Status - per capita income per month Low - <500 Low Middle - >500-<1000 Middle ->1000-< 1500 Upper Middle - >1500-<2000 Upper - >2000

Majority of the women suffering from vaginal candidiasis were of reproductive age group with parity 1 & 2. Sixty three percent women were from low & low middle socioeconomic status in both the groups.

The symptoms with which the women with candidiasis presented were –

Symptoms	Group I	Group II
Vaginal itching alone	16	11
Vaginal discharge alone	18	20
Vaginal soreness	42	39
Vaginal itching with thick curdy white vaginal discharge	10	12
Severe vaginal irritation , discharge and lower abdominal pain	6	8
Oral white patches with vaginal itching	8	10

Most of the women presented with thick curdy vaginal discharge with itching.

Women with group one received oral fluconazole and group two received vaginal suppositories of cotrimazole. There were demonstrated how to insert the vaginal tablets.

On their first follow up after 10 days (shortterm assessment) the cure of the disease was seen as follows table III.

Table III: Cure of disease

Symptoms / Clinical Examination	Group I	Group II
Complete relief	98	46
Partial relief	2	47
No relief	0	7

Complete relief was considered when women was asymptomatic and clinical speculum examination revealed no discharge. Partial relief was when some symptoms were still present and speculum examination revealed persistence of some curdy discharge. Complete relief was seen in group I (98%) significantly much more as compared to group II (46%). Also in group II there was not a single women belonging to the 'no relief' group. Duration of relief of symptoms was comparatively lesser in group I who received the oral therapy as compared to group II with vaginal therapy.

Table IV: Duration of cure

Duration of Symptoms Relief	Group I	Group II
3 days	86	26
4-6 days	11	36
>6 days	3	38

% patients came back for follow up in the first visit. 97% and 96% came back for second follow up in group one and two respectively.

For the third follow up visit 82% of group I and 86% of group II came back. Out of 86% who came back after third visit 19 women still had complaints of vaginal itching and discharge.

Table V: Compliance of patients for follow up

Follow up visit	Group I	Group II
Ist visit (after 10 days)	100	100
2 nd visit (after 15 days of 15% visit)	97	96
3 rd visit (after 15 days of 3 rd visit)	82	86

Different side effects were seen in both the groups however the symptoms which hampered the women's day to day life were more in group II.

Table VI : Side effects of oral versus vaginal therapy in candidiasis

Side effects	Group I	Group II
Nausea and Vomiting	2	-
Giddiness	2	2
Vaginal burning & soreness	-	21
Excessive vaginal discharge	2	12
Vulval itching	-	12

IV. DISCUSSION

Various trials have been conducted to compare the efficacy of various antifungals with each other. Two trials reporting three comparisons were found in the update. Nineteen trials are included in the review, reporting 22 oral versus intra-vaginal anti-fungal comparisons. No statistically significant differences were shown between oral and intra-vaginal anti-fungal treatment for clinical cure at short term (OR 0.94, 95% CI, 0.75 to 1.17) and long term (OR 1.07, 95% CI, 0.82 to 1.41) follow-up. In one study no statistically significant differences for mycological cure were observed between oral and intra-vaginal treatment at short term. However there was a statistically significant difference for long term follow-up. In our study however even in short term follow up systemic antifungal (fluconazole) was not found to be better as compared to vaginal clotrimazole. In a study by Hiroshige et al (1995) a total of 150 women with clinical and mycological evidence of vaginal candidiasis were randomized to receive 50 mg of oral fluconazole daily for 6 days (50 women), a single oral 150 mg dose of fluconazole (50 women), or 100 mg of intravaginal clotrimazole daily for 6 days (50 women). They were assessed at 5-15 days (short-term assessment) and again at 30-60 days (long-term assessment) after the completion of treatment. The rates of clinical effectiveness were 92% or 88% in the 6-day oral fluconazole group, 80% or 76% in the single oral fluconazole group, and 72% or 58% in the intravaginal clotrimazole group at the short-term or long-term assessment, respectively. Treatment related side effects were not found in any group. An additional Cochrane review comparing oral vs. intra-vaginal anti-fungal treatments found no difference between clotrimazole and fluconazole or itraconazole for clinical cure at long (2 to 12 weeks) or short term (5-15 days) follow up (Watson et al 2001).

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Development of Mucilaginous Spongy Dessert-A Herbal Rassogolla Prepared from Cow Milk

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Abstract- This study deals with the development of "Spongy Dessert" by incorporating the "mucilage" powder extracted from the seeds of psyllium (*Plantago ovata*). The mucilage powder was incorporated at 3.0, 3.5 4.0 & 4.5 % level in the Chhena (milk solid) prepared from the low fat cow milk. On the basis of results obtained through organoleptic evaluation, the Spongy Dessert prepared by incorporating 4% mucilage was selected and analyzed for nutrients. The developed product namely herbal rassogolla prepared by incorporating 4.0 % mucilage powder was a good source of protein (13.8 g/100g) and dietary fibre (1.5), low in carbohydrates (18.8 g/100g), saturated fat (0.8 g/100g) & energy (141.2 Kcal) and free from trans fat. This mucilaginous spongy dessert has the properties to provide relief from constipation and acidity.

Index Terms- constipation, herbal rassogolla, psyllium, spongy dessert

I. INTRODUCTION

Psyllium (*Isabgol*) is the name that is often used to describe a plant called Plantago. It is an annual species that has originated from arid and semi arid zone and is used in traditional and industrial pharmacology (1) Isabgol has been used as a laxative for centuries, especially in India to treat constipation. Isabgol (Psyllium), the common name in India for *Plantago ovata*, comes from the Persian words "isap" and "ghol" that mean horse ear, which is descriptive of the shape of the seed. It is indigenous to Mediterranean region and West Asia extending up to Suttlej and Sindh in West Pakistan, also distributed from Canary Islands across Southern Spain, North Africa, Middle East and North-Western Asia. In India the use of isabgol is as old as the Ayurveda System of Medicine. It is commercially cultivated in North Gujarat, Western Rajasthan, Punjab, Hariyana and Uttar Pradesh (2). Psyllium is a high source of fiber and it acts as a bulk-forming laxative. In other words, it helps in increasing the volume of fecal matter, which stimulates a reflex contraction of the bowel walls that helps the stool to pass smoothly. Since Psyllium is known to help soften stool, it is an effective way to reduce the pain and discomfort associated with hemorrhoids. In a study by Marlett et al (2000), they proposed that the unfermented gel isolated from psyllium containing stools functions as an emollient and lubricant. Studies suggest that the

various constituents of psyllium (such as soluble fibers, linoleic acid, and alkaloids) can help lower blood sugar levels. The high levels of soluble fiber and linoleic acid in Psyllium stimulate the production of cholesterol-lowering bile acids and reduce the amount of cholesterol absorption by the body (3). Psyllium causes a feeling of fullness, which can reduce our sensation of hunger. Short term placebo-controlled studies showed that consumption of 7-10 g psyllium/day lowers serum total cholesterol concentrations 4-11% and serum LDL cholesterol concentrations 6-18% below placebo control concentrations (4, 5, 6, 7, 8, 9, 10, 11, 12, 13). Psyllium was shown to stimulate bile acid synthesis (7 alpha hydroxylase activity) in animal models (14, 15) and in humans (9), which leads to reduction of serum cholesterol. Additional mechanisms, such as inhibition of hepatic cholesterol synthesis by propionate (16) and secondary effects of slowing glucose absorption (17) may also play a role.

It is mainly used as a [dietary fiber](#) and produced for its [mucilage](#) content. The term *mucilage* describes a group of clear, colorless, gelling agents derived from plants. It is a thick, gluey substance produced by nearly all plants and some microorganisms. It is a [polar glycoprotein](#) and an [exopolysaccharide](#). The mucilage obtained from psyllium comes from the seed coat.

II. MATERIALS AND METHODS

Materials

Local variety of Psyllium (Isabgoal) seeds (*Plantago ovata*), cow milk, sugar, citric acid, rose water were procured from local market of Jaipur, Rajasthan, India. Chemicals used for estimation were of analytical grade.

Extraction of mucilage

Preliminary trials were carried out to standardize the amount of deionized water, NaOH & HCl and time along with temperature for extraction of mucilage.

50 gm Psyllium (*Plantago ovata*) seeds were dispersed in 500 ml deionized water at room temperature and kept in water bath for 2 hrs at 40°C with discontinuous stirring and allowed it to cool at room temperature followed by 24 hrs soaking. 0.25 M NaOH was prepared in deionized water and added to separate the sticky mucilage from the seeds for 30 minutes continuous stirring at 180 rpm. The resulting sticky mucilage strained through the

muslin cloth collected in a sterilized beaker and washed with 0.25 M HCl and deionized water.

The separated mucilage was dried overnight in an oven at 40°C, the dried mucilage was then grinded in a mortar pestle and sieved through 70 mesh size.

Production of spongy dessert

The Chhena making process includes the boiling of cow milk followed by addition of 0.3-0.5% citric acid solution (25 ml per liter of milk). Further the milk was gently stirred and cold water was added which results in the precipitation of the milk. After completion of precipitation it was collected in a muslin cloth and the whey was drained off by squeezing the lump (milk solid) as much as possible. The lumps of Chhena were softened uniformly by mashing.

Four different percentage of 'mucilage powder' was incorporated at 3, 3.5, and 4.5 % by mass into the Chhena and mixed properly followed by preparation of Chhena balls. The ready balls were then cooked in the boiling sugar solution (30% w/v) for 15 minutes. All the three incorporation levels (3, 3.5 and 4 % by mass) of mucilage powder into Chhena resulted in successful formation of spongy dessert where as percentage level of 4.5 % by mass resulted in the breakage of chhena balls while cooking them in sugar solution. The successfully cooked balls were then collected from the deep pan and placed in the freshly prepared sugar syrup in which 4-5 drops of purified rose water were sprinkled.

Organoleptic evaluation

The developed product was evaluated for various parameters like appearance, color, texture, flavor and taste, after taste and overall acceptability through 9 point hedonic scale by semi trained panel members. Sensory evaluation, a scientific discipline used to evoke, measure, analyze and interpret reactions to those characteristics of foods and materials as they are perceived by the senses of sight, smell, taste and touch (18). Sensory evaluation consists of judging the quality of food by a panel of judges. The sensory qualities affect the choice of food very much.

For sensory evaluation, following points were followed.

1. Testing area was quiet and a comfortable environment.
2. Testing area was centrally located and members of the panel easily reached to it.
3. Cosmetic odours were avoided from food testing area.
4. Each sample was given code and evaluation was carried out in a separate room and interaction among judges was avoided to prevent the biasness.

The panel members were having Good health, Average sensitivity, High degree of personal integrity, Intellectual curiosity, Availability and willingness to spend time in evaluation and periodic tests for acquit. Selection of panel members involved the screening of 30 semi trained panel members. All the semi trained panel members were subjected to triangle difference test. 20 panel members having sharp discrimination, discretion and communication skills were

selected and then preceded for 9 point hedonic evaluations. This method has nine points and these points are given word descriptions ranging from "dislike extremely" to "like extremely" (19). This test explores consumer likings or preference levels of the developed food products.

Nutritional analysis

On the basis of highest scores obtained through 9 point hedonic method, the Spongy Dessert containing 4% by mass mucilage powder was analyzed for various nutrients like protein (IS:721-1973[R-2005]), total fat (IS:4079-1967[R-2009]), saturated & trans fat (AOAC 996.06), cholesterol (AOAC 976.26), sodium & potassium (AAS), energy (IS:8220-1976[R-2005]), crude fibre (AOAC 978.10), total dietary fibre (AOAC 985.29), total carbohydrates (IS:1656-2007) & sugar (IS:1162-1958 Reaffirmed - 2009).

Statistical analysis

Student's 't' test was used for analysis of data.

III. RESULTS & DISCUSSION

Organoleptic evaluation

Organoleptic evaluation of Spongy Dessert showed that standard was the most acceptable in (8.86) in terms of appearance. It was followed by sample A (8.33), B (8.26) and C (7.60).

Color wise, standard was the most acceptable (8.80). Sample C (8.40) was placed after this. It was followed by sample B (8.06) and A (7.30) (Figure 1).

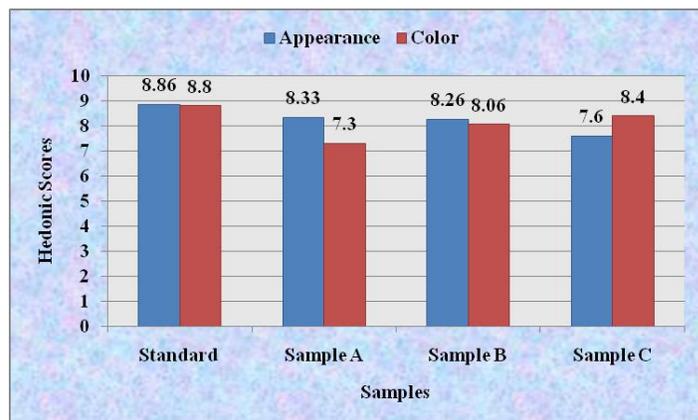


Fig.1: Appearance & Color scores of Spongy Dessert through 9 point hedonic method

S – Standard (without incorporation of mucilage powder), A – Spongy Dessert (With incorporation of 3 % mucilage powder by mass), B - Spongy Dessert (With incorporation of 3.5 % mucilage powder by mass), C - Spongy Dessert (With incorporation of 4 % mucilage powder by mass)

In terms of texture, sample C (8.66) stood out. Standard (8.06) got place after this. Sample A and B were equally accepted (8.00). Taste of sample C was found the best (8.70). While

sample A (8.60), B (8.50) and standard (8.10) were next to it respectively (Figure 2).

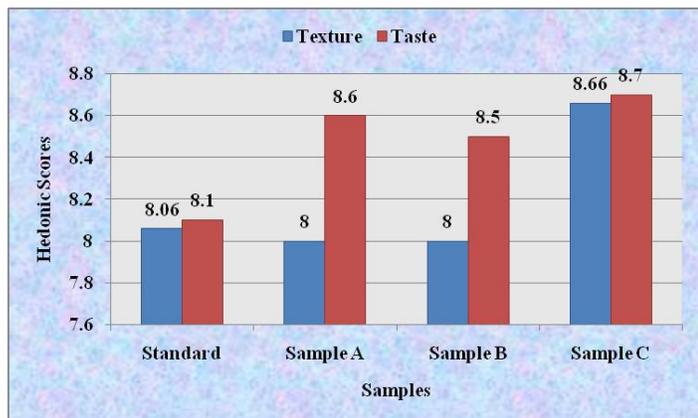


Fig.2: Texture & Taste scores of Spongy Dessert through 9 point hedonic method

S – Standard (without incorporation of mucilage powder), A – Spongy Dessert (With incorporation of 3 % mucilage powder by mass), B - Spongy Dessert (With incorporation of 3.5 % mucilage powder by mass), C - Spongy Dessert (With incorporation of 4 % mucilage powder by mass)

Flavor of sample A and C were the most acceptable (8.80). Sample B was placed next (8.70). Flavor of standard was the least acceptable among all (8.10).

In over all acceptability, sample C (8.43) was the most preferred and sample A (8.18) the least. Standard was the second choice and sample B, the third with values 8.38 and 8.30 respectively in terms of over all acceptability (Figure 3). Soymilk was used in preparation of rasgulla (20).

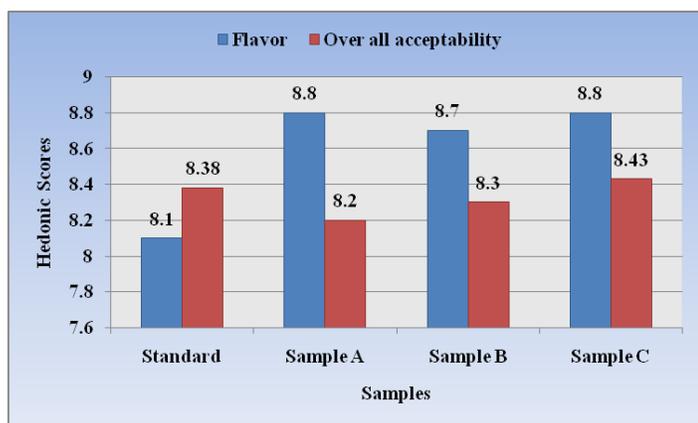


Fig.3: Flavor & Over all acceptability scores of Spongy Dessert through 9 point hedonic method

S – Standard (without incorporation of mucilage powder), A – Spongy Dessert (With incorporation of 3 % mucilage powder by mass), B - Spongy Dessert (With incorporation of 3.5 %

mucilage powder by mass), C - Spongy Dessert (With incorporation of 4 % mucilage powder by mass)
Nutritional analysis

The study of nutritional values revealed that the Spongy Dessert found more nutritive as compared to control available in the market. It was observed that carbohydrate content (18.8 g/100g) of this product was lesser than the control (61.0 g/100g). Protein content (13.8g/100g) of the developed product was higher as compared to control one (6g/100g) (Table 1). Low-carbohydrate diets have specific cardiovascular benefits (21). Low-carbohydrate, high-protein diets typically produce a 2- to 3-kg weight loss (22). This diet appears to improve satiety through their action on measures of adiposity and gut peptides that influence appetite and caloric intake (23). The effect of higher-carbohydrate diets, particularly those enriched in refined carbohydrates, coupled with the rising incidence of overweight and obesity, creates a metabolic state that can favor a worsening of the atherogenic dyslipidemia that is characterized by elevated triglycerides, reduced HDL cholesterol, and increased concentrations of small, dense LDL particles (24, 25).

Table 1: Nutritional analysis of standard and Spongy Dessert

Nutrients	Control	Spongy Dessert
Total carbohydrates (% by mass)	61.0	18.8
Sugar (% by mass)	36.0	17.4
Protein (% by mass)	6.0	13.8
Total fat (% by mass)	1.0	1.2
Saturated fat (% by mass)	1.0	0.8
Trans fat (% by mass)	Nil	Nil
Sodium (mg/100g)	27	28
Potassium (mg/100g)	7.4	4.1
Energy (Kcal/100g)	276	141.2
Total dietary fibre (% by mass)	0.0	1.5

A slight increase of fat content (1.2g/100g) was reported in Spongy Dessert as compared to control (1.0g/100g) but the saturated fat was found lesser (0.8g/100g) than the control (1.0g/100g) which was beneficial for health. Saturated fat intake has been linked to an increased risk of cardiovascular disease (CVD), and this effect is thought to be mediated primarily by increased concentrations of LDL cholesterol (26). Both control and Spongy Dessert were found free from trans fat. Trans fats adversely affect multiple cardiovascular risk factors and contribute significantly to increased risk of CHD events. They may also worsen insulin sensitivity, particularly among individuals predisposed to insulin resistance; possible effects on weight gain and diabetes incidence (27). Negligible difference was observed in sodium content of control and Spongy Dessert. It plays a major role in maintaining blood volume and blood

pressure by attracting and holding water. Sodium is also important in cellular osmotic pressure (the passage of fluids in and out of the cells) and in transmitting nerve impulses. Potassium content (4.1 mg/100g) was also found in Spongy Dessert which may reduce systolic and diastolic blood pressure, risk of cardiovascular disease, stroke and coronary heart disease. WHO also suggested a potassium intake of at least 90 mol/day (3510 mg/day) for adults (28). Energy value of control and Spongy Dessert was found as 276.00 & 141.20 Kcal/100g respectively (Table 1). Spongy Dessert consists dietary fiber which upon absorption of fluids converts into a laxative and helps in smooth bowel movement. Total fibre content was absent in control product whereas in Spongy Dessert it was estimated as 1.5 g/100g. Increasing the intake of high-fiber foods or fiber supplements improves serum lipoprotein values, lowers blood pressure, improves blood glucose control for diabetic individuals, aids weight loss, and improves regularity (29).

IV. CONCLUSION

The developed product namely mucilaginous spongy dessert is a low calorie, low fat, high protein and fibrous product which is having the potential to relieve the constipation, controlling the acidity and diabetes mellitus along with lowering the high blood pressure.

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Study of Perfect Shuffle for Image Scrambling

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Abstract- In recent years, Digital data transmission has increased, providing security to this digital data is of high importance. As a result, people pay much more attention to image encryption. Many approaches for image encryption that have high security as well as simple encryption process have been proposed. In this paper, Perfect shuffle for image scrambling is introduced. Effects of perfect shuffles with different factors of the image size are discussed. The number of iterations required to get back the original image are related to the power of 2. Finally all these results are displayed by using 1024 X1024 Lena's image.

Index Terms- Encryption, Scrambling, Perfect Shuffle, Down Sampling

I. INTRODUCTION

Image scrambling is a useful approach to secure the image data by scrambling the image into an unintelligible format. [1] introduces a new parameter based M-sequence which can be produced by a series shift registers. In addition, a new image scrambling algorithm based on the M-sequence is presented. The user can change the security keys, r , which indicates the number of shift operations to be implemented, or the distance parameter p , to generate many different M-sequences. This makes the scrambled images difficult to decode thus providing a high level of security protection for the images. The presented algorithm can encrypt the 2-D or 3-D images in one step. It also shows good performance in the image attacks such as filters (data loss) and noise attacks. The algorithm can be applied in the real-time applications since it is a straightforward process and easily implemented. [2] presents a novel image scrambling method using Poker shuffle, which is controlled dynamically by chaotic system. Compared with other scrambling techniques such as algebraic permutations and chaotic permutations, the proposed method has properties of nonlinearity, non-analytic formula and large key space. Moreover, its scrambling performance is satisfied and can deal with non-square image. All these features show that the proposed method is more secure and efficient for image scrambling encryption.

There are many methods for calculating the periodicity of Arnold transformation and getting the inverse transformation, the use of traditional Arnold transformation for the image scrambling is unsafe, for this issue [3] proposed an algorithm for digital image block location scrambling. It has improved the traditional Arnold transformation by adding two parameters a and b , furthermore it use Logistic map to generate the parameter sequences. The digital image is blocked, then carry out Arnold transformation with different parameters on each image block, after that put the transformed pixels on the corresponding position of the encrypted image, thus achieving image location scrambling. The results of simulation show that this algorithm can achieve good image encryption effect, and it has a large key space, key sensitivity. It basically meets the effectiveness and security requirements of image encryption.

Cryptography is done in two ways: (i) symmetric (private) key cryptography, where only single key is used to do encryption and decryption, (ii) asymmetric (public) key cryptography, where one key is used to do encryption and other key is used to do decryption. In [4], the author proposed a method, SD-AEI, for image encryption, which is an upgraded module for SD-EI combined image encryption technique and basically has three stages: 1) In first stage, each pixel of image is converted to its equivalent eight bit binary number and in that eight bit number, the number of bits, which are equal to the length of password are rotated and then reversed; 2) In second stage, extended hill cipher technique is applied by using involutory matrix, which is generated by same password used in second stage of encryption to make it more secure; 3) In third stage, the whole image file is randomized multiple number of times using Modified MSA Randomization encryption technique and the randomization is dependent on an unique number, which is generated from the password provided for encryption.

In [5] a novel scheme for optical information hiding (encryption) of two-dimensional images by combining image scrambling techniques in fractional Fourier domains is proposed. The image is initially random shifted using the jigsaw transform algorithm, and then a pixel scrambling technique based on the Arnold transform (ART) is applied. Then, the scrambled image is iteratively encrypted in the fractional Fourier domains using randomly chosen fractional orders. The parameters of the architecture, including the jigsaw permutations indices, Arnold frequencies, and fractional Fourier orders, form a huge key space enhancing the security level of the proposed encryption system. Optical implementations are discussed and numerical simulation results are presented to demonstrate the flexibility and robustness of the method [6] gives an Enhancement to Image security in which Data bits from textual message are encrypted through key to some suitable nonlinear pixel and bit positions about the entire image. As a result, a watermarked image is produced. After that three different image shares using any two components of R, G and B of entire watermarked image are formed. The key is also divided into three different logical blocks by digits. By combining any two blocks of key, key shares are formed and are assigned to image shares. Out of those three shares, only addition of any two is able to make the full image or key. At the

decryption end through appropriate arrangement of shares of key and image, make possible to retrieve hidden data bits from watermarked image and reform into its original content

In 1999, J.-C. Yen and J.-I. Guo proposed a novel image encryption algorithm called BRIE (Bit Recirculation Image Encryption). [7] points out that BRIE is not secure enough from strict cryptographic viewpoint. It has been found that some defects exist in BRIE, and a know/chosen-plaintext attack can break BRIE with only one know/chosen plain-image. Experiments were performed to verify the defects of BRIE and the feasibility of the attack.

Chaotic maps have been widely used in image encryption for their extreme sensitivity to tiny changes of initial conditions. The chaos based algorithms have suggested a new and efficient way to deal with the problem of fast and highly secure image encryption. In [8] the chaotic features of traditional trigonometric function is analyzed and a new chaotic image encryption algorithm is proposed. The algorithm uses a chaotic map based on trigonometric function as a mask to confuse the plain-image and employs several different types of operations to shuffle the image pixels according to the outcome of another chaotic map. Thereby it significantly increases the resistance to statistical and differential attacks. The results of experiment, statistical analysis, correlation coefficient analysis and key sensitivity tests show that the algorithm is of great security and practicability.

Advanced Encryption Standard (AES) is a well known block cipher that has several advantages in data encryption. However, it is not suitable for real-time applications. In [9], a modification to the Advanced Encryption Standard (MAES) is presented and analyzed to reflect a high level security and better image encryption. The modification is done by adjusting the ShiftRow Transformation. Detailed results in terms of security analysis and implementation are given. Experimental results verify and prove that the proposed modification to image cryptosystem is highly secure from the cryptographic viewpoint. The results also prove that with a comparison to original AES encryption algorithm the modified algorithm gives better encryption results in terms of security against statistical attacks

A new linear transform for scrambling images is proposed in [10]. The forward transform scrambles the image and the inverse transform unscrambles the image. Transformation matrices for both scalar and blocked cases are defined. Recursive and non-recursive algorithms based on the new transform are also given. The experimental results show that the positions of the pixels are strongly irregularized using the transform. Unscrambling using a wrong key fails and results in an unintelligible image which cannot be recognized.

A new digital image scrambling method based on Fibonacci numbers is presented[11]. The uniformity and periodicity of the scrambling transformation are discussed. The scrambling transformation has the following advantages: (1) Encoding and decoding is very simple and they can be applied in real-time situations. (2) The scrambling effect is very good, the information of the image is re-distributed randomly across the whole image.(3) The method can endure common image attacks, such as compression, noise and loss of data packet

The properties and periodicity of the two dimensional Fibonacci transformation of digital images are discussed[12] on the background of image information security problem research, and a new computation method and an accurate formula of whose period are also given, its application in digital image scrambling is illustrated with examples.

In [13] a new spatial domain image scrambling method is proposed which is based on Fibonacci and Lucas series, that can be used in various spatial domain image processing techniques of data hiding and secret communications such as Steganography and Watermarking and can increase the security of the hidden message

A new scrambling algorithm based on random shuffling strategy is proposed in [14], which can scramble non equilateral image and has a low cost to build coordinate shifting path. The algorithm has a good one time scrambling performance. It can be used to scramble or recover image in real time and can also resist the JPEG compression attacks. Experiments show the scrambling method validity in scrambling or recovering non equilateral image and robustness in enduring erasing, cropping and JPEG compressing attacks

II. PERFECT SHUFFLE

A shuffle is a permutation of n elements. Clearly, each shuffle produces a new permutation or returns to a previous one. Therefore at some point the process would return to the original order. However, there are $n!$ permutations of a set of n elements. The perfect shuffle is a non-random process. A perfect shuffle deck of cards with an even number of cards is accomplished by splitting the deck of cards into an upper half and a lower half and then interlacing the cards alternately, one at a time from each half of the deck.

There are two ways to perfectly shuffle a deck of $2n$ cards. Both methods cut the deck in half and interlace perfectly. The out shuffle O leaves the original top card on top. The in shuffle I leaves the original top card second from the top.

In this paper, Out shuffle (O renamed to $S1$) and In shuffle (I renamed to $S2$) both are applied to Digital Images. The different factors for the size of a digital image ($2^k \times 2^k$) are used for generating different combinations of patterns. Every pattern considered has 2^m rows and 2^n columns in shuffle $S1$, which are interchanged in shuffle $S2$ (2^n rows and 2^m columns), where $k = m+n$.

To explain how Shuffle $S1$ and Shuffle $S2$ are applied to a digital Image, let us consider Shuffle $S1$.

Let the image size be $2^k \times 2^k$ (total number of pixels in an image M^2). As we know a digital image is a matrix having rows and columns. The pixels need to be shuffled in a certain order inside the matrix. Based on the size of the digital image, there are different factors for e.g. For an image size of 256×256 factors are 2,4,8,16,32,64,128. To arrange all the pixels using perfect shuffle ($S1$) we could consider a rectangular block of size (rows \times columns = Total Size of the image), where rows and columns are chosen in such a way that a product of the two factors results in total size of the image. For e.g. ($2 \times 128 = 256$, $4 \times 64 = 256$) in which the rectangular

block will have 2^1 rows and 128 (2^7) columns. In this rectangular block the pixel positions are written serially row wise and read column wise. Interchanging the two factors and rearranging the rectangular block according to the two factors results in second type of shuffle(S2) for e.g. ($128 \times 2 = 256$, $64 \times 4 = 256$) in which the rectangular block will have 128 (2^7) columns and 2 (2^1) rows.

In Perfect shuffle S1 let 2^m be the number of rows and 2^n be the number of columns, where $k = m+n$. The Write arrow in Figure 1.1 and 1.2 indicates the direction of writing the pixel positions from the digital image and the read arrow indicates the direction of reading the pixel positions of the digital image to apply the Perfect shuffle S1 to a digital Image.

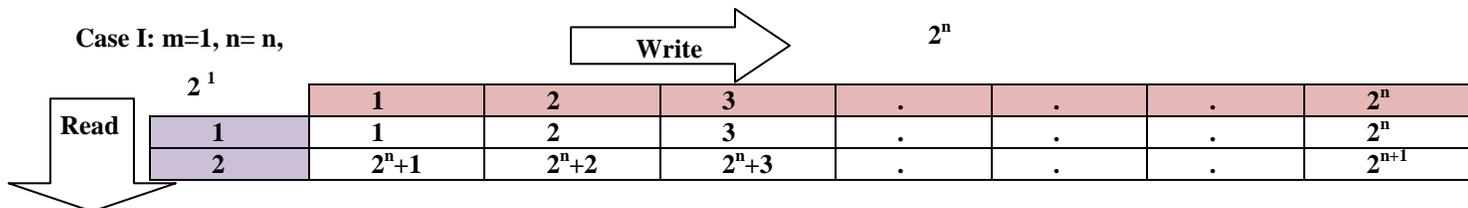


Figure 1.1 Rectangular Block of Shuffle S1 for Case I

Case II

Let us consider a general case in which $m=m$ and $n=n$ for shuffle S1.

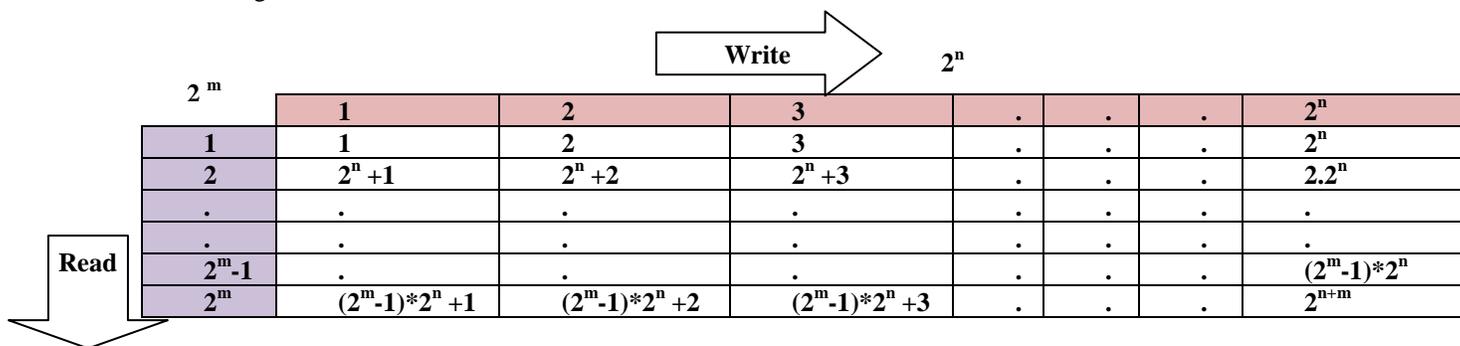


Figure 1.2 Rectangular Block of Shuffle S1 for Case II

In Perfect shuffle S2 let 2^n be the number of rows and 2^m be the number of columns, where $k = m+n$. The Write arrow in Figure 2.1 and 2.2 indicates the direction of writing the pixel positions from the digital image and the read arrow indicates the direction of reading the pixel positions of the digital image to apply the Perfect shuffle S2 to a digital Image.

Case I: $m=1$, and $n=n$

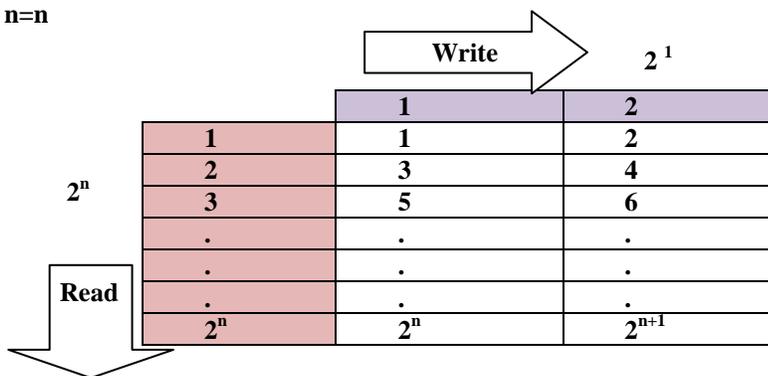
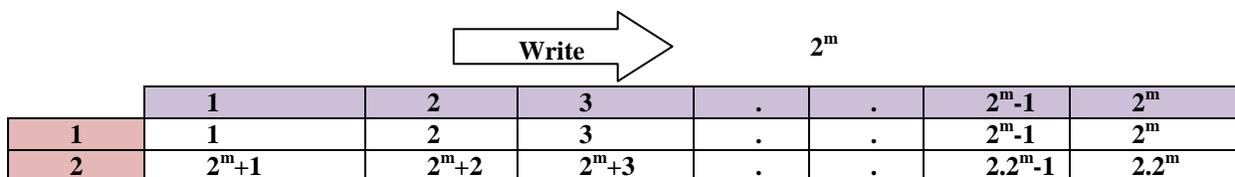


Figure 2.1 Rectangular Block of Shuffle S2 for Case I

Case II Let us consider a general case in which $m=m$ and $n=n$ for shuffle S2.



2^n Read	3	$2 \cdot 2^m + 1$	$2 \cdot 2^m + 2$	$2 \cdot 2^m + 3$	.	.	$2 \cdot 2^m - 1$	$3 \cdot 2^m$

	$2^n - 1$	$(2^n - 2) \cdot 2^m + 1$	.	.	.	.	.	$2^n - 1 \cdot 2^m$
	2^n	$(2^n - 1) \cdot 2^m + 1$	.	.	.	.	$2^{n+m} - 1$	2^{n+m}

Figure 2.2 Rectangular Block of Shuffle S2 for Case II

Let us consider an image of size 1024X1024 and Shuffle S1 when applied to an image of size 1024 X 1024, The factors 2 and 512 are used to generate the rectangular block . The rectangular block has 2^1 rows and 2^9 columns as shown in the Figure 3.1 below

(Pattern 2X512)

2^1	2^9						
	1	2	3	.	.	.	2^9
	1	2	3	.	.	.	512
2	513	514	515	.	.	.	1024

Figure 3.1. Factors 2 and 512 (2^1 and 2^9) used to generate the rectangular block for shuffle S1

Another pattern using 8 and 128 as the factors is shown as an example for shuffle S1 in Figure 3.2

(Pattern 8X128)

2^3	2^7							
	1	2	3	.	.	.	2^n	
	1	2	3	.	.	.	128	
	2	129	130	131	.	.	.	256

	$2^m - 1$	.	.	.	.	.	.	896
2^m	897	898	899	.	.	.	1024	

Figure 3.2. Factors 8 and 128 (2^3 and 2^7) used to generate the rectangular block for shuffle S1

The above two Patterns (Factors 2X512 and 8X128) are shown for shuffle S2, These factors needs to be interchanged i.e. (512X2 and 128X8). The rectangular block obtained by using 512X2 is shown in Figure 4.1 and rectangular block using 128X8 is shown in Figure 4.2

(Pattern 512X2)

2^9	2^1	
	1	2
	1	2
	2	3
	3	4
	.	.
	.	.
	2^n	1023
	1024	

Figure 4.1. Factors 512 and 2 (2^9 and 2^1) used to generate the rectangular block for shuffle S2

(Pattern 128X8)

2^7	2^3	
	.	.

	1	2	3	.	.	2^m-1	2^3
1	1	2	3	.	.	7	8
2	9	10	11	.	.	15	16
3	17	18	19	.	.	23	24
.
.
2^n-1	1007	.	.	.	.	.	1015
2^n	1016	.	.	.	.	1023	1024

Figure 4.2. Factors 128 and 8 (2^7 and 2^3) used to generate the rectangular block for shuffle S2

III. EXPERIMENTAL RESULTS

For Experimental purpose, Lena grayscale image of size 1024 X 1024 was used. Perfect Shuffle S1 and S2 were applied on the image for 10 iterations. The output obtained for Shuffle S1 and Shuffle S2 is shown in Figure 5.1 and 5.2. The factors used for S1 and S2 are 2 and 512. The #number indicates the output obtained for the successive iterations. For e.g #1 indicated the output obtained for Iteration No 1.

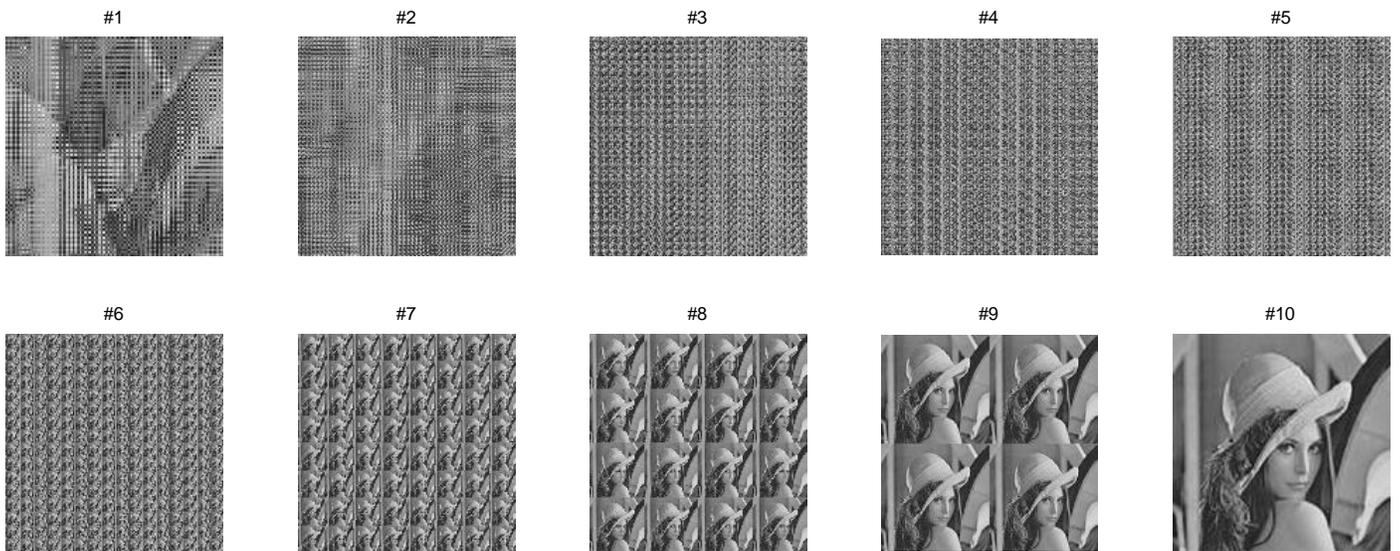


Figure 5.1 Perfect Shuffle S1 and pattern 2X512 (Iteration Number 1 to 10)

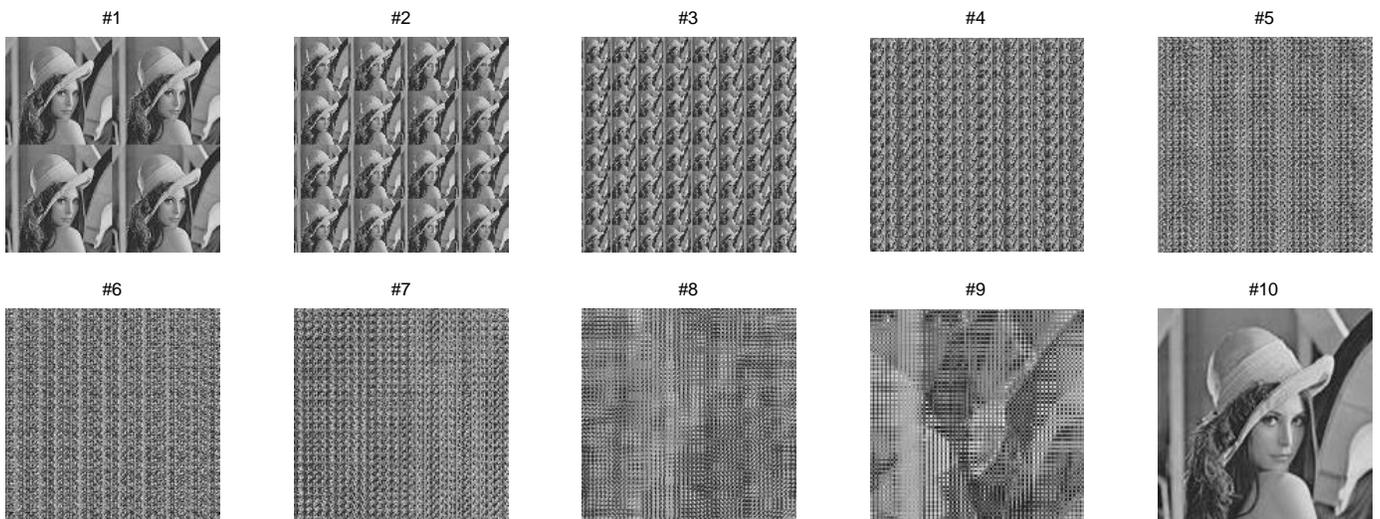


Figure 5.2 Perfect Shuffle S2 and pattern 512X2 (Iteration Number 1 to 10)

As seen from figure 5.1 and 5.2, The application of Perfect Shuffle results in down sampling effect on a digital Image. In Figure 5.1 Perfect shuffle S1, The number of iterations considered were 10 . The 10th iteration results in the original image back. The output obtained in S2 is just the reverse of the output obtained in S1.

IV. ANALYSIS OF OUTPUT OBTAINED IN SHUFFLE S1 AND SHUFFLE S2.

To analyze the output obtained in shuffle S1 and Shuffle S2, i.e the number of Lena’s generated at a particular iteration can be estimated based on the factors / pattern used in shuffle S1 and S2. For e.g Factors of 1024 (2,4,8,16,32,64,128,256,512,1024). Based on the above factors of 1024, the combination of these factors used for 1024 are (2X512, 4X256, 8X128, 16X64 and 32X32).

Let us number the output obtained in Figure 5.1 from #1 to #10. In the last iteration (10th) it can be seen that we obtain the original image. In the 9th Iteration the original image is down sampled into 4, in the 8th iteration it is down sampled to 16 and so on. Every (n-1)th iteration results in down sampling of the image 4 times the images down sampled in the nth iteration. This can be used to estimate the number of lena’s that will be generated due to down sampling for any other pattern considered for the image size of 1024X1024.

For e.g. Let us try to find out the number of lena’s that will be generated for Pattern 4X256 in shuffle S1. This pattern can be written in power of 2.

$$4 = 2^2 \text{ and } 256 = 2^8$$

As the image size considered is 1024 which is 2¹⁰. The maximum number of iterations can be limited to 10. For pattern 2²x2⁸. The Power of 2 for the number of rows in the rectangular block will be the first image to be generated. The #2 will be the first output figure that will be obtained for iteration number 1, for the next iteration we can go in a circular sequence and #4 will be the output image obtained. An increment of two will result in the output of successive iterations. For this pattern we get the original image after 4 iterations. The circular sequence followed is shown below in Figure No 6.1

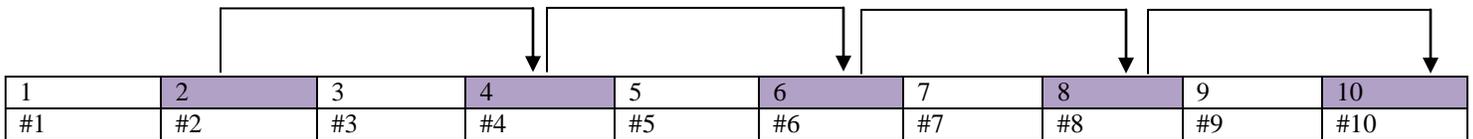


Figure 6.1 Circular sequence followed for 4X256 Pattern

The same procedure when applied to all the different patterns we obtain the table as shown below for Shuffle S1 and S2.

Table 1.1. Experimental Results obtained for Perfect Shuffle S1 and Shuffle S2 for 10 iterations.

Type of Shuffle		Iterations / Power of 2	1	2	3	4	5	6	7	8	9	0
			#1	#2	#3	#4	#5	#6	#7	#8	#9	#10
S1	2X512	1	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10
	No of Lena’s		65,536	16,384	4096	1024	512	256	64	16	4	1
S2	512x2	9	#9	#8	#7	#6	#5	#4	#3	#2	#1	#10
	No of Lena’s		4	16	64	256	512	1024	4096	16384	65536	1
S1	4x256	2	#2	#4	#6	#8	#10					
	No of Lena’s		16,384	1024	256	16	1					
S2	256x4	8	#8	#6	#4	#2	#10					
	No of Lena’s		16	256	1024	16384	1					
S1	8x128	3	#3	#6	#9	#2	#5	#8	#1	#4	#7	#10
	No of Lena’s		4096	256	4	16,384	512	16	65,536	1024	64	1
S2	128x8	7	#7	#4	#1	#8	#5	#2	#9	#6	#3	#10
	No of Lena’s		64	1024	65536	16	512	16384	4	256	4096	1
S1	16X64	4	#4	#8	#2	#6	#10					
	No of Lena’s		1024	16	16,384	256	1					
S2	64x16	6	#6	#2	#8	#4	#10					
	No of Lena’s		256	16,384	16	1024	1					

S1	32X32	5	# 5	# 10								
	No of Lena's		512	1								
S2	32X32	5	# 5	# 10								
	No of Lena's		512	1								

V. CONCLUSION

In this paper, while studying the properties of Perfect shuffling for the purpose of scrambling, following observations have been made

- 1) **Down Sampling Effect:** One of the most interesting observation made was the down sampling effect which occurs on the image when perfect shuffle is applied to it. This down sampling effect results in particular number of images of the original image as can be seen in the result, we have studied this effect and have given a relation as to how to correlate the number of images generated based on the factors used for Perfect shuffling.
- 2) **Repetition of the original image:** As it can be seen from Table No 1.1, Based on the pattern used, a circular sequence when applied to the Powers of 2, we get the original image back after certain number of iterations.
- 3) **No of Lena's Generated:** From experimental results it can be very easily found out the number of Lena's generated if we start from the Original image in the last iteration. For e.g 2X512 Pattern for Perfect Shuffle S1.
- 4) **S1 and S2 are complement to each other:** The results obtained in Figure 5.1 and 5.2 clearly indicates that perfect shuffle S1 and S2 are complement of each other.
- 5) **Scrambling:** The Main objective of studying Perfect Shuffle was its use for Image scrambling, Table 1.1 can be used as a reference for Image scrambling , where we can choose a particular pattern from scrambling and limit the number of iterations. For eg. In 2X512 pattern the Iteration Number #1, #2,#3,#4, #5 and #6 can be very well used for scrambling purpose, as the number of lena's generated are huge in number, which are not perceptible to a human eye.

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Effect of Caffeine on Heart Rate and Blood Pressure

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Abstract- Caffeine increases systolic blood pressure to extent of 17% and mean arterial blood pressure by about 11%. Heart rate was also increased. The increase in systolic blood pressure was attributed more to the increased stiffness of the aorta and larger blood vessels rather than increased stroke volume. The increase of aortic stiffness is attributed to the increased production of angiotensin II and catecholamines potentially nor adrenaline. These changes are attributable to the inhibition of adenosine A2a receptors activity in the smooth muscles of blood vessels. The concomitant increase in the release of rennin from the kidneys because of the direct stimulation by caffeine and similar activity on sympathetic ganglions releasing noradrenaline contributes to the increased activity of vascular smooth muscles. In the present study, attempt has been made to know the changes occurring in heart rate and blood pressure after the intake of caffeine.

Index Terms- Caffeine, Angiotensin, Adenosine Receptors

I. INTRODUCTION

Caffeine is the world's most widely consumed psychoactive substance but like many other psychoactive substances it is legal and unregulated in all countries of the world. The chemical name is 1,3,7-trimethyl-1H purine-2,6(3H,7H)-Dione, also named as 1,3,7-trimethyl xanthenes or 7 methyl theophylline. Its molecular formula is C₈H₁₀N₄O₂ and molecular mass 194.19g/mole. It is an odourless white crystalline substance or powder. Because of its liquefactive nature and worldwide usage, a lot of work has been done and obtained quite contradictory results by different groups. It was presumed that caffeine is a major source of antioxidants contributing up to 65% of dietary supplement. Epidemiologic studies have found that ingestion of coffee is associated with reduced biomarkers of oxidative stress¹ and helpful in reduction of morbidity in rheumatoid arthritis, chronic obstructive pulmonary disease, asthma, ischemic perfusion, ulcerative colitis, diabetes, sexual type of neurodegenerative diseases and atherosclerosis².

Adenosine is a potent vasodilator but caffeine, an adenosine analogue competitively inhibits the adenosine receptors and

brings out vasoconstriction. The psychoactive effects of caffeine are due to the blockade of adenosine receptors of brain. It can increase the systolic blood pressure by enhancing angiotensin II and epinephrine. It can also increase the heart rate by increasing the levels of catecholamines.

II. MATERIALS AND METHODS

Forty healthy nonobese, non-smoking male healthy volunteers of age group between 19-22 years and weight 45-60 kgs not suffering from any cardiac or pulmonary diseases were recruited for this study. The participants were randomly divided into two groups, control and test groups. Twenty students were allocated in control group and twenty in test group. All the participants gave the informed written consent for the study. The study was approved by Institutional Human Ethical Committee on 26/03/2010. The study was conducted according to the guidelines of SVS Medical College, Mahabubnagar.

All the participants were instructed not to take coffee or tea atleast four days prior to the test. Once they were in the lab they were permitted to take rest for 30 minutes. Blood pressure and heart rate were recorded for all the individuals using sphygmomanometer and pulse rate. Later the test group were given caffeine 5mg/kg body weight in gelatine capsules and placebo for control group. They were allowed to take rest for 60 minutes. Later blood pressure and heart rate were recorded in both the test group and control group. The data was tabulated and analysed by using SPSS 16 statistical soft ware.

III. RESULTS

Caffeine caused significant increase in the mean systolic blood pressure (60 minutes post ingestion) from 116.6 to 128.3 mmHg as compared to placebo conditions. The mean rate increased from 72.9 to 77.3 Bpm in test group. No change was observed in control group.

TEST GROUP

	RESTING		60 MIN AFTER CAFFEINE	
	BP	HR	BP	HR
MEAN	116.6/72.2	72.9	128.3/72.2	77.3
SD	6.65/4.44	4.52	7.32/4.44	6.17

SIG	P<0.01	P<0.01	P<0.01	P<0.01
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CONTROL GROUP

	RESTING		60 MIN AFTER PLACEBO	
	BP	HR	BP	HR
MEAN	118.7/76.4	73.8	118.7/76.4	73.8
SD	5.59/3.93	2.97	5.59/3.93	2.97

IV. DISCUSSION

Under resting conditions caffeine has been shown to cause increase in blood pressure and systemic vascular resistance³. Azra mohammed et al⁴ have shown that caffeine can change stiffness of blood vessels may be independent of blood pressure changes. They here also shown that arterial stiffness increases with caffeine and pressor effect of caffeine is predominantly on the vessel resistance rather than an increase in the cardiac output. They also claim that the increase in the sympathetic nervous system activity, serum adrenaline and rennin have been linked, the acute pressor effect is also seen in adrenergic patients. Jonson w. daniels et al³ showed that angiotensin II levels were increased with caffeine. As we know that angiotensin II is a powerful vasoconstrictor, it causes increase in blood pressure. In the present study we noticed increase in values of blood pressure after caffeine intake which clearly substantiates the above statement.

Angiotensin II (ANG) potently enhances catecholamine release from the peripheral sympathetic system⁵. Catecholamines released by this mechanism contribute to the vasoconstricting and sodium-retaining properties of ANG⁶. In particular, the chronic effects of ANG at moderately elevated levels are promoted by adrenergic pathways that are significantly involved in the development of hypertension^{7, 8}. Catecholamines can also cause increase in heart rate.

Caffeine with its multiple effects is (1) an adenosine receptor blocker. (2) increasing levels of angiotensin II (3) increasing the levels of catecholamines.

In the present study, an increase in the values of heart rate and blood pressure were noticed with the intake of caffeine when compared to placebo. It has been explained due to the above said multiple effects of caffeine.

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Gender Classification of Human Faces Using Class Based PCA

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Abstract- Gender classification is a binary classification system where system has to assign a given test image to one of the two classes (male or female). The gender classification system with large set of training data normally gives good accuracy. But to achieve good accuracy with small training data is a difficult task. This paper proposes an algorithm for gender classification with small training data and it gives good accuracy even with one image per person for training. The system contains mainly two parts: feature vector generation and classification. Feature vector generation is done with PCA (Principal Component Analysis). Generally all training images are organized as a columns of a matrix and then PCA is applied to generate feature vectors of those training images. To reduce the computational complexity, PCA is separately applied to each individual training class. The paper proposes a new approach of classification where, after a given test image is reconstructed with different Eigen coordinate systems, lowest MSE (mean square error) between given image and reconstructed image, indicate the output class for that image. The proposed method is also compared with nearest neighbor classification using different similarity criteria such as Euclidean, Manhattan, Chebyshev, Canberra, Cosine Correlation and Bray-Curtis distance. These all algorithms are applied on two databases. Indian face database (664 images) and local database (1000 images). Results show that the proposed method significantly improves the overall classification accuracy.

Index Terms- Feature Vector, Nearest neighbor classifier, Principal Component Analysis, Similarity Measures, Supervised Classification.

I. INTRODUCTION

Face is a most important biometric feature of human beings and used for identification in many applications such as surveillance, security, human computer interaction, object based video coding etc. For a human, to recognize whether a given image is of man or woman, is very easy but for the system it is complex to recognize a gender. In recent years, a lot of research is done on this topic. Gender classification using the frontal still facial image is a challenging task. Two main steps of gender classification are feature extraction and pattern classification. Let the image 'I' is of size $N \times N$. This image can be represented as a point in N^2 -dimensional space. So face image of 256×256 can be represented as a point in 65,536-dimensional space. But being a

lot of similarity involved in facial images, these images are not randomly distributed in huge image space and can be represented by relatively low dimension space. The face image can be represented by feature vector. The feature extraction can be done in two ways either by considering the whole image as given by Ardakany and Joula [1] or by considering the local features of different parts of an image such as eyes, nose, mouth etc.[2][3][4]. Principal component analysis (PCA) is the most popular method for feature extraction in face recognition domain. The goal of the PCA is to reduce the dimension of an image space so that new basis better describes the typical model of the image space. Beginning with Matthew Turk's and Alex Pentland's [5] early system, Eigen faces have been created using PCA and used for face recognition. Later PCA method has been extensively used in this domain[6][7]. For classification task the traditional pattern classifiers such as nearest-neighbor classifier[8][9], decision tree classifier[10] as well as modern techniques like neural networks[11] and support vector machine (SVM)[12] have been used. The proposed methods of gender classification are based on PCA and nearest neighbor classification. Initially PCA is applied to training images of male and female class separately so named as **Class Based PCA**. The Eigen faces are calculated which define the male face space and female face space. Then for each male training image a set of weights (feature vector) is calculated by projecting that image onto each of the Eigen faces of male face space. Similar process is done with female training images. After generating the one feature vector for each training image, two feature vectors are generated for a given testing image by projecting that image on both the face spaces. Nearest neighbor classification is done with different similarity criteria and the results obtained are compared. The paper is organized as follows : Section II gives a brief idea about PCA. Section III gives the equations of different distance criteria. Section IV proposes the methodologies of the system. Section V discusses the results. Finally Section VI describes the conclusion followed by references.

II. PRINCIPAL COMPONENT ANALYSIS (PCA)

PCA is a mathematical and statistical technique used for finding patterns in high dimensional data. It is generally accepted that the earliest descriptions of the technique now known as PCA were given by Karl Pearson in 1901[13] and it was later researched by [Harold Hotelling](#) [14] in the 1930s. A lot of information about PCA is given in a book by I.T.Jolliffe [15].

Mathematically, PCA finds the principal components of the distribution of faces. It is based upon the Eigen vector decomposition of a covariance matrix of the set of face images. These Eigen vectors can be rearranged to generate Eigen face. The number of Eigen faces is same as the number of training images. To reconstruct the original training face image, we need to calculate the weighted sum of all Eigen faces. The set of the weight coefficients required for reconstruction, is called as the feature vector of that image.

III. DISTANCE CRITERIA

Many similarity measures have been proposed by X.Chen and T.J.Cham [16], E.Deza and M.Deza [17], and John P.Van De Geer [18] in literature for image classification. This section describes the six distance measures used by H.B.Kekre et al. [19]. Consider P (P_1, P_2, \dots, P_n) and Q (Q_1, Q_2, \dots, Q_n) are two feature vectors.

A. Euclidean Distance

Euclidean distance as given in Eq.1, is a standard metric for geometrical problems.

$$D_{Euc}(P, Q) = \sqrt{\sum_{i=1}^n |P_i - Q_i|^2} \quad (1)$$

B. Manhattan Distance

It is a distance between two points measured along axes at right angles. It is also known as rectilinear distance or city block distance. It is given in Eq.2.

$$D_{Man}(P, Q) = \sum_{i=1}^n |P_i - Q_i| \quad (2)$$

C. Chebyshev Distance

Chebyshev distance (Eq. 3) between two [vectors](#) is the greatest of their differences along any coordinate dimension.

$$D_{Cheb}(P, Q) = \max_i |P_i - Q_i| \quad (3)$$

D. Canberra Distance

It is similar to the Manhattan distance as shown in Eq.4. The distinction is that the absolute difference between the variables of the two objects is divided by the sum of the absolute variable values prior to summing.

$$D_{Can}(P, Q) = \sum_{i=1}^n \frac{|P_i - Q_i|}{|P_i| + |Q_i|} \quad (4)$$

E. Cosine Correlation Distance

Eq. 5 gives Cosine similarity which is a measure of similarity between two vectors by measuring the [cosine](#) of the angle between them.

$$D_{Corr}(P, Q) = \frac{\sum_{i=1}^n P_i Q_i}{\sqrt{\sum_{i=1}^n P_i^2} \sqrt{\sum_{i=1}^n Q_i^2}} \quad (5)$$

F. BrayCurtis Distance

The distance based on Bray-Curtis dissimilarity[20] is given in Eq.6. It is also known as *Sorensen* distance.

$$D_{BC}(P, Q) = \frac{\sum_{i=1}^n |P_i - Q_i|}{\sum_{i=1}^n |P_i + Q_i|} \quad (6)$$

IV. PROPOSED SYSTEM

Proposed algorithm is explained in two sections. First section describes the procedure of generation of feature vectors and second section explains the classification methods.

A. Generation of feature vectors

Image database is divided into two parts: training set and testing set. The training and testing set consists images of two classes (male and female). Consider there are 'n' images in training set in each class. All images are converted into gray scale and of 256x256 size. In the beginning Eigen images for each class are generated using the procedure given below.

Step1 : Find the average image 'I_{avg}'.

Step2 : Find zero mean images by subtracting average image from each image of that class

Step 3: Each zero mean image is converted into one dimensional vector by arranging its columns one below the other.

Step 4: Form the matrix say Φ whose columns are the one dimensional vectors obtained in step 3.

Step 5: Calculate the covariance matrix A given by Eq.7

$$A = (1/n) \times \Phi^t \times \Phi \quad (7)$$

where n=Number of columns of matrix Φ

Step 6: Find the Eigen vectors using Eq.8. Arrange the Eigen vectors in decreasing order of corresponding Eigen values. Discard the last Eigen vector corresponding to the smallest Eigen value (It is negligible because of very small value compared to others).

$$[A - \lambda I] V = 0 \quad (8)$$

Step 7: Each Eigen vector is converted into two dimensional matrix i.e. Eigen image by dividing it into n parts and organizing those parts as columns of matrix.

After forming the Eigen coordinate system for male and female class, the feature vector is generated for each image in training set and testing set. The generation of feature vector for training image is done using the corresponding Eigen coordinate system where as the generation of feature vector for testing image is done using both the Eigen coordinate system. Hence for each training image one feature vector is generated and for each testing image two feature vectors are generated. The stepwise procedure is given below:

Step 1: Find zero mean images by subtracting the average image of each class from the given image.

Step 2: Calculate the feature vectors of given image for each class 1 and 2 using the Eq.9

$$W1 = \begin{bmatrix} w1_1 \\ w1_2 \\ \vdots \\ M \\ w1_{(n-1)} \end{bmatrix} \quad W2 = \begin{bmatrix} w2_1 \\ w2_2 \\ \vdots \\ M \\ w2_{(n-1)} \end{bmatrix} \quad (9)$$

where each coefficient $w1_j$ is given in Eq.10

$$w1_j = \frac{1}{\mu_j} \sum_{x,y} Z_{t1}(x,y) F_j(x,y) \quad (10)$$

where $\mu_j =$ Cumulative energy of the eigen image F_j of class 1

$Z_{t1} =$ Zero mean test image for class 1
 for $j = 1..n-1$

In similar way the coefficients of feature vector $w2$ is calculated.

B. Classification Methods

After finding the two feature vectors for each image in testing set, classification can be done to find an appropriate class for testing image. Since the number of training images in male and female category is not equal, the sizes of two feature vectors are different. The two methods of classification have been applied. The first method is nearest neighbor classification where nearest neighbor of testing image feature vector gives the class for the testing image as given by Kekre et al. [21]. Different similarity criteria are applied such as Euclidean distance, Manhattan distance, Chebyshev distance, Canberra distance, Cosine similarity and Bray Curtis distance. In the second method of classification, mean square error is calculated between the given test image and reconstructed image (image reconstructed by sum of weighted Eigen images and average image of that class). Lowest mean square error indicates the final output class for given test image [22].

V. RESULTS

The implementation of the proposed method is done in MATLAB 7.0 using a computer with Intel Core i5, CPU (2.50GHz and 6 GB RAM). The proposed technique is tested on two face databases. First one is Indian face database created by Vidit Jain and Amitabha Mukherjee [23]. This database contains human face images captured in February, 2002 in the campus of [Indian Institute of Technology Kanpur](#). This database contains face images of 61 people. All the images have a bright homogeneous background and the subjects are in an upright, frontal position. Different poses such as looking front, looking left, looking right, looking up and different emotions such as - neutral, smile, laughter and sad - are also included in the database for every individual. There are total 664 images (422 male and 242 female). Second one is a local database created by H.B.Kekre and K.Shah[24] without any constraints of lighting condition and pose variations. The faces have been selected from long video clips where the object is asked to move the face with different angle and expressions. This database contains face images of 100 people. There are total 1000 images (620 male and 380 female) in this database. Fig.1 shows the sample images from first data base and Fig.2 shows the sample images from second database.

From the first database, each person's single face is considered for training. So there are total 61 training images (male 39 and

female 22). Remaining 603 images are used for testing purpose. Table I shows the number of correctly classified images for male, female and both for different algorithms. Fig.3 shows the accuracy for different methods.



Figure 1: Sample images from first database



Figure 2: Sample images from second database

Then two faces of each individual person are considered for training. So now 122 images (male 78 and female 44) are used for training and remaining 542 images are used for testing. Number of correctly classified images and their accuracy is shown in table II. The performance is also tested and tabulated in table III when training images are increased by considering 3 faces of each individual for training purpose.

With the first database, it has been observed that in Euclidean, Manhattan, Canberra, Cosine correlation and Bray-Curtis, more accuracy is achieved in female class compared to male class. In Chebyshev and classification using MSE more accuracy is achieved in male class compared to female class. In Canberra, the male accuracy is below 2% so the overall accuracy is lowest. The classification using MSE gives the best overall results. In this method both male and female accuracy is above 88% even

when just 9% training data is used. Similar procedure is carried out for second database. Performances are shown in table IV, table V, table VI and Fig.4.

Table I Performance of different methods for **first database** for 61 training images and 603 testing images

Classification Methods		Number of correctly classified images					
		Male (out of 383)	% Accuracy	Female (out of 220)	% Accuracy	Total (out of 603)	% Accuracy
Nearest Neighbor using	Euclidean	191	49.87	214	97.27	405	67.16
	Manhattan	50	13.05	220	100	270	44.78
	Chebyshev	341	89.03	125	56.82	466	77.28
	Canberra	10	2.61	220	100	230	38.14
	Cosine Correlation	199	51.95	206	93.64	405	67.16
	Bray-Curtis	167	43.6	204	92.73	371	61.53
Classification using MSE		381	99.48	195	88.64	576	95.52

Note : Numbers in pink indicate highest number of correctly classified images and green indicate highest accuracy.

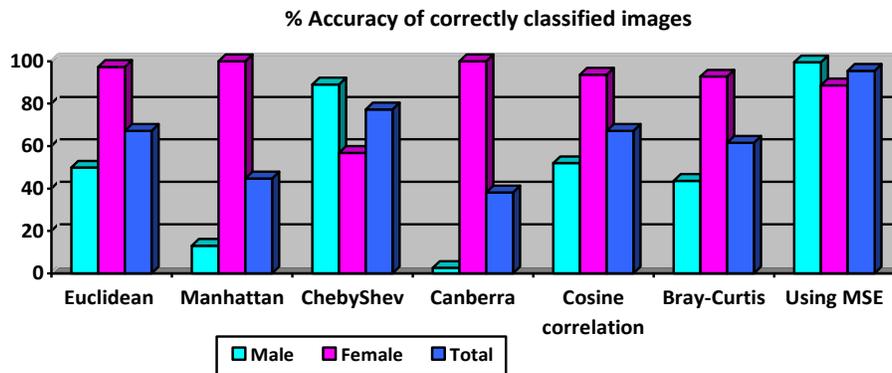


Figure 3: Accuracy of different methods for first database for 61 training images

Table II Performance of different methods for **first database** for 122 training images and 542 testing images

Classification Methods		Number of correctly classified images					
		Male (out of 344)	% Accuracy	Female (out of 198)	% Accuracy	Total (out of 542)	% Accuracy
Nearest Neighbor using	Euclidean	175	50.87	198	100	373	68.82
	Manhattan	47	13.66	198	100	245	45.20
	Chebyshev	317	92.15	123	62.12	440	81.18
	Canberra	3	0.87	198	100	201	37.08
	Cosine Correlation	176	51.16	188	94.95	364	67.16
	Bray-Curtis	151	43.90	188	94.95	339	62.55
Classification using MSE		342	99.42	180	90.91	522	96.31

Note : Numbers in pink indicate highest number of correctly classified images and green indicate highest accuracy.

Table III Performance of different methods for **first database** for 183 training images and 481 testing images

Classification Methods		Number of correctly classified images					
		Male (out of 305)	% Accuracy	Female (out of 176)	% Accuracy	Total (out of 481)	% Accuracy
Nearest Neighbor using	Euclidean	154	50.49	176	100	330	68.61
	Manhattan	35	11.48	176	100	211	43.87
	Chebyshev	285	93.44	105	59.66	390	81.08

	Canberra	6	1.97	176	100	182	37.84
	Cosine Correlation	158	51.80	167	94.89	325	67.57
	Bray-Curtis	152	49.84	164	93.18	316	65.70
	Classification using MSE	305	100	161	91.48	466	96.88

Note : Numbers in pink indicate highest number of correctly classified images and green indicate highest accuracy.

Table IV Performance of different methods for **second database** for 100 training images and 900 testing images

Classification Methods		Number of correctly classified images					
		Male (out of 558)	% Accuracy	Female (out of 342)	% Accuracy	Total (out of 900)	% Accuracy
Nearest Neighbor using	Euclidean	468	83.37	310	90.64	778	86.44
	Manhattan	223	39.96	342	100	565	62.78
	Chebyshev	541	96.95	115	33.63	656	72.89
	Canberra	15	2.69	342	100	357	39.67
	Cosine Correlation	397	71.15	297	86.84	694	77.11
	Bray-Curtis	353	63.26	300	87.72	653	72.56
	Classification using MSE	551	98.75	258	75.44	809	89.89

Note : Numbers in pink indicate highest number of correctly classified images and green indicate highest accuracy.

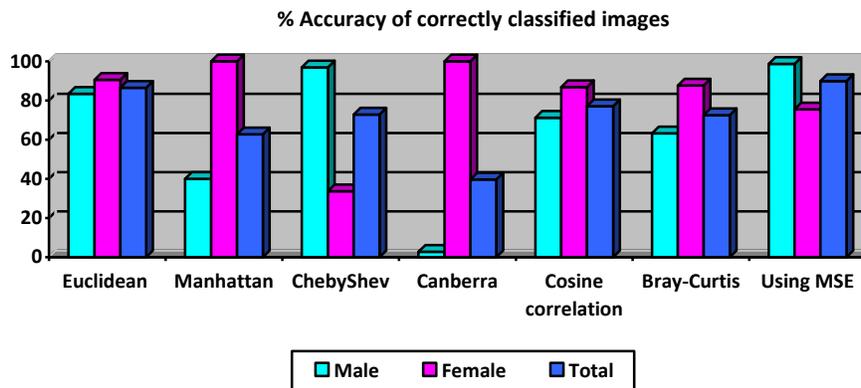


Figure 4: Accuracy of different methods for second database for 100 training images

Table V Performance of different methods for **second database** for 200 training images and 800 testing images

Classification Methods		Number of correctly classified images					
		Male (out of 496)	% Accuracy	Female (out of 304)	% Accuracy	Total (out of 800)	% Accuracy
Nearest Neighbor using	Euclidean	454	91.53	286	94.08	740	92.5
	Manhattan	187	37.70	304	100	491	61.38
	Chebyshev	495	99.80	78	25.66	573	71.63
	Canberra	9	1.81	304	100	313	39.12
	Cosine Correlation	370	74.60	286	94.08	656	82
	Bray-Curtis	335	67.54	287	94.41	622	77.75
	Classification using MSE	495	99.80	233	76.64	728	91

Note : Numbers in pink indicate highest number of correctly classified images and green indicate highest accuracy.

Table VI Performance of different methods for **second database** for 300 training images and 700 testing images

Classification Methods		Number of correctly classified images					
		Male (out of 434)	% Accuracy	Female (out of 266)	% Accuracy	Total (out of 700)	% Accuracy

Nearest Neighbor using	Euclidean	406	93.55	257	96.62	663	94.71
	Manhattan	176	40.55	266	100	442	63.14
	Chebyshev	433	99.77	53	19.92	486	69.43
	Canberra	9	2.07	263	98.87	272	38.86
	Cosine Correlation	327	75.35	253	95.11	580	82.86
	Bray-Curtis	329	75.81	248	93.23	577	82.43
Classification using MSE		434	100	217	81.58	651	93

Note : Numbers in pink indicate highest number of correctly classified images and green indicate highest accuracy.

With second database it has been observed that, as the number of training images is increased from 10% to 30%, the accuracy of male and female class in Euclidean increases above 90%. If 10% data is used for training purpose then the classification using MSE gives the highest accuracy of 90%. Like with the first database, it has also been observed that in Euclidean, Manhattan, Canberra, Cosine correlation and Bray-Curtis, more accuracy is achieved in female class compared to male class. In Chebyshev and classification using MSE more accuracy is achieved in male class compared to female class. In both the databases the number

of male faces is more than the number of female faces. So the number of training images for male is more than female. To test whether this factor affects the results, a subset of second database, say third database, is considered. This third database contains the faces of 30 males and 30 females. Total number of images is 600. In the beginning training is done with single faces for each individual. Then two faces and at last three faces for each individual are considered for training. Table VII, table VIII, table IX and Fig. 5 gives the results obtained with this third database.

Table VII Performance of different methods for **third database** for 60 training images and 540 testing images

Classification Methods		Number of correctly classified images					
		Male (out of 270)	% Accuracy	Female (out of 270)	% Accuracy	Total (out of 540)	% Accuracy
Nearest Neighbor Using	Euclidean	248	91.85	205	75.93	453	83.89
	Manhattan	248	91.85	219	81.11	467	86.48
	Chebyshev	238	88.15	180	66.67	418	77.41
	Canberra	179	66.3	203	75.19	382	70.74
	Cosine Correlation	235	87.04	203	75.19	438	81.11
	Bray-Curtis	221	81.85	213	78.89	434	80.37
Classification using MSE		251	92.96	263	97.41	514	95.19

Note : Numbers in pink indicate highest number of correctly classified images and green indicate highest accuracy.

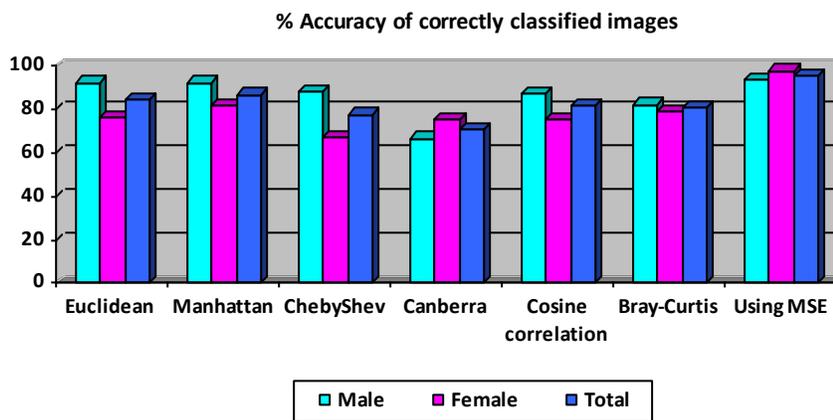


Figure 5: Accuracy of different methods for third database for 60 training images

Table VII Performance of different methods for **third database** for 120 training images and 480 testing images

Classification Methods		Number of correctly classified images					
		Male (out of 240)	% Accuracy	Female (out of 240)	% Accuracy	Total (out of 480)	% Accuracy

Nearest Neighbor using	Euclidean	237	98.75	171	71.25	408	85
	Manhattan	238	99.17	168	70	406	84.58
	Chebyshev	217	90.42	144	60	361	75.21
	Canberra	182	75.84	174	72.5	356	74.17
	Cosine Correlation	216	90	188	78.33	404	84.17
	Bray-Curtis	206	85.83	189	78.75	395	82.29
Classification using MSE		232	96.67	239	99.58	471	98.13

Note : Numbers in pink indicate highest number of correctly classified images and green indicate highest accuracy.

Table IX Performance of different methods for **third database** for 180 training images and 420 testing images

Classification Methods		Number of correctly classified images					
		Male (out of 210)	% Accuracy	Female (out of 210)	% Accuracy	Total (out of 420)	% Accuracy
Nearest Neighbor using	Euclidean	209	99.52	173	82.38	382	90.95
	Manhattan	208	99.05	166	79.05	374	89.05
	Chebyshev	196	93.33	125	59.52	321	76.43
	Canberra	177	84.29	163	77.62	340	80.95
	Cosine Correlation	194	92.38	180	85.71	374	89.05
	Bray-Curtis	197	93.81	185	88.10	382	90.95
Classification using MSE		204	97.14	210	100	414	98.57

Note : Numbers in pink indicate highest number of correctly classified images and green indicate highest accuracy.

When equal number of images for male and female is used for training purpose, it has been observed that the accuracy of male classification has increased in nearest neighbor classification methods. Also it has been observed that the difference between male and female classification accuracy is reduced. Classification using MSE gives very high overall accuracy (above 95%). Fig.6 shows the reconstruction of sample male and female test image from the first database using both the Eigen spaces. For female test image, reconstructed image using female Eigen space shows lower MSE compared to the MSE obtained between given test image and reconstructed image using male Eigen space. Similar results are observed for male test image.

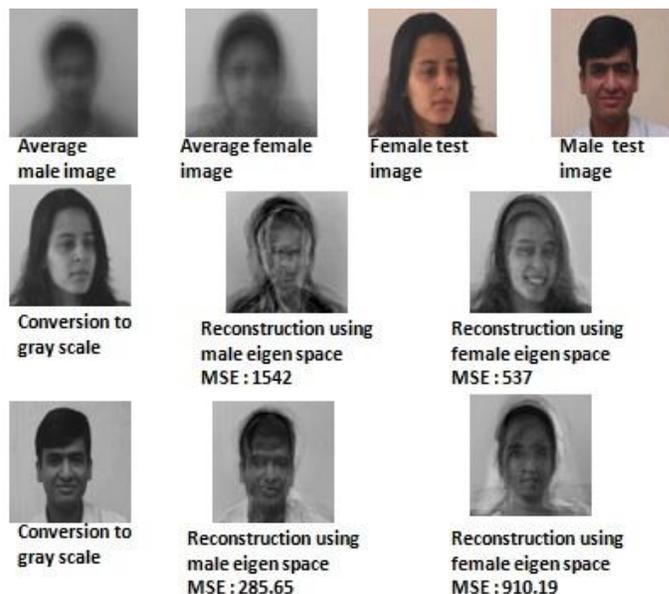


Figure 6: Reconstruction of 2 test images in 'Classification using MSE' method

VI. CONCLUSIONS

Traditionally PCA is applied to all training images together. This paper presents a method where PCA is applied to each training class separately. Hence male Eigen co-ordinate system and female Eigen coordinate system are made. After forming Eigen face images and feature vectors, a different approach of classification is presented and its performance is tested with traditional nearest neighbor classification method. Even with nearest neighbor classification method, a variety of similarity

measures are used and their results are shown. The proposed method is applied on two different databases. All images in the first database have same background whereas second database contains images taken in an uncontrolled environment. All the algorithms are robust since they give equally well performance in second database. After a lot of experimentation, performance wise the nearest neighbor classification methods using distances such as Euclidean, Manhattan, Canberra, Cosine correlation and Bray-Curtis show the high accuracy in female class classification than male class classification. One reason of high accuracy in female category is the number of training images in female category are less. This is verified by using third database with equal number of male and female images where the male and female accuracies are close to each other. With the first database, for 9%, 18%, 27% training data, best method is classification using MSE which gives overall performance from 95% to 97%. With second database, for 10% training data, the best method is classification using MSE which gives overall performance of 90%. For 20% and 30% training data, the best method is nearest neighbor classification using Euclidean distance which gives 93% and 95% overall accuracy. It may be observed that the technique proposed in this paper gives high accuracy of 95% with a very small training data set as low as 9%.

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Eco-Tourism and Its Socio Economic Effects - A Study on Jeypore Rainforest

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Abstract- The Jeypore rainforest is home to a number of wildlife species, including many endangered ones. So far, 46 species of mammals, 283 species of birds, 276 varieties of butterflies, 102 species of orchids, 71 species of reptiles and amphibians, 70 species of fishes and nearly 40 species of dragonflies and damselflies have been recorded here. The present study is focused on identifying the efforts which are being made for the better and larger conservation of biodiversity in this area along with their results. The paper will also try to analyze the socio-economic influence of the forest in the nearby areas with special reference to the eco-tourism in the rain forest and to know about the future prospects of the rain forest and the initiatives of the government in this regard.

Index Terms- *Animals, Biodiversity, Environment, Rainforest, Tourism.*

I. INTRODUCTION

In India, rainforests are unique to the country's North-Eastern region, parts of the Western Ghats and the Andamans. The upper Assam-Arunachal Pradesh belt is particularly rich. Jeypore Reserve Forest, falling under the Dibrugarh Forest Division of Assam, is one of such rare jewel in India's forest cover. The 'Jeypore rain forest' is well known for its mega bio-diversity and a cynosure for the Botanists and Researchers to appreciate its floral diversity. It is a part of Jeypore-Dihing landscape of the Assam valley lowland evergreen rainforest- part of the northern most rainforests in the world, and among the last stretches of this forest type remaining in the country.

The Jeypore rainforest is home to a number of wildlife species, including many endangered ones. So far, 46 species of mammals, 283 species of birds, 276 varieties of butterflies, 102 species of orchids, 71 species of reptiles and amphibians, 70 species of fishes and nearly 40 species of dragonflies and damselflies have been recorded here.

Jeypore came into focus in 2009 when photographs, taken by wildlife biologist *Dr. Kashmiri Kakati* during a survey by the *Wildlife Conservation Society*, confirmed the co-existence of seven cat species in a single landscape. The research found seven cat species in a 354-square-mile (570-square-kilometer) range, which is the highest diversity of cat species yet photographed in a single area. Using camera traps over a two-year period, wildlife biologist *Dr. Kashmiri Kakati* has discovered seven species of wild cats living in the same forest; the Jeypore-Dehing lowland forests in the northeastern Indian state of Assam.

The Dehing Patkai rainforest, a wildlife sanctuary, has a rich biodiversity that is comparable to the rainforest of Amazon

basin. Jeypore is also part of the Dehing Patkai elephant reserve. With 30 digital camera traps, *Kakati* captured not only the cats, but a number of other rare forest animals between 2007 and 2009.

Such *Tropical* forests are home to millions of native (indigenous) people who make their livings through subsistence agriculture, hunting and gathering, or through low-impact harvesting of forest products like rubber or nuts. A unique community of people with *Thai origin*, a distinct culture, lives in the peripheries of this forest. A number of medicinal trees and insects are available in this forest.

In a bid to conserve India's easternmost rainforest here, home to seven wild cat species, authorities are trying to promote the wildlife preserve as an eco-tourism destination by involving the local populace.

The *first Rainforest Festival* is being held on the banks of the Burhidihing at Jeypore in to highlight the importance of rainforest, and tourists, including foreigners, have thronged in large numbers. This kind of festivals also gives lot of opportunities to the local people. Over these days, the festival has seen the participation of myriad of ethnic groups showcasing their ethnic culture, dresses and food habits. Elephant safaris, trekking, seminars were also a hit. The other highlights of the festival were display of customary dresses, display of cultural heritage of the local people living in and around these areas, tools, ornaments used by different tribal groups and display of the history of forest, wildlife and their association with local people in their lives.

The rainforest and Dilli reserve forest combine to be the only rainforest area in the state spread across the three upper Assam's districts of Tinsukia, Dibrugarh and Sivasagar comprising a total area of 575 sq km. The forest is listed to be the last lowland forests under the Assam valley wet evergreen forest area in the region.

II. OBJECTIVES

The objectives of the study are:

- To identify the variety of animals and plants in the Jeypore Rain Forest area.
- To find out what efforts are being made for the better and larger conservation of biodiversity in this area along with their results.
- To analyze the socio-economic influence of the forest in the nearby areas with special reference to the eco-tourism in the rain forest.

- To know about the future prospects of the rain forest and the initiatives of the government in this regard.

Research Methodology

The study is an admixture of both primary and secondary data. Primary data includes a survey made on the various forest officials responsible for taking care of the inhabitants of the forest, the residents of the locality and also the tourists visiting the site.

Ecotourism in Jeypore Rainforest:

Assam Chief Minister Tarun Gogoi focused on the promotion of ecotourism by harnessing potentialities available in the Jeypore Rainforest and the consequent economic improvement and employment generation. Promising to include Jeypore Rainforest Festival in the government itinerary, Gogoi further said that the present government has planned to construct an eco-lodge here for attracting more and more tourists.

While presiding over the rain forest function, Dibrugarh DC KK Dwivedi said that a proposal had already been submitted to the government for giving recognition to the Jeypore Rainforest as a National Park.

For promoting ecotourism, the government is planning for making tourists tracks, rope ways. Government has also planning to allot 3 houses with proper accommodation facilities for lodging of the tourists.

The Scope for developing ecotourism in Jeypore Rain forest can be highlighted in the following points:

- **Biodiversity:**

Jeypore is the home to a wide variety of plants and animals, that can easily attract tourists, and thus there is a high possibility for the development of ecotourism in this area. In the rain forest, there are a number of rare plants and animals, which can be found in this forest only. A large number of species of Orchids, Butterflies, Birds, Cats, and Fishes are the central attractive issues of the forest which cannot be found in any other rain forests.

- **Convenient to reach:**

Moreover, the Jeypore rain forest is well connected to by air, road and rail. Mohanbari is the nearest airport, situated at a distance of only 65 km., from where the road journey to Jeypore will take only 2 hours. The nearest railway station is Naharkatia, situated at a distance of only 8 km., which has direct rail links with rest of the country. One can also reach Jeypore from Dibrugarh (70km.) and from Tinsukia (65 km.) by P.W.D. road.

- **Existence of other tourist destinations near the Rainforest:**

There exist a number of attractive tourist places in the peripheries of Jeypore Rainforest, widening the scope for promoting ecotourism in the Jeypore Rainforest area. These are as follows:

- **Namrup:** Namrup is situated in the foot hills of Patkai range of hills and contiguous to the beautiful evergreen Jeypore Rainforest. It is one of the top most industrial towns of North east. The historical name of Namrup was Namhuk. Namrup is famous for having heavy fertilizer industries, petro chemical

industry and thermal plant. A 2 to 3 days stay at Namrup will be a pleasant trip for tourists.

- **Sitakunda:** Another attractive and beautiful place situated nearby the rainforest in the upstream of Dehing river is Sitakunda. An annual big religious festival takes place at this place during Makar Sankranti, where devotees come in large number every year. Sitakunda is a small rocky Majuli in the midstream of Buridihing river with a beautiful temple constructed on a large stone.

- **Namphake village and Buddhist Monastery:** After migrating for 75 years, the Tai Phake people established Namphake village near Naharkatia and Tipam Phake village near Jeypore in the year 1850. At present, these are the two most populous and large Tai phake villages in Assam. Tai phake people are famous for their unique language, food habit, traditional culture, handloom items, traditional dresses and beautiful craftmanships. The Buddhist Monastery situated here is the centre of attraction for both domestic and international tourists, wherein the Golden idol of Lord Buddha is there. The traditional unique lifestyle and culture of the inhabitants are also subject of attraction to the tourists.

- **Hukanjuri:** This location within the rainforest, situated on the bank of Namsang River with the background of hills range of Arunachal Pradesh, has a special beautiful spot for visiting tourists. Tourists might get enjoyment by availing open Jeep Safari from Jeypore to Hukanjuri enjoying the jungle beauty on the both sides of the road. One night halt at Hukanjuri will also be more pleasurable for the tourists.

- **Favourable climate:** The temperature and climate of the Jeypore Rainforest is favourable for the tourists in all the 12 months of a year.

Biodiversity and its conservation

The Jeypore rain forest forms part of the world heritage of Tropical wet evergreen forests which is characterized by multi storied in structure and rich in biodiversity. 100% respondents belonging to forest employees and local people and 90% of the tourist respondents have responded in favor of its richness. This rain forest harbors rich varieties of flora, avifauna, wildlife and reptiles.

Flora: The peculiarity of the Jeypore rain forest is the three tier structure. The top tier looms over the rest and consists of isolated, tall, evergreen or deciduous trees which grow to a height of around 150 feet(46 meters). The common species among them are :

- Dipterocarpus macrocarpus (Hollong)

- *Artocarpus choplasha* (Sam)
- *Mekai* (*Shorea assamica*)
- *Bhelu* (*Tetramelia nudiflora*) and
- *Hollok* (*Terminalia myriocarpa*),

Each of these is growing tall and handsome with spreading branches and abundant foliage. Other species which are found to occur in the top canopy sporadically are,

- *Sopa* (*Michelia champaca*)
- *Dhuna* (*Canarium resiniferum*)
- *Jutuli* (*Altingia excels*)
- *Amari* (*Amoora wallichii*)
- *Barpat* (*Ailanthus grandis*).

The middle tier consists of several medium sized trees growing up to a height of about 80 feet (25 meters). *Colophyllum*, *Nahor* (*Measua ferra*), *Amoora*, *Gonsoroi* (*Cinnamomum cecidodapene*), *Mekahi* (*Phoebe attenuate*), *Machilus* and *Khokan* (*Duabanga sonneratioides*) form the mixed middle canopy. *Ficus elastica*, *Micholia*, *Maugolia* and *Schima* are also found.

The ground tier consists of shrubs and climbers, orchids and ferns that cover every inch of the land. The undergrowth is composed of woody shrubs, like *Kaupat*, *Bogitora* etc. palms such as *Gerugatamul*, *Tokopat* etc. and canes such as *Jengu*, *Raidang*, *Haukabet*, *Lejai* etc.

Fauna: Being a completely virgin rainforest, this sanctuary is very rich in terms of biodiversity. It is an ideal habitat for non-human primates. Till date, 46 species of mammals, 71 species of reptiles and amphibians, 70 species of fishes and nearly 40 species of dragonflies and 276 species of butterflies have been listed from here.

The most common mammal species of this sanctuary are – [Hoolock Gibbon](#), [slow loris](#), [Pig-tailed Macaque](#), [Stump-tailed Macaque](#), [Capped Langur](#), [Asian Elephant](#), [Tiger](#), [Black Panther](#), [Leopard](#), [Gaur](#), [Chinese Pangolin](#), [Himalayan Black Bear](#), [Himalayan Squirrel](#), [Leopard Cat](#), [Clouded Leopard](#), [Porcupine](#), [Crab Eating Mongoose](#), [Sambar](#), [Sun bear](#), [Binturong](#), [Barking deer](#), [Golden cat](#), [marbled cat](#) etc.

The reptiles here include Burmese Rock python (*Python molurus*), Bamboo pit viper (*Trimeresurus gramineus*), King cobra (*Ophiophagus Hannah*), Asian leaf turtle (*Cyclemys oldhami*), and Water lizard/monitor (*Varanus salvator*).

Jeypore rainforest has reported 28% i.e. 276 species of colourful Butterflies have been recorded from Jeypore so far.

Avifauna: Dehing Patkai Rain forest in Upper Assam is a bird-watchers delight, known to harbor about 293 bird species, belonging to 174 genera and 51 families. The majority is residents (63.7%), some are winter visitors (23.1%), and very few are summer visitors (2.5%). About 10.7% are altitudinal migrants, coming mainly from the higher reaches of the western, central and eastern Himalayas. There are 13 globally threatened species here viz. the Slender-billed Vulture, White-winged Duck, Greater Adjutant, Greater Spotted Eagle, Lesser Adjutant, Beautiful Nuthatch, Marsh Babbler, Tawny-breasted Wren Babbler, White-cheeked Hill Partridge, Great Hornbill, Brown Hornbill, Oriental Darter and Painted Stork.

At least 10 of the bird species are listed in Schedule-I of Wildlife Protection Act 1972 (1994) including the White-winged

Duck, Kalij Pheasant Grey Peacock Pheasant, Besra, Black Baza, Slender-billed Vulture, Osprey Great, Hornbill Wreathed Hornbill and Common Hill Myna.

Dehing Patkai Rain forest is home to five endemic bird species, which is 26% of the endemics reported from the north eastern region and all belong to the family Sylviidae. These are the Yellow-vented Warbler, Broad-billed Warbler, Marsh Babbler, Tawny-breasted Wren Babbler and White-naped Yuhina.

The birds of Dehing Patkai Rain forest thrive in the diversity of microhabitats in the predominantly evergreen forest such as dense evergreen forest, rivers & streams, evergreen forest edge, swamps, semi-open evergreen forest that includes the logged areas where openings are present, agriculture (cultivations, fallows and tea gardens) along the edge and habitations on evergreen forest edge. Most species are habitat specialists i.e. they are found only in a single microhabitat, with dense evergreen forest harbouring the maximum of 111 of the total 281 birds species recorded in Jeypore, of which insectivores are the most dominant guild with 79 species. 44 species were recorded along rivers or streams, 37 species in evergreen forest edge and 23 species in semi-open evergreen forest.

The insectivorous, carnivorous and most of the omnivorous birds help control the insect and rodent pests in the forest as well as in the agricultural ecosystem adjoining the forest. Frugivores like the hornbills, barbets, pigeons and koel, along with some of the omnivores like crows, mynas and starlings that feed on fruits serve as seed dispersers. Nectarivores and some of the insectivores and omnivores that feed on nectar help in plant pollination. There are terrestrial piscivores and 31 aquatic species that depend on the rivers and streams inside the forest and the agricultural fields along the forest edge.

Specialties of Jeypore Rainforest:

93% of the respondents belonging to forest employees and 77% tourist respondents have opined that the forest is successful in preserving many plants and animals from their extinction, as the forest has some rare animals and plants that cannot be found in any other forests in the world.

From the following highlights of the Jeypore Rainforest, it will be clear that the forest is successful in preventing extinction of a huge species of plants and animals.

- **7 species of cat:** The research found seven cat species in a 354-square-mile (570-square-kilometer) range, which is the highest diversity of cat species yet photographed in a single area. Using camera traps over a two-year period, wildlife biologist Dr. Kashmira Kakati has discovered seven species of wild cats living in the same forest; the Jeypore-Dehing lowland forests in the northeastern Indian state of Assam. The cats are namely, the jungle cat (*Felis chaus*), leopard cat (*Prionailurus bengalensis*), golden cat (*Catopuma temminckii*), the clouded leopard (*Neofelis nebulosa*), marbled cat (*Pardofelis marmorata*), the leopard (*Panthera pardus*), and the world's largest cat, the tiger (*Panthera tigris*).
- **Orchids:** Orchids are literally the jewels of the forest. They lend a beauty and charm of its own to

the landscape due to their bewildering variety of flowers, many showy and colorful and exquisitely beautiful and fragrant. They are also used in medicine, and are important parts of the culture of many societies, including the Assamese. Orchids are also important ecological indicators, disappearing rapidly when the quality of soil and air of the region degrades. So far, 101 species of orchids within 45 genera have been recorded here. Of these, 79 are epiphytic, 21 are terrestrial and 1 species is a saprophyte.

Eight of the species found here are critically endangered, 15 species are endangered, 5 species are near threatened and 28 species are in the vulnerable category. Jeypore Rainforest has the distinction of several new orchid records for the region. *Thrixspermum acuminatissimum* is a new record to India; 9 species *Bulbophyllum ebulbum*, *Chrysoglossum erraticum*, *robinsonii*, *Eria connate*, *pubica*, *Hetaeria affinis*, *Thelasis pygmaea*, *Taeniophyllum crepidiforme* and *Zeuxine clandestine* are new records from Assam; and 12 species *Anoectochilus brevilabris*, *Bulbophyllum protractum*, *spathulatum*, *Calanthe lyroglossa*, *Ceratostylis sabulata*, *Cleisostoma discolor*, *Podochilus khasianus*, *Tainia minor*, *T. waryana*, *Thelasis longifolia*, *Trichotomia velutina*, and *Tylostylis discolor* are new records from Upper Assam. It is important to focus conservation on species like *Acanthephippium striatum*, *Anoectochilus brevilabris*, *Bulbophyllum spathulatum*, *Cymbidium bicolor*, *dayanum*, *Dendrobium nobile*, *Eria paniculatum*, *Gastrochilus calceolaris*, *Phalanopsis manni*, *P. parishii* and *Zeuxine clandestine* that are already very rare in Jeypore. Depending on the sunlight, temperature and other microhabitat requirements, orchids grow in different layers of the Jeypore rainforest. Light-loving orchids like *Acampe papillosa*, *A. rigida* and *Dendrobium acinaciforme* grow well at the top storey upto 20-30 meter height. Species such as *Aerides odoratum*, *Bulbophyllum affine*, *Cleisostoma appendiculatum* and *Coelogyne ovalis* grow in the middle story; while shade-preferring species like *Bulbophyllum delitescens*, *Cymbidium bicolor*, and *Dendrobium aduncum* grow best in the lower stories of the forest. Occasionally, one may chance upon terrestrial orchids that grow in the diffused sunlight of the dense forest floor of Jeypore.

- **Butterflies:** In Europe, butterflies are used as pollution indicators because they are very sensitive to atmospheric carbon dioxide. Butterfly parks are built in cities, and any die off of butterflies are taken as an indication that pollution levels have risen. Northeast India is by far the richest habitat of butterflies, the best known pollinators after honey bees. Out of the one thousand species of butterflies here, Jeypore has reported nearly 28% i.e. 276 species of these colorful Lepidopteron have been recorded from Jeypore so far.

Two new butterflies' records from Jeypore are the rediscovery of the *White Punch* and *Yellow banded Flat*. Jeypore takes a very special place on the butterfly map of India with the presence of very rare Peal's *Palmfly*; the forest probably

also has the best population in the northeast India of the *White Dragon tail butterfly*.

- **Birds:** Birds form an intrinsic part of most cultures most apparently because of their fabulous colors and melodious calls. Of deeper significance is their role as predators, prey and dispersers of pollen and plant seed which are necessary for the survival of natural ecosystems. India, with its predominantly tropical climate and diverse habitats has 1,306 species of birds, which forms more than 13% of the world's bird assemblage with 57 or 4.4% being endemic species. Of these, 953 species have been recorded in the north-eastern region of which 19 species are endemic

Jeypore Rainforest in Upper Assam is a bird-watchers delight, known to harbour about 281 bird species, belonging to 174 genera and 51 families. The majority is residents (63.7%), some are winter visitors (23.1%), and very few are summer visitors (2.5%). About 10.7% are altitudinal migrants, coming mainly from the higher reaches of the western, central and eastern Himalayas. There are 13 globally threatened species here viz. the Slender-billed Vulture, White-winged Duck, Greater Adjutant, Greater Spotted Eagle, Lesser Adjutant, Beautiful Nuthatch, Marsh Babbler, Tawny-breasted Wren Babbler, White-cheeked Hill Partridge, Great Hornbill, Brown Hornbill, Oriental Darter and Painted Stork. Jeypore is home to five endemic bird species, which is 26% of the endemics reported from the north eastern region and all belong to the family Sylviidae. These are the Yellow-vented Warbler, Broad-billed Warbler, Marsh Babbler, Tawny-breasted Wren Babbler and White-napped Yuhina.

- **Hornbills:** 5 endangered species of hornbill are found here. These are: Oriental pied hornbill, Great pied Hornbill, Rufous necked hornbill, Wreathed hornbill and Brown hornbill
- **Fishes:** Out of around 1000 species of the world, in Jeypore Rain Forest, 71 species of fish belonging to 21 families and 48 genera were recorded in a preliminary survey of the River Buridihing and its tributaries in the forest landscape including the Tipam, Dilli and smaller forest streams and beels. The dominant families are Cyprinidae, Bagridae, Schilbeidae and Cobitidae, with the cyprinid fishes constituting the major group of fish fauna, accounting for 40% of the total species recorded. Four species are endangered, while 14 species are considered Vulnerable and 36 species are Near Threatened. Common fish genera in Jeypore include *Labeo*, *Barilius*, *Puntius*, *Aspidoparia*, *Phylorinchus*, *Raimas*, *Danio*, *Salmostoma*, *Cirrhinus*, *Salmostoma*, *Erethistes* and *Rita*.

Jeypore provides a wide diversity of micro habitats for fish. Rocky, fast-flowing streams have fish such as *Psilorhynchus balitora*, *Acanthobotis botia*, *Lepidocephalus guntea*; while streams with moderate current and sand-pebble beds are home to species like *Devario devario*, *Danio dangila*, *Danio aequipinnatus*

and Raiamus bola. Deep pools with sandy beds provide shelter to species like Rita rita, Notopterus notopterus, Salmostoma bacila, Cirrhinus reba etc. and the shallow streams with gravel beds and rooted macrophytes harbour species such as Erethistes hara, Botia Dario and Psilorhynchus balitora. The rivers have a few deep pools locally called doobis where relatively larger sized fish like Rita, Cirrhinus, Labeo, Wallago, Clupisoma, Sperata dwell and feed year round. Fish swim into the small, usually seasonal rivulets that empty into the Buridehing River during the rainy months to forage and possibly breed there.

Some of the fishes that are special to Jeypore include the *Olyra longicaudata*, locally known as *tulaji or pahari singhi* because it is found in hilly areas; *Psilorhynchus balitora*, locally known as *balitora*; the rare *carni-omnivorous Raiamas bola*, locally known as *korang* whose coloration of greenish grey dorsally and silvery on the belly is excellent camouflage in the rainforest habitat it occupies. Other interesting fish in Jeypore are *Danio aequipinnatus* and the migratory, *carnivorous Anguilla benghalensis*, locally known as *nagbami* which is an endangered species.

- **Monkeys, Ape and elephants:** So far, 46 species of mammals have been identified. Among these there exist **7 endangered species of monkeys**, namely Holooock gibbon, Capped langur, Slow loris, Rhesus Macaque, Assamese Macaque, Stumptailed Macaque and Pig tailed macaque.

Mid-mornings in Jeypore ring out with the loud calls of the *hoolock gibbon*, a globally critically endangered species for which this is one of the most secure sites in its range. It is part of the range also of some 200 elephants that roam in the landscape, within the Dehing-Patkai Elephant Reserve and represents India's eastern-most viable population of this endangered National Heritage animal at present. Ape is one of the rare animals, found in the forest.

The forest department is making their own efforts for the conservation of biodiversity by:

- Imposing restrictions on use of forest resources even fallen trees, broken woods etc. as these are main source of biodiversity conservation. Insects lives and grows in these fallen trees.
- The forest department organizes meetings and seminars in nearby areas to get valuable suggestions from the knowledgeable people regarding conservation of biodiversity. 57% local people have participated in the forest meetings on the topic of conservation of biodiversity.
- The department of Tourism also organizes seminars on the schools and colleges of the areas to spread knowledge about the importance of biodiversity among students and local inhabitants, for gaining cooperation for conserving biodiversity.

The government is not taking active initiatives for conserving biodiversity in the forest. Some funds have been allotted for the same by the government, but have not been obtained by the forest department yet.

Forest festival was the single successful effort made by the government to make people aware of the biodiversity and its importance.

All other schemes and plans of the government for the same are still in their planned form only and have not been implementing. Government's announcement for making the forest a national park is also in its infancy.

Assam's first ever Rainforest festival in Jeypore and its Socio-economic effects

To bring the unique rain forest into highlight and also to save them by creating consciousness among the local tribes of the region, government organized a Rainforest festival for the first time, from February 11th to 13th, 2011. As it was celebrated in the Jeypore rainforest of Assam, India, the festival was also named as Jeypore Rainforest Festival, 2011.

In a bid to conserve India's easternmost rainforest here, home to seven wildcat species, authorities are trying to promote the wildlife preserve as an eco-tourism destination by involving the local populace. The first Rainforest Festival is being held on the banks of the Burhidihing at Jeypore and tourists, including foreigners, have thronged in large numbers. The aim was to develop an exemplary eco-tourism roadmap for Jeypore. And for this purpose, community-based eco-tourism is the best option. To promote the rainforest and attract tourists, some long-term measures will be adopted like more accommodation units, involvement of locals and awareness programmes.

The local people have taken an active part in the festival. They have put up over 100 stalls of handicrafts, artifacts, bamboo products, pickles and ethnic food. Festivals like these help in a long way in generating employment at the local level.

The festival has seen the participation of myriad of ethnic groups showcasing their ethnic culture, dresses and food habits. Elephant safaris, trekking, seminars were also a hit.

The other highlights of the festival were display of customary dresses, display of cultural heritage of the local people living in and around these areas, tools, ornaments used by different tribal groups and display of the history of forest, wildlife and their association with local people in their lives.

The Rainforest festival was to give tribute to this biodiversity of the region. The forest is surrounded by people of the tribes *Tai Nam Phake, Singpho, Wangchu, Naga, Nocte*, etc. Various cultural activities from these tribes were part of the festival. Also various traditional artifacts which are eco-friendly from these tribes were on display. The elephant procession was the main highlight of the event. The visitors were engaged in Elephant rides, Bird Watching, Trekking, boating and other wildlife activities.

The rainforest and Dilli reserve forest combine to be the only rainforest area in the state spread across the three upper Assam's districts of Tinsukia, Dibrugarh and Sivasagar comprising a total area of 575 sq km. The forest is listed to be the last lowland forests under the Assam valley wet evergreen forest area in the region.

III. SOCIO-ECONOMIC SIGNIFICANCE

The local people are getting pollution free and calm area due to the existence of the rain forest and ranked this rainforest

benefit in number 1. Most of the respondents belonging to local people opined that the forest is making the nearby areas pollution free. The forest has enough resources to contribute towards the economy, such as medicinal trees, bamboo, woods, fodders etc. But these resources have not been used up profitably yet. Government is not taking initiatives to use the medicinal trees, having scope for greater economic influence. Silkworm available here is also used to produce silk clothes.

Few people use the fodders derived from the forest to sell in the nearby markets. Despite direct sale, fodders like mango, orange, pineapple, tomato, coconut, guava, banana etc can be used to produce jam, pickle, juice etc. and to sale in markets. Such fodders are available in plenty in the Jeypore Rainforest.

The forest has a tree popularly known as the "lipstick tree" that is used during the season of bihu to produce lipsticks.

The orchids available here are very precious. Seasonal orchids are used during various festivals. The local people sell them in the nearby markets to earn money. Orchids also have medicinal use.

The insectivorous, carnivorous and most of the omnivorous birds help control the insect and rodent pests in the forest as well as in the agricultural ecosystem adjoining the forest. The forest department provides employment facility to the local eligible people with their own efforts. They appoint tourist guides by paying lump sum money. 53% local people are aware of the employment opportunities provided by the forest department, and satisfied with the same.

Some people of the peripheries of the rain forest use forest resources like, firewood, fodder, livestock, and timber for their household purposes. From the responses of the forest employees and local people it is found that fodders and firewood are the only mentionable items used by the nearby people. However use of other items is negligible. Imposition of restrictions on the use of these resources is the main reason for less use of the forest products.

Existence of the rainforest in the area is developing the infrastructure facilities especially communication system of the Jeypore and its nearby areas.

The forest is also making the nearby areas globally known and improving the overall economy of these areas and these benefits provided by the rain forest is getting 2nd and 3rd positions respectively by the local people.

The rain forest is one of the most beautiful attractions for the tourists in India for being rich in biodiversity and consisting beautiful, colorful and attractive flora and fauna; having wide scope of economic contribution. But due to the lack of initiatives on the part of the government for developing eco-tourism in this area, it is failing to provide economic significance.

The forest is not a satisfactory tourist place according to 30% tourist respondents. While 47% tourists found it a satisfactory one and only 23% said that it is a highly satisfactory tourist place. Rich biodiversity exist in the rain forest is the primary reason mentioned by the respondents for ranking the forest a satisfactory tourist spot. Some of them also mentioned that the way to reach the forest is convenient.

Most of the tourists mentioned that there is a lack of water logging area, where they could see the birds and animals together. Due to this, they find it difficult to enjoy the view of the variety of species.

Lack of trekking and rope way facilities for the tourists within the rainforest is another drawback.

Inadequate lodging facility is also a drawback of the rainforest. 77% tourists opined that they did not get any lodging facility from the forest. It is also identified that the forest has a heritage bungalow with ample amenities, but it is available for the VIP tourists only. Common tourists do not get any such lodging facilities from the forest.

However, the guiding facility provided to the tourists is satisfactory. 80% tourists are satisfied with the guiding facility provided to them.

A variety of valuable woods like *sopa*, *dhuna*, *sam* etc. are available, which have various socio-economic uses.

IV. SOCIO ECONOMIC EFFECTS OF JEYPORE RAINFOREST FESTIVAL

For spreading biodiversity conservation consciousness among people and promoting ecotourism in the Jeypore rainforest, government has organized the Jeypore Rainforest festival. The local people have taken an active part in the festival. They have put up over 100 stalls of handicrafts, artifacts, bamboo products, pickles and ethnic food.

The highlights of the festival were- display of customary dresses, display of cultural heritage, food habits of the local people living in and around these areas. The various tribes living in the peripheries of the forest are: *Sonowal kachari*, *Tai Nam Phake*, *Singpho*, *Wangchu*, *Naga*, *Nocte*, etc.

Display of tools, ornaments used by different tribal groups and display of the history of forest, wildlife and their association with local people in their lives were also included in the festival.

The elephant procession was the main highlight of the event. The visitors were engaged in Elephant rides, Bird Watching, Trekking, boating and other wildlife activities.

V. FUTURE PROSPECTS OF THE RAIN FOREST

The government is planning for making the forest a satisfactory eco tourism spot. However the efforts made by the government in this regard was not helpful. But the plan to organize another rain forest festival will help in achieving this target to a great extent. Festivals like these will also help in generating employment at the local level.

For developing tourism in this area, the government and forest department is planning for rope way; however it has not been implemented yet. Making tracks for tourists and water logging area in the forest is another plan of the government for developing tourism. For promoting tourism, the government has declared to allot 3 houses with sufficient accommodation facilities for lodging of the tourists. The estimates for the same has been made but not yet started. The government is also planning for making the forest "a national park".

Both the government and forest department are expecting for providing larger employment facility to the nearby areas, when ecotourism will develop. Local people also expect the same. Government's plan for developing ecotourism in Jeypore Rain forest will be most advantageous for generating local employment, especially in the field of tourists' guides. 87%

respondents have responded in the favor of this advantage.70% respondents have opined that promotion of ecotourism in the rain forest will improve the communication system in the local areas.60% respondents have opined that ecotourism development will improve the overall economy of the nearby areas. Developed ecotourism in this area, in the long run will contribute a large portion towards the total foreign revenue of the country.

VI. SUGGESTIONS AND RECOMMENDATIONS

As shown in the study, the Jeypore rain forest is the richest rain forest of India having a wide range of biodiversity and a number of rare species of plants and animals; having wide scope for socio-economic significance. But still the forest is not getting the desired attention for its development. The following recommendations are made on the basis of the present study:

- ❖ The government must provide sufficient financial and other skilled assistance to the forest department for better conservation of the biodiversity in the rain forest.
- ❖ The government should appoint eligible persons in the Jeypore rain forest department having knowledge on biodiversity conservation.
- ❖ Government should provide scope and assistance to the researchers interested in doing research on this area.
- ❖ The plans made by the government for making tourist tracks and rope ways should be implemented soon.
- ❖ The lodging facility for tourists must be developed and houses with proper accommodation facilities should be allotted.
- ❖ The forest department should train the present and prospective guides for efficient guiding to the tourists. Government help in this regard is essential.
- ❖ The government must use the medicinal trees like orchids to get the best possible results out of them.
- ❖ The forest department should motivate the local NGOs to get help for the development of the forest.
- ❖ As the first rain forest festival had a great success providing socio-economic development opportunities to the nearby areas, such festivals should be held by the government annually.
- ❖ Bamboo found in this area in plenty. The government and the forest department must encourage the local people for the efficient economic use of bamboo.
- ❖ The government must provide assistance for the development of the Jeypore forest department, as this department has consistently been ignoring by the government.
- ❖ The forest department and the government must organize seminars in the nearby areas for providing training on the profitable use of the rain forest products.

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BlueMedo: Automation in Hospital Management through Bluetooth

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Abstract- This technical report describes a Bluetooth based autonomous hospital management system which provides adequate features to the doctors, nurses and patients' parties as well to share information among them without meeting each other in person.

We have designed the proposed system named "BLUEMEDO" in order to reduce human effort for the hospital management by introducing automation through this wireless system. As the system is wireless so it is quite easy to install and maintain within the hospital. We can even use this system with moving objects such as ambulance, medical stretcher etc. due to the high mobility of wireless technology.

Nurse first collects the information of the patients' health conditions (e.g.:B.P, Pulse rate, age etc.) and then it sends the data to the server. When the ambulance equipped with the proposed system comes within the vicinity of the hospital Bluetooth server the information gets exchanged within the ambulance and hospital server. The server then receives the prior information about the patients' health condition and the emergency unit of the hospital can get ready on the basis of the information they receive from the ambulance.

Index Terms- Wireless networking, Bluetooth, Server-Client, Wireless networking protocol, python programming

I. MOTIVATION

The motto of our project is to save time and reduce the human effort with better communication between doctor, nurse, management and other hospital stuffs with patient's party. In emergency cases sometimes due to time consumption of filling-up the hospital admission form and arranging other medical equipment by hospital authority even after arriving in the causes

the patient's death. So we can save a lot of time by our "BLUEMEDO" as we are saving the general form fill-up in the ambulance along with the case details and patient's condition such as blood group, incident details, and other important details while the ambulance comes into vicinity of the hospital server via Bluetooth communication system.

So from admission to discharge of a patient this "BLUEMEDO" software do every task with less human effort and in less time but very accurately. And on other hand Bluetooth is a low frequency wireless communication medium which doesn't harm any medical accessories or human beings.

II. INTRODUCTION

PYTHON

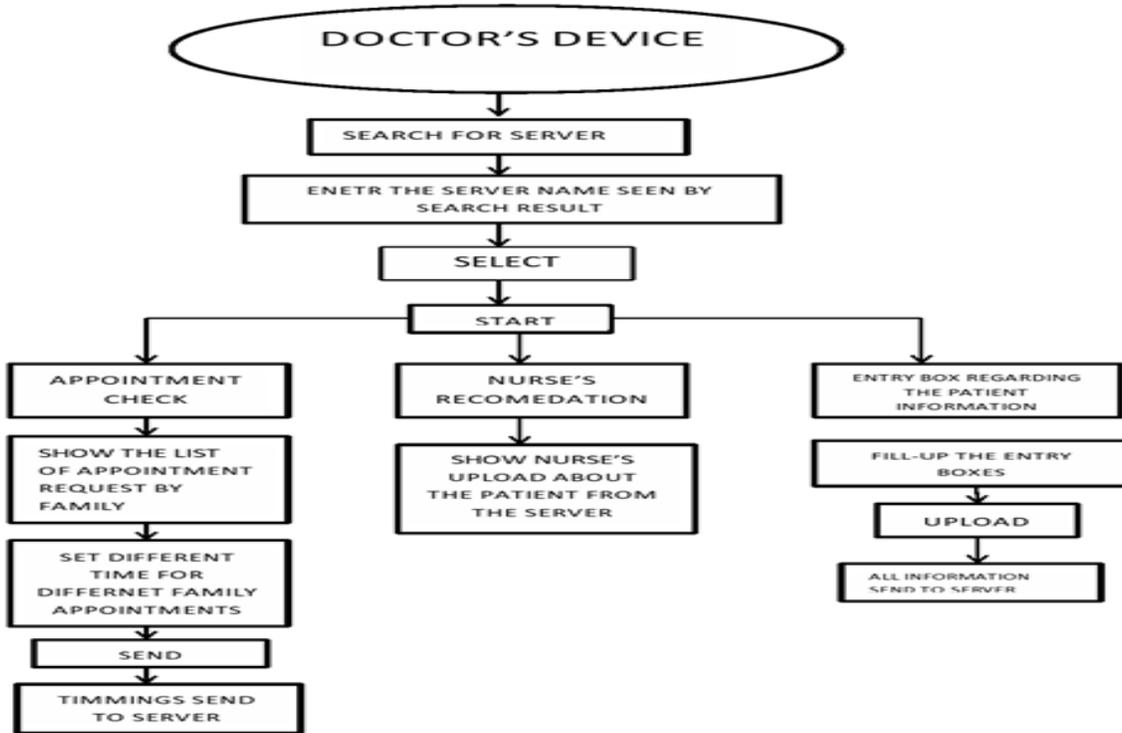
Python is a widely used general-purpose, high-level programming language. Its design philosophy emphasizes code readability, and its syntax allows programmers to express concepts in fewer lines of code than would be possible in languages such as C. The language provides constructs intended to enable clear programs on both a small and large scale.

BLUETOOTH

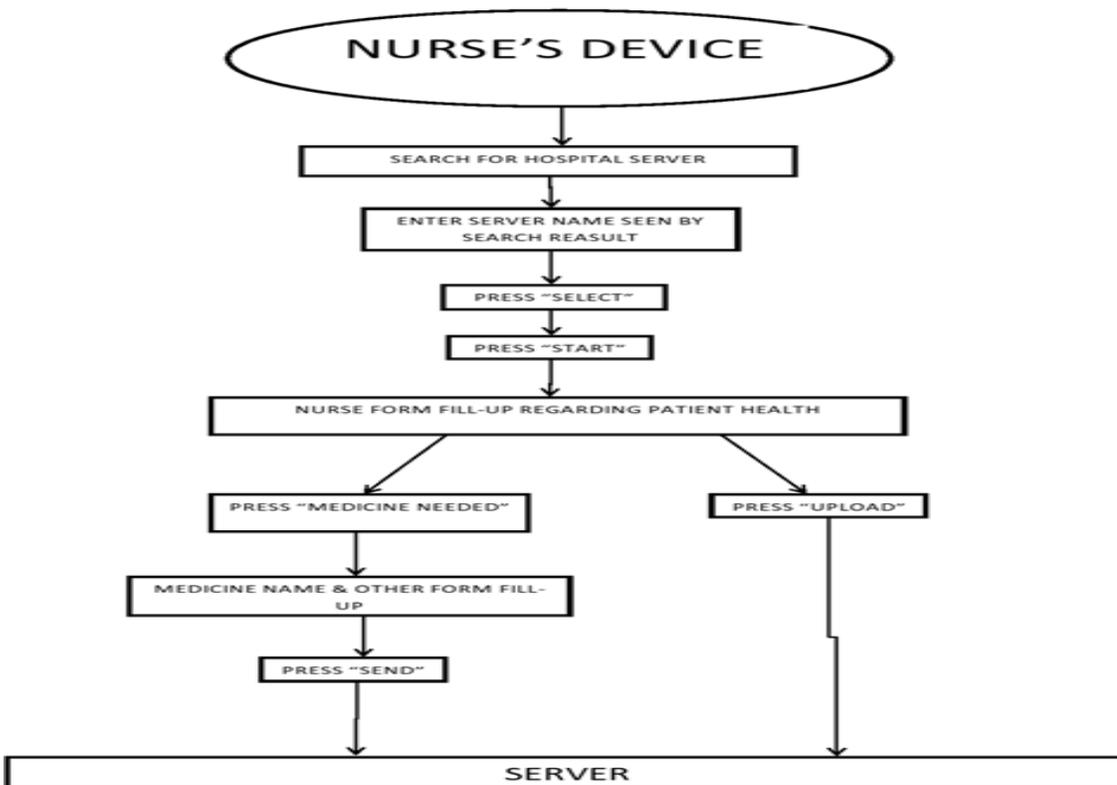
Bluetooth is a wireless technology standard for exchanging data over short distances (using short-wavelength microwave transmissions in the ISM band from 2400–2480 MHz) from fixed and mobile devices, creating personal area networks (PANs). Created by telecom vendor Ericsson in 1994, it was originally conceived as a wireless alternative to RS-232 data cables. It can connect several devices, overcoming problems of synchronization.

III. METHODOLOGY

2. DOCTOR DEVICE:



3. NURSE DEVICE:



STEP ALGORITHM-

1. SERVER:

STEP 1:-START the program.

STEP 2:-If SERVER receives "AMBULANCE" then server will be ready to receive ambulance record then add time with it and store it into a file.

STEP 3:-If SERVER receive "DOCTOR SYSTEM" then check for authorization if authorized then send doctor system update record to doctor.

STEP 4:-If SERVER receives "UPLOAD DOCTOR" then check for authorization if authorized then receive patient health and store data into the proper dictionary.

STEP 5:-if SERVER receive "APPOINTMENT TIME" then check for authorization if authorized then send patient-id (whose family want to take appointment) to doctor.

STEP 6:-If SERVER receives "HEALTH.NURSE" then check for authorization if authorized then send patient health of this patient uploaded by nurse to doctor

STEP 7:- if SERVER receives "APPOINMENT" then check for authorization if authorized then receive appointment time from doctor and store it into proper patient dictionary.

STEP 8:- if SERVER receives "PATIENT INFORMATION" then check for authorization if authorized then send family device update record and patient information within a packet to family.

STEP 9:- if server receives "PATIENT APPOINMENT" then check for authorization if authorized then receive doctor's name and send appointment time to family if any.

STEP 10:-if server receives "PATIENT HEALTH" then check for authorization if authorized then send patient health uploaded by doctor and nurse.

STEP 11:- if server receives "PATIENT BILL" then check for authorization if authorized then send bill to family.

STEP 12:- if server receives "CHECK OUT" then check for authorization if authorized then checks if management permit to check out or not. If permit then erase the patient-id from "FAMILY DEVICE REGISTRATION" and send an successful message otherwise send an error message.

STEP 13:- if server receive "NURSE SYSTEM" then check for authorization if authorized then send nurse system update record to nurse.

STEP 14:- if server receive "UPLOAD NURSE" then check for authorization if authorized then receive patient health uploaded by nurse and store it into proper patient dictionary.

STEP 15:- if server receive "UPLOAD BILL" then check for authorization if authorized then receive medicine details from nurse and store it in proper dictionary.

STEP 16:- server store all data into a .txt file.

STEP 17:- END

2. DOCTOR DEVICE:

STEP 1:-START the program.

STEP 2:-After execution of the program it will search for nearby B.T device, then enter the server name seen by search result in the entry box and press "SELECT" button, then a "START"

button will appear. If the button is pressed entry box regarding patient's information will appear, after filling up the entry boxes by pressing the "UPLOAD" button the saved data's are send to server.

STEP 3:-By pressing "NURSE'S RECOMANDATION" button doctor can see the data's what nurse uploaded about the patient.

STEP 4:-By pressing "APPOINTMENT CHECK" button doctor can see if there are any appointment requests from any patient's family.

STEP 5:-Doctor will input the timings of the appointments.

STEP 6:-By pressing "SEND" button the timings will be sent to the server.

STEP 7:-END

3. NURSE DEVICE:

STEP 1:-START the program.

STEP 2:-After execution of the program it will search for nearby B.T sever, then enter the server name seen by search result in the entry box and press "SCELECT" button, then a "START" button will appear. If the button is pressed then it will ask for nurse for fill-ups, after form fill-up by pressing "UPLOAD" button data send to server

STEP 3:-If "MEDICINE NEEDED" button is pressed then a new window will appear containing entry boxes to enter medicine name other form fill-ups then by clicking the "SEND" button all data send to server

STEP 4:-END of the program.

DATA STRUCTURE AND RESULTS:

MANAGEMENT DEVICE (FOR UPDATE AND REGISTRATON):- For updating "DOCTOR DEVICE", "NURSE DEVICE" and "FAMILY DEVICE" and registry doctor's device and nurse's device, this device follow the data structure which are given bellow:

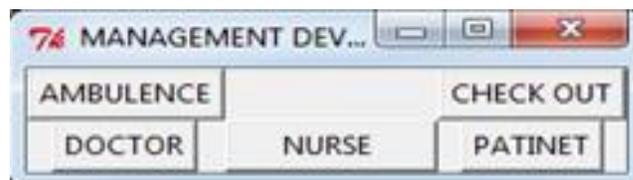


Fig1. MANAGEMENT DEVICE

It is the home window of "MANAGEMENT DEVICE". Five buttons are there, by which management can take full control of server. For updating their hospital's device like "DOCTOR DEVICE" or "NURSE DEVICE" or "FAMILY DEVICE" or for registration of doctors and nurse, management should follow some steps. These are:

Step2:

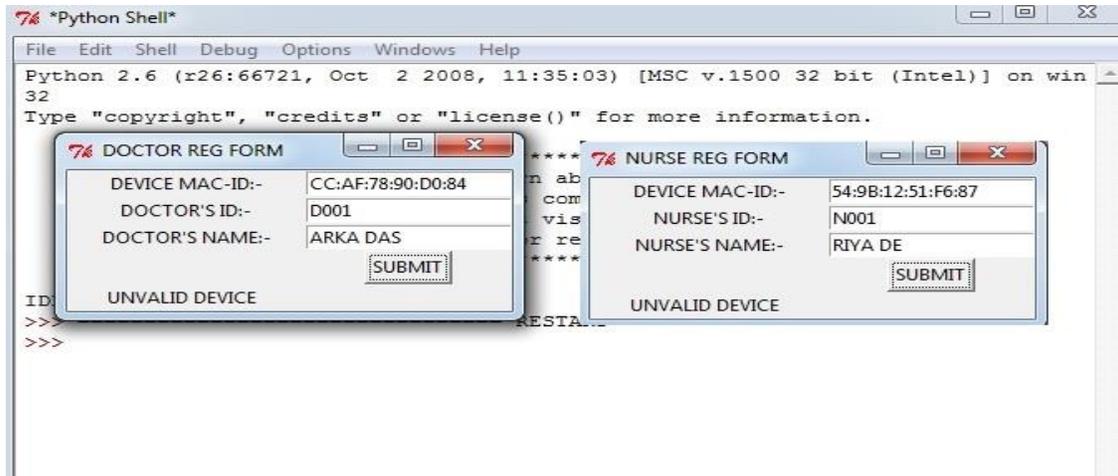


Fig: 2. DOCTOR-NURSE REGISTRATION PRECAUTION

Without registry “DOCTOR DEVICE” and “NURSE DEVICE”, if we want to registry any doctor or nurse with this device, system will show “UNVALID DEVICE”. For this reason first we need to registry any device as these two devices. Then we register these records. From next step this process are explain briefly.

Step 3:

For update “DOCTOR SYSTEM”, “DOCTOR”- button should be pressed at home window.

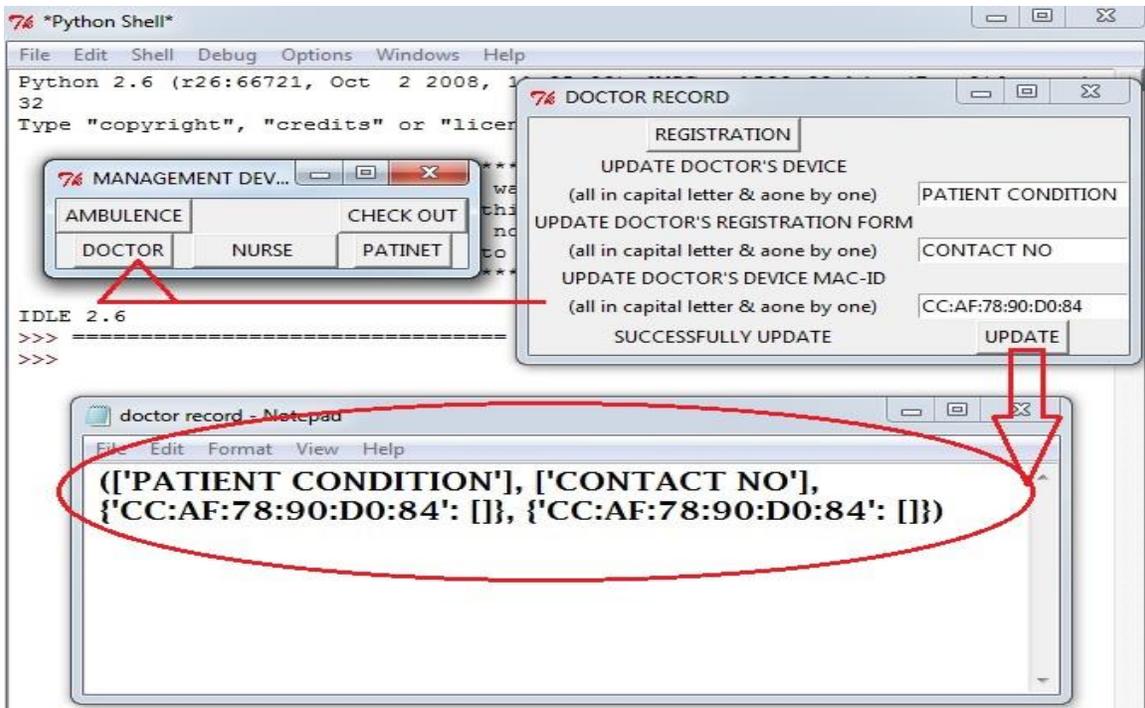


Fig: 3: DOCTOR SYSTEM UPDATE

Then open a new window according to Fig3 Then we fill up those entry boxes which we need to update. Then, if we press “UPDATE”-button then data will store it as List format for “DOCTOR DEVICE UPDATE” and “DOCTOR REGISTRATION FORM UPDATE” into a file. And for “UPDATE DOCTOR”S DEVICE MAC-ID”, two Dictionary are created. All List and Dictionary are store into a file as TUPLE format like Fig. 1.3.and the record of “DOCTOR DEVICE

UPDATE” also update “health uploaded by doctor in family device” part.

Step 4:

After that if, we need to registry doctor record, press “REGISTRATION”-button of “DOCTOR RECORD” window, and open a new window like Fig.1.4. In there, after fill up all entry box, if we press “SUBMIT”-button, then all data are store

into first Dictionary of two, which created previously. The keys of these data are the device's Mac-id. As shown in Fig4.

Step 5:

The update process for NURSE is same as Step 2 . Registration for NURSE is same as Step 3

Step 6:

To do anything about patient, press "PATIENT"-button on home window of "MANAGEMENT DEVICE". Then open a new window. And then management can update family device.

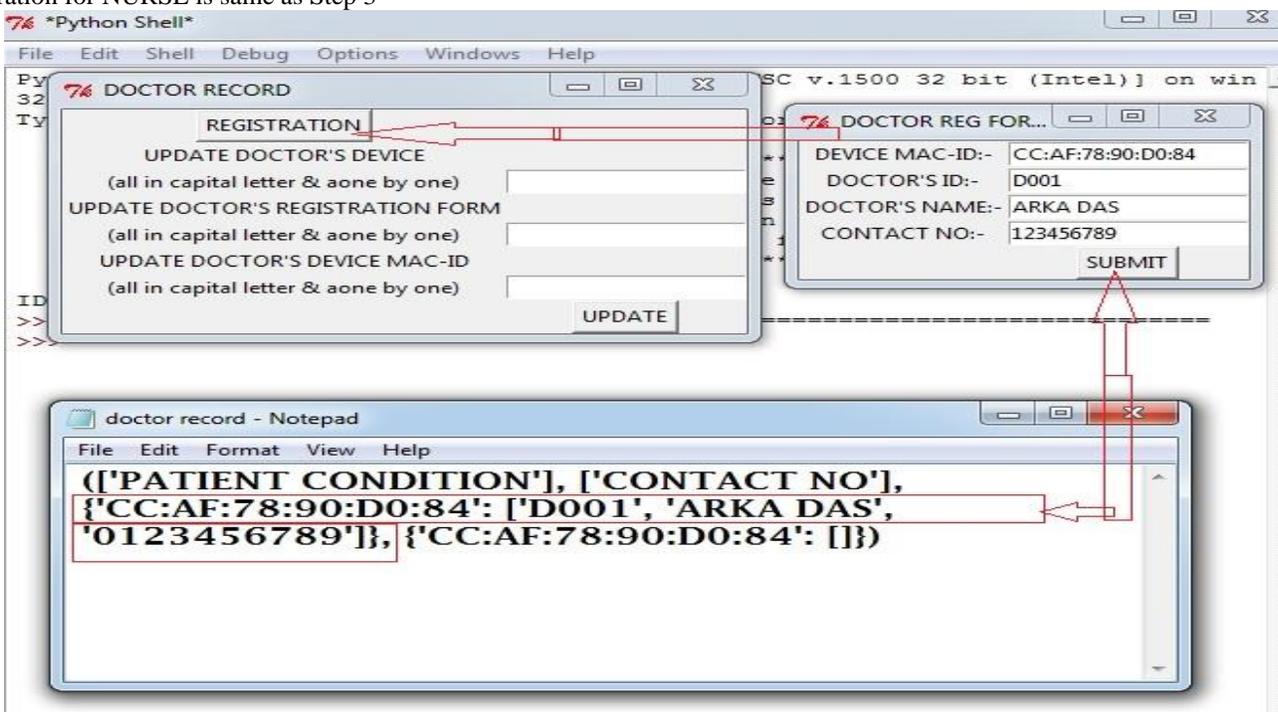


Fig. 4: DOCTOR REGISTRATION

BLUETOOTH COMMUNICATION IN MEDICAL TREATMENT:-

Step 1:

If we press "General form fill up"-button in home window of this device, then open a new window as shown in Fig: 3.1. After fill up all entry box, by pressing "SUBMIT"-button data are store it as List format as shown in Fig5.

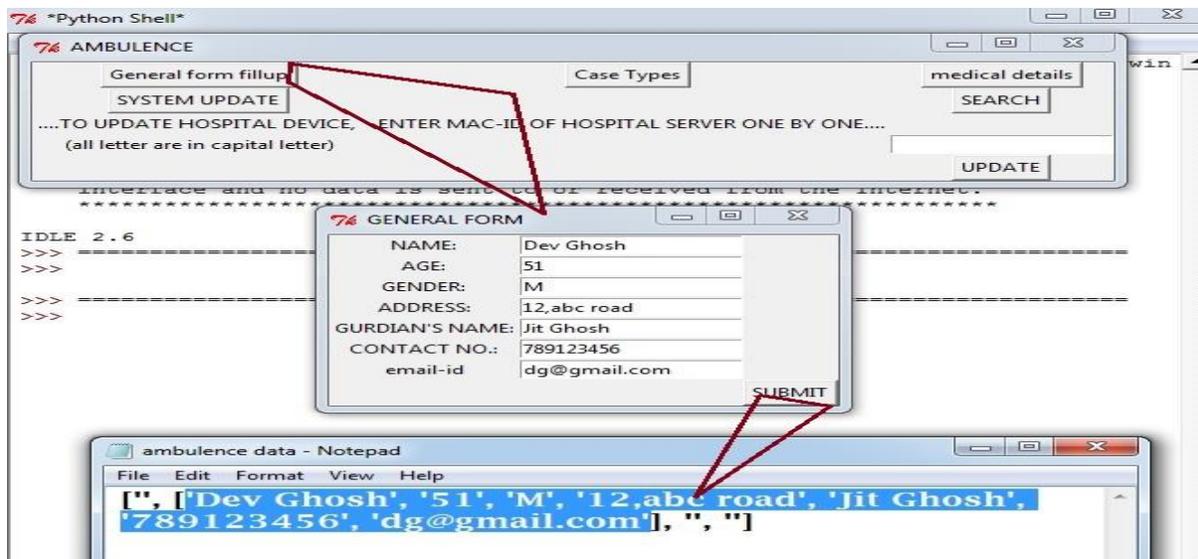


Fig5. GENERAL FORM

Step 2:

If we press "Case Types"-button in home window of this device, then open a new window as shown in Fig6. After that we

need to press anyone of two buttons in this window. And after that which button pressed, this button's name are store into file as shown in Fig6.

Step 3:

If we press “medical details”-button in home window of this device, then open a new window as shown in Fig7. After fill up all entry box, by pressing save button all data are store in a List

format as shown in Fig7. This window declares the medical condition of a patient.

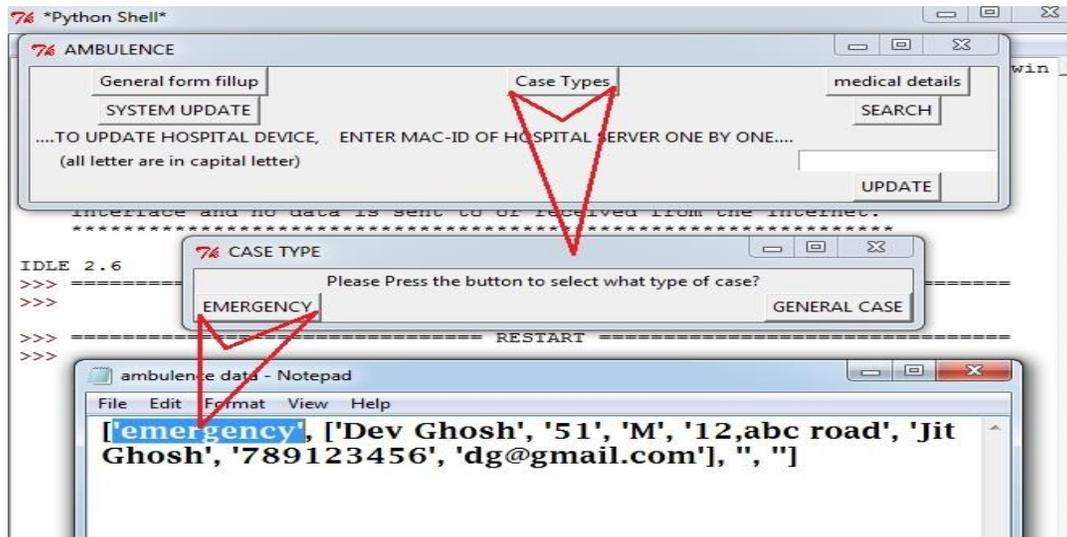


Fig.6 CASE TYPE

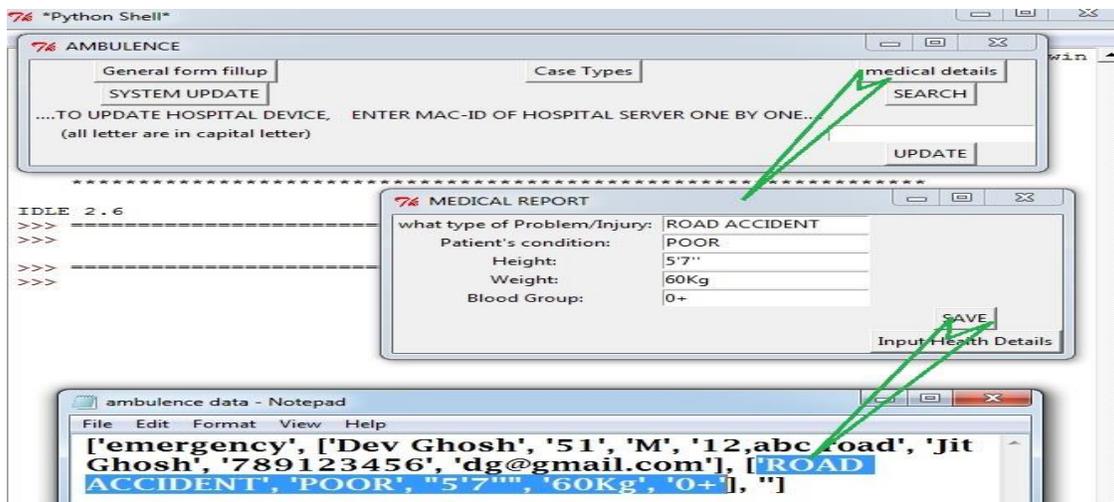


Fig7. MEDICAL DETAILS

Step 4:

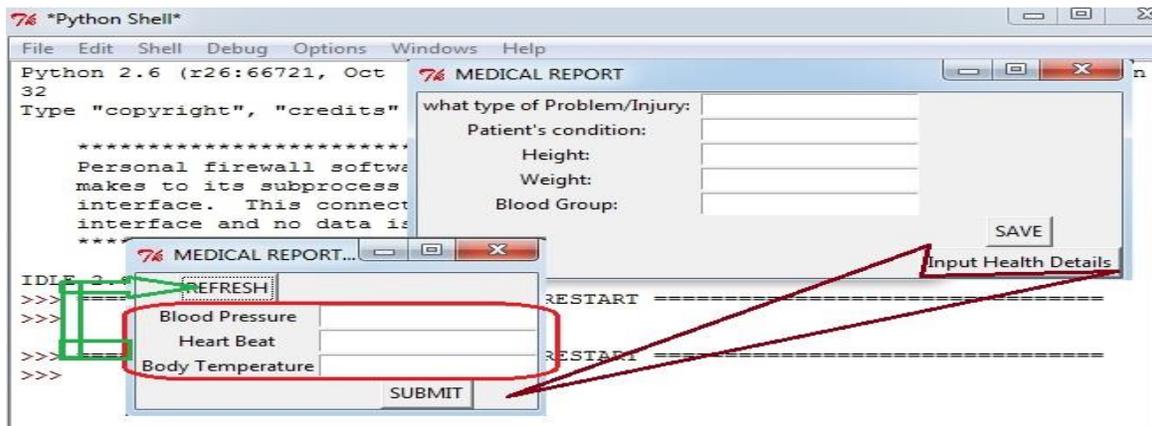


Fig8. MEDICAL REPORT PER 15 MIN

If we press the “Input Health Details”-button of “MEDICAL REPORT”-window then open “MEDICAL REPORT PER 15 MIN” window like Fig8. On this window if we press “REFRESH”-button then re-initialize all labels and entry box like Fig8.

Step 5:

Now management generate bill. This is after a few moments when patient admit, so nurse cannot upload any medicine. Thus medicine charge bill cannot generate. So for generating bill they need to press “BILL GENERATE”-button and open a new window where we write the patient-id and press “SUBMIT”-button and then the length of this window would be large, as shown in Fig9. An example is given in Fig10.

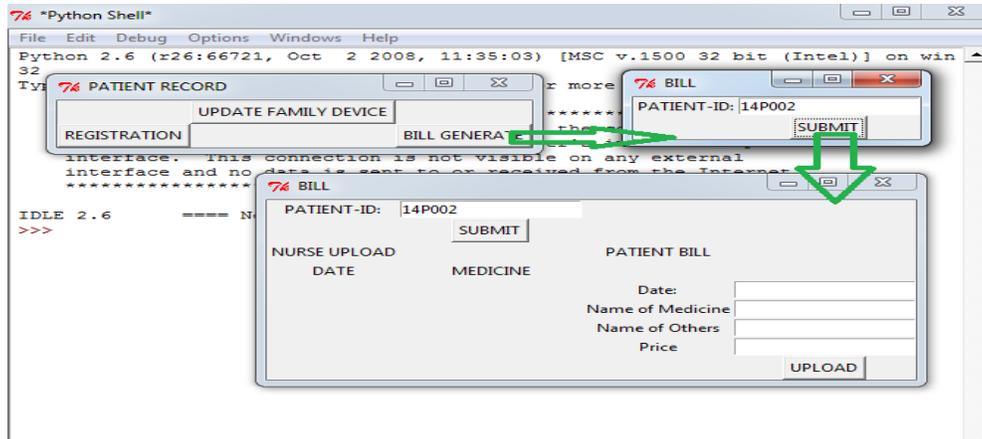


Fig9. OPEN BILL WINDOW BY MANAGEMENT

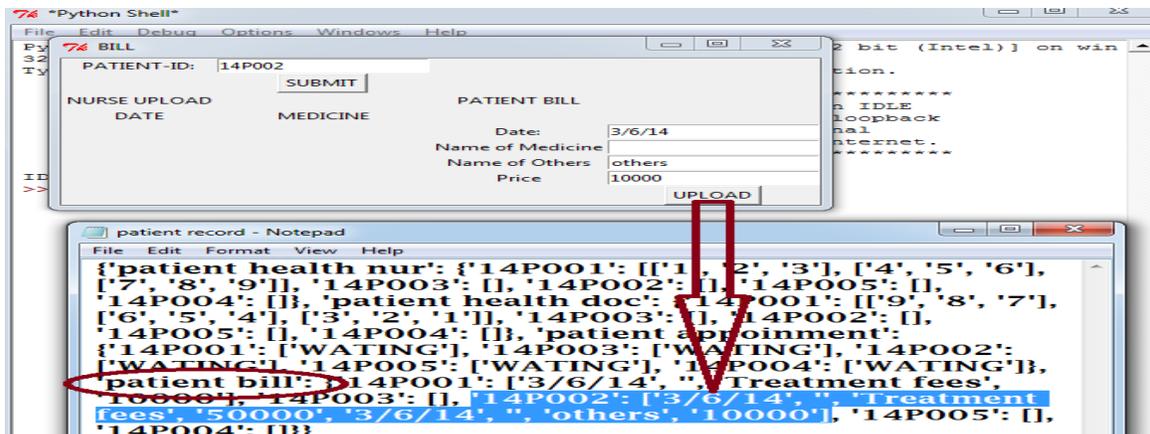


Fig10. BILL GENERATED BY MANAGEMENT

In Fig10, We can see all data about bill are store into a file as a Dictionary format of key “patient bill”.

Step 6:

Now if family want to check the bill of treatment up to this moment. Then they need to press “TOTAL BILL”-button and then open a new window which shows the bill of treatment. Here an example is given in Fig11.

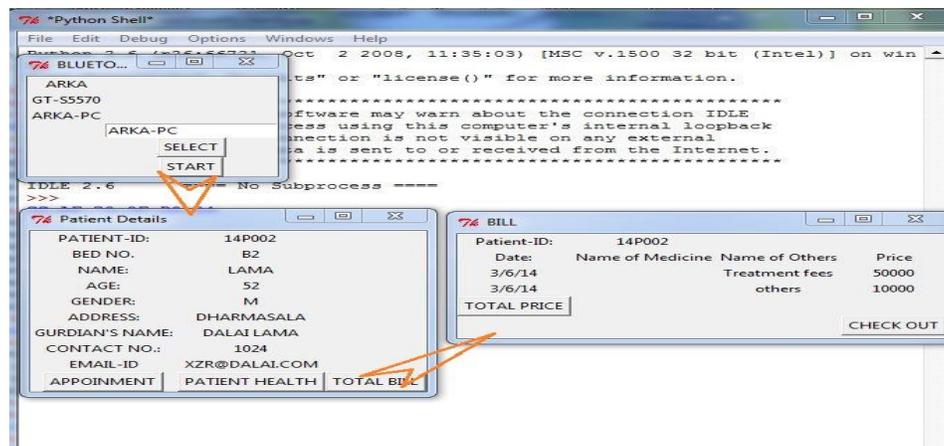


Fig11. BILL OF TREATMENT

IV. CONCLUSION AND FUTURE WORK

The methodology and result sections show that the system works as per our expectation. We haven't introduced security in this system, but in order to prevent outside attacks we need to import security features. We will include cryptography and use the encryption, decryption techniques during data transmission from one end to another.

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Educators' reflection on organizational commitment in technical and vocational education

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Abstract- The education system is facing changes. Technical and vocational education is also facing changes called vocational education transformation. Implementation of changes can cause a variety of implications among educators in technical and vocational education. Organizational commitment is one of the work situations that play an important role in the organization. Therefore, this study aims to identify the perceptions of educators on organizational commitment in technical and vocational education. This research is a combination of quantitative and qualitative methods known explanatory mixed method design. A total of 359 samples involved for the quantitative method. While 4 samples involved for the qualitative method. The descriptive method of frequency and the mean used to analyze quantitative research. The content analysis method used to analyze qualitative research. The analysis shows that technical and vocational educators are committed despite the changes in education system. Further studies of leadership impact and long-term research pattern 'longitudinal research' should be carried out to identify ongoing organizational commitment among technical and vocational educators.

Index Terms- Education, technical, vocational, commitment

I. INTRODUCTION

Organizational commitment is one of the important working situations in the organization. Employees show high commitment and loyalty due to willingness to be in the organization. It can be seen from effectiveness and job performance among employees. Organizational commitment can be defined as a bond between the individual with the organization (Sarminah Samad, 2011). Organizational commitment is the employee's psychological relationship to the organization (Marmaya et al., 2011). Commitment also has the potential to affect employees effectiveness and loyalty in the organizations (Meyer & Herscovitch, 2001).

The education system is more complex and subject to change from time to time. Technical and vocational education system also always facing changes. According to Mohd Zufadly et al. (2011) the country's education system, especially technical and vocational education is going through a transformation process. The process of transformation is consistent with the new demands in the vocational and technical education. This change gives the impression to the employment situation in the teaching carrier. Educators play an important role in implementing the changes. Thus, they exposed to various work situations such as job stress, job satisfaction, organizational commitment and work motivation. Therefore, this study carried out to identify educator's perception on organizational commitment in technical and vocational education.

II. LITERATURE REVIEW

Commitment has the potential to influence organizational effectiveness and employee well-being (Meyer & Herscovitch, 2001). It also is loyalty, behavior and interests of employees in achieving success in an organization (Lily Suriani, 2004; Gurses & Demiray, 2009). This commitment to create a conducive environment and provide tangible results in the organization (Gurses & Demiray, 2009). Organizations play an important role in ensuring the commitment among employees is always at a high level. Organizations will always maintain a commitment among employees so that organizational performance is stable (Meyer & Allen, 2004). According to Meyer and Allen (2004) employees who are committed to the organization will be working hard and go beyond the goals targeted by the organization.

Studies of organizational commitment divided into four periods and interrelated. It started from 1960 until now (Weibo et al., 2010). It is a side-bet theory, affective dependence, multi-dimensional and a new development period. The study conducted by Meyer and Allen in period dimension is widely used in research organizational commitment. It is divided into three types, namely affective commitment, continuance and normative. Employees with high affective commitment remain in the organization for their needs (Meyer & Allen, 2004). According to Salami (2008) affective commitment is referring to the perception associated with emotions. Employees with continuance commitment remain in the organization because they have to do so (Meyer & Allen, 2004). Ageing will strengthen the commitment among workers continuance. Salami (2008) states continuance commitment refers to the perception to leave the organization and work elsewhere. Employees who have a normative commitment remain in the organization because they feel should remain in the organization (Meyer & Allen, 2004). Salami (2008) stated normative commitment refers to employees' perceptions of organizational duties. The three commitments are linked as a psychological condition that is characterized as the relationship between the employee and the organization. It will have implications to the decision to stay or not in the organization (Ugboro, 2006).

Changes in the education system caused by the policies and context (Bolivar-Botia & Bolivar-Ruano, 2011; Muhammad Faizal et al., 2011). These changes are inevitable as demand is increasing. With this, the educator's role increases to ensure that changes in the education system run smoothly. The education system in Malaysia is undergoing a radical transformation that began around the year 1990's (Habib, 2008). Technical and vocational education has undergone changes because it is one of the national transformation agenda that will increase national income (Mohd Izyan et al., 2012). The challenges of technical and vocational education changes, pursue all parties involved in organization to work together (Nurul et al., 2011). These changes cause a variety of reactions and work situations exist within the organization. The work situations that are often discussed are job satisfaction, motivation, job stress and organizational commitment. These work situations can lead to success or not. Therefore, educators should be committed and loyal to the organization for facing changes in the technical and vocational education. It will ensure that current changes in technical and vocational transformation succeed and achieve targeted goals.

III. RESEARCH QUESTIONS

The overall purpose of the study was to identify the level and perception of educators on commitment organization in technical and vocational education. Thus, the study designed to gather deep insight into the nature of educator's reflection on organizational commitment. The three research questions guiding this study were:

- (1) What is the level of organizational commitment of educators in technical and vocational education?
- (2) What is the reflection of educators on organizational commitment in technical and vocational education?

IV. METHODOLOGY

The design of the study is explanatory mixed method; combining quantitative and qualitative methods. Questionnaires used for quantitative studies. The interview conducted for the qualitative study using seven semi-structured questions. A total of 359 samples consisting vocational educators used for quantitative studies. Simple random sampling method used for the quantitative sampling. While 4 vocational educators selected using purposive sampling for qualitative research. Purposive sampling method used for sampling qualitative research. Purposive sampling used for qualitative research because the selected sample should have at least one year experience in teaching vocational subjects.

This study conducted by using organizational commitment scale adapted from Meyer and Allen (2004). Organizational commitment instrument also consists three dimensions; affective, continuance and normative. Reliability of the organizational commitment instrument in this study was 0.80. This shows the instruments used in this study has a high reliability index.

V. ANALYSIS AND FINDINGS

There were 165 (46%) male respondents and 194 (54%) female respondents participated in the research. The summary of the results of the study showing frequencies and percentage of gender, marital status, age and educational qualification (table 1).

Table 1
Respondents Profile

Variables	Frequency	Percent
<i>Gender</i>		
Male	165	46.0
Female	194	54.0
<i>Marital Status</i>		
Single	53	14.7
Married	306	85.3
<i>Age</i>		
< 25	7	1.9
26 – 30	47	13.0
31 – 35	55	15.3
35 – 40	63	17.5
41 – 45	63	17.5
46 – 50	74	20.6
51 – 55	39	10.9
55 – 60	11	3.1
<i>Educational Qualification</i>		
SPM/MCE/SPMV	4	1.1
STPM/STP	1	0.3
Diploma	5	1.4
Bachelor	312	86.9
Masters	36	10.0

Research Question 1 – Descriptive Analysis

Descriptive statistics of the organizational commitment variables reported in table 2. The means range of the three dimension of organizational commitment is from 3.49 to 3.69. The overall mean for organizational commitment is 3.59. It shows that the organizational commitment in technical and vocational education in moderately high level. Standard deviations are close to one, which is at an acceptable level.

Table 2

Descriptive for Organizational Commitment

Dimension & Variable	Mean	Standard Deviation
Affective Commitment	3.69	0.94
Continuous Commitment	3.49	0.93
Normative commitment	3.60	0.86
ORGANIZATIONAL COMMITMENT	3.59	0.91

Research Question 2 – Content Analysis

There are three main categories in organizational commitment: the involvement of affective commitment, desire of continuance commitment and the loyalty of normative commitment.

According to respondents V1;

" ... My job is teaching. We guide and we teach our students to make them into a useful man to religion, nation-building".

This view clearly shows that respondents V1 have a high desire to educate students. The aim is not only to be successful in the exam but also to create a talented student. This indicates the respondent is committed to his career so he wants his students to succeed and become a useful man.

According to respondents V2;

" ... I manage classes and manage the daily lesson plan. I am also a warden who must manage the hostels. I'm very, very dedicated to work and I feel comfortable with my job."

Respondents V2 view showed that he have a desire to perform a variety of jobs within the organization. In fact, statements that is very dedicated to his work shows that he has a high desire within the organization. This shows that he is very committed to his career.

According to respondents V3;

" ... Still loyal to the organization".

V3 respondent's statement shows he is very loyal to the organization. It is also related to his experience and age. With the high experience and increasing age is also an aspect that increases the commitment to the continuation of the organization.

According to respondents V4;

" ... The task exchanged and rotated, so give me the opportunity to gain work experience".

Contrary to the views of respondents, V4 although routine works always changed and rotated but he remained loyal to the organization. He felt that this system could improve and give him the opportunity to gain more work experience. This shows that respondents V4 is a faithful educator's in the organization

The results showed there are similarities in quantitative method and qualitative method. Findings in quantitative method strength with qualitative method as proposed in explanatory mixed method design. This indicates that educators in technical and vocational education are committed to their job.

The education system is becoming a complex and undergone significant change with the changes of times Work situations in the organization can influence the organization effectiveness. High motivation and commitment in organizations is one of the important work situations to solve complex problems in the organization (May-Chiun et al., 2009). Thus, organizational commitment plays important role in organization.

According to Fletcher (2007) level of commitment is moderately high mean score of 3.67. This assertion is supported by research conducted by Addae and his colleagues of the level of commitment is at a medium level with the mean score 3.51 affective commitment, 3.58 continuance commitment and 3.17 normative commitment. Referring previous studies, the level of organizational commitment is to be at moderately high. Along with this study, the level of organizational commitment is also at a moderately high level. Although educator is in technical and vocational education facing transformation but they are still committed with their carrier.

VI. CONCLUSION

In the findings of this study, results show that organizational commitment among educator in technical and vocational education in moderately high level. It shows that educators committed although the organization facing overall transformation. The findings indicate that transformation is not a situation that could decrease commitment in technical and vocational education. Its depends to the educators and organization leadership to maintain the commitment level among educators. Leaders plays important role in increasing or decreasing organizational commitment among educators. The teamwork leadership form is important in today's organizations. The teamwork leadership can enhance work effectively (Ministry of Education, 2012). Therefore, leadership impacts on organizational commitment are suggested for further study. Further studies of long-term research pattern 'longitudinal research' also should be carried out to identify ongoing organizational commitment among technical and vocational educators.

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Environmental Risks of Mercury Contamination in Losari Coastal Area of Makassar City, Indonesia

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Abstract- Coastal area of Makassar City spread out of \pm 35km. This area is susceptible on various pollutants resulting from some activities both naturally and mostly anthropogenic. The existing of industrial, agricultural, hospital wastes and gold processing enterprise were the main potential source of Mercury (Hg) in form of metal and vapor through waste disposals. This study aimed to investigate the concentration of mercury (Hg) on sea water, mollusk *Marcia Hiantina* and urine of mollusk seekers and the potential environmental risk posed in coastal area of Makassar. This observational research was conducted by delivering laboratory analysis. Sample collection technique of sea water and mollusk used a grab sample and for urine sample using purposive sampling method then hazard quotient calculated using available formulation. Sample analysis used Atomic Absorption Spectrophotometry (AAS) MVU-1, oceanographic data measured was temperature ranged of 32-34°C. The results showed that concentration of Mercury (Hg) in sea water in three stations during high tide were 0,001mg/L, 0,001mg/L and 0,002mg/L respectively. While at low tide condition ranged from 0,001–0,008mg/L, in small-sized shellfish, Hg concentration ranged from 0,042–0,112 ppm and large-sized shellfish ranged from 0,044–0,077 ppm, whereas Hg in urine ranged 0,811–6,589 µg/L. In conclusion, concentration of mercury (Hg) in sea water during low tide in point I and II with concentration 0,006 mg/L and 0,008mg/L had exceeded the established quality standard of 0,001 mg/L, in small- and large-sized mollusks, its concentration was still under maximum limit within 0,5ppm and while in urine was found at four samples; 4,489µg/l, 5,493µg/l, 5,836µg/l dan 6,589µg/l respectively which had exceeded normal concentration namely 4µg/l.

Index Terms- Mercury (Hg), Sea Water, *Marcia Hiantina*, Urine

I. INTRODUCTION

Indonesia as a tropical country, marine waters have a fairly high biodiversity such a variety of fish, coral reefs and mangrove forests. However, behind the above given function potential sea can also multi-dimensional role in development such as fisheries, mining and it is not uncommon to marine tourism activities threatens the survival of marine organisms that exist such as fish and other biota (Supriharyono, 2000). As one of the pollutants in waters due to human activity, mercury (Hg) is classified as the most dangerous pollutants. Effect of Hg as pollutants on marine life can be direct or indirect, for example through a reduction in water quality. The ability to accumulate in the body can be harmful to marine biota as well as other organisms through the food chain or food chain, this condition allows the accumulation of heavy metals in the tissues of

organisms (bioaccumulative) at each trophic level (Supriharyono, 2000).

The tragedy of Minamata disease in Japan in 1955-1960 as a result of Hg water pollution or other heavy metals from industrial waste plastics are dumped into the waters. The content of Hg fish around Minamata Bay was 9-24 ppm which is then consumed by people which resulted in 110 deaths (Boediono, 2003). Cases of poisoning by Hg have also been reported in several countries, namely in Iraq in 1961 resulted in 35 deaths, in the 1963 western Pakistan which resulted in 4 deaths, in Guatemala in 1966 which resulted in 20 people dead and Niigata in Japan in 1968 that resulted of 5 people died (Widowati, Sastiono, Rumampuk, 2008).

Acute mercury poisoning can cause damage to the gastrointestinal tract, cardiovascular disorders, acute renal failure and shock (Sudarmaji, Mukono, Corie, 2006), and chronic toxicity in the form of digestive system disorders and nervous system such as tremors, impaired eye lens and mild anemia (Widowati, Sastiono, Rumampuk, 2008).

The existence of gold merchants who process (electroplating) and selling gold has contributed greatly to the increase of Hg in the coastal areas of Makassar (Sultan in Dullah, 2009). In addition to the waste comes from gold merchants also expected because of the sewage flow through Tallo River and Jeneberang River which empties into the coastal city of Makassar. Results of the study found levels of Hg Tallo river water was 0,002 mg/l (Utami, 2009) and Hg Jeneberang sediment was 0,669 mg/kg and in the Harbour Paotere was 0,6636 mg/kg (Nurhidayah, 2008).

One type of marine organism that are easily contaminated by pollutants are shellfish. *Marcia Hiantina* is one type of shellfish found in coastal areas other than the type of Makassar and shellfish *Anadara maculosa* are much sought after and sold by fishermen and consumed by the community due to the high protein content. According Yennie and under Suprapti Martini (2008), potential biota shellfish is contaminated by heavy metals because it is a filter feeder, so these species are often used as test animals in monitoring the rate of accumulation of heavy metals in marine organisms.

Shellfish seekers are potentially exposed to the toxicity of Hg through the consumption of shellfish. The content of Hg in the urine is used as a marker to determine levels of Hg in the body. Someone who consume fish or other food that has been contaminated with Hg 95 % will be absorbed by the body that can attack the central nervous system and the kidneys are then excreted through the urine. Research conducted in the United States in the gold shop workers found that the levels of Hg in urine was 1200 ug/l (Inswiasri, 2008).

II. MATERIAL AND METHODS

2.1. Types of Research

This observational study applied Risk Analysis (Hazard Quotient) approach to conduct a risk assessment to the environmental and laboratory analysis for Hg concentration in the *Marcia hiantina*, potential environmental risks in coastal areas of the city of Makassar.

2.2. Time and study area

This study conducted in the year 2010 which include: sampling, treatment, analysis and examination of samples. Then perform the calculation of health risk analysis (HQ) of mercury pollution in the coastal region of Makassar.

Coastal waters of Makassar various every day depend on the human activities. At high tide, fisherman catches fish and in low tide they crowdedly catching shellfish. From the results observation conducted along the coastal areas of Makassar only a few places that still can be found the presence of mussel populations, namely Tanjung Bunga, shipyard area (PT IKI) and the local fishing village. At the point I (fishing village) and II (shipyard) sources of pollution by Hg is derived from Tallo River, Navy Dental Hospital, PT.IKI and gold processing business in Satando Road, while the third point (Cape of Flowers) are thought to originate from the River Jeneberang, RS and gold merchant business in Jalan Somba Opu (Figure 1)

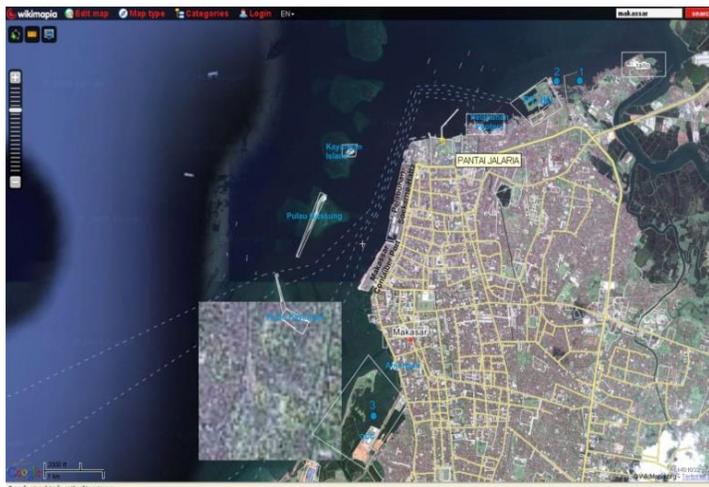


Figure 1. Map of sampling location

Temperature is the physical parameters that are important for living organisms in the sea, and is one of the parameters that affect the concentration of heavy metals (Rochyaton in Palar, 2004). Temperature rise above the tolerance range where organisms can increase the rate of metabolism such as growth, reproduction and activity of these organisms (Damandiri, 2006). The increase in sea water temperature will reduce adsorption heavy metal compounds on the particulate. The temperature of the sea water cooler will increase the adsorption so that it will settle, while when the temperature of the sea water rising, a heavy metal compound dissolves in sea water due to a decrease in the rate of adsorption into particulate (Palar, 2004).

2.3. Population and Sample

Population

The population in this study is the *Marcia hiantina* shellfish, community around the study area, and shellfish seekers as well as their children.

Sample

In this study samples of *Marcia hiantina* shellfish that commonly consumed, Community around the study area, fishermen and shellfish seeker children in coastal areas of Makassar using purposive sampling method. The number of shellfish samples were 10-25 samples at any point while the environmental risk analysis carried out in the study area around the Community, fishermen and shellfish seeker children.

2.4. Equipment, Materials and Works Process

Sampling Process for Bivalve

Marcia Hiantina were collected in coastal areas of Makassar in three points each residential area fishing, shipbuilding and Tanjung Bunga. Shellfish samples taken based on their size of the search and a scallop catches at three points. Determination of the size of the shells based on the weight of the clam meat, scallop small samples (< 2.4 g) and large mussels (>3.1 g). Shellfish samples obtained by hand picking and when needed can use tools (rakes and spades). Sampling was carried out during low tide. The number of shellfish were taken of 10-25 at each point, given the number of samples required for laboratory examination is 10 grams dry weight. The mussels were taken and stored in a plastic container that has been labeled and immediately taken to laboratory for in the analysis.

Laboratory analysis

Samples were washed with water until the shells lost all the mud, then separate the meat from the shell. Clam meat is then weighed using an analytical balance. Small shellfish samples is determined based on the weight of scallop meat. For small shellfish samples required approximately 15-20 seed mussel shells while for large samples approximately 10-15 seed shells, and boil for 10 minutes. Then enter into the oven to be dried at a temperature of 30 °C, after dried and then powdered (crushed). Powdered samples were weighed accurately (by using the analytical balance) less than 10 grams of dry weight and then put in a porcelain cup and destructed, heated at a temperature of 70-80 °C for 3-5 hours. At this stage add the destruction p 5 ml HNO₃ solution, add 2.5 ml of H₂SO₄ solution p. Destruction until the vapor becomes white and clear solution. If the steam is not yet clear white and add another solution HNO₃ solution p as much as 5 ml and then in destruction again. Then the sample was cooled and added to 5 ml HCl₆ N, then heated to boiling and all ingredients dissolve. The sample was then filtered using filter paper. Add distilled water to the appropriate volume of 100 ml, then homogenized. Subsequently the samples prepared were analyzed using MVU - IA. The purpose of this is to overhaul the destruction of organic materials.

Processing and Data Analysis

Data obtained from the results of field observations and laboratory tests are presented in table form, further described in the form of descriptive then compared with the corresponding sea water quality standard MOE Decree 51 of 2004, according shells Decision No. Directorate General of POM. In 1989 and 3725 according to WHO standard 1990 for Hg in urine.

III. RESULTS

3.1. Hg concentrations in sea water

The difference between high tide and low tide occurs as a result of the influence of gravity. Seawater sampling method using the grab sampling method, where samples are taken only once when the ups and downs at every point. The sampling distance from the shoreline ± 5 meters at a depth of 30 cm from the surface of the water, as shown in Table 1.

Table 1. Hg Concentrations of sea water in high and low tides at the three stations in Coastal areas of Makassar, year 2010

Stations	Time		Hg Concentration (mg/l)		Standard
	High tide	Low tide	High tide	Low tide	
I	10.00	11.15	0.001	0.008	
II	09.50	11.00	0.001	0.006	0.001 mg/l
III	11.20	14.10	0.001	0.001	

Table 1 shows that the concentration of Hg in sea water at low tide at the point I and II in the coastal areas of Makassar exceeded the standard with 0.008 and 0.006 mg/l, whereas at high tide concentration reached the maximum limit set by Ministerial Decree environment, no. 51 / 2004 on marine water quality standard that is equal to 0.001 mg/l. and the assessment of potential risks assessment for the environment is calculated as revealed in the Table 2.

Table 2. Potential environmental risks (HQ) of Hg in sea water at three stations of Coastal areas of Makassar, 2010

Stations	Time		HQ		Standard
	High tide	Low tide	High tide	Low tide	
I	10.00	11.15	1	8	>1 at risk
II	09.50	11.00	1	6	
III	11.20	14.10	1	1	

Table 2 revealed that all those three HQ stations have equal values for environmental risks and exceeded the standard set by the EPA in 2000 (>1). That indicates that risks for the environment in the coastal area of Makassar.

3.2. Hg concentrations of *Marcia Hiantina*

Marcia Hiantina types were collected at three points made during low tide the water height ± 25 cm, considering *Marcia Hiantina* live on muddy or sandy substrate. There are differences in the size of the shells between points I and II to point III. From the observation at the point of the first and second shells sizes larger than at point III. Based on information from the shellfish

collectors, this difference occurs as a result of reclamation activities at point III (Tanjung Bunga) that covers the bulk of the coastal areas, resulting in more coastal base substrate dominated by mud affecting shellfish breeding including its size, in Table 3.

Table 3. Hg Concentrations in *Marcia hiantina* at three stations in Coastal areas of Makassar, 2010

Stations	Size of <i>Marcia Hiantina</i> (gr)		Hg concentration (ppm)		Standard
	Small	Big	Small	Big	
I	0.9 – 2.5	4.7 – 10	0.11	0.06	0.5
II	1.6 – 2.3	3.9 – 7.2	0.04	0.04	ppm
III	0.5 – 2.4	3.1 – 5.6	0.08	0.08	

The results of the analysis of Hg in shellfish samples *Marcia Hiantina* conducted in Makassar Health Laboratory Center for further reference to the quality standards established by the Director General of the Republic of Indonesia POM. No. 03725/B/SK/VII/1989.

Table shows that the concentration of Hg in *Marcia Hiantina* from coastal city of Makassar at station I, II and III as a whole still meets the standard set by the Director General of POM RI 1989 on the concentration of metals in decent seafood consumed in the amount of 0.5 ppm.

3.3 Hg Concentrations in the urine of shellfish seekers

Urine sampling of shellfish seekers from the coastal of Makassar region made at the time they were looking for shellfish. The urine sample is a 24-hour urine was collected in a bottle with a lid Winkler dark despair with a volume of 250 ml. The results of the analysis of urine samples can be seen in the Figure 1.

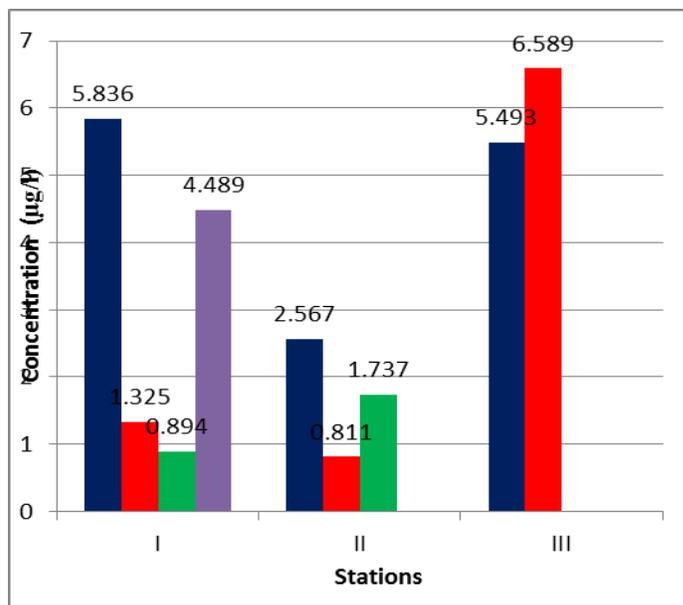


Figure 1. Hg Concentrations in the Urine of Shellfish seekers from coastal regions of Makassar, 2010

Figure 1 indicated that Hg concentration in the urine of those nine respondents, that there were four respondents who had concentrations of mercury (Hg) in the urine is exceeded the standard; 4.4885 mg/l, 5.4926 mg/l, 5.8357 mg/l and 6.5899 mg/l, respectively. However, there are five respondents concentrations of Hg in urine were still meet the standard. The number of respondents in the four person fishing village, numbering around three shipyards and in a two-person flower cape. Concentrations of Hg in urine was found in the highest interest of the respondents in the Tanjung Bunga. Then, the association between age of respondents and the Hg concentration in urine is described in the following Table 4.

Table 4. Distribution of respondents' age and Hg concentration in urine of the shellfish seekers in coastal areas of Makassar, 2010

Age (year)	Hg concentration in urine (µg/l)				num ber	%
	Meet standard		Not meet standard			
	n	%	N	%		
22	1	100	0	0	1	100
30	0	0	1	100	1	100
31	1	100	0	0	1	100
40	2	100	0	0	2	100
42	0	0	1	100	1	100
46	0	0	1	100	1	100
64	0	0	1	100	1	100
65	1	100	0	0	1	100
Total	5	56	4	44	9	100

Table 4 shows that the concentrations of Hg in the urine exceeded the standard was found on respondents aged 30 years, 42 years, 46 years and 64 years. With the highest concentration of respondent aged 46 years. While five respondents with Hg concentrations in urine still meet the guideline defined by WHO ie ≤ 4 mg /l.

IV. DISCUSSIONS

4.1 Hg Concentrations in Sea Water

Hg enters water bodies sourced from a wide range of activities both directly using Hg in its activities and is a byproduct of the industry. The existence of vendors selling and processing of gold ore that occupies Somba Opu Street and Road Satando as well as the industrial and agricultural discharges through the Jeneberang and Tallo rivers are the main factor that can affect the concentration of Hg in the coastal areas of Makassar. From the results of research conducted by Utami (2009) found that the levels of Hg in Tallo river water of 0.002 mg/l and Nurhidayah (2008) found Hg content in sediments Port Paotere of 0.6636 mg/kg and at Jeneberang River at 0.669 mg/kg. Based on the Decree of the Minister of the Environment no.51 /2004 Hg on Sea Water Quality Standard for marine life. Results of laboratory tests on the three stations either tide or low tide in coastal areas of Makassar showed that the concentrations of Hg in sea water has been at the limit the third point is a

maximum of 0.001 mg/l, even concentrations have exceeded the quality standard with a concentration of 0.006 mg/l and 0.008 mg/l which is the point I and II at low tide.

Concentrations Hg based on the results of the analysis in the waters of Tanjung Bunga is located on either stable or fixed concentration of Hg at high tide and low tide is equal to 0.001 mg/l, oceanographic data obtained found that the water temperature at the point during the tide or low tide is 33°C. By contrast, the concentration of Hg in the fishing village and surrounding shipyards when the ups and downs that have differences, where in tide, Hg concentration of 0.001 mg/l with the same temperature is 34°C, whereas at low temperature measured was 32°C with Hg concentrations reached 0.006 mg/l around shipbuilding and 0.008 mg/l in the fishing village. This shows that when there is a change in water temperature will be followed by changes in the Hg concentration in seawater, considering the temperature is one of the parameters that affect the concentration of heavy metals in water (Rochyaton in Palar, 2004).

Hence, changes in the pattern of currents and wave motion as a result of reclamation occurred in Tanjung Bunga may lead to the difference concentration, thus indirectly tide and low tide conditions also influence the increase of Hg concentration in seawater. Results of research conducted by WALHI (2006) in Kendari Bay found Hg concentrations in sea water at 1 ppm and allegedly one of the impact of reclamation. According Damandiri (2001), reclamation of coastal region will generate changes to the coastal ecosystems and artificial ecosystems.

Another case, in Buyat area found that the tailings are discharged by NMR Industry that affect the metabolism of aquatic animals also reduce waters fertility. Because of the movement of sea water, waves and tides resulting tailings are difficult to control, given the river at high tide the water will spread out into the sea while at low tide the river water will be carried out to sea (Hadi, 2007). Sea water as a pollutant that fall reception of the atmosphere, which is then entered into the coastal waters and marine ecosystems. Partially soluble in water, mostly sink to the bottom and sediments and partially concentrated to enter the body tissues of marine organisms (Fachrudin, 2008).

Waters are often contaminated by inorganic components include pollution due to heavy metals originating from the place itself as well as from the results of human waste being dumped directly into the water. Presence of heavy metals that fall into a body of water is strongly supported by the solubility of heavy metals in water. According (Romimohtarto,1991 in Palar 2004) after a trip pollutants entering coastal and marine waters will be diluted and dispersed by ocean currents and mixing turbulence and will be dispersed directly by currents and biota.

Hg is discharged into the river, beach or body of water is only temporary so it will still be carried by the flow of water to the mouth and will spread to the coast by the influence of the motion pattern of sea currents and waves, can further contaminate marine life including algae and plants other water is switched on inside. The concentration of Hg in seawater is usually lower than in biota and sediment. In the aquatic environment, sea water Hg concentrations generally ranged between 0.6 to 3.0 mg/l, whereas methyl mercury concentration

in sea water is not polluted by 3 to 6% and in fresh water ranged from 26 to 53% of the total mercury concentration.

4.2 Hg concentration in *Marcia Hiantina*

Hg is classified into groups and non essential metals are highly toxic, methyl mercury found in the environment in small quantities, but very harmful to humans and animals, since these compounds can only be accumulated by fish and other aquatic organisms (FAO, 1971 in Budiono, 2002). In the animal body, the metal is then absorbed by the blood, binds to blood proteins which are then distributed throughout the body tissues. The highest accumulation in organs usually detoxicated via (liver) and excretion (kidney).

Future growth and development of the embryo mussel to adult phase will be hampered because of the influence of heavy metal toxicity is expressed as a sublethal effect (chronic). Barriers such growth will be much longer in larval shells that would easily fall prey to predators or suffer pain and cause many deaths, which in turn lowers the population in areas contaminated shellfish (Darmono, 2001). The results of the analysis of shellfish samples in Makassar Health Center for Laboratory showed that the Hg concentrations for small clams ranged from 0.079 to 0.112 ppm, while for bigger shellfish between 0.044 to 0.077 ppm. Of the three stations, Hg concentrations were elevated in the fishing village that is for small clams with a concentration of 0.112 ppm, while for large shells in Tanjung Bunga is 0.077 ppm. Results of research conducted by Indrakusuma (2008) on the coast of Surabaya Kenjeran Ria found mercury concentrations in muscle and gill blood clam (*Anadara Granosa*) bigger size > 25.1 mm was 0.032 ppm and 0.1615 ppm, respectively, while the small clams (size 10.0 to 25.0 mm) was not detected. The big difference in the concentrations occurred partly due to differences in size are used, the type and location of shellfish research.

The difference in concentration of heavy metals mercury (Hg) between small and bigger shellfish can occur considering all species of life in water is affected by the presence of dissolved metals in the water. Especially at concentrations that exceed the normal limits, depending on the condition of the fish / biota phase of the life cycle (egg, larvae and adults) the large size of the organism, sex and nutritional adequacy requirements as a factor that can affect the toxicity of heavy metals in the water of the living creatures in it. Several studies on the toxicity of the metal on the type of shellfish has been done, and it turned out stage larvae are usually more sensitive to the effects of metal pollution on adult life.

Metal heavy metal generally has a deadly poison to organisms in different conditions. This situation will occur when the concentration of the solubility of heavy metals in water bodies is high. Because of the accumulation in the body of organisms that occur in organs of heavy metals will exceed the tolerance which later became the cause of death. Hg Concentrations in shellfish between 0.058 to 32 mg / l is lethal in 96 hours of exposure (Palar, 2004).

Hg enter into the bodies of living organisms primarily through the food line. The number may have experienced a doubling of the initial amount that goes through the process of methylation that occurs in sediments by reducing bacteria. Sediment characteristics will affect the morphology, function,

behavior and animal nutrient benthos, which is the lowest level in the tropic level. Because it is easy to bind to organic matter and sediment in the bottom waters, resulting in higher concentrations in sediments than in water (Harahap, 1991 in Damandiri, 2007). It is not advantageous for a living organism on the basis of such small shells (Oyster) as filter feeders, because the sediment particles will enter the digestive system (Williams, 1979 in Damandiri, 2007).

4.3 Hg concentrations in Urine of shellfish seekers

Excretion is the process of releasing the rest of the body's metabolism of substances, such as CO₂, H₂O, NH₃, dyes bile and gout. Disposal of mercury compounds in the body is closely related to the urinary system. Mercury that enters the liver would split in two, some will accumulate in the liver and the other part will be sent to the gall. In the gallbladder, mercury compounds will be overhauled to be destroyed and detoxicated. The results are then sent through the overhaul of blood to the kidneys, where some will accumulate in the kidneys and some will be discharged with the urine (Palar, 2004).

Based on the analysis conducted, it was found that all existing nine urine samples containing mercury at various concentrations. The high concentration in the urine was found on the third point with concentration is 5.836 mg/l and 6.589 mg/l and at a point I of 4.489 mg/l and 5.836 mg/l, respectively. However, overall urine in the third point containing heavy metals mercury at various concentrations. The difference in concentration of mercury in the human body is affected by the magnitude of the dose, how it exposure, forms of Hg compounds and biota species. Mercury toxicity and metabolism depend on the form of mercury compounds, pathways of exposure, duration of exposure and the amount of other elements present in the food (Widowati, et al, 2008).

Hg can enter into the human body through food contaminated with mercury is usually in the form of organic mercury compounds (methylmercury), and ± 95 % will be absorbed by the body (Inswiasri, 2008). Biological half-life for mercury is 70-90 days. Levels of Hg in the urine of 150 mg/l not show specific symptoms, while at levels of 300-600 mg/l showed symptoms of tremor (Klaassen et al in Widowati, Sastiono, Rumampak, 2008). Muscle tremor is an early symptom of the Hg toxicity. But the degree of toxicity depends on the diet per day and age. Thus, the more and the longer people consuming food contaminated metal mercury per day, the more severe symptoms of the disease because of the toxicity of the metal mercury (Alfian, 2006).

V. CONCLUSION

1. Concentrations of heavy metals Hg in sea water at high tide in the fishing village, shipbuilding and cape flowers are at the maximum limit determined by the concentration of 0.001 mg/l, while the concentration of Hg at low concentrations has been found to exceed the requirements defined by a concentration of 0.008 mg/l in the fisherman township and 0.006 mg/l at the shipyard.

2. Health risk occurs when people consume water from mercury-contaminated water in the fishing village area when taken 2 L/day for 350 days/year within a period of 20 years or 70

years and by people with a weight of 60 kg or less is 0:11 which means dangerous and passing standard.

3. Concentrations of Hg in the shellfish in the fishing village area, shipbuilding and flowers cape were still meet the standard, with a concentration on small shellfish ranged from 0.042 to 0.112 ppm, while the bigger ranged from 0.044 to 0.077 ppm.

4. Concentrations of Hg in the urine shellfish seekers in the fishing village area and cape flowers mostly found exceeded the values set by the WHO.

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Effect of Fungal Staling Growth Substances of Precolonized Microfungi on Colonization of Some Potential Microfungi of Composite Soil Inocula

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Abstract- Antibiotics actively generated as staling growth product by the earlier established fungal colonies that inhibit the growth of soil inhabiting microfungi. In the present study, the composite soil mycoflora was assessed for its capability to get established on virgin and staled agar discs after 24, 48, 72, 96 and 120hrs under *in vitro* condition. It was experimentally monitored that the intricate pattern of fungal growth varied widely in each staled agar disc plate. The interim result from the experiment showed that the sum of fungi colonizing the staled agar disc reduces gradually with time from 24 to 120 hrs. Based on their racial low to high endurance capacity against the staled growth products or antibiotics actively generated by pre-colonized fungal colonies, they were sorted in VI groups. The dominating microfungi which could persist up to 96 to 120 hours were *Aspergillus flavus*, *A. luchuensis*, *A. niger*, *A. sulphureus*, *Penicillium citrinum*, *P. chrysogenum*, *P. italicum*, *Trichoderma viride* and *T. koningii*.

Index Terms- Antibiotics, Composite soil, Fungal antagonists, Soil mycoflora, Staled products.

I. INTRODUCTION

The competitive endurance and establishment of soil mycoflora depend upon its quantitative and qualitative antibiotic secretion and tolerance potential against other fungi. As yet, the study on the effect of fungal staling toxic growth substances released from pre-colonized microfungi, on colonization of some potential mycoflora of composite soil inocula has received a little attention. Rao (10) extensively studied the inter-specific fungal competition for substrate colonization. Later, Dwivedi and Garrett (4) reported that the tolerance potential of microfungi to mycostatic substances such as antibiotics or staling growth products play a very significant role in their colonization on nutrient agar plates. Working on fungal competition in agar plate, they also reported that the species spectrum of fungi colonizing on nutrient agar plates changed successively with the increase of time i.e. degree of staling caused by pre-colonized fungal colonies. The present research paper deals with the study of competitive survival and colonization potential of some composite soil mycoflora on staled agar plates after different time intervals, i.e. 24, 48, 72, 96 and 120 hours.

II. MATERIALS AND METHODS

Soil Sampling

The composite soil was collected by using standard techniques from different sites near Sitapur District, Uttar Pradesh, India during the winter season. The collected soil samples were brought into the laboratory for further studies.

Effect of fungal staling growth substance on the growth and colonization of microfungi of composite soil inocula

The soil samples were mixed thoroughly in the laboratory under aseptic conditions and sieved. The soil:water suspension of 1:1000, 1:10000 and 1:100000 dilution was prepared by using sterilized distilled water. About 15ml of the sterilized and cooled down Czapek-Dox agar medium was poured in Petri-plates. After solidification of agar, 1ml of each soil:water suspension of the above dilutions was poured in respective Petri-plates. Control was also maintained for each dilution separately. Inoculated plates were incubated at $25 \pm 2^\circ\text{C}$ for 24, 48, 72, 96 and 120 hours and there after the entire circle of agar in each Petri-plate was reversed i.e. placed upside down after the completion of respective hours, and one ml of corresponding soil:water suspension was poured over the reversed agar discs and the fungi grown were recorded and identified with the help of relevant literatures.

The percent colonization of the fungi on virgin and staled agar media was determined by the following formula

$$\% \text{ Colonization} = \frac{\text{Total no. of the respective fungal colonies}}{\text{Total no. of all fungal colonies}} \times 100$$

III. DATA ANALYSIS

The data were expressed as Mean \pm SD, n=3 and were analyzed statistically by using analysis of variance technique. A probability of 0.05 or less was considered as significant. Correlation test was applied to compare the percent colonization of composite soil fungal species after different staling periods (in Hrs.).

IV. RESULT

The result of the present study showed that the competition for survival among the microfungi in the soil is a highly complex natural process. The endurance and colonization ability of

microfungi entirely depends upon the potentiality of antibiotic production and fast growth rate. The observation recorded revealed that there was a significant decrease in the number of fungi colonizing on the reverse of agar discs with an increase in the staling time period from 24 hours to 120 hours respectively. This might be due to the diffusion of the staling growth substances released from pre-colonized microfungi colonies of composite soil inocula before the reversal of the agar discs. Based on the tolerance potential against the staling growth product of the earlier established microfungi, the composite soil mycoflora were classified into I to VI groups (Table 1-3). The microfungi having the best tolerance potential and colonizing abilities were placed in the group VI followed by the groups V, IV, III, II and I. The fungi of the group I have the minimum tolerance potential. It was noticed that the comparatively less numbers of fungi could colonize the staled agar discs after 96 and 120 hours of staling periods.

The result of 1:1000 dilution (Table No. 1) showed that after 120 hours of a long staling period, *Aspergillus flavus*, *A. luchuensis*, *A. niger* and *Penicillium citrinum* have maximum tolerance potential for antibiotics or staling growth product diffused by the pre-colonized fungi. Their total quantities (Table No. 4) were also high compared to other microfungi of the same composite soil inocula. Only three fungal species (*Helminthosporium sp.*, *Fusarium longipes* and *Rhizopus*) appeared after 48 hours of staling period whereas four fungal species (*Chaetomium globosum*, *Alternaria solani*, *Humicola* and *Alternaria alternata*) were recorded after 24 hours of staling period. Similarly, the fungal species that were observed after 96 and 120 hours of staling period were minimum in the number. Those fungi that loomed on the nutrient virgin agar plate (*Chaetomium globosum*, *Alternaria solani*, *Humicola* and *Alternaria alternata*) (Table No. 1) but absent in staled agar disc plates revealed that they were extremely susceptible to the staled growth substances. Similarly, *Aspergillus flavus*, *A. luchuensis* and *A. niger* were found to be exceptionally dominating in 1:10000 dilution (Table No. 2). Therefore, these were placed in the group VI followed by *Aspergillus sulphureus*, *Penicillium citrinum* and *P. italicum* respectively. In case of 1:100000 dilution (Table No. 3), two dominant fungal species were observed i.e. *Aspergillus luchuensis* and *A. niger* followed by *Aspergillus flavus* and *Penicillium citrinum*. In all the three dilutions 1:1000, 1:10000 and 1:100000 (Table No. 1, 2 and 3), almost the same pattern of fungal colonization was monitored i.e. the number of fungal species and fungal colonies of composite soil inocula decreases successively with the gradual increase in the staling period. After 96 and 120 hours of staling period comparatively few, the highly resistant and tolerant species of fungi have survived and colonized on staled agar discs.

The observation (Table No. 4) revealed that the number of colonies of the most tolerant microfungi, i.e. *Aspergillus flavus* (5×10^3 cfug⁻¹ soil), *Penicillium citrinum* (3.67×10^3 cfug⁻¹ soil), *A. niger* (4.33×10^3 cfug⁻¹ soil) and *A. luchuensis* (6×10^3 cfug⁻¹ soil) were maximum as compared to microfungi of other given groups. The overall result of analysis mentioned in Table No. 4, 5 and 6 revealed that the number of microfungi colonies viewed on the staled agar disc plate, decreased gradually with the progressive increase in staling periods from 24 hours to 120 hours respectively.

The percent colonization of the respective fungal species revealed that the growth potential of the relatively dominant microfungi existing in composite soil inocula was highest comparatively to the less tolerant (against staling substances) microfungal communities. (Fig. 1, Fig. 2 and Fig. 3) It was observed that the *Aspergillus flavus* (8.93%), *Penicillium citrinum* (6.55%), *A. niger* (7.74%) and *A. luchuensis* (10.71%) (Fig. 1a) showed the maximum percent colonization followed by *Trichoderma viride* (5.95%), *A. sulphureus* (5.36%), *Fusarium oxysporum* (5.36%), *P. chrysogenum* (4.76%), *Rhizoctonia solani* (4.17%) and so on. *Chaetomium globosum* (1.19%) and *Humicola* (1.79%) were found to have remarkably low colonization ability. There were many fungal species which were present in the control plate but completely disappeared from staled agar disc plates such as *Drechslera* and *Alternaria solani* (Fig. 2). In the same way *Humicola*, *Fusarium longipes* and *Rhizoctonia solani* were present in staled agar disc after 24 hours of staling period but were lacking in 48, 72, 96 and 120 hours of staled agar disc plates. It was observed that after 120 hours of staling period only three fungal species were seemed to be established, i.e. *Aspergillus flavus*, *A. niger* and *A. luchuensis* having colonization percentage around 33%. Similar pattern of colonization was recorded in 1:100000 dilution (Fig. 3) where two fungal species i.e. *A. niger* (33.33%) and *A. luchuensis* (66.67%) survived.

The significant values of the simple linear correlation coefficients (r) indicate that they were significantly different from zero at the 5% and 1% probability level. The significant, high r value indicates that fungal colonization and staling period are highly associated with one another in a linear way.

V. DISCUSSION

The study of inter-specific fungal competition in composite soil mycoflora in the presence of staling growth substances progressively released from the earlier established fungal colonies of composite soil inocula has received little attention. In the present study, it was observed that the number of fungi colonizing on the reverse agar disc decreases gradually with the increase in the staling period this may be due to the diffusion of the antibiotics or staling growth substances actively produced by the pre-colonized fungal colonies (1; 3). It was also observed that the fungal population (i.e. number of fungal colonies) of the extremely tolerant and dominating fungi were higher as compared to surprisingly less endure microfungi of the composite soil inocula. The staling phenomenon is a very perplex process and it is detected by the decrease in growth rate (11). The success of colonization of a particular fungus depends upon its population level in the soil (4). It was also noticed that the fungi which loomed on nutrient virgin agar disc disappeared from the staled agar disc, this failure in the colonization of fungi after different staling periods on staled agar disc might be due to the low growth rate and less tolerance potential against the staling growth substances. The similar result was reported by (4; 5). Upadhyay et al., (14) reported that besides pH, nutrient supply in staling growth product, antibiotics play a very significant role in the colonization. Arora et al., (2) studied the effect of fungal staling growth products some dominant rhizospheric fungi such as *Aspergillus candidus*, *A.fumigatus*, *Chaetomium globosum*,

Fusarium chlamydosporum, *F. cutmorum*, and *Penicillium citrinum* against *Rhizoctonia solani* and found that *R. solani* possessed strong tolerance potential for staling growth substances and not a single antagonist could inhibit its growth successfully. The success of the competition depends upon the tolerance to staling product and antibiotic secretion ability (6). Leaf inhabiting microfungi may inhibit the pathogen by producing antibiotics which caused the mycostasis on the leaf surface (15; 7; 12; 13). The competitive fungal species utilizes the toxic metabolites on antibiotics for their establishments (9). Makut and Owolewa, (8) isolated the *Absidia corymbifera*, *Alternaria alternata*, *Aspergillus flavus*, *A. fumigatus*, *A. niger*, *Cladosporium herbarum*, *Curvularia lunata*, *Penicillium* sp., *Rhizopus stolonifer* and *Trichoderma viride*, which are antibiotic producing fungi present in soil.

VI. CONCLUSION

Interspecific fungal competition for the survival in the soil is a very perplex process. The exponential growth and colonization ability of a composite soil mycoflora depend upon its growth rate and racial tolerance potential against the antibiotics or staling growth substances actively produced by the pre-colonized microfungi of the composite soil inocula.

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Table No. 1: Grouping of composite soil mycoflora (1:1000 dilution) and their colonization pattern in presence of staled agar after different staling periods i.e. 24, 48, 72, 96 and 120 hours

Names of the fungal species	0 Hrs	24 Hrs	48 Hrs	72 Hrs	96 Hrs	120 Hrs
Group I						
<i>Chaetomium globosum</i>	+	-	-	-	-	-
<i>Alternaria solani</i>	+	-	-	-	-	-
<i>Humicola</i>	+	-	-	-	-	-
<i>Alternaria alternata</i>	+	-	-	-	-	-
Group II						
<i>Helminthosporium sp.</i>	+	+	-	-	-	-
<i>Fusarium longipes</i>	+	+	-	-	-	-
<i>Rhizopus nigricans</i>	+	+	-	-	-	-
Group III						
<i>Drechslera</i>	+	+	+	-	-	-
<i>Penicillium oxalicum</i>	+	+	+	-	-	-
Group IV						
<i>Rhizoctonia solani</i>	+	+	+	+	-	-
Sterile mycelium	+	+	+	+	-	-
<i>Fusarium oxysporum</i>	+	+	+	+	-	-
Group V						
<i>Penicillium chrysogenum</i>	+	+	+	+	+	-
<i>Penicillium italicum</i>	+	+	+	+	+	-
<i>Aspergillus sulphureus</i>	+	+	+	+	+	-
<i>Trichoderma viride</i>	+	+	+	+	+	-
<i>Trichoderma koningii</i>	+	+	+	+	+	-
Group VI						
<i>Aspergillus flavus</i>	+	+	+	-	+	+
<i>Penicillium citrinum</i>	+	+	+	+	+	+
<i>Aspergillus niger</i>	+	-	+	+	-	+
<i>Aspergillus luchuensis</i>	+	+	+	+	+	+
Total species	21	16	14	11	8	4

+ = Presence, - = Absence

Table No. 2: Grouping of composite soil mycoflora (1:10000 dilution) and their colonization pattern in presence of staled agar after different staling periods i.e. 24, 48, 72, 96 and 120 hours

Names of the fungal species	0 Hrs	24 Hrs	48 Hrs	72 Hrs	96 Hrs	120 Hrs
Group I						
<i>Drechslera</i>	+	-	-	-	-	-
<i>Alternaria solani</i>	+	-	-	-	-	-
Group II						
<i>Humicola</i>	+	+	-	-	-	-
<i>Fusarium longipes</i>	+	+	-	-	-	-
<i>Rhizopus nigricans</i>	+	+	-	-	-	-
Group III						
<i>Trichoderma viride</i>	+	+	+	-	-	-
<i>Penicillium oxalicum</i>	+	+	+	-	-	-
Group IV						
<i>Penicillium chrysogenum</i>	+	+	-	+	-	-
Sterile mycelium	+	+	+	+	-	-
<i>Fusarium oxysporum</i>	+	-	+	+	-	-
Group V						
<i>Penicillium italicum</i>	+	-	-	+	+	-
<i>Aspergillus sulphureus</i>	+	+	-	+	+	-
<i>Penicillium citrinum</i>	+	+	+	+	+	-
Group VI						
<i>Aspergillus flavus</i>	+	+	+	-	+	+
<i>Aspergillus niger</i>	+	-	+	+	-	+

<i>Aspergillus luchuensis</i>	+	+	+	+	+	+
Total species	16	11	8	8	5	3

+ = Presence, - = Absence

Table No. 3: Grouping of composite soil mycoflora (1:100000 dilution) and their colonization pattern in presence of staled agar after different staling periods i.e. 24, 48, 72, 96 and 120 hours

Names of the fungal species	0 Hrs	24 Hrs	48 Hrs	72 Hrs	96 Hrs	120 Hrs
Group I						
<i>Alternaria solani</i>	+	-	-	-	-	-
Group II						
<i>Rhizopus nigricans</i>	+	+	-	-	-	-
<i>Penicillium oxalicum</i>	+	+	-	-	-	-
Group III						
<i>Drechslera</i>	+	+	+	-	-	-
<i>Fusarium oxysporum</i>	+	+	+	-	-	-
Group IV						
<i>Trichoderma koningii</i>	+	+	+	+	-	-
<i>Aspergillus sulphureus</i>	+	+	-	+	-	-
Group V						
<i>Aspergillus flavus</i>	+	-	+	+	+	-
<i>Penicillium citrinum</i>	+	+	+	+	+	-
Group VI						
<i>Aspergillus niger</i>	+	+	+	-	-	+
<i>Aspergillus luchuensis</i>	+	+	+	+	+	+
Total species	11	9	7	3	3	2

+ = Presence, - = Absence

Table No. 4: Fungal population in composite soil inocula (1:1000 dilution) on staled agar discs after 24, 48, 72, 96 and 120 hours of staling periods

Names of the fungal species	Fungal population (cfu/g soil X 10 ³)					
	Different staling periods (Hours)					
	0 Hrs	24 Hrs	48 Hrs	72 Hrs	96 Hrs	120 Hrs
Group I						
<i>Chaetomium globosum</i>	0.67 ± 0.58					
<i>Alternaria solani</i>	1.33 ± 0.58					
<i>Humicola</i>	1.00 ± 1.00					
<i>Alternaria alternata</i>	2.00 ± 1.00					
Group II						
<i>Helminthosporium sp.</i>	2.00 ± 1.00	2.67 ± 0.58				
<i>Fusarium longipes</i>		2.33 ± 0.58	2.67 ± 0.58			
<i>Rhizopus nigricans</i>	1.67 ± 0.58	2.33 ± 0.58				
Group III						
<i>Drechslera</i>	2.33 ± 0.58	2.67 ± 0.58	2.00 ± 1.00			
<i>Penicillium oxalicum</i>	2.67 ± 0.58	2.33 ± 0.58	1.67 ± 0.58			
Group IV						
<i>Rhizoctonia solani</i>		2.33 ± 0.58	2.00 ± 1.00	1.67 ± 0.58	1.00 ± 1.00	
Sterile mycelium	2.33 ± 0.58	2.67 ± 0.58	1.67 ± 0.58	1.33 ± 0.58		
<i>Fusarium oxysporum</i>	3.00 ± 1.00	3.00 ± 1.00	2.33 ± 0.58	2.00 ± 1.00		
Group V						
<i>Penicillium chrysogenum</i>	2.67 ± 0.58	2.67 ± 0.58	1.67 ± 0.58	1.33 ± 0.58	1.00 ± 0.00	
<i>Penicillium italicum</i>	2.00 ± 0.00	2.00 ± 1.00	1.67 ± 0.58	1.33 ± 0.58	0.67 ± 0.58	
<i>Aspergillus sulphureus</i>	3.00 ± 1.00	2.67 ± 0.58	1.67 ± 0.58	1.33 ± 0.58	1.33 ± 0.58	
<i>Trichoderma viride</i>	3.33 ± 1.53	3.33 ± 1.15	2.67 ± 0.58	2.33 ± 0.58	1.67 ± 0.58	
<i>Trichoderma koningii</i>	2.33 ± 0.58	2.67 ± 0.58	2.33 ± 0.58	2.00 ± 1.00	1.67 ± 1.15	
Group VI						

<i>Aspergillus flavus</i>	5.00 ± 1.00	5.00 ± 1.00	4.33 ± 0.58	0.00 ± 0.00	1.67 ± 0.58	1.00 ± 0.00
<i>Penicillium citrinum</i>	3.67 ± 1.15	3.67 ± 0.58	3.33 ± 0.58	2.67 ± 0.58	2.33 ± 0.58	1.67 ± 0.58
<i>Aspergillus niger</i>	4.33 ± 1.53	0.00 ± 0.00	4.33 ± 0.58	3.67 ± 0.58	0.00 ± 0.00	0.67 ± 0.58
<i>Aspergillus luchuensis</i>	6.00 ± 1.00	5.67 ± 0.58	4.67 ± 0.58	4.00 ± 1.00	2.67 ± 0.58	1.67 ± 0.58

ns= Non significant

**= Significant at 1%

CV%	33 %	25.8 %	24 %	37.8 %	42.3 %	40 %
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Mean ± SD, n=3, CV= Coefficient of variation

Table No. 5: Fungal population in composite soil inocula (1:10000 dilution) on staled agar discs after 24, 48, 72, 96 and 120 hours of staling periods

Names of the fungal species	Fungal population (cfu/g soil X 104)					
	Different staling periods (Hours)					
	0 Hrs	24 Hrs	48 Hrs	72 Hrs	96 Hrs	120 Hrs
Group I						
<i>Drechslera</i>	1.33 ± 0.58					
<i>Alternaria solani</i>	0.67 ± 0.58					
Group II						
<i>Humicola</i>	0.67 ± 0.58	0.67 ± 0.58				
<i>Fusarium longipes</i>	1.67 ± 0.58	1.33 ± 0.58				
<i>Rhizopus nigricans</i>	1.33 ± 0.58	1.33 ± 0.58				
Group III						
<i>Trichoderma viride</i>	1.67 ± 0.58	1.67 ± 0.58	0.67 ± 0.58			
<i>Penicillium oxalicum</i>	1.33 ± 0.58	0.67 ± 0.58	0.33 ± 0.58			
Group IV						
<i>Penicillium chrysogenum</i>	1.33 ± 0.58	1.00 ± 0.00	0.67 ± 0.58	0.33 ± 0.58		
White sterile mycelium	1.67 ± 0.58	1.33 ± 0.58	0.67 ± 0.58	0.33 ± 0.58		
<i>Fusarium oxysporum</i>	1.67 ± 0.58	1.33 ± 0.58	0.67 ± 0.58	0.67 ± 0.58		
Group V						
<i>Penicillium italicum</i>	1.67 ± 0.58	1.33 ± 0.58	0.67 ± 0.58	0.33 ± 0.58	0.33 ± 0.58	
<i>Aspergillus sulphureus</i>	2.33 ± 0.58	1.33 ± 0.58	0.33 ± 0.58	0.33 ± 0.58	0.33 ± 0.58	
<i>Penicillium citrinum</i>	2.33 ± 0.58	1.67 ± 0.58	1.00 ± 0.00	0.67 ± 0.58	0.67 ± 0.58	
Group VI						
<i>Aspergillus flavus</i>	2.67 ± 0.58	1.67 ± 0.58	0.67 ± 0.58	0.00 ± 0.00	0.67 ± 0.58	0.67 ± 0.58
<i>Aspergillus niger</i>	2.33 ± 0.58	0.00 ± 0.00	0.67 ± 0.58	0.67 ± 0.58	0.00 ± 0.00	0.67 ± 0.58
<i>Aspergillus luchuensis</i>	2.33 ± 0.58	1.67 ± 0.58	0.67 ± 0.58	0.67 ± 0.58	1.00 ± 0.00	0.67 ± 0.58
ns= Non significant,						
*= Significant at 5%,						
**= Significant at 1%	**	*	ns	ns	ns	ns
CV%	34.2 %	44.2 %	86 %	123.7 %	94.3 %	86.2 %

Mean ± SD, n=3, CV= Coefficient of variation

Table No. 6: Fungal population in composite soil inocula (1:100000 dilution) on staled agar discs after 24, 48, 72, 96 and 120hours of staling periods

Names of the fungal species	Fungal population (cfu/g soil X 105)					
	Different staling periods (Hours)					
	0 Hrs	24 Hrs	48 Hrs	72 Hrs	96 Hrs	120 Hrs
Group I						
<i>Alternaria solani</i>	0.67 ± 0.58					
Group II						
<i>Rhizopus nigricans</i>	0.67 ± 0.58	0.33 ± 0.58				
<i>Penicillium oxalicum</i>	0.67 ± 0.58	0.67 ± 0.58				
Group III						
<i>Drechslera</i>	0.33 ± 0.58	0.33 ± 0.58	0.33 ± 0.58			
<i>Fusarium oxysporum</i>	1.00 ± 0.00	0.67 ± 0.58	0.67 ± 0.58			
Group IV						
<i>Trichoderma koningii</i>	0.67 ± 0.58	0.67 ± 0.58	0.67 ± 0.58	0.67 ± 0.58		
<i>Aspergillus sulphureus</i>	0.67 ± 0.58	0.67 ± 0.58	0.00 ± 0.00	0.33 ± 0.58		

Group V						
<i>Aspergillus flavus</i>	1.33 ± 0.58	0.00 ± 0.00	0.67 ± 0.58	1.00 ± 0.00	0.33 ± 0.58	
<i>Penicillium citrinum</i>	1.00 ± 1.00	0.67 ± 0.58	0.33 ± 0.58	0.00 ± 0.00	0.33 ± 0.58	
Group VI						
<i>Aspergillus niger</i>	1.33 ± 0.58	0.67 ± 0.58	0.67 ± 0.58	0.00 ± 0.00	0.00 ± 0.00	0.33 ± 0.58
<i>Aspergillus luchuensis</i>	1.67 ± 0.58	1.33 ± 0.58	0.67 ± 0.58	0.00 ± 0.00	0.33 ± 0.58	0.67 ± 0.58
ns= Non significant,						
*= Significant at 5%	ns	ns	ns	*	ns	ns
CV%	66.3 %	91.3 %	108.0 %	101.0 %	200 %	115.5 %

Mean ± SD, n=3, CV= Coefficient of variation

Table No. 7: Computation of Linear correlation coefficient between the present colonization of composite soil fungal species (1:1000 dilution) after different staling periods (in Hours)

	Control	24 Hrs	48 Hrs	72 Hrs	96 Hrs	120 Hrs
Control	1**					
24 Hrs	0.714**	1**				
48 Hrs	0.910**	0.606**	1**			
72 Hrs	0.687**	0.354	0.763**	1**		
96 Hrs	0.686**	0.704**	0.670**	0.603**	1**	
120 Hrs	0.777**	0.538*	0.722**	0.584**	0.715**	1**

*= Significance at 5%, **= Significance at 1%. Perfect positive correlation (r) = +1.0, Weak positive correlation (r) = +0.1 to +0.30, Medium positive correlation (r) = +0.30 to +0.50, Strong positive correlation (r) = +0.50 to +1.0, Perfect negative correlation (r) = -1.0, Weak negative correlation (r) = -0.30 to -0.1, Medium negative correlation (r) = -0.50 to -0.30, Strong negative correlation (r) = -1.0 to -0.50.

Table No. 8: Computation of Linear correlation coefficient between the present colonization of composite soil fungal species (1:10000 dilution) after different staling periods (in Hours)

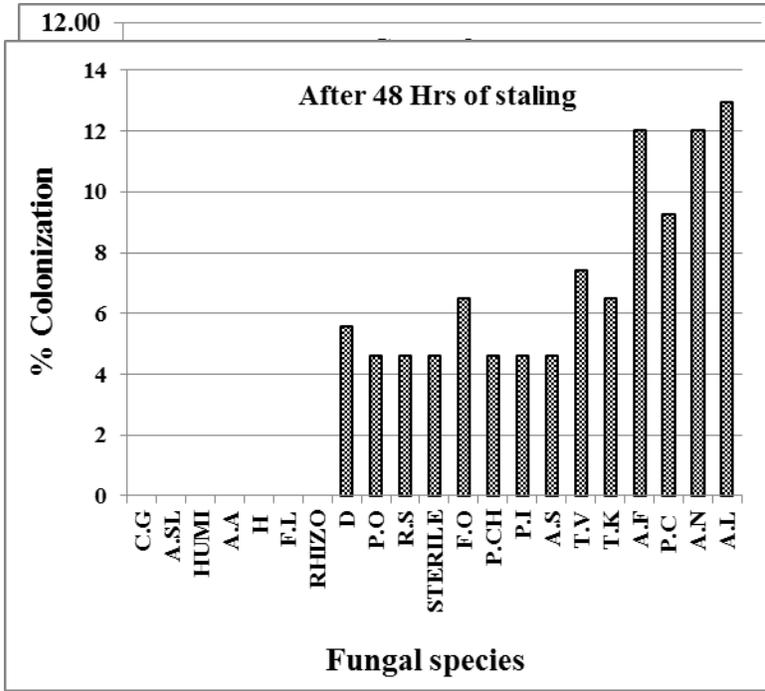
	Control	24 Hrs	48 Hrs	72 Hrs	96 Hrs	120 Hrs
Control	1**					
24 Hrs	0.51*	1**				
48 Hrs	0.657**	0.504*	1**			
72 Hrs	0.539*	0.20166	0.710**	1**		
96 Hrs	0.682**	0.540*	0.490001	0.424005	1**	
120 Hrs	0.637**	0.039457	0.336227	0.337963	0.568*	1**

*= Significance at 5%, **= Significance at 1%. Perfect positive correlation (r) = +1.0, Weak positive correlation (r) = +0.1 to +0.30, Medium positive correlation (r) = +0.30 to +0.50, Strong positive correlation (r) = +0.50 to +1.0, Perfect negative correlation (r) = -1.0, Weak negative correlation (r) = -0.30 to -0.1, Medium negative correlation (r) = -0.50 to -0.30, Strong negative correlation (r) = -1.0 to -0.50.

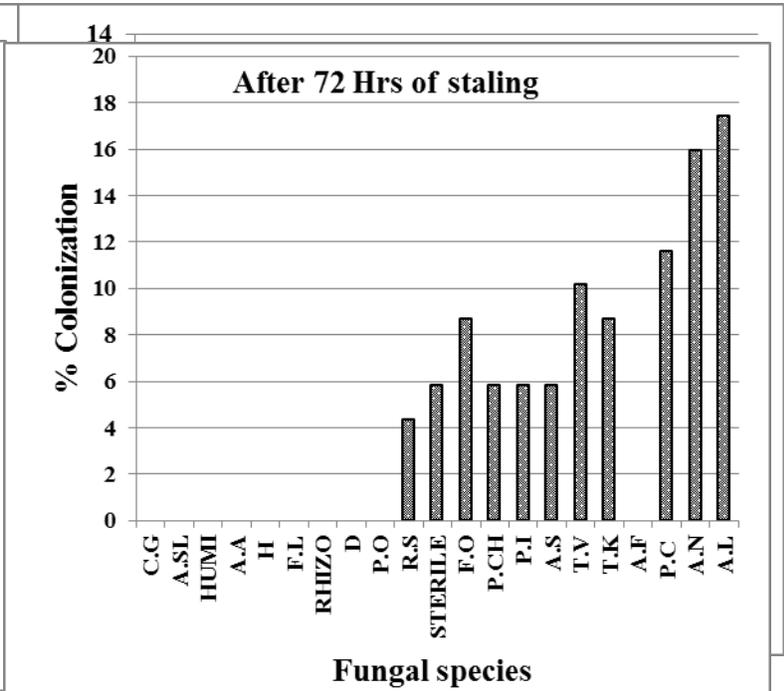
Table No. 9: Computation of Linear correlation coefficient between the present colonization of composite soil fungal species (1:100000 dilution) after different staling periods (in Hours)

	Control	24 Hrs	48 Hrs	72 Hrs	96 Hrs	120 Hrs
Control	1**					
24 Hrs	0.517	1**				
48 Hrs	0.686*	0.318	1**			
72 Hrs	0.161	-0.329	0.353	1**		
96 Hrs	0.683*	0.209	0.392	0.282	1**	
120 Hrs	0.736**	0.703*	0.447	-0.244	0.391	1**

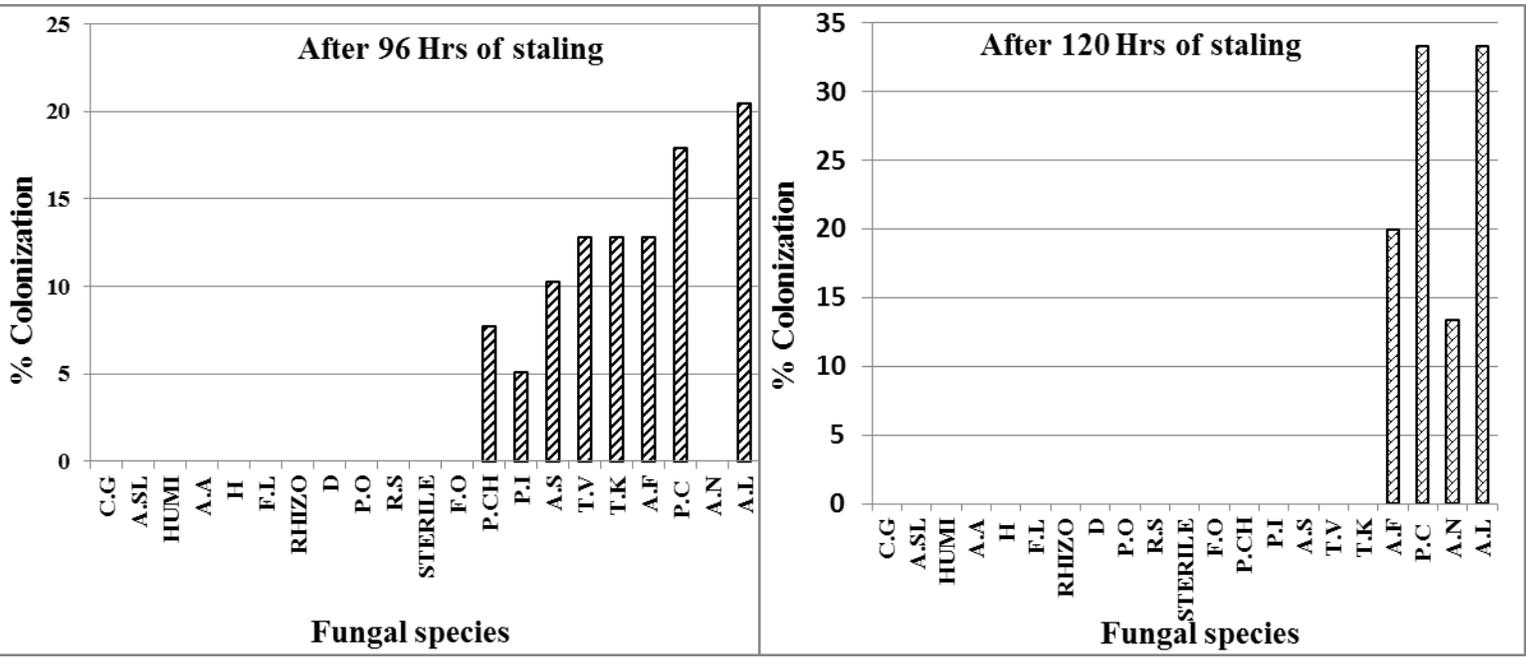
*= Significance at 5%, **= Significance at 1%. Perfect positive correlation (r) = +1.0, Weak positive correlation (r) = +0.1 to +0.30, Medium positive correlation (r) = +0.30 to +0.50, Strong positive correlation (r) = +0.50 to +1.0, Perfect negative correlation (r) = -1.0, Weak negative correlation (r) = -0.30 to -0.1, Medium negative correlation (r) = -0.50 to -0.30, Strong negative correlation (r) = -1.0 to -0.50.



(c)



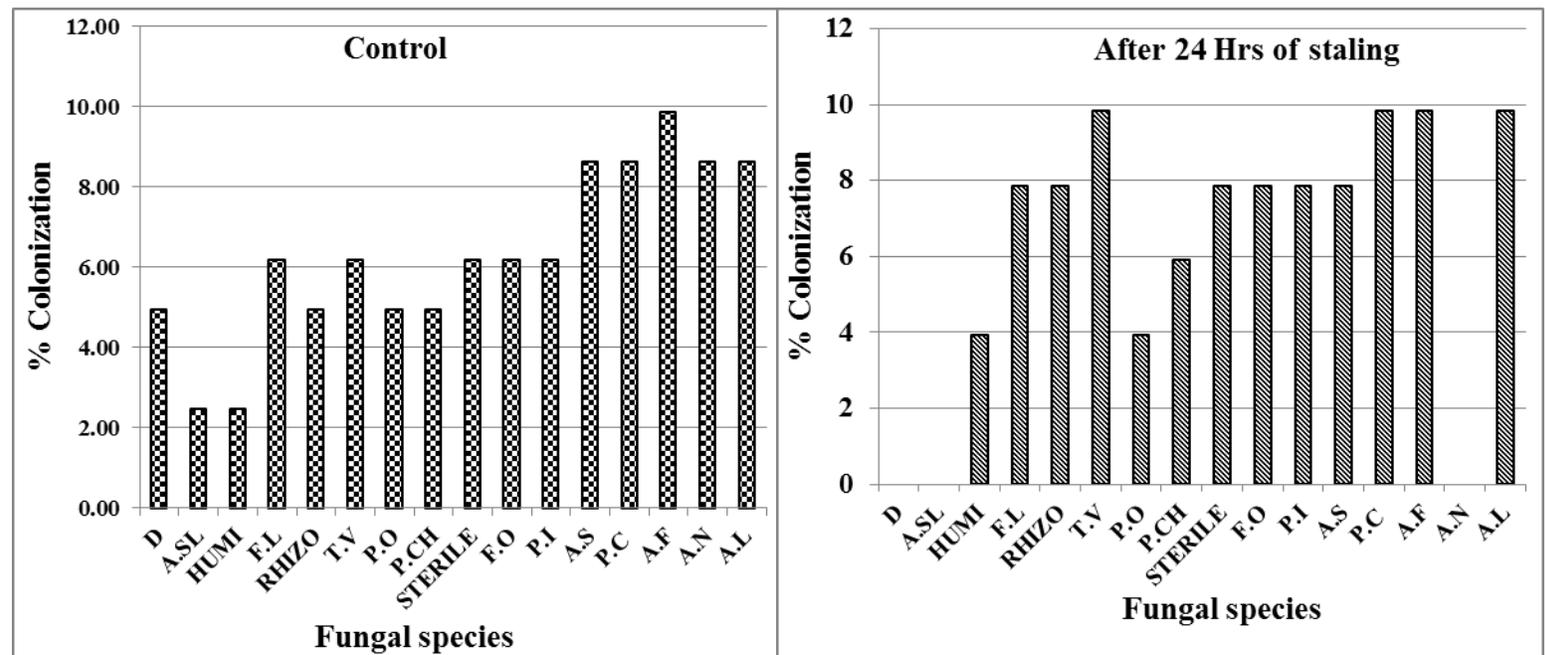
(d)



(e)

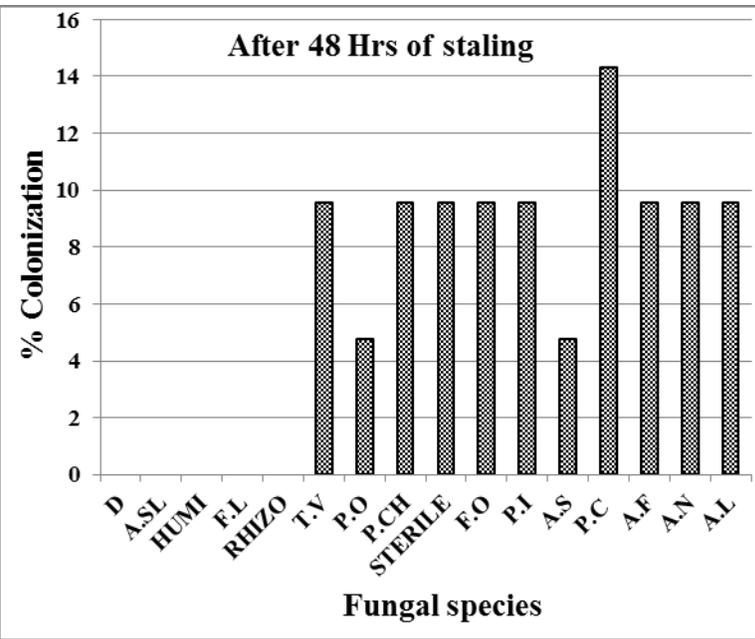
(f)

Fig. 1: Percent colonization of composite soil mycoflora (1:1000 dilution) on nutrient virgin agar and staled agar disc after different periods of staling (a) Control, (b) After 24 Hrs of staling, (c) After 48 Hrs of staling, (d) After 72 Hrs of staling, (e) After 96 Hrs of staling and (f) After 120 Hrs of staling. C.G - *Chaetomium globosum*, A.SL - *Alternaria solani*, HUMI - *Humicola*, A.A - *Alternaria alternata*, H - *Helminthosporium*, F.L - *Fusarium longipes*, RHIZO - *Rhizopus nigricans*, D - *Drechslera*, P.O - *Penicillium oxalicum*, R.S - *Rhizoctonia solani*, STERILE - *Sterile mycelium*, F.O - *Fusarium oxysporum*, P.CH - *Penicillium chrysogenum*, P.I - *Penicillium italicum*, A.S - *Aspergillus sulphureus*, T.V - *Trichoderma viride*, T.K - *Trichoderma koningii*, A.F - *Aspergillus flavus*, P.C - *Penicillium citrinum*, A.N - *Aspergillus niger*, A.L - *Aspergillus luchuensis*

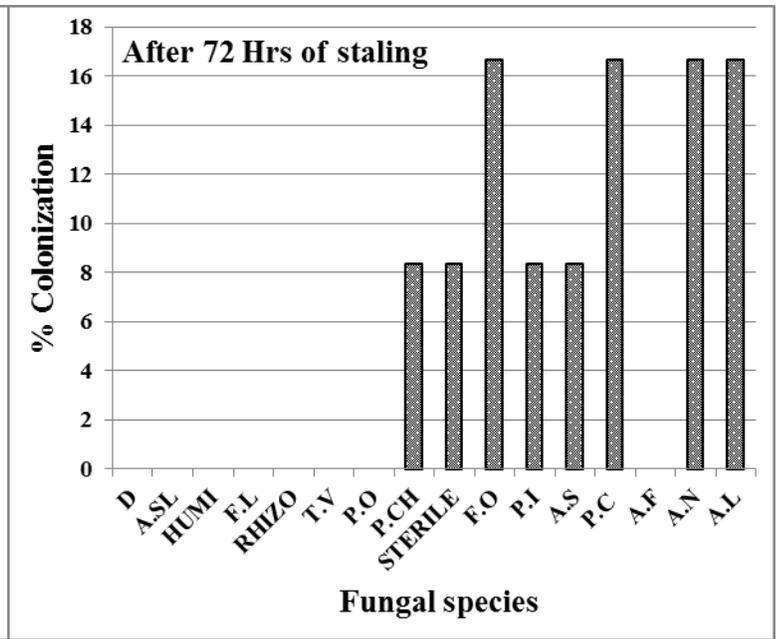


(a)

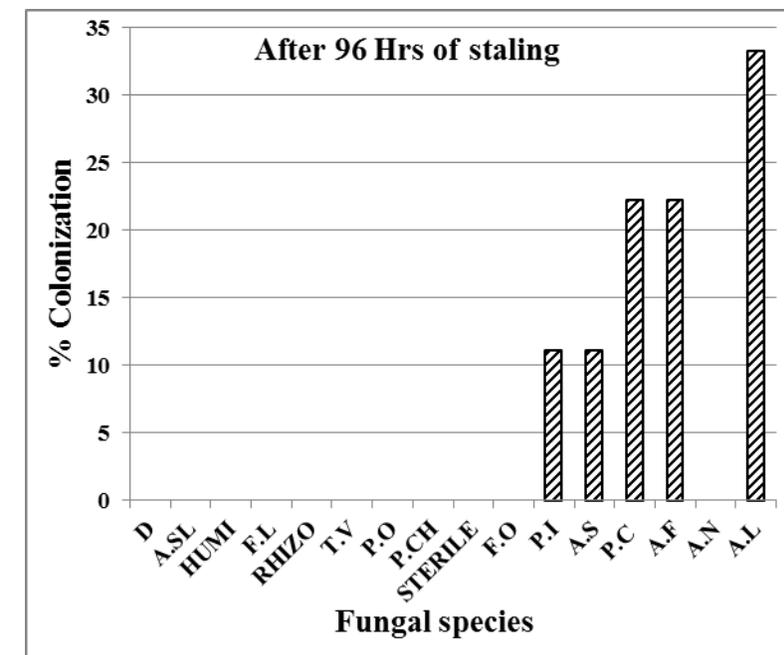
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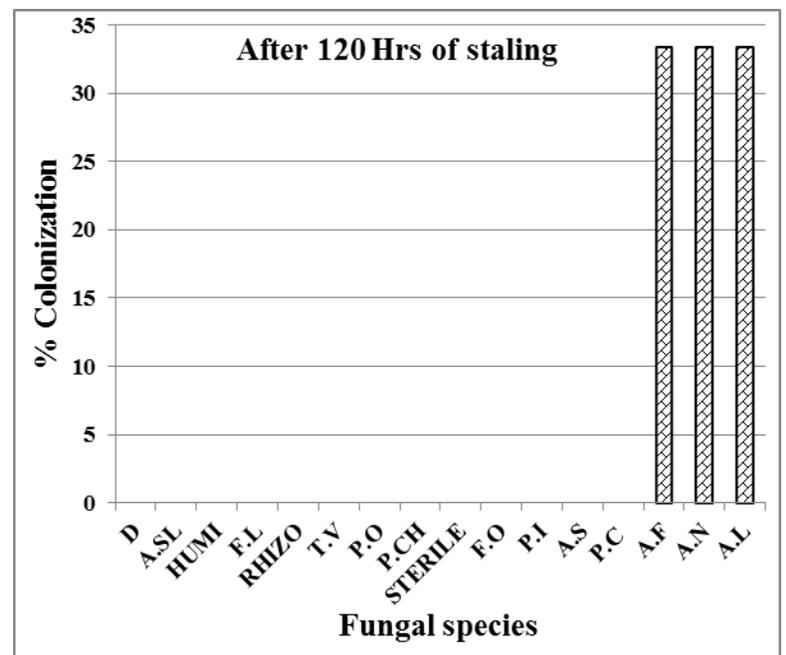
(c)



(d)

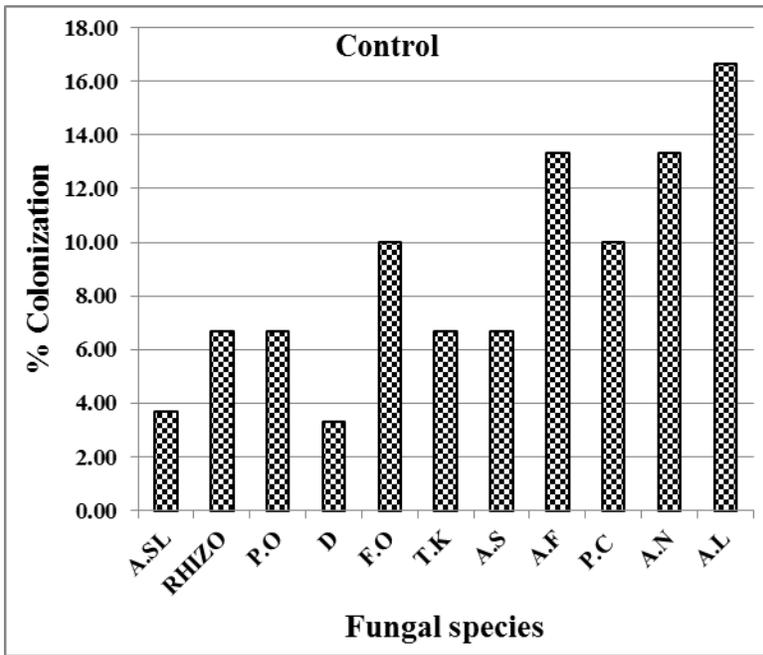


(e)

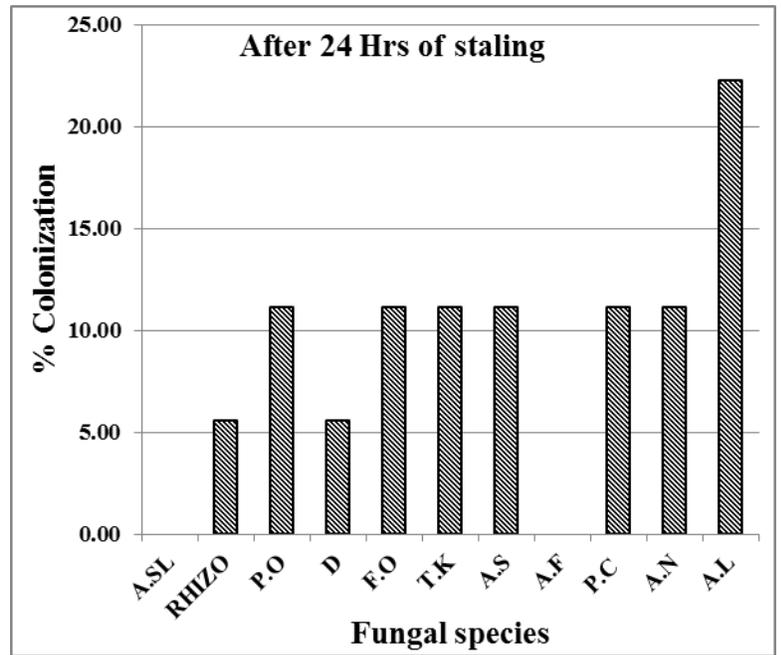


(f)

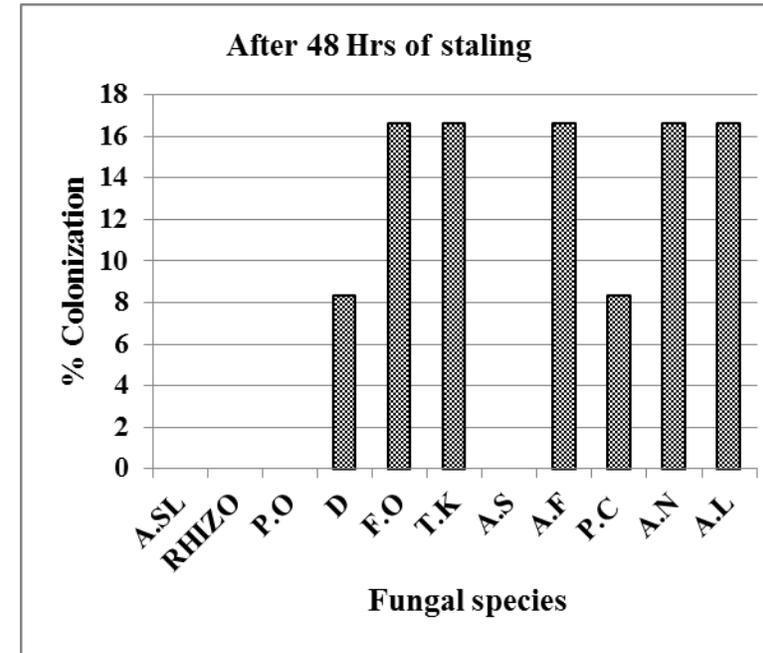
Fig. 2: Percent colonization of composite soil mycoflora (1:10000 dilution) on nutrient virgin agar and staled agar disc after different periods of staling (a) Control, (b) After 24 Hrs of staling, (c) After 48 Hrs of staling, (d) After 72 Hrs of staling, (e) After 96 Hrs of staling and (d) After 120 Hrs of staling. D – *Drechslera*, A.SL - *Alternaria solani*, HUMI – *Humicola*, F.L - *Fusarium longipes*, RHIZO – *Rhizopus nigricans*, T.V - *Trichoderma viride*, P.O - *Penicillium oxalicum*, P.CH - *Penicillium chrysogenum*, STERILE - *Sterile mycelium*, F.O - *Fusarium oxysporum*, P.I - *Penicillium italicum*, A.S - *Aspergillus sulphureus*, P.C - *Penicillium citrinum*, A.F - *Aspergillus flavus*, A.N - *Aspergillus niger*, A.L - *Aspergillus luchuensis*.



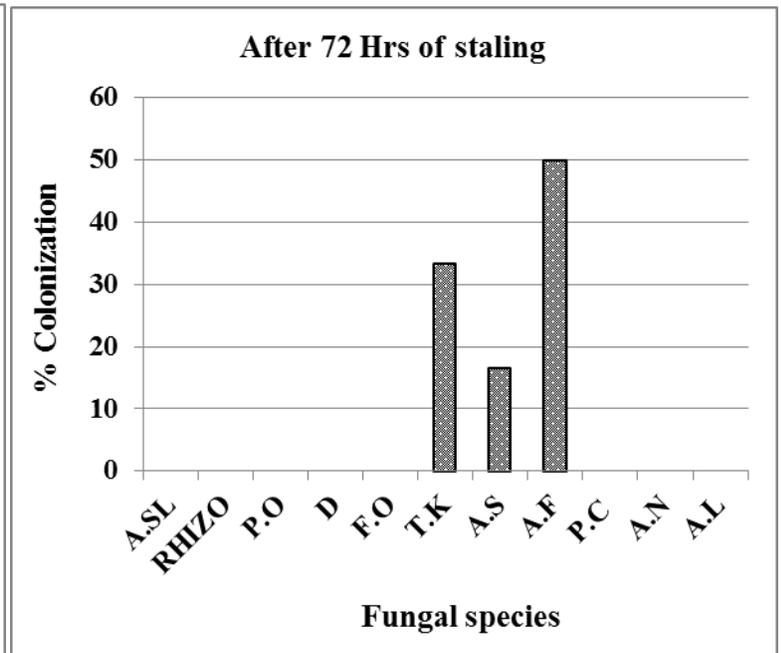
(a)



(b)



(c)



(d)

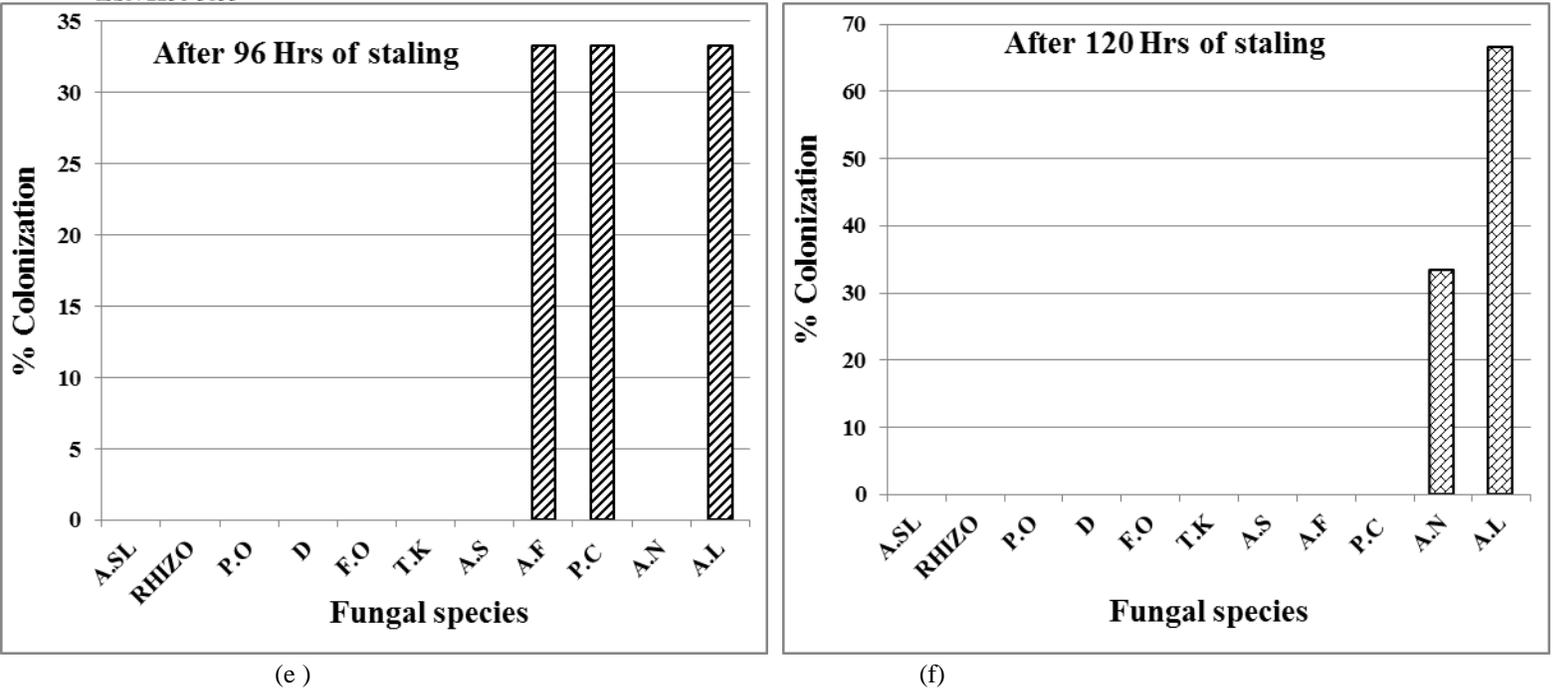


Fig. 3: Percent colonization of composite soil mycoflora (1:100000 dilution) on nutrient virgin agar and staled agar disc after different periods of staling (a) Control, (b) After 24 Hrs of staling, (c) After 48 Hrs of staling, (d) After 72 Hrs of staling, (e) After 96 Hrs of staling and (d) After 120 Hrs of staling . A.SL - *Alternaria solani*, RHIZO – *Rhizopus nigricans*, P.O - *Penicillium oxalicum*, D – *Drechslera*, F.O - *Fusarium oxysporum*, T.K - *Trichoderma koningii*, A.S - *Aspergillus sulphureus*, A.F - *Aspergillus flavus*, P.C - *Penicillium citrinum*, A.N - *Aspergillus niger*, A.L - *Aspergillus luchuensis*.

Proposed Evaluation Methodology for Predicting Groundwater Contamination Potential from Storm water Infiltration Activities

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Abstract- Infiltration is gaining acceptance, and is even being encouraged, as a practical way to manage storm water on site. To prevent potential groundwater contamination, though, tools are required to predict the potential for contamination due to this infiltration for many site conditions. Infiltration should be encouraged in areas having the least potential for causing groundwater contamination. Factors that influence contamination potential include the pollutant concentration in the runoff directed to the infiltration device (after any necessary pre-treatment) and the ability of the underlying soil to remove the pollutant. This paper presents two levels of modeling for predicting whether groundwater contamination is a concern and whether pre-treatment should be considered. The potential effects of storm water on groundwater quality was estimated based on the likely presence of problem constituents in the storm water, their mobility through soils, the type of treatment received before infiltration, and the infiltration method used. The constituents of most concern include chloride, certain pesticides (lindane and chlordane), organic toxicants (1,3-dichlorobenzene, pyrene and fluoranthene), pathogens, and some heavy metals (nickel and zinc). Reported instances of groundwater contamination associated with storm water was rare in residential areas where infiltration occurred through surface soils (except for chloride), but was more common (especially for toxicants) in commercial and industrial areas where subsurface infiltration was used.

Index Terms- Groundwater contamination, storm water, infiltration, Nutrients; Toxicants

I. INTRODUCTION

With urbanization, the permeable soil surface area where infiltration and subsequent groundwater recharge has historically occurred, is reduced, while the available soils usually have their infiltration capacity dramatically reduced due to compaction. This has resulted in much less groundwater recharge and greatly increased quantities of surface runoff. In addition, the waters available for recharge carry increased quantities of pollutants compared to natural conditions. Infiltration has been viewed by the engineering community as a way to address the need to restore the natural hydrologic cycle and that will improve groundwater recharge. What is not available is good guidance on predicting whether infiltration is appropriate and what levels of pre-treatment are required prior to infiltration. The intention of this paper is to identify known storm water contaminants as to their potential to adversely affect groundwater. This potential is evaluated based on pollutant abundance in storm water, pollutant

mobility in the vadose zone, the treatability of the pollutants, and the infiltration procedure used. Published observations of groundwater contamination in areas of storm water recharge are also provided in this review paper, along with suggestions to minimize potential contamination problems. Because urban hydrogeology is an active research field, there are many new papers continuously becoming available containing new case studies. The purpose of this paper is to assemble a collection of information relating to potential groundwater problems that is of great interest to storm water managers responsible for the design and implementation of infiltration devices and who may be uncertain of these potential problems. Prior to urbanization, natural groundwater recharge resulted from infiltration of precipitation through pervious surfaces, including grasslands and woods. This infiltrating water was relatively uncontaminated. With urbanization, the permeable soil surface area through which recharge by infiltration could occur was reduced. This resulted in much less groundwater recharge and greatly increased surface runoff. In addition, the waters available for recharge generally carried increased quantities of pollutants. There are many types of artificial storm water infiltration mechanisms that have been used in urbanizing areas in order to decrease discharges of storm water to surface waters and to help preserve groundwater recharge. These are described in many storm water design manuals. The following infiltration techniques are most commonly used. Recent evaluations, using a computer-based vadose zone model, were performed as part of a Water Environment Research Foundation (WERF)-sponsored project on developing guidance for storm water managers considering infiltration as a management practice (Clark, *et al.* 2006). The complete description of these two levels of modeling, in addition to two case studies, is available in Clark and Pitt (2007).

- surface infiltration devices (grass filters and grass lined drainage swales; infiltration is usually dominant storm water treatment mechanism; infiltration occurs through turf and surface soils, providing the most opportunities for pollutant trapping before the water reaches groundwater)
- French drains or soak-aways (small source area subsurface infiltration pits, most typically used for infiltrating drainage from roofs; usually simple gravel-filled dug holes, but can be an empty perforated container)
- porous pavements or grid pavers (replace impervious pavements, overlain on a relatively thick storage layer of coarse material; may include drainage pipes to collect

excess water that cannot be infiltrated into underlying soil)

- drainage trenches (collect and infiltrate runoff from adjacent paved areas; generally long, moderately wide, and shallow in dimensions; filled with coarse gravel to provide storage)
- infiltration wells, or dry wells (deep, relatively small diameter holes allowing storm water to be discharged to deep soil horizons, sometimes directly into saturated zones, commonly located at storm drainage inlet locations serving up to a few hectares of drainage area, with overflows discharged to storm or combined drainage system)
- percolating sewerage (conventional separate storm drainage, but with perforations through pipe or gaps between pipe segments; usually wrapped in geotextile fabric with coarse gravel used as trench backfill material);
- dry (percolating) basins (usually large storage areas typically located at end of drainage system before discharge into receiving water; commonly used as recreation facilities during dry weather; also provides infiltration through turf and surface soils).

All infiltration devices redirect runoff waters from the surface to the sub-surface environments. Therefore, they must be carefully designed using sufficient site specific information to protect the groundwater resources and to achieve the desired water quality management goals.

1. Groundwater contamination associated with storm water pollutants:

1.1. Nutrients

While nitrate is one of the most frequently encountered contaminants in groundwater (AWWA, 1990), groundwater contamination by phosphorus has not been as widespread, or as severe. Nitrogen loadings are usually much greater than phosphorus loadings, especially from nonagricultural sources (Hampson, 1986). Nitrogen occurs naturally both in the atmosphere and in the earth's soils. Natural nitrogen can lead to groundwater contamination by nitrate. As an example, in regions with relatively unweathered sedimentary deposits or loess beneath the root zone, residual exchangeable ammonium in the soil can be readily oxidized to nitrate if exposed to the correct conditions. Leaching of this naturally occurring nitrate caused groundwater contamination (with concentrations greater than 30 mg/l) in non-populated and non-agricultural areas of Montana and North Dakota (Power & Schepers, 1989). Forms of nitrogen from precipitation may be either nitrate or ammonium. Atmospheric nitrate results from combustion, with the highest ambient air concentrations being downwind of power plants, major industrial areas, and major automobile activity. Atmospheric ammonium results from volatilization of ammonia from soils, fertilizers, animal wastes and vegetation (Power & Schepers, 1989). In the United States, the areas with the greatest nitrate contamination of groundwater include heavily populated states with large dairy and poultry industries, or states having extensive agricultural irrigation. Extensively irrigated areas of the United States include the corn-growing areas of Delaware, Pennsylvania and

Maryland; the vegetable growing areas of New York and the Northeast; the potato growing areas of New Jersey; the tobacco, soybean and corn growing areas of Virginia, Delaware and Maryland (Ritter, Humenik & Skaggs, 1989); the chicken, corn and soybean production areas in New York (Ritter, Scarborough & Chirside, 1991); the western Corn Belt states (Power & Schepers, 1989); and the citrus, potato and grape vineyard areas in California (Schmidt & Sherman, 1987). Roadway runoff has been documented as the major source of groundwater nitrogen contamination in urban areas of Florida (Hampson, 1986; Schifer, 1989; German, 1989). This occurs from both vehicular exhaust onto road surfaces and onto adjacent soils, and from roadside fertilization of landscaped areas. Roadway runoff also contains phosphorus from motor oil use and from other nutrient sources, such as bird droppings and animal remains that has contaminated groundwaters (Schifer, 1989). Nitrate has leached from fertilizers and affected groundwater's under various turf grasses in urban areas, including at golf courses, parks and home lawns (Petrovic, 1990; Ku & Simmons, 1986; Robinson & Stephen Snyder, 1991). Leakage from sanitary sewers and septic tanks in urban areas can contribute significantly to nitrate-nitrogen contamination of the soil and groundwater (Power & Schepers, 1989). Nitrate contamination of groundwater from sanitary sewage and sludge disposal has been documented in New York (Ku & Simmons, 1986; Smith & Myott, 1975), California (Schmidt & Sherman, 1987; Chang, Page, Pratt & Warneke, 1988), Narbonne, France (Razack, Drogue & M'Baitelem 1988), Florida (Waller, Howie & Causaras, 1987) and Delaware (Ritter et al., 1989).

1.1.1. Removal processes in soil

Whenever nitrogen-containing compounds come into contact with soil, a potential for nitrate leaching into groundwater exists, especially in rapid-infiltration wastewater basins, storm water infiltration devices, and in agricultural areas. Nitrate is highly soluble and will stay in solution in the percolation water, after leaving the root zone, until it reaches the groundwater. Therefore, vadose-zone sampling can be an effective tool in predicting nonpoint sources that may adversely affect groundwater (Spalding & Kitchen, 1988). Nitrogen containing compounds in urban storm water runoff may be carried long distances before infiltration into soil and subsequent contamination of groundwater (Robinson & Stephen Snyder, 1991). The amount of nitrogen available for leaching is directly related to the impervious cover in the watershed (Butler, 1987). Nitrogen infiltration is controlled by soil texture and the rate and timing of water application (either through irrigation or rainfall) (Petrovic, 1990; Boggess, 1975). Landfills, especially those that predate the RCRA Subtitle D Regulations, often produce significant nitrogen contamination in nearby groundwater, as demonstrated in Lee County, Florida (Boggess, 1975). Studies in Broward County, Florida, found that nitrogen contamination problems can also occur in areas with older septic tanks and sanitary sewer systems (Waller et al., 1987). Nutrient leachates usually move vertically through the soil and dilute rapidly down gradient from their source. The primary factors affecting leachate movement are the layering of geologic materials, the hydraulic gradients, and the volume of the leachate discharge (Waller et al., 1987; Wilde, 1994). Once the leachate is in the soil/groundwater system,

decomposition by denitrification can occur, with the primary decomposition product being elemental nitrogen (Hickey & Vecchioli, 1986). As an example, deep well injection of organonitriles and nitrates in a limestone aquifer acts like an anaerobic filter with nitrate respiring bacteria being the dominant microorganism. These bacteria caused an 80% reduction of the waste within one hundred meters of injection in the Floridan aquifer, near Pensacola (Ehrlich et al., 1979b). Gold and Groffman (1993) reported groundwater leaching losses from residential lawns to be low for nitrates (typically <2 mg/l), when using application rates recommended for residential lawn care. During percolation through the soil, some nutrients are removed and the nutrient concentrations affecting the groundwater are significantly reduced. Phosphorus, in the form of soluble orthophosphate, may be either directly precipitated or chemically adsorbed onto soil surfaces through reactions with exposed iron, aluminum or calcium on solid soil surfaces (Crites, 1985). Phosphorus fixation is a two-step process, sorption onto the soil solid and then conversion of the sorbed phosphorus into mineraloids or minerals. If the sorption sites are filled either with phosphate anions or another ion, phosphorus sorption will be low. The sorption of phosphorus per unit of percolation liquid decreases with each year of recharge (White & Dornbush, 1988). Downward movement of phosphorus in different soils was found to be directly related to the reactivity index measured for each soil, especially for surface-applied phosphorus fertilizer. In Washington, a difference in depth of penetration was noted, however, between sandy- and clayey-textured soils, with sandy-textured soils showing the greater depth of penetration. If the fertilizer was surface applied, instead of sprinkler applied, and the soil was not inverted, most of the phosphorus remained within the top 5 ± 7.5 cm of the surface (Lauer, 1988). If the nitrogen is not used by the plant, it will leach through the soil toward the groundwater, with some being removed in the soil prior to its reaching the aquifer. Under certain conditions, losses of dissolved nitrate and nitrite can be described by zero-order kinetics (Hampson, 1986). In general, however, the process is regulated by so many limiting factors that such a simplified description is not possible. Residual nitrate concentrations were found to be highly variable in soil due to factors such as soil texture, mineralization, rainfall, irrigation, organic matter content, crop yield, nitrogen fertilizer/sludge application rate, denitrification, and soil compaction (Ferguson, Eisenbauer, Bockstadter, Krull & Buttermore, 1990). Nitrates flow to groundwater from storm water infiltration is controlled by the rate and volume of infiltration, horizontal and vertical groundwater flow, the depth to the water table, and the existence of areas/channels of preferential flow. Once the nitrate has reached the groundwater, its concentration may be reduced by dispersion and diffusion with uncontaminated groundwater (Wilde, 1994). The amount of ammonia volatilization is influenced by the position of the nitrogen in the soil/turf grass after application. This position is highly influenced by rainfall and/or irrigation (Bowman, Paul, Davis & Nelson, 1987) as reported by Petrovic (1990).

Phosphorus concentrations generally decrease with depth in agricultural soils because phosphorus is adsorbed to soil minerals and also precipitates readily with calcium, iron, or aluminum

(Lauer, 1988; Ragone, 1977). The dominant precipitation reactions are pH dependent, forming mostly iron and aluminum phosphates in acid soils and calcium phosphates under alkaline conditions. In neutral soils, the precipitation reactions are strongly rate-limited, so that the apparent solubility of the phosphate compounds is higher than under either acid or alkaline conditions (Bouwer, 1985).

1.2. Pesticides

Pesticides are used in urban areas, primarily for weed and insect control in houses, along roadsides, railroad rights of way, in parks, on golf courses, and on private lawns (Racke & Leslie, 1993). The pesticide loading in runoff water has been correlated to the amount of impervious cover and to the distance the runoff will travel prior to infiltration or decomposition, as demonstrated Lager (1977) and confirmed in Austin, Texas by Butler (1987). Urban pesticide contamination of groundwater in central Florida likely resulted from municipal and homeowner use of these chemicals for pest control and their subsequent collection in storm water runoff. Samples from the upper part of the Floridan aquifer have contained detectable amounts of diazinon, malathion, 2,4-D, ethion, methyl trithion, silvex, and 2,4,5-T (German, 1989). In California, chlordane groundwater contamination has been traced to its application adjacent to residential foundations where it had been used for termite and ant control (Greene, 1992). Atrazine and simazine groundwater contamination was related to their use to control weeds along roadways (Domagalski & Dubrovsky, 1992). In Arizona, diazinon, dacthal, and dioxathion were detected in stormwater runoff entering urban dry wells that recharge the aquifer (Wilson, Osborn, Olson, Maida & Katz, 1990). Diazinon (at 30 lg/l) and methyl parathion (at 10 µg/l) were detected in groundwater below municipal waste treatment plants in Florida which used land spreading or well injection of wastes (Pruitt, Troutman & Irwin, 1985). Gold and Groffman (1993) reported groundwater leaching losses from residential lawns to be low for dicamba and 2,4-D (< 1 µg/l), when using application rates recommended for residential lawn care. In contrast, groundwater below Fresno, California, stormwater recharge basins contained only one of the organ phosphorus pesticides, diazinon. None of the ten chlorinated pesticides (aldrin, chlordane, endosulfan I, endosulfan II, endosulfan sulfate, DDD-mixed isomers, DDT-mixed isomers, DDE-mixed isomers, gamma- BHC, and methoxychlor) and none of the chlorophenoxy herbicides were found (Nightingale, 1987b; Salo, Harrison & Archibald, 1986). The Technical University of Denmark (Mikkelsen, Madsen, Rosbjerg & Harremoens, 1996a; Mikkelsen, Arngjerg-Nielson & Harremoens, 1996b) has been involved in a series of tests to examine the effects of storm water infiltration on soil and groundwater quality. They found that heavy metals and PAHs present little groundwater contamination threat, if surface infiltration systems are used. However, they express concern about pesticides which are much more mobile.

1.2.1. Removal processes in soil

Heavy repetitive use of mobile pesticides, such as EDB, on irrigated and sandy soils likely contaminates groundwater. Fungicides and nematocides must be mobile in order to reach the

target pest and hence, they generally have the highest contamination potential. Pesticide leaching depends on patterns of use, soil texture, total organic carbon content of the soil, pesticide persistence, and depth to the water table (Shirmohammadi and Knisel, 1989). A pesticide leaches to groundwater when its residence time in the soil is less than the time required to remove it, or transform it to an innocuous form by chemical or biological processes. The residence time is controlled by two factors: water applied and chemical adsorption to stationary solid surfaces. Volatilization losses of soil-applied pesticides can be a significant removal mechanism for compounds having large Henry's constants (K_h), such as DBCP or EPTC (Jury, Spencer & Farne, 1983). However, for mobile

compounds having low K_h values, such as atrazine, metolachlor, or alachlor, it is a negligible loss pathway compared to the leaching mechanism (Alhajjar, Simsiman & Chesters, 1990).

1.2.2. Mobility.

Estimates of pesticide mobility can be made based on the three removal mechanisms affecting organic compounds (volatilization, sorption, and solubility), as shown on Tables A (Armstrong & Llena, 1992). Application methods and formulation state can also play a significant role in pesticide mobility. Residues of foliar-applied water soluble pesticides appear in high concentrations in runoff (Pierce & Wong, 1988).

Table A: Mobility class definition

Class	K_d	MI
I-Mobile	<.1-1.0	1-1.0
II-Intermediate Mobility	1.0-10.0	0.01-0.1
III-Low Mobility	10.0-100.0	0.001-0.01
IV-Very Low Mobility	>100.0	<0.001

K_d is the soil adsorption coefficient, ml/g and MI is the mobility index (ratio of pollutant's migration velocity to migration velocity of water under saturated flow).

Source: modified from Armstrong and Llena (1992).

Infiltration Evaluation Methodology and Model Results:

The design of an appropriately-functioning infiltration device, including the prevention of groundwater contamination, requires three steps: (1) determining the concentrations and forms of the pollutants entering and leaving the device; (2) determining the characteristics of the soil that affect water quality; and (3) predicting the potential for groundwater contamination. The goal of an effective screening methodology to evaluate groundwater contamination potential is to incorporate locally-derived data and the available body of research on storm water quality and soils into an evaluation method that can be used to determine if storm water infiltration is feasible at a site.

Step 1: Evaluate Pollutant Loadings and Chemical Forms

Once it is determined which pollutants are found in the storm water runoff for which infiltration is planned, an important consideration for fate and transport is whether or not pollutants of concern are associated with particulates or are in dissolved (ionic) or colloidal forms. Ionic/dissolved or colloidal pollutants are more likely to penetrate into the vadose zone and require a chemical interaction between the soil and the pollutant to prevent transport. Particulate associated pollutants are more likely to be trapped on the infiltration device's surface, or in the near-surface soils.

Sources of Data for Pollutant Concentrations. Using locally-derived data to evaluate the appropriateness of infiltration is preferable; however, there are often financial and time

constraints that preclude local sampling. When local storm water quality data is absent, using regional or land-use-specific data may be the best option. Many Municipal Separate Storm Sewer Systems (MS4s) have monitored their storm water outfalls as part of their permitting process. Outfall data from the site's watershed may prove to be a valuable source of runoff characterization data, assuming the predominant watershed land use is similar to that of the site. Other sources include land-use-specific data cited in the literature. It has been well-documented that several land uses are more likely to generate specific pollutants of concern, e.g., hydrocarbons from highways and maintenance yards; metals from watersheds with substantial quantities of galvanized roofing; lawn care chemicals from well-maintained landscaped areas, etc. When regional or land-use-specific data is absent, the data collected as part of the US EPA's storm water permit program, and summarized in the National Storm water Quality Database (NSQD), is available (Maestre and Pitt 2005). The full database, including summary tables showing median concentrations for different land uses [industrial, commercial, residential, freeway, open space, etc.], is located at <http://unix.eng.ua.edu/~rpitt/Research/ms4/mainms4.shtml>, along with several published papers describing the database features and example evaluations). The NSQD database can provide a first estimate of end-of-pipe concentrations of the pollutants of interest.

Step 2: Evaluation of the Soil for Infiltration:

Soil Chemical Characteristics. One important aspect of soils that affects pollutant movement is the soil's organic content, which ranges from less than 0.05% to greater than 80%, but is most often between 2 and 5%. Greater amounts of organic matter decrease the movement of many pollutants of concern through the soil. In addition, the multitudes of microorganisms present in

the vadose-zone soils fix nitrogen and degrade organic matter and various pollutants. A second important aspect is the pore volume between the grains, which may be filled with water or air.

Infiltration Rate and Capacity. The infiltration capacity of soil is the maximum rate at which infiltration can occur under specific conditions of soil moisture. The infiltration capacity of a soil depends on soil texture, the water content of the soil, its compaction (density), and the presence of macropores and cracks.

Step 3: Predicting Groundwater Contamination Potential Below Infiltration Basins

The prediction of groundwater contamination potential can be very complex – depending on the concentration and form of the pollutant, the characteristics of the soil, and the rate at which water moves through the soil. Mobility is compound-specific and depends on the soil matrix (mostly the soil texture, and associated permeability, and organic content). Other soil characteristics, such as pH, also play an important role in pollutant movement. Two types of models have been developed by the authors to assist stormwater managers with evaluating the potential for groundwater contamination. The first is a simplified method that links in a chart the mobility of the pollutant, the fraction in the filterable (dissolved) phase, and the concentration of the pollutant. This information is combined with the information on the soil type and general soil reactivity to provide a mobility class depending on the type of infiltration device used. The second method described uses a vadose-zone model, developed for predicting pollutant movement beneath a landfill. This model, unlike the simplified method, predicts pollutant concentrations in the groundwater at various depths in the vadose zone after different infiltration time periods, given input parameters of rainfall amount, soil chemistry, and pollutant concentrations of the infiltrating water.

Simplified Method for Predicting Groundwater Contamination

The Groundwater Recharge Committee of the National Academy of Science (Andelman, *et al.* 1994) examined risks associated with recharging groundwater with waste waters (including storm water). General causes of concern included the following:

- High mobility (low sorption potential) in the vadose zone,
- High abundance (high concentrations and high detection frequencies) in storm water, and
- High soluble fractions (small fraction associated with particulates that could be removed at the soil surface by straining or by common sedimentation treatment).

It is possible to assess the need for pre-treatment to reduce the runoff pollutant loadings before infiltration. Results of that analysis (the simplified method predicting groundwater contamination potential) are shown in Clark and Pitt (2007). This simplified method is based on the following assumptions. The contamination potential is the most critical rating of the influencing factors. As an example, if no pretreatment was to be used before percolation through surface soils, the mobility and abundance criteria are most important. The filterable fraction is not as important since no pretreatment is being used. If sedimentation pretreatment is to be used before surface infiltration, then some of the pollutants will likely be removed before infiltration. In this case, all three influencing factors (mobility, abundance in storm water, and soluble fraction) are important. If subsurface injection (with minimal pretreatment) is used, then only abundance is significant. If the pollutant is present in high concentrations, it will likely have an adverse effect on the groundwater. Attenuation through the vadose zone may be insignificant as the water would bypass it if using direct injection. Table 1 is only appropriate for initial estimates of contamination potential because of the simplifying assumptions made, such as the likely worst-case mobility conditions for sandy soils having low organic content.

Table 1. Groundwater Contamination Potential for Stormwater Pollutants (Pitt, *et al.* 1994)

	Compounds	Mobility (sandy/low organic soils)	Abundance in storm-water	Fraction Filterable*	Contam. potential - (surface infiltr. and no pretreat)	Contam. potential - (surface infiltr. with sediment.)	Contam. potential (if sub-surface inj. w/ min. pretreat)	
Nutrients	nitrates	mobile	low/moderate	high	low/moderate	low/moderate	low/moderate	
Pesticides	2,4-D	mobile	low	likely low	low	low	low	
	γ-BHC (lindane)	intermediate	moderate	likely low	moderate	low	moderate	
	malathion	mobile	low	likely low	low	low	low	
	atrazine	mobile	low	likely low	low	low	low	
	chlordane	intermediate	moderate	very low	moderate	low	moderate	
	diazinon	mobile	low	likely low	low	low	low	
Other organics	VOCs	mobile	low	very high	low	low	low	
	1,3-dichloro-benzene	low	high	high	low	low	high	
	anthracene	intermediate	low	moderate	low	low	low	
	benzo(a)anthracene	intermediate	moderate	very low	moderate	low	moderate	
	bis (2-ethylhexyl) phthalate	intermediate	moderate	likely low	moderate	low?	moderate	
	butyl benzyl phthalate	low	low/moderate	moderate	low	low	low/moderate	
	fluoranthene	intermediate	high	high	moderate	moderate	high	
	fluorene	intermediate	low	likely low	low	low	low	
	naphthalene	low/inter.	low	moderate	low	low	low	
	pentachlorophenol	intermediate	moderate	likely low	moderate	low?	moderate	
	phenanthrene	intermediate	moderate	very low	moderate	low	moderate	
	pyrene	intermediate	high	high	moderate	moderate	high	
	Pathogens	entroviruses	mobile	likely present	high	high	high	high
		<i>Shigella</i>	low/inter.	likely present	moderate	low/moderate	low/moderate	high
<i>Pseudomonas aeruginosa</i>		low/inter.	very high	moderate	low/moderate	low/moderate	high	
protozoa		low/inter.	likely present	moderate	low/moderate	low/moderate	high	
Heavy metals		nickel	low	high	low	low	low	high
	cadmium	low	low	moderate	low	low	low	
	chromium	inter./very low	moderate	very low	low/moderate	low	moderate	
	lead	very low	moderate	very low	low	low	moderate	
	zinc	low/very low	high	high	low	low	High	
Salts	chloride	mobile	seasonally high	high	high	high	High	

*"high" contamination potential is for mostly dissolved/ionic or colloidal compounds and would have a low removal potential in typical stormwater treatment devices

Computer Models to Predict Vadose Zone Contaminant Transport

Over the last fifteen years, computer models for the vadose zone have become readily available. Many of these models were developed initially to predict plume migration beneath leaking landfills. They typically focused on the behavior of either organic or inorganic pollutants in the vadose zone. One model, SESOIL (Seasonal Soil compartment model), is capable of modeling both organic and inorganic pollutants (RISKPRO 2003; Clark, *et al.* 2006).

As described earlier, the specific type of soil and its properties have a profound effect on the movement of water and pollutants. Three main properties were identified during modeling studies conducted by Clark, *et al.* (2006): intrinsic permeability, organic content, and pH. Other factors beyond the soil itself also affect pollutant movement and groundwater contamination potential, including pollutant concentrations of the infiltrating water, rainfall, and vadose zone thickness. The primary objective of the research conducted by Mikula (2005) and Clark, *et al.* (2006) was to determine which controlling factors have the greatest influence on the movement of zinc and

sodium chloride in the vadose zone beneath a typical infiltration device. A case study illustrating the use of a vadose zone model can be found in Clark and Pitt (2007).

II. CONCLUSIONS AND RECOMMENDATIONS

Many types of storm water infiltration approaches have been used in urban areas to decrease surface discharges of storm water and restore groundwater recharge. The most common include the following:

- Surface infiltration devices (e.g., grass filters, grass-lined drainage swales, percolating basins, bioretention/biofiltration cells) – infiltration occurs through turf and surface soils, providing the best opportunity for pollutant trapping in the surface soils and vadose zone. The devices listed below discharge stormwater below organic soils, allowing increased pollutant movement to the groundwater.
- French drains or soak-aways (e.g., source area infiltration pits, roof runoff infiltration pits)

- Porous pavements or grid pavers
- Drainage trenches
- Infiltration wells or dry wells
- Percolating pipes

When selecting the appropriate infiltration device for a site (or for determining whether infiltration is a viable option), it is crucial to evaluate the potential for groundwater contamination below the device. As described above, the prediction of the vulnerability of groundwaters to contamination from surface water infiltration is a three-step process. The first step is determining the pollutants of concern and the concentrations and chemical forms of these pollutants. The storm water pollutants of most concern (those that may have the greatest potential Adverse impacts on groundwaters) include the following:

- Nutrients – possibly nitrates in areas having high stormwater nitrate concentrations;
- Pesticides – Lindane and chlordane;
- Other organics – 1,3-dichlorobenzene;
- Pathogens – Enteroviruses and possibly other pathogens, including *Shigella*, *Pseudomonas aeruginosa*, and various protozoa;
- Heavy metals – Nickel and zinc, followed by chromium and lead.
- Salts – Chloride in northern areas where de-icing salts are used for traffic safety.

Identifying the soil characteristics for a particular site affecting pollutant migration is the second step. The information required includes the following:

- Soil texture – Sand, silt, clay, loam, or a combination of these
- Intrinsic permeability
- Hydraulic conductivity
- pH
- Organic content
- Cation exchange capacity

The third step requires using the information determined in the first two steps to predict the potential for groundwater contamination. Two approaches were described in detail in Clark and Pitt (2007). In general, to prevent groundwater contamination below infiltration devices, surface devices (such as grass swales, bioretention/biofiltration cells, and percolation ponds) that have a substantial depth of underlying organic-rich soils above the groundwater, are preferable to using subsurface infiltration devices (such gravel trenches or French drains, and especially injection wells), unless the runoff water is known to be relatively free of pollutants. Infiltration of stormwater from residential areas is also safer than from more contaminated areas, unless suitable pre-treatment is used. Pre-treatment to remove solids and particulate-associated pollutants will also reduce the required maintenance frequency of the infiltration component of the treatment train.

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IN VITRO TESTING OF ANTIMICROBIAL PROPERTIES OF LEMONGRASS, EUCALYPTUS AND THEIR SYNERGISTIC EFFECT

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Abstract- Herbal medicine represents one of the most important fields of traditional medicine all over the world. Plants produce certain bioactive compounds which are naturally toxic to microorganisms and so have been investigated as therapeutic agents. The present study was carried out so as to evaluate in vitro the antimicrobial effect of essential oils of two aromatic medicinal plants namely, Lemongrass and Eucalyptus. The in vitro evaluation was done for individual oils and combination of the two oils in 1:1 ratio against four bacterial pathogens of nosocomial infections namely *Staphylococcus aureus*, *Bacillus subtilis*, *Escherichia coli* and *Klebsiella pneumoniae*. The combination formula was used with two assumptions one that individual oil may show ineffectiveness if used repeatedly as seen in antibiotics and second the combined formulation may show wider range of antimicrobial activity. The antimicrobial activity of the plant essential oils was screened using Agar well diffusion method and the minimal inhibitory concentration (MIC) of the essential oils was determined by Broth assay method. The study showed promising results for the use of Lemongrass and Eucalyptus as antimicrobial agents.

Index Terms- Antimicrobial activity, Bioactive compounds, Drug resistance, Medicinal plants, Nosocomial infections.

I. INTRODUCTION

Medicinal plants are part and parcel of humans since the dawn of civilization. In India they form the back bone of several indigenous traditional systems of medicine. Today, pharmacological studies have acknowledged the value of medicinal plants as potential source of bioactive compounds. It has been estimated that between 60-90% of the populations of developing countries use traditional and botanical medicines almost exclusively and consider them to be a normal part of primary healthcare (WHO, 2002).

In herbal medicine, crude plant extracts in the form of infusion, decoction, tincture or herbal extract are traditionally used by the population for the treatment of diseases, including infectious diseases. Although their efficacy and mechanisms of action have not been tested scientifically in most cases, these simple medicinal preparations often mediate beneficial responses due to their active chemical constituents (Barnes et al., 2007). To promote the proper use of herbal medicine and to determine their potential as sources for new drugs, it is essential to study medicinal plants, which have folklore reputation in a more intensified way. In recent years, multiple drug resistance in both human and plant pathogens has developed due to indiscriminate use of synthetic drugs. This drives, the need to screen medicinal plants for novel bioactive compounds as plant based drugs are safe, biodegradable and have fewer side effects.

Lemongrass (*Cymbopogon citratus*) and Eucalyptus (*Eucalyptus globulus*) are very famous aromatic medicinal plants. They contain essential oils which are volatile, concentrated and hydrophobic liquids usually with pleasant and sometimes intensive odors. These essential oils contain bioactive compounds which are used mainly for medicinal purposes. They are applied directly on to the skin for treatment of different ailments and can also be consumed in very low concentrations. These compounds either act on different systems of animals including man, and/or act through interfering in the metabolism of microbes infecting them. The microbes may be pathogenic or symbiotic. In either way the bioactive compounds from medicinal plants play a determining role in regulating host-microbe interaction in favor of the host. These compounds exert a wide spectrum of biological activities such as antimicrobial, antiseptic, stimulant, carminative, diuretic, analgesic, etc.

Plant-derived extracts are available for sale in the local markets in India. The present study was an attempt to evaluate in vitro the antibacterial activity of the aromatic medicinal plants Lemongrass and Eucalyptus essential oils individually and in combination against the bacterial test cultures which especially cause nosocomial infections. Even though some reports are available on antimicrobial activity of these oils, the studies on multiple oil usage is negligible. One of the reasons for using it as combination formula is assumption that individual oil may show ineffectiveness if used repeatedly and irrationally as seen with irrational use of

antibiotics. Another reason is the combined formulation may show wider range of antimicrobial activity as well as better inhibition of pathogens. The microbial strains selected include Gram Positive bacteria- *Staphylococcus aureus*, *Bacillus subtilis* and Gram negative bacteria- *Escherichia coli* and *Klebsiella pneumoniae*.

II. MATERIALS AND METHODS

II.1. Materials required:

II.1.1. Plant extracts:

Pure essential oils of Lemongrass and Eucalyptus were obtained from a local outlet in Hyderabad, India, which sells the plant extracts as therapeutic agents.



Figure 1: Essential oils of Lemongrass, Eucalyptus and their mixture

II.1.2. Bacterial test cultures:

Pure cultures of the following Microorganisms were used for screening the antimicrobial properties of plant essential oils.

- a) *Staphylococcus aureus*
- b) *Bacillus subtilis*
- c) *Escherichia coli*
- d) *Klebsiella pneumoniae*

The pure cultures of these test bacteria were obtained from National Collection of Industrial Microorganisms (NCIM), NCL, India. The cultures were maintained on Nutrient Agar (HI Media, India) slopes at 4°C and sub-cultured before use.

II.1.3. Culture media:

- a) Nutrient broth
- b) Nutrient agar
- c) Mueller Hinton Agar

II.2. Methods followed:

II.2.1. Agar well diffusion method for screening the antimicrobial activity of plant essential oils:

In vitro antibacterial activity was studied against four bacterial strains using Agar well diffusion method. In this method the antimicrobials present in the plant essential oil are allowed to diffuse out into the medium and interact in a plate freshly seeded with the test organisms. The Mueller-Hinton agar plates were seeded with the overnight broth culture of each test organism (1.5×10^8 CFU/ml). Wells were prepared in seeded agar plates with 6mm diameter and 100 μ l of each essential oil (125 μ g/ μ l concentration) was introduced in each well. The solvent used for preparing essential oil solution was absolute alcohol or ethanol. Solvent control well was run for every assay. All the inoculated plates were incubated at 37°C for 24 hours in the incubator. The antimicrobial spectrum of the extract was determined in terms of diameter of inhibition zones. A zone of inhibition of 12mm (millimeter) or above was considered as sensitive and less than 12mm as resistant. The entire experiment was carried out under strict aseptic conditions. The samples were run in triplicates and each result is a mean of the three values obtained. The concentration for plant essential oils was selected based on MIC values that had previously been evaluated.

II.2.2. Evaluation of the synergistic effect of the two plant essential oils (phytochemicals):

This evaluation was done according to Agar well diffusion method on the four bacterial test cultures. The aliquots of 100 μ l of bacterial cultures grown in Nutrient broth for 18 hours (1.5×10^8 CFU/ml) were spread plated on Mueller-Hinton agar medium

supplemented with 100µl of both the plant essential oils together (50µl + 50µl with 125µg/µl concentration). The methodology followed was same as above.

II.2.3. Broth assay method for determination of MIC:

Minimum bactericidal concentrations of the extracts were determined by a broth assay using Nutrient broth. The aim of a broth assay is to determine the lowest concentration of the assayed antimicrobial agent (minimal inhibitory concentration, MIC) that, under defined test conditions, inhibits the visible growth of the bacterium being investigated. MIC values are used to determine susceptibilities of test cultures to bioactive compounds at lowest concentrations. Four bacterial samples [*K. pneumoniae*, *S. aureus*, *B. subtilis* and *E. coli*] were grown in Nutrient broth for 6 hours. Next, 100µL (10⁶ cells/mL) of each bacterial culture was inoculated in tubes with Nutrient broth supplemented with different concentrations of the phytochemicals in the ratio 1:2, 1:4, 1:8, 1:16, 1:32, 1:64, 1:128 and 1:256 respectively, which were prepared from stock solution (with 1 gm/ml concentration) through serial dilution using ethanol as diluent. A control was maintained for ethanol. After incubation at 37 °C for 24 hours, the MIC of each sample was determined by looking for turbidity as a measure of the bacterial growth comparing the sample with the negative control which was non-inoculated Nutrient broth and the positive control which was Nutrient broth without any phytochemical.

III. RESULTS AND FINDINGS

Table 1: Results for Gram positive bacteria-*Staphylococcus aureus* and *Bacillus subtilis*

S.No.	Antimicrobial agent/ essential oil	Zone of inhibition (diameter in mm.)	
		<i>Staphylococcus aureus</i>	<i>Bacillus subtilis</i>
1.	Lemon grass	30	25
2.	Eucalyptus	20	22
3.	Lemon grass + Eucalyptus	20	30

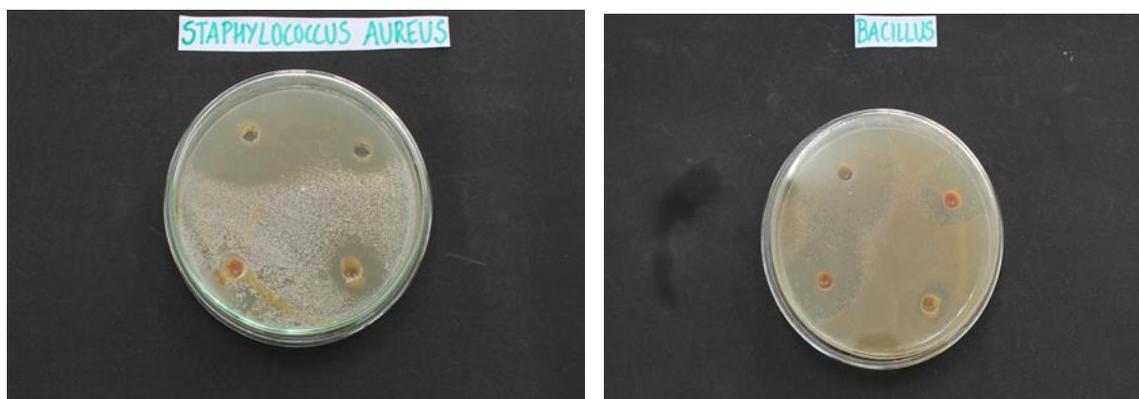


Figure 2: Zones of inhibition in Gram positive bacteria

Table 2: Results for Gram negative bacteria-*Escherishia coli* and *Klebsiella pneumonia*

S.No.	Antimicrobial agent/ essential oil	Zone of inhibition (diameter in mm.)	
		<i>E. coli</i>	<i>Klebsiella pneumoniae</i>
1.	Lemon grass	25	25
2.	Eucalyptus	15	20
3.	Lemon grass + Eucalyptus	15	26

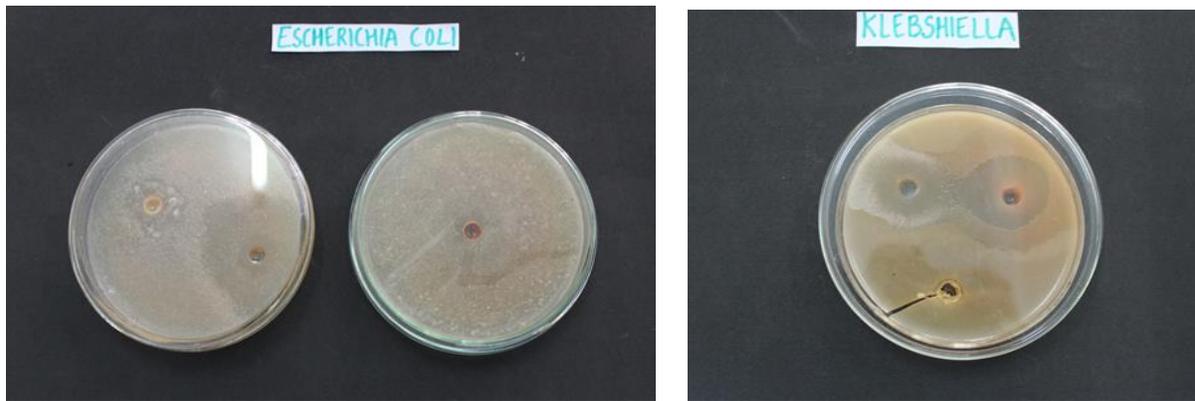


Figure 3: Zones of inhibition in Gram negative bacteria

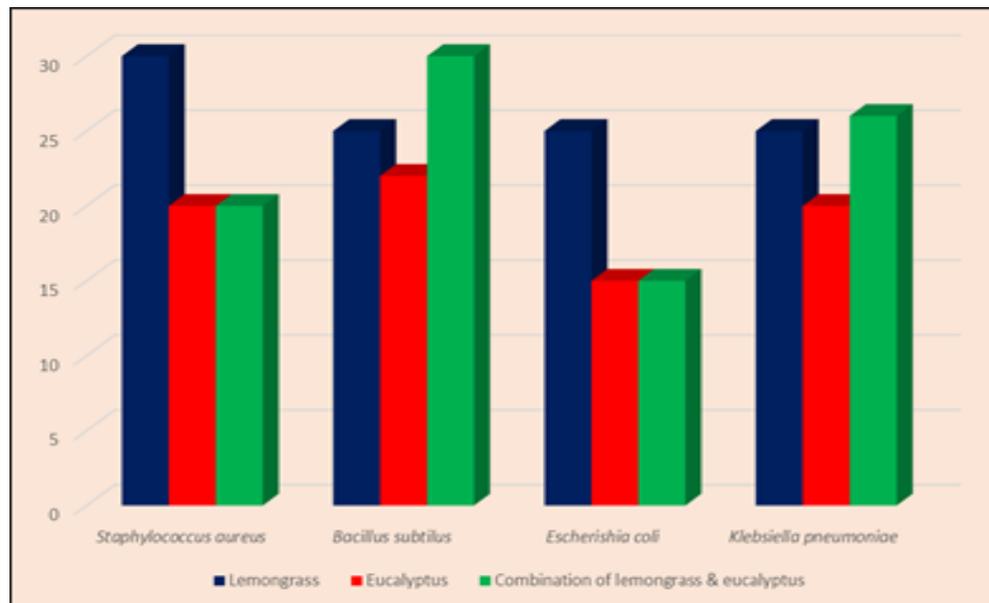


Figure 4: Comparison of antimicrobial activity of test oils

Table 3: MIC of Lemongrass

S.No.	Dilutions of Lemongrass essential oil	Concentrations of essential oil (mg/ml)	Turbidity			
			<i>Staphylococcus aureus</i>	<i>Bacillus subtilis</i>	<i>E. coli</i>	<i>Klebsiella pneumoniae</i>
1	1:2	500	-	-	-	-
2	1:4	250	-	-	-	-
3	1:8	125	-	-	-	-
4	1:16	62.5	+	+	+	+
5	1:32	31.25	+	+	+	+
6	1:64	15.625	+	+	+	+
7	1:128	7.813	+	+	+	+
8	1:256	3.906	+	+	+	+

[+: Presence of turbidity indicating growth; - : Absence of turbidity indicating no growth]



Figure 5: Tube Dilution Assay of Lemongrass

Table 4: MIC of Eucalyptus

S.No.	Dilutions of Eucalyptus essential oil	Concentrations of essential oil (mg/ml)	Turbidity			
			<i>Staphylococcus aureus</i>	<i>Bacillus subtilis</i>	<i>E. coli</i>	<i>Klebsiella pneumoniae</i>
1	1:2	500	-	-	-	-
2	1:4	250	-	-	-	-
3	1:8	125	-	-	-	-
4	1:16	62.5	+	+	+	+
5	1:32	31.25	+	+	+	+
6	1:64	15.625	+	+	+	+
7	1:128	7.813	+	+	+	+
8	1:256	3.906	+	+	+	+

[+: Presence of turbidity indicating growth; - : Absence of turbidity indicating no growth]



Figure 5: Tube Dilution Assay of Eucalyptus

IV. DISCUSSION

Among four bacterial strains tested, two were Gram positive bacteria namely, *Staphylococcus aureus* and *Bacillus subtilis* and two were Gram negative bacteria namely, *Escherichia coli* and *Klebsiella pneumoniae*. Gram positive and Gram negative bacteria show difference in their sensitivity towards antibiotics which are used as therapeutic agents. This difference is attributed to differences in their cell wall composition. Gram negative bacteria have thin layer of peptidoglycan and has outer membrane made up of lipoproteins and lipopolysaccharides. Gram positive cell wall has thick peptidoglycan layer and lacks outer membrane.

The plants extracts used in the study namely, Lemongrass and Eucalyptus showed high inhibitory effect on both Gram positive and Gram negative bacteria. Lemongrass showed highest inhibition zones for all the test cultures, when tested by agar well diffusion

assay (Kirby Bauer method). Both the herbal oils showed slightly higher inhibitory effect on growth of Gram positive bacteria and moderate effect on Gram negative bacteria. The combination of two oils in 1:1 ratio showed higher inhibitory activity against *Bacillus subtilis* and *Klebsiella pneumoniae* but did not have any beneficial inhibitory effect for *Staphylococcus aureus* and *E.coli*.

Gram positive and Gram negative test cultures were equally sensitive to both the oils individually as well as in combination and did not show difference because of the Gram character. Thus these oils may have its action on proteins, cell membranes or any other enzymatic processes.

The MIC for Lemongrass and Eucalyptus oil for all the test cultures was found to be 125 mg/ml and below that it was not effective in inhibiting the growth of any of these cultures. The extracts were tested using ethanol as solvent. Ethanol at this concentration did not have any inhibitory effect when tested as control.

The pathogens used like, *Staphylococcus aureus*, *E.coli*, *Klebsiella pneumoniae* are the leading nosocomial infective agents. The routes of pathogen transmission are many and varied. Spread is by direct or indirect contact with animate or inanimate objects, and may be horizontal or vertical (ref. [7]).

Wide scale use of antibiotic led to microbial drug resistance, an adaptive response in which microorganisms are able to tolerate any amount of drug that would ordinarily be inhibitory (ref. [8]). Therefore, the use of essential oils from plants seems to be the practical alternative or a supportive treatment process. The combined therapy may become useful in blocking the ways of microbes to develop resistance to antimicrobial agents.

V. CONCLUSION

Our study of in vitro testing of antimicrobial activity indicates promising results for the use of Lemongrass, Eucalyptus & Lemongrass and Eucalyptus as combined oil preparation as therapeutic agents against *Staphylococcus aureus*, *E.coli*, *Klebsiella pneumoniae* and *Bacillus subtilis*.

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Leveratiracetam in Status Epilepticus

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I. INTRODUCTION

Status Epilepticus is a medical emergency with significant morbidity and mortality. Refractory status epilepticus is a prolonged status epilepticus with a grave prognosis until treated timely and wisely. Various agents are used for Status Epilepticus but fewer studies are there for control of refractory status epilepticus. This review highlights the use of levetiracetam in refractory status epilepticus.

Refractory status epilepticus is defined as seizures which last longer than sixty minutes despite treatment with a benzodiazepine and an adequate loading dose of intra venous antiepileptic drug⁽¹⁾ It has high mortality (32-77%) and requires prompt management. Refractory status epilepticus is also associated with co-morbidities and multiple organ dysfunction in patients in intensive care unit (ICU).⁽²⁾

Refractory status epilepticus may cause irreversible brain injury⁽³⁾. Currently recommended drugs are midazolam, pentobarbital and propofol but these drugs often necessitates ionotropic and ventilatory support.⁽⁴⁾ There arises a need for much safer drug which are effective as intravenous agent and does not result in prolonged sedation and respiration compromise. Refractory status epilepticus is more prevalent in incidence than recurrent status epilepticus. Risk factors predisposing to refractory status epilepticus include delay in receiving treatment, infections of central nervous system, metabolic encephalopathy and hypoxia and much more^(5,6,7).

Encephalitis is a predictor for refractory status epilepticus, which is associated with markedly poor outcome, in particular, the development of post status epilepticus symptomatic epilepsy.⁽⁸⁾ Pathophysiology of refractory status epilepticus includes failure of normal factors that serve to terminate a typical seizure and it is γ -amino butyric acid (GABA) receptor mediated inhibition. In addition, there is activation of N-methyl-D aspartate (NMDA) receptor by glutamate leading to propagation of seizure activity. In experimental models, resistance to both benzodiazepenes (BZP) and GABA leads to prolonged seizure. Continuous EEG monitoring is required in diagnosis and management especially in non convulsive status epilepticus and electrographic seizures.

To date, no randomised controlled trials are done for status epilepticus refractory to first and second line therapy. Most experience exists with continuous IV infusion of pentobarbital, Midazolam and propofol.^(9,10) Traditional drugs like barbiturates such as pentobarbital or thiopental which are used to terminate status epilepticus has side effects like coma and EEG suppression. Propofol treated 21 episodes (67%) of refractory status epilepticus but reported to have 23% deaths. Propofol causes metabolic acidosis and cardiovascular collapse with prolonged used leading to death⁽¹¹⁾ called as propofol infusion

syndromes. Intravenous Midazolam has failed in 14-18% of refractory status epilepticus⁽¹²⁾.

First clinical trial for IV levetiracetam in status epilepticus was reported by moddelat et all⁽¹³⁾. In 2006, levetiracetam was approved as first newer anticonvulsant formulation for patients with epileptic seizure unable to take oral medication. IV Valproate has shown significant promise in this regard⁽¹⁴⁾ and now IV levetiracetam is demonstrating similar promise. USA Food and Drug administration in 2006 approved IV formulation of levetiracetam for instances in which oral medication cannot be used.

Lawrence J Hersch⁽¹⁴⁾ has reported experience with use of IV levetiracetam for treatment of 18 episodes of benzodiazepine refractory focal status epilepticus and in 16 patients including 4 patients with secondary generalized status epilepticus. They noted no severe side effects and further suggested that IV levetiracetam may be an alternative for treatment of refractory status epilepticus in future even in patients that did not respond to benzodiazepines.

Initially IV levetiracetam was not approved for higher doses or for use in status epilepticus. However, studies showed that upto 2500 mg over 5 minutes and upto 4000 mg over 15 minutes could be administered safely to normal volunteers⁽¹⁵⁾. Knake et all reported use of levetiracetam mean loading dose of 944 mg/d. there was no serious adverse effect and intubation was avoided in 17 out of 18 episodes. Efficacy was impressive with clinical seizure activity stopping in all patients. **Five** patients had failed IV valproate prior to receiving IV levetiracetam, only one had failed IV phenytoin first. All patients were discharged on oral levetiracetam with mean dose of 2000 mg/day⁽¹⁶⁾. Limitation of the study, it was highly selective (i.e. those patients with hepatic failure and to avoid interaction with anticoagulant or chemotherapy). Nonetheless, Knake et all report is quite encouraging and provide justification for further prospective clinical trials.

Levetiracetam stops seizure activity mainly by desynchronizing neuronal network without affecting normal neuronal transmission thereby preventing burst firing. Levetiracetam binds to synaptic vesicle **protease 2A**, a regulator of vesicular traffic and prevent early changes in gene expression during kindling and modulates effect of calcium and GABA.

IV Levetiracetam is required mainly in critically ill patients who can not take the drug orally. Levetiracetam bio-availability is 95%⁽¹⁶⁾. There are several studies that have found oral levetiracetam (via naso-gastric tube) to be effective in acute refractory seizures including **NCSE**^(17, 18, 19). Another study reported use of IV Levetiracetam in 50 critically ill patients including 24 with status epilepticus. Status epilepticus ceased in 2/3rd of cases at a mean dose of 1780 mg, typically given over 15-30 minutes and seizure cessation was confirmed by EEG. 20

of 50 patients given IV Levetiracetam developed transient thrombocytopenia. No serious adverse effects were noted except agitation and infection which were more frequent in individuals on Levetiracetam than on placebo in clinical trials⁽²⁰⁾. So this needs more comparative, prospective trials. Nonetheless IV Levetiracetam has many attractive features that will ensure its common use in the in patients settings including most by renal clearance, virtually no interaction, rare allergic reactions, minimal respiratory and cardiovascular effect with IV loading, broad spectrum and ease of use. No other IV medication for seizures shares these features. Lawrence Hirsch report provides justification for continued use of IV Levetiracetam for critically ill patients with seizures especially refractory status epilepticus.

P. Bhargava also reported IV levetiracetam use in refractory status epilepticus in 3 cases where IV levetiracetam has been successful in abating refractory status epilepticus⁽²¹⁾.

Pastalas showed that levetiracetam has many favourable drug profile like no protein binding, no hepatic or renal metabolism, no autoinduction and no accumulation on multiple dosing. Successful oral levetiracetam use for refractory status epilepticus also been reported⁽²²⁾. Ramel et al have demonstrated the safety and tolerability of IV Levetiracetam at doses higher than proposed⁽²³⁾.

II. CONCLUSION

Levetiracetam can be use to control status epilepticus and refractory status epilepticus effectively in ICU setting. Its use in NCSE has been showed in one pilot study. While waiting for large, controlled studies, IV Levetiracetam might be an alteranative for treatment of refractory status epilepticus especially in elderly patients with vascular status epilepticus and concomitant medical conditions.

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Investigating the Relationship between Citizenship Behavior and Social Discipline (The Case Study: Shahrekord)

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Abstract- The present study was taken from a study titled "investigating the relationship between citizenship behavior and social discipline" and its objective is to study and investigate the relationship between citizenship behavior and the citizens' tendency toward social discipline. Its research design is descriptive and it was conducted through correlation method and with an applied objective. In order to measure the variables two questionnaires (citizenship behavior and tendency to social discipline) have been used. The statistical population included all citizens of Shahrekord from whom 105 were selected via multi-stage random sampling. The achieved data were too analyzed through applying t-test, correlation and regression analysis. Some of the findings are the followings: the importance of law, punctuality, personal cleaning, observing traffic rules, psychological growth, right social action and public health are above the mean level in the citizens. The tendency toward social discipline in the citizens is above the mean level. The importance of law from the viewpoint of citizens, punctuality, personal and environmental cleaning, observing traffic rules, psychological growth, right social action and public health have significant relationship with their tendency to social discipline, moreover near 37% of the changes associated with the citizens' tendency to social discipline is explained through their citizenship behavior and it is related to it and the other changes regarding tendency to social discipline are explained by other variables out of the study.

Index Terms- citizenship behavior, social discipline, citizens, Shahrekord

I. INTRODUCTION

The promotion of social discipline and regulation is one of the most important objectives which each country seeks to get (Gidens, translated by Saboori, 2010). Accepting the discipline is among remarkable issues that inattentiveness on the part of the people to observe it in the society will lead to anarchy and turmoil (Ghavam and Dehghan, 2000:2). Regarding to the analyses carried out we will lead to this conclusion that creating discipline and security in public extent needs behavioral manifestation under the effect of majority of people which the scholars mention it under the name of citizenship behavior (Habermas, 1992:455). A brief look at the present world and complex social interactions between the people has made prominent the requirement of accounting for citizenship behavior

more than before. Today, whether in major systems of the society wherein the governments codify strategies or in the areas of the provinces and cities and in minor systems of the family wherein the parents are the authors of the objectives and strategies the existence of people with features such shouldering the responsibility, being critical, patriotism, and in whole, a responsible citizen are among vital and important constituents (Gha'edi, 2006). Its importance is to such extent that many of the strategists of the society assume the lack of such factor as the most critical reason for such programs and plans not being administered which have been codified with specialty and theoretical care (Fathi Vajargah and Vahed, 2009).

The citizens of every society are the basic and fundamental elements of that society. Certainly having such citizens who are responsible and aware of their behavior, rights and duties and consider themselves responsible for their society's future fate and participate in different related affairs guarantees the society's survival and the promotion of discipline in the society (Mahmoodi, 2008). Needing good and active citizens has caused the citizenship change into a global demand, the concept of citizenship as an individual who accepts his commitments against the society and besides retaining his/her basic rights assumes the awareness as the requirement of partnership is a way today many of the organizations assume their legality possible through it, the feature of a good citizen is so important that should be continuously taken into account from the beginning and birth by the parents, at school and from the first grade by the teachers and at the society level by the principle institutions (Fathi Vajargah and Vahed, 1999). Although the citizenship training in developed educational systems is considered as an important aspect of education and developed countries, too, spend high amounts of money to better access to the objectives of such training, yet the citizenship training confront serious challenges and sometimes there is suspicion regarding its success (Faulks, 2001). Along with it, the citizens play a major role in promoting social discipline as an effective group and can critically help the executants of discipline and security (Sarraf and Abdollahi, 2006). In the course of studies carried out in this regard we perceived that numerous studies have carried out regarding citizenship behavior and social discipline separately and even the relationship between citizenship and some variables and also the relationship of some variables and social discipline have been conducted, but regarding the relationship between citizenship behavior and social discipline there has not been any studies so far. According to this research we are going to

investigate the relationship between citizenship behavior and their tendencies to social discipline and also the extent of each aspect and constituents of citizenship behavior on high school students' tendency to social discipline besides determining the features of citizenship behavior of the people in Shahrekord and

the degree of their tendencies to social discipline; and the following conceptual model has been applied in order to explain the relationship between citizenship behavior and the tendency toward social discipline.

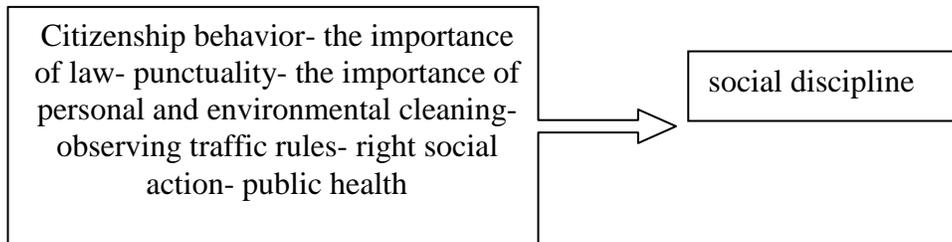


Figure 1. conceptual model.

According to the above conceptual model in the present study, the following hypotheses have been investigated:

1. Tendency toward citizenship culture is above the mean in the citizens of Shahrekord.
2. Tendency toward social discipline is above the mean in the citizens of Shahrekord.
3. There is a significant relationship and tendency toward social discipline.

II. DEFINITIONS

Social discipline, normative and ultra-personal discipline, in fact it is these norms that specify people as an interactive set in the group and... and helps to observe each others' rights (Chalabi, 1996:33)

Citizen comes from Persian word "Shahrvand" composing of the word "Shahr" and suffix "vand". "Shahr" in Persian means "large village" or "country" (Moiem, 2nd volume : 2096). Citizen is a person who interferes and participates in public activities. (Farmahini, 2011). Citizens are all the residents in the city of Shahrekord.

III. LITERATURE REVIEW

Bagheri (2010) in a study entitled "the design of social discipline and its role in regulating the citizens from the standpoint of residents in the town of Afzalipoor in Kerman" stated that there is a significant relationship between the increase of legalism and the design of social discipline. Further there is no significant relationship between facilitating social life and the design of social discipline and there is a significant relationship between preventing expressing aggravation of illegality and the design of social discipline. There is no significant relationship between observing citizenship rights and the design of social discipline. Moreover it has not been observed any significant difference between the subjects' views regarding administering this design in regulating citizens in terms of gender and age. But a significant difference has been observed in terms of education level.

Maleki (2009) in a study under the name of "promoting the level of social discipline at schools, an unknown requirement for

cooperation of institutions and disciplinary education" has concluded that providing a healthy social environment entails creating disciplined schools. The schools' discipline has been used to indicate external manifestations of those intruding and damaging the discipline and welfare at schools, in this study it was tried to investigate the approaches of different societies against the issue of disciplines at school. The achieved results of these studies imply that social, economic, and cultural changes in different societies, especially those undergoing development, the need of reviewing and change in educational and training systems and processes, an generally, in all aspects of educational system mentions that these changes, the indices such as structural status and the schools' condition, behavioral problems, the students' morale should be specially taken into account.

The studies carried out by Atzioni (1998) indicated that teaching citizenship rights and creating citizen skill have special importance in the society. The children, as a citizen, should be trained in such a way that they can participate in social activities of the environment, get familiar with their rights and do their duties in interacting with the society. Therefore Education and Citizenship exceed judicial decision making and judgment in social relationships to that extent that it includes citizenship teaching. Mutual respect is among citizens who show difference in ethnic, lingual, racial, cultural, religious and sexual identities that of course on teaching these skills should be emphasized.

IV. METHOD

Since the present study works on developing applied knowledge in the area of explaining the relationship between citizenship behavior and tendency to social discipline it is applied in terms of method, and due to the fact that its objective is to know the extent of the effect of citizenship behavior of the citizens on the social discipline it is among descriptive studies; further, because it accounts for the analysis of the status, regular description of the relationship between citizenship behavior and social discipline in the present study and in the actual form it is in correlational type. The current statistical population included all the citizens in Shahrekord. In order to determine the needed sample size, Gorjesi and Morgan (1970) ki-square statistics has been applied. Through conducting related calculations the

required sample size equaled 105 who were selected via multi-stage random sampling method.

In order to measure the variables and collect required data in the present study besides library information for accessing to literature review, in the field stage, in order to collect needed data, two questionnaires (citizenship behavior and the tendency to social discipline) have been applied. In table 1 the reliability of the questionnaires are given:

Table 1. the Cronbach alphan reliability of research questionnaires

Questionnaire	citizenship behavior	social discipline
	%78	%69

Table 2: the results of t-test of citizenship behavior of citizens

Variable/constituent	mean	standard deviation	number	standard score	T	d,f	sig
Citizenship behavior	13.3	3.21	105	10	83.79	104	0/000
the importance of law	4.58	26.48	105	21	59.16	10	0/000
Punctuality	4.71	25.67	105	21	55.81	104	0/000
the importance of personal and environmental cleaning	6.02	41.63	105	30	70.80	104	0/000
observing traffic rules	8.60	43.02	105	33	51.23	104	0/000
psychological growth	2.58	16.03	105	12	63.53	104	0/000
right social action	2.11	11.20	105	9	54.41	10	0/000
public health	4.27	29.23	105	24	70.07	104	0/000

As it is observed in table 2, the variables of the importance of law, punctuality, importance of personal and environmental cleaning, observing traffic rules, psychological growth, right social action and public health of the citizens have been analyzed through differentiating with standard score, standard deviation, t-test, and significance level. The results of the table show that: the mean score of citizenship behavior of the citizens was 13.3 which is above the standard score of 10 and this amount is significant at sig=0/000 $\text{ } t=83/79$ level, therefore the citizenship behavior of the citizens is above the mean level.

The mean score of the importance of law is 26.48 which is above the standard score of 21 and this amount is significant at sig=0/000 $\text{ } t=59/16$, so the importance of law is above the mean in the citizens.

The mean score of punctuality is 25.67 which is above the mean standard score of 21 and this amount is significant at sig=0/000 $\text{ } t=55/81$, therefore punctuality is above the mean level in the citizens.

The mean score of the importance of personal cleaning is 41.63 which is above the standard score of 30 and this amount is significant at sig=0/000 $\text{ } t=70/80$, therefore the importance and personal cleaning is above the mean level in the citizens.

The mean score of observing traffic rules is 43.02 which is above the standard score of 33 and this amount is significant at

V. FINDINGS

In order to analyze the data in the present study, t-test, correlation, and regression analysis have been used. It should be pointed out that all the statistical calculations have been conducted through SPSS software. It is followed by the results of testing hypotheses.

The tendency to citizenship behavior is above the mean in the citizens

In order to assess the citizenship behavior of the citizens, seven variables of the importance of law, punctuality, the importance of personal and environmental cleaning, observing traffic rules, psychological growth, right social action and public health have been considered. Standard score was achieved through calculating the mean score of each variable. In table 2 the mean and standard score of the citizens in the variables under study have been rendered.

sig=0/000 $\text{ } t=51/23$, therefore observing traffic rules is above the mean level in the citizens.

The mean score of psychological growth is 16.03 which is above the standard score of 12 and this amount is significant at sig=0/000 $\text{ } t=63/53$, therefore psychological growth is above the mean level in the citizens.

The mean score of right social action is 11.20 which is above the standard score of 9 and this amount is significant at sig=0/000 $\text{ } t=54/41$, therefore right social action is above the mean level in the citizens.

The mean score of public health is 29.23 which is above the standard score of 24 and this amount is significant at sig=0/000 $\text{ } t=70/07$, therefore public health is above the mean level in the citizens.

According to the results of table 1 we understand that among the features of the citizens, the importance of law, punctuality, the importance of personal and environmental cleaning, observing traffic rules, psychological growth, right social action and public health are above the mean level. Therefore, the hypothesis 1 in the fields of the importance of law, punctuality, the importance of personal and environmental cleaning, observing traffic rules, psychological growth, right social action, and public health has been confirmed.

Tendency to social discipline is above the mean level in the citizens.

In order to assess the tendency the citizens' social tendency of the citizens, 15 questions have been considered. The standard score was achieved through calculating the mean score of the

tendency toward social discipline. In table 3, the mean and standard score of the citizens in the variable of tendency toward social discipline have been investigated.

Table 3: the results of t-test of tendency toward social discipline of the citizens

Tendency toward social discipline	mean	standard deviation	number	standard score	T	d,f	sig
	61.84	10.08	105	45	62.84	104	0/000

As it was observed in table 3, the variable of the tendency toward social discipline of the citizens have been analyzed through differentiating with standard score, standard deviation, t-test, and significance level. The results of the table indicate that: the mean of the citizens' tendency to social discipline is 61.84 which is about mean score of 45 and this quantity is significant at $\text{sig}=0/000$ و $t=62/84$, therefore the tendency toward social discipline in the citizens is above the mean level. Taking the results stated in table 2 we perceived that the mean of the tendency toward social discipline in the citizens is above the mean, therefore the hypothesis 2 is among the confirmed fields.

There is a significant relationship between citizenship behavior and tendency toward social discipline.

The correlation coefficient in each of the variables (0.58, 0.47, 0.44, 0.51, 0.35, 0.37, 0.33, 0.41) and their achieved

significance level is (0.000) respectively indicate the significant relationship between citizenship behavior, legalism, punctuality, personal and environmental cleaning, traffic laws, the importance of psychological growth, right social action, the importance of public health from the viewpoint of the citizens and their tendency toward social discipline is at 0.1 and 0.5 and we conclude that each of these variables has a significant relationship with tendency toward social discipline. Generally the results imply that among the above variables, the variables of citizenship behavior (total) and the importance of personal and the environmental cleaning have had the greatest relationship with the variable of the tendency toward social discipline.

Table 4: the results of t-test, significant correlation between citizenship and social discipline

Predictive variable	criterion variable	coefficient	Sig (nificance)	result
Citizenship behavior	social discipline	0.58	0.000	hypothesis confirmation
the importance of law	social discipline	0.47	0.000	hypothesis confirmation
Punctuality	social discipline	0.44	0.000	hypothesis confirmation
the importance of personal and environmental cleaning	social discipline	0.51	0.000	hypothesis confirmation
observing traffic rules	social discipline	0.35	0.000	hypothesis confirmation
, psychological growth	social discipline	0.37	0.000	hypothesis confirmation
right social action	social discipline	0.33	0.000	hypothesis confirmation
public health	social discipline	0.41	0.000	hypothesis confirmation

Regression analysis, the effect of citizenship behavior on the tendency toward social discipline of the citizens

In tables 5 to 7 the summary of the results of regression analysis of the predictive variable (citizenship behavior) on the criterion variable (tendency toward social discipline) has been given. In table 5 the amount of identification coefficient (R Square=0.37) indicates that near to 37% of the changes related to the tendency toward social discipline of the citizens is explained through the citizenship behavior and relates to them and other changes associated with their tendency toward social discipline are explained through other variables out of this research.

Table 5: the coefficient of determining research variables

Model	R	R square	Adjusted R square	Std. Error of the estimate
1	0.611 ^a	0.374	0.329	8.26393

a. Predictors: (constant), health, punctuality, action, guidance, law, growth, cleanign

In table 6, it was also observed that the achieved F is significant up to a thousands; the above fact implies that at least one of predictive variables (the constituents of the variable of citizenship behavior) has been effective in predicting criterion

variable (tendency toward social discipline), that here the constituents of (the importance of rules and regulations, punctuality, personal cleaning, the importance of traffic rules and right social actions) the variable of citizenship behavior has been

effective in predicting the tendency toward the citizens' social discipline.

Table 6 the results of variance analysis

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	3953.192	7	564.742	8.269	.000 ^a
Residual	6624.370	97	68.292		
Total	10577.562	104			

- a. predictors: (constant), health, punctuality, action, guidance, law, growth, cleaning
- b. Dependent variable: cleaning

Table 7 shows the coefficient of standardized and un-standardized variables. Looking at the column of significance it can be seen that there is significant relationship between rules and regulations, punctuality, the importance of personal and environmental cleaning, the importance of observing traffic rules and right social action; however there is no significant

relationship between the constituents of the importance of social growth and public health of the citizens and their tendencies toward social discipline. Moreover, the results prove that within the variables, the constituents of the importance of personal and environmental cleaning, the importance of punctuality, the importance of rules and regulations, the importance of observing the traffic rules and right social action had the highest effect on the citizens' tendency toward social discipline.

Table 7: standardized and un-standardized coefficients of the research variables

Model	Un standardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	10.180	7.072		1.439	.153
Law	.309	.240	.140	1.288	.040
punctuality	.440	.206	.206	2.138	.035
Cleaning	.395	.224	.236	1.764	.031
Guidance	.052	.118	.115	.445	.047
Growth	-.152	.490	-.039	-.311	.097
Action	.549	.438	.045	1.253	.050
Health	.334	.245	.142	1.364	.176

- c. Dependent variable: discipline

Taking these descriptions into account, if we want to write a regression linear equation regarding Beta coefficient, it will be like the following:

$$Y (\text{discipline}) = .24(\text{cleaning}) + .21(\text{punctuality}) + .14(\text{laws}) + .16(\text{guidance}) + .05(\text{action})$$

VI. CONCLUSION

The presents study's objective was to explain the relationship between citizenship behavior in the people of Shahrekord with their tendency toward social discipline and it aimed to investigate the relationship and the effects that this variable has on the citizens of Shahrekord toward social discipline besides determining the degree of citizenship behavior in them.

The results showed that the citizenship behavior in the citizens of Shahrekord is above the mean level. Therefore, the citizenship behavior of the citizens should be strengthened and promoted and this ability should be improved through some teaching to strengthen citizenship behavior in the people.

Moreover the results showed that attending to the laws, observing traffic rules, punctuality, personal and environmental cleaning and, psychological growth, right social action have right and direct relationship with social discipline; so it is necessary for the school books, between-primary school and between-school teaching, teaching families, all, to be along with teaching and promoting citizenship behavior. Since citizenship behavior manifests an ideal society and competent society, then teaching its basic principles and concepts can be the solution of so many problems of the societies. Authorities and executants of social issues should be the idea model for citizenship behavior.

The findings indicated that the importance of law, punctuality, personal cleaning, psychological growth and right social action are above the mean level. Therefore hypothesis 1 stating that the citizenship culture is above the mean in the citizens has been confirmed.

Moreover, the results proved that the tendency toward social discipline is above the mean level in the citizens. According to the results it can be perceived that the mean of the tendency toward social discipline in the citizens is above the mean level. So the second hypothesis has been confirmed.

The results also imply that the citizenship behavior of the citizens relates significantly with their tendency toward social discipline. Moreover the results indicated that the importance of law from the viewpoint of citizens with their tendency toward social discipline, punctuality from the standpoint of the citizens with their tendency toward social discipline, the importance of personal and environmental cleaning from the viewpoint of citizens with their tendency toward social discipline, the importance of observing traffic rules from the viewpoint of citizens with their tendency toward social discipline, the importance of psychological growth from the viewpoint of citizens with the tendency toward social discipline, the importance of right social action from the viewpoint of citizens with their tendency toward social discipline and the importance of public health from the viewpoint of the citizens with their tendency toward social discipline, all, have significant relationship. Further, the results indicated that near 37% of the changes associated with the tendency toward social discipline of the citizens is explained through their citizenship behavior and relates to them and other changes regarding their tendency toward social discipline is explained by other variables out of this study. Moreover, the results show that among the variables, the constituents of the importance of personal and environmental cleaning, the importance of punctuality, the importance of rules and regulations, the importance of observing traffic rules and right social action had the highest effect on the citizens' tendency toward social discipline. According to the findings, it is necessary to have special plans at schools and educational centers in order to remove the citizenship and social discipline problems and difficulties.

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A Survey on “Energy Efficient Routing Techniques in Wireless Sensor Networks Focusing On Hierarchical Network Routing Protocols”

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Abstract- Wireless Sensor Networks have an extensive range of applications but they are conquered with many challenging problems and complications that need to be addressed. The energy consumption of the nodes and the extension of the network lifetime are the core challenges and the most significant features of the routing protocol in order to make it suitable, effective and efficient for WSNs. As the sensor nodes are basically battery powered devices, so the top concern is always to how to reduce the energy utilization to extend its lifetime. In the past few years WSNs has gained a considerable amount of attention from both the research community and the real users. The researchers also proposed many different energy efficient routing protocols to achieve the desired network operations. In this paper there is an attempt to give a wide comparison of the routing protocols in WSNs focusing on the hierarchical or clustering based routing protocols. Moreover, extracting the strengths and weaknesses of each protocol, providing a comparison among them, including some metrics like scalability, mobility, power usage, robustness etc. to make it understandable and simple to select the most suitable one as per the requirement of the network.

Index Terms- Wireless Sensor Networks, Routing Protocols, Sensor nodes, Energy Efficiency, Power Management

I. INTRODUCTION

Wireless Sensor Networks (WSNs) brought a dramatic variation in bringing advancement in technologies and also providing opportunities for effective usage of resources in critical environments [2]. WSNs are basically the collection of wireless nodes having limited energy capabilities, are deployed randomly over a dynamically changing atmosphere, may be mobile or stationary, for observing physical phenomena like humidity, temperature, health monitoring, vibrations, seismic events etc. [4][5]. Selecting a routing strategy is the core issue for gathering and delivering the efficient packets of useful information to the specified destination. So the routing strategy should guarantee the least energy consumption resulting in maximizing the network's lifetime [6].

The WSNs may be used in the variety of everyday life activities or services. For example its common use is for monitoring like in Military to detect enemy intrusion or monitoring the air pollution or to be used for forest fire detection to control when a fire has started. In addition, an important area of use is the healthcare sector. Moreover, the use of WSNs on agriculture may benefit the industry frees the farmer from the maintenance and wiring in a difficult environment [5].

A sensor node is typically an ultra-small limited power device that consists of four basic components. First is the sensing part for data acquisition, then the control system for the local data processing and memory operations (storage), then a communication subsystem for transmission and reception of data from other linked devices and finally a power source that supplies the required energy for performing the desired tasks [1][3]. This power source usually comprises of a battery with limited energy so if a critical node stops working then it's a big and serious protocol failure. The main thing is that it could be impossible to recharge the battery because the nodes are deployed and spread randomly in a hostile environment or any other area of interest such as unapproachable areas or the disaster locations for getting the required information. So to fulfil the scenario requirements the sensor nodes should have enough and prolonged life time, even in some cases up to several months or years can be required. So the question arises that “how to elongate the lifetime of the node for such a long duration” [2][3].

It is also possible to use the energy from the external environment e.g. using the solar cells as a power source [7]. But usually a non-continuous behavior is usually observed from the external power sources so some energy buffer is also needed. Whatever is the situation; energy is a serious resource and should be used very carefully. So what is clear from it is that energy is a main issue for the systems grounded on WSNs.

The distributed protocols can be a good solution in handling the failures more efficiently. Clustering based routing protocols which are designed for the energy efficiency of a network are capable of data aggregation [2]. Delay can be easily reduced because with in a cluster the localized algorithms can function without the wait of the control messages. So as compared with the centralized ones the localized algorithms can achieve more stability and throughput. In clustering certain nodes are selected as Cluster Heads (CHs) which had to spent more energy than rest of the nodes for a specific time frame. The information from the sensor nodes is accelerated to CHs and then these CHs are responsible to handover the information to the base station (BS) which is placed far apart from the field. Many

cluster based protocols like LEACH [8][14], LEACH-C [9][15], PEGASIS [10], TEEN[11], APTEEN[12], VGA[13] etc. are proposed which enlighten the efficient usage of energy in wireless sensor networks.

This paper is structured as follows: The section 2 enlightens the related work in the surveys of routing protocols in WSNs. In section 3 the Network Lifetime is defined and the vital concept behind any technique used for energy efficient routing. The objective of section 4 is to understand the sources of energy waste in WSNs. In section 5, I described and compared different clustering protocols schemes and showing some of the advantages and disadvantages of them. Finally in section 6, I conclude the paper.

II. RELATED WORK

An enormous number of current works and efforts are on the go, for the advancement of routing protocols in WSNs. These routing protocols are grounded on the application needs and the structure of the network. However, there are some issues that must be taken into consideration while mounting the routing protocols for WSNs. The most important and glittering factor is the energy efficiency of the sensors that directly influence the lifetime of the network. There are numerous surveys and Journals on routing protocols in WSNs and an effort is done to present below and discuss the dissimilarities between them.

In survey [4], the authors explained comprehensively the design problems and techniques for the WSNs (2002). They define the “physical constraints of sensor nodes” and the “proposed protocols” apprehending all layers of the network stack. Other than that the potential applications of sensor networks are also discussed. But the list of discussed protocols in the paper can't give the complete picture and the scope of the survey. My survey is more dedicated to the energy efficiency of WSNs providing the classification of the existing routing hierarchical protocols. I also discussed a number of already developed energy-efficient routing hierarchical protocols and provide guidelines to the readers to select the most suitable protocol for their network.

The [23], is a survey on “routing protocols in WSNs” presented in 2004. Flat, hierarchical, and location-based routing protocols are the three routing techniques classified in this survey based on the structure of the network. These protocols are further classified into “multipath-based, query-based, negotiation based, and QoS-based routing techniques”. In total it presents 27 routing protocols. Furthermore, this paper presents a fine number of energy efficient routing protocols which have been established for WSNs. Challenges in routing are also presented and Design Issues are also mentioned in the paper. On the other side, in my work I focused on the energy efficiency issues in WSNs. I provide some details and comparisons on energy efficient protocols that may help researchers on their work to some extent.

The survey in [24] discusses some of the routing protocols for sensor networks and classifies them into “data-centric, hierarchical and location-based “(2005). Although it describes routing protocols for WSNs but it does not focus on the energy efficient policies. On the other side, I mainly focused on the energy-efficient routing hierarchical protocols elaborating the strengths and flaws of each protocol in such a way as to provide directions to the readers to choose the most effective energy-efficient routing hierarchical protocol.

In [25], authors give a “systematical investigation of current state-of-the-art algorithms “(2007). The authors categorize the algorithms in the minimum energy broadcast/multicast problem and the maximum lifetime broadcast/multicast problem in wireless ad hoc networks. Characteristically, the two key energy-aware metrics that are taken in consideration are “minimizing the total transmission power consumption of all nodes involved in the multicast session and maximizing the operation time until the battery depletion of the first node involved in the multicast session”.

The survey in [26], shows a “top-down approach “of numerous applications and reviews on many features of WSNs in 2008. It organizes the problems into three different kinds: “internal platform and underlying operating system, communication protocol stack, network services, provisioning, and deployment”. But the survey didn't provide a detailed comparison of the protocols. My work is a dedicated study on energy-efficient clustering protocols and provides guidelines to the readers on selecting the most appropriate protocol.

In [27], the authors present a survey that is focused on the energy consumption based on the hardware components of a typical sensor node (2009). They distribute the sensor node into four key components: “a sensing subsystem including one or more sensors for data acquisition, a processing subsystem including a micro-controller and memory for local data processing, a radio subsystem for wireless data communication and a power supply unit”. The paper is concentrated on the explanation of the characteristics and benefits of the taxonomy of the energy conservation schemes. The protocols are categorized into “duty-cycling, data-driven and mobility based”. In the next protocols, more details and discussion are presented of this classification. Moreover, different approaches to energy management are provided and highlighted. They conclude that “the sampling phase may need a long time especially compared to the time needed for communications”.

In [28], the design issues of WSNs and classification of routing protocols are presented (2009). Moreover, a few routing protocols are presented based on their characteristics and the mechanisms they use in order to extend the network lifetime without providing details on each of the described protocols. Also, the authors do not present a direct comparison of the discussed protocols. In our work we do not only focus on the energy-efficient protocols but we also discuss the strengths and weaknesses of each protocol in such a way as to provide directions to the readers on how to choose the most appropriate energy-efficient routing protocol for their network.

The paper [29] enlightens the challenges in the design of the energy-efficient MAC protocols for the WSNs presented in 2009. It describes 12 MAC protocols for the WSNs highlighting their strengths and weaknesses. The paper neither deliberates the energy-efficient routing protocols established on WSNs nor gives a comprehensive comparison of the protocols.

In survey [30], some energy-efficient routing techniques for “Wireless Multimedia Sensor Networks (WMSNs)” are presented in 2011. The authors also focused on the performance matters of each strategy. The design tasks of routing protocols for WMSNs are also highlighted in the paper. Furthermore, taxonomy of current routing protocols for WMSNs is also presented. This survey paper discusses few issues on energy efficiency.

Though, there are decent number of surveys for “sensor networks, or routing and MAC algorithms for WSNs” ([4], [23], [24], [25], [26], [27], [28], [29] and [30]), but this paper gives a brief survey emphasizing on the energy-efficient routing hierarchical protocols in WSNs. My survey is focused on the energy efficient clustering protocols in WSNs that can provide some directions to the readers. Moreover, I also discussed the strengths and weaknesses of each clustering protocol making a comparison between them including some metrics.

III. NETWORK LIFETIME EXPLANATION

Recently, the most thought-provoking concern in “WSN” is how to save the node energy as well maintaining the wanted network performance. Till their being alive, these nodes can perform their work, but after that it will not be possible. Its mean is that the goal of every energy efficient technique is to optimize the life duration of these energy nodes through which the lifetime of the “WSN” will be increased. So its mean, lifetime of the single node, should be increased. In the literature, related to the definitions of network lifetime, there is no absolute consensus, which leading us toward the cluster of definition. Following are some more relevant and common definitions of the network lifetime which are based on the previous work on “WSN” [16], [17]. Different authors describe the network lifetime, based on the different reasons as:

- According to the definition as per literature of the time, when all the nodes are alive also called as “n out of n in [17], where n is the total number of sensors”, the network lifetime based on the number of alive nodes. But as per the literature review, on assumption has been found that for the satisfaction of above definition, it’s necessary to assume that “sink” nodes are more sophisticated and powerful that’s why they should be out of the set of nodes. If the topology changes have been controlled as the external variable in this model of definition, then it will be easy to compute the lifetime of network. In the case of opaque networks, this type of metric does not work as actually the lifetime evaluation. So its means that this metric based on two presumptions as: 1) all nodes are of equal importance, 2) all nodes are critical to network application. One variant describes the lifetime of the network with a minimum threshold β . Its mean that the lifetime of network will be the time till the fraction of an alive node fall below β [18]. The positive side of it is that it reflects the redundancy but not precisely defines the correct assembly of applications, where the failure of at most $\beta\%$ of sensors near the sink can stop the sink to obtain composed data. Literature review showing that many authors have changed the “cluster head” dynamically, to stable the consumption of energy.
- *Some authors define the lifetime of the network based on coverage.*
Let’s firstly define the coverage. Coverage reveals that in the monitored area, how well the network can detect an event. That’s why many authors define the lifetime of network as the time during which the sensor nodes cover the relevant interest. At one point, it’s going to lack the importance that it does not ensure that composed data are delivered to the sink or not. That’s why the 100% efficiency is not sufficient.
- *Definition here is based on not the coverage, but based on the connectivity.*
It means that the ability to transfer the data to a sink is considered here as the base to define the connectivity. Here the authors [21] describe the time as the least point, when either the %age of “alive nodes” or the size of the main connected component of the network falls below a definite threshold.
- Some authors define the lifetime of network by considering that network is “alive as long as application functionalities are required.” Kumar et al. [22] define “we define the lifetime of a WSN to be the time period during which the network continually satisfies the application requirements”. Tian and Georganas [18] propose another explanation as “the network no longer provides an acceptable event detection ratio.” But to some extent, it becomes irrelevant.

In the summary of the above defined statement, it’s obvious that while defining the lifetime of network, the concept of coverage, connectivity, and to some extent the requirements of the application functionalities for “WSN” have to consider. Because the idea of the application requirements will lead the authors to further refine the concept of the lifetime of network. Indeed on the users side, it will lead toward the more accurate and relevant evaluation.

IV. REASONS OF ENERGY WASTE IN WSNs

If have to save the energy then lessening data extracted from transducer is necessary. During the reporting, repetition can be arisen because of the intrinsic redundancy in “WSN”. It’s true that the communication subsystem is a gluttonous cause of the energy debauchery because in communication, wastage of energy occurred in those states which are useless from the application point of view. Some of them are as follows [16]:

Crash: All the packets will be crashed, when a node obtains more than one pack at the similar time. All packs that grounds the smash have to be castoff and the retransmission of these packs is obligatory.

Overhearing: P.Minet in “Ad Hoc and Sensor Wireless Networks” explains that “when a sender transmits a packet, all nodes in its transmission range receive this packet even if they are not the intended destination. Thus, energy is wasted when a node receives packets that are destined to other nodes.”

Control Packet Overhead: To enable data transmission, the minimal number of control packets should be used.

Idle Listening: it's occurred, when a node listens to an idle channel to get probable traffic. It is considered the biggest source of energy wastage.

Interference: P.Minet in "Ad Hoc and Sensor Wireless Networks" explains that "each node located between transmission range and interference range receives a packet but cannot decode it."

V. HIERARCHICAL NETWORK ROUTING PROTOCOLS

In "Hierarchical Networks" protocols nodes are grouped into the clusters, as compare to flat protocols in which each node has its distinctive universal address and all the nodes are peers. In "Hierarchical Networks", each cluster owns a cluster head, of which election is established on the different election algorithm. Uses of cluster head are: 1) *advanced level of communication*, 2) *decreasing the transportation overhead*. Having the identical level of communication thoughts in each level, the clustering can be drawn-out to the more than just two levels. Indeed, this technique also has a lot of positive points, among all of them, reducing the size of routing tables along with increasing the scalability is very dominant benefit.

LEACH: "Low-Energy Adaptive Clustering Hierarchy":

In this type of hierarchical protocol, most of the nodes communicate to cluster heads (C.H) [8], [14].

"LEACH" consists of two phases:

The Setup Phase: in this phase, the clusters are ordered and then C.H¹ has been selected. The task of C.H is to cumulate, wrapping, and forward the information to the base station (Sink).but question is that how it will be decided, that which node will be C.H? "Stochastic algorithm" will be used in this round of selection. But it will be applied with a condition that, if a node will be C.H, the next time it will not be selected in the "P- Round"². It means that in each round the possibility to become the C.H for each node is 1/P. by doing this a systematic rotation of the nodes in each round leads toward balanced energy consumption by all the nodes and indeed will enhance the lifetime of the network.



The Study State Phase: in the previous state, the nodes and the C.H have been organized, but in the second state of "LEACH", the data is communicated to the base station (Sink). Duration of this phase is longer than the previous state. To minimize the overhead, the duration of this phase has been increased. Each node in the network, contact with the cluster head, and transfer the data to it, after that C.H will develop the schedule to transfer the data of each node to base station. D.A. Vidhale et al describes main advantages of this technique as "it outperforms conventional communication protocols, in terms of energy dissipation, ease of configuration, and system lifetime/quality of the network" As per these advantages, "wireless Distributed protocol" will help pave the way in "WSN". Basically in the "LEACH", the "single hop" routing has been used, in which each node can be transmitted directly to the sink (Base Station). It's a way of dynamic clustering, which help to extra overhead like the advertisements, which leads toward the lessen the addition in energy consumption.

LEACH-C "Low-Energy Adaptive Clustering Hierarchy Centralized:

As compare to the "LEACH", the base station is used to develop the C.H, instead of nodes will be configured themselves into the C.H [15]. How the BS (Base Station) will work in this regard to develop the C.H? Firstly the BS obtains data as per the location & energy level of every node in the network. On the second stage it will find a recent number of C.H and the after that it will be organizes the network into the clusters. It has been completed in respect to curtail the energy, mandatory for non CH nodes to convey their information to their particular cluster heads.

Following are the improvements as compare to "LEACH":

- The BS uses its universal knowledge of the network to create clusters that necessitate less energy for data broadcast.
- In "LEACH-C" the number of C.H in each round equals a prearranged optimum value.

PEGASIS "Power-Efficient Gathering in Sensor Information Systems":

It is a "chain-bases protocol" and an upgrading of the "LEACH" [10]. In "PEGASIS" every node transfers only with a close neighbor to direct and obtain information. It receipts turns communicating to the BS, thus decreasing the quantity of energy consumed per round. The nodes are in this way that a chain should be developed, which can be completed by the sensor nodes along with using an algorithm. On the other hand, the BS can compute this chain and transmission of it to all the sensor nodes.

In the simulation, it is completed in a system that has 100 situated nodes but randomly. The BS is located at a distant distance from all the remaining nodes. Thus, for "a 50m x 50m plot", the BS is situated at "(25, 150)" so that the BS is at least "100m" remote away

¹ C.H means the Cluster Head.

² "Where P is the desired percentage of cluster heads".

from the neighboring sensor node. To develop the chain, it is expected that all nodes have universal information of the system and that a greedy algorithm is engaged. Thus, the structure of the chain will begin from the remote node to the nearer node. If a node expires, the chain is rebuilt in the similar method to avoid the lifeless node.

Overall, the "PEGASIS" protocol offerings two or more than two presentation in contrast with the "LEACH" protocol [31], [32]. Though, the "PEGASIS" protocol reasons the dismissed data broadcast meanwhile one of the nodes on the sequence has been carefully chosen. Unlike "LEACH", the conveying distance for most of the nodes is condensed in "PEGASIS". Investigational consequences show that "PEGASIS" delivers enhancement by factor 2 compared to "LEACH" protocol for "50m x 50m network" and upgrading by factor 3 for "100m x 100m network". The "PEGASIS" protocol, though, has a serious problem that is the terminated broadcasting of the data. The reason of this difficulty is that there is no thought of the BS's location for the energy of nodes when one of nodes is nominated as head of node.

TEEN "Threshold sensitive Energy Efficient sensor Network protocol":

Manjeshwar et al explains about "TEEN" as "The TEEN is a hierarchical protocol designed for the conditions like sudden changes in the sensed attributes such as temperature [11]." indeed, the responsiveness is important for all those situations, where the time critical applications are required, which mostly happened in the network of responsive node.

In this structure, the closer nodes form the clusters, and this procedure goes on the 2nd level until the sink is grasped. In this arrangement, the cluster-head broadcasts to its followers the "Hard Threshold (HT)" and the "Soft Threshold (ST)". The "HT" is a threshold charge for the detected feature. It is the complete value of the feature beyond which, the node identifying this value must shift to its receiver and explain to its C.H. The "ST" is a minor alteration in the value of the identified feature which activates the node to shift on its receiver and communicate. The nodes identify their surroundings constantly. Firstly a parameter from the feature set access to "HT", the node shifts on its receiver and directs the detected data. The identified value is deposited in an inner variable of the node, called the "sensed value (SV)".

The key benefit of "TEEN" is that it performs sound in the circumstances like unexpected variations in the identified characteristics like temperature. On the other side, in big area networks and when the number of covers in the pyramid is small, "TEEN" inclines to consume a lot of energy, because of long remoteness broadcasts. Furthermore, when the number of covers rises, the broadcasts converts into shorter and overhead in the system stage as well as the process of the system exist.

APTEEN "Adaptive Threshold sensitive Energy Efficient sensor Network":

The "APTEEN" is an expansion of "TEEN" and goals at both taking episodic data gatherings and replying to time critical events [12]. As soon as the BS formulates the clusters, the C.H transmits the features, the values of threshold and schedule of transmission to all nodes. After that, the C.H performs data accumulation, which has as a consequence to preserve energy. The core benefit of "APTEEN", contrasted to "TEEN", is that nodes use less energy. However, the foremost disadvantages of APTEEN are the complication and that it results in lengthier deferment times.

VGA "Virtual Grid Architecture Routing":

VGA associates the "data combination and in-network processing" to get energy efficient system and expansion of network lifetime [13]. This whole scheme can be distributed into two phases, first is "clustering" and the other is "routing of aggregated data". In the first phase, sensors are organized in a fixed topology because many applications require stationary sensors. Inside each cluster there is a CH, recognized as "local aggregator (LA)", which performs the aggregation. A subdivision of this LA is designated to perform "global or in-cluster aggregation" and its associates are named as "master aggregator (MA)". In the second phase, some heuristic are suggested which may provide effective, modest, efficient and an optimal solution. The core benefit of this protocol is that it can achieve energy efficiency and can expand the network lifetime, but the problem of optimal selection of LAs as MAs is a solid problem.

EESAA "Energy Efficient Sleep Awake Aware":

The goal of EESAA is to minimize the energy consumption by using the concept of pairing. Sensor nodes of same application and which are at the minimum distance between them will form a pair for data sensing and communication. This protocol will also use the Cluster Heads selection technique, by selecting CHs on basis of the remaining energy of the nodes. Information from the sensor nodes is forwarded to the cluster heads (CHs) and these CHs are responsible to transmit this information to the base station which is placed far away from the field.

According to this scheme [2], the nodes switch between "Sleep" and "Awake" modes during a particular communication Interval. Firstly node in a pair, switch into Awake mode also called "Active-mode". This happens if its distance from the sink is less than its coupled node. Node which is in "Active-mode" will gather data from surroundings and transmits it to the CHs. During this time period transceiver of the coupled node will remain "off" and switches into "Sleep-mode". In the next step, nodes in "Active-mode" will switch into "Sleep-mode" and "Sleep-mode" nodes switches into "active-mode". By this process the consumption of energy can be minimized because nodes which are in "Sleep-modes" save their energy by not interacting with the CHs. "Unpaired nodes" remain in "Active-mode" for each round till their energy resources died. This method lessons the energy consumption but is still not up to the mark for the upcoming network requirements. Another thing is that there can be large number of isolated nodes in the cluster which are left out in the coupling process, remain active for whole network life time, hence consuming considerable amount of energy.

Table 1. shows the summary of the comparison of hierarchical routing schemes.

TABLE I. HIERARCHICAL ROUTING SCHEMES COMPARISON (redrawn from [5])

Scheme	Advantages	Drawbacks	Scalability	Mobility	Route Metric	Periodic Message Type	Robust
LEACH	Low energy, ad-hoc, distributed protocol	It is not applicable to networks deployed in large regions and the dynamic clustering brings extra overhead	Good	Fixed BS	Shortest Path	None	Good
LEACH-C	The energy for data transmission is less than LEACH	Overhead	Good	Fixed BS	The best route	None	Good
PEGASIS	The transmitting distance for most of the node is reduced	There is no consideration of the base station's location about the energy of nodes when one of the nodes is selected as the head node	Good	Fixed BS	Greed route selection	None	Good
TEEN	It works well in the conditions like sudden changes in the sensed attributes such as temperature	A lot of energy consumption and overhead in case of large network	Good	Fixed BS	The best route	None	Limited
APTEEN	Low energy consumption	Long delay	Good	Fixed BS	The best route	IMEP Control	Good
VGA	It may achieve energy efficiency and maximization of network lifetime	The problem of optimal selection of local aggregators as master aggregators is NP-hard problem	Good	No	Greed route selection	None	Good

VI. CONCLUSION

WSNs have greatly prolonged playing a key role for the data efficient selection and delivery. The energy efficiency is a very most important issue for the networks particularly for WSNs which are described by "limited battery capabilities". Due to complexity in WSNs operations, what is required is the use of energy-efficient routing techniques and protocols, which will assure the network connectivity and routing of information with less required energy.

In this paper, our focus was on the energy efficient hierarchical protocols that have been developed for WSNs. If we talk about a large network, the flat protocols become "infeasible" because of link and the processing overhead. This is a problem and the hierarchical protocols try to solve it and as a result produce scalable, efficient and effective solutions. They split the network into "clusters" to proficiently maintain the energy consumption of sensor nodes and also perform "data aggregation and fusion" to lessen the number of transmitted messages to the sink. The clusters are arranged based on the energy backup of sensors and sensor's nearness to the CH. Thus, we can conclude that the hierarchical protocols are appropriate for sensor networks with the heavy load and wide coverage area.

So in order to develop a scheme that will prolong the lifetime of the WSNs is needed to increase the energy consumption of the sensors with in the network.

Therefore, the application of the appropriate routing protocol will enhance the lifetime of the network and at the same time it will guarantee the network connectivity and effective and efficient data delivery.

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Hernial Sac Tuberculosis- An Unusual Presentation of Gastrointestinal Tuberculosis: Case Report with Review of Literature

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Abstract- Gastrointestinal tuberculosis, an endemic disease in India and Africa continues to surprise us with its myriad ways of presentation. In a resource poor country like ours high index of suspicion based on meticulous clinical and vigilant intraoperative examination of the pathological tissues can often unravel coexisting diagnosis. We describe here an interesting case of hernia sac tuberculosis suspected on an unreported physical finding of presence of palpable nodule at the hernial site. Clinical suspicion prompted cautious intraoperative search for any abnormality of the hernia sac and its contents. Firm, nodular swellings were found on the hernial sac wall which were confirmed on histopathological examination as tuberculous granulomas.

Index Terms- Gastrointestinal tuberculosis, Hernial sac tuberculosis, Indirect inguinal hernia, Hernial sac, Tuberculous granulomas.

I. INTRODUCTION

Gastrointestinal tuberculosis (GTB) is a common entity in India,^[1,2] where the protean clinical manifestations continue to challenge the clinicians in its diagnosis and therapy. In a resource poor country like ours high index of suspicion based on meticulous clinical and vigilant intraoperative examination of the pathological tissues can often unravel coexisting diagnosis. We describe here a case of 10-year old male child who presented with a left inguinal hernia and diagnosed as a case of hernial sac tuberculosis.

II. CASE REPORT

A 10-year-old male child presented with a left inguinal hernia of 6 months duration, associated with mild pain but no other significant complaints.

General physical, abdominal and chest examination were normal.

Local examination revealed left sided inguinal hernia. Interestingly on completely reducing the hernia and palpation firm nodularity was felt at the hernial site which kept us curious till the time of herniotomy. The external genitalia was normal.

Preoperative investigations revealed hemoglobin of 11.3 g/dl, total leukocyte counts 7800/mm³ with neutrophils 67.7% and lymphocytes 19.9%, fasting blood sugar 78mg/dl, ESR 18mm in 1 hr (Westergren method). His routine preoperative chest x-ray was essentially normal.

On operation, a left indirect inguinal hernia (omentalocele) was found. A careful visual inspection of the hernia sac and its contents was done due to preoperative physical finding of nodularity. It revealed few firm nodules on the inner surface of the sac. The omentum was grossly unremarkable. Herniotomy was done and excised sac was sent for histopathological examination. In the absence of other abdominal symptoms and evidence of other abdominal organ involvement laparoscopy or laparotomy was not done. Post-operative recovery of the patient was uneventful.

Histopathology report showed multiple granulomas along with Langhan's giant cells and caseous necrosis in the peritoneal tissue background (figs 1 & 2) which were suggestive of tuberculosis.

Postoperatively Mantoux skin test was done which showed a 10x15 mm induration (after 48 hrs) thereby supporting the diagnosis of hernial tuberculosis. The patient was put on standard antitubercular treatment regime by the paediatricians and was doing well at follow-up.

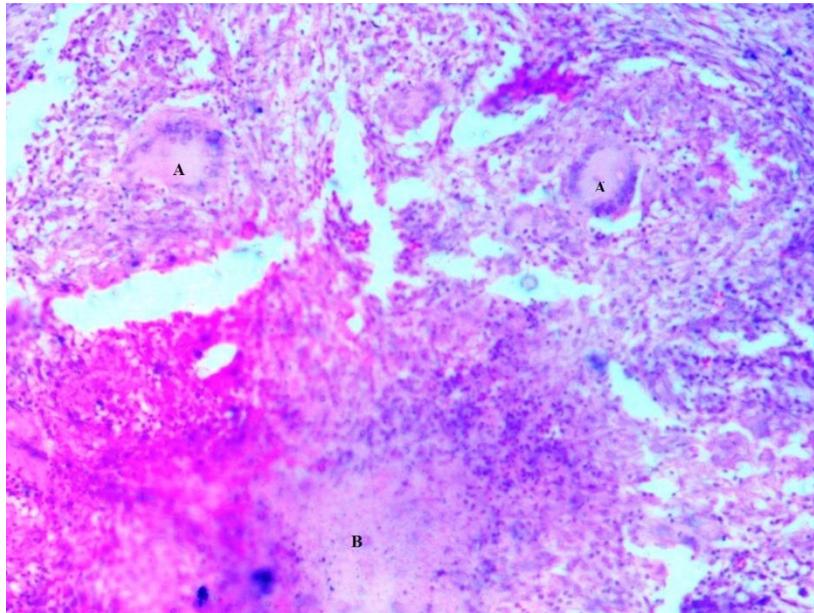


Figure 1: Haematoxylin and Eosin stained section (100x) showing giant cells(marked as A). and caseous necrosis(marked as B).

III. DISCUSSION

GTB is the sixth most frequent site of extrapulmonary involvement in tuberculosis (TB) with rising trends seen with ever increasing incidence of Human Immunodeficiency Virus (HIV) infection,^[1,2]. In decreasing order gastrointestinal involvement include: the ileocecal region, ascending colon, jejunum, appendix, duodenum, stomach, esophagus, sigmoid colon, and rectum,^[3].

A recent study from India found that GTB was seen in 11.2% of children affected with TB of which over 50% have extra-abdominal manifestations,^[4]. Inguinal hernia is one of the commonest surgical problems encountered in day-to-day practice. It is quite surprising, that with such wide prevalence of GTB,^[4] involvement of sac or its contents is not common in patients with inguinal hernia in our country,^[5] even though the momentum is a common content of the sac.

A review of rather meagre literature about Hernial tuberculosis (HT)^[6] states that it involves sac, its contents or both. In children it affects only the sac because the sac is usually empty and the concomitant visceral involvement usually affects the viscera, the hernia sac is always involved and when it affects the hernia sac the entire peritoneal surface is also involved^[6].

The probable mechanism can be that, the congenital groin sac, as in the present case, is the lower most part of the peritoneal sac into which the seeding of the tuberculous bacterium from the peritoneal cavity can occur through gravitational forces.

There are three forms of HT : Miliary or ascitic, ulcerocaseous and fibrous,^[6]. The clinical findings of HT are pain, change in size & consistency of hernia bulge and incarceration which is the most constant finding besides the usual constitutional symptoms of tuberculosis. We describe here an unreported physical finding of presence of palpable nodule at the hernial site.

Histopathological examination of tissue samples like the sac wall for mycobacterium tuberculosis is essential for the confirmation of diagnosis,^[6].

Surgery involves repair of inguinal hernia, wide resection of the sac and resection of the involved omentum. Bowel resection can be necessary in presence of strictures, firm adhesions, localized ulcerative lesions as well as strangulation and incarcerations. All cases must receive full course of antituberculous therapy,^[6].

If at operation the hernia sac is seen to be abnormal or is thickened, then histology should always be performed. However routine histological examination of hernia sacs is not recommended. Kasson and colleagues routinely examined 1020 hernial sacs after surgery^[7]. The incidence of unexpected findings, the discovery of an occult tumor in those specimens which appeared normal at operation was 1 in 1020(0.098%).

As pointed by Vashist et al,^[8] presence of tubercles in omentum or hernia sac during hernia surgery should be biopsied and sent for histopathology to rule out tuberculosis. In our patient there was preoperative suspicion of HT which lead to close visual inspection of the sac tissue and later histopathological examination to confirm our suspicion of HT.

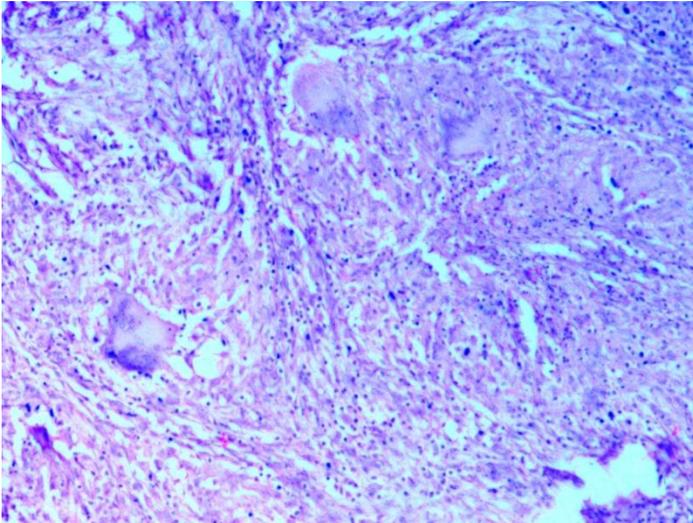


Figure 2: Haematoxylin and Eosin stained section (100x) showing peritoneal tissue on the upper left corner along with granulomas.

IV. CONCLUSION

HT though rare should be kept in mind in tuberculosis endemic countries like India & the continent of Africa. Palpation of the hernia site after complete reduction of hernia should be done preoperatively. Any abnormality of hernia sac found on preoperative physical examination and intraoperatively should be followed by histopathological examination. If confirmed as GTB, it should be promptly treated by standard antituberculous treatment which goes a long way not only in good recovery but also preventing life threatening complications of GTB like intestinal obstruction and bowel perforation.

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Pose Estimation Algorithm Implication for Bicycle Using Gyroscope & Accelerometer: Design Approach

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Abstract— The research on two-wheeled self-balancing robot has gained momentum over the last decade at research, industrial and hobby level around the world. This paper deals with the modeling of two-wheeled self-balancing robot. This paper proposes a new method by which the error of two self-balancing robot sensors can be reduced and avoids traditional Kalman filter which cannot meet real-time modulation. In this paper, Correction algorithm can come out real-time robot posture in the right way according to the characteristics of navigation sensor error from the iteration of nonlinear least-squares error model based on the method Dynamic Regulator. By computer simulation, an error through the gyro and accelerometer can be corrected. Kalman filter fused the data of gyroscope and accelerometer adaptation and errors of the sensors pose estimation can be corrected.

The mathematical derivation of Dynamic Regulator shows that this method of reducing posture estimation error is feasible and effective, and can achieve better accurate estimates in expensively.

Keywords— Gyroscope, accelerometer, servomotor-controller.

I. INTRODUCTION

Recently many investigations have been devoted to problems of controlling two-wheeled self-balancing robot, which are widely taken into applications in the field of autonomous robotics and intelligent vehicles. Robots can move on the flat and complex terrain, such as on the slope. The two-wheeled self-balancing robot models are not only of theoretical interest but also of practical interest. Many practical systems have been implemented based on two-wheeled self-balancing robot models. From the point of view of theories, the two-wheeled self-balancing robot models have attracted much attention in the field of control theory and engineering because they are nonlinear with inherent unstable dynamics. Many control techniques have been studied in the past decades for the control of benchmark under actuated systems such as the inverted pendulum, the acrobot and the rotating pendulum.

Two-wheeled self-balancing robot features intrinsic instability, lack of drive, non-holonomic constraints, which is a nonlinear system. The robot have two wheel arrangement of the axis, driven by independent motor, a body placed in the center of mass above the axis and a posture controller which drives two wheel based on body state to maintain body posture and walk upright.

Much research on its dynamic modeling and balance control has been carried out. Grasser used Newton's method to establish three dynamic models and control its posture and speed using decoupling method. TU used Lagrange method to establish its model on the level ground and the state feedback method was used to design its controller. Huang built its dynamic model on the slopes and designed a sliding mode controller without considering direction change. A dual closed-loop controller was designed with attitude control using back stepping method, while position and movement control

using PID. However, these control methods mainly focus the ground level situation, and few consider the modeling and control on the slopes.

This paper proposes the solution for problem to balance a robotic two wheeled bicycle. Problem statement in the actual robot's navigation system, a variety of temporary factors, interference and measurement noise and random variation, the accuracy of the standard Kalman filter will be reduced. Therefore, the Dynamic Regulator focuses on the two self-balanced navigation.

Self frame flex-balancing robot navigation system; we need to get the acceleration of the robot posture and speed information, it is very important to build the navigation sensor output model. Dynamic Filter can make the complementary nature of the multi-sensor information, the ability to use data integration to complete the composition of the robot test Dynamic Regulator (DR) suppression interference, it also allows the system has good dynamic performance. Some researchers added one or two manipulators on the self-balancing robot to construct a mobile manipulator, which is also a research trend of this kind of robot.

Because of these shortcomings of the navigation sensors, they are always such as the output signal and noise temperature, such as is always the interference of external factors, by randomly drift, according to the characteristics of the navigation sensors, we want to minimize the error, and need to create a mathematical model, random drift is the best estimation method to deal with error compensation. The improved system will pass self-balancing test of the two robots.

Error of navigation sensors and low costs, the establishment of error models, the Dynamic Regulator to suppress noise and fuse the accelerometer and gyroscope data, this approach not only has good real-time performance, but also the algorithm simple, DR is a very practical method of selfbalancing robot navigation system.

II. LITERATURE REVIEW

The linear quadratic optimal regulator was designed to control its attitude and speed. The simulation results show that the two wheeled self-balancing robot in the slope situations can keep balance without displacement [1].

A wheeled robot model having the feature of real robot's kinematics and dynamics was built in virtual reality environment to achieve free balance, fixed-point balance, speed tracking, heading control and linear obstacle negotiating. And related procedures have been designed for real-time detection of model parameters and export of simulation data which provide a reliable basis for the experimental study [2].

Low cost MEMS accelerometer and gyro are selected to measure the posture information of the robot with a novel data fusion method. This data fusion method can overcome the shortcomings of accelerometer and gyro so that the precise posture information is obtained even with oscillation and impact. Based on the robot's dynamics model established by Lagrange's function method, two robust sliding mode controllers are designed for controlling the motions of the robot. The robot performed well with precise measurement of the posture and sliding mode controllers [3].

Two-wheeled self-balancing robot is a mechanically unstable, non-homonymic constraint robot. This paper has established a dynamics and kinematics more effective for self-balancing robot's balance model, has designed fuzzy controller based on the T-S fuzzy model with the parallel distribution compensator (PDC) the structure [4].

III. TWO-WHEELED SELF-BALANCED ROBOT MODEL SELECTING

The self-balanced robot navigation required an excellent performance of precision, reliability and autonomy. Inertial navigation system could provide comprehensive information of navigation independently. The Global Positioning System posited widely, what always attracted people was the high precision and low cost, but the signal is easy to keep out. The error would accumulated ceaselessly with the time went by.

The system could complement each other; it was widely used in the present integrated navigation system. Integrated system navigation system made the full use of two, and overcame the shortcomings.

This system model and the statistic characteristics of noise had been known, and the system noise was the Gaussian White home measured noise had not been known. This paper used the integrated navigation system as the research object, the integrated navigation system was used as the main navigation system, using speed and position information Global Positioning System provided as the observed quantity. To establish the mathematical models, the ADC to be used with Micro Controller Units to obtain the information of sensor, such as gyroscope and accelerometer.

Gyroscope output continuous voltage signal, after 12 bit A/D conversion, provided by the gyro random drift only greater power, is because centrifugal not only the temperature to reach a stable over time, gradually, average output in the form, and ultimately tend to the dynamic stability. Repeat experimental results show that the different characteristics of the gyroscope of time, Based observations show that the drift error is mainly due to the influence of temperature in the work process of the gyroscope, According to the ambient temperature deviation is reduced to a positive or negative.

The same method to analyze the accelerometer output value; through two figures we know that the error characteristics of accelerometers and gyroscopes are basically similar, but different parameters.

III. DYNAMIC REGULATION ALGORITHM

Aiming at two-wheeled self-balanced robot SINS/GPS integrated navigation system, state space model, Traditional

Kalman filter algorithm is optimal in theory. But it is difficult to meet the actual system Kalman filtering Gaussian white noise and other conditions, easily lead to instability of the differences and filters. Dynamic Regulator algorithm with forgetting factor, to improve the robustness of the system, to improve the accuracy of the system.

A. Discrete-time linear equation of the model

Consider the following model, which is expressed by the discrete-time linear equation:

$$X(k+1) = \Phi(k+1, k)X(k) + T(k+1, k)W(k) \quad (1)$$

$$Y(k+1) = C(k+1)X(k+1) + V(k) \quad (2)$$

In this equation V(k) is the measurement noise vector, C(k) is observation matrix, Y(k) is observation vector, W(k) is system noise vector, X(k) is error state vector, F(k,k+1) is state transition matrix, T(k+1,k) is noise state transition matrix.

The formula of Dynamic Filtering is:

$$\hat{X}(k|k) = \hat{X}(k|k-1) + K(k)[Z(k) - C(k)\hat{X}(k|k-1)] \quad (3)$$

$$\hat{X}(k|k-1) = \Phi(k, k-1)\hat{X}(k-1|k-1) \quad (4)$$

$$K(k) = P(k|k-1)C^T(K)[C(K)P(k|k-1)C^T(K) + R(k)]^{-1} \quad (5)$$

$$P(k|k-1) = \Phi(k, k-1)P(k-1|k-1)\Phi^T(k, k-1) + T(k, k-1)Q(k-1)T^T(k, k-1) \quad (6)$$

$$P(k|k) = [1 - K(k)C(k)]P(k|k-1)[1 - K(k)C(k)]^T + K(k)R(k)K^T(k) \quad (7)$$

In order to develop the control system, we need a dynamic model of the system that will link the system's behavior (described by the state space variables) to its inputs (defined in introduction). This model is characterized by the system's parameters (i.e. size, mass and moment of inertia of the vehicle).

B. The inertial sensor data fusion based on Dynamic Filtering

Dynamic Filter estimates the state of the process and measurement noise and feedback. The feedback control provides an efficient recursive solution to solve the minimum mean square by the feedback correction of optimal estimation of nonlinear optimal estimation of the final state vector. The main idea of inertial sensor data fusion is the use of gyroscopes and accelerometers different error characteristics, Information collected in order to correct their mistakes. Optimal estimation of the two robot pose obtained by the Dynamic Regulator and gyro bias calibration, automatic tracking deviation.

The red line is the data of gyro, blue line is the data of accelerometer and yellow line is the data of Kalman filter.

IV. CONCLUSION

The design of algorithm for the regulation of sensor data to keep the two-wheeled robot standing for a long time. It is clear that the Dynamic Regulator will more suitable to control the self-balanced robot. Integrated navigation system in the unknown measurement noise, the essence of traditional Kalman filter method is very difficult to meet the problem. This paper presents a real-time.

Dynamic Regulator methods will use inertial sensors, data fitting, nonlinear least squares method and the error model of experimental error characteristics. Estimated attitude will solve the problem of random drift error compensation. Get a low-cost, high-precision self-balancing robot posture sensor system.

This paper will use the integrated navigation system as the research object, the integrated navigation system will be used as the main navigation system, using speed and position information Global Positioning System provided as the observed quantity.

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DM Make up Water Reduction in Power Plants Using DMAIC Methodology a Six Sigma approach

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Abstract- DM water is life line of a power plant. Presently DM make up for all NTPC running plants is around 0.84% of BMCR, however percentage figure seems misnomer if we observe the absolute values. Overall in NTPC for the year 2010-11,11-12 & 12-13 DM make up has been 55 Lacs MT, 57 Lacs MT & 63 Lacs MT respectively and this DM Make up has financial implication on cost in terms of crores of Rupees. However significance of every additional DM Make up in present cost competitive scenario is such that it needs special focus. Stringent norms of CERC recently has given a red wake up call to run our plants at maximum efficiency level and keep our performance at better heat rate possible . On this motivation we have made our research that will focus on how efficiently we are using this scarce and precious commodity and how we can further improve and increase overall profitability of our stations . Main aim of this paper was to find statistical as well as subjective solutions for minimizing DM water wastages or leakages. To initiate our research , we firstly found loss potential of DM water statistically. How much loss we find due to increased consumption and how much it affects our performance level. DMAIC approach is used to find out at what sigma level our plants are performing. We have taken data of Dadri (Thermal) stage- 1 unit -3 three months data from feb 2013 to Aug 2013. The process capability analysis of these data says that DM consumption rate was less than 95 % conformal and the consumption rate is $+0.16\sigma$. (To be very much particular regarding this sigma value two things are most important. Sigma value is a variable term . In a layman's language it can be said as if any company is running under six sigma levels, it doesn't mean It will always remain at that value. It may increase or decrease any time depending upon its performance at any point of time.) For finding monetary loss analysis we have used heat transfer method to find out the percentage loss in heat rate by additional DM make up . If we include cost of heat loss due to loss of enthalpy net additional make up of DM costs us Rs 1225 per metric ton. This figure itself shows that if we reduce DM leakages even by 0.1 % we can save so much of money. For coming to solution we have drafted a thirty question audit based online survey and on the base of that analysis a bar chart and a paretochart has also prepared. This water audit helped us to develop a framework not only for finding the root cause for poor sigma level of DM make up pattern but also gives some suggestive solutions that will help plants in finding solutions and comprehensive plans to plug them. Lastly we have formulated a *0.1% reduction strategy* on the basis of various inputs collected through our research.

Index Terms- DM make up, DMAIC, Minitab 16.0 , process capability , six sigma , 0.1% reduction strategy

I. INTRODUCTION

DM water is life line of a power plant. Presently DM make up for all NTPC running plants is around 0.84% of BMCR; however percentage figure seems misnomer if we observe the absolute values. Overall in NTPC for the year 2010-11,11-12 & 12-13 DM make up has been 55 Lacs MT, 57 Lacs MT & 63 Lacs MT respectively and this DM Make up has financial implication on cost in terms of crores of Rupees. However significance of every additional DM Make up in present cost competitive scenario is such that it needs special focus. Stringent norms of CERC recently has given a red wake up call to run our plants at maximum efficiency level and keep our performance at better heat rate possible . On this motivation we have made our research that will focus on how efficiently we are using this scarce and precious commodity and how we can further improve and increase overall profitability of our stations. Main aim of this paper was to find statistical as well as subjective solutions for minimizing DM water wastages or leakages. To initiate our research, we firstly found loss potential of DM water statistically. How much loss we find due to increased consumption and how much it affects our performance level. DMAIC approach is used to find out at what sigma level our plants are performing. We have taken data of Dadri (Thermal) stage- 1 unit -3 six months data from Feb 2013 to Aug 2013. The process capability analysis of these data says that DM consumption rate was less than 95 % conformal and the consumption rate is $+0.16\sigma$. (To be very much particular regarding this sigma value two things are most important. Sigma value is a variable term. In a layman's language it can be said as if any company is running under six sigma levels, it doesn't mean it will always remain at that value. It may increase or decrease any time depending upon its performance at any point of time.) In dadri presently DM make up in our plant is around 0.55-0.56%. DM leakages can occur from 'n' number of points. To initiate our work a DM water audit sheet (online survey) has been designed to find out various aspects of DM consumption in NTPC Dadri plant. We all know there are two mode of research – one is application research and second is developmental research. This audit cum survey*acts as a tool for both type of research. This audit sheet (**which** can be viewed online

at <http://www.surveymonkey.com/s/ZVDCHDS>, <http://www.surveymonkey.com/s/JLSKPR8>,<http://www.surveymonkey.com/s/JX5CW2D>) can be applied to any plant to find out the DM make

up trend in any utility or industrial boiler. Before starting DMAIC firstly we see what the financial implications of this mych hyped thing are.

1.a. financial implications

Our current process in DM cycle make up and its analysis suggest that there is a considerable scope of improvement in plugging leakages and reducing variability. Cost of every additional DM makeup at any given plant depends on cost of raw water, chemical consumption and heat energy loss (of course additional makeup is required due to some sorts of steam leakage). Considering case study of NTPC Dadri where cost calculation for steam leakage works out to be in the range of Rs. 790 to Rs. 1225/MT depending upon where the leakage is occurring in the cycle. Our calculations suggest that every 0.1% reduction in DM Makeup at Dadri alone will result in saving of Appx. 2 Cr every year. However at NTPC level these figures become further staggering at any thing between 60Cr. to 90Cr. depending on primarily heat rate calculations of other plants .To reiterate once again, as on today our plants do not have system to carryout regular flow audits to identify sources & quantify leakages and objective of our paper is to sensitize people with regards to DM makeup and its actual considerable financial impact.

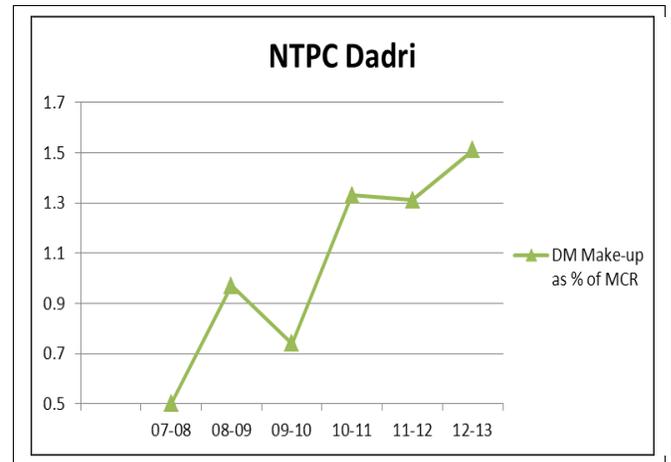


Fig.1 DM make up pattern in Dadri

II. DMAIC APPROACH IN NTPC DADRI -A CASE STUDY

To start the main content firstly it is necessary to know about DMAIC process. The DMAIC (Define-Measure-Analyze-Improve-Control) method is a formalized problem-solving process of Six Sigma. It's made-up of five steps to apply to any procedure of a business to improve effectiveness. These five phases are design, measure, analyze, improve and control. In power plants we all know DM water is main working fluid in generation cycle and its process parameters are flow, pH, conductivity, silica, COC, total hardness, TDS, langelier index etc. The core philosophy of this paper is how to increase our performance level in DM consumption and how can we attain close to six sigma .If we increase sigma value by this approach we will certainly improve our efficiency and will make our process more sustainable.

Flow diagram of DMAIC :

Supplier	Input	Process	Output	Customer
DM plant	Make -up	Opn practices	Reduction in m/u	NTPC Management

Steam is produced by DM water . So , It is main motive element in generation cycle. DM water is of two kinds – cyclic and non-cyclic DM. Cyclic dm water is that which is a part of steam cycle and non cyclic dm water is used in various applications like Stator water, SG ECW/ TG ECW etc. Here our focus is on cyclic DM water consumption only. Calculations are based on six months dm water trend of unit - 3 of stage- 1 dadri plant. DM make up water enters in a condenser at atmospheric temperature that is heated around 537°C for raising steam. DM integrator is used to measure daily cycle make up water as percentage of feed water flow. Presently, makeup water consumption of Dadri is around 0.55-0.56% of MCR (Maximum Continuous Rating) {while the best figure till date is 0.45%}. **One of the best figures of DM make up is of Dhanu Plant where make up was 0.37% (and this figure is of 2005, so indeed we have much to do!)**

III. METHODOLOGY ADOPTED

To apply DMAIC approach in minitab 16.0 software six month data from 1st Feb'13 to 31st July data of unit 3 has been taken. (Just as random sample). Cycle make up water consumption has to be converted in terms of percentage of MCR of feed water flow so that this methodology can be applied to other power plants. As it is not possible to reduce cycle make up water consumption to zero and minimum is the best, LSL (lower specification limit) cannot be fixed for water consumption. Hence, only USL (around 100 tons = 0.65%) and target value of 50 tons has been taken.

Define

The first phase defines the problem statement and goal statement necessitating the team to identify the need of implementation of six sigma and major challenges faced. Goal statement – To minimise variability in DM consumption and keeping consumption in a fixed band of percentage BMCR flow. In define phase we define Critical success factors (CSF), which are those factors which need to be worked upon for achieving goal statement. Following are the critical success factors: Reduction in DM make up and its inventories, Improvement in heat rate due to reduction in APC and Secondary benefits and periodically water audit for continuous improvement.

Measure

There is a very basic fact that we cannot control what we don't measure. In cycle make up water consumption at TPP, make up water flow is measured by an integrator. Although we can use ultrasonic flow meter for finding velocity and flow from any pipe easily. Every plant must have this apparatus as it is very easy to handle and find out flow from any pipe easily. This phase involves analyzing CSFs determined in measure phase. It also identifies the Before Improvement Values (BIV) for each CSF which will help in evaluation of monetary savings. Just before going to six sigma tools a graphical summary is plotted for six month data. It is a graphical summary of DM makeup.

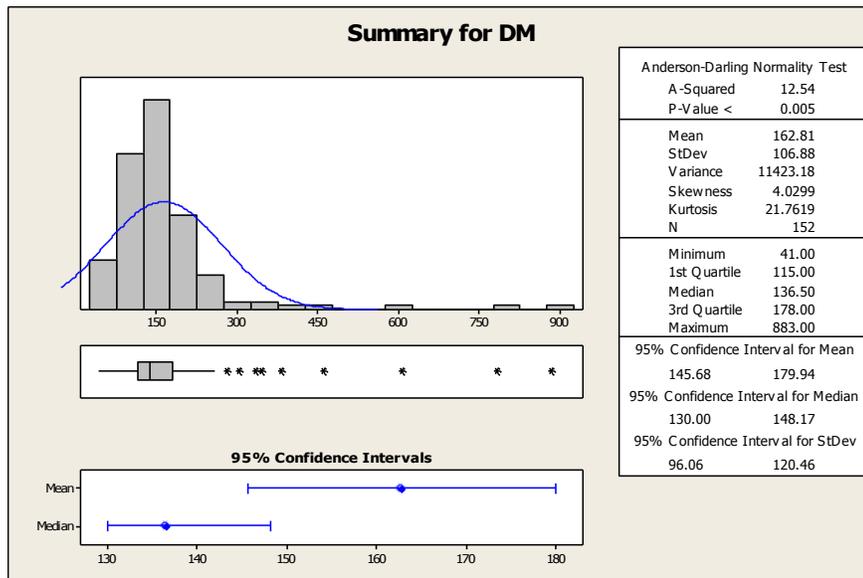


Fig.2 DM consumption stats in unit 3 (Data : Feb-Aug 2013)

ANALYSE

Firstly when we take data of six months, minitab16.0 firstly trims value of top 5 % and bottom 5% data. As these data are like outliers. (What is outlier – It is just like a boy coming school daily on time but gets delayed on some day it doesn't mean that he is a late comer. In a same way some max or min DM data may be due to unit light up / shutdown or whatever). We see A squared value is 12.54 .Graph is skewed to higher side positively skewed..

Runchart

Runchart was drawn for unit 3 from 1st Feb to 1st August (six month timeframe). This is a DM water integrator reading. P-

values for clustering = (0.014), trend = 0.241, oscillation = (0.798) and mixtures = (0.986). As the p-value for the cluster test is less than the alpha value of 0.05, we can conclude that special causes are affecting the process, and we should investigate possible sources. Clusters can be even evidence of sampling or measurement problems, but more to more data collection removes this probability. p value for clustering is less than 0.05 it means that with 95 % confidence we can say that pattern is not normal. We have to look for the reasons for non normality. If p value is more than 0.05 it means that distribution is normal.

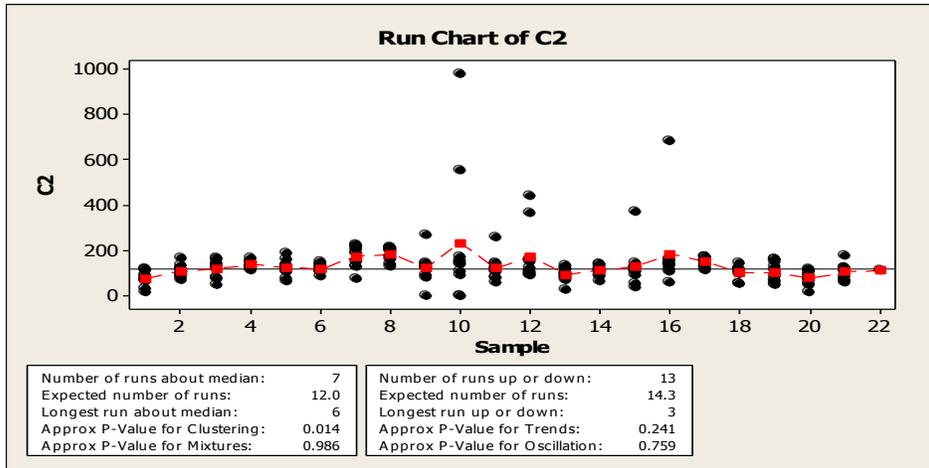


Fig 3. Run chart

Process Capability Analysis

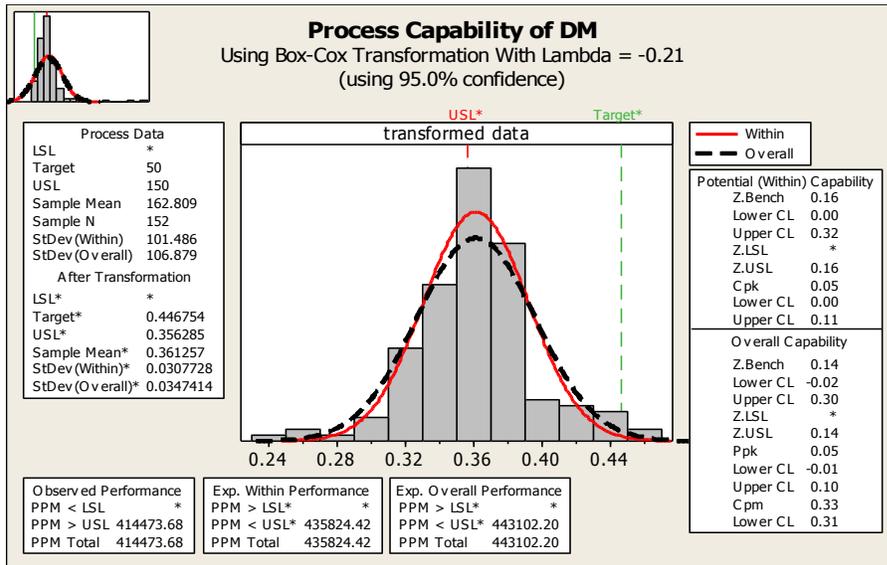


Fig. 4. Process capability

Process capability analysis was performed using minitab to draw curve for cycle make up water from TPP measured through flow meter. In our case Z bench value comes 0.16σ presently dm make up is +0.16 sigma level. If we limit upper specification level around 150 ton (1% BMCR flow) and target value around 50 Ton

Fish Bone diagram

Using survey results and brainstorming fish bone diagram is plotted to find different causes related to man, machine, method and material .

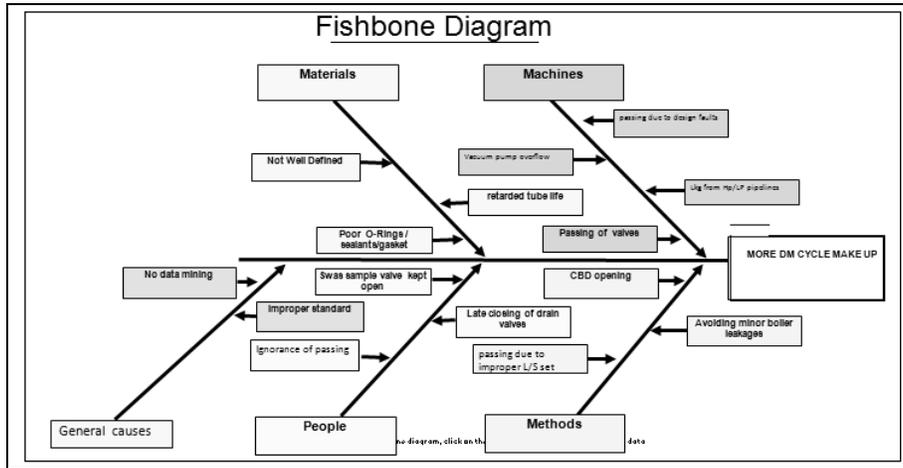


Fig. 5. Fish bone diagram

Bar Chart

Actual DM water wastage from different points was possible. On the basis of audit sheet, bar chart was drawn.

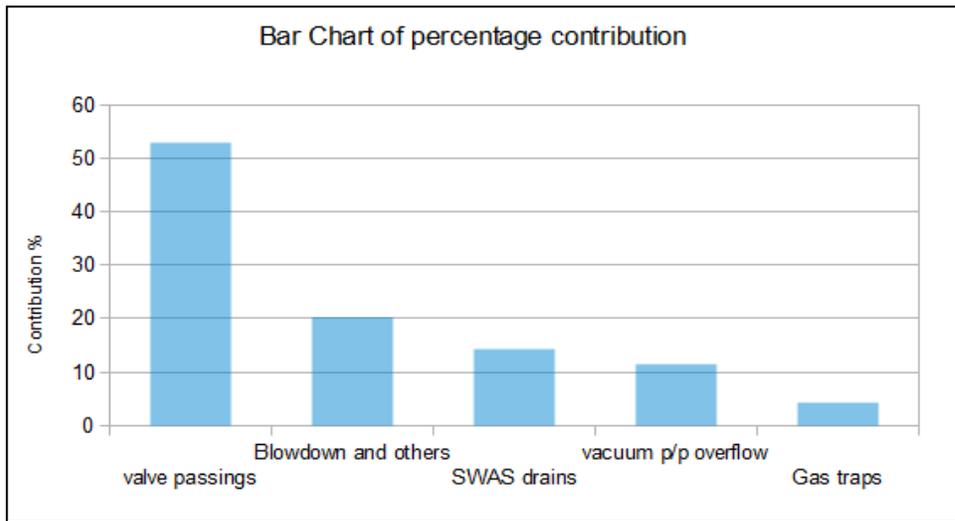


Fig. 6. Barchart

Pareto Chart

Pareto chart is prepared by getting responses from dm water audit survey. The above barchart is replicated into paretochart

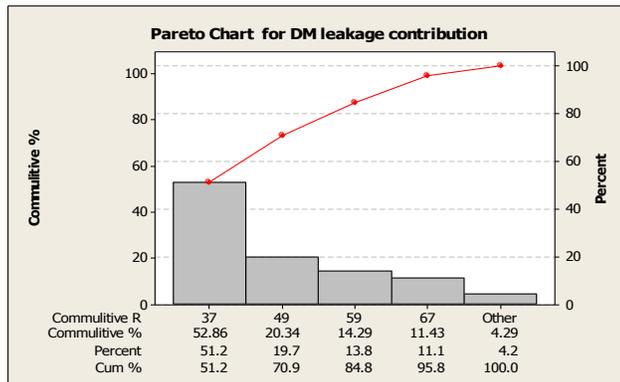


Fig. 7. Pareto Chart

Improve

From the above analysis we find that valve passings like safety valve passing, drain valves passing are the biggest cause of problem. High energy drains are also major culprit. SWAS drains are very much neglected we can reduce DM leakages from swas sample drains by periodic awareness and training of lab analysts, communication gap between operation and chemistry staff and casual approaches can be removed to find out solutions. For NTPC this analysis has two -three things which are very important: Firstly Lower limit definition – As we know

for any SQC we require UCL /USL (upper critical limit or upper specification limit) and LCL/LSL... OEM gives us relaxation of DM up to 2% of BMCR.. We know our LCL/LSL can't be zero as power generation does not work on isolated system concept. The processes are practically open system (although it should be closed one).So, our goal statement converges to a band of DM (%BMCR) .Say like 0.3 to 0.5%. So for calculation of LCL, we have used statistics.Firstly we see that our DM consumption is following which type of distribution. To get more specific results we find DM distribution pattern individually by minitab16.0.

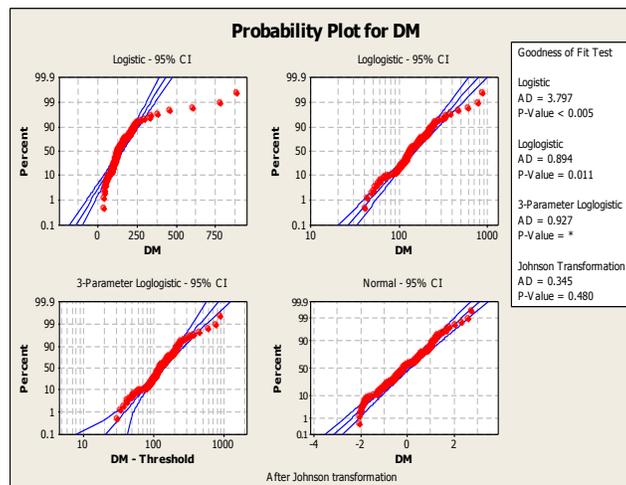


Fig. 8 Probabilistic distribution

We find logistic normal distribution in dm pattern and p value is more than 0.05 (with 95% conformality). The greater the CpK value, the better. A CpK greater than 1.0 means that the 6σ (±3σ) spread of the data falls completely within the specification limits. A CpK of 1.0 means that one end of the 6μ spread falls on a specification limit. A CpK between 0 and 1 means that part of the 6σ spread falls outside the specification limits. A negative CpK indicates that the mean of the data is not between the specification limits. In layman's language roughly sigma level is 3 x cpk values...

Control

In this stage, new process considerations are documented and frozen into systems so that the gains are permanent. All possible related causes of specific measured or approximated where no measurement was identified problem from analysis phase were tackled and shut out in control phase. With mere 1ton addition of DM makeup in system doesn't only add monetary burden of Rs.1225/- (Ref. Appendix 2). Regular checking of all sources to be done on fixed time basis. We can also go for some retrofits in flanges as we always see in DM line there is very much flange leakage. Victaulic coupling can be used in place of flanges which have best reliability. Ultrasonic flow meter should be used frequently to find actual amount of DM leakages. Deareator vent valve orifice to be checked during

overhauling for its erosion. Presently there is no forum like bureau of water efficiency. On a pilot basis we can pitch this idea .In our audit report we can give some rating analogous to star rating given by BEE for every equipments. We can improve some better operation practices likewise if there is unit light up just after condenser flood test and if we get no abnormality we can send that water to drum directly. (Generally after flood test hotwell is drained). We can use AHU drains in chilling of swas compressors. If ambient temperature is very less during winter season we can even isolate one PHE also. (Turbine ECW has 3 PHE and boiler side have 2 PHE). Passing of some less using valves like pegging steam valve or CRH extraction valves in deareator or CRH supply to seal steam should be done regularly. Steam traps are very much neglected. Steam trap drains to be collected at one vessel. CBD flow measurement and LPD valves passing to be checked properly. One can say that by regulating so much we can't suffocate our plant operation system. It is a wise idea but we should keep one thing always in mind. And this thing is a Taguchi loss function. This function says even we are under specification limit but we are not at our specified target value we are making our losses in square term. If we are "x" away from target it means our loss into the system is order of "x²" and this loss is transmitted to society itself. It can be easily depicted by following curve.

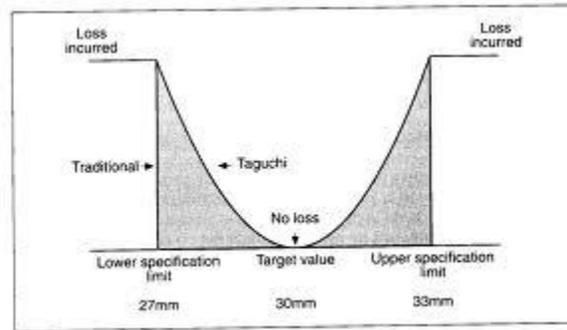


Fig. 9. Taguchi loss function / Learning curve

IV. ANALYSIS AND CONCLUSIONS

The preferred Study proves that we can implement Six Sigma methodology in even power plant to perform better. Higher consumption of DM water is found to be a big problem in a thermal power plant. The causes for more DM water consumption are safety valve passing, swas drain leakage, various pumps seal problems, vacuum pump overflow and of course blow down and drain or vents. This paper is open ended paper as actual quantification of different leakage points to be noted down in plant by using ultrasonic flow meter. Our R&D team can do a cost benefit analysis on use of Victaulic coupling. After doing and implementing DMAIC study a post work financial audit is to be done. We all know in order to minimise our DM consumption we can't suffocate our plant on the basis of equipment healthiness. So after analysing our study O&M management team can see this scenario under acceptable risk, tolerable risk or unacceptable risk. For this purpose a sensitivity analysis is required to be carrying out.

ANNEXURE

- [1] Online survey webpage: (In PDF format attached with sheet) <http://www.surveymonkey.com/s/ZVDCHDS>, <http://www.surveymonkey.com/s/JLSKPR8>, <http://www.surveymonkey.com/s/JX5CW2D>
- [2] DM heat loss calculation excel sheet (In word format attached with sheet)

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Development of MEMS Based 3-Axis Accelerometer for Hand Movement Monitoring

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Abstract- This project develops a hand movement monitoring system, which feeds the data into the computer and gives the 3D image rotation according to the direction of the tilt and hence monitoring the movement of the hand in context to its tilt. Advancement of MEMS Technology has enabled us to get very small and low cost accelerometer ICs which is based on capacitive principle. Accelerometer based Tilt sensor ADXL335 is used in this paper, based on MEMS technology and the project emphasis on the development of the MEMS based accelerometer to measure the tilt, interfacing the hardware with the LabVIEW and showing the 3D rotation to the user, which is in his understandable form and tilt data can be saved in the computer. It provides an experience of working on emerging technologies like MEMS and design software like LabVIEW.

Index Terms- MEMS Accelerometer, Tilt sensor ADXL335, LabVIEW simulation, 3D Animation

I. INTRODUCTION

With modern nanotechnology, it is now possible to bring sensors, their signal conditioning and processing circuits on single silicon based platform. The technology used for this purpose is called as micro electro mechanical (MEMS) system. Due to its small size and ease of operation, MEMS accelerometer sensor is commonly used in gaming applications to enhance the effect, mobile handsets, even implemented on human body to analyze tremors and other physical activities.

The 3 axis accelerometer is based on the principle of capacitive sensing. The fig.1 shows basic principle of accelerometer sensor. The sensor is made of spring loaded, micro machined structure, mounted on silicon base. Force on the structure changes the position of seismic mass attached on the spring. This deflection is measured using fixed plate capacitor sensors. The change in acceleration unbalances capacitor plate distance, observed by modulation/demodulation circuits and thus, resulted in output proportional to acceleration. The sensing can be static (gravity) or dynamic (forced acceleration).

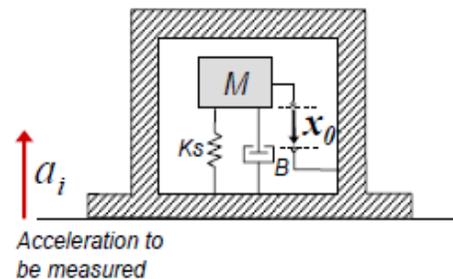


Figure 1 Accelerometer Principle

II. TILT EXPERIMENT

To test the accuracy of the accelerometer tilt measurements, the accelerometer is tilted in various angles in all direction. The data was read through LabVIEW and stored in a text file. The results obtained are as follows. The fig. 2 shown below is the interfacing of the ADXL335 with the NI DAQ cards.

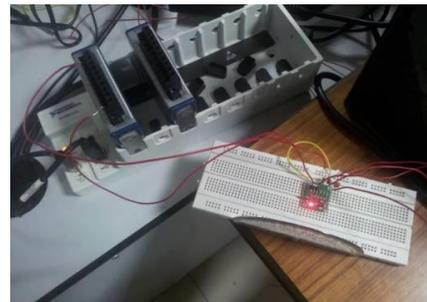


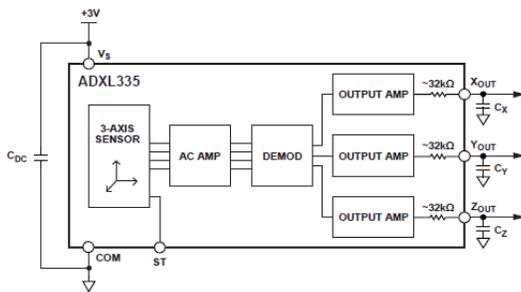
Figure 2 Interfacing with NI DAQ CARDS

III. ACCELEROMETER EVALUATION ADXL335

A number of factors were considered for acceleration sensor selection. Sensor with small measurement range was selected as resolution degrades with increase in the sensing capability. Additionally, power supply and thermal stability with optimum bias were the important parameters to be considered for the experiment. The accelerometer used for the research is ADXL335 from Analog Devices. ADXL335 is tri axial accelerometer sensor with built-in amplifiers and demodulator. ADXL335 has a range of $\pm 3g$ in each axis.

The output shows ratio metric characteristics thus, output voltage changes depending on the change in supply voltage. Nominally, at zero g, output voltage is half of the supply voltage. Each axis has a separate bandwidth adjustments. The capacitor in series with output decides the bandwidth of each axis. Bandwidth range of 200 Hz to 1 KHz is used. The analog voltage output from three different axes is fed to Ni DAQ USB 9201 for sampling and signal conditioning.

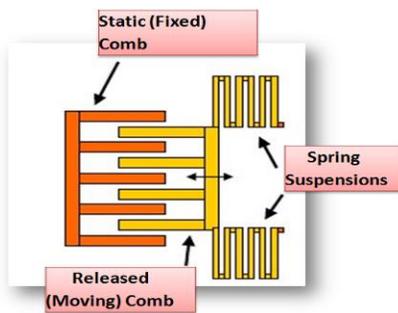
Fig3. shows basic block diagram of ADXL335 as mentioned in the data sheet. The chip has in-built coupling capacitor between supply voltage and ground; thus reducing the noise at the power supply line. It contains micro machined three axis sensor along with signal conditioning circuitry. The sensor output data is acquired using LabVIEW and DAQ card. The capacitor value is selected as 0.1µF for sensor frequency of 50 Hz.



IV. SYSTEM DESCRIPTION AND PRINCIPLE BEHIND IT

The accelerometer sensor used here is a polysilicon surface-micro machined structure built on top of a silicon wafer. Deflection of the structure is measured using a differential capacitor. The differential capacitor involves the interdigitation of moving fingers attached to the proof mass with fixed fingers attached to the frame. The differential capacitance is proportional to the overlapping area and the distance between the moving and fixed fingers. Acceleration deflects the moving mass and unbalances the differential capacitor resulting in a sensor output whose amplitude is proportional to acceleration.

Figure 4 Differential capacitor Sensor



According to the Tilt we get voltage readings i.e. for different tilt angle we get different voltage readings.

In order to acquire accurate and high resolution measurements, the accelerometer parameters must be calibrated accurately. Each axis of the accelerometer has two parameters that need to be measured in order to convert analog voltage readings to acceleration reading correctly, namely Axis Offset and Axis Sensitivity.

The ADXL335 accelerometer outputs a voltage between 0 and Vcc volts for each axis, and zero acceleration for the axis occurs at approximately 1/2 Vcc. Therefore, each voltage output contains an offset that must be specifically calibrated for each axis. To convert a measured voltage reading to acceleration, Axis Sensitivity is also required, a conversion constant that must also be measured specifically for each axis. The approximate sensitivity of each axis depends on the type of accelerometer. The ADXL335 Accelerometer has an approximate Axis Sensitivity of 330mV/g, where g is the acceleration due to gravity equal to 9.81m/s².

V. TEST RESULTS

Table 1 Tilt Angles obtained from the LabVIEW:

Tilt given (YZ plane)	Tilt obtained
0	0
30	27.55
60	58.01
90	85.25
120	56.58
150	19.22
180	0

Table 2 Mean error deviation

	Mean	Standard Deviation	Variance
Tilt Error	3.06	1.47	2.18

VI. CALIBRATION MEASUREMENTS

To calibrate the ADXL335 accelerometer, the accelerometer was supplied by a voltage supply of Vcc =3.0V. Accelerometer calibration was complete with a voltage supply of Vcc = 3.0V (DC). To determine the sensitivity of each axis, the accelerometer was positioned in various ways such that outputs of -1g and +1g were captured for each axis. To determine the offset of each axis, the accelerometer was positioned to capture a 0g for x axis, y axis and 1g for z axis.

As x & y has 0g acceleration: Offset = Input

As z has 1g acceleration: Offset = Input – Sensitivity

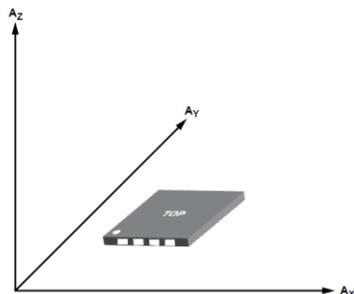
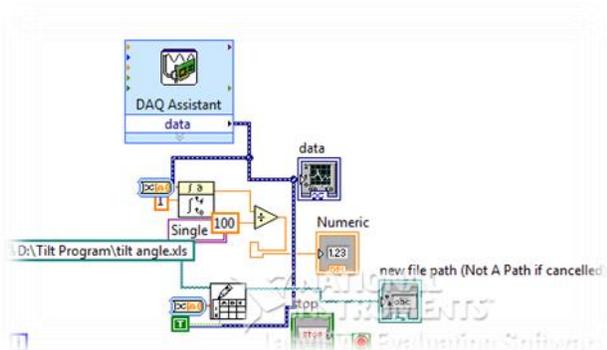


Figure 5 Sensor Axis

Ni DAQ Interfacing with LabVIEW

Figure 6 Interfacing Program



VII. MEASURING ANGLE OF ROTATION USING ADXL335 ACCELEROMETER

To measure the angle of rotation of the ADXL335 about the z-axis, the maximum sensitivity is obtained by measuring tilt using all three axes of the accelerometer. Measuring tilt about the z-axis using all three axes of acceleration provides the greatest resolution, and the angle of tilt calculated is independent of the direction rotated from the z-axis. Using basic trigonometry to derive the equation, rotation about the z-axis using calculated using the following equation:

$$\theta = \text{atan} \left(\frac{\sqrt{Ax^2 + Ay^2}}{Az} \right)$$

where A_x , A_y & A_z are acceleration in x,y & z direction respectively, given by

$$A = \frac{V_{in} - V_{offset}}{Sensitivity}$$

θ gives angle of tilt. For finding the angle of rotation, we need angle in x, y and z with respect to ground. These are given by:

$$\theta_x = \frac{Ax}{\sqrt{Ay^2 + Az^2}}$$

$$\theta_y = \frac{Ay}{\sqrt{Ax^2 + Az^2}}$$

$$\theta_z = \frac{Az}{\sqrt{Ax^2 + Ay^2}}$$

The angles thus found will need adjustments based on the signs of acceleration obtained

Table 3 Table for Angle Calculation:

Ax	Ay	Az	θ_x	θ_y	θ_z
+	+	+	θ_x	$-\theta_y$	θ_z
+	+	-	θ_x	$-\theta_y$	$180+\theta_z$
+	-	-	θ_x	$-\theta_y$	$-(\theta_z+180)$
+	-	-	θ_x	$180-\theta_y$	θ_z
-	-	-	θ_x	$-\theta_y$	$-(180+\theta_z)$

For getting a proper rotation, we need to follow a particular sequence. i.e.

Table 4 Sequence of rotation

	axis	angle
applied first	heading	yaw
applied second	attitude	pitch
applied last	bank	roll

Here as the axis of LabVIEW and the sensor are different, we have found out the below mentioned sequence for the project.

Table 5 Sequence of rotation used in our system

Sequence	Axis of LabVIEW	Angle of sensor
1	Y	$-\theta_y$ (Roll)
2	-Z	θ_x (Pitch)
3	-X	θ_z (Yaw)

VIII. 3D RESULTS

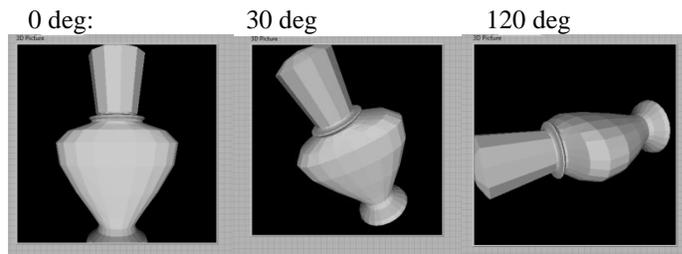


Figure 7 Final result

The Figure 7 shown above is the final result which is shown in the form of 3D image

IX. CONCLUSION

Accelerometer sensor used in this project help us to monitor the movement of the hand which can be beneficial in accessing the muscle control and further helpful in gaming field. The system developed has the ability to access the movement of hand up to 180 degrees. The data obtained from the system is interfaced with the LabVIEW, and further implementation of the software allows the output to be viewed in 3D rotational format. The use of the software allows the user to record the data and further can be accessed for future works.

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Emerging Technological Applications for Teaching and Learning Process

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Abstract- The increase of advancement of information technology in the present world has been found that the educators and students make use of the technologies and applications for teaching and learning purposes. There are often no formal guidelines to assist with evaluating apps. The development of various mobile applications (apps), tablet computing, game-based learning, personal learning environments, and natural user interfaces helps in learning and teaching the concepts. Implementing these apps makes the process of education more innovative and interesting and even results in increase in the interest of the students.

Many educational applications are economical and affordable by the students. These applications help the students by getting expertise information instantly from professor or researchers. The system of collecting the feedback is also done quickly so that they can improvise the app based on the user requirement.

The advancement of these applications has their own advantages and disadvantages. So the emerging of applications is like a double edged sword having its own pros and cons. However it is we who need to take a right decision and use the applications in an optimum way.

Index Terms- Advancement of information technology, affordable, economical, game based learning, mobile apps, tablet computing.

I. INTRODUCTION

In the present world of advancement of technologies and applications there is an increase in the usage of the apps in various fields. Now these apps are implemented in the field of teaching and learning sector too. The implementation of such apps in the day-to-day scenario will slowly result in the elimination of the conventional or the traditional method of teaching and learning.

Traditional way of teaching and learning without any innovations turned out to be a bore after some time. So introduction of online learning and implementing the apps for educations makes the learning process a joyful and pleasurable one.

There are various ways which are adopted to teach innovatively. Few of them are as follows: mobile apps, tablet-computing, game based learning, Personal Learning Environments, Natural User Interfaces, and E-books.

Effective use of these technologies requires the students to exhibit digital literacy skills such as being able to access,

manage, and evaluate digital resources. Further, students might be informally using many different applications for academic purposes, making it difficult to determine what and how to use such apps.

The need of technology in the Classroom

The usage of the technologies in classrooms makes the process of education innovative and it helps to make classroom a site of active learning and critical thinking, furthering student and related with the materials. The usage of technological application makes the students to explore fundamental areas and enable them to understand the concept whereby they can answer the core questions. Students are allowed to use internet, electronic databases, applets and other online sources to gather information. They make use of spreadsheets, virtual labs, and other programs to store, that helps to analyze information. Students are taught how to use certain software like desktop publishing, web publishing, video and audio editing, as well as graphic programs so that they can use them effectively for presentation purposes by doing so we can attain conceptual learning.

Many teachers make use of apps like 'rubrics' to mark student's work, whether work habits, class work, assignments or homework. This process is usually performed on paper and is both time consuming and laborious. Assessment enables teachers to import their own rubrics and class lists into the app and mark student's work. Another app known as 'Chem. Pro' is created by students for students. This app features 80 self-developed video lessons duration of 31 hours that take students through the entire year of college, General Chemistry or high school AP Chemistry. Various other apps like: 'Math Superheroes, Interactive Listening' are emerged to make the learning process quick and portable. These applications make the process of learning more quick and interesting. It actually reduces the time for searching the data. Instead they provide expertise answers for the queries which are put forth by the educators and the students instantly. Some apps which were recognized as Best Apps for Teaching & Learning are of exceptional value to inquiry-based teaching and learning as embodied in the AASL's Standards for the 21st-Century Learner are:

- **For Books**

'Al Gore – Our Choice': A Plan to Solve the Climate Crisis by Al Gore by Push Pop Press

- **For Science, Technology, Engineering, and Math (STEM)**

'Science 360' by the National Science Foundation
'NASA' by NASA Ames Research Centre

- **For Social Sciences**

'News-o-Matic, Daily for Kids' by Press4Kids

- **For Content Creation**

'Garage Band' by Apple

Therefore the emerging apps when used in the teaching and learning process help both the students and teachers in making the education process and innovative and a pleasurable one.

II. EMERGING APPS AND ITS DESCRIPTION

There are various apps that are used in the field of learning and teaching the famous ones are as follows:

1. Mobile apps
 - a) *Shakespeare In Bits*
 - b) *Rubrics*
 - c) *Chem.-pro*
 - d) *Garage Band by Apple*
 - e) *Math Superheroes*
2. Tablet computing
3. Game based learning
4. Natural user interface
5. E-books

MOBILE APPLICATIONS (APPS)

It is not uncommon to find the students of middle school using the mobile phones in the present world. The invention of smart phones has increased the usage of the mobile phones among the students and teachers. By these smart phones there is also an increased trend in usage of all the emerging apps that are available in the network. The usages of these mobile phone and apps will be effective in classroom only if there is proper supervision. These phones help to connect to the internet using 3g, or 4g wireless networking. The mobile phones are portable and can be used inside or outside the classrooms by which communications between the students and teachers and are effective.

Some of the apps used in mobiles for education purposes are as follows:

1. Shakespeare in Bits

'*Shakespeare in bits*' is a new exciting multimedia app used for learning and teaching the Shakespeare's plays. It is filled with audio and video of the popular plays like: '*Julius Caesar, Hamlet, Romeo & Juliet, Macbeth, and a Midsummer Night's Dream*'

2. Rubrics

'*Rubrics*' is an app which is used by teachers for assessment purposes. This app helps them to do the time consuming and laborious job of evaluating assessing the students.

3. Chem.-pro

'*chem-pro*' is an app which is created by students for the students. It is an app that consists of 80 video chapters that a student learns in their collage. This is helpful for the students who pursue General chemistry. This app also includes various

study-aids such as reference table, periodic table, and flash cards by which students are able to reinforce the important concepts.

4. Garage band

'*Garage band*' is the app which is used by the students who are interested in the field of music. This is software which is developed by the '*Apple Inc*' as a part of '*ilife*' software package.

5. Math superheroes

'*Math superheroes*' is an app which is developed for the students who are above the age of 5. This app consists of various games which are related to the topics like numbers, shapes, patterns, sequences, and operations. This app helps the students to learn maths in more practical way.

TABLET COMPUTING

Tablet devices are those, which have a big screen compared to mobile phones. Their sharper display enables their use in educational specific applications. These tablets have touch screen options, built-in dictionaries and libraries.

The advancement in technology has witnessed a number of positive changes such as, once upon a time room sized computers have become extinct. Desktops and laptops explain the current trend and tablet computing is only adding more benefits. The portability of this device makes an added advantage to this device.

GAME BASED LEARNING

The visual impact created by video games is the reason for its extensive followers. Today many educational concepts find their way to students through games. Many concepts in the maths are in form of games like: puzzles and problem solving. Hence by incorporating of these games in learning has positive effects and can make the student to understand the concepts in more effective manner. On the other side there is also scope for increase in the creativity among the students.

NATURAL USER INTERFACE AND E-BOOKS:

Natural user interface (NUI) is a user interface that is designed to feel as natural as possible by the user. The main goal of the NUI is to create a flawless interaction between a human and a machine. The common example of NUI is the touch screen. These touch screen allows to move the objects by tapping and dragging them using finger or the stylus on the screen. The digital objects on the screen respond to the touch made by the people. This method of selecting the objects seems to be more natural rather than the usage of keyboard and mouse to interact with the objects on the screen.

Other few example of 'Natural user interface' are: Video games and Voice recognition. Here the objects on the screen can be controlled either by the users movement of the body or by their voice. Thus the natural user interface is an emerging application that makes the process of learning and teaching in more natural way.

III. MERITS AND DEMERITS OF TECHNOLOGICAL LEARNING

Online learning and usage of apps in teaching and learning has both their advantages and disadvantages. The advantages are as follows:

1. Flexibility- This is the major advantage of e-learning. The user has the space for planning their work and lectures on their ease.
2. Cost effective and accessible
3. Various learning styles are addressed and facilitation of learning occurs through many activities.
4. The self paced modules facilitate the learners to learn on their own pace.
5. The incorporation of these apps makes the learning process an innovative and pleasurable one.
6. The usage of these apps helps the students to become more creative person.

DISADVANTAGES:

As a coin has two sides, it also suffers from serious disadvantages, and they are as follows:

1. Requirement of sound knowledge: for using these applications both the students and the teachers need to have a sound knowledge on the devices for achieving a fruitful result.
2. These devices are not affordable by all group of society.
3. Unmotivated learners or those with poor study habits may fall behind and there is a large scope for the students to get deviated or carried away by other entertainment apps.
4. Unplanned study schedules tend to shift the students focus from completing tasks on time.
5. The absence of teacher student interaction poses as a great hindrance to assess the ward personally.

IV. CONCLUSION

The emerging apps which were invented by man, made the job of completing the task in an effective way. These apps are

now used in various fields like education, research, entertainment and so on. The implementation of these apps in the field of education makes the process of education more effective and innovative. There is a large scope of conceptual learning through this process.

The incorporation of these apps in today's educational system will result in making the students a creative person. Hence the emerging apps in present day have a larger scope in near future.

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Land Degradation Assessment in Rawashda Area, Gedaref State-Sudan “Using Remote Sensing, GIS and Soil Techniques”.

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Abstract- The objective of this study is to quantify the land deterioration in Al Rawasha area in Gedaref State - Sudan. Owing to the availability of vast potential cultivable arable land, good amount of seasonal rainfall, and favourable climatic conditions, Sudan, was qualified to be one of the leading countries in food production worldwide (World Breadbasket). Therefore, rain-fed mechanized farming which was introduced in the 1945 in Al Gedaref area, had rapidly expanded horizontal in the clay plain across the country. But, the development of this type of farming system became a problematic area, particularly in the arid and semi arid zones (GEF, et al., (1999) (Sanyu Consultants inc. (2001). This is because huge vegetation covers was removed without replacement. The situation was aggravated by land misuse (mismanagement, poor agricultural practices, logging, overgrazing, and adoption of inappropriate technology). Consequently, the socio-economic dimensions and environmental quality have been negatively affected. To achieve the above objective, data and information deduced and extracted from fieldwork, remote sensed data, in addition to other sources were used. Remote sensing, GIS and Personal Computer were used to analyze the data. The results of the data analysis indicated that both cultivated and uncultivated lands are degraded but at varied degree. The cultivated soils have more coarse texture and lower fertility and tend to acidity compared to uncultivated soils. Furthermore, the yield of different grown crop showed a trend of fluctuation throughout the study period from 2007 to 2012. Acacia species are found to be dominant tree species beside the unpalatable grazing plant species.

Index Terms- Land degradation, Geoinformatics, Crop yield, GIS and Remote Sensing.

I. INTRODUCTION

Land degradation is the process in which the value of biophysical environment is being adversely affected. It also defined as a total deterioration, or total losses of productive capacity of soil for present and future (FAO, 1980). While the term land deterioration more specific definition(s). FAO (2002) defined land deterioration as the loss of production capacity of land in terms of loss of soil fertility, soil biodiversity and degradation of natural resources. Precisely, it is a long term loss

of function and productivity of an ecosystem as a result of disturbances from which the land cannot recover unaided (Bai, et al., 2008). Land degradation is a complex. It is a result of various interacting biophysical and human factors. The objective of this study is to identify the causes, understand the mechanisms of land deterioration, the consequences, and produce hard copy of thematic maps which can provide a scientific based solution. However, many studies showed that, land degradation has negative impacts on socio-economic status as well as on environmental settings (Haroun, 2012). There are two main factors contributing to land degradation, namely, the proximate and root causes (underlying driving forces) (Geist, et al., 2004). This; occurs when a process or combination of processes cause a reduction of the potential productivity of land resources, or when the biological productivity decreases under current management leading to a diminishing productivity in the foreseeable future (UNEP, 1992), (prince, 2002). In the study area, land misuse, land misplanning, land mismanagement and adoption of inappropriate technology are the major causes of land deterioration (Sonneveld, 2002, Haroun2007). Anyway, the field data analysis showed a decrease in soil fertility, palatable grazing plant species and yield drop of different cultivated crops. Generally, the increase of both population and animal wealth put more pressure on land resources, as consequences, land deterioration continues. However, various studies displayed that about 40% of the worlds agricultural land is seriously degraded (Ian Sample (2007). Studies by Geist, et al., (2004) on land degradation all over the world showed that agricultural management is the proximate causes associated with desertification in 90% of the cases studied. In Africa, various studies displayed that several countries are seriously threatened by land degradation. The productivity of some lands has declined by 50% due to soil erosion and desertification. Yield reduction in Africa due to past soil erosion may range from 2 to 40%, with a mean loss of 8.2% for the continent (Eswaran, et al., 2001). As a consequence, Africa accounts for 65% of the total extensive degradation crop land of the world (Thiombiano, et al, 2006 Bationo , et al., 2006). According to Lamourdia , et al., (2007), there is an increasing trend of severity and extend of land degradation from the humid zones of the Congo and Zambezi basins (24 to 29%) to the dry areas of the Nile, Niger and lake Chad basins (78 to 86%); and the effects of water and wind

erosion are also increasing along these agro-ecological zones. Land degradations in South Asian countries are widespread and have reached a severe degree. The annual loss in productivity is estimated at 36 million tons of cereal (Eswaran, et al., 2001). The main causal is wind, water erosion, water logging and lowering of ground water. The study found that 140 million hectares (43%) of the region's total agricultural land, suffered from one form of degradation or more. Out of this, 31 million hectares were strongly degraded and, 63 million hectares moderately degraded. The worst country affected was Iran, with 94% of agricultural land degraded, followed by Bangladesh (75%), Pakistan (61%), Sri Lanka (44%), Afghanistan (33%), Nepal (26%), India (25%) and Bhutan (10%) [FAO, and UNEP (1994)]. In Asia, studies reflected that 50% of irrigated soils in Central Asia are Salinized and/or waterlogged (Paroda, 2007). The cause of land degradation is the intensive cropping, monocropping, overgrazing, mining, logging, lack of appropriate soil fertility management, and invasive species (UNCCD, 2003). In Australia, about two thirds of agricultural land is degraded by soil erosion, soil salinity, soil acidity and soil contamination Cribb, J (2010). Considering the land degradation on global scale, it is found that the annual loss is about 75 billion tons of soil. Therefore, soil degradation is a serious threat in the United States as well as the world around. It is estimated that the total annual cost of erosion from agriculture in US is about US\$44 billion per year (Eswaran, et al., 2001). The main, causes are human activities such as agriculture and deforestation. It is estimated that soil erosion is costing about "\$44 billion a year in damage to farmland, waterways, infrastructure, and health" (Kaiser & Proffitt, 2004). It is also predicted that if farmers did not replace the lost water and nutrients, "U.S. crop yields would drop by 8% per year". Moreover, 22,661 species in the United

States are threatened (Kaiser, et al., 2004). However, despite the importance of land deterioration, only few data are available. Therefore, it is necessary to carry out this study to obtain accurate, updated and reliable data to enables stockholders, environmentalist, planners and decision makers to select the best options for sustainable land use (Haroun, 2012). Based on the above objective, soil attributes as well as yield of cultivated crops are studied. Integrated remotely sensed and geographical Information System (GIS) technology was used. The results are presented in forms tables, thematic maps and bar charts.

II. STUDY AREA

Al Rawashda, is located in Gedaref State. It is situated within the latitudes 14° .20' N and longitudes 35° .40' E. With total area of 64, 280 feddan (Fig1). The area located in the savanna region. It receives an average annual rainfall of 450 mm. The soil is described as cracking clay soil (Harrison et al, 1958). The existing vegetation cover includes bushes, trees and different annual plant species. The dominant tree species includes *Acacia seyal*, *A. Senegal*, *A. nylotica* beside other tree species like *Commiphora Africana*, *Bosia senegalensis*. As far as the annual plant species concern, Sudan grass spp., *Cymbopogon spp.*, *Sorghum halepense.*, *Chorch oltorius*, *Dactylocetium aegyptium*, *Striga hermanthica*, *Ipomoea cordofana*, are the most widespread in the study area. However, five (5) land uses are identified, the agricultural land, forestland, rangeland, barren land and residential area. The thick forests and rich ranges of Al Rawasha area have undergone serious deterioration as a result of logging, deforestation and over grazing.

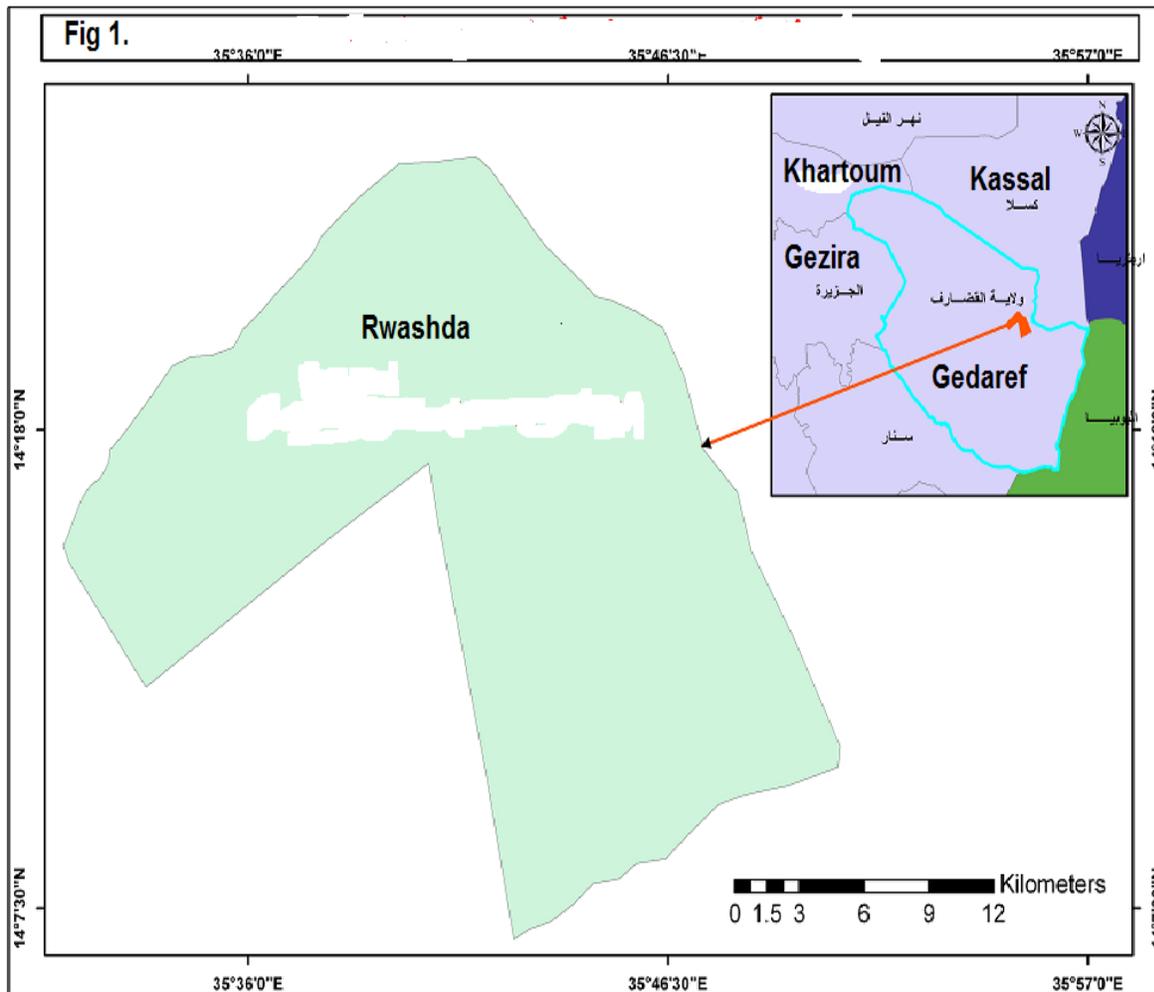


Fig (1) Location map of the study area.

III. METHODOLOGY

▪ Remote sensing:

Field work was conducted during the period from 15 to 25th May, 2012. Aided by Global Positioning System (GPS) receivers (Garmin 60C); when check sites were located. Radiometric and image to ground points geometric corrections were conducted. Then, two false colour composite (FCC) subsets images from Landsat TM and ETM dated (2007 and 2012) covering the study area (64280 feddan) were used in this study. Thereafter, the images were analyzed by GIS software.

▪ Soil attributes:

Following the determination of the study area, by Auger, random soil samples were taken from both, cultivated and uncultivated lands. The samples were analyzed in Laboratory of Environmental and Natural Resources Research Institute, -Khartoum-Sudan in 2012). Different soil sample strategies were applied depending on satellite image interpretation,

morphological and different physical properties (colour, texture, structure... etc.) to determine:

- Soil Reaction: Soil pH was measured in soil paste using analogue pH-meter JENWAY.
- The Electrical Conductivity (ECe): The electrical conductivity of the saturation extract (ECe) was measured by conductivity meter WAPcm 35 (model cm 35).
- Soil Texture.
- Nitrogen.
- Potassium and,
- Phosphorus.

▪ Vegetation attributes measurement:

Muller method, the so called” The Point-Centred Quarter method” for tree sampling was adopted to determine:

- Types of tree species in the study area
- Dominant tree species in the study area and

Other plant species present in the study area also recorded.

- **Yield of the grown crops:** Yield during 2007 – 2012 is used as an indicator for soil deterioration.

IV. RESULTS AND DISCUSSION

The results of soil data analysis indicated that most of the soils of the study area are non-saline, slightly alkaline; except some buckets in the middle, top north east, and southern parts of the study area which was slightly saline (Cultivated land) (see figures 2, 3 and table1). Nitrogen, Potassium and Phosphors values indicated that most of the studied areas have lower Nitrogen, Potassium and Phosphors contents. This may be due to water erosion (See Figures 4, 5, 6 and table1).

The spatial variability of E_{Ce} for the surface are shown in Figures 2 and table 1 indicating that Soils with values of E_{Ce} 1.5 – 3.6 dS/m. This located in the middle, and some eastern parts of the study area.

The results of field work and survey indicated signs of land degradation which might be due to land mismanagement.

The soil Reaction (pH): The analysis of the soil samples revealed that the soil reaction ranged from moderate to slightly alkaline, which is unexpected for soils of arid and semiarid region (see fig 3).

In general, the analysis of soil texture of cultivated land showed various types of soils, these are: Silt loam, Loam, Silty Clay, Silty Clay Loam and silty clay. But the cultivated had greater rate of coarse texture (sand) compared to uncultivated land (Fig. 1). This is may be due to increasing surface water run off and erosion in the cultivated land. As far as the crop yield concern, the average yield of all grown crops is poor, below the world average (Table 2). The reasons may be due to mono-cropping, use of no fertilizer, rainfall irregularity, and poor land management. Similar results were found in Renk area in Upper Nile State and also in different parts of the world (Haroun, 2007). However, adopting some practices had improved the situation. Among these: In Nigeria, study showed that the coarse-textured soils are weak, low productivity, do not retain adequate water and nutrients for sustainable production. They produce poor harvest. By introduction of different field practices, substantial yield increase was obtained (F.K. Salako, 2003). Study under rain fall farming in Faisalabad, Pakistan, reflected that agronomic management practices can improve the soil fertility and crop productivity on sustainable basis. Also, the deep tillage practice with mulch treatments have performed best for soil bulk density, total soil porosity, root penetration resistance and grain yield (Javeed et al., (2013). Another study on long-term effects of management systems on crop yield and soil physical properties of semi-arid tropics of Vertisols indicated that minimum tillage gave high porosity, improved water logging, favoured changes in soil physical, and hydrological properties. Thus, it contributed in increasing and sustaining the crop productivity, which recorded about 5 times higher compared to traditional management system (Pathak, et al., 2011).

Furthermore, the vegetation analysis reflected the domination of *Acacia seyal*, followed by *Acacia mellifera*, *Acacia nubica* and *Balanites aegyptiaca*. Furthermore, along with the trees, different grasses and other plants species are found which flourish the grazing plants species in the study area.

V. CONCLUSION AND RECOMMENDATION

The study revealed different signs of land degradation in the study area which is reflected by the changes in soil chemical properties.

The cultivated land showed changes in soil chemical like increase of salinity in some parts and alkalinity in other parts as well as physical properties such as an increase of coarse texture. These changes will have negative impact on soil productivity and crop yield.

The observed degraded land is due to increased anthropogenic activities as well as natural factors.

Based on these finding the following recommendations can be stated:

1. The reclamation of the slightly saline and/or alkaline pockets of the soils that found in some parts of the study area should be attempted.
2. 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 to lower the pH of alkaline soils which affects the availability of the macro and micronutrients.
3. Effective extension services to be introduced.
4. Introduction of new cropping pattern.
5. To sustain the rain-fed farming, the old design should be changed, modified, redesigned or readjusted so that to address the socio-economic and environmental issues.
 3. Mobilization and optimal use of water resources ie. Water harvest and spread techniques. To be adopted.
 4. Cultivation of improved varieties.
 5. Rehabilitation of range.
 6. Immediate action plan towards natural resources (soil, forest, biodiversity, range) conservation is urgently needed

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Table (1) Results of soil physical and chemical properties of the study area (2012)

Sample No.	PH	EC cls mm ^ō	Total N (%)	P mg/L	K mg/L	Moisture Content	Clay (%)	Silt (%)	Sand (%)	Soil Texture
1	7.22	1.55	0.91	16.5	3.25	2.81	23.79	64.51	11.70	Silt loam
2	7.20	159.70	0.23	21.0	3.25	3.12	23.87	41.50	34.64	loam
3	7.50	253.00	0.49	10.0	4.35	2.52	49.36	41.24	90.40	Silt clay
4	6.91	313.00	0.34	18.0	1.60	2.27	29.85	51.63	18.52	Silt clay loam
5	7.37	206.00	0.17	16.5	6.55	2.45	24.62	24.82	25.55	loam
6	8.00	153.00	0.57	9.0	3.25	2.67	45.23	44.79	9.98	Silt clay

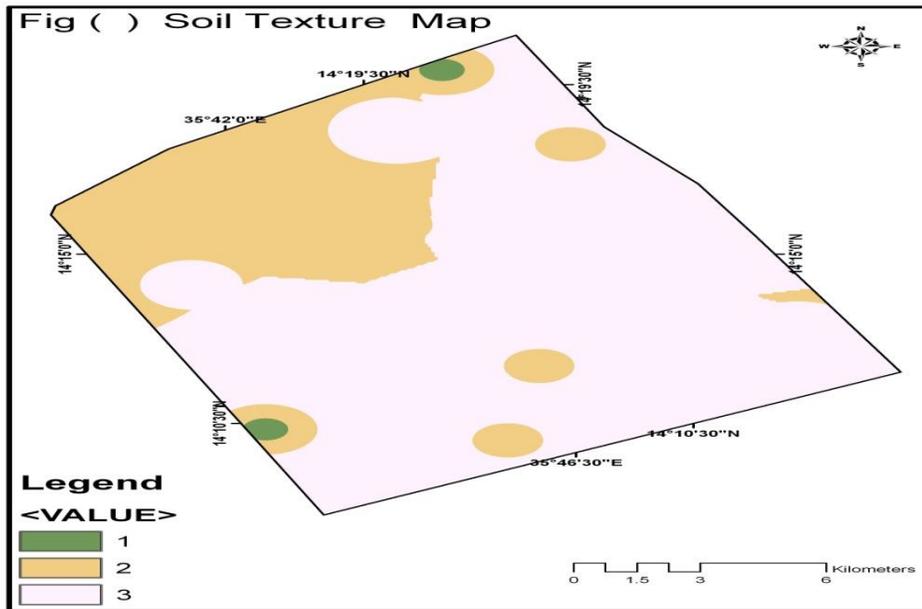


Figure (2) ECe values

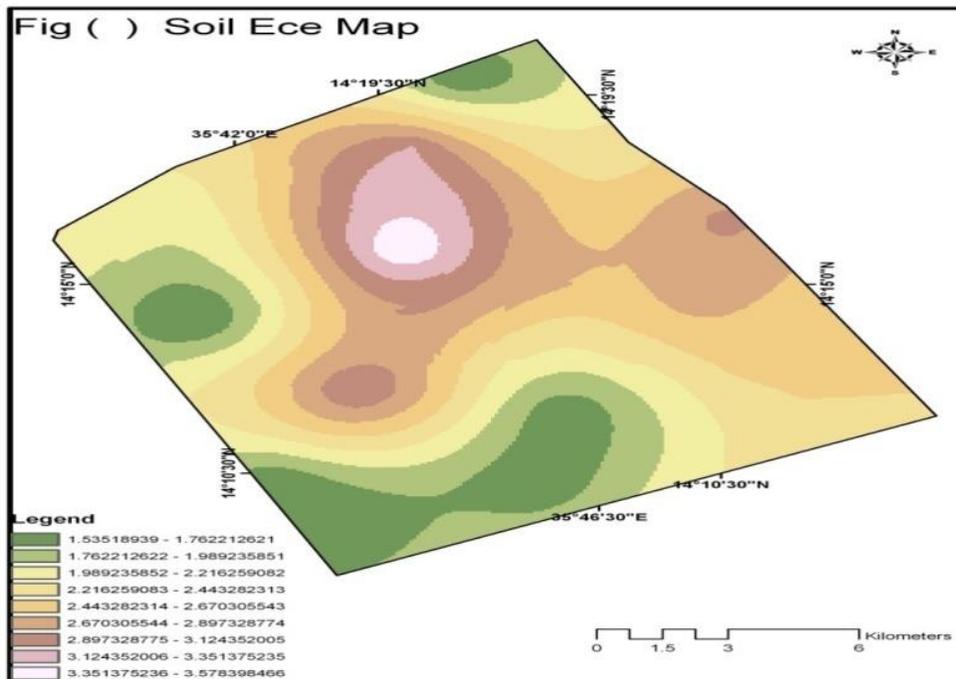


Figure (3) pH values

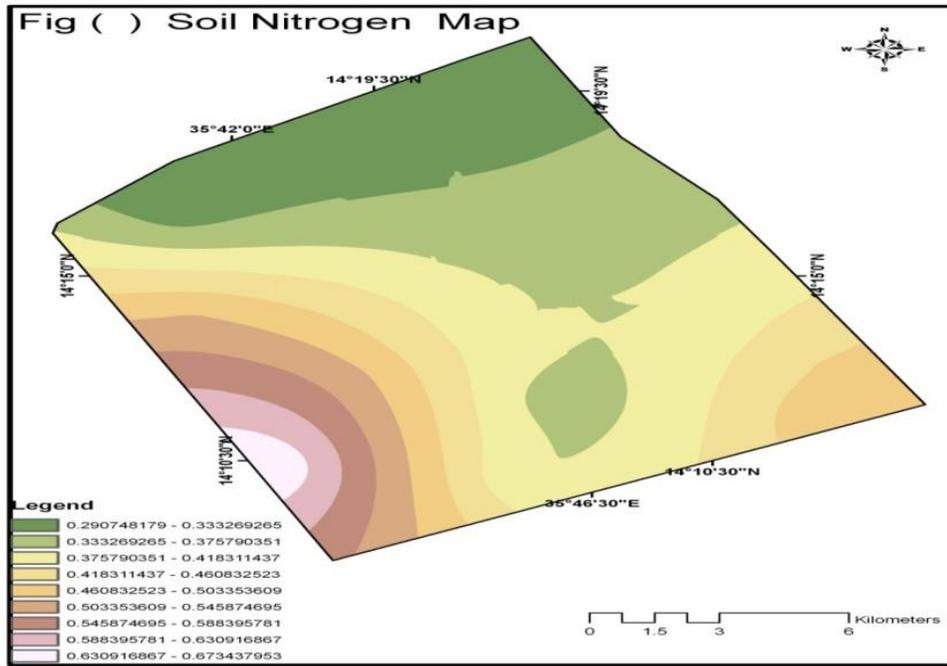


Fig 4 Soil Nitrogen Values

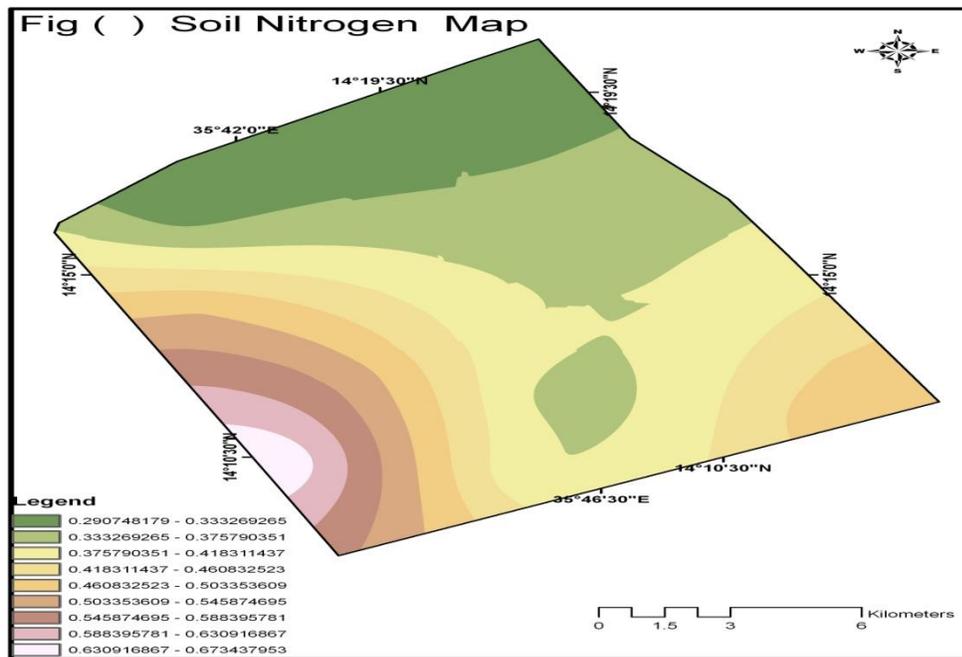


Fig 5 Soil Phosphorus Values.

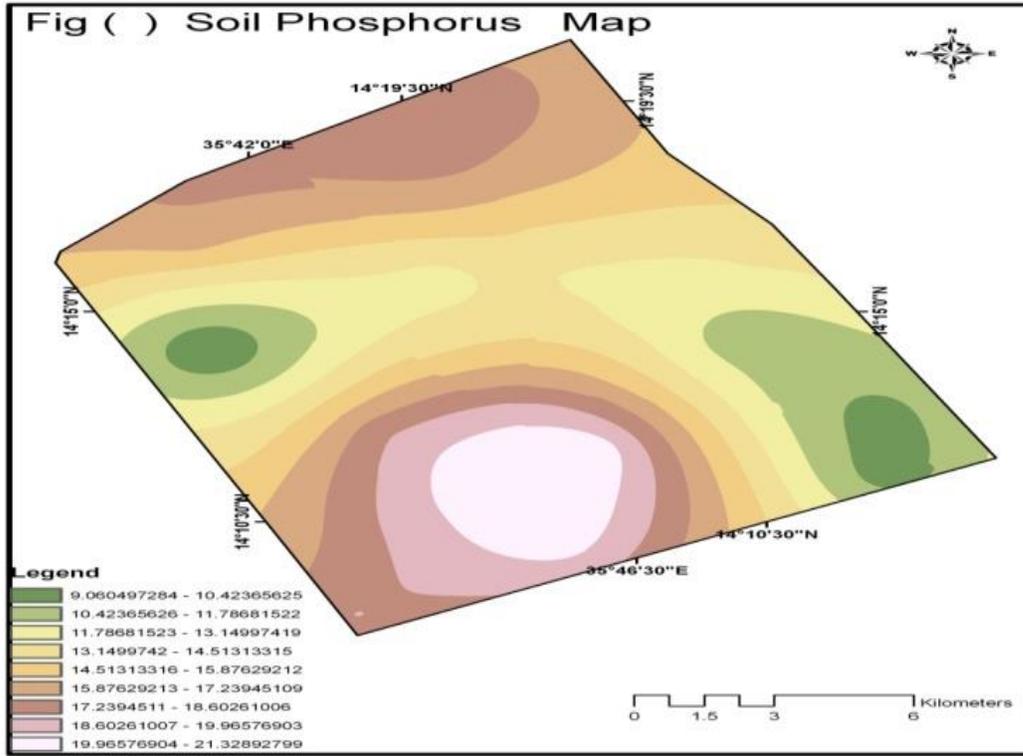


Fig 6 Soil Potassium Values

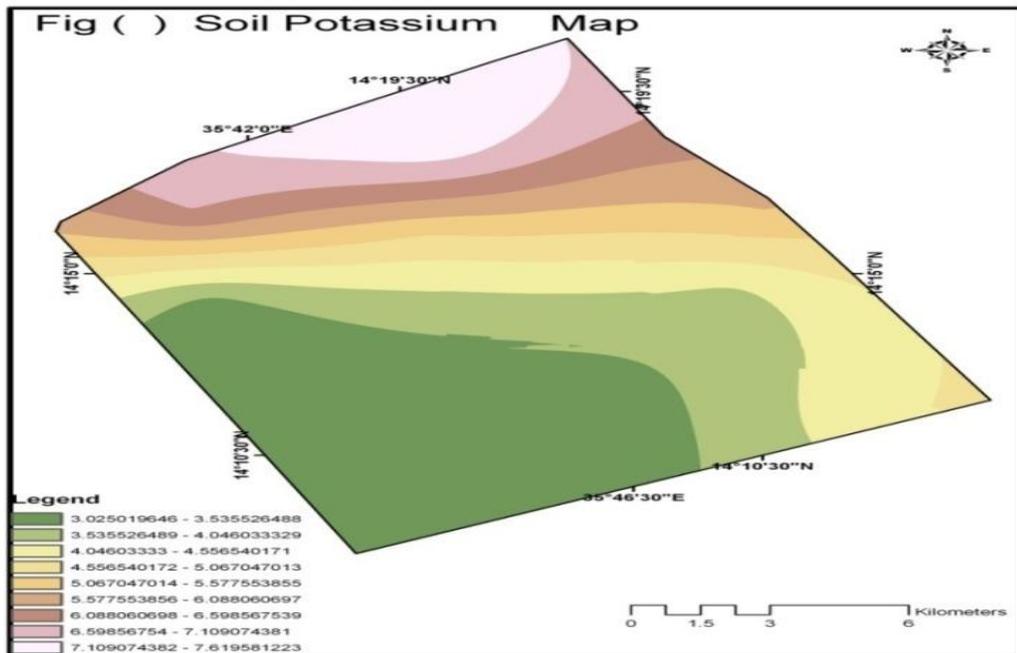
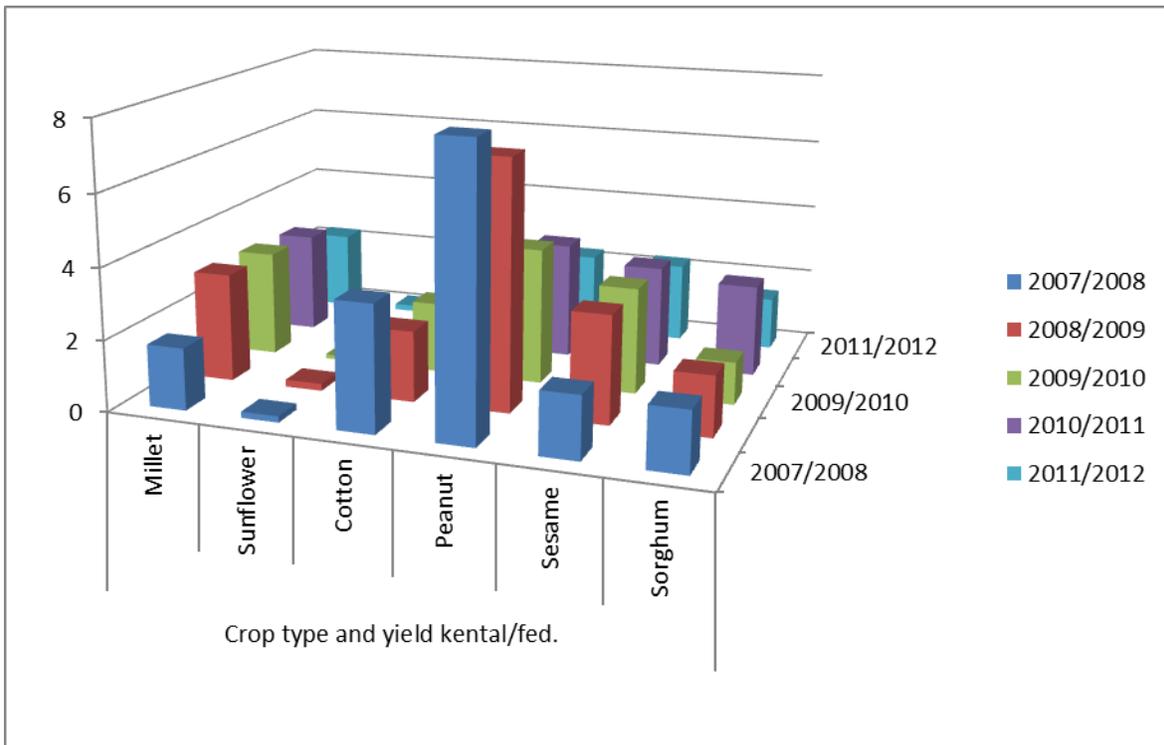


Table (2): Yield of different grown crops in the study area during (2007/2012)

No.	Season	Crop type and yield kental/fed.					
		Millet	Sunflower	Cotton	Peanut	Sesame	Sorghum
1	2007/2008	1.75	0.175	3.54	8.0	1.75	1.7
2	2008/2009	3.07	0.2	2.0	7.0	3.03	1.7
3	2009/2010	3.0	0.12	2.0	3.85	3.0	1.2
4	2010/2011	2.88	0.122	3.83	3.31	2.88	2.59
5	2011/2012	2.26	0.173	3.0	2.3	2.26	1.49

Source: Ministry of agriculture, Gedaref State –Sudan (2012)

Fig 7: Crop types and yield in the study area (2007-2012)



PC Based Design and Fabrication of Wireless Industrial Surveillance System using Lab VIEW

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Abstract- In an industry, number of electrical equipments are connected at different locations of the plant. It is difficult to monitor all the parameters of every equipment continuously, also collection of such numerous information and analysis is time consuming. The Wireless Industrial Surveillance System using real time operating system (RTOS) is an application designed to monitor the individual device or parameter at the time of requirement. This is a kind of wireless sensor networking used in supervisory control system. It can be designed with a single cluster sensor polled by the central monitoring station for its status and also the control operation of stand by device can be made from the control room. The cluster of sensors are connected to a AT89C51 based system the sensor channels are scanned with interrupt based program to make the system more efficient and fast responsive. The Central monitoring station receives the information on polling and this system is designed using a PC. An application program is designed using Lab VIEW (Laboratory virtual instrumentation engineering workbench) to monitor the sensor nodes. The sensor node sends the status information on receiving a request from the central monitoring station, as the data communicated by polling method.

Index Terms- Lab VIEW, RF trans-receiver, AT89C51 microcontroller, RTOS

I. INTRODUCTION

Wireless sensor networking used in supervisory control system have few stations, each station monitors a number of electrical equipments. Every station has a microcontroller running with a RTOS to monitor the parameters. The sensors activate the interrupt service routines (ISR) to protect the devices locally, so the protection relays reacts faster compare to the scanning type of OS. The local node stores the parameters in memory and provides an audio visual indication. Every local station has a unique address and connected with a wireless trans-receiver. The local stations are normally scanning the receiver and that is in a super-loop. There is a central Station used for surveillance, when it is required to monitor the different parameters or equipments of local stations then the user will run a high level program in the PC and monitor the local station by sending request to the local station by its address and its parameter number. The local station will receive the address and after recognition retrieve the information regarding the particular parameter number from the controller memory and send to the central station for required analysis purpose. The local stations

are running on RTOS and the ISR can be designed to send the automatic SOS report to the central nodes. When the parameters are very crucial then the ISR can include sending the SOS report along with local protection. As every local station is acting as a cluster of smart sensor, it is possible to provide interlock between the parameters and stations.

1.2 DESIGN PRINCIPLE:

Hardware Design: The sensor network is connected to an AT89C51 based motherboard. The mother board is having on board 2.4GHz FSK trans-receiver. The trans-receiver module is compatible to 8 bit digital data format at 9600 baud rate for transmit in air and receive the same. The trans-receiver is designed with CC2500 IC. This IC is used as a trans-receiver for demodulating FSK modulated data to recover the digital data and vice versa. There is a RF trans-receiver connected to communicate the data between the central station and local station.

The Central station is also designed by using a PC that is interfaced with a trans-receiver to communicate data between the local and central station. The PC receives and sends digital data through a similar RF trans-receiver The RF trans-receiver process wireless signal and generates digital data and the PC read the received data for decoding. The decoded data is interpreted and displayed on a LCD screen for user information.

Software Programming:

In this application there are two platforms used to develop the programs. The local stations (Station1,...,Station N) are designed with AT89C51 microcontroller and programmed by using assembly language; the flow diagram is designed on the basis of embedded RTOS. The Central station is designed with a PC based application program developed with Lab VIEW. The SOS message from local stations received at PC. The entire system is basically works like a supervisory control system for enhancing the capability of surveillance of different equipments and analyzing the performance of the system. The data communication between the local station and central station is implemented by poling method.

1.3 CIRCUIT DESCRIPTION:-

1.3.1 Power Supply:-

The power supply designed for catering a fixed demand connected in this model. The basic requirement for designing a power supply is as follows,

1. The different voltage levels required for operating the devices: +5 Volts required for

operating microcontroller and +12 is required for drivers and amplifiers and comparators etc.

2. The current requirement of each device or load must be added to estimate the final capacity of the power supply.

There are two methods for designing power supply, the average value method and peak value method. In case of small power supply peak value method is quit economical, for a particular value of DC output, the input AC requirement is appreciably less. In this method the DC output is approximately equal to V_m .

1.4 Sensor Interfaced:-

1.4.1 Over Voltage Detector: - That output signal is compatible with the controller because the current will flows from the collector of the transistor whenever the base voltage is high due to the transistor action. Similarly the output is low in the absence of the input signal to the signal conditioning circuit from the comparator. The Circuit diagram has been shown in Figure 3.

1.4.2 Over Current Detector: - This circuit is designed to detect over current. In this section a special type of CT is used to detect very low current. The output of this CT is an AC voltage

proportional to the Load current. The CT voltage varies with load current. The Circuit diagram has been shown in Figure 3.

1.4.3 Over Temperature detector: - To detect the over temperature / fire detection or above the room temperature. The Circuit diagram has been shown in Figure 3.

1.5 Mono-shot Multivibrator:- A monostable multivibrator (MMV) often called a one-shot multivibrator, is a pulse generator circuit in which the duration of the pulse is determined by the R-C network, connected externally to the 555 timer. In such a vibrator, one state of output is stable while the other is quasi-stable (unstable). For auto-triggering of output from quasi-stable state to stable state energy is stored by an externally connected capacitor C to a reference level. The time taken in storage determines the pulse width. The transition of output from stable state to quasi-stable state is accomplished by external triggering. The schematic of a 555 timer in monostable mode of operation has been shown in figure 3.

1.6 LED Indicator: - The indicator section consists of a light emitting diode and its driver circuit is designed on the basis of current required to glow the light emitting diode.

1.7 Relay and Relay Driver: - To activate and deactivate the high voltage load (Electrical appliances) for that a relay is required as an element. Here relay itself cannot actuate (ON/OFF) of its own for that a driver is required, here a transistor as a driver is used which is configured as a switch.

1.8 Operation of Remote Section

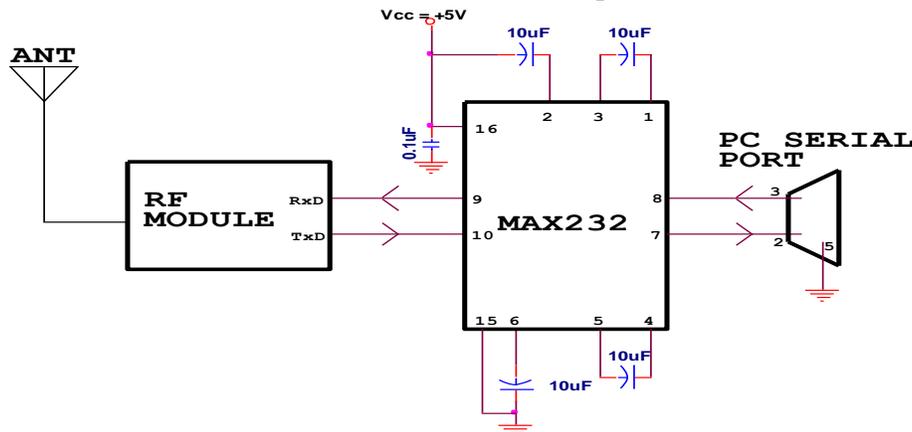
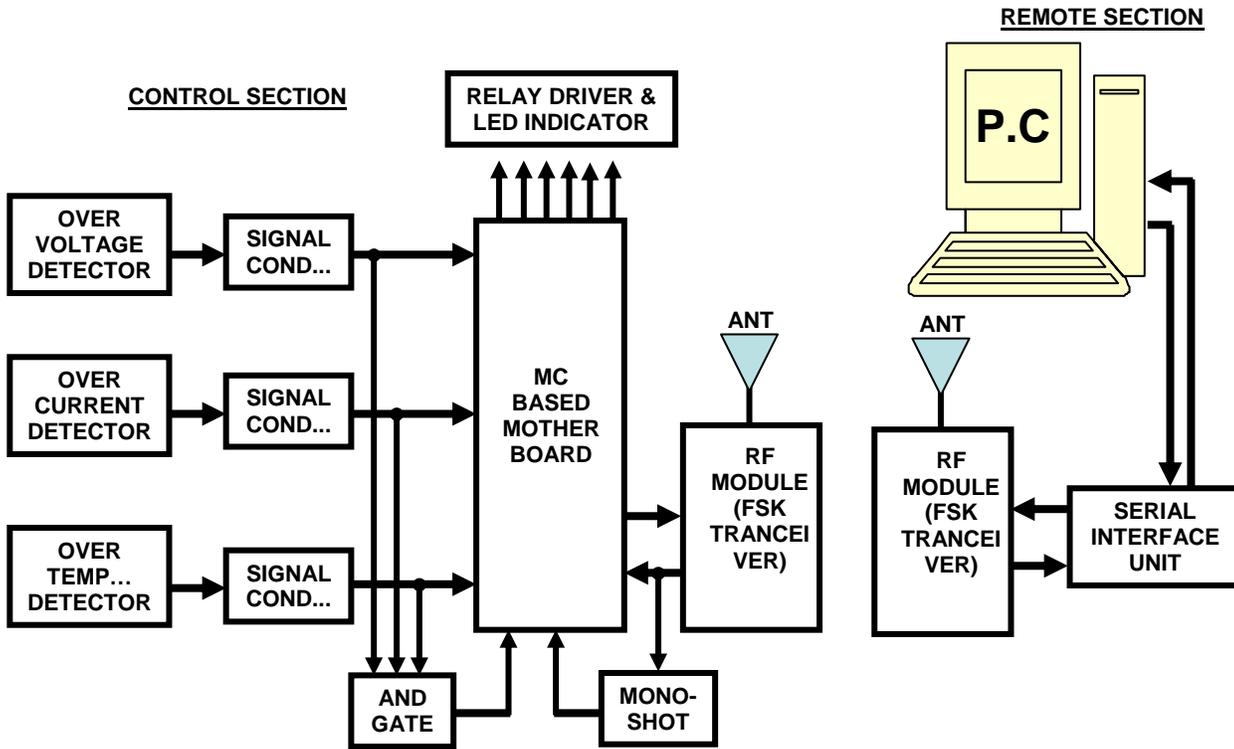


Figure -1

In figure 1 the output of the RF module port is fed to the PC and vice versa through a SIU circuit, because the transition output signal of the PC serial port is not compatible with the RF module port and vice versa. The SIU unit will convert the CMOS output signal into serial transition output TTL signal and vice versa. At normal condition, the PC serial port is in ideal

condition no serial data transmission occurs. Whenever a KEY is pressed on the keyboard of that PC, the corresponding ASCII value is converted into a serial data format and that output signal is fed to the controller (RxD) as input signal through SIU section.

1.9 BLOCK DIAGRAM



PC BASED WIRELESS SURVEILLANCE FOR INDUSTRIAL MACHINES

Figure 2

1.10 Control section circuit diagram

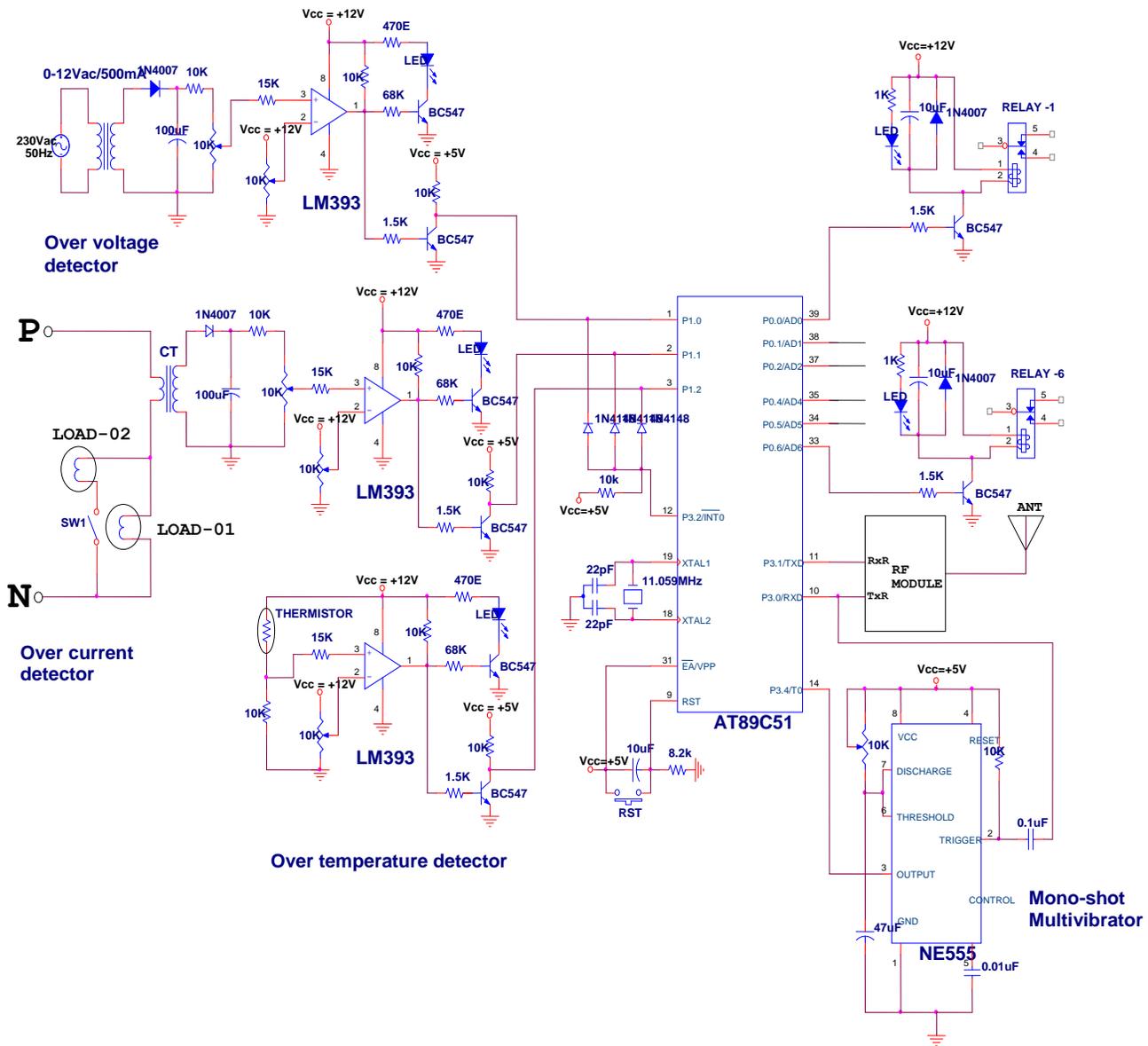


Figure 3

1.11 Hardware part of industrial surveillance system using Lab VIEW



Figure 4

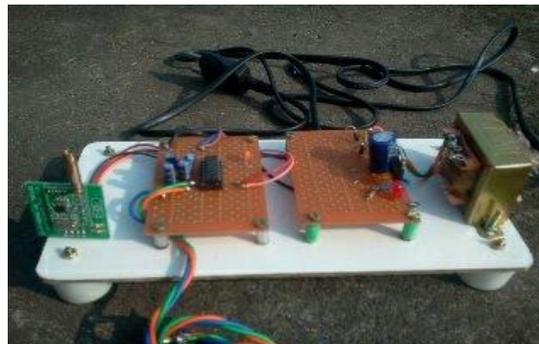


Figure 5

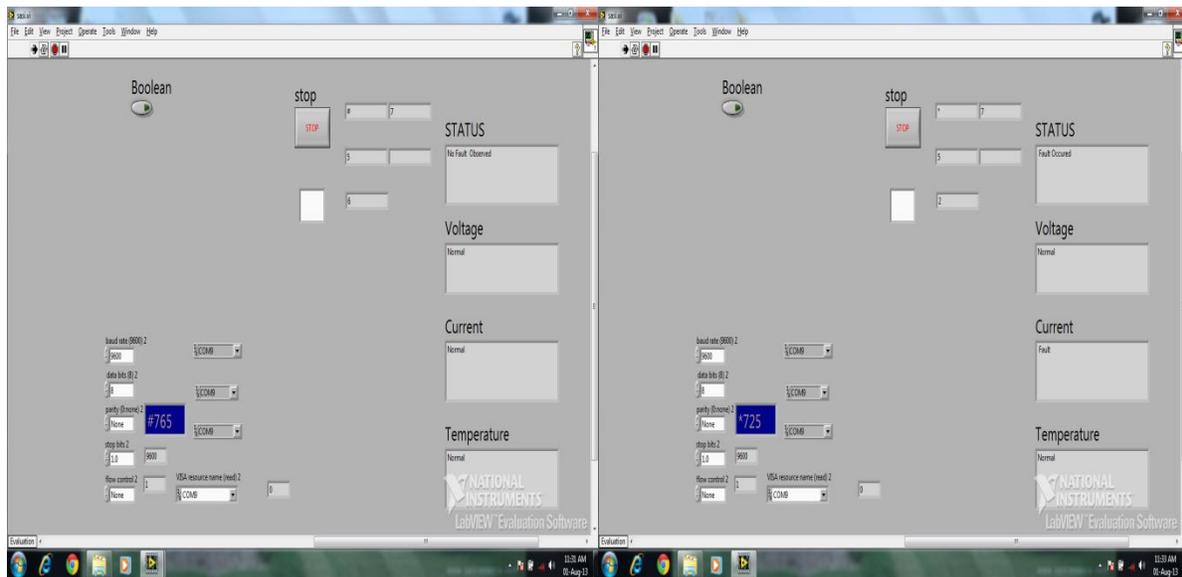
1.12 RESULT AND DISCUSSION:-

In this paper an application is designed for continuous monitoring the individual various parameters (current, voltage and temperature) at the time of requirement. PC monitors the local station by sending a request to the local station. The local station receives the address and after recognition retrieves the information regarding the particular parameter from the controller memory and send to the central station for required analysis purpose and to display the status using LAB VIEW. The character “#” indicates that all the parameters are in normal condition. The character “*” indicates that fault has been

occurred. The character “5” indicates that the status of voltage is in normal condition. The character “1” indicates that the status of voltage is not in normal condition. The character “6” indicates that the status of current is in normal condition. The character “2” indicates that the status of current is not in normal condition. The character “7” indicates that the status of temperature is in normal condition. The character “3” indicates that the status of temperature is not in normal condition. When the program will run in Lab VIEW the following result will be displayed on the front panel of Lab VIEW.

Condition	Status	Voltage	Current	Temperature	Remark
Normal condition	No Fault	Normal	Normal	Normal	Figure 6
For Over Voltage	Fault	Fault	Normal	Normal	Figure 8
Over Current	Fault	Normal	Fault	Normal	Figure 7
Over Temperature	Fault	Normal	Normal	Fault	Figure 9

1.13 OUTPUT OF VARIOUS PARAMETERS IN Lab VIEW:-

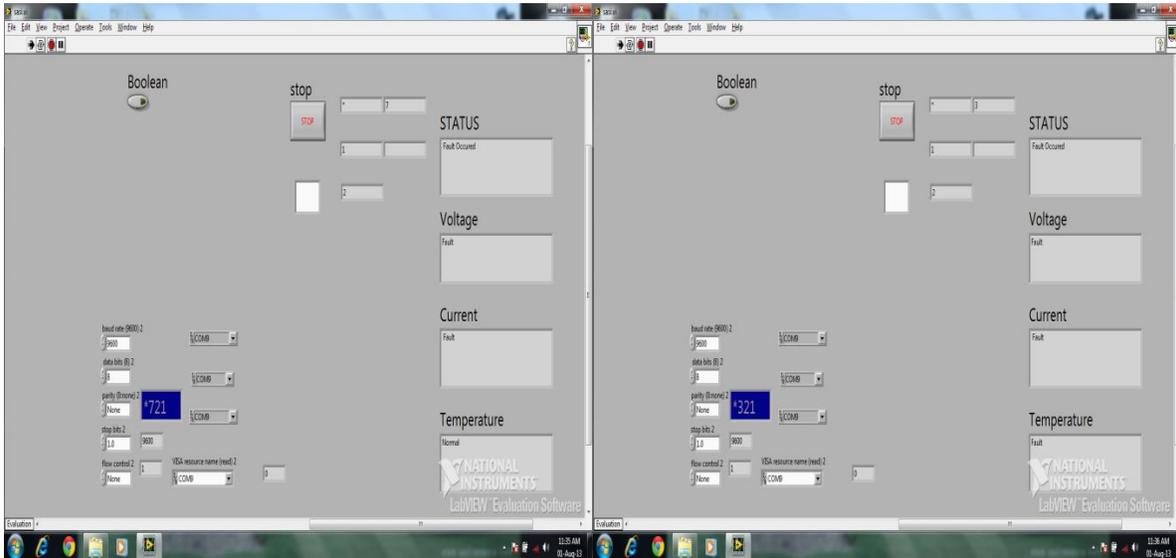


In normal condition

Over current

Figure 6

Figure 7



**Over voltage
Figure 8**

**Over temperature
Figure 9**

1.14 CONCLUSION

This fabricated model has been tested successfully and achieved reliable transmission of data to the remote site and representation of indications and controls using LAB VIEW. The observations are shown in above table. It may require slight modification to make suitable for working in the outdoor conditions.

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Exclusive Breast Feeding Practice in Gangawatakorallaya MOH area, Sri Lanka

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Abstract- Breastfeeding is an unequalled way of providing optimal and complete nutrition for the healthy growth and development of infants. Even though the Sri Lankan mothers increasingly choosing to breastfeed their babies, the rates of exclusive breast feeding for first six months still remain low. The purpose of this study was to determine the prevalence of exclusive breastfeeding practice in Gangawatakorallaya MOH area in Sri Lanka. The study variables were the mother's occupation, level of education, parity and the sex of the baby. The statistical significance of the study variables were tested by chi-square test using SAS 9.1 and significant effects were tested using Fisher's Exact Test. An effect was considered statistically significant if $p < 0.05$. Out of the 350 subjects, 215 (61.43 %) mothers exclusively breast fed their children for first six months. Beside breast feeding 77 (22.0%) mothers were given water to their children during the first six months. Statistically significant number of housemaid mothers was exclusively breast fed their children compared to working mothers. Health care workers have a greater responsibility in promoting exclusive breast feeding practice through effective health education strategies in Sri Lanka.

Index Terms- Exclusive Breast Feeding, Medical officer of Health(MOH), Public Health Midwife (PHM), Infant Mortality Rate(IMR)

I. INTRODUCTION

Human breast milk is the natural source of optimal nutrition for the human infant. In addition to the nutritive value, it is well recognized to protect against various infections including diarrheal diseases, and respiratory infections. Breastfeeding and the use of human milk confer unique nutritional and non nutritional benefits to the infant and the mother and, in turn, optimize infant, child, and adult health as well as child growth and development. According to the Infant Feeding Survey 2005, 76% of UK mothers had initiated breastfeeding, but only 48% continued breastfeeding at age six weeks, and only 35% were breastfed at age four months [1].

Infant feeding should not be considered as a lifestyle choice but rather as a basic health issue. In 2001, WHO recommended that infants should be exclusively breastfed for the first six months of their life and thereafter to be introduced nutritious complementary food and continue breastfeeding up to the age of two years or beyond [2]. The meaning of Exclusive breastfeeding is the infant only receives breast milk and not even water. A survey conducted in Sri Lanka in 2011, reported that only 62.2% of infants were exclusively breastfed up to 6 months of age [3].

Sri Lanka is a developing country situated in South Asian region. Kandy district is situated in the central province in the country. The Infant Mortality Rate (IMR) and Neonatal Mortality Rate (NNMR) has declined over the last few decades and the figure for the Central Province of IMR for the 2007 is 11.3 per 1000 live births is much higher than the national figure of 8.5 per 1000 live births. The NNMR for the Central Province is 8.6 per 1000 live births for the year 2007 [4]. According to DHS 2006/2007 99.5% mothers in Kandy district have received antenatal care from a health care professional. According to Annual Health Bulletin, 2009, prevalence of mothers who have exclusively breast fed during the first 4 months at their last birth in Sri Lanka is 82.7% and this figure for the Kandy district is 84.8%. There are 23 MOH areas and 454 Public Health Midwife (PHM) areas in Kandy district. Gangawatakorallaya MOH area is one of those MOH areas and consists of socio-economically mixed population. MOH area is one of the well margined health care units managed by a Medical Officer of Health (MOH). Public Health Midwife area (PHM areas) is the very valuable smallest health unit in the government health system. The PHM is providing care at the door step in the field. Each PHM has a well defined area consisting of a population ranging from 2000-4000. Though systematic and well organized home visits, the Public Health Midwife provides care to pregnant women, infants and pre-school children within her area [5].

Even though the reported breast feeding rate was high in the Kandy district, there are some inappropriate feeding practices prevailing among mothers. This study was conducted in Gangawatakorallaya MOH area to determine the prevalence of exclusive breast feeding practice for first six months of infant's life.

II. MATERIALS AND METHOD

A community based, cross-sectional study was conducted at all the child welfare clinics at Gangawatakorallaya MOH area, Kandy, Sri Lanka. The study was carried out from October 2013 to December 2013. Full term healthy infants who were between 6 months to 5 years of age and their mothers attending child welfare clinics were included in the study. Mothers with psychiatric disorders and language barriers were excluded from the study.

The information was gathered through a pre-tested interviewer administered questionnaire. Mothers were questioned about how they fed their children during first six months. Study was carried out among randomly selected three hundred and fifty maternal-infants units who have fulfilled the above inclusion and exclusion criteria. Data was gathered by the principal

investigator by participating to each child welfare clinic at Gangawatakoralaya MOH area. Before administering the questionnaire, purpose of the study was clearly explained and informed written consent was obtained from the mothers who took placed in the study.

Ethical clearance for the study was obtained from the Ethical Review Committee, Faculty of Allied Health Sciences, University of Peradeniya and permission to carry out the study was obtained from the Provincial Director of Health Services, Central Province. The statistical analysis was done with SAS 9.1 using Fisher's exact test. The p value < 0.05 was considered as significant.

III. RESULTS

Out of 350 mothers who were participated for the study, majority (88%) were educated up to secondary level where as 84.29% of mothers were housemaids. Among the 350 enrolled infants 171(48.86%) were male and 179 (51.14%) were female. Family income was varied between less than 17000 to above 88000 Sri Lankan rupees.

Table I: Characteristics of the study sample

Characteristic	Frequency (n)	(%)	
Mother's level of education	Primary	17	4.86
	Secondary	308	88.00
	University	25	7.14
Mother's occupation	Housemaid	295	84.29
	Working mothers	55	15.71
Parity	Primiparous	177	50.6
	Multiparous	173	49.4
Sex of the infant	Male	171	48.86
	Female	179	51.14
Family Income (per month)* LKR	<170000	76	21.71
	>17000-26000	124	35.43
	>26000-38000	85	24.29
	>38000-60000	56	16.00
	>60000-88000	7	2.00
	>88000	2	0.57

*Five categories of income made by combining Mean and median monthly household income by household income decile and sector – 2009 [6].

The prevalence of exclusive breast feeding practice in Gangawatakoralaya MOH area was 61.43%. Out of 350 infants 124(35.43%) infants were introduced water before six months of age. Commencement of complementary feeding was 13.13% before the 7 months of age and 211 (60.28%) infants never experienced formula feeding where as 108 (30.86%) mother introduced formula feeding for their children after 6 months of age. A significantly large number of housemaid mothers (191/295, 64.7%) exclusively breast fed their babies for 6 months

compared to the working mothers (24/55, 43.6%) (p=0.0032). The practice of exclusive breast feeding was not significantly different between the mothers with different education levels, between primiparous and multiparous and also between male and female infants. Family income was also not a significant factor for practice of exclusive breast feeding.

Table II: Exclusive Breast Feeding

Age in months	Frequency (n)	(%)
Less than 1 month	5	1.43
Over 1 st month	9	2.57
Over first 2month	22	6.29
Over first 3month	44	12.57
Over first 4 month	55	15.71
Over first 6 month	215	61.43
Total	350	100.0%

Table III: Introduction of water

Age in months	Frequenc y (n)	(%)
During 1 st month	2	0.57
During 2 nd month	4	1.14
During 3 rd month	20	5.71
During 4 th month	42	12.00
During 5 th month	56	16.00
During 7 th months	226	64.57
Total	350	100.0%

Table IV: Commencement of Formula Feeding

Age in months	Frequency (n)	(%)
No formula feeding	211	60.29
During 1 st month	4	1.14
During 2 nd month	5	1.43
During 3 rd month	5	1.43
During 4 th month	9	2.57
During 5 th month	8	2.29
After 6 th months	108	30.86
Total	350	100.0%

Table V: Commencement of the complementary feeding

Age in months	Frequency (n)	(%)
During 3 rd month	2	0.57
During 4 th month	11	3.14
During 5 th month	33	9.42
At 7 th month	304	86.87
Total	350	100.0%

Table VI: Exclusive Breast feeding practice

		Exclusive Breast feeding for first six months of life	
		Yes (%)	No (%)
Education	Primary	10 (2.9%)	07 (2%)
	Secondary	184 (52.6%)	124 (35.4%)
	University	21 (6%)	04 (1.1%)
Occupation	House maid	191 (54.6%)	104 (29.7%)
	Working mothers	24 (6.9%)	31 (8.8%)
	Parity	108 (30.9%)	69 (19.7%)
	Multiparous	107 (30.6%)	66 (18.8%)
Sex of the infant	Male	106 (30.2%)	65 (18.6%)
	Female	109 (31.1%)	70 (20%)

IV. DISCUSSION

There are number of studies have done on the prevalence of exclusive breast feeding among general population in various countries. In Sri Lanka, exclusive breast feeding for first six month of life has been adopted since 2005 with the WHO recommendation in 2001, and until that it was 4- 6 months [3].

According to a descriptive cross sectional study done by Perera *et al*, 2011, Ragama MOH area in Sri Lanka only 62.2% of infants were exclusively breast fed up to 6 months. In the current study out of 350 infants only 215 infants (61.43%) were exclusively breast and this finding is very similar to the previous study [3]. The results of the current study were possibly affected by different attitudes of the parents and grandparents of the infants of the study population.

Initiation of complementary feeding at 7th month was 86.87% in the current study, which was higher than previous studies [7]. The housemaid mothers showed significantly higher prevalence of exclusive breast feeding practice for first six months compared to working mothers.

V. CONCLUSION

There were 215 (61.43%) exclusive breast fed infants out of 350 in Gangawatakoralya MOH area. Some parents believe that it is essential to give water during early life to avoid dehydration

and there were 77(22.0%) infants who were introduced breast feeding plus water during the first six months of life. Even though the mothers knew the meaning of exclusive breast feeding, they were reluctant to practice it because of some myths and beliefs. With the increasing number of working mothers in the modern society, mothers are tending to wean their children before six months of age. Health care workers who are dealing with mothers and infants, especially the public health midwives have a greater responsibility in promoting exclusive breast feeding practice thorough effective health education strategies in Sri Lanka.

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A Review of Personality Types and Locus of Control as Moderators of Stress and Conflict Management

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Abstract- Abstract

Today managing conflicts and stresses in organizations became a prudent factor for gearing the journey of organizational success. Due to the fact of inevitability of conflicts and stresses (Gultekin et al.2011) it is vital to study the factors which affect the level of conflicts and stresses since root cause of the conflicts and stresses are incompatible goals of the individuals (Galtun, 1973). Numerous studies examined the role of personality and its interaction with situational demands to the perceived stress and ways of coping with stress (Costa, Somerfield, & McCrae, 1996). Meanwhile, the studies on work- family conflicts (Greenhaus & Beutell ,1985) elaborated three dimensions; time-based, strain-based, and behavior-based conflicts. Locus of Control is a strong positive correlate of mental strain. Externals tend to report more negative moods when faced with stressful events. Internals tend to perceive less stress, and have better coping skills (Arsenault, Dolan, & Ameringen, 1991). Pilisuk and Montgomery (1993) found that an external Locus of control was related to a greater number of stress-related somatic symptoms than an internal Locus of controller. There, the study examines and develop a model to elicit how A and B Personality types introduced by Friedman and Rosenman (1974) and locus of control moderate stresses and conflicts rendering different theories and models and the impact of coping strategies with the particular personality type.

Index Terms- A/B Personality Type, Conflict, Coping, Locus of Control Stress

I. INTRODUCTION

The words stresses and conflicts (SaC) are most common in today's world. With the overloaded work and craves SaC have been internalized and already harbored. Every human in the world runs a journey which seemingly endless. There SaC are envisaged since they cannot kept as secluded apart from the man. Many numbers of researchers have been researched on types of stresses and conflicts. And found that incompatible goals are the root cause of SaC (Galtun, 1973). According to Robbins (2000) "personality" is a state of psychology which leads to human emotions and behavior. Lazarus (1993) stated that stresses are psychological rather than physiological. Yet, there is very little attention has paid on personality types and its influence on conflicts. Only lately researchers have considered the role of individual difference variables in the work-family link (Carlson, 1999; Noor, 2003; Stova, Chiu, & Greenhaus, 2002). The psychological stress is considered as a part of a larger topic, the emotions. Through many numbers of theoretical aspects it entails

that stress is an emotion which impacts ones psychology. It is important to note this study discusses on psychological stress and not on physiological. Stress defines an unfavorable person-environmental relationship; its essence is process and change rather than structure or stasis (Lazarus, 1993) and traditional approaches to coping had emphasized traits or styles--that is, stable properties of personality.(Lazarus 1966, 1981; Lazarus & Folkman 1984; Lazarus & Launier 1978). Further, Lazarus stated in his study (1993) that the personality variables and those that characterize the environment come together in the appraisal of relational meaning. An emotion is aroused not just by an environmental demand, constraint, or resource but by their juxtaposition with a person's motives and beliefs. Hence, this study focuses on how the A and B personality types introduced by Friedman and Rosenman (1974) clinging to the locus of control moderate stresses and conflicts. The early research on locus of control beliefs conceptualized it as a bipolar, Funi-dimensional construct (Lefcourt, 1976).

External locus of control was conceptualized as a generalized belief that outcomes are determined by external factors, whereas an internal locus of control was conceptualized as the belief that outcomes are contingent on one's own responses (Kim L.S et al ,1996). Fogas and colleagues (1992) found evidence that locus of control was a partial mediator of the relations between stressful events and anxiety and depression problems. These researchers show the relationship between stress and locus of control and how the locus of control influence on stresses that will be discussed with the early theoretical findings. Fogas found that an external locus of control orientation was significantly related to higher stress and lower achievement orientation. Higher achievement orientation was positively related to the use of active coping styles. The review by Cohen and Edwards (1989) concluded that locus of control is the personality characteristic that provides the most consistent and the strongest evidence of stress-moderation.

According to the study of Keinan and Tal (2004) type A behavior is a coping response to the threat of control loss. The study revealed that Type As are more inclined to stress than Type Bs and this study was able to comply with Friedman and Rosenmans' study on similar. However, these studies examined the attributional style of the two types A and B personalities; internal-external. There, it is apparent the relationship among stress levels, A and B personality types and the locus of control. This study further renders the relationship among these factors and in between conflicts and personality.

II. EARLY THEORETICAL FINDINGS

A and B type personality:

Personality, according to (George, 1992), is the enduring ways a person has of feeling, thinking, and behaving, is the first determinant of how people think and feel about their jobs or job satisfaction. Policemen's personality (like every other person) influences the extent which thoughts and feelings about a job are positive or negative. (Afolabi, 2011) There are two personality types, type A and type B. Type A/B behavior pattern is a behavioral trait (Spector & O'Connell, 1994) referring to how one responds to environmental challenges and threats (Ivancevich & Matteson, 1984).

Type A individuals respond in ways characterized as aggressive, achievement oriented, dynamic, hard driving, assertive, fast paced (in eating, walking, and talking), impatient, competitive, ambitious, irritated, angry, hostile, and under time pressures (Cooper, Kirkcaldy, & Brown, 1994; Friedman, 1967; Jamal, 1990; Rosenman & Chesney, 1985). Type A personalities are very hurried, impatient and can be hostile and aggressive. They are very cynical of the world and are very competitive and tend to be tense and agitated when it comes to work. They have poor impulse control and feel that they always need to be active in all things. When it comes to emotions, they express their anger with outburst and verbal comments, display strong emotional reactions, can be unpredictable with emotional inconsistency, and experience negative emotions.

Type As always watches others and can react in a hostile manner towards others. They like to have control over everything so they tend to be team leaders but are difficult to please. Type A personalities are risk takers, rigid and inflexible, and according to Irikefe (2006), McShane and Von Glinow (2000) this contributed to their low level of job satisfaction. Type As develop coronary heart disease (Friedman, 1967; Schaubroeck, Ganster, & Kemmerer, 1994) and experience more stressors and strains (Jamal, 1999; Sharpley, Dua, Reynolds, & Acosta, 1995) than Type Bs.

According to the study of Douglas's the usefulness of the Type A personality construct has come under serious examination as it relates to stress. Many authors suggest that Type A personality is too global a definition and that there are specific personality traits of Type A individuals that are more related to stress than other traits (Matthews, Glass, Rosenman, & Bortner, 1977; Matthews, 1988). The hostility and irritability components of Type A behavior (reflecting anger, and an obsession with time) have been most often linked to stress-related illnesses. Pred, Spence, & Helmreich (1987) found that impatience and irritability, but not achievement strivings, were positively correlated with somatic self-complaints. They argue that it is highly unlikely that the same components of the Type A behavior pattern are responsible for both vocational excellence and stress-related health problems. Additional studies (Bluer, 1990; Matthews, 1988; Robbins, et al., 1991) show that certain Type A traits like anger, impatience, and irritability are more likely to lead to stress-related health problems than achievement strivings.

On the other hand, Type Bs are open to criticism and they try to make others feel accepted and at ease and so they are more satisfied with their jobs. When they are angry, they use humour subtly to make their point, but they are angry about the issue not

the person. They can be more accepting of emotions and tend to go with the mood at the moment. They are supportive of others and are more likely to express positive feelings and be more satisfied with their jobs (Kirkcaldy *et al.*, 2002). Type B individuals are casual, easygoing, and never in a rush to get things done (Bortner, 1969).

People's values, attitudes, abilities, and emotion vary. This is probably because of the differences in personality. Personality is defined as the combination of stable physical and mental characteristics that gives the individual his or her uniqueness. These characteristics or traits, including how one looks, acts, and feels are the products of interacting genetic and environmental influences. (Afolabi, 2011)

Type A is one of the few personality characteristics that has been previously studied in relation to WFC. Individuals who exhibit Type A behavior are characterized as being ambitious, competitive, impatient, and aggressive or hostile. Individuals lacking these characteristics are relaxed and patient, and are referred to as Type B (Spence, Helmreich, & Pred, 1987). Type A individuals experience a keen sense of time urgency, are more likely to be involved in conflict with coworkers, more overloaded at work, and more likely to be overcommitted than Type B individuals (Baron, 1989; Jamal & Baba, 1991; Strube, 1991). According to the study of Bruck *et al.*... Type A behavior would be more likely to relate to WFC than would the achievement striving dimension.

III. LOCUS OF CONTROL

Internal-external LOC refers to an individual's beliefs that she or he has control over events (Phares, 1968; Ritchie & Phares, 1969; Rotter, 1975; Terborg, 1985). Internals generally believe they are primarily responsible for and in control of what happens to them; externals generally believe mainly other people or forces beyond themselves determine major events in their lives. Previous research (e.g., Harari, Jones, & Sek, 1988; Kirkcaldy & Cooper, 1992; Spector & O'Connell, 1994) showed that internals tended to report more stressors and strains than internals.

The single personality characteristic acting as a stress-mediator to which stress researchers have paid the most attention is locus of control (Kobassa, 1993). Control is expressed as a tendency to feel and act as if one is influential (rather than helpless). Individuals with an internal LC believe their reinforcements are contingent on their own behavior, capacities, and attributes. External LC individuals believe their reinforcements are under the control of powerful others, luck, or fate (Rotter, 1966). Internal LC individuals possess a pervasive, enduring feeling of confidence that one's internal and external environments are predictable and that there is a high probability that all things will work out as well as can be expected dependent on their own efforts (Kobassa, & Puccetti, 1983). This implies the perception of oneself as having a definite influence on life events through the exercise of imagination, skill, knowledge, and choice. Internal LC individuals also tend to have higher achievement motivation, be more purposeful and goal-directed, be more extroverted, sociable, active, and less neurotic and dogmatic than externals (Ormel, & Schaufeli, 1991). LC is a strong positive correlate of mental strain. Externals tend to report more negative moods when faced with stressful events. Internals

tend to perceive less stress, and have better coping skills (Arsenault, Dolan, & Ameringen, 1991).

IV. WORK-FAMILY CONFLICTS (WFC)

Greenhaus and Beutell (1985) defined WFC as occurring when an individual's efforts to fulfill roles at work interfere with efforts to fulfill roles outside of work and vice versa. Greenhaus and Beutell identified three dimensions of WFC: time-based, strain-based, and behavior-based conflict. Time-based conflict occurs when time spent on activities in one role impede the fulfillment of responsibilities in another role. Strain-based conflict occurs when pressures from one role interfere with fulfilling the requirements of another role. The source of these pressures can arise from either the work (Jones & Butler, 1980) or the family domain (Chadwick, Albrecht, & Kunz, 1976; Eiswirth-Neems & Handal, 1978; Holahan & Gilbert, 1979). Lastly, behavior-based conflict occurs when behaviors performed in one role are difficult to adjust to be compatible with behavior patterns in another role. As underscored by the dimensions of WFC, conflict can originate in the workplace and interfere with the family (WIF conflict), or conflict can originate in the family and interfere with work (FIW conflict). Thus, the nature of WFC is that it is bidirectional and that it consists of time-based, strain-based, and behavior-based conflict.

Work-family conflict (WFC) has become a growing topic of interest among researchers due to its implications for both organizations and employees (Allen, Herst, Bruck, & Sutton, 2000). The majority of WFC research to date has focused on the consequences of WFC, and two recent reviews have identified multiple work-related, non work-related, and stress-related outcomes associated with WFC (Allen et al., 2000; Kossek & Ozeki, 1998).

The dominant theoretical approach has been based on role theory (Kahn, Wolfe, Quinn, Snoek, & Rosenthal, 1964) and the examination of role variables such as role conflict, role ambiguity, and role overload (Aryee, 1992; Bacharach, Bamberger, & Conley, 1991). Another area of focus has been on demographic factors such as gender, marital status, and number of children (Greenhaus, Collins, Singh, & Parasuraman, 1997), and number of hours worked per week (Burke, Weir, & DuWors, 1980). Although these studies have provided significant insights into the causes of WFC, the address of personality factors on WFC is less. Bruck et al.'s study was to further investigate correlates of WFC through an examination of the relationships between dispositional or personality variables and WFC. Specifically, Type A behavior and negative affectivity are the only two dispositional variables that have garnered research attention in relation to WFC (Burke, 1988; Carlson, 1999; Frone, Stoeva et al., 1992).

V. COPING

The process of coping is a stabilizing factor that helps individuals maintain psychosocial adaptation during stressful episodes (Holahan, & Moos, 1987). This process is complex but it is directed toward moderating the impact of life events on

individual's physical, and social functions (Billings, & Moos, 1981).

Coping with stressful events is viewed as a dynamic process consisting of the environmental Stressors (i.e. demands, constraints), a cognitive appraisal process, levels of stress experienced psycho-physiologically/behaviorally, and coping responses, behaviors, or styles (Lalack, 1986). The bulk of this discussion will deal with the appraisal process and work done on coping responses, behaviors, or styles.

Folkman and Lazarus (1984, 1985, 1988) developed the cognitive theory of psychological stress and coping. It views the process as transactional in that the person and the environment are in a dynamic, mutually reciprocal, relationship. In order for individuals to experience stress, they first must appraise the situation as threatening or challenging. Cognitive appraisal is the process whereby the person evaluates whether an encounter with the environment is relevant to his or her well-being, and in what way (Folkman, Lazarus, Gruen, & DeLongis, 1986). The process of appraisal actively negotiates between the demands of the environment and the goals and beliefs of the individual.

Appraisal consists of both primary and secondary appraisal. In primary appraisal, the individual evaluates whether he/she has anything at stake in an encounter with the environment. It is the interpretation of the situation, rather than some objective quality of the situation, that determines its stressfulness to the individual. Secondary appraisal is the process of thinking of responses to a situation deemed threatening or challenging. It involves judgments regarding available options. Various coping options are evaluated for their worth and chance of success in a particular situation.

Appraisal is affected by both situation and person factors. One of the main points made by Folkman and Lazarus (1984) though, is that one's beliefs about one's mastery over the environment may have significant effects on threat or challenge appraisals. LC is related to beliefs about mastery of the environment and is thought to affect the appraisal process and influence the coping responses made. This will be discussed in more detail later, but generally internal LC individuals are less likely to report being threatened by a Stressor and more accepting of Stressors deemed unchangeable (Vitaliano, Russo, & Maiuro, 1987).

Internal LC individuals tend to have better coping skills than externals (Arsenault, et al., 1991). They tend to use more instrumental strategies and engage in less task-irrelevant self-preoccupation (Solomon, 1988). As Pinwall and Taylor (1992) believe that an internal LC leads people to adopt active coping strategies by contributing to a sense of self confidence needed to confront problems directly. The trait approach to coping (Bolger, 1990; Holahan, & Moos, 1986) assumes that coping responses are a property of the person and are influenced by biology, personality, learning, and socialization. In the trait approach, coping responses are referred to as coping styles- any pattern of coping behavior which an individual exhibits over the longer-term, resulting either from the way the individual tends to appraise events, or from semi-habitual behavior (Newton, & Keenan, 1990). These long-term coping styles may exist relatively independently of the environment, and they might also be conditioned through learning the relative efficacy of different

coping responses. This definition of coping styles acknowledges that people may have a tendency to cope in a certain way over time. This coping style may result because the person tends to appraise events in a certain way, because they have a tendency to behave in a certain way, or the coping style may be a product of existence in a certain type of environment (e.g. very high demand environment).

In the trait approach to coping, people do not approach each coping context anew, but bring a preferred set of coping strategies that remains relatively fixed across time and circumstances. Certain personality dispositions in fact, such as internal LC, constructive thinking, self-confidence, learned resourcefulness, self-efficacy, optimism, a desire for mastery, and hardiness all appear related to certain coping styles (Lazarus, 1993) that will be discussed later. These facets of personality affect a variety of factors in the coping situation to include range of coping responses considered, interpretation of the stressful event, and effort expended on coping.

Even Folkman and Lazarus (the major proponents of the process approach to coping) admit that there are relatively stable coping styles and that to understand stress, we must consider individual differences in motivational and cognitive variables which intervene between the Stressor and the reaction (Lazarus, 1993). Buntrock and Reddy (1992) provide further argument for studying coping styles. Even though appraisal can change throughout a stressful encounter as a result of the bidirectional influence of the person and the environment, and the environment/situation is important to consider in understanding the coping process, focusing on change does not preclude investigating the influence of personality traits on the coping process. They argue that looking at only one specific stressful encounter makes it difficult to determine whether or not a coping strategy is effective. A single coping strategy may be effective in only some domains. (Douglas, 1995)

VI. A AND B TYPE PERSONALITY & LOCUS OF CONTROL ARE COMBINED FACTORS

Robbins et al. (1991) found that stress-related problems correlated only with negative affect characteristics- low self-esteem, pervasive dissatisfaction, disgust, anger, irritability, hostility, and guilt, but not achievement strivings. The hostility and irritability components of Type A behavior (reflecting anger, and an obsession with time) have been most often linked to stress-related illnesses. Pred, Spence, & Helmreich (1987) found that impatience and irritability, but not achievement strivings, were positively correlated with somatic self-complaints.

As per the theoretical aspect on locus of control Internal LC individuals possess a pervasive, enduring feeling of confidence that one's internal and external environments are predictable and that there is a high probability that all things will work out as well as can be expected dependent on their own efforts (Kobassa, & Puccetti, 1983). Internal LC individuals also tend to have higher achievement motivation, be more purposeful and goal-directed, be more extroverted, sociable, active, and less neurotic and dogmatic than externals (Ormel, & Schaufeli, 1991).

LC is a strong positive correlate of mental strain. Externals tend to report more negative moods when faced with stressful

events. Internals tend to perceive less stress, and have better coping skills (Arsenault, Dolan, & Ameringen, 1991).

These studies elaborate the relationship between A Type personality characteristics and the external locus of controllers' behavioral characteristics are most frequently common. And the relationship between internal locus of control and B type personality; external locus of control and A type personality is inevitable. Yet, it is proven Locus of control and A/B type personalities are combined and they act simultaneously for a given external situation.

VII. LOCUS CONTROL AND WFC

Little attention has been paid to the effects of personality factors on work-family conflict. Only lately have researchers considered the role of individual difference variables in the work-family link (Carlson, 1999; Noor, 2003). The study by Carlson (1999) showed that Type A and negative affectivity (NA) explained for significant additional variance beyond those attributed by the role variables (role ambiguity and role conflict) in the work and family domains. In addition, Stova et al. (2002) examined the mechanisms by which NA influenced work-family conflict and found that NA played both mediator and moderator roles in the relationship between role stress (job stress and family stress) and work-family conflict. The study by Noor (2002) used another personality variable that of locus of control, in the relationship between work-family conflict and well-being to examine the different pathways control can impact upon well-being. However, in this case, work-family conflict was considered as the antecedent, rather than the outcome variable.

Locus of control, the generalized belief on the part of the individual concerning the extent to which outcomes are determined by internal factors (such as personal effort and ability) as opposed to external ones (such as fate, chance or powerful others), is chosen as the personality variable of interest in this study. Past studies in the areas of both work and general life stresses have indicated the beneficial effect of internal control beliefs on well-being (Frese, 1989). Following from this reasoning, a sense of control should be associated with less work-family conflict. While control is a personality trait, it may also reflect the degree to which individuals actually does have control over the environment.

An individual learns through social interaction and personal experiences whether his/her actions and efforts affect outcomes or not. In addition, locus of control has been shown to moderate the relationship between stress and mental health outcomes (Parkes, 1994). The review by Cohen and Edwards (1989) concluded that locus of control is the personality characteristic that provides the most consistent and the strongest evidence of stress-moderation. In this case, external control was found to act as a vulnerability factor. Having supportive workplace policies offers workers the opportunities to exercise initiative and independent judgment, giving them a sense of autonomy and control within the workplace. A sense of control originating within the workplace may promote feelings of efficacy and effectiveness in coping with the environment leading to less work-family conflict being experienced.

VIII. COPING, LOCUS OF CONTROL AND PERSONALITY

Evidence has accumulated indicating that various personality characteristics, such as locus of control and optimism, are related to how people cope with stress (Lefcourt, 1980). For example, an optimistic orientation has been associated with increased problem-solving efforts (Scheier & Carver, 1987), especially in controllable situations (Scheier et al., 1986). Also, internal locus of control beliefs have been found to be associated with increased problem-focused coping or more adaptive coping (Anderson, 1971; Parkes, 1984).

The cognitive-relational theory of stress (Lazarus & Folkman, 1984) postulates that the effects of personality on coping are mediated by cognitive appraisal. More specifically, secondary appraisal (Lazarus, 1966; Lazarus & Launier, 1978) has been hypothesized as playing an important mediating role. A major function of secondary appraisal is to determine what can be done about a stressful event, or whether it is controllable (Wong & Weiner, 1981). Control appraisals assess whether personal coping resources are capable of meeting situational demands (Folkman, 1984).

IX. THE RELATIONSHIP AMONG COPING, LOCUS OF CONTROL, STRESS AND CONFLICTS

A positive association between appraisal of the situation as controllable (changeable) and problem-focused coping has been reported in several studies (Bachrach & Zautra, 1985; Folkman & Lazarus, 1980; Folkman, Lazarus, Dunkel-Schetter) .However, Forsythe and Compas (1981) found that perceived control of an event was associated with problem-focused coping for major life events but not for daily problems. Furthermore, conflicting results have been obtained concerning the relation between control appraisals and other types of coping (e.g. Folkman & Lazarus, 1985; Stone & Neale, 1984).

Coping schemas represent generalized knowledge about which coping strategies are effective in common stressful situations. The objective of coping schemas is to reduce stress and resolve problems. When a person is faced with a stressful situation, coping schemas determine the specific coping strategies to be utilized. The selection of coping strategies is based on accumulated knowledge of the characteristics of situations, coping responses available, and the effectiveness of these coping strategies for different situations. Each coping schema is a fuzzy category of the coping strategies most effective for a given type of situation. Therefore, once a coping schema is activated, the coping strategies most representative of the schema or most typically effective will be selected (Peacock, 1996).

Reker & Wong (1984b) proposed a two dimensional view of optimism: people's expectation of positive outcomes can be based on either confidence in one's own efficacy or an expectation of good fortune. Both internally based optimism (e.g. perceived self-efficacy) and externally based optimism (e.g. belief in good luck) may contribute to the expectation of positive outcomes (Marshall & Lang, 1990; Reker & Wong, 1984)

According to the congruence model introduced by Peacock, Wong, & Reker in 1993, locus of control beliefs and optimism affect coping primarily through their impact on control appraisals. For example, a person with strong internal control

beliefs is more likely to view a stressful situation as personally controllable and this appraisal will result in increased problem-focused coping efforts. (Peacock & Wong, 1996) This renders that the internal locus of controllers are more likely to cope up with stresses and conflicts in a positive way while they are emotionally controllable. Similarly, an optimistic individual, who expects positive outcomes, is also likely to view a problem as manageable and consequently engage in more problem-focused coping.

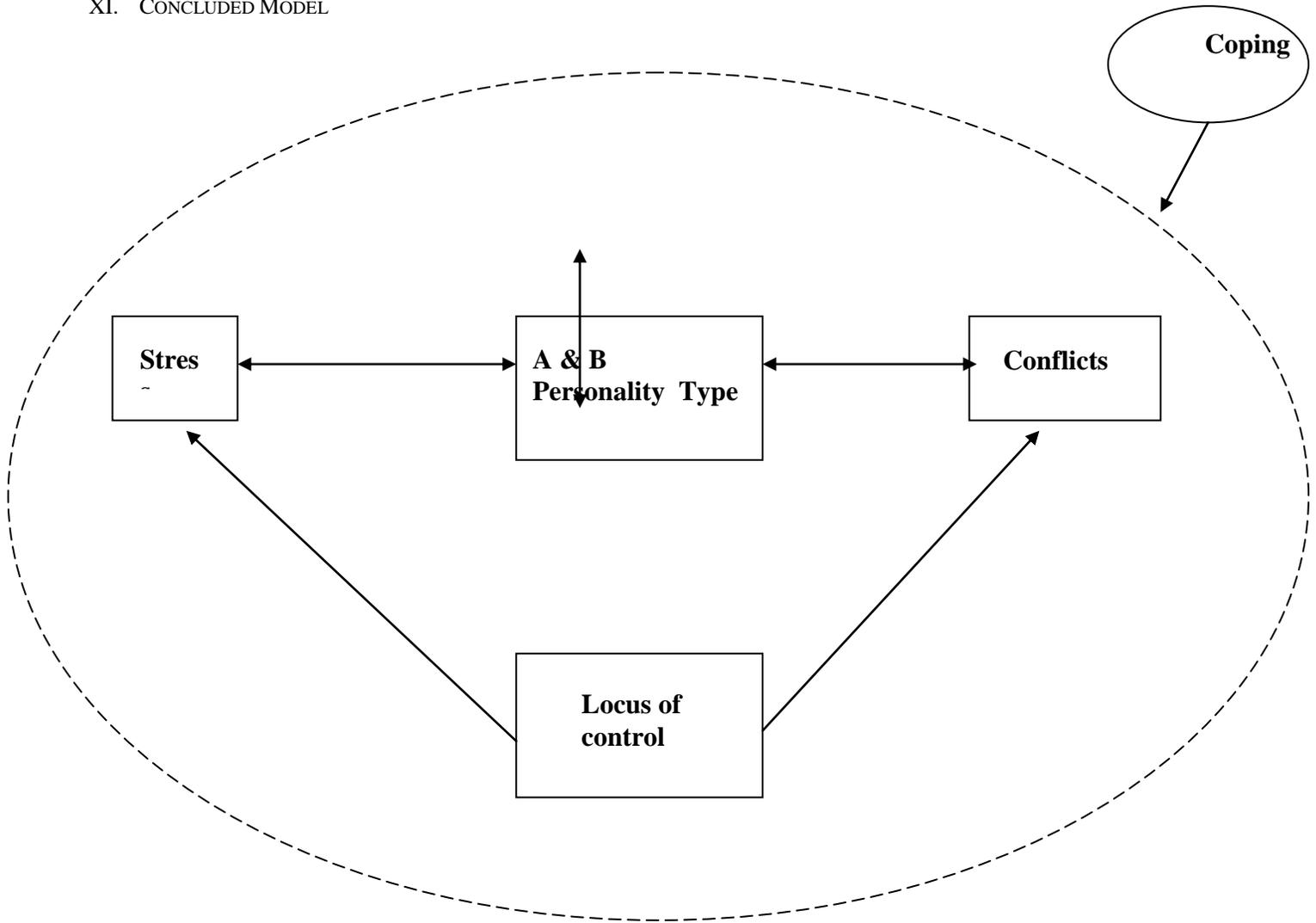
Much research shows the relation between LC and stress. Antonovsky (1979) proposed the construct of stress-resistance resources (a combination of internal locus of control and a supportive social network) as the most beneficial moderator of stress. Pilisuk and Montgomery (1993) feel that LC may be the central psychosocial variable in resistance to stress-related illness. They found that an external LC was related to a greater number of stress-related somatic symptoms than an internal LC, and that LC was a reliable predictor of stress-related physical symptoms. These authors believe that one's sense of control may affect the types of coping strategies used and this is the link between LC and stress. LC orientation may influence reactions to Stressors through use of specific types of coping strategies.

X. RATIONALE

The literature elaborate A and B personality type and locus of control are glued combined factors. And these psychological states rise simultaneously in a particular external situation. Therefore, the researcher discusses LC and A/B personality type as a combined factor in the paper. Further, deriving personality characteristics from LC behavioral characteristics the researcher discusses the relationship between LC and stress; personality and stress; WFC and LC and how coping strategies balance all the factors. Most of the authors developed models and discussed theories on how conflicts and which type of conflicts lead to stress and which type of stressors. Here, the researcher by reviewing different authors' findings derived a model in order to elicit the relationship between stress and conflicts. And how stress leads to conflicts and how personality factors affect on each variable. The model renders that the stress cause for conflicts and conflicts cause for stress in vice-versa. Further, the researcher has studied a moderating variable for stress and conflicts; which is A and B type personality factor combining with Locus of control. Therefore, it is considered both LC and A and B personality factors as moderating variables. And the literature proves all variables are influenced by the coping strategies of the people.

According to the social learning theory personality types can be changed with the life experiences and exposures. Hence, when a person gets stress and it moderates by the personality combining LC he is the person who lets that stress in to a conflict or not. It is vital to study individual differences and make an environment where people do not expose to a conflicting climate. Especially, organizations which take their transformation in to a learning organization should recognize the individual differences since the organization itself can create a place where people do not engage in conflicts by changing their surroundings. And the social learning theory is a rational and vital practice to study in doing the change in people by changing their personalities.

XI. CONCLUDED MODEL



XII. CONCLUSION

The researcher has elaborated the relationship between stress and conflicts via getting a combined moderating variable (A and B type personality and LC). Thus, the paper presents the vitality of managing personality characteristics in order to prevent potential conflicts and unnecessary illnesses due to stresses. According to the reviewed literature and through a thorough study of relationships of each variable the researcher develops a model to exhibit the relationship between each variable and how stress leads to conflicts via personalities and coping. The model renders that a person who can manage his emotions can control his own stresses while coping in a positive way. Either he would be able to cope-up or tolerate the external cause since stresses are psychological rather physiological according to the literature. Cope –up controls the human psychology towards an external stimulus or stimuli. Thus, there are many ways of balancing A and B type personality traits and locus of control situations rather sticking to extremes. According

to Rotter none of the personality types or type of the Locus of control is not right or wrong. They are only psychological states. The needed factor is maintaining a balanced behavior rather expecting too much, being over estimated or being depend on fate, being too much easy going. That is known to be stress management and conflict management. Regardless the occasion, situation or on a time knowing the root cause for conflicts and stresses gives a countless value since it leads to inner peace. Whenever, a person is internally peaceful, calm and self well-behaved the external stimuli cannot make a sabotage to the inner peace or to the psychology of the particular. There, it leads to reduced stressors and conflicts in organizations, families, in relationships and within the person. The paper presents the model to emphasize the vitality of knowing the root cause of these stresses and conflicts for the management of the root causes by developing coping strategies. These strategies can be either problem focused or emotion focused. Taking decisions are sudden and unexpected. Yet, it determines by the personality and the locus of control simultaneously. Practice makes everyone better. Therefore, practice of balancing these moderating factors

would be much important rather moving to take any action in order to prevent stresses or conflicts. Because it is always advisable that “prevention is better than cure”.

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A Survey on Various Optimization Techniques with Respect to Flexible Job Shop Scheduling

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Abstract- The purpose of this paper is to show the survey study done on the optimization algorithms for the Flexible Job Shop Scheduling Problem. There are many algorithms that have been used for finding the optimal solution of Flexible Job Shop Scheduling Problem. Here the Multi Objective aspects have been also taken into consideration. The FJS problem has already been proved an NP hard problem. Pareto optimality principal enriches the solution with the ease of finding the optimal solution.

Index Terms- Computational Intelligence, Flexible Job Shop Scheduling Problem, Optimization Algorithm, Pareto Optimality.

I. INTRODUCTION

The Job Shop Scheduling refers to concept that there are some jobs which needed to be done in a given time. In order to complete the jobs, jobs are employed to the machines. A job has several operations in it. So to complete a job it is important to complete that operations associated with the job. A set of n jobs must be executed on m machines, whereas every job j composed of n_j operations. When all the operations are completed then the associated job is regarded as complete.

When it comes to the term “Flexible” in Job Shop Scheduling, it tells the idea that all machines can do all operations. That means, every machine is capable of performing all of the operations. This makes the system completely flexible. Since Flexible Job Shop Scheduling problem is an advance version of Job Shop Scheduling problem, and comes from the same family of job scheduling therefore it is also an NP-Hard problem, which has been proved [1]. Since the nature of problem is NP-Hard that is why no procedure have been yet discovered to solve these problems within a given time. A variety of methods have been used to solve these problems such as local search, tabu search, simulated annealing, genetic algorithm etc. They provide solution for the problem of course not the exact solution, but near to the optimal solution.

There are several objectives associated with the problems which when taken with the Flexible Job Shop Scheduling problem then needed to be optimized. Then the problem becomes Multi Objective Flexible Job Shop Scheduling Problem.

These objectives are always in tradeoff with each other. In the case of Multi Objective Flexible Job Shop Scheduling the objectives could be total time for the jobs to finish; makespan, total workload on all the machines; total workload and the maximum workload of the entire working machines. These objectives are together taken into consideration while solving such problems. In the Industry Production environment, the

Multi Objective concept has attained a very important place and studied in areas like, Batch Machines [2], Flow Shops [3], Job Shops [4], Parallel Machines [5]

In the past few years, Multi Objective Flexible Job Shop Scheduling has collected a huge attention by researchers. For solving these problems, some contributor to this research has used the approaches in combination with other approach for getting better results. The solution of Multi Objective optimization is also enriched by Pareto Approach. The Pareto approach defines the idea that for about 80% of the problems, 20% of the causes are responsible. In other words, if that 20% causes are removed then most of the problems i.e., about 80% problems will be solved. This approach helped many researchers to find out the Pareto Optimal solution.

A Hybrid tabu search algorithm with some existing dispatching rules to solve the single-objective FJSP was proposed by [6]. [7] used local search algorithm technique and developed two neighborhood functions for the problem.

In this paper, a study on the different techniques and approaches that have been used for solving the Flexible Job Shop Scheduling problem so far in this area of research have been presented. Also some benchmark algorithms for the same problem have been compared.

II. PROBLEM FORMATION

The FJSP as described in [8] is defined as:

1. There are m machines in the set $M = \{m_1, m_2, m_3, \dots, m_m\}$.
2. There are n jobs in the set $J = \{j_1, j_2, j_3, \dots, j_n\}$.
3. Each job j ($1 \leq j \leq n$) is composed of several operations i .
4. Each Operation of each job represented by O_{ji} (i^{th} operation of j^{th} job), is processed on a machine from the set of available machines M .
5. The processing time of an operation performed by machine m is P_{jmi} , a constant value and is already known. Where j is j^{th} job from set J , i is the i^{th} operation of j^{th} job, m is the machine from set M on which the operation is performed.
6. The completion time is CT_{ji} for O_{ji} .

There are some important hypotheses shown below.

1. All the jobs and machines are ready at time zero.
2. All jobs have predefined operations.
3. A machine can perform only one operation at a time.
4. The processing of operation is non-preemptive i.e., if a machine is performing an operation it cannot be stopped.

5. Jobs are not dependent on each other and machines are not dependent on each other.
6. The time required for setting up of machines is not to be considered.
7. The time of moving machines is also negligible.

The most common objective in all the industries or production environments is the time required to finish all the jobs. This objective is known as makespan. For quick response to the market requirements a smaller makespan is desired, which make the production faster. Second objective is this literature is the total workload; this means the total time on all the machines working in the production. Third objective in this literature is maximum workload. The maximum workload is the machine with the highest working time.

These objectives are formulated by [8] are as follows.

1. Makespan denoted by $C_M : f_1 = \max_{j=1, \dots, n} C_{jn}$.
2. Total workload $W_T : f_2 = \sum_{k=1, \dots, m} \sum_{\substack{O_{ji} \\ j=1, \dots, n}} P_{jik}$
3. Maximum workload $W_M : f_3 = \max_{\substack{O_{ji} \\ j=1, \dots, n}} \sum_{k=1, \dots, m} P_{jik}$

Descriptions of above terminologies are.

1. Makespan: The makespan is the time required to complete all jobs.
2. Total workload: This is the total processing time of all the machines.
3. Maximum workload: This is the maximum time among all the machines.

III. ALGORITHMS USED FOR SOLVING MULTI OBJECTIVE FLEXIBLE JOB SHOP SCHEDULING PROBLEM

Genetic Algorithm

The Genetic Algorithm is a very efficient algorithm in the context of solving Multi Objective Flexible Job Shop Scheduling Problem. Genetic Algorithms (GAs) are adaptive heuristic algorithm based on the ideas of natural selection and genetic. The basic concept of GA is designed to processes in natural system necessary for evolution. Here a short explanation is given on how the Genetic Algorithm has been used in research work carried out by [8].

Two parameters have been used, the population size (N_{POP}) and maximum generation number (T_{GEN}).

The detailed steps are:

1. Initialization: Generate the initial population of size N_{POP} . Decode the initial solutions, calculate the objectives values, and evaluate individuals. Set the generation number $t=1$.
2. Reproduction: Generate N_{POP} offspring by mating selection and crossover. Among the original individuals and the new offspring, N_{POP} individuals survive to generation $(t+1)$ by environmental selection.

3. Balanced exploration and exploitation: Refine duplicate individuals by effective mutation operators.

4. Termination: If $t > T_{GEN}$, stop; otherwise, $t=t+1$, go to Step 2.

Chromosome Encoding

The Chromosome Encoding is done to format the population for the routing and sequencing process. This is a three tuple scheme [8] [9] [10]. Each chromosome is a sequence of genes. A Chromosome is a 3-tuple (j, i, k), in which j, i, and k represents the job, operation, and machine, respectively. A tuple (j, i, k) means that the operation O_{ji} will be processed by machine k. The position of each tuple tells its priority. The tuple on the left end has higher priority.

Chromosome Decoding

For the decoding process first [8] assigns the machines to operations based on the encoding done. Then the GT algorithm [11] have been used.

Initial Population

The routing methods for the initial population used are some listed in [12] [9] and [13]. Apart from these following are the two methods given are:

1. Minimum Processing time: This method assigns an operation to the machine with the minimum processing time.
2. Random Assignment: This method assigns each operation to a machine randomly.

The sequencing methods are:

1. Most work remaining: This method puts the operations into the chromosome according to the remaining processing time.
2. Most number of operations remaining: It puts the operations into the chromosome according to the number of remaining operations in the same job.
3. Random dispatching: It places the operations into the chromosome in a random way.

Individual Evaluation and selection

This step requires two sub processes one is choosing individual for producing the offspring and another is choosing individual to survive to the next generation. For evaluating individual NSGA-II [14] have been used. First two individuals are taken randomly and one with higher rank or larger crowding distance is taken as parent. This way parents are selected and two parents produces two offspring through crossover.

Crossover

For crossover process two operators are selected. One is Assignment Crossover and another is Preserving order-Based Crossover [15].

Balanced exploration and exploitation

The individuals with similar objective vector will not make a good diversity. So these individuals will be removed. But the information encoded on these individuals may be useful. So a

balance between the exploration and exploitation should be made. There are five operators given by [8] for this purpose which are as follows.

1. Machine re-assignment for the reduction of maximum workload.
2. Machine re-assignment for the reduction of makespan.
3. Random machine re-assignment.
4. Critical operation swap.
5. Critical operation re-insertion.

Artificial Immune Algorithm for FJSP

The natural immune system is a complex system of recognizing the pathogens. It has been used for solving Flexible Job Shop Scheduling Problem. It has been used in [10] for solving Flexible Job Shop Scheduling Problem which is explained here. It exists in the human body and its aim is to defend the body from foreign pathogens. Pathogens are foreign bacteria or viruses that enter the human body and destroy it. This process is called infection.

The immune system is capable of recognizing the pathogens that invade into the human body and proliferate. The pathogens have some proteins (antigens) in them which are recognized by immune cells. The immune system cells then kills the pathogens. These cells are immune cells or antibodies, and are distributed all around the body.

There are two processes that explain that how immune system works. It tells that how the immune system recognizes pathogens and kill them. They are Clonal Selection and Affinity Maturation. The clonal selection process happens in the event of a pathogens invasion in the body. The immune cells that recognize the pathogens get proliferated and some of them become effector cell and some becomes memory cells. The effector cells produces antibodies in large number and memory cells have a larger life. Memory cells stores the pathogens for future use. During the process of cell proliferation the cells with higher affinity to pathogens becomes memory cells. This process is known as affinity maturity.

The proposed Artificial Immune Algorithm by [10] is given below.

Initialization: it consists of two steps;

a. Parameter Setting:

This sets the limit of initial population, number of generations, the rate of AssignmentRule1, the rate of AssignmentRule2, the rate of Random rule, the rate of MWR rule, the rate of MOR rule, the number of mutation in each generation, the number of exchangeable antibodies and the implementation probability of each mutation operator.

b. Initial Population generation:

By using the AssingmentRule1 and AssignmentRule2 initial assignments are done. By using the random selection, MOR rule and MWR rule the sequencing is done.

Objective Function Evaluation:

This part is responsible for evaluating the fitness function for each antibody.

Affinity evaluation:

This calculates the affinity value for each antibody as

$$\text{Affinity} = \frac{1}{\text{makespan}}$$

Clonal Selection and expansion:

- a. The antibodies with largest affinity are selected.
- b. Generate same number of clones or copies from the selected antibodies.

Producing next population:

- a. Mutation Operator: selecting some antibodies randomly from the clones and apply mutation to produce new antibodies.
- b. Add the new antibodies to the current generation.
- c. Replace antibodies with the lowest affinity with new ones.
- d. Copy the best ones to the next generation.
- e. Select antibodies from the current generation by a selection procedure and copy them to the next generation.

Termination: If the stopping criterion is met then best antibodies are returned.

Search Method proposed by [16]

The steps for their algorithms are as follows:

Operation Assignment

This step performs the assignment of operations to machines. First an operation is selected and then search the machine capable of performing that operation in minimum time. Among the machines found randomly a machine is chosen for the operation to be performed. These steps are repeated.

Operation Sequencing

In the operation sequencing, operations are sequenced on each machine. The steps for the complete process have been explained in [16] for better understanding it can be referred.

Feasible Move Search

The move is for operation from one machine to another machine. And in [16] it is defined as

$$\text{Move} = \{ O_{ij}, M_s, M_t \}$$

Where O_{ij} is the operation, M_s is the source machine of operation O_{ij} , M_t is the destination or target machine. In every move the operation is moved from the source machine to destination machine.

Further there are two move search algorithm defined. First is random handpicked searching algorithm and another is full scaled general searching algorithm. Random handpicked searched algorithm is (1) Select an operation randomly. (2) Move that operation to the machine that is having minimal processing time. The algorithm is known as Full-Scaled general searching algorithm and it is described as (1) Select operations one by one. (2) Move the operation to all the machines except the current machine. The implementation of these algorithms is first the random handpicked searching algorithm is applied first followed by the full scaled general searching algorithm.

Feasible Move Evaluation

The performance of one move is evaluated using the total objective value of the resulted schedule.

Best Move Evaluation

The best move is the one which have performed better than all the other moves therefore it is regarded as best move and it is obtained after the move evaluation

Stopping Criteria

There are two stopping criteria given, (1) Maximum Preset search iterative is completed. (2) The known optimal solution is achieved.

Genetic Algorithm based on Immune and Entropy principle

In this research work [17], the genetic algorithm has been used with immune and entropy principle for maintaining the diversity of the individuals. There are following things done in the work carried out in [17].

Fitness Assignment Scheme

The fitness is calculated on the basis of dominance. It is also like the fitness scheme in SPEA2 [18]. But the difference is that the in [17] the diversity strategy have been applied by immune and entropy algorithm instead of the strength niche.

For the non-dominated individuals, the fitness calculation is done as,

$$\text{Fitness} = n_i / (N+I)$$

Where, N is the population, n_i is the individuals that are dominated by individual i .

The dominated solutions get their fitness by,

$$\text{Fitness} = \sum_{i \in NDSet, i > j} \text{fitness}$$

Where, $NDSet$ is the set of non-dominated solutions. $i > j$ represents that, individual i dominates j .

Immune and Entropy principle.

Under this, the basic definition of immune system has been given. The explanation of antigens, pathogens, immune cells etc have been given a basic explanation. The strategy have been explained is given in a very easy way and can be referred to [17].

Initialization

The initialization strategy that have used is easy and simple and described as a combination of two steps. The first step is the generation of operation sequence is randomly done and two machines are selected out of capable machines. The second is, if a random generated number $Random$ is less than 0.8, then choose the one with the shorter processing time on it; else choose one with longer processing time.

Encoding and decoding

The representation is done in two parts, first is used to know the processing sequence of the operations. Second is, to assign a suitable machine to each operation. The representation is done by the two parts above explained.

The decoding process is the process of scheduling solutions. For decoding, the steps are performed as. First, choose the

machine for each operation based on the machine assignment vector and then find the sequence of operations.

Selection Operator

In the selection procedure there are two steps. First, keeping the best individual. Second, tournament selection. The best individuals are kept in a way that 1% best individuals are copied in the parent solution to the children. The tournament selection strategy is actually proposed by [19].

Crossover Operator

There are two crossover operators are used. First is the Improved Precedence operation crossover and another is multi point preservative crossover.

For the operation sequencing the Improved Precedence operation crossover and for machine assignment multi point preservative crossover is used.

Mutation Operator

For the requirement of improving the ability of local search and maintaining the population the mutation operator are used. For the operation sequencing and machine assignment mutation operator is applied.

Artificial Bee colony Algorithm

Concept of the ABC Algorithm

The ABC algorithm was initially used for solving continuous problems like multi-variable and multi-modal continuous problems. There are few control parameters in the ABC algorithm, which is the main advantage of the algorithm. Due to its simplicity and ease of implementation, the ABC algorithm has gained more and more attention and has been used to solve many practical engineering problems.

There are two components in the algorithm: the foraging artificial bees and the food source. The position of a food source represents a possible solution and the nectar amount of a food source corresponds to the fitness of the solution.

The artificial bee is divided into three groups; employed bees, onlooker bee, and scouts bees. The employed bees are the one who are performing exploitation on a food source. A bee waiting in the hive for making decision to choose a food source is called an onlooker. The scout bees are the one who performs exploration procedure and random exploitation search to find a new food source.

ABC tries to use natural behavior of real honey bees in food foraging. Honey bees use some techniques such as waggle dance for optimally locating the food sources and to search new ones. Also makes them a good candidate for developing new intelligent search algorithms.

In the research work presented by [20] have presented the artificial bee colony optimization algorithm as a hybrid algorithm named as Pareto based discrete artificial bee colony.

The hybrid Pareto based ABC

- a. Food Source Representation

The food representation is done by two vectors. The first vector places the assigned machines for each operation on their positions. Another one informs about the scheduling sequence.

b. Local Search approach

There are two operators have been used are; Local Search Operator in Routing Component and Local Search Operator in Operation Scheduling component.

c. Employed Bee Phase

The work of the employed bee is to do local search around the given food source. So exploitation search with local search have been taken. In this way the new food sources are discovered and compared with the old food sources. Finally the better food sources are kept.

d. Crossover Operator

The crossover is done in a random process. The crossover produces new population. This process is an important process in the system. First an employed bee is allowed to select one employed bee randomly and performs crossover. This produces two results. The resulted solutions are compared with the older ones and the better ones are kept.

e. Onlooker bee phase

The onlooker bee selects a food source based on the nectar amount of food source. But this process consumes high computational time, so another approach has been proposed here, tournament selection. In the tournament selection through a random picking process, three food sources are picked up and the one with the highest nectar amount is taken by the onlooker bee. Then each onlooker performs the same local search operator with the employed bee and produces new food sources.

f. Scout bee

The scout bee randomly searches in the Artificial Bee Colony. This increases the diversity in population and helps in avoiding the local minima however it will decrease the search efficacy.

IV. PERFORMANCE COMPARISON

Benchmark Instances

In the study of Job Shop Scheduling there are two most popular benchmark instances available. They are given in [6] and [21]. These two instances are taken as the input in most of the algorithms and also are taken in [8]. The data in [21] set contains 5 instances in the form of $n \times m$ (where n is number of jobs and m is number machines) and it ranges from 4×5 to 15×10 . Another data set in [6] contains ten datasets and ranges from 10×6 to 20×15 .

In the literature work done in Flexible Job Shop Scheduling so far there is always performance is presented as per the list of non-dominated solutions found in a certain number of run.

The comparison done in [8] is shown here. The parameter are just two only here which makes this algorithm apart from all algorithms. They are the population size and the generation number.

The Table 1 shows the comparison between the surveyed algorithms. This table has been taken from [8]. The bold values are the non-dominated solutions. This solution is for the 8×8 problem from [21].

The survey revealed that the techniques and efforts given in [8] have much more ability to get desired solution. One main thing to be noted here is that the other algorithm has used around 5 to 14 parameters.

Whereas [8] have just used two parameters which makes it less computational complex. While [10] focused on minimizing the makespan only. [16] have aggregated the three objectives by linear weighted sum.

Another comparison of the conceptual level have been introduced in this paper with advantage and disadvantage for the algorithms surveyed. This information can be seen in Table 2.

Surveyed paper	C_M	W_T	W_M
[8]	14	77	12
	15	75	12
	16	73	13
	16	77	11
[10]	14	77	12
	16	77	11
[16]	14	77	12
	15	75	12
	16	77	11
	17	73	13
[17]	15	75	12
	15	81	11
	16	73	13
[20]	14	77	12
	15	75	12
	16	73	13

By the two given tables it can be inferred that what the algorithms are capable of doing. The flexible job shop scheduling is an NP-Hard Problem whose exact solution cannot be determined.

But so far such algorithms and techniques have been developed that only tells the near optimal solutions. There are many authors that have addressed this problem. These kind of problems are extremely tough and are hard to solve. Use of pareto optimality principle it becomes easier to find the solution that are optimal for a problem. Pareto approach has been widely used in the literature of Flexible Job Shop Scheduling Problem for solving the problem.

Table 2: Comparison of Surveyed papers

Surveyed paper	Merit	Demerit
[8]	The algorithm has performed better in	For Brandimarte benchmark

	all cases of objectives. And minimized the number of parameters to just two as compared to other algorithms.	instances it has not performed well.
[10]	The algorithm has performed very effectively in minimizing the makespan.	It has confined in the makespan only which resist it as a Multi Objective Problem.
[16]	User can set preferences for the objectives with tags like 'very important', 'important', 'unimportant'.	It has not performed better than other algorithms in one solution rest it has performed equivalent to all.
[17]	For the brandimarte instances the algorithm has performed better than any other algorithm.	High number of parameter usage may lead to complex calculations
[20]	A new crossover operator has been introduced.	It uses a search technique that stores non-dominated solutions for next generation which makes causes less diverse population

V. CONCLUSION

This paper is a survey between five algorithms which are summarized in the table 1. Here procedure of these algorithms has been explained in short. For detailed explanation it is recommended to look for the corresponding papers. Multi Objective Flexible Job Shop Scheduling is a challenging problem whose exact solution could not be determined but a near optimal solution is obtained by several research works.

There is also a conceptual comparison done in the table number 2. It consists of the performance and the merits and demerits for the respective algorithms.

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13 February: Birth Anniversary of Alfred P. Wolf - "Dr. APIS" SCIENCE LEAFLET

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I. INTRODUCTION

ALFRED P. WOLF: (BIRTH: 13 FEBRUARY, 1923) - (DEATH: 17 DECEMBER, 1998)

ALFRED P. WOLF WAS born in Manhattan on February 13, 1923. Al was the son of Margarete and Josef Wolf, who had emigrated from Germany before World War I. Josef Wolf had been a pastry chef on a German cruise ship, and when World War I broke out his ship could not go back to Germany. So he and Margarete, who was a dressmaker, settled in Manhattan raising Al and his older brother John. Al grew up to be the quintessential New Yorker, drinking in the culture and becoming a connoisseur of food and wine, and the arts. His first love was music; in fact, his chosen profession was to be a concert pianist, but as he would later comment, "I would go to Carnegie Hall and hear Artur Schnabel play the piano, and I quickly realized that I could never be any good."

What Al did possess was a keen aptitude for science, particularly chemistry. During his long career, he pioneered the development of labeling techniques that used the reactions of hot atoms (i.e., atoms with very high translational energies produced by recoil from nuclear reactions). He used this as a springboard to develop labeling methods to produce organic radiotracers that enriched the field of nuclear medicine and allowed the field of human neuroscience to germinate and to blossom through the use of positron emission tomography, or PET. He is most well known for the role he played in the development of 2-deoxy-2-[¹⁸F]fluoro-D-glucose (¹⁸FDG), a radiotracer that stimulated more than two decades of progress in the use of human neuroimaging to study mental illness. ¹⁸FDG remains the most sensitive tracer ever developed to image tumors and tumor metastases, and it has provided the means of directly studying the effects of drugs on the human brain.

Al's education at Columbia College was interrupted by World War II, when at eighteen years of age he enlisted in the army and spent some time working on the Manhattan Project in Los Alamos, where he worked on the initiator of the atomic bomb. While at Los Alamos in 1941-42, he worked on metal X and metal Y, which he later found out were uranium and plutonium. His group leader at Los Alamos was Richard W. Dodson, who would later become the first chair of the Chemistry Department at Brookhaven National Laboratory, a new national laboratory established in 1947 and dedicated to the peacetime uses of atomic energy. After the war, Al returned to Columbia to finish his education. He joined the group of William Doering as a graduate student and worked on the fenchol β-fenchene

rearrangement. In an American Chemical Society symposium honoring Al in 1998, Doering described Al's elegant early mechanistic studies by characterizing him as a man having a "pride of craft," and the only one of his graduate students to have his thesis bound in full morocco leather. He set high standards for himself and for others. It was a pattern that he carried through his entire career.

Al Wolf's early studies involved research on the chemical fate of carbon atoms. Initially in collaboration with Carol Redvanly and R. C. (Andy) Anderson, he produced carbon-14 using the Brookhaven research reactor. He rapidly realized that in producing carbon-14, he was studying not only the chemical fate of the carbon atoms but also the radiation chemistry of the target compound. He continued his work using the 20-minute-half-life nuclide carbon-11, which could be produced with much lower radiation doses even though it challenged the chemist in the analysis of the products. Using carbon-11, Al and his colleagues probed unusual reactions of carbon that were not possible to study by other means at that time. When the research required new analytical tools, Al designed and built them, including a flow proportional counter in 1967 and a GLPC instrument designed for short-lived isotopes in 1969. These studies led in a major way to our understanding of these basic systems.

Al's curiosity also drove him to study other systems, and here he made noteworthy contributions to problems in organic chemistry. He developed non-nuclear techniques to study the chemistry of carbon atoms and in the late 1960s he attacked one of the most challenging problems in organic chemistry, that of the synthesis of tetrahedrane. With colleague Philip Shevlin, he made a significant dent in the problem by demonstrating the probable intermediacy of tetrahedrane in the synthesis. Another highlight in Al's career was his study of the selectivity of the reactions of elemental fluorine with aromatic compounds. With his colleague and close friend Fulvio Cacace, he was able to show that aromatic fluorination with elemental fluorine showed the characteristics of electrophilic substitution of low regioselectivity.

Throughout his career, Al continued to build a strong research group at Brookhaven, and many came from around the world to work with him. This led to what came to be known affectionately as the "Wolf Pack," which consisted of Al, a core group of Brookhaven scientists, including David Christman, and an ever-changing group of postdoctoral fellows and students who were stimulated by Al's continual challenges to go beyond observation to understand the phenomena at the fundamental level.

Al carried this challenge more and more into the area of biology and medicine, and by the mid-1960s his fundamental studies had laid the groundwork for the synthesis of simple molecules labeled with the short-lived positron emitters in pure form and high specific activity for tracer applications in medicine using a PET. The chemistry of two of these isotopes, carbon-11 and fluorine-18, became a focus because they lent themselves to incorporation into organic compounds. However, their chemistry was dominated by their short half-lives: carbon-11 has a 20.4-minute half-life and fluorine-18 has a 110-minute half-life. Al and his group precisely measured the excitation functions of many nuclear reactions and produced important medical isotopes, including C-11 and F-18. These measurements on C-11 and F-18 in particular are standards around the world. In parallel with these measurements Al and his group (including David Christman and Ronald Finn) made a major breakthrough in the development of nitrogen gas targets producing C-11-labeled precursors. The bombardment of nitrogen gas with protons produces carbon-11 and an alpha particle ($^{14}\text{N}(p, \alpha)^{11}\text{C}$). If nitrogen with a trace of oxygen is bombarded with protons of sufficient energy, C-11 is produced in the chemical form of carbon dioxide. If hydrogen is present during the bombardment, methane is produced. This can rapidly be converted to carbon-11-labeled cyanide in the presence of ammonia and Pt at 1000°C. Al made similar contributions to the development of F-18-labeled precursors and with Richard Lambrecht developed a neon gas target for the production of F-18-labeled elemental fluorine, which was first presented in 1973. Here a target of neon gas is bombarded with deuterons producing F-18 and an alpha particle.

Interestingly, the basic studies of fluorine-18 not only led to the labeling of biological compounds but to new knowledge in the area of atmospheric chemistry. Al's long-time friend F. Sherwood Rowland, originally a halogen-hot-atom chemist, used his background in this area to understand the decomposition of ozone by species formed from freon.

Although producing isotopes like carbon-11 and fluorine-18 is a challenge, creating organic compounds from simple labeled compounds like cyanide, carbon dioxide, fluoride, and fluorine gas was an equal problem. To prepare an organic compound labeled with carbon-11 one has about 45 minutes; otherwise all is lost to radioactive decay. Success hinges on the availability of large quantities of synthetically useful labeled precursor molecules. Al's studies gave the organic chemist carbon-11-labeled carbon dioxide and cyanide and fluorine-18-labeled fluoride ion and elemental fluorine from which to synthesize complex radiotracers; this knowledge formed the basis of a new interest in developing positron-emitter-labeled radiotracers so that the tracer method could be applied to visualize biochemical transformations in living systems, including the human body.

Positron decay is at the heart of PET. When a positron emitter decays, it results in the production of two high-energy (511 KeV) annihilation photons emitted at approximately 180 degrees. These are energetic enough to penetrate the body barrier, and they can be imaged using coincident detection. Prototype PET scanners were developed in the early 1960s. By the early 1970s, radiotracer chemistry and PET instrumentation were growing hand in hand with new discoveries in one area, stimulating growth in the other. Al realized that advances in chemistry would be a major driving force in the field, and this

drove him to solidify radiotracer chemistry in its own right. He along with several other leading chemists from around the world (Monte Blau, Yves Cohen, Dominique Comar, W. Maier-Borst, Aldo E. A. Mitta, Tadashi Nozaki, Gerhard Stöcklin, Michael J. Welch, and David Silvester) established the International Symposium for Radiopharmaceutical Chemistry for chemists to come together and grapple with the unusual problems of working with very short-lived isotopes at a sub-micromolar reaction scale. The first symposium was held at Brookhaven in 1976; the meeting, held every two years since, has grown in size and breadth, with an increasing emphasis on understanding and probing the interactions between chemical compounds and living systems, while focusing on the central science, chemistry.

Al had a passion for knowledge. He believed in the power of the tracer method and he developed the tools to apply it in the human body. At the same time he set the standards for PET research throughout the world. Nowhere is his vision and leadership more powerfully illustrated than in his role in the development of ^{18}F FDG in 1976. This was a remarkable collaboration between Al and his group and David Kuhl, Martin Reivich, and Louis Sokoloff. It began in 1973 to develop a method for measuring brain glucose metabolism in the living human. Al successfully led the effort to synthesize 2-deoxy-2- ^{18}F fluoro-D-glucose (^{18}F FDG). He coined the term "metabolic trapping" as a principle of radiotracer design to describe the trapping of ^{18}F FDG -6-phosphate in cells as a marker of glucose metabolism in a paper published in 1978 (*Journal of Nuclear Medicine* 19:1154-1161). The first synthesis of ^{18}F FDG was carried out at Brookhaven in 1976 by Tatsuo Ido. It took one half-life (110 minutes), and the product was flown by private plane to the University of Pennsylvania, where the first brain and body images were made on the Mark II scanner developed by David Kuhl. This was the very first time that brain glucose metabolism was mapped in the living human. This is well recognized to have been a watershed in the current worldwide growth of PET for basic and clinical research and diagnosis. Al went on to push the use of ^{18}F FDG and other radiotracers in neurology and in psychiatry (with New York University colleagues Jonathan Brodie, Tibor Farkas, and Mony DeLeon). The fruits of his efforts abound, including an internationally recognized research program in imaging in substance abuse research at Brookhaven.

Al derived great satisfaction from teaching, and for 30 years (1953-83) he taught organic chemistry at night at the Columbia University School of General Studies. Though this involved a long trek from Brookhaven, which is about 60 miles east of New York City, the environment and energy of the city and his strong rapport with students were powerful reinforcers. Though he bemoaned the fact that a majority of the students were pre-med candidates, when bright students were challenged to pursue chemistry, Al happily declared victory. He also enjoyed his group at Brookhaven, holding wine tastings, walking tours of New York City, and ski trips to Vermont. He was an extraordinary travel guide, and it was not unusual for members of the Chemistry Department to seek his travel advice and to use his extensive collection of maps of cities throughout the world.

Al's favorite city was Rome, and he had a passion for all things Italian. In 1969, when he began consulting for the National Research Council of Italy, he learned Italian and on

more that one occasion prepared pasta and espresso for the group in the chemistry laboratory at Brookhaven. Though Al loved cities, he also appreciated the wilderness, including hiking, rock climbing in California, and camping in the Adirondacks. He never compromised on food, however, and carried fresh eggs packed in a special padded egg case on his mountain treks. No matter where he was in the world, Al could be counted on to seek out the finest restaurants, museums, music, ballet, or architecture.

Not surprisingly, Al Wolf received many honors during his long career at Brookhaven. He was a member of the National Academy of Sciences (elected in 1988). He received the Nuclear Chemistry Award of the American Chemical Society (1971), the Society of Nuclear Medicine Paul Aebersold Award (1981), the Hevesy Nuclear Medicine Pioneer Award (1991), and the Melvin Calvin Award of the International Isotope Society (1997), to name a few. He chaired the Chemistry Department at Brookhaven from 1983 to 1987. During his long career, he published over 325 papers on basic and applied research in chemistry and nuclear medicine.

Al was not only a strong scientific leader and a mentor to many; he was also our friend. Those of us who knew him well also appreciated his passion, his drive, and his willingness to stand up and fight for what he believed. We could not imagine a stronger or a more articulate ally. Though he left us with much new knowledge, more importantly, he left us with the tools to grow more knowledge. He stimulated and inspired the dozens of scientists around the world who worked with him over the years. Indeed most of the world's cyclotron-PET centers have one or more individuals who, to their great advantage, spent part of their careers at Brookhaven working with Al Wolf.

Al died on December 17, 1998, after a long illness. His wife, Elizabeth (Helga), died in April 1998. He is survived by his son, Roger, an architect living in Santa Monica, California, and two granddaughters, Allison and Madeline. He is sorely missed by his friends throughout the world.

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LEACH-DSR Base Routing For Minimization Energy Consumption in MANET

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Abstract- A mobile ad-hoc network (MANET) is autonomous, self organizing and self-configuring network with the capability of rapid deployment in response to application needs. In our simulation we use DSR (dynamic source routing) that provide MANET route request flood and maintenance of routing but one is the measure challenge is energy issue in mobile ad-hoc network, because mobile node are energy constraint devices, In this paper we proposed LEACH and DSR routing and find-out reliable path (higher energy base route selection), in our proposal LEACH generate cluster and gives information about energy of each cluster belongs zone and if energy of an of the node is higher so LEACH select that particular node for data transmission that work increases the reliability to the communication, in this paper we also analyze the result in the form of network parameter like throughput, packet delivery ratio, energy consumption via node and routing overhead.

In this method we analyze the behaviour of network through network simulator-2 and get result of the network.

Index Terms- Routing Load, Packet Delivery Ratio, attack, OLSR, congestion, Leach

I. INTRODUCTION

Mobile Ad hoc Networks (MANETs) consist of a collection of wireless mobile hosts (called nodes), recently have received increasing attention. Independence from central network administration, ability for being self-configured, self-healing through continuous reconfiguration, scalability and flexibility are the distinguished reasons to deploy such networks [1,2].

MANETs require no fixed infrastructure or central administration. Mobile nodes in an ad hoc network work not only as hosts but also as routers, and communicate with each other via packet radios.

Since most wireless nodes in ad hoc networks are not connected to a power supply and battery replacement may be difficult, optimizing the energy consumption in these networks has a high priority and power management is one of the most challenging problems in ad hoc networking.

Wireless mobile sensor network applications the energy source is a battery, energy plays an important role in wireless sensor network, and preserving the consumed energy of each node is an important goal that must be considered when developing a routing protocol for wireless sensor networks. Many routing protocols have been proposed in the literature such

as LEACH [3,4]. Leach is considered as the most popular routing protocol that use cluster based routing in order to minimize the energy consumption; in this paper we propose an energy base routing on the Leach Protocol that further enhance the Power consumption.

Low Energy Adaptive Clustering Hierarchy (LEACH) [5, 6] is one of the most popular hierarchical routing protocols for wireless mobile sensor networks. The idea is to form clusters of the sensor nodes based on the received signal strength and use local cluster heads as routers to the sink. This will save energy since the transmissions will only be done by such cluster heads rather than all mobile sensor nodes. Conventional network protocols, such as direct transmission, minimum transmission energy, multi-hop routing, and clustering all have drawbacks that don't allow them to achieve all the desirable properties. LEACH includes distributed cluster formation, local processing to reduce global communication, and randomized rotation of the cluster - heads. Together, these features allow LEACH to achieve the desired properties. Initial simulations show that LEACH is an energy efficient protocol that extends system lifetime than some general-purpose multi-hop approaches, such as MTE routing and Static-Clustering protocol [5].

II. RELATED WORK

Here we describe various type of energy base routing scheme that is useful for encouragement and provides diversity on to new approach of energy base routing

“Flow Augmentation and Flow Redirection Energy-Conserving Routing” In [7], the authors propose two algorithms with the aim of extending the network lifetime via optimizing the routing from an energy consumption perspective. Their solutions are targeted toward networks with static or slowly changing topology. They define the problem as maximizing the minimum lifetime of all nodes. The goal is to find the best link cost function which will lead to the maximization of the system lifetime.

Power-Aware Routing

In [8], the authors explore power-aware metrics to use with routing protocols on top of their MAC power savings protocol, PAMAS. They indicate that the strategy followed by the different routing protocols that are not power conscious would lead to fast depletion of battery power and hence quick degradation of the network operation.

Maximum Battery Life Routing

In [9], a power-aware routing protocol that distributes power consumption evenly over nodes and minimizes the overall transmission power is proposed. This protocol uses the conditional max-min battery capacity routing (CMMBCR) scheme. It uses battery capacity instead of a cost function as a route selection metric. When all nodes on some possible routes between a source and a destination have sufficient remaining energy above a certain value, the route with the minimum total transmission power (MTRP) among these routes is chosen

Energy Drain Rate Based Routing

In [10], the authors propose route selection mechanisms for routing protocols based on a new metric, the drain rate. They propose the Minimum Drain Rate (MDR) mechanism which incorporates their new metric into the routing process. They also introduce the Conditional Minimum Drain Rate (CMDR) as MDR by itself does not guarantee that the total transmission energy is minimized over a given route. CMDR attempts to enhance the nodes and connections lifetime while minimizing the total transmission energy consumed per packet.

Localized Power-Aware Routing

In [11], localized power aware routing algorithms are devised on the assumption that each network node has accurate information about the location of its neighbors and the destination node. This could be the case in static networks or ones in which a strong location update scheme is utilized. Nodes exchange location information via control messages. In the power-efficient routing algorithm, each node decides to forward packets that are intended for a certain destination to a neighbor based on the minimum transmission power between this sending node and its neighbors.

III. PROBLEM STATEMENT

MANET device are work through energy and each node contain self battery backup power that leads to issue how we select the node from network because all are contain limited power so in this paper we deal and analyze LEACH-DSR base routing approach that minimize the energy consumption and increases the data delivery ratio, the selection of node on the bases of cluster formation. LEACH manages the cluster and creates the coordinator that inform to the source node for best possible path so sender established the connection.

IV. PROPOSED SLOUATION

In-network processing can greatly reduce the overall power consumption of a mobile ad-hoc network when large amounts of redundancy exist between nearby nodes. Rather than requiring all mobile nodes' sends energy information to be forwarded to a source node that is data sender in that environment, nodes within a region can collaborate and send only a single summarization packet for the region. In LEACH, nodes are divided into clusters, each containing a cluster head whose role is considerably more energy-intensive than the rest of the nodes; for this reason, nodes rotate roles between cluster head and ordinary mobile sensors throughout the lifetime of the network. At the beginning of each round, each sensor node makes an independent decision through a randomized algorithm about whether or not to assume a cluster

head role. Nodes that choose to be cluster heads announce their status to the rest of the network. Based on the received energy strength of these announcements, mobile nodes join the cluster that requires the least power to communicate with the cluster head (assuming transmission power control is available). During the round, the ordinary sensors in each cluster send energy information to their respective cluster heads according to a time-division multiple access (TDMA) schedule. Inter cluster interference is reduced using different spreading codes in neighboring clusters. The cluster head sends maximum energy contained nodes information within cluster region into the sender node, and that sender sends actual data from these maximum energy based node into the receiver node

The length of each round is chosen such that each node is expected to be able to perform a cluster head role once during its lifetime. Because there is no interaction between nodes when deciding roles, the cluster heads may be chosen such that there is no uniformity throughout the network and certain mobile nodes are forced to join clusters located at large distances from them. In our simulation we apply leach protocol for energy base routing and network layer protocol for route request flooding we use DSR (dynamic source routing) and establish the communication between sender to destination, LEACH use the cluster head base energy information to the sender and then sender sends data to the genuine receiver, but mobile ad-hoc network is dynamic in nature so if any cluster head and any of node change their position from one to another location or energy of particular source to destination belonging path are discharge and node died so cluster head will be change and also re-broadcast energy information of new cluster head to the sender node. Through that approach we increase the life time of the data communication and save the energy of the network.

V. PROPOSED ALGORITHM

Here we design algorithm for LEACH working as well as routing broadcasting on the bases of energy aware of the each node, that module useful for internal structure design of simulator. LEACH (low energy adaptive cluster head) mechanism are suitable for higher energy base node selection within the region that work minimize the route load of the source node and decreases the power consumption of the network.

```
Set Energy_Prot = LEACH // for energy base routing
Set Node = M; // Mobile Node's
Set Sender = S; // S ∈ M;
Set Receiver = R; //R ∈ M;
Set Routing= DSR
Leach_method()
{
    Form cluster;
    Select cluster head;
    Periodical_rx energy info from all node's
    Save max_energy node info value Eg
}
Rreq_bcast(S, R, pkts)
If (radio_rng <= 550 m && cluster-head == true &&
energy == Eg)
    { receives routing packet and send to next
hop;
```

```

If (receiver ==R)
    { receives routing packet;
      Send ackpkt to sender;
    }
Else { receiver not exist ;}
Else { node out of range or node is died}

```

Terminate session;

VI. SIMULATION STRUCTURE

Ns is a discrete event simulator targeted at networking research. Ns provides substantial support for simulation of TCP, routing, and multicast protocols over wired and wireless (local and satellite) networks.

Ns began as a variant of the REAL network simulator in 1989 and has evolved substantially over the past few years. In 1995 ns development was supported by DARPA through the VINT project at LBL, Xerox PARC, UCB, and USC/ISI. Currently ns development is supported through DARPA with SAMAN and through NSF with CONSER, both in collaboration with other researchers including ACIRI. Ns have always included substantial contributions from other researchers, including wireless code from the UCB Daedalus and CMU Monarch projects and Sun Microsystems.

A. Simulation Environment

Network simulator 2 is the result of an on-going effort of research and development that is administrated by researchers at Berkeley. It is a discrete event simulator targeted at networking research. It provides substantial support for simulation of TCP, routing, and multicast protocols [12].

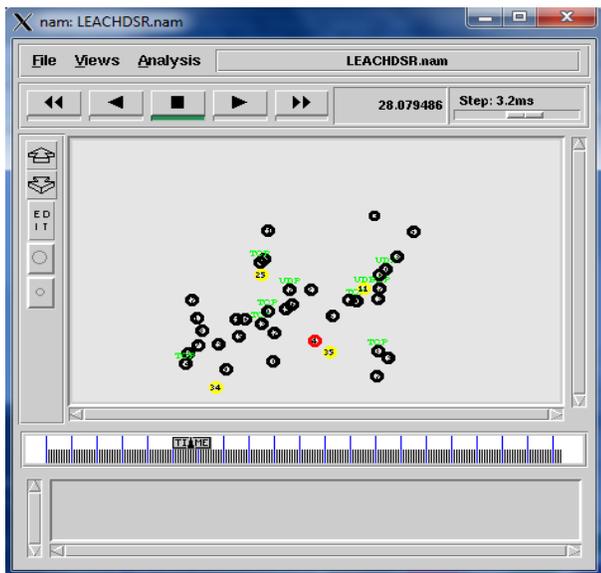


Figure 1: Network Animator scenario

The simulator is written in C++ and a script language called OTcl. Ns use an OTcl interpreter towards the user. This means that the user writes an OTcl script that defines the network (number of nodes, links), the traffic in the network (sources, destinations, type of traffic) and which protocols it will use. This

script is then used by ns during the simulations. The result of the simulations is an output trace file that can be used to do data processing (calculate delay, throughput etc) and to visualize the simulation with a program called

B. Simulation Parameter

We get Simulator Parameter like Number of nodes, Dimension, Routing protocol, traffic etc.

Simulation Parameter	Value
Number of nodes	40
Dimension of simulated area	800×800
Routing Protocol	DSR
Simulation time (seconds)	100
Energy Aware	LEACH
Transport Layer	TCP
Traffic type	CBR
Packet size (bytes)	1000
Initial Energy (in Joule)	Random
Number of traffic connections	10
Maximum Speed (m/s)	Random

Table 1 Simulation parameter

According to above table 1 we simulate our network.

C. Performance Evaluation

There are following different performance metrics have showed the results on the basis of following:

Packet delivery ratio: ratio of the data packets received at the destination nodes to the packets that were sent by the sources.

Routing load: number of routing packets (and supporting protocol control packets) transmitted per data packet delivered at the destination.

Throughput: throughput or network throughput is the average rate of successful message delivery over a communication channel from source to destination. This data may be delivered over a physical or logical link, or pass through a certain network node or mobile nodes. The throughput is usually measured in bits per second (bit/s or bps), and sometimes in data packets per second or data packets per time slot.

VII. SIMULATION RESULT

A. Packet Delivery Ratio Analysis

Packet delivery fraction (PDF) or packet delivery ratio is a ratio of receives packets from packets sends at time unit. PDF calculated as

$$PDF = \left(\frac{Rx}{Send} \right) * 100$$



Figure 2: Packet Delivery Ratio Analysis

According to formula if our PDF is best that means this performance is very good.

In our simulation we create forty mobile nodes and generate test traffic and then analyze the packet delivery ratio, result shows our average PDF nearly 97 that is tremendous performance of the network

B. Energy consumption

In this graph we deploy energy consumption graph that shows at particular time energy remains of the node, in our simulation we use 50 mobile nodes but here we show energy consumption only for the first ten nodes, initially we set energy of each node as random that is from 1 joule to 100 joules and apply the Leach protocol for energy base routing. Very first Leach sends maximum energy containing information to the source node so the sender sends data packets through maximum energy containing node, that work increases the life time of the communication.

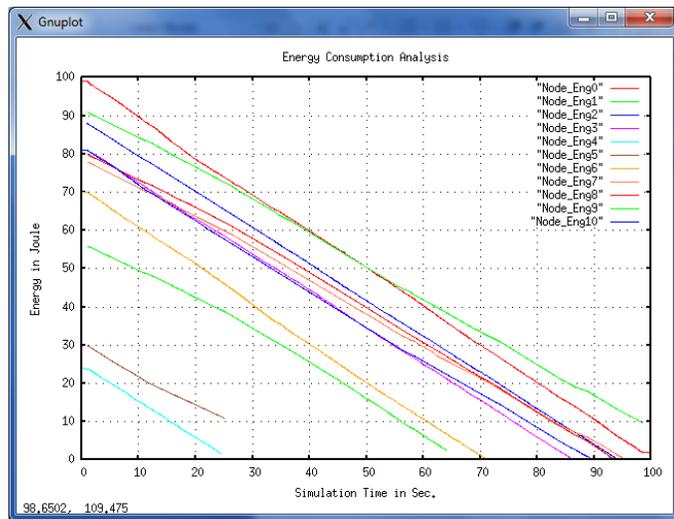


Figure 3: Energy analysis

If we take example of node 1 energy consumption graph very first we set nearly 90 joules if energy of that node and till end

of simulation time 100th second energy remaining of that node nearly 10 joules

C. Throughput Analysis

Here we analyze throughput of the TCP transmission case, in our simulation we create three TCP connections and get nearly sixteen hundred data has been transmitted, LEACH-DSR protocol case our network throughput is constantly performed, that gives better performance.

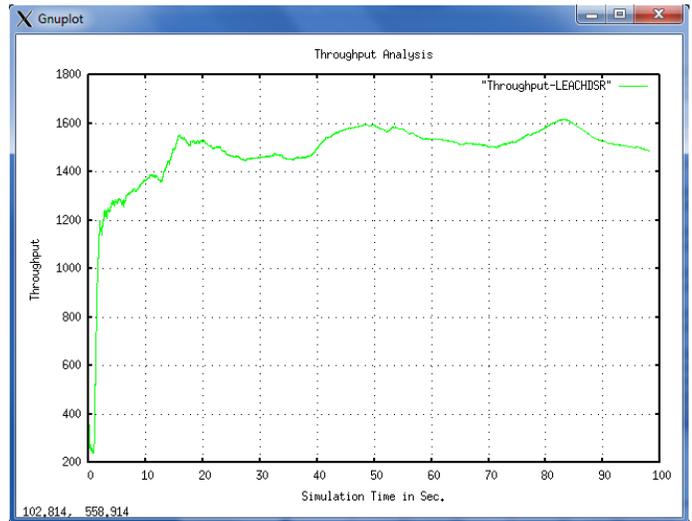


Figure 4: Throughput Analysis

D. Routing Load Analysis

Routing load is calculated as the total number of routing packets transmitted over the successful data transmission. The increase in the routing load reduces the performance of the ad-hoc network as it consumes portions from the bandwidth available to transfer data between the nodes.

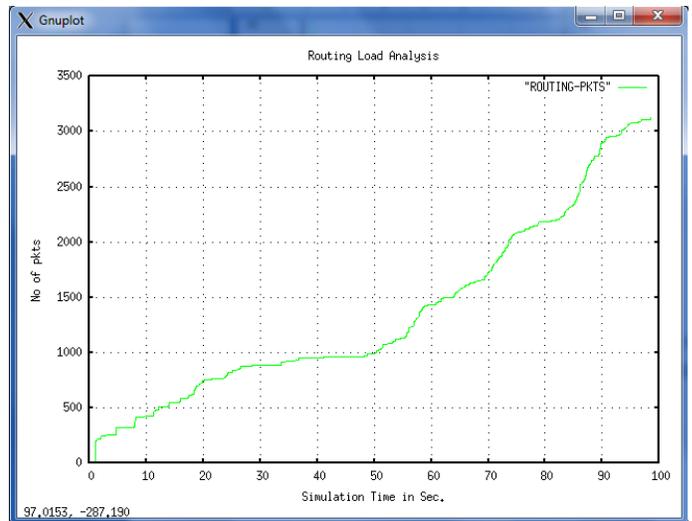


Figure 5: Routing Load Analysis

As per graph shown it is observed that till 50 seconds of simulation routing load is slightly increased in case of node movement drastically in the network

In this graph we analyze routing load, if routing overhead minimum that means efficient route search and gives better result, in our approach we use DSR as a routing protocol, through various research paper we get DSR are efficient so here we use DSR routing protocol, in this graph x-axis shows simulation time in second and y-axis shows number of routing packet, result conclude total routing packet nearly 3100 packet and normal routing overhead nearly 0.46percentage.

VIII. ABOUT THE DEMONSTRATION

In this demo, we analyze network performance on the basis of network parameter like attack percentage, routing load, packet delivery ratio and energy consumption analysis etc. In our simulation we check network performance in LEACH-DSRtime and found that protocol are very reliable in MANET environment.

IX. CONCLUSION

In this simulation we use network simulator -2 (ns-2). Here number of simulation were taken and finally conclude through various result. In our first parameter packet delivery ratio that case result nearly 96% that shows efficient communication in the form of data receiving base, in second result we deploy energy consumption but here we take only ten node and conclude that maximum node live till the end that means our approach are efficient energy utilize where actual needed, in third result we retrieve throughput of the network and get better result, lastly we identify routing overhead in forty node with random motion case routing overhead nearly 0.46% (on the bases of overall packet). LEACH and DSR jointly gives efficient approach for mobile ad-hoc network communication. and it's also work with the coordination base of each node.

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In silico Analysis, Homology Modelling and Evolutionary Analysis of 5-enolpyruvyl shikimate 3-phosphate (EPSP) synthase enzyme from different plants

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Abstract- 5-enolpyruvylshikimate 3-phosphate (EPSP) synthase, an enzyme used in biosynthesis of aromatic amino acids in plants, many bacteria, and microbes, is a prime target for drugs and herbicides. The herbicide glyphosate (N-phosphonomethyl glycine) is a potent reversible inhibitor of the 5-enolpyruvylshikimate-3-phosphate (EPSP) synthase activity as it is competitive with respect to phosphoenolpyruvate and uncompetitive with respect to shikimate-3-phosphate. It is important to study this enzyme for elucidation of the active site of EPSP synthase and especially of the binding pattern of glyphosate provides a valuable roadmap for engineering new herbicides and herbicide-resistant crops, as well as new antibiotic and antiparasitic drugs. In this paper, a bioinformatics and molecular modeling approach was adopted to explore properties and structure of enzymes from different plants viz., *Nicotiana tabacum*, *Vitis vinifera*, *Amaranthus palmeri*, *Gossypium hirsutum*, *Brassica napus*, *Eleusine indica*, *Convolvulus arvensis* and *Capsicum annuum*. The properties of these proteins have been interpreted by Physico-chemical characterization including pI, EC, AI, GRAVY and instability index. Functional characterization was done by predicting motifs, patterns, disulfide bridges and secondary structure. Three dimensional structures for these proteins were not available as yet at PDB. Therefore, homology models for these enzymes were developed by using SWISS MODEL server. The model was analyzed for its Fold reliability by using server ProSA, ERRAT server was used for analyzes the statistics of non-bonded interactions between different atom types. The model was validated using protein structure checking tool WHAT IF. These structures will provide a good foundation for functional analysis of experimentally derived crystal structures. Phylogenetic analysis was done by using MEGA 4.0. Two major sequence clusters were constructed by phylogenetic analysis showing *Nicotiana tabacum*, *Solanum lycopersicum* and *Capsicum annuum* showed in single cluster with other studied plants.

I. INTRODUCTION

The enzyme 5-enolpyruvylshikimate 3-phosphate (EPSP) synthase (EC 2.5.1.19) is an enzyme involved the shikimate pathway and is essential for the synthesis of aromatic amino acids. This pathway is found in algae, higher plants, bacteria, and fungi (1–3), as well as in apicomplexan parasites (4) but absent from mammals (2, 3). New drugs, herbicides and antimicrobial agents effective against Weeds, bacterial,

parasitological and fungal pathogens had been designed against EPSP synthase. Glyphosate (N-phosphonomethyl glycine, 'Roundup') is a successful, broad-spectrum, postemergence herbicide, which has proven as potent and specific inhibitor of EPSP synthase (5). Glyphosate is successfully used as a herbicide, being the active ingredient of the widely used weed control agent Roundup, and was recently shown to inhibit the growth of the pathogenic parasites *Plasmodium falciparum* (malaria), *Toxoplasma gondii*, and *Cryptosporidium parvum* (4).

EPSP synthase catalyzes the transfer of the enolpyruvyl moiety from phosphoenol pyruvate (PEP) to shikimate-3-phosphate forming the products EPSP and inorganic phosphate (1, 6). The reaction is chemically unusual because it proceeds via C–O bond cleavage of PEP rather than via P–O bond cleavage (7) as in most PEP-utilizing enzymes. Glyphosate inhibits EPSP synthase in a slowly reversible reaction, which is competitive versus PEP and uncompetitive versus shikimate-3-phosphate (5, 8, 9).

Although EPSP synthase has been extensively studied over more than three decades (10), conclusions on the enzyme mechanism (8, 9, 10, 11) and especially on the mode of action of the herbicide glyphosate (9, 10, 11) remained controversial. *In silico* approach reveals the two dimensional and three dimensional structural properties by Homology modeling of EPSP synthase from different plants viz., *Nicotiana tabacum*, *Vitis vinifera*, *Amaranthus palmeri*, *Gossypium hirsutum*, *Brassica napus*, *Eleusine indica*, *Convolvulus arvensis*, *Capsicum annuum* and further studied for elucidation of the active site of EPSP synthase and especially of the binding pattern of glyphosate by Docking study provides a valuable roadmap for engineering new herbicides and herbicide-resistant crops, as well as new antibiotic and antiparasitic drugs.

II. MATERIALS AND METHODS

Sequences of antioxidant proteins of spinach were retrieved from the NCBI (<http://www.ncbi.nlm.nih.gov/>), a public domain protein database (12) as shown in table 1. The EPSP synthase enzyme sequences were retrieved in FASTA format and used for further analysis.

For physico-chemical characterization, theoretical isoelectric point (pI), molecular weight, total number of positive and negative residues, extinction coefficient (13), instability index (14), aliphatic index (15) and grand average hydropathy (GRAVY) (16) were computed using the ExPASy's ProtParam

server (17) (<http://us.expasy.org/tools/protparam.html>). The results were shown in Table 1.

SOPMA (18) was employed for calculating the secondary structural features of the EPSP synthase enzyme sequences considered for this study. The results were presented in Table 2.

The modeling of the three dimensional structure of the protein was performed by homology modeling server, Swissmodel (<http://swissmodel.expasy.org/>) (19). The overall stereochemical property of the protein was assessed by Ramchandran plot analysis (20). The validation for structure models obtained from the three software tools was performed by using WHAT IF (21), ProSA (22) and ERRAT. The results of WHAT IF, ProSA (<https://prosa.services.came.sbg.ac.at/prosa.php>) and ERRAT (<http://nihserver.mbi.ucla.edu/ERRATv2/>) analysis were shown in figure 1. Structural analysis was performed and figures representations were generated with Swiss PDB Viewer (23).

Phylogenic analysis for EPSP synthase from different plants was done by MEGA 4 tool. Results were shown in Figure 2. There is single cluster to all proteins revealed that the functional motif are conserved in evolution.

III. RESULTS AND DISCUSSION

Table 1 shows accession numbers of EPSP synthase enzyme from different plants considered in this study and retrieved in FASTA format for further analysis. The parameter pI, EC, AI, GRAVY and instability index, which was computed using Expasy's ProtParam tool had been shown in table 1. Isoelectric point (pI) value was calculated because at that value protein is stable and compact. pI value is the pH at which protein has no net charge. The computed pI value of EPSP synthase enzyme from plants *Brassica napus* and *Eleusine indica* (CAA35839.1, CAD01096.1, AAR87845.1) were less than 7 (pI<7) indicates that these antioxidant proteins were considered as acidic whereas for *Convolvulus arvensis* it is 7.05 showing the neutral. The EPSP synthase enzyme plants *Nicotiana tabacum*, *Vitis vinifera*, *Amaranthus palmeri* and *Gossypium hirsutum* showed pI value more than 7.0. The computed isoelectric point (pI) will be useful for developing buffer system for purification by isoelectric focusing method. Extinction coefficient computed for the wavelength 276, 278, 279, 280 and 282 nm of which 280 nm is favored because proteins (Cys, Trp and Tyr amino acids) absorb light strongly. The high EC of enzyme from plants *Nicotiana tabacum* and *Brassica napus* indicates presence of high concentration of Cys, Trp and Tyr. The computed extinction coefficients help in the quantitative study of protein-protein and protein-ligand interactions in solution. The instability index provides an estimate of the stability of protein in a test tube. A protein whose instability index is smaller than 40 is predicted as stable, a value above 40 predicts that the protein may be unstable (14). The instability index value for the spinach antioxidant proteins were found to be ranging from 29.2 to 36.59. The results classified as enzyme of all plants were stable protein (Table 1).

The aliphatic index (AI) is defined as the relative volume of a protein occupied by aliphatic side chains. It is a positive factor for the increase of thermal stability of globular proteins. Aliphatic index for the antioxidant protein sequences ranged from 88.87 to 95.53. The very high aliphatic index of all

enzymes sequences indicates that these enzymes may be stable for a wide temperature range whereas the lower thermal stability of enzyme from plant *Gossypium hirsutum* was indicative of a more flexible structure when compared to other antioxidant protein.

The secondary structure of EPSP synthase enzyme from different plants were predicted by SOPMA (Self Optimized Prediction Method with Alignment) with default parameter which correctly predicts 69.5% of amino acids for a state description of the secondary structure prediction (18). Results are represented in table 3 with parameters Alpha helix Pi helix Beta bridge Extended strand Beta turn Bend region Random coil Ambiguous states.

The modeling of the three dimensional structure of the protein was performed by three homology modeling server, Swiss Model. SWISS-MODEL is a fully automated protein structure homology-modeling server, accessible via the ExPASy web server, or from the program DeepView (Swiss Pdb-Viewer). The purpose of this server is to make Protein Modelling accessible to all biochemists and molecular biologists worldwide.

The model was analyzed for its Fold reliability by using server ProSA server. The recognition of errors in experimental and theoretical models of protein structures is a major problem in structural biology. ProSA calculates an overall quality score for a specific input structure. If this score is outside a range characteristic for native proteins the structure probably contains errors. A plot of local quality scores points to problematic parts of the model which are also highlighted in a 3D molecule viewer to facilitate their detection. The z-score indicates overall model quality (As shown in analysis). Its value is displayed in a plot that contains the z-scores of all experimentally determined protein chains in current PDB. Plot of residue scores groups of structures from different sources (X-ray, NMR) are distinguished by different color. It can be used to check whether the z-score of the input structure is within the range of scores typically found for native proteins of similar size. Results are shown in figure 1. ERRAT server was used for analyzes the statistics of non-bonded interactions between different atom types. ERRAT is a protein structure verification algorithm that is especially well-suited for evaluating the progress of crystallographic model building and refinement. The program works by analyzing the statistics of non-bonded interactions between different atom types.

The modeled structures of EPSP synthase enzymes were also validated by other structure verification servers WHAT IF (21). Standard bond angles of the four models are determined using WHAT IF. The results were shown in Table 3. The analysis revealed RMS Z-scores were almost equal to 1 suggesting high model quality. The predicted structures conformed well to the stereochemistry indicating reasonably good quality.

Phylogenic analysis was done by using MEGA 4.0. Two major sequence clusters were constructed by phylogenetic analysis showing *Nicotiana tabacum*, and *Capsicum annum* showed in single cluster with other studied plants.

IV. CONCLUSION

The modeling of the three dimensional structure of the protein was performed by three homology modeling server, Swiss Model. Model of EPSP synthase enzyme from all plants

show reliable folding, validated by ERRAT and WHAT IF servers. These structures will provide a good foundation for functional analysis of experimentally derived crystal structures.

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	Accession No.	Sequence length	Molecular wt	pI	-R	+R	EC	II	AI	GRAVY
<i>Nicotiana tabacum</i>	AAA34071.1	518	55711.2	8.45	54	58	40380	31.62	92.37	-0.042
<i>Vitis vinifera</i>	ACY29662.2	521	55486.7	7.58	50	51	31900	34.61	89.98	-0.017
<i>Amaranthus palmeri</i>	ACV53022.1	518	55175.5	7.53	55	56	36370	36.59	91.08	-0.027
<i>Gossypium hirsutum</i>	ACF16410.1	521	55597.1	8.56	52	57	38890	27.7	88.87	-0.041
<i>Brassica napus</i>	CAA35839.1	516	55030.2	6.63	55	54	39015	33.33	91.63	-0.009
<i>Eleusine indica</i>	CAD01096.1	445	47397.7	5.52	54	48	33265	29.2	94.65	0.08
	AAR87845.1	445	47414.7	5.41	54	47	34775	29.21	95.53	0.09
<i>Convolvulus arvensis</i>	ACD80082.1	520	55498.9	7.05	56	56	34755	36.34	92.25	-0.037
<i>Capsicum annuum</i>	AEK22121.1	516	55377.7	7.54	56	57	33390	32.06	92.56	-0.047

Table 1 Protein sequences considered for the study and Parameters computed using Expsy's ProtParam tool And Transmembrane regions identified by SOSUI

	<i>Nicotiana tabacum</i>	<i>Vitis vinifera</i>	<i>Amaranthus palmeri</i>	<i>Gossypium hirsutum</i>	<i>Brassica napus</i>	<i>Eleusine indica</i>		<i>Convolvulus arvensis</i>	<i>Capsicum annuum</i>
	AAA34071.1	ACY29662.2	ACV53022.1	ACF16410.1	CAA35839.1	CAD01096.1	AAR87845.1	ACD80082.1	AEK22121.1
Alpha helix	31.47	28.79	33.2	30.13	31.78	33.48	32.36	30.77	34.88
310 helix	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Pi helix	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Beta bridge	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Extended strand	17.76	18.62	16.02	18.04	18.02	16.63	17.98	15.96	16.67
Beta turn	6.56	5.57	3.86	6.53	4.46	6.07	6.52	5.38	6.2
Bend region	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Random coil	44.21	47.02	46.91	45.3	45.75	43.82	43.15	47.88	42.25
Ambiguous states	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

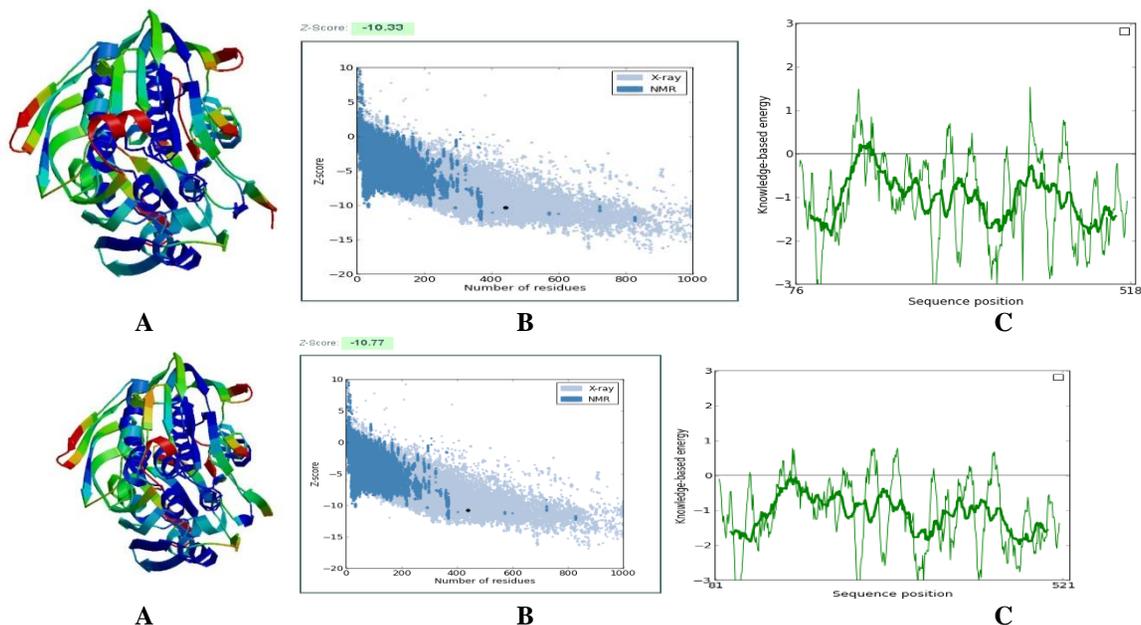
Table 2. Calculated secondary structure elements by SOPMA

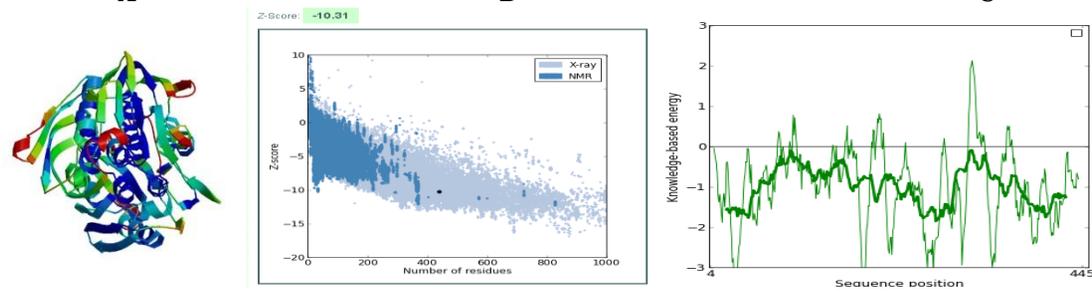
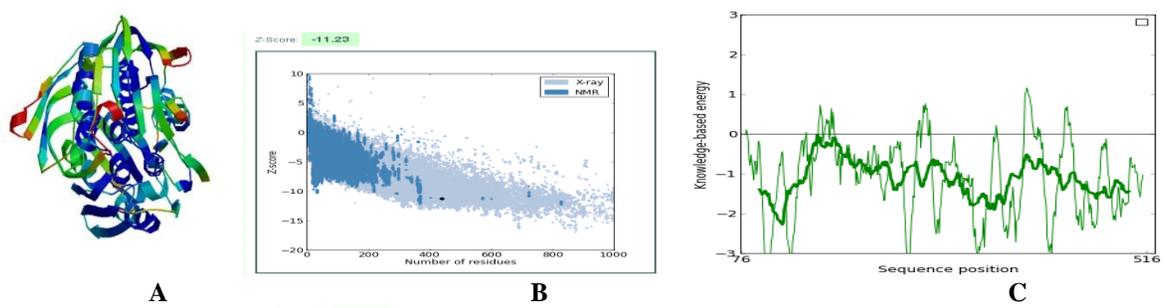
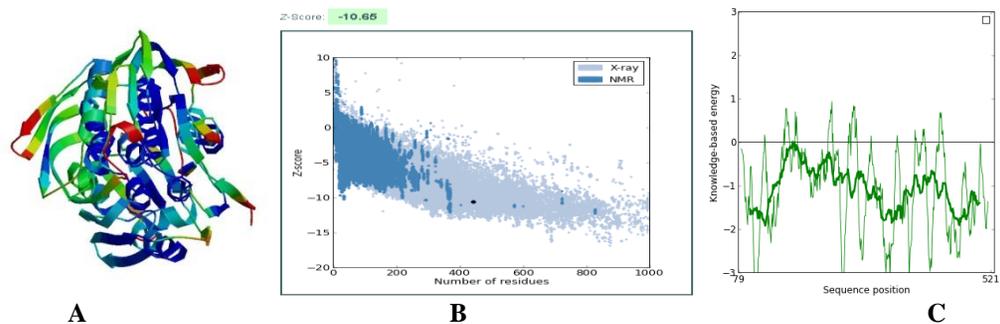
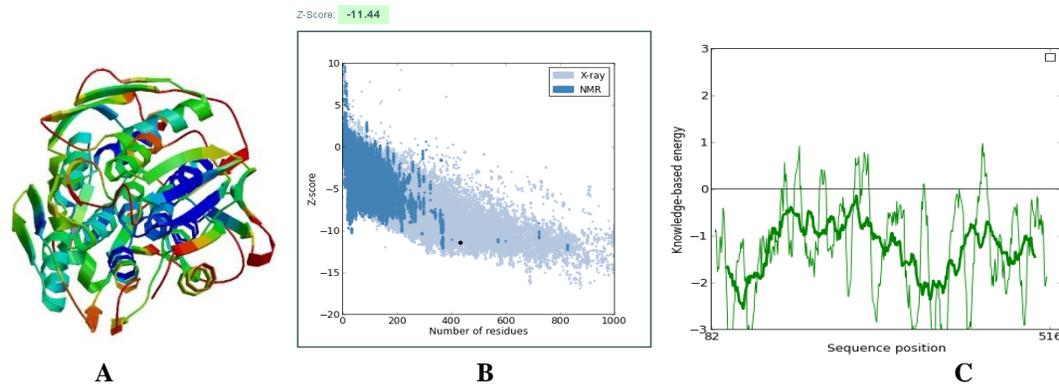
	<i>Nicotiana tabacum</i>	<i>Vitis vinifera</i>	<i>Amaranthus palmeri</i>	<i>Gossypium hirsutum</i>	<i>Brassica napus</i>	<i>Eleusine indica</i>		<i>Convolvulus arvensis</i>	<i>Capsicum annuum</i>
	AAA34071.1	ACY29662.2	ACV53022.1	ACF16410.1	CAA35839.1	CAD01096.1	AAR87845.1	ACD80082.1	AEK22121.1
Structure Z-scores, positive is better than average									
1st generation packing quality	-0.929	-0.955	-1.387	-0.835	-0.624	-0.746	-0.734	-0.874	-0.797
2nd generation packing quality	-2.093	-1.892	-2.87	-2.332	-1.953	-1.771	-1.664	-2.01	-2.064

Ramachandran plot appearance	-1.089	-0.895	-1.078	-0.886	-0.79	-0.931	-0.906	-1.027	-0.952
chi-1/chi-2 rotamer normality	0.961	1.321	0.073	1.104	1.163	1.291	1.227	1.376	0.852
Backbone conformation	-1.676	-2.126	-2.239	-1.76	-1.661	-2.188	-2.056	-1.937	-2.024
RMS Z-scores, should be close to 1.0:									
Bond lengths	0.652T	0.67	0.612	0.612T	0.616T	0.661T	0.641T	0.678	0.638T
Bond angles	1.086	1.14	1.355	1.118	1.127	1.172	1.166	1.101	1.088
Omega angle restraints	1.041	0.964	1.072	1.088	0.881	1.007	1.031	0.875	0.97
Side chain planarity	1.823	2.344L	2.191L	1.857	1.819	1.906	1.935	1.579	2.009L
Improper dihedral distribution	1.476	1.548L	1.763L	1.582L	1.516L	1.493	1.493	1.513L	1.516L
Inside/Outside distribution	0.976	0.972	1.027	0.976	0.975	0.993	0.993	0.958	0.975

Table 3 What if analysis

Figure 1. Modeled Structure (SWISS MODE) and ProSA analysis of Antioxidant proteins





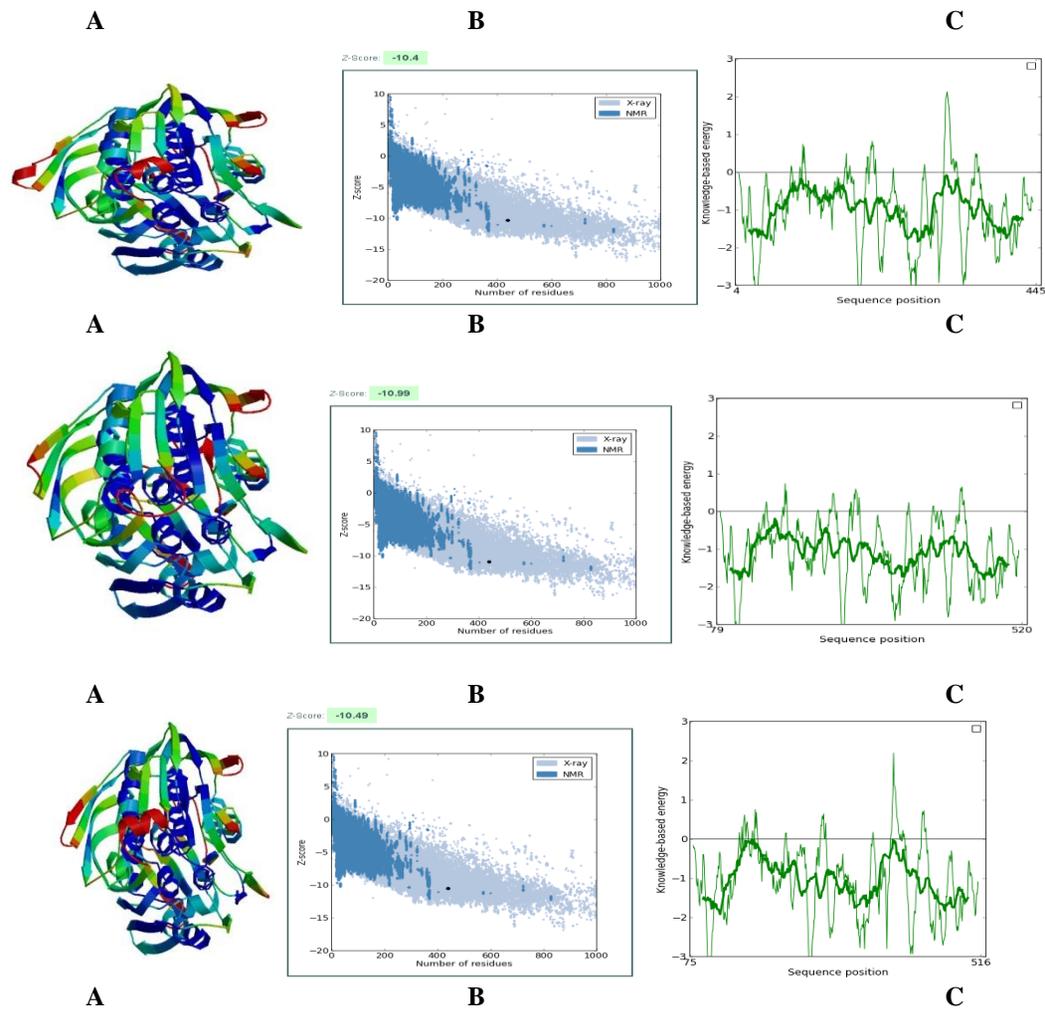
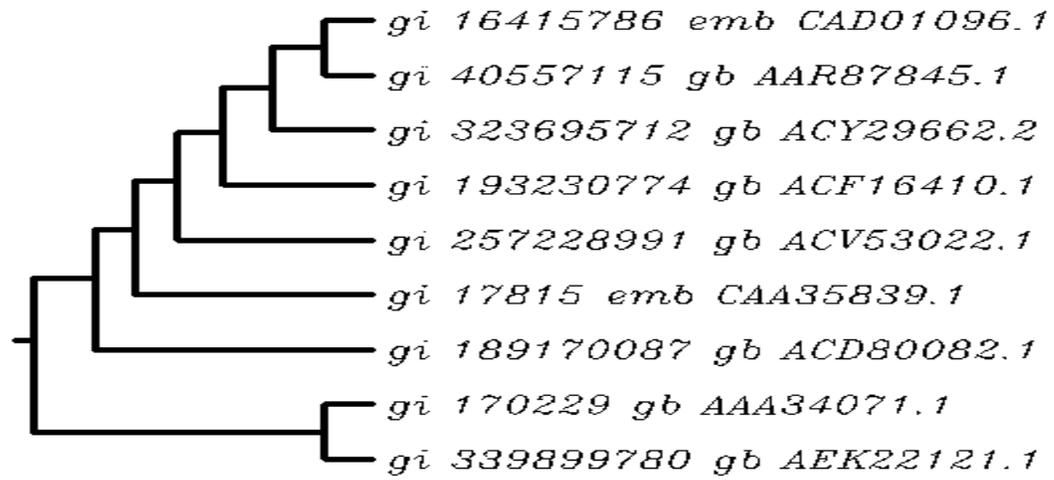


Figure 2 Phylogenic analysis



Smoke Testing

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Abstract- Smoke testing is an end-to-end testing which determine the stability of new build by checking the crucial functionality of the application under test and used as criteria of accepting the new build for detailed testing.

Index Terms- Software testing, acceptance testing, agile, build, regression testing, sanity testing

I. INTRODUCTION

The purpose of this research paper is to give details of smoke testing from the industry practices.

II. SMOKE TESTING

The purpose of smoke testing is to determine whether the new software build is stable or not so that the build could be used for detailed testing by the QA team and further work by the development team. If the build is stable i.e. the smoke test passes then build could be used by the QA and development team. On the stable build QA team performs functional testing for the newly added features/functionality and then performs regression testing depending upon the situation. But if the build is not stable i.e. the smoke fails then the build is rejected to the development team to fix the build issues and create a new build.

Smoke Testing is generally done by the QA team but in certain situations, can be done by the development team. In that case the development team checks the stability of the build and deploy to QA only if the build is stable. In other case, whenever there is new build deployment to the QA environment then the team first performs the smoke test on the build and depending upon the results of smoke the decision to accept or reject the build is taken. Generally if smoke fails then the build is rejected otherwise build is accepted.

Smoke testing is preliminary testing to reveal simple failures severe enough to reject a prospective software release. [1] This is the first testing performed on the build and all other kinds of testing follow it.

While checking the stability of the build, we do end-to-end testing to check if the code breaks. If there is any code break in any of the end-to-end flows then smoke fails. Smoke testing is conducted to ensure whether the most crucial functions of a program are working, but not bothering with finer details. [2] Because if crucial functionality is not working it will not be possible to perform the detailed testing so the build has to be rejected to fix the issues. For example login functionality in Facebook, launching the Facebook URL, navigate to account home page etc. are examples of smoke test cases.

Smoke testing performed on a particular build is also known as a build verification test (BVT). [1] The focus of the testing is the verification of the crucial functionality and not on the finer details. We touch all areas of application without going into deep. Smoke test cases are subset of the total test cases since we don't have to go in details rather check the crucial functionality only.

Smoke Testing has a great importance in Agile. We have frequent build deployments which need to perform the smoke tests before performing the detailed testing. In certain cases the frequency of the deployments could be very high; more than one build per day. One feature/functionality is implemented or some issues are fixed and then new build is deployed to the QA environment to know if the new build is stable and functionality is implemented correctly. During this time another feature/functionality could be implemented or more issues can be fixed by the development team and then again new build could be deployed to QA environment. This way deploying more than one build per day, first ensures the quality of product and secondly ensure that the QA team is not sitting idle. Such situation occurs only when we have critical client releases but generally we have one build per day in agile.

The plumbing industry started using the smoke test in 1875 [3] but some believe this term originated in the electronic hardware testing. "The phrase smoke test comes from electronic hardware testing. You plug in a new board and turn on the power. If you see smoke coming from the board, turn off the power. You don't have to do any more testing." [4] When a new hardware component is added to a device then if smoke comes out then it fails. Similarly in plumbing if there are any breaks in the pipe fitting then smoke comes out. To serve the same purpose in software field, smoke testing is used to find the code breaks in the end-to-end testing of the product.

Sanity testing is the term which is related to smoke testing but they are different. One similarity between two is that both are used as criteria for accepting/rejecting the new build. If sanity test cases fail then build is rejected because if the build is not containing the required changes then there is no point of doing regression testing on the build. Smoke is being part of regression testing, checks the crucial functionality while sanity testing is part of acceptance testing, checks whether the newly added functionality is working or not. Generally smoke is performed on relatively unstable product while sanity testing is done on the relatively stable product.

Moreover generally only one of them is performed but if we need to do both then smoke testing is performed first and then sanity testing is done.

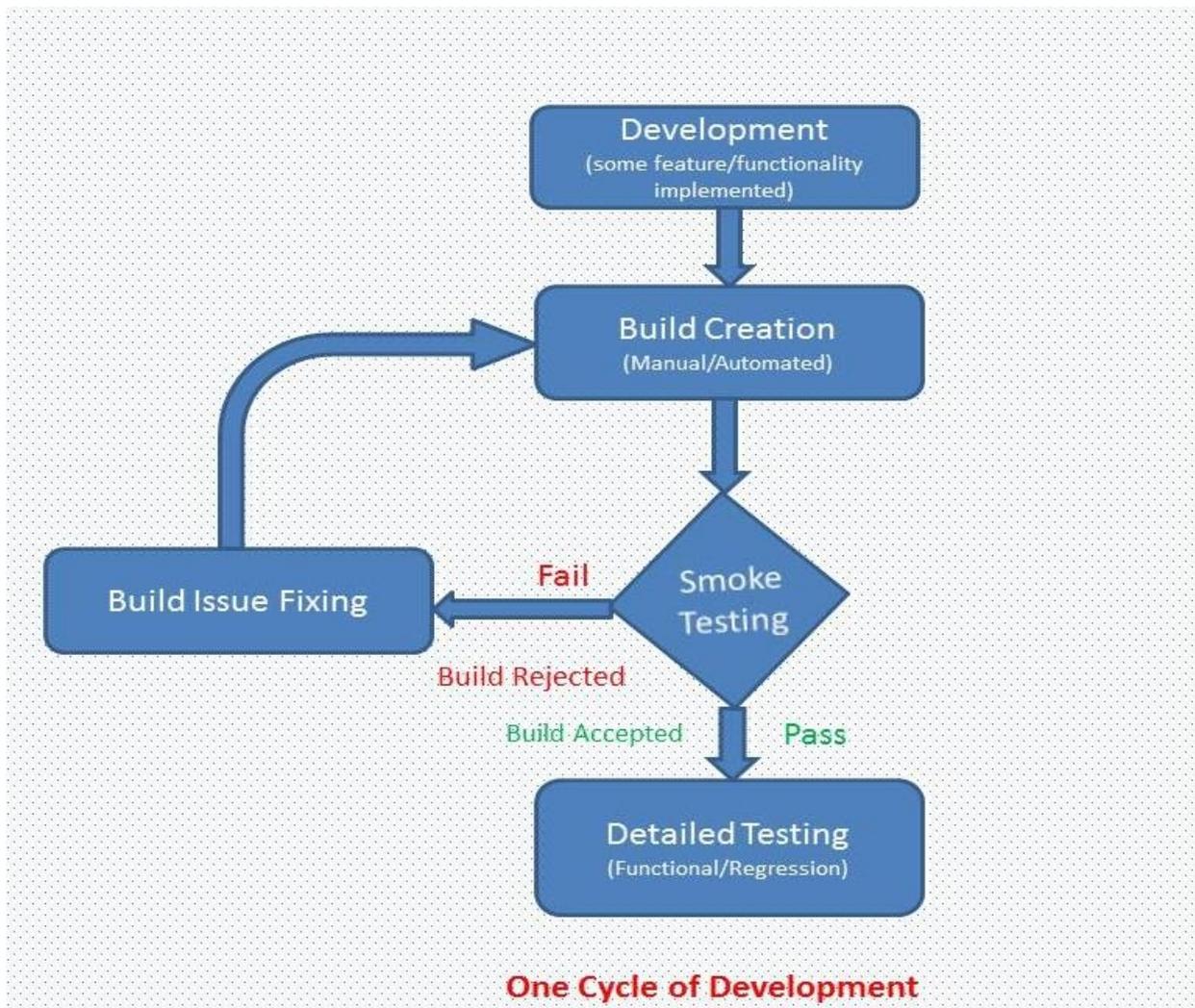


Figure 1: One cycle of Development

III. SCOPE OF SMOKE TESTING

We can define the scope of smoke testing w.r.t. when, where and how smoke testing is performed as follows:

1) When

Smoke testing is performed immediately after the build deployment. This is the first testing done on the build. First smoke testing is performed followed by other testing like functional testing (to test the newly added features), regression testing and user acceptance testing etc. It is a preliminary testing. [1]

2) Where

Smoke testing is generally done by the QA team in QA environment as criteria of accepting the build but in certain cases, it can be performed by development team.

3) How

The focus of smoke testing is to perform end-to-end testing of the build without going in finer details of the modules. This is high level testing. We simply navigate the different application flows from start to end without testing the details of the individual modules. Details of the modules are tested in the functional and regression testing. Here we just try to touch all the parts of the application.

IV. IMPORTANCE OF SMOKE TESTING

1) Saves Time

Smoke testing uses subset of total test cases to determine whether the build can be accepted for further testing and work, or not. Suppose we don't perform smoke testing and start with the detailed testing. Now if there is issue on the last page of the application then we won't be able to complete the regression testing of the application. The build has to be rejected to fix the issue. Now when new build will be deployed then that will need to perform the regression again. In this way a lot of effort and time, spent on the regression testing of earlier build is wasted. But if we perform smoke testing on the earlier build then we could detect the issue in lesser time and with lesser effort because smoke test cases are subset of total test cases.

2) Saves Effort

Smoke testing leads to saving of effort also as discussed above.

3) Saves Cost

Saving time and effort lead to saving cost of testing the application. In the software life cycle the earlier the errors are discovered and removed, the lower is the cost of their removal. [5]

4) Integration Risk

We perform end-to-end testing on each build so the blocker type issues can be uncovered early. So the risk of having integration issues is reduced.

5) Quality Improvement

Here the major issues are detected and corrected much earlier in the software test cycle thereby increasing the quality of software.

6) Progress Assessment

It is easier for project managers to assess the development progress. Since with each build we certify that end-to-end product is working and new features are added correctly.

V. TECHNIQUES OF SMOKE TESTING

1) Manual Approach

Here the smoke test cases are run manually. Manual approach is mainly used where the product is developed from the scratch and is unstable. Since during each development cycle new features/functionality is added to the product so using automation for this scenario will be very costly affair. This is because a lot of effort will be required on each build to maintain the scripts. For each newly added feature, we may have to update the scripts or may need to create new scripts. So for a new and unstable product, it is better to use the manual approach.

2) Automation Approach

Here the smoke test cases are automated and run with the help of some automation tools. In some cases the smoke scripts can be integrated with the automated build creation tools like Jenkins so that whenever a new build is deployed, the smoke suite automatically start execution without manual intervention and without wasting any time.

Automated smoke test cases are used in those environments where the product has become stable or product is the customization of some base product. No doubt even in this scenario, smoke scripts require maintenance but the maintenance effort is less.

3) Hybrid Approach

This approach is the combination of manual and automation approaches.

VI. PROCESS OF SMOKE TESTING

1) Identify Smoke Test Cases

Smoke test cases are subset of total test cases. To create a smoke, we need to identify the minimum number of test cases, to cover the crucial functionality of the product so that they could be executed in least amount of time. This is a very important step of the smoke testing. If we create large set of smoke test cases then it may take more time in execution and if we create small set of smoke test cases then it may not be effective in covering the crucial functionality.

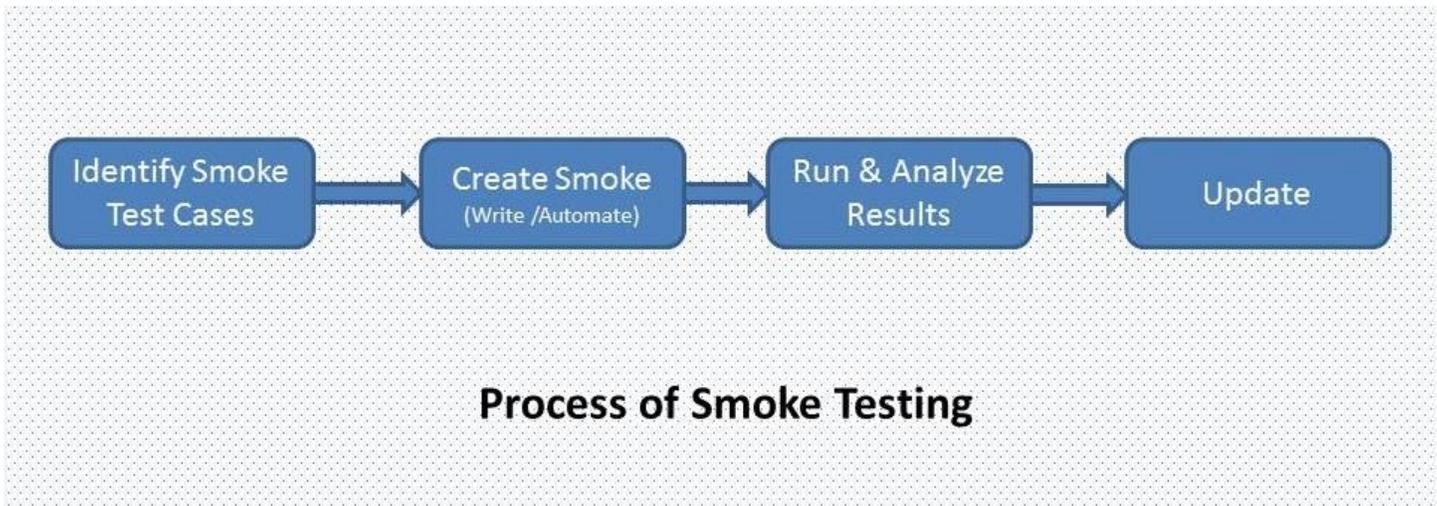


Figure 2: Process of smoke testing

2) Create Smoke Test Cases

Once the smoke test cases have been identified, the next step is to create test cases. We write smoke test cases and automate them if required. But as discussed in ‘V. Techniques of Smoke Testing’, it’s not always possible to automate the smoke test cases.

3) Run and Analyze the Results

Once the smoke test cases are ready then whenever there is a new build, smoke is run on the build and results are analyzed to take the decision of accepting or rejecting the build.

4) Maintenance

Maintenance is used to maintain the value of smoke test cases over the period of time. Whenever new crucial functionality is added, we need to create new smoke test cases. Similarly whenever there are changes which affect the smoke scripts, we have to fix them.

VII. CHARACTERISTICS OF SMOKE TESTING

- 1) Smoke testing is preliminary testing. [1]
- 2) It is one type of integration testing because it involves end-to-end testing.
- 3) It checks only the crucial functionality without going into the finer details.
- 4) Generally done by the QA team in QA environment.
- 5) It checks the stability of build.
- 6) It checks if the build could be used for detailed testing and further work or not.
- 7) It is performed on the new build only.
- 8) Smoke test cases are a subset of total test cases.
- 9) It is also known as Build Verification Test (BVT). [1]
- 10) Smoke testing is like General Health Check Up. [6]
- 11) Smoke testing is used as criteria for accepting or rejecting the new build.
- 12) It is a high level testing.
- 13) It is widely used in agile.

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A QoS-Aware Web Service Selection Based on Clustering

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Abstract- Web service plays an important role in e-business and e-commerce applications. A web service applications are interoperable and can work on any platform, large scale distributed systems can be established easily. The selection of most suitable web service is very crucial for successful execution of applications due to the rapid growth of web service providers in the Internet. Researchers have proposed various techniques for service discovery like ranking and clustering the web services. These models lead to the selection and re-selection of improper web services due to the analysis of non-functional characteristics of web services. A novel technique to mine Web Service Description Language (WSDL) documents and cluster them into QoS similar Web service groups is proposed. The application of this approach to real Web service description files has shown good performance for clustering Web services based on QoS similarity, as a predecessor step to retrieving the relevant Web services for a user request by search engines. The various parameters of quality are trustworthiness, security, performance, availability, response time, scalability etc.

Index Terms- Web Services, QoS Parameter, Clustering, K-Means, Service Discovery.

- We introduce service clustering for grouping services with similar functionality into classes according to their QoS properties. The clustering result can make us obtain the service clustering information by which we know the characteristic of each atomic service. And this can help to speed up the algorithm while guaranteeing the near-optimal result by choosing the best services from each class. Besides, when an accident happens, it can assist to re-select atomic services according to the service clustering information which can be updated at run time.
- We demonstrate our proposed model's feasibility through some experiments, and analyze the experiment results with different parameters and in different situations.

The rest of this paper is organized as follows. Section II gives a brief background on related work. Section III describes the QoS parameters. Section IV introduces our proposed clustering approach. Section V explains the selection of web service from the cluster. Section VI discusses the experiments and results. Finally, Section VII concludes the paper and outlines future research avenues.

I. INTRODUCTION

The building block of web services architecture [1] are service provider, service registry and service users. The interaction involves publish, find and bind operations. Collectively, these roles and operations act upon the Web Service artifacts such as the Web service software module and its description. In a usual scenario, a service provider hosts a network-accessible software module. The service provider defines a service description and publishes it to a service registry. The service user queries the service registry for service selection and uses the service description to bind with the service provider. However, as the number of atomic services developed by different service providers grows rapidly, it is essential to select appropriate atomic services for complex business processes. However, as the number of atomic services developed by different service providers grows rapidly, it is essential to select appropriate atomic services for complex business processes.

In order to achieve better service selection the services are clustered based on the QoS values. We used K-means clustering algorithm to cluster the QoS values. So, we can able to differentiate the cluster values using mean values of the cluster. Our algorithm is used when service requestor needs to find an optimal choice of services for the purpose of satisfying the service requester's requirements, and it performs well in highly competitive environments. The main contributions of this paper are listed as follows:

II. BACKGROUND AND RELATED WORK

Research in Web mining has recently gained much attention due to the popularity of Web services and the potential benefits that can be achieved from mining Web services description files. Non-semantic Web services are described by WSDL documents while semantic Web services use Web ontology languages (OWL-S) [2] or Web Service Modeling Ontology (WSMO) [3] as a description language. Non-semantic Web services are more popular and supported by both the industry and development tools. The discovery process is quite different according to the Web services description method. Semantic Web services are discovered by high level match-making approaches [4], whereas non-semantic Web services discovery uses information retrieval techniques [5]. In our approach, we target the discovery of semantic Web services.

Yi Xia, Ping Chen, Liang Boa, Meng Wang and Jing Yang [6] proposed a method to improve the Web service discovery process using BPEL tree structure. He provides the special kind of algorithm called QSSAC that selects and reselects the proper Web Service for the user request. In contrast, our approach clusters Web Services based on their QoS values in order to reduce the search space and improve query matching. We make use of QoS values extracted from the description files to calculate the similarity among Web services. Many efforts have been made to overcome the drawbacks of UDDI-based discovery techniques. Khalid Elgazzar, Ahmed E.Hassan and Patrick

Martin [7] propose functionality based discovery mechanisms. Their proposed model follow the K- Means algorithm to cluster the Web Service which useful to bootstrap the Web Service discovery. The application of this approach to real Web service description files has shown good performance for clustering Web services based on function similarity, as a prior step to retrieving the relevant Web services for a user request by search engines. Rajini Mohana and Deepak Dahiya,. [8] propose an Algorithm for building a rule based model for ranking the web service based on quality of service (QoS) using fuzzy clustering and particle swarm optimization (POS). The number of quality attributes considered for the ranking but PSO reduces the number of rules by removing the rules that are having less weightage and will not affect the system.

Liu and Wong [9] use a proposal similar to ours and apply text mining techniques to extract features such as service content, context, host name, and name, from Web service description files

in order to cluster Web services. They propose an integrated feature mining and clustering approach for Web services as a predecessor to discovery, hoping to help in building a search engine to crawl and cluster non-semantic Web services. We differ in our choice of features. We believe that the service context and service host name features offer little help in the clustering process. Providers tend to advertise the services they provide on their own website, which means they provide different Web services on the same site. Hence, mining the surrounding Web pages (service context) or considering the host name does not help with the meaning of the Web service, which is not the case in UDDI. In addition, some Web services do not make use of the <documentation> element in the WSDL document, which means there is insufficient information for the content feature.

III. QoS PARAMETERS

Table-1: QoS Parameter and its units

S.No	QoS Attribute Name	Description	Unit
1.	Response Time	Maximum or Average Time taken to send a request and receive a response.	ms
2.	Availability	Number of successful invocations/total invocations.	%
3.	Throughput	Total Number of invocations for a given period of time.	Invokes/ second
4.	Successability	Number of response / number of request messages.	%
5.	Reliability	Ratio of the number of error messages to total messages.	%
6.	Latency	Time taken for the server to process a given request.	ms

There are some possible QoS metrics such as Performance, dependability, cost and reputation which is relevant to the web services. The performance of a web service represents how fast a service request can be completed. Depending on the stakeholder interests, it can be set to deal with performance such as throughput, response time, execution time and resource utilization. Throughput is the number of completions of web service requests during an observation time interval. Response time is the period of time necessary to complete a web service request. Execution time is the resource time consumed by a web service to process its composing activities. Resource utilization is the percentage of time a resource is busy serving web service activities. The dependability of Web Services is a property that integrates several attributes like reliability, availability and security.

Reliability represents the ability of a Web Service to perform its required functions under stated conditions for a specified time interval, Availability is the probability that the system is up and security.

Web service can be provided against payment of a certain amount of money. Usually the price of a Web Services is defined by the provider. The cost may be permanent for each invocation or proportional to the actual service demand to each Web Service method that is used. Providers may also request higher fees for services hosted on better/faster hardware. Reputation reflects a common perception of other WS or customer towards that service. It aggregates the ratings of the given service by other principals. Typically, a reputation would be established from a history of ratings by various parties.

IV. PROPOSED CLUSTERING APPROACH

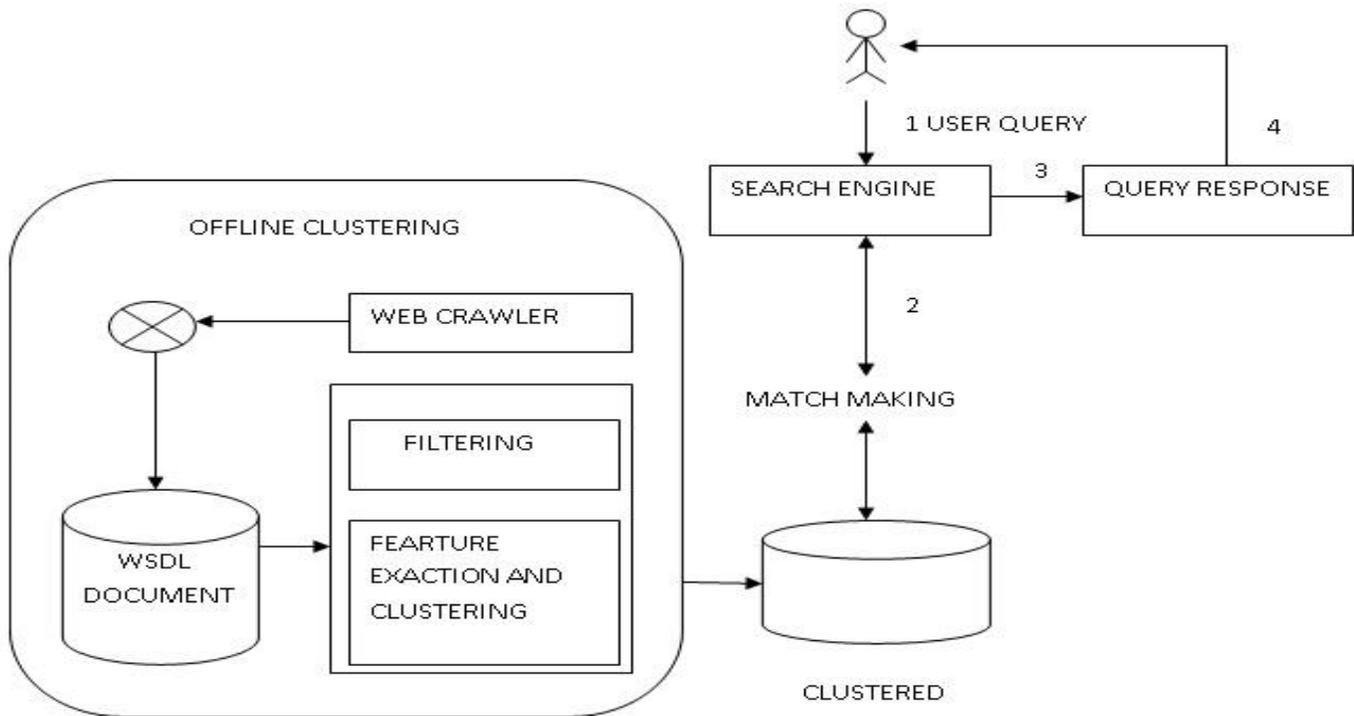


Fig-1: Architecture of proposed model

Clustering is based on QoS parameters which are requested by the user at the searching time. It significantly increases the performance of service discovery by analysing the best cluster value instead of analysing the huge amount of data. Our proposed model includes the four kinds of steps. They are,

- Filtering the web service based on keywords
- Extracting the QoS values from WSDL document
- Forming the cluster using the extracted QoS values
- Selecting the most suitable web service from the cluster.

Filtering is the very first step in web service clustering. It parses the WSDL document which contains a web service name and other QoS properties for the specific web service and also it has a URL for the web service. Finally it returns the web services Name which is specified by the user.

After the filtering process, the web service name will be displayed. The user specified QoS values are retrieved from the WSDL document based on filtered web service names. The retrieved QoS values are clustered using K-Means algorithm. The K-means algorithm proceeds as follows. First, it randomly selects k of the objects, each of which initially represents a cluster mean or center. For each of the remaining objects is assigned to the cluster to which it is the most similar, based on the distance between the object and the cluster mean. It then computes the new mean for each cluster. This process iterates

until the criterion function converges. It forms the cluster using the following procedure

- Step 1: Make initial guesses for the means m_1, m_2, \dots, m_k
- Step 2: Until there are no changes in any mean
 - Step 2.1: Use the estimated means to classify the samples into clusters
 - Step 2.2: For i from 1 to k
 - Replace m_i with the mean of all of the samples for cluster i
 - Step 2.3: end_for
- Step 3: end_until

The clustered web Services are stored in the intermediate storage area. Which is contains the centroid as mean values of the cluster.

V. WEB SERVICES SELECTION

The ResponseTime QoS attributes comes under the minimization type and the remaining attributes falls under maximization type. If the user request the web service based on ResponseTime, the selection algorithm returns minimum value's URL from the cluster which has minimum centroid value. For the remaining QoS attributes request, the selection algorithm returns maximum value's URL from the cluster which has the maximum centroid value.

During the Web Service selection the selection algorithm checks for the first request. If the request is fresh then it from the cluster end stores in the intermediate storage area or otherwise the selection algorithm directly goes to the intermediate storage

area and analyse the already stored clusters and returns the proper Web Service for the user request and QoS parameter.

5.1 Merits of Proposed System

- Returns the correct web service based on requesting QoS attribute

- Performance of Web service selection will increase because of intermediate storage area between client and server.
- Updatons and modifications in the web service will not affect the performance of web service.

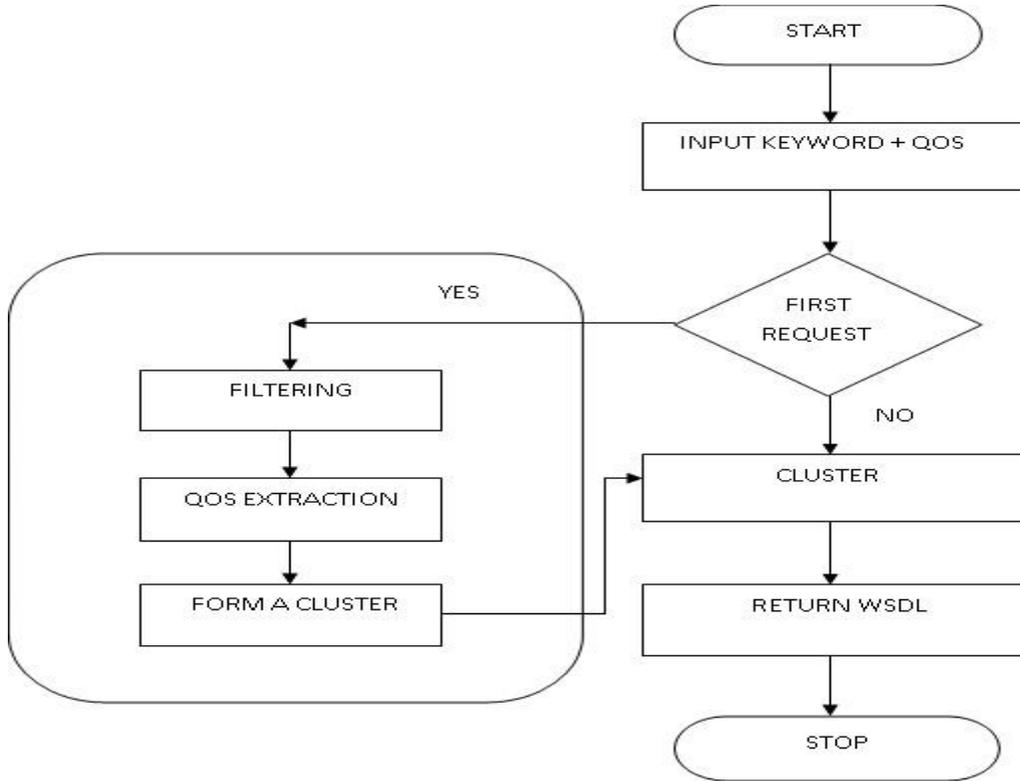


Fig-2: Data flow diagram for proposed model

VI. EXPERIMENTS AND RESULTS

This chapter focuses on the demonstration of the proposed model with single QoS constraint. The demonstration gives the best service from the huge volume of dataset based on QoS parameter. The QoS parameter is specified by the user at

searching time. The input dataset for the proposed model contains 2500 records.

Here, the specified QoS parameters are Availability, Throughput, Successability, Reliability, Latency and ResponseTime. At the same time number of cluster value is also specified by the user.

Table-2: Input for the Proposed System

Keywords	QoS Parameters	Number of Clusters
Holiday	Availability	Vary depending on the User
User	Throughput	
Web	Successability	
Google	Reliability	
Address	Latency	

Phone	ResponseTime	
Tax		
Wizard		
SMS		
Hotel		

The system returns the Web services and the specified QoS value for the request based on the keyword mentioned by the user. For example user wants to access the hotel web service with Quality of Service as Successability, it returns the output as

Table-3: Web Services Filtering

Service Name	Successability
K4THotelAvailWS	96
HotelsService	65
K4THotelSellWS	97
HotelFunctionsService	78

Based on the number of clusters and Web Service filtered outputs the system forms the cluster. For example, if the user enters a number of clusters equal to 3 then it forms a cluster in the following order

Table-4: Cluster Values

Cluster 1	Cluster 2	Cluster 3
65	78	96,97

Finally it returns the best cluster value, and the cluster value stored in the intermediate storage area.

96
97

It displays the URL by analysing the best QoS value from best cluster which stored in the intermediate storage area.

VII. CONCLUSION

Success of published web services depends on how it is getting discovered. Efficiency and accuracy factors must be considered while providing a discovery mechanism. Traditional UDDI based and search engine-based Web service discovery lacks the ability to recognize the content of the Web service description file. In this proposed model, filtering and QoS-based clustering is used to select the best web service for the customers. The procedure allows users to specify their QoS constraints which are used to filter off irrelevant services and takes the total QoS utility score for each filtered candidate and it forms the cluster for relevant web services. From the cluster, the user assists to select the best web service in response to their specified

preferences. Based on this project work, it can be concluded that, the proposed methodology provides a solution for dynamic web service selection at run time. The proposed model depicts that user will specify the QoS constraint and required specification to discover the best optimal service. Also, proposed model produce better quality result in comparison to the existing methods. The future scope of this work is to include more number of QoS parameters.

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Correlation of Mechanical Properties of Some Rocks in South-Eastern Nigeria

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Abstract- The mechanical properties of five different rock types from south-eastern Nigeria were determined through uniaxial compressive strength (UCS) test, point load strength test, impact strength index test and natural density test. The results were correlated by using correlation coefficient and regression analyses. The equation of the best-fit line, and the correlation coefficient were determined for each regression. Among the four rock properties correlated in terms of drillability (penetration rate) of percussive or rotary drilling rig, the uniaxial compressive strength, the impact strength index and natural density are found to be the dominant properties affecting penetration rate of rotary drills.

Index Terms- uniaxial compressive strength, impact strength index, natural density, point load, correlation coefficient

VIII. INTRODUCTION

Rock aggregate is used in very different construction works such as building constructions and most public projects, including roads and highways, bridges, railroads etc. An enormous amount of aggregate is used in the world each year. The demand for crushed stone aggregate is increasing from day to day because of increasing expansion of highway and other construction works and decreasing natural aggregate resources in the world (Kahraman and Fener, 2007). The suitability of aggregate for use in a given type of construction is determined by evaluating the materials in terms of its physical and mechanical properties.

Most specifications for aggregates require the material to be strong (Al-Harhi, 2001; Ugur et al, 2010). Aggregates used must be tough and abrasion resistant to prevent crushing, degradation and disintegration when stockpiled, fed through an asphalt plant, and subjected to traffic loadings.

Deere and Miller (1966) published extensive research on the relation between shore hardness (SH) and uniaxial compressive strength (UCS) of 28 different rock types, using the C-2 type shore scleroscope. The SH values were also used to determine the UCS of rocks (Yasar and Erdogan, 2004; Shalabi et al., 2007; Tumac et al., 2007). Researchers have tried to develop empirical methods to estimate the uniaxial compressive strength of rocks by using tests such as Los Angeles abrasion, Point load index, Schmidt hammer, slake durability and shore hardness tests. These tests have less strict requirements for sample preparation than the uniaxial compressive strength (UCS) test and also cheap and easy to use. The correlation index tests are widely used to predict the UCS instead of measuring it.

This paper wants to correlate the various mechanical properties of the rocks around Lekwesi, in South-Eastern Nigeria. The mechanical properties to be considered are: Point load test, Impact strength test, density test and Uniaxial compressive strength test, considering their drillability.

The concept of specific energy was proposed by Teale (1965) as a quick means of assessing rock drillability. Teale defined specific energy as the energy required to remove a unit volume of rock. However, another definition of specific energy as the energy required to create a new surface area was given by Parthinker and Misra (1976). It was Rabia (1985, 1982) who concluded that specific energy in terms of either unit volume or new surface area is not a fundamental intrinsic property of rock, and that the breakage parameters or operational parameters control numerical value of specific energy. Wayment and Grantmare (1976), and Mahyera et al (1982) studying high energy hydraulic impactors concluded that, for a given rock type specific energy is proportional to the inverse root of the blow energy. Destruction of rocks, either by drilling, cutting breaking and sawing has some mechanical similarities. Specific energy is a common concept of rock destruction governing the efficiency of any rock excavation process. It was Hughes (1972) and Mellor (1972) who demonstrated that specific energy may be formulated thus:

$$SE = \sigma_c^2 / 2E \dots\dots\dots\text{equation (1)}$$

Where SE is the specific energy, E is the secant modulus from zero to load to failure and σ_c is the rock compressive strength.

Farmer and Garrity (1987) and Pool (1987) using the same concept as explained earlier showed that for a given power of road header, excavation rate in m^3/h may be predicted significantly using specific energy values as given in equation (1). Again, Krupa and Sekula and co-workers (1994, 1993) noticed that for a given power, advance rate of a full force tunnel boring machine is directly related to specific energy values as formulated in equation (1).

There are some models in percussive drilling or rotary cutting which assumed that thrust force is a product of rock compressive strength and tool projectile area, given good agreement between predicted and actual advance rate values (Roxbotough and Phillips, 1975; Bernola and Oyanguran, 1987). This fact emphasizes that rock compressive strength should be considered as one of the major properties in a model for estimating drilling rates (Akun and Karpuz (2005), Altindag (2004, 2006). However, in rotary drilling or in rock cutting using drag tools, tensile strength, compressive strength and shear strength are the dominant rock properties as explained by Evans and Pomeroy (1966) and Nishimatsu (1972).

Sinkala (1991) emphasized that reduction in a hole deviation is vital in order to minimize operational costs and stated that among the controllable factors with a major effect on hole trajectory deviation, are thrust, torque and operator. The main function of the thrust is to maintain bit-rock contact and to keep the drill string joints closed before the pulses arrive so that the energy losses are minimized. The torque is applied mainly to move bit inserts to new surfaces and simultaneously to tighten drill string joints before the arrival of stern waves (Sinkala, 1991). Sinkala then derived the following theoretical expression for minimum torque necessary to maintain constant bit rotation and found good agreement between actual and theoretical values.

$$\tau = \frac{FD}{3} \sqrt{\frac{R}{15f\theta}} \dots\dots\dots\text{equation (2)}$$

where τ is the bit rotation torque, F is the thrust on the bit, R is the penetration rate, f is the piston impact frequency, D is the bit diameter, and θ is the button diameter.

The above consideration showed that automatic control of drilling parameters may be realized as rock condition changes. Sinkala’s contribution enabled the sub-level intervals from LKAB-Kirum mine to be increased from 22 to 27m, thereby increasing the scale of mining and minimizing drilling cost.

IX. RESEARCH ELABORATIONS

Basic intrusive rocks and shales of Cretaceous age in parts of Eastern Nigeria were sampled using Slanzi rotary diamond drilling rig. Drilling performance was carried out on five different rock types within a mine area of 81,750m². Drill type, bit type and diameter, feed pressure, rotation pressure, blow pressure, air pressure, net drilling time, etc were recorded during the operation and hence the net penetration rate calculated for each rock type (table 1) and the samples were later subjected to the following tests:

Table 1: Drill Penetration Rates through Different Rock Types

Rock Type	Net Penetration Rate (m/min)
Lateritic Soil	0.75
Light Grayish Shale	0.44
Dark Grayish Shale	0.40
Carbonate Rock	0.12
Dolerite	0.03

Bit diameter, 76-89mm; rock drill power (14-17.5 kW); bpm (3000-3600); pulldown pressure (60-80bar); blow pressure (100-120 bar); rotational pressure (60-70 bar).

2.1 Uniaxial Compressive Strength Test: Uniaxial Compressive Strength Test was performed on trimmed core samples having a diameter of 33mm and a length- to-diameter ratio of 2. The applied stress rate was in the range of 0.4 - 1.2MPa/s and the results are given in table 2

2.2 Point Load Test: This test was carried out on the cores having a diameter 33mm and a length of 66mm. The results were corrected to a specimen diameter of 50mm and the following results were obtained (Table 3).

2.3 Impact Strength Index Test: The device of Evans and Pomeroy (1966) was used in the impact strength index test. A 100g sample of rock in the size range 3,175 - 9.525 mm is placed in a cylinder of 42.86 mm diameter and a 1.8 kg weight is dropped 20 times from a height 30.48cm on to the rock sample. The impact Strength index was then measured (i.e. the amount of rock remaining in the initial size range after the test, table 4).

2.4 Density Test: Trimmed core samples were used in the determination of natural density. The specimen volume was calculated from an average of several calliper readings. The weight of the specimen was determined by a balance capable of weighing to an accuracy of 0.01 of the sample weight. The natural density values were obtained from the ratio of the specimen weight to the specimen volume. The average results of the tests are listed in table 5.

Table 2: Uniaxial Compressive Strength (UCS) Test

Rock Type	Mean Compressive Strength (MPa)	Standard Deviation	Coefficient of variation %
Lateritic Soil	18.74	12.56	67.02
Light Grayish Shale	74.55	11.79	15.81
Dark Grayish Shale	88.42	11.85	13.40
Carbonate Rock	109.13	8.34	7.64
Dolerite	180.50	11.73	5.23
Average			21.82

Table 3: Point Load Strength Test

Rock Type	Mean Point Load Strength (MPa)	Standard Deviation	Coefficient of variation %
Lateritic Soil	1.8	0.41	22.78
Light Grayish Shale	4.2	0.34	8.10
Dark Grayish Shale	4.6	0.32	6.96
Carbonate Rock	5.6	1.56	27.86

Dolerite	10.5	0.89	8.48
Average			14.84

Table 4: Results of Impact Strength Test

Rock Type	Mean Impact Strength	Standard Deviation	Coefficient of variation %
Light Grayish Shale	54.2	0.75	- 1.38
Dark Grayish Shale	61.5	0.27	- 0.44
Carbonate Rock	82.9	- 0.17	- 0.21
Dolerite	92.2	- 0.65	-0.70
Average			- 0.68

Table 5: Natural Density Test

Rock Type	Density (g/cm ³)	Standard Deviation	Coefficient of variation %
Light Grayish Shale	2.21	0.12	5.43
Dark Grayish Shale	2.36	0.16	6.78
Carbonate Rock	2.73	0.13	4.76
Dolerite	2.98	0.21	7.05
Average			6.01

X. RESULTS AND FINDINGS

Two statistical analyses, coefficients of variation and regression analyses were used in this study.

3.1 Coefficients of variation

The coefficients of variation (CoV) were calculated to evaluate the variability of test results for each test and rock type as shown in tables 2 to 5. The CoV is obtained by dividing the standard deviation by the population mean and expressing it as percentage. The higher the CoV, the more variable are the results of a given test.

The uniaxial compressive strength (UCS) values range from 18.74 MPa for lateritic soil to 180.50 MPa for dolerite while the CoV range from 5.23% for dolerite to 67.02% for lateritic soil with overall average of 21.82% (table 2).

The point load strength index values range from 1.8MPa for lateritic soil to 10.5MPa for dolerite with the CoV ranging between 6.96% for light gray shale to 27.86% for shalley carbonate and an overall average of 14.84% (table 3).

The impact strength index range from 54.2 for the light grayish shale to 92.2 for dolerite with the CoV value ranging from 0.21% for shalley carbonate to 1.38% for light grayish shale with an overall average of 0.68 % (table 4)

The natural density values range from 2.21 g/cm³ for light grayish shale to 2.98 g/cm³ for dolerite while the CoV range from 4.76% for light Shelley carbonate to 7.05% for dolerite with overall average of 6.01% (table 5).

3.2 Regression Analysis

Penetration rates were correlated with the rock properties using the method of least-squares regression. The equation of the best-fit line, 95% confidence limits, and the correlation coefficient (r) were determined for each regression. As shown in the plots, there is an inverse relationship between penetration rate and the horizontal axis (Figures 1- 4).

The linear relationship between penetration rates and the UCS values shown in figure 1 verifies the theoretical consideration that thrust force and penetration rate are related to the product of rock compressive strength and tool projectile area. The equation of line is $y = -0.0045\sigma_c + 0.77$; $r = 9.4590 \times 10^{-01}$ or -0.95 with a standard error, $Se = \pm 0.50$ where y is the penetration rate (m/min) and σ_c is the uniaxial compressive strength (MPa).

A linear relationship is seen between the point load index and the penetration rate (figure 2) and the equation of line is $y = -0.079P_l + 0.77$; $r = 8.932 \times 10^{-01}$ or -0.89 with a standard error, $Se = \pm 0.15$ where y is the penetration rate and P_l is the point load index (MPa). Again, there is an inverse relationship between the penetration rate and point load index.

The plot of penetration rate as a function of the impact strength index is shown in figure 3. There also exist a linear relationship between penetration rate and the impact strength index as shown in the equation of line, $y = -0.011 I_s + 1.07$; $r = -9.955 \times 10^{-01}$ or -0.996 with a standard error, $Se = \pm 0.04$, where y is the penetration rate and I_s is the impact strength index.

A linear relation between penetration rate and natural density is found in figure 4 with the equation of line as $y = -0.57\rho + 1.72$; $r = -0.98$; $Se = \pm 0.04$ where y is the penetration rate and ρ is the natural density (g/cm³).

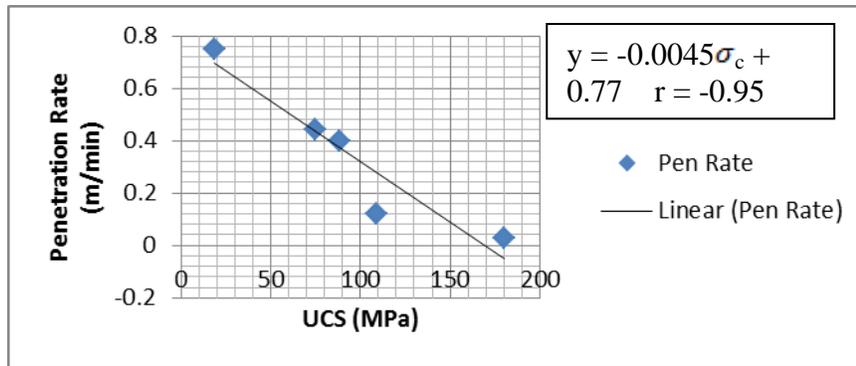


Fig 1: Penetration Rate versus Uniaxial Compressive Strength

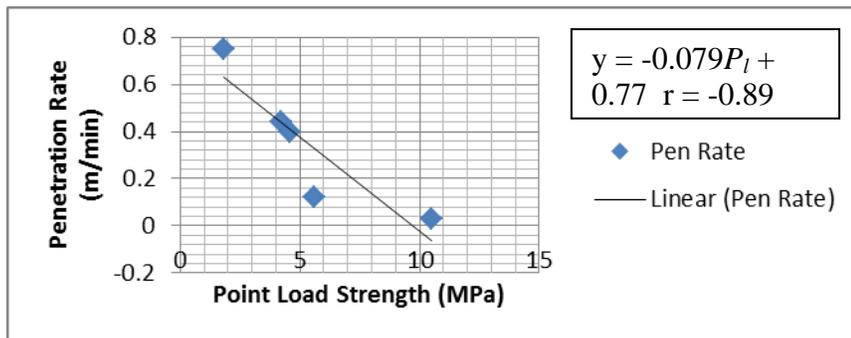


Fig 2: Penetration Rate versus Point Load Strength

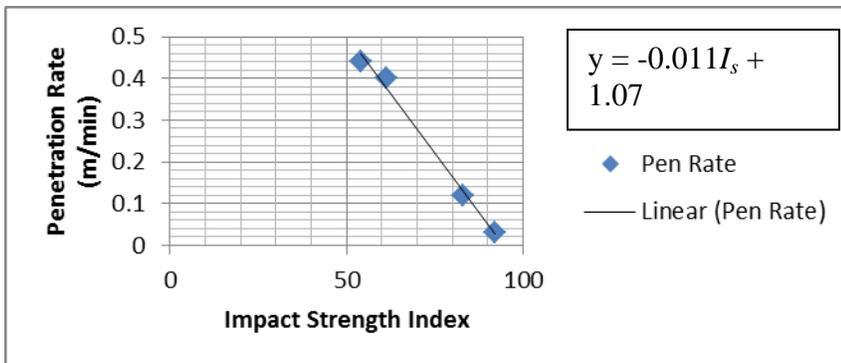


Fig 3: Penetration Rate versus Impact Strength Index

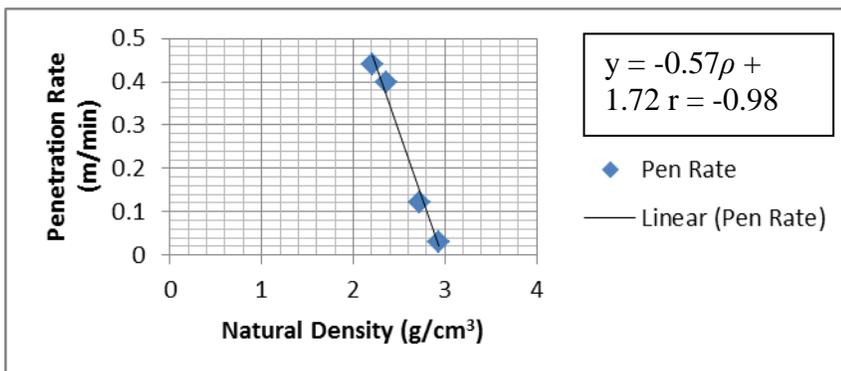


Fig 4: Penetration Rate versus Natural Density

XI. FINDINGS

The impact strength test yields the most consistent result of the four methods used. Only the coefficient of variation of the point load test is a little close to UCS while those of impact strength and natural density are far. Both UCS and point load have relatively high values of coefficient of variation, though the variability of their results is still within acceptable limits for most engineering purposes.

Theoretical considerations given in the paper shows that penetration rates of percussive drills are directly proportional to blow energy, blow frequency, energy transfer rate and inversely proportional to hole diameter and specific energy values. However, specific energy is not a fundamental intrinsic rock property and operational parameters like blow energy controls the numerical values of specific energy. It is concluded that for a given power of drilling, specific energy is a direct function of rock parameters and may be formulated as given in equation (1). There are some models in percussive or rotary drilling, assuming that thrust force for unit length of advance is a product of compressive strength and tool projectile area. These two realities explain the highly statistical relations between penetration rates and elastic modulus values.

From the rock properties adopted in this study, UCS exhibited the strongest correlation with penetration rate, followed by impact strength index and natural density while point load strength showed weak correlations.

XII. CONCLUSIONS

The mechanical properties of four different rock types were determined and correlated by using correlation coefficient and regression analyses. The equation of the best-fit line, and the correlation coefficient were determined for each regression. Among the four rock properties correlated in terms of drillability (penetration rate) of percussive or rotary drilling rig, the uniaxial compressive strength, the impact strength index and natural density are found to be the dominant properties affecting penetration rate of rotary drills.

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Hand Gesture Recognition System

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Abstract- Gestures are a major form of human communication. Hence gestures can be found to be an appealing way to interact with computers, since they are already a natural part of how people communicate. A primary goal of gesture recognition is to create a system which can identify specific human gestures and use them to convey information for controlling devices and by implementing real time gesture recognition a user can control a computer by doing a specific gesture in front of a video camera which is linked to the computer.

A primary goal of this gesture recognition research is to create a system which can identify specific human gestures for the control of traffic signals and mouse.

This project also covers various issues like what are gestures, their classification, their role in implementing a gesture recognition system for traffic and mouse control, system architecture concepts for implementing a gesture recognition system, major issues involved in implementing a gesture recognition system, and future scope of gesture recognition system. For implementation of this system real-time hand tracking and extraction algorithm, and feature extraction are used.

Index Terms- Gesture Recognition, Hidden Markov Model, Hand Tracking, Feature Extraction, Background Subtraction.

I. INTRODUCTION

A primary goal of gesture recognition research is to create a system which can identify specific human gestures and use them to convey information or for device control. To understand what gestures are, an examination is required of how other researchers view gestures. How do sociologists and biologists define and view "gesture"? How is information encoded in gestures? Also how humans use gestures to communicate with and command other people are explored. Furthermore, engineering researchers have designed a variety of "gesture" recognition systems.

People frequently use gestures to communicate. They are used for pointing to a person, to get his attention & convey information about spatial and temporal characteristics. Gesturing does not simply embellish spoken language, but it is part of the language generation process.

II. NATURE OF THE PROBLEM

When traffic is very heavy, an automated traffic light system is not efficient to control traffic causing traffic jam. Also sometimes at the peak hours traffic at some roads is very heavy while at the opposite end it is less. But the time for each signal is

same and that causes some of the crossroads to be jammed while some of them are empty.

Another problem is about mouse. Physically handicapped people can find it difficult to handle mouse. Also while travelling it might be inconvenient to use the mouse.

2.1 Previous Systems

There are many systems for regulating the traffic given as following:

The author Zhang Yuye et.al. [1] System use AT89C51 and CAN BUS controller which leads to complicated design and cost of the system more because of CAN BUS controller. Also in this case power requirement will be more in case of AT89C51.

The author Manoj Kanta Mainali et.al.[2] proposed a genetic algorithm approach to estimate the traffic volume in road sections without the traffic information of road sections. This method estimates the unknown traffic volume using only the known traffic volumes.

The author Cai Bai-gen et.al.[3] designed a vehicle detection system based on magneto-resistive sensor is composed by wireless traffic information collection nodes which are set on two sides of road to detect vehicle signal. The magneto-resistive sensor is expensive and maintenance cost of the system will be more if the system fails.

2.2 Proposed System and purpose of the system

To solve the problems, a system can be used called Gesture Recognition System. A primary goal of this gesture recognition is to create a system which can identify specific human gestures and use them to convey information to control traffic signals as per traffic controller's wish and also for controlling the mouse.

Two methods are considered suitable for gesture recognition. The first one is to use vision sensors like cameras to acquire images, which are analyzed to recognize the gestures. The second one is to place inertial sensor on the traffic police hand and extract the motion characters. The most advantage of the vision method is that it can recognize gestures without adding any extra hindrance to the traffic controller. Also sensors are inconvenient for use while travelling.

Also non-gesture recognition systems increase the cost and unnecessary hardware's while this sensorless system is less costly and also efficient to use.

So the purpose of this system is to control the traffic signals and mouse using hand gestures without using sensors at lower cost and with ease.

III. WORKING

During implementation one thing was clear that a system is going to be developed which can capture a hand gesture performed by the user in front of web Cam, this captured image

is then processed to identify the valid gesture through specific algorithm & execute the corresponding operation. The overall implementation of process is described as follows:

3.1 Human Generated Gesture

In the first step of implementation user will show one gesture. The gesture should be constant for some period of time, which is necessary for dynamic processing. These gestures should be already defined as valid gesture for processing.

3.2 Web Camera

The purpose of Web camera is to capture the human generated hand gesture and store its image in memory. The package called Java Media Framework is used for storing image in memory and again calling the same program after particular interval.



Fig 1 Interaction among the components

3.3 Image Processing Algorithm

This carries the major portion of implementation. First the captured image is preprocessed by techniques like real-time hand tracking and extraction algorithm, feature extraction, hidden markov model(hmm) training and gesture recognition.

3.4 Event Handling

Once the gesture is identified the appropriate command for it will be executed. This includes controlling mouse, performing its various applications like selecting, dragging and pasting any folder from one place to another, both left and right clicks and scrolling. This also includes controlling all traffic signals through different gestures for each signal.

IV. IMPLEMENTATION AND SYSTEM DESCRIPTION

4.1 Hand tracking and handshape extraction

Here, a real-time hand tracking method is developed. This method is robust and reliable in complex background. For tracking the moving hand and then for extracting the hand shape fast and accurately, the trade-off between the computation complexity and robustness need to be considered.

4.1.1 Feature extraction

To find the movement information, the input gesture is assumed to be non-stationary or moving. When objects move in the spatial-time space, an image sequence is generated, motion detector is able to track the moving objects by examining the local gray-level changes. Let $F_i(x,y)$ be the i th frame of the sequence and $D_i(x,y)$ be the difference image between the i th and the $(i+1)$ th frame defined as:

$$D_i(x,y) = T_i\{|F_i(x,y)-F_{i+1}(x,y)|\} \quad (1)$$

where T_i is a thresholding function, $F_i(x,y)$ and $D_i(x,y)$ are all 160×120 images, and $D_i(x,y)$ is binary image defined as follows:

$$D_i(x,y) = \begin{cases} 1, & |F_i(x,y) - F_{i+1}(x,y)| \geq \text{threshold} \\ 0, & \text{otherwise.} \end{cases} \quad (2)$$

(1)Thresholding- Having extracted the moving object region, the thresholding on the frame difference (i.e. Eq. (2)) can be applied for the extraction of the possible moving region in complex background. Conventional thresholding methods, such as Ostu thresholding are not suitable for the case of detecting motion difference. Instead, a simple thresholding technique is used to extract moving regions. The threshold for motion detection is determined as $t_M=0.2\mu$; where μ is the average luminous of captured image $F_i(x,y)$:

(2) Skin color detection- Skin can be easily detected by using the color information. First, we use the constraint, i.e. $R < G < B$, to find the skin color regions which may include a wide range of colors, such as pink, red, orange, and brown colors. So, we will find many regions other than the skin regions. However, those non-skin regions which satisfy our constraint will be excluded due to there is no motion information, e.g. orange color region will not be misidentified as the hand region. Second, some sample colors from the hand region may be obtained. To find the skin regions, we compare the colors in the regions with the prestored sample colors. If they are similar, then the region must be skin region..

(3) Edge detection- Edge detection is applied to separate the arm region from the hand region. There are fewer edges on the arm region than on the palm region. A simple edge detection technique (e.g. Kirsch edge operator) to obtain different direction edges is used, and then the absolute maximum value of each pixel is chosen to form the edge image of i th frame as $E_i(x,y)$:

(4) Combination of motion, skin color, and edge- The hand gestures information consists of skin color, movement and edge feature. We use the logic 'AND' to combine these three types of information, that is:

$$C_i(x,y) = D_i(x,y) \wedge S_i(x,y) \wedge E_i(x,y) \quad (3)$$

where $D_i(x,y)$, $S_i(x,y)$ and $E_i(x,y)$ indicate the movement, skin color and edge images. The combined region is shown in

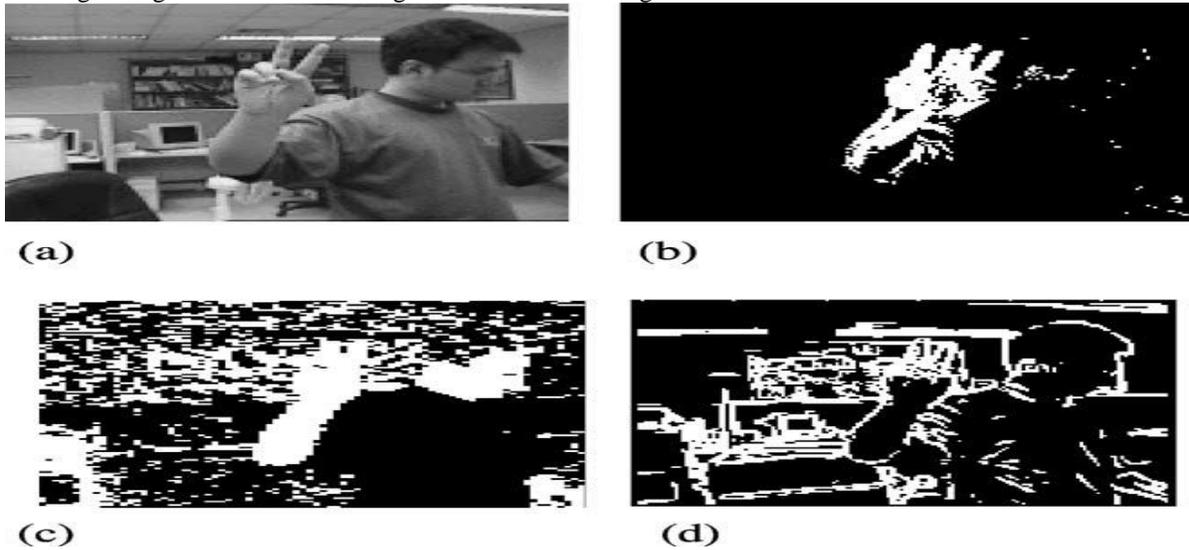


Fig. 2. The hand gesture information. (a) Original image $F_i(x, y)$, (b) motion region $D_i S(x, y)$, (c) skin color region $S_i(x, y)$, (d) edge region $E_i(x, y)$:

Fig. 3 shows the combined region $C_i(x,y)$: The combined image consists of a large region in the palm area and some small regions in the arm area.



Fig. 3. The combined region $C_i(x, y)$:

(5) Region identification.- A simple method for region identification is to label each region with a unique integer number which is called the labeling process. After labeling, the largest integer label indicates the number of regions in the image.

After the labeling process, the small regions can be treated as noise and then be removed. Fig. 4(a) shows that the labeling results and Fig. 4(b) shows the center position $p_c(i)$ of the hand region.

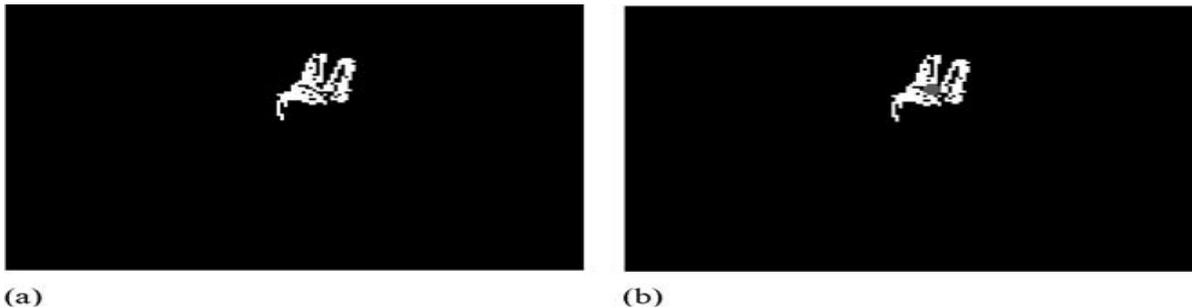


Fig. 4. (a) The labeling results $L_i(x, y)$; (b) the correct center position.

4.1.2 Robustness and low complexity

Only motion and color information is not sufficient, and also hand-shape is not always the largest labeled region. If there are other skin-color objects moving rapidly, the tracking process may fail. We need to take advantage of the motion smoothness constraint for trajectory justification, and use background subtraction to find the foreground object, and finally we can identify the hand region.

(1). Background subtraction- A simple background subtraction technique is used to obtain the hand gesture shape. We Fig. 5 shows the foreground region.

To update our background model, we adapt our background model by using current frame F_i and foreground region FG_i : We have generated two different types of foreground regions, one is $FG1_i = FG_i$; which is used to obtain the hand gesture region; and the other is $FG2_i$, which is applied for background updating

process. $FG1_i$ has a compact shape while $FG2_i$ is generated for background updating.. The background update equation is:

$$BG_{i+1} = (1-w)BG_i + wF_i \quad (4)$$

Fig. 5 shows the flow diagram of our hand gesture tracking system and Fig. 6 shows the results of hand gesture region extraction process.

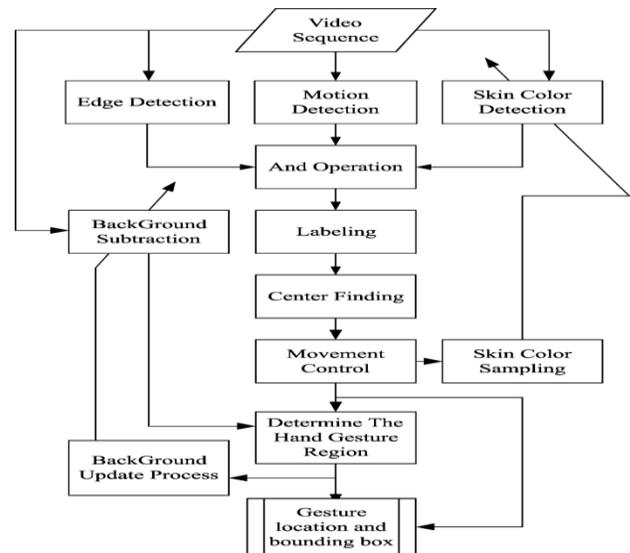


Fig. 5. The flow diagram of hand gesture tracking system.



(a) current frame. (b) foreground. (c) hand region

Fig. 6. Foreground region combining skin color and hand gesture position.

V. APPLICATIONS AND FUTURE ENHANCEMENT

5.1 Applications

This hand gesture recognition system is very vast in day-to-day technical solutions. Its main applications are

1. For controlling the traffic signals as per the wish of traffic controller to reduce the problem of traffic jam at peak hours.
2. To control the mouse so that physically handicapped people can use it and also it mouse will not be inefficient to use while travelling.

5.2 Future Enhancement

1. By integrating our system with voice recognition system we can embed it in ROBOTS.
2. We are also able to handle dynamic image processing and event handling accordingly.

VI. CONCLUSION

In this paper we have presented a method to recognize the unknown input gestures by using hand tracking and extraction method. We apply this system to recognize the single gesture. In the experiments, we assume stationary background so that our system will have smaller search region for tracking.

Using this model we have developed an application where we can control mouse with the finger using it on web cam. Also

we have developed an application controlling traffic signals using hand gestures.

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Design Rectangular Microstrip Patch Antenna for IEEE 802.15.3a (WPAN) with MB-OFDM Ultra Wide Band Communication System

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Abstract— A rectangular microstrip patch antenna was designed on three layer substrate for ultra wide band (UWB) wireless communications system. The proposed UWB antenna simply consists of a rectangular patch with microstrip line feeding and on three layer substrate. Where used substrate permittivity is 2.2, 2.33 and 4.4, that is placed on the ground plane. The proposed rectangular microstrip patch antenna was simulated which covers the range of 6.9 to 8.7 GHz. Here study the graph of return loss, input impedance, 2D radiation pattern and 3D radiation pattern.

Index Terms— Ultra wide band (UWB) MB-OFDM and microstrip patch antenna.

INTRODUCTION

The antenna is a vital part of any wireless communication system. It is used for coupling between the guided medium and free-space. For wireless communication system highly used microstrip patch antenna because this antenna has following advantages like small size, light weight, low cost low power consumption. But a major drawback of this antenna is the narrow bandwidth. The many methods to used increasing this bandwidth, like changing feeding technique, increasing substrate height, changing the substrate permittivity, multi layer substrate and changing the patch shaped [1]. Here the antenna substrate divided three layers and each layer having different permittivity. Then get wide bandwidth microstrip patch antenna that is used for IEEE 802.15.3a (WPAN), MB-OFDM UWB communication system.

UWB is a very important technology for future short-range wireless communications. This UWB communication has some advantages, its gives high data rates and immunity to multipath interference. Also this system design very simple, low cost and low power consumption. Because here used very short-duration baseband pulse which is able to propagate without modulation. So here dose not required up converter, down converter and amplifier.

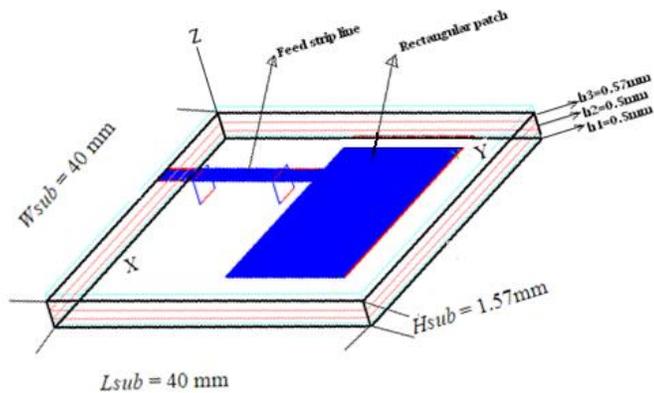
UWB was approved by the Federal Communications Commission (FCC) in March 2002 on the allocation of a 3.1–10.6 GHz spectrum for unlicensed use of UWB devices [2].

A more recent approach to UWB is a multiband system where the total UWB spectrum from 3.1 GHz to 10.6 GHz total 7.5 GHz divided into several smaller bands. Each of these bands has a bandwidth greater than 500MHz, to comply with the FCC definition of UWB.

In 2004, Batra *et al.* from Texas Instrument proposed the MB-OFDM scheme for IEEE802.15.3a [3], [4]. The proposed scheme divides the available UWB spectrum into 14 non-overlapping subbands of 528 MHz bandwidth for each channel. Here the first four band groups have three subbands each, and the last band group has two subbands as shown in Figure 1. The advantage of the grouping is that the transmitter and receiver can process a smaller bandwidth signal while taking advantages from frequency hopping. Here the combination of three subbands 8, 9 and 10 make additional band group 6. So for IEEE 802.15.3a (WPAN) with MB-OFDM ultra wide band communication system required designed antenna having bandwidth more than 1.5 GHz.

ANTENNA SPECIFICATION

The proposed geometry of the rectangular microstrip patch antenna is shown in Figure 2. This



(Scale size taken X=1 Y=1 and Z=2)

Figure 2: Geometry of the proposed antenna.

substrate $L_{sub} = 40$ mm, width of substrate $W_{sub} = 40$ mm, height of substrate $H_{sub} = 1.57$ mm, length of patch $L_p = 15$ mm, width of patch $W_p = 30$ mm, and height of patch $H_p = 0.5$ mm. Where is used Microstrip line feeding technique. The feed strip length is $L_f = 20$ mm, feed strip width is $W_f = 2.5$ mm and feed strip height is $H_f = 0.5$ mm.

Special feature is where we divided total substrate height $H_{sub} = 1.57$ mm in to three parts $h_1 = 0.5$ mm, $h_2 = 0.5$ mm and $h_3 = 0.57$ mm respectively. The permittivity of those three substrates is 2.2, 2.33 and 4.4 correspondingly.

RESULTS AND DISCUSSION

The proposed antenna was analyzed and optimized with the help of Conformal Finite Difference Time Domain Maxwell's Equations Solver (CFDTD) software. The simulation results of the return loss (in dB) for this proposed antenna are shown in figure 3. It indicates that the proposed antenna cover 6.9 to 8.7 GHz, that is some portion of UWB. Here the maximum return loss is found -20dB at 7.8 GHz. The bandwidth obtained from this graph is 1.8 GHz. Here are obtained the lower cutoff frequency 6.9 GHz, upper cutoff frequency 8.7 GHz and the efficiency 23%.

This proposed antenna can cover additional band group 6 or subbands 8, 9 and 10 are shown in figure 1

The frequency verses input impedance graph is shown in the figure 4. Here we are obtained input impedance around 50Ω in the operating area.

The radiation patterns of the proposed antenna are also investigated. The 2D radiation patterns of proposed antenna for five different frequencies are shown in the figure 5. This figure shows that the simulated total field radiation patterns at 7GHz, 7.5GHz, 8GHz, 8.5GHz and 9GHz. The proposed antenna is characterized by a quasi-omnidirectional pattern in the combination of E-plane and H-plane. It can be seen that the excellent wide band radiation patterns are observed.

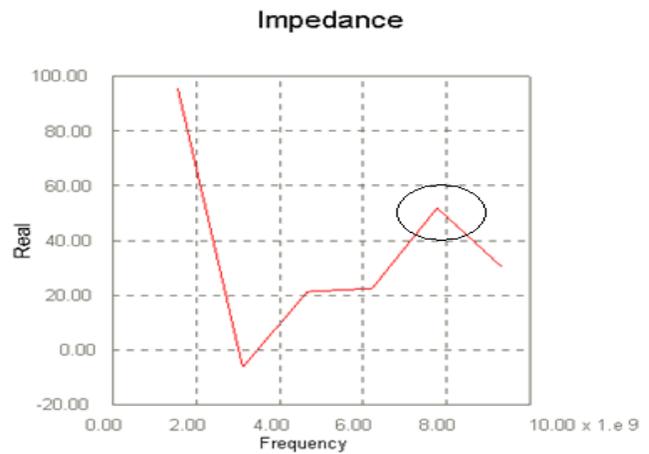


Figure 4: Graph of input impedance for proposed antenna. The graph shows the real part of the input impedance versus frequency. The impedance is around 50Ω in the operating area (6.9 GHz to 8.7 GHz).

is consists by a rectangular patch with finite-size ground plane. The rectangular patch is situated top of the substrate and the ground plane is situated bottom of the substrate. The antenna has the following parameters length of

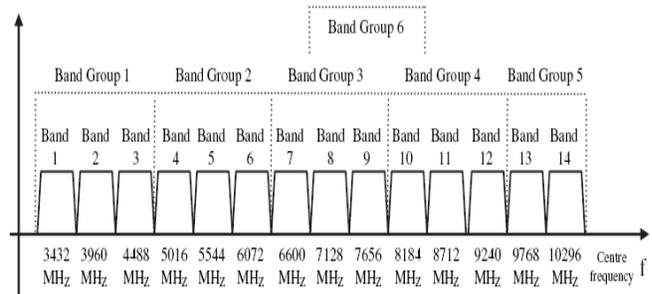
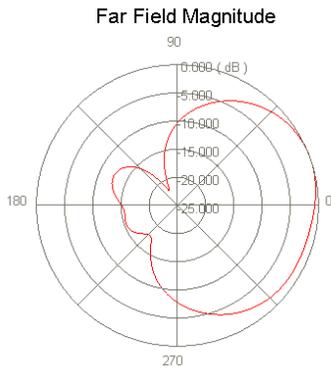
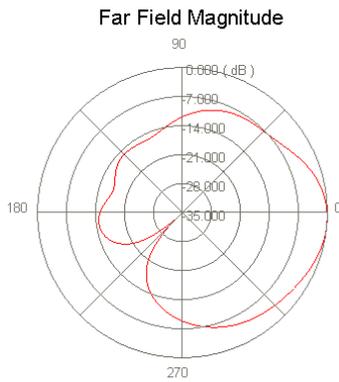


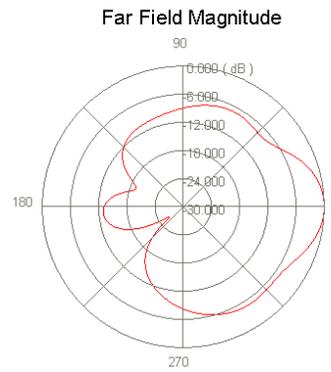
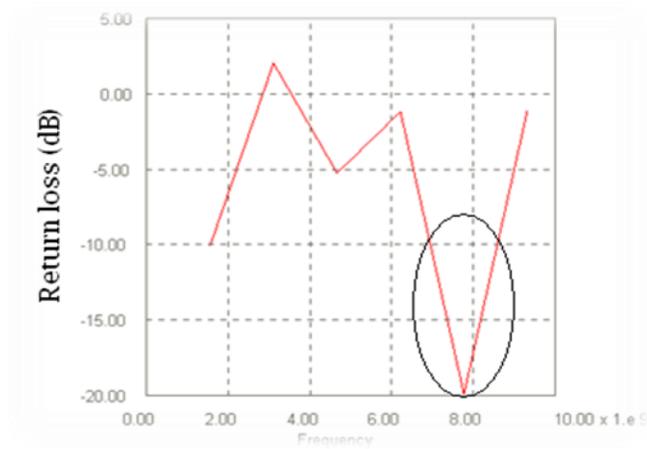
Figure 1: Division of the UWB spectrum from 3.1 to 10.6 GHz into band groups containing subbands of 528 MHz in MB-OFDM systems [5].



(a)

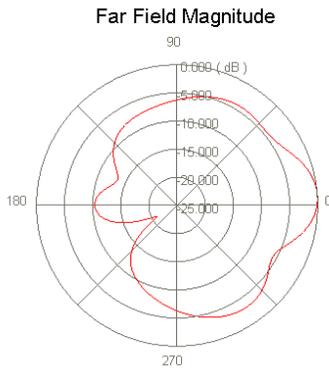


(b)

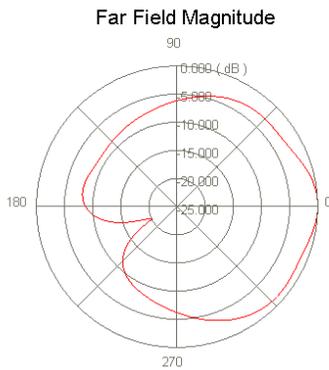


(c)

Figure 3: Graph of return loss for the proposed



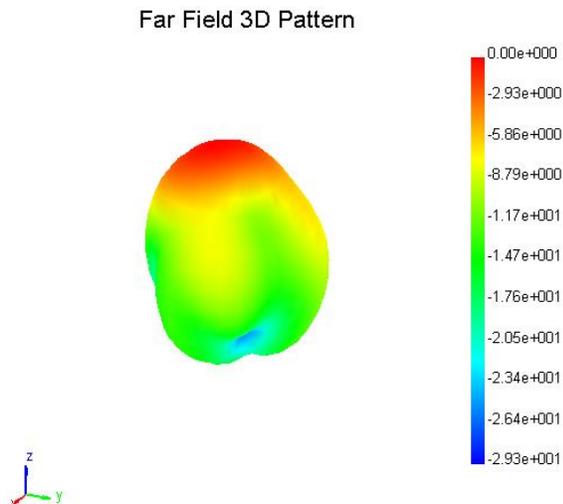
(d)



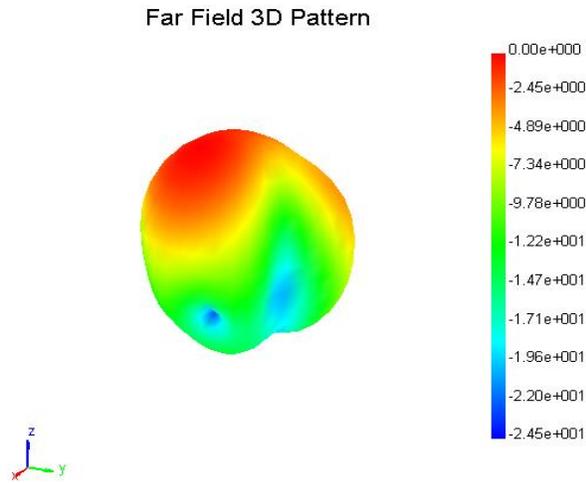
(e)

Figure 5: Shows 2D radiation pattern of the proposed antenna at (a) 7GHz (b) 7.5GHz (c) 8GHz (d) 8.5GHz (e) 9GHz.

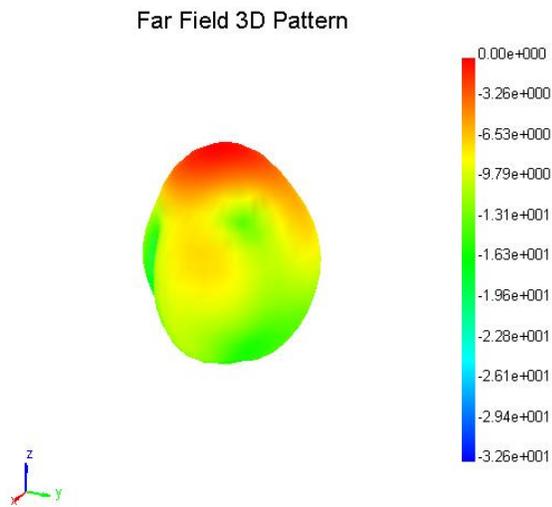
The Figure 6 shows the 3D radiation pattern for the 7GHz, 7.5GHz, 8GHz, 8.5GHz and 9GHz frequencies. These patterns present the relationship between the co-polarization that is desired component and cross-polarization that is undesired component. Moreover it gives a clear picture as to the nature of polarization of the fields propagating through the UWB microstrip patch antenna.



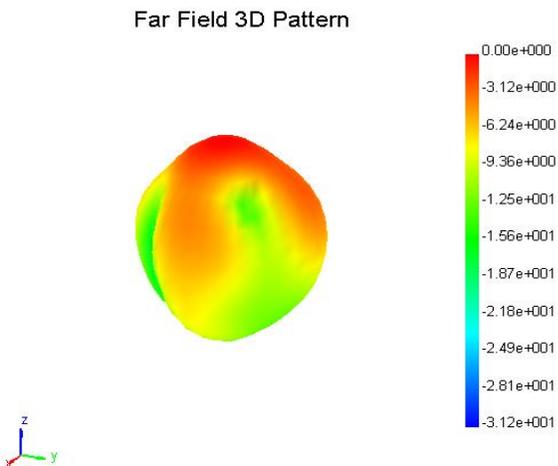
(a)



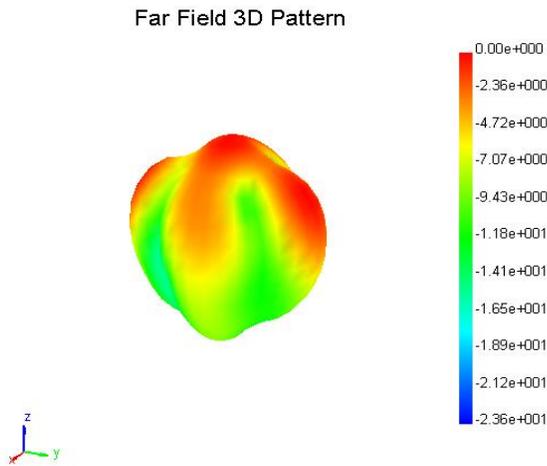
(b)



(c)



(d)



(e)

Figure 6: Shows 3D radiation pattern of the proposed antenna at (a) 7GHz (b) 7.5GHz (c) 8GHz (d) 8.5GHz (e) 9GHz.

Conclusion

In this paper gives the concept of designed UWB rectangular microstrip patch antenna using three layers substrate and each layers having different permittivity. Various parameters of this antenna designed are optimized and the optimized design is prototyped. The various simulation results like return loss characteristics, input impedance, 2D radiation pattern and 3D radiation pattern of the proposed antenna are indicate that this antenna suitable for IEEE 802.15.3a (WPAN), MB-OFDM UWB communication system. This simulation results also be help full for next generation indoor wireless communication and remote sensing systems designed.

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Preliminary Phytochemical Screening of *Calotropis gigantea* Leaf

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Abstract- Herbals plants are effective source of traditional and modern medicines, useful for primary health care. Plants are richest source of bioactive organic chemicals on earth. The active metabolites like Phytochemicals from the medicinal plants were under exploration for the development of novel and biodegradable effective drugs as an alternative to the ineffective contemporary medicine. *Calotropis gigantea* has great medicinal importance to treat fever, indigestion, cold, cough, cardio tonic, asthma, scabies etc. Phytochemical properties of leaf of *Calotropis gigantea* obtained from methanol and petroleum ether extracts were investigated. The results suggest that the Phytochemical properties of the leaf for using various ailments.

Index Terms- *Calotropis gigantea*, Phytochemical

I. INTRODUCTION

A medicinal plant is any plant which, in one or more of its organ, contains substance that can be used for therapeutic purpose or which is a precursor for synthesis of useful drugs. The plants possess therapeutic properties or exert Beneficial Pharmacological effects on the animal body are generally designated as "Medicinal Plants". It has now been established that the plants which naturally synthesis and accumulate some secondary metabolites, like alkaloids, glycosides, tannins, volatiles oils and contain minerals and vitamins, possess medicinal properties. Plants contain useful constituents, including vitamins, minerals, proteins, carbohydrates, essential oils, tannins, alkaloids, bitters and flavonoids. Each part of the plant contains distinct properties and is used for different purposes (Rahman et al, 2013).

The Asclepiadaceae is a large family comprising of 175-180 genera and 2200 species distributed mainly in the tropical and subtropical region of the world, represented in India by 23 genera and 41 species. Several genera of this family contain biologically active compounds. Among these are the species of *Asclepias* and *Calotropis* which contain cardenolides toxic to vertebrates. Certain insects notably monarch butterflies and milk weed bugs sequester these cardenolides from *Asclepias* host plants and apparently utilize them for defense against vertebrate predators (Shirsat et al, 2013). *Calotropis* is a small genus of about 6 species of shrubs or small trees, distributed in tropical and subtropical Africa, Asia and central and South America, represented in India by only two species namely *Calotropis procera* and *Calotropis gigantea* Linn. Both the species closely resemble each other in structure and find similar uses (Kirtikar et al, 1994). *Calotropis gigantea* Linn is a glabrous or hoary, laticiferous shrubs or small trees, about 3-4 m tall commonly

known as the swallow-wort or milkweed. Its stems are erect, up to 20 cm in diameter. The leaves are broadly elliptical to oblong-obovate in shape, with the size of 9-20 cm x 6-12.5 cm but subsessile. The cymes are 5-12.5 cm in diameter. The inflorescence stalk is between 5-12 cm long, the stalk of an individual flower is 2.5-4 cm long. Sepal lobes are broadly eggshaped with a size of 4-6 mm x 2-3 mm. Petal is 2.5-4 cm in diameter. It has clusters of waxy flowers that are either white or lavender in colour. Each flower consists of five pointed petals and a small, elegant "crown" rising from the centre, which holds the stamens. The plant has oval, light green leaves and milky stem (Carol et al, 2012). The flower of the plant contains the cardiac glycosides, calotropin, uscharin, calotoxin, calactin, uscharidin and gigantol. The flower also contains the protease calotropin DI and DII and calotropin FI and FII (Dhivya et al, 2013).

It is estimated that only one percent of 2,65,000 flowering plants on earth have been studied exhaustively for their chemical composition and potential against important medicinal value (Cox et al, 1994). Here an attempt has been made to investigate the chemical present in the leaf for curing various diseases.

II. MATERIAL AND METHODS

1. Plant material:

Calotropis gigantea leaf collected in January 2013 from Rewa. The plant material was identified at the field using standard keys and descriptions.

2. Method of extraction:

Solvent – Petroleum ether, Methanol

Method – Maceration

Procedure:

Leaf powder was weighed 500 gm and kept in a container in contact with pet ether for seven days, with vigorous shaking at regular interval. Material was filtered a first with muslin cloth and then with filter paper. Filtrate was collected and dried in water bath till no further reduction in mass of extract was observed. Dried extract was weighed and packed in air tight container and the marc was air dried then kept in a container in contact with methanol for seven days, with vigorous shaking at regular interval. Material was filtered a first with muslin cloth and then with filter paper. Filtrate was collected and dried in water bath till no further reduction in mass of extract was observed. Dried extract was weighed and packed in air tight container.

3. Phytochemical Screening-

Phytochemical Screening was carried out using standard methods to detect the bioactive compounds like alkaloids, tannins, phenols, steroids, flavonoids, saponins (Trease et al, 1989).

III. RESULT AND DISCUSSION

TABLE 1: Phytochemical Screening of *Calotropis procera* Leaf

Phyto chemicals	Petroleum ether extract	Methanol extract
Alkaloids	-	+
Carbohydrates	-	-
Reducing Sugar's	-	-
Flavonoids	-	+
Glycoside	+	-
Tannin and Phenolic	-	+
Saponin	+	-
Protein and amino acid	-	-
Fats and oils	+	-
Triterpenoids and steroids	-	+

(+) indicates presence

(-) indicate absence

A Preliminary study has reported the leaves extracts contains large number of bioactive secondary molecules like alkaloids, tannins, saponin, flavonoids, glycoside (Table-1). The presence of these components in this species is an indication that it may have some medicinal potential. The leaves of *Calotropis gigantea* are used traditionally for treatment of abdominal tumors, boils, syphilis, leprosy, skin diseases, piles, insect bites and elephantiasis (Habib et al, 2009). Kumar 2013 have studied the Phytochemical assessment on various extracts of *Calotropis gigantea* (L.) R.Br. through GC- MS.

Different parts of the plant have immense potential to cure various diseases and disorders . It is used in various polyherbal preparations. *Calotropis* is used alone and sometimes with other plants to cure variety of human and animals ailments (Kumar et al, 2013). This research has been proved as a path to many scientists who may implement the result of the present work in developing drugs from *Calotropis gigantea* against human pathogenic microorganisms.

IV. CONCLUSION

The plant *Calotropis gigantea* is a plant with many curative principles and other economic values with the following features: a perennial shrub, distributed up to 900m elevation in the tropical and subtropical areas, growing in all types of soils and environmental conditions, requiring no cultivation practices. The investigation concluded that the stronger extraction capacity of methanol and petroleum ether could have produced number of active constituents which are responsible for many biological activities. So that it might be utilized for the development of traditional medicines and further investigation is in need to elute novel active compounds from the medicinal plants which may create a new way to treat many incurable diseases.

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Analysis of Research in Consumer Behavior of Automobile Passenger Car Customer

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Abstract- The automobile industry today is the most lucrative industry. Due to increase in disposable income in both rural and urban sector and availability of easy finance are the main drivers of high volume car segments. Further competition is heating up with host of new players coming in and global brands like Porsche, Bentley, and Ferrari all set to venture in Indian market. This research will be helpful for the existing and new entrant car manufacturing companies in India to find out the customer expectations and their market offerings. Indian Automobile car business is influenced by the presence of many national and multinational manufacturers. This paper presents analysis of research in the area of Consumer Behavior of Automobile Car Customer. Proper understanding of consumer buying behavior will help the marketer to succeed in the market. All segments in Indian Car industry were studied and found that buyer has different priority of behaviors in each segment, where as main driver for car purchase is disposable income. Value for money, safety and driving comforts top the rank in terms of customer requirement; where as perceived quality by customers mainly depends on brand image.

For this research, methodology adopted was to study the research papers in the area of Passenger Car segment, study the purchase decision process and its interaction with behavior parameters across all the segments of car such as small & Hatch Back segment, Sedan class segment, SUV & MUV segment and Luxury Car segment. The objective of this study is the identification of factors influencing customer's preferences for particular segment of cars. This paper also attempts to consolidate findings & suggestions to overcome present scenario of stagnancy in sales and cultivate future demand for automobile car market.

Index Terms- Consumer behavior, Small Car, Sedan class segment, Customer Perception, Luxury Car segment, Automotive Industry

I. INTRODUCTION

India being the second most populated country in the world and the growth rate of Indian economy is also high as compared to developed countries, which attracts the presence of huge demand in the Automobile Small Car Industry. India is becoming emerging market for worldwide auto giants. India is on growth path and has lowest passenger vehicle penetration, ref. Figure 1.

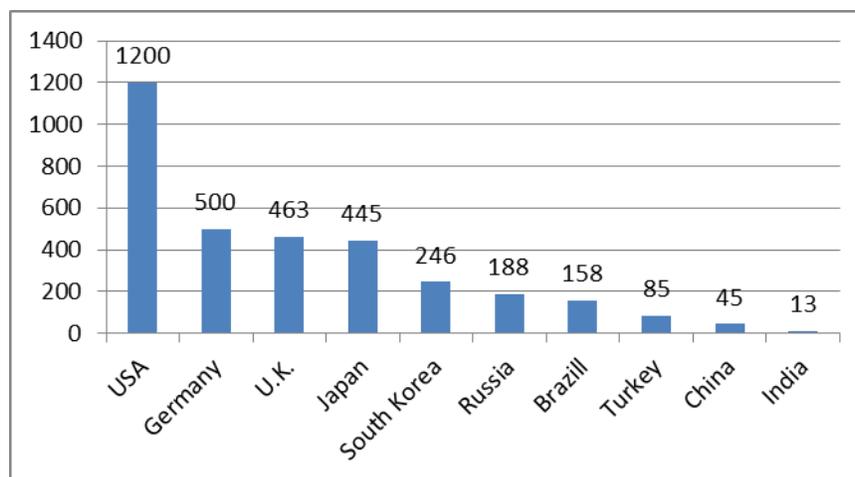


Figure 1: Passenger Vehicle Penetration
Source: ICRA, Mar 2011

There are various reasons for the growth of the Indian automobile market such as -

1. The people have more disposable income as economy is growing.
2. Increase in the need of mobility due to urbanization and leisure travel.
3. Car Finance options available from Financial Institutes at reasonable rate of interest.
4. Availability of service centers and spare parts in near vicinity.

5. Improvement in highway infrastructure.

For most of the people, purchasing a car is the second most important and expensive decision, next to purchase of a house; for the automotive manufacturers, first-time car buyers give them the opportunity to create positive brand image which definitely could be reflected in next coming years because consumers could make repeat car purchasing. The concept of “buying behavior” is of prime importance in marketing and has evolved over the years. It is very important to understand consumer buying behavior as it plays a vital role while purchasing products. Day to day human wants are growing, expectation is growing. Car Models are no exception to this behavior. Consumer behavior is fairly complex as Car Purchase implies a high level of social and psychological involvement. Consumer buying behavior is a blend of Economic, technological, political, cultural, demographic and natural factors as well as Customer’s own characteristics which is reflected by his attitude, motivation, perception, personality, knowledge and lifestyle.

This lead to constant modifications of Car Models and its features in terms of their size, capacity, styling etc. and today we see a new model coming into the market practically every quarter. Market has become very competitive and has become very ‘important place’ to study the behavior of consumers and also provide useful insights what a consumer requires in a product in a constant dynamic environment. Consumer behavior also differs for same Car under below conditions-

1. New Car launch in market
2. Car is in market for 1-2 years
3. Car is in the market for more than 4 years
4. Purchase of second hand Car

It is only through research that a company will be able to study the buying behavior of consumers. With better understanding of customer’s perceptions, companies can determine the actions required to meet the customer’s need. They can identify their own strengths and weaknesses, where they stand in comparison to their competitors, chart out the future progress path and improvement. The passenger car market changed very rapidly due to the fierce competition and advance technology, therefore, it requires the automotive manufactures to understand the consumer’s preference on time and take fast actions to reflect market changes quickly. So it would be very interesting to know consumer’s preference in today’s fast-changing passenger car market and how is the customer’s buying process.

II. STATEMENT OF THE PROBLEM

Due to the emergence of globalization and liberalization there is a stiff completion among the Automobile industries which are focusing attention in capturing the Indian markets an automobile are no more considered as luxury once, now occupies a part of day-to-day life and has become a necessity. Customers have now changed their attitude that yesterday’s luxuries are today’s necessities. To be a successful marketer it is absolutely essential to study the perceptions of the prospective buyers and track their drivers of those perceptions.

III. REVIEW OF LITERATURE

Manish Kumar Srivastava, A.K. Tiwari [1], studies the consumer behavior for A3 segment vehicles such as Honda City and SX4 in a particular region Jaipur. Data collected from 100 respondents 50 each from Honda City and Maruti SX4. Respondents were considered from various backgrounds like Gender, Occupation, Income class. Also customer purchase parameters considered for study are Price, Safety, Comfort, Power & Pickup, Mileage, Max Speed, Styling, After Sales Service, Brand Name and Spare Parts Cost. Based on above parameters and analysis made in this it revealed that, while purchasing A3 segment car Customer give much importance to Safty, Brand Name and seating and driving comfort. Also word of mouth publicity and advertisements in car magazines are more effective communication medium for promotion of Cars.

Prasanna Mohan Raj [2], studied the factors influencing customers brand preference of the economy segment SUV’s and MUV’s. Data collection was made through direct interaction and customer intercept survey using questionnaire. Descriptive analysis was used to transform data into understand format and factor analysis was used for identification of factors influencing customer preference. In light of study findings, the preference of a given brand can be explained in terms of six factors namely Product reliability, monetary factor, trendy appeal, frequency of non-price promotions offered, trustworthiness and customer feeling or association towards brand. There is need for marketers to take these factors into consideration when crafting product innovations in the SUV segment of Automobile market.

Nikhil Monga, Bhuvender Chaudhary, Saurabh Tripathi [3], this research attempts to answer some of the questions regarding brand personality of selected cars in India by conducting the market research. This personality sketching will help in knowing what a customer (or a potential customer) thinks about a given brand of car and what are the possible factors guiding a possible purchase. Similarly, the idea of measuring the customer satisfaction will serve the same purpose of determining the customer perception. Thus, by measuring the willingness of exciting users of a car to recommend it to others will help the car manufacturers to chock out the entire customer Buying Behavior. The study shows that brand perception is something which starts building up before a car is purchased and goes on with its use and is reflected in the recommendations. The customer makes to his acquaintances for the same car. Also it is seen that the customer might not be using the car still he holds the perceptions about it. Brand personality of a car is

enforced by the sellers in the mindsets of the customers and customers reacts to it by forming their perception about the car and this reflects in the overall brand image of the car. So brand image and brand personality complement each other and the brand perception aids the building of brand images. As per the study findings, dealers play a very important role in building up the brand perceptions of the cars.

Samin Rezvani, Goodarz Javadian Dehkordi, Muhammad Sabbir Rahman [4], this paper reviews the country of origin and different variables that influence consumer purchase intention, also highlight the relationship of variables and customer purchase intention. Study demonstrate that people care about which country products come from and where they are made and consider these factors when evaluating the quality of product. Stereotypes of country and the preferences of customers, influence the purpose intention. Political system, culture and the economy of the country can be a cause of sensitivity to people. There are many factors that have an impact on consumer purchase intention. Research and methodologies have shown that even when consumers can evaluate all the intrinsic product characteristics by expressing the product, the effect of extrinsic cues has more influence on consumer product evaluation. Country of origin is one of the extrinsic cues; in addition, there is no doubt that country of origin has considerable influence on the purchase intention process.

K.Vidyavathi [5], the study throws light on various aspects that the manufactures should concentrate on to attract the prospective buyers. The demand for the small Automobile segment is increasing because of the growing number of nuclear families as well as parking problems. Hence the manufactures should find out the needs, wants, tastes and preferences of consumers in order to design the products. Also fuel economy and driving comfort are the most important parameters followed by availability of spares and their price.

Balakrishnan Menon, Jagathy Raj V.P.[6], study findings shows that due to price difference in Gasoline and Diesel, about one third of the car owners were having diesel vehicles. The research results showed that about one seventh of car for the city drive for family usage, while using the second car for office and business usage. Foreign brand cars show clear preference in the Kerala car market. Also it was observed that in the information gathering and consumer purchase initiation stage, TV commercials on car models and brands, search on internet website of the manufacturer and visit to dealers / distributors were the prime sources where customers gathers information on car models.

Ramita Verma, Shubhkamana Rathore [8], studied the luxury car segment of India. Researches and studies have revealed that the luxury car market is growing at a steady speed of 25% per annum with more and more numbers of luxury cars entering Indian car market. Luxury cars are preferred by HNI (High Net worth Individuals). HNI wants to differentiate themselves from crowd for various reasons. Change in attitude of the customer accounts for the sudden acceleration in the Luxury car Market in India, as the emphasis has been shifted from price consideration and affordability to design, quality and pleasure. Study also throws light on market drivers of luxury cars like

- Political-government taxation, business sentiments, import-export policies, government stability.
- Demographical factors like Consumer trends, Income growth, spending power.
- Customer requirements such as status symbol, indulgence, technological factors.
- Socio cultural factors such as Lifestyle and preferences of people which impact their choice of types of automobiles. Social norms that impact the decision to own and use automobiles versus other means of transport.

IV. METHODOLOGY

However all the studies made in Consumer buying behavior of Automotive Car for various segments from small up to luxury car provides the knowhow for Car Manufacturer but fails to provide scientific approach for factors of Consumer behavior and their drivers. In this paper an attempt is made to-

- 4.1. Study & Classify Car market based on segments like – small car, Hatch back, Sedan Class, premium Sedan, SUV & MUV and Luxury Car.
- 4.2. Study on purchase decision process.
- 4.3. Broad classification of behaviors and their effect on various car segments.

4.1 India Car Market Segments:

The Indian car industry is now the seventh largest car manufacturer in the world. The overall Indian automobile industry has grown at a high rate of around 15% (CAGR 2007-12) on the back of a healthy macro-economic growth and overall positive sentiments. As India is a developing economy with relatively low GDP per capita, the Indian automobile industry is dominated by 2-Wheelers which comprise of ~77% of the overall market. Passenger vehicles are the 2nd largest segment of the industry with a share of ~15% and commercial and three wheelers comprise of 8% of the market share. In India Passenger Vehicle market is further classified into three segments –

- Passenger Cars (PC)
- Utility Vehicles (UV)
- Vans (Mini Vans - not included in study)

Passenger Cars sub-segment dominates the passenger vehicle market in India with ~70% share. The next biggest sub-segment is the Utility Vehicles segment which has a share of ~20%, followed by Mini Vans.

Passenger Car Segment:

The Passenger Car (PC) segment is categorized into 9 sub-segments primarily based on overall vehicle length as shown in figure 2.

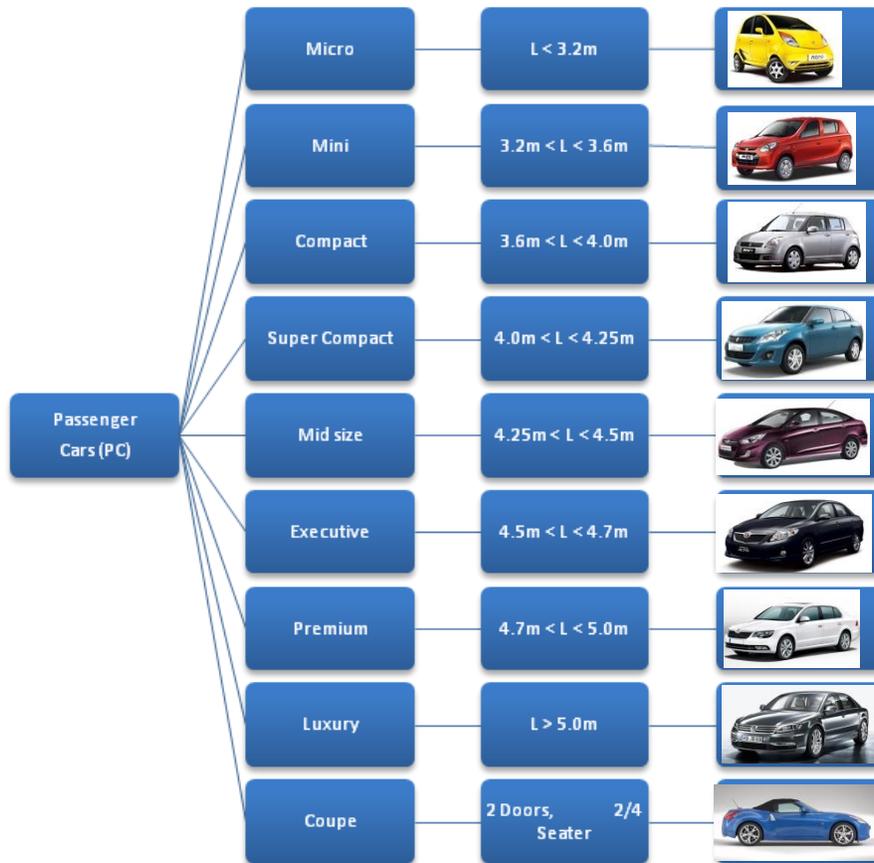


Figure 2: Indian Passenger Car Segment

Source: Society of Indian Automotive Manufacturers (SIAM new Classification)

Out of the 9 sub-segments, 3 sub-segments viz. Compact, Mini and Super Compact comprise ~90% of the overall passenger car (PC) market. The largest sub-segment is Compact followed by Mini. The demand for small cars is the highest because of relatively lower per-capita incomes and high traffic density in urban areas. Compact and Mini sub-segments primarily comprise of hatchbacks which are preferred due to relatively low price, high fuel efficiency and easy maneuverability. Suzuki is the leading player in the passenger car segment with a dominant share of ~45%, distantly followed by Hyundai with a share of ~20%.

4.2 Purchase Decision Process:

In order to assess the importance of the environmental awareness in the car purchase decision, it is necessary to get an insight into the process of purchasing itself. The consumer's decision to purchase a product is a multi staged process. Kotler (2006) identifies that the consumer will go through five stages. Vehicle purchase behavior fairly complex, as car purchase implies a high level of social and / or psychological involvement. Therefore, the consumer will transit each stage of purchase decision making process as presented in figure-3.

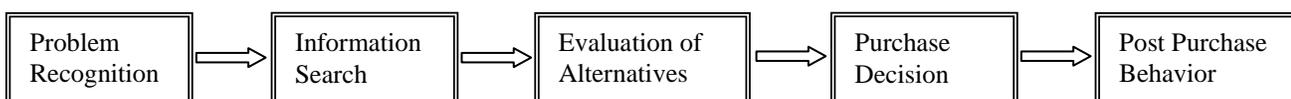


Figure 3: The Purchase Decision Making Process (Source – Kotler)

- a) **Problem Recognition:** In this information processing model, the consumer buying process begins when the buyer recognizes a problem or need. When we found out a difference between the actual state and a desired state, a problem is recognized. When we find a problem, we usually try to solve the problem. We, in other words, recognize the need to solve the problem. But how?
- b) **Information Search:** When a consumer discovers a problem, he/she is likely to search for more information. Through gathering information, the consumer learns more about some brands that compete in the market and their features and characteristics.
- c) **Evaluation and Selection of Alternatives:** How does the consumer process competitive brand information and evaluate the value of the brands? Unfortunately there is no single, simple evaluation process applied by all consumers or by one consumer in all buying situations. One dominant view, however, is to see the evaluation process as being cognitively driven and rational. Under this view, a consumer is trying to solve the problem and ultimately satisfying his/her need. In other words, he/she will look for problem-solving benefits from the product. The consumer, then, looks for products with a certain set of attributes that deliver the benefits. Thus, the consumer sees each product as a bundle of attributes with different levels of ability of delivering the problem solving benefits to satisfy his/her need. The distinctions among the need, benefits, and attributes are very important. One useful way to organize the relationships among the three is a hierarchical one.
- d) **Decision Implementation:** To actually implement the purchase decision, however, a consumer needs to select both specific items (brands) and specific outlets (where to buy) to resolve the problems. There are, in fact, three ways these decisions can be made: 1) simultaneously; 2) item first, outlet second; or 3) outlet first, item second. In many situations, consumers engage in a simultaneous selection process of stores and brands. Once the brand and outlet have been decided, the consumer moves on to the transaction (“buying”).
- e) **Post-purchase Evaluation:** Post-purchase evaluation processes are directly influenced by the type of preceding decision-making process. Directly relevant here is the level of purchase involvement of the consumer. Purchase involvement is often referred to as “the level of concern for or interest in the purchase” situation, and it determines how extensively the consumer searches information in making a purchase decision. Although purchase involvement is viewed as a continuum (from low to high), it is useful to consider two extreme cases here. Suppose one buys a certain brand of product as a matter of habit (habitual purchase). For him/her, buying a is a very low purchase involvement situation, and he/she is not likely to search and evaluate product information extensively. In such a case, the consumer would simply purchase, consume and/or dispose of the product with very limited post-purchase evaluation and generally maintain a high level of repeat purchase motivation.

4.3 Broad Classification of consumer behavior:

Consumer behavior is a blend of Economic, Technological, Political, Cultural, Demographic and natural factors as well as his own characteristics which is reflected by his attitude, motivation, perception, personality, knowledge and lifestyle. Marketers can rationalize their existence only when they are able to understand consumer behavior. From study it was envisaged to classify these behavior parameters under broad categories – Economic, Social, Demographic, Geographic, Psychological, Product & Technology. Various customer behavior parameters can be clubbed as given in below Table 1.

TABLE I
Broad Classification of Consumer Behavior

Social Parameters	Economical Parameters	Political Parameters	Product & Technology Parameters	Demographic Parameters	Geographic Parameters	Psychographic Parameters
Road Infrastructure	Monthly Income	Government budget planning	Fuel Efficiency	Source of Income	Region	Activities
Road Safety	Disposable Income	Government Policies – such as vehicle Life (Max 15 years)	Exteriors – Overall look, color, shape, feature lines, head lamp & tail lamp	Gender	Size / Area	Interests
Lifestyle	Loan Interest	Government taxation & duty structure	Interiors such as Plush interiors, exotic colors, legroom, seat design, arm rest, music system	Height, Weight, Complexion	Population density	Opinions
Competition in the market (options available)	Easy Loan Availability		Vehicle performance- Pickup, mileage, acceleration, max speed, torque, Engine Capacity	Education	Climate	Attitudes

	Age		Driving Comfort	Occupation	Off-Road, On-road	Values
	Fuel Price		Product Quality – Durability, reliability,	Age		
	Product Price					

Based on the analysis and as shown in figure 4, it is evident that, increase in disposable income seems to be the most important reason for buying a car. This trend is reflected in the growth of the per capita income and consequently the growth of the Indian automobile Industry. Similarly, the growing family needs like working partners, increasing family size, status, etc. add to the motives of buying a car. At the same time affordability of car price is the most important factors for purchasing a particular segment car.

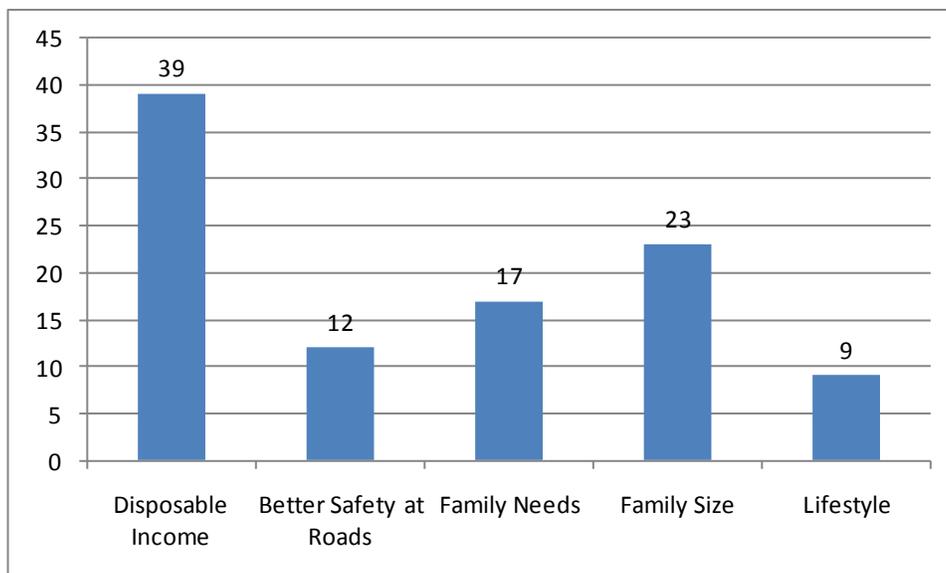


Figure 4: Drivers for Buying a Car.

Customer Behaviors of various Passenger Car segments are as described below:

Micro Car Segment (Length < 3.2 Meter) - It is the lowest cost segment with only one Tata Nano Car. Despite being the cheapest car, had serious initial quality issues which damaged its brand image and customer faith. As a product this segment will get preference for city drive over congested road conditions wherein safety on road will be better than two wheeler.

Mini Car Segment (3.2 < L < 3.6 Meter) - It is the 2nd largest sub-segment in the passenger car market is highly consolidated with 2~3 significant players having 7 products. The reason for presence of relatively few players in this segment is because of highly price sensitive consumer. To enable competitive low cost manufacturing, high volumes and thus a large network is required. Maruti Suzuki and Hyundai are the dominant players in the sub-segment as they were the early entrants and have low cost manufacturing competence. Consumers of these segment cars are 1st time car buyers with product price as deciding factor. M800, Suzuki Alto, Zen, Wagon R, Santro, Spark are the cars from this segment.

Compact car segment (3.6 < L < 4.0 Meter) – It is the most crowded segment with about 13 players and 20 product offerings as it is the largest sub-segment (~45% share) in passenger cars. Yet, the ability to manufacture low cost good quality cars has resulted in the market being relatively consolidated with 2 players – Maruti Suzuki and Hyundai – dominating the market with a combined share of over 50%. While Maruti Suzuki, Hyundai and Tata were the early entrants in the sub-segment, Honda has already overtaken Tata to become the 3rd largest player in the sub-segment. This has happened because of high brand equity and competitive pricing of Honda products. Swift, i10, Jazz, Vista, Beat, Figo, Polo, Micra, Liva, Vibe, Punto, Pulse etc. are the cars from this segment.

Super Compact (4.0 < L < 4.25 Meter) and Mid size Segment (4.25 < L < 4.5 Meter):

“Super Compact”, the largest sub-segment, is comprised of sedans and marks the beginning of 3 box cars in the segment. This sub-segment is dominated by Maruti Suzuki with cheapest sedan Swift Dzire developed on its most successful compact hatchback car platform. The dominance of Maruti Suzuki ends at this sub-segment in the hierarchy.

“Mid-size” is the 4th largest sub-segment in passenger car market. It is also the relative more fragmented sub-segment with 11 players offering 14 products. Most players in this segment either offer a product which shares platform with it offering in the Compact sub-

segment or a global product. Hyundai is the dominant player in this segment due to competitively priced feature-rich product with option of both gasoline and diesel powered engines.

The choice of car in this segment is driven by income. In this segment customers first preference is for safety, driving & Seating comfort and brand, second most preference is for after sales service, price, power and pickup, mileage whereas maximum speed is of lowest preference. Also this segment requires value for money, best features, and customer friendly vehicle.

Executive (4.5 < L < 4.7 Meter) and Premium class segment (4.7 < L < 5.0 Meter) : Due to low sub-segment volumes, most players offer global products which are manufactured using CKDs (Completely Knocked Down kits). Hyundai and Toyota are the leading players in the segment. This is an executive and premium class segment customer; most of these owners tend to have purchased a car previously, the customer has potentially developed an attitude towards car. In this segment attitude becomes an evaluating judgment based on prior or present experience. These customers preference is for attractive styling, brand image, best product performance in terms of acceleration, max speed and higher horse power. These customers seek to show personality, leadership from brand of car as most of the customers prefer this segment for business purpose. Car price, fuel efficiency, spares cost are of secondary importance. Car interiors styling such as IP shape & finish, all customer touch points, seat, steering door handle etc. are of high importance. Also exterior styling, overall look, paint finish and safety & driving comforts are of prime importance.

Luxury and Coupe sub-segment: These are relatively marginal segments with less than 1% combined share of the passenger car market. Almost all products in these sub-segments are offered through the CBU route (Completely Built Unit) due to miniscule volumes which neither justify neither localization nor local assembly. This segment is of high end luxury cars such as Audi, BMW, Jaguar, Mercedes, Lexus, Porsche, Rolls-Royce, as these brands are considered luxury. Average car price of this segment cars is more than Rs. 35 Lakh and is growing at an average rate of 20% Y-O-Y. According to the Report of World Wealth by Capgemini and Merrill Lynch Wealth Management, most countries in the world have increased their HNI (High Net-worth Individuals) count. While, India has more than doubled it – maximum compared to any other country in the world. HNI customers are celebrities, business leaders, and corporate honchos, politicians from urban and rural India. Their attitudes are “Got it? Flaunt it”, “Power Show”, “Image and Uniqueness”. High social status from perceived brand image is the common driving factor of this segment. Superior functionality, best in class quality and high end & customized features are the most preferred parameters of this segment.

SUV & MUV Segment: This segment is actually utility segment further segmented into UV1, UV2, UV3 and UV4 based on length and price parameter. Economy segment UV's are Sumo, Safari, Aarya, Bolero, Scorpio, XUV500, Xylo, Innova. Whereas high end UV market is very limited and dominated by Fortuner, Prado, Landcruiser, Pajero etc. Customers of economy and high end SUV shows difference mainly in terms of affordability of vehicle price, spares cost and serviceability. Whereas the main driving factor of this segment is fun, road presence, egocentric relationship. In India economy class SUV's found to be of better choice in rural area as product image is rugged, muscular, rough& tough, worthiness to bad roads. High end SUV customers are celebrities, business tycoons, politicians those want to use car as indulgence. These segment cars are having high perceived safety by customers because of looks, overall structure and exterior styling of vehicle.

Suggestions and Findings:

1. After 68 years of freedom India is still dependent on gulf countries for its fuel requirement. Uncertainty and dependability for fuel on other countries restricts the growth of Indian car industry. Also currency used globally for fuel pricing is USD and any fluctuation in currency has direct impact on fuel cost which dampens the car sale. Manufacturers need to focus on alternative fuels to propel the future of car industry.
2. India is developing nation with low per capita income. Instability in Indian economy will have an immediate effect on car sale, as car is perceived as life style product. Though car industry cannot be insulated from the effects of slow down and recession in economy, industry needs to be more insync with growth and development of India.
3. Growth in disposable income and higher education will remain the main drivers of future advance cars. Car manufacturers need to track these trends and align their product strategies.
4. Indian government should come forward, reduce the taxation and revise the duty structure for green vehicles those are - less pollutant, high fuel efficient, safe drive vehicles. Government should ensure better quality cars to be available on roads and implement ELV (End of Life) norms. Cars plying on roads for more than 10 years should be re-inspected for their proper functioning and roadworthiness. Road infrastructure needs to be further updated to support technological requirements such as ABS, Air Bag, and Vehicle tracking through GPS, RFID and electric car by proving road side electrical charging.
5. Car dealers and manufacturers show very good hospitality to customers during their visits to the place of showroom before and immediately after their purchase. But after some time they face a problem with their dealers regarding after sales service. Therefore, it is suggested that the services rendered r to be rendered should be properly explained, friendly approach and reliability in service to be further improved. Cost of spare parts to be charged reasonably.
6. The increase in number of women car owners, using the car for their office, personnel and family work, thus becoming an influential group, calls for separate attention of car manufacturers and marketers to focus their strategic efforts in this direction.

7. During initial search, TV commercials on car models and brands, search on internet websites of the manufacturer and visit to dealers / distributors were the prime sources where customers gathered information on car models and brands, marketers might want to focus on these factors to catch the attention of the intending future customers.
8. When it came to decision based on preferences, personal needs, the top slot parameters were - the need of the business firm, peer pressure from other family members owning a car and upgraded the model to suit personal ambition. Marketers need to understand these requirements and focus their marketing strategies towards these customer requirements.
9. In the category of personal preference on comfort factors, dominant factors were comfort in driving, value for money and interior design, which topped the requirement list. Car segment wise analysis also brought out these specific comfort requirements across all the brands. Manufacturers might look into these aspects to their car design, so to attract car passengers, prone to decide the models based on these criteria.

CONCLUSION

Consumer behavior consists of all human behavior that goes in making before and post purchase decisions. One can succeed in the competitive market only after understanding the complex consumer behavior. An understanding of the consumer enables a marketer to take marketing decisions which are compatible with its consumer needs. From study there are various major class of consumer behavior determinants and expectations, namely socioeconomic, psychological, political, geographical, demographic and Product & Technology. Further classification of human behaviors under main categories will enable car manufacturer to align their strategies in concurrence to customer behavior. While purchasing mini segment car though customer is highly cost conscious but this segment is also upgrading their requirements and due to rise in disposable income, with in segment migration is observed, Customer is more inclined to purchase Suzuki Swift, 120. For mid size segment customer focus is for safety, driving & seating comfort, brand. Also this segment requires value for money, best features and customer friendly vehicles. In higher segment cars like Executive and Premium brand image is main deciding factor which gives assurance of meeting their needs interms of safety, performance and feature requirements. Global brands are highly preferred in Executive and above segments. So car companies should adopt the "Think-Global, Act-Global". Approach in strategy making which involves standardization across the world. Brand global presence is judged by consumers based on availability around the globe with standardized products, brand name, distribution channels and communications. By going global, the company will enjoy an increase in market share, which indicates increase in demand for their products. With that, the company can produce with economies of scale, reduce cost per unit and increase production efficiency resulting in serving customers efficiently and economically. Most importantly, compared to local brands, companies with global brands will be able to penetrate into markets more easily, regardless to high or low status seeking consumers, global brands with proper strategy will enable them to achieve an enhanced global image.

APPENDIX

Nil

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Inhibition of Carbon Steel Corrosion by DTPMP – SPT – Zn²⁺ System

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Abstract- With the objective of developing a new eco-friendly inhibitor formulation for the corrosion of carbon steel on neutral aqueous solution containing 60 ppm Cl⁻. The phosphonic acid {diethylenetriamine penta(methylene phosphonic acid)}(DTPMP) was chosen as the inhibitor, which gives the inhibition efficiency of 93%. Many phosphonic acids are used as good corrosion inhibitors like ATMP, HEDP and DTPMP etc. Among which we have used the DTPMP as a potent corrosion inhibitor for this study. Because it contains number hetero atoms like Oxygen and Nitrogen. The Sodium potassium Tartrate (SPT) which is an environment friendly and used as the first synergist, Zn²⁺ may be second synergist so it may used as a ternary inhibitor system. When DTPMP used alone shows some inhibition efficiency. If we combine with the formulation of 60 ppm Cl⁻, 50 ppm DTPMP, 25 ppm SPT, and 10 ppm Zn²⁺, it gives maximum inhibition efficiency. From FTIR spectra it was observed that the protective film is formed on the metal surface. EIS spectra also confirms the formation of protective film on the metal.

Index Terms- Electrochemical studies, Inhibitors, Phosphonic acid, protective film, SEM, Synergism

I. INTRODUCTION

The inhibitors are used to protect the metals from corrosion. In general for industrial applications large number of inhibitors are used like organic compounds, amines, heterocyclic compounds and phosphonic acids etc^{1,2}. The use of polyphosphates and their derivatives has received considerable attention. These compounds are used as good inhibitors in absence of toxic nature. The very low concentrations of inhibitors (ppm) level are used to protect the large water supply system. These type of inhibitors are used in cooling water treatment^{3,4}. They are good complexing agents; they also used as corrosion inhibitors in concrete and anti-freezing coolants⁵. The phosphonic acid alone gives some inhibition efficiency. But some co-inhibitors and additives are also to be used to enhance the percentage efficiency of inhibition⁶. Further the inhibition efficiency was improved by using bivalent cations like Zn²⁺^{7,8}. The formation of protective film can be analyzed by FT-IR and EIS analysis. The suitable mechanism was proposed for the corrosion inhibition.

II. EXPERIMENTAL

2.1 Preparation of Carbon Steel Specimen

Carbon steel specimen were taken from the single sheet of Carbon Steel with the composition (C – 0.188% , S – 0.016 % , Si – 0.346 % , Mn – 1.15% , P – 0.036 % , Cr – 0.557% , Mo – 0.225 % , Ni – 0.0847% , Al – 0.0417% , Cu- 0.0342% , Ti- 0.0149% , V – 0.0313% , Pb- 0.0006% and rest Iron 97.27%) were used for weight-loss study, specimen of the size 1.0 cm x 0.2 cm x 4.0 cm were cut, polished to mirror finish by table grinding wheels, degreased with Trichloroethylene. The environment chosen for the study is 60 ppm Cl⁻.

2.2 Preparation of the solutions:

Sodium salt of Phosphonic acid (DTPMP)

0.5 g of DTPMP was dissolved in water by using triple distilled water and made up to 100 mL in a standard measuring flask. 1 mL of this solution was diluted to 100 mL to get 50 ppm of DTPMP⁹

Sodium potassium tartrate solution

0.5 g of SPT was dissolved in triple distilled water and made it up to 100 mL in a standard measuring flask. 1 mL of this solution was diluted to 100 mL to get 50 ppm of Sodium potassium tartrate.

Zinc Sulphate solution

Exactly 0.44 g of Zinc sulphate was dissolved in triple-distilled water and makes it up to 1 liter. A hundred – fold dilution yields exactly 10 ppm of Zn²⁺ ion concentration.

2.3 Weight – Loss Measurement

The Carbon Steel specimens were taken from the single sheet of Carbon Steel in Triplicate was immersed in the environment of 60 ppm Cl⁻ with and without inhibitor. The metal specimens were weighed accurately with the Denver Analytical Balance – TP 214 DE. After the immersion of metal specimen in 60 ppm Cl⁻, the metal were taken out, rinsed in running tap water and kept in desiccators. The corrosion products were cleaned with Clark's solution. The Corrosion rate and Inhibition Efficiency were calculated using the following relations from the difference of weight before and after the immersion.

$$I.E = X 100 \frac{W_o - W_i}{W_o} \%$$

W_o = Weight – loss in absence of an inhibitor, W_i = Weight – loss in presence of an inhibitor.

$$CR = \frac{534 \times \text{Loss in Weight (mg)}}{D (\text{g/cm}^3) \times A (\text{in}^2) \times T (\text{Hrs})} \text{ (mpy)}$$

D – Density of the metal specimen (g/cm³), A – Area of the specimen in in², T – Immersion time in Hours

2.4 Electrochemical Impedance Spectra

The electrochemical measurements presented in this study were performed using the Electrochemical Workstation (Model No. CHI760, CH Instruments, USA). Prior to the electrochemical measurements, the metal specimens were prepared according to the above described procedure. The real part (Z') and the imaginary part (Z'') of the cell impedance were measured. The Charge transfer resistance (Rct) and Double layer Capacitance (Cdl) value were measured using the following relation.

$$Cdl = \frac{1}{2 \pi f Rct}$$

2.5 Synergism Parameter

The inhibitors used alone which gives some inhibition efficiency. If it combines with other inhibitors, the inhibition efficiency is getting improved. This change in inhibition efficiency explained as the synergism^{10,11}. The synergism parameter can be calculated by using the equation indicated the synergistic effect existing between the inhibitors. SI value is found to be greater than one suggesting that the synergistic effect between the inhibitors.

$$S_1 = |1 - I_{1+2} / 1 - I_{1+2}'|$$

I₁ – Inhibition efficiency of the inhibitor 1, I₂ – Inhibition efficiency of the inhibitor 2,
I' ₁₊₂ – Combined Inhibition efficiency of inhibitor 1 and 2.

2.6 Surface Examination studies

The Carbon Steel specimens were immersed in blank as well as inhibitor solutions, for a period of three days. After the immersion period is over, the specimens were taken out and dried. The nature of the thin film formed on the surface of the metal specimens was analyzed by various surface analysis techniques.

2.6.1 FT-IR spectra

Shimadzu IR affinity – 1 KBr dei set method spectrophotometer the film formed on the Carbon steel specimen were taken out, dried and the film was carefully removed, mixed thoroughly with KBr and made in to pellets and the FT-IR spectra were recorded.

III. RESULTS AND DISCUSSION

3.1 Evaluation of synergistic effect of DTPMP with SPT-Zn²⁺ system

The environment chosen for this study was 60 ppm Cl⁻. Where, it can found that the inhibition efficiency (IE) and Corrosion Rate (CR) of DTPMP, SPT in inhibiting the corrosion of carbon steel immersed for a period of three days in the absence and the presence of Zn²⁺ is given in Table 1. It was observed from the data that SPT alone shows some IE and Zn²⁺ alone has some IE. In the absence of SPT, the rate of transport of Zn²⁺ from the bulk of the solution towards the metal surface is slower than the rate of the corrosion process on the metal surface. Hence the lower corrosion inhibition takes place in the absence of SPT, Similar observation has already been reported^{12,13}. When SPT is combined with Zn²⁺ ions, it is found that the IE increases. For example, 25 ppm SPT has only 8 % IE and 10 ppm Zn²⁺ has only 24 % interestingly, their combination shows 45 % IE. This suggests a synergistic effect between the binary inhibitor formulation SPT and Zn²⁺ ions; SPT is able to transport Zn²⁺ towards the metal surface. The role of DTPMP in the ternary inhibitor formulation, experiments was conducted with DTPMP alone, SPT and with Zn²⁺, DTPMP with various concentrations. The highest inhibition efficiency with these systems is shown in the Table 1. 50 ppm DTPMP, 25 ppm SPT and 10 ppm Zn²⁺ gives maximum inhibition efficiency, which will not obtained even at higher concentrations. This confirms the synergistic effect is offered between the inhibitors. Thus, it may be concluded that Zn²⁺ is the primary synergist and DTPMP is the secondary synergist and both play a significant synergistic role in inhibiting corrosion¹⁴. The Maximum inhibition efficiency is offered at which the lower concentrations, Hence, it was confirmed the synergistic behavior between the inhibitors. Concentration plays an important role in this system, as the concentration increases the inhibition efficiency also increases up to which a certain concentration. After that the inhibition efficiency decreases because of the dissolution of inhibitors in water itself. This maximum Inhibition Efficiency is found to identify the synergism.

TABLE. 1. Inhibition Efficiencies (IE) and Corrosion Rate (CR) of carbon steel in 60 ppm Cl⁻, the absence and the presence of inhibitors by weight – loss method

SPT Ppm	Zn ²⁺ ppm	DTPMP Ppm	Corrosion rate (mpy)	IE %
25	0	0	1.62	8
0	10	0	1.34	24
0	0	50	1.36	22
25	10	0	0.96	45
0	10	50	1.03	41
25	10	10	0.44	74
25	10	25	0.30	83
25	10	50	0.11	93
25	10	75	0.33	81
25	10	100	0.37	79

3.2 Synergism Parameter

Each and every inhibitor having its individual inhibition efficiency that may be high or low depends on the group of atoms present in the inhibitor molecule. If more than 1 inhibitors are used for the study, which must be checked whether the synergistic behaviour is offered between the inhibitors or not. In general, if two or more inhibitors are combined that may improve the inhibition efficiency of the system. The values of synergism parameters are shown in Table 2. The values of SI are greater than one, suggesting a synergistic effect.

S_1 approaches 1 when no interaction exists between the inhibitor compounds. When $SI > 1$, this leads to the synergistic effect. In the case of $SI < 1$, the negative interaction of inhibitors prevails. i.e. Increase in corrosion rate taking place¹⁵.
Table 2.

TABLE 2. Synergism parameter of Carbon steel immersed in 60 ppm Cl⁻ in the presence and absence of inhibitor

SPT + Zn ²⁺ (I ₂) IE %	DTPMP (I ₁) IE %	SPT-Zn ²⁺ - DTPMP (I' ₁₊₂) IE %	S ₁
45	15	74	8.43
45	25	83	12.87
45	10	93	4.30
45	22	81	11.55
45	27	79	14.66

3.3 Analysis of FT-IR Spectra

The FT-IR spectrum of pure DTPMP is shown in Fig. 1 b. The P – O stretching frequency appears at 1059 cm⁻¹. The C – N stretching frequency appears at 1116 cm⁻¹¹⁶. P- OH group causes absorption at 3332 cm⁻¹ and P(O) OH group at 3402 cm⁻¹. The absorption band at 1059 cm⁻¹ represents P – O stretching frequency. The absorption band at 1346 cm⁻¹ represent P = O stretching. The absorption band due to the bending of O-P-O appears at 493,545, and 633 cm⁻¹. The bending vibrations (-CH₂ Scissoring) of aliphatic tertiary amine group CH₂-N appears at 1448 cm⁻¹. The weak C-C stretching vibrations appears at 956 748,725 cm⁻¹. Thus DTPMP with molecular formula C₉H₂₈N₃O₁₅P₅ is characterized by FT-IR spectrum. The FT-IR spectrum of Pure Sodium Potassium Tartrate (SPT) is shown in Fig. 1a. The C=O stretching frequency of carbonyl group appears at 1604 cm⁻¹. The FT-IR spectrum of the film (KBr) formed on the surface of carbon steel after immersion in the test solution containing 50 ppm DTPMP, 25 ppm SPT and 10 ppm of Zn²⁺ is shown in the Fig. 1. (c). The C – N stretching frequency shifted from 1116 cm⁻¹ to 1059 cm⁻¹ and P – O stretching frequency shifted from 1059 cm⁻¹ to 1056 cm⁻¹, which suggests that oxygen and nitrogen atom of DTPMP is coordinated with Fe²⁺ on the anodic sites of the metal surface, resulting the formation of Fe²⁺ - DTPMP complex¹⁷⁻¹⁹. The C = O stretching frequency has shifted from 1604 cm⁻¹ to 1614 cm⁻¹. This indicates that SPT has coordinated to the Fe²⁺ on the anodic sites of the metal surface. The peak at 1348 cm⁻¹ is due to Zn (OH)₂ formed on the cathodic sites. Thus FT-IR spectra lead to the conclusion that the protective film consists of Fe²⁺ - SPT and Zn (OH)₂^{20,21}.

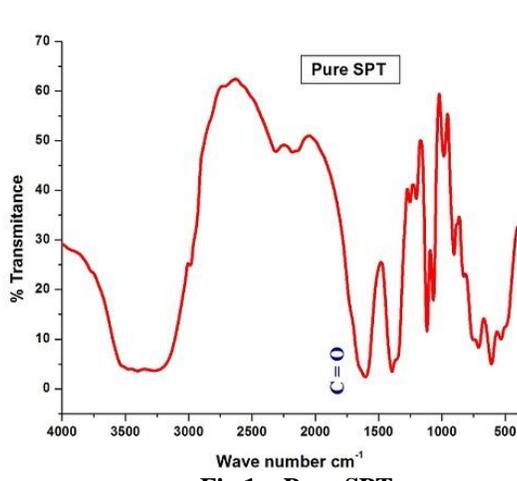


Fig.1 a Pure SPT

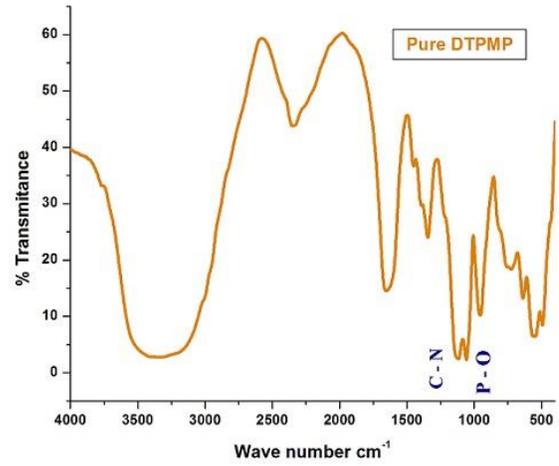


Fig 1. b Pure DTPMP

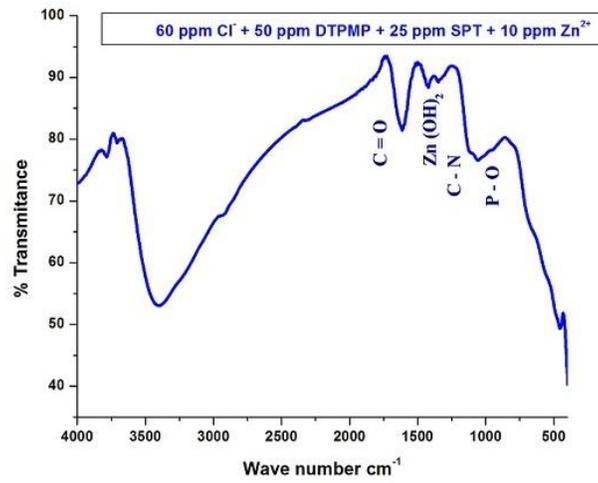


Fig 1. c 60 pp Cl⁻ + 50 ppm DTPMP + 25 ppm SPT + 10 ppm Zn²⁺

3.4 Analysis of Electrochemical Impedance Spectra (EIS)

Table 3. The EIS parameters of carbon steel immersed in various test solutions are given in Table 3.

S.No	Cl ⁻ ppm	DTPMP ppm	SPT Ppm	Zn ²⁺ ppm	R _t Ω cm ²	C _{dl} μF / cm ²	IE %
1	60	0	0	0	215	6.22 x 10 ⁻⁶	----
2	60	50	25	10	2711	3.94 x 10 ⁻⁸	92

Fig. 2. Shows the Electrochemical Impedance Spectra

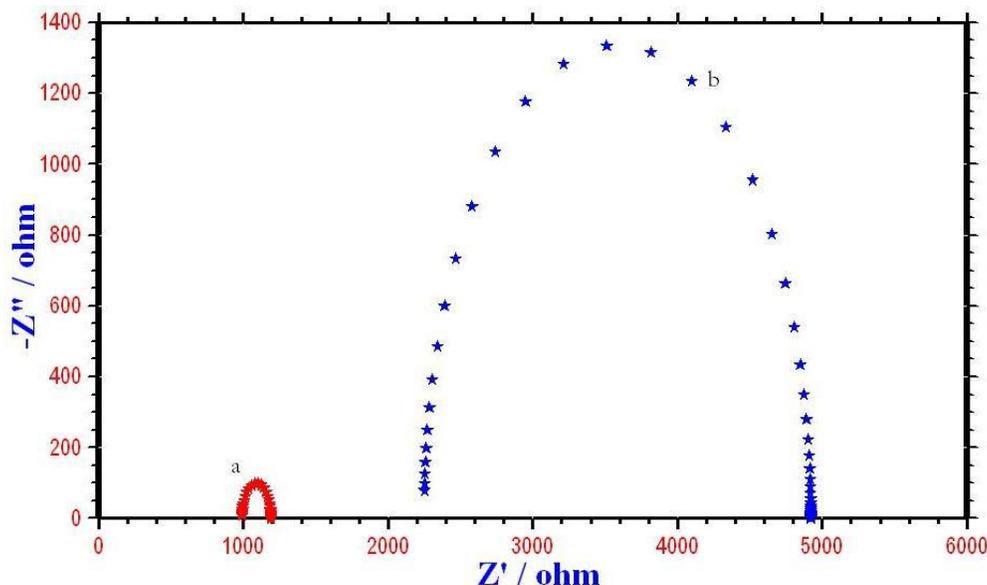


Fig.2 EIS curves of carbon steel immersed in various test solutions.

- a) 60 ppm Cl⁻
- b) 60 ppm Cl⁻ + 50 ppm DTPMP + 25 ppm SPT + 10 ppm Zn²⁺

The Nyquist representations of the impedance behaviour of carbon steel in 60 ppm Cl⁻ with and without inhibitors are given in Table 3. The existence of single semi circle showed the single charge transfer process during dissolution, which is unaffected by the presence of inhibitor. Here, for uninhibited solution the charge transfer resistance is 215 ohm cm², for inhibited solution containing 50 ppm DTPMP, 25 ppm SPT and 10 ppm Zn²⁺ the charge transfer resistance 2711 ohm cm². At the same time the double layer capacitance (C_{dl}) value getting decreases from 6.22 x 10⁻⁶ μF / cm² to 3.94 x 10⁻⁸ μF / cm². It is clear that the addition of inhibitor increases the value of charge transfer resistance (R_{ct}) and decreases the value of C_{dl}. The decreases in C_{dl} attributed to increases in thickness of electronic double layer^{22,23}. In addition to that the formation of protective film was confirmed by increase in R_{ct} value²⁴⁻²⁶. The percentage of efficiency of the inhibitor can be calculated by using following relation.

$$I.E = \frac{R'_{ct} - R_{ct}}{R'_{ct}}$$

R'_{ct} – Charge transfer resistance for inhibited solution
R_{ct} - Charge transfer resistance for uninhibited solution

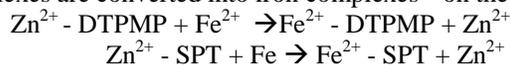
By using the above relation the percentage efficiency of the inhibitor was calculated. This inhibitor formulation gives 92 % inhibition efficiency. Thus the EIS spectral data reveal that a protective film is formed on the metal surface^{27,28}

3.5 Mechanism of Corrosion Inhibition

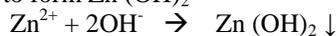
In order to explain the experimental results, the following mechanism was proposed for corrosion inhibition. The formulation consisting of 50 ppm of DTPMP, 25 ppm of SPT and 10 ppm of Zn²⁺ has 93 % Inhibition Efficiency. Polarization study reveals that the formulation functions as anodic inhibitor. Electrochemical Impedance spectra reveal that the protective film is formed on the metal surface. FT-IR spectra show that the protective film consists of Fe²⁺ - DTPMP complex.

When formulation consisting of 60 ppm Cl⁻, 50 ppm DTPMP, 25 ppm SPT and 10 ppm Zn²⁺ is prepared, there will be the formation of DTPMP-Zn²⁺ and SPT- Fe²⁺ complexes in the solution .When Carbon steel is immersed the complexes formed on the solution may diffuse to the metal.

On the Carbon steel the Zn²⁺ complexes are converted into iron complexes²⁹ on the anodic sites.



The released Zn²⁺ ions reacts with OH⁻ ions to form Zn (OH)₂



Thus the protective film consists of Fe²⁺ - DTPMP, Fe²⁺ - SPT and Zn (OH)₂ complexes. Thus Zn(OH)₂ precipitate may take place at cathodic sites thus decreasing the rate of further oxygen reduction.

IV. CONCLUSION

A formulation consisting of DTPMP, SPT and Zn^{2+} can be used as a potent inhibitor to prevent the corrosion of Carbon steel in 60 ppm Cl^- medium. DTPMP plays an excellent synergistic role in the SPT- Zn^{2+} - DTPMP system. The ternary system SPT (25ppm) – Zn^{2+} (10 ppm) – DTPMP (50ppm) is effective and it gives 93 % of Inhibition Efficiency. Significant synergism was obtained by the combined application of SPT- Zn^{2+} - DTPMP. The concentration of Zn^{2+} can be reduced by the addition of SPT. The DTPMP is an eco-friendly and is required very low concentrations. Thus this new inhibitor formulation is environment friendly. The inhibitor formulation acts as anodic inhibitor. In presence of the inhibitor, the charge transfer resistance is significantly increased. Also, the double layer capacitance of surface film reduced markedly. Both SPT and DTPMP form stable complexes with metal ions in the metal surface. The protective film consists of Fe^{2+} - SPT, Fe^{2+} - DTPMP and $Zn(OH)_2$.

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Evaluation of a Novel Method of Real time Computer Assisted Spine Surgery

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Abstract- In this paper the effectiveness of a novel method of computer assisted pedicle screw insertion was studied using testing of hypothesis procedure with a sample size of 48. Pattern recognition based on geometric features of markers on the drill has been performed on real time optical video obtained from orthogonally placed CCD cameras. The study reveals the exactness of the calculated position of the drill using navigation based on CT image of the vertebra and real time optical video of the drill. The significance value is 0.424 at 95% confidence level which indicates good precision with a standard mean error of only 0.00724. The virtual vision method is less hazardous to both patient and the surgeon.

Index Terms- computer assisted spine surgery (CASS); pedicle screw; micro-motor drill; pattern matching; graphical overlay

I. INTRODUCTION

The basic principle in surgery is to restrict the iatrogenic trauma done to a patient to a minimum. Modern surgical technology and technique have shifted this principle into a new dimension. However, the surgical strategy depends on the localization and patho-anatomy of the region or structure which has to be treated (Fig.1).

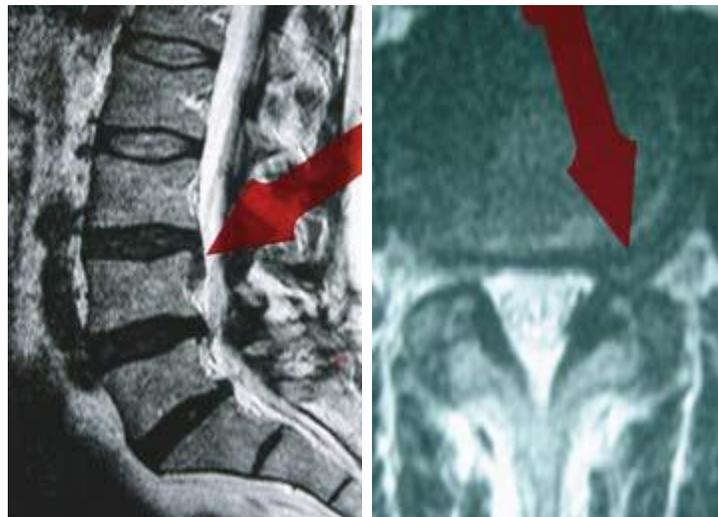


Figure.1 Different localization, size, and configuration of surgical targets

Topography and volumetry of the target must be clear. This information is usually given by different imaging techniques such as MRI, CT, etc. [1]. One of the major advantages lies in the possibility to perform operations through small skin incisions (“keyhole surgery”). This needs meticulous preoperative planning, exact positioning of the patient, and reliable localization of the surgical target area in projection to the entry level on the skin surface, there are some objections which might depend on the surgical training, the acquired surgical philosophy, as well as the age and experience of the individual surgeon[2][3]. This is one of the difficulties which are faced by the surgeon at the beginning of his individual learning curve. Quite often removal of bone becomes necessary [4][5]. Important tools used to enter the spinal canal and to enlarge the spinal canal are high-speed drills which perform quick and precise dissection of bone

structures. High-speed drills guarantee flat smooth surfaces without edges and spurs [6][7][8].

With the advent of precise pre and intra operative imaging means, the development of sophisticated image data visualization, and the accessibility of sub milli metric, real-time tracking of objects in space, surgical navigation systems have been created that aim at enhanced surgical accuracy and ultimately improved clinical outcome [9][10][11][12][13][14]. Numerous studies have shown the superiority of computer-assisted versus conventional instrumentation at different levels of the spine regarding accuracy and thus potential safety [15][16][17][18][19][20][21]. Although pre-operative CT-imaging or registration is not required in fluoroscopy based navigation systems, CT based navigation systems have definite advantage with respect to precise preoperative planning using 3D visualization of patient anatomy [22]. Moreover, x-ray

fluoroscopic technique has definite side effects, due to considerable radiation exposure to the patient and the surgical staff [23]. Also, it cannot be used during the entire screw insertion procedure due to possible spatial conflicts between C-frame, the surgeon and the surgical instruments [24]. Surgical robots are voluminous and occupy too much of the operating room space [24][25]. Registration and immobilization are two key issues in robot assisted surgery [26]. Also, commercial surgical robots are extremely costly. Although these methods claim over 90 percent accuracy, their use is limited to few large research hospitals [24][27]. In this paper, we present the evaluation of a novel method of computer assisted surgery, with low instrumentation cost and high precision using real time video processing and computer graphics.

II. METHODS AND MATERIALS

The method developed is based on real time processing of the video grabbed using the experimental setup, consisting of cadaveric dry human vertebra, phantom model of the vertebra, micro motor drill, Cohu DSP

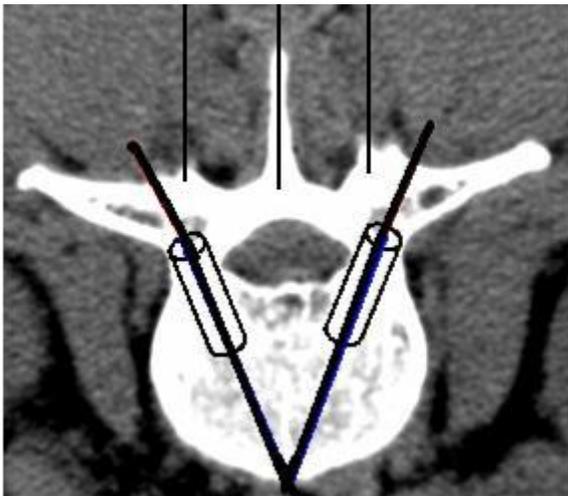


Figure.2 An example of the reference image

3600 cameras, workstation computer with matrox morphis frame grabber, in a created surgical environment. The optimum distance, position, yaw, pitch and roll of the camera are fixed. The camera is placed in a position considering the entire surgical setup, like patient position, lighting and also without causing any obstruction to the surgeon and the entire surgical set up. The workstation computer is arranged with the monitor at a viewable distance.

A. Pre-operative Planning

Pre-operative planning is an important step in the procedure which involves the analysis and measurement of the pedicle parameters viz., width, height and orientation. The preoperative axial CT- image of the spine is used for this purpose. The step involves identification of the vertebrae where the pedicle screw is to be inserted, selection of the appropriate representative image of the vertebra, marking the landmark points on the selected image and computing the parameters of the pedicle like width

and height. The process is done for both the vertebrae used for fusing. 3D doctor software is used for vertebra modelling and measurements [24]. A one inch square marker with a unique geometric shape is designed by considering the shapes of all background objects so as to avoid ambiguity and false detection during object search. The marker is fixed centrally on the body of the micro motor drill. An alternate method of fixing the marker on the drill owl is also used for tracking the pedicle screw. The axis of the drill or drill owl passes through the centroid of the marker. The axial CT image of the candidate vertebra consists of eight or nine slices at a separation of 2 to 3 mm. The fourth or fifth slice is the best representative image [24]. This image provides a clear picture about the pedicle dimensions, from normal anatomy. The image as shown in the figure1 is used to determine the pedicle width, angle and relationship with other anatomical structures. A vertical line is drawn through the middle of the transverse process and equidistant lines from the central lines drawn in each of the spinous process as shown in figure 2, aid in the registration step [24]. Registration of the CT image and the actual vertebra is done by overlaying. Two lines drawn through the centre of the pedicle area from the lamina to the vertebra body as shown in figure1, displays the ideal reference path for pedicle screw insertion [24]. The anatomy of the pedicle shows that, it has a non-uniform cylindrical shape, with varying diameter across its length [24]. Graphical cylinder plotted with diameter, fixed using minimum width of the pedicle area as shown in figure1, aids in visualization of the trajectory and tracking of the pedicle screw during insertion [24].

B. Camera Calibration

Relationship between pixel coordinates and real world coordinates is established using camera calibration. A dot pattern grid is used to map pixel coordinates to real world coordinates, for accurate analysis and measurement of the drill position and orientation. A square grid pattern is used, for detecting perspective distortions due to camera lens. The mapping physically corrects image distortions, viz. non unity aspect ratio distortion, rotation distortion, perspective distortion, pincushion distortion and barrel type distortion. The results are returned in real world units, which automatically compensates for any distortions in the image. A calibration object is used to hold the defined mapping and used to transform pixel coordinates or results to their real world equivalents.

Using the theorem of intersecting lines [28], the computational model of the pinhole camera model is denoted by:

$$\begin{pmatrix} u \\ v \end{pmatrix} = \frac{f}{z} \begin{pmatrix} x \\ y \end{pmatrix} \quad [28]$$

where, x, y, z the coordinates of a scene point in the 3D coordinate system whose origin is the projection center and u, v denote the image coordinates. The parameter f is known as the camera constant; it denotes the distance from the projection center to the image plane.

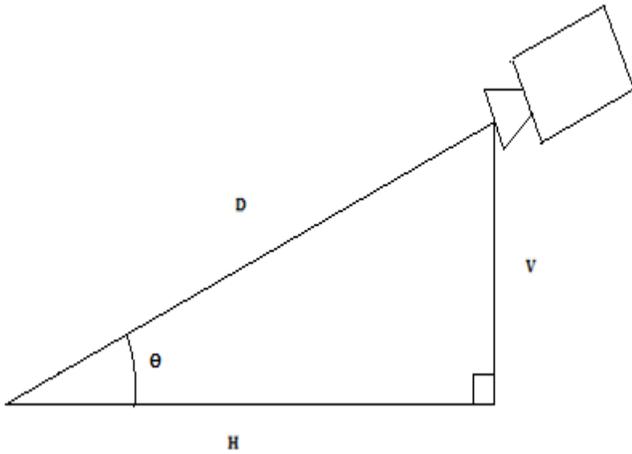


Figure 3. Camera placement and distances

From figure 3,

$$\begin{pmatrix} u \\ v \end{pmatrix} = \frac{f}{D} \begin{pmatrix} x \\ y \end{pmatrix} \quad (1)$$

Where $z \approx D$ the axial distance.

Also

$$D = \sqrt{V^2 + H^2}$$

$$u = \frac{f}{\sqrt{V^2 + H^2}} \times x \quad (2)$$

From equation (2),

$$(u_1 - u_2) = \frac{f}{\sqrt{V^2 + H^2}} \times (x_1 - x_2)$$

Therefore,

$$\frac{(u_1 - u_2)}{(x_1 - x_2)} = \frac{f}{\sqrt{V^2 + H^2}}$$

Let P_d be the Pixel distance with respect to the object displacement R_d . Therefore, the Euclidean distance between any two pixel positions is,

$$P_d = P_{d1} - P_{d2} = \sqrt{(u_1 - u_2)^2 + (v_1 - v_2)^2}$$

The corresponding object displacement,

$$R_d = R_{d1} - R_{d2} = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$$

The ratio,

$$\frac{P_d}{R_d} = \frac{\sqrt{(u_1 - u_2)^2 + (v_1 - v_2)^2}}{\sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}} \quad (3)$$

From equation (2),

$$\frac{\sqrt{(u_1 - u_2)^2 + (v_1 - v_2)^2}}{\sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}} = \frac{f}{\sqrt{V^2 + H^2}}$$

Therefore,

$$\frac{P_d}{R_d} = \frac{f}{\sqrt{V^2 + H^2}} \quad (4)$$

Or,

$$f = \frac{P_d}{R_d} \times \sqrt{V^2 + H^2} \quad (5)$$

Using a set of object points $\{ (x_1, y_1), (x_2, y_2), \dots, (x_n, y_n) \}$, the corresponding image points $\{ (u_1, v_1), (u_2, v_2), \dots, (u_n, v_n) \}$, are obtained using the camera and the ratio " P_d/R_d " is found out from (3). Next, the value of V and H are measured after fixing the camera. Knowing the ratio " P_d/R_d ", V and H , the value of f is found out using (5). Now, knowing, V and H , the value of " R_d " can be found out for every measured " P_d ".

C. Registration and Surgery

After surgical exposure of the spine, one needle is placed in the middle of the superior articular process and two needles are placed, on the spinous process, at distances measured during the pre-operative planning phase [24]. By overlaying the transparent reference image, with lines drawn as mentioned in section [II A], over the video and adjusting the focus and zoom of the camera, the three needles in the video, are exactly made to coincide with the three vertical lines, plotted on the reference image. At this stage, the dimensions of the objects in both the images match, which finalizes the registration process. Now, the drill is positioned with its burr exactly placed at the entry point. Using computer graphics, the cylinder and its axis, with the required height and diameter, measured during the pre-planning phase, are created.

Square marker with 2.5 cm x 2.5 cm dimension, having a unique geometric shape is designed by considering the shapes of all background objects, so as to avoid ambiguity and false detection. Marker is fixed centrally on the body of the micro motor drill, so as to face the camera. An alternate method is to fix the marker, on the drill owl, so as to track the pedicle screw. The axis of the drill or drill owl passes through the centroid of the marker. The video of the drill, with the marker fixed centrally on its body is grabbed and processed in sequential frames.

The procedure begins by correcting the orientation of the drill so that, it correctly enters the pedicle canal and the vertebral body. The orientation of the drill is same as the marker orientation. Now, the path of the drill is tracked during insertion, to ensure that it does not go beyond the walls of the pedicle canal or pierce the vertebra body. The method is to search the marker, using edge extraction to get the geometric features of the marker. The search is performed and results are displayed, based on calibration. The algorithm uses edge based geometric features of the models and the target, to establish match. Gradient method is

used, for extracting object contours. An object contour is a type of edge that defines the outline of the objects in an image. The edges extracted from the video frame are used to form the image's edge map, which represents how the image is defined as a set of edges. The feature calculations are performed using the image's edge map. The edge finding method uses operations that are based on differential analysis, where edges are extracted by analyzing intensity transitions in images. Edges are extracted in three basic steps. First, a filtering process provides an enhanced image of the edges, based on the computations of the image's derivatives. Second, detection and thresholding operations determine all pertinent edge elements, or edgels from the image. Third, neighboring edgels are connected to build the edge chains and features are calculated for each edge. The enhanced image of the object contours is obtained by calculating gradient magnitude of each pixel in the image.

First order derivatives of a digital image are based on various approximations of the 2D gradient. The gradient of an image $f(x, y)$ at the location (x, y) is defined as the vector [29]:

$$\nabla f = \begin{pmatrix} G_x \\ G_y \end{pmatrix} = \begin{pmatrix} \frac{\partial f}{\partial x} \\ \frac{\partial f}{\partial y} \end{pmatrix} \quad (6)$$

The gradient magnitude is calculated at each pixel position, from the image's first derivatives. It is defined as [29]:

$$= \text{mag}(\nabla f) = \sqrt{G_x^2 + G_y^2} \quad (7)$$

An edgel or edge element is located at the maximum value of the gradient magnitude over adjacent pixels, in the direction defined by the gradient vector. The gradient direction is the direction of the steepest ascent at an edgel in the image, while the gradient magnitude is the steepness of that ascent. Also, the gradient direction is the perpendicular to the object contour. The marker with the unique geometric shape is fixed as the search model. The search of instances of models in the sequence of video frames is performed. The match between the model and its occurrences in the target image is determined using the values of "score" and "target score". The score is a measure of active edges of the model found in the occurrence, weighted by the deviation in position of these common edges. The model scores are calculated as follows.

Score = Model coverage \times (1- (Fit error weighing factor \times Normalized Fit Error))

Target score = Target coverage \times (1- (Fit error weighing factor \times Normalized Fit Error))

The model coverage is the percentage of the total length of the model's active edges, found in the target image. 100% indicates that, for each of the model's active edges, a corresponding edge was found in the occurrence. The target coverage is the percentage of the total length of the model's active edges, found in the occurrence, divided by the length of edges present within the occurrence's bounding box. Thus, a target coverage score of 100 % means that, no extra edges were found. Lower scores indicate that, features or edges found in the target are not present in the model. The fit error is a measure of how well the edges in the occurrence, correspond to those of the model. The fit error is calculated as the average quadratic

distance, in pixels or calibrated units, between the edgels in the occurrence and the corresponding active edges in the model.

$$\text{Fit error} = \frac{\sum_{\text{all common pixels}} [(\text{error in } x)^2 + (\text{error in } y)^2]}{\text{Number of common pixels}}$$

A perfect fit gives a fit error of 0.0. The fit error weighing factor (between 0.0 – 100.0) determines the importance to place on the fit error when calculating score and target score. An acceptance level is set for both the score and target score. A graphical line, showing the position and orientation of the marker on the drill, is constructed within the graphical cylinder using line drawing technique in computer graphics, and is displayed in real time, by using the position and orientation of the centroid of the marker and drawing the results, in the display's overlay buffer non-destructively. The line is displayed within the graphical cylinder with its axis at exact inclination as that of the axis of the pedicle canal and its dimensions exactly same as that of the pedicle canal, constructed earlier using computer graphics. The graphical results display the position and orientation of the drill and are used for real time drill control and navigation. Positional results and audio-visual alerts are used to prevent boundary violation, which can lead to pedicle wall perforation. An interactive GUI and real time video display, with real time graphical overlay is built for ease of access, for viewing position and orientation of the drill or pedicle screw during insertion.

D. Paired samples t-test

T-test is based on t-distribution and is considered an appropriate test for judging the significance of a sample mean or for judging the significance of difference between the means of two samples. In case two samples are related, we use paired t-test for judging the significance of the mean of difference between the two related samples. The relevant test statistic, t , is calculated from the sample data and then compared with its probable value based on t-distribution (to be read from the table that gives probable values of t , for different levels of significance for different degrees of freedom) at a specified level of significance for concerning degrees of freedom for accepting or rejecting the null hypothesis. A paired samples t-test based on a "matched-pairs sample" results from an unpaired sample that is subsequently used to form a paired sample, by using additional variables that were measured along with the variable of interest [30]. The matching is carried out by identifying pairs of values consisting of one observation from each of the two samples, where the pair is similar in terms of other measured variables. For the sample pairs $(x_1, y_1), (x_2, y_2), \dots, (x_n, y_n)$, we can define the difference of each pair as: $d_i = (x_i - y_i)$; $i=1, 2, 3, \dots, n$. Under the basic assumption that the differences d_i follows normal distribution with mean value zero and fixed variance σ^2 we define a t-statistic as follows:

$$t = \frac{\bar{d}}{S_d / \sqrt{(n-1)}}$$

Where,

$$\bar{d} = \sum_{i=1}^n \frac{d_i}{n}$$

$$S_d = \sqrt{\frac{1}{n} \sum_{i=1}^n (d_i - \bar{d})^2}$$

't' follows student 't' distribution with (n-1) degrees of freedom. We formulate the pair of hypothesis, $H_0: \mu = 0$ Vs $H_1: \mu \neq 0$, for the chosen significance level ' α '. The best critical region is given by the condition $|t| \geq t_{\alpha/2}$. If the value of t lies in the C.R, it leads to the rejection of the null hypothesis [31].

III. EXPERIMENTAL SETUP AND RESULTS

A. Evaluation of Real Time Object Tracking

The new technique was evaluated, by inserting the drill into the pre-determined point, of the transparent phantom model of the human vertebra, using computer assistance. Three needles were inserted into the landmark points on the phantom vertebra. The focus and zoom of the camera were adjusted so that, the three needles in the video were exactly made to coincide with the three vertical lines plotted on the reference CT image to complete the registration process. The graphical cylinder was drawn, with its axis at an inclination, exactly same as that of the pedicle canal, obtained from the reference CT image of the vertebra. The orientation of the axis of the cylinder was estimated, with respect to the three vertical lines drawn in the reference CT image of the vertebra. The online video of the drill, with the marker fixed centrally on its body was processed in sequential frames. The search of instances of marker models in the sequence of video frames was performed. The centroid of the marker model was found out in each frame of the video.

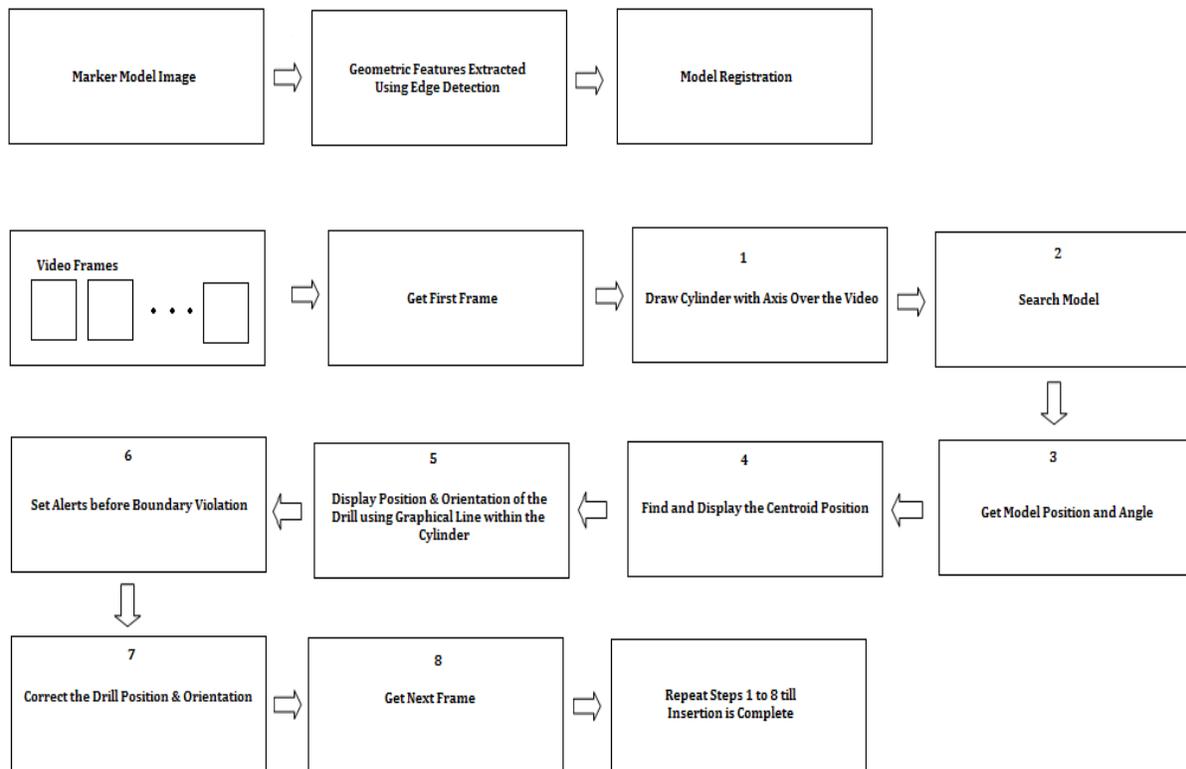


Figure4. Real time object tracking for CASS

A graphical line, showing the position and orientation of the centroid of the marker on the drill, was displayed in real time using computer graphics, and by using the position and orientation of the centroid of the marker and drawing the results, in the display's overlay buffer non-destructively[32],[33]. The drill was positioned with its burr exactly placed at the entry point on the phantom vertebra. The orientation of the drill was corrected so as to correctly enter the pedicle canal. The orientation of the drill should be the same as the marker orientation. Then, the path of the drill was tracked during insertion, so that it neither goes beyond the walls of the pedicle canal nor pierces the vertebra body. The trajectory of the burr or tip of the drill was viewed in real time, by observing the

movement of the graphical line within the cylinder. The depth of insertion was estimated by viewing the movement of the graphical line. Figure4 illustrates the procedure of real time Computer Assisted Spine Surgery (CASS). A user friendly GUI with the provision for testing camera, loading marker image, real time tracking, display positional results and search time has been developed as shown in figure 5. The centroid of the marker detected is shown in figure 6.

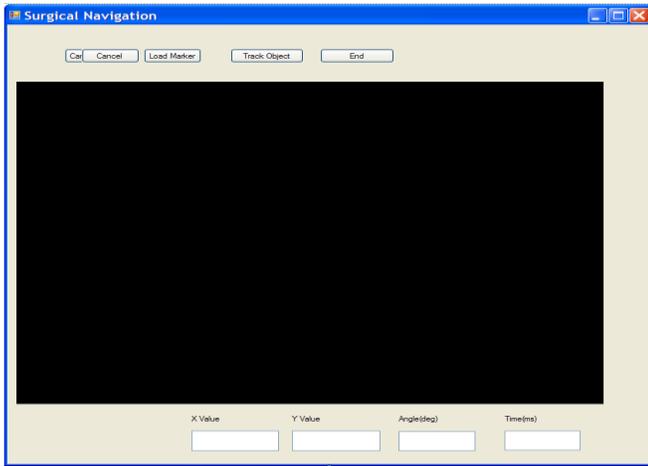


Figure5.GUI for computer assisted spine surgery



Figure6. Centroid of the marker on the micro motor drill detected

Table 2: Evaluation of Real time Computer Assisted Spine Surgery

Real World Co-ordinates					Image Co-ordinates							
x1(cm)	y1(cm)	x2(cm)	y2(cm)	Real World Distance Rd	u1	v1	u2	v2	Pixel Distance Pd	Ratio Pd/Rd	Calculated Rd	
16.4	10.6	15	9.4	1.84	422	429	406	441	20.00	10.85	1.87	
15	11.9	14	10.2	1.97	405	416	393	433	20.81	10.55	1.95	
12	13	11.9	11.8	1.20	368	406	372	418	12.65	10.50	1.18	
7.7	11.8	9	10.4	1.91	311	424	327	437	20.62	10.79	1.93	
6.8	10.8	8.4	9.7	1.94	300	435	318	445	20.59	10.61	1.93	
7	11	8.7	10	1.97	302	437	320	448	21.10	10.70	1.98	
11	15	12.7	14	1.97	304	439	322	450	21.10	10.70	1.98	
10	11	6	9	4.47	275	463	321	450	47.80	10.69	4.48	
12.7	10.9	8.6	7.8	5.14	268	472	315	444	54.71	10.64	5.12	
13.8	4.2	10.8	10.2	6.71	255	481	318	446	72.07	10.74	6.75	
6.9	4.2	10.4	10.7	7.38	249	475	320	440	79.16	10.72	7.41	
5.8	11.3	9.8	18.9	8.59	233	462	322	443	91.01	10.60	8.52	
12.7	10.9	15.7	2.6	8.83	224	451	318	449	94.02	10.65	8.80	
9.5	12.4	3.9	4.4	9.77	217	446	321	445	104.00	10.65	9.74	
10.9	11.6	4.1	3.1	10.89	209	440	325	447	116.21	10.68	10.88	
10.2	11.5	1	3.8	12.00	202	433	330	441	128.25	10.69	12.01	
14.2	17.5	6.4	7	13.08	200	422	339	425	139.03	10.63	13.02	
11.2	14.7	4.7	3.3	13.12	191	370	331	375	140.09	10.68	13.12	
16.5	12.2	11.1	2.9	10.75	190	399	300	365	115.13	10.71	10.78	

14.1	11.5	5.6	1.5	13.12	160	385	299	365	140.43	10.70	13.15
14.5	12.7	6.1	2.5	13.21	152	385	245	278	141.77	10.73	13.27
14.8	12.6	6.8	3.2	12.34	134	363	245	292	131.76	10.67	12.34

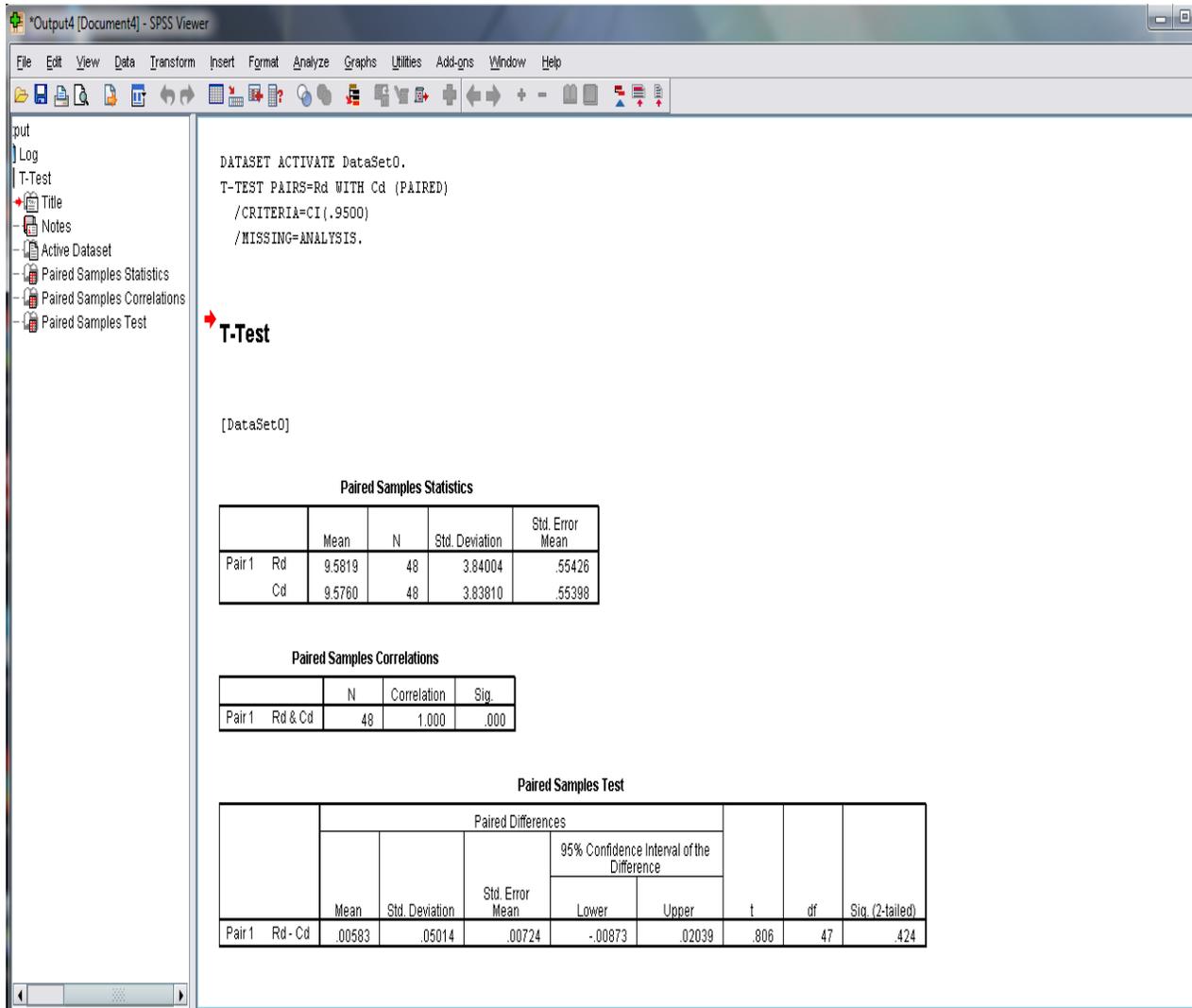


Fig 2. Output window of SPSS result viewer

B. Evaluation of the Real Time Computer Assisted Spine Surgery

A study on the effectiveness of the new method of tracking the drill for pedicle screw insertion was carried out comparing the real world displacement with the displacement in the image co-ordinates. The pilot hole was drilled at various positions and angles. The readings with respect to real world displacement and the corresponding displacement in the image co-ordinates have been tabulated, sample of the readings are shown in Table1. The table shows the correlation between real world displacement and displacement in the image coordinates. A comparison between them has been conducted using paired samples T test. The method is used to prove the exactness of movement of the drill using the new computer assisted navigation method. The positions of the markers on the drill were estimated using the new tracking algorithm. The (x, y) and (u, v) co-ordinate values

of the centroid for initial and final positions are tabulated both for real world and image co-ordinates. The Euclidean distances are found out using the following equations:

$$P_d = P_{d1} - P_{d2} = \sqrt{(u_1 - u_2)^2 + (v_1 - v_2)^2}$$

$$R_d = R_{d1} - R_{d2} = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$$

C. Results

The paired T- test procedure was performed using a sample size of 48. From each pair of observations (x_i, y_i) of R_d and P_d , the difference can be taken as $d_i = x_i - y_i$; $i=1,2,3,\dots,48$. Set the null hypothesis $H_0: \mu = 0$ against $H_1: \mu \neq 0$, where μ denotes the mean difference. The sample values allow accepting the null hypothesis with the required level of confidence (95% confidence level). The significance level is much above 0 and its value is 0.424 as shown in fig. 2. This reveals the fact that the drill can be guided precisely and this can be stated with 95 % confidence level, which indicates good precision with a standard mean error of only 0.00724.

IV. CONCLUSION

A real time surgical navigation system for pedicle screw insertion was developed. The trajectory of insertion of the drill or the pedicle screw is displayed in real time and provides an aid to the surgeon, to insert the screw precisely. The system developed is cost effective and has good precision required for spine surgery.

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Interim Government of India under Colonial Rule 1946

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Abstract- With the inception of World War II British Empire in India and His Majesty Government in the House of Commons, London showed some conditional readiness to address the problems of constitutional crisis and political impasse in India. Britain was in a dire need to win India's support in her War related efforts to combat the Axis forces. Taking ongoing World War II as blessing in disguise Indian National Congress started bargaining with the British government to further her interest of complete independence. Establishment of Interim government in the year 1946 was a natural outcome of the same.

This paper attempts to illustrate some of the important aspects related to interim government of 1946 under colonial rule in India.

Index Terms- Interim government, political impasse, INC, Muslim League, HMG, Direct Action Day, Viceroyalty.

I. INTRODUCTION

The miscarriage of Cabinet Mission plan of 1946 made British government to put the hammer on the floor by making her intension very clear to the belligerent parties of India that the British government in India has embarked on her penultimate role of solving the political impasse of the country. The British government in a master stroke demonstrated her withdrawal of imperialistic interest from India and created a flutter of restlessness in the political camps of India. This was perhaps for the first time that political parties of India could reasonably believe that British government in India and HMG means business. With the announcement of putting the things on anvil for formation of interim government in India the British government notwithstanding confusing political corridors was adroitly successful in diverting the winds of acrimonious animosity towards political parties of India thereby leaving the British government in India an elbow room for strategizing the political maneuverability.

His Majesty Government and Viceroy Wavell made up their intentions very clear that as the first thing first interim government will come into existence with the judicious combination of representatives from various political parties of India and then India's new constitution shall come into being which will address and respect the diverse shades of beliefs and opinions.

The stage was set for Indian National Congress and Muslim League for marathon negotiations with British government for establishment of Interim government and its likely face. At this crucial juncture at the behest of Gandhi Nehru assumed the responsibility as Congress President to steer the negotiations to a logical conclusion. The patriarch of Indian National Congress Gandhi always looked up to Nehru as the most befitting negotiator for political arch rivals like Jinnah of Indian Muslim

League and authorities of British Empire in India. Moreover Gandhi knew that Jinnah had developed an inexplicable abhorrence for previous president of Congress Mr.Maulana Azad which could have had a damaging impact on furthering of India's interest in formation of Interim government. There was no scintilla of doubt in Gandhi's mind about Jawaharlal Nehru's aristocracy and his ability to rub the shoulders with the rank and files of British authorities in India and in the House of Commons in London will come handy in strengthening the bargaining position of India during negotiations.

Viceroy Wavell knew that it was a litmus test of his Viceroyalty to bring the major political parties of India at drawing table to form an interim government acceptable to all. It was a tumultuous time period when Viceroy was required to show lot of gumptions to resolve the political impasse of India and to add a feather of coruscating success to his own cap.

Nehru from the saddle position of President of Indian National Congress did not mince the words and expressed his resentment with Viceroy Wavell for his silence on India's freedom. Nehru wanted British government to quit India once the interim government was established and should not wait till constitution was framed. He was quite vocal in communicating to the British government that India is capable of solving her internal problems and intervention or adjudication on the part of Britain is absolutely uncalled for.

Absolutely an antithetical school of thought was harbored in the mind of Mr. Jinnah a patriarch of Muslim League. To put the things in his perspective his mind was saturated by dominant fear psychosis that Congress had a mollified intention of grabbing the power at the centre to make the numerical minority of Muslim vulnerable under the dictating dominance of Hindus. The records of history will convince us of the fact that such fear was deeply rooted in the mind of Jinnah which made him to exploit every opportunity to lead the Viceroy up the garden path. Jinnah propagated novel school of thought that Hindu and Muslim communities are antithetical in more than one ways hence campaigning for their peaceful coexistence is not only farfetched but too far from being real. He made it very clear from time and over again that Muslims shall never come to roost under Hindu dominance hence separate Pakistan with steel frame and absolute freedom is a panacea to the perennial problem of Indian polity. In this way the idea of two nation theory came into being during colonial rule. Whereas the school of thought being propagated by Indian National Congress was such that Muslims are the ancestors of foreign rulers and over thousand years they are well assimilated in India in a mixed culture therefore the line of hardcore identity of Muslims have got largely obscured hence separate Pakistan on the ground of religious identity was highly inconceivable.

The philosophical battle between INC and Muslim League hinged upon the type of interim government. Congress was not ready for parity with Muslim at the centre and it was yearning for

strong centre whereas Muslim League under the leadership of Jinnah was battling for more and more devolution of power with weak government at the centre. Muslim League was too cautious as it did not want to give the cudgels of country's governance into the hands of Congress for obvious fear of ruthless dominance of Hindus over vulnerable Muslims. Jinnah had a unique temperamental problem with Jawaharlal Nehru. He would never accept Jawaharlal as his senior. He had an inexplicable animosity and idiopathic hate for Jawaharlal Nehru.

Wavell brought all his genre of conflict resolution to the table. In a fresh bid, he took an initiative for the formation of a popular government with the approval of the British Cabinet. Wavell gave identical letters to Jawaharlal and Jinnah on July 22 inviting them to form a Coalition Government of 14 members. The fourteen members consisted of six members including one representative from Schedule Caste to be nominated by Congress, five members to be nominated by Muslim League and three representatives of the minorities by Viceroy. Both the political parties found the proposal as incommensurate and summarily rejected the offer. In a nutshell, the negotiations were destined to be marred inexorably by abysmal failure.

Over a period of time quaid e azam Jinnah woke up to a dark reality that his leading the Viceroy up the garden path yielding him no positive result. On July 27, 1946 during the meet of All-India Muslim League in Bombay Jinnah announced his categorical rejection to all constitutional methods and insinuated violent measures to further his interest of separate Pakistan even at the cost of bloodshed. With such a bold and daring announcement Jinnah broke all his ties with constitutional ways and means. British government who used to sing the praise of Jinnah for being cooperator to British government got a master stroke of enmity from Jinnah.

Disenchanted Muslim League on this day passed two historic resolutions which proved to be a nemesis for ongoing indefatigable struggle to bring about conciliation between the two political parties. A black day in the course of political negotiations which were aimed at making British Government quit India gracefully was desecrated in these two resolutions of the League: The first was withdrawing its acceptance of 16 May statement and reaffirming its demand for Pakistan and the second on Direct Action to enforce the demand. Jinnah appealed the top layers of Muslims to renounce the titles conferred upon them by the British Government. Now Jinnah had nailed his colors to the mast.

The rack and ruin caused by the great Calcutta killings as a result of Direct Action Day shook the British Government in India. The activists of Muslim League literally painted the town red by a large scale bloody violence. The situation was tantamount to a Civil War. The Britain's efforts to salvage its brand image by maintaining peace in India had received a severe jolt. Wavell by now understood that the strategy of 'to rob Peter to pay Paul' would not do wonder any more.

At this stage once again the fallacy of British authorities got exposed. They failed to sense the suppressed inferno in the minds of people belonging to the separate communities. It was an abysmal and embarrassing failure of British Imperialists that they were so weak or naïve to read the psychology of the people and possibility of catastrophe.

Britain may have enjoyed her imperialism over one third of the world yet the essence of Asia was far different than her developed subjects like New Zealand, Canada or Ireland. Britain miserably failed to study the society and culture of India. The whole world salutes Mahatma Gandhi for his immaculate leadership qualities. Gandhi was a leader of the same comrade yet he led such an exemplary ascetic life with unflinching faith on non-violence that he did not leave any scope for inferno to take birth in the minds of the people against anybody. The smart thinking management on the part of British authorities seemed to have eclipsed.

It was a time for Congress to get all formalities done for investiture ceremony so as to enter the Interim Government. The road to freedom was already carved. It was a sigh of relief for the people of India. Scintillates of mass murders committed during Direct Action Day were permanently ascribed to nation's rich ethos. In that background formation of Interim Government by Congress was like a godsend.

The members of Interim Government were perched on unknown territory of country's governance as the newly formed Interim Government would begin functioning from September 2, 1946.

Though Gandhi appeared to be invisible on the radar, he played a crucial and vital role in guiding the players of Congress who used to be party in negotiations with Jinnah and British authorities in India and London. He was quite adroit in adopting rigid and flexible stand at appropriate times. The greatest asset of Gandhi was that he never demonstrated irrational exuberance as well as frustration at any point in time during the course of his political currency. He did never step on the gas paddle when the road ahead was foggy as he knew that was a sure way to get killed. He had uncanny knack to take himself on and off the radar of Indian polity so as to achieve the best purpose in the interest of the nation.

Jawaharlal Nehru must have felt the handicapped nature of lamed government. He must have felt the absence of charm of governing as the country was still reeling under the pool of blood bath. Muslim League's loose walk entry into interim government and absence from executive assembly had carved out a functional stigma. The pessimistic sense of glass half empty was still playing havoc in the minds of Wavell as without Muslim League into the popular government, every day would be a futile one. As a natural sequence, opinion was built up to allow assembly to meet even in absentia of Muslim League.

In the meantime, Jinnah had a sick feeling of being in a sinister isolation. Though he was a leader of minority Muslims, all eyes were set on him. The Congress being at the helm of the affair made Jinnah restless. He feared the shock of crisis credibility from his own community. Ultimately Jinnah joined the interim government with a clear message to the community for whom he was a knight in the armor that he joined Interim Government not to rub shoulder with his die hard opponent Jawaharlal Nehru but to offer him even more opposition from within the government. From such attitude of Jinnah one thing was more than clear that he had no feelings towards sacrosanct government. He had one point agenda which he carried on his back all through his life and that was of surgical amputation of India into two nations no matter even if it turned out to be a moth eaten Pakistan.

The prime Minister of Britain in a decisive stroke careened the Viceroyalty of Wavell and roped in Lord Mountbatten as a new Viceroy of India. For Atlee, Mountbatten was a darling colleague with indomitable faith. It was for this reason alone that Atlee empowered Mountbatten with plethora of exceptional and special powers which other like Cripps or Cabinet Mission were deprived of. Mountbatten came to India with a definite plan for transfer of power to India not later than June 1948 which at a later stage got rescheduled to 1947 which is popularly known as freedom at a lightning speed.

II. CONCLUSION

It became quite clear that all the three parties- the Congress, the Muslim League and the British Government of India presented farrago of conflicting claims and counter claims of fissiparous nature which sometimes were so acrid that made British Government in India look feckless. Had there not been so much of animosity and antagonism, by this time the path to India's freedom would have been festooned. It was this morbid obesity of plethora of entangled issues which made the job truly herculean. It was a period of empty logomachies with no victors. The political impasse in India was constitutional in nature and temperamental at the same time. The front line leaders from different political parties demonstrated official posture in varying degrees. British regime was more reactionary than precautionary to Indian problems. Axis forces led by Hitler were closing in to endanger the British regime in South East Asia. Japan was close at the Bay of Bengal which made British Government in India to ask for India's support. The onset of World War II put British Empire in India in a quandary. Because British government wanted India's support in their war related efforts it started talking in terms of solving India's constitutional crisis. However the concrete commitment of granting freedom to India by definite time span was missing until failure of interim government and pronouncement of Direct action day by Muslim League.

After an abysmal failure of Cabinet Mission Plan of 1946 formation of interim government after marathon political and diplomatic negotiations was an exercise in futile. Over the period

of time the political parties zeroed down to the tragic conclusion that surgical amputation of India was inevitable. There was a tradeoff between the partition and unbridled inhuman horripilating violence on the streets of India. Naturally acquiescence was for partition to win a lasting peace.

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The Picture of Lower-Class Society in Anita Desai's Voices in the City-A Study

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I. INTRODUCTION

Anita Desai's second novel, *Voices in the City*, which was published in 1965 and which won Sahitya Akedami Award in 1978 has received adequate critical response. The title of the novel made critics to debate on the point whether Nirode or the city of Calcutta may be called the hero of the novel. *Voices in the City* is "the unforgettable story of a Bohemian brother and his two sisters caught in the cross currents of changing social values". It is a feudal family of Kalimpong dominated by the mother with an inferior father who is most of the time drunk; there are four children, two sons and two daughters-Arun, Nirode, Monisha and Amla. Father is no more now, mother leads a lonely life because all the children are outside Kalimpong; she gets company of her neighbor, one retired Major Chaddha with whom seemingly she is also having an affair which is much resented by Nirode. Anita Desai portrays how people, especially poor, are forced to lose their moral values because of money which is indispensable to lead the life. Thus the society makes a lot of sudden changes.

Anita Desai was born on June 24, 1937 at Mussoorie of Bengali-German parentage. Very little is known of the life of this Indian English fiction writer who published 14 novels. A keenly observant writer, she cannot be faulted on the specifics. In *Voices in the City* she has captured the spirit and the essence of Calcutta. Anita Desai's second novel, *Voices in the City*, which was published in 1965 and which won Sahitya Akedami Award in 1978 has received adequate critical response. The title of the novel made critics to debate on the point whether Nirode or the city of Calcutta may be called the hero of the novel. Anita Desai's skilful handling invests the city with a character. Nirode's sketch on the other hand is rather insipid. Discussed in depth by A.V.Krishna Rao who also feels that it is Calcutta which is the hero of the novel and not Nirode:

"Thus although one may be tempted to consider Nirode as the hero of the novel, the city of Calcutta is indeed the protagonist of the novel. Calcutta, conceived as a fore of creation, presentation and destruction is ultimately identified as a symbol for the Goddess Kali".

It is true that the city of Calcutta is the locale for most of the actions of the novel and serves as a background and it influences and affects all the major characters in the novel. But the novel itself is primarily a family drama around which the story revolves. Even the blurb of the novel says that the novel describes the corrosive effects of the city life upon the Indian family. It is this city that affects the protagonist and forces to go out of the city and to find a good place to live on. The situations and circumstances in the city make a rapid change in the life of the many characters in this novel. Thus Anita Desai took a gentle

effort to exemplify the surroundings of the city and makes the reader to understand how a society can change the human life.

Nirode and Amla feel the pressure of the city. He is rather afraid and is threatened by the deserted look of it. "On all sides the city pressed down, alight, aglow and stirring with its own marsh-bred, monster life that, like ogre, kept one eye open through sleep and waking [...] the city was as much atmosphere as odor, as much a haunting ghost of the past as a frenzied passage towards early death". It seems, he is morally afraid of the city of the odors of 'open gutters' and 'tuberose garland'. Monisha's reaction is similar. She feels trapped in her husband's house. "There is escape from it", she cries. The city, to her has two faces; its devilish look and its hapless, vacant one:

"Has the city a conscience at all, this Calcutta that holds its head between its knees and grins toothlessly up to me from beneath a bottom block with the dirt than it sits on?"

In fact, *Voices in the City* is "the unforgettable story of a Bohemian brother and his two sisters caught in the cross currents of changing social values". It is a feudal family of Kalimpong dominated by the mother with an inferior father who is most of the time drunk; there are four children, two sons and two daughters-Arun, Nirode, Monisha and Amla. Father is no more now, mother leads a lonely life because all the children are outside Kalimpong; she gets company of her neighbor, one retired Major Chaddha with whom seemingly she is also having an affair which is much resented by Nirode. What perturbs him is his dislike for Calcutta, the dirty city. The sordidness, brutality and the sheer dreariness of the physical world are the unwanted things. Desai's characters of this novel rebel against the dirty or ugly reality which also hidden in materialism. It never appeals to their sensitivity. In this sense, the outward dirtiness which is enshrined in the buildings, ugly gutters, street hawkers, beggars, and the narrow and filthy roads is personified here. It is rather repulsive. In fact, Calcutta plays an important role as a dirty character against which these voices are raised.

Though he has reminiscences of his childhood and of his mother at Kalimpong, he recalls with destruction his mother's attraction for their neighbor, which he believes has deprived him of his mother's love towards him. When he reads the letter from his mother, he expresses such resentment about his mother mentioning Major Chaddha's name "how unashamedly she wrote the hideous name, so like a cooking pot full of yellow food, or a rag of dirty underwear. How helpful was this Chaddha, providing her with male company and admiration". Nirode found that the whole world runs behind material success and fame.

On the other hand, *Voices in the City* depicts how the corrosive effects of city life on an Indian family caught in the cross current of changing social values and norms make them to suffer a lot. Disillusionment and frustration are their lot in the city. Nirode doesn't voluntarily leave his city and come to

another city which is unfamiliar to him. Nirode is employed as an “anonymous, shabby clerk on a newspaper, calling himself a journalist” while his real job is cutting out “long strips of newspaper and paste and file them, occasionally venturing out to verify a dull fat in some airless office room. “ He is not happy with his lot in the city and desperately wants to escape.

All that he desires are three drinks a night and a room of his own—three drinks for inspiration and a room in which to write—so that he can devote himself to creative pursuits. He leaves his room at YMCA and starts living with his friend Sonny Ghosh, scion of an aristocratic family fallen on bad days. He starts a magazine, *Voice*, which is not much of a success. He is full of contempt for people like Jit Nair because he is lucratively employed in a British tea firm as a box-wallah and leads a high-society life with his wife, Sarla, who has her own string of admirers and who eventually elopes with an Englishman to Malaya.

Nirode wants to pack up and escape from Calcutta, but he can't (as David does) because he is doomed to failure. Nirode is appalled at the vulgarity of the high society and remembers that his own mother had been a part of it during her Calcutta days. The lower strata are equally repulsive to him and he feels like “a leper” amid his squalid surrounding living in a tin-top room in one of the old buildings. His sense of loneliness is heightened when David leaves for Sikkim to become a Buddhist monk. There is “a familiar disgust “ that envelops him in spite of his sessions of heavy drinking with Jit, Sonny and Bose, who are stuck in rot and cannot get away even though they occasionally desire to do so. He becomes impatient, peevish and aggressive during his three years of working at the *Voice*, but knows that there is no way out for him. Finally he falls sick and is alone and is looked after by his sister. Now he is experiencing poverty. From this we can understand how a man, Nirode, has been suffering because of money. Till the very end, he can't able to stand on his own legs. From this we can understand the materialistic world in which people give more respect only to money and not to humanity.

His elder sister Monisha, on the other hand, has been married for three years to a bureaucrat Jiban. She lives in an iron-barred large house with her husband's extended family in Bow Bazaar in central Calcutta. Like Nirode, Monisha too is stifled by her surroundings and the tradition-bound household in which “feet before faces” syndrome rules. Since she has not bear a child because her fallopian tubes are blocked, she is consigned to an obscure room on top of the house and is merely tolerated by Jiban's mother and Kalyani di. The sights, smells and sounds of the household rebel her. “Through the thick iron bars I look out on other walls, other windows—other bars,” she writes in her diary. The once healthy and lively daughter of the hills leads the life of a recluse. Monisha immerses herself in the household chores:

“I am glad they give so much work to do. I am glad to be occupied in cutting vegetables, serving food, brushing small children's hair. Only I wish I were given some tasks I could do alone, in privacy, away from the aunts and uncles, the cousins and nieces and nephews. Alone, I could work better, and I should feel more-whole”. Monisha's restlessness is simply because of her circumstances. She has been considered as a bare woman

who can't able to bear a child. This shows that a woman in this society is considered as a machine which is producing babies.

Amla, through whom we are shown the world of the upper class society, also hates the lower-class society in Calcutta. When she sees Nirode and Monisha, she can hardly recognize them. She wonders what the marriage and the society have done to them. To Amla, the city and its people appear like a monster. She asks Nirode, ‘this city, this city of yours, it conspires against all who wish to enjoy it, doesn't it?’ The descriptions show the sordidness, spiritual disintegration, menaces, that threaten the integrity of the individuals. It makes her to hate the city and the lower-class society. So she plans to marry a rich man to lead a peaceful life. The monsoon rains make the city look like a symbol of dissolution. So the city is called, ‘a black, dead devil’, ‘a poisoned city’ and the like. Here is yet another passage that vividly symbolizes the evil forces of the society in the city:

Calcutta, Calcutta, like the rattle of the reckless train; Calcutta, Calcutta—the very pulse beat in its people's veined writs. The streets were slaughtered sheep hung beside bright tinsel tassels to adorn oiled black braids, and a syphilitic beggar with his entire syphilitic family came rolling down on barrows, like the survivors of an atomic blast, then paused to let a procession of beautifully laundered Bengalis in white carrying their marigold-decked Durga [...] Kali—on their shoulders down the Ganges, amidst drums and fevered chanting.

II. CONCLUSION

If the people, particularly his mother and the society had not affected Nirode, he would not have left the city. If the family of Monisha had not behaved rudely, she could have led a peaceful life. If the mother had been good, both of them, when suffering in life, would have gone to the mother. From the mother, who is poor and seeks money through ill-manner, Anita Desai portrays how people, especially poor, are forced to lose their moral values because of money which is indispensable to lead the life. Thus the society makes a lot of sudden changes.

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Effect of Fire and seasonality on Some Soil Properties in Elnour Forest at Blue Nile State

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Abstract- Fire in one of the factors that affect the vegetation cover in low rainfall savannah, so this study was carried out to examine the effect of fire on *Acacia seyal* forests soil and also to test its accumulative effects. The results showed that the Nitrogen, Organic carbon, Phosphorus and pH were not affected with fire. But Phosphorus and pH were decreased through seasons while Nitrogen, Organic carbon were not affected with seasons.

Index Terms- Acacia seyal. Fire. Season. Phosphorus. pH.

I. INTRODUCTION

Fire effects are variable from area to area and results on the forest and soil beneath can vary accordingly (Trabaud, 1987). There are many factors controlling the effects of fire on soil like frequency of fire, heat intensity and duration of fire, forest floor and soil type (Davis, 1959). The physical effects of fire on soil are severe erosion and accelerated surface water runoff by destruction of the vegetation cover, infiltration is reduced, colloidal structure is changed, increased soil temperature through blackening of the surface (Bot and Benites, 2005). The chemical effect of the soil comes from two sources; minerals release in the process of combustion and left in ash and changed micro-climatic condition following burning (Ahlgren and Ahlgren, 1960). Available Nitrogen in the soil is usually increased following burning because of low volatilization temperature of Nitrogen and subsequent temperature accelerated mineralization and nitrification rates after soil exposure to fire (Neary et al, 1999). Phosphorus and soil pH also increased after burning. (Blank et al, 1994). *An Acacia seyal tree* is a multipurpose tree which spread widely in the clay plain of Sudan. Seasonal fires were common in those areas (Hassan, 2004). So this work aimed to study the effect of fire on soil properties, which may influence the vegetation cover.

II. MATERIAL & METHODS

This study was carried out in Elnour forest, east of Eldamazeen in the Blue Nile State. (11° 50' North and 34° 29' East) during 2001-2002-2003. Clearance of all kinds of trees was done in an area of 100 m x 80 m (area of study). The number and species of trees cleared were 56 *A.seyal*, 27 *A.senegal*, 5 *Zizphus.spina* –Christi, 11 *Balanites aegyptiaca*. The experimental area was divided into four blocks; each block was further divided into four plots with an area of 7 m X 12.5 m each. Fire lines 3 m wide within the

plots and 10 m wide around the whole area were established. Plots in each block received one of the following treatments:

Control: grass cover kept intact. (Grass was 120 cm tall), Light fire: fire with low intensity, this was done by cutting 75% of the grass tallness and burning the rest, Moderate fire: fire with moderate intensity, this was done by cutting 50% of the grass tallness and burning the rest, Severe fire: fire with high intensity, this was done by burning all the grass (100%).

The first burning was in November 2001, second in November 2002 and the third in November 2003.

The macro kjeldahl method was used to determine of nitrogen content in each soil sample (Chapman and Pratt, 1961). The soil samples were digested with sulphuric acid on an electric heater for 2-3 hrs, and then the clear solution was distilled and titrated against hydrochloric acid.

Available phosphorus was determined by Olsen's method as described by Jackson (1958).

Organic Carbon percentage was estimated by oxidation with potassium dichromate in sulphuric acid using Walkely Black method as described by Page and Willard, 1946.

The soil pH was measured in a saturated soil paste Kincked digital pH meter model (type 644/1).

III. RESULTS AND DISCUSSION

The site before clearance was dense with Acacia trees, which are characterized by nitrogen fixation; in spite of this, the percentage of nitrogen was low in the site (table, 2). The level of nitrogen in the soil was not significantly different throughout the period of the study (3 seasons) (Table 1). Thus it may be assumed that it had no effect on plant growth in the site since it was not taken from the soil.

Fire had no effect on nitrogen levels in the soil (Table 1). This may be explainable by that the quantity available to plants was not decreased because most of the nitrogen lost from burning material would be lost without burning through slow decomposing. (Davis, 1959).

Phosphorus is an essential nutrient because it is a vital component of DNA (memory unit) and RNA and ATP (energy unit) of plants (AlKhateeb, 1998). The levels of phosphorus in the site decreased with time (Table 2), while it was high in the first year (Although it was under the critical level, it was about 7ppm and the critical level for the grasses is 15ppm (Little and McCutcheon, 2004) it decreased significantly in the second year and third year. Phosphorus level in the soil is affected by many

factors like degree of weathering, climate condition, erosion and crop removal (Alkhateeb, 1998). In this case study this decrease may be due to the grass consuming which have a higher requirement of phosphorus (Spikes, 2004; little and Mccutcheon, 2004). Because of the high density of grass growth in the first and second year, this probably absorbed phosphorus from the soil.

Organic Carbon was added to the soil by plant residues or ash remains after burning. The level of Organic Carbon was found not affected with fire (three intensities) (Table 1). The quantity of Organic Carbon added to the soil with burning is equal to that was added by plant residues in unburned (control) area. Seasons seem to have no significant effect on the level of Organic Carbon in the soil (table 2).

Soil pH is defined as the logarithm of the hydrogen ion concentration; it is an indication of the soil acidity or alkalinity (Elkhateeb, 1998). The soil pH in the site was 7.8 – 7.9

in the first season (Table 2), this means that the site soil was slightly to moderate alkaline, pH decreased in the second season to 6.2 – 6.3, thus the soil became slightly acidic. These pH changes seem not affected with fire treatment, because light, moderate and severe fire were not significantly different from untreated area in pH level. (Table 1). The changes in pH level may explain the loss of phosphorus, because most of the minerals are more soluble or available in acid soils than the neutral or slightly alkaline soils (Bichelhaupt, 2004), this mean that the pH made phosphorus available to be absorbed by plants, and this cause phosphorus decreasing in the soil. pH changes is a result of rain water leaching away basic ions (Ca, Mg, K, Na), carbon dioxide from decomposing organic matter and root respiration dissolves in soil water forming a weak organic acid and formation of strong organic and inorganic acids.

Table (1) effect of fire on Soil Nitrogen, Phosphorus, Organic carbon and soil pH overall seasons

<i>Treatments</i>	<i>Mean / content</i>	<i>%Nitrogen Mean Phosphorus content (ppm)</i>	<i>/ Mean / Organic content</i>	<i>%Mean /Soil pH Carbon</i>
Control	0.06 a	3.42 a	0.78 a	6.7 a
Light Fire	0.06 a	3.33 a	0.64 a	6.8 a
Moderate Fire	0.011 a	2.99 a	0.79 a	6.8 a
Severe Fire	0.011 a	3.49 a	0.75 a	6.8 a
P≤	0.1481	0.046	0.09	0.65
SE±	0.02	0.2	0.05	0.07
CV=	137	85	31	12

Table (2) Effect of Seasonality on Soil Nitrogen, Phosphorus, Organic carbon and soil pH overall treatments

<i>Seasons</i>	<i>Mean / content</i>	<i>%Nitrogen Mean Phosphorus content (ppm)</i>	<i>/ Mean / Organic content</i>	<i>%Mean /Soil pH</i>
May 2001	0.12 a	7.13 a	0.78 a	7.9 a
Nov 2001	0.06 a	6.63 a	0.74 a	7.8 a
May 2002	0.08 a	0.5 c	0.66 a	6.3 b
Nov 2002	0.06a	1.8 b	0.70 a	6.2 b
May 2003	0.07 a	2.32 b	0.80 a	6.3 b
Nov 2003	0.12 a	1.48 bc	0.75 a	6.2 b
P≤	0.376	0.0001	0.55	0.0001
SE±	0.02	0.2	0.06	0.09
CV=	137	85	31	12

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Study of Antepartum Haemorrhage & Its Maternal & Perinatal Outcome

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Abstract- TITLE: - STUDY OF ANTEPARTUM HAEMORRHAGE & ITS MATERNAL & PERINATAL OUTCOME

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AIMS & OBJECTIVE :- (I) To study factors association with Antepartum hemorrhage, (II) To study maternal morbidity and mortality due to A.P.H, (III) To study perinatal outcome in A.P.H

MATERIAL & METHOD :- In this study 100 cases of A.P.H admitted in Kamla Raja Hospital were studied and inclusion criteria of patients were Gestational age more than 28 wks with bleeding per Vaginum. All the cases were grouped as placenta previa, Accidental hemorrhage, local causes and unknown. The diagnosis was made on the basis of history, Clinical examination and few cases aided by ultrasonography.

RESULT:- Out of 100 cases of A.P.H., Placenta previa contributed to 71%, Abruptio placenta 27% and undetermined cause 2%. Maternal mortality out of 71 cases of placenta previa was 3 and 1 Abruptio placenta. Perinatal mortality was 12.69 in placenta previa and 18.52% in Abruptio placenta.

CONCLUSION:- APH is a major causes of maternal and perinatal morbidity and mortality which could be prevented by early registration, regular antenatal care, early detection of High risk cases, early referral to higher centre.

Index Terms- Antepartum haemorrhage, abruptio placentae, placenta praevia, post partum haemorrhage.

I. INTRODUCTION

Obstetric haemorrhage is one of the three leading causes of maternal deaths and is also a major cause of perinatal morbidity and mortality.

- ❖ Obstetric haemorrhage is responsible for 25-60% of maternal deaths.
- ❖ commonest single preventable cause of maternal death. Half of the cases are due to antepartum haemorrhage which continues to be one of the most common complication of pregnancy.
- ❖ APH occurs without warning signs.

In about 3% of pregnancies, significant bleeding from birth canal occurs after 28 weeks of gestation this is known as antepartum haemorrhage.

AIMS AND OBJECTIVE

- ❖ To study factors associated with antepartum haemorrhage.
- ❖ To study maternal morbidity and mortality due to A.P.H.
- ❖ To study perinatal outcome in A.P.H.

II. MATERIAL AND METHODS

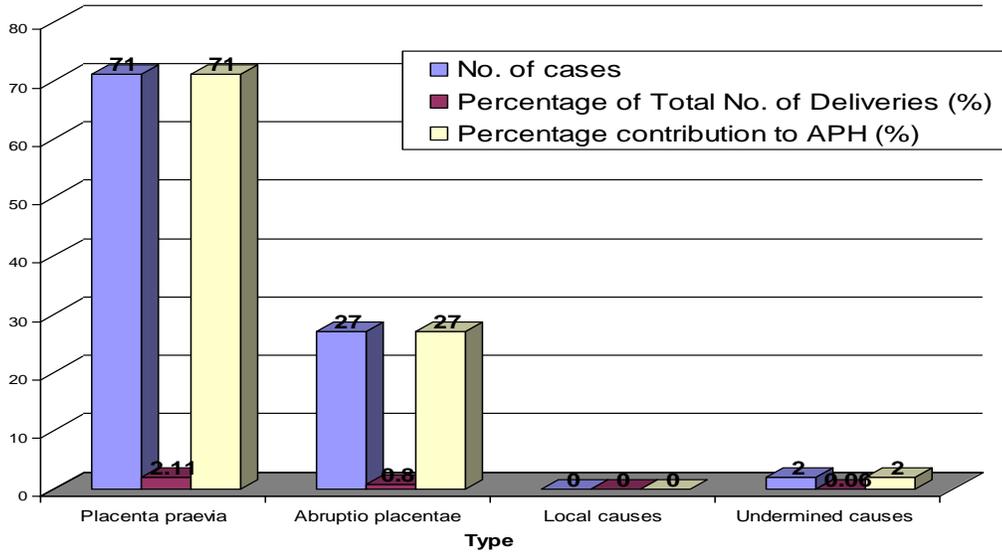
The material for this study comprises of 100 cases of antepartum haemorrhage admitted in Kamla Raja Hospital, Gwalior.

Inclusion Criteria:

1. Patients with bleeding per vagina after 28 weeks of gestation.
 - ❖ All the cases of haemorrhage in late pregnancy were grouped as – placenta praevia, accidental haemorrhage, local causes and unknown.
 - ❖ The diagnosis of all cases was made on the basis of history, clinical examination and a few cases aided by ultrasonography. There were 3369 deliveries from 1 Sept. to 30 Sept. 2010.

III. FIGURES

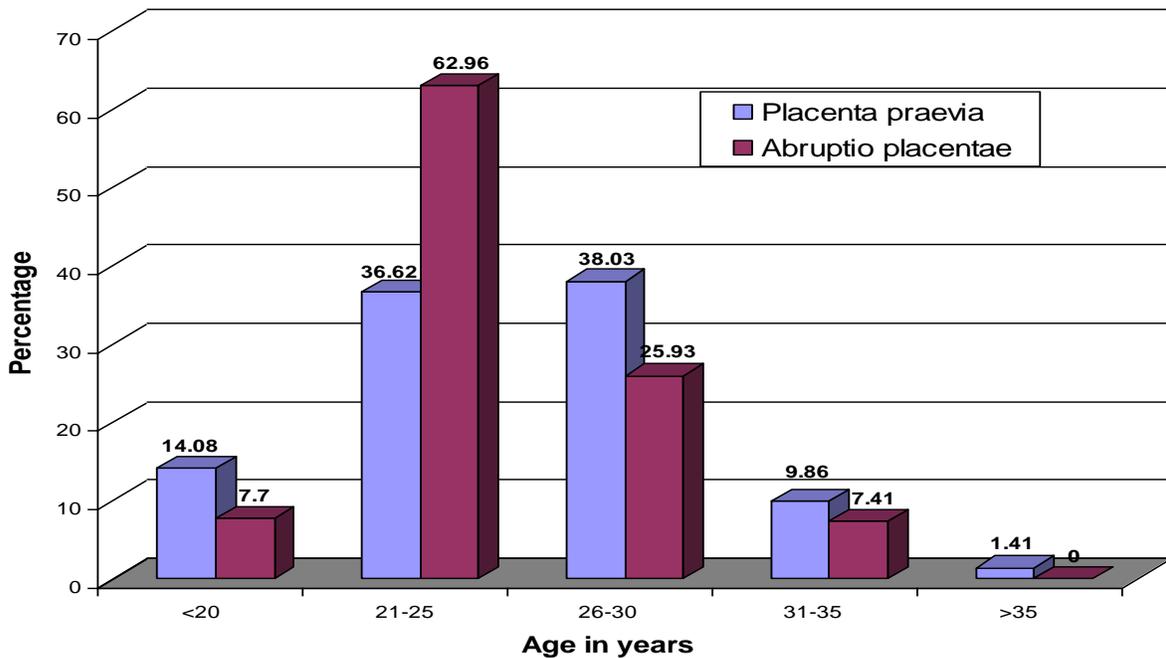
Distribution of Cases According to causes of APH



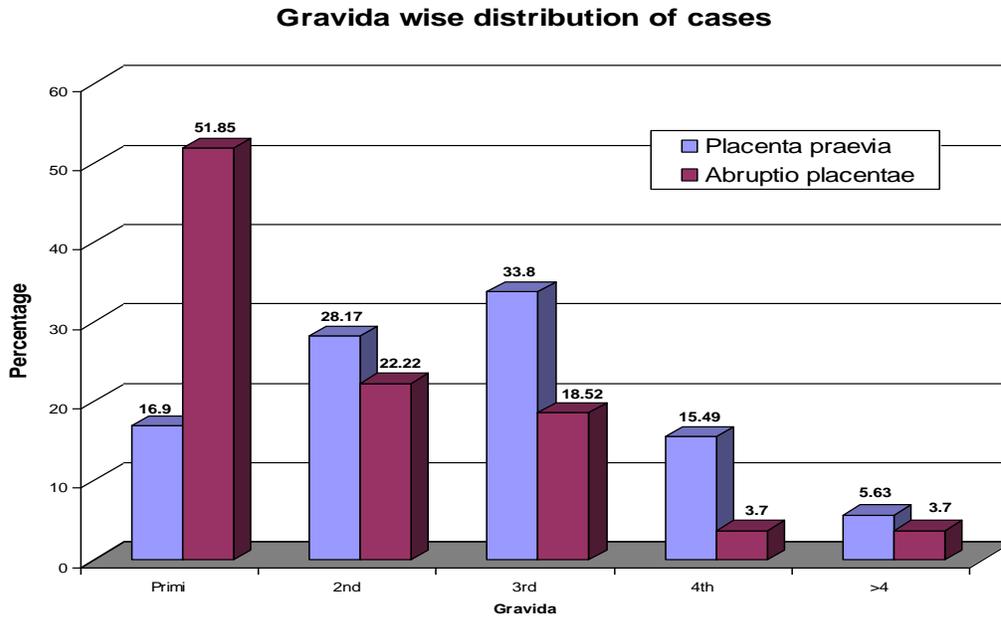
Out of 100 cases of APH there were 71 cases of placenta praevia giving incidence of 2.11%, 27 cases of abruptio placenta giving incidence of 0.80% and 2 cases of undetermined cause,

hence placenta praevia contributed to 71% of the total cases of APH, abruptio placentae 27% and undermined causes 2%.

Age wise Distribution of cases

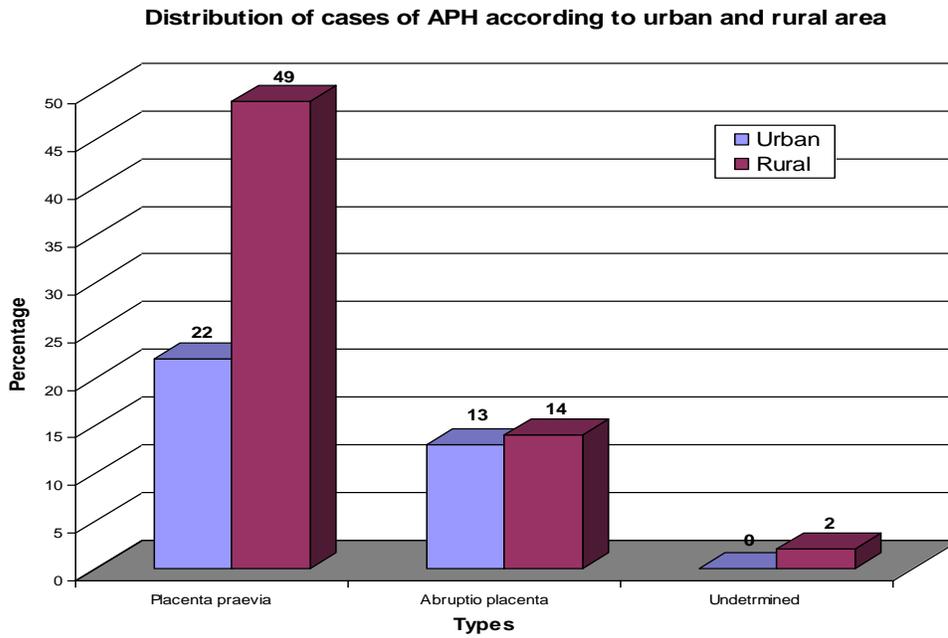


The table shows that incidence of placenta praevia is higher in age group. 26-30 yrs i.e. 38.03% and in abruptio placentae incidence was higher in age group 21-25 yrs.

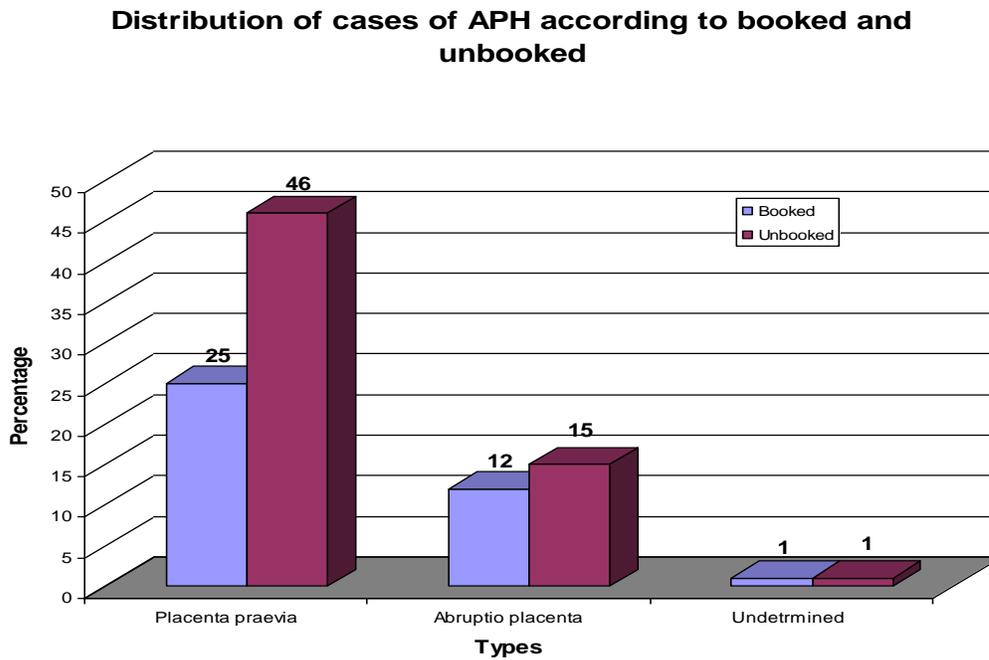


Incidence of APH due to placenta praevia was higher in 2nd and 3rd gravida patients 20 (28.17%) and 24(33.80%) cases

respectively and incidence of abruptio placentae is higher in primi and 2nd gravida 14(51.85%) and 6 (22.22%) cases respectively.

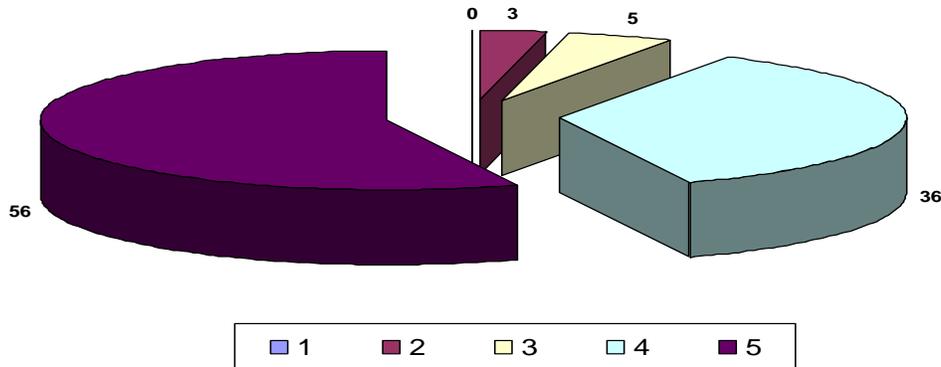


Majority of cases i.e. 65% of APH belonged from rural area
35% from urban area 35%.



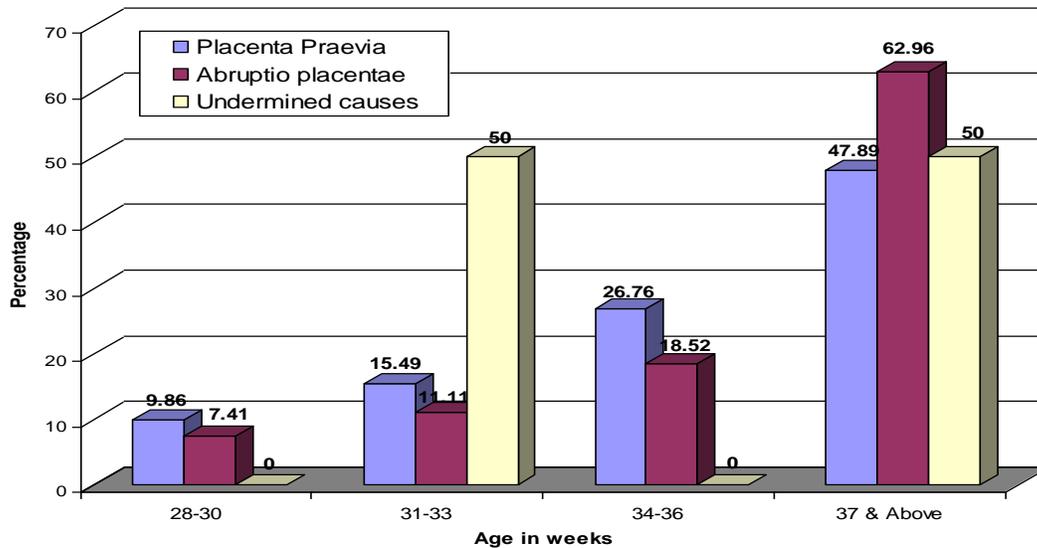
Majority of cases i.e. 62% of APH were unbooked
emergency cases and the of booked cases was 38%.

Distribution of cases according to socio-economic status (%)



The patients were graded according to kuppuswami's classification the maximum cases were in class 5 and 4 were 56% (56 cases) and 36% (36 cases) whereas, in category 2 and 3 were 3% (3 cases) and 5% (5 cases) respectively.

Distribution of cases according to gestational age at the time of admission

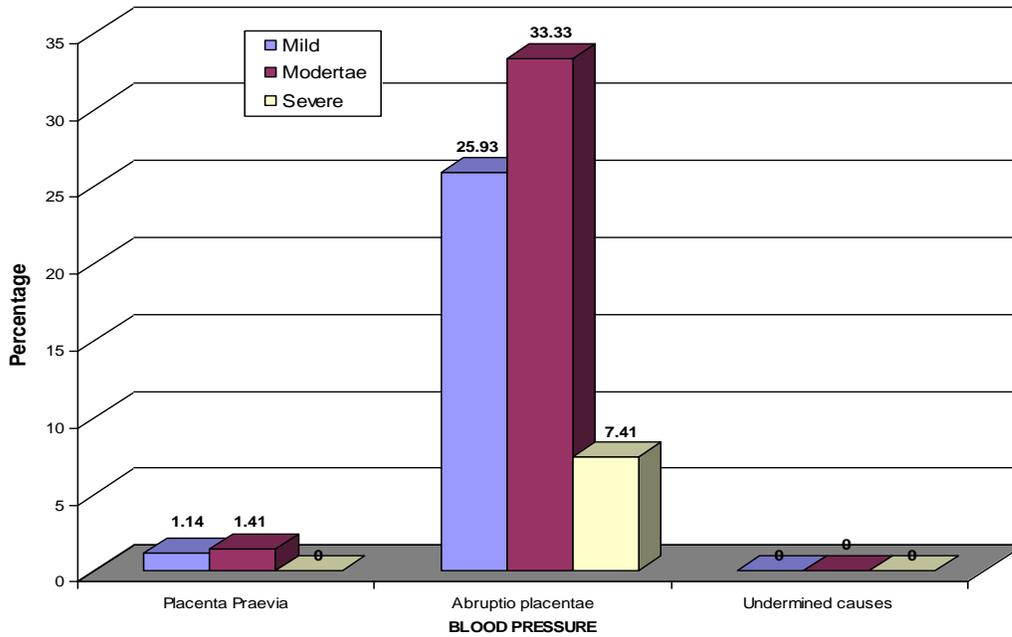


In cases of placenta praevia maximum number 37 cases i.e. 52.11% were below 37 weeks.

Hence chances of preterm delivery were much more in placenta praevia, however majority of cases, 17 cases of abruptio

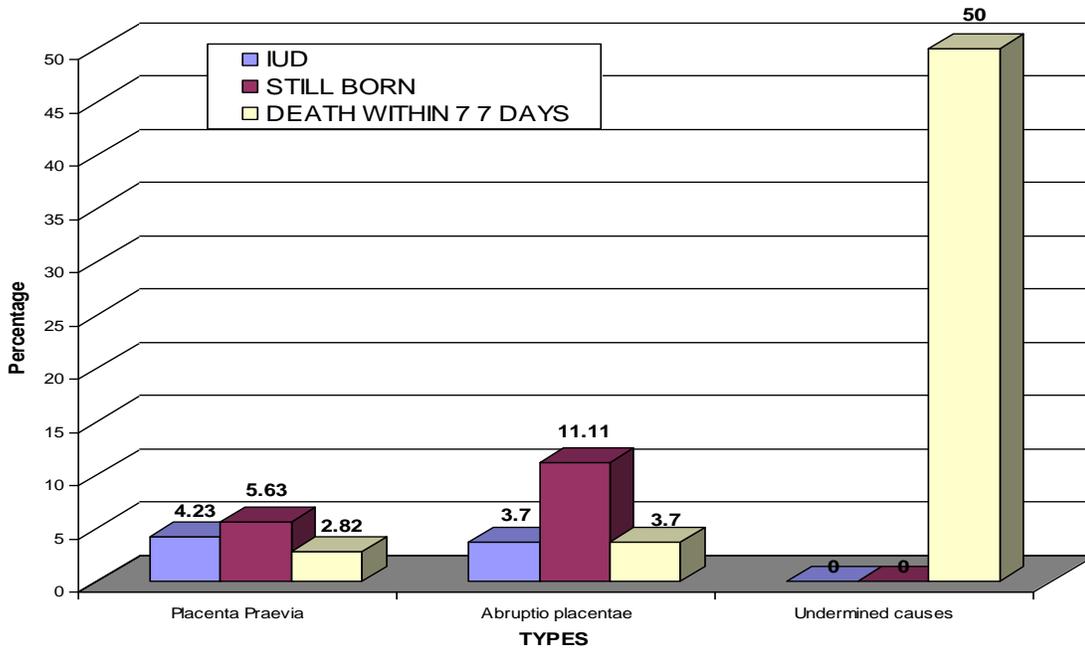
placenta were found to be 2 cases of undermined cause among which 1 was preterm and 1 was term.

DISTRIBUTION OF CASES OF APH WITH HYPERTENSION



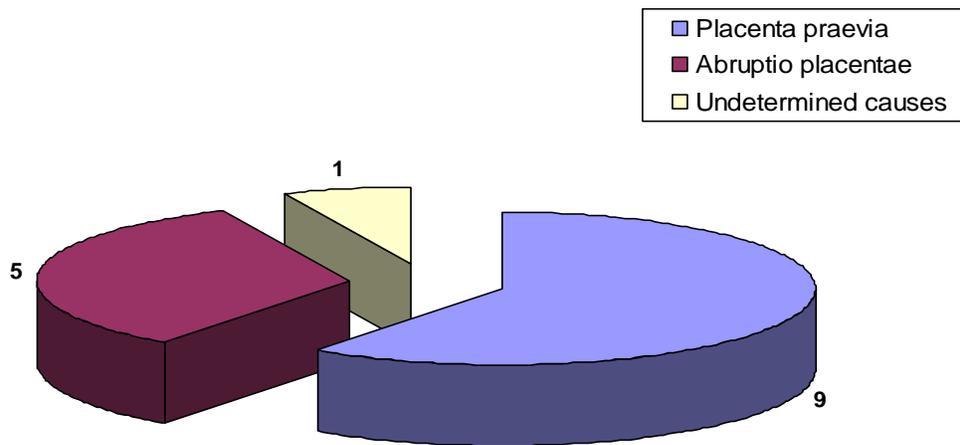
Hypertension was commonly associated with abruptio placentae.

PERINATAL OUTCOME IN CASES OF APH



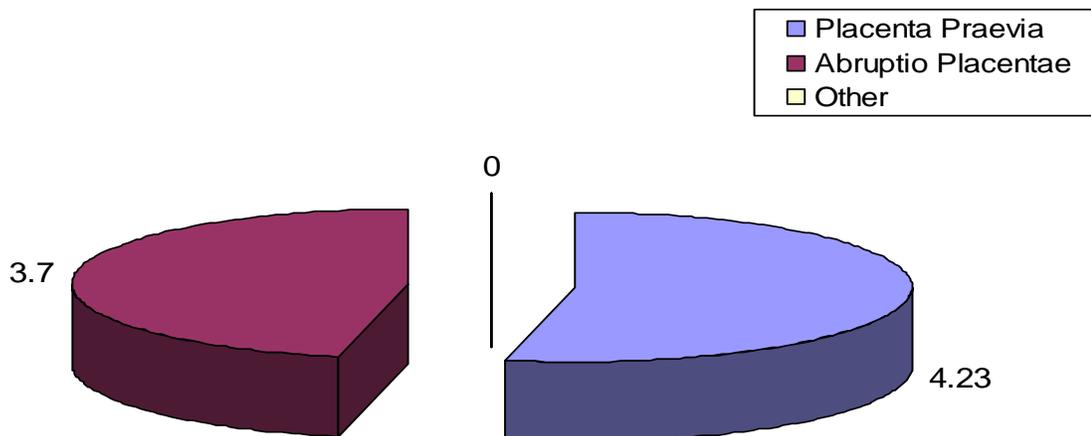
The perinatal mortality was 12.68% (9 cases) in placenta praevia and 18.52% (5 cases) in abruptio placentae. Thus prevalence LBW babies and preterm babies with low apgar score is high in cases of APH leading of high parinatal mortality.

PERINATAL MORTALITY IN CASES OF APH (%)



Perinatal mortality in case of APH is 15%.

METERNAL MORTALITY IN ANATEPARTUM HAEMORRAHAGE (%)



Out of 71 cases of placenta praevia 3 (4.23%) patients died of severe haemorrhage and hypovolumic shock. There was 1 death (3.70%) amongst 27 patients of abruptio placentae. The cause of death was uncontrolled PPH leading to coagulation disorder

IV. DISCUSSION

In present study there were 100 cases of APH. Out of 3369 deliveries giving incidence of 2.96%. This is similar to Feroza (1983) and Bhatt (1985)⁷. G. Roberts (1994)⁸. maximum cases of placenta praevia was in age 26-0 yrs. (3662%) which is similar to Penna and J.H. Pearee (1988)¹⁶. Nasreen (2003)¹³ studies.

Incidence of APH to be 82.1% in multigravida and 16.9% in primi. Hibbard reported 76% incidence in multipara. O'Donel

Browne, Menon (1990)¹⁵, BCP Chan (1999)³ high incidence in multipara.

71 cases of placenta praevia 3 had curettage following spontaneous abortion. Correlated with the study of Barrett (1981)². 9 cases of placenta praevia had 1 previous section and 5 had previous 2 section giving an incidence of 6.39% and 3.55% respectively which is similar to Clark et al⁴.

The incidence of placenta praevia type 1 is 9.5% type 2, 40.8%, type 3, 28.17% and type 4, 22.54 which is similar to P.N. Sura (1986)¹⁷, Nasreen (2003)¹³ and Bahar and Abusham (2009)¹ studies.

Malpresentation was seen in 25.36% cases which is similar to Macefee and Errol R. Norwitz (2010)¹² studies. In our study 94.37% cases of placenta praevia were delivered by C. section and 2.82% delivered spontaneously, similar to study done in SSG Hospital Baroda 1989¹⁹ and study by Nusrat Nisar 2009¹⁴.

In present study the incidence of PPH is 21.49% which is correlated with the study conducted by G. Roberts 1995⁹, Nasreen 2003¹³. Maternal mortality due to placenta praevia is 4.23% and due to abruption is 3.7%. Similar to study done by David K. Skinner 1991⁵, HA Mansouri 2001¹⁰ SAgauma Wiger 2002-04.¹⁸

The perinatal mortality in cases of placenta praevia is 12.6 and 18.5 is abruption placental, which is similar to study conducted in Women Hospital Madras 1990²⁰. David K. Skinner (1997)⁶.

V. RESULTS

Out of 100 cases of APH placenta praevia contributed to 71%, abruptio placenta 27% and undetermined caused to 2% of total cases of APH. Majority of cases i.e. 62% of APH were emergency cases and incidence of booked cases was 38%. Maternal mortality in APH showed out of 71 cases of placenta praevia 3 died of severe haemorrhage and 1 death in abruptio placentae. Perinatal mortality was 12.69 in placenta praevia and 18.52% in abruptio placentae. Prevalence of LBW babies and preterm babies is high.

VI. CONCLUSION

Antepartum haemorrhage is a major cause of maternal and perinatal morbidity and mortality which could be prevented by early registration, regular antenatal care, early detection of high risk cases, and early referral to higher centre. Good facilities for caesarean section, availability of blood banks. Use of contraceptives can improve maternal and perinatal outcome of APH.

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- [10] HA Mansouri (2001)
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- [12] Macefee and Errol R. Norwitz (2010)
- [13] Nasreen (2003)
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- [15] O'Donel Browne, Mennon (1990)
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- [17] PN Sura (1986)
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Preparation and Studies of Nanostructured Thin Films of $(\text{CdS})_{0.8}\text{Se}_{0.2}$

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Abstract- The $(\text{CdS})_{0.8}\text{Se}_{0.2}$ thin films were prepared through using thermal evaporation technique onto rotating microscopic glass substrate. The obtained samples are studied by X-ray Diffraction (XRD), Atomic Force Microscopy (AFM), Scanning Electron Microscopy (SEM), and UV-VIS Spectroscopy. The micro structural features are obtained with help of XRD pattern, which confirms the films are polycrystalline in nature having hexagonal structure. The AFM images revealed that, sample consists of well defined nano sized grains with almost uniform size distribution. SEM observation depicts the uniform distribution of grains and all the grains are spherical in nature. The absorbance spectrum exhibits absorption to be dominating mainly in visible spectrum. The variation of optical band gap was represented as a function of thickness.

Index Terms- XRD, AFM, SEM, UV-VIS

I. INTRODUCTION

The II-VI group semiconductor especially cadmium sulphoselenium is an important alloy with excellent properties like, good photo conductivity material, response time and band gap [1]. In $\text{CdS}_{1-x}\text{Se}_x$ the band gap and physical properties can be tailored by doping concentration of Se. [2]. The ternary CdS-Se alloy is found to be an important semiconductor material in wide industrial application because of their excellent optical and mechanical properties. Commercially, this material is used for optical filters, LSI circuits, Discrete and multi element photo resistor, signal memory device, optoelectronic switches, LIS integration, electro photography [3], optical wave guide [4], temperature fiber sensor [5], sharp-cut filter [6], and photo voltaic cell [7], etc.

The thin film synthesis technique affects the properties of the films. There are various techniques which are involved to prepare CdS thin films such as, vacuum evaporation [8] chemical deposition [9], screen printing [10], sputtering [11] and electro-deposition [12]. The vacuum evaporation is a very reliable technique for synthesis of thin film. The thin films prepared by vacuum evaporation technique are uniformed with excellent crystallinity, dense and highly oriented. The qualities and properties of film mainly depend upon pressure, deposition rate, substrate temperature and thickness of the film [13].

In the present work we have synthesized the $(\text{CdS})_{0.8}\text{Se}_{0.2}$ alloy films using thermal evaporation techniques and further investigated the structural, micro graphical and optical properties

of the films to employ this material for the production of photovoltaic devices.

II. RESEARCH ELABORATION

Preparation of Alloy

The ternary alloy of $(\text{CdS})_{0.8}\text{Se}_{0.2}$ compound were obtained melt quench method, by taking appropriate amount of 99.999% pure CdS and Se in an evacuated quartz ampoule. The ampoule with the charge was then sealed under a pressure of 10-6 mbar and was placed in rotating furnace. The temperature of the furnace was raised gradually to 1173 °K and left at this temperature for about 12 hrs. Well mixed charges were then quenched in an ice bath. The $(\text{CdS})_{0.8}\text{Se}_{0.2}$ ingot was taken out from the ampoule and made into fine powder and used for film preparation

Synthesis of Thin Film

The films of Cadmium Sulphoselenium $(\text{CdS})_{0.8}\text{Se}_{0.2}$ were grown by thermal evaporation technique under pressure of 10^{-5} torr. The source to substrate distance was kept 14 cm. The samples of different thicknesses were deposited under similar conditions. The thickness of the films was monitored by quartz crystal thickness monitor model No. DTM-101 provided by Hind-Hi Vac. The deposition rate was maintained 8-10 Å/sec throughout sample preparation. Before evaporation, the glass substrates were cleaned throughout using concentrated chromic acid, detergent and acetone.

X – Ray analysis were done using Bruker diffractometer with $\text{CuK}\alpha$ line. The scanning angle (2θ) range was from $20^\circ - 80^\circ$. Surface morphological study of deposited films was carried out by using Scanning Electron Microscope (Zeiss EVO 50), operating with an accelerating voltage 10 KV and Atomic Force Microscopy (AFM). The elemental analysis of the sample was carried out by EDAX (Energy dispersive X-ray Analyzer) technique attached with SEM. The optical absorption spectrums were recorded within the range of 200-900 nm wavelength with the help of UV-VIS Spectrophotometer (Shimadzu – 2600).

III. RESULTS

1. XRD

Figure 1 shows the XRD pattern of $(\text{CdS})_{0.8}\text{Se}_{0.2}$ thin film having thickness of 3000\AA .

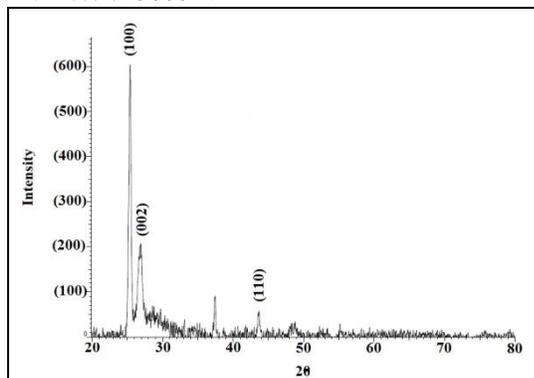


Figure 1 XRD Pattern of $(\text{CdS})_{0.8}\text{Se}_{0.2}$ Thin Film

The 2θ peaks observed at 24.8 and 27.8 exhibit the formation of the hexagonal phase of $(\text{CdS})_{0.8}\text{Se}_{0.2}$ which correspond to the (100), (101) planes of reflections. The presence of multiple peaks indicates that the films are polycrystalline in nature. The strong and sharp diffraction peaks show the formation of well crystalline sample. The intensity of the peaks depends on crystalline quality. The average grain size is found to be 251.6\AA by Debye - Scherrer formula,

$$d = \frac{0.94 \lambda}{\beta \cos \theta}$$

Where λ is the wavelength of X-Ray source, θ is the diffraction angle, β is Full Width Half Maxima. The value of the lattice parameters obtained from the analysis of x-ray diffraction pattern is $a = 4.15\text{\AA}$, $c = 6.76$ and unit cell volume was estimated as 101.08\AA^3 .

2. AFM

The surface topology and roughness was studied with the help of AFM. Figure 2 shows 3D image of sample surface with 100\mu m^2 areas.

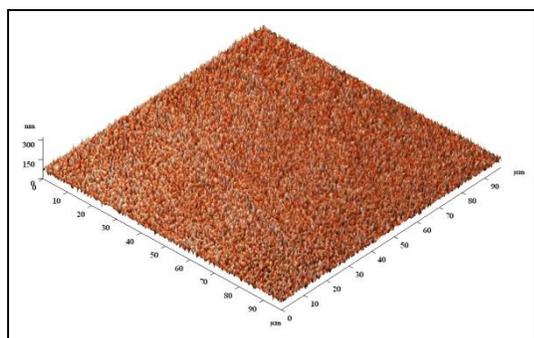


Figure 2 AFM of $(\text{CdS})_{0.8}\text{Se}_{0.2}$ Thin Film

The image shows well defined particle somewhat elongated morphology. It should be noted that both height and diameter of islands are of the order of same size. The root mean square value of the surface roughness of the films from different area of the film was calculated. It was observed that the surface roughness

of the film is 16nm . This observation infers that the film surface is smooth.

3. SEM:

The SEM micrograph of $(\text{CdS})_{0.8}\text{Se}_{0.2}$ Thin Film is shown in figure 3.

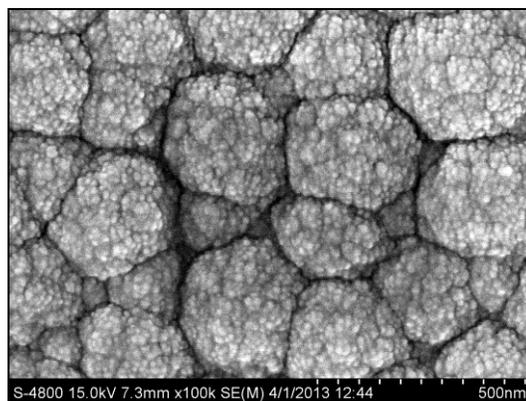


Figure 3 SEM image of $(\text{CdS})_{0.8}\text{Se}_{0.2}$ Thin Film

SEM images of $(\text{CdS})_{0.8}\text{Se}_{0.2}$ Thin Film on the glass substrates reveals the uniform distribution of spherical grains over total coverage of the surface of the substrate. The surface showing uniform and smooth spherical grains without any defects like cracks and pinholes. The average microcrystalline size was found to be within the range of $170\text{--}221\text{nm}$. On the other hand crystalline dimension of the same sample as determined by using XRD analysis is 251nm .

4. EDAX:

The elemental composition of $(\text{CdS})_{0.8}\text{Se}_{0.2}$ Thin Film was determined by using Energy Dispersive Analysis by X rays, attached with SEM, is shown in figure 4.

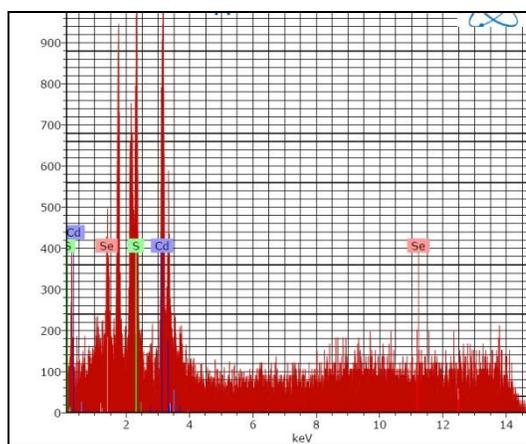


Figure 4 EDAX Pattern of $(\text{CdS})_{0.8}\text{Se}_{0.2}$ Thin Film

The average atomic percentage of Cd, S and Se was found to be $(44.49) : (46.83) : (8.68)$ respectively. The presence of other peaks in spectrum is may probably result from glass used as substrate.

5. UV-VIS:

The optical band gap of the films was estimated with the help of absorbance and transmittance spectra recorded in 200-900 nm wavelength range by employing a Shimadzu 2600 UV-VIS Spectrophotometer.

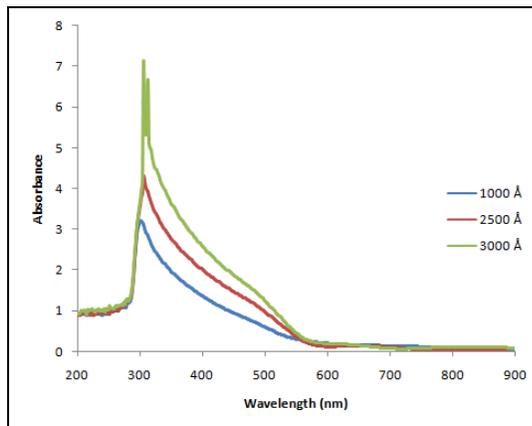


Figure 5 Absorbance Spectra of $(\text{CdS})_{0.8}\text{Se}_{0.2}$ Thin Film

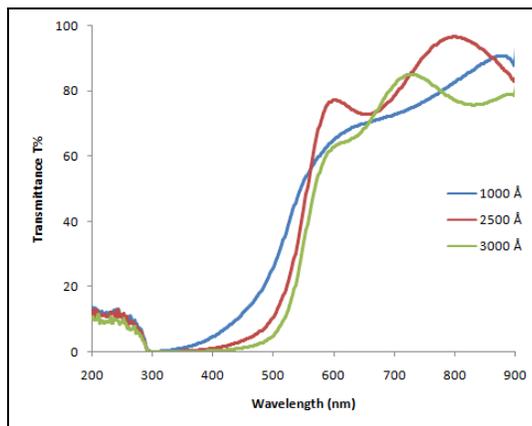


Figure 6 Transmittance Spectra of $(\text{CdS})_{0.8}\text{Se}_{0.2}$ Thin Film

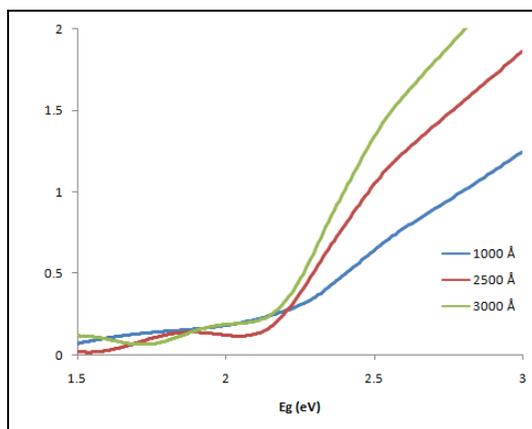


Figure 7 Plot of Energy Band Gap of $(\text{CdS})_{0.8}\text{Se}_{0.2}$ Thin Film

It is observed that the absorbance of the $(\text{CdS})_{0.8}\text{Se}_{0.2}$ films enhance continually from the near IR towards the visible region. The highest absorbance is found at wavelength near 300 nm. It is observed that as deposited $(\text{CdS})_{0.8}\text{Se}_{0.2}$ thin films have lower transmittance in the UV visible region and moderate to higher transmittance in the IR region as shown in Figure 6. This higher

transmittance of $(\text{CdS})_{0.8}\text{Se}_{0.2}$ films makes it suitable as a window material for fabrication of PV devices. The band gap energy (E_g) of $(\text{CdS})_{0.8}\text{Se}_{0.2}$ thin films were obtained from absorbance spectra for the corresponding wavelength graphs as shown in figure 7. The estimated value of the band gap energy is 2.0 – 2.2 eV.

IV. CONCLUSION

The XRD study illustrates the formation of polycrystalline $(\text{CdS})_{0.8}\text{Se}_{0.2}$ thin film having hexagonal structure. The AFM images reveals that, sample consists of well defined nano sized elongated grains with almost uniform size distribution while SEM reveals that films were uniformly deposited over the substrate and particles were found to be spherical in shape. The presence of elemental constituents was confirmed with the help of EDAX spectrum. The optical band gap of the sample varies from 2.0 to 2.2 eV which can be used for efficient photo voltaic devices.

V. Acknowledgement:

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Construction of Positivity in Indian Scenario

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Abstract- Positivity refers to the degree to which something is positive or the quality or state of being positive. Positivity is that which accepts the world as it is, takes inspiration from it and sees the brighter side of it.

Positive Psychology, a newly developed branch of Psychology, is an evolving branch of psychology developed by Martin Seligman and Mihaly Csikszentmihalyi in 1998. It was developed in order to get an insight and understanding in to various dimensions of the concept of positivity. The aim of this branch of psychology was summed up by its authors in the following words:

“We believe that a psychology of positive human functioning will arise that achieve a scientific understanding and effective interventions to build thriving in individuals, families and communities.”

Positive psychologists seek to find and nurture genius and talent and to make normal life more fulfilling rather than treating mental illness.

The paper deals with a study carried out on Indian adults (both young and middle-aged males and females) to understand what constitutes as ‘positive’ in their lives with respect to their country, culture, education, family and relationships, life-style and changing trends, personal experiences, technology and sports. Open ended personal interviews of the sample were taken. The sample comprised of 80 subjects with the age group of youngsters ranging between 18-25, while that of the older group between 40-55 years. The content analysis of the interviews was done to understand the positivity in Indian perspective.

The above study yielded a pleasantly surprising result—the common perception that we as a society are extremely negative and cynical in our attitude was found out to be completely untrue.

Index Terms- Positivity, Positive Psychology, Social Constructionism, India

I. INTRODUCTION

Positivity refers to the degree to which something is positive or the quality or state of being positive. Positivity is that which accepts the world as it is, takes inspiration from it and sees the brighter side of it.

In order to get an insight and understanding in to various dimensions of the concept of positivity a branch of psychology has been developed recently and is christened positive psychology

Positive Psychology is an evolving branch of psychology, which has been aptly summed up by Martin Seligman and Mihaly Csikszentmihalyi in the following words : "We believe that a psychology of positive human functioning will arise that achieves a scientific understanding and effective interventions to build thriving in individuals, families, and communities."^[1] Positive psychologists seek "to find and nurture genius and talent", and "to make normal life more fulfilling",^[2] not simply to treat mental illness.

Positive Psychology is intended to complement, not to replace traditional psychology. It does not seek to deny the importance of studying how things go wrong, but rather to emphasize the importance of using the scientific method to determine how things go right. Researchers in the field analyze things like states of pleasure or flow, values, virtues, talents, as well the ways that they can be promoted by social systems and institutions.^[3]

Positive Psychologists are concerned with four topics:

- 1) Positive experiences

- 2) Enduring psychological traits
- 3) Positive relationships
- 4) Positive institutions

Seligman and Csikszentmihalyi define positive psychology as the “the scientific study of positive human functioning and flourishing on multiple levels that includes the biological, personal, relational, institutional, cultural and global dimensions of life.”^[4]

L.M. Keyes and Shane Lopez illustrate the four typologies of mental health functioning, flourishing, struggling, floundering and languishing. However complete mental health is combination of high emotional well-being, high psychological well-being and high social well-being along with low mental illness.^[5]

Historical Background

The history of positivity is ancient, even though the term “positivity” was not used in those days. Socrates advocated self-knowledge as the path to happiness. Plato's allegory of the cave influenced western thinkers who believed that happiness is found by finding deeper meaning. Aristotle believed happiness, or eudaimonia is constituted by rational activity in accordance with virtue over a complete life. The Epicureans believed in reaching happiness through the enjoyment of simple pleasures. The Stoics believed they could remain happy by being objective and reasonable, and described many "spiritual exercises" comparable to the psychological exercises employed in cognitive behavioral therapy and positive psychology.

Several humanistic psychologists of the 20th century—such as Abraham Maslow, Carl Rogers, and Erich Fromm—developed theories and practices that involved human happiness. Recently the theories of human flourishing developed by these humanistic psychologists have found empirical support from studies by positive psychologists. Positive psychology has also moved ahead in a number of new directions.

Positive psychology began as a new area of psychology in 1998 when Martin Seligman, considered the father of the modern positive psychology movement,^[6] chose it as the theme for his term as president of the American Psychological Association,^[7] though the term originates with Maslow, in his 1954 book *Motivation and Personality*,^[8] and there have been indications that psychologists since the 1950s have been increasingly focused on promoting mental health rather than merely treating illness.^{[9][10]} Seligman pointed out that for the half century clinical psychology "has been consumed by a single topic only - mental illness",^[11] echoing Maslow's comments.^[12] He urged psychologists to continue the earlier missions of psychology of nurturing talent and improving normal life.^[2]

The first positive psychology summit took place in 1999. The First International Conference on Positive Psychology took place in 2002.^[2] More attention was given by the general public in 2006 when, using the same framework, a course at Harvard University became particularly popular.^[13] In June 2009, the First World Congress on Positive Psychology took place.^[14]

Social Constructionism

Social constructionism and social constructivism are sociological theories of knowledge that consider how social phenomena or objects of consciousness develop in social contexts. A social construction (social construct) is a concept or practice that is the construct (or artifact) of a particular group. When we say that something is socially constructed, we are focusing on its dependence on contingent variables of our social selves rather than any inherent quality that it possesses in itself. The underlying assumptions on which social constructivism is typically seen to be based are reality, knowledge, and learning.^{[15] [16]}

Social constructionists posit that there is no real reality. All reality is socially constructed. Social construction takes place in our day to day interactions with others. Hence what we consider as real is the outcome of various social processes. E.g. - Negotiation, communication and reflections, etc. This process is very forceful in framing our cognitions and taking things accordingly. Repeated exposure and social construction help us to believe that only our construction of reality is unique and formulated in this fashion. Even we construct the meaning of our experiences and believe that these are our 'real' experiences.

A common perception among the masses is that the country and the society are going down abyss with rampant corruption, crime, inequality and injustice being the order of day. The major reason for such an attitude is the media that more often than not thrives by publishing negative stories. This study was conducted to determine if this concept of social constructivism holds true in the present scenario.

II RESEARCH ELABORATION

Objective : To find out about the positive aspects of modern life among adult (youth and middle aged persons, old persons).

Method

Sample : The sample comprised of 80 adults (both males and females) with the age group of youngsters varying from 18 to 25 years, while that of the older group between 40 to 55 years. The sample was urban and educated, and the socio-economic status of the sample was middle middle-class to upper middle-class. There were 40 females and 40 males. The young group was mostly students while 5 participants were working. The older group comprised of working women, housewives and employed males in different fields. The participants were selected on the basis of their agreement towards sparing time for this study.

Procedure : The tools for data collection were open ended interviews. The interviewees were told of how different events unfolded in our day to day life, and how we sometimes take them very seriously particularly when they impact our lives. Besides this, they were told about several other national events that were occurring in the country in which their role is negligible as they weren't directly involved. Even in such case, there are positive and negative impacts, we feed on ourselves and others. In our day to day interaction with others we often engage in discussing many things and they shape our views about those events. More often than not, we discuss the negativities. For example—when we discuss our politicians or even our neighbor, we are tempted to highlight negative aspects and ignore the positives. In this context, I would like you to see what positive things are happening in your life and in the country as a whole.

The participant were asked what aspect of their life they view as positive with respect to culture, family, relationships, country development, changing trends, lifestyles, technology, education, personal experiences, religion etc. etc. Indepth interviews were taken and the participants were encouraged to share their views about positivity in whatever area or field they like without restricting them to aforementioned areas.

III RESULTS

Analysis and Discussion

Content analysis of the interviewees was done. The interviewees were read and categories of the responses were generated. After reading the interviews many times, the general categories gradually became more crystal and general categories emerged. Some categories were clubbed into one and some broad categories were subdivided into sub-categories. Response of youngsters and middle-aged participants were also studied to see if there was any difference in their responses on positivity, and if there were then which category did they belong to. The responses of males and females as separate groups were also analyzed.

The eight categories which finally emerged from the content analysis of interviewees:

- 1) Country
- 2) Culture
- 3) Education
- 4) Family and Relationships
- 5) Lifestyle and Changing trends
- 6) Personal Experiences
- 7) Technology
- 8) Sports

The responses of the participants in each category are as follows:

1) *Country:* Almost 65% of the participants agreed that there has been a positive growth in the country over the years. As a whole roads, infrastructure, education, health-standards have improved significantly. Our country has a strong army capable of defending our sovereignty come what may; we are far far ahead of other countries in the subcontinent in almost every field. People have been empowered with new schemes, the Right To Information Act being perhaps the most important among the many reforms introduced. The Medical facilities in India are extremely good and the average life-expectancy has increased considerably, while the mortality rate has gone down. At the end of the day, even after all the shortcomings of our country, the general perception for the country's present and future is positive and upbeat.

2) Culture: The response of the younger and older group was quite different varied and interesting on the topic of culture. Around 55% of the respondents had positive outlook towards their culture and traditions. Younger group showed positivity towards their cultural traditions (such as “*Garbha*”, an Indian folk dance), while the older generation stressed on the religious traditions (such as ‘*Satsang*’, a religious gathering), Art and Drama. Both the groups however showed commonalities in their liking for festivals, marriage traditions and Yoga. A few differences between the two groups on how these traditions and rituals should be performed was observed.

3) Education: The responses of the participants were very positive for this category. Almost everyone viz. 95% of the participants agreed that education has brought a tremendous change in the present scenario. Women participants were very enthusiastic about the increasing literacy rate especially among females. Everyone agreed that villagers are also becoming more aware towards the importance of education, and the literacy rates among them have gone up considerably. Schemes like “*School Chalein Hum*” (“Lets go to school”) are very effective. Participants agreed that there was ample scope for excelling in life with proper education, notwithstanding the person’s financial standing in the society. Social ills such as Child Marriage, Dowry, Cast Divisions, etc. are also decreasing with increased awareness due to education. However, 2 elder participants said that modern education system was also eroding the established moral value-systems.

4) Family and Relationships: The responses of the participants were mixed in this category. 75% of the respondents were positive and upbeat about their family and relationship structures. The older group saw less positivity than the younger lot. Younger females stated that there is more freedom, equality and frankness in parent-child /husband-wife relationship. Freedom of speech has increased and females can be financially independent. The responses of males and females were a bit different when it came to family life (Ex-- Females were more happy about nuclear families). But both the groups saw positivity in Indian family structure and value system. Everybody agreed that India’s strong family-values are one of its major strengths and asset.

5) Life-Style and Changing Trends: Our society and culture is a reality. About 90% of the respondents viewed their current Lifestyle and changing trends positively. The participants highlighted tremendous improvement in the medical facilities as a major barometer for this positivity. The life-style has improved—even a domestic help can buy a one rupee shampoo. Every person is better dressed that they used to be a generation ago. The younger group was particularly impressed with the culture of malls and multiplexes. People have become more aware about health and fitness. Elder people are now very careful and aware about their health and go for regular check-ups. Everyone wants to have a secure old age.

6) Personal Experiences: This is the most varied category with the participants giving many interesting views. 60% of the respondents had a positive outlook about their personal experiences. Some respondents saw positivity in beauty and spirituality. A respondent explained how he liked to work on his own creations (such as opera) and see the results of his work. One of the participant enjoyed playing football in the rains. Experiences of honesty were memorable for most respondents. A particular respondent narrated how an auto-driver returned her handbag that she had left in the auto. Others found positivity in feeding animals, doing social work, listening to *satsangs*, etc.

7) Sports: This perhaps is the least appreciated category on the positivity scale. 50% of the respondents, mainly youngsters showed positivity in this category. Younger group was very enthusiastic about sports especially cricket. But sadly apart from cricket, only the names of Saina Nahewal (Indian badminton champion) and Sania Mirza (Indian tennis player) awoke some interest in the younger group. The younger group stressed that sport complexes were being opened across India which would provide new opportunities to budding sportsmen. In totality, both the groups appreciated sports—mainly cricket (though the older group criticized the private cricketing ventures such as IPL as a waste of time).

8) Technology: Technology is undoubtedly modern India’s most positive story. Almost all the respondents i.e. 98% were very happy with the advances in this field and agreed that it had brought about a lot of positivity in their day-to-day life. The use of mobile phones, internet, and computers has made life much easier and interesting. Females were happy about the positive role of technology (such as mixer-grinder, washing machines, microwave, vacuum cleaners, etc.) in easing the burden of house-hold chores. The advent of internet railway ticket booking has made travel much more easier task for the common people.

IV CONCLUSION

The above study yielded a pleasantly surprising result—the common perception that we as a society are extremely negative and cynical in our attitude was found out to be completely untrue. Infact, the general attitude of the respondents was pretty positive towards almost all aspects of life.

Hence the study negates the long-held view that Indians by and large are cynical and unappreciative people. Moreover, the basic statement of Social Constructivism that “*reality is relational*” finds support in this study. However positivity and negativity aren’t very stable, these categories emerge and re-emerge in various social processes.

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Security Aware Congestion Control Mechanism on SPLIT-TCP over MANETs

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Abstract- Wireless Ad hoc Networks TCP wrongly attributes packet losses due to the high Bit Error Rate (BER) location-dependent contention, unidirectional links, dynamic topology and the inherent fading properties of the wireless channel to as congestion. It causes an overall degradation of throughput; it especially affects connections with a large number of hops, where link failures are more likely. A number of cross layer solutions such as TCP-F, TCP-ELFN, ATCP, TCP-Bus and SPLIT-TCP has been proposed. Among them Split-TCP is well suited because this scheme converts longer TCP connections to multiple shorter TCP connection, in order to achieve greater Throughput. Another major issue at transport layer is security and few solutions has been proposed so far to provide secure communication and congestion control at the Transport Layer. In this paper we have proposed a security aware congestion control mechanism for MANETs that not only improves performance using SPLIT-TCP but also provide security at Transport Layer.

Index Terms- Split-TCP, ARAN, Congestion Control, Security

I. INTRODUCTION

The objectives of TCP-like Transport layer protocols in MANET include setting up of end-to-end connection, end-to-end reliable delivery of packets, flow control, congestion control, clearing of end-to-end connection. Similar to TCP protocols in the Internet, the mobile node is vulnerable to the classic SYN flooding attack or session hijacking attacks. However, a MANET has a higher channel error rate when compared with wired networks. Because TCP does not have any mechanism to distinguish between whether a loss was caused by congestion, random error, or malicious attacks, TCP multiplicatively decreases its congestion window upon experiencing losses, which degrades network performance significantly [1].

SYN flooding attack: The SYN flooding attack is a denial-of-service attack. The attacker creates a large number of half-opened TCP connections with a victim node, but never completes the handshake to fully open the connection. For two nodes to communicate using TCP, they must first establish a TCP connection using a three-way handshake. The three messages exchanged during the handshake, illustrated in Figure 1, allow both nodes to learn that the other is ready to communicate and to agree on initial sequence numbers for the conversation. During the attack, a malicious node sends a large amount of SYN packets to a victim node, spoofing the return addresses of the

SYN packets. The SYNACK packets are sent out from the victim right after it receives the SYN packets from the attacker and then the victim waits for the response of ACK packet. Without any response of ACK packets, the half-open data structure remains in the victim node. If the victim node stores these half-opened connections in a fixed-size table while it awaits the acknowledgement of the three-way handshake, all of these pending connections could overflow the buffer, and the victim node would not be able to accept any other legitimate attempts to open a connection.

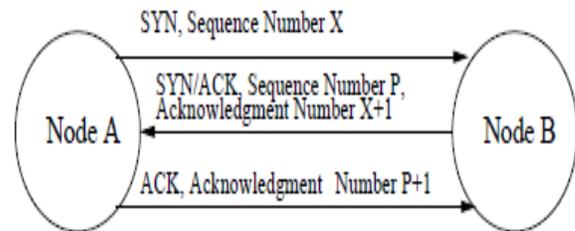


Figure 1: TCP Three-way Handshake

Normally there is a time-out associated with a pending connection, so the half-open connections will eventually expire and the victim node will recover. However, malicious nodes can simply continue sending packets that request new connections faster than the expiration of pending connections [2].

Session hijacking: Session hijacking takes advantage of the fact that most communications are protected (by providing credentials) at session setup, but not thereafter. In the TCP session hijacking attack, the attacker spoofs the victim's IP address, determines the correct sequence number that is expected by the target, and then performs a DoS attack on the victim. Thus the attacker impersonates the victim node and continues the session with the target. The TCP ACK storm problem, illustrated in Figure 2, could be created when an attacker launches a TCP session hijacking attack. The attacker sends injected session data, and node A will acknowledge the receipt of the data by sending an ACK packet to node B. This packet will not contain a sequence number that node B is expecting, so when node B receives this packet, it will try to resynchronize the TCP session with node A by sending it an ACK packet with the sequence number that it is expecting. The cycle goes on and on, and the ACK packets passing back and forth create an ACK storm. Hijacking a session over UDP is the same as over TCP, except that UDP attackers do not have to worry about the overhead of managing sequence numbers and other TCP mechanisms. Since

UDP is connectionless, edging into a session without being detected is much easier than the TCP session attacks. The rest of this paper is organized as follows. Section 2 covers an overview of SPLIT-TCP and ARAN protocols, Section 3 summarizes related work, Section 4 discuss proposed mechanism that degrade congestion and provide security, Section 5, simulation analysis and result discussion is presented and Section 6 concludes this paper with discussions.

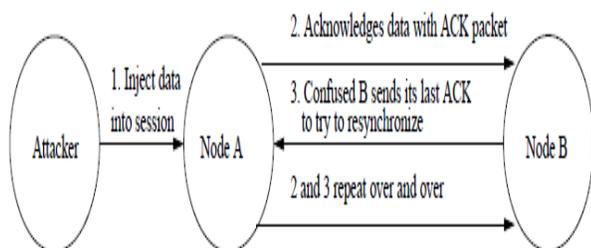


Figure 2: TCP ACK Storm

II. OVERVIEW OF SPLIT-TCP AND ARAN SECURITY PROTOCOL

In this paper, we have proposed a Security Aware Congestion Control Mechanism that consists two modules Split-TCP and ARAN. The Split-TCP is used to reduce delay and to provide security ARAN security protocol has been embed with it.

2.1 SPLIT-TCP

In ad hoc networks, traditional TCP protocol cannot handle node mobility well. Due to mobility of nodes frequent links break, lot of packet losses (until the routing layer discovers a new route). Furthermore, as the number of hops on a path increases, the probability of a link failure on the path increases. This implies that shorter TCP connections enjoy an unfair advantage in throughput as compared with longer connections. So this give birth to new enhanced TCP protocol i.e. Split-TCP. In Split-TCP [3] provides a unique solution to this problem by splitting the transport layer objectives into congestion control and end-to-end reliability. In the ad hoc wireless networks environment, congestion control demands local solutions. At the same time, reliability is an end-to-end requirement and needs end-to-end acknowledgments. Split-TCP splits a long TCP connection into a set of short concatenated TCP connections with a number of selected intermediate nodes (known as proxy nodes) as terminating points of these short connections. Figure 3 illustrates the operation of split-TCP where a three segment split-TCP connection exists between source node 1 and destination node 15. For any TCP connection, [4] certain nodes along the route take up the role of being proxies for that connection.

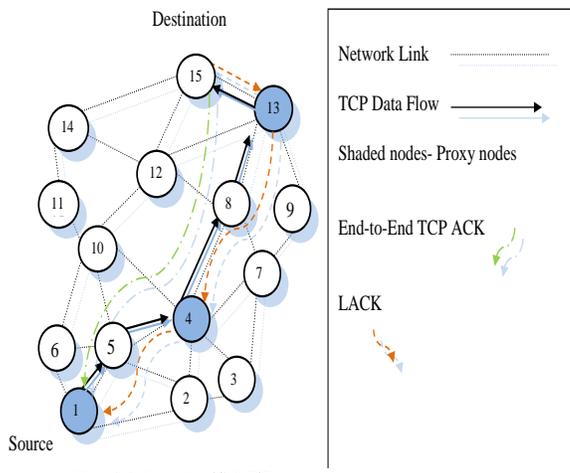


Figure 3: An illustration of Split-TCP

A proxy node receives the TCP packets, reads its contents, stores it in local buffer, and sends an acknowledgement to the source (or the previous proxy). This acknowledgement called local acknowledgement (LACK) does not guarantee end-to-end delivery. The responsibility of further delivery of packets is assigned to the proxy nodes. A proxy node clears a buffered packet once it receives LACK from the immediate successor proxy nodes for that packet. Split-TCP maintains the end-to-end acknowledgement mechanism intact, irrespective of the addition of zone-wise LACKs. The source node clears the buffered packets only after receiving the end-to-end acknowledgement for those packets [5] [6]. In the figure 3 node 1 initiates a TCP session to node 15. Node 4 and node 13 are chosen as proxy nodes. The number of proxy nodes in a TCP session is determined by the length of the path between source and destination nodes. Based on a distributed algorithm, the intermediate nodes that receive TCP packets determine whether to act as a proxy node or just as a simple forwarding node. The simplest algorithm makes the decision for acting as proxy node if the packet has already traversed more than a predetermined number of hops from the last proxy node or the sender of the TCP session. In fig the path between node 1 and node 4 is the first zone, the path between node 4 and 13 is the second zone, and the last zone is between node 13 and 15. The proxy node 4, upon receipt of each TCP packet from source node 1, acknowledges it with a LACK packet, and buffers the received packets. This buffered packet is forwarded to the next proxy node (node 13) at the transmission rate proportional to the arrival of LACKs from the next proxy node or destination. The transmission control window at TCP sender is also split into two windows, i.e. the congestion window and the end-to-end window. The congestion window changes according to the rate of arrival of LACKs from the next proxy node and end-to-end window is updated based on the arrival of end-to-end ACKs. Both these windows are updated as per traditional TCP except that the congestion window should stay within the end-to-end window. In addition to these transmission windows at the TCP sender, every proxy node maintains a congestion window that governs the segment level transmission rate [5]. In TCP-BUS explicit messages such as ICMP source quench are used for

congestion control. ECN is used to notify TCP sender in ATCP, congestion control is same as TCP. In split-TCP [5] since connection is split, the congestion control is handled within a zone by proxy nodes and proxy nodes maintain congestion window and handle congestion.

2.2 Authenticated Routing for Ad hoc Networks (ARAN)

ARAN uses public key cryptography to defeat all identified attacks. It takes care of authentication, message integrity, and non-repudiation, but expects a small amount of prior security coordination among nodes. During the route discovery process of ARAN, the source node broadcasts Route Request packets. The destination node, on receiving the Route Request packets, responds by unicasting back a reply packet on the selected path. The ARAN protocol uses a preliminary cryptographic certification process, followed by an end-to-end route authentication process, which ensures secure route establishment [5].

- **Route Formation Phase:**

Step 1: Each node, before attempting to connect to ad hoc network, must contact the certification authority and request a certificate, which contains the IP address of the node (IP_A), the public key of A (K_{A+}), a timestamp k of when the certificate was created, and a time e at which the certificate expires. These variables are concatenated and signed by K_T . The protocol assumes that each node knows a priori the public key of certification authority.

$$T \rightarrow A : cert_A = [IP_A, K_{A+}, t, e]K_T$$

Step 2: The route discovery of the ARAN protocol begins with a node broadcasting a route discovery packet (RDP) to its neighbors. The RDP includes a packet type identifier ("RDP"), the IP address of the destination X (IP_X), A's certificate ($cert_A$) and a nonce N_A , all signed with A's private key. Note that the RDP is only signed by the source and not encrypted, so the contents can be viewed publicly. The purpose of the nonce is to uniquely identify an RDP coming from a source. Each time, A, performs route discovery it monotonically increases the nonce. Each node validates the signature with the certificate, updates its routing table with the neighbor from which it received the RDP, signs it, and forwards it to its neighbors after removing the certificate and the signature of the previous node (but not the initiator's signature and certificate). Let B be a neighbor that has received from A the RDP broadcast, which it subsequently rebroadcasts.

$$A \rightarrow brdcst : [RDP, IP_X, N_A]K_A-, Cert_A$$

$$B \rightarrow brdcst : [[RDP, IP_X, N_A]K_A-]K_B-, Cert_A, Cert_B$$

Upon receiving the RDP B's neighbor C validates the signatures for both the RDP initiator, and B, the neighbor it received the RDP from, using the certificates in the RDP. C then removes B's certificate and signature, records as its predecessor, signs the contents of the message originally broadcast by Y and appends its own certificate C then rebroadcasts the RDP.

$$C \rightarrow brdcst : [[RDP, IP_X, N_A]K_A-]K_C-, Cert_A, Cert_C$$

Eventually, the message is received by the destination X, who replies to the first RDP that it receives for a source and a given nonce. This RDP need not have traveled along the path

with the least number of hops; the least-hop path may have a higher delay, either legitimately or maliciously manifested. In this case, however, a non-congested, non least-hop path is likely to be preferred to a congested least hop path because of the reduction in delay. Because RDP's do not contain a hop count or specific recorded source route, and because messages are signed at each hop, malicious nodes have no opportunity to redirect traffic. After receiving the RDP, the destination unicasts a Reply (REP) packet back along the reverse path to the source. Let the first node that receives the REP sent by X be node D.

$$X \rightarrow D : [REP, IP_A, N_A]K_X-, Cert_X$$

The REP contains the address of the source node, the destination's certificate, a nonce, and the associated timestamp. The destination node signs the REP before transmitting it. The REP is forwarded back to the initiating node by a process similar to the process described for the route discovery, except that the REP is unicasted along the reverse path. Let D's next hop to the source node C.

$$D \rightarrow C : [[REP, IP_A, N_A]K_X-]K_D-, Cert_X, Cert_D$$

C validates D's signature on the received message, removes the signature and certificate, then signs the contents of the message and appends its own certificate before unicasting the REP to B. Each node checks the nonce and signature of the previous hop as the REP is returned to the source. When the source receives the REP, it verifies the destination's signature and the nonce returned by the destination.

$$C \rightarrow B : [[REP, IP_A, N_A]K_X-]K_C-, Cert_X, Cert_C$$

- **Route maintenance**

When no traffic has occurred on an existing route for that route's lifetime, the route is simply de-activated in the route table. Data received on an inactive route causes nodes to generate an Error (ERR) message. Nodes also use ERR messages to report links in active routes that are broken due to node movement. All ERR messages must be signed. For a route between source A and destination X, a node B generates the ERR message for its neighbor C as follows:

$$B \rightarrow C : [ERR, IP_A, IP_X, N_B]K_B-, Cert_B$$

This message is forwarded along the path toward the source without modification. A nonce ensures that the ERR message is fresh. It is extremely difficult to detect when ERR messages are fabricated for links that are truly active and not broken. However, the signature on the message prevents impersonation and enables non-repudiation. A node that transmits a large number of ERR messages, whether the ERR messages are valid or fabricated, should be avoided.

- **Key Revocation**

In the event that a certificate needs to be revoked, the trusted certificate server, T, sends a broadcast message to the ad hoc group that announces the revocation. Calling the revoked certificate $cert_X$, the transmission appears as:

$$T \rightarrow brdcst : [revoke, cert_T]K_T-$$

Any node receiving this message re-broadcasts it to its neighbors. Revocation notices need to be stored until the revoked certificate would have expired normally. Any neighbor of the node with the revoked certificate needs to reform routing as necessary to avoid transmission through the now untrusted node.

III. RELATED WORK

Swastik Kopparty et al. [4], has proposed that for any TCP connection, certain nodes along the route take up the role of being proxies for that connection. The proxies buffer packets upon receipt and administer rate control. The buffering enables dropped packets to be recovered from the most recent proxy. The rate control helps in controlling congestion on inter-proxy segments. Thus, this work concludes that shorter TCP connections achieve better parallelism in the network.

In [7] the main idea behind the proposed mechanism is to notify the sender when the packets of a Transport layer flow change their route. In this work sender can benefit from this information when deciding whether to retransmit a missing segment or to wait, when estimating the RTT (Round Trip Time), and when deciding whether to change the congestion window.

Nizar et. al. [8] suggested the techniques introducing awareness of the physical medium into TCP are typically implemented using different explicit notification techniques. One of the first proposals in this category presented in [9] is Explicit Congestion Notification (ECN). It reserves a specific bit inside the IP header, which brings indication of network congestion back from a router to the sender node. This allows TCP sender to select its congestion control actions differentiating between congestion and link error related losses.

In [10] Sarolahti et. al. proposed explicit signaling algorithm allowing network routers to increase TCP startup performance over high-speed network paths. Having the core algorithms controlling TCP functionality such as congestion control and error recovery implemented at the sender node turns the design of optimization algorithms towards explicit notification solutions, which usually demonstrate considerable performance advantages. However, the main drawback for such solutions is the requirement for the modification of TCP sender code - traditionally implemented inside the operating system kernel, making the deployment of these schemes difficult on the wide scale.

In [8] aims at overhead reduction deriving from the multilayer ARQ employed at the link and transport layers. It introduces ARQ proxy [11],[12] at the base station and ARQ client at the mobile node agents, which substitute the transmission of the TCP ACK packet with a short link layer request sent over the radio link. As a result, ARQ proxy releases radio link resources required for TCP ACK packet transmission - which can be used by other transmitting stations.

In [13] proposed that approaches that rely on explicit feedback from intermediate nodes, like ECN can face problems, since no direct access for the IP header is allowed for such nodes. In order to mitigate such a problem, some effort has to be put on that, but a really robust solution seems to be absent.

Ding et. al. [14] proposed TCP-MANET to detect malicious packet drop attack based on RTT of next acknowledged packet. Upon inferring a malicious attack, TCP-MANET trigger the routing protocol to find a new route to connection, and locate the malicious node in the network.

In [15] to defeat all identified attacks on AODV and DSR using ARAN has been proposed. ARAN can secure routing in environments where nodes are authorized to participate but untrusted to cooperate, as well as environments where participants do not need to be authorized to participate. This

work evaluates ARAN and shows that it is able to effectively and efficiently discover secure routes within an ad hoc network.

Jonny Karlsson et. al.[16] proposed that due to heavy asymmetric cryptographic operations and large routing packets, ARAN has a high computational cost for route discovery. ARAN is also vulnerable against selfish nodes e.g. drop routing packets. In particular, if the selfish node is an authenticated node, then ARAN is unable to detect this type of attack.

Kimaya Sanzgiri et. al. [17] proposed ARAN, a routing protocol for ad hoc networks that uses authentication and requires the use of a trusted certificate server. In ARAN, every node that forwards a route discovery or a route reply message must also sign it, (which is very computing power consuming and causes the size of the routing messages to increase at each hop). A proposal that only require originators to sign the message has been proposed in [18]. In addition, it is prone to reply attacks using error messages unless the nodes have time synchronization. Harsh Sadawarti et. al. [19] proposed security model based on ARAN to handle the DoS attacks. All the routing messages are authenticated at every hop from source to destination as well as on reverse path from destination to source.

IV. PROPOSED SECURITY AWARE AND CONGESTION CONTROL MECHANISM

The proposed work provided the security and performance enhancement by controlling the congestion at transport layer. The above said work embeds ARAN over SPLIT-TCP at transport layer that not only prevents congestion but also provide secure data communication in MANET. This work takes the following assumptions:

- The scheme is based on public key cryptography using offline certification authority (CA).
- Proxy nodes are the trusted nodes and know the public key of other proxy nodes.
- The encryption/decryption takes place at the proxy nodes.
- Only proxy nodes can be the source and destination nodes.
- All links are bidirectional.

Each node gets digital certificate from Certifying Authority (CA) in a secure fashion before communication. Since the intermediate nodes will act as only forwarding nodes. All the security checks will be carried out at proxy nodes using ARAN. Let P_1 P_2 be the Proxy Nodes and F_1 , F_2 be the intermediate nodes. Here R_{P_1} U_{P_1} are the Private and Public key of node P_1 and R_{P_2} U_{P_2} are the Private and Public key of node P_2 . The packets will have to pass through the nodes which can be in an arrangement among the following cases:

Case 1: (Secure communication between two proxy nodes)

In this case at proxy node P_1 the message is encrypted with R_{P_1} and further encrypted with public key U_{P_2} . At the proxy node P_2 this combination is decrypted with R_{P_2} and further decrypted with private U_{P_1} .



Figure 4: Secure Communication between two proxy nodes

Case 2: (Secure communication Through Intermediate Node)

In this case a proxy node P_1 knows R_{P_1} and U_{P_2} . The message is encrypted with R_{P_1} and further encrypted with U_{P_2} . The next node is an intermediate node F_1 which will only forward the message to the neighbour node. It does not perform any verification and testing.

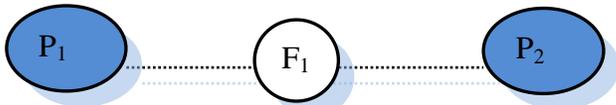


Figure 5 : Secure communication Through Intermediate Node

Case 3: (Communication Between Forwarding Nodes)

The first intermediate node F_1 will forward the message to next intermediate node F_2 without performing any verification and testing which will also forward the message to the neighbour node.



Figure 6: Communications Between Forwarding Nodes

If the message is tampered proper decryption of the encrypted message cannot take place. If a message is unable to reach the next proxy node in the first attempt then the message is retransmitted. If the message is unable to reach the destination node in three attempts then a negative acknowledgement is sent to the source proxy node. An alternate route is then chosen with minimum number of intermediate nodes using the information that is present in the cache of nodes.

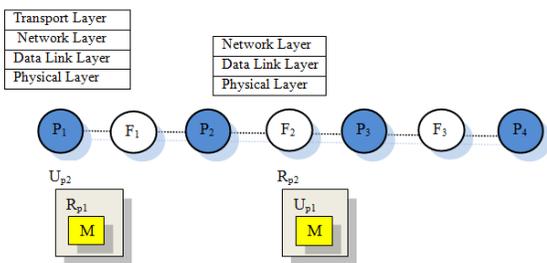


Figure 7: illustrates the operation of SPLIT-TCP

Figure 7 illustrates the operation of split-TCP where a split-TCP connection exists between source node P_1 and destination node P_4 . A proxy node receives the TCP packets, reads its contents, stores it in local buffer, encrypts/decrypts the message and sends an acknowledgement to the source (or the previous proxy). This acknowledgement called local acknowledgement (LACK). In the fig the P_1 initiates a TCP session to node P_4 .

Node P_2 is chosen as next proxy node after the source node. The number of proxy nodes in a TCP session is determined by the length of the path between source and destination nodes. The following mechanism takes place:

Step 1: The node P_1 encrypts the message with R_{P_1} and further encrypts with public key U_{P_2} . Double encryption takes place at the proxy node and the message is forwarded to intermediate node F_1 .

Step 2: Node F_1 does not perform any verification and simply forwards the message to next neighbor node (proxy node P_2).

Step 3: Proxy node P_2 , upon receipt of each TCP packet or message from node F_1 , carries out decryption with U_{P_1} and one more decryption is carried out with R_{P_1} . At the first level of decryption authentication, non-repudiation and integrity is achieved. Then at the second level of decryption we are able to achieve secrecy. If proper decryption takes place then proxy node P_2 acknowledges the previous proxy node (P_1) with a LACK packet, and buffers the received packets.

Step 4: The buffered packet is forwarded to next neighbor node which is an intermediate node 2. It forwards the received message to next node which is proxy node (P_3).

Step 5: The process in step1 to step3 is repeated. If proper results are not obtained on decryption of the encrypted message at proxy node (P_2) then the information in the message is tampered.

4.1 Performance Analysis

The network scenario consists of a proxy nodes followed by an intermediate node. The proxy node can be source and destination node. Our simulation environment consists of 5 proxy and 4 intermediate nodes as illustrated in figure 4. For simulation purpose we assume P_1 as the source and P_3 as the destination. Node P_1 sends cipher text by applying double encryption using RSA with its private key for first encryption and RSA with private-public key of next proxy node (P_2) for second encryption. The intermediate node 1 receives the data and forwards the cipher text to P_2 which carries out decryption using the same algorithm and obtains the original message. Now for transferring the message further, it again encrypts. This process repeats till the message reaches the destination node. The cipher text obtained on first level decryption matches that of the one obtained after first level of encryption which has been obtained using private key encryption. The attacker can only attack at any of the intermediate node since we have assumed all the proxies as trusted nodes. Interruption attacks are launched to deny routing messages from reaching the destination nodes by modifying the message.

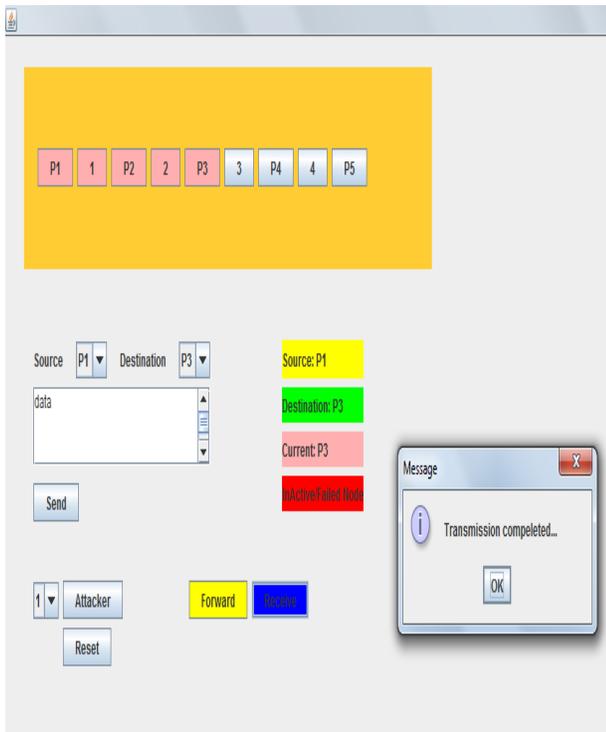


Figure 8: Simulation Scenario (when a between source and destination is complete in graphical mode)

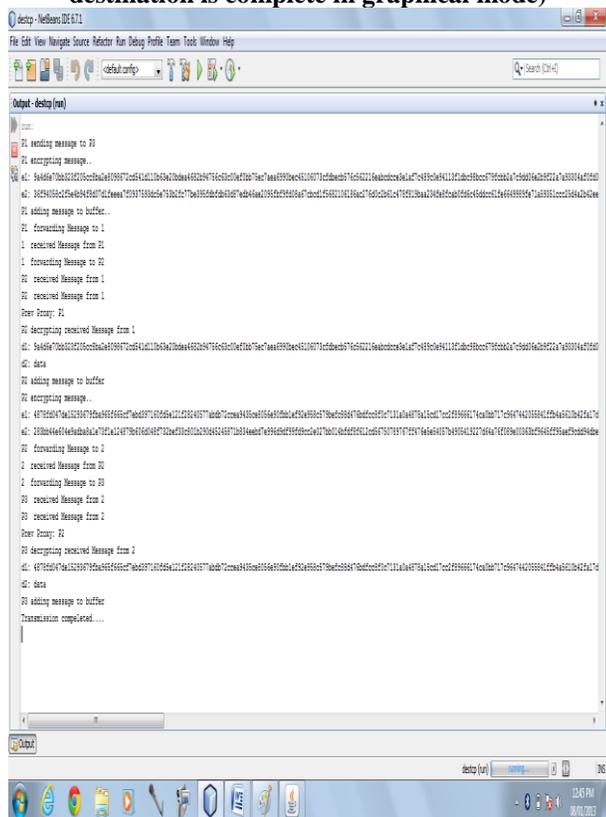


Figure 9: Simulation Scenario (when a transmission between source and destination is complete in text mode)

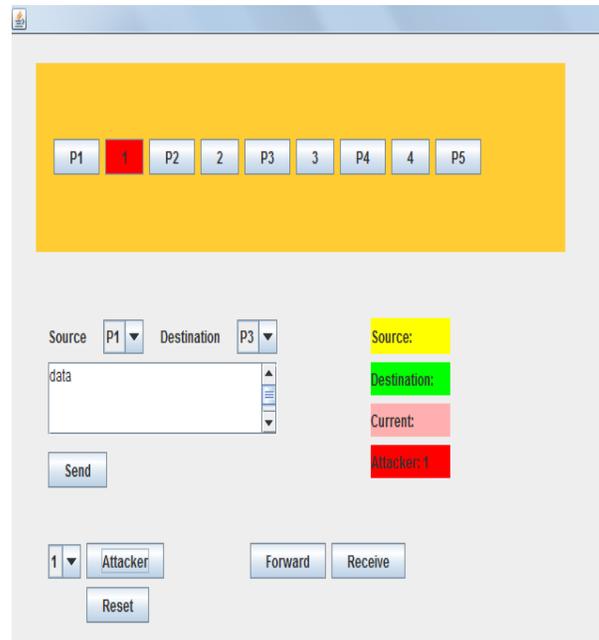


Figure 10: Simulation Scenario to select the attacking node

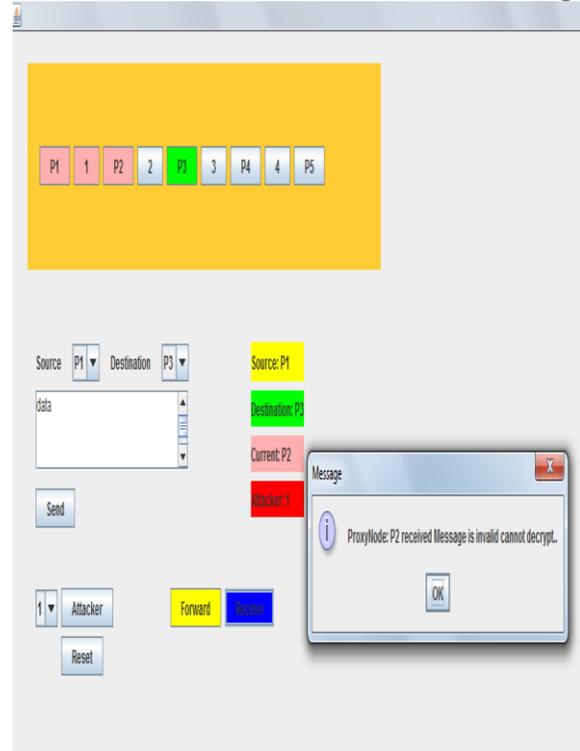


Figure 11: Simulation Scenario (showing transmission in case of attack in graphical mode)

So, if there is an attacking node present in the network then the message is unable to travel further in the network and is thus unable to reach the destination node. In figure 10 and figure 11, node 1 is causing interruption and this is detected by proxy P2 which is unable to decrypt the message since, it has been modified at previous node (node 1).

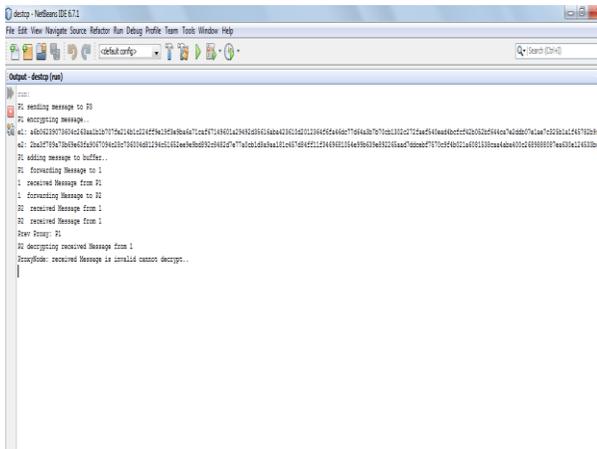


Figure 12: Simulation Scenario showing transmission in case of attack in text mode

V. RESULT AND DISCUSSIONS

The proposed work provide Security and congestion control on SPLIT-TCP. In this work the number of proxy nodes can be obtained from the given equation:

$$np = n - (n/2) \text{ where, } n \text{ is total number of nodes}$$

The implementation of the network consists 9 nodes in which 4 intermediate nodes and 5 proxy nodes. Following table is used in the graph analysis. It has been assumed that the network topology consists of an alternate combination of proxy and intermediate nodes. T is the time taken to travel from source to destination at the Transport layer.

Table 1: Computational Times of ARAN at Network layer and SPLIT-TCP

Number of Nodes	ARAN at Network Layer	Proposed (ARAN +Split-TCP)
50	50T	25T
100	100T	50T
150	150T	75T
200	200T	100T

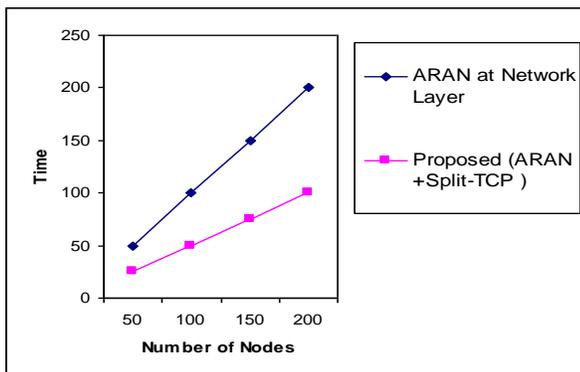


Figure 13: Computational Time of ARAN at Network Layer Vs. Transport Layer

In Figure 13 comparison of computational times of ARAN over routing protocols of network layer and transport layer. As we can see in the figure starting with 50 nodes in the network the computational time taken by ARAN over Network layer is 50T and over Transport layer is 25T, with 100 nodes the computational time taken by ARAN over Network layer is 100T and over Transport layer is 50T, with 150 nodes the computational time taken by ARAN over Network layer is 150T and over Transport layer is 75T and with 200 nodes the computational time taken by ARAN over Network layer is 200T and over Transport layer is 100T.

VI. CONCLUSION AND FUTURE SCOPE OF WORK

The research work embed ARAN on Split-TCP at the Transport layer results in a security aware congestion control mechanism which also reduces delay and thus enhances performance. It is secure since the proxy node does not forward the tampered message to the next node. And it enhances the performance as security checks are not implemented at every node of the network. Instead security is analyzed only at the proxy nodes. As per proposed scheme when the proxy node is unable to carry out decryption successfully then it sends a negative acknowledgement to the source. In the future work, this can be extended by making three attempts for retransmission, then considering this scenario as congestion. The work can also be enhanced by finding an alternate route by using DSR in case source receives a negative acknowledgement thrice.

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Tests for Equality of Coefficients of Variation of Two Normal Distributions for Correlated Samples

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Abstract: Coefficient of variation (C.V) is widely used as a measure of dispersion in applied research. C.V is unit less and thus facilitates the comparison of variability in two or more groups. Several tests have been proposed in the past for testing equality of C.Vs of two independent normal distributions. In plant sciences, medical sciences several characteristics of the plant or the subjects are to be compared regarding the variability and the samples are correlated. In this paper six tests are proposed for testing equality of C.Vs of a Bivariate normal distribution. The asymptotic null distribution of the entire test statistic is Chi-square distribution with 1 degree of freedom. The adequacy of the Chi-square approximation for finite samples is examined using simulation.

Keywords: Coefficient of variation (C.V); Normal distribution; Bivariate normal distribution; Chi-square approximation; Simulation.

I. INTRODUCTION

Coefficient of Variation (C.V) is widely used as a measure of variation by the researchers in the applied disciplines like finance, climatology, engineering etc. The popularity of C.V stems from the fact that it is unit less and can be interpreted easily than standard deviation. C.V interpreted as relative risk in the area of finance [1]. In stock market analysis, it is interpreted as volatility per mean return and inverse C.V is referred as Sharp ratio [1].

Historically the first research work on C.V dates back to 1932 [2]. Initially, the researchers were interested to develop improved Confidence Interval for the C.V of the Normal Distribution. Recent references in these directions are Banik and Kibria [3] and see the references cited in this paper for earlier works.

Although $100(1-\alpha)\%$ confidence interval at a level α test are interrelated, a formal Likelihood Ratio(LR) Test for equality of C.Vs of independent Normal Distributions was first introduced by Bennett [4] using modified C.V. Shafer and Sullivan [5] improved these tests using conditional likelihood. LR Test for equality of C.Vs of two independent Normal Distributions was proposed by Miller and Karson [1]. Doornbos and Dijkstra [6] extended the LR test for testing the equality of C.Vs of more than two independent Normal Distributions. Rao and Bhatta [7] proposed Wald test (also see [8]) for the same hypothesis. Gupta and Ma [9] proposed Score test for testing the equality of C.Vs. of two or more Normal Distributions.

Following the generalized variable approach Tsui and Weerahandi [10], Jafari and Behboodan[11] developed generalized test statistic for testing the common C.V of two or more independent Normal Distributions. The LR, Wald and Score tests and their perturbed version were not robust against the assumption of normality. This has motivated Cabras, Mostallino and Racugno [12] to propose bootstrap tests for equality of C.Vs of two distributions. All these tests assumed that the samples are independent. In practice, correlated samples are often encountered. In medical studies many of the periodical characters are interrelated. For example, in the field of Anatomy, when gender has to be decided using the various measurements of the skull, these measurements are interrelated. This example is discussed in section 4. In the stock market the stock prices of various scripts are related and testing for equality of volatility for mean return for two or more scripts, the correlation needs to be accounted for Singh [13] proposed generalized test for testing equality of C.Vs of p variates Normal Distributions. This test is computationally tedious and it is not appealing to the scientists in the applied disciplines. To overcome this difficulty, we propose LR, Wald and Score tests for equality of C.Vs and Inverse

Coefficient of Variations (ICV) from a Bivariate Normal Distribution. The finite sample performances of the tests are examined using extensive simulation. The simulation results indicate that the Wald test based on the ICV performs well and has more power compared to LR and Score tests using C.V and ICVs.

The organization of the paper is as follows.

In section 2, six tests are derived for equality of C.Vs from a Bivariate Normal Distribution using C.V and I.C.V. For small sample performance of the tests in terms of estimated type I error rate are examined in section 3. The paper concludes in section 4 where final remarks regarding the tests are provided.

2. Tests for Equality of C.Vs from a Bivariate Normal Distribution.

Let $(x_1, y_1), \dots, (x_n, y_n)$ be a random sample from a Bivariate Normal Distribution with

$$\text{pdf } f(x, y) = \frac{1}{\sigma_1 \sigma_2 2\pi(1-\rho^2)^{1/2}} e^{-\frac{1}{2(1-\rho^2)} \left\{ \left(\frac{x_i - \mu_1}{\sigma_1} \right)^2 + \left(\frac{y_i - \mu_2}{\sigma_2} \right)^2 - \frac{2\rho}{\sigma_1 \sigma_2} (x_i - \mu_1)(y_i - \mu_2) \right\}}$$

$$-\infty < x, y < \infty, -\infty < \mu_1, \mu_2 < \infty \quad \sigma_1, \sigma_2 > 0, -1 \leq \rho \leq 1$$

In this paper we have used observed Fisher Information matrix for constructing Wald and Score tests. The reason is that Hinkley and Efron [14] advocate the use of observed Fisher Information rather than the expected Fisher Information. The score vector and the element from the Fisher Information matrix are given in the appendix. The hypothesis of interest is

$$H_0: \eta_1 = \eta_2 \quad \text{where } \eta_1 = \sigma_1/\mu_1, \eta_2 = \sigma_2/\mu_2$$

$$H_1: \eta_1 \neq \eta_2$$

The Likelihood Ratio, Wald and Score test statistic for this hypothesis are given by

$$\Lambda = -2 \ln \lambda,$$

$$w = \frac{\hat{\eta}_1 - \hat{\eta}_2}{\sqrt{V(\hat{\eta}_1 - \hat{\eta}_2)}} \quad \text{Where } \hat{\eta}_1 = \frac{\hat{\sigma}_1}{\hat{\mu}_1}, \hat{\eta}_2 = \frac{\hat{\sigma}_2}{\hat{\mu}_2}$$

$$\text{And } S = U(\hat{\eta}_0) I(\hat{\eta}_0)^{-1} U(\hat{\eta}_0)'$$

Testing for equality of C.Vs is equivalent for testing equality of ICVs. Sharma and Krishna [15] and Singh [13] advocate the use of inverse sample C.V (ISCV) for constructing Confidence Interval for the C.V of a distribution. The reason is that the Taylor series expansion for ISCV contains less number of terms than the sample C.V. Following this idea Nairy and Rao [16] developed LR, Wald and Score tests for testing equality of C.Vs from independent Normal Distributions. Their simulation results indicated that the Wald test based on ICV maintains type I error rate and has more power compared to the LR and Score tests. In this paper we derive the LR, Wald and Score tests for testing the hypothesis

$$H_0: \theta_1 = \theta_2 = \theta \text{ (unknown)}, \text{ where } \theta_1 = \frac{\mu_1}{\sigma_1}, \theta_2 = \frac{\mu_2}{\sigma_2} \quad H_1: \theta_1 \neq \theta_2$$

The LRT statistic is given by $\Lambda = -2 \ln \lambda$

$$\text{The Wald test statistic is given by } w = \frac{\hat{\theta}_1 - \hat{\theta}_2}{\sqrt{V(\hat{\theta}_1 - \hat{\theta}_2)}} \text{ where } \hat{\theta}_1 = \frac{\hat{\mu}_1}{\hat{\sigma}_1}, \hat{\theta}_2 = \frac{\hat{\mu}_2}{\hat{\sigma}_2}$$

$$\text{The Score test statistic is given by } S = U(\hat{\theta}_0) I(\hat{\theta}_0)^{-1} U(\hat{\theta}_0)', \quad \text{where } I(\hat{\theta}_0) = -E \left(\frac{\partial^2 \log L(\hat{\theta}_0|x)}{\partial \theta \partial \theta'} \right).$$

3. Finite sample comparison of the Tests

3.1 Simulation Experiment

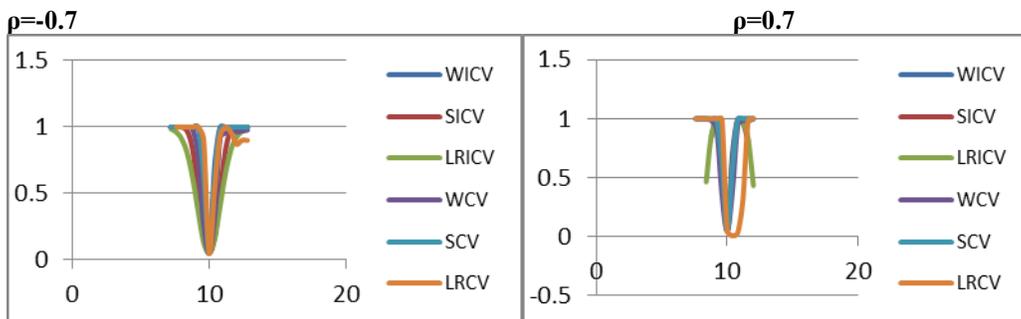
The asymptotic null distribution of the entire test statistic is central Chi-square with one degree of freedom and non-central Chi-square with the same no centrality parameter under the alternative hypothesis. For estimating size of the test samples of size n is generated from a Bivariate Normal Distribution with parameters $\mu_1, \sigma_1, \mu_2, \sigma_2$ and ρ . The values of $\mu_1, \sigma_1, \mu_2, \sigma_2$ are adjusted such that $\sigma_1/\mu_1 = \sigma_2/\mu_2$ i.e. $\theta_1 = \theta_2$ or in other words the C.V for the components of the Bivariate Normal Distribution are equal. The experiment is repeated 10,000 times and size of the test is proportion of the times the null hypothesis is rejected. Using the 10,000 simulated values of the test statistic the upper percentile value of the null distribution of the test statistic is recorded. The common values of $\theta_1 = \theta_2 = \theta$ are from 0.1 to 0.9 with an increment of 0.1. The values of the correlation coefficient ranges from -0.9 to 0.9 with an increment of 0.2. In addition to these values $\rho = 0$ is also included. The samples are of sizes $n = 5, 10, 20,$ and 40 . The value $\alpha = 0.05$.

3.2 Estimated Type I Error

From the estimated type I error rates it follows that Wald test for I.C.V maintains type I error rate for all the sample sizes for all values of C.V and correlation coefficient. We say that a test maintains type I error rate if the size of the test is in the interval 0.045 ± 0.005 . Likelihood Ratio and Score test for C.V and I.C.V. do not maintain type I error rate. The estimated error rates are far below the nominal level 0.05 and are the stringent tests. Score test for I.C.V. maintains type I error rate for all values of correlation coefficient and for $C.V \leq 0.4$.

3.3 Estimated Power Function

For comparing the power of various tests, it is important to ensure that all the tests have the same size. Since four of the tests do not maintain type I error rate for the computation of the power of the test, for Likelihood Ratio and Score tests using C.V and I.C.V the estimated α^{th} percentile values are used for estimating the power and for the Wald test the upper α percentile value of the Chi-square distribution with 1 degree of freedom is used. Fixing the value $\theta_1 = \mu_1/\sigma_1 = \theta$, the value used for estimating the type I error rates. θ_2 is adjusted such that $\theta_2 = k\theta_1$. To ensure the value of θ_2 , the standard deviation σ_2 is made equal to σ_1 and the values of μ_2 are altered. The power function for each test is estimated for fixed value of $\sigma_1 = \sigma_2 = \sigma$ and ρ . Figures 3.3(a) and (b) represent the power function for $n = 20, \theta = 0.1, \rho = -0.7$ and $\rho = 0.7$



3.3a

3.3b

3.4 Discussion

From the estimated Type I error rates and power of the test for all the configurations ($9 \times 11 \times 4 = 396$) it follows that Wald test for I.C.V maintain Type I error rate. When the power function of all the 6 tests are compared Wald test based on I.C.V emerges as the best test. The conclusion is based by comparing the power of the modest departures from the null hypothesis and rate of convergence of the power function to 1 in the right and left directions. Score test based on I.C.V emerges as the next best test. Wald test based on I.C.V has marginally higher power for modest alternatives compared to the Wald test based on C.V: The salient difference is that the rate of convergence of the power function to 1 is faster for the Wald test based on I.C.V compared to Wald test for the C.V.

The power function for the Likelihood Ratio test indicate that when the numerical value of coefficient of correlation is high (ignoring the sign), the power function of the Likelihood Ratio test exhibits irregular pattern, in the sense that the function increases in either direction and starts declining after a point in right and left directions. For the score test when the numerical value of the correlation coefficient is high, the power function of the test increases up to a level and then starts fluctuating, in the sense that it decreases and the increases and decreases. The oddities of the score test are examined in the paper of Sumathi and Rao [17]. For the

Likelihood Ratio test a possible explanation for this is that the Likelihood is not well behaved when the coefficient of correlation is high, which creates difficulty in the estimation of restricted maximum likelihood estimators of the parameters.

Among Likelihood Ratio and Score tests, score test has higher power for modest alternative compared to Likelihood Ratio test. This is true for the tests based on C.V as well as I.C.V. Further the rate of convergence of the power function to 1 is faster for the Score test than the Likelihood Ratio test. A salient finding is that all the tests based on I.C.V perform better than the tests based on C.V.

Sharma and Krishna [15] advocated the use of Inverse Sample C.V (ISCV) for construction of confidence interval for C.V. Further Singh [13] observed that Taylor series expansion for ISCV consists of fewer numbers of terms compared to sample C.V. Our results for tests based on C.V and I.C.V confirm their findings.

The power comparison of the tests for $\rho=0$ corresponds to the scenario when the tests based on correlated samples is used for testing the equality of C.V when the samples are independent. The present investigation reveals that one can safely use these proposed tests in the absence of a knowledge regarding the independence of the samples.

4. Conclusion:

In this paper we derived LR, Wald and Score tests based on C.V and I.C.V for testing equality of C.V of a Bivariate Normal Distribution. Testing for common value of C.V is also equivalent for testing for common value of I.C.V and thus LR, Wald and Score tests are derived for testing the equality of I.C.V. The tests are simple in nature. The finite sample comparison of simulation result indicates that Wald test based on I.C.V maintains type I error rate. LR and Score test needs a correction factor so that the accuracy of the Chi-square distribution and they maintain type I error rates. One alternative is to use bootstrap tests [18] and the other one is to use empirical satterthwaite approximation [19]. This re sampling technique may not appeal to the applied researchers. The power comparison for the various tests indicate that Wald test based on I.C.V has more power at modest alternatives compared to the other test and rate of convergence of the power function is faster for this test. Therefore we recommend this test for the users. The specific reason is the following.

- 1) This test maintains nominal level of significance. Whereas other tests require a correction for the test statistic. The corrections based on re sampling methods like Jackknife and bootstrap are tedious to implement.
- 2) Wald test does not require the estimation of restricted maximum likelihood estimator of the parameter, which cause problem when the samples are highly correlated.
- 3) The Wald test is more powerful for modest alternatives compared to the other tests. These alternatives are important from a practical perspective.
- 4) Computation of Wald test is simple compared to the other tests.

Mat lab program for carrying out the tests is available with the first author and can be made available to any interested person.

Appendix

$$H_0 : \theta_1 = \theta_2 \text{ Vs } H_1 : \theta_1 \neq \theta_2$$

$$\theta_1 = \theta_2 = \theta \log L = C - \frac{n}{2} \log \sigma_1^2 - \frac{n}{2} \log \sigma_2^2 - \frac{n}{2} \log(1 - \rho^2) - \frac{1}{2(1 - \rho^2)} \left\{ \frac{\sum x_i^2}{\sigma_1^2} + \frac{\sum y_i^2}{\sigma_2^2} + 2n\theta^2 - 2\theta \left(\frac{\sum x_i}{\sigma_1} + \frac{\sum y_i}{\sigma_2} \right) \right\} + \left(\frac{\rho}{1 - \rho^2} \right) \left\{ \frac{\sum x_i y_i}{\sigma_1 \sigma_2} - \theta \left(\frac{\sum x_i}{\sigma_1} + \frac{\sum y_i}{\sigma_2} \right) + n\theta^2 \right\}$$

$$\frac{\partial \log L}{\partial \theta} = \frac{1}{1 + \rho} \left\{ \frac{\sum x_i}{\sigma_1} + \frac{\sum y_i}{\sigma_2} - 2n\theta \right\}, \quad \frac{\partial^2 \log L}{(\partial \theta)^2} = \frac{-2n}{1 + \rho},$$

$$\frac{\partial^2 \log L}{\partial \theta \partial \sigma_2^2} = \frac{-\Sigma y_i}{2\sigma_2^3(1+\rho)} = \frac{\partial^2 \log L}{\partial \sigma_2^2 \partial \theta} = \frac{\partial^2 \log L}{\partial \theta \partial \sigma_1^2} = \frac{-\Sigma x_i}{2\sigma_1^3(1+\rho)} = \frac{\partial^2 \log L}{\partial \sigma_1^2 \partial \theta}$$

$$\frac{\partial^2 \log L}{\partial \theta \partial \rho} = \frac{-1}{(1+\rho)^2} \left\{ \frac{\Sigma x_i}{\sigma_1} + \frac{\Sigma y_i}{\sigma_2} - 2n\theta \right\} = \frac{\partial^2 \log L}{\partial \rho \partial \theta} = \frac{\partial \log L}{\partial \sigma_1^2} = \frac{-n}{2\sigma_1^2} + \frac{1}{\sigma_1^3(1-\rho^2)^2} \left\{ \frac{\Sigma x_i^2}{\sigma_1} - \Sigma x_i \theta(1+\rho) - \frac{\rho \Sigma x_i y_i}{\sigma_2} \right\}$$

$$\frac{\partial^2 \log L}{(\partial \sigma_1^2)^2} = \frac{n}{2(\sigma_1^2)^2} - \frac{1}{2\sigma_1^5(1-\rho^2)} \left\{ \frac{2\Sigma x_i^2}{\sigma_1} - \frac{3\theta \Sigma x_i}{2} \right\} + \frac{3\rho}{4\sigma_1^5(1-\rho^2)} \left\{ \frac{\Sigma x_i y_i}{\sigma_2} - \theta \Sigma x_i \right\} = \frac{\partial^2 \log L}{\partial \sigma_1^2 \partial \sigma_2^2} = \frac{\rho \Sigma x_i y_i}{4\sigma_1^3 \sigma_2^3 (1-\rho^2)} = \frac{\partial^2 \log L}{\partial \sigma_2^2 \partial \sigma_1^2}$$

$$\frac{\partial^2 \log L}{\partial \sigma_1^2 \partial \rho} = \frac{\rho}{(1-\rho^2)^2 \sigma_1^3} \left\{ \frac{\Sigma x_i}{\sigma_1} - \Sigma x_i \right\} - \left\{ \frac{1+\rho^2}{2(1-\rho^2)^2 \sigma_1^3} \right\} \left\{ \frac{\Sigma x_i y_i}{\sigma_2} - \theta \right\} = \frac{\partial^2 \log L}{\partial \rho \partial \sigma_1^2}$$

$$\frac{\partial \log L}{\partial \sigma_2^2} = \frac{-n}{2\sigma_2^2} + \frac{1}{\sigma_2^3(1-\rho^2)^2} \left\{ \frac{\Sigma y_i^2}{\sigma_2} - \theta(1+\rho) \Sigma y_i - \frac{\rho \Sigma x_i y_i}{\sigma_1} \right\}$$

$$\frac{\partial^2 \log L}{(\partial \sigma_2^2)^2} = \frac{n}{2(\sigma_2^2)^2} - \frac{1}{2(1-\rho^2)\sigma_2^5} \left\{ \frac{2\Sigma y_i^2}{\sigma_2} - \frac{\theta_3 \Sigma y_i}{2} \right\} + \frac{3\rho}{4\sigma_2^5(1-\rho^2)} \left\{ \frac{\Sigma x_i y_i}{\sigma_1} - \theta \Sigma y_i \right\}$$

$$\frac{\partial^2 \log L}{\partial \sigma_2^2 \partial \rho} = \frac{\rho}{(1-\rho^2)^2 \sigma_2^3} \left\{ \frac{\Sigma y_i}{\sigma_2} - \theta \Sigma y_i \right\} - \left(\frac{1+\rho^2}{2\sigma_2^3(1-\rho^2)^2} \right) \left\{ \frac{\Sigma x_i y_i}{\sigma_1} - \theta \Sigma y_i \right\} = \frac{\partial^2 \log L}{\partial \rho \partial \sigma_2^2}$$

$$\frac{\partial^2 \log L}{\partial \rho} = \frac{n\rho}{1-\rho^2} - \frac{\rho}{(1-\rho^2)^2} \left\{ \frac{\Sigma x_i^2}{\sigma_1^2} + \frac{\Sigma y_i^2}{\sigma_2^2} + 2n\theta^2 - 2\theta \left(\frac{\Sigma x_i}{\sigma_1} + \frac{\Sigma y_i}{\sigma_2} \right) \right\} + \frac{1+\rho^2}{(1-\rho^2)^2} \left\{ \frac{\Sigma x_i y_i}{\sigma_1 \sigma_2} - \theta \left(\frac{\Sigma x_i}{\sigma_1} + \frac{\Sigma y_i}{\sigma_2} \right) + n\theta^2 \right\}$$

$$\frac{\partial \log L}{\partial \theta_1} = \frac{-1}{1-\rho^2} \left\{ n\theta_1 - \rho n\theta_2 - \frac{\Sigma x_i}{\sigma_1} + \frac{\rho \Sigma y_i}{\sigma_2} \right\}, \quad \frac{\partial^2 \log L}{\partial \theta_1^2} = \frac{-n}{1-\rho^2}, \quad \frac{\partial^2 \log L}{\partial \theta_1 \partial \theta_2} = \frac{n\rho}{(1-\rho^2)} = \frac{\partial^2 \log L}{\partial \theta_2 \partial \theta_1}$$

$$\frac{\partial^2 \log L}{\partial \theta_1 \partial \sigma_1^2} = \frac{-\Sigma x_i}{2\sigma_1^3(1-\rho^2)} = \frac{\sigma^2 \log L}{\partial \sigma_1^2 \partial \theta_1} = \frac{\partial^2 \log L}{\partial \theta_1 \partial \sigma_2^2} = \frac{\rho \Sigma y_i}{2\sigma_2^3(1-\rho^2)} = \frac{\sigma^2 \log L}{\partial \sigma_2^2 \partial \theta_1}$$

$$\frac{\partial^2 \log L}{\partial \theta_1 \partial \rho} = \frac{1}{(1-\rho^2)^2} \left\{ 2\rho \left(\frac{\Sigma x_i}{\sigma_1} - n\theta_1 \right) + (1+\rho^2) \left(n\theta_2 - \frac{\Sigma y_i}{\sigma_2} \right) \right\} = \frac{\partial \log L}{\partial \theta_2} = \frac{1}{1-\rho^2} \left\{ n\theta_2 - \frac{\Sigma y_i}{\sigma_2} + \frac{\rho \Sigma x_i}{\sigma_1} - \rho n\theta_1 \right\},$$

$$\frac{\partial^2 \log L}{(\partial \theta_2)^2} = \frac{-n}{1-\rho^2} = \frac{\partial^2 \log L}{\partial \theta_2 \partial \sigma_1^2} = \frac{\rho \Sigma x_i}{2\sigma_1^3(1-\rho^2)} = \frac{\partial^2 \log L}{\partial \sigma_1^2 \partial \theta_2}$$

$$\frac{\partial^2 \log L}{\partial \theta_2 \partial \theta_1} = \frac{n\rho}{1-\rho^2} = \frac{\partial^2 \log L}{\partial \theta_1 \partial \theta_2} = \frac{\partial^2 \log L}{\partial \theta_2 \partial \sigma_2^2} = \frac{-\Sigma y_i}{2\sigma_2^3(1-\rho^2)} = \frac{\partial^2 \log L}{\partial \sigma_2^2 \partial \theta_2}$$

$$\frac{\partial^2 \log L}{\partial \theta_2 \partial \rho} = \frac{1}{(1-\rho^2)^2} \left\{ 2\rho \left(\frac{\Sigma y_i}{\sigma_2} - n\theta_2 \right) - (1+\rho^2) \left(\frac{\Sigma x_i}{\sigma_1} - n\theta_1 \right) \right\}$$

$$\frac{\partial \log L}{\partial \sigma_1^2} = \frac{-n}{2\sigma_1^2} - \frac{1}{2(1-\rho^2)} \left\{ \frac{\Sigma x_i}{\sigma_1^3} (\theta_1 + \rho\theta_2) - \frac{\Sigma x_i^2}{(\sigma_1^2)^2} + \frac{\rho \Sigma x_i y_i}{\sigma_1^3 \sigma_2} \right\}$$

$$\frac{\partial^2 \log L}{(\partial \sigma_1^2)^2} = \frac{n}{(2\sigma_1^2)^2} - \frac{1}{2(1-\rho^2)} \left\{ \frac{2\Sigma x_i^2}{(\sigma_1^2)^3} - \frac{3\Sigma x_i (\theta_1 + \rho\theta_2)}{\sigma_1^5} - \frac{3\rho \Sigma x_i y_i}{4\sigma_2 \sigma_1^5} \right\} = \frac{\partial^2 \log L}{\partial \sigma_1^2 \partial \sigma_2^2} = \frac{\rho \Sigma x_i y_i}{4(1-\rho^2) \sigma_1^3 \sigma_2^3} = \frac{\partial^2 \log L}{\partial \sigma_2^2 \partial \sigma_1^2}$$

$$\frac{\partial^2 \log L}{\partial \sigma_1^2 \partial \rho} = \frac{-\rho}{(1-\rho^2)^2} \left\{ \frac{\theta_1 \Sigma x_i}{\sigma_1^3} - \frac{\Sigma x_i^2}{(\sigma_1^2)^2} \right\} - \left\{ \frac{\theta_2 \Sigma x_i}{\sigma_1^3} + \frac{\Sigma x_i y_i}{\sigma_1^3 \sigma_2} \right\} \left\{ \frac{1+\rho^2}{2(1-\rho^2)^2} \right\}$$

$$\frac{\partial \log L}{\partial \sigma_2^2} = \frac{-n}{2\sigma_2^2} - \frac{1}{2(1-\rho^2)} \left\{ \frac{\Sigma y_i}{\sigma_2^3} (\theta_2 + \rho\theta_1) - \frac{\Sigma y_i^2}{(\sigma_2^2)^2} + \frac{\rho \Sigma x_i y_i}{\sigma_1 \sigma_2^3} \right\}$$

$$\frac{\partial^2 \log L}{(\partial \sigma_2^2)^2} = \frac{n}{2(\sigma_2^2)^2} - \frac{1}{2(1-\rho^2)} \left\{ \frac{2\Sigma y_i^2}{(\sigma_2^2)^3} - 3(\theta_2 + \rho\theta_1) \frac{\Sigma y_i}{\sigma_2^5} - \frac{3\rho \Sigma x_i y_i}{4\sigma_1 \sigma_2^5} \right\}$$

$$\frac{\partial^2 \log L}{\partial \sigma_2^2 \partial \rho} = \frac{\rho}{(1-\rho^2)^2} \left\{ \frac{\sum y_i^2}{(\sigma_2^2)^2} - \frac{\theta_2 \sum y_i}{\sigma_2^3} \right\} - \frac{1+\rho^2}{2(1-\rho^2)^2} \left\{ \frac{\sum x_i y_i}{\sigma_1 \sigma_2^3} + \frac{\theta_1 \sum y_i}{\sigma_2^3} \right\}$$

$$\frac{\partial \log L}{\partial \rho} = \frac{-\rho}{(1-\rho^2)^2} \left\{ \frac{\sum x_i^2}{(\sigma_1^2)^2} + \frac{\sum y_i^2}{\sigma_2^2} + n(\theta_1^2 + \theta_2^2) - \frac{2\theta_1 \sum x_i}{\sigma_1} - \frac{2\theta_2 \sum y_i}{\sigma_2} \right\} + \frac{1+\rho^2}{(1-\rho^2)^2} \left\{ \frac{\sum x_i y_i}{\sigma_1 \sigma_2} - \frac{\theta_2 \sum x_i}{\sigma_1} - \frac{\theta_1 \sum y_i}{\sigma_2} + n\theta_1 \theta_2 \right\} + \left(\frac{n\rho}{1-\rho^2} \right)$$

$$\frac{\partial^2 \log L}{(\partial \rho)^2} = - \left[\frac{1+3\rho^2}{(1-\rho^2)^3} \right] \left\{ \frac{\sum x_i^2}{\sigma_1^2} + \frac{\sum y_i^2}{\sigma_2^2} + n(\theta_1^2 + \theta_2^2) - \frac{2\theta_1 \sum x_i}{\sigma_1} - \frac{2\theta_2 \sum y_i}{\sigma_2} \right\} +$$

$$\frac{2\rho(3+\rho^2)}{(1-\rho^2)^3} \left\{ \frac{\sum x_i y_i}{\sigma_1 \sigma_2} - \frac{\theta_2 \sum x_i}{\sigma_1} - \frac{\theta_1 \sum y_i}{\sigma_2} + n\theta_1 \theta_2 \right\} + \frac{n(1+\rho^2)}{(1-\rho^2)^2}$$

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A Survey on Energy Consumption in Smartphones over Wi-Fi

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Abstract- Wireless data transmission consumes a significant part of the overall energy consumption of smartphones, due to the popularity of Internet applications. The proposed method investigate the energy consumption characteristics of data transmission over Wi-Fi, focusing on user characteristics. The focus is on current and previous data usage profile of the user to optimize data usage of Wi-Fi by modeling energy consumption. Previous data usage profile will be tracked based on parameters such as time, battery usage etc. The background service will create a usage profile of a user to collect the data used by the user. This tracked information can be used to toggle the Wi-Fi on or off in order to reduce the battery consumption in smartphones. The proposed method enables effective battery usage by reducing useless battery consumption and detects abnormal battery usage by comparing operating times between normal and abnormal states.

Index Terms- Wi-Fi, Usage Profile, Smartphone

I. INTRODUCTION

Saving power of Android enabled devices have become a significant issue with 400,000 such devices being activated daily. Android smartphones and tablets offer several power hungry hardware components and the app developers are exploiting these components at disposal to provide revolutionary user experience. But the battery life has not increased at the same pace to support the power demand. Thus many researches have been carried out to investigate how to minimize the power consumption in smartphones. Today's smartphones are equipped with high quality graphics and processing power. They have 3G, Edge, WiFi and Bluetooth interfaces for data connectivity. As a result, smartphones have become very popular, and numerous applications are being developed for them. To name a few, surfing the web with browser, calling through VoIP client, checking emails, accessing weather forecast, stock market quotes, and navigating through GPS (Global Positioning System) based maps are some prominent applications. This increased availability of network applications in smartphones causes increased network traffic, and the volume is increasing rapidly, the growth rate is faster than broadband traffic.

In order to develop energy-efficient networked applications on smartphones, the developers need to know the factors that affect the energy efficiency in wireless data transmission and the joint effects of these factors (network throughput, traffic patterns) on battery life. Existing network management methods have focused on performance of network itself. However there is

still need to address the requirements from the perspective of customers and personalized services.

This paper presents a usage pattern analysis of user's previous and current activity. The background service is developed which collects data from user's activity and then analyzes it in order to promote effective battery usage.

II. RELATED WORK

Energy consumption caused by wireless data transmission on smartphones is increasing rapidly with the growing popularity of internet applications that require network connectivity. This results in shrinking battery life, as the development of battery technology is not able to keep up with the energy demand of applications. While waiting for breakthroughs in battery technology, the networked applications can be made more energy efficient. In order to develop energy-efficient networked applications on smartphones, the developers need to know the factors that affect the energy efficiency in wireless data transmission and the joint effects of these factors (network throughput, traffic patterns) on battery life. Existing network management methods have focused on performance of network itself. However there is still need to address the requirements from the perspective of customers and personalized services[2]. To remedy the situation, Yu Xiao, Yong Cui et al. [1] have presented the power models that utilize traffic characteristics to estimate the energy consumption of WiFi data transmission. The models can be used for power analysis of network applications, as well as for runtime power estimation in energy-aware applications that utilize technologies such as as computational offloading. Existing network management methods have focused on performance of network itself. However there is still need to address the requirements from the perspective of customers and personalized services. In [2], Joon-Myung Kang and Sin-seok Seo, James Won-Ki Hong have presented the usage pattern analysis of smartphones. The authors present basic smartphone states based on their basic functions and they define time and battery spent in each operational states. Then the authors developed an application to log the data from smartphones and apply this to analyze the usage pattern. The data is analysed to show that the user has his/her own usage pattern.

In [4], Feng Qian, Zhaoguang Wang et.al. address the aforementioned challenge by developing a tool called ARO (mobile Application Resource Optimizer). ARO is the first tool that exposes the cross-layer interaction for layers ranging from higher layers such as user input and application behavior down to the lower protocol layers such as HTTP, transport, and very

importantly radio resources. In particular, so far little focus has been placed on the interaction between applications and the radio access network (RAN) in the research community. Such cross-layer information encompassing device-specific and network-specific information helps capture the tradeoffs across important dimensions such as energy efficiency, performance, and functionality, making such tradeoffs explicit rather than arbitrary as it is often the case today. It therefore helps reveal inefficient resource usage (e.g., high resource overhead of periodic audience measurements for Pandora) due to a lack of transparency in the lower-layer protocol behavior, leading to suggestions for improvement.

Researchers have studied the energy consumption in smartphones while running some network related applications (NRAs) but they have neither fully covered the wide pool of NRAs nor provided a methodology to measure the energy consumption in smartphones. In [4], Abdulhakim Abogharaf, Rajesh Palit, Kshirasagar Naik, Ajit Singh identified the most popular NRAs and configurable parameters which can impact the energy consumption while running these NRAs. They further propose a methodology to measure the energy consumption in smartphones while conducting a feasible set of experiments. They present a measurement bench for measuring the energy consumption in smartphones. They conducted selected experiments on latest smartphones to support the methodology. The methodology evaluates the impact of configurable parameters and NRAs on energy consumption and provide a base to compare the energy consumption across smartphones. In [5], authors present a detailed study of energy consumption of smartphones focusing on different communication interfaces (Bluetooth, 3G, Wi-Fi) in different scenarios such as standby, scanning, transferring.

III. OBJECTIVE

One of the main constraints of the mobile phones is the battery power. Because of their multi-purpose usage and multitasking characteristics, the battery life of smartphones is shorter than normal mobile phones these smart devices and mobile networks. However, research on mobile network management has focused on the performance of the network itself. Few research has focused on applying the usage patterns of smartphone users to power management. In proposed methodology, analysis of smartphone usage patterns will be presented. The real usage log data from real smartphone users will be recorded. This usage pattern information will be used for toggling the Wi-Fi connection.

The data collection module will be developed in Android. This module will collect the information about user's personalized activity. This module monitors the previously defined data and records it to a log file. The following data will be collected by this module

- 1) Number of bytes transmitted
- 2) Number of bytes received
- 3) Total Usage
- 4) Date and Time

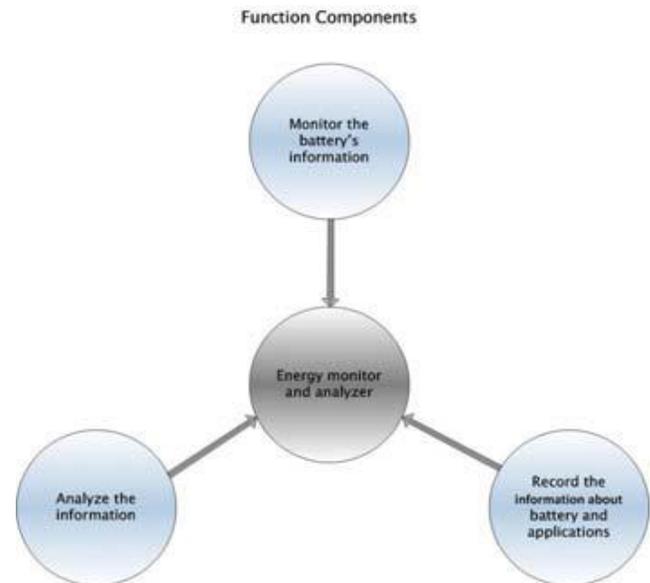


Figure 1

The smartphone users have their own usage pattern and the amount of time they spend and amount of battery power they use in different states varies. If we make the analytic model of usage pattern we can use it to optimize the energy efficiency of smartphones over Wi-Fi and that we can use to design smartphones that consumes less power.

IV. CONCLUSION

A mobile device's short battery lifetime can cause much inconvenience to the user's and can reduce the device usefulness. Thus mechanisms to provide long and stable battery life are required. One of the methods to guarantee long battery life is to minimize consumption by reducing unnecessary battery usage. In this paper we presented a survey of energy consumption caused by Wi-Fi data transmission. Further we aim to optimize the energy consumption by doing usage pattern analysis by creating usage profile of a user which will toggle the Wi-Fi connection of the smartphone to reduce the unnecessary battery power consumption. This analysis can help to optimize the energy and design the smartphones which consumes less power.

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Surface Water Quality with respect to Municipal Solid Waste Disposal within the Imphal Municipality Area, Manipur

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Abstract -Unscientific disposal of municipal solid wastes from different sources pollutes the environment. The present paper tries to find out the pollution level of surface water of river Nambul and surface water quality at the very vicinity of the disposal site at Lamphelpat. River Nambul is one of the important rivers passing through the heart of the Imphal municipality. Three sampling sites have been taken along this river one at the entrance of the municipality (upstream), at the middle and the other at the outgoing of the municipality (downstream). The fourth site is near the solid waste disposal site. The parameters taken for the analysis using the standard methods are air temperature, water temperature, transparency, conductivity, pH, TDS, alkalinity, hardness, calcium, magnesium, chloride, dissolved oxygen and BOD. The study has been carried out on monthly basis during April, 2010 to March, 2012.

Index Terms- Imphal municipality, Lamphelpat, Nambul, Pollution, Solid waste and Surface water

I. INTRODUCTION

Urban society produces garbage and other solid waste every day. In the past, men thought the environment had an infinite capacity to devour his waste without any ill effects. More recently, however, man's health and welfare are being affected by environmental pollution. These pollutants are substances present naturally in the environment but when released in significant amount by humans, become toxic [1]. Different workers detected higher levels of organic and inorganic pollutants and heavy metals in surface and underground water and water in the vicinity of solid waste landfills [2-5]. In non-arid regions, infiltrations of water through landfill have caused water table molding. This causes leachate to flow downward and outward from the land fill. Downward flow pollutes ground water while outward flow causes leachate springs at the periphery of the landfills or seepage into streams or other surface-water [6].

The urban centers of the developing world are ill equipped to handle the increasing amounts of municipal solid waste. Health and environment get jeopardized when urban infrastructure is unable to cope with increasing amounts of wastes [7]. It is reported that urban centers of India produce 120,000t of solid waste per day and in almost all the cities, unscientific disposal of solid waste has created environmental pollution [8]. Recently 43 ground water samples and 7 surface

water samples from waste dumping sites at Erode city, Tamilnadu were analyzed and found that the analyzed water samples are unsuitable for drinking due to contamination from leachates [9]. Therefore, the present study has been carried out with the objective of assessing the variation of water quality with respect to the disposal of urban municipal solid waste in Imphal municipality, Manipur.

II. MATERIALS AND METHODS

The Imphal municipality area covers parts from the districts of Imphal East and West. The districts of Imphal East and West occupy an area of 1, 22,800 hectares, which is situated at the central part of the Manipur valley and has five districts all around it. This Municipality extends over an area of 34.48 sq. km. and geographically, it is situated at 24°48.8' N and 93°57' E. It has twenty-seven (27) wards and a total population of 219467 (2001 census).

The sampling of water was carried out monthly from the month of April, 2010 to March, 2012. Three sampling points are selected from the river Nambul which is one of the important rivers passing through the heart of the city. Site-1, Iroisemba near bridge, represents the point of entrance of river within the municipal areas. Here direct dumping of waste and other sewage discharge are very less. Site-2, Hump bridge (Thong Nambonbi), represents the middle point of the river within the municipal areas. This site is in the heart of the city. Dumping of municipal wastes from the houses, markets and other shops and business establishments and sewage discharges are done into the river. Site-3, Heirangoithong, represents the exit point of the river from the municipal areas. Here also haphazard dumping of municipal wastes and discharge of sewages are done. Site-4, the very vicinity of Lamphelpat temporary disposal site, represents the stagnant water.

The water samples were collected in 1litre plastic bottles after thoroughly cleaning with distilled water every month. Some parameters like Air and Water temperature, Conductivity, pH, Total dissolved solids and Dissolved oxygen is recorded and analyzed on the spot immediately after the samples have been collected. The analyses of the other remaining parameters have been carried out in the laboratory. The analysis of the physico-chemical parameters have been carried out following the standard methods as described in APHA [10] and Trivedy and Goel (1984) [11].

III. RESULTS AND DISCUSSION

The variation in the physico-chemical parameters of water in the four different sites i.e. site-1, site-2, site-3 (along the river Nambul) and site-4 at the very vicinity of Lamphelpat disposal site are given in the Table-1.

The mean air temperatures at the sites 1, 2, 3 and 4 are $26.08 \pm 5.09^\circ\text{C}$, $27.04 \pm 5.22^\circ\text{C}$, $24.67 \pm 5.12^\circ\text{C}$ and $23.75 \pm 5.50^\circ\text{C}$ respectively. The water temperature at site 1, 2, 3, and 4 are 21.88 ± 4.88 , 22.54 ± 5.74 , 22.21 ± 4.94 , 23.54 ± 5.62 respectively. The water temperature at the sites 2, 3 and 4 are higher than that of site-1. After the river enters within the

municipal area, several human activities like dumping of waste from the domestic, commercial and other sources is done into this river. This higher value of temperature may be due to reaction of chemicals and discharged into water bodies [12]. The mean transparency value at the study sites 1, 2, 3 and 4 are 18.5 ± 8.59 , 15.5 ± 8.30 , 17.58 ± 9.53 and 18.94 ± 6.1 respectively. During the study period the transparency ranges from 5 cm to 33.7 cm. The mean transparency was highest at site-4 i.e. 18.94 ± 6.1 and the lowest was at site-2 i.e. 15.5 ± 8.30 . The lowest at site-2 may be because of the discharge of sewages and other waste materials in addition to other human activities.

Table 1: Physico-chemical parameters of Nambul River and Lamphelpat disposal site during April 2010 to March 2012. The values are Means for the different month \pm SD and Range.

Parameter	Nambul River			Disposal site
	SITE -1	SITE -2	SITE -3	SITE -4
Air Temperature ($^\circ\text{C}$)	26.08 ± 5.09 (14-33)	27.04 ± 5.22 (15-33)	24.67 ± 5.12 (14-30)	23.75 ± 5.50 (11-30)
Water Temperature($^\circ\text{C}$)	21.88 ± 4.88 (12-27)	22.54 ± 5.74 (12-36)	22.21 ± 4.94 (13-27)	23.54 ± 5.62 (12-31)
Transparency (cm)	18.5 ± 8.59 (5.6-33.6)	15.5 ± 8.30 (5.1-29.4)	17.58 ± 9.53 (5-33.7)	18.94 ± 6.1 (11.2-29.8)
Conductivity ($\mu\text{mho/cm}$)	129.58 ± 30 (80-180)	196.25 ± 72.04 (80-310)	242.5 ± 97.59 (90-450)	605 ± 158.64 (240-820)
pH	7.09 ± 0.52 (6.29-8.56)	6.77 ± 0.46 (6.3-7.62)	6.79 ± 0.48 (6.23-7.7)	6.99 ± 0.5 (6.27-7.8)
TDS (ppm)	42.5 ± 12.25 (20-60)	66.25 ± 33.47 (20-160)	93.33 ± 54.83 (20-280)	1055.42 ± 589.24 (70-1920)
Alkalinity (mg/l)	86.25 ± 21.17 (50-120)	99.58 ± 33.72 (55-170)	111.04 ± 38.16 (55-190)	240.83 ± 140.95 (35-485)
Hardness (mg/l)	35.75 ± 10.96 (18-54)	41.5 ± 12.94 (18-60)	47.5 ± 21.11 (18-110)	192.29 ± 64.28 (43-292)
Calcium (mg/l)	9.15 ± 5.12 (1.6-20.04)	9.92 ± 5.94 (0.8-20.04)	11.86 ± 6.05 (1.6-20.04)	26.95 ± 13.09 (7.21-59.32)
Magnesium (mg/l)	3.31 ± 2.15 (0-7.8)	4.43 ± 2.50 (0.97-10.72)	4.61 ± 3.46 (1.46-16.57)	30.98 ± 14.21 (3.9-55.06)
Chloride (mg/l)	9.11 ± 3.7 (2.84-17.04)	12.60 ± 6.23 (2.84-24.14)	16.63 ± 10.30 (2.84-41.18)	71 ± 30.57 (17.04-147.68)
DO (mg/l)	4.78 ± 1.17 (3.04-6.89)	3.71 ± 1.40 (1.62-5.47)	3.28 ± 1.4 (1.01-7.09)	5.46 ± 3.55 (2.23-19.86)
BOD (mg/l)	1.74 ± 0.91 (0.61-3.65)	5.02 ± 2.49 (0.91-8.83)	4.89 ± 2.54 (0.91-9.14)	5.43 ± 2.73 (0.91-9.74)

Conductivity, the capacity to conduct electric current in a solution ranges from $80 \mu\text{mho/cm}$ to $820 \mu\text{mho/cm}$ during the study period. The mean values at the study sites 1, 2, 3 and 4 are 129.58 ± 30 , 196.25 ± 72.04 , 242.5 ± 97.59 and 605 ± 158.64 respectively. The conductivity gradually increases from sites 1 to 3 along the river. But the highest mean conductivity value was observed at site-4. The higher value of conductivity may be because of the discharge of runoff from the unsegregated waste dumped. The value is comparable with that reported from the two Wetlands of Tiptur Taluk, Karnataka ($560.67 \mu\text{mho/cm}$ in Bajgur and $265.25 \mu\text{mho/cm}$ in Sugur) [13]. The highest value of conductivity (1940

$\mu\text{mho/cm}$) was reported from the Cauvery River, Tamil Nadu [14].

The average pH value at site-1 is 7.09 ± 0.52 and at site 2, 3 and 4 are 6.77 ± 0.46 , 6.79 ± 0.48 and 6.99 ± 0.5 respectively. The pH value during the study period ranges from 6.23 to 8.56 across the study sites. The pH value at the sites 2, 3 and 4 shows slight acidic nature. It may be because of the waste dumping. This was in support of the values reported from the Brahmani River, Orissa [15]. The observed minimum value of pH are slightly lower than the desirable value prescribed by BIS, Bureau of Indian Standard (6.5-8.5)

for drinking water and maximum values in all sites are within the desirable limit except in site-1.

The mean value of the TDS at site-1 is 42.5 ± 12.25 and at sites 2 and 3 are 66.25 ± 33.47 and 93.33 ± 54.83 respectively, whereas at site-4 it was 1055.42 ± 589.24 . The TDS values varied from 20 ppm to 1920 ppm in all the sites during the study period. The value of TDS gradually increases from site-1 to site-3 along the river Nambul. The values can be comparable with that reported from the vicinity of the municipality dumping sites of Karimganj district, Assam, India [16]. The maximum value in the present study was observed at site-4 which is comparable with the value of 1324 mg/l reported from the Cauvery River, Tamil Nadu [14]. TDS value may be higher due to run off from many bathing ghats, municipality solid garbage dump and other wastages [17].

During the study period the mean alkalinity value at the different sites 1, 2, 3 and 4 are 86.25 ± 21.17 , 99.58 ± 33.72 , 111.04 ± 38.16 and 240.83 ± 140.95 respectively. The value ranges from 35 mg/l to 485 mg/l across the sites. There is gradual increase in the values from site-1 to site-3 along the river and the highest value was observed at the site-4, the very vicinity of municipal waste dumping yard. The minimum values are comparable with the value (32-64 mg/l) reported from Thengapattanam estuary, Tamilnadu, India [18]. Higher values can be supported by the value (112-148 mg/l) reported from river Chambal in Kota city area, Rajasthan, India [19] and Jagadeshappa et al. (2011) from the two Wetlands of Tiptur Taluk, Karnataka [13]. It is also supported by the values (13-246 mg/l) reported from Ganga River, Kanpur [20]. The observed mean value at site-4 exceeds the desirable range prescribed by BIS (200mg/l).

The mean hardness values are 35.75 ± 10.96 , 41.5 ± 12.94 , 47.5 ± 21.11 and 192.29 ± 64.28 respectively for sites 1, 2, 3, and 4. Hardness values ranges from 18 mg/l to 292 mg/l during the study period. The higher value of hardness is observed at site-3 and the highest at site-4. The high hardness in river water may be because of the discharge of untreated domestic wastes and industrial effluents [21]. The mean value of calcium at the study sites 1, 2, 3 and 4 are 9.15 ± 5.12 , 9.92 ± 5.94 , 11.86 ± 6.05 and 26.95 ± 13.09 respectively. Calcium concentration varied from 0.8 mg/l to 59.32 mg/l in the study sites during the study period. There is gradual increase in the mean value from site-1 to site-3 along the river and it was maximum at site-4, the disposal site. The mean value of magnesium at the sites 1, 2, 3 and 4 are 3.31 ± 2.15 , 4.43 ± 2.50 , 4.61 ± 3.46 and 30.98 ± 14.21 respectively. Magnesium ranges from 0 mg/l to 55.06 mg/l during the study period. The highest value at site-4 may be because of the runoff from the dump site. The observed value of magnesium at site-4 is slightly greater than the desirable value prescribed by BIS.

The mean chloride value at the sites 1, 2, 3 and 4 are 9.11 ± 3.7 , 12.60 ± 6.23 , 16.63 ± 10.30 and 71 ± 30.57 respectively. Chloride concentration from across the sites ranges from 2.84 mg/l to 147.68 mg/l. The value is gradually increasing from site-1 to site-3 and the highest value is observed at site-4. The finding is similar with that reported in [22] which state that municipal sewage and domestic waste in river water raises the chloride value. Reference [23] reported that the greater value of chloride in surface water might be due to natural processes like passage of water through natural salt

formations in the earth or it may be an indication of pollution from domestic waste.

The mean dissolved oxygen value at site-1, site-2, site-3 and site-4 are 4.78 ± 1.17 , 3.71 ± 1.40 , 3.28 ± 1.4 and 5.46 ± 3.55 respectively. The dissolved oxygen value ranges from 1.01 mg/l to 19.86 mg/l across the study sites during the study period. The mean value of biological oxygen demand, the indicator of bi-oxidisable inorganic and organic substances at the study site-1, site-2, site-3 and site-4 are 1.74 ± 0.91 , 5.02 ± 2.49 , 4.89 ± 2.54 , and 5.43 ± 2.73 respectively. The BOD value varied from 0.61 mg/l to 9.74 mg/l across the study sites during the study period. The lowest value of BOD at site-1 indicates least organic pollutants while the higher value at sites 2 and 4 indicate the water is moderately polluted by organic wastes. The result is comparable with that reported (1.26-2.81 mg/l) from the Dhamra estuary [24] and (1.20-12.20 mg/l) reported from the river Chambal in Kota city area, Rajasthan [19].

IV. CONCLUSION

From the study of the physico-chemical parameters of water it can be concluded that disposal of solid waste in water bodies leads to pollution of water quality. It also shows that there are differences in the values of parameter between the waste disposal area and non disposal area. It also can be concluded that proper management of the municipal solid waste should be practiced to minimize harmful effect on river which is also used for drinking and other domestic work by people living along the course of river. The public should be given proper awareness regarding the haphazard dumping of solid waste into water bodies and their health impact. Illegal open dumping is hazardous and pollute both land and water (lotic as well as lentic). Considering the impact of pollutants on public health it is essential to prevent pollution of River Nambul as well as water bodies near the disposal site and develop scientific management of solid waste, segregation at source etc. so that aquatic system pollution may be avoided.

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Is Human Development Index (HDI) a Reflector of Quality of Air? A Comparative Study on Developed and Developing Countries

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Abstract- Economic Indicators alone cannot capture the totality of 'Quality of Life' (QOL). The Most acceptable Measure of QOL is the 'Human Development Index' (HDI) of UNDP³. HDI is a composite Index of three Indicators of three essential dimensions of life. These three indicators are of per capita GDP adjusted to purchasing power, life expectancy at birth, and adult literacy rate (including the gross school enrollment ratios). While, the measurement of HDI is considered as a measure of Human well-being, it ignores the other dimension of life, which is the quality of natural environment. Human being lives within this natural environment. In a polluted environment, human being cannot be stay well. In this study, it was examined whether the Quality of Air is Reflected through the HDI or not. In this study, the result has been come out that the Quality of Air is reflected through the HDI only for the Developing Countries. But, in case of Developed Countries, the Quality of Air is not reflected through the HDI.

Index Terms- Composite Index for Quality of Air (CIQA), Human Development Index (HDI), Principal Component Analysis (PCA), Spearman's Rank correlation Coefficient

I. INTRODUCTION

In this universe, Lives come only on this earth, because of the favorable natural environment to sustain its life. That is why we only found Human beings on this earth only, till now. Human born here, utilized the earth's natural resources for his/her livelihood and release some particles, which are toxic for his/her health, to the nature. The nature has its own power to purify itself, but at certain limit. With the progression of human civilization, human activities increase rapidly day by day and human being is crossing the nature's limit. Thus, the concept of environmental pollution had come out. Now people suffering from its own created polluted environment. Once upon a time, we were concerned about the per capita GDP only as a measure of Human development. In second half of the last century, the development economist incorporated the issues of social dimensions with the per capita GDP for calculating the measures of Human Development. Now with the growing awareness of the environment the time has come to look at the natural environment too in calculating the Human Development. Because, by ignoring the environment no development would be Human Development. Therefore, we should incorporate the issues of natural environment in Human Development Index (HDI) (Basak and Kamdar, 2005).

Human Development Index (HDI): The concept of human development has come to the surface of development economics. Human development broadly focuses on the overall human well-beings. The process of development should create an environment to enable people to have full access to resources needed for a decent standard of living. The economic Indicators alone do not capture the totality of 'Quality of Life' (QOL)⁴. The most accepted measure of QOL is the 'Human Development Index' (HDI) of United Nation Development Programme (UNDP), measuring since 1991. HDI is a composite index of three Indicators of three Dimensions of Life (Bhattacharya, 2001). A long and healthy life is measured by the Life expectancy at birth. The Knowledge is measured by the combined education index of Adult literacy rate (with 2/3 weight) and the combined primary, secondary and tertiary gross enrollment ratio (with 1/3 weight). And a decent standard of living is measured by GDP per capita (PPP US\$). Therefore the three Indicators for measuring HDI are:

- Per Capita GDP adjusted to Purchasing power (i.e., PPP US\$),
- Adult Literacy Rate (including gross school enrolment), and
- Life Expectancy at birth (years).

However, While HDI measures changes in Human Welfare; it ignores the 'Quality of Ambient Environment'. There is a profound relation between human health and well-being from the one side and air pollution levels from the other. The polluted environment affects health and thus it affects the life expectancy (Kyrkilis et. Al., 2007). And through life expectancy HDI is affected

³ UNDP stands for United Nations Development Programme.

⁴ Quality of life (QOL) references the general well-being of individuals and societies.

by the polluted environment. For inadequacy of data, the study was concentrated only with air pollution. Is the polluted air is reflected through the HDI or not? This is the main asking of this study. So, now we look at the Air pollution and its effect on human health.

Air pollution: Air is a precious natural resource and without which life cannot be sustained, even for more than a few minutes. Human activities like industrial production, Motor transport and domestic burning of fuels, large amounts of harmful pollutants to the atmosphere were added by the human being. According to the World Health Organization (WHO) definition, "Air pollution is as a situation in which the outdoor atmosphere contains certain materials in concentrations which are harmful to people or their environment". Worldwide air pollution is responsible for large numbers of deaths and cases of respiratory disease. While major stationary sources are often identified with air pollution, the greatest source of emissions is actually mobile sources, mainly automobiles (Barrege et. Al., 2006). Gases such as carbon dioxide, which contribute to global warming, have recently gained recognition as pollutants by some scientists. Air pollution can affect the health in many ways with both *short-term* and *long-term* effects. Different groups of individuals are affected by air pollution in different ways. Young children and elderly people often suffer more from the effects of air pollution. People with health problems such as asthma, heart and lung disease may also suffer more when the air is polluted. Examples of **short-term effects** include irritation to the eyes, nose and throat, and upper respiratory infections such as bronchitis and pneumonia. Other symptoms can include headaches, nausea, and allergic reactions. Short-term air pollution can aggravate the medical conditions of individuals with asthma and emphysema. **Long-term health effects** can include chronic respiratory disease, *lung cancer, heart disease*, and even *damage to the brain, nerves, liver, or kidneys*. Continual exposure to air pollution affects the *lungs* of growing children and may aggravate or complicate medical conditions in the elderly.

The Major pollutants: The major pollutants in air, are identified by the physical scientists, are as follows: Carbon dioxide (CO₂), Carbon monoxide (CO), Sulfur dioxide (SO₂), Oxides of Nitrogen (NO_x), Suspended Particulate Matter (SPM), Hydro Carbons, metallic traces, Ozone (O₃), etc. However, due to the lack of adequate data, I have selected only three Pollutants in the present study. There are; Carbon dioxide (CO₂), Oxides of Nitrogen (NO_x) and Sulfur dioxide (SO₂). Nitrogen oxides are produced during most combustion processes. Mobile sources and power plants are the major contributors in Southern California. About 80 percent of the immediately released nitrogen oxide is in the form of nitric oxide (NO). Small amounts of nitrous oxide (N₂O) are also produced. Nitrous oxide is a "greenhouse" gas that is suspected of playing an important role in global warming. Nitrogen dioxide is the most important nitrogen oxide compound with respect to acute adverse health effects. Children living in areas with high nitrogen dioxide concentrations had greater incidences of lung-related illness than children living in areas with lower concentrations did. Some studies also have suggested that children younger than five years old may be more severely affected by nitrogen dioxide than older children. Many studies show significant associations between outdoor nitrogen dioxide concentrations and adverse health outcomes (Campbell, 1997). Most man-made emissions of the gas sulfur dioxide (SO₂) come primarily from the combustion of fossil fuels such as coal, oil, and diesel fuel. For those with asthma, even relatively short-term, low-level exposures to sulfur dioxide can result in airway constriction leading to difficulty in breathing and possibly contribute to the severity of an asthmatic attack. A number of epidemiological studies have shown associations between ambient sulfur dioxide and rates of mortality (death) and morbidity (illness) (Zhang et. Al., 2006). Carbon dioxide is a chemical component composed of two oxygen atoms covalently bonded to a single Carbon atom. In general, it is exhaled by animals and utilized by plants during photosynthesis. Additional Carbon dioxide is created by the combustion of fossil fuels. Carbon dioxide is an important greenhouse gas; it causes Global warming (Jurado, and Southgate, 1999). Though it is not so dangerous to health, it affects health if we inhaled it in high concentrations (greater than 5% by volume). Carbon dioxide causes Drowsy, Headaches.

The Urban concentrations of health-damaging pollutants are often among the highest in the middle-income countries, and preventive and protective measures are still at an early stage. It is also relevant to low income countries, where air pollution problems tend to be more localized, but can very sever when they do arise (McGranahan and Murray, 2003). A review of evidence from Developed nations substantiates the harmful effects of air pollutants on health, even at levels considerably lower than those observed in many mega cities of the developed world. Difference in relation to the level of exposure and co-exposure to different pollutant mixture, the pollution structure, the Nutritional Status and the lifestyle observed in developing nations suggest that the adverse effects of air pollution may be even greater than those observed in developed nations (Romieu, 2003).

II. OBJECTIVE OF THE STUDY

HDI has three components; Per Capita GDP adjusted to Purchasing Power, Education and Life Expectancy. The Quality of Air may only affect HDI through the Life expectancy, only. The objective in this study is whether the Quality of Air is reflected through the HDI or not. The hypothesis in this study is that Quality of Air is reflected through the HDI only for Developing Countries, but not for the Developed countries.

III. METHODOLOGY

In this Study, it was examined that whether HDI reflects the Quality of Air or not. To do that job, 15 developed countries (such as Australia, Belgium, Denmark, Finland, Germany, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Spain, Sweden, United Kingdom, and United States of America) were selected and 15 developing countries (such as Algeria, Bolivia, Bulgaria, Chile, Colombia, Ethiopia, Guatemala, Jamaica, Lebanon, Lithuania, Morocco, Philippines, Sri Lanka, and Uzbekistan, and Yemen) were

selected also. The Countries are collected based on availability of the relevant data and information. After collecting the data, the following steps were taken:

- ❖ Step-1:- After collecting, the data on the values of HDI for each developed countries and rank the countries according to their HDI values. Higher the values of HDI will get higher rank, i.e., 1st, 2nd, 3rd and so on.
- ❖ Step-2:- Collecting the data on quality of air (only SO₂, CO₂ and NO_x data are available) for all the selected developed countries, the method of Standardization was done. Then, the Composite Index for Quality of Air (CIQA) was calculated based on the Principal Component Analysis (PCA)⁵. After that the corresponding rank is given for each country. In this case, lower the value of CIQA would have been given higher the rank.
- ❖ Step-3:- Now with these two sets of Ranks, i.e., Ranks of HDI values and that of CIQA, the Spearman's Rank Correlation Coefficient was calculated. The high value of Rank Coefficient can say that HDI is a good Reflector of Quality of Air.
- ❖ Step-4:- After collecting the data of Life Expectancy at birth (LIEX) for all the developed countries, they were ranked according to their values. Higher the value of LIEX, it will get higher rank.
- ❖ Step-5:- With the two sets of Ranks, i.e., Ranks of LIEX and that of CIQA, the Spearman's Rank Correlation Coefficient was calculated.
- ❖ Step-6:- All the above steps are done for the Developing Countries, as well.

IV. DATA COLLECTION

Data for Quality of Air (QOA) is collected from the Official web site of United Nation Statistical Division and World Development Report, 2006. And, the data on the HDI and its three components are collected from Human Development Report, 2004. The comparability of sources of data is one most challenging task in this paper. Data on other pollutants are not available properly. The threshold levels of each pollutants of every country are not available. And all of calculations were done with the statistical software, SPSS 14.0.

V. FINDINGS AND DISCUSSION

As it is mention in the Methodology Section that the study would be comparative study of Developed countries and Developing countries.

For Developed Countries: The per capita air pollution emission of three major pollutants, SO₂, CO₂ and NO_x, were tabulated for 15 most developed countries in Table-1. And these values were standardized⁶. The Composite Index for Quality of Air has been calculated through the method of PCA through the SPSS software. The values for first component, FAC1 were taken and these are ranked accordingly among these 15 developed countries. The ranking for HDI and the life expectancy were also done separately for all 15 developed countries. The values and ranks of Composite Index for Quality of Air (CIQA), HDI, and Life Expectancy (LIEX) at birth and their Ranks of all 15 developed countries are shown in table-1, below.

Table-1: - DEVELOPED COUNTRIES

Country	Air Pollution (emission per capita)			Standardized values			Composite Index for Quality of Air (CIQA)		HDI (2004)		Life expectancy (LIEX) at birth 2004	
	SO ₂ (kg)	CO ₂ (ton) 2000	NO _x (kg)	SO ₂	CO ₂	NO _x	FAC1	Rank	value of index	Rank	Values	Rank
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Australia	38.4	18.0	82.4	1.5	2.0	2.0	2.15	15	0.957	2	76.1	15
Belgium	12.8	10.0	74.3	-0.3	-0.1	1.7	0.52	12	0.945	9	78.7	5.5
Denmark	4.6	8.4	36.8	-0.8	-0.5	-0.2	-0.58	6	0.943	10	76.6	14
Finland	14.1	10.3	40.5	-0.2	0.0	0.0	-0.07	10	0.947	8	77.9	11
Germany	6.5	9.6	16.8	-0.7	-0.2	-1.1	-0.78	4	0.932	15	78.2	8.5
Ireland	24.6	11.1	31.0	0.5	0.2	-0.4	0.12	11	0.956	3	76.9	13

⁵ Principal component analysis (PCA) is a statistical procedure that uses [orthogonal transformation](#) to convert a set of observations of possibly correlated variables into a set of values of [linearly uncorrelated](#) variables called principal components. PCA is also used to make composite index.

⁶ The process of standardization is done by subtracting from mean and then it is divided by the standard deviation of a series of values.

Italy	10.4	7.4	21.6	-0.4	-0.7	-0.9	-0.78	3	0.940	11	78.7	5.5
Japan	6.0	9.3	14.5	-0.7	-0.2	-1.2	-0.82	2	0.949	5	81.5	1
Netherlands	4.8	8.7	26.8	-0.8	-0.4	-0.7	-0.74	5	0.947	7	78.3	7
New Zealand	13.5	8.3	51.5	-0.2	-0.5	0.5	-0.07	9	0.936	14	78.2	8.5
Norway	2.0	11.1	43.7	-1.0	0.2	0.2	-0.22	8	0.965	1	78.9	4
Spain	46.6	7.0	45.6	2.0	-0.8	0.3	0.57	13	0.938	13	79.2	3
Sweden	4.6	5.3	25.8	-0.8	-1.3	-0.7	-1.09	1	0.951	4	80.0	2
UK	16.2	9.6	26.7	0.0	-0.2	-0.7	-0.35	7	0.940	12	78.1	10
USA	42.8	19.8	65.4	1.8	2.5	1.2	2.15	14	0.948	6	77.0	12
Mean	16.5	10.3	40.2									
S.D.	14.8	3.8	20.6									

Source:- For Air Pollution, Data are collected the from web-site of UN Statistical Division
For HDI and Life expectancy at birth, from Human Development Report,2004,(UNDP)

Then, the Spearman’s Rank Correlation Coefficient between Rank of HDI and Rank of Air Pollution for developed countries was calculated and this is shown in the Table-2, as below. Here The Spearman’s Rank correlation Coefficient is only 0.129 which is very much statistically insignificant. That means, it can be concluded that HDI is not a good reflector of Quality of Air (QOA) for the Developed Countries.

Table-2:
Spearman’s Rank correlation Coefficient between Rank of HDI and Rank of Air Pollution

	Rank of HDI	Rank of Air Pollution
Rank of HDI	1	0.129
Rank of Air Pollution	0.129	1

Now the Spearman’s Rank Correlation Coefficient between Rank of Life Expectancy and Rank of Air Pollution for developed countries is done for the developed countries and the Result is shown in the Table-3, as below:

Table-3: Spearman’s Rank correlation Coefficient between Rank of (LIEX) and Rank of (CIQA)

	Rank of Air Pollution	Rank of Life expectancy
Rank of Air Pollution	1	0.512
Rank of Life expectancy	0.512	1

Here we see that, the Quality of Air (QOA) is not reflected through HDI as well as through the life expectancy (LIEX), because the Spearman’s Rank correlation Coefficient between Rank of life expectancy and Rank of Composite Index of Quality of Air is 0.512, which is also insignificant at 95% significance level.

For Developing Countries: In Table-4, the values of Composite Index for Quality of Air (CIQA), HDI, and Life Expectancy (LIEX) at birth and their Ranks of all 15 developed countries are shown.

Table-4: - DEVELOPING COUNTRIES

Country	Air Pollution (emission per capita)			Standardized values			Composite Index		HDI (2004)		Life expectancy at birth 2004	
	SO ₂ (kg)	CO ₂ (ton) 2000	NO _x (kg)	SO ₂	Co ₂	NO _x	FACI	Rank	value of index	Rank	Values	Rank
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Algeria	1.8	2.9	6.4	-0.5	0.3	-0.4	-0.21	9	0.728	8	69.5	9.5
Bolivia	1.2	1.3	5.5	-0.5	-0.6	-0.6	-0.64	6	0.692	11	63.7	13

Bulgaria	121.4	5.3	14.3	3.4	1.7	1.2	2.29	15	0.816	3	70.9	7
Chile	10.4	3.9	11.6	-0.2	0.9	0.6	0.52	10	0.859	1	76.0	1
Colombia	4.3	1.4	6.1	-0.4	-0.5	-0.5	-0.53	7	0.790	4	72.1	6
Ethiopia	0.2	0.1	1.5	-0.6	-1.3	-1.4	-1.26	1	0.371	15	45.5	15
Guatemala	8.4	0.9	4.2	-0.3	-0.8	-0.8	-0.73	4.5	0.673	12	65.7	12
Jamaica	40.4	4.2	12.6	0.8	1.1	0.8	1.01	13	0.724	9	75.6	2
Lebanon	26.0	3.5	17.5	0.3	0.7	1.8	1.06	14	0.774	5	73.5	3
Lithuania	13.2	3.4	16.6	-0.1	0.6	1.6	0.81	12	0.857	2	72.5	4.5
Morocco	10.8	1.3	5.8	-0.2	-0.6	-0.5	-0.50	8	0.640	13	68.5	11
Philippines	6.5	1.0	4.4	-0.3	-0.8	-0.8	-0.73	4.5	0.763	6	69.8	8
Sri Lanka	2.3	0.6	3.3	-0.5	-1.0	-1.0	-0.95	2	0.755	7	72.5	4.5
Uzbekistan	11.1	4.8	10.8	-0.2	1.4	0.5	0.68	11	0.696	10	69.5	9.5
Yemen	0.2	0.5	5.8	-0.6	-1.1	-0.5	-0.83	3	0.492	14	59.8	14
Mean	17.2	2.3	8.4									
S.D.	30.8	1.7	5.0									

Source:- For Air Pollution, Data are collected the from web-site of UN Statistical Division

The Spearman’s Rank correlation Coefficient between Rank of HDI and Rank of Air Pollution for developing countries was calculated and it was shown in Table -5, as below: Here, the Spearman’s Rank correlation Coefficient is **0.579**, and which is statistically significant. That means, it can be concluded that HDI is a reflector of Quality of Air (QOA) for the Developing Countries.

	Rank of Air Pollution	Rank of HDI
Rank of Air Pollution	1	0.579
Rank of HDI	0.579	1

**Correlation is significant at the 0.05 level (2-tailed).*

Now, the Spearman’s Rank correlation Coefficient between Rank of Life Expectancy and Rank of Air Pollution for developing countries is done for the developed countries and the Result is shown in the Table-6, as below: The Spearman’s Rank Correlation Coefficient between Rank of life expectancy and Rank of Composite Index of Quality of Air is 0.512, which is significant at 95% significance level. There we see that the Quality of Air (QOA) is reflected through HDI as well as the life expectancy.

	Rank of Air Pollution	Rank of Life Expectancy
Rank of Air Pollution	1	0.605
Rank of Life Expectancy	0.605	1

**Correlation is significant at the 0.05 level (2-tailed).*

Thus, it is clear from the above study that the HDI is a reflector of Quality of Air (QOA) for developing countries. But, HDI is not a good reflector of QOA for developed countries.

VI. CONCLUSION

From the Above Result, it can be concluded that in case of developing countries, HDI also reflects the Quality of Air through affecting the Life Expectancy at birth. However, the result for the developed countries came in the contradictory. In case of developed countries, HDI does not reflect the Quality of Air. The Quality of Air is also does not affect the Life of Expectancy at birth for the developed countries. Since, among the three component, Quality of Air affect only Life Expectancy at birth and since, it is not a good respondent with the change of Quality of Air, the HDI also does not change for developed countries. One of the major probable cause is that developed countries have high per capita income, high per capita expenditure (private and govt., both), well connection of safe drinking water and good sanitation facilities etc. The people the developed countries may cope up with the high level of pollution with the both adoptive and mitigation method. And in this way they can maintain good health and high life expectancy. However, in developing countries all the facilities are either absent or in adequate for the entire citizen or beyond the ability of purchasing power.

The people of developing countries cannot prevent themselves to suffering from polluted air. That is why, the people of Developing Countries, has a low level of Life Expectancy at birth.

Limitation of this study: This study is not the beyond of any criticism. It is a preliminary attempt to associate air quality with the HDI. In this study, Carbon Monoxide (CO) and Suspended Particulate Matters (SPM) were excluded due to the lack of adequate data, though these two pollutants have much effect on human health. Moreover, Ranking process itself has a limitation. A lot of research can be done here.

Future Prospect: There is a huge scope for research in different aspects out of this paper. The outcome of this paper shows that the life expectancy is not affected by the bad quality of air pollution for developed countries. One can go for further research to find out causes of it. One can also want to investigate the basic factor of these differential results in developed countries. Life expectancy at birth not only depends on the air pollution only, the effects of overall environmental pollution level (i.e., Air, water, Noise, Municipality's solid waste, biological solid waste etc.) can also be the areas of interest. However, the effect of food and nutrition is also importance in this respect. Moreover, the threshold level of each pollutant is also crucial, because the pollutants harm human beings only if it reached beyond certain limit.

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Synthesis and Characterization of Nano hydroxyapatite with Polyurethane Nano Composite

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Abstract- In this study, a new kind of nano hydroxyapatite (nHAp) / polyurethane (PU) nano composite were fabricated for potential use in teeth and bone tissue engineering. Nano hydroxyapatite was successfully synthesized by wet chemical precipitation method. In this work, hydroxyapatite/polyurethane nano composites were synthesized and characterization of the compound were done by using Fourier transform infrared (FTIR), X-ray diffraction (XRD), scanning electron microscopy (SEM), energy dispersive spectrum (EDS).

Index Terms- FTIR, XRD, SEM, EDS, Polyurethane (PU).

I. INTRODUCTION

Hydroxyapatite(HAp) is a major mineral component of bone and teeth[1]. HAp is biocompatible with the human organism. It is capable of integrating biological compound into bone tissue. HAp with the chemical formula $\text{Ca}_{10}(\text{PO}_4)_6(\text{OH})_2$, has been studied to repair bone defect or restore bone tissue functionality[2]. Various methods have been tried for the preparation of HAp either from natural sources (coral or bone) through wet chemical synthesis [3, 4]. The bioceramic has been widely used in dental materials. It can also be used as bone substituent materials due to its excellent biocompatibility, bioactivity, and non-toxicity, non-inflammatory nature [5]. HAp is manufactured in many forms and can be prepared as a dense ceramic [6], powder [7], ceramic coating [8], or porous ceramic [9] as required for the particular applications.

In recent years, much research has been carried out towards the development of applications. The small amounts of other materials such as carbon, nitrogen, iron, and another element are incorporated along with HAp to prepare the biomaterials. This biomaterials are widely used to repair, fill, extend and reconstruct deranged bone tissue and can also be used in soft tissue. HAp can also be manufactured synthetically by using number of different methods. The process for the preparation of hydroxyapatite and other calcium phosphate powder may be classified in synthesis from manual bone or coral. It can also be synthesized by reactions in solid state [10], co-precipitation [11,12],hydrothermal method[13], sol-gel.process[14], microwave processing[15].

Polymeric materials have been used in medical and surgical applications. This paper has shown to improve the performance of polyurethane along with HAp for medical applications in addition to the usage of Polyurethane to be used in formulation of industrial, foot ware, cable & wire, tube, paint, film and sheet [16]. The requirement of specific materials differ according

to the nature of the application and there fore different techniques have been used in modifying and fabricating different compositions to achieve exact requirements for clinical use. Polyurethane is a versatile class of polymers and is one of the most interesting classes of synthetic elastomer with unique properties that are used in a broad range of applications due to their excellent physical properties and relatively good biocompatibility [17]. However, during the commercial process, the studies found that the prepolymer i.e., two step process yielded polyurethane was insoluble in common organic solvent at room temperature but are easily moldable. In contrast the one-step process with the same formulation generally produced soluble polyurethane. A great deal of attention has been given to the synthesis morphology, chemical and mechanical properties of this family of materials [18]. Polyurethane is of good physical strength, abrasion resistance, water resistance, fatigue life and biocompatible character. Research on polyurethane has focused on its potential application as a facial prosthesis in dentistry, based on its inherent environmental stability, high tear resistance and low modulus without strength and elongation.

II. MATERIAL AND METHOD

Material

Material used in this study were: calcium hydroxide ($\text{Ca}(\text{OH})_2$) and ammonium dihydrogen phosphate($(\text{NH}_4)_2\text{H}_2\text{PO}_4$) obtained from Merck(India) and polyurethane purchased from Sigma Aldrich. Doubly distilled water, ethanol and N,N-dimethylformamide (DMF) was used as the solvent.

Method

Synthesis of nano Hap

Nano HAp was synthesized by following a modified wet chemical precipitation method. At 33°C , 7.48g of $(\text{Ca}(\text{OH})_2)$ was first dissolved in a 100 ml volume of an ethanol-water mixture (50:50%, v/v) and was stirred for 3hrs. A solution of 6.7g ($(\text{NH}_4)_2\text{H}_2\text{PO}_4$) was dissolved in 100 ml volume water and then added to the $(\text{Ca}(\text{OH})_2)$ solution over a period of 24hrs. The PH of the slurry was measured digitally during to the precipitation reaction, reaching a final value of PH as 11.

Synthesis of PU/Hap nano composites

Polyurethane was dissolved in N,N-dimethylformamide(DMF) solvent. After it was homogenously dissolved in DMF nano hydroxyapatite powder was added to the parent solution. The PU / HAp solution was subjected to microwave exposure for initiating nano synthesis process under heat treatment.

III. RESULTS AND DISCUSSION

FTIR

The Fourier transform infrared (FTIR) investigations were carried out using PERKIN ELEMER spectrometer in the range of 400 cm^{-1} to 4000 cm^{-1} . The functional groups were identified using the peak assignments. A strong peak at 3497.15 cm^{-1} was assigned to the O-H stretching in alcohol group. The strong band at 2931.87 cm^{-1} was assigned to C-H stretching alkane group. The band $\text{-C}\equiv\text{C-}$ which usually occurred at 1998.99 cm^{-1} . The strong peak at 1657.63 cm^{-1} revealed the stretching vibration of C=O urea group. The strong peak at 1542.51 cm^{-1} was attributed to the N-O stretching nitro group. The medium weak and multiple band appeared at 1423.40 cm^{-1} had shown alkyl halide C-F and C-Cl stretching respectively. The alkyl halide stretching at 565.91 cm^{-1} was also observed

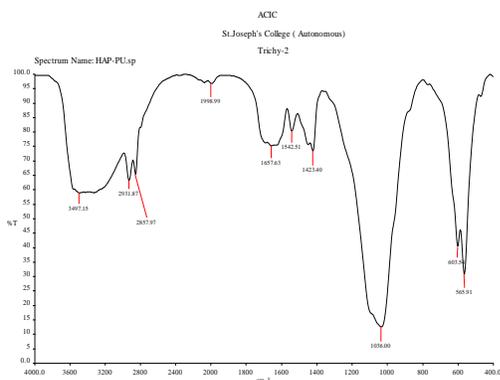


Figure 1: FTIR spectrum of nHAp/PU

XRD

The XRD patterns of nHAp and PU nanocomposite were taken. The observed diffraction peaks were identified by standard JCPDS (file no. 09-0432) file and were assigned as crystalline HAp. Well defined Bragg peaks were obtained at specific 2θ angles indicating that nanoparticle was ordered. The diffraction peaks, particularly in the planes 201, 211, 300, 222, and 213 are high and narrow implying that the HAp crystallines well. The crystalline size of the pure HAp/PU nano composite was calculated using Scherrer's formula. The structure of the samples was analyzed by X-ray diffraction (XRD) using a RIGAKU X-ray diffractometer. The $\text{Cu K}\alpha$ $\lambda = 0.15418\text{ nm}$ was used as a target material for X-ray source. The Scherrer formula is $X_s = K\lambda/(\beta_m \cos\theta)$

Where X_s is the mean crystallite size in nm, K is the constant taken for HAp as 0.89λ , λ is the X-ray wavelength (0.154 nm), θ is the diffraction angle, and β_m is the full width at half maximum for the diffraction peak under consideration.

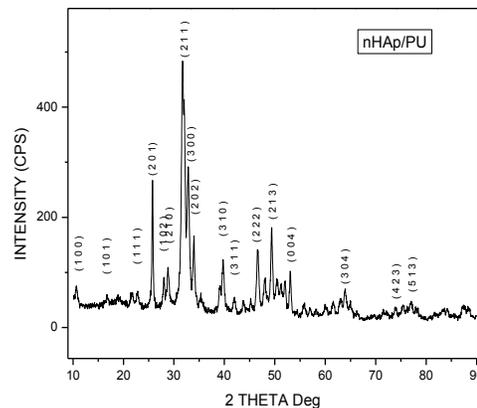
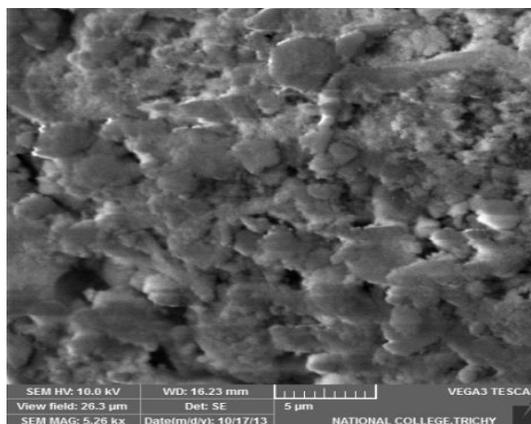


Figure 2: XRD pattern of nHAp/PU

SEM

The microstructure of pure and nHAp/PU is shown in figure 3. The presence of well-distributed macroporous through and microporous within the pore walls can be seen on the figure. The size, morphology, and interconnectivity of pores determine the ability of the nutrient diffusion, metabolic product delivery, cell attachment, tissue in growth and angiogenesis. With increase of mineral content, porosity and pore average size decreases, and well thickness increases slightly. It seems that the closed pores are formed in the samples containing higher nHAp content. Moreover, the SEM images showed that nHAp powder homogeneously dispersed in the pore wall as well in the pore surface. The porosity of pure nHAp 50% and PU 50% samples were identified approximately. The pores are regular, uniformly distributed, and interconnected with average pore size ranging $5\ \mu\text{m}$ to $10\ \mu\text{m}$ which are suitable architecture for application in bone tissue engineering.



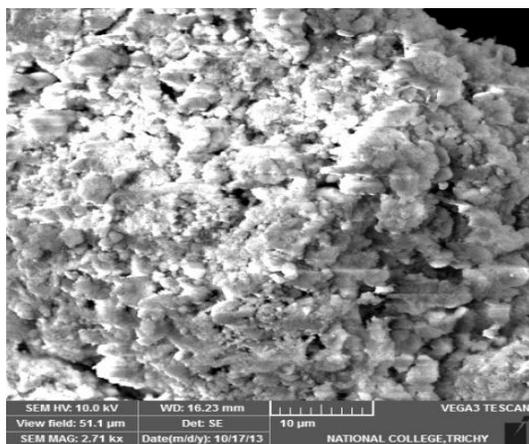


Figure 3: SEM image of nHAp/PU microsphere particle at different magnifications.

EDS

The energy dispersive spectrum(EDS) of nanoHAp/PU is given figure4. Energy peaks correspond to the various elements in the are also observed. The characteristic peaks for C, O, Ca and P were observed at 1.263 keV respectively. The atomic percentage of C, O, Ca and P are focused to be 15.54%, 59.25%, 10.47% and 14.75% respectively. So the EDS conform the presence of Ca/P nanoparticle.

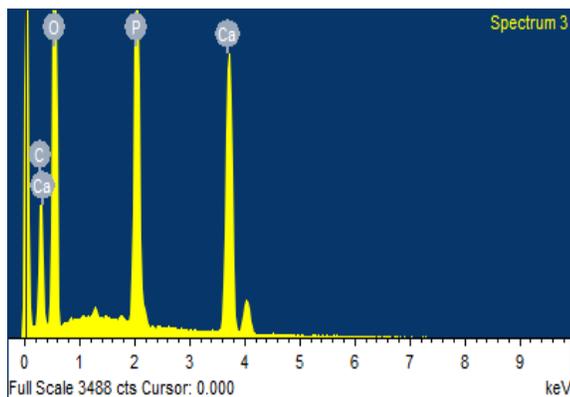


Figure 4: EDS of nHAp/PU

IV. CONCLUSION

According to the results, nHAp/PU nanocomposites synthesis using a wet chemical precipitation method is feasible for synthesized nanocomposite with homogeneous composition. Composites showed satisfactory mechanical properties giving the possibility for using them as both structural substitute and regeneration element of bone in future application due to low biodegradability and acceptable elastic module. In addition, the results conformed as well as the composite with high nHAp/PU contents increase apatite formation growing. The data suggest that the method utilized in this work can be successfully synthesized by hydroxyapatite on polyurethane substrate.

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Routing Protocols in IPv6 enabled LoWPAN: A Survey

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Abstract- 6LoWPAN consists of low power devices that conform to IEEE 802.15.4 and uses the address scheme of IPV6. It is defined by IETF. It enables the integration of IPV6 and low power devices in a personal area network. We need this new technology in order to combine various low power heterogeneous networks and enable the embedded devices to communicate with the Internet based devices. The devices connected in the 6LoWPAN network need to route packets and transfer data and thus consider efficient routing as a major concern. Issues relating to the routing requirements and the various protocols in the area of routing in 6LoWPAN are presented in this survey.

Index Terms- Applications, IPv6, 6LoWPAN, Routing.

I. INTRODUCTION

6LoWPAN is an acronym of IPv6 over Low power Wireless Personal Area Networks[1]. 6LoWPAN technology is rapidly gaining popularity for its extensive applicability, ranging from healthcare to environmental monitoring. In order to provide more reliable and effective IPv6 connectivity on top of LoWPAN, the 6LoWPAN WG (Working Group) has defined some key technologies.

There are 6LoWPAN technology and its applications that discuss on possible technology that can enhance the energy efficiency of 6LoWPAN. One possible technology that is considered for combination with 6LoWPAN is the virtual multiple input and multiple output (V-MIMO) technology [10]. Since devices in 6LoWPAN are expected to be deployed in extremely large numbers and they are expected to have limited compute, display and input capabilities, it makes network management critical in 6LoWPAN [11]. The recent arrival of 6LoWPAN, an IPv6 variant for low-power wireless devices, allows for the development of IP-based applications for low-power wireless networks like sensor networks. As these networks often suffer from unreliable radio channels or frequent node failure, the question arises how 6LoWPAN-based applications can be hardened against such issues. Well-known concepts from the research domain of P2P networks can be applied for increasing the robustness of 6LoWPAN networks have been also recently discussed [16].

6LoWPAN devices are intended to be deployed in IPv6 networks whose subnets that often will be physically disjunct and perhaps separated by large distances. A major advantage of exploiting the nearly inexhaustible address pool available in IPv6 is the ease with which true host-to-host communication can be realised. This however amplifies the importance of security in the network. It must be warranted with nearly 100% certainty that whenever a sensor node solicits or furnishes data to another node, that the solicited node be in fact that node from which the

data is required, and just importantly, that the soliciting node be true node authorised to request the data.[18]

The 6LoWPAN concept originated from the idea that "the Internet Protocol could and should be applied even to the smallest devices," and that low-power devices with limited processing capabilities should be able to participate in the Internet of Things. The Internet of Things refers to uniquely identifiable objects (things) and their virtual representations in an Internet-like structure. In order to really benefit of such kind of integration the IPv6 addressing method and communication protocols adopted in the IoT must be modified to match the WSNs scenario. This adaptation has been standardized with the name of IPv6 over Low power Wireless Personal Area Networks (6LoWPAN).

The term Internet of Things was first used by Adam Baumgarten in 1999. The concept of the Internet of Things first became popular through the Auto-ID Center and related market analysts publication [2]. Internet of Things (IoT) is an integrated part of Future Internet and could be defined as a dynamic global network infrastructure with self configuring capabilities. These capabilities are based on standard and interoperable communication protocols where physical and virtual 'things' have identities, physical attributes, and virtual personalities and use intelligent interfaces, and are seamlessly integrated into the information network. The usage of IPV6 on wireless sensor networks can enable the integration of existing and new sensing applications with the internet. One key issue with the Internet of Things is the ability to rapidly create IoT applications[1][7].

6LoWPAN enables the use of Service Oriented Architectures (SOAs) in WSN. The Internet Engineering Task Force (IETF) has defined the Constrained Application Protocol (CoAP), a web transfer protocol which provides several Hypertext Transfer Protocol (HTTP) functionalities, re-designed for constrained embedded devices. CoAP allows WSN applications to be built on top of Representational State Transfer (REST) architectures. This considerably eases the IoT application development and facilitates the integration of constrained devices with the Web.

Wireless sensor network (WSN) is one of the fastest growing segments in the ubiquitous networking today [4]. In order to morph WSN from personal area network (PAN) into low power personal area network (LoWPAN), IEEE standard 802.15.4 is introduced. A WSN consists of sensor nodes deployed over a geographical area for monitoring physical phenomena like temperature, humidity, vibrations, seismic events, and so on [3]. Typically, a sensor node is a tiny device that includes three basic components: a sensing subsystem for data acquisition from the physical surrounding environment, a processing subsystem for local data processing and storage, and a wireless communication subsystem for data transmission[5].

Whereas a wireless personal area network (WPAN for short) is a low-range wireless network which covers an area of only a few dozen metres. This sort of network is generally used for linking peripheral devices (like printers, cellphones, and home appliances) or a personal assistant (PDA) to a computer, or just two nearby computers, without using a hard-wired connection. There are several kinds of technology used for WPANs: The main WPAN technology is Bluetooth, 6LoWPAN is a simple low cost communication network that allows wireless connectivity in applications with limited power and relaxed throughput requirements as it provides IPv6 networking over IEEE 802.15.4 networks. It is formed by devices that are compatible with the IEEE 802.15.4 standard and characterized by short range, low bit rate, low power, low memory usage and low cost.

In this paper, a survey on routing in IPV6 enabled 6LoWPAN is conducted. This work classifies the routing protocols of 6LoWPAN based on various mobility issues and the heterogeneity of the networks.

This paper is divided into the following sections: Section II is the architecture of 6LoWPAN ,section III gives the classifications, Section IV gives the open issues and finally section V conclude paper.

II. ARCHITECTURE OF 6LOWPAN

6LowPAN working group mainly works on low power devices and the different types of LoWPANs are configured in some ratio to form the architecture of 6LoWPAN and thus the three types of LoWPANs are determined as discussed below and depicted in the Figure 1

There are three types of 6LoWPANs : Ad-Hoc LoWPANs, Simple LoWPANs, and Extended LoWPANs. Ad-hoc LoWPANs are infrastructure less and not connected to the internet, a Simple LoWPANs is connected through one LoWPANs edge router to another Internet Protocol (IP) network. Extended LoWPANs have the LoWPANs consisting of multiple edge routers along with a backbone link in order to interconnect them [9]. The role of edge router is as it routes traffic data or video in and out of the LoWPANs. A LoWPAN consists of a number of nodes, which can play the role of a router or host, along with one or multiple edge routers.

One important term used with 6LoWPAN is the Neighbor discovery (ND), which facilitates the nodes to register with the edge router in order to provide efficient network operation. ND is the basic mechanism in 6LoWPAN and defines how routers and hosts communicate with each other on the same link. The IETF ROLL WG is currently in the final steps of the specification of RPL, a new routing protocol for low power and lossy networks (e.g. wireless sensor networks).

RPL may use layer two- and layer three-based mechanisms for neighbor reachability maintenance. Since layer two mechanisms may not always be available, RPL relies by default on the 6LoWPAN Neighbor Discovery, a version of the IPv6 Neighbor Discovery which is optimized for LLNs[12]. Nodes in the LoWPAN are free to move throughout the LoWPAN, between edge routers, and even between LoWPANs. 6LoWPAN standards enable the efficient use of IPv6 over low-rate, low-power wireless networks of simple embedded devices through an optimization of related protocols and adaptation layer

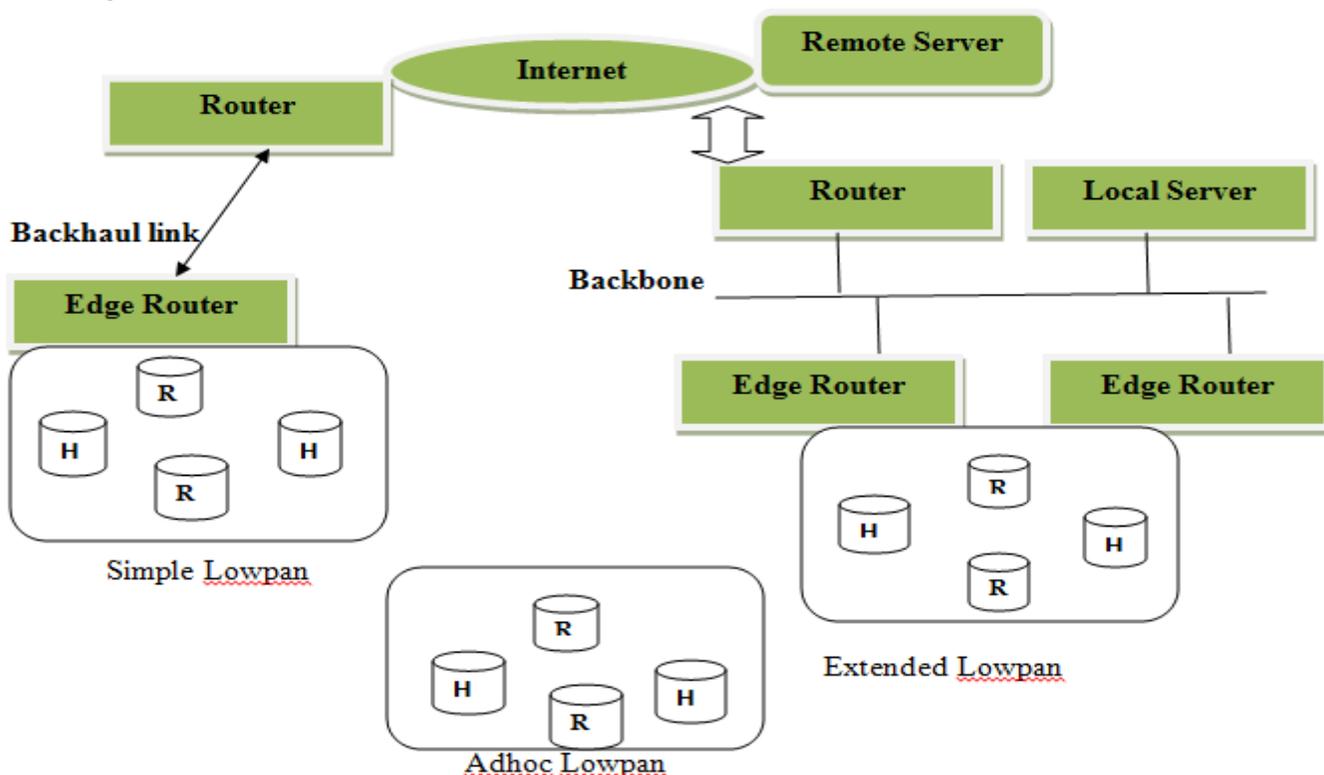


Figure 1 Architecture of 6lowpan

Routing is the process of selecting paths in a network along which to send network traffic. Routing is performed for many kinds of networks, including the telephone network (circuit switching), electronic data networks (such as the Internet), and transportation networks. In packet switching networks, routing directs packet forwarding, the transit of logically addressed packets from their source toward their ultimate destination through intermediate nodes, typically hardware devices called routers, bridges, gateways, firewalls, or switches. General-purpose computers can also forward packets and perform routing, though they are not specialized hardware and may suffer from limited performance. The routing process usually directs forwarding on the basis of routing tables which maintain a record of the routes to various network destinations. Thus, constructing routing tables, which are held in the router's memory, is very important for efficient routing. Most routing algorithms use only one network path at a time, but multipath routing techniques enable the use of multiple alternative paths. There are four basic requirements for routing in 6LoWPAN: (i) the node should support sleep mode for considering battery saving; (ii) generated overhead on data packets should be low; (iii) routing overhead should be lower; (iv) minimal computation and memory requirements.

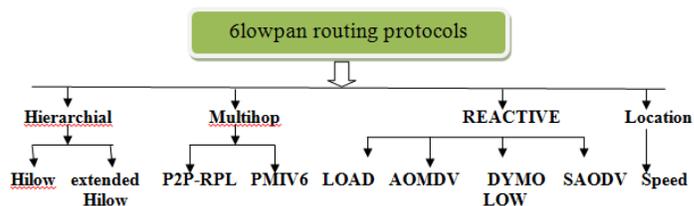
6LoWPAN has a broad range of applications as in Facility, Building and Home Automation, Personal Sports & Entertainment, Healthcare and Wellbeing, Asset Management, Advanced Metering Infrastructures, Environmental Monitoring, Security and Safety Industrial Automation. [6] Transmission Control Protocol (TCP) was considered unsuitable for Low power and Lossy Networks (LLNs) due to the characteristics LLN devices (low computing power, strong energy constraint, etc.) and to the absence of IP layer on the network layer. Recently, the IPv6 over Low power Wireless Personal Area Networks (6LoWPANs) has been introduced as an adaptation layer for IPv6 over LLNs. Thanks to the 6LoWPAN layer and uIP (micro IP) protocol stack, TCP becomes more and more viable for LLNs. Moreover, TCP provides a reliable communication scheme between new small industrial devices [17].

The Mobility management is one of the most important research issues in 6LoWPAN, which is standardizing IP-based Wireless Sensor Networks (IP-WSN) architecture. Currently, IP-WSN is popularly recognized as a global sensor network infrastructure by combining IPv6 protocol with WSN [6]. IPv6 technology has obvious advantages compared to IPv4 in the address space, addressability, address autoconfiguration, security, mobility, QoS support, etc. However, IPv6 was originally designed for traditional IP networks. It needs improving according to the characteristics of WSNs, and then can be applied to WSNs and we also need to optimise the routing algorithms.

There are many issues relating to managing the addressing, mobility, routing protocols and their advanced versions and deciding the handover mechanisms in 6LoWPAN so many research activities have been carried out in order to deal with these issues but also many issues remain open and need to be addressed like security issues and so on.

III. CLASSIFICATION OF ROUTING PROTOCOLS IN 6LoWPAN

Depending on the topology of a 6LoWPAN and the application(s) running over it, different types of routing may be used. 6LoWPAN routing protocols should allow for dynamically adaptive topologies and mobile nodes. The routing protocols can be classified as follows:



HiLow [4] is a hierarchical routing algorithm well-known for the lightweight 16-bit short address allocation and routing mechanism. In HiLow, two types of nodes are defined: higher level nodes called parent nodes that are only represented by full-functional devices (FFDs) and lower level nodes called children nodes. Note that it is very important to reduce the path length for transmitting frames in order to reduce energy consumption and latency. In HILOW the number of hop counts is less compared to the existing hierarchical protocols. However, in the case in which the hop-counts in our scheme is the same as that in HiLow, latency will result due to the broadcasting of the "Hello" message to the forwarding nodes in the route path between the source node and the first ascendant node of the destination node.

HILOW routing protocol focuses on the address allocation method and routing mechanism. However the routing protocol doesn't address scenario where there is more than one potential parent node. If the child nodes attaches to the first responding parent when there is more than one potential parent than this could lead to bias or uneven distribution of child node. Bias association could impact the reliability and also shorten the life span of the network [3].

To overcome this problem a mechanism which uses current number of child node of potential parent was suggested. This mechanism displayed weakness when the responding parent node is having different depth or energy level or same number of current child. Thus HILOW routing protocol highlights the issues and suggests a mechanism which avoids a bias routing hierarchical tree set up. Sensor nodes in 6LoWPAN can distinguish each other and exchange packet after being assigned the 16 bits short address. HiLOW assumes that all the nodes know its own depth of the routing tree.

Each node in HiLOW [4] maintains a neighbor table which contains the information of the parent and children node. When a node loses an association with its parent, it should re-associate with its previous parent by utilizing the information in its neighbor table. In the case the association with the parent node is able to be recovered due to parent nodes battery drained, nodes mobility, malfunction and so on, the node should try to associate with new parent in its Personal Operation Space (POS).

Meanwhile if the current node realizes that the next-hop node regardless whether its child or parent node is not accessible

for some reason, the node shall try to recover the path or to report this forwarding error to the source of the packet. Even though a route maintenance mechanism has been defined in HiLOW, the mechanism is seen as not sufficient.

An Extended Hierarchical Routing Over 6LoWPAN which extends HiLOW was presented by C.Nam et al[6]. in order to have better maintained routing tree. They suggested two additional fields to be added to the existing routing table of HiLOW namely, Neighbour_Replace Parent (NRP) and Neighbour_Added_Child (NAC). This NRP does not point to the current parent node but to another node which can be its parent if association to current parent fails. Meanwhile NAC refers to the newly added child node. HiLOW did not define a mechanism to handle a scenario where the child node detects more than one potential parent. A new mechanism which is able to overcome weakness displayed in previous mechanism and avoid bias child association was suggested. In this mechanism it is suggested that the new child node to be provided with two data, one is the depth of the potential parent node and secondly the average amount of power the potential parent node has [4].

RPL [5] is a routing protocol that organizes routers along a Destination Oriented Directed Acyclic Graph (DODAG), a category of Directed Acyclic Graph, rooted at the sink. The DODAG root initiates the DODAG formation by periodically originating DODAG Information Object (DIO) messages which it advertises via link-local.

The availability of paths from the sink to individual sensors are necessary in many scenarios, including industrial actuators and selective sensor queries. In order to address this lack, an RPL router that requires a path from the sink to itself must send a Destination Advertisement Object (DAO) message upwards along the DODAG all the way up to the root, which records and install this path. The DAO mechanism can be operated either in storing or in non-storing mode. In storing mode each router needs to store routing information in order to forward packets hop-by-hop.

RPL provides dog-legged paths for point to point (P2P) communication between arbitrary sensors in the network. P2P-RPL [6] allows routers to discover and establish path(s) to another router, based on a simple reactive mechanism. Essentially, when a router S needs to discover a path to another router D, router S originates a message similar in functionality to an AODV Route-Request. P2P-RPL uses the same mechanisms as basic RPL to form the DODAG. It introduces a new DIO option that specifies the address that should be discovered and records the traversed path.

Various protocol for 6LoWPAN mobile sensor node, named 6LoMSN, based on Proxy Mobile IPv6 (PMIPv6) [4] have been introduced. The conventional PMIPv6 standard supports only single-hop networks and cannot be applied to multihop-based 6LoWPAN. It does not support the mobility of 6LoMSNs and 6LoWPAN gateways, named 6LoGW, cannot detect the PAN attachment of the 6LoMSN. Therefore, the movement notification of a 6LoMSN in order to support its mobility in multihop-based 6LoWPAN environments is introduced. The attachment of 6LoMSNs reduces signalling costs over the wireless link by using router solicitation (RS) and router advertisement (RA) messages. In order to apply the single hop-based PMIPv6 protocol to multihop-based 6LoWPAN networks,

a PAN attachment detection scheme for the 6LoMSNs is defined, using router solicitation (RS) and router advertisement (RA) messages, which is a modified lightweight neighbor discovery protocol.

Nodes in industrial scenarios often tend to be mobile. Active data flows may be in progress, which have to be held up while travelling around within the same prefix domain but also between different WSN. Mobility in IP based networks can be usually divided into two terms - micro and macro mobility. In 6LoWPAN micro mobility is considered as the mobility of a node in which the IPv6 prefix does not change. In contrast to that, macro mobility refers to mobility between networks, in which the IPv6 prefix changes.

In order to achieve a protocol that maximizes bandwidth efficiency in 6LoWPAN, the 6LoWPAN Ad-Hoc On-Demand Distance Vector Routing protocol (LOAD) has been proposed. It is a simplified on-demand routing protocol based on Ad-hoc On-Demand Distance (AODV). Besides that, Dynamic MANET On-demand for 6LoWPAN Routing (DYMO-low) is another 6LoWPAN routing protocol that based on DYMO. The significant feature in DYMO-low is it can support either 16-bit link layer short address or IEEE 64-bit extended address (EUI-64). To obtain a globally unique address for preventing address conflict, both AODV and LOAD use IEEE 64-bit address as devices' interface identifiers for building on demand multi-hop routing table.

LOAD [18] is an on demand routing protocol based on AODV and has been placed on top of the adaptation layer. It should run on the FFD nodes. There are certain routing metrics that this protocol needs as the route cost between the nodes and the number of hops. It also simplifies the routing table. The mechanisms of this protocol is that when a link breaks the upstream node tries to repair the link locally using the route discovery method and this protocol also saves some energy by using link layer acknowledgements and Hello messages. It uses the MAC layer acknowledgments for any data sent known as Link Layer Notification.

It uses the Route Request message(RREQ) in order to set up the route between two end points and then the other end gives a reply back in the form of the Route Reply(RREP) packet or message and then if the route cannot be set up then Route error(RERR) message is sent.

DYMO-low [19] is termed as Dynamic MANET On Demand for 6Lowpan routing and also depends on AODV and uses the same three messages as RREQ, RREP and RERR for route establishment. This protocol does not use the local repair mechanism but keep track of the connection using the HELLO message. It is placed on top of IP but this protocol cannot be used directly on the 6lowpan networks and thus another version DYMO-LOW is devised. It works on Link Layer and uses 16-bit link layer short address.

Speed [19] is a geographic routing algorithm and supports soft real time communication in large scale sensor networks. It includes certain features as avoiding route creation time, load balancing and flow shaping. The protocol provides three types of real-time communication services:

_ real-time unicast: a packet is sent to a specific node within the network which is identified by its geographic position and global network address;

_ real-time area-multicast: this service allows to send a data packet to all the nodes inside a destination area identified by its center position and radius;

_ real-time area-anycast: a packet is sent to at least one node inside an area specified by its center and radius.

S-AODV [21] is another routing protocol designed in order to adapt to the energy constraints in the 6LOWPAN networks. It introduces features as traffic reduction, power consumption and network lifetime extension and it also reduces the control information traffic and also optimise the performance of 6LOWPAN.

AOMDV [18] is defined as Ad-Hoc On Demand Distance Vector Routing With Multi-Path Scheme, it is another routing protocol that helps to find multipath routes during the route discovery. AOMDV compute multiple loop-free and link-disjoint paths in order to reduce the network overhead of route discovery. The AOMDV route discovery will find primary route and alternate route according to cost. When the primary route fail, then use the alternate route for continue transmit the data reducing the route discovery times.

In mesh-under routing [21] and forwarding are performed based on layer 2 addresses. The 6LoWPAN-working group has originally considered only the mesh-under approach to support routing. Mesh-under provides a virtual broadcast link to the IP protocol. In this case, the network layer can assume that all nodes within a subnet are directly reachable, hence, the IP model does not need to change. In the mesh-under approach, the routing and forwarding occur at data link layer or at 6LoWPAN adaptation layer.

In mesh-under approach, fragments can be delivered over multiple hops without requiring fragmentation and reassembly at each hop. Moreover, mesh-under also allows the use of multiple paths to deliver fragments for a given datagram. However, there are some significant drawbacks to this approach. Network diagnostic tools, such as trace route and some SNMP-based diagnostics, cannot be used in mesh-under approach since every node in the mesh is one hop away, from the viewpoint of IP. In route-over approach, each radio hop is an IP hop. IP routing model works by separating the routing engine and forwarding engine into distinct functions. The routing function is responsible for maintaining the routing tables and the forwarding function examines the routing table to find the best next hop node to forward the packet

The main drawback of route-over approach is that it requires 6LoWPAN fragmentation and reassembly at every radio hop. As a consequence, the transmission of fragments of a given datagram to its final destination through multiple paths cannot be done. Note that fragmentation and reassemble occur at the 6LoWPAN adaptation layer and, therefore, only the first fragment carries the IP header.

IV. OPEN ISSUES

There are many issues regarding the routing in the 6LoWPAN networks which still need to be addressed and researched. The routing algorithms have been continuously modified into a better version but still many issues pertaining to their optimization exists[8]. Many efforts are put into the area of forming the 6LoWPAN network and determining the potential

parent node in such a network but still issue exist in determining some factors of finding the potential parent without much conflict. In the 6lowpan context some computation overhead exist while routing which needs to be handled and issues like using the 6lowpan network for centralised administration control still needs to be addressed.

V. CONCLUSION

In this paper we analysed the various routing requirements in 6LoWPAN networks and the also tried to understand the architecture of this network and tried to classify the various protocols in the routing area and we have found that many issues still need to be addressed in this area and the routing algorithms need to be optimised and the security need to be improved and also the various delays need to be minimised.

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Palm Leaves Manuscripts in Kerala and its' Preservation: Factors necessitating digital archiving

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Abstract - Palm leaves occupy a significant place among the manuscripts available in the state of Kerala. As any part of the world, palm leaves were one of the main and important sources for writing before the advent of paper in the southern region of India. Due to the absence of a proper solution for the storage of data in bulk, over the past years, thousands of palm leaf manuscripts were perished even without retaining a copy or image for future use. Being a solution for the problem, a study was conducted to find out whether the digital archiving is a solution for preserving the contents of the palm leaf manuscripts and what are the prevailing issues in digitizing the manuscripts as a whole. The paper also discussing the major reasons for the deterioration of palm leaf manuscripts, how they can be preserved and what are the factors necessitating the digital archiving.

Index terms - Palm leaves, Manuscript, Preservation of manuscripts, Digital archives, Digitization, Digital Library

I. INTRODUCTION

In the ancient period, scholars (Gurus) were transmitted their wisdom and knowledge through their pupils (shishyas) orally for many years and afterwards started copying the knowledge in to materials such as stones, wood, metal etc., but the area of scribing was very small. The scholars at that time were failed to record their knowledge exhaustively by lacking a proper recording media until the invention of birch bark and palm leaves. According to sources, writing traditions were started in India as early as 5th century B.C. The first reference to writing in India was found in a Pali Buddhists Canon of the 5th century B.C. (Kesavan, 1985)¹. But it was a great challenge to them to preserve the knowledge recorded on palm leaves from deterioration. Kerala was the land of scholars, teaching and studies and had a rich tradition in preserving ancient knowledge in the form of palm leaves. Even though a large number of manuscripts were perished irrecoverably, and lost many of this kind over the past years, still a large number of palm leaves manuscripts are preserved without any damage. Now it is the duty of the present day information scientists to find out an acceptable solution for the preservation of the contents in the palm leaves manuscripts and to find out the problems exists in digital archiving the palm leaves manuscripts.

History of Palm Leaves - There were no correct idea regarding when the people started using palm leaves as a writing medium. One among the oldest palm leaf manuscript available in India belongs to the 10th century AD (Dharma lingam, 2012)². In India and its neighboring countries, still lakhs and lakhs of palm leaves manuscripts are lying un-identified. Perhaps each and every bundle may not be unique in nature, because in the early days, it was a common practice to transfer the content of a palm leaf to another before the original is being corroded.

Type of Palm leaf material - There are three type of palm leaves ; *Corypha umbraculifera* Linn. This is also known as 'Talipot palm'. This is the long lasting material among the palm leaves having 300 to 400 years of life. Another one is *Borassus flabellifer* Linn. This is also known 'Palmyra palm'. The leaves are thick, strong and fibrous and not lasting compare to the Talipot palm. *Corypha taliera roxb.* This is the strong leaf which is slightly brown. This is also thick but not flexible and prone to insect attack. (Yana wan Dyke, 2009)³

Preparation of palm leaves - Palm leaves are collected from the petioles and cut in to required sizes and boiled in water. Later, the dried leaves are placed in between two wood planks prepared with the same size of the leaves. After a day or two, the leaves are taken out and small holes are made at the centre or either ends of the leaf and wooden planks. Then the leaves are polished and after drying for few days bundled and stored in dry places.

Writing on palm leaves - Writing on palm leaves (incision) was a trained and skilled activity which requires patience and practice. In olden days, writing on palm leaves was practiced as a profession and they were called known as Lipikaras (copyist). (Kamat, 2000)⁴. The act of writing was known as incision or scribing. There are references of families who belong to the generation of palm leaf manuscript writing (Udaya Kumar et.al, 2009)⁵. The palm leaves writers are also called 'Scribers' who used a metal made pen called 'Stylus'.

Preservation of palm leaves - Preservation of palm leaves manuscript was the biggest challenge faced its' custodians all the times. From the time when the palm leaves were prepared and used for recording information, there were several techniques used for preserving the material. From the ancient period the common accepted method was using herbal extracts to prevent natural decay. Later on fumigation methods are followed and started using chemical methods in modern world. Above all, digitization is accepted as the best practice for preserving the contents of the manuscripts, (Udaya Kumar et al, 2009)⁵.

II. REVIEW OF LITERATURE

Raman Nair (2004)⁶ observed that digital conversion allows hitherto unavailable facilities for durable storage and speedy and efficient transmission / retrieval of information contained in all the analogue formats. Chowdhury and Sudatta Chowdhury (1999)⁷ says that there are several digital library projects in the world for establishing digital libraries.....some of them are working with the support of International agencies and some are independent. At the same time in the state of Kerala, Kerala University, one of the pioneers in collecting and preserving indigenous materials have not satisfactorily digitized its archival collection (Raman Nair, 2006)⁸. Efforts are there in the state of Kerala for creating a user friendly full text search and retrieving tool. CIRD (Centre for Informatics Research and Development) in Kerala developed such a tool named "NITYA". The utility can be used for bringing out digital publications too. Nitya is created by interfacing UNESCO's database management system CDS/ISIS and Adobe Acrobat Reader. Searching of the digital library and opening of the full text is made possible by this front end Centre for (CIRD). (Ravindran Asari et.al)⁹

III. SCOPE OF THE STUDY

Kerala have given birth to eminent Indian philosopher like Jagath Guru Sree Sankaracharya. Over hundreds of years, the scholars in that geographical area have created and preserved their cultural, philosophical, and scientific heritage in the form of palm leaves manuscripts. Many of these manuscripts were looted out by the invaders from other countries and many have perished without retaining a copy. In this region, a large number of palm leaves manuscripts were identified and carefully preserved over years by many Governmental and Non Governmental institutions, individuals and families. Still there are a large number of palm leaves manuscripts in many parts of Kerala lying un-identified and properly preserved. The scope of the study lies on whether the findings can be practically applied on solving the existing problems in creating a digital library or a consortia based sharing resources using the digital image so created and also to find out the possibility of bringing the material under a common roof.

IV. OBJECTIVES OF THE STUDY

The objectives of the study can be summed up as; What is the present condition of the palm leaves manuscripts in Kerala State?. What are the factors leading to deterioration of manuscripts?. Whether the custodians are ready to transfer the palm leaves under their custody to a central place that are primarily entrusted the task of preservation?. Whether the present custodians are really feel that the digitization as a remedy to preserve its' contents?. Then what are the hindrances behind the digital archiving of palm leaves under their custody?.

V. METHODOLOGY USED IN THE STUDY

The study was conducted to know whether the custodians were ready to transfer the palm leaves to a centre that are entrusted for preservation and o know the awareness among them regarding the importance of preserving the palm leaves and the problems they are facing on the process of preservation. Visited most of the premises where the palm leaves are stored and collected the data directly in a data work Sheet that are prepared well in advance. A questionnaire also was used for the data collection from the custodians to know their expertise in the field and the methodology used for the preservation. In some cases, data are collected from the most reliable sources and their reports. The study population includes Government Institutions, Trusts, Old family houses (illam), Houses of old local rulers, Religious Centers and individuals who hold Palm Leaves Manuscripts. The study populations were broadly divided into three viz, Government Institutions, Private institutions and Individuals.

Table 1. Govt. Institutions who owned Palm Leaf Manuscripts					
Population	Government. Colleges	Universities	Preservation Centre	State Level Institutes	Total
Govt. Institutions	3	3	1	4	11

Table 2. Private Institutions owned Palm Leaf Manuscripts				
Population	Private Trusts	Religious Centers	Traditional families	Total
Private Institutions	8	6	18	32

Table 3. Individuals owned Palm Leaf Manuscripts				
Population	Traditional Scholars	Technical Persons	Ordinary People	Total
Individuals	6	8	24	38

VI. RESULTS AND DISCUSSION

Factors necessitating digitization - The study reveals that the following factors are necessitating the digitization process in order to save our ancestral wisdom and heritage of the country. The study also reveals that the factors leading to the deterioration of the manuscripts and the factors that are gearing up the digitization process. These factors are natural, social, economical and technological.

Natural Factors - There are many natural factors affecting the life of palm leaves adversely, which can be termed as deterioration. While the natural factors directly affecting the life of palm leaves, these factors never affect the life of a digital content. These factors are:

- Biological factors: fungus, insects, rodents, worms, cockroach, termites, silver fish, book lice, etc.
- Climatic factors: heat, light, humidity, water, moisture,
- Chemical factors: dust, dirt, pollution, oxidation, etc.
- Natural calamities: flood, earthquake, hot wind, cold wind, fire, etc.

Social Factors - There are so many social factors adversely affecting the up keeping of palm leaves manuscripts at its original. At the same time many of these factors are highly demanded the digitization of palm leaves. The important factors are:

- The nation’s cultural heritage has to be preserved intact; Lack of social commitment;
- Lack of interest in preserving traditional materials at its original;
- Lack of awareness among community;
- Lack of professional skill in keeping the materials;
- Lack of proper storage;
- Lack of financial resources to meet the recurring expenses in this regard;
- Religious beliefs;
- Innocence and negligence from the stake holders;
- Rough handling of the material due to the lack of proper training in handling;
- Creating unwanted marks and symbols on the materials;
- Movements of the materials without adequate precaution;
- Some custodians are not permitted others to verify; and
- Human factors such as carelessness, rough handling, misuse, etc.

Economical factors - There are some economical factors also necessitating the digitization of palm leaves. The economic factors necessitating digital archiving are:

- Compare to digital format, large space occupied for the storage of palm leaf bundles;
- The recurring expenses is very high in preserving palm leaves at its origin;
- Huge expense for creating physical security;
- A user has to spent huge amount for physically verifying the material;
- Up keeping of the material is highly labor oriented;
- Unknowingly spent huge amount for keeping duplicate copies.

Technological factors - When we go through the technology which is used for the preservation of manuscripts, we cannot see much progress over the last hundreds of years. Still we are using the primitive technology for preserving the palm leaves that is originally developed by the pioneers. That is why the life of the palm leaves are still cannot be extended beyond a few hundred years. This technological issue along with the following necessitates the digital archiving of palm leaves to a great extent.

- No technology has been developed so far to increase the life of palm leaves;
- The physical form facilitate single point storage while the digital archives facilitates multi point storage;
- While The physical medium restrict to single access, the digital archives facilitates multiple access;
- The physical storage compel the user for physical presents at its premise, while the digital archives ensure global access from the users premise;
- It enhances the security;
- Giving facility for full text search;
- Giving meta date information for the same and related documents;
- Overcome the barriers of time and space;
- It ensure long term preservation; and
- The technology ensures facility for providing translation and transliteration along with the original documents.

VII. RESULTS OF THE STUDY

Table 4. Major factors caused for the deterioration of Palm Leaf Manuscripts

Area covered	Biological factors	Climatic Factors	Chemical factors	Natural Calamities	Human Factors
Government institutions	73%	6%	8%	0%	13%

Private institutions	70%	13%	12%	0%	5%
Individuals	65%	13%	14%	0%	8%

Table 4 above shows that the biggest factor caused for deterioration is the attack of biological agents like fungus, insects, rodents, worms, cockroach, termites, silver fish, book lice, etc. irrespective of the location where the manuscripts are preserved. Climatic factors and chemical factors are making less harm compare to the biological factors to the collection in the state of Kerala. The study also reveals that the human factors are very high in governmental organizations. In the state of Kerala, natural calamities are not making any harm to the manuscript collection.

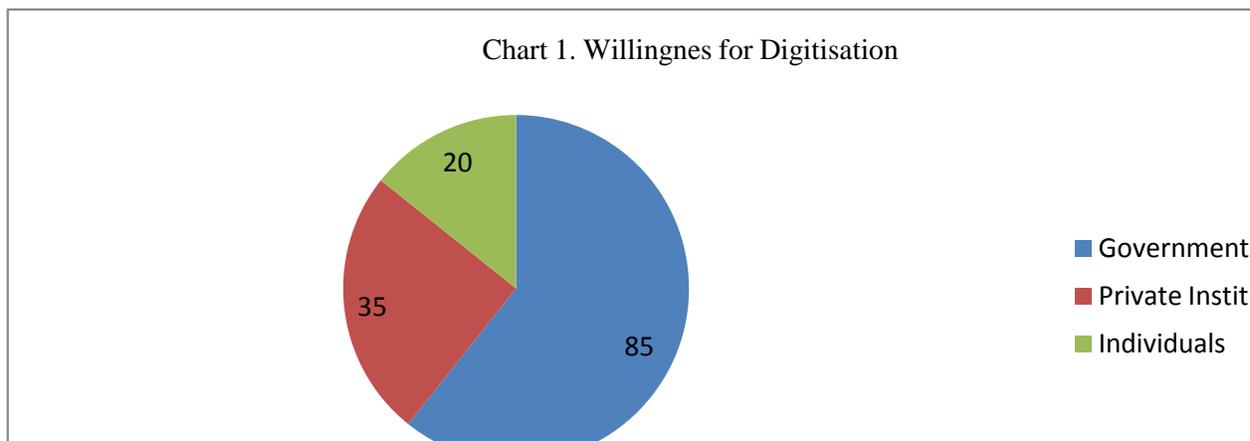
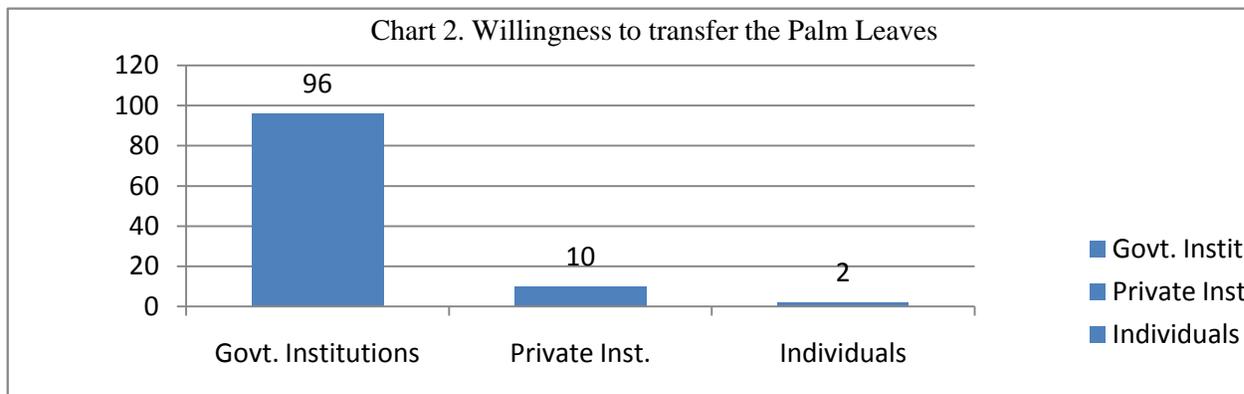


Chart 1 above shows that 85 % of the Governmental institutions are ready for the digitization process provided they are equipped with sufficient infrastructure and trained staff. Present custodians of a few of the Government institutions were reluctant to go for digitization because of the feel that such a work will yield extra burden on them. While 65 % of the private institutions and families are reluctant for digital archiving the entire content, only 20% individual custodians are agreed for the process. At the same time all custodians opined that digitization can be opted for the preservation of its contents.



The study shows that all the Governmental institutions are not able to comment on transferring the materials to a central place for proper preservation since it is a policy decision that have to taken at higher levels. But taking in to account the advantages of storing the materials at a common place, chart 2 above shows that 96% of them are favored for the opinion. 70% of the Semi and non-governmental institutions are favor for the decision. 90% of the private institutions were refused to offer the transfer and 98% of the individuals refused the same at this stage.

VIII. LIMITATIONS

The study could not cover all the persons and institutions that hold palm leaves manuscripts because of a number of reasons. Many private families deny permission to their collection because of personal and religious believes. Some were reluctant to disclose the present condition of the manuscript and comment on the holdings. Some were not responded at that moment for want of permission from their higher-ups or superior authority

IX. CONCLUSION

Due to the absence of a proper solution for the bulk storage of data, over the past years thousands and thousands of palm leaves manuscripts were perished even without retaining a copy or image for future use. If there were such a technology, they would have saved crores of valuable documents and data / information and the later generation would have benefited. Compared to the natural and

unavoidable threats on the life of palm leaves, the only remedy for preserving the data on palm leaves is to convert them in to digital format. Before starting the process of digital archiving, there a number of questions to be answered, such as whether to archive all the available manuscripts, question about the property right, data portability, inter operability, platform independency, technological obsolescence, data format to be used, storage media to be used, etc. The study reveals that, whatever be the questions and threats, digital archiving is the commonly accepted and immediate remedy in front of the information seekers and information scientists to preserve the contents in palm leaves.

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Fuzzy Approach to Detect and Reduce Impulse Noise in RGB Color Image

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Abstract- This paper mainly focuses on image enhancement technique using soft computing approach like fuzzy sets. Image enhancement primarily covers noise detection and reduction from digital color image. To overcome the color disorder on edge and texture pixel, here each color component of a pixel is correlated to the other two corresponding color components of the same pixel. Here filtering is applied to only the corrupted pixels found by the fuzzy approach to improve the complexity and to avoid the color disorder at edges. An experimental result shows that the proposed method in this paper provides significant improvement as compared to the other non-fuzzy and fuzzy filters.

Index terms- Image processing, impulse noise, RGB Color, fuzzy logic, fuzzy rule based system, membership function.

I. INTRODUCTION

Image processing is one vital part of signal processing, which takes an image as input and produces processed output image or image information. Now-a-days image processing is used in various fields as essential features of technology. Where image is used one major source of information then finding the accurate data is very essential. So here comes the need of image enhancement or improvement. The image is mainly corrupted by different kind of noises generally produced while transmitting it through various medium.

One color image is the 3 dimensional data storing in image form where Red, Blue and Green are the three dimension. Each component like Red, Green and Blue of the image is one 2D image like one gray scale image having two spatial co-ordinates. These image elements are called pixels and the amplitude of the pixels are called intensity of that pixel. Noise reduction is a vital problem in image processing as after the noise reduction any other image processing techniques can be applied like image segmentation, edge detection etc. Noise generates in an image due to various reason basically during acquisition and transmission in channels, faulty memory location in hardware, high energy spikes generates during transmission. various types of noises are there like Gaussian noise, impulse noise, speckle noise etc. Impulse noise i.e. salt & pepper noise is very common type of noise generated in image. Salt & pepper noise is an impulse noise that digitized the original image pixel values to two extreme intensities. Before processing the noisy image to any further steps of image processing field this corrupted image should be filtered to remove those noise to get good quality image. The conventional median filters and its further modifications generally used to filter this salt & pepper kind of noise but it produces blurring effect in the image. the filtering technique to all the pixels in the image which creates a blurring effect in the image. Many vector based noise reduction technique has also been introduced later for removal of impulse noise but they have some disadvantage that is they consider each pixel as a whole vector in vector based approach and their capacity of noise reduction is inversely proportional to noise level. A better way to come out from these drawbacks is to apply some technique to differentiate between noisy pixel and noise-free pixel[10] so that the filtering technique can only be applied to those noisy pixels.

Fuzzy logic is introduced in 1965 by L. A. Zadeh professor in Computer science at the University of California in Berkeley[20]. It is a fastest growing area which is applied to many research areas. It processes human knowledge in the form of fuzzy if-then rules which have a partial truth value ranging between 0 and 1[1].Fuzzy logic deals with both qualitative and quantitative kind of problem domain. Fuzzy logic is applied in image processing as it can differentiate between image characteristics and noise characteristics . Fuzzy theory is employed as an extensions to the modified median filter which is giving better result in noise removal. Fuzzy based filters are capable of removing noise from an image by keeping the details of image intact and preserving the edge sharpness. Many fuzzy based filters has been introduced so far like Fuzzy Similarity-based filter (FSF) [6], Fuzzy Random Impulse Noise Reduction Method (FRINRM) [8] , Adaptive Fuzzy Switching Filter (ASFS) [2], Histogram Adaptive Fuzzy filter (HAF) [7], Fuzzy Impulse Noise Detection & Reduction method (FIDRM) [18], Fuzzy Adaptive Noise Filter[14],Fuzzy based Median Filter[19], etc. But these filters are well suited for 2-D grey scale images. Basic problem with these approaches were that it causes disorderness in the texture of the image and also affects the edge sharpness this is due to the filtering algorithm of 2-D grey scale is applied to each color component of color image as each component R, G, B are one 2-D images. In this paper we are using fuzzy technique for detection and removal of impulse noise using color components of the color image by co-relating them with each other with the help of R-G-B color model. In this paper Fuzzy technique is used efficiently to differentiate between noisy and noise-free pixels and the filtering technique is applied only to the corrupted or noisy pixels without affecting the color, the age sharpness and the image details.

In the section II of this paper detection technique i.e. to detect the noisy pixels and filtration or we can say de-noising part of this detected noisy pixels is described using fuzzy logic. In the section III we described final results of this experiment and compared with other techniques so far. And lastly we conclude this paper in section IV with conclusion.

II. PROPOSED IMAGE FILTERATION TECHNIQUE

A. Noisy Pixels Detection Phase using Fuzzy Technique

Detection phase is the vital stage in the filtering process as the filtering will be applied only to those detected noisy pixels.

In the detection part two steps are followed to detect the noisy pixel

1. each pixel is processed by taking a 3 X 3 window filter where its value is compared with its neighbours to calculate similarity level in each color component pixels individually

2. then comparing similarity level of each pixel of each color component with the other two components at the same position.

Each pixel is processed here by taking a 3 X 3 sliding window to test each pixels with its neighbours shown in the figure 1.

	-1	0	1
-1	P ₁	P ₂	P ₃
0	P ₄	P ₀	P ₅
1	P ₆	P ₇	P ₈

Figure-1 : 3 X 3 Sliding Window

In this above 3 X 3 sliding window P₀ is the test pixel which is processed and its similarity degree is calculated with its neighbours P₁ to P₈ to know the similarity level between them. By going through the proper steps specified in the algorithm, these generated absolute value differences are converted to fuzzy values to know the similarity level i.e. if pixels have 'LARGE' similarity level or 'SMALL' degree of similarity level[5]. To convert them to fuzzy values absolute value differences are added with membership function[1] which gives us the similarity degrees. Here to convert the absolute values to fuzzy values we are using Z-membership function as when the absolute values differences[16] are relatively small then membership degree will be high and it gradually decreases with increasing differences and after a certain value it decreases faster as compared to previous rate and finally becomes zero[5]. Z-membership function[1] can be defined as

$$Z\text{-MF}(x, [a b]) = \begin{cases} 1, & \text{if } x \leq a \\ 1 - 2 \left(\frac{x-a}{b-a} \right)^2, & \text{if } a \leq x \leq \frac{a+b}{2} \\ 2 \left(\frac{x-a}{b-a} \right)^2, & \text{if } \frac{a+b}{2} \leq x \leq b \\ 0, & \text{if } x \geq b \end{cases}$$

Algorithm For The Detection Phase

1. Calculating absolute value differences

$$\Delta P_k^R = | P_0^R - P_k^R |, \quad \Delta P_k^G = | P_0^G - P_k^G |, \quad \Delta P_k^B = | P_0^B - P_k^B | \quad (1)$$

2. Calculating similarity degree in each color component pixel with its neighbour pixels by adding membership function Z-MF as M₁ having parameter values as a=20, b=75 with the absolute value differences.

$$SIM^R = \prod_{i=1}^k M_1(\Delta P_i^R), \quad SIM^G = \prod_{i=1}^k M_1(\Delta P_i^G), \quad SIM^B = \prod_{i=1}^k M_1(\Delta P_i^B) \quad (2)$$

3. Calculating similarity degree of each color component pixel with the other two color component pixel at the same position by adding membership function M₂ having parameter values a=0.01, b=0.15 with the differences

$$SIM_k^{RG} = M_2(|M_1(\Delta P_k^R) - M_1(\Delta P_k^G)|)$$

$$\begin{aligned} SIM_k^{RB} &= M_2(|M_1(\Delta P_k^R) - M_1(\Delta P_k^B)|) \\ SIM_k^{GB} &= M_2(|M_1(\Delta P_k^G) - M_1(\Delta P_k^B)|) \end{aligned}$$

4. Now calculating the joint similarity for all till k^{th} pixel can be given as by taking the conjunction(AND) i.e. t-norm operation

$$SIM^{RG} = \prod_{j=1}^k SIM_j^{RG}, \quad SIM^{RB} = \prod_{j=1}^k SIM_j^{RB}, \quad SIM^{GB} = \prod_{j=1}^k SIM_j^{GB} \quad (3)$$

5. After calculation of similarity degrees Noise-freeness of the test pixel P_0 for all RED, GREEN, BLUE component is calculated using fuzzy If-Then rules

$$\begin{aligned} &\text{IF } ((SIM^R \text{ is large}) \text{ AND } (SIM^G \text{ is large}) \text{ AND } (SIM^{RG} \text{ is large})) \\ &\quad \text{OR} \\ &((SIM^R \text{ is large}) \text{ AND } (SIM^B \text{ is large}) \text{ AND } (SIM^{RB} \text{ is large})) \\ &\quad \text{Then (Noise-free } (P_0^{RED}) \text{ is large)} \end{aligned} \quad (4)$$

$$\begin{aligned} &\text{IF } ((SIM^G \text{ is large}) \text{ AND } (SIM^R \text{ is large}) \text{ AND } (SIM^{GR} \text{ is large})) \\ &\quad \text{OR} \\ &((SIM^G \text{ is large}) \text{ AND } (SIM^B \text{ is large}) \text{ AND } (SIM^{GB} \text{ is large})) \\ &\quad \text{Then (Noise-free } (P_0^{GREEN}) \text{ is large)} \end{aligned} \quad (5)$$

$$\begin{aligned} &\text{IF } ((SIM^B \text{ is large}) \text{ AND } (SIM^R \text{ is large}) \text{ AND } (SIM^{BR} \text{ is large})) \\ &\quad \text{OR} \\ &((SIM^B \text{ is large}) \text{ AND } (SIM^G \text{ is large}) \text{ AND } (SIM^{BG} \text{ is large})) \\ &\quad \text{Then (Noise-free } (P_0^{BLUE}) \text{ is large)} \end{aligned} \quad (6)$$

The detection phase is explained by taking standard image of Lena as example using this proposed fuzzy approach given in the following figure i.e. Figure-2

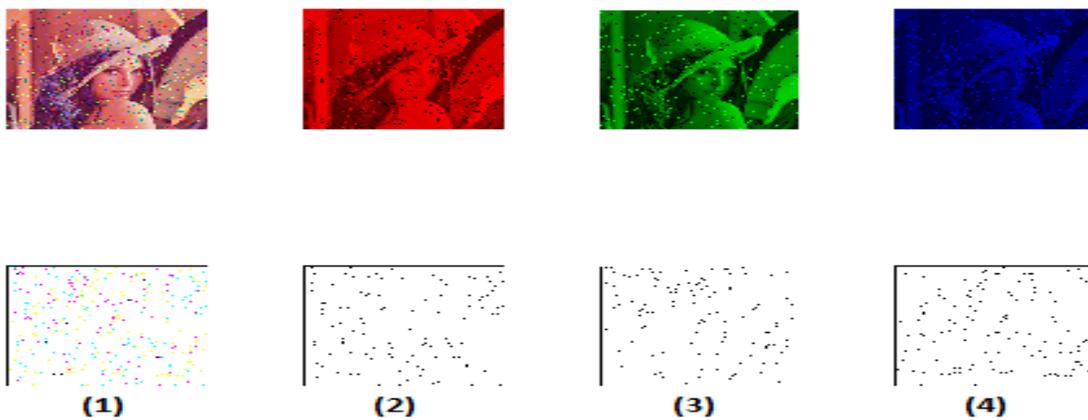


Figure-2: First rows (1) Lena image with 5% noise (2) RED-component of noisy image (3) GREEN-component of noisy image (4) BLUE-component of noisy image; second row (1) Membership degree *Noise-free* of original image (2) Membership degree *Noise-free(RED)* (3) Membership degree *Noise-free(GREEN)* (4) Membership degree *Noise-free(BLUE)*

B. Removal of Detected Noisy pixels By Applying Fuzzy Filtering Technique

In this paper main focus is on the detection of the noisy pixels after getting those noisy pixels filtering technique is applied to those pixels only. When some components of a color are found noisy, it is filtered in a proportional degree that is calculated by comparing with other color components which give the estimated values to evaluate the de-noising process. In the paper "A New fuzzy color correlated impulse noise reduction method" by S. Schulte et al. published in IEEE Transaction, a new de-noising technique is introduced which we are following for de-noising technique to reduce noise.

To calculate the noise-free output, for each pixel of all the three color components RED, GREEN & BLUE each time a weighted average is calculated by considering a 3 X 3 filtering window for the test pixel in the window. This weight calculation process involves calculation of the weighted average of all the neighbour pixels in the filtering window for that test pixel which gives the filter

output. If that processed pixel of the color component is noise-free then its neighbours are assigned with a value zero and that test pixel remains unchanged. Weight will be large if the noise-free degree is large of its neighbours.

Let in the filtering window P_0 is the processed pixel and $w_{P_0}^{RED}$ is the weight for RED component. Similarly for GREEN and BLUE $w_{P_0}^{GREEN}$ and $w_{P_0}^{BLUE}$ respectively. $w_{P_k}^{RED}$ is the neighbour weights for RED component for $k=1, \dots, n^2-1$. To filter the pixel values according to their noise-freeness the weight of the central pixel or processed pixel corresponds to its membership degree in the fuzzy set Noise-free[5].

In first step weight value of the processed pixel is calculated let for $w_{P_0}^{RED}$ the calculation will be as follows

IF (Noise-free (P_0^{RED}) is Large) **THEN** ($w_{P_0}^{RED}$ is Large)

IF (Noise-free (P_0^{GREEN}) is Large) **THEN** ($w_{P_0}^{GREEN}$ is Large)

IF (Noise-free (P_0^{BLUE}) is Large) **THEN** ($w_{P_0}^{BLUE}$ is Large)

The weight value for k^{th} neighbour for RED, GREEN and BLUE components $w_{P_k}^{RED}, w_{P_k}^{GREEN}, w_{P_k}^{BLUE}$ can be calculated as follows

IF ((Noise-free (P_0^{RED}) is Not Large) **AND** (Noise-free (P_k^{RED}) is Large) **AND** ($M_1(\Delta P_k^{GREEN})$ is Large) & (Noise-free (P_k^{GREEN}) is Large)) **OR** (Noise-free (P_0^{RED}) is Not Large) **AND** (Noise-free (P_k^{RED}) is Large) **AND** ($M_1(\Delta P_k^{BLUE})$ is Large) & (Noise-free (P_k^{BLUE}) is Large)) **THEN** ($w_{P_k}^{RED}$ is large)

Similarly it will be calculated for GREEN and BLUE components for k^{th} neighbour. If that processed pixel is noisy then that is being replaced with this weighted average value of that pixel as given below. Now to replace the noisy pixel value can be done by calculating weighted average, for RED, GREEN and BLUE components this can be given as $w_{P_0}^{RED}, w_{P_0}^{GREEN}$ and $w_{P_0}^{BLUE}$ respectively

$$w_{P_0}^{RED} = \frac{\sum_{k=0}^{n^2-1} w_{P_k}^{RED} P_k^{RED}}{\sum_{k=0}^{n^2-1} w_{P_k}^{RED}}, \quad w_{P_0}^{GREEN} = \frac{\sum_{k=0}^{n^2-1} w_{P_k}^{GREEN} P_k^{GREEN}}{\sum_{k=0}^{n^2-1} w_{P_k}^{GREEN}}, \quad w_{P_0}^{BLUE} = \frac{\sum_{k=0}^{n^2-1} w_{P_k}^{BLUE} P_k^{BLUE}}{\sum_{k=0}^{n^2-1} w_{P_k}^{BLUE}}$$

III. EXPERIMENTAL RESULTS

We have inputted standard image of Lena to examine this proposed method with impulse noise level of 10% to it and also calculated the PSNR value for the noise level of that de-noised image which is given in the following Table-1, where it is compared the results with the other filter results which values are taken from the reference papers[2] [3] -[19] related to those filters. Below in the Figure-3 the output of the filtered image is given by adding 10% noise level to the standard images of Lena.



Figure-3: (1) Lena image with 10% impulse noise (2) Filtered image using proposed method

Table 1: PSNR values of different filters with the proposed filter considering Lena image with different percentage of impulse noise.

PSNR values of colored Lena image with different noise levels							
Filters	5%	10%	15%	20%	25%	30%	40%
None	22.15	19.61	17.82	16.72	15.91	14.62	13.41
ASVMF	24.87	24.12	22.79	21.98	21.91	21.63	20.88
FIDRMC	26.04	25.33	24.67	23.88	23.32	22.76	20.54
HAF	23.54	23.77	23.96	22.96	21.43	20.89	20.02
Proposed	31.78	29.15	27.43	26.23	25.05	24.44	21.95

Method							
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IV. CONCLUSION

In this paper we have applied fuzzy based approach to detect and reduce noise in an image to get a good quality image by keeping image details preserved. We have examined and explained noise detection phase and filtering of that noisy pixels by using standard color image of Lena by giving specified noise level to it. Main focus in this paper is the fuzzy based noisy pixel detection phase using the RGB color components of the digitized color image and their co-relations to detect the noise. Here We have find that this proposed method detection phase detects the noisy pixels very efficiently by using fuzzy approach and it reduces the noise in the image without affecting the color and the edge sharpness of that image by preserving the image details.

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ETL and its impact on Business Intelligence

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Abstract- Business Intelligence (BI) is considered to have a high impact on businesses. Research activity has risen in the last years. An important part of BI systems is a well performing implementation of the Extract, Transform, and Load (ETL) process. In typical BI projects, implementing the ETL process can be the task with the greatest effort.

Index Terms- Business Intelligence, Data Warehouse, Decision Making, ETL, Operational Data, Metadata

I. INTRODUCTION

Business intelligence (BI) has gained wide recognition in the last years. It also got high business impact and is seen as a key enabler for increasing value and performance" [1].

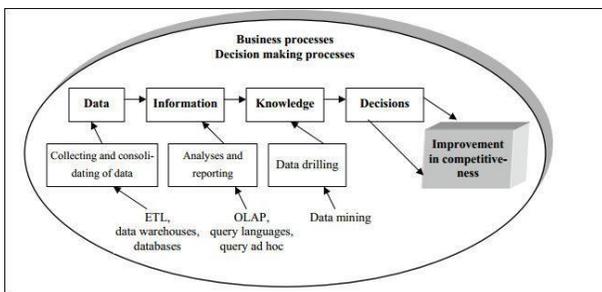


Figure 1: The role of BI systems in decision making [18]

Unsurprisingly, the progress of BI is monitored by management and IT consultants [2]. It is recognized as having a high relevance for the profit of businesses [3]. It is agreed that a strategic business intelligence approach will be needed [4].

At the same time, Business intelligence is a rather new discipline with a lot of research activity. Even though the term has been coined in 1958 [5], the number of published papers has risen considerably in the last few years. The rapid progress has also brought a high level of heterogeneity [6]; this causes both problems for businesses and offers research opportunities. It is possible to grasp the current state of BI [1] and practitioner's literature tries to lay out a roadmap on how to implement BI in a company [7]. There is no reliable roadmap for BI progress, though.

One important component of BI is the Extract, Transform and Load (ETL) process. It describes the gathering of data from various sources (extract), its modification to match a desired state (transformation) and its import into a database or data warehouse (load). ETL processes take up to 80% of the effort in BI projects [8]. A high performance is thereby vital to be able to process large amounts of data and to have a up-to-date database. The term ETL is known for a while [9] and the relevant market is

already divided by a number of major players [10]. A data warehouse is predominantly used to store detailed summary data and metadata. Detailed data concern, for instance, sales or production volume in a given period. In order to increase effectiveness of queries, data in a data warehouse are subject to aggregation. Data e.g. on sales may be aggregated in a geographical dimension, a time period dimension or a product line dimension, etc. On the other hand, metadata include information on data themselves. They facilitate a process of extracting, transforming and loading data through presenting sources of data in the layout of data warehouses. Metadata are also used to automate summary data creation and queries management.

Furthermore, existing BI architectures typically feature a unidirectional communication flow between different components. The architectures proposed in [12] and [13] are good examples where they only feature a one-way data flow from data sources to data warehouse. The limitation of unidirectional data flow (i.e., no backward data flow from data warehouse to data sources) is that no adjustment or correction is allowed on data source even if an error is found. This may lead to the garbage-in-garbage out situation. If organizations want to correct the error, they have to repeat the entire BI process especially that of the cleansing procedures again. To overcome these problems, a two-way data integration flow [14] is suggested whereby the cleansed data can be sent back to data sources to improve accuracy and reduce cleansing work.

Another issue with existing BI architectures is the lack of support on metadata management. A good BI architecture should include the layer of metadata. A metadata repository is essential for business users to store and standardize metadata across different systems. By having a well-structured metadata, organizations will be able to track and monitor data flows within their BI environment [15]. In addition, they will be able to ensure the consistency of definitions and descriptions of data that support BI components and thus avoid misunderstanding and misinterpretation of data.

Aside from that, some of the architectures do not include operational data store (ODS) within the BI environment. For instance, Watson's BI architecture (2009) [16] contains only data warehouse and data marts whereas [17] include only data warehouse. In order to address operational data needs of an organization, it is essential to implement ODS to provide current or near current integrated information that can be accessed or updated directly by users. Through this way, decision makers will be able to react faster to changing business environment and requirements. Furthermore, it is necessary to consider data staging area in the ETL (Extract Transform-Load) process. As most of the data from data source require cleansing and transformation, it is important to create a temporary storage for data to reside prior to loading into ODS or data warehouse.

Without building this staging area, the process of working on the data [27]

II. BUSINESS INTELLIGENCE ARCHITECTURE

This paper describes a framework of a five layered BI architecture (see Figure 1), taking into consideration the value and quality of data as well as information flow in the system. The five layers are data source, ETL (Extract-Transform-Load), data warehouse, end user, and metadata layers. The rest of this section describes each of the layers.

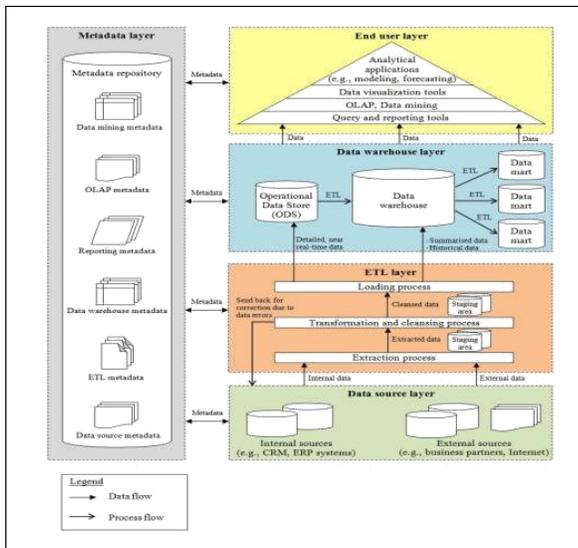


Fig 2: BI Architecture [12]

III. DATA SOURCE LAYER

Nowadays, many application domains require the use of structured data as well as unstructured and semi-structured data to make effective and timely decision [12]. All these data can be acquired from two types of sources: internal and external.

Internal data source refers to data that is captured and maintained by operational systems inside an organization such as Customer Relationship Management and Enterprise Resource Planning systems. Internal data sources include the data related to business operations (i.e., customers, products, and sales data). These operational systems are also known as online transaction processing systems because they process large amount of transactions in real time and update data whenever it is needed. Operational systems contain only current data that is used to support daily business operations of an organization. Generally, operational mainly on specific business operations such as sales, accounting, and purchasing [19]

External data source refers to those that originate outside an organization. This type of data can be collected from external sources such as business partners, syndicate data suppliers, the Internet, governments, and market research organizations [20]. These data are often related to competitors, market, environment

(e.g., customer demographic and economic), and technology [21]

It is important for organizations to clearly identify their data sources. Knowing where the required data can be obtained is useful in addressing specific business questions and requirements, thereby resulting in significant time savings and greater speed of information delivery. Furthermore, the knowledge can also be used to facilitate data replication, data cleansing, and data extraction [26]

IV. ETL (EXTRACT-TRANSFORM-LOAD) LAYER

This layer focuses on three main processes: Extraction, Transformation and Loading [17]. Extraction is the process of identifying and collecting relevant data from different sources. Usually, the data collected from internal and external sources are not integrated, incomplete, and may be duplicated. Therefore, the extraction process is needed to select data that are significant in supporting organizational decision making. The extracted data are then sent to a temporary storage area called the data staging area prior to the transformation and cleansing process. This is done to avoid the need of extracting data again should any problem occurs. After that, the data will go through the transformation and the cleansing process.

Transformation is the process of converting data using a set of business rules (such as aggregation functions) into consistent formats for reporting and analysis. Data transformation process also includes defining business logic for data mapping and standardizing data definitions in order to ensure consistency across an organization [

V. DATA WAREHOUSE LAYER

There are three components in the data warehouse layer, namely operational data store, data warehouse, and data marts. Data flows from operational data store to data warehouse and subsequently to data

VI. OPERATIONAL DATA STORE

An operational data store (ODS) is used to integrate all data from the ETL layer and load them into data warehouses.

ODS is a database that stores subject-oriented, detailed, and current data from multiple sources to support tactical decision making. It provides an integrated view of near real-time data such as transactions and prices. In addition, the data stored in ODS is volatile, which means it can be over-written or updated with new data that Blow into ODS [22]. As such, ODS does not store any historical data. Generally, ODS is designed to support operational processing and reporting needs of a specific application by providing an integrated view of data across many different business applications [23]. It is normally used by middle management level for daily management and short-term decision making [24]. Since the data stored in ODS are updated frequently (i.e., in minutes or hours), it is useful for reporting types that require real time (within 15 minutes) or near time (updated in 15 minutes to 1 hour) information [25]

VII. END USER LAYER

The end user layer consists of tools that display information in different formats to different users. These tools can be grouped hierarchically in a pyramid shape (as shown in Figure 1). As one moves from the bottom to the top of the pyramid, the degree of comprehensiveness at which data are being processed increases.

VIII. CONCLUSION

This paper has described a framework of five-layered BI architecture with various components. BI architecture plays an important role in affecting the success of a BI implementation. To have a smooth BI operation, organizations can benchmark their architectural plan against the framework proposed here. By having a good BI architecture, organizations will be able to maximize the value from their BI investments, and thereby meet their business requirements and improve business performance. However, at this point, the framework proposed in this paper remains conceptual in nature. Though it is built based on existing literature, the framework still needs to be validated using real-life BI cases to affirm its usability. Future research therefore can go along this line to validate the framework.

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Navigation Application Using Android

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Abstract- GPS Is increasingly being used for a wide range of applications. So we make an attempt to develop a Project that has the capability to store and review where a user and his Android device has been to. The application NAVIGATOR tracks the person's co-ordinate location and traces the path where his android device has been to. Basically the press record at the start of his trip and the phone stores the route he takes. This route is drawn real-time on the Maps functionality of Android or in the background with an idle device. The route is stored on the phone for review and further use. The applications tracks location by GPS, hence the name is NAVIGATOR.

Index Terms- Android, Database, GPS, Navigator, Position, Statistical data.

I. INTRODUCTION

Navigation is the field of study that focuses on the process of monitoring and controlling the movement of craft or vehicle from one place to another. Navigation in broader sense, can refer to any a skill or study that involves the determination of position and direction. The field of navigation includes four general categories Land Navigation, Marine Navigation and Space Navigation. It is also term of art used for the specialized knowledge used by navigator's position compared to known location or pattern. In addition to bearing, navigators also often measure distance to object. On chart, a distance produces a circle or arc of position. Method of navigation has changed through history. A GPS tracking unit is a device that uses the Global Positioning System to determine the precise location of a vehicle, person, or other asset to which it is attached and to record the position of the asset at regular intervals.

II. PROBLEM STATEMENT

An application shows where I have been. The operation of tracking a phone through GPS. Marking the route travelled on the map by the person possessing the phone. Maintaining statistical data about his where about. Voice recognition is provided for efficient handling. Providing you Current temperature, weather forecasting etc.

III. FUTURE SCOPE

Adding the ability to share the track and other related information obtained via SMS, Bluetooth or mail. Adding the ability to share the track via Chat Messenger ("WhatsApp") and social networking site ("Facebook, Twitter")

IV. DESIGN AND METHODOLOGY

Android applications are written in the Java programming language. The Android SDK tools compile the code—along with any data and resource files—into an Android package, an archive file with an .apk suffix. All the code in a single .apk file is considered to be one application and is the file that Android-powered devices use to install the application. Once installed on a device, each Android application lives in its own security sandbox: The Android operating system is a multi-user Linux system in which each application is a different user.

By default, the system assigns each application a unique Linux user ID (the ID is used only by the system and is unknown to the application). The system sets permissions for all the files in an application so that only the user ID assigned to that application can access them.

Each process has its own virtual machine (VM), so an application's code runs in isolation from other applications. By default, every application runs in its own Linux process. Android starts the process when any of the application's components need to be executed, then shuts down the process when it's no longer needed or when the system must recover memory for other applications.

Very first essential aspect of this project is UI (user interface) is to developed using XML (Extensible Markup Language) taking the user input.

Further part of this project is been implemented using JAVA language.

We used the (SQLite) database to keep the user record, maintain the log etc.

We used the (ECLIPSE JUNO) ide to develop the entire source code of the program.

V. RESULT AND IMPLEMENTATION



Fig: a

When the application is started first screen appeared is loading screen.

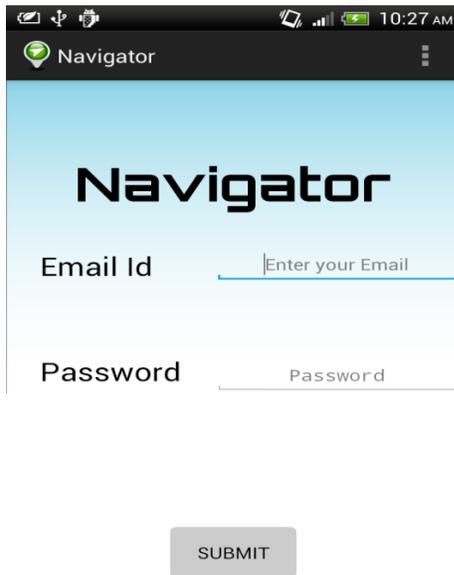


Fig.b

Login for user authentication.

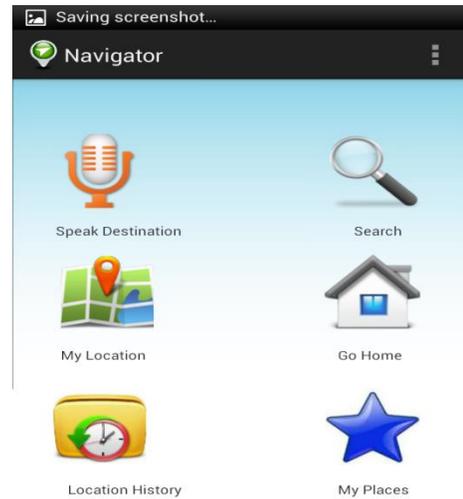


Fig: c

Option are provided for searching, speak destination, my location, location history and Bookmark the places we search.

VI. CONCLUSION

Here we have proposed a Navigator for android phone. It can help a user to be aware of his position and also helps him with statistical data of his movement.

We successfully implemented the following:
The operation of tracking a phone through GPS.
User can get his/her current location using this application.
User can search places.

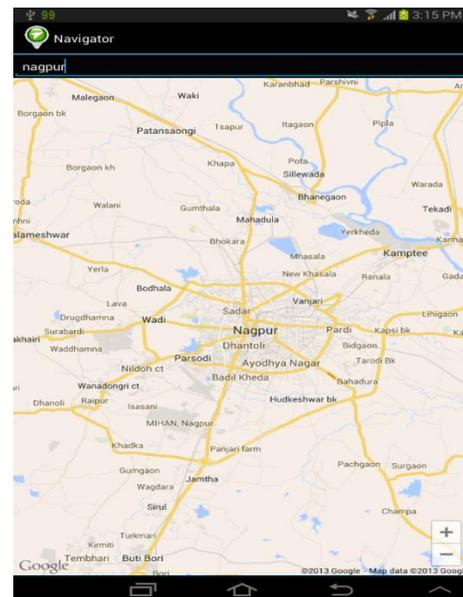


Fig: d

Map shows search location Nagpur.

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In-Vitro Efficacy of Crude Extract of *Zizipus Jujuba* against Selected Bacterial Strains

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Abstract- The research was assessed to evaluate the efficacy of crude extract of *Zizipus jujuba* against selected bacterial strains. The extract of *Zizipus jujuba* leaves was obtained by three different methods and the inhibition zones obtained through disc diffusion method. A decent antibacterial activity of *Zizipus jujuba* leaves crude extract of cold water and ethanol was found against *Salmonella typhimurium* and *Staphylococcus aureus*. Maximum zone of inhibition through cold water extract was obtained by *Enterococcus faecalis* (32mm) followed by *Staphylococcus aureus* (28mm), *Salmonella typhimurium* (27.52), *Klebsilla pneumonia* (19mm) and *Escherichia coli* (19mm). Similarly maximum zone of inhibition through ethanol extract was obtained by *Staphylococcus aureus* (28mm) followed by *Salmonella typhimurium* (27.52). The bacterial species showed no sensitivity against hot water extract due to the degradation of alkaloids in hot water. Mean observation taken was that these bacterial species can be inhibited by *Zizipus jujuba* plant. The study showed that *Zizipus jujuba* plant can be used to obtain antibiotics having less or no side effect, especially against *Salmonella* and *staphylococcus aureus* infections.

Index Terms- Efficacy, *Zizipus jujuba*, Antibacterial activity, Cold water extract, zone of Inhibition.

I. INTRODUCTION

Plants are the fundamental to existence on globe as they directly or indirectly resource around 70-80% of human energy and protein consumption, the rest being resulting from visceral products. They are sparingly significant to man due to their numerous applications, such as antibiotics, analgesic, flavors, perfumes, insecticides, dyes, food additives, poisons etc (Zamin *et al.*, 2013). Antimicrobial activity of medicinal plant has turn out to be a worldwide concern. This problem is of great issue particularly in 3rd world countries because are one of the major causes of mortality in these countries is due to these infectious diseases (Majid *et al.*, 2013)

The fruit of *jujuba* has been designated as “fruit of life”. The unique properties were erudite by ancient Chinese over thousands of years. Now a day medical practitioners are now discovering scientific evidence of its extraordinary possessions (Sharif *et al.*, 2010). Investigations have exposed that fresh jujubes contain higher anti-oxidant ingredients than apples, strawberries, blueberries, plums, raspberries and blackberries (Soliman and Hegazi., 2013). In Asia the seed of *Z. jujuba* has been utilized as tranquilizer, analgesic and convulsant. These seeds have also been recommended for the cure of sleeplessness,

anxiety and restlessness in Asia (Gautam *et al.*, 2011) herbal treatment using *Zizyphus jujuba* and other basils ensued more rapid collapsing of jaundice than those who were cured with western remedies (Ebrahimi *et al.*, 2011).

Zizyphus jujuba is universally known as Red Date (Rao and Lakshmi., 2012) and Chinese date or Bera (Pashto) that belongs to the family of Rhamnaceae (Ahmad *et al.*, 2011). Phillip Miller was the man who titled Chinese jujube as *Zizyphus jujuba* in 1768, decided on the type of specimen collected from Austria. (Akhter *et al.*, 2013). The family of Rhamnaceae is composed of 50 genera and more than 900 species. (Rao and Lakshmi., 2012). It is disseminated in the low temperature areas (Singh and Arya., 2011) almost multicultural (Ahmad *et al.*, 2011) and growing generally in subtropical to tropical areas (Rao and Lakshmi., 2012) and found in Asia, Brazil, Nepal (Singh and Arya., 2011) and in several parts of India and Burma (Ganachari *et al.*, 2004) . Chinese Jujube required full sun or partial shade for its cultivation and it should be grown on any well-drained soil. This plant does not give good growing outcomes on heavy clay or slushy soils (Edward *et al.*, 1994). The vegetative breeding of *Z. jujuba* comprises of numerous techniques of vegetative propagation counting cuttings, grafting cutting and root cutting. Cuttings must be obtained from young vibrant, shoots from a sound mature tree (Singh and Arya., 2011). The leaves of *Z. jujuba* are simple alternate and ovate in shape having green spring color and yellow fall color. The size of the leaves is about 2 to 4 inches. The fruits are oval in shape having red or black color of about 1 to 5 inches size. Fruits have characteristics to attract squirrels and other mammals to cause a significant litter (Edward *et al.*, 1994).

It has been investigated that *Z. jujuba* contain saponin, glycosides, alkaloids, steroids, polysaccharides and terpenoids as main ingredients that has a dynamic role in different activities such as hypoglycemic, hypolipidemic, antioxidant, antimicrobial and permeability enhancement activity (Ganachari *et al.*, 2004). The alkaloids Coclaurine, Isoboldine, Norisoboldine, Asimilobine, Iusiphine and Iusirine were isolated from *Z. jujuba* leaves (Rao and Lakshmi., 2012).

Current study pursues the evaluation of pathogenicity of bacterial strains against the crude extract of *Zizipus jujuba* that supports the antibiotics preparation for bacterial infections especially Typhoid infection. Those antibiotics will have less or no side effects and adverse effects in comparison with synthetic drugs.

II. MATERIALS AND METHODS

This research was carried out in the Microbiology Research Laboratory at department of Microbiology in Hazara University Mansehra.

Plant Collection

The aerial part (leaves) of the plant was collected from district Mardan Khyber Pukhtoonkhwa, Pakistan. The collected samples were washed out with running tap water, dried by air in the shadow at room temperature for one week. The dried leaves were then grounded into fine powder by an electric grinder.

Extract Preparation

Cold water extract:

The aqueous extract of dried *Zizipus jujuba* leaves was made in the distilled water. About 5 grams of *Zizipus jujuba* leaves powder were taken and mixed into 50 ml of distilled water. The mixture was taken into 250 ml sterile conical flask, plugged with sterile cotton and kept in shake on electric shaker (K (model: VRN-360) with the 200 rpm for 24 hours. After 24 hours the solution was centrifuged with 4500 rpm for 15 minutes by Eppendorf centrifuge (5702) and filtered through muslin cloth in sterile test tube. This process was repeated three times after which a clear aqueous extract of *Zizipus jujuba* was taken.

Hot water extract:

10g of the weighed plant leaves powder was soaked in 100ml of boiled hot water. That mixture was boiled for thirty minutes into a conical flask and put for 24hrs. The extract was filtered using filter paper and evaporated.

Ethanol Extract:

The ethanol extract of dried *Zizipus jujuba* leaves was also prepared. The ethanol extract was prepared through the same protocol followed for that of cold water extract.

Media preparation

Nutrient agar

The enrichment medium used for the growth of microorganisms was Nutrient Agar. Medium was prepared by adding 13g of dehydrated powder using electrical balance into 1 liter of distilled water. PH was adjusted by electrical pH meter at 7.4 and was boiled to dissolve completely.

Media sterilization

All Media were sterilized by using automatic autoclave (SANYO) at 121°C for 15 minutes.

Media pouring and drying

Media was poured in pre-sterilized glass Petri plates of 90mm in Laminar Flow Hood which was sterilized by overnight exposure of UV light and disinfected with 70% ethanol solution. Media plates were kept open for half an hour in the Laminar Flow Hood for drying and solidifying media.

Test microorganisms

The in-vitro activity of the extracts was assayed against the bacterial strains. All the ATCC (Micro BioLogics) against gram positive bacteria *Staphylococcus aerious* ATCC@6538, and *Enterococcus feacalis* and gram negative bacteria *Escherichia coli* ATCC@25922, and *Salmonella typhimurium* ATCC@14028 and *Klebsilla pneumonia*. These strains were kindly provided by Dr. Malik Mujaddad ur Rehman, Assistant Professor, and HOD Department of Microbiology, Hazara University, Mansehra.

Strains were maintained on Nutrient Agar Tubes at 4 °C. The antibiotic efficacy of the plant extracts was evaluated against given strains

Inoculation of test organisms

After the incubation time, single selective colony of each bacterium from their respective selective agar medium was inoculated into Nutrient agar medium. Sterile wireloop was used for all the bacterial strains. Bacterial strains were picked up by the sterile wireloop and streaked on the Nutrient agar plates inside the ESSCO® (EN 1822.1) streamline horizontal air flow hood. The inoculated plates were kept for 24 hours at 37 °C in incubator (NAPCO). After 24 hours the bacterial growth was observed.

Disc Diffusion Method

In order to determine the antimicrobial activity of *Zizipus jujuba* leaf extract, disc diffusion method was used. In this method discs of the plant's extracts were placed aseptically on the Nutrients Agar plates containing the specific bacterial culture. The plates were incubated for 24 hours inside incubator at 37 °C. After incubation the zones of inhibition were observed around the discs on certain nutrient agar plates. The zones of inhibition were measured by the digital Vernier Calliper (Mitutoyo). The experiment was repeated three times in order to confirm the given results.

Evaluation of antimicrobial activity

Disc diffusion method was used to determine the antimicrobial of *Zizipus jujuba* leaf extract. Single disc was used for both the cold water and ethanol extract of *Zizipus jujuba* were placed aseptically on the Nutrient agar plates containing the specific bacterial cultures. The plates were incubated for 24 hours at 37 °C. After a good incubation period the zones of inhibition were measured with the help of Digital Verneir Calliper and the values were recorded three times after each experiment. All the antimicrobial assays were performed three times. The mean values of zones of inhibition against each bacterium were documented in this report.

III. DATA ANALYSIS

The average of all data was recorded and all the data were repeated three times. The statistical data were subjected to Microsoft excel 2010.

IV. RESULTS

In current research, the antimicrobial activity of *Zizipus jujuba* leaf extract was checked out against two Gram positive and three Gram negative bacteria. The leaf extract was prepared by two ways; one was cold water extract and second was ethanol extract. Their potential antimicrobial activity was qualitative and quantitative, estimated by the presence and absence of zone of inhibition and MIC values.

Antibacterial activity

In this investigation, the leaf extract of *Z. jujuba* plant showed the antibacterial activity against all the bacterial cultures

used. Results of the current investigation were recorded in table I and 2 and the Figure 1-4. Among which the graphical result of cold water extract and ethanol has been represented in figure 1 and 2 respectively. Ethanol extract was used against *Salmonella typhimurium* and *Staphylococcus aureus*. The graphical comparison of three extracts has been represented in figure 3 and figure 4 presented plate results.

Table 1: Measurement of zones of inhibition in cold water extract

COLD WATER EXTRACT BY DISC DIFFUSION METHOD	
Bacterial strains	Zone of inhibition
<i>Escherichia coli</i>	19mm
<i>Staphylococcus aureus</i>	28mm
<i>Klebsella pneumonia</i>	19mm
<i>Salmonella typhimurium</i>	27.52mm
<i>Enterococcus feacalis</i>	32mm

Table I represents the result of *Z. jujuba* leaf extract prepared by cold water methods against both the Gram negative and Gram positive. The Gram negative bacteria include *Escherichia coli*, *Klebsilla pneumonia* and *Salmonella typhimurium* giving the zones of inhibition up to 19mm, 19mm and 27.52mm respectively. The Gram positive bacteria include *Enterococcus feacalis* and *staphylococcus aureus* giving the zones of inhibition up to about 32mm and 28mm.

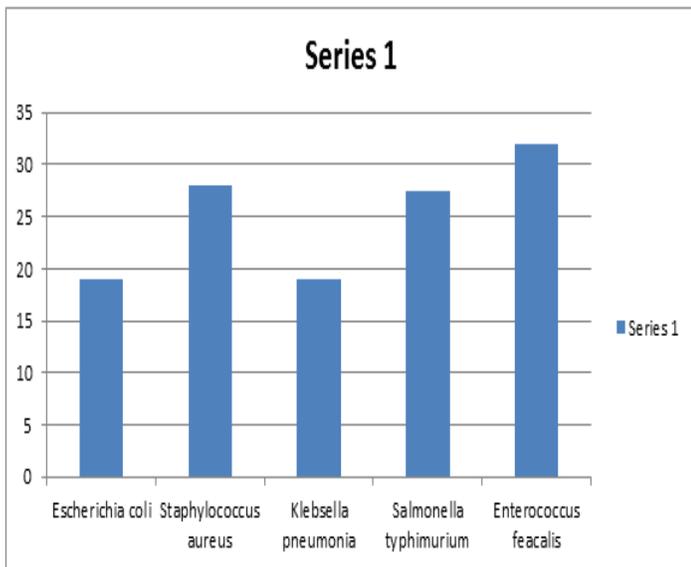


Figure 1: Graphical result of cold water extract showing zone of inhibition in mm

Table 2: Measurement of zones of inhibition in ethanol extract

ETHANOL EXTRACT BY DISC DIFFUSION METHOD	
Bacterial strains	Zone of inhibition
<i>Escherichia coli</i>	-----

<i>Staphylococcus aureus</i>	28mm
<i>Klebsella pneumonia</i>	-----
<i>Salmonella typhimurium</i>	27.52mm
<i>E. Feacalis</i>	-----

Table 2 shows the result of *Z. jujuba* leaf extract prepared through ethanol method. The ethanol extract was used against one Gram negative bacteria and one Gram positive bacteria. The Gram Negative bacteria used in this investigation include *Staphylococcus aureus* and *Salmonella typhimurium* giving the zones of inhibition up to 28mm and 27.52mm respectively.

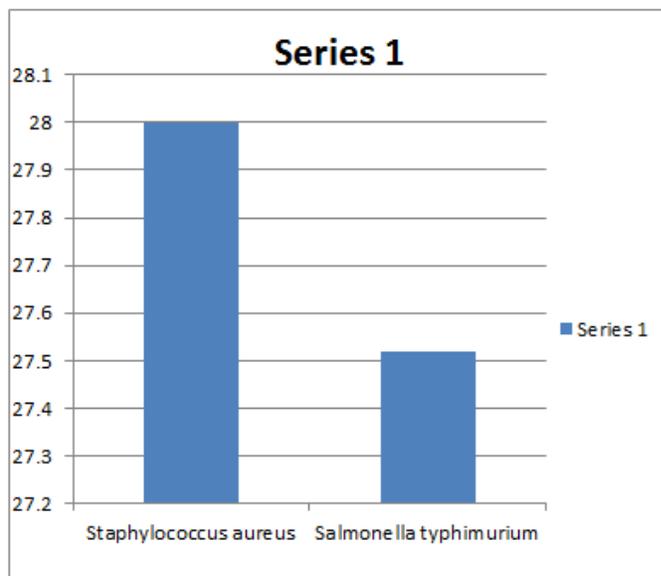


Figure 2: Graphical result of ethanol extract showing zone of inhibition in mm.

Hot water extract was used against all the selected bacterial strains except *Staphylococcus aureus*. The hot water extract showed no activity against the bacterial strains. The reason for that were the degradation alkaloids (Coclaurine). Coclaurine has the boiling point less than the boiling point of water therefore that was degraded with the high temperature.

Graphs representing activity of three extracts represented in Figure 3. The cold water and ethanol give same results against *Staphylococcus aureus* and *Salmonella typhimurium* giving zones of inhibition of 28mm and 27.52mm respectively.

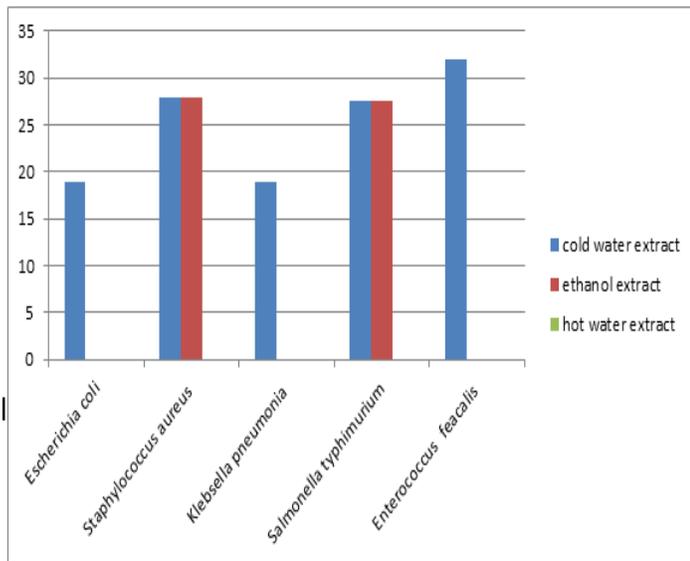


Figure 3: Graphical representation of result obtained through cold water, ethanol and hot water extract

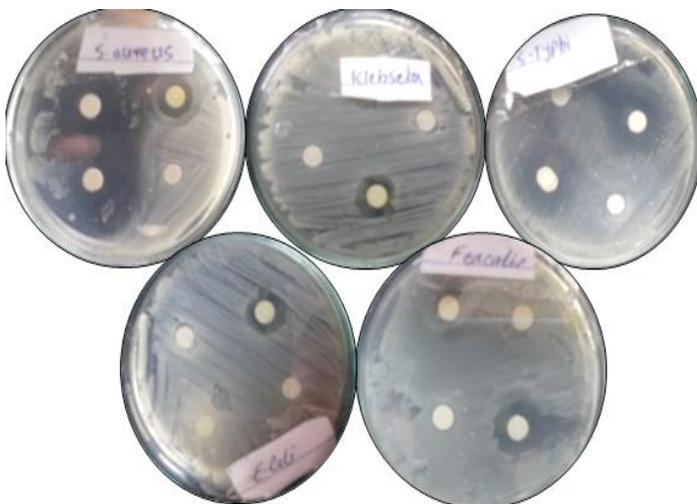


Figure 4: Plates indicating positive inhibition by Zizipus jujuba extracts and also measurement of zones of inhibition

V. DISCUSSION

Pharmacologically plants are the main focus of the researchers around the globe. Plants have been used for the preparation of multiple drugs since ancients. The world is facilitated with a great variety of pharmacologically important plants and herbs by the God that has efficient and very potential properties in order to eliminate a variety of diseases and lesser the health problems. On the other hand industrialization and chemically prepared products have damaged the human life on about every aspect, from physical to genetics. The only solution to those problems suggested by scientists is the vast use of plants on different aspects.

Medicinal plants played a vital role against different diseases including microbial infections, cancer and other disorders like diabetes. The antimicrobial activities of most medicinal plants are qualified due to the presence of alkaloids, and flavonoids (Burapedjo and Bunchoo 1995; Fewell and Roddick, 1993).

Zizipus jujuba is one of the useful and important medicinal plants. Ahmad et al has investigated that the crude methanol extract of *Z. jujuba* plant showed moderate activity against *P. aeruginosa*, *B. pumalis* and *E. aerogens* with 55.55, 52 and 41.37%, low against *S. typhi*, *S. epidermidis*, *S. pneumoniae*, *S. aureus* and *K. pneumoniae* with 37.03, 34.61, 31.03, 30.76 and 28.57% inhibition, respectively.

The present research is the investigation of antimicrobial activity of plant (*Z. jujuba*). This research suggested that cold water extract, and ethanol extract of *Zizipus jujuba* leaves have a potential activity against Gram Negative bacteria and Gram Positive bacteria. The extract was applied to nutrient agar plates containing different bacterial cultures by the disc diffusion method that interact the extract with bacteria directly and clearly showed its effects on bacterial strains. The discs were kept in the extract for 15 to 20 minutes. The degree of vulnerability of bacterial cultures to the extracts varied among the methods of extraction and strains. Figure 4 shows the comparison between three extracts. It showed the equal potentiality of cold water and ethanol extracts. Pathogenic bacteria *Staphylococcus aureus* and *Salmonella typhimurium* were more vulnerable to both cold water and ethanol extract.

VI. CONCLUSIONS

This investigation suggests the *Zizipus jujuba* to be a good antimicrobial agent against various pathogenic agents. The antimicrobial activity of the plant could be enhancing by synthetic methods. Further investigation is required in this regards that can replace the plant with a very beneficial antimicrobial medicine and enhance its effects.

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Correlation between Humeral Head of Biceps Brachii Muscle and Variation of its Motor Innervation: A Descriptive Study

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Abstract- Background and Aim: Variations in the morphology of biceps brachii muscle and its motor nerve, the musculocutaneous nerve have been studied extensively. The infero medial type of accessory third head of biceps and anastomoses between musculocutaneous and median nerve are the most common and frequent of all the reported variations. Studies describing existence of the said anomalies are few in literature. The aim of this study is to analyse the correlation between the most common reported anomaly of biceps and its motor nerve. **Materials and Methods:** The study was performed in 384 arms in the department of anatomy, Thrissur Government Medical College, Kerala. **Results:** Out of the 14 limbs with three heads of biceps intercommunication between the two nerves was observed in 14.3% arms. There is no statistically significant difference between the proportions of nerve connection among arms with normal and anomalous biceps muscle. Knowledge of the existence of accessory muscles and their innervating nerve anomalies are useful in determining the pathophysiology and treatment for compression neuropathies.

Index Terms- humeral head of biceps, musculocutaneous-median nerve communication, accessory head of biceps, absence of musculocutaneous nerve.

I. INTRODUCTION

Medical progress needs a more accurate knowledge of the variations of the human morphology to improve diagnosis and therapeutic performance¹. Traditionally biceps is described as a two headed muscle that originates by a long head and short head from the scapula. Variations in the morphology of biceps brachii muscle have been studied extensively. 8 to 12 % of arms show biceps muscle variation with gender difference more in males. Presence of multiple heads ranging from three to seven with origins from the coracoid process, from the articular capsule of the glenohumeral joint and tuberosities of the humerus have been reported². Among the humeral origin of third head of biceps brachii, the infero-medial type, as classified by Rodriguez et al³ forms the most common variation. A descriptive study on the variations of biceps brachii muscle conducted by the author found 10.8% prevalence of three heads of biceps muscle in a population of central Kerala⁴.

Anatomic studies on variations in the course and branching pattern of musculocutaneous nerve supplying biceps are

available in literature. The most frequent musculocutaneous nerve anomaly is its communication with median nerve⁵. The authors observed that, in the same population, the musculocutaneous nerve showed a variation of 24.2 %⁶. To the best of our knowledge, except for case reports, only few studies describing co-existence of biceps brachii muscle variation and musculocutaneous nerve anomalies and their prevalence are available in literature. The aim of this study was to analyse the correlation between the most common anomaly of biceps brachii with the most common variation of musculocutaneous nerve. Knowledge of the existence of accessory muscles and their innervating nerve anomalies are useful in determining the pathophysiology and treatment for compression neuropathies. In this article we present the prevalence and importance of humeral head of biceps brachii and musculocutaneous – median nerve intercommunication.

II. MATERIALS AND METHODS

The study was performed in 384 limbs of 192 bodies between 2006 and 2013, in the department of anatomy, Thrissur Government Medical College, Kerala, India. Of the 192 bodies 124 were of males and 68 belonged to females. The study included 92 adult human cadavers and 100 human fetuses of both sexes, from spontaneous abortions and stillbirths aged 28 weeks to full term obtained from department of Obstetrics and Gynaecology of the same institution. Fetuses were collected after prior approval from institutional ethical committee. Dissection of axilla and front of arm were carried out from the infra clavicular part to the level of elbow. The muscles supplied by musculocutaneous nerve were studied for anomalies in the origin, termination and innervation. The median and musculocutaneous nerves were dissected out from their origin to exit from the arm at elbow with particular emphasis to communication between them. Deviation from the normal pattern were studied in detail, sketched and photographed. Data collected were entered in Microsoft excel and analysed quantitatively and qualitatively using epi info software. Data was analysed using proportions and 95% Confidence interval. The relationship between the muscle anomaly and its nerve anomaly was tested using Chi square test. The significance level was kept at 5% level.

III. RESULTS

In our study, out of 192 bodies, humeral head of origin of biceps brachii was found in 7.3% of arms (95% CI = 4.76 – 9.83). Out of this 4.1 % had anomaly on the left arm and 3.1% on the right arm. Bilateral three heads were found in one case 0.5%. Humeral head was more in males 8.87% than in females 1.4%. Prevalence of the anomalies observed in this study is shown in table 1.

Musculocutaneous nerve was absent in 2.3% of arm. In this study musculocutaneous – median nerve intercommunication was observed in 9.9 % of arms (n=49). Bilateral anomaly was observed in 3.1%. Of the 192 bodies there was no difference in the prevalence of intercommunication between the sides, 13% and 12.5%.

Photograph showing humeral head of biceps brachii and musculocutaneous median nerve intercommunication on the right arm of a male cadaver was shown in Fig.1. Out of the 14 limbs with three heads of biceps, intercommunication between the two nerves was observed in 14.3% (n=2) limbs. This is similar to the proportion observed in musculocutaneous – median nerve connection of 12.6% of biceps brachii with two heads in this study. Relation of three heads of biceps brachii and musculocutaneous- median nerve intercommunication shown in table 2. There is no statistically significant difference between the proportions of nerve connection among limbs with normal and anomalous biceps brachii muscle.

IV. DISCUSSION

Developmental anomalies of biceps brachii and its innervation are a common finding during routine dissection. Detection of association between biceps anomaly and musculocutaneous nerve variation is of great significance in the management of peripheral nerve disorders. The present study documents the prevalence of tricapital head of biceps to be 7.3%. Accessory fascicles of biceps brachii muscle arising from the shaft of humerus is described as the humeral head of biceps. Literature reports that the incidence of third head is rare in Indian population. Several authors suggested a racial variation for the occurrence of humeral head. It is found to be 2% in Indians according to Vollala⁷, 5% in South Indians as reported by Lokanadham⁸, 3.7% in Srilankans as per Ilayperuma⁹ and 7.5% - 18.3% according to Vinnakota¹⁰. Rodriguez found three heads of biceps in 7.7% of arms and classified humeral heads into three types based on their location³.

Many authors reported connections between the musculocutaneous and median nerve and the prevalence ranging from 5% to 63.5%¹¹. Bhattarai and Poudel¹² revealed the prevalence of musculocutaneous median nerve communication to be 6.25% of arms with no statistically significant difference by gender and side. Kosugi et al¹³ reported that the presence of a supernumerary head effected the course and branching of the musculocutaneous nerve. In their study, a communicating branch arising from the median nerve was found in 16% of the cases with a supernumerary head of biceps brachii muscle. Previous study by the authors observed 15.1% of musculocutaneous median nerve intercommunication in Kerala population⁶. The present study revealed that 14.3 % of biceps with three heads

showed nerve intercommunication. The results indicates that no relationship exists between accessory head of biceps and musculocutaneous – median nerve communication.

Kayode et al¹⁴ observed accessory heads of biceps from humerus with intercommunication between musculocutaneous and median nerve in I out of 48 upper limbs. Four headed biceps brachii muscle with variation in the course of musculocutaneous nerve was observed in left arm of a male cadaver as reported by Anjali¹⁵. Abu-Hijleh¹⁶ observed in a cadaver, an anteromedial type of three-headed biceps brachii muscle associated with duplicated musculocutaneous nerve, where coracobrachialis and biceps were supplied by the proximal musculocutaneous nerve and distal musculocutaneous nerve arose from the median nerve in the lower arm and supplied the supernumerary head and brachialis and then continued as the lateral cutaneous nerve of forearm.

Co-existence of infero-medial humeral head of biceps brachii with absent musculocutaneous nerve and muscle innervation by lateral root of median nerve was observed on the right arm of a male cadaver by Renata et al¹⁷. Similar case of accessory head supplied by median nerve in the absence of musculocutaneous was observed by Arora and Dhingra¹⁸.

Clinically supernumerary heads with their motor nerves intercommunicating with other nerves are important in post traumatic evaluation of arm. Vinnakota states that the accessory head may not give extra strength or cause an unusual displacement of fracture fragments of humerus; but might cause compression of the median nerve when it pass between fibres of accessory head. They may cause compression of neurovascular structures because of their close relation to the brachial artery and median nerve¹⁰. Awareness of different patterns of variations are essential for the differential diagnosis and treatment of neurovascular compression syndromes. According to Stefano et al anatomical variations of musculocutaneous nerve cause difficulties to reanimate the biceps muscle by neurotization of the motor branches of the musculocutaneous nerve in C5–7 avulsion-related brachial plexus injuries¹⁹.

During biceps muscle flap transfer, accessory heads may cause difficulty in muscle lifting . Ramon Gheno observed an accessory head of biceps brachii near bicapital groove on routine MRI evaluation of shoulder, suggests that the accessory muscle can easily be misinterpreted as partial longitudinal tearing of long head of biceps tendon²⁰.

During surgeries for recurrent dislocation of shoulder musculocutaneous nerve is at risk²¹. Iatrogenic injuries to musculocutaneous nerve can occur from retractors placed under coracoid process during coracoid process grafting and in shoulder surgery²². Damage to the nerve is indicated by a reduction in the power of flexion of the elbow and of supination of the forearm. Presence of accessory head co existing with median nerve intercommunication may confuse a surgeon and lead to diagnostic errors.

It is presumed that development of a third head of biceps may influence the course or branching pattern of musculocutaneous nerve²³. Limb muscles develop from dorsolateral mesenchyme of somite that migrate into the developing limb bud. The spinal nerves follow the growth cones, regulated by cues produced by the muscle²⁴. Variation of muscle patterns may be a result of molecular changes occurring in

myogenic precursor cells. Presence of supernumerary heads of biceps brachii especially the infero-medial type, may be due to the musculocutaneous nerve that pierces biceps and cause a longitudinal splitting of myotubules which are later covered by connective tissue²⁵. Lokanatham suggested that presence of humeral head was due to the musculocutaneous nerve piercing the brachialis muscle and producing a supernumerary separate head⁸.

The variation in the directional growth of nerve fibers can be explained by the theory of neurotropism or chemotropism hypothesis of Ramon and Cajal²⁶. Axonal growth cones act as sensors to concentration gradients of molecules in the environment and grow up the gradient towards the target²⁷.

V. CONCLUSION

A thorough knowledge of the possible anatomical variations of biceps brachii muscle and its innervating musculocutaneous nerve are essential to the medical fraternity because of the increasing frequency of shoulder and axillary surgeries.

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Table.1 showing prevalence of biceps brachii muscle and musculocutaneous nerve anomalies.

Sl. No.	Prevalence of anomaly (N = 384)		95% CI
	No.	%	
1	3heads of biceps	14 3.64	1.81 - 5.46
2	Absent MCN	9 2.3	0.83 - 3.76
3	MCN – MN intercommunication	49 9.9	6.98 – 12.81

N= total number of limbs studied. CI – confidence interval. MCN – Musculocutaneous nerve. MN – Median nerve.

Table. 2 showing relationship of biceps brachii with three heads of origin and intercommunication between musculocutaneous and median nerve.

Biceps	MCN – MN connection		Total	Chi Square = 0.04 p = 0.82 (NS)
	Present	Absent		
3 heads	2 (14.3%)	12 (35.7%)	14	
2 heads	47 (12.6%)	323 (87.36%)	370	

MCN – Musculocutaneous nerve. MN – Median nerve. NS – Not significant.

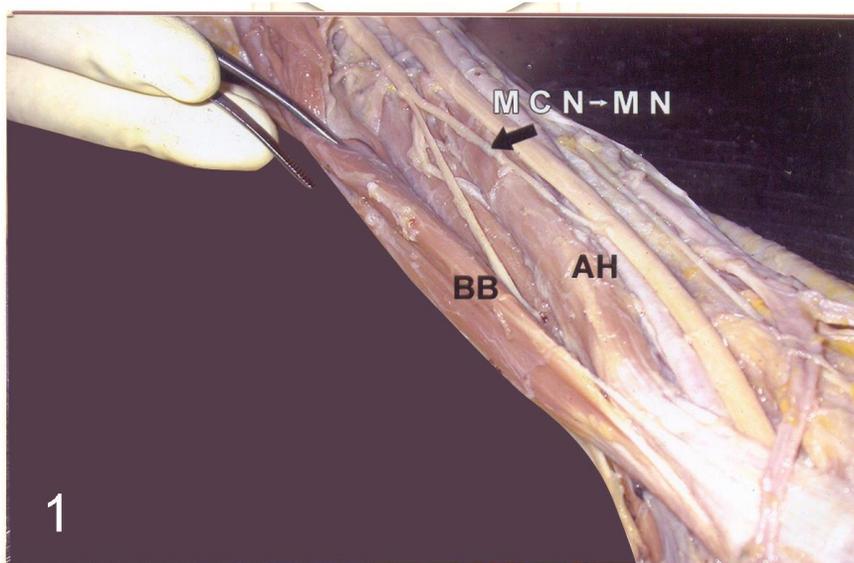


Fig.1 Photograph of front of arm showing humeral head of biceps brachii muscle with connection between musculocutaneous and median nerve. Biceps brachii reflected laterally to expose the communicating segment and accessory head. BB = Biceps brachii muscle, AH = the third head arising from the front of arm medial to brachialis muscle and joining with the main biceps muscle. MCN= Musculocutaneous nerve, MN = Median nerve. MCN-MN= intercommunication between musculocutaneous and median nerve.

The New Millennium and Emerging Concerns

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Abstract- Environment Protection and its preservation is today the major concern all over the world. The changes in environment prove that all human activities are inter-connected. While the scientific and technological progress of man has invested him with immense power over nature, it has also resulted in the reckless use of the power, and endless encroachment of nature. Some of the environmental issues of concern a decade ago were acid rain, stratospheric ozone layer depletion and global warming. Today, electronic waste (E-waste) is becoming an issue of greatest concern. Electronic waste consists of hazardous material, which causes damage to the environment resulting in environmental problems. The worst nightmare of this helpless situation is the growth of electronic waste (e-waste) in India. Solid waste management, which has already been a mammoth task in India, is now becoming more complicated by the invasion of e-waste. There exists an urgent need for a detailed assessment of the current and future scenario of e-waste materials and their recycling in India, particularly in Gujarat which is a fast growing industrial State.

This Study on e-waste and recycling including quantification, characteristics, existing disposal practices, environmental impacts etc. would be helpful not only to the country and its people but to the field of education as a whole. The present Study was carried out in the area of awareness of e-waste and recycling on higher secondary students of English medium schools of Anand city, Gujarat, India. On the basis of analysis of data it can be said that the awareness of e-waste among students, who are future citizens, is indeed in a positive direction. However, awareness regarding their recycling was only satisfactory.

The Study concluded that the education system alone is a powerful medium to ensure environmental protection. It should reach most parts of the population at a young age, and more e-waste friendly behavior should be practiced on daily basis. Government should introduce such topics related to disposal of e-waste materials and its recycling and adverse effects of e-waste in Environmental Education as a compulsory subject in view of its future benefits.

Index Terms- Environmental Protection, E-Waste, Adverse Effects, Recycling, Environmental Education

I. INTRODUCTION

The present millennium is grappling with major human made catastrophes - environment degradation, rising sea levels, global warming and the gradual depletion of the ozone layer. Survival of all living species including humans has increasingly become very difficult as land, water and air have been polluted as never before. The current markers of contemporary world scenario i.e. globalization, industrialization, liberalization and

consumerism have eroded the delicate balance between human activity and nature.

We come across nowadays a number of buzzwords like environment pollution, climate change, global warming, rising sea water levels, knowledge explosion and information & communication technology (2G, 3G and now 4G) revolution, globalization, industrialization, consumerism, sustainable development etc. As scientific inventions started, it appears that man has got license to exploit nature in his attempt to conquer it. In support of this, Bhandare (2010) rightly observed, "Globalization has created both interrelated and interlinked world generating opportunities and also throwing up challenges". The imbalanced and reckless over utilization of the natural resources of the earth have started as a result of scientific and industrial revolutions, new technology, modernization and urbanization. It would be worthwhile to quote here a report by the World Wildlife Fund for Nature. WWF put together a Report "The Living Planet Report" (LPR). The LPR uses an ecological footprint to measure peoples' natural resource use. The LPR (2004) Report estimated that people were presently using 20% more natural resources than the world could produce (Srivastava, 2010). Hence, sensitivity towards economic use of Natural Resources and Environment Awareness is the prime concern of the present Education at global level and in particular in India. Students who are the future citizens of this globe should be aware of their responsibilities and duties towards protection of social, cultural, ecological, natural environments and their heritage.

Role of Technology in Our Lives - The present age is described as the age of information and knowledge explosion, an age of information and communication technology revolution. According to Bhatnagar (2004) "Globalization and technological change processes that have accelerated in tandem over the past fifteen years, have created a new global economy powered by technology, fueled by information and driven by knowledge". Due to globalization, modernization, industrialization and scientific inventions, there are rapid developments taking place in every walk of our lives. Technology is both a boon and a curse. Technology can be boon for business, trade, travelling and other activities of welfare of human society. Technology provides an understanding and an appreciation of the world around us. Technology can bring the world closer and make it a global village. Various media of mass communication like radio, television, movies etc. provide not only entertainment but also education and general awareness of social issues.

Educational Technology in Schools - Technology plays a crucial role in the field of Education in general and School Education in particular. Educational technology, the incorporation of information technology into the classroom or distance and open learning experience, is a term that continues to evolve alongside technological advancements in the field. The

issue of Educational Technology has played a major part in improving the learning outcomes of individuals by personalizing the learning experience. NPE (1986) as well as the revised NPE (1992) has laid emphasis on the use of educational technology [ET] for improving both the quality and access to education. The immediate responsiveness of computer based programs, and the self-paced private learning environment that Educational Technology warrants, seeks to promote higher levels of motivation among students worldwide. It has also provided greater access to Education such as in the case of increased accommodation for students with severe physical disabilities and for students living in remote locations.

The Gadget Savvy Learner Of Today - Today the average children of teenage in semi-urban and rural area have exposure to radio, television, mobile and internet computer technologies. SMS, Video calling, Email, Face book, Twitter, and Orkut are some examples with which an average teen is said to be hardly unfamiliar. Teens are more technologically savvy. Today's 6 to 12-year-olds are laden with gadgets their older siblings could only have dreamed about; two-thirds of them own mobile phones and iPods.

II. FALLOUTS OF TECHNOLOGY – HAZARD OF E-WASTE

In today's high paced modern world where technology is moving at an unbelievable pace, due to very high redundancy, there are new gadgets to replace the earlier ones – and that too at an incredible pace!

Despite their obvious benefits, each wave of technology creates a set of waste previously unknown by humans: toxic waste, radioactive waste, electronic waste. Most modern technological processes produce unwanted byproducts in addition to the desired products, which is known as industrial waste and pollution. While most material waste is re-used in the industrial process, many forms are released into the environment, with negative environmental side effects, such as pollution and lack of sustainability. Some technologies are designed specifically with the environment in mind, but most are designed first for economic or ergonomic effects

Electrical and electronic equipment are made up of a multitude of components, some containing toxic substances which can have an adverse impact on human health and the environment if not handled properly. Often, these hazards arise due to the improper recycling and disposal processes used. For example, Cathode Ray Tubes (CRTs) have high content of carcinogens such as lead, barium, phosphor and other heavy metals. When disposed carefully in a controlled environment, they do not pose any serious health or environmental risk. However, breaking, recycling or disposing CRTs in an uncontrolled environment without the necessary safety precautions can result in harmful side effects and release toxins into the soil, air and groundwater.

'E-waste' includes computers, entertainment electronics, mobile phones and other items that have been discarded by their original users. While there is no generally accepted definition of e-waste, in most cases e-waste consists of expensive and more or less durable products used for data processing, telecommunications or entertainment in private households and businesses. Despite its common classification as a waste,

disposal of electronics are a considerable category of secondary resource due to their significant suitability for direct reuse (for example, many fully functional computers and components are discarded during upgrades), refurbishing, and material recycling of its constituent raw materials. Re-conceptualization of e-waste as a resource thus pre-empts its potentially hazardous qualities.

E-waste is both valuable as source for secondary raw material, and toxic if treated and discarded improperly. Rapid technology change, low initial cost and even planned obsolescence have resulted in a fast growing problem around the globe. Uncontrolled burning and disposal are causing environmental problems due to the methods of processing the waste. E-waste is of concern largely due to the toxicity of some of the substances if processed improperly. The toxicity is due in part to lead, mercury, cadmium and a number of other substances. A typical computer monitor may contain more than 6% lead by weight.

E-waste is a global concern because it contains components which are toxic in nature and are non-biodegradable. In the past few months the studies conducted about e-waste give an insight into the realities the existence of e-waste in unimaginable quantities emerging in the form of donations and reuse and acquiring more place, and taking a serious toll on the health of humans and also on the environment - 20-50million tons of scrap / yr worldwide of which Asia estimates 12 million tons/ yr, Only 11% of e-waste gets recycled!

In India, e-waste is mostly generated in large cities like Delhi, Mumbai and Bangalore. Some of the recycling processes are extremely harmful and have negative impacts on the workers' health and the environment. A Study on the burning of printed wiring boards that was conducted 2004 showed an alarming concentration of dioxins in the surrounding areas in which open burning was practiced. These toxins cause an increased risk of cancer if inhaled by workers and local residents or by entering the food chain via crops from the surrounding fields. They also result in health hazards like brain disorder, asthma, skin diseases, cancers, liver and heart problems, kidney and spleen damages, etc.

Policy and legislative context of environmental protection and sustainability: Policies and laws regarding environmental protection and sustainability have been introduced in India. The National Environment Policy of India was announced on 18 May, 2006 as an umbrella policy for a range of environmental problems. The National Environment Policy works as a guide to action on several fronts, such as regulatory reform, programmes and projects for environmental conservation, and the review and enactment of legislation by Central, State and local Governments. The Ministry of Environment and Forests has drafted e-waste rules (dealing with the management and handling of e-waste) that were posted for comment on its website this year. The Hazardous Waste Management and Handling Rules were regulated in 1989 and amended in 2000 and 2003. They are focused on the import of hazardous waste from any part of the world into India. Electronic waste was not, however, emphasized in existing regulation.

The Ministry of Environment and Forests came up with the Guidelines for the Environmentally Sound Management of E-waste on 12 March 2008. These specify that India has no specific environmental laws or guidelines for e-waste and none of the existing environmental laws have any direct reference to e-waste

or refer to its handling as hazardous in nature. However, several provisions of these laws may apply to various aspects of e-waste. Environmentally sound recycling of e-waste requires sophisticated technology and processes, which are not only very expensive, but also need specific skills and training for the operation. Proper recycling of complex materials requires the expertise to recognize or determine the presence of hazardous or potentially hazardous constituents as well as desirable constituents (i.e. those with recoverable value), and then be able to apply the company's capabilities and process systems to properly recycle both of these streams. Appropriate air pollution control devices for the fugitive and point source emissions are required. Guidelines are to be developed for environmentally sound recycling of E Wastes.

Electronic products ultimately lead to E-waste of components which have reached their end-of-life stages, like televisions, PCs, mobile phones, electrical appliances, etc. and this constitutes a serious threat to the environment. Thus, their proper recycling is a must! Each individual should not only know how to use such latest electronics gadgets but must also know how to discard it properly without harming oneself or environment.

Thus, this Study was considered necessary to sensitize students, the inhabitants of this planet and in future its decision takers, to the threat of e-waste and its recycling.

Statement of the Problem: A Study of Awareness of E-Waste Materials among Students of Standard XI of English Medium Schools in Anand City of Gujarat, India.

Definition of The Terms: Awareness here refers to the knowledge of the students regarding e-waste materials and how it creates problems related to environment and related to health.

E-Waste here includes computers, entertainment electronics, mobile phones and other items that have been discarded by their original users.

Recycling here refers to discarded machines that contain usable parts which could be salvaged and combined with other used equipment to create a working unit.

Objectives of the Study:

- To study the awareness regarding e-waste materials among students of standard XI in English medium schools of Anand city of Gujarat
- To study the views of students regarding recycling of e-waste materials.

Review of Related Literature.

The investigator reviewed related literature and studies conducted in the area of awareness and recycling of e-waste materials. The Studies reviewed were classified under two categories -

Studies carried out abroad; Studies carried out In India

From the comprehensive review of related studies and literature, it was found that most of the studies had been carried out on either surveying the present status of awareness for environmental pollution or making people aware about it through experiments. Very few researches had been found related to the present status of awareness of e-waste materials and its recycling among the students of secondary and higher secondary schools in India. Also, very few studies were carried out for specific aspects of awareness of e-waste materials and its recycling. Hence, the

researcher was convinced to take up the study on awareness of e-waste and recycling.

III. DESIGN OF THE STUDY

Population: The population of the study comprised of all the students of Standard XI of Anand city in the academic year 2010-11.

Sample: From the population, 258 representative samples were randomly selected of the six English medium schools of Anand city.

Anand is the administrative centre of Anand District in the state of Gujarat, India. It is administered by Anand Municipality. It is part of the region known as "Charotar", consisting of Anand & Kheda Districts. Anand is also known as the "Milk City" or "Milk Capital of India". It has become famous for Amul dairy and its "white revolution", lead by Tribhuvandas Patel and Dr. Varghese Currien. This city hosts the National Dairy Development Board of India and Anand Agricultural University. Another well-known part of the city is Vallabh Vidhyanagar, an educational town and Vallabh Udyognagar - an industrial town and nearby to it, the birth place of Iron man of India: Sardar Vallabhbhai Patel i.e. Karamsad, an educational suburb of Anand.

Sampling Techniques: For the present study the researcher selected XI standard students using random sampling technique. For the selection of school, researcher visited some of the schools which are following GSHSEB and CBSC syllabus and obtained permission from the schools to carry out her Study. Thereafter the researcher selected six schools randomly which was having manageable number of students and minimum facilities for conducting the Study.

Delimitation of the Study: The present Study was delimited to

- Anand city only
- Some electronic gadgets like cell phone, computer and television
- E-waste materials and recycling awareness only.

Tools Used For the Study: In order to obtain the relevant data as required for the Study, the following tools were prepared by the investigator herself for data collection:

- Check list
- Questionnaire

The first tool was check list, to meet the first objective which was 'To study the awareness regarding E-Waste materials among students of Standard XI in English medium schools of Anand city of Gujarat'. The tool had 16 questions, covering awareness of e-waste materials in students of Standard XI. The data will reflect awareness of e-waste materials in students of standard XI.

The second tool, 'Open ended Questionnaire for students' dealt with the second objective 'To study the views of students regarding the recycling of E- Waste materials'. The tool had six open ended questions. This tool was prepared to find out the views of students regarding the recycling of e-waste materials.

The investigator validated her tools from five different experts in their subjects. All the five Experts were 'Teacher Educators'. The Experts were requested to give their opinion and suggestion regarding the tools. They were requested to check for relevance,

simplicity, content validity and language of the tools. Appropriate modifications were made as per the suggestions of the Experts.

Quantification Of Data: For the present type of study both quantitative and qualitative data were required, so they were collected using two tools to achieve the objectives. Quantitative data included the response of the English medium higher secondary students given on close ended items in Checklist. Qualitative data included the response of the English medium higher secondary students given on open ended items in Questionnaire.

Analysis of Data: The data collected using Checklist and Questionnaire were analyzed through simple statistical techniques like frequencies and percentages with respect to objective 1 for quantitative data; whereas content analysis was employed for analysis of qualitative data with respect to objective 2. Survey method was adopted and for it, sample of 258 students were drawn randomly. The Study was delimited to

Anand city, English medium schools and chosen gadgets under e-waste materials and recycling. Check list for quantitative factual information and Questionnaire for descriptive open ended response were used as data collection tools. The tools were finalized and administered finally on students after getting them validated by five experts. The tools were administered on students of higher secondary English medium schools by personal visit paid by investigator. The data was analyzed using simple statistical techniques like frequencies and percentage and content analysis technique.

IV. SECTION WISE ANALYSIS

Objective 1: To study the awareness regarding E-Waste materials among students of standard XI in English medium schools of Anand city of Gujarat

TABLE 1

Sr. No	Question	Yes%	No%	Not sure%
1	Are you aware of the harmful components of a cell phone?	80.23%	10.08%	6.69%
2	Is lead contained in the battery dangerous to human body?	77.52%	3.1%	19.38%
3	Would you immediately discard or dispose the battery of cell phone when it is not functioning?	37.6%	47.29%	15.11%
4	Do you know about the harmful components of television?	56.98%	30.62%	12.4%
5	Do waste materials of television create pollution?	56.98%	11.24%	31.78%
6	Is cathode ray tube of the television set harmful to environment?	46.12%	4.27%	49.61%
7	Is mercury contained in cathode ray tube of television harmful to human body?	51.55%	6.98%	41.47%
8	Do you know about the harmful effects of computer on the environment?	47.67%	37.21%	15.12%
9	Will you throw away the printed circuit board of your computer which is not functioning well?	23.26%	58.53%	18.21%
10	Will you give back the computer wastes to the Company?	50%	28.68%	21.32%
11	Does cartilage ribbon used in printer create environment pollution?	34.11%	6.98%	58.91%
12	Do you throw your CD's and DVD's in garbage, when not functioning?	50.39%	44.57%	5.04%
13	Do you store your pen drive at home, when not functioning?	50%	41.47%	8.53%
14	Do you know that plastic used in electronic gadgets can be recycled?	65.89%	20.93%	13.18%
15	Do you know about the official recycling centers of particular electronic companies nearby your home or in your city?	22.48%	63.95%	13.57%
16	Do you think second hand electronic items are dangerous to use?	36.82%	33.72%	29.46%

The following are the graphical representation of the data.

Figure: 3
Awareness of harmful components of Cell Phone

In response to the first question whether the students were aware of harmful components of cell phone, 80.23% students responded that they were aware of harmful components of cell phone, while 10.08% students were not aware of harmful components of cell phone and 6.69% students were not sure about it.

This shows that majority of the students were aware about the harmful components of cell phone, very few number of students were not aware of any harmful components of cell phone.

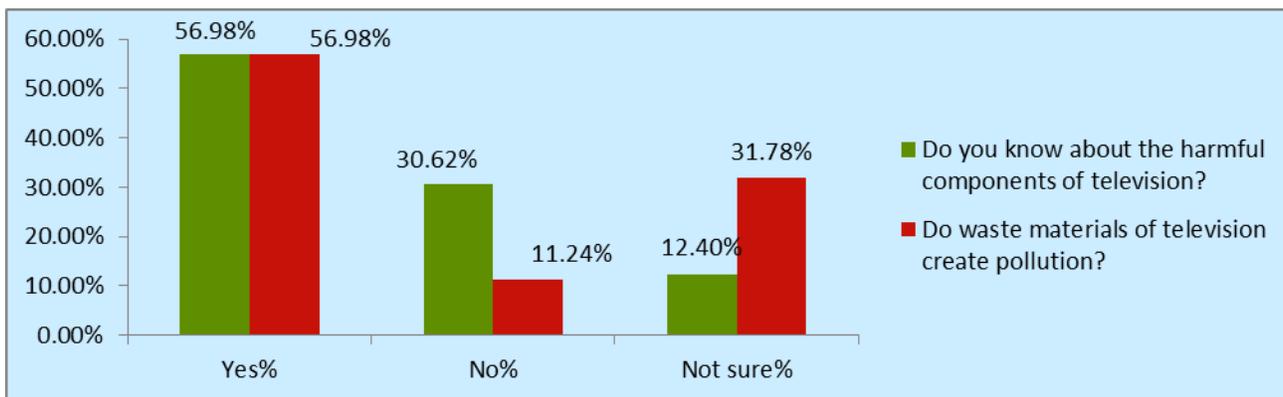
To the question posed by the researcher whether the lead that was contained in battery was dangerous to human body, 77.52% students said that lead contained in battery was dangerous to human body, while 3.1% students said lead contained in battery was not dangerous to human. 19.38% students were not sure about it.

To the question posed by the researcher whether one should immediately discard of dispose the battery of cell phone when it

is not functioning, 37.6% students were in favor to discard or dispose the battery of cell phone immediately when it was not functioning. 47.29% students were not ready to discard or dispose the battery of cell phone when it was not functioning. 15.11% students were not sure about it.

This shows that not maximum number of students were in favor to discard or dispose the battery of cell phone. Majority of the students were not ready to discard of dispose the battery of cell phone, while less number of students were not sure about discard or dispose of the battery of cell phone.

FIGURE 4
Awareness of harmful components of television and adverse effect on environment



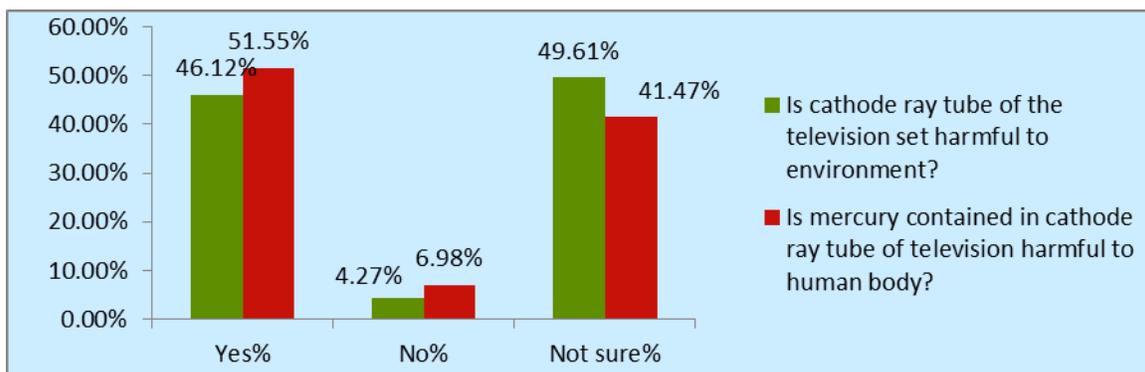
To the question posed by the researcher whether they knew about the harmful component of television, 56.98% students said that they were aware of the harmful components of television, 30.62% students said that they did not know the harmful components of television. 12.4% students were not sure.

This shows that majority of the students were aware of harmful components of television, while less number of students were not aware of harmful components of television. Very few students were not sure about the harmful components of television.

To the question posed by the researcher whether the waste material of television created pollution, 56.98% students agreed that waste materials of television could create pollution, 11.24% students said that waste materials of television did not create pollution, while 31.78% students were not sure whether waste materials of television created pollution.

This shows that majority of students agreed that waste materials of television could create pollution. Very few students did not agree with the answer that waste materials of television could create pollution.

FIGURE 5
Regarding the harmful effects of cathode ray tube and mercury contained in cathode ray tube



The responses regarding the sixth question whether the cathode ray tube of the television set was harmful to

environment. 46.12% students responded that cathode ray tube of the television set was harmful to environment, 4.27% students

responded that it was not harmful to environment. 49.61% students were not sure about the harmful effects of cathode ray tube of the television on environment.

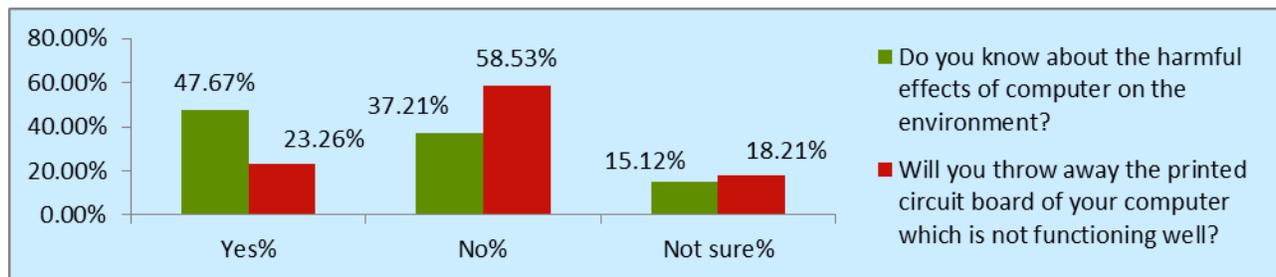
This shows that maximum number of students were aware of harmful effects of cathode ray tube of the television. Very few students did not agree with harmful effects of cathode ray tube, while majority of students of were not sure about the harmful effects of cathode ray tube.

The response regarding the seventh question whether mercury contained in cathode ray tube of television harmful to human body, was distributed among two extremes. 51.55%

students said that the mercury present in cathode ray tube was harmful to human body, 6.98% did not agree with it while 41.47% student were not sure about the harmful effects of the mercury present in cathode ray tube on human body.

This shows that majority of students were aware of harmful effects of mercury contained in cathode ray tube on human body. Very few students did not agree with the answer harmful effects of mercury on human body. A large number of students were not sure about the harmful effects of mercury contained on cathode ray tube on human body.

FIGURE 6
Regarding harmful effects of computer and disposal of printed circuit board of computer



The above responses related to the question whether they knew about the harmful effects of computer on the environment. 47.67% students were aware of the harmful effects of computer on the environment. 37.21% students did not agree with it. 15.12% students were not sure about it.

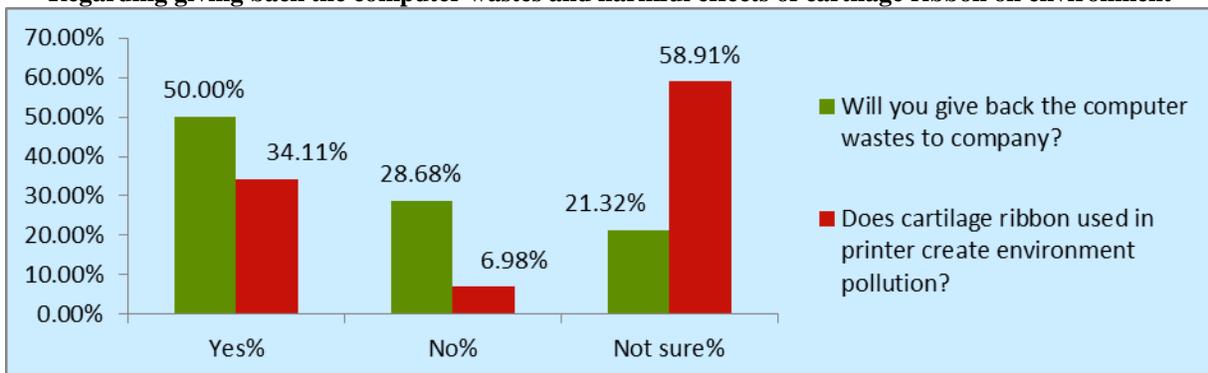
This shows that majority of students were aware of harmful effects of computer on the environment, while more students were not aware of harmful effects of computer on the environment. Few students were not sure about the harmful effects of computer on the environment.

The responses related to the question, whether they would throw the printed circuit board of computer when not functioning

well. Very few students (23.26%) would throw away the printed circuit board of computer when it was not functioning well. Most of students (58.53%) would not throw it, while few students (18.215%) were not sure about it.

This shows that majority of the students were not aware of harmful effects of the printed circuit board of computer when it was not functioning well. Very few students were aware of harmful effects of the printed circuit board and less number of students were not sure about the harmful effects of the printed circuit board of computer

FIGURE 7
Regarding giving back the computer wastes and harmful effects of cartilage ribbon on environment



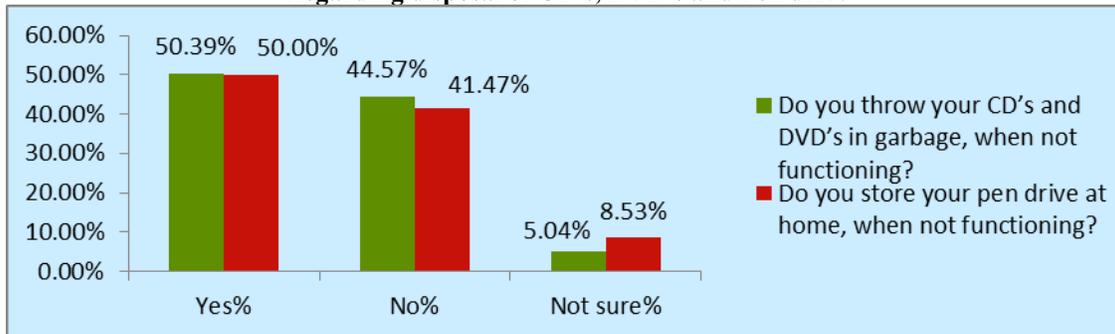
To the question regarding whether they would give back the computer wastes to the company, the responses were as follows, 50% students said that they would give back the computer waste to company. 28.68% students would not give back the waste of computer to company. 21.32% students were not sure.

This shows that majority of students were aware of harmful effects of waste materials of computer which created pollution of environment. Few students were not aware of harmful effects of waste materials of computer on environment. Very few students were not sure about the harmful effects of waste materials of computer on environment.

To the question regarding whether cartilage ribbon used in printer could create environment pollution - 34.11% students' responded that cartilage ribbon used in computer created environment pollution, 6.98% students said that they did not agree with it, while 58.91% students were not sure that cartilage ribbon used in computer could create environment pollution.

This shows that majority of students were not sure that cartilage ribbon used in printer created environment pollution. Large numbers of students were aware that cartilage ribbon used in printer created environment pollution and very few students were not aware that cartilage ribbon created environment pollution.

FIGURE 8
Regarding disposal of CD's, DVD's and Pen drive



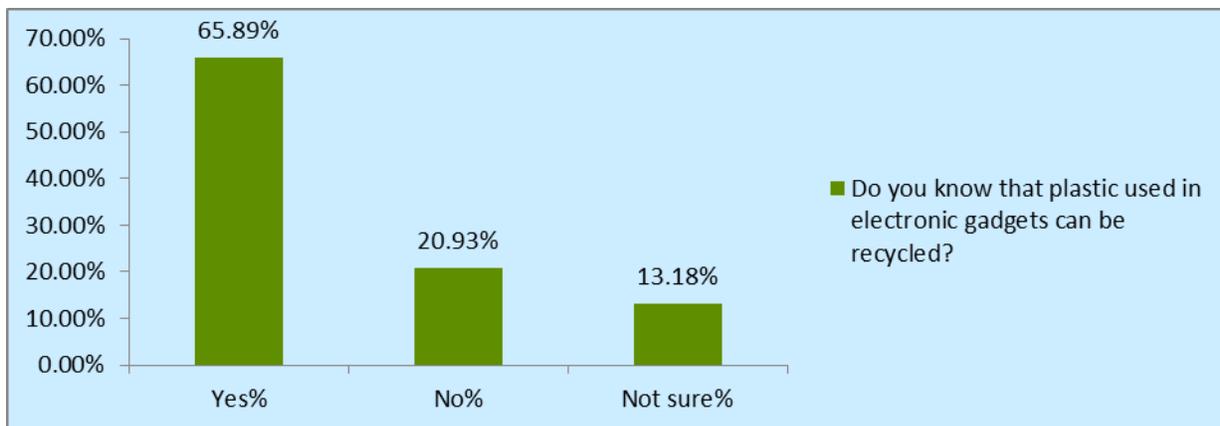
To the question regarding whether they would throw CD's and DVD's in garbage, when not functioning, the responses were as follows, 50.39% students responded that they would throw their CD's DVD's in garbage, when not functioning. 44.57% students would not throw them in garbage. Very few 5.04% students were not sure what they did with their CD's and DVD's, when not functioning.

To the question regarding whether they would store their pen drive at home, when not functioning - 50% students wanted to store their pen drives at home, when not functioning. 41.47% students did not want to store it at home, 8.53% students were not sure.

This shows that majority of students were not aware of the correct disposal method of CD's and DVD's when not functioning. A Large number of students were aware of correct disposal method of CD's and DVD's. Very few students were not sure what to do with CD's and DVD's when not functioning.

This shows that majority of students were not aware how to dispose their pen drive with proper method. Most of the students would not store their pen drive at home, while very few students were not sure what to do with pen drive when not functioning.

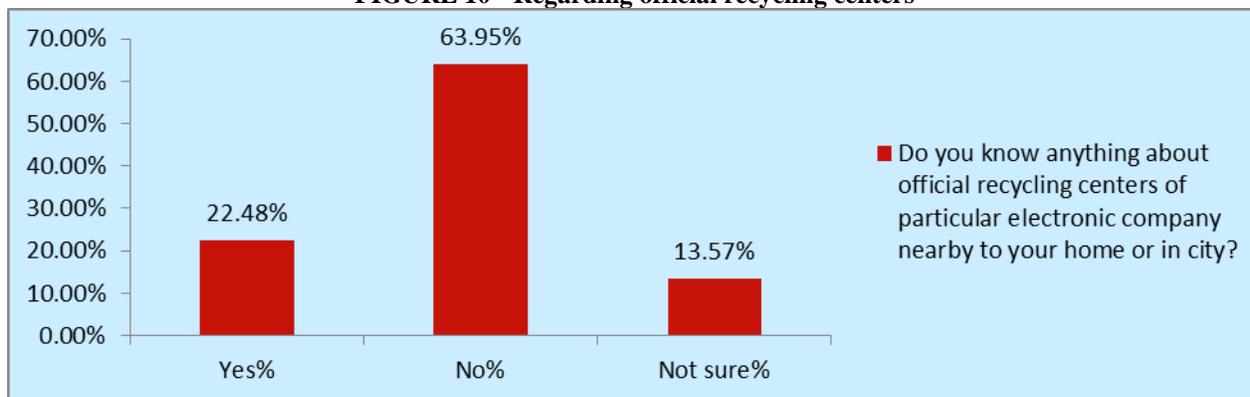
FIGURE 9 - Regarding plastic used in electronic gadgets



From the above figure it can be observed that 65.89% students knew that plastics used in electronic gadgets could be recycled. 20.93% students did not know, whereas only a few i.e. 13.18% students were not sure that plastics used in electronic gadgets could be recycled.

This shows that the majority of students were aware of recycling of plastic used in electronic gadgets. Few students were not aware of recycling of plastic, while very few students were not sure that plastic used in electronic gadgets could be recycled.

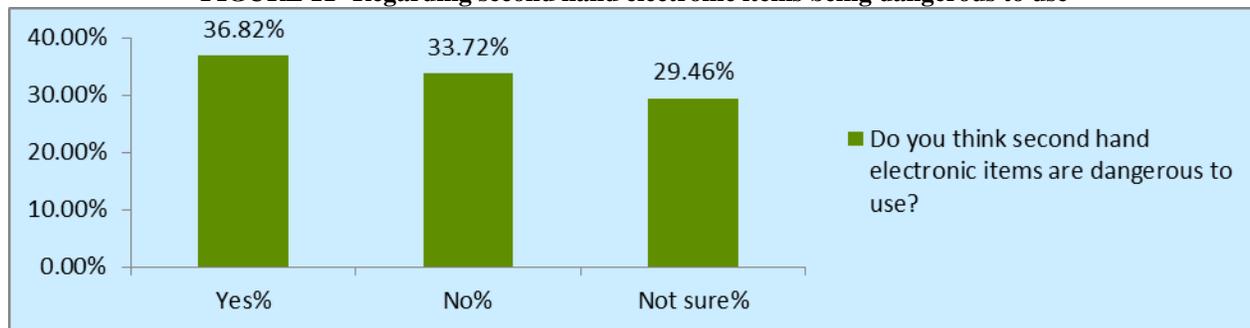
FIGURE 10 - Regarding official recycling centers



Regarding the response to the question whether they knew about official recycling centers of particular electronic company nearby their homes or in city, 22.48% students responded that they knew about official recycling centers, 63.95% students said that they did not know anything about any official recycling centers, while 13.57% students responded that they were not sure about official recycling centers.

This shows that majority of students were not aware about official recycling center of particular electronic company nearby their home or city. Only few numbers of students were aware about any recycling center nearby their home or city. Very few students were not sure about the recycling center nearby their home or city.

FIGURE 11- Regarding second hand electronic items being dangerous to use



In response to the sixteenth question whether they thought that second hand electronic items were dangerous to use, 36.82% students thought that second hand electronic items were dangerous to use. 33.72% students did not agree with it, while 29.46% students were not sure about use of second hand electronic items.

This shows that majority of students thought that use of second electronic items were dangerous, while a large number of students thought that use of second hand electronic were not dangerous and least number of students were not sure about use of second hand electronic items were dangerous.

The investigator had prepared a check list to check the awareness of students regarding e-waste materials. But it was also important to know their views regarding recycling of e-waste materials. So investigator had prepared open ended questionnaire to know the different views of students regarding recycling of e-waste materials.

The following is the data analysis and interpretation of Objective 2 which was "To study the views of students regarding the recycling of e-waste materials".

The views of students were taken regarding the recycling of e-waste materials. Different questions were asked in the Questionnaire by the investigator and the different views in

descriptive form were received. The qualitative data received were analyzed using content analyses technique which is as follows. (The following section has been written in the form of questions posed and responses given).

Q1. Why do you think e-waste material should be recycled?

In response to this question, majority of the students said that e-waste could create more harmful effects to environment. According to them, it was hazardous to environment and it was one of the major pollutants of the day. Also, majority of students said that e-waste was harmful to living creatures. A significant number of respondents replied that e-waste caused several diseases and was dangerous to health. According to them, there were very less resources available on mother earth and we could reuse some part of e-waste materials. Very few students said that e-waste should be recycled to save our earth for future generation because e-waste materials were non-degradable. Hardly any respondent replied that recycling centers could create an opportunity for employment.

Q.2: How can youngsters be sensitized to this crucial problem?

The most common view shared by students was that youngsters could be sensitized by bringing awareness in them

through different activities, charts, newspapers, magazines, seminars, debates, speeches, street play, drama, public meetings, different media like Television, Internet, Facebook, Orkut. Also, a majority of students said that youngsters could be sensitized through lectures. A significant number of students said that youngsters should minimize the use of different electronic gadgets. Few students opined that youngsters should not throw their e-waste in open place and they should give e-waste materials for recycling. Very few students said youngsters can be sensitized by (1) extra curriculum activities in school and colleges, organizing competitions. (2) Bringing social awareness in the youngsters

Hardly one or two respondents responded that (1) topics regarding awareness of e-waste should be inserted in the curriculum/syllabus (2) consumers should not use second hand gadgets (3) awareness should be inculcated via documentary film, videos or live telecast of e-waste.

Q.3 What will be your personal contribution in this respect?

Majority of the students replied positively and suggested to create or spread awareness among people/society. Also many of them recommend not dumping or disposing e-waste in open places. Average number of students said that they would try to minimize the use of electronic gadgets or use judiciously and carefully. Minimum or very less number of students replied that they would give back their waste gadgets to company in exchange. They showed readiness to use those gadgets which could be recycled. Some of them accepted that they need to enhance their own knowledge regarding e-waste and its recycling.

Different views came from very few students regarding their personal contribution towards recycling. They replied that they were ready to use very less harmful products. They showed readiness to establish awareness clubs. Few students replied that they would not give e-waste materials to children to make toys. They would also first enhance their own knowledge regarding the problem related to recycling of e-waste materials. They would conduct awareness programs. They would collect e-waste materials from friends and follow 3Rs i.e. reuse, recycling and reducing. They could organize drama for public awareness

Q. 4 What efforts will you put forward to make others aware about recycling of e-waste materials?

Most of the students replied that they would like to bring awareness by using newspaper, magazines, television, radio, sms, internet, Facebook, camps, seminars, speeches. Also majority of students said that they would try to bring awareness by arranging lectures, exhibiting posters, giving advertisement, arranging group discussion, and they would give information to others regarding recycling of e-waste. Many students said that they would stop people from throwing e-waste and they would collect all e-waste from friends, family, relatives and give it back to recycling centers. Few students said that they would help in campaigning and join social institute/networking site. Also they said that they would pay door to door visit and they would take out rallies, do street plays, drama and do conversation with friends. A single student said through education, he would try to bring awareness about recycling of e-waste materials.

Q.5 Give your opinion about the role of government, NGOs and pollution control board towards recycling of e-waste materials.

Responding to this question, majority of the students replied that Government should pass law/rules/acts/policies on recycling. Also they said that government, NGOs and pollution control board could launch some social awareness programme on television, give information of recycling of e-waste in newspapers, and arrange seminars. Also they could use posters, pictures to bring awareness about recycling of e-waste materials. Many students felt that NGOs could go in villages and urban areas and give information regarding recycling of e-waste. The government could collect e-waste materials and establish recycling centers. A significant number of respondents said that government was not doing anything regarding recycling of e-waste. Also they said that government could arrange public meetings, drama and rallies to bring awareness among people – they could establish a department for e-waste recycling. Very few students replied that government could create funds, start movement, encourage people for recycling e-waste, and organize fair related to recycling of e-waste. Government could use research and find disposal methods. Pollution control board should check e-waste dumping.

Q.6 State your views on what type of role the company should play in recycling of e-waste materials.

Maximum students replied that the Company should collect e-waste materials or make provision for exchange offer and recycle e-waste material. Majority of students said that the Company should provide recycling centers/system. The Company could give compensation/discount to all who return their e-waste back. Company should make non-harmful and less pollutant products. Less number of students said that the Company should use recycled materials, Company should give detail about gadget to use and give detail about the disposal of e-waste. They also replied that the Company should provide the information about harmfulness of e-waste. From their views Company could give advertisement regarding recycling of e-waste and Company should know negative impact of e-waste materials. Very few students said that Company should make environment friendly gadgets. Company should make a policy to recycle. Company should regularly check their gadgets and collect back discarded materials so that they could be recycled.

V. MAJOR FINDINGS OF THE STUDY.

Based on the analysis of the data collected on two tools i.e. checklist and structured questionnaire, it was observed that the highest response for “Yes” was 80.23 % on item no.1 i.e. Are you aware of harmful component of cell phone? ; whereas the lowest response for “Yes” was 22.48 % on item no.15 i.e. Do you know anything about official recycling centers of particular electronic company nearby to your home or in city?

Similarly, item no.15 had the highest response for “No” that was 63.95 % whereas the lowest response for “No” was 3.1 % on item no.2 i.e. Is lead contained in battery dangerous to human body?

It was quite interesting to note that on the third category i.e. “Not sure”, the highest response was 58.91 % for item no.11 i.e. Does cartilage ribbon used in printer create environment

pollution?; whereas the lowest response was 5.04 % on item no.12 i.e. Do you throw your CD's and DVD's in garbage, when not functioning?

Based on the above observations, it was very much clear that whilst the students were aware of the e-waste materials, they really required to know and were not aware of many things about the recycling of the e-waste materials. It was also noteworthy from the responses that most students were reluctant to throw or discard the e-waste materials that they made use of in their daily lives.

When compared, some of the responses on particular items given on checklist with that of the descriptive answers on open ended questions in order to cross check and validate the responses; it was found that majority of the students were aware of the hazardous effects of e-waste materials on human body as well as on earth or nature but did not know much about the process of recycling. However, they did show a positive inclination to learn it.

The present Study was carried out on a small scale, using sample of 258 and the methodology employed for the present Study was survey method.

The Study has major implications for course or syllabus designers of science and technology, for education policy makers and decision makers, for curriculum designers for school and college level. For example, based on the present Study, it can be thought to implement or introduce "Environment Education" as a core subject at school and/or college level education.

In order to arrive at major findings and conclusion for the scope of generalisation of the present Study to the theory and practice of education field, first and foremost the investigator grouped the collected data according to the nature of the data and analyzed as per the two objectives of the Study. The analysis of data suggested significant awareness towards e-waste materials. The awareness of e-waste in students of standard XI was found positive. Analysis of the responses on the checklist by the students showed that the students of all streams were aware of e-waste products and its harmful effects.

Based on the analysis, interpretation of the collected data and inferences drawn, the following were the major findings of the Study:

As per the first objective related to the awareness regarding e-waste materials, the following were the major findings:

- Majority of students were aware of e-waste materials in cell phone (80.23%), television (56.98%), computer (47.67%), printer (34.11%), CDs and DVDs (50.39%) and pen drive (41.47%)
- Less than average numbers of students were aware of the micro electrical gadgets used in various electronic equipments.
- While comparing the data, it was found that students were aware of the harmful effects of e-waste materials to human body and environment, but at the same time majority of students were reluctant to discard them away, as in case of e-waste equipments like cell phone battery (47.29%), printed circuit board of computer (58.43%), CDs and DVDs (44.57%), pen drive (50%).
- More than average numbers of students were aware of recycling of some e-waste materials i.e. 65.89%, but it was quite noteworthy that most of them (63.95%) were unaware regarding the existence and whereabouts of such recycling centers for e-waste materials.

The second objective related to the views of students regarding the recycling of e-waste materials, the following major findings were found from the data analysis.

Majority of students were aware about the harmful effects of e-waste to environment and also to all living beings on earth. Majority of students knew that E-waste could create various diseases to human body and they realized the fact that e-waste materials were non-degradable. Majority of students viewed recycling of e-waste materials as a must in present times. Some students opined that Recycling could offer employment also. Such views expressed by higher secondary students, show that students were not only aware about e-waste and recycling, but also identified recycling as an effective field of trade and commerce or for entrepreneurship.

It was found that majority of students gave wonderful suggestions like bringing awareness in youth regarding recycling through different activities, preparing charts and posters, arranging seminars debates, speeches, and different media can also bring awareness like Television, Internet, Facebook, Orkut. Most of the students were also in favor of some legislative steps to be taken by Government and Electronic Companies in disposing of e-waste materials and its recycling. Most of the students opined that NGOs and pollution control board should also play an important role to reduce adverse effects of e-waste on environment as well as human beings.

Suggestion for Future Research:

- Similar study on awareness of e-waste materials (focusing on household appliances like electric switches, radio, torch, torch-battery, microwave oven, refrigerator, hand blander, electric stove, electric shaver, electric toys for children, etc) and its recycling process among Gujarati Medium School Students or/and Hindi medium schools students can be carried out.
- Using the same tools and methodology of the present Study, another Study can be carried out with schools having CBSC, ICSC, IB syllabi
- A Study on awareness of e-waste and recycling among students from primary to university education can be carried out for entire Gujarat for all kinds of schools i.e. purely government, grant- in -aided, granted, privately managed and self aided
- A Study on the same topic can be carried out at larger scale taking large sample from entire India.
- Comparative Study of awareness among boys and girls of urban, semi-urban and rural background and Comparative study of awareness of e-waste among students of Gujarati medium school to students of other medium can also be carried out with the same topic.
- The present Study can be further enriched with combination of newer methodology. A Study with similar topic can have a different methodology like developmental, experimental research design. One can make use of CAL, CIA, CALL, CAI etc. computer related PLM Packages, and its effectiveness for developing awareness among variety of sample like students, teachers, principal, administrates, dealers or distributors of electronic equipments and even manufactures of such electronically goods can be investigated.

- Another Study with same topic can focus on teachers, principal, administrators of schools/colleges.
- A large scale project can be taken up including more electrical items and awareness regarding other electrical equipments and their recycling can be done.

VI. CONCLUSION

Environment Protection and its preservation is today the major concern all over the world. The changes in environment prove that all the human activities are inter-connected. An environmental damage within the boundaries of one State has trans-border ramifications. While the scientific and technological progress of man has invested him with immense power over nature, it has also resulted in the reckless use of the power, and endless encroachment of nature. Some of the environmental issues of concern a decade ago were: acid rain, stratospheric ozone layer depletion and global warming. Today, electronic waste (E-waste) is becoming an issue of greatest concern.. The electronic waste consists of hazardous material, which causes damage to the environment resulting in environmental problems. The worst nightmare of this helpless situation is the growth of electronic waste (e-waste) in India. Solid waste management, which has already been a mammoth task in India, is now becoming more complicated by the invasion of e-waste. There exists an urgent need for a detailed assessment of the current and future scenario of e-waste materials and their recycling in India, particularly in Gujarat which is industry friendly and business oriented community. The present status of awareness about e-waste among Indians, especially among people of Gujarat is the need of the hour. The study on e-waste and recycling including quantification, characteristics, existing disposal practices, environmental impacts etc. would be helpful to not only country and its people but to the field of education as a whole.

The present Study was carried out on the area of awareness of e-waste and recycling using Survey method. The Study was conducted on higher secondary students of English medium schools of Anand city of Gujarat. As compared to the earlier Studies carried out in the area of awareness about e-waste and recycling, the present Study was in itself a new one and had no resemblance with the earlier Studies.

The present Study was carried out on the area which was less familiar in the field of education especially among school going adolescents in India. The Study was more significant in terms of the locality and sample as English medium higher secondary students of a small town of Gujarat were taken. Such Studies on the area of e-waste and recycling were very less in quantity in India and not a single Study in Gujarat. Hence, the investigator had studied a crucial and most important area of problem which is in reality a global one.

The present Study was significant in terms of its contribution to the field of educational research and to the area of science and technology and social science.

On the basis of analysis of data it can be said that the awareness of e-waste in students of standard XI is in a positive direction. However, awareness regarding recycling of e-waste among the higher secondary school students was only satisfactory.

Government should introduce some topics related to disposal of e-waste materials and its recycling and adverse effects of e-waste on health of human body in Environmental Education as a compulsory subject from lower to higher grades.

It has been realized recently that the education system alone is a powerful medium to ensure environmental protection. It should reach most parts of the population at a young age, and more e-waste friendly behavior should be practiced on daily basis.

India faces significant challenges in protecting the environment from further damage. Population growth and consumerism make the task all the more difficult for the Indian Government. The Indian Government's ability to safeguard the country's environment depends on policies and educational systems. (R. Sahaya Marry, I Paul Raj, 2005) .Disposal of e-waste is one of the major challenges facing the world. Hence, human beings are asked to reduce, reuse and recycle their e-resources. Even the learned people do not know which objects are to be reduced, reused and recycled. These three words if followed by each and every person would be helpful to protect our environment.

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Agribusiness Management Education: A Review on Employment Opportunities

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Abstract- Agribusiness management education is a discipline of blend of economic, agriculture, business (commerce) and management principles. Agribusiness management field is of very recent origin and gaining rapid popularity among students as carrier choice. The agribusiness program is planned to develop management workforce to cater agricultural Industry which serves as a good option for the students willing to perform in corporate sector. Agribusiness management education has great opportunities of employment for agrigraduates in private, governmental and cooperative sector. Agribusiness students can get jobs for various posts such as sales executives, credit officers, agri experts, warehousing managers, financing officers, food managers and logistic managers in national and Multinational Corporation. Agribusiness professionals have bright future in academic field due to new emerging discipline and lack of agribusiness faculty in the country. Agribusiness sector also helps in fighting against the Poverty, Hunger, Malnutrition and unemployment situations in the economy. This review paper explores the potential opportunities in agribusiness management education which helps in employment generation and entrepreneurship development. Thus, Agribusiness management sector will change more in the next decade than it did in the last century.

Index Terms- Agribusiness Education, Agribusiness Students, Employment opportunities and Entrepreneurship Development

I. INTRODUCTION

The term 'Agribusiness' was first introduced by Davis and Goldberg in 1957 in a paper presented at the Boston Conference on Distribution as "the sum total of all operations involved in the production and distribution of food and fiber", which described three interdependent sectors in a global food system. It represents a three-part system made up of (i) the agricultural input sector, (ii) the production sector and (iii) the processing-manufacturing sector (Sonka and Hudson, 1989). Agribusiness is the business of agricultural production. It includes crop production, seed supply, agrochemicals, farm machinery, distribution, processing, marketing and retailing of agricultural produce to ultimate consumers. Agribusiness is used simply as a portmanteau of agriculture and business within the agriculture industry, referring to the range of activities and disciplines encompassed by modern food production (www.wikipedia.com). Agribusiness has evolved from agriculture and has become a vast and complex system that reaches for beyond the farm to include all those who are involved in bringing food and fiber to consumers. Agribusiness include

not only those that farm the land but also the people and firms that provide the inputs (Seed, chemicals, credit), process the output (Milk, grain, meat), manufacture the food products (ice cream, bread, breakfast cereals), and transport and sell the food products to consumers (restaurants, supermarkets). Agribusiness system has undergone a rapid transformation as new industries have evolved and traditional farming operations have grown larger and more specialized (Baruah, 2008 and Bairwa *et al.*, 2012). A company that is doing business transactions with farmers also come under the agri business sector. These transactions may be either in the form of products or even services. Similarly suggestions or consultancies for agriculture, seeds, pesticides, supplying agriculture equipment all come under agri business. In the same way providing loans to agriculture, agriculture insurance, stocking agri products, transportation, packing, processing, and distribution also come under the same sector (Sunitha, 2009). The policy of liberalization and the establishment of WTO have created more opportunities for globalizing agriculture and allied sector. The agribusiness sector encompasses the many activities of agricultural sector under one umbrella like integration of agricultural inputs, agricultural productions, agro processing, agricultural marketing and trade which add value to the agricultural produce (Bairwa *et al.*, 2012). Agribusiness is thus a term used for farming plus all the other industries and services that constitute the supply chain from farm through processing, wholesaling and retailing to the consumer.

II. IMPORTANCE OF AGRIBUSINESS MANAGEMENT

The commercial agriculture and agribusiness calls for specialized production, postharvest management, expansion of processing, transportation, packaging activities and positioning of products both in the domestic as well as international markets. Agribusiness was widely recognized as an important new field during the 1980s when its unique characteristics and needs were described by agricultural economists (Bairwa *et al.*, 2014). Sonka (1989) highlighted five ways agribusinesses may be different from other types of firms: 1) the unique cultural, institutional and political aspects, 2) the uncertainty from production, 3) the alternative goals and forms of political intervention, 4) the public sector's contribution toward development of technology, and 5) the variety of competitive structures in the agribusiness sector (Larson, 2013). Agriculture is rapidly changing into a business opportunity and with these trends after harvesting the crop by following technical methods for processing, packaging and transportation the food is being exported to the national and international markets. However by not taking appropriate

measures in our country almost every year 20 to 30 percent of the crop produce is being wasted due to reasons like floods, pests – insects, improper handling, storage, processing, and transportation of agricultural produce and due to not using proper methods at the time of reaping the crops. In the same way vegetables and fruits are also 30 percent being wasted due to lack of processing and storage facilities. However with changes in business policies and international business organizations entering into the food processing market of India there is an overall boost to the agriculture sector in the country. With the application of advanced technology and managerial skills, many people are investing in poultry, aqua, processing of fruits and vegetables in our country which is turning out into a profitable business. As a result people are made investment in production, transportation, processing and marketing field. Moreover agribusiness management is very important for developing countries like India to capitalize on the benefits of globalization and face new challenges to enhance their economy growth. Government, private and other organizations are looking forward for qualified agribusiness managers and the agricultural universities and other agricultural education institutions have taken up the responsibility of providing qualified human resources for agribusiness industry training students with the required business management skills (Sunitha, 2009). Food consumption is also leading the boom in agriculture and agribusiness sector. India is expected to overtake China as the world's largest nation. With the world's youngest population, food and Agri sector is set to triple by 2020 from US \$328 to US \$895 Billion in just six years from now (Bairwa *et al.*, 2013). Huge opportunities in Agribusiness are attracting investments in primary production as well as on the output side in food processing and distribution. Organized retail is growing at 35% CAGR and so many input industries, all of whom are demanding more capable people to manage growth. This growth will invariably cause major structural shifts in the management of agribusiness enterprises and also will throw up a million opportunities beginning with the agglomeration of land, most likely via lease arrangements with the intent of improving production efficiencies – resulting in expansion of the farm mechanization business, micro irrigation, reorganization of supply chains, investments in food processing, cold chains and agri infrastructure, to name a few (Puri, 2012). There are a growing number of new companies in the Billion Dollar plus club in the area of processed foods, beverages, nutrition and the plantation sector. Inputs and farm mechanization have several such companies signalling interest in agribusiness and appetite for investment in this sector. Agriculture and allied sector has achieved satisfactory growth since last few decades, but presently due to the various factors the agricultural growth is relatively stagnated (Pandey and Tewari, 2010). The reports from various sources always reveals about the bottlenecks from the sector which put us back in terms of its growth and development. The up gradation of agriculture is needed right from harvesting of agriculture crops till it reaches at consumer fork. Majority of the farmers and small entrepreneurs are not well versed about standard practices required during pre-harvest as well as post-harvest operations, which undoubtedly plays a vital role in overall productivity. In addition to these, growing global population has resulted into disparity between market demand

and supply side of agricultural produce. There is need a market and consumer oriented education system which fulfills the objective of the growth and development of the economy through the income and employment generation. In Agriculture education system, agribusiness management discipline is recent origin and gaining rapid popularity among students and academician. The agribusiness program is planned to develop management workforce to cater agricultural Industry which serves as a good option for the students willing to perform in corporate sector (Sunitha, 2009). A proper management of all the agribusiness activities right from planting the seed to getting the actual reward at market place is required. These issues are expected to be addressed by management education in agricultural sector which certainly has hidden potential of creating second wave of agricultural revolution.

III. EMPLOYMENT OPPORTUNITIES IN AGRIBUSINESS MANAGEMENT

In the era of privatization and globalization major structural reforms are taking place in the agricultural sector. India is on the threshold of Green revolution. Commercialization of agriculture, animal husbandry, dairying, fisheries and allied sectors are taking place at a faster pace in the country. National agriculture policy, agricultural reforms like public private partnerships, market lead extension programmes and agricultural technology management programmes envisage market centred production programmes in agriculture and allied sectors to attain sustainability. This fact that food security issues are emerging over the globe, we needed standardized practices for food safety, packaging, quality control, HACCP. To achieving the above envisaged objectives, technocrats endowed with relevant management skills and experience are essential which paved the way for starting the Agribusiness Management programmes for critical management and entrepreneurial competencies to agricultural graduates for enabling them to own and manage Agribusiness enterprises of global standards. Thus, agribusiness managers have great opportunities in agriculture production, agricultural marketing, food processing, supply chain, dairying and retailing sector in national and Multinational Corporation. These MNCs are very interested to investment in industries like agrochemical, organic farming, cattle feed industry, horticultural based industries, poultry, plantation, agroforestry, and ayurvedic industry in order to exploit the potentials of market access in India.

Today India's agriculture has become globalised and the idea of integrating Indian agriculture with the world economy is getting support. India has enormous potential as an exporter of agricultural commodities ranging from mushrooms to flowers, spices, cereals, oilseeds and vegetables. The spurt in government support for export of agri-products has evoked considerable interest among the large business houses which have worked out agreements for technology transfer, marketing tie-ups, and management and trading contacts with leading foreign counterparts. Horticulture with its offshoot floriculture has become a focus of export activity. India's exports of roses, carnations, gladioli, chrysanthemums, jasmine and other tropical plants and flowers are touching new heights. This situation creates employment opportunities in the economy directly and indirectly. There are varied opportunities for salaried jobs and

entrepreneurship in agriculture and horticulture sector. Landscapers and horticulturists are hired by hotels, health farms, and holiday resorts to beautify their surroundings. Florists and nurseries managers are doing lucrative business especially in the metropolitan cities. Agribusiness management is one of the courses having more opportunities and potential for job within the country and abroad (Puri, 2012). Commercialization of agriculture and allied activities pave way for agribusiness experts to acquire better jobs in industrial sector. Food business, agribusiness, retail chains, banking, agri insurance, supply chain management and logistics management are some important career oriented areas in agribusiness management. A logistics model can provide cost effective access for rural produce to urban markets. Moreover public private partnerships will help to address some of the rural development issues. This further emphasizes the importance of Agri business, supply chain and logistics management.

Agribusiness is a field where economics, business, and agriculture merge, and individuals often study and gain experience in all three in order to be skilled candidates. Agribusiness management jobs are available in both the public and private sectors, such as government agencies and large corporations. The agribusiness education gives an option of joining the agricultural corporate sector as one of the good career alternatives. The corporate sectors involved in production and distribution of pesticides, fertilizers, seeds, farm equipments are some of the usual options available (Srivastava, 1989). Agribusiness students can join in the warehousing, retail, seeds companies, fertilizers and pesticides companies, banks and insurance sectors. They also can join as agribusiness experts, as management professor, as policy maker, agribusiness researcher and agribusiness consultant in any concerned institutions. They can also look for a career in agriculture consultancy, agri banking, hi-tech farming and agriculture engineering sectors (Sunitha, 2009). Careers in agribusiness are varied from farming or ranching to commodity broker, food broker, loan officer, marketing researcher/specialist, product analyst, purchasing agent, statistician, and wholesaler. Agribusiness graduates and managers can find career openings in many areas of specialization, including positions such as grain traders, sales representatives in agri input companies, logistics managers, finance and credit officers, food managers, agribusiness experts and analyst positions in market development organizations. There is a continuing strong demand by agribusiness firms, ranging from large multinational corporations to emerging food manufacturing firms for better trained employees in both management and the agriculture field. These firms are looking for employees who have the skills to make sense of the world around them, especially in a rapidly changing, global agriculture industry.

Recently Prime Minister Dr. Manmohan Singh emphasized on the need for greater attention to local needs by citing an important modern management principle of 'think global and act local'. Logistics could play a key role in integrating rural and urban divide. A best option of employment can be developed through agripreneurship development. Agribusiness professionals can change their own farming land in to profitable venture by applying the managerial skill plus knowledge and agribusiness managers can perform well in the same due to their

suitable educational background (Puri, 2012). To shape the Indian agriculture into a commercially viable entity, there is vital need to inculcate the spirit of entrepreneurship, and then only agriculture can become a major contributor to the nation's gross production. Agri-business management has wide scope in developing the trained manpower in different area of operations viz. management personnel to cater cooperatives and agriculture industry, policy makers for financial sector, trained teaching staff to cater academic field, technically sound team to serve research area in agribusiness sector (Srivastava, 1989).

IV. CONCLUSION

Agribusiness is a growing discipline as well as industry sector emerging as promising career options for agribusiness students and has bright scope in both academic and industrial development. Agribusiness management education is necessary for developing trained manpower, to create business opportunities, reduce poverty through employment generation and industrial growth for the true development of Indian agriculture. Now days, the public, private and cooperative organizations are looking for professionally competent and trained agribusiness managers for maintaining growth of the organization. The managerial skills of meritorious agricultural graduates can be developed through agribusiness management education by academic institutions so that they can prove as effective agribusiness managers in the national and international corporate organizations. Thus agribusiness management professionals have good and ample opportunities of employment or jobs in private, public and cooperative sector. They have opportunities in academic field as agribusiness faculty along with an alternative of entrepreneurship development.

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Traditional Human Relationship with Nature: With Special reference to the Tangkhul Naga

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Abstract- The Tangkhul Nagas are complexly bound to nature in their social, cultural, economic, ethical and religious values. The dynamics of Tangkhul's livelihood activities in many ways reflect the complexities of the human and nature relationship. Interactions between human and nature have undergone significant changes during the last century which leaves unwarranted impact on its natural environment. This paper examines how domains of ethnoecological knowledge are deeply rooted and their relationship so profound, in turn, how people choose to interact with wild animals, living beings and non-living beings on their daily basis of traditional life of the Tangkhul people. Data were collected mostly through secondary sources and few from the selected interviews of people of the community. The interviews were conducted through formally and informally. Results indicate that there was a strong relationship between the people of this community with living and non-living things, with rich folklores and myths. But today due to the advancement of technology and many other developmental activities, besides, the arrival of Christianity in 19th Century a great transition has brought into the life of the Tangkhul Naga.

Index Terms- Tangkhul Naga, Human, Nature, Land, Plant, Animal, Lifeworld, Christianity

I. INTRODUCTION

In the ancient times, the direct dependence of people on natural ecosystems for their food, and the intimate knowledge of the natural world that this requires, is generally reflected in their beliefs and attitudes toward nature and wildlife. Such peoples commonly view themselves as inseparable from the natural ecosystems and wildlife around them. Animals or plants are often regarded to be another kind of people, or as spirit beings, who can be appealed to for help and protection. Rituals are commonly performed to show respect, gratitude and reverence for the nature with the hope of promoting good omen. These literal beliefs in magic, ritual and fusion of humans with the natural world are often termed animism. Many indigenous religions perceived the biological components of the environment and the human population as an integral part of nature system. Religions taught them to believe and act towards nature, indigenous religions governed not just by a principle of sustainability for survival's sake, but by a moral sanction against waste or greed. Humans worldwide lived in tribal, hunter-gatherer societies for most of their evolutionary history, and some anthropologists argue that we therefore feel most at ease in circumstances that mimic such societies. These circumstances include open settings with views

of wildlife living in areas near water, and egalitarian social groups with frequent interactions with close family members and at most a few dozen members of the same culture. Since the beginning of human history, humans have interacted with animals. Nature is also perceived as an external, solid and harmonious entity, which man can manipulate as long as he is aware of and respects its covering laws. Following this ideology, development can be seen in term of increasing knowledge and control over nature. The basis for this view has, however, collapsed as nature is no longer seen as stable and man has lost his privileges in nature.

II. STUDY AREA AND METHOD

The Tangkhul Nagas

Tangkhul Naga tribe lives in the present North- Eastern part of India and north-western part of Burma (Myanmar). Tangkhul inhabited mainly the Ukhrul district in Manipur covering an area of 4544 sq kms with the population of 183,115 (2011 Census). Some Tangkhul villages are found in the adjoining Senapati, Thoubal and Chandel district in Manipur and sizable numbers of Tangkhuls are also found in the Somrah tract of Sagaing Division in Burma. Tangkhul region is gifted with rich biodiversity. The climatic condition varies from place to place due to the mountainous terrain. The primary occupation of the people is jhum cultivation though some of them have adopted wet and terrace cultivation. Rice, millet and maize are the main crops. Weaving, hunting, fishing, necklace, wood carving, cane work and basket making are their subsistence occupations. The Tangkhuls live in villages and firmly uphold the doctrine that one never abandons "one's village, home and clan". The villages are generally thickly populated and are situated on the top of the hills. The village has been the highest political, social, economic and religious unit and the main source of spiritual, social and cultural bonding among the people. The hereditary village chief (Awunga) and his clan-based village council (Hangva) is the highest decision making body in the village hierarchy who take the responsibility of looking after the welfare of the villagers. All village festivals, social and religious functions begin with rites and sacrifices by the Awunga.

The method of data collection for this paper was carried out through interviewing, observational method and from secondary sources. Data were collected mostly through from the secondary sources, and few from the selected people whom I interviewed. The interviews were conducted through formal and informal ways of interviewing. The age of my informants falls mostly from the age group of 60-80 years. All interviews were taped. During the interview, "A systematic multi-method approach"

was employed. Oral histories are part of a multi-method research design geared to provide relevant quantitative and qualitative information for social impact assessments. These data were supplemented with statements derived from observation (Colburn, Clay 2011-2012).

III. RELATIONSHIP BETWEEN THE TANGKHUL NAGAS AND NATURE

The Tangkhul, like every tribal group, have a close affinity to nature. This can be seen not only from their myths or folktales but from their day today ways of life. Traditional Tangkhul had a belief that heavenly phenomena indicate something in their day today life. Rainbow is considered as a bridge between heaven and earth. No one dares to point a finger at the rainbow because it is believed that his or her finger would slant. There is also a belief that if a rainbow encircles the sun then it is a sign that a village chief would die. The people would try to locate the direction of the misfortune by studying the gap in the circular line of the rainbow (Angkang 1990; Khamuiwo; 1999; Horam 2010). The Tangkhul believe that if the rainbow occurs high up in the sky then sunny days would come but if it occurs just above the earth then it would rain again.

There are also many accounts of folktales where man and animal interacts. For instance, there is a story that goes like after Kasa Akhava (Creator) had created all the creatures on the earth, the Kasa Akhava wanted his creatures to determine the duration of the day and night. So he summoned all the creatures to give their opinion. For a long time, nobody spoke up and there was complete silence. Finally a tiny-eyed Mole suggested that the duration of the day and night should be one year each. But many of the creatures opposed the Mole's unrealistic proposal but did not offer any concrete suggestion. Later on Chaklen proposed that "let there be short intervals for rest and equally short interval for work" (Shimray 2000). Kasa Akhava approved such a sound and wise suggestion given by the Chaklen and chose him to foretell events of day and night. At the same time, he appointed the Harva (Cock) to determine the length of the day and night. Kasa Akhava commanded the Cock, that when he becomes tired and could not work any longer, he should crow and sleep and that would determine the duration of the night. In the same manner, the cock should wake up when his body had fully renewed with strength and is ready to work, he should once again crow and that would be the duration of the day. Thus the Cock declared the rising of the sun and the setting of the sun by crowing "Ki...Kri...Ki" ushering in the day and the night. The cock crowing in the morning is a time to wake up and crowing at night is a time to go to bed. Since that day, the Tangkhul claimed that the world received light and darkness at regular intervals. Even today because of the Moles's proposal for the unworkable duration of the day and the night, the Mole remains hidden underground eating only grass roots and if he ever comes out into the open he normally does not survive. He is eaten by either wild cats or hawks (Luikham 1983).

The administration of legal matters in the Traditional Tangkhul society is done at the local level through the village Hangva (Council). The administration of justice in the traditional Tangkhul society was strictly based on customary laws. However, if the cases cannot be settled down by the village

council, it is settled through ordeals which is claimed to be the last judgment by swearing in the name of heaven and earth. What is important in this form of judgment is the prominent role that nature plays in human decision. It tells us that nature plays a great role in the faith and trust of the Tangkhul as the enforcer of law. To them, nature was considered as the best judge and in difficult cases, the people recourse to nature to bring about a just pronouncement which they took as the will of God, the Creator. They took oath in the name of heaven, earth, sun and moon which relate to natural things. Traditional Tangkhul did not have written laws and regulations to judge different cases of litigation. One of the common judgments practiced by the Tangkhul was the immersion in water. In this, the one who can stay longer inside the water is considered innocent and the other the offender (Angkang 1990).

The Tangkhul villages are generally thickly populated and are situated on the top of the hills enclosed with thick forest. The village has been the highest political, social, economic and religious unit and the main source of spiritual, social and cultural bonding among the people. The hereditary village chief and his clan-based village council is the highest decision making body in the village who take the responsibility of looking after the welfare of the villagers. The chief of the village is not only the head of the village community but also acts as the head priest who enjoys many rights and privileges. Every rituals and ceremonies begin with the village chief.

The village councils acted as forest guards and wardens in conservation of natural resources to see that the village forests and other eco-system are properly managed. They would also select the area for jhumming cultivation for each year and in order to allow land to regain its fertility it was left as barren land where the villagers would not be allowed to re-cultivate for at least four or five years. Tangkhul believe that land cannot be put to use for a long time, therefore, they put to rest as fallow land to regain its fertility. Likewise, in the Tangkhul customary laws there is a law concerning fire called Meiyen (Law of fire). One cannot just lit a fire in an around the village territory. This is to protect the forest from fire and anyone who violates would be punished (Khamuiwo 1999; Horam 2010). It is also a taboo to cut down trees during the rainy season and especially at the time when the trees are sprouting. A belief which is still prevalent with the people with regard to the preservation of the trees and forest would indicate that if a branch from a tree is cut, it would 'bite' back. The other aspect of this belief is that, it generated fear at the psychological level, thereby, preventing the trees from being cut by the people. Apart from the above, in the olden days, the Tangkhul believed old trees, big rocks as the abode of spirits. Therefore, the people feared to cut down trees to avoid misfortune (Angkang 1990.) The Tangkhul were also known to carry out ancestor worship and sacrifices would be carried out in the sacred grooves to the most potent deity 'Ameowo' (God). Conspicuous places like the peaks of the hills, caves, large and tall stones, lakes, trees are being considered as places and objects to communicate with the spiritual deities (Luikham, 1983).

Until the arrival of modern education and institutions in the Tangkhul region, the economic, social, cultural and religious activities would revolve around nature and were closely entwined with their livelihood and culture. The Tangkhul lived by adapting to the changes in their immediate environment. The early tribal

life centres round the soil, the ancestral fields, sowing and harvesting. Village feast and festivals were dictated by the agricultural calendar and seasons. In the absence of modern day calendar, traditional Tangkhul would observe the sun and the shadow that is cast would indicate the time. Months are counted in relation to the shape of the moon and it is named accordingly in relation to their agricultural activities and change of natural vegetation. Seasons are calculated in terms of climatic changes and the beginning of one agricultural operation till the next is considered a year. Even through the sound of birds, Tangkhul could understand the change of seasons. For instance, Tangkhul could understand from the coming of the migratory bird cuckoo, that spring has come and they could also learn from the crowing of wild hen that summer has come. For every season, there is a festival that lasts almost a week. The Luira phanit or the seed sowing festival is a major one among many. Most religious ceremonies and festivals are directly connected with the fields. Gods and spirits are appeased so as not to bring harm and disease and to bless the village with good harvest. Nature has provided the Tangkhul with a solid foundation for the formation of distinct ethno-cultural trait.

The Tangkhul could read and interpret the movements and migration of animals, insects and their surrounding environment and linked them up to natural environment. For example, during the rainy season, if ants would come out of their hive in search of food, it would imply that there would be no rain on that day. Likewise, if a rainbow appears high above the day would be sunny but if it appears just above then there would be rain. It is considered to be a bad omen to see a swarm of dragonfly during the spring season as this would indicate war or fire and that the direction of the flight of the dragonfly is being studied carefully. The chirping of birds at the time of hunting or journey would always serve as a sign to be read and understood. While undertaking a journey for work or for some other purposes they would listen to the chirping of a bird called 'chicklen'. The bird is noted for making varying sounds from time to time. If the chirping is long on the right or above the road with melodious voice unceasing, it is considered a good sign but if the chirping is on the left and if the chirping is dull, then it is considered a bad omen. In such cases, one has to remain at home in order to avoid misfortune (Khamuinao 1999; Shimray 2007; Angkang 1990).

Domesticated animals and birds were used at the time of religious rituals and sacrifices and not the wild or endangered species. Some animals are also being used for medicines and also at the time of rituals and sacrifices. Animals are not picked up randomly but after a careful examination. This would speak much on the process of selection of animals. Some animals were regarded as sacred and were not allowed to be killed or eaten depending on the person's social affiliation or status. For instance, it is a taboo for the members of the chief family to eat the meat of a cat or a tiger, as the cat and tiger are considered as royal animals. Cats are considered as the one who takes away the burden of man. In the olden days, when a king dies or at the time of erection of a big wooden post usually in Y shape called Tarung, the Tangkhul used to sacrifice a man but in the course of time it was replaced by a cat. Therefore, among all domesticated animals, cats are hardly ill-treated. They were also believed to have descended from the ruling class of animals and they were at times called Achon Amei (Madam and Sir). Cruelty to animal is

considered an offense and it includes both wild and domesticated animals. They believed that man shall not tease or mock animals. One should also not speak ill of the tiger and other big animals. For instance, there is a belief that if you mock a monkey, it will destroy all your crops and if you mock a mouse, then it will destroy all your clothes. During the breeding seasons of animals and birds, hunting and laying of traps are forbidden. Tangkhul hunted animals for meat but it is considered an offence to kill animal when they are mating. It is also a taboo for them to kill animal when they were sleeping because sleeping is the time for all beings to take rest so they would have to wait until it wakes up or in the process throw a small stone.

The use of medicinal plants also clearly depicts that there exist a bond of friendship with nature. Since long, Tangkhul medicine men had been practicing and administering indigenous herbal medicines in the form of juice of fruit, leaves, bark, roots or as paste to treat and heal the sick among them. They have knowledge of herbal medicines which they picked and chose and process them into effective medicines for treating different diseases even in the absence of modern day hospitals or clinics. People also have the knowledge to identify plants and to find their usefulness to cure different ailments. The use of a plant as medicine depends not only on the physical features of the plant but also on the knowledge and skill of the practitioners who manage to understand the properties of plants and draw its hidden power from the plants. For instance, the Tangkhul use Kokluiwon (Rhododendron) as a medicine for treating ailment when a fish bone is stuck in the throat. In that case a leave is applied on the throat. It is also used while bleeding. Ngavaithing (alder) is also used as a fertilizer while its bark is used in tanning and dyeing and is also used as a medicine for diarrhoea. The bark of a walnut tree is used for toothache. Tobacco leaf is used for the treatment of allergy. There is also a tree known as Thingkha (bitter tree) which is used for the treatment of high fever.

The Tangkhul society, like any other indigenous people in world believes that lands, plants and animals have same ancestral roots and therefore, humans are integral part of creation and not above creation. The integral relationship of Tangkhuls with nature can be traced not only through their verbal folktales or myths but is also evident from their lifestyle as witness. As humans are not the master, they make use of nature with other creatures and operate within the biodiversity. They depend upon nature for every activity. The land produces a good harvest because it is fertile, and also it gets enough rain. If there is no forest land, it cannot retain its fertility; neither there will be enough rain for the plants to grow. So the Tangkhul don't look to prove his superiority but to satisfy hunger not an object to be used, to be controlled or exploited, but as a living entity, an object of respect. When the peoples meet their immediate needs they take time off to dance, rituals, ceremonials, festivals, and sing to thanks the creators.

IV. DISCUSSION AND CONCLUDING REMARKS

Viewing society as a system of interrelated parts is at the core of most social theory. Difference is in terms of organizing principles. The way a society is organized to meet the needs of its population determines the rest of the system. The various parts of society are interrelated. When one part of society

changes, other parts must also change, an institution, such as the family cannot be looked at in isolation from the economic, political, or religious institutions of a society. When one part changes it has an effect on other parts of the system. People cannot be totally inactive, but when confronted with a given task, they prefer to carry it out by expending less rather than more human energy. The physical, biological, and chemical constraints to which human action is subject, like all living organisms, Humans must draw energy from their environment. The environment is limited in terms of the amount of energy and matter it contains, and the amount of pollution it can tolerate. Therefore, it has to be protected like our fore father has been conserving harmlessly.

Until the arrival of modern education and institutions, their economic, social, cultural and religious activities revolved around nature and were closely intertwined with their livelihood and culture. Tangkhul Nagas lived by adapting to changes in their immediate environment. Horam (1975) talks of how “the early tribal life centred round the soil, the ancestral fields, sowing and harvesting. Village feast were dictated by the agricultural calendar and the seasons. Most religious ceremonies and festivals are directly connected with the fields. Gods and spirits are placated so as not to bring blight and frost and to bless the village with good harvest.” Nature in this context has provided the Tangkhuls with a solid foundation for the formation of distinct ethno-cultural trait. Everything in nature has direct impact on them and plays pivotal role in contributing to their material, social and spiritual well-being and thus shapes their cultural community life. Therefore, nature is considered in Tangkhul as a fundamental element of their life world. But with the coming of western ideas, globalization and thoughts the socio-economic and cultural life of the Tangkhul has undergone a drastic change. By embracing Christianity they gave up certain traditional ideas, beliefs and practices as it has become a taboo. The relationship between human and nature has also changed dramatically. The hills, rocks, lakes which the Tangkhul considered as a sacred place have been destroyed. Again with the arrival of modern technology in the Tangkhul region their social and economic life have changed dramatically which posed an immediate threat to the environment. The use of chemical like pesticides and insecticides for agricultural purposes not only harm the soil but also to other living organisms. There are hardly any forest left untouched which has been a threat to the existing flora and fauna. Meanwhile, drive for cash in the modern economy, desires for development and improved material living conditions has caused to exploit the rich resources in the land of Tangkhuls. Horam (1975) argues that “unaware of the value of their products and resources they gifted away all trade and business privileges to other communities.” Faced with these challenges, the Tangkhuls are struggling to maintain the human relationship with nature which was once a part of their cultural identity. The underlying purpose is to delineate the importance of Tangkhul’s traditional knowledge in conservation of biodiversity vis-à-vis human relation with the nature for sustainable development.

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Rec-Tech: A Recommendation System encapsulated in Online Technical Forum

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Abstract- In the present days of e-commerce and social engineering the use of recommendation system is one of the most relevant issue. Several IT giants like Amazon, Facebook use highly developed recommender system to serve the users in a better method. So, Recommendation Algorithms are one of the most important topics in Data Science and Social Engineering. Here we used a recommendation system in a Technological Discussion Forum where users can post any relevant question related to different genres like, Programming Languages, Operating System, Artificial Intelligence etc. and we are building a recommendation system based on the user activities. With the advancement in the process of learning via Internet lead learners to an Internet Forums. As they are getting interested in Group Discussions, it's the best and huge platform to share our knowledge among different perspective to make it more lucid. In this paper, we have created a website, Technical Forum where our main objective is to make Recommendation System operative with our own algorithms.

Index Terms- Recommender System, Data Mining, JSP, Web Development, Database, Artificial Intelligence

I. INTRODUCTION

We intent to create a technical forum which is a General Discussion website emphasizes on various topics of Computer Science only accessible to pre-registered user. We have rendered facilities to the registered user as they can create any technical conversational thread, may post their view for any thread. Moreover, we aim on creating a Recommendation System which basically mean we hand over them updates on their area of interest in various ways by saving their searches in a Database.

We have operated on various languages and technology:--

1. HTML (Hyper Text Markup Language)
2. CSS (Cascading Style Sheet)
3. JAVASCRIPT
4. MYSQL
5. JSP (Java Server Page)

HTML:

- The main markup language for creating web pages and other information that can be displayed in a web browser.
- Provide a means to create structured documents by denoting structural semantics for text such as headings, paragraphs, lists, links, quotes, images and other items.
- Embed script written in language such as JavaScript which affect behaviour of HTML web pages.

CSS:

- Style sheet language used for describing the look and formatting of a document written in a markup language.
- Provide more flexibility and control in the specification of presentation characteristics, enable multiple pages to share formatting, and reduce complexity and repetition in the structural content.
- Allow the web page to display differently depending on the screen size or device on which it is being viewed.

JAVASCRIPT:

- Prototype-based scripting language with dynamic typing has first class functions. It is a multi-paradigm language, supporting object-oriented, imperative, and functional programming styles.
- Enables programmatic access to computational objects within a host environment.

MYSQL:

- MySQL is open-source relational database management system.

JSP:

- A technology that helps software developers create dynamically generated web pages based on HTML, XML, or other document types. It uses the java programming language.
- To deploy and run Java Server Page, a compatible web server with a servlet container is required and here, we have used Apache Tomcat.

- JSP pages used delimiters for scripting functions. A script is fragment of Java code that is run when the user requests the page.

II. MOTIVATION

As students and teachers are depending more and more on internet for their various educational purpose which involve searches for the website such as forums which may have reliable information for their problems. Furthermore, to interact to the large community of members having same interest which they can easily find in forum websites where people with different location and with different perspective discuss on any topic where the nature of topic depend on type of forum. Thus, we aim to provide them the proper discussion platform as well as recommending them various books and various conversational thread in order to help them to enhance their knowledge.

We also put our conscious effort to make the recommendation system effective and efficient by introducing our own algorithm behind it. The methodology section describes the algorithm in detail with mathematical notations.

III. METHODOLOGY

In the following section we are going to describe the methodology of the project we have done:

A. Flow Diagram

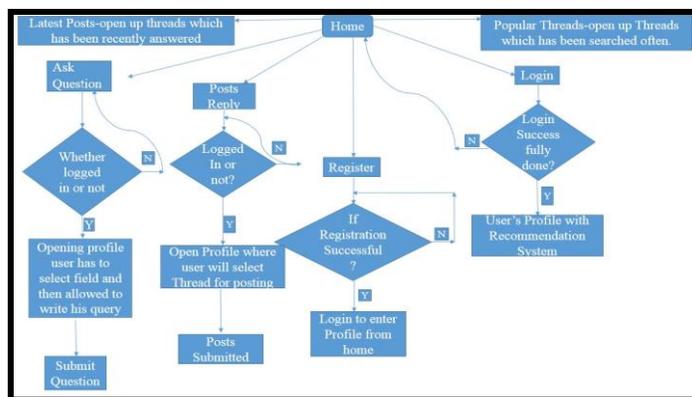


Figure 1: Flow Diagram for the Home Page

The Figure 1 describes the flow diagrams of the Home Page that comes to the user at the very beginning. At first the system checks that whether any user is logged in or not. If someone is logged in then we are allowing him or her to proceed with the forum. Otherwise it prompts the user to login.

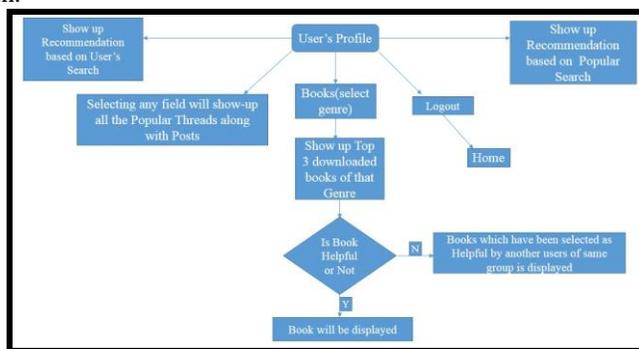


Figure 2: Flow Diagram for the User Profile

The Figure 2 describes the flow diagrams of the User Profile Page.

As the website is completely login-based, visitors have to register for being profited from the features of website. Popular posts are generally the threads which have the highest priorities among all the fields (searched maximum times on the website) whereas Latest Posts are the conversational threads which has been started recently on the website. Besides, When a user have to ask any query or want to post for any conversational thread then he has to get himself logged in, as soon as he is logged in he can proceed further through his Profile. Each time when any user submit his query, a new file is written each time named after genre name together with Question ID.

When user login to his profile he get Recommendation on the basis of his previously performed work ,that is, information about the field he is mostly interested in and additionally, Recommendation on the basis popular searches so that to let the user know about

popular discussions going through websites. Moreover, we are providing books to them as well as we are asking user whether the book is helpful or not, if the user don't find it helpful then we will show him the books which has been found helpful by the user of his own group. Here, group primarily means we have divided all users on the basis of their same area of interest.

B. Algorithms

In the primary level, we recommended the users with the top popular threads from the top popular genres from the table where questions are stored. In that table, there is a column of Priority which is being incremented each time the user click in the thread. So in the cold start level, we used the maximum of the Popularity Index to recommend the users.

At the next level of recommendation, we have used the Clustering Method to throw the recommendations to the users. At first, we have a matrix of size (m×n) where we have stored the interest factors of the users according to the genres. Table 1 demonstrate the structure of the matrix.

Table 1
 The Matrix used to store the interests of the users

Genre	U_1	U_2	U_3	U_4	U_5	U_6	U_7	U_8
Java	4	5	1	0	6	8	4	2
Python	5	6	2	1	7	2	3	1
Linux	3	2	2	2	10	6	5	6
Oracle	1	1	1	0	1	3	5	8
ML	0	1	8	9	1	0	1	0
CV	1	1	10	10	1	1	1	8

Now, from this table, we are interested in finding the right recommendation for the users. We used clustering method to find out the right choice. First, we searched the highest interest factor for a particular user. For example, from the Table 1, U_1 has highest interest in Python. So, we recommended the user U_1 with python threads. In the next level, we saw that users U_1, U_2 and U_5 are in the same group because they have almost same Interest Factor in the field of Python. To calculate this we used Mean Deviation (MD). Where the formula for calculating the MD is given below. Here u represents a particular user and U represents the user group. Here if_u represents the interest factor of the user of a particular genre and \bar{if} represents the Interest factors of the user who is logged in a particular genre.

$$md = (if_u - \bar{if}) \text{ where } u \in U$$

Now if md is in a range of 2 – 2.5 we declared the particular user u in the group of the particular user we are interested with. We recommended the user with the latest threads which are initiated by the users of his or her group. This calculated this measure robustly. Thus, the recommendation process is dynamic this results in a situation that, the user may not fall in a particular group each time. As the interest of human being changes frequently, the user who was interested in Python at a particular time may not be interested in Python one week later. He or she may be interested in JAVA currently, then he or she should fall in the cluster of the people who are interested in JAVA. This constraint is also served by our system.

Books are necessary part of the students or working people who are interested in technological discussions. Thus, books are also recommended to the users which are relevant to the thread for which the user is searching. For example user U_1 is searching for a thread on Linux and when he or she once found the particular thread he or she is interested with. We are showing the popular books on Linux. There are two buttons, “Helpful” and “Not Helpful”, with each and every book to track the user’s preference about the books. When the user is clicking on the “Helpful” button we are transferring him or her to a new page with the description of the book, and possible download link of those books which are available in Online Versions. But, when the user clicks on the “Not Helpful” button we are showing the book, which may be the most helpful one for the user. We are doing this with a new algorithm. Using the MD we are creating a group of users who share their interests. And, then we are selecting those books which has been recommended by the users of that group in that particular genre. According to the aforesaid example, we will show the relevant Linux books to the user. The figure given below describes the algorithm for selecting the relevant book.

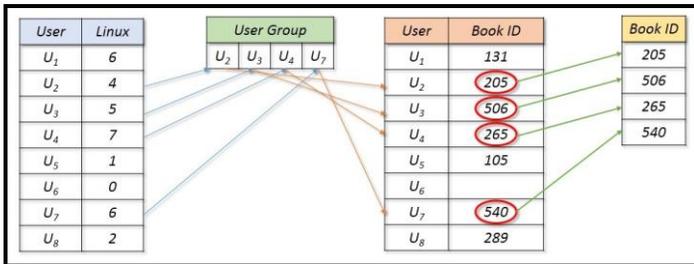


Figure 3: The Process for recommending the books to the users

Now, once we get the Book IDs we are showing the relevant books to the user according to the Book ID one by one when the user is clicking on the “Not Helpful” button.

C. Databases:

MySQL is the most popular Open Source Relational SQL database management system. We have used MySQL for storing and retrieving all the database information both conveniently and efficiently. In a database forum we have used several tables for different operation. Following are the tables:-

1. Table mod_deatil – Used for storing the details of the user. As the data is fetched we store it with a particular user-id. This table have attributes, like-
 - i) mod_id (int)
 - ii) user_name (varchar).
 - iii) Password (varchar)
 - iv) email_id (varchar)
2. Table ques_tbl - This table is used for storing queries being asked by user. On submitting the question, the question with particular question id is stored in a table with Priority=0 in the beginning. As many times the Question is being searched, the Priority is increased. Attributes are-
 - i) Q_id (int)
 - ii) Ques (varchar)
 - iii) Priority (int)
 - iv) Link (varchar)
 - v) Genre (varchar)
3. Table ans_tbl – Mainly used to store the posts submitted for any conversational thread with the date of posting. Attributes are as-
 - i) Q_id(int)
 - ii) Posts (varchar)
 - iii) Date(date)
4. Table rec_new – Chiefly, this table is used for applying Recommendation System to the forum where we have one columns for one user-id with genre and average attribute. The user searching for any thread will increase the corresponding genre along that user’s column by value 1. Attributes-
 - i) Genre(varchar)
 - ii) Average(int)
 - iii) User’s name as columns(int)
5. Table book_rec – Again, we have another table for recommending books where we have particular column named by user’s-id with the book-id for storing value 0 ,if the book is not helpful and 1, if the book is helpful along that user’s column corresponding to particular book-id. Attributes are-
 - i) Book_id(int)
 - ii) Genre(varchar)
 - iii) User’s name as column(int)
6. Table book_tbl –Used to store the unique book id with different attributes where we have book priority which is increased each time when the book is downloaded. Attributes are as follows:-
 - i) B_id(int)
 - ii) B_genre(varchar)
 - iii) B_priority(int)

- iv) B_link(varchar)
- v) B_name(varchar)
- vi) Img(varchar)
- vii) Description(varchar)

Here, a varchar represents a string and an int represents an integer of length 8 bit.

IV. RESULTS

Here goes some of the web pages of our development, which shows the recommendation and various other features. The Figure 4 is showing the Home Page of our system.

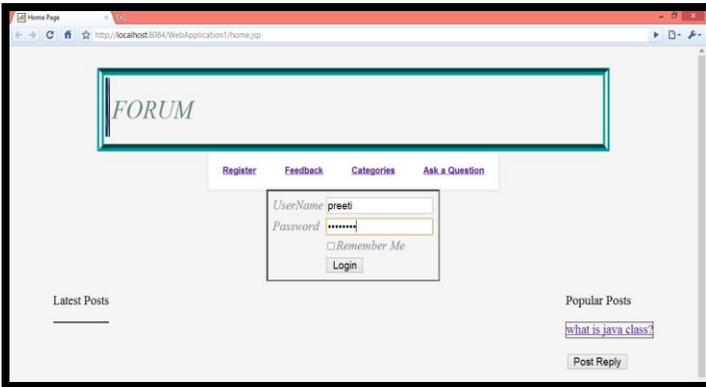


Figure 4: The Home Page displayed to the visitors

The next screenshot displays the User's Profile of our system.

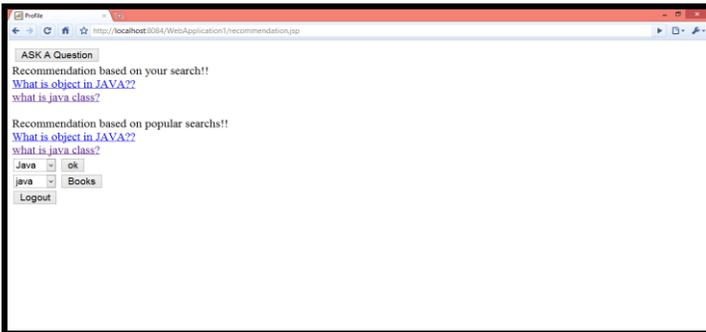


Figure 5: The User Page displayed to the users

The next screenshot displays the page from where an user can ask a question.

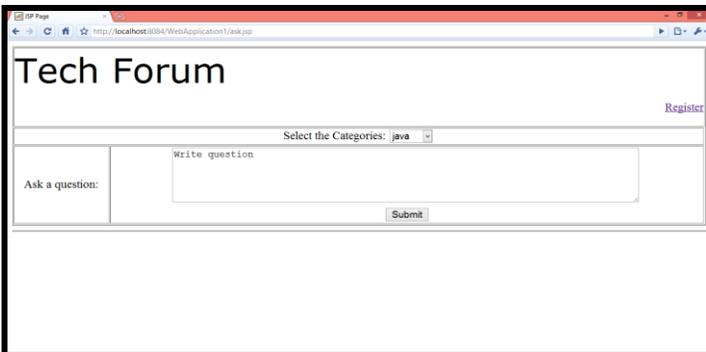


Figure 6: The page for posting new thread by the users



Figure 7: The page for showing an existing thread and commenting on the thread

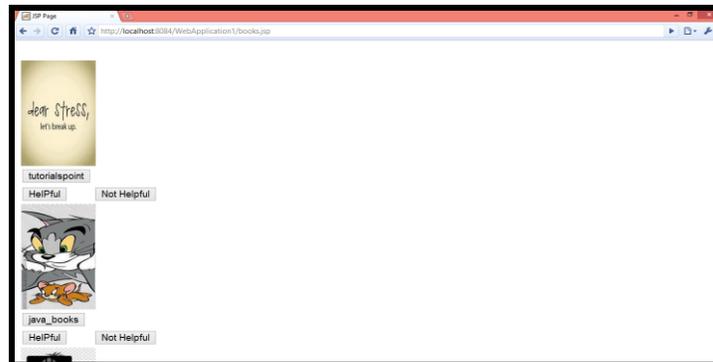


Figure 8: The page displaying the recommended books

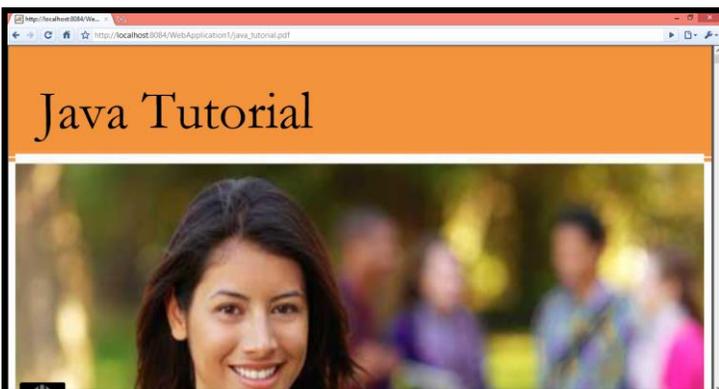


Figure 9: The page where the e-books are being downloaded

The Figures 6, 7, 8, 9 are displaying several screenshots of our system.

V. FUTURE WORK

We will work on this later and we will emphasize on the security of the system. We will use cryptographic algorithms like Hashing, Private Key Encryption intensively to make the system more secure and protect this from serious threats. Moreover, we will work on the Recommender System to make it more efficient.

VI. CONCLUSION

The methodology section describes the implementation of the system in detail and the result section shows that the system is working as per our expectation.

Image de-noising using Markov Random Field in Wavelet Domain

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Abstract Removing noise from original image is still a challenging problem for researchers. There have been several published algorithm and each approach has its assumptions, advantages and disadvantages. Markov Random Field is n-dimensional random process defined on a on a discrete lattice. Markov Random Field is a new branch of probability theory that promises to be important both in theory and application of probability. This paper is an attempt to present the basic idea of the subject and its application in image denoising to the wider audience. In this paper, a novel approach for image denoising is introduced using ICM (Iterated Conditional Modes) approach of Markov Random Fields model.

Index Terms- ICM (Iterated Conditional Modes), Image denoising, Markov Random Field, Wavelet.

I. INTRODUCTION

Many problems in Image processing can be cast in the framework of state estimation, in which we have state variables whose values are not directly accessible and variables whose values are available. Variables of the latter kind are also referred to as observations in this context. Usually there exists a statistical relationship between the state variables and the observations such that we can infer estimates of the states from the observations. In many cases prior knowledge about the states is also available (usually in form of a probability distribution on the state variables) and we can use that knowledge to refine the state estimate.

In a variety of interesting problems, however, neither the statistical relationship between the state variables and the observations nor the prior distribution are perfectly known and hence are modeled as parameterized distributions with unknown parameters. These parameters are then also subjected to estimation.

In the domain of physics and probability [1], a Markov Random Field (often abbreviated as MRF), Markov network or undirected graphical model is a set of random variables having a Markov property described by an undirected graph [2]. A Markov Random Field is similar to a Bayesian network in its representation of dependencies; the differences being that Bayesian networks are directed and acyclic, whereas Markov networks are undirected and may be cyclic. Thus, a Markov network can represent certain dependencies that a Bayesian network cannot (such as cyclic dependencies).

II. RANDOM MARKOV FIELD THEORY

Markov Random Fields (MRF) are a natural extension to the

concept of Markov Chains [3]. A MRF is described by a undirected graph. The vertices in a MRF stand for random variables and the edge impose statistical constrains on these random variables. Specifically, based on the standard MRF theory, the indexed set of random variables.

$$H = \{ h[i, j] : 0 \leq i \leq M - 1, \quad 0 \leq j \leq L - 1 \}$$

is assumed to satisfy the following two conditions:

$$p(h[i, j] | H \setminus h[i, j]) > 0$$

$$p(h[i, j] | H \setminus h[i, j]) = p(h[i, j] | N[i, j])$$

Where $H \setminus h[i, j]$ is the entire set of random variables H without the element $h[i, j]$ and $N[i, j]$ represents the set of $h[i, j]$'s neighboring vertices. It is well known which consequences this setup has on the joint distribution of the random variables in H . Before we can elaborate on these however, we need to introduce the concept of a cilque [4][5][6]. A subset of H is called a clique if it is a singleton or if every pair of elements $h[i, j]$ in that subset is neighbors in the corresponding graph. The lattice shaped MRF considered in this paper is depicted in Figure 1.

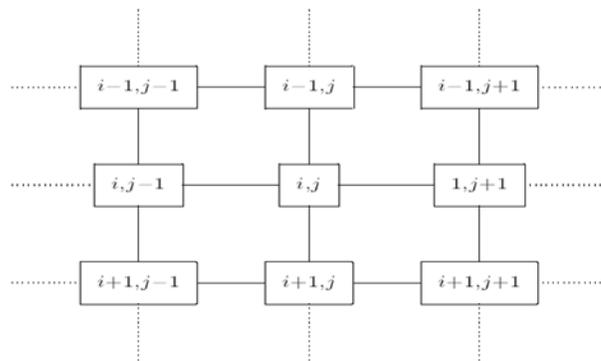


Figure 1: Lattice shaped MRF

We easily identify a single clique for each vertex $h[i, j]$ and also identify cliques of the form $\{h[i, j], h[i, j-1]\}$ or $\{h[i, j], h[i-1, j]\}$ for each pair of adjacent vertices. According to the Hammersley-Clifford theorem [3] an MRF has equivalent Gibbs distribution is given by

$$p(H) \sim \exp \left(- \frac{\sum_{b \in B} V_b(\vec{b})}{K} \right)$$

Where K is the temperature parameter chosen to be unity in this paper. The argument of the exponential function includes a sum of clique potentials $V_b(\vec{b})$ over all the possible cliques B , with \vec{b} denoting a vector composed of the set of vertices $h[i, j]$

within the clique b . The clique potentials $V_b(\bar{b})$ are simply defined to be non-negative functions of their arguments. In this paper we take the potential of pairwise cliques as the square of adjacent differences:

$$V_b(\bar{b}) = \alpha_{[ib, jb], [mb, nb]} | (h[ib, jb] - \mu[jb]) - (h[mb, nb] - \mu[nb]) |^2$$

Where, $[ib, jb]$ and $[m, nb]$ are the coordinates of the vertices in the one pair clique b and $a, b, nb[ib, jb], [mb, nb], \mu[jb]$ and $\mu[n]$ are parameters. The potentials of single cliques that are associated with a random variable $h [I, j]$ with index $I = 0$ form a Gaussian distribution b .

$$V_b(b) = \alpha_{[jb]} | h[ib, jb] - \mu[jb] |^2$$

With the parameters $\mu[jb]$ and $\alpha_{[jb]}$. The other potentials are assumed to be zero. So we have

$$p(\mathbf{H} | \theta) = Z(\theta) \prod_{b \in B_1} \exp(-\alpha_{[jb]} | h[ib, jb] - \mu[jb] |^2)$$

$$\prod_{b \in B_2} \exp(-\alpha_{[ib, jb], [mb, nb]} | (h[ib, jb] - \mu[jb]) - (h[mb, nb] - \mu[nb]) |^2)$$

Where, the vector θ contain all the model parameters i.e. the $\alpha_{[ib, jb], [mb, nb]}$, the $\alpha_{[jb]}$ and the $\mu[jb]$. The set B_1 comprises all single cliques that correspond to random variables $h[i, j]$ with index $i=0$ and the set B_2 contains all the pairwise cliques. $Z(\theta)$ is normalization constant and is also referred to as the partition function in this context.

III. OPTIMAZATION

An optimization problem is one that involves finding the extreme of a quantity or function. Such problems often arise as a result of a source of uncertainty that precludes the possibility of an exact solution. Optimization in an MRF problem involves finding the maximum of the joint probability over the graph, usually with some of the variables given by some observed data. Equivalently, as can be seen from the equations above, this can be done by minimizing the total energy, which in turn requires the simultaneous minimization of all the clique potentials are plentiful. Many of them are also applicable to optimization problems other than MRF. For example, gradient descent methods are well-known techniques for finding local minima, while the closely-related method of simulated annealing attempts to find a global minimum.

An example of a technique invented specifically for MRF optimization is Iterated Conditional Modes (ICM)[7]. This simple algorithm proceeds first by choosing an initial configuration for the variables. Then, it iterates over each node in the graph and calculates the value that minimizes the energy given the current values for all the variables in its neighborhood. At the end of iteration, the new values for each variable become the current values, and the next iteration begins. The algorithm is guaranteed to converge, and may be terminated according to a chosen criterion of convergence.

IV. MRF APPLICATION TO IMAGE DENOISING

Problems in computer vision usually involve noise, and so exact solutions are most often impossible. Additionally, the latent variables of interest often have the Markov property. For example, the pixel values in an image usually depend most strongly on those in the immediate vicinity, and have only weak correlations with those further away. Therefore, vision problems are well suited to the MRF optimization technique. Image denoising is one of the computer vision problem to which MRF has been applied. Having constructed an MRF, the clique potentials must be defined [7][8]. This encodes the relationship between variables, and so this is where we get to specify what we want from the solution. Finding an appropriate energy function and selecting the parameters that give an acceptable solution requires insight, as well as trial and error. However, there are many often-used, standard energy functions for different types of problem.

V. PROPOSED ALGORITHM

Following algorithm was used while denoising images using the MRF technique.

1. Choose an initial condition for the variables
2. Iterate over each node of the graph
3. Calculate the value that minimizes the energy given the current values for the variables in neighborhood.
4. After every iteration, the new value for each variable becomes the current value and the next iteration begins.
5. Calculate V_{max} using the following formula :

$$V_{max} = rc \left(\frac{256^2}{2n} + 4 * w * \max P \right)$$

Where, V_{max} : a larger value than potential of any pixel

R : row count of image

C : column count of image

N : noise variance

W : weights and $\max P$: maximum potential of the neighboring pixels

6. Initial local potential value with the highest potential value for each pixel at each iteration and minimum value below which no pixel will descend.
7. Calculate the component due to known image data (from noisy image)

$$V_{data} = \frac{(pInt - Im gPix)^2}{2n}$$

Where,

V_{data} : component due to known image data (from noisy image)

$pInt$: intensity value

$ImgPix$: image pixel value

8. Calculate component due to difference btw neighboring pixel values

$$V_{diff} = \min((pInt - Im gPix)^2, diffM)$$

V_{diff} : component due to difference between neighboring pixels

$diffM$: maximum contribution to the potential of the difference between two neighboring pixel values.

9. The current potential value for a pixel is calculated as :

$$V_{current} = V_{data} + diffW * V_{diff}$$

diffW: weighting attached to the component of the potential due to the difference between two neighboring pixel values.

This is a simple algorithm to be implemented on the noisy image. But, there are some other information that has to be kept in mind while evaluating this algorithm. The value of V_{local} is initialized for each pixel of input image will be processes for all the algorithm and testing for too many cases, we have concluded the following values best suited for optimum results:

- i. Minimum value (step) should be kept -1. $diffM$ should be 200.
- ii. $diffW$ should be 0.02 and a particular image should be processed for 10 iterations.
- iii. A pixel value will be changed if and only if $V_{current} < V_{local}$, otherwise that pixel value is left unchanged.
- iv. And when the pixel value is changed, V_{local} is set to $V_{current}$ for next intensity processing. Also keep alternating the image and output image. This way, we can attain the best possible solution.

VI. RESULT

The performance of RMF method is illustrated with a quantitative and qualitative performance measure. The qualitative measure is the visual quality of the resulting image. The Peak-signal-to-noise (PSNR) is used as the quantitative measure. Different images, like natural, medical, aerial and under water, are used with four different noise, Gaussian, salt and pepper, speckle and Poisson. Fig (1), (4) and (7) show aerial, medical and underwater images respectively. Fig(2), (5) and (8) show original images with Gaussian , Poisson and speckle noise with PSNR values 30.9688 dB, 27.8729 dB and 27.247dB . And fig. (3), (6) and (9) are the denoised images with PSNR 38.5907dB, 35.324dB and 32.2061dB. (4) and (7) show aerial, medical and underwater images respectively. Fig(2), (5) and (8) show original images with Gaussian , Poisson and speckle noise with PSNR values 30.9688 dB, 27.8729 dB and 27.247dB . And fig. (3), (6) and (9) are the denoised images with PSNR 38.5907dB, 35.324dB and 32.2061dB.



FIGURE 2

FIGURE 3

FIGURE 4



FIGURE 5

FIGURE 6

FIGURE 7

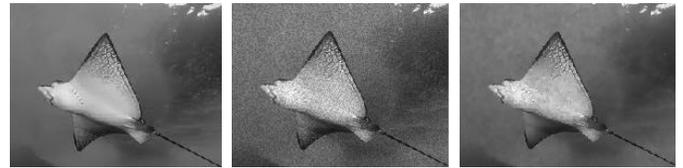


FIGURE 8

FIGURE 9

FIGURE 10

VII. CONCLUSION

To improve the denoising performance and reduce the computational complexity, a denoising method based on MRF models in wavelet domain is proposed in this paper. Experiment result demonstrate that this method has a good denoising performance, while the image is having Gaussian noise it gives the best output for aerial images, similarly, image with Poisson noise gives best suited output for medical images whereas image with Speckle noise gives best output for underwater images.

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Resource Sharing With Mobile Nodes

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Abstract— Resource Management in wireless is concerned with a system in which the main aim is to make sure that a user/client can access the remote resources with as much ease as it can access the local resources. The basis of Resource Management is also resource sharing. The main goal of this project is to ease the sharing of resources among mobile users. We are going to implement a Peer to Peer system where files are our prime resources. Any two mobile nodes within a network can access their resources provided they are authenticated. A graphical user interface is made available at each peer for registering itself to the network, for searching required file and if found, displaying its contents. In our proposed system we are implementing resource sharing (file, image etc.) security by authentication, fast query solving in wireless environment.

Index terms—Peer-to-peer resource sharing, peer-to-peer networks, P2P, super-peer selection, super-peer, mobile nodes

I. INTRODUCTION

Peer-to-peer (P2P) systems are constructed to provide resource sharing among interested participants (peers) in decentralized way. We can also define our user based topology for peer to peer network. Mobile environments pose additional challenges on P2P networks due to heterogeneity of nodes, built in limited resources, dynamic context and wireless network characteristics. When it comes to P2P file sharing specifically, there are two models: centralized and decentralized. In the centralized model, the central servers maintain directories of the files shared by the users of the system. The servers allow query of their database and provide results that allow a user doing a query to establish a direct connection with a user who is sharing a desired file.

In super-peer overlay infrastructures, the network topology is constructed in three layers. First layer contains server, which maintain directories for super peer. Second layer contains nodes called *super-peers* (or *super-nodes*) that have relatively higher capability and assume special responsibilities. The third layer contains all other peers (called *ordinary peers*). Super-peers handle the communications inside their corresponding cells as well as exchange information with other super-peers. Query resolving (resource discovery) in super-peer architecture is much faster than any other P2P topology. However, super-peer selection is challenging due to the many factors that govern the selection decision which have direct impact on the super-peer performance.

The choice of the underlying network architecture has a great impact on the overall system performance. Super-peer networks take advantage of centralized schemes. It also introduces a reliability improvement scheme that reduces the

network maintenance overhead, while improving the overall network reliability and stability. In addition, it reduces the overdue burden on resource-constrained nodes by distributing loads evenly across the network.

P2P file sharing networks can be classified into four basic categories: the centralized, decentralized, hierarchical and ring systems. These topologies may exist on their own it is usually the practice for distributed systems to have a more complex topology by combining several basic systems to create, what is known now as hybrid systems. This thus gives P2P systems two main key characteristics:

- I. Scalability: There is no limitation for extension of size of system, e.g. the performance measure of the system should be somewhat constant regardless of number of nodes in the system.
- II. Reliability: The failure of any given node will not affect the whole system (or maybe even any other nodes).
- III. Allowing users of the network to schedule batch-jobs that are processed by the computers on the network during their idle time thereby decreasing the need for new computing resources; and
- IV File sharing: Allow users to exchange data directly without storing files on a centralized server thereby avoiding the need to establish a centralized server and allowing two businesses to communicate with each other directly.

II. RELATED WORK AND CONTRIBUTION

Resource sharing in P2P systems is done in ad-hoc fashion. Peers that request or offer access to resources voluntarily participates in process and have the option to join and leave the network. Many research efforts are done in the super-peer selection algorithms and maintenance schemes of topology because of the introduction of the super-peer P2P network architecture. Some of these researches introduced several modifications to the original design of Gnutella in order to accommodate node heterogeneity. Some proposed a double-layered P2P system, in which super-nodes are selected based on their mobility pattern in order to enhance the system stability and reliability. They also believe that the node energy level should be taken into consideration along with the mobility factor. Also some people contributed to propose a super-peer topology construction and maintenance scheme based on network coordinates.

In contrast to these previous research efforts, Khalid et. Al [1] integrated many factors to efficiently select super peers, including the node's current mobility, immediate energy level, and connectivity degree. Current energy level assigns a higher

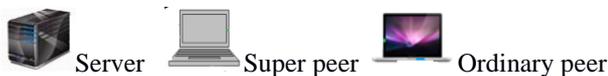
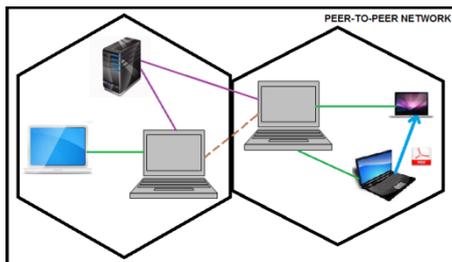
priority to nodes with higher network connectivity. The connectivity degree aims to balance the node load (number of served peers) with its capacity and uniformly distribute the peer load across the network topology. In this proposed system they have considered one cache memory for server instead of storing block of data it only store entry of that document where it locate on which node in that network. Due to which increase time efficiency of resource sharing also less memory get utilizes.

III. OVERVIEW DESCRIPTION

We design robust peer to peer architecture for resource sharing among mobile devices by providing semi-centralized control over system with the help of efficient super peer selection. The design of RobP2P boils down to a three-fold objective:

- 1) Develop a robust and efficient super-peer selection protocol;
- 2) reduce the overhead traffic of network topology maintenance;
- 3) Increase the reliability and stability of the network infrastructure through enabling peers to flexibly change their role.

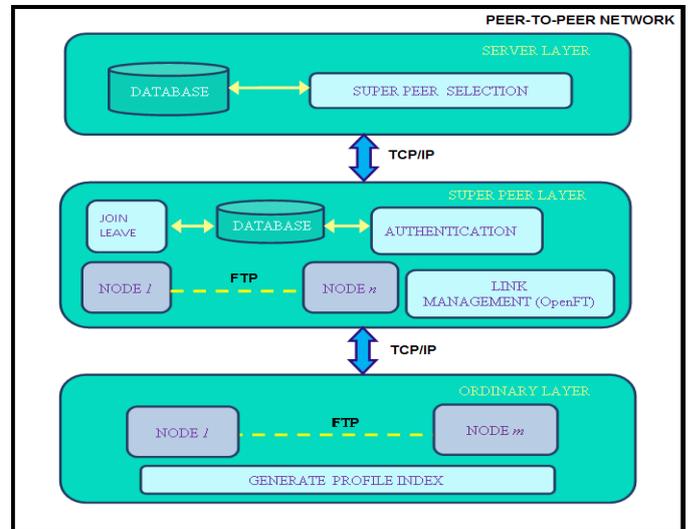
We have considered one main server, single super peer for each cell and multiple ordinary peers. Every element has its specific work. This system design is mainly used to select super peer among all peers that leads to solve query efficiently.



Super peer manages co-ordination among its connected nodes. Resource sharing can be done within nodes which are in own cell through super peer. But in case when resource sharing has to be done within nodes belonging to different cells, it will be done through server. Link management works when any node leaves its cell and enters into another cell or it destroys. This information needs to be update at server side.

IV. SYSTEM ARCHITECTURE

System Architecture is structure of components, their externally visible properties and relationship between the components. We are considering three layered architecture in which first layer is 'Server Layer' which maintains database of super peers. Selection of super peer is done in this layer. Second layer is 'Super Peer layer' which controls Ordinary peers within their own cells. Third layer is 'Ordinary peer layer' which are involved in the sharing of resources. The resource sharing among ordinary peers is authenticated by super peer.



System Architecture

The P2P network is divided into multiple regions. Each region represents a location-based group that contains peers that are physically located with the region boundaries. Algorithm 1 shows the group initialization procedure. Each group selects a super-peer that represents the group head, while the rest of the peers become ordinary peers. All peers calculate their profile index using the function in Equation (1) and participate to the super-peer selection following Algorithm 2. Once super-peers are selected, all advertisements and queries within groups are sent to respective super-peers. Super-peers collect and index the group information including active peers, advertised resources, and offered services in order to manage the group communications and resolve queries addressed to the group. The super-peer is also responsible for maintaining the group state including selecting new super-peers, in case it moves away from the group's centroid.

The selection of super peer is done only when the performance of current super peer degrades and it send signal about its status.

Join/Leave

The newly joining peer calculates its profile index based on the network *utility function* and update profile index arrange them into descending order. If the performance of current Super Peer degrades then it will inform to server and server will give command to perform selection of super peer

algorithm. Then new super peer will select on basis of profile index. Super-peer, the new peer takes over the super-peer responsibility. Then, the current super-peer downgrades itself and sends an update message to the group declaring the new super-peer. This message updates the role of the current super-peer and provides the ID of the new super-peer.

Super peer selection

Super peer is nothing but an ordinary peer which manages control over a cell in a network. Main functionality of super peer is link management among peers. Selection of super peer is done by using super peer selection algorithm. Selecting super-peers in P2P systems is always challenging. A super-peer must be capable to improve the overall performance of P2P networks.

Battery - super-peers must possess sufficient resources to handle the group communications and resolve queries with reasonable delay.

Mobility - peers with low mobility profiles must be given higher preferences to avoid frequent super peer selections.

Network connectivity - Super peer must connect more devices within cell and provide sufficient connectivity to each node.

Super peer selection algorithm

To measure whether a peer n_j is a candidate to assume super-peer responsibilities in a group G_i , we define the peer profile using the utility function in Equation (1). In this equation, b is the current battery power level on n_j , E_{max} denotes the maximum energy level that any peer belongs to G_i might have, m is the current mobility pattern of n_j , M_{max} is the maximum mobility n_j can reach, u is the normalized mean uptime of n_j , which denotes how stable the peer is, NC represents the network connectivity, i.e. how many peers in G_i can reach n_j , w_1 w_5 are weights that represent the factor importance, where $\sum_{k=1}^5 w_k = 1$. In this utility function, we reverse the peer mobility, since peers with low mobility pattern are of higher preferences. The peer profile ranges from 0 to 1. The higher the profile value, the more possibility a peer could be selected as a super-peer. Each peer in G_i calculates and shares its profile with other peers. The peer with the highest profile declares itself the super-peer serving G_i .

Input: N_i : Set of nodes in G_i

Output: $n_{current.leader}$

ChooseLeader (N_i)

1. $n_j.profile = calculateEqu1(n_j)$
2. $n_{current.leader} = n_{current}$

3. best profile = 0
4. while selectionduration and msgrecvd do
5. if msgrecvd[$n_j.profile$] > bestprofile then
6. $n_{current.leader} = n_j$
7. bestprofile = $n_j.profile$
8. end

D. Profile Index equation

$$n_j.profile = 1/3 \left(w_1 \frac{n_j.b}{E_{max}(G_i)} + w_2 \frac{M_{max} - n_j.m}{M_{max}} + w_3 \frac{n_j.NC}{|N_i|} \right)$$

Where,

$n_j.profile$: profile index of peer

w_i : weight of each factor

b : battery of a peer

$E_{max}(G_i)$: maximum energy level that any peer belongs to G_i

M_{max} : maximum mobility n_j can reach

m : current mobility pattern of n_j

NC : network connectivity, i.e. how many peers in G_i can reach n_j

$|N_i|$: Node connectivity, i.e. how many peers can reach n_j

E. Join Algorithm

This algorithm is used when any new node want to enter into the network. Firstly newly entered node is an ordinary peer then its profile index gets generated. Then authentication to that peer is provided by already selected super peer and also takes all records of that peer for file sharing. If current super peer is degraded its performance then using super peer selection algorithm is used to select new super peer using their profile index already generated. Profile index is generated after some interval time.

Input: n_{new} : new node to join G_i ,

Output: null

Join (G_i)

1. $n_{new}.profile = calculateEqu1(1)$
2. Broadcast(new join, $n_{new}.ID$, $n_{new}.profile$)
3. while wait duration do
4. if msgrecvd[$n_j.profile$] \geq $n_{new}.profile$ then
5. $n_{current.leader} = n_{new}$

6. break //i.e. end search
7. end
8. end
9. best profile = nnew.profile
10. Broadcast(ncurrent.leader, bestprofile)

F. Leave algorithm

This algorithm is used when any node leave network. If that node is ordinary peer then all records stored in super peers database get deleted and database gets updated. But if that node is super peer then it needs to more stuff that is super peer has database of all ordinary peers within that cell. If that peer leaves the node firstly it had to broadcast message so that server can choose new super peer and also transfer all database to new super peer.

Input: ncurrent.leader: Super-peer

Output: nnew. Leader

Leave (Gi)

1. ncurrent.leader delegate (nnext best)
2. best profile nnext best .profile
3. Broadcast (ncurrent.leader, best profile)

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An Approach to Improve Cloud Data Privacy by Preventing from Data Mining Based Attacks

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Abstract- Cloud Computing provides a good model for the providers to deploy the computing infrastructure and applications on-demand. It offers greater flexibility to users by connecting to various computing resources and allowing access to IT enabled services. But it has the risk of privacy of user data and security. Thus security among the users of cloud is the most important concern. One of the security issue in cloud computing is data mining based attacks, which involves that the data can be analyzed continuously by an unanonymous person to get the valuable information. Using the single cloud provider this is a major problem among the clients in the cloud, because the outside attacker can analyze their data for a long time to gain the sensitive information. In this paper, we have given the data mining based attacks on cloud data and a method to prevent the attacks.

Index Terms- *Cloud Computing, Data Mining, Security, Privacy etc.*

I. INTRODUCTION

Cloud computing enables the end-users, small and medium-sized companies to access computational resources like storage, software etc. In cloud computing, with these vast amount of computing resources, users are able to solve their problems easily using the resources provided by cloud. Some of the cloud services include Software as a Service(SaaS), Platform as a Service(PaaS), Infrastructure as a Service(IaaS)[2]. The examples of cloud services provided by big organizations are: Elastic Compute Cloud(EC2) by Amazon, Google App Engine(GAE) by Google and SQL Azure by Microsoft etc.

Using the cloud computing services, users are able to store their data in servers and access their data from anywhere and they need not worry about the lose of data due to disk faults, system breakdown etc. But there are several security issues in cloud like assurance and confidentiality of user data. The users who are entrusting the cloud provider may lose the access to his data either permanently or temporarily due to any unexpected event like malware attack. This unexpected event provides significant harm to the users. The providers in cloud can analyze the user data continuously and similarly the outside attackers who try to get access to the cloud can also analyze the user data. So, the user may lose his data privacy.

There are various data analysis techniques are available now to extract the sensitive information from cloud data. The outside attackers can use these techniques to get the sensitive information from cloud[10]. The potential threat to cloud security may be data mining where the large volume of data belonging to a particular user will be stored in a single cloud provider. This single cloud provider approach is the main drawback in cloud where the provider can use more powerful data mining algorithms to extract the private information of user. The second drawback of this approach is the attackers who have unauthorized access to the cloud can use the data mining techniques to extract the sensitive information in the user data.

In this paper, we present a approach to provide unique identity to the cloud users and servers known as Federated Identity Management and to prevent data mining attacks by using multiple cloud providers. The user data will be distributed among multiple cloud providers, so it will be a difficult task to the attackers to get the data. The key idea of our approach is to classify the user data, divide the data into small chunks and

distribute these chunks to the various cloud providers. Simply, this approach consists of 3 steps: classification, fragmentation and distribution of data. Classification is a process where sensitive data is identified and appropriate mechanisms are implemented to maintain privacy of this sensitive data. Fragmentation is a process where the data is divided into small chunks. Distribution is a process where the divided chunks will be distributed to cloud providers. Distribution of data to a cloud provider can be done depending upon the reliability of cloud provider and data sensitivity. The reliability of a cloud provider means if the cloud provider is able to store the data chunks with such sensitivity. Using this approach, it is difficult for the attacker to get the data chunks from different providers and also mining sensitive information from these data chunks is a tedious process[8][9].

II. RELATIONSHIP BETWEEN CLOUD COMPUTING AND DATA MINING

Data Mining is the major growing field in IT industry which is also known as Knowledge Discovery in Databases(KDD)[1]. It is used to discover useful patterns from large volumes of data. In data mining, the main areas are like Frequent Pattern Mining, Association Rule Mining etc.

Cloud Computing and Data Mining are closely related to each other. The interrelationship between these two is having its advantages and disadvantages. The advantage is: data mining has been used by cloud providers to provide better service to clients. The disadvantage is: attackers outside the cloud provider who is not having authorized access to cloud, will also use data mining to extract data from cloud. The extraction of useful data from cloud involves 2 factors: suitable amount of data and appropriate mining algorithms. There are so many mining algorithms which will work good to extract useful information from cloud which violated the user data privacy. For example, association rule mining algorithms[3] can be used to find association relationships between huge number of business transaction records etc. Thus data mining is becoming a powerful tool and possess more threats to cloud users.

III. DATA MINING ATTACKS IN CLOUD

The main vulnerability in the present cloud storage system[7] is data reside in a single cloud provider which leads to data loss due to malware attack, network disruption, cloud provider going out of business etc. This is illustrated in Figure 1. The attacker may be an inside attacker(malicious persons at cloud provider) or an outside attacker(persons outside cloud provider). If an attacker wants to attack a particular client, he may aim at the single cloud provider and gather the sensitive information of that client data. Thus this single provider system in cloud is a greatest security concern. Both the inside and outside attackers have the advantage of using data mining to extract the useful data.

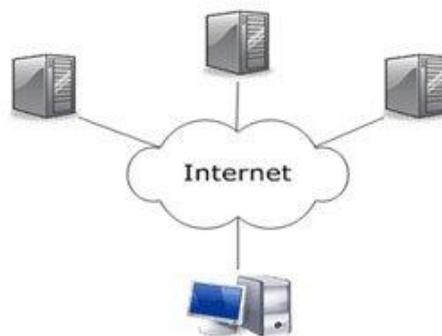


Figure 1. A Simple Cloud Architecture

Our proposed system consists of multiple providers and data can be splitted into several chunks and distributed among the providers[6]. Thus distributing the data to multiple providers prevents the cloud provider from accessing all the chunks of a client. Even if he performs mining on the chunks to the provider, the extracted knowledge will be incomplete which leads to unsuccessful mining[5].

This method can be implemented in traditional databases using Redundant Array of Independent Disks (RAID) technique. Redundant Arrays of Cloud Storage (RACS) uses this technique to reduce the cost of maintaining the data in cloud[4]. Different RAID levels can be choosen to ensure the assurance of data. Higher RAID level leads to higher level of assurance. The main advantages of this approach are: first privacy is improved by increasing the number of destinations and second amount of data stored at each destination is reduced.

IV. SYSTEM ARCHITECTURE

Our proposed system is illustrated using Figure 2 as shown below.

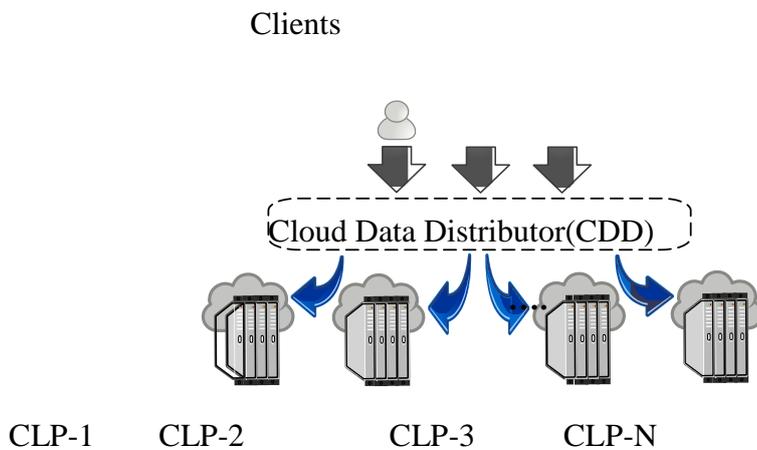


Figure 2. System Structure

This system consists of two main components: Cloud Data Distributor(CDD) and Cloud Providers(CLP). The main role of CDD is: it receives data as files from clients, splits each file into data chunks and distributes these data chunks to cloud providers. The cloud providers stores these data chunks and responds to the any chunk requests by providing the chunks. We will see the detailed functioning of these components in the sections below.

Cloud Data Distributor

It is an entity between the clients and cloud providers. It receives data from clients in the form of files, slices into small chunks and distributes these chunks to the cloud providers. It also performs receiving chunk requests from clients and forwarding the chunk requests to cloud providers. Clients can interact with cloud providers only through cloud data distributor.

If the client wants to upload any data in cloud, it provides it as files to the cloud data distributor. Clients sends the files with a secrecy level defined for each file. This secrecy level is used to mention sensibility which is a measure used to refer the significance of information that can be seeped through mining data in the file. There are 4 secrecy levels: SL 0, SL 1, SL 2, SL 3. The higher the secrecy level, the data in the file is more sensitive. SL 0 indicates it is the public data(data can be accessible by anyone), SL 1 indicates it is a low sensitive data(data can be retrieved but without the private and protected information), SL 2 indicates it

is a moderate sensitive data(protected data used t get any legal information about a company), SL 3 indicates high sensitive data(data used to extract personal information about an individual).

Whenever the cloud data distributor receives a file from client, it partitions the file into several chunks with the same secrecy level for each chunk as the original file. The number of chunks of a file will be intimated to its client by the cloud data distributor, where the clients can request any chunk by mentioning the file name and the serial no of the chunk which corresponds to position of chunk in the file.

Each chunk will be given a unique actual id used to recognize the chunk within cloud data distributor and cloud providers. After this, cloud data distributor distributes the chunks to cloud providers. The cloud provider will not be knowing about owner of the data stored in it. Because the cloud data distributor maintains secrecy level 4 for every cloud provider. Along with the secrecy level, the cloud data distributor also maintains a cost level for every cloud provider. Similar to secrecy level, there are 4 cost levels maintained. Higher the cost level, the cost of storing data in that provider will be high and lower the cost level, the cost of storing data in that provider will be low. The cloud data distributor may also add some false data into the chunks and these false data can be removed while provided to the clients.

For performing the above mentioned tasks, the cloud data distributor maintains some tables to record the information. They are Cloud Provider Table, Client Table and Data Chunk Table. These tables are described below.

1.Cloud Provider Table: The entries consists about the information of a cloud provider like cloud provider name, its secrecy level SL, cost level CL, no. of chunks given to this provider and list of actual ids of chunks given to this provider.

Cloud Provider Name	SL	CL	No.of Chunks	Actual id list
CLP1	3	2	15289	{24538,...}
CLP2	2	2	60455	{72593,...}
CLP3	2	3	29753	{30674,...}
CLP4	3	3	84670	{92157,...}
CLP5	3	2	56341	{44863,...}

Table 1. Cloud Provider Table

2.Client Table: The entries consists of the information about clients like client name, a pair consisting of password and secrecy level of the password, total no. of chunks of the client and a set of quadruples consisting of filename, serial no., secrecy level and Data Chunk Table index for each chunk belonging to the client.

Client Name	(pw,SL)	No. of	(filename,sl,SL,cid)
-------------	---------	--------	----------------------

		Chunks	
C1	(w31h,2)	54869	(f1,1,3,0)
	(59BM,3)		(f1,2,3,1)
C2	(y4U2,0)	79043	(f2,1,2,0)
	(16tG,2)		(f2,2,2,1)
C3	(al78,3)	93602	(f3,1,3,0)
	(8qks,3)		(f3,2,3,1)

Table 2. Client Table

3.Data Chunk Table:The entries consists of the information about the data chunks like actual id, SL, cloud provider table index of the present cloud provider which is storing the data chunk and set of positions of false data bytes(F) (if any) for all chunks.

Actual id	SL	CLP index	F
24538	3	3	{35,...}
72593	2	1	{72,...}
30674	2	2	{48,...}
92157	3	0	{23,...}
44863	3	1	{28,...}

Table 3. Data Chunk Table

Cloud Providers

The next important entity is cloud providers whose responsibilities are to storing data chunks received from cloud data distributor, providing data to clients by replying to a query, and deleting data chunks whenever receiving requests from cloud data distributor..

Structural Issues

The above mentioned system structure has several bottlenecks: First the cloud data distributor is the single point of failure. If it crashes or going beyond control, this system will not work. So multiple cloud data distributors can be used to avoid this problem. For each client, one data distributor is primary which is used to upload their data in cloud and other data distributors are secondary which are used to simple data retrieval operations. Second, the reliability of implementing multiple cloud data distributors. They can be implemented at client side itself using hash tables[24] which can map the pair <filename, chunk S1> to a cloud provider. For this, clients have to maintain a data chunk table at their own risk.

Simple Application Scenario

Whenever a client wants to run an application using files, the application can request for a single chunk by providing (client name, password, file name, sl.no.) or for all chunks of a file by providing only (client name, password, file name). The password has to be privileged. If the privilege level of the password is greater than or equal to the privilege level of the chunks, the cloud data distributor uses the cloud index field(cid) in the Client Table to identify the respective chunks in Data Chunk Table. The Data Chunk Table issues the Actual id of the respective chunk. This table also provides the cloud provider index(CLP index) which is used to identify the corresponding provider in the Cloud Provider Table. After finding the cloud provider, the cloud data distributor uses the actual id as a key to obtain the necessary chunk from the respective cloud provider. Then the data chunk is passed to the application which is run by the client.

Consider a scenario shown in Figure 3. where a chunk request to cloud data distributor is given as (C1, b25R, f1,0). The client C1 is listed in the Client Table and the password b25R is given in C1 and its secrecy level is 1. The secrecy level of chunk 0 of file 1 is 1. Since the secrecy level of password and chunk are equal, the password will be privileged to request the chunk. Now the chunk index of chunk 0 of file1 is given as 0 in Client Table. So, the Cloud Data Distributor verifies the 0th entry of Data Chunk Table which exposes the actual id of the chunk 11256. And also it provides the present cloud provider index 5 which in turn shows the information about the provider from Cloud Provider Table.

Consider another scenario, where a chunk request to cloud data distributor is given as (C1, 18Ph, f1,0). The client C1 is listed in the Client Table and the password 18Ph is given in C1 and its secrecy level is 0. The secrecy level of chunk 0 of file 1 is 1. Since the secrecy level the password is less than the secrecy level of the chunk, the password will not be privileged to request the chunk and this request will be denied.

V. SYSTEM DESIGN

To implement our proposed system, the following functionalities has to be mainly defined.

- Allocate data
- Recover data
- Delete data

The division of data among multiple cloud providers can be implemented by the following 2 functions.

1.datachunks[] divide(file): This function gets a file from client and divides the file into several data chunks. The chunk size will be fixed for a specific privilege level. The higher the privilege level, the lower will be the data chunk size. The actual id attached with each data chunk is used to hide the client identity to the Cloud Provider. Thus the client identity is made private to the Cloud Data Distributor.

2. void allocate(datachunks[]): This function gets chunks from divide[] method and allocates these chunks to the Cloud Providers in a random fashion.

The data recovery process can be implemented by the following 3 functions.

1.datachunk acquire_chunk(clientname,pw,filename,sl.no): This function gets a chunk request from a client, get the required chunk from Cloud Provider and issues it to client.

2.datachunks[] acquire_file(clientname,pw,filename): This function accepts a file request from a client, get all the chunks of the file from Cloud Provider and issues them to client

3.datachunk acquire(actual id as key): This function queries the Cloud Provider for a specific chunk by using the unique actual id as key.

The deletion of data can be implemented by 3 functions.

1.eliminate_datachunk(clientname,pw,filename,sl.no): This function gets a chunk removal request from a client and dispatches the request to the respective Cloud Provider.

2.eliminate_file(clientname,pw,filename): This function gets a file removal request from a client dispatches the request to the respective Cloud Provider.

3.eliminate(actual id as key): This function queries the Cloud Provider to remove a specified chunk by using the actual id as key.

VI. RELATED WORK

In cloud computing, there are various techniques implemented for data assurance. One among the technique is using multiple cloud providers. A similar technique known as RACS(Redundant Array of Cloud Storage) is used nowadays to provide higher assurance of data[4]. Recent related works proposes a new technique Map-Reduce[11] based system which uses Hadoop architecture to provide data privacy and data security in for distributed computation on more sensitive data.

VII. CONCLUSION

There are several type of security threats to the cloud. One among that is a data mining based attack in cloud. In this paper, we have discussed about the significance of data mining in cloud and a proposed architecture to avoid data mining attacks which assures the privacy of data in cloud. Our approach uses a multiple cloud provides and a cloud data distributor which performs the categorization of data, fragmentation of data into chunks and distribution of the data chunks to multiple cloud providers. In this system, the cloud providers are unaware of the client identity. But if the clients have to restore their data from cloud providers, it will be a diffiult task.

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Correlation of Glomerular C4d Staining with Disease Activity in Lupus Nephritis- A prospective study

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Abstract -The purpose of this study is to evaluate whether glomerular C4d deposition can be a useful marker of disease activity in lupus nephritis. This is a 2 years study conducted from May 2010 to April 2012. Renal biopsies from 40 patients diagnosed as lupus nephritis are taken . Lupus nephritis incidence is more common in females (90%) and the mean patient age is 26±12.9 years. The most common clinical presentation of lupus nephritis is nephrotic syndrome (67.5%). Lupus nephritis cases are classified according to ISN/RPS 2003. Class I-2 cases, class II-4 cases, class III-3 cases, class IV-12, class V-11, class VI-1, class V+IV-5 and class V+III-2 cases. Full house pattern of immunofluorescence is seen in 50% of the cases. C4d - complement factor 4 breakdown product is detected by immunohistochemistry. It showed positivity in 70% of the cases. Analysis of C4d deposition with histological activity index is done, which is not significant statistically (p value 0.4).

Index Terms - Activity index, glomerular C4d, lupus nephritis, marker of disease activity.

I. INTRODUCTION

Systemic lupus erythematosus (SLE) is the prototype of a multisystem disease of autoimmune origin, characterized by a vast array of autoantibodies, particularly antinuclear antibodies (ANAs). Acute or insidious in its onset, it is a chronic, remitting and relapsing, often febrile illness characterized principally by injury to the skin, joints, kidney, and serosal membranes. Ninety percent of cases are woman usually of child bearing age.¹

Renal involvement is a frequent and a potentially serious complication of systemic lupus erythematosus that may influence morbidity and mortality. Renal biopsy findings are valuable in facilitating assessment and management of patients with lupus nephritis (LN) by confirming the diagnosis, evaluating the disease activity and suggesting prognosis and appropriate therapy.

C4d, a cleavage product of the activated complement component C4, has attained considerable significance in the last few years for its role in helping elucidate the pathophysiology of renal allograft rejection. C4d is the most clinically used marker for humoral rejection.²

Complement split products are more sensitive indicators of disease activity than conventionally measured C3 and C4.³⁻¹¹ Serum C4d levels correlate with degree of disease activity.⁵ However, there are fewer studies on correlation between tissue C4d deposition and disease activity in lupus nephritis.

The purpose of this study is to evaluate whether glomerular C4d deposition can be a useful marker of disease activity in lupus nephritis.

II. RESEARCH ELABORATION

2.1 Aim of the study:

-To evaluate whether glomerular C4d deposition can be a useful marker of disease activity in lupus nephritis.

-To study the patterns of C4d deposition in native kidneys of patients with lupus nephritis.

2.2 Materials and methods:

Material:

The present study c4d staining in lupus nephritis was conducted from May 2010 to April 2012 in the Upgraded department of pathology, Osmania Medical College, Hyderabad and department of pathology, Apollo hospital, Hyderabad. Renal biopsies sent from Department of Nephrology, Osmania Medical College, Hyderabad were taken into this study.

Methods:

Clinical parameters are retrieved from medical records. The indications for renal biopsy are evaluation of nephritic syndrome, nephritic syndrome and rapidly progressing renal failure. 40 renal biopsy cores were sent in Bouin's fixative for light microscopy (LM) and tissue was wrapped in a saline soaked gauze and transported in ice for immunofluorescence (IF).

For LM, tissues were processed routinely by automated tissue processor and stained by Hematoxylin and Eosin (H&E), Periodic acid and Schiff (PAS) and silver stains.

IF was done with following FITC labeled antibodies (from Dako Inc. Denmark)

Anti IgG (FITC-F-0202)

Anti IgM (FITC-F-0203)

Anti IgA (FITC-F-0204)

Anti C3c (FITC-F-0201)

Anti C1q (FITC-F-0254)

Anti Kappa light (FITC-F-0198)

Anti Lamda light chain (FITC-F-0199)

Immunohistochemistry was done with Polyclonal Rabbit anti-Human C4d antibody (Biogenesis) (Catalog Number: 0300-0230),

III RESULTS

3.1 Age distribution

Age group ranged from 0-60 years. Lupus nephritis incidence was more common in 21 to 30 age group which constituted 35% followed by 11-20 age group which constituted 27.5%.

3.2 Gender distribution

Among 40 cases, 36 were females which constituted 90%.

3.3 Clinical presentation

Patient's clinical manifestations were broadly grouped into 3 categories based upon their presentation as nephrotic syndrome, nephritic syndrome and rapidly progressing renal failure (RPRF). Nephrotic syndrome patients (62.5%) had proteinuria greater than 3.5gm/day in adults, >50mg/kg/day in children, hypercholesterolemia and edema. Nephritic syndrome patients (17.5%) presented with hematuria, hypertension and oliguria. RPRF patients(20%) had serum creatinine levels greater than 5mg/day and patients were dialysis dependent. 18 patients (45%) had elevated serum creatinine levels (> 1.5 mg/dl) and 20 patients (50%) had 24 hours proteinuria greater than 500mg/day.

3.4 Classification¹²

Table 1: Abbreviated International Society of Nephrology/ Renal Pathology Society (ISN/RPS) classification of lupus nephritis (2003)

Class I Minimal mesangial lupus nephritis
Class II Mesangial proliferative lupus nephritis
Class III Focal lupus nephritis
Class IV Diffuse segmental (IV-S) or global (IV-G) lupus nephritis
Class V Membranous lupus nephritis
Class VI Advanced sclerosing lupus nephritis

Class V may occur in combination with class III or IV in which case both will be diagnosed.

In the present study ,Class I-2 cases, class II-4 cases, class III-3 cases, class IV-12, class V-11, class VI-1, class V+IV-5 and class V+III-2 cases were diagnosed.

3.5 Immunofluorescence (IF)

IF study of IgG, IgM, IgA, C3, C1q, Kappa and Lamda chains immune deposition was done for all the cases.

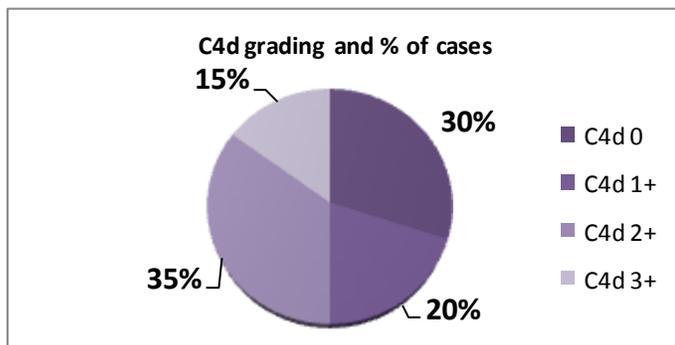
Full house pattern of immune deposition was seen in 55% of the cases, followed by deposition of IgG, IgM, C3, C1q and IgG, C3, C1q in 17.5% of the cases. Immune deposits were localized in peripheral, mesangial or diffuse. Pattern of immune deposits also varied, mostly fine granular pattern.

3.6 Immunohistochemistry (IHC)

C4d deposition was graded as 0, 1+, 2+ and 3+. C4d immune deposition was not observed in 12 cases (30%), 1+ in 8 cases (20%), 2+ in 14 cases (35%) and 3+ in 6 cases (15%). 28 cases (70%) showed deposition of C4d in the glomerular structures. No peritubular capillary c4d deposition was observed. C4d deposition was graded as 0, 1+, 2+ and 3+ based on intensity. Pattern of deposition was coarsely granular, linear along the entire capillary circumference



Figure 1 : IJSRP.ORG C4d grading and % of cases



3.7 Disease activity in Lupus Nephritis

In addition to the pathologic classification, activity and chronicity indices are scored pathologically and predict the renal prognosis- that is, the progression of renal disease.

The activity index reflects the state of active inflammation observed at biopsy, which may be reversible with medical therapy. The chronicity index reflects the amount of fibrosis and scarring, which are unlikely to respond to therapy.

The activity and chronicity indices are evaluated at a single point in time and renal lesions may transform from one class to another either spontaneously or as a result of treatment.

Activity index was done for 22 cases belonging to class III (3), IV (12), V+IV (5) and V+III (2). Activity index was graded as mild (0-7), moderate (8-14) and severe (15-21) according to ISN/RPS.

Table 2: Active and chronic glomerular lesions (ISN / RPS 2003)¹²

Activity Index	Chronicity Index
Endocapillary hypercellularity with or without leukocyte infiltration; luminal reduction	Glomerular sclerosis; (segmental, global)
Karyorrhexis	Fibrous adhesion
Fibrinoid necrosis	Fibrous crescents
Rupture of glomerular basement membrane	
Crescents, Cellular or fibrocellular crescents	
Subendothelial deposits on light microscopy (wireloops)	
Intraluminal immune aggregates(hyaline thrombi)	

Each variable is scored 0 - 3 points. Total activity is 21 and chronicity is 9.

Score	Activity (total 21)	Chronicity (total 9)
Mild	1 – 7	1 – 3
Moderate	8 – 14	4 – 6
Severe	15 – 21	7 – 9

Statistical analysis was done by Pearson chi-square test, p value 0.479.

Table 3: Analysis of activity index (AI) with C4d grading

AI	C4d 0	1+	2+	3+	Total
Mild	3	2	3	2	10
Moderate	1	4	2	-	7
Severe	-	-	-	-	0
No activity	2	1	3	-	6

Figure 2: Class III-Focal lupus nephritis-Endocapillary hypercellularity & wireloops (PAS 40x)

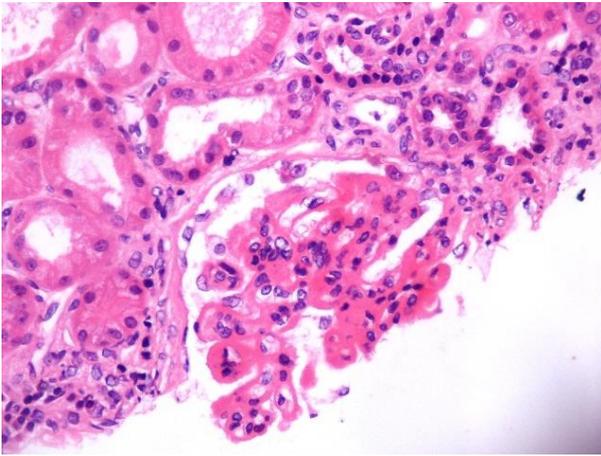


Figure 3: Hyaline thrombi – Class IV (PAS 40x)

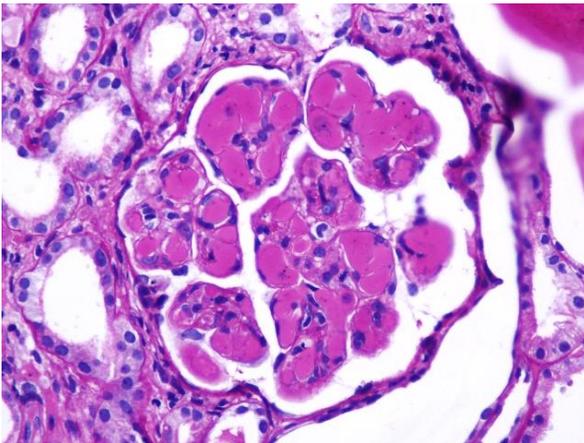


Figure 4: Full house pattern of immunofluorescence

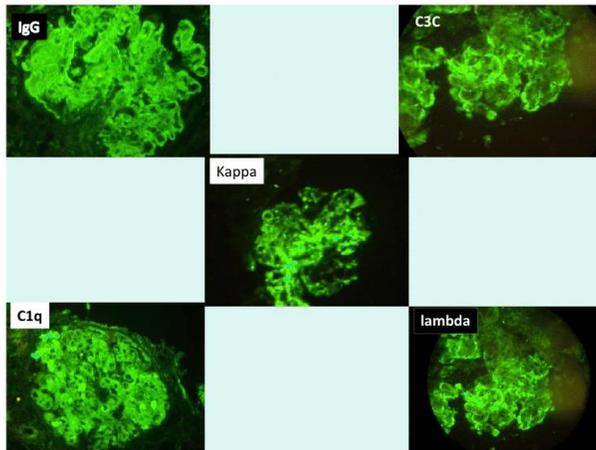
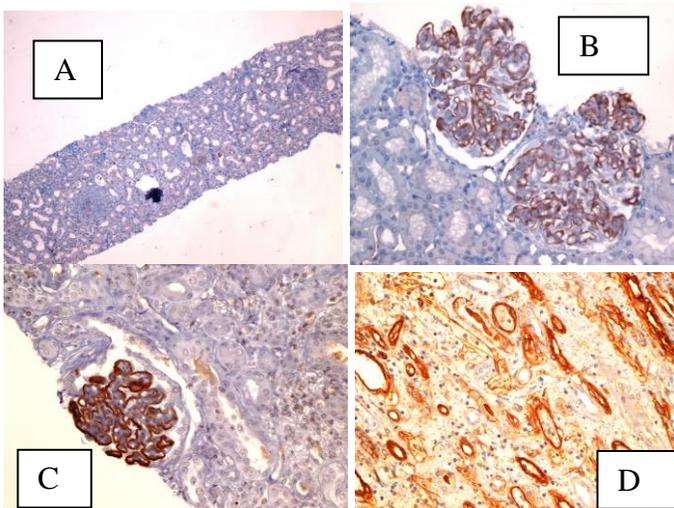


Figure 5: Different intensities of glomerular C4d staining. A. No glomerular C4d staining. B. 2+ glomerular C4d staining C. Intense 3+ glomerular C4d staining D. Control-Renal allograft biopsy showing peritubular capillary deposition



IV DISCUSSION

Complement component 4 is a protein involved in the complement system. It is cleaved into proteins 4a and 4b.

- C4a is an anaphylatoxin.
- C4b forms part of C3-convertase, in conjunction with 2a
- C4d is the final proteolytic remnant of deposited C4b on endothelium, remains covalently attached to endothelium and easily detectable by antibody staining.

C4d is the most clinically used marker for humoral rejection. It is a degradation product of the activated complement factor C4b. C4d is typically initiated by binding of antibodies to specific target molecules. Following activation and degradation of the C4 molecule, thio-ester groups are exposed, which allow transient, covalent binding of the degradation product C4d to endothelial cell surfaces and extracellular matrix components of vascular basement membranes near the sites of C4 activation¹³. C4d is also found in intra

cytoplasmic vacuoles of endothelial cells. Covalent binding renders C4d a stable molecule that can easily be detected by immunohistochemistry. In addition, C4d may also be generated by the antibody independent mannan binding lectin pathway.

Kim and Jeong et al (2003) studied glomerular C4d deposition in 21 cases diagnosed as lupus nephritis. Immunofluorescence for C4d showed diffusely granular staining along glomerular capillary loops, in all cases examined (1+ in 8 cases; 2+ in 7 cases; 3+ in 6 cases). The intensity of C4d correlated with those of capillary IgG, IgA, C3, C1q, and fibrinogen. However, C4d staining intensity did not correlate with the lupus nephritis activity index¹⁴.

Sumanth R. Daram et. al (2006) studied patterns of C4d staining in lupus nephritis. All 16 patients (100%) showed deposition of C4d in the glomerular structures, and one also had focal deposition of C4d in the peritubular capillaries. class II (4 cases), class III (3 cases), class IV (8 cases), and class V (1 case)¹⁵.

Sahin OZ et al observed a relationship between glomerular C4d staining and activity of lupus nephritis. C4d staining may be a useful marker to predict the prognosis of lupus nephritis. Among total 24 cases, fourteen (58%) patients were C4d+ and 10 (42%) patients C4d-. Urinary protein excretion was more elevated in C4d+ group ($p = 0.0001$). The renal biopsy showed that activity index score >12 was a higher proportion in C4d+ patients. The patients were followed up for 3.5 years. Four patients in the C4d+ group evolved to ESRD in the follow-up, but none of the patients in the C4d- group ($p = 0.064$)¹⁶.

The present study showed **C4d immune deposition** in 28 cases out of 40. 12 cases (30%) showed no C4d immune deposition. C4d 1+ was observed in 8 cases (20%), 2+ in 14 cases (35%), 3+ in 6 cases (15%). All 28 cases showed deposition of C4d in the glomerular structures which was comparable to both the studies. No peritubular capillary C4d deposition was observed.

Reasons for the negativity in 30% of the cases in present study could be due to

1. Variable period of fixation and
2. C4d may not be that sensitive to pick up less intensity staining.

V LIMITATIONS OF THIS STUDY

Although the study sample size is not negligible, it would have been more valuable to have had an appropriate follow up to establish valid associations between disease activity and C4d deposition. Grading of C4d is subjected to personal variation.

VI CONCLUSION

C4d positivity indicates activation of insitu classical complement pathway in lupus nephritis. C4d deposition in glomerular capillaries of lupus nephritis does not indicate the present disease activity. Pattern of C4d immune deposition was coarsely granular, linear along the entire capillary circumference. Further studies are needed to evaluate C4d as a biomarker of disease activity in lupus nephritis. Further studies are also needed to explain the C4d negativity.

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Inhibitive Action of *Allium Sativum* Extract on the Corrosion of Zinc in 0.5N H₂SO₄ Medium

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Abstract- In this work, the extract of *Allium Sativum* was examined as a green corrosion inhibitor for zinc in 0.5N H₂SO₄ by using weight loss, gasometric and thermometric methods. Results indicated that the extract of *Allium Sativum* performed as a very good corrosion inhibitor for the corrosion of zinc. The inhibition efficiency increases with the increase in the extract concentration. The adsorption of the inhibitor molecules on the zinc metal surface obeyed Temkin adsorption isotherm.

Index Terms- *Allium sativum*, acidic solution, zinc corrosion, weight loss, gasometry, thermometry.

I.INTRODUCTION

In order to remove the undesirable scale and rust on the metals, acid solutions are widely employed in many industries. To control the excess acid consumption and metal dissolution, inhibitors are used. Corrosion inhibitors are mostly synthetic organic compounds, used to bring down the rate of corrosion of metals and alloys in various aggressive environments. These compounds are expensive, non-biodegradable and hazardous to both the environment and human beings. This made the researchers to focus their attention on employing natural products as corrosion inhibitors, which are cheap, biodegradable and environment friendly for different metals and alloys in various aggressive environments¹⁻¹⁵.

Allium sativum is a medicinal plant, native to Central Asia and cultivated all over India, belongs to the family Liliaceae. It is widely used in the preparation of ayurvedic medicines to cure diseases such as, cardiac related problems, chronic fever, tumours, throat infection, cough, asthma, constipation and intestinal parasitic infections. In the present work we have examined the extract of *allium sativum* as a green corrosion inhibitor for zinc metal in 0.5N H₂SO₄ employing weight loss, gasometric and thermometric methods.

II.EXPERIMENTAL

The composition of the zinc metal specimens used in this work is given in table-1

Table-1 Composition of zinc metal specimens(Wt %)

Lead	Cadmium	Iron	Zinc
1.03	0.04	0.001	Remainder

The size of the zinc metal specimens used in this work is 3cm*1.5cm* 0.08cm. Zinc metal specimens were polished with a series of emery papers of various grades from 200- 1200, washed with distilled water ,degreased with acetone and dried. The corrosion medium employed was 0.5N H₂SO₄ prepared from A.R grade H₂SO₄ and deionised water.

Preparation of the extract

Allium sativum was obtained from the local market. The outer hard cover was removed and the inner soft bulb is dried and ground to get the powder form of the material. 500 ml of alcohol was then added to 10 gram of this powder and left standing for three days with occasional shaking. The solution was then filtered and the alcohol on evaporation results in a light yellow sticky mass. 1 gram of this sticky mass was then dissolved in 1L of 0.5N H₂SO₄ to get the stock solution. From these stock solution concentrations of 200, 400, 600, 800 mg/L were prepared by dilution.

Weight loss, gasometry and thermometric studies

Weight loss, gasometry and thermometric studies were carried out as reported earlier¹⁶⁻²⁰. From the weight loss experiments, the % inhibition efficiency (I.E) and the degree of surface coverage (θ) were calculated by using the following equations.

$$I.E = \frac{W_o - W_i}{W_o} \times 100$$

Where W_o and W_i are the weight loss of the metal in the absence and presence of the inhibitor respectively. The corrosion rate (C.R) of the metal was calculated by using the following equation.

$$C.R(mmy) = \frac{87.6 W}{A t D}$$

Where W is the weight loss of the zinc metal (mg), A is the surface area of the metal specimen (cm²), t is the exposure time (h) and D is the density of the metal (g/cm³).

From the gasometry experiments, the inhibition efficiency was calculated by using the following equation.

Where V_o and V_i represent the volume of hydrogen gas evolved in the absence and presence of the inhibitor respectively.

$$I.E = \frac{V_o - V_i}{V_o} \times 100$$

From the thermometric studies the reaction number was first calculated by using the equation

Where T_m is the maximum temperature, T_i is the initial temperature and t is the time taken to attain the maximum temperature.

$$RN = \frac{T_m - T_i}{t}$$

The inhibition efficiency is calculated by using the following equation

$$I.E = \frac{RN_o - RN_i}{RN_o}$$

Where RN_o is the reaction number in the absence of the inhibitor and RN_i is the reaction number in the presence of various concentrations of the inhibitor.

III.RESULTS AND DISCUSSION

Weight loss, gasometry and thermometric experiments were carried out at five different concentrations of the extract and the inhibition efficiency(IE) values were calculated. Table-2 presents the values of inhibition efficiency obtained from these experiments.

Table 2 Values of inhibition efficiency (I.E(%)) obtained from the weight loss, gasometry and thermometric experiments.

Method employed	Values of I.E(%) for different concentrations (mg/L) of the extract				
	200	400	600	800	1000
Weight loss	26.7	52.7	65.8	74.6	81.2
Gasometry	25.9	51.4	63.9	73.4	80.2
Thermometry	24.6	53.7	64.2	75.4	82.3

From the table it can be observed that there is very good agreement between the values of inhibition efficiency obtained from these three methods. It shows that the inhibition efficiency increases with increase in the extract concentration. The dependence of inhibition efficiency of the extract on the concentration is shown in figure-1

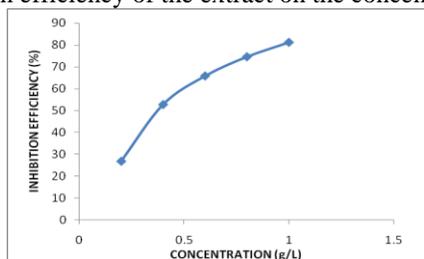


Figure 1 Variation of inhibition efficiency with concentration of the extract.

Table-3 presents the values of corrosion rates obtained from the weight loss experiments for the extract for the corrosion of zinc in 0.5N H₂SO₄ in the presence of different concentrations of the extract.

Table 3 Values of corrosion rates obtained from the weight loss experiments.

Values of corrosion rates (mm/y) for different concentrations (mg/L) of the extract				
200	400	600	800	1000
75.5	48.7	35.2	26.2	19.4

From the table-3 it can be observed that the corrosion rates decreases with increasing concentration of the extract. The influence of extract concentration on the corrosion rates is shown in figure-2.

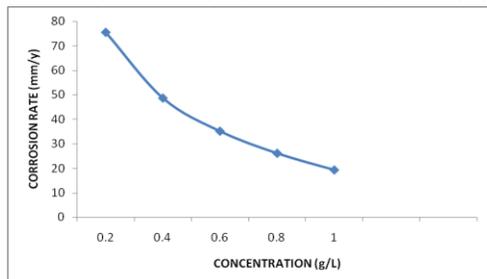
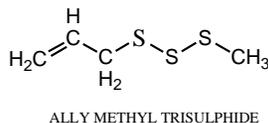
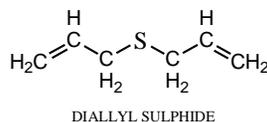
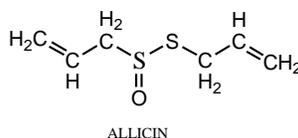
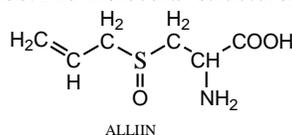


Figure 2 Variation of corrosion rates with concentration of the inhibitor.

The inhibitive action of *allium sativum* can be attributed to the presence of various organic compounds in the extract. These include alliin, alliin, diallyl sulphide and ally methyl trisulphide. The molecular structures of these compounds are shown below.



The molecular structures of these compounds shows the presence of many hetero atoms and double bonds, which are potential adsorption centres for adsorption on to the metal surface. Organic compounds containing π -electrons, hetero atoms and multiple bonds have been reported to function as effective inhibitors for the corrosion of many metals in various media²¹⁻²⁵. Since the *allium sativum* extract contains many organic compounds, it is very difficult to attribute the inhibitive activity to any one of these compounds. The inhibitive activity of the extract is attributed to the combined action of all the compounds present in the extract.

IV. ADSORPTION ISOTHERMS

Inhibitors retard the corrosion of metals by adsorption on to the metal surface leading to the formation of a thin film which acts as a barrier between the metal and the aggressive media resulting in the inhibition of corrosion. To study the mechanism of corrosion inhibition, attempts were made to fit the data available to the various adsorption isotherms such as Langmuir, Temkin, Freundlich, Bockris-Swinkels and Flory-Huggins. From the weight loss values the degree of surface coverage (θ) for various concentration of extract were determined and plotted against $\log C$ of the extract which resulted in a straight line. This shows that the adsorption of the inhibitor on to the zinc metal surface follows Temkin adsorption isotherm. Figure 3 shows the Temkin adsorption isotherm.

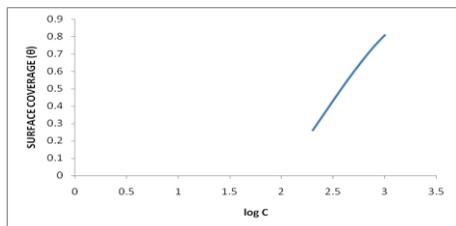


Figure 3 Temkin adsorption isotherm plot for zinc in 0.5N H₂SO₄ containing different concentrations of the extract.

V.CONCLUSIONS

The extract of *allium sativum* used in this work performed as a good corrosion inhibitor for the zinc metal corrosion in 0.5N H₂SO₄. The inhibition efficiency increased with increase in the concentration of the extract. The adsorption of the components of the extract on to the metal surface in 0.5N H₂SO₄ obeys the Temkin adsorption isotherm.

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Dibutyl Sulphide as Corrosion Inhibitor for Zinc Metal in Acid Solutions

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Abstract- The efficiency of dibutyl sulphide as zinc corrosion inhibitor in 0.5N HCl and 0.5N H₂SO₄ was studied by the conventional weight loss and gasometry methods. Results obtained from this study revealed that dibutyl sulphide exhibited good inhibiting action. The inhibition efficiency of dibutyl sulphide increased with the increase in inhibitor concentration. The inhibitor obeyed Temkin adsorption isotherm.

Index Terms- Dibutyl sulphide, acidic solutions, zinc corrosion, weight loss, gasometry.

I. INTRODUCTION

Corrosion inhibitors are compounds which are added in small quantities to the corrosive environment in order to control or prevent the corrosion of metals and alloys¹⁻²⁹. The inhibitive action of the inhibitors is based on the adsorption of the inhibitor molecules on the metal surface. In the present work, dibutyl sulphide was evaluated as an inhibitor for zinc corrosion in 0.5N HCl and 0.5N H₂SO₄ using the conventional weight loss and gasometry methods.

II. EXPERIMENTAL

The zinc metal specimens of composition: lead 1.03%, cadmium 0.04%, iron 0.001% and the remainder being zinc and size of 4cm*2cm* 0.08cm were used in these studies. Zinc metal specimens were abraded with a series of emery papers of various grades from 200- 1200, degreased with absolute ethanol and air dried. The inhibitor compound, dibutyl sulphide was an imported sigma Aldrich sample. The corrosion medium was 0.5N HCl and 0.5N H₂SO₄ prepared from A.R grade HCl and H₂SO₄ and deionised water.

Weight loss and gasometry studies

Weight loss and gasometry studies were conducted as reported earlier³⁰⁻³¹. From the weight loss experiments the % inhibition efficiency (I.E) and the degree of surface coverage (θ) were calculated by using the following equations.

$$I.E = \frac{W_o - W_i}{W_o} \times 100$$

$$\theta = \frac{W_o - W_i}{W_o}$$

Where W_o and W_i are the weight loss of the metal in the absence and presence of the inhibitor respectively.

The corrosion rate (C.R) of the metal was calculated by using the following equation.

$$C.R(mmy) = \frac{87.6 W}{A t D}$$

Where W is the weight loss of the zinc metal (mg), A is the surface area of the metal specimen (cm²), t is the exposure time (h) and D is the density of the metal (g/cm³).

From the gasometry experiments the inhibition efficiency is calculated by using the following equation.

$$I.E = \frac{V_o - V_i}{V_o} \times 100$$

Where V_o and V_i are the volume of hydrogen gas evolved in the absence and presence of the inhibitor respectively.

III. RESULTS AND DISCUSSION

Values of inhibition efficiency obtained from the weight loss and gasometry experiments for the inhibitor for the corrosion of zinc in 0.5N HCl and 0.5N H₂SO₄ in the presence of different concentrations of dibutyl sulphide are presented in the tables 1 and 2 respectively.

Table 1 Values of inhibition efficiency obtained from the weight loss experiments.

Corrosive medium	Values of I.E(%) for different concentrations (mM) of dibutyl sulphide				
	5	10	30	50	100
0.5N HCl	38.1	52.3	74.0	82.5	92.4
0.5N H ₂ SO ₄	48.7	61.5	78.2	86.5	96.4

Table 2 Values of inhibition efficiency obtained from the gasometry experiments.

Corrosive medium	Values of I.E(%) for different concentrations (mM) of dibutyl sulphide				
	5	10	30	50	100
0.5N HCl	37.6	52.4	73.8	81.9	92.6
0.5N H ₂ SO ₄	48.5	61.1	77.9	86.8	95.9

It can be seen from these tables that dibutyl sulphide performed better in 0.5N H₂SO₄ than in 0.5N HCl. A similar observation has already been made by several authors³²⁻³⁷. It can also be observed that the inhibition efficiencies increases with increase in the inhibitor concentration.

The inhibitor molecule possess a sulphur atom and two butyl groups. The sulphur atom with its two lone pairs of electrons gets adsorbed on the positively charged metal surface. This leads to the formation of a thin film on the metal surface offering protection to the metal. The inhibitor used in this study contains two bulky butyl groups in its molecular structure. Butyl groups are electron releasing in nature (+ I effect.). Due to this, the electron density on the sulphur atom increases resulting in more adsorption of the inhibitor molecule on to the metal surface leading to more protection hence more inhibition efficiency.

The sulphur atom in the inhibitor molecule in acid medium can get protonated to some extent to form the cationic form of the inhibitor. The chloride and sulphate ions in the corrosive medium with less degree of hydration gets specifically adsorbed on the positively charged metal surface leading to the creation of excess negative charges on the metal surface which facilitates more adsorption of the protonated form of the inhibitor molecules and hence more protection of the metal.

The bulky nature of the butyl groups play an important role in the reduction of the corrosion rates. After getting adsorbed on the metal surface through the sulphur atom, the bulky butyl groups offers more surface coverage to the metal from the aggressive media, leading to more corrosion inhibition. Infrared spectrum confirm that a metal sulphur bond may exist between the sulphur atom of the inhibitor and the metal³⁸. The variation of inhibition efficiency with the concentration of the inhibitor is shown in figure 1.

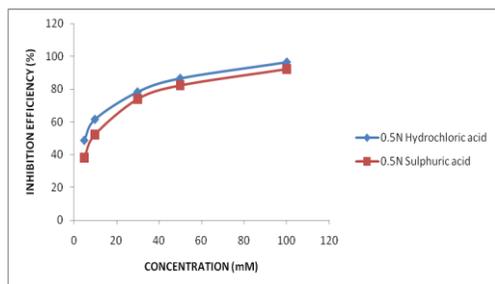


Figure- 1 Variation of inhibition efficiency with concentration of the dibutyl sulphide inhibitor for zinc in 0.5N HCl and 0.5N H₂SO₄

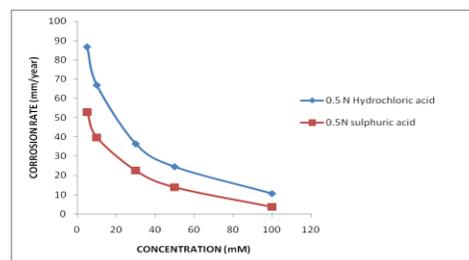
Values of corrosion rates(mm/year) obtained from the weight loss experiments for the inhibition for the corrosion of zinc in both the acids in the presence of different concentrations of the inhibitor are presented in the table 3.

Table 3 Values of corrosion rates(mm/year) from the weight loss measurements

Corrosive medium	Values of corrosion rates(mm/year) for different concentrations (mM) of dibutyl sulphide				
	5	10	30	50	100
0.5N HCl	86.6	66.8	36.4	24.5	10.6
0.5N H ₂ SO ₄	52.8	39.7	22.5	13.9	03.7

From the table 3 it can be observed that the corrosion rates for the corrosion of zinc in both acids decreases with increasing concentration of the inhibitor. The effect of inhibitor concentration on the corrosion rates is shown in figure 2.

Figure- 2 Variation of corrosion rates with concentration of the dibutyl sulphide inhibitor for zinc in 0.5N HCl and 0.5N H₂SO₄



IV. ADSORPTION ISOTHERMS

From the weight loss experiments, the degree of surface coverage (θ) for various concentration of the inhibitor were determined and plotted against $\log C$ for different concentrations of the inhibitor. A straight line was obtained. This shows that Temkin adsorption isotherm was obeyed. Figure 3 shows the Temkin adsorption isotherm.

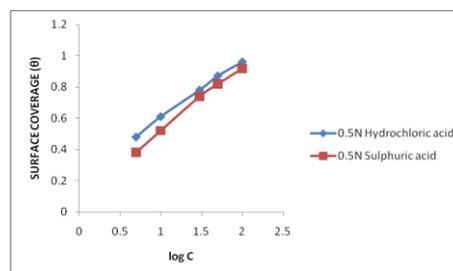


Figure-3 Temkin adsorption isotherm plot for corrosion of zinc in 0.5N HCl and 0.5N H₂SO₄ containing different concentrations of inhibitor.

V. CONCLUSIONS

The inhibitor dibutyl sulphide used in this work exhibited good inhibition efficiency. Inhibition efficiency increases with increase in inhibitor concentration. The inhibitor performed better in 0.5N H₂SO₄ than in 0.5N HCl. The adsorption of the inhibitor molecules on the metal surface obeyed Temkin's adsorption isotherm.

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Tartrazine Dye as a Novel Corrosion Inhibitor for Zinc Metal in Acid Solutions

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Abstract- Weight loss and gasometry methods were employed to evaluate the inhibition efficiency of tartrazine dye as zinc corrosion inhibitor in 0.5 N H₂SO₄. The results showed that the tartrazine dye is a very good inhibitor in 0.5N H₂SO₄. The dye exhibited more than 85% inhibition efficiency at a concentration of 30mM. The inhibition efficiency of the dye increased with the increase in the concentration of the dye. The adsorption of the dye obeyed Temkin adsorption isotherm.

Index Terms- Tartrazine dye, sulphuric acid, weight loss, gasometry.

I. INTRODUCTION

Among the various methods available for the protection of metals and alloys against corrosion in various aggressive media, the use of inhibitors occupies an importance place in the field of metallic corrosion. Many organic compounds containing hetero atoms such as nitrogen, sulphur and oxygen were employed as inhibitors for the protection of zinc metal corrosion in different aggressive media¹⁻¹⁹. The presence of hetero atoms, multiple bonds and aromatic rings in the inhibitor molecules make them efficient corrosion inhibitors as these are regarded as good adsorption centers, through which adsorption of these molecules on the metal surface occurs, leading to the formation of a protective film.

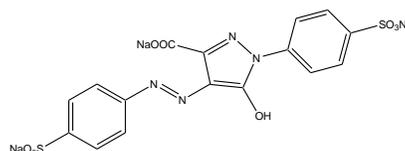
Synthetic organic dyes are a class of compounds which possess most of the above mentioned characteristics, which makes them a prospective candidate to be employed as corrosion inhibitors. A review of the literature reveals the fact that many synthetic organic dyes have been used as corrosion inhibitors for various metals in different acidic media²⁰⁻²⁷.

In the present work, we have examined tartrazine dye as a corrosion inhibitor for zinc metal in 0.5 N H₂SO₄ using the conventional weight loss and gasometry methods.

II. EXPERIMENTAL

Weight loss and gasometry experiments were performed on zinc metal specimens of the following composition (wt %): lead 1.03, cadmium 0.04, iron 0.001 and the remainder being zinc and dimension 4cm * 2cm * 0.08cm. Zinc metal specimens were abraded with a series of emery papers of various grades from 200- 1200, degreased with absolute ethanol and air dried. The inhibitor compound, tartrazine dye was obtained from the Loba chemicals, India. The corrosion medium employed was 0.5N H₂SO₄ prepared from A.R grade H₂SO₄ and deionised water. The

following figure shows the molecular structure of the tartrazine dye.



Weight loss and gasometry studies

Weight loss and gasometry studies were carried out as reported earlier^{28,29}. From the weight loss experiments the % inhibition efficiency (I.E) and the degree of surface coverage (θ) were calculated by using the following equations.

$$I.E = \frac{W_o - W_i}{W_o} \times 100$$

$$\theta = \frac{W_o - W_i}{W_o}$$

Where W_o and W_i are the weight loss of the metal in the absence and presence of the inhibitor respectively.

The corrosion rate (C.R) of the metal was calculated by using the following equation.

$$C.R(mmy) = \frac{87.6 W}{A t D}$$

Where W is the weight loss of the zinc metal (mg), A is the surface area of the metal specimen(cm²), t is the exposure time (h) and D is the density of the metal (g/cm³).

From the gasometry experiments the inhibition efficiency is calculated by using the following equation.

$$I.E = \frac{V_o - V_i}{V_o} \times 100$$

Where V_o and V_i are the volume of hydrogen gas evolved in the absence and presence of the inhibitor respectively.

III. RESULTS AND DISCUSSION

Weight loss and gasometry studies were carried out at six different concentrations of the inhibitor and the inhibition

efficiency(IE) values were calculated. Values of inhibition efficiency obtained from these experiments are presented in the table-1

Table- 1 Values of inhibition efficiency(IE(%)) obtained from the weight loss and gasometry experiments.

Method employed	Values of I.E(%) for different concentrations (mM) of tartrazine dye inhibitor					
	5	10	15	20	25	30
Weight loss	23.2	40.3	55.6	68.2	79.6	88.4
Gasometry	22.8	41.6	54.7	67.4	80.4	89.3

The results show that the inhibition efficiency increases with increase in the inhibitor concentration. The dependence of inhibition efficiency of the inhibitor on the concentration is shown in figure-1

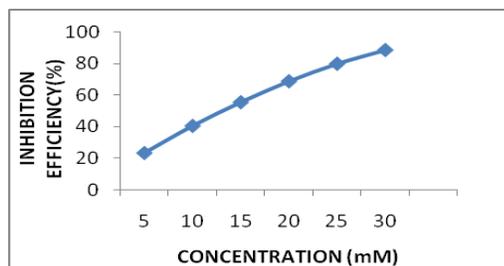


Figure-1 Variation of inhibition efficiency with concentration of the inhibitor.

The inhibitor molecule contains many hetero atoms namely sulphur, oxygen and nitrogen, all of them possess lone pair of electrons. Through these lone pair of electrons they get adsorbed on the metal surface leading to the formation of a layer on the metal surface. This layer acts as a barrier between the metal and the corrosive media giving protection to the metal. The inhibitor also contains aromatic rings with lot of π electrons through which also adsorption of the inhibitor molecules on the metal surface can take place leading to enhanced protection. Another important factor responsible for the higher inhibition efficiency of the inhibitor is the large surface area of the inhibitor molecules which provides higher surface coverage to the metal after getting adsorbed on the metal surface.

Values of corrosion rates obtained from the weight loss experiments for the corrosion of zinc in 0.5N H_2SO_4 in the presence of different concentrations of the inhibitor are presented in the table-2

Table 2 Values of corrosion rates obtained from the weight loss experiments.

Values of corrosion rates(mm/y) for different concentrations (mM) of tartrazine dye inhibitor					
5	10	15	20	25	30
79.0	61.5	45.7	32.8	21.0	11.9

From the table-2 it can be seen that the corrosion rates for the corrosion of zinc in 0.5N H_2SO_4 decreases with increasing

concentration of the inhibitor. The effect of inhibitor concentration on the corrosion rates is shown in figure-2.

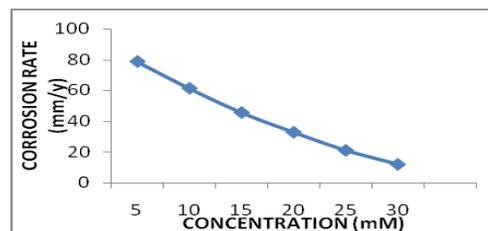


Figure 2 Variation of corrosion rates with concentration of the inhibitor.

IV. ADSORPTION ISOTHERMS

From the weight loss measurements the degree of surface coverage (θ) for various concentrations of the inhibitor were evaluated. Temkin's adsorption isotherm was tested by plotting $\log C$ vs θ which resulted in a straight line thereby showing that the adsorption of the inhibitor on the surface of zinc from 0.5N H_2SO_4 obeys Temkin's adsorption isotherm. Figure -3 shows the Temkin adsorption isotherm plot for zinc in 0.5N H_2SO_4 containing different concentrations of the inhibitor.

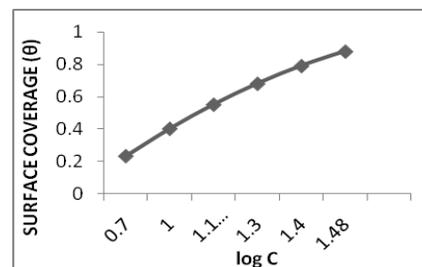


Figure 3 Temkin adsorption isotherm plot for zinc in 0.5N H_2SO_4 with different concentrations of the inhibitor

V. CONCLUSIONS

The tartrazine dye used as a corrosion inhibitor for zinc in 0.5N H_2SO_4 performed well and gave high percentage of inhibition efficiency. It exhibited a maximum inhibition efficiency of 89.3 % at 30mM concentration. The inhibition efficiency of the inhibitor increases with the increase in the concentration of the inhibitor. The adsorption of the inhibitor on zinc surface obeyed Temkin adsorption isotherm.

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Green Building Architecture: A Literature Review on Designing Techniques

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Abstract- Buildings are found to be both, one of the biggest consumer of energy and producer of greenhouse gases. It has become a global issue. According to the National Institute of Building Sciences(USA), buildings generate 35 percent of the carbon dioxide (the primary greenhouse gas associated with climate change), 49 percent of the sulphur dioxide, and 25 percent of the nitrogen oxide found in the air. Since buildings are accountable for this scenario, it has imposed an immediate requirement to not only think of, but implement sustainability in every new construction instantly. This will render us a sustained environment and a healthy ecosystem. Green Buildings are buildings that subscribe to the principle of conscientious handling of natural resources, which means causing as little environmental interference as possible, using environment friendly materials, requires low operational energy, utilizes renewable sources of energy to fulfil its requirements, follows high-quality and longevity as a guideline for construction and last but not least, must be economically viable. Albeit the problem is common in developing nations. The paper focuses on green design as a vital transformation of contemporary architecture practiced in developing nations. It endeavours to present some environmental and physical design approaches for green buildings in promptly developing countries chiefly India. In this regard, the study presents hands on analysis of basics and principles of green architecture, theories and viewpoints outlined in the field and also the analysis of efficacious cases of environment friendly buildings in India.

Index Terms- Greenhouse gases, Sustainability, Ecosystem, Green Buildings, Renewable, Green Design, Contemporary Architecture

I. INTRODUCTION

Buildings account for more than 40% of all global carbon dioxide emission, one of the main culprits implicated in the phenomenon of global warming in which India comes on 144th position (1.4 metric ton) in carbon emission rating in the world. Green building is the practice of constructing or modifying structures to be environmentally responsible, sustainable and resource-efficient throughout their life cycle. This includes efficiently using energy, water and other natural resources, protecting occupant health, improving employee productivity and reducing waste, pollution and environmental degradation [1]. Green buildings accounts for improving environmental footprint by reducing energy use by 30-5-%, CO2 emissions by 35%, waste output by 70% and water usage by 40%.

II. REPURCUSSION AT WORLD LEVEL

The pressure that man exerts upon nature for fulfilment of his needs is greater than ever and is escalating at an alarming rate. Whether one considers the availability of fresh water, resources, or ecological balance, the MEA (Millennium Ecosystem Assessment) study of 2005 has found that there has been a 62% decline over the last four decade, which in turn has brought about the undeniable realization that the system is under the risk of destructive and possibly irreversible changes. Another possible consequence of all this is the escalation of poverty on countries that rely on the resources produced by the collapsing eco systems. According to the reports published by MEA (millennium ecosystem assessment), the ability of the global ecosystem to nurture future generations can no longer be counted upon.

From the environmental viewpoint, buildings account for nearly half of all energy consumption and raw material use around the globe. The 2008 Building Energy Data book (USDE 2008) says that commercial and residential buildings are held responsible for 39.7 percent of the energy consumed (residential 21.5 percent and commercial 18.2 percent) globally and 76 percent of the electricity used and 15 percent of the total water consumed (Architecture 2030 2009). Building and Construction sector takes up the lion share of resources for land use and material extraction, 50 percent of the world's raw material wealth – many of which are non-renewable resources – and are responsible for 36 percent of all waste generated worldwide[2]. Some of the non-recyclable materials such as lead-based paints, asbestos, mould, wastes containing mercury, fluorescent bulbs, batteries pose serious environmental and health problems[3]. Hazardous waste must be disposed of in a separate landfill at a very high cost [4].

III. GREEN BUILDING RATING SYSTEM

GRIHA (Green Rating for Integrated Habitat Assessment), TERI (The Energy and Resources Institute) & SVAGRIHA (Small Versatile Affordable GRIHA) are green building rating system developed for Indian construction sector. GRIHA is a rating system which assesses the environmental performance of buildings on scale of 0-104. On the basis of number of points scored, a building can be rated between 1 & 5stars. GRIHA was developed by TERI and has now been adopted by the Ministry of New and Renewable Energy (MNRE) as the National Rating System for green buildings in India and to promote green buildings in India and to oversee the various activities associated with it, MNRE and TERI jointly established an independently

registered society called ADaRSH (Association for Development and Research of Sustainable Habitats). ADaRSH functions as a platform for interaction between various stakeholders as well as promotes GRIHA, SVAGRIHA and other similar green building rating systems in India whereas SVAGRIHA is a recently designed system especially for small scale projects i.e. buildings with built up area less than 2500sq.mt [5].

IV. DESIGN TECHNIQUES VIA CASE STUDY

4.1 Centre for Environmental Sciences & Engineering Building, IIT, Kanpur, India

Introduction

The CESE is a 5 star green rating building by GRIHA(India) and research facility at the IIT (Indian Institute of Technology), Kanpur on a plot area of 175, 000 square metre . It has been designed in an environment friendly manner and conceptualized and constructed as a "building in the garden" that is sustainable.

Key Sustainable Features

- The building is fully compliant with the ECBC (Energy Conservation Building Code).
- Sustainable site planning has been integrated to maintain favourable microclimate.
- The architectural design has been optimized as per climate and sun path analysis.
- The building has energy-efficient artificial lighting design and daylight integration.
- Water body to cool the micro climate.
- Orientation of building: North – South.
- It also has energy-efficient air conditioning design with controls integrated to reduce annual energy consumption.



Fig 1: Existing Site Features

- Passive strategies such as an earth air tunnel have been incorporated in the HVAC design to reduce the cooling load.
- Optimized window design by selection of Low E glass and external shading.

4.2 The Dallas Middle School, Portland, Oregon

The Dallas Middle School is the LEED Gold certified green building. Architect of the building is Heinz Rudolf, BOORA

Key Design Features

- The school is oriented so classrooms face north and south. They do not get direct western sun during the hottest time of the day.

- The large windows have a special glazing to minimize glare and heat, but bring lots of natural light inside the room.
- The operable windows pull fresh air into one side of the classroom, while ventilation stacks (chimney-like devices) pull the air out on the opposite side of the classroom.
- Building materials were specified to contain post-consumer recycled content.
- Used light-coloured concrete for the parking area to reduce heat "islands."
- Directed the exterior lighting downward to reduce night light pollution.
- Used local building products when possible to avoid transporting materials long distances and consuming more fuel.
- Stained the concrete walls to look like basalt rock and to blend with the colours of the natural landscape.

V. CONCLUSIONS

Green building are today the most widely used form of architecture. Creating green buildings is an important focus of building owners and even governments worldwide. In India some world class Green Buildings have constructed in past few years, but still the concept of green buildings for general masses is in infancy stage. Present work is an attempt in the direction to make people, communities and general public aware about the advantages of green buildings for sustainable environmental development and management.

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Science for Non-Scientist

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I. INTRODUCTION

I would prefer to start with this wonderful quote, once said by Albert Einstein, "Imagination is more important than knowledge". Yes, of course; action is the by-product of our thoughts or it may be said that the imagination comes before action. Let's look back into history, since time immemorial; mankind is getting benefitted from 'Science & technology' by prominent heroes of the earth and society has given them special honor and privilege. They have truly changed the face of life, but that was the era of a few scientists who contributed individually.

It is true that innovation has always been done by a few and masses take the benefits for centuries and several generations. Therefore, the expectations from a scientist are always higher as the ultimate of science is to serve the different sectors of the societies. For example, industries want science to make more money, the government wants science to enable development, citizens want science to change their lifestyle as well as standard to provide them clean air, fresh water, and at the same time make their life safer and more enjoyable.

Interestingly, the idiopathic image of a scientist in our mind is almost established and that appears with a grey-haired spectacled, perhaps with a beard and of course, with a white lab coat. This caricature contains several other features that we have come to associate with a 'Scientist' who can be found contemplating for long in isolation exploring recondite ideas and society looks at him with respect. We know that the applications of science have been drawn into many things for the immediate use of the society and nation.

"Science" is under the sky, so cannot be limited up to those who study science only. The majority of the greatest inventions were done by non-professionals in the past. So, the opportunity is open for all to contribute and anyone can be a scientist without exactly studying science. The life of science goes through sustainable development. A development for the next generation is to understand its needs. Still many new inventions are yet to be done, but a special observation and absorption is the key to formulate new ideas, which might turn into new investigations on the path of real scientific services.

We remember the connection between Newton's discovery and apple similarly, James Watt's invention with kettle who exemplified their ideas in limited resources. There were many great inventors who barely completed their formal education but gave new dimensions to science & technology since knowledge and talent have no boundaries. Research starts with an idea and its implementation which doesn't require the proximity of a laboratory.

Behind a great invention, there is always an idea, an idea that needs to be thought of, that needs to be tested, and if found working then needs to be applied to achieve the ends. An idea might come from an individual not from masses; mind it.

Role of A Scientist and Youth:

A Scientist plays between a triangle of Research, teaching and services.

Research enhances the vitality of teaching, teaching lifts the standards of services and services open the new avenues of investigations. There is a difference between knowledge and wisdom which both often looks similar. Knowledge can be acquired from scriptures and text books but wisdom comes from experience and consciousness. Thus, is it enough to be tested on the text books and to pass the exams for getting the degree only?

Today, Science needs future oriented youths. As our problems are new, so older solutions cannot work. As life is constantly changing and information is changing very rapidly. Roughly, every generation changes in 20 years. Youth may have problems but it also has the potential. Similarly, older generation (The experienced) might have the solutions. So the gap between both the generations has to be bridged, joining a common forum. Unfortunately, if focus is given to university research, resources and infrastructure available to individual scientists are less, thus there is no pace in their work. Therefore, students often learn sophisticated research methods and approach elsewhere outside their university. Later on youths prefer to migrate to western countries for higher studies where they meet all requirements, a good excuse! The universities have not done their job if they produce an army of youths with a degree alone.

It's obvious that youths now demand or expect employment, but they somehow ignore the fact that their education somewhere needs to be implemented selflessly. Rather asking for employment, youth has to think to create employment and to understand that everyone cannot get employment. Modern youth needs to be an entrepreneur and start his own enterprise. Young researchers need to be proactive, vigil and attentive besides their routine and repetitive work. The youth has to apply their knowledge to enhance discipline in learning, and also use it as a tool that could produce meaningful materials for society. The next century belongs to India, which will become a unique intellectual powerhouse. On the other hand, the time has come that scientific community stands up for scientific reasons.

If India wants to become a genuine “Science Superpower”, Indian scientist will have to do much more than just getting integrated into corporate research and development. They must develop a genuine culture of open, fearless questioning and experimentation within their laboratories as well as in the larger culture outside the walls of the laboratory.

This will require an overhaul of science education so that science is not treated merely as a route of learning technical formulas, but is integrated into a new secular understanding of nature and need of life. It is not enough for the institutions of higher learning in India to produce good researchers, doctors, and engineers who can perform well in the west. It is the need of the hour that we must produce critical thinkers who engage themselves with larger issues that affect the cultural climate of their country.

Scientists have to work as a workforce, not just as an academy of scholars and youths have to face this challenge. They must provide new dimensions of living and learning which can make life more prosperous and healthier for humanity.

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EASE OF E-LEARNING FOR SPECIAL NEED PERSONS: USING E-LEARNING UTILITY

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Abstract- Increasing strength of students' day-by-day over worldwide is a big challenge for any education institution to manage them. From past few years individuals with disabilities also shown their interest to obtain meaningful education like others, but due to their limitations they are unable to get the complete benefits of these learning technologies or tools as a non-disabled individual does. A strong need was felt to produce a solution in form of some utility to enhance the capabilities of such individuals so that they can participate in activities of life, getting education opportunities or make their life simpler or easier.

This paper proposes an E-learning utility which primarily targets people with hearing, vision or learning impairment as a possibility of alleviating the problem faced by persons with such disabilities and it will definitely be improvise the Distance learning concept.

Keywords— Adaptive technology, Distance education, Disability, E-learning, Impairment

I. INTRODUCTION

Distance education or distance learning is a field of education that focuses on teaching methods and technology with the aim of delivering teaching, often on an individual basis, to students who are not physically present in a traditional educational setting such as a classroom [1]. It has been described as "a process to create and provide access to learning when the source of information and the learners are separated by time and distance, or both. Distance learning is primarily a goal of removal of barriers to learning. Evolution of distance learning have breaks the barriers and provide an opportunity for those students or learners who are incapable to invest a lot of money or travelling long distances to get educated and for students with disabilities, a determined effort to provide education in a suitable form that overcome the disability. Distance learning provides the capability to get access and share the knowledge from any location.

Increasing access to more students is a common reason given for providing instructions in a distance learning format. However these access arguments usually focus on people separated by distance and time rarely include consideration of the needs of people with disabilities. According to American disability act people with disabilities have equal access to public program and services. According to this law, any individual shall by reason of their disabilities, be excluded from participation in these programs [2].

Individual with disabilities who would have trouble in travelling to or navigating a campus, or those for whom sitting in a college classroom would be challenging, have the benefit of widespread online education programs that allow individuals to complete their degree requirements at home [3]. Students with disabilities can also choose a combination of online and in-person classes to fulfil their degree requirements. Distance learning benefits disabled students because the course options allow students to take the courses that best meet their needs and abilities.

Education for all is one of the goals that all countries should achieve for better livelihood. This goal caters for both children and adults with disability. One of the educational modes that make this possible is Distance Education. Distance learning program provides postsecondary educational opportunities that may not be present at conventional universities for students with disabilities.

Distance learning is also a great tool to help students who are in geographically remote areas and may not have readily available access to educational facilities or who want to explore opportunities not offered by their local schools or colleges. Many schools and educational institutions are now being put up with a focus on distance education and even many popular and well-respected educational institutions around the world now introduce distance education programs in many of the educational courses they offer [4] for their students.

Distance learning through Internet (e-learning), provides the rich promise and potential of learning delivery at anytime, anywhere, on any topic: international courses (fully inter-cultural, with learners-teachers from all over the world), relevant learning efficiency, just-in-time learning, higher degrees of inter-activity and communication.

These new forms of distance learning particularly offer a number of opportunities for persons with disabilities to overcome certain physical impairments (e.g. visual deficiencies, hearing problems, difficulties resulting). Distance learning provides facility to access knowledge, services without travelling [5]. Distance learning provides ability to these individuals to break the isolation that disabled people feel in their life and by restoring a social identity for them, but all these things are not gone in easy steps. Individuals suffering from such disabilities require more attention and easy access of all available educational tools so that they met their requirements.

Today is the time of computers, laptops, tablets and android based mobiles that provides a dramatically change in way of learning and teaching. This device enhances the learning abilities of students to a great extent. But in case of person with disability who are unable to access or getting the benefits of these devices they offered, these devices are not sufficient enough to serve for this purpose. This disorder can make it problematic for a person to learn as quickly or in the same way as someone who is not affected by a learning disability.

This paper describes the detailed description of functionality of E-learning utility for helping individuals having physical disabilities.

Section II describes the shortcomings of the current distance learning methods. Section III discusses the learning Utility and its features. Section IV contains the Implementation details of this utility. Section V Advantages of this utility and Section VI concludes the paper.

II. SHORTCOMING OF CURRENT LEARNING METHODS

When developing courses for online sharing, it is essential that educators are equipped to meet the requirements of all potential members, which may includes individuals with some specific disabilities also. Individual suffering from such disabilities

Traditional classrooms are the most common education scenario available worldwide in which one instructor surrounded by multiple students. Person with disabilities are feeling insecure or unable to participate in this environment. They feel afraid or shame because of their disabilities. Some other drawbacks still occur in current education tools.

- Individuals growing up with disabilities are unable to use mouse, keyboard normally. They need some technology to make their work easy without using these devices.
- Person suffering from blind or low vision problem are unable to view contents on screen easily due to small screen resolution.
- Special training is needed for instructors to teach students having such disabilities.

- Users using hearing aids experience disturbance from digital mobile phones, while people who have physical impairments may find it hard to hold and activate the buttons on mobile devices.

III. FEATURES OF E-LEARNING UTILITY

We believe people with disabilities should have the same opportunities as others. Unfortunately, they often lack some of the skills they need to experience these opportunities. Computers and mobile devices have done a great deal to allow individuals with physical or mental disabilities to participate fuller life. Computers and mobile devices can help disabled people in many different areas of life including working, reading, and communicating. For this purpose E-learning utility is used to provide greater advantages over these limitations.

E-learning utility provides functionality to support several local languages that makes easy to understand for individuals with some learning disabilities. E-Learning utility can be designed and developed with following feature set:

FOR BLIND/LOW VISION

- Text-to-speech facility.
- Talking word processors with talking spell checking system.

Blind or Low vision persons are unable to see information display on screen. On screen keyboard is not beneficial for them due to their low vision impairment. Such persons needed some adaptive technology or tools that empower their ability to read and write in normal way as others. This utility serves a functionality that enables such users to read and write computer or electronic device screens easily.

FOR MOBILITY IMPAIRMENT

- On screen keyboard facility
- Allowing for mouse less operation

Persons who have limited use of their hands or arms feeling problem in making use of keyboard or other pointing devices like mouse or sometime they unable to make eye-hand coordination while using pointing devices. People with such disabilities struggle to carry out one or more functions with ease by an average person

FOR HEARING/HARD HEARING

- Transcript for audio based files
- Blinking lights and vibration alert facility when any application open or close.
- Translate sign language into text

Persons suffered from hearing problems needed a tool which enhances their hearing impairment functioning in a predominantly hearing world. Person with hearing disability having problem in communicate or unable to hear voice commands. Sign language is good option to communicate with them. This utility provides functionality to immediate translation of sign language into text on screen available in multiple languages. After configuring this utility user will able to see the information or content on screen in his/her understandable language.

The basic idea behind this utility is to help individuals with disabilities to break the barriers of their limitations so that they can get similar opportunities and also lives a normal life as others.

IV. IMPLEMENTATION OF E-LEARNING UTILITY

The implementation of this e-learning utility based on the idea to provide similar benefits to individuals with disabilities so that they can learn and grown up their knowledge as non-disabled individuals. This utility provides facility to see information displayed in user understandable language. User will able to select any language other than system default language which is more understandable for user.



Figure 1. Type of disability interface



Figure 2. Language selection configure interface

FOR BLIND/LOW VISION

This process provides options for blind or low vision persons so that they can use computers or other mobile devices in normal way.

Features of the process are:-

- i) Automatic text-to-speech conversion.
- ii) Audible feedback
- iii) Audible cues to indicate services like low battery, caller waiting.
- iv) Talking word processors with talking spell checking system.

FOR HEARING OR HARD HEARING

This process provides option for person with hearing disabilities to make use of sign language into text appeared on screen. User signs captured by standard camera integrated in laptops, pc, tablets and their signs are immediately translated into text which can be read by person with such disabilities.

Features of the process are:-

- i) Transcript for audio based files.
- ii) Provide alternative text with every video files.
- iii) Blinking lights and vibration facility
- iv) On screen keyboard facility
- v) Sign language conversion into text on screen



Figure 3. Audio-text Conversion interface



Figure 4. On screen keyboard interface

FOR MOBILITY IMPAIRMENT/LEARNING DISABILITY

This process provides options for individuals who have limited access of their hands or arms.

Features of the process are:-

- i) On screen keyboard facility
- ii) Predictive Texting
- iii) Information present in format in which student control pace of instruction.
- iv) Provide written text instructions.

V. ADVANTAGES OF E-LEARNING UTILITY

Main advantage of this utility is to enhance the capability of an individual with disability which restricts them to take participate in life activities. Using this utility they break the barriers of their disability limitations and get similar opportunities to improve their knowledge and skills as others. This utility provides creative solutions that enable individuals with disabilities to be more independent, productive and included in society and community life.

Implementation of this E-learning utility has following benefits:

- Disabled persons feeling unsafe in travelling from one location to other, for them distance learning is good option.

- Interact to a great extent with non-disabled individual.
- Benefits from opportunities that are taken for granted by individuals who do not have disabilities [6].
- Participate in and contribute more fully to activities in their homes, schools or other places [6].
- Improving the concept of distance education.

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Comparative study on fish and fisheries of a closed and an open type wetland of the Brahmaputra valley

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Abstract- The floodplain Wetlands are considered as biologically sensitive areas and provide excellent nursery grounds for several fish species besides a host of other fauna and flora. The Nahotia (open type) and Potiasola (closed type) Wetlands are located in the geographical ordinates of (26°48'-26°49'N and 94°12'-94°13' E, open Beel) and (26°48'-26°49'N and 94°08'-94°10' E, closed Beel). Investigation on the Wetlands was pursued from January 2005 to December 2007. The Wetlands are situated in the North east of Jorhat town, Assam. The Nahotia Beel is of the open type. 18 families including 50 species have been encountered in the open Beel. The Potiasola Beel is closed type Wetland, situated at about 5 km. from the Jorhat town in Potiagaon. 17 families including 41 species have been encountered in the closed Wetland, during study period. Status of the Ichthyospecies of the open Beel was 3 species as Vulnerable (VU), 3 species as Lower Risk least concern (LR-lc), 17 species Near threatened (LRnt) and 15 species Not assessed (NA). In case of the closed Wetland 5 species as Endangered, 3 species as Vulnerable (VU), 3 species as Lower Risk least concern (LRlc), 17 species Near threatened (LRnt) and 15 species Not assessed (NA). The rate of fish production from the open Beel has been estimated to be average 1693 kg /yr. on an average which is equivalent to 8546264 X10³kcal whereas in the closed Beel has been estimated to be on average 540kg /yr. which is equivalent to 272592 X10⁴kcal.

Index Terms- Closed wetland, Open Wetland, Nahotia Beel, Potiasola Beel etc.

I. INTRODUCTION

Fishery, under modern scientific research, signifies the judicious exploitation of natural resources of water. The success of fishery depends on the knowledge of characteristics of water and soil. The floodplain lakes are considered as biologically sensitive areas as they have vital bearing on the recruitment of population in the riverine ecosystem and provide excellent nursery grounds for several fish species besides a host of other fauna and flora. Most of the Beels of Assam are infested with macrophytes, which pose problem in the operation of various fishing gear. These interfere in the productivity of the ecosystem also. At present, the Nahotia and Potiasola Beels are infested with aquatic weeds, there is very low level of fish production i.e., 30 – 40 kg/ha/yr. But there is a potential for at least 1000 – 2000 kg/ha/yr. if managed scientifically. Fishing gears such as Drag nets, Lift nets, Hooks, and Cast net (Locally the net is known as “khewalijal” in this area) were practiced in the wetlands. This net is made of nylon threads and having a strong long rope attached to the apex. The net is look like an open

umbrella. A number of weights of iron or lead are attached along the Margin of the pockets. The length of the cast net is from 2 to 4 meters. The weight of the net is ranged from 5 -10 kg. Some traditional methods are also practiced in the Beels (Chepa, Tonijal, Jakoi Hhekijal etc.). Dewatering method is carried out during the month of December/January. After dewatering fish are easily caught by hand picking. The major changes observed that the nets were woven and fabricated by synthetic materials instead of natural materials as in the past. The use of unauthorized mesh size and use of a wide range of non – selective fishing gears such as mosquito nets in these Beels indicates that most fishers does not comply with the existing fishery act and fishing regulations and are not concerned with possible over exploitation of the stocks of commercially important species.

II. MATERIAL & METHODS

Physical, chemical and biological parameters of the Nahotia (Open type) and Potiasola (Closed type) wetlands have been investigated from January 2005 to December 2007. Morphometric parameters such as Full Storage Level (FSL), Dead storage level (DSL), length, width, and periphery were measured using standard civil engineering method (Punmia, B.C. 1988). Shore development (SD) is calculated by the equation. $SD = S/2 \sqrt{A/\pi}$, where, S, the length of the shoreline and A, the area of the wetland. The volume development (V_D) is determined by following equation. $V_D = 3 (D_m) / (D_{max})$ where, D_m, mean depth of the wetland and D_{max}, Maximum depth of the wetland.

The fish species of the Beels was studied with regard to their taxonomy catch statistics and production. Fish samples were collected at the time of catch of the Beels. Landing site was visited once a week and collected data from the Beels and also enquires from fishermen, Mohalder etc. The individual species was weighed and recorded. Fish yield are estimated by direct observations on catch of individual Beel (Jhingran and Dutta, 1968). The collected samples preserve in 5% formalin and identified after Talwar & Jhingran (1991) and Jayaram (1999). Energy conservation factor of fish tissues is 5048 – 5789cal/g (Javier et al., 2006). 1kg of fish tissues is equal to 5048x10³kcal. Fish (5048 – 5789cal/g) are most energy density group, followed by insect (50462 – 5231), crustaceans (3364 - 3994cal/g), oligochaetes (3471) and gastropods (1143cal/g). Monthly water samples of the surface and bottom layers of the two zones of the studied wetlands were collected from randomly from the selected spots following the sampling procedure (APHA, 1989).

III. RESULT

Study area of the Beels : The Nahotia (open type) and Potiasola (closed type) wetlands are located in the geographical ordinates of (26°48'-26°49'N and 94°12'-94°13' E, open Beel) and (26°48'-26°49'N and 94°08'-94°10' E, Closed Beel). Hydrotopographic measurement of the closed and open type Wetlands (table 1) and hydro topographical map of the Wetlands are shown figure 4. 18 families including 41 and 50 species have been encountered in the closed and open Beel respectively during 2005-07 (table.2).

Status of fishes according to IUCN are shown in table 2 & fig 1 for both the Wetlands. Annual fish yield was 41.53kg/ha (open Beel) and 25.65 kg/ha (closed Beel) (table 3&4). Average fish production of closed Beel was 500,520 and 600 in the years 2005, 2006 and 2007 respectively. Fish landing in open Beel was 1502, 1531, 2046 in the year 2005, 2006 and 2007 respectively (table 3&4). Fish production by different groups was 316 kg by the carps, catfish (270kg), Feather Back (220kg), Murrel (120kg), *Anabus* (100kg) *C.batrachus*(40kg), *H.pneuses fossilis* (50), and Miscellaneous (577kg) in the open Wetland. Fish production by different group of fishes were as follow 10 kg by carps, *C.batrachus*(40kg), *H.pneuses fossilis* (50), catfish(54kg), Feather Back (40kg), Murrels (30kg), and Miscellaneous (216kg) in the closed Wetland (table 4 &fig.3).

Physicochemical characteristics:

Dissolved oxygen in Open Beels water ranged 6 to 10 ml/l with an average value 8.41 ml/l and in closed Beel ranges from 6.49 to 10.03 ml/l with an average value 8.23 ml/l during 2005 – 07(table 6). In open Beel, free CO₂ was 1.9 mg/l and in closed Beel with an average value 1.5mg/l. P^H in open Beel was 6.30 – 7.7. And in Closed Beel fluctuated within 6.5 and 7.2. Hardness of water was higher (35) in open Beel than closed Beel. Minimum and maximum values were 18 and 50 (July and august) in open Beel whereas 15 and 35 in case of Closed Beel. Seasonal variation of turbidity have been observed in entire years. Turbidity was higher (28 NTU) in open Beel than closed Beel (26.8 NTU) during 2005-07. Temperature in open Beel was 17.94 o^C, minimum 7 o^C and maximum 23 o^C. Water temperatures in Closed Beel was 18.18 o^C, minimum 7 o^C and 24.5 o^C maximum. The soil of both the Beels were of the alluvial type. The range of sand in soil was 36.7-40% with an average value of 38.12% and clay ranged from 26.8 - 30 36% with value 25.8 % in Nahatia (open Beel). In closed Beel, it ranged from 29 - 35% (sand) with mean value 32.8% and range of clay from 20 – 23 % with the mean value 21.5.

IV. DISCUSSION

Wetlands are the creation of the river Brahmaputra in the flood plain area. The physiographic and morphometric features of both the Beels are different from each other. The area and water level of the Nahotia Beel is fully dependent upon the water level of the river Brahmaputra. During the summer season, the water level reaches a high level which drops down in the winter season. The area and depth of the Beel increases manifolds at the time of the flood. The area of the Beel expands upto about 80 ha. And the depth reaches up to about 8 meters. In Potiasola Beel the water level and area are dependent upon the

rainwater from surrounding paddy fields. During rainy season the area of the Beel increases up to about 20.000ha, due to the surrounding low-lying paddy fields, which become an integral part of the Beel. Depth increases up to about 6 meters during rainy season .

18 families including 41 and 50 species have been encountered in the closed and open Beel respectively during 2005-07 (table.2). In the open wetland, out of 18 family the Cyprinidae family was found to be highest species (19) and followed by Belontiidae, Siluridae and Channidae with 4 species each and Bagridae having 3 species each, Chandidae, Mastacembelidae, Nandiadae and Notopteridae with 2 species each. And also family such as Belonidae, Anabatidae, Clariidae, Cobitidae, Clupeidae, Chacidae, Heteropneustidae, Synbranchidae and Tetraodontidae were appearing as single species in the open wetland (Nahotia).

In the closed wetland (Potiasola), out of 17 families the Cyprinidae family was found to be highest species (13). And followed by Belontiidae and Channidae with 4 species each and Siluridae and Bagridae having 3 species each, Chandidae, Mastacembelidae and Nandiadae with 2 species each. The remaining family such as Belonidae, Anabatidae, Clariidae, Cobitidae, Clupeidae, Heteropneustidae, Chacidae, Synbranchidae and Tetraodontidae were observed as single species in the wetland. Similar observation was reported by Singh (2009) and Abujam et al (2012). The International Union for Conservation of Nature and Natural Resources (IUCN) has categorized the conservation status of fish species available in the studied Beels. Out of the recorded species in the open beel, 5 species as Endangered (facing an extremely high risk of extinction, or dying out in the wild); 5 species as Vulnerable (VU) (facing a very high risk of extinction in the wild); 3 species as Lower Risk least concern (LRlc) (facing a high risk of extinction in the wild), 19 species Near threatened (LRnt), 16 species are still Not assessed (NA). In case of the closed Wetland (Table 2 & fig 1), was 5 species as Endangered (facing an extremely high risk of extinction, or dying out in the wild); 3 species as Vulnerable (VU) (facing a very high risk of extinction in the wild); 3 species as Lower Risk least concern (LRlc) (facing a high risk of extinction in the wild), 17 species Near threatened (LRnt) and 15 species was Not assessed (NA). 4% species were recorded as exotic and 96 % species were indigeneous in both the wetlands (fig.2). *T.putitora*, *T.tor* *Chitola chitola*, *Ompok pabda* (Ham) and *Ompok bimaculatus* are belongs to endangerous species in open beel. But only one species are found in the closed beel (*Ompok pabda* (Ham) which is also available in the open beel. So far 267 fish species belonging to 114 genera under 38 families and 10 orders has been recorded and reported from the region. This is about 33.13% of total Indian fresh water fishes (Sen, 2000). Sarkar and Poonia (2000) evaluated the ornamental value of 172 fish species occurring in North Eastern Region. The status and export potentialities of indigenous ornamental fishes of India were highlighted by some workers (Dey, 1980 & 1982), Sen & Dey (1984), Nath (1986 & 1987) and Tamang (1992).

Annual fish yield was 41.53kg/ha (Open Beel) and 25.65 kg/ha (Closed Beel) (table 3&4). Average fish production of Closed Beel was 540kg which is less than production of open beel (1693 kg 1), (table 3&4). Fish production by different group

of fishes was found catfish (54kg), Mureles (30kg), *Anabus* (100kg) Feather Back (40kg), *H.pneuses fossilis* (50), *C.batrachus* (40kg), 10 kg by the carps and Miscellaneous (216kg) including ornamental fishes the closed Wetland (table 3-4&fig.3).Highest production was from carp (270kg), followed by catfish(270kg), Feather Back (220kg), *Anabus* (100kg) , *H.pneuses fossilis* (50), *C.batrachus*(40kg) and Miscellaneous (577kg) including ornamental fishes in the open Wetland. Both beels dominated by ornamental fishes (577kg in open Beel and 216kg in closed Beel). Carp production (270kg), was higher in open Beel than the closed Beel (10 kg).Similar observation was found (Acharjee et al, 1998), Bordoloi 2010).

Energy production:

The rate of fish production from the open Beel has been estimated to be average 1693 kg /yr. on an average which is equivalent to 8546264 X10³kcal. (1kg of fish is equal to 5048x10³kcal/kg, table - 5. The contribution of various species in the energy output was as follows *Catla catla*_35336X10⁴k cal, *L. rohita*, 30288X10⁴ k cal , *C.migrala*, 636048 X10⁴ k cal, *L. goni* 2524 X10⁵ k cal , feather back 111056 X10⁴ k cal , Cat fishes, 136296 X10⁴ k cal (dominated by *W.attu*), live fishes including *Channa striatus*, 20192 X10⁴ k cal, *C. punctatus*1, 15144 X10⁴ k cal ,*Channa muralus* ,2524 X10⁵ k cal, *C.batrachus*1, 20192 X10⁴k cal, *H.fossilis* 2524 X10⁵ k cal ,*Anabus*5048 X10⁴ kcal and miscellaneous,2912696 X10³ kcal ., Javieretal C. and Miguel P. (2006) reported that Fish (5048 – 5789cal/g) are most energy density group, followed by insect(50462 – 5231),crustaceans(3364 -3994cal/g),oligochaetys (3471) and gastropods (1143cal/g).

The rate of fish production from the Beel has been estimated to be on average of average 540kg /yr. on an average, which is equivalent to 272592 X10⁴k cal. The contribution of various species in the energy output was *C.batrachus* 20192 x10⁴ kcal,*H.fossilis* 2524 x10⁵ k cal, *Channa muralus* 5048 x10⁴ k cal, *Channa striatus* 42,000k cal, *C. punctatus* 5048 x10⁴k cal, Common carps 5048 x10⁴ k cal , feather back 20192 x10⁴ k cal ,Carp 50480 x10⁴ kcal and Cat fishes 272592 x10³ k cal, table 5.

Comercial production :

Annual fish production was higher in (41.53kg/ha) open Beel than (25.65 kg/ha)closed beel . Average fish production of Closed Beel was 540 kg/yr. and in Open Beel was 1693 k/yr. On the basis of inquiries made at the *beels* sites, the Central Inland Fisheries Research Institute, Barrac pore has estimated yields varying from 14 to 488 kg/ha/year. Average yields of 17 *beels* in the Brahmaputra valley is 134 kg/ha/year, compared to 285 kg/ha in 6 *beels* of the Barak valley. The average yield of 23 *beels* in Assam across the districts is 173 kg/ha (Sugunan and Sinha, 2000). Present production is less due overexploitation fishes, habitat loss and using of unauthorized fishing gears as

well as catch of juvenile in the months of July ,August and September .

V. PHYSICOCHEMICAL CHARECTERSTICS OF WATER

Seasonal variation of dissolved oxygen has been observed throughout the entire year during the investigation. Dissolved oxygen in open Beels water ranged from 6 to 10 ml/l with an average value of 8.41 ml/l and in Closed Beel ranges, 6.49 to 10.03 ml/l with an average value of 8.23 ml/l during 2005 – 07. In open Beel, free co₂ was ranged from 0.5 – 3.3 mg/l with an average value 1.9 mg/l and in closed Beel ranged from 0.5 – 3.2 with an average value 1.5mg/l. Free co₂ (r = -.793) is negatively correlated to dissolved oxygen . Hardness of water in the open Beel ranged from 18 – 50 mg/l with an average value of 35 mg/l whereas in closed Beel it ranged from 15 – 35 mg/l with an average value of 23.1mg /l. Turbidity of water in open Beel fluctuated from 18 – 50 (NTU) with an average valueof 28 (NTU) whereas in the closed Beel it ranged from 15 – 35(NTU) with an average value of 26.8(NTU). p^H of water in the open Beel ranged from 6.30 – 7.7 with an average value of 6.9 while in the closed Beel the was from 5.6 – 7.2 with an average value of 6.8 . Surface water temperature of the open Beel ranged from 7 – 23°C with an average value of about 17.9°C. The average water temperature of the Closed Beel fluctuated from 7°C to 24.5°C with an average value of 18.8°C,table. 5. The minimum and maximum temperature of Closed Beel and open Beels were 9.8⁰c (January) and 32.3⁰c (August). Air temperature of the Beel varied from 9.8 – 33.80^oc with an average temperature 23.680^oc and in the Closed Beel the range was 9 – 33.5 0^oc with an average range 23.68 0^oc during 2005 – 07. Air temperature has a significant positive correlation at the level 0.01 with water temperature (r=0.972)and turbidity (r =0.972), Physico – chemical parameters of water and soil have multiple positive correlations (5% level) with fish production , growth of aquatic macrophytes as well as plankton density. Several workers have reported variable dissolved oxygen level in the beels of Assam. For instance Yadava *et al.*, (1987) recorded 2.6 to 10.9 mg/l Jhingran and Pathak (1987) 4.27 to 11.2mg/l; Acharjee *et al.* (1999) 5.4 to 8.18mg/l.

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Table.1.Hydrotopographic measurement of the Closed and Open type wetlands (FSL= Full storage level, DSL = Dead storage level.

Parameters	Open Beel	Closed Beel
Area at FSL (ha)	80	20

Area at DSL (ha)	66	13.25
Total volume at FSL m ³)	1610448.84	31729.62
Total volume at DSL m ³)	88724.42	15864.81
Maximum length at FSL (m)	1500	1000
Maximum width at FSL (m)	600	500
Maximum length at DSL (m)	930	500
Maximum width at DSL (m)	710	210
Maximum depth at FSL (m)	8	6
Minimum depth at FSL (m)	3	0.25
Mean depth (Dm) at FSL (m)	2.5	2.54
Maximum depth at DSL (m)	3	2.10
Minimum depth at DSL (m)	1.25	0.20
Mean depth (Dm) at DSL (m)	1.1	0.25
Volume development (VD) at FSL)	9.6	3.96
Volume development (VD) at DSL	7.2	0.25

Table 2. Status of the Ichthyospecies of the Nahotia (Open Beel) and Potiasola (Closed Beel) wetlands. Critical Endangered (CR), Endangered (EN), Vulnerable (VU), Lower Risk near threatened (LR - nt), Lower Risk least concern (LR lc) and Not assessed (NA) (January 2005 –December 2007).

Family	Species	Occurrence		Status (IUCN)	Economic importance
		Nahotia Wetland (Open)	Potiasola Wetland (Closed)		
1.Anabatidae	1. <i>Anabus testudineus</i> (Ham.)	√	√	VU	Edible, Good Medicinal value, Aqurium species
2. Belontidae	1. <i>Trichogaster fasciata</i>	√	√	NA	Edible, Aqurium species
	2. <i>T. labiosa</i>	√	√	NA	Edible, Aqurium species
	3. <i>T. lalia</i>	√	√	NA	Edible, Aqurium species
	4. <i>T. sota</i>	√	√	NA	Edible, Aqurium species
3. Beloni dae	1. <i>Xenentodon cancilla</i> (Ham.)	√	√	LR-nt	Edible, Aqurium species
4. Bagr i dae	1. <i>Mystus cavasius</i> (Ham.)	√	√	LR-nt	Edible, Aqurium species
	2. <i>M. tengra</i> (Ham.)	√	√	NA	Edible, Aqurium species
	3. <i>Rita Rita</i> (Ham.)	√	√	LR-nt	Edible

5.Chandi dae	1. <i>C.handa nama</i> (Ham.)	√	√	NA	Edible, Aqurium species
	2. <i>Parambassis ranga</i> (Ham.)	√	√	NA	Edible, Aqurium species
6.Chacidae	1. <i>Chaca chaca</i> (Ham.)	√	√	NA	Edible, Good Aqurium species
7. Clariidae	1. <i>Clarius batrachus</i> (Linn.)	√	√	VU	Edible,Good Medicinal value Aqurium species
8. Cobitidae	1. <i>Botia dario</i> (Ham.)	√	√	NA	Edible, Aqurium species
Family	Species	Occurrence		Status (IUCN)	Economic importance
		Nahotia Wetland (Open)	Potiasola Wetland		
9. Cyprinidae	1. <i>Amblypharyngodonmola</i> (Ham.)	√	√	LR-lc	Edible, Aqurium species
	3. <i>Chela apter</i> (ham).	√	√	NA	Edible, Aqurium species
	4. <i>Cirrhinus mrigala</i> (ham).	√	√	LR-nt	Edible
	5. <i>Labeo bata</i> .	√	√	LR-nt	Edible
	6. <i>Labeo gonius</i> (ham).	√	√	LR-nt	Edible
	7. <i>Puntius chola</i> (ham.)	√	√	VU	Edible, Aqurium species
	8. <i>P.sophore</i> (ham.)	√	√	LR-nt	Edible, Aqurium species
	9. <i>P.ticto</i> (ham)	√	√	LR-nt	Edible Aqurium species
	10. <i>P. sarrana</i> .	√	X	VU	Edible
	11. <i>Rasbora daniconius</i> (ham.).	√	√	NA	Edible Aqurium species
	12. <i>Cyprinus carpio carpio</i> (Lin.)	√	√	Exotic	Edible
	13.Ctenopharyngodon idella	√	√	Exotic	Edible
	14. <i>Catla catla</i>	√	X	VU	Edible
	15. <i>L. calbasu</i>	√	X	LR-nt	Edible
	16. <i>L. rohita</i>	√	√	LR-nt	Edible
	17. <i>T.putitora</i>	√	X	EN	Edible
	18. <i>T.tor</i>	√	X	EN	Edible
	19. <i>Pangusia pangusia</i>	√	X	NA	Edible
Family	Species	Occurrence		Status (IUCN)	Economic importance

		Nahotia Wetland (Open)	Potiasola Wetland (Closed)		
10. Channidae	1. <i>Channa gachua</i> (Ham.-Bloch.)	√	√	NA	Edible, Good Aqurium species
	2. <i>C. marulius</i> (Ham.)	√	√	LR-nt	Edible Aqurium species
	3. <i>C. punctatus</i> (Bloch.)	√	√	LR-nt	Edible Aqurium species
	4. <i>C. striata</i> (Bloch.)	√	√	LR-lc	Edible Aqurium species
11. Clupeidae	1. <i>Gudusia chapra</i> (Ham)	√	√	LR-lc	Edible Aqurium species
12. Heteropneutidae	1. <i>Heteropneustes fossilis</i> (Bloch)	√	√	VU	Edible, Good mecnal value, Aqurium species
13. Mastacembellidae	1. <i>Mastacembelus armatus</i> (Lacepede).	√	√	LR-nt	Edible Aqurium species
	2. <i>Macrogathus pancalus</i> (Ham)	√	√	LR-nt	Edible Aqurium species
14. Nandidae	1. <i>Nandus nandus</i> (Ham)	√	√	LT-nt	Edible ,Good Aqurium species
	2. <i>Badis badis</i>	√	√	NA	Edible, Good Aqurium species
15. Notopteridae	1. <i>Notopterus notopterus.</i>	√	√	LR-nt	Edible Aqurium fish
	2. <i>Chitala chitala</i>	√	X	EN	Edible
16. Siluridae	1. <i>Ompok pabda</i> (Ham)	√	√	EN	Edible, species Aqurium fish
	2. <i>Ompok pabo</i> (Ham)	√	√	NA	Edible species Aqurium fish,
	3. <i>Ompok bimaculatus</i>	√	X	EN	Edible, Aqurium fish
	4. <i>Wallago attu</i>	√	√	LR -nt	Edible
17. Synbranchidae	1. <i>Monopterus chuchia</i> (Ham)	√	√	LR-nt	Edible Good Aquriumspecies
18. Tetradontidae	1. <i>Tetradon cutcutia</i> (Ham)	√	X	LR-nt	Edible, Aquriumspecies

Table .3. Annual fish catch statistics (kg) in Nahotia (NAH) and Potiasola (POT) Wetlands (2005-07)

Years	Closed Wetland	Open Wetland	Mean
	(kg)	(kg)	
2005	500	1502	1001
2006	520	1531	1025.5
2007	600	2046	1323
Average	540	1693	

Table .4. Fish catch statistics (kg) by different groups in Nahotia (NAH) and Potiasola (POT) Wetlands (2005-07)

	Closed Wetland	Open Wetland
Carps	10	316
Cat fishes	54	270
Mureles	30	120
Feather Back	40	220
Miscellaneous	216	577
C.batrachus&	40	40
H.pneuses fossilis	50	50
Anabus	100	100
Total	540	1693

Table 5. Energy Density of individual fish tissues (kcal/g).

Species	Individual fish in Open Wetland (kg)	Energy Density (kcal)	Individual fish in Closed Wetland(kg)	Energy Density (kcal)
		Energy Consevation factors(5048g/cal)		Energy Consevation Factors (5048 g/cal)
<u>Catla catla</u>	70	35336X10 ⁴	0	0
L. rohita	60	30288X10 ⁴	0	0
C.migrala	126	636048 X10 ⁴	0	0
Common carps&Grass carps(exotic)	10	5048 X10 ⁴	10	5048 X10 ⁴
L. gonius	50	2524 X10 ⁵		
Cat fishes (dominated by W.attu),	270	136296 X10 ⁴	54	272592 X10 ³
Featherback	220	111056 X10 ⁴	40	20192 X10 ⁴
Channa striatus	40	20192 X10 ⁴	10	5048 X10 ⁴
C. puncatus1	30	15144 X10 ⁴	10	5048 X10 ⁴
Channa muralus	50	2524 X10 ⁵	10	5048 X10 ⁴
H.fossilis	50	2524 X10 ⁵	50	2524 X10 ⁵
C.batrachus	40	20192 X10 ⁴	40	20192 X10 ⁴
Anabus	100	5048 X10 ⁴	100	5048 X10 ⁵
Miscellaneous	577	2912696 X10 ³	216	1090368 X10 ⁴
	1693	8546264 X10 ³	540	272592 X10 ⁴

Table 6. Summary of the physicochemical charecterstics of water of the closed and open Wetlands (January 2005 – December 2007).

Characteristics of water	Wetlands	Range	Mean
DO (mg/l)	Open beel	7.5 - 10	8.41
	Closed Beel	6.49 - 10.03	8.23
pH	Open beel	6.30 - 7.7	6.9
	Closed Beel	5.6 - 7.2	6.8
Hardness (mg/l)	Open beel	18 - 50	35
	Closed Beel	15 - 35	23.1
Free co2	Open beel	0.5 - 2.8	1.5
	Closed Beel	0.5 - 2.7	1.34
Temperature Oc	Open eel	7 - 23	17.9
	Closed eel	7 - 24.5	18.18
Air Temperature Oc	Open beel	9.8 - 33.8	28
	Closed Beel	9 - 33.5	26.8
Turbidity (NTU)	Open beel	18 - 50	28
	Closed Beel	18 - 50	26.8

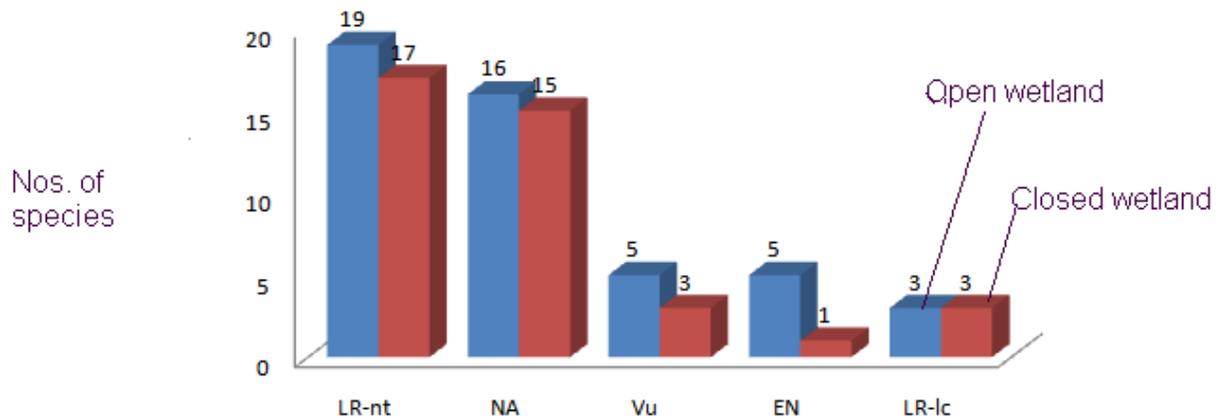


Fig.1. Status of the Ichthyospecies of the Nahotia (Open Beel) and Potiasola (Closed Beel) wetlands. Critical Endangered (CR), Endangered (EN), Vulnerable (VU), Lower Risk near threatened (LR - nt), Lower Risk least concern (LR lc) and Not assessed (NA) (January 2005 –December 2007) .

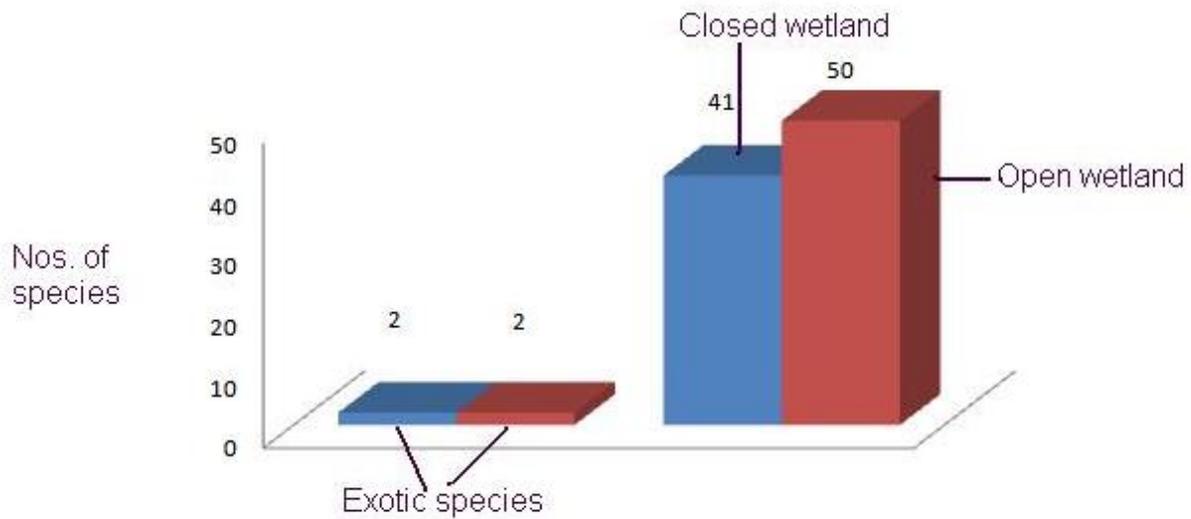


Fig.2.Status of exotic species in closed and open Wetland (2005-07).

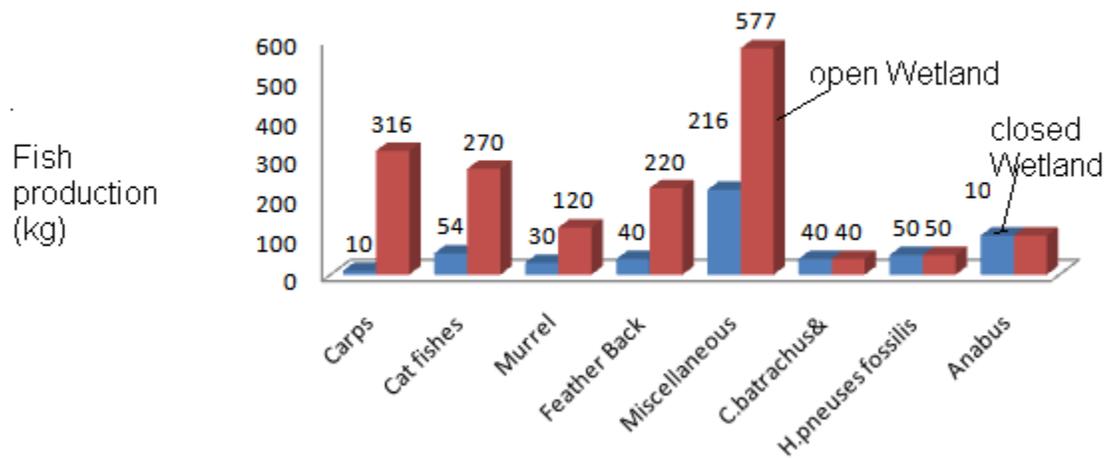


Fig.3. Fish composition in closed and open beel (2005-07).

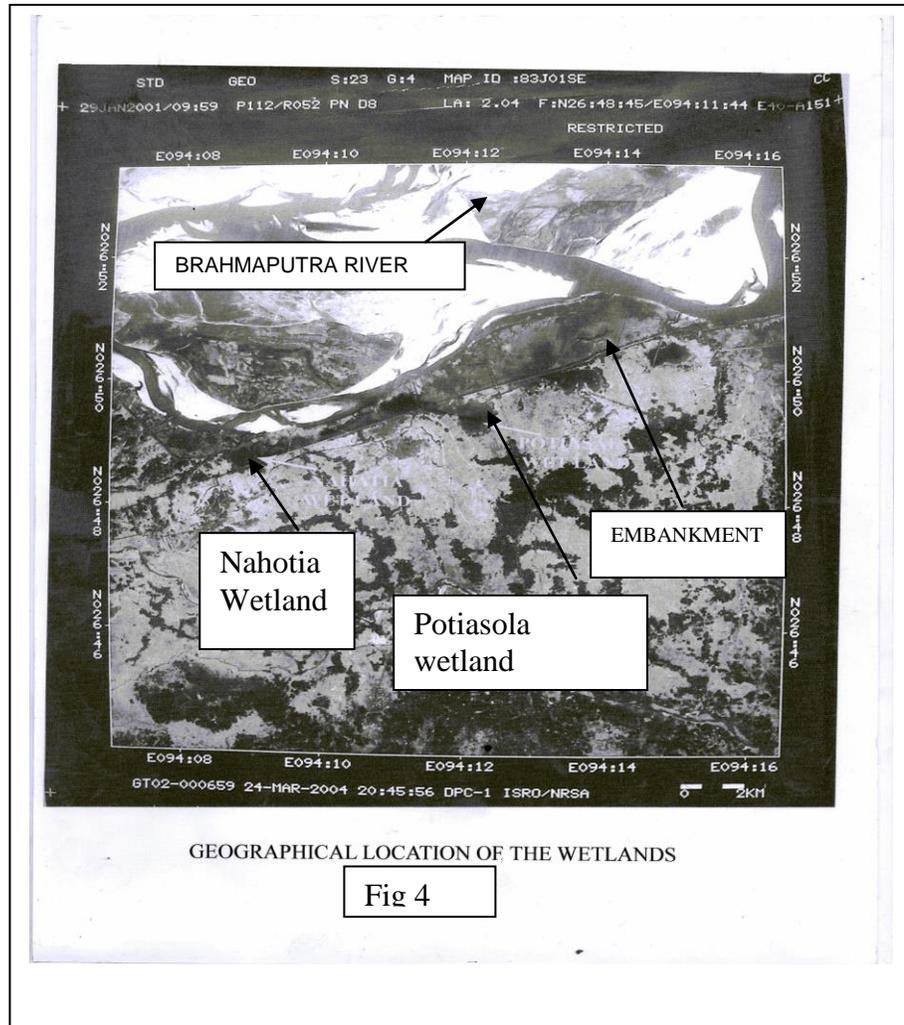


Fig.4 : Location of the wetlands.

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Foreign Direct Investment, the Indian scenario

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Abstract- Globalization and liberalisation brings lots of new innovative products to the world, Foreign Direct Investment is the one among this, also there are number of different forms of FDI is available currently. Recently, Government of India allowed FDI in different sectors of Indian economy. But several opposition parties are making it a political issue in parliament on these policy decisions and amendments. With a view to infuse globally acceptable best practices, modern management skills and latest technology, it has been decided to allow foreign investment in India. The objective of the present study is to provide a skeleton on foreign direct investment with the scene of different sectors. It also point out the sector-wise distribution of FDI inflow to know about which has concerned with the chief share. The present study is based on secondary data collected from different sources. This paper also tries to find out the scenario and role and Scope of Foreign Direct Investment in India.

Index Terms- foreign direct investment; economic growth, economic development, dynamic growth.

I. INTRODUCTION

The role of foreign direct investment (FDI) in stimulating economic growth is one of the controversial issues in the development literature. The great promise of foreign direct investment (FDI) by multinational corporations is that capital will stimulate dynamic growth. Beyond boosting income and employment, the hope is that manufacturing FDI will bring knowledge that indirectly effect in building skill and technological capacities of local firms, catalysing broad-based economic growth. The part played by foreign direct investment (FDI) in the development process has undergone several changes. In the 1960s, FDI was seen in most countries as a partner in the development endeavours. India adopted a regime that was perceived to be restrictive towards FDI. Explicit curbs on foreign investment were imposed through the introduction of the Foreign Exchange Regulation Act (FERA) in 1973 by restricting foreign ownership of shares in enterprises incorporated in India. At the same time, foreign firms operating in India were subjected to "local content" and "foreign exchange balancing" rules that curbed their freedom of operation. The Industrial Licensing System under the Industries Development and Regulation Act, 1951 and the Monopolies and Restrictive Trade Practices Act, 1969 sought to channelize their activities into high technology and export-oriented production.

The limits on foreign shares fostered joint ventures with Indian entrepreneurs. These policies continued until the policy of creeping liberalisation of the Indian economy was initiated in the 1980s. The fast-tracked liberalisation of the Indian economy

introduced in 1991 brought with it a radical shift in the policy towards FDI. In fact, FDI policy reform formed part of the first package of industrial reforms in July 1991 and was reflected in the Industrial Policy announced in 1991.

Foreign investment would bring associated advantages of technology transfer, marketing expertise, introduction of modern managerial techniques and new possibilities for promotion of exports. The government will therefore welcome foreign investment which is in the interest of the country's industrial development.

FDI is considered to be the most attractive type of capital flow for emerging economies as it is expected to bring latest technology and enhance production capabilities of the economy. Foreign investments mean both foreign portfolio investments and foreign direct investments (FDI). FDI brings better technology and management, access to marketing networks and offers competition, the latter helping Indian companies improve, quite apart from being good for consumers. This efficiency contribution of FDI is much more important.

The changes in the sentiments towards FDI were given effect to in the form of a series of changes in the policies. These included removing the ceilings on foreign equity imposed by the FERA, lifting of restrictions on the use of foreign brand names in the domestic market, removing restrictions on entry and expansion of foreign direct investment into consumer goods, abandoning the "local content" and "foreign exchange balancing" rules, among others. The parallel process of virtual withdrawal of the Industrial Licensing System and the retreating from the primacy given to public sector also enhanced the scope for FDI participation in India. Together with liberalizing the FDI regime, steps were taken to allow foreign portfolio investments into the Indian stock market through the mechanism of foreign institutional investors. The objective was not only to facilitate non-debt creating foreign capital inflows but also to develop the stock market in India's FDI Inflows: lower the cost of capital for Indian enterprises and indirectly improve corporate governance structures. On their part, large Indian companies have been allowed to raise capital directly from international capital markets through commercial borrowings and depository receipts having underlying Indian equity. Thus, the country adopted a two-pronged strategy: one to attract FDI and to encourage portfolio capital flows which ease the financing constraints of Indian enterprises. As a result of the above-mentioned policy changes, India now follows an FDI-friendly regime that is quite comparable to that adopted by most countries.

Much of the foreign investment can now take advantage of the automatic approval route without seeking prior permission of the Central Government. Caps on FDI shareholding are now applied to only a few sectors, mainly in the services sector. Simultaneous steps have also been taken to remove the hurdles in the path of foreign investors both at the stage of entry and later in

the process of establishing the venture. The policy changes were thus aimed at improving India's record in attracting FDI inflows, which was seen to be below its potential, particularly when compared with the massive inflows reported by other countries.

Following the commercial bank debt crisis and the aid fatigue, in the 1980s, FDI became the preferred source once again, as countries became more attracted towards non-debt creating sources of external private finance. Since then; more attention is being paid to the possible role of FDI in economic development. An extensive amount of literature on FDI has emerged regarding its role in not just augmenting domestic savings for investment but more as provider of technologies and managerial skills essential for a developing country to achieve rapid economic development.

Now Government of India allowed FDI (Foreign Direct Investment) in different sectors of economy. FDI includes mergers and acquisitions, building new facilities reinvesting profits earned from overseas operations and intra company loans. FDI is in dissimilarities to portfolio investment which is a passive investment in the securities of another country such as stocks and bonds. FDI is defined as the net inflows of investment to acquire a lasting management interest in an enterprise operating in an economy other than that of the investor. As per the data, the sectors that attracted higher inflows were services, telecommunication, construction activities and computer software and hardware. On 14 September 2012, Government of India allowed FDI in aviation up to 49%, in the broadcast sector up to 74%, in multi-brand retail up to 100%, the choice of allowing FDI in Multi-brand retailing up to 51% has been left to each state.

II. REVIEW OF LITERATURE

Agarwal and Khanin (2011) in their the study found that 1% increase in FDI would result in 0.07% increase in GDP of China and 0.02% increase in GDP of India. We also found that China's growth is more affected by FDI, than India's growth. Kumar and Karthika (2010) found out in their study that Foreign Direct Investment has a major role to play in the economic development of the host country. Most of the countries have been making use of foreign investment and foreign technology to accelerate the pace of their economic growth. FDI ensures a huge amount of domestic capital, production level and employment opportunities in the developing countries, which a major step towards the economic growth of the country.

Singh (2009) stated in their study that foreign direct investment (FDI) policies play a major role in the economic growth of developing countries around the world. Attracting FDI inflows with conducive policies has therefore become a key battleground in the emerging markets. The paper highlighted the trend of FDI in India after the sector-wise economic reforms. Devajit (2012) conducted the study to find out the impact of foreign direct investments on Indian economy and concluded that Foreign Direct Investment (FDI) as a strategic component of investment is needed by India for its sustained economic growth and development through creation of jobs, expansion of existing manufacturing industries, short and long term project in the field of healthcare, education, research and development.

Balasubramanyam and Sapsford (2007) stated in their article "Does India need a lot more FDI" compared the levels of FDI inflows in India and China, and found that FDI in India is one tenth of that of China. The paper also concluded that India may not require increased FDI because of the structure and composition of India's manufacturing, service sectors and her endowments of human capital and the country is in a position to unbundle the FDI package effectively and rely on sources other than FDI for its capital requirements. Bajpai and Jeffrey (2006) stated attempted the paper on "Foreign Direct Investment in India: Issues and Problems", to identify the issues and problems associated with India's current FDI regimes, and also the other associated factors responsible for India's unattractiveness as an investment location. Despite India offering a large domestic market, rule of law, low labour costs, and a well working democracy, her performance in attracting FDI flows have been far from satisfactory. The conclusion of the study is that a restricted FDI regime, high import tariffs, exit barriers for firms, stringent labor laws, poor quality infrastructure, centralized decision making processes, and a very limited scale of export processing zones make India an unattractive investment location. Chien and Zhang (2012) focused in their study the problems related to FDI in the North Central Area and South Central Area of Vietnam in the period 2000-2010. The paper found out that FDI and GDP have close relationship with each other. Both FDI and GDP have contributed importantly and positively in the interpretation of each other in the provinces having extremely difficult socio-economic conditions, but this is especially true in localities with better socio-economic conditions.

Sharma Reetu and Khurana Nikita (2013) in their study on the sector-wise distribution of FDI inflow to know about which has concerned with the chief share, used a data from 1991-92 to 2011-2012 (post-liberalization period). This paper also discusses the various problems about the foreign direct investment and suggests the some recommendations for the same. In this study found that, Indian economy is mostly based on agriculture. So, there is a most important scope of agriculture services. Therefore, the foreign direct investment in this sector should be encouraged.

The trends in foreign investment flows into India may be classified as Foreign Direct Investment and Portfolio Investment (FII). FDI refers to the net inflows of investment to acquire a lasting management interest (10 percent or more of voting stock) in an enterprise operating in an economy other than the investor. Foreign Institutional Investment refers to the outside companies investing in the financial markets of India. International Institutional investors must register with the Securities Exchange Board of India to participate in the market. FDI in Indian business sectors can easily be made in a variety of ways, through the Governmental and Automatic routes.

Recently in 2012, the Industry Ministry came out with a consolidated Foreign Direct Investment (FDI) document incorporating significant changes in the FDI norms by permitting foreign institutional investors. According to a notification issued by the Department of Industrial Policy and Promotion's (DIPP's) on consolidated FDI policy, the government has decided to liberalise the policy. DIPP also announced that the consolidated FDI circular will be announced every year instead of six monthly bases. The next policy will be on March 29, 2013. The policy

also clarified that subject to the sectorial foreign holding cap, companies will now need prior permission from Reserve bank of India (RBI) for an overall FII holding of beyond 24 per cent. After RBI permission, the companies can allow FIIs to hold more than 24 per cent after the approval for the same by their boards and shareholders. Thus this paper attempts to analyze the trend of FDI in various sectors in India.

III. OBJECTIVES AND METHODOLOGY

The data required for this study were collected from various published sources and the specific objectives are:

- To access the sector-wise foreign direct investment in India.
- To discuss the trend of foreign direct investment in India.
- To suggest some recommendations with reference to this study.

The cumulative amount of inflow of FDI was US\$ 290,078 million for the period from April, 2000 to March, 2013. While the FDI inflow to India during the financial year 2012-13 was US\$ 36,860million.

Table No. 1
Total FDI Inflows
(From April, 2000 to March, 2013)

Sl No.	Item	Amount of FDI Inflow	
		(in ₹ Crore)	(in \$ million)
1	Cumulative Amount of FDI Inflows (Equity inflows + Re-invested earnings + Other capital)	-	290,078
2	Cumulative Amount of FDI Equity Inflows (Excluding, amount remitted through RBI's-NRI Schemes)	896,380	193,282

Source: FDI Statistics, Department of Industrial Policy & Promotion, Ministry of Commerce & Industry, Government of India. 2013.

Table No. 3
SECTOR-WISE FDI EQUITY INFLOWS FROM APRIL, 2000 TO MARCH, 2013

Sl. No	Sector	Amount of FDI Inflow		% with total FDI Inflow (+)
		(in ₹ Crore)	(in \$ million)	
1	Services Sector	172,275.31	37,234.60	19.26
2	Construction Development	101,049.13	22,080.20	11.42
3	Telecommunications	58,732.23	12,856.06	6.65
4	Computer Software & Hardware	52,774.07	11,691.10	6.05
5	Drugs & Pharmaceuticals	48,879.53	10,318.17	5.34
6	Chemicals (Other Than Fertilizers)	40,495.55	8,880.83	4.59

Table No. 2
FDI Inflows during Financial Year 2012-13
(From April, 2012 to March, 2013)

Sl No.	Item	Amount of FDI Inflow	
		(in ₹ Crore)	(in \$ million)
1	Total FDI Inflows Into India (Equity inflows + Re-invested earnings + \Other capital)	-	36,860
2	FDI Equity Inflows	121,907	22,423

Source: RBI's Monthly bulletin dated: 13.05.2013.

Foreign Direct Investment (FDI) as a strategic component of investment is needed by India for its sustained economic growth and development through creation of jobs, expansion of existing manufacturing industries, short and long term project in the field of healthcare, education, research and development. The sector-wise inflow of FDI into various sectors in India reflects the sustained economic growth and development through creation of jobs, expansion of existing manufacturing industries.

The sectorial-wise inflow of FDI to India for the period from April, 2000 to March 2013, reveal that 19.26 percentages were on service sector, while 11.42 percentages were in Construction Development sector. Telecommunications. Computer, Software & Hardware and Drugs & Pharmaceuticals sector were 6.65 % 6.05%, and 5.34% respectively. FDI inflow to Automobile Industry, Power, Metallurgical Industries and Hotel & Tourism sector were 4.59 %, 4.29 %, 4.05 %, 3.88% and 3.43% respectively.

During this period FDI inflow to sectors namely Petroleum & Natural Gas ,Trading Information & Broadcasting (Including Print Media) , Electrical Equipment ,Cement and Gypsum Products , Non-Conventional Energy , Miscellaneous Mechanical & Engineering Industries , Industrial Machinery ,Consultancy Services and Construction (Infrastructure) accounts for one to three percentage only. While in the other sectors the FDI inflows were less than one percentage.

7	Automobile Industry	39,169.94	8,294.85	4.29
8	Power	36,136.88	7,834.22	4.05
9	Metallurgical Industries	34,814.13	7,507.07	3.88
10	Hotel & Tourism	33,260.03	6,631.25	3.43
11	Petroleum & Natural Gas	24,808.41	5,381.48	2.78
12	Trading	18,646.51	3,955.80	2.05
13	Information & Broadcasting (Including Print Media)	15,495.69	3,284.21	1.70
14	Electrical Equipment	14,668.58	3,182.70	1.65
15	Cement and Gypsum Products	11,779.04	2,626.43	1..36
16	Non-Conventional Energy	12,901.12	2,591.22	1.34
17	Miscellaneous Mechanical & Engineering Industries	10,522.52	2,318.71	1.20
18	Industrial Machinery	11,017.51	2,302.14	1.19
19	Consultancy Services	9,692.72	2,095.13	1.08
20	Construction (Infrastructure) Activities	9,741.06	1.08	1.08
21	Food Processing Industries	8,681.38	1,811.06	0.94
22	Ports	6,717.38	1,635.08	0.85
23	Agriculture Services	7,797.73	1,608.69	0.83
24	Hospital & Diagnostic Centres	7,437.93	1,597.33	0.83
25	Textiles (Including Dyed,Printed)	5,689.76	1,226.02	0.63
26	Electronics	5,466.74	1,198.22	0.62
27	Sea Transport	5,492.51	1,194.50	0.62
28	Fermentation Industries	5,095.29	1,134.63	0.59
29	Rubber Goods	5,824.46	1,134.44	0.59
30	Mining	4,368.18	998.30	0.52
31	Paper And Pulp (Including Paper Products)	4,056.14	865.54	0.45
32	Prime Mover (Other Than Electrical Generators)	4,131.80	848.68	0.44
33	Education	3,332.97	684.35	0.35
34	Soaps, Cosmetics & Toilet Preparations	3,115.54	632.39	0.33
35	Machine Tools	2,967.09	622.99	0.32
36	Medical And Surgical Appliances	2,913.92	604.47	0.31
37	Ceramics	2,195.59	508.13	0.26
38	Air Transport (Including Air Freight)	2,022.00	449.26	0. 23
39	Diamond &,Gold Ornaments	1,810.74	390.76	0.20
40	Glass	1,942.21	389.07	0.20
41	Vegetable Oils And Vanaspati	1,893.72	384.94	0.20
42	Fertilizers	1,425.53	297.90	0.15
43	Agricultural Machinery	1,423.25	296.42	0.15
44	Printing Of Books (Including Litho Printing Industry)	1,257.51	272.32 0	40.14
45	Railway Related Components	1,246.35	270.33	0.14
46	Commercial, Office & Household Equipment	1,181.76	254.83	0.13
47	Earth-Moving Machinery	769.05	174.95	0.09
48	Leather,Leather Goods And Pickers	527.88	107.43	0.06
49	Tea And Coffee & Rubber (Processing &	456.01	101.21	0.05
50	Retail Trading (Single Brand)	459.55 9	95.36	0.05
51	Scientific Instruments	496.11	94.48	0.05
52	Timber Products 398.52 79.15 0.04	398.52	79.15	0.04
53	Photographic Raw Film And Paper	269.26	66.54	0.03
54	Industrial Instruments	307.45	66.53	0.03

55	Boilers And Steam Generating Plants	305.75	61.83	0.03
56	Sugar	242.32	51.82	0.03
57	Coal Production	103.11	24.78	0.01
58	Dye-Stuffs	87.32	19.50	0.01
59	Glue And Gelatin	70.56	14.55	0.01
60	Mathematical, Surveying And Drawing Instruments	39.80	7.98	0.00
61	Defence Industries	19.89	4.12	0.00
62	Coir	10.37	0.00	60.00
63	Miscellaneous Industries	35,469.	7,843.68	4.10
Sub -Total		896,379.67	193,283.31	100
64	RBI'S- NRI Schemes (2000-2002)	533.06	121.33	-
Grand Total		896,912.73	193,404.64	-

Source: FDI Statistics, Department of Industrial Policy & Promotion, Ministry of Commerce & Industry, Government of India, 2013.

IV. CONCLUSION

FDI in India has a significant role in the economic growth and development of India. FDI in India to various sectors can attain sustained economic growth and development through creation of jobs, expansion of existing manufacturing industries. The inflow of FDI in service sectors and construction and development sector, from April, 2000 to March, 2013 attained substantial sustained economic growth and development through creation of jobs in India. Computer, Software & Hardware and Drugs & Pharmaceuticals sector were the other sectors to which attention was shown by Foreign Direct Investors (FDI). The other sectors in Indian economy the Foreign Direct Investors interest was, in fact has been quite poor.

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Hepatoprotective Effects of Carotenoids on the Kidneys of Adult Wistar Rats

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Abstract- Carotenoids, the colorful plant pigments some of which the body can turn into Vitamin A, are powerful antioxidants that help prevent some forms of cancer, heart diseases and act to enhance immune response to infections. The aim of this study is to investigate the effects of oral administration of carotenoid on the kidney of adult wistar rats. Twenty healthy wistar rats weighing between 150-210Kg were used. They were divided into four groups (A, B, C & D) of five animals each. Group A served as the control and received 0.35ml of distilled water; the experimental groups B, C & D were orally treated with 0.4ml, 0.5ml and 0.6ml of carotenoid respectively for twenty one days. Twenty four hours after the last administration, the animals were weighed, anaesthetized using chloroform inhalation method and dissected. Kidney tissues were removed, weighed and trimmed down to a size of 3mm × 3mm and fixed in zenkers fluid for histological studies. The final body weight of the experimental groups increased significantly ($P < 0.001$) relative to the control (A). The relative kidney weights of the experimental groups are statistically similar with the control. Histological results proved that no histopathological lesions were observed in the experimental groups when compared with the control. The present study proved that consumption of carotenoid at low and high doses may not put the kidney at risks of adverse histopathological condition.

Index Terms- Carotenoid, kidney weight, body weight, Wistar rats, Hepatoprotective

I. INTRODUCTION

Carotenoids are a class of more than 600 natural occurring pigments synthesized by plant, algae, and photosynthetic bacteria.

These richly colored molecules are the sources of the yellow, orange and red colours of many plants [1].

Fruits and vegetable provide most of the carotenoids in human diet. Alpha carotene, beta-carotene, beta-cryptoxanthin, lutein, lycopene and zeaxanthin are the most common dietary carotenoids. Alpha carotene, Beta carotene and Beta cryptoxanthin are provitaminA carotenoids [2].

Carotenoids can be broadly classified into two classes, carotenes (alpha-carotene, beta-carotene, lycopene) and xanthophylls (beta-cryptoxanthin, lutein and zeaxanthin) [3].

In plants, carotenoids have the important antioxidant function of quenching (deactivating) singlet oxygen, an oxidant formed during photosynthesis [4].

Test tube studies indicate that lycopene is one of the most effective quenchers of singlet oxygen among carotenoids [5].

Although important for plants, the relevance of singlet oxygen quenching to human health is less clear. Test tube studies indicated that carotenoids can also inhibit the oxidation of fats under certain conditions but their actions in humans appear to be more complex [6].

Carotenoids have many physiological functions. Given their structure, carotenoids are efficient free radical scavengers and they enhance the vertebrate immune system. There are several dozen carotenoid in foods people consume and most carotenoids have antioxidant activity [7].

Epidemiological studies have shown that people with high beta carotene intake and high plasma levels of Beta carotene have a significantly reduced risk of lung cancer. However, studies of supplementation with large doses of beta carotene in smokers have shown an increase in cancer risk possibly because Beta-carotene under intense oxidative stress e.g induced by heavy smoking gives breakdown products that reduce plasma VitaminA and worsen the lung cell proliferation induced by smoke [8].

More than 900 drugs, toxins and herbs have been reported to cause liver and kidney diseases. The kidney being the primary organ of drug and xenobiotics excretion is therefore liable to damage. This scenario provides a necessity to carry out research on the effects of carotenoids on the kidney of wistar rats.

II. MATERIALS AND METHODS

2.1: Breeding of Animals

Twenty wistar rats weighing between 150-210Kg were purchased from animal house of Anatomy Department, University of Calabar, Cross River State, Nigeria. They were allowed for seven days acclimatization under normal temperature (27°C - 30°C), and fed ad libitum with water and guinea feed pellets from Agro feed mill Nigeria Ltd.

2.2: Drugs preparation

Commercial carotenoid was procured from Golden Neo-life Diamite (GNLD) Int. spartan by pharmaceutical contractors Isando road, Isando, South Africa and purchased from No. 6 Itu Road Uyo retail outlet, Akwa Ibom State, Nigeria. One capsule of carotenoid containing 900mg was dissolved in 10mls of distilled water and administered to the animals.

2.3: Experimental Protocols

The twenty adult wistar rats were weighed and assigned into four groups of five animals each. Group A as the control received 0.35ml of distilled water; the experimental groups B, C & D received 0.4ml, 0.5ml and 0.6ml of carotenoid respectively for a period of twenty one days. Twenty four hours after the last administration, the animals were weighed, anaesthetized under

the influence of chloroform vapour and dissected. Kidney tissues were removed, weighed trimmed down to a size of 3mm × 3mm thick and fixed in zenkers fluid for four hours for histological studies.

2.4: Tissue processing

The tissues passed through several processes of fixation, dehydration, clearing, infiltration, embedding, sectioning and staining. The fixed tissues in zenkers fluid were washed overnight under a stream tap water. Dehydration of the fixed tissues were carried out in different percentages of alcohol

50%, 70% and 90% absolute. The dehydrated tissues were cleared in xylene for two hours after which infiltration was done in molten paraffin wax at a temperature of 60°C for two hours each in two changes and then sectioned. Haemtoxyline and eosin method was used.

III. RESULTS

3.1 Morphometric Analysis of Body Weights

Table 1: Comparison of mean initial and final body weight and weight change in all the groups (A, B, C & D).

(Mean ± SEM given for each measurement)

	GP A	GP B	GP C	GP D	F-RATIO	PROB OF SIG
INITIAL BODY INT	190.10 ± 3.60	192.80 ± 4.60	195.60 ± 6.60	198.40 ± 7.20	64.230	< 0.001
FINAL BODY INT	200.40 ± 5.50	209.30 ± 2.70	212.30 ± 4.20	215.20 ± 2.50	40.240	< 0.001
WEIGHT CHANGE	10.10 ± 2.20	17.10 ± 4.60	17.70 ± 6.20	17.60 ± 6.50	7.280	< 0.001

The final body weight for the experimental groups B, C, & D increased significantly (P < 0.001) relative to the control (A).

3.2: Morphometric analysis of kidney weight

Table 2: Comparison of mean relative kidney weight of all the groups (A, B, C & D)

(mean ± SEM given for each measurement)

	GP A	GP B	GP C	GP D	F. RATIO	PROB OF SIG.
KIDNEY WT	5.30 ± 0.230	5.34 ± 0.280	5.36 ± 0.420	5.39 ± 0.610	52.40	< 0.001

The relative kidney weights for the experimental group increased significantly (p < 0.001) with the control.

3.3: Histopathological Findings:

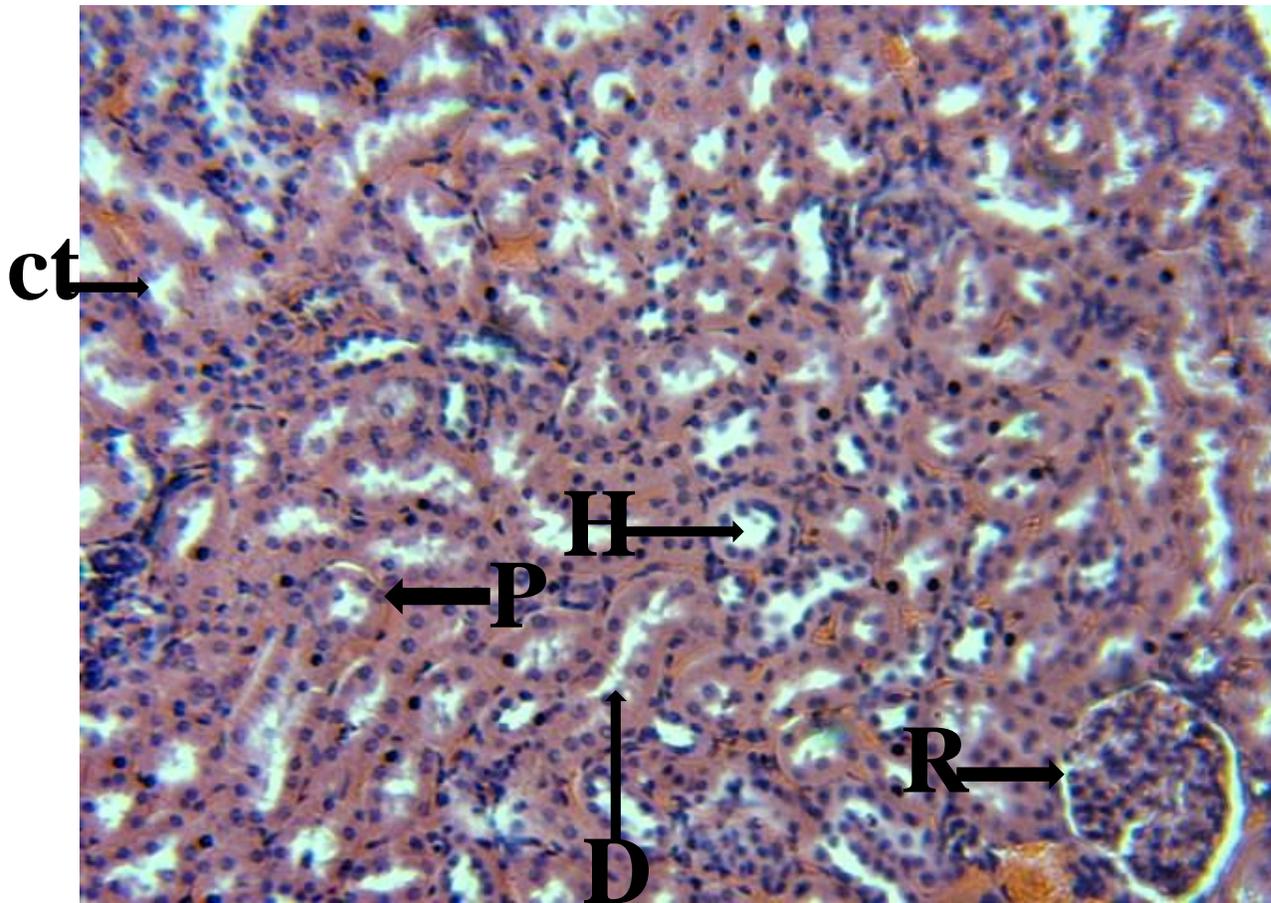


Fig 1, Micrograph 1 (control), shows normal histological structure of renal corpuscle (R), proximal convoluted tubule (P), distal convoluted tubule (D), Henle's loop (H), and collecting tubule (ct), stained by H & E technique, x 200.

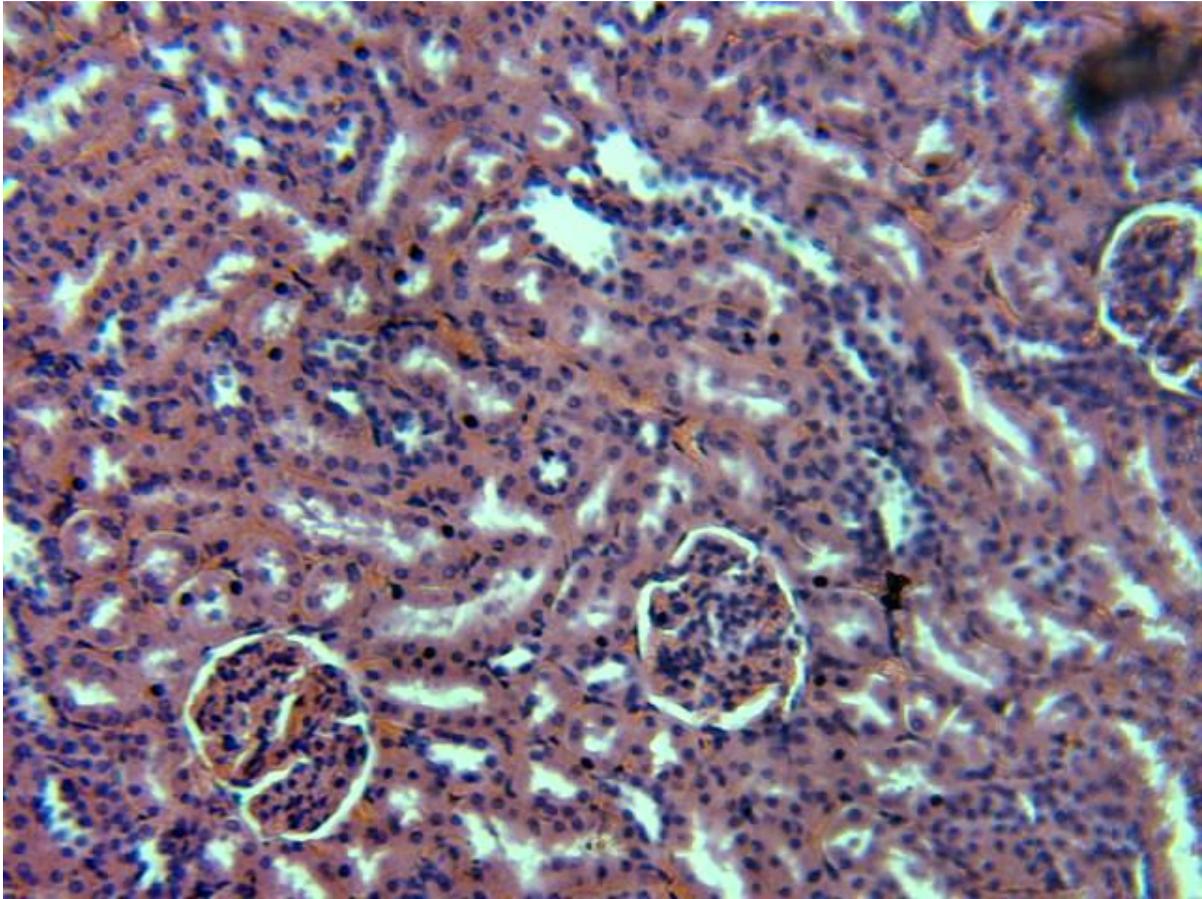


Fig 2, Micrograph 2 Group B, (treated with 0.4ml of Carotenoid) showing normal histoarchitecture of the kidney, stained by H & E technique, x 200.

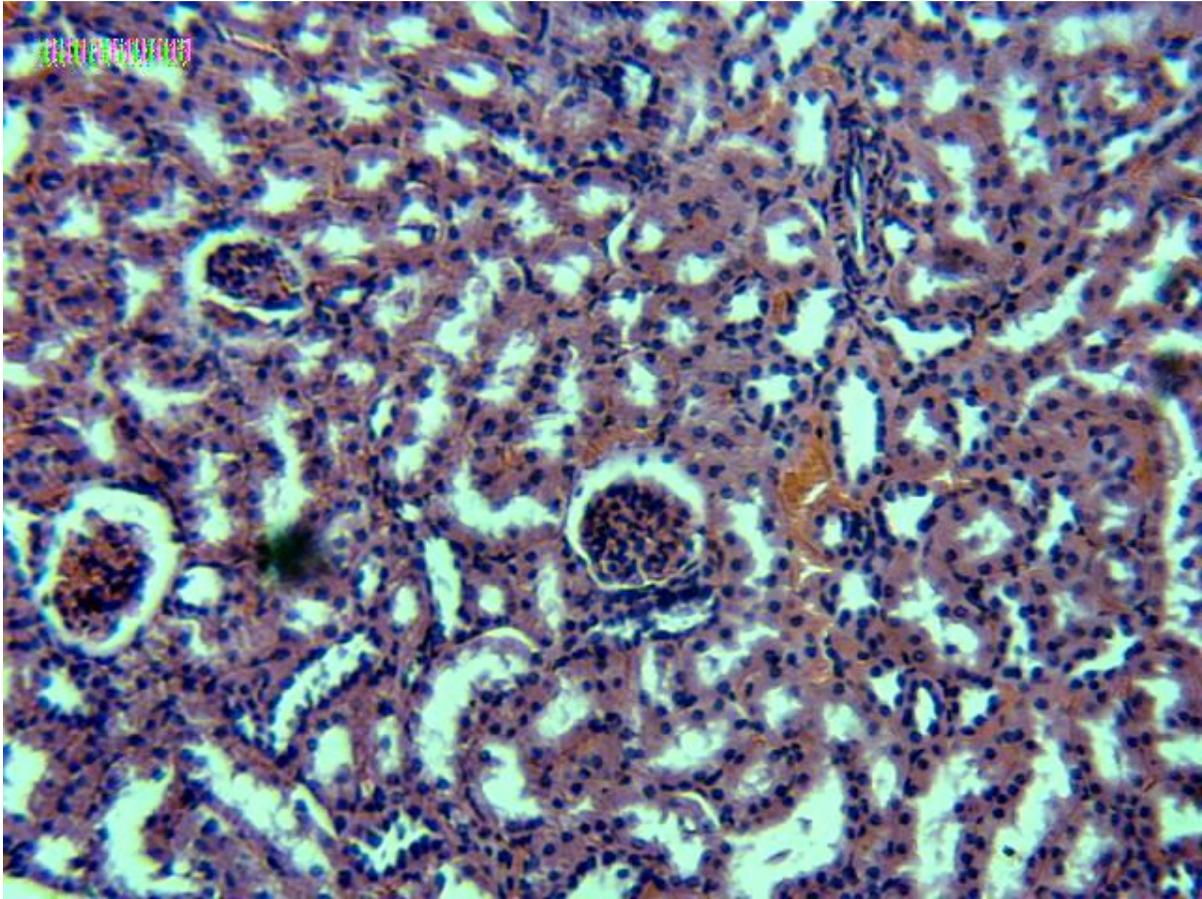


Fig 3, Micrograph 3 Group C, (treated with 0.5ml of Carotenoid) shows none distortion of the histoarchitecture of the kidney, stained by H & E technique, x 200.

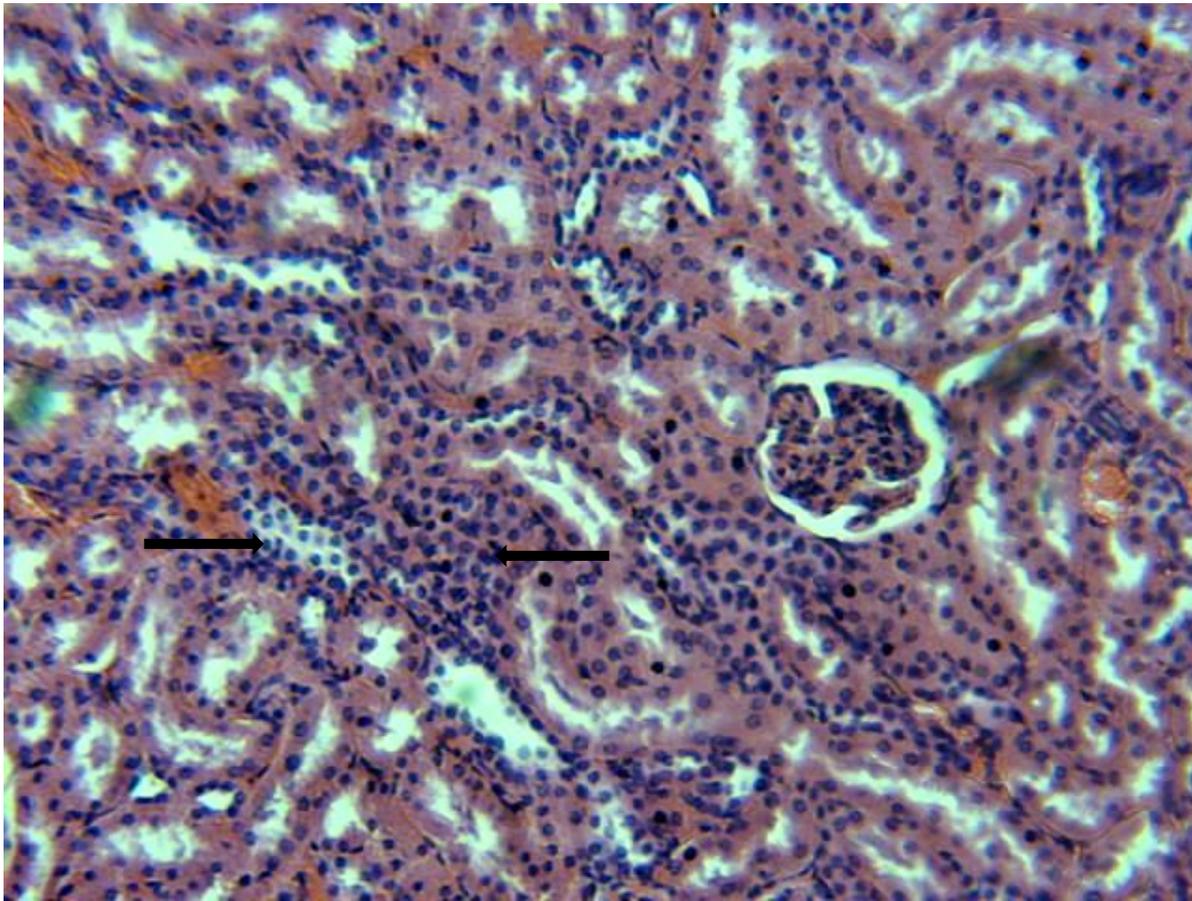


Fig 4, Micrograph 4 Group D, (treated with 0.6ml of Carotenoid), showing normal histological structure of the kidney, though, there is evidence of mild congestion and infiltration of cells into the tubules(Arrows), stained by H & E technique, x 200.

IV. DISCUSSION

In recent years there is an upsurge in the areas related to newer developments in prevention of disease especially the role of free radicals and antioxidants. Antioxidants are substances that neutralize free radicals or their actions. Nature has endowed each cell with adequate protective mechanisms against any harmful effects of free radicals: Superoxide dismutase, glutathione peroxidase, glutathione reductase, thioredoxin, thiols and disulfide bonding are a chain-breaking antioxidant which prevents the propagation of free radical reactions in all cell membranes in the human body. Ascorbic acid is also part of the normal protecting mechanism. Other non-enzymatic antioxidants include carotenoids, flavonoids and related polyphenols, glutathione etc[9].

There is evidence to suggest that carotenoid act as modulators of intracellular of redox status.

There is ability to function as antioxidant has been known for many years. They are not just “another group of natural pigments”, they are substances with very special and remarkable properties that no other group of substances possesses and that form the basics of their many varied functions and actions in all kinds of living organisms. The conjugated double bond structure is primarily responsible for the ability of beta carotenoid to quench singlet oxygen physically without degradation, and for

the chemical reactivity of Beta carotene with free radicals such as the peroxy, hydroxyl, and superoxide radicals.

Carotenoid have been shown to be able to prevent or decreases oxidation damage to DNA, lipid and proteins[10,11].

Oxidative stress and free radical attack on biological structure are believed to be the major factors in the initiation and propagation of the development of many degenerative diseases. In general, carotenoids behave as effective antioxidants in vitro[12, 13] and clear evidence exists from a majority of epidemiological studies on the incidence of CVD indicating an inverse relationship with dietary carotenoids[14] and circulating carotenoid levels. Carotenoid may function as chain breaking antioxidant reducing lipid peroxidation of such vulnerable membrane.

The antioxidant properties of carotenoids are primarily associated with their ability to quench singlet oxygen[15] and scavengers free radicals[16, 17].

Hence the results of the present study is in line with previous researches on antioxidant and hepatoprotective properties possessed by carotenoid.

V. CONCLUSION

From the present study, we therefore inferred that carotenoid has an appreciable ability to prevent damage to the kidney of humans.

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Variation in the lexicon of the Mech (Boro) dialect of North Bengal and standard Boro language spoken in Assam

Rujab Muchahary

Abstract- The Bodos are known by different names in different places. In North Bengal they are known as Mech, in Nepal as Meche, in the Brahmaputra valley of Assam as Boro or Bodo. Racially they are the people of Mongoloid origin and linguistically to the Tibeto-Burman branch of Sino-Tibetan language family. Lexical variations can be observed among the Boro speakers of different geographical areas. As such there are variations in the lexicon among the Boro speakers of North Bengal and Assam. In this paper, a study will be made on the lexicon variation of the Mech dialect of North Bengal and standard dialect of Boro spoken in Assam.

Index Terms- Mech, Boro, dialect, standard language, lexicon, variation

I. INTRODUCTION

The Mech tribe is one of the scheduled tribe that belongs to the Northern part of the state of West Bengal in India. The Government of West Bengal recognizes them as Mech. Scholars are not unanimous in their opinions about the generic term 'Mech'. There are a few discussions about the origin of the name, 'Mech'. The Bodos of Jalpaiguri and Terai call themselves Mech because they settled on the banks of the river Mechi,¹ which flows across India and Nepal. Some scholars think that the word 'Mech' is derived from the Sanskrit word 'Mlechha' which means barbarian or unclean.² At present, they would like to introduce themselves as Boro or Bodo. K. Kiryu, notices Mech as a western Boro dialect.³ Speakers of this dialect estimate their population to be more than one lakh (non official).

The generic term 'Boro' was first applied by Hodgson.⁴ The Boro or Bodos are concentrated in the vast area of the Brahmaputra valley of the state of Assam of North East India. It is an official language of BTAD and associate state language of Assam. This language was included in the eight schedule of the constitution of India in the year 2003. According to the census report of 2001, the total Boro speakers in Assam is 12, 96,162. The Kokrajhar dialect is considered as standard Boro language. The Bodos belong to Mongoloid origin and linguistically, to the Tibeto-Burman sub-family within the Sino-Tibetan language family.

II. OBJECTIVE OF THE STUDY

This paper is a study on lexical variation of the Mech dialect of North Bengal and standard Boro language spoken in Assam. The main objective of this paper is to highlight the variation of

words used by the Boro speakers of two geographical areas i.e. North Bengal and Assam.

III. METHODOLOGY

During data collection, primary and secondary methods were used. For primary data sources, a visit was made to the areas of North Bengal concentrated by the Mech people. Then with the application of interview and observation method, a collection of words used by the Mech people was obtained. For secondary source, different books written on Mech dialect and Boro standard was collected and referred.

¹ Bordoloi, B.N., forward in the book 'Tribes of Assam' 1991, p-80

² Kiryu, Kazuyuki: An Outline of the Meche Language-grammar, text and glossary, p-2

³ Endle, S., The Kacharis, 1997, p-xp

⁴ Linguistic Survey of India, vol. iii, part-ii, 1903, p-1

IV. LEXICON VARIATION

A. Fruits

<i>Mech dialect</i>	<i>Boro Standard</i>	<i>English</i>
/kaklɔu/	/juɔgunad/	pumpkin
/lambhera/	/baŋɔn/	tomato
/banzut/	/banlu/	chilly
/t ^h ulmul/	/muɪtru/	mapaya
/t ^h am/	/sɔmpram/	muava
/dumba/	/jukam/	maize
/guai/	/gɔi/	betel nut
/juɔgunad/	/panlu buɔdun/	small chilly

B. Body Parts

/musrum/	/musugur/	eyebrow
/mɔɔn/	/megɔn/	eye
/gɔntuŋ/	/gɔtɔŋ/	nose
/nasi/	/asi/	nail
/gusuti/	/gusti/	lip
/nagda/	/agda/	right
/gɔdɔna/	/guduna/	neck
/t ^h ɔi/	/t ^h ui/	blood
/athɛŋ/	/atiŋ/	leg
/ashima/	/ashibima/	toe

<i>C. Animals</i>			/dintiya/ /dadaəri/	/diŋkiya/ /təŋali/	a kind of vegetable loose character's girl
/məkra/ /məided/ /məisə/ /mushə/ /barma/ /məi/	/mukra/ /muider/ /muisu/ /musuə/ /burma/ /mui/	monkey elephant buffalo cow goat deer	/senja/ /dudu/ /seŋgri/ /seŋgra/	/patisina/ /gaiker/ /sikla/ /seŋgra/	jute sticks milk young girl young boy
<i>D. Household Articles</i>			/majeti/ /taduŋ/ /bedəd/ /hatəki/ /muukruui/ /əa/	/mainəə/ /tarun/ /bedər/ /hatərki/ /uŋkruui/ /uəə/	lizard arum meat star curry bamboo
<i>E. Adjective Words</i>			V. CONCLUSION		
/gudui/ /gului/ /gumu/ /guzza/ /mutaŋ/ /guccuum/ /gəpəd/ /gədəi/ /majəŋ/ /gədəi/ /gəka/	/gudi/ /guɾlui/ /gumu/ /guza/ /gutaŋ/ /gusum/ /gupur/ /undui/ /mujaŋ/ /gudui/ /guka/	basic simple yellow red blue black white small good sweet bitter	Above discussion notices the lexical variation of the two dialects spoken in two different geographical areas. It can be observed that some words have marginal differences. For example, the verb 'jump' is termed as {bad} in Mech and as {bar} in Boro. In this example, phone /r/ of Boro is pronounced as /d/ in Mech. There are also some words which are completely different, but the meaning is same. For example, the noun 'milk' is termed as {dudu} in Mech and as {gaiker} in standard Boro. The differences observed in their lexicon may arise from the geographical separation which leads to minimal verbal communication. The variation also might have arisen due to the influence of other neighboring languages. The above discussion and examples are not enough to draw a line of difference between the two dialects. There are scopes and areas which can be compassed into with further researches on this aspect.		
<i>F. Verb words</i>			ABBREVIATION		
/bad/ /lid/ /kad/ /pran/ /musha/ /klam/ /khui/ /pəi/	/bar/ /lir/ /kar/ /puran/ /musha/ /kalam/ /ukuui/ /puui/	jump write run to dry dance make hungry come	BTAD- Bodoland Territorial Area District		
<i>G. Adverb Words</i>			REFERENCES		
/miya/ /habəə/ /bəə/ /aglayəə/	/muuya/ /buiyaə/ /beə/ /sigəŋəə/	yesterday there here past	[1] Basumatary, Phukan, An Introduction to the Boro Language, Mittal Publication, First Edition, 2005. [2] Baro, Madhu Ram, The Historical Development of Boro Language, N.L. Publication, New Edition, 2007. [3] Bordoloi, B.N., Tribes of Assam part-III, Assam Institute of Research for tribals and Scheduled Castes, First Edition, 1991 [4] Chetterji, Suniti kumar, Linguistic Survey of India, 1903 [5] Endle, Rev. Sidney, The Kacharis, Low Price Publication, Reprint, 1997 [6] Kiryu, Kazuyuki, An Outline of the Meche language-grammar, text, glossary, project report, 2005-2007 [7] Mandal, Satyendra Nath, History & Culture of the Bodos, Kolkata, First Edition, 2011. [8] Sanyal, Charu Chandra, The Meches and the Totos of North Bengal, The University of North Bengal Publication, 1989. [9] Saibo, Subin (Chief Editor), Barfung, Mouthpiece, Jalpaiguri District Bodo Sahitya Sabha, 2011.		
<i>H. Miscellaneous words</i>					
/gaŋgrim/ /bader/ /hu/ /akundui/ /swi/ /deəsi/ /batri/aped/ /bhatu/ /slathai/ /nəka/ /əat/	/baŋgrin/ /sambramgupur/ /ha/ /ukundui/ /kəpri/ /pujari/ /ruati/ /dahuma/ /ək ^h a kuurumnai/ /ək ^h a/ /or/	earthquake garlic land smoke a kind of umbrella made of leaves priest housemaid male servant thunder rain fair			

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Case Study on Comparison of Wireless Technologies in Industrial Applications

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Abstract- This paper conveys more information about communication modules like RF, Bluetooth and Zigbee in industrial applications. In this paper, an overall comparison of these modules on the basis of their industrial applications and characteristics such as standard, bandwidth, battery life, data rate, and maximum transmission range etc.

I. Introduction

Wireless technologies have been available for decades, and in the last several years wireless technologies have been making their way to the factory floor. This technology has been allowed for transferring data efficiently over long distances. When this wireless technology is utilized, a new world of applications is available to designers. Sensors and actuators can be added to many industrial, commercial, and entertainment automation applications.

The main advantages for using a wireless solution in industrial applications are greater mobility and possibility to move devices and connect to smart phones and tablets freely without constraining cables, eliminate expensive and maintenance heavy transmission media such as flexible cables, swivels, bypassing long distances and areas where cables cannot physically fit, fast and easy installation and commissioning, high flexibility if there is a need to modify an installation, increased personnel safety by not having to be physically close to a device during configuration and maintenance, flexible human interface devices (HID), easy integration of devices into the network.

Industrial plants consist of multiple devices interconnected in different ways. These varied types of devices consist of Simple data collection units (I/Os) without built-in intelligence, intelligent devices such as sensors with built-in intelligence, single-loop controllers or programmable controllers, supervisory systems used as human machine interface (HMI), data logging and supervisory control. All these types of devices are interconnected using different communication protocols that in some cases can be replaced by wireless technologies to accomplish the above listed advantages.

II. Wireless Technologies

In the past years, we were used the wired technologies for the communication. These technologies have the greatest drawbacks of using cable and it is impossible to use for long distance and not a reliable one also. To overcome these drawbacks, we have been moved to the wireless one. By using the wireless communication technologies, we make our communication as reliable one and cable free one.

Wireless technologies are applied in various wide applications throughout the world. For communicating over the world, wireless communications communicates via satellite. In the closed environments or limited range applications like school, colleges, offices, factories, and industries, we communicate or transfer the data with the help of wireless sensor networks such as RF modem, Bluetooth, Wi-Fi and Zigbee etc. The primary advantages of wireless sensor networks are,

- Reliable one
- Authenticated one
- No use of cables
- Lesser cost than wired one

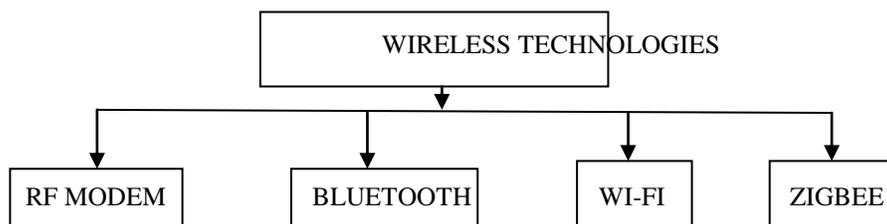


FIGURE 1: Types of Wireless Technologies

III. RF module

An RF module (radio frequency module) is a small electronic circuit used to transmit and receive radio signals on one of a number of carrier frequencies. RF modules are widely used in electronic and designing radio circuitry.

RF modules are most often applied in medium and low volume products depending on consumer applications such as wireless alarm systems, industrial remote controls, smart sensor applications, and wireless home automation systems. Commercially available RF module frequencies are 433.92 MHz, 315 MHz, 868 MHz and 915MHz. These frequencies are used because of national and international regulations governing the use of radio for communication.

IV. Main factors affecting RF module performance

The performance of an RF module will depend on a number of factors such as an increase in the transmitter power and larger communication distance. However, this will also result in a higher electrical power drain on the transmitter device, which will cause shorter operating life for battery powered devices. Likewise, using a higher transmit power will make the system more prone to interference with other RF devices and also by increasing the receiver sensitivity will also increase the effective communication range, but will also potentially cause malfunction due to interference with other RF devices. The performance of the overall system may be improved by using matched antennas at each end of the communication link, such as those described earlier.

The system is normally measured in an open-air line of sight configuration without any interference, but frequently there will be obstacles such as walls, floors, iron construction to absorb the radio wave signals, then the effective operational distance will in most practical instances is less than specified.

V. Bluetooth

For industrial applications, a wireless technology has to work well in a noisy environment. Bluetooth operates based on the features of Adaptive Frequency Hopping (AFH) and Forward Error Correction (FEC). It provides a universal short range wireless capability. It operates in the 2.4 GHz frequency band and the devices within 10m of each other can share the data up to 720Kbps of capacity. This technology is also an authenticated one by sending the acknowledgement from the receiver to the transmitter before making the connection between devices. But its limitation is up to eight devices can communicate in a single network and it asks the confirmation about receiving the each data at every time and also it limits the packet size



FIGURE 2: Bluetooth Network

VI. Wi-Fi

Wi-Fi stands for Wireless Fidelity, which refers to wireless technology that allows devices to communicate over a wireless signal. This network is based on the IEEE standard 802.11; including 802.11a, 802.11b, 802.11g and 802.11n, by using the centralized router devices can share the Wi-Fi signal. Wi-Fi networking technology that uses waves to allow high speed data transfer over short distances. In indoor environment, this technology causing problem called multipath interference due to reflection of signals from the walls, furniture and other obstacles. Wi-Fi allows local area networks (LANs) to operate without cable and wiring. It is popular for the home and business networks. Generally, it can be used to provide the wireless broadband internet access for many modern devices such as laptops, smart phones, tablet and computers with authentication. By increasing the number of devices in a single Wi-Fi connection, the strength of the signal provides to each device becomes weak.



FIGURE 3: Wi-Fi network

VII. Zigbee

The communication layer of Zigbee is at level 3 and upper layer in the OSI model. Zigbee provides a network topology to let a network of devices communicate between them and to set extra communication features such as authentication, encryption, and the association and in the upper layer application services. A reactive Adhoc protocol has been implemented to perform the data routing and forwarding process to any node in the network. The main application of Zigbee is clustering. Zigbee has a lot to offer in industrial applications such as low cost deployment and redeployment, mesh networking to cover entire industrial plants and factories, an open standard with multiple vendors, battery operation.

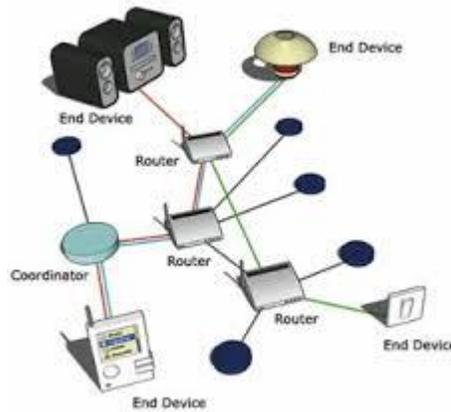


FIGURE 4: Zigbee network

TABLE I: Comparison of Xbee vs Zigbee

PROPERTIES	XBEE	ZIGBEE
STACK LAYER	Layer at level two in OSI model	Communication layer at level three and uppers in the OSI model
PURPOSE	To let communication between two devices	To create a network topology to let a network of devices communicate among them and to set extra communication features such as authentication, encryption, association and in

		the upper layer application service.
FREQUENCY	3 main bands of frequency 2.40-2.48 GHz 2.40GHz,Xbee802.15.4OEM	ISM band 2.40-2.48 GHz
BIT RATES	115 kbps	250 kbps

TABLE II: COMPARISON OF KEY FEATURES OF COMPLEMENTARY PROTOCOLS

FEATURES	IEEE 802.11B	BLUETOOTH	ZIGBEE
Power Profile	Hours	Days	Years
Complexity	Very complex	complex	Simple
Nodes/Master	32	7	6400
Latency	Enumeration upto 3 seconds	Enumeration upto seconds	Enumeration 30ms
Range	100 m	10m	70m-300m
Extendability	Roaming possible	No	Yes
Data Rate	11mbps	1Mbps	250 kbps

TABLE III: ZIGBEE VS BLUETOOTH

ZIGBEE		BLUETOOTH
Smaller packets over large networks		Large packets over small network
Mostly static networks with many, infrequently used devices		Ad-hoc networks, file transfer
Home automation, toys, remote controls, etc		Screen graphics, pictures, handsets etc
Rechargeable		Non-rechargeable
Devices/network	6500	6500
Link rate	250 Kbps	1 Mbps
Range	100+ meters	10 meters
Air interface	FHSS	DSSS

VIII. CONCLUSION

ZigBee has a great deal to offer in industrial automation applications such as low cost deployment and redeployment, mesh networking to cover entire industrial plants and factories, an open standard with multiple vendors, battery operation. The different Zigbee products are designed as per to function and survive in industrial settings like high RF noise floor, temperature extremes, rough handling.

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A Simple Score to Predict Malaria Occurrence in Keerom, Papua: A Prospective Cohort Study Analyzed by Multivariate Logistic Regression

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Abstract: Keerom regency is the most prevalent malaria in Papua (17.7%). Malaria prevention addressed to the people who lived in Keerom. Hence, it is necessary to start preventing people before entering Keerom. This study aimed to develop a kind of device called scoring system that could be used as a primordial prevention. Methods: A prospective cohort prognostic study followed 606 subjects for three months to find out the malaria dominant risk factors. Prior to constructing a scoring system, bivariate analysis using chi square and multivariate logistic regressions were applied in this study. Results: Among 15 identified risk factors (namely sex, age, ethnic group, education, duration of stay at Keerom, nutritional status, socio economic status, forest activity, drug prevention, using insecticide, using insecticide treated nets, night time activity, animals around the house, the distant of breeding places and health centers from house), respectively, only 6 risk factors considered as dominant risk factors. The dominant risk factors are socio economic status (RR 1,430 95% CI 1,025- 1,995), night time activity (RR 1,624 95% CI 1,030-2,561), sex (RR 1,543 95% CI 1,116-2,133), forest activity (RR 0,587 95% CI 0,369-0,943), nutritional status (RR 1,405 95% CI 1,017-1,941) and duration of stay at Keerom (RR 2,519 95% CI 1,462-4,340), respectively. The scoring system was constructed based on dominant risk factors and could be used to predict malaria occurrence according to someone's characteristics and conditions. Calibration and discrimination test showed that scoring system was a reliable tool (Hosmer Lemeshow test $p = 0,337$

and AUC 0,633 (95% CI 0,580-0,687)). However there were only 57% risk factors could be included in the system. Therefore it is necessary to take into a consideration to enhance the system by including others risk factors such as genetic and climate risk factors. Conclusion: The scoring system usually used in clinical setting, but it could be used in public health as well. Results show that the model is reliable enough, yet only could be used in Keerom.

Index Terms - Scoring system, Malaria, Risks factor, Breeding places.

I. INTRODUCTION

Indonesia was considered has the highest malaria prevalence and incidence in South East Asia. The population at risk was 31,427,995 out of 244,420,912 people or 12.86% and causing Malaria Mortality Rate of 0.83/100,000. This number posted Indonesia as the third country after Timor Leste (4.90/100,000) and Myanmar (2.40/100,000). This condition could be understood since the Annual Parasite Incidence of Indonesia was 4.37⁰/₀₀. compared to Timor Leste and Myanmar which has the Annual Parasite Incidence of 43.93⁰/₀₀ and 10.21⁰/₀₀ respectively [1].

Based on clinical finding, the national prevalence of malaria in Indonesia was 2.85%. This prevalence mainly contributed by 3 provinces namely West Papua (26.1%), Papua (18.7%) and East Nusa Tenggara (12.0%). A survey conducted by Ministry of Health showed the average prevalence in Papua was 65.5% (diagnosed clinically) or 18.7% (smear

examination). Among the 29 regencies in Papua, Keerom showed the highest prevalence (82.1% clinically and 17.7% smear examination) [2, 3].

Since the launching of its national program in 1963, Papua has not been able to control malaria moreover Keerom newly developed regency. The control program consists of Indoor Residual Spraying (IRS), the use of Insecticide Treated Nets (ITN) and media campaign. These all efforts addressed for preventing people who lived in Keerom. As a newly develop regency, Keerom attracts many people to come for works. Therefore it is also necessary to prevent people before entering Keerom as a primordial prevention.

Scoring system generally used in clinical setting as a simple and reliable device to predict the outcome of a disease in relation to the symptoms and signs. Plenty publications could be found elsewhere regarding the scoring system for several diseases (e.g scoring system for malaria [4-7], dengue fever [8], neonatal seizure [9]).

The purpose of this study was to develop a malaria scoring system in a public health setting to predict the malaria occurrence in relation to people's characteristics and conditions. Hopefully the scoring systems could be used as guidance by clinicians, decision makers and lay men for malaria primordial prevention.

II. MATERIAL AND METHODS

2.3 Study Area

The study was carried out at Keerom Regency, Papua, Indonesia. Keerom with 46,282 inhabitants is located in the southern part of Jayapura which is the capital of Papua [12]. Keerom is divided into six districts (Web, Senggi, Waris, Arso, Arso Timur, Skanto). The regency is located in low land area of 4 m above sea level. The climate and weather are homogeneous all over Keerom. Hence, climate and weather are not considered having any influences in this study.

2.2 Subjects

Twenty five blocks census and 10 families in every block census were chosen randomly from 6 districts. The average number of family member is 4.289, so that the number of subjects chosen was around 1.000.

However a total of 777 subjects were able to collect in this study.

A questionnaire inquiring for malaria risk factors was administered and physical and smear examination for malaria were done to all subjects (including collection of body weight, height and urine test for β HCG). The positive malaria subjects were excluded from study and the remaining (606 subjects) followed for 3 months for prospective cohort study.

Those considered as malaria risk factors are sex, age, ethnic group, education level, duration of stay at Keerom, nutritional status, socio economic status, forest activity, drug prevention, using insecticide, using insecticide treated bed nets, night time activity, animals around the house, the distant of breeding places and Health Centers from house.

There are many ethnics group who lived in Keerom. Some of them are local people with several tribes and the others are ethnics who came from other part on Indonesia. For simplicity the ethnics in Keerom was divided in two ethnics group, the Papuans (the local people) and Non Papuans (from other part of Indonesia). The Papuans commonly practicing subsistence agriculture and exploit forest product, yet the Non Papuans who are transmigrated from Java mostly work as government official and as peasant in the forest.

The Papuans is more resistant to malaria than the Non Papuans [13]. Therefore ethnics considered as a risk factor of malaria. This condition was in relation with the duration of stay in endemic area and the immunity against malaria. Accordingly people who were stayed longer than 2 years in Papua were more resistant to malaria than those who were stayed less than 2 years [14].

Many studies showed that nutritional status influenced the malaria occurrence and vice versa [15, 16]. The nutritional status in this study was measured by age (0-5; 6-17 and 18+ years), weights and heights according to WHO and Blössner et al [17, 18]. Therefore in this study ages was grouped into this manner. Nutritional status was defined as poor (under nourished and overweight) and normal. People in poor nutritional status prompt to easily getting malaria. There is a relationship between malaria and socio economic status [16, 19, 20]. In Vietnam and some other countries the main malaria risk factor was poverty [20, 21]. The socio economic status in this study defined as the amount of expenses per person

per month with the cut off value of IDR.280000 or \$23.3 [22].

The education was influencing malaria occurrence as shown in Sulawesi (Indonesia), some countries in Africa and Vietnam [21, 23-25]. Thang divided the education level to None, Primary school and Secondary school or higher. These levels of education were used in this study as well.

2.3 Statistical Analysis

Data were double entered, checked and cleaned. The data set analyzed with Statistical Product for Service Solutions (SPSS) version 19. Descriptive statistics and chi-square test were used to test for significant difference (p<0.05). A logistic regression was used to carry out a multivariate analysis for the malaria risk factors. Finally a scoring system was developed based on the result of logistic regression analysis. Calibration and discrimination of the system was tested using Hosmer and Lemeshow and Area Under the Curve (AUC).

2.4 Ethical Consideration

The study was approved by the ethical committee of Faculty Medicine, Hasanuddin University, Makassar, Indonesia. The fundamental principles of ethics in research on human participants were upheld throughout the study. The research procedures were disclosed to the participants and informed consent was sought from them or their legal representatives. Nobody was coerced into the study and if individuals wished to withdraw, they were allowed to do so without prejudice.

III. RESULTS AND DISCUSSION

3.1 Results

There were 777 people in the study, but after checked their malaria condition with blood smear examination, 171 people excluded from the study. The cohort started with 606 negative smear examination

people who were then followed up for 3 months to check their malaria condition again.

Among the 606 participants (Table 1), 72.4% were represented by Non Papuans and mostly above 18 years of age. Keerom is new developed regency and inhabited by 76.6% people who stayed no longer than 2 years. Most of the people worked as government officials especially the Non Papuans and only 23.1% as forest workers either as peasant or hunter. People whose living expenses under IDR.280000 were 25.9% and the rest considered living above the poverty line. In total 32.2% of the population were in poor nutrition status (under nourished and overweight). Keerom still a remote area surrounding with jungle, accordingly only 8.1% people have night time activity.

The environment factors in relation with malaria occurrence were the distant of breeding places and the distant of Health Center to house. The distant of breeding places that was less than 500 m from housing (22.8%) considered at high risk. Similarly the distant of health center more than 500 m (23.4%). More than half population (67.3%) used ITN and few additional people were sleeping without a bed net. As commonly happens, animals around the house could protect against mosquito bite especially the zoophilic anopheles and in turn could prevent malaria occurrence. Without understanding of this knowledge more than half people in Keerom breed their animals around their house (56.3%).

Most people have negative blood smear examination after 3 months followed up (80.2%) the additional people (19.8%) were positive. This finding slightly higher than the results of the former survey conducted in Keerom (17.7%) [3].

To find out the malaria risk factors that could be used to develop scoring system, a bivariate and multivariate analysis were done, (Table 2). Bivariate analysis showed that 10 out of 15 risk factors have p < 0.25.

Table 1 Baseline characteristic of the study population

Study population n = 606		n	%
1	Ethnic groups		
	- Non Papuans	439	72.4
	- Papuans *)	167	27.6

2	Sex				
	- Female		328	54.1	
	- Male ^{*)}		278	45.9	
3	Age groups				
	- 0-5 years		18	3.0	
	- 6-17 years		81	13.4	
	- >18 years ^{*)}		507	83.7	
4	Duration of stay				
	- < 2 years		464	76.6	
	- > 2 years ^{*)}		142	23.4	
5	Education level				
	- None		76	12.5	
	- Primary school		207	34.2	
	- Secondary school or higher ^{*)}		323	53.3	
6	Socio economic status (based on the expenses per person per months				
	- < IDR.280,000		157	25.9	
	- > IDR.280,000 ^{*)}		449	74.1	
7	Forest activity				
	- Yes		140	23.1	
	- No ^{*)}		466	76.9	
8	Night time activity				
	- Yes		49	8.1	
	- No ^{*)}		557	91.9	
9	Drug prevention				
	- No		378	62.4	
	- Yes ^{*)}		228	37.6	
10	Using insecticide				
	- No		335	55.3	
	- Yes ^{*)}		271	44.7	
11	Using Insecticide Treated Nets (ITN)				
	- No		198	32.7	
	- Yes ^{*)}		408	67.3	
12	Animals around the house				
	- No		265	43.7	
	- Yes ^{*)}		341	56.3	
13	Nutritional status				
	- Poor		195	32.2	
	- Normal ^{*)}		411	67.8	
14	Distant to breeding places				
	- < 500 m		138	22.8	
	- > 500 m ^{*)}		468	77.2	
15	Distant to health services (health centers)				
	- > 500 m		142	23.4	
	- 250-500 m		132	21.8	
	- < 250 m ^{*)}		332	54.8	
16	Blood smear examination				
	- Positive		120	19.8	
	- Negative		486	80.2	

*) Reference

Table 2 Risk factors, bivariate analysis

Variables	Blood smear examination				p value	RR	95% CI	
	Positive		Negative				Min	Max
	n	%	n	%				

Sex								
Male	68	24,5	210	75,5	0,008	1,543	1,116	2,133
Female*)	52	15,9	276	84,1				
Age								
0-5 y	4	22,2	14	77,8	0,804			
6-17 y	18	22,2	63	77,8				
>18 y*)	98	19,3	409	80,7				
Ethnic groups								
Non Papuans	95	21,6	344	78,4	0,006	1,446	0,966	2,163
Papuans*)	25	15,0	142	85,0				
Education level								
None	11	14,5	65	85,5	0,016			
Primary school	31	15,0	176	85,0				
>Secondary school*)	78	24,1	245	75,9				
Duration of stay								
≤2 years	107	23,1	357	76,9	0,000	2,519	1,462	4,340
>2 years*)	13	9,2	129	90,8				
Nutritional status								
Poor	48	24,6	147	75,4	0,041	1,405	1,017	1,941
Normal*)	72	17,5	339	82,5				
Socio economic status								
< IDR.280000	40	25,5	117	74,5	0,038	1,430	1,025	1,995
> IDR.280000	80	17,8	369	82,2				
Forest activity								
Yes	18	12,9	122	87,1	0,019	0,587	0,369	0,934
No*)	102	21,9	364	78,1				
Drug prevention								
No	72	19,0	306	81,0	0,549	0,905	0,653	1,254
Yes*)	48	21,1	180	78,9				
Using insecticide								
No	57	17,0	278	83,0	0,056	0,732	0,531	1,008
Yes*)	63	23,2	208	76,8				
ITN								
No	30	15,2	168	84,8	0,045	0,687	0,471	1,001
Yes*)	90	22,1	318	77,9				
Night time activity								
Yes	15	30,6	34	69,4	0,048	1,624	1,030	2,561
No*)	237	34,8	445	65,2				
Animals around the house								
No	54	20,4	211	79,6	0,754	1,053	0,763	1,453
Yes*)	66	19,4	275	80,6				
Breeding places distant								
≤500 m	38	27,5	100	72,5	0,009	1,572	1,125	2,196
>500 m*)	82	17,5	386	82,5				
Health centers distant								
>500 m	30	21,1	112	78,9	0,898			
250-500 m	26	19,7	106	80,3				
< 250 m*)	64	19,3	268	80,7				

Those with $p < 0.25$ could be further analyzed by backward stepwise multivariate logistic regression. However, only 6 risk factors considered as the main

risk factors connected to the malaria occurrence (Table 3).

Table 3 Backward stepwise logistic regression of the malaria risk factors

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)		
								Lower	Upper	
Step 1 ^a	Socio economic status(1)	.389	.257	2.298	1	.130	1.476	.892	2.442	
	Night time activity(1)	.717	.358	4.009	1	.045	2.049	1.015	4.136	
	Sex(1)	.599	.216	7.665	1	.006	1.820	1.191	2.780	
	Education level			1.979	2	.372				
	Education level (1)	-.271	.386	.495	1	.482	.762	.358	1.624	
	Education level (2)	-.359	.263	1.864	1	.172	.699	.417	1.169	
	Forest activity(1)	-.363	.321	1.280	1	.258	.696	.371	1.305	
	ITN(1)	-.325	.257	1.594	1	.207	.723	.437	1.196	
	Breeding places distant(1)	.238	.267	.791	1	.374	1.268	.751	2.141	
	Nutrition status(1)	.631	.229	7.582	1	.006	1.880	1.200	2.947	
	Duration of stay(1)	1.091	.331	10.848	1	.001	2.977	1.555	5.698	
	Constant	-2.747	.391	49.447	1	.000	.064			
	Step 2 ^a	Socio economic status(1)	.483	.234	4.266	1	.039	1.621	1.025	2.563
Night time activity(1)		.753	.355	4.498	1	.034	2.124	1.059	4.262	
Sex(1)		.597	.216	7.641	1	.006	1.817	1.190	2.774	
Education level				2.274	2	.321				
Education level (1)		-.311	.383	.660	1	.417	.733	.346	1.552	
Education level (2)		-.377	.261	2.080	1	.149	.686	.411	1.145	
Forest activity(1)		-.402	.318	1.599	1	.206	.669	.359	1.247	
ITN(1)		-.303	.256	1.398	1	.237	.739	.447	1.220	
Nutrition status(1)		.613	.228	7.231	1	.007	1.846	1.181	2.885	
Duration of stay(1)		1.120	.330	11.527	1	.001	3.066	1.606	5.855	
Constant		-2.722	.390	48.838	1	.000	.066			
Step 3 ^a		Socio economic status(1)	.492	.233	4.453	1	.035	1.635	1.036	2.583
		Night time activity(1)	.721	.351	4.229	1	.040	2.057	1.034	4.090
	Sex(1)	.614	.215	8.150	1	.004	1.848	1.212	2.816	
	Forest activity(1)	-.537	.305	3.107	1	.078	.584	.322	1.062	
	ITN(1)	-.332	.250	1.755	1	.185	.718	.439	1.172	
	Nutrition status(1)	.562	.225	6.260	1	.012	1.754	1.129	2.724	
	Duration of stay(1)	1.210	.325	13.869	1	.000	3.354	1.774	6.340	
	Constant	-2.902	.373	60.399	1	.000	.055			
	Step 4 ^a	Socio economic status(1)	.479	.232	4.243	1	.039	1.614	1.024	2.546
		Night time activity(1)	.725	.352	4.252	1	.039	2.064	1.037	4.112
		Sex(1)	.608	.214	8.042	1	.005	1.837	1.207	2.796
		Forest activity(1)	-.652	.292	4.979	1	.026	.521	.294	.924
		Nutrition status(1)	.564	.224	6.326	1	.012	1.757	1.132	2.726
Duration of stay(1)		1.219	.324	14.123	1	.000	3.384	1.792	6.391	
Constant		-2.978	.370	64.941	1	.000	.051			

a. Variable(s) entered on step 1: Socio economic status, Night time activity, Sex, Education level, Forest activity, ITN, Breeding places distant, Nutrition status, Duration of stay.

The risk factors which were processed for scoring system were sex, duration of stay, nutritional status, socio economic status, forest activity and night time activity. All these factors were scored with the range of zero to seven. A person with zero score meant having no risk factors and score seven meant having all the risk factors. All the score of the risk factors were then sum up as a total score.

Logistic regression as a mathematical approach explained the relation between risk factors and dependent variable (malaria occurrence) using a

regression equation $y = (\alpha + \beta_1x_1 + \beta_2x_2 + \dots + \beta_ix_i)$. In this case the equation was $y = -2.703 + 0.434 x$ total_score. The probability having malaria was shown by the equation of $P = \frac{1}{1 + e^{-y}}$

To find the probability of someone getting malaria in Keerom, it was provided a malaria score card. The card is easy to fill in by choosing the condition they may have and the score comes up with certain number and percentage of the probability of malaria occurrence (Figure 1).

Figure 1 Malaria Score Card

MALARIA SCORE CARD KEEROM REGENCY				
Date				
Name				
Please fill in according to your conditions				
1	Sex	Male	Female	Score
		1	0	
2	Nutritional status *)	Poor	Normal	
		1	0	
3	Forest activity	Yes	No	
		1	0	
4	Night time activity	Yes	No	
		1	0	
5	Expenses per person per month	Less than IDR.280000	More than IDR.280000	
		1	0	
6	Duration of stay in Keerom	Less than 2 years	More than 2 years	
		2	0	
Total Score				
According to the Total Score, the probability you encountered with malaria in Keerom is:				
Score	Probability malaria occurrence	Score	Probability malaria occurrence	
0	6%	4	27%	
1	9%	5	36%	
2	13%	6	46%	
3	19%	7	57%	

*) Nutritional status based on Body Mass Index. BMI between 18.5 -24.9 considered normal otherwise is poor.

3.2 Discussion

Keerom is a new regency and gave a plenty opportunities for works. Many people came to Keerom from other part of Papua and Indonesia for work. Almost all of them were susceptible to malaria and have no immunity at all. Therefore malaria prevalence was very high. Several efforts have been done to control, however the prevalence still very high. The last survey done in this area reveal the prevalence of 17.7% [3]. The main effort to eliminate malaria in Keerom was prevention against mosquito bite such as insecticide, ITN and Indoors Residual Spraying. All these measures addressed to people who were already stayed in Keerom. However, there was no effort to protect people before coming to Keerom.

A prognostics study aimed to develop a model to predict a malaria outcome of a subject according to his characteristics. According to Royston and Steyerberg, the appropriate design for the study was prospective cohort with the alternative design were case control or nested case control [10, 26] to find the main risk factor of malaria. This study conducted with prospective cohort for 3 months. Some aspects have to be taken into consideration in choosing risk factors used in the model in order the model could be easily used by the lay men, decision makers and clinician. In addition the risk factors have to be chosen statistically and based on the literatures.

The bivariate analysis and logistic regression eliminated some risk factors and 6 remaining used in the model. Based on these 6 factors (sex, socio economic status, night time activity, forest activity, duration of stay and nutritional status) scoring system was developed.

Hosmer and Lemeshow test ($p=0.337$) and AUC (0.633 95% CI 0.580-0.687) showed that the model reliable enough (Figure 2).

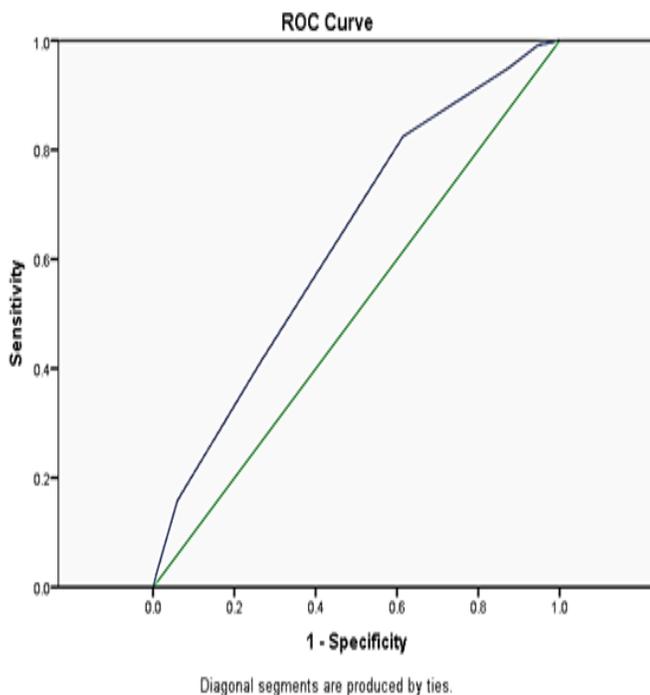


Figure 2. Area Under the Curve of the model

However, this model was not able to accommodate the other 43% risk factors and was only able to predict the 57% risk factors (Figure 1). In order the model could accommodate all risk factors, it has to accommodate more risk factors such as genetics (ovalocytosis, G6PD, Thalassemia, Duffy antigen), environment factors (house

condition) and weather factors (temperature, humidity, rainfall). Certainly this scoring system could only be used in Keerom.

IV. Conclusions

We propose this scoring system for people entering Keerom Regency as a primordial prevention. This scoring system needs prospective validation in a new sample of people in other regency. If confirmed with other study, then the scoring system has the potential to become a useful tool for primordial prevention before entering malaria endemic area.

Authors' contributions

All the authors participated significantly in the analysis, drafting of the manuscript and writing the final version of the paper. BS conceptualized the study. NN, AA and AN contributed towards the statistical analysis.

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Service characteristics towards individual's adoption in Mobile Banking

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Abstract- This paper intends to explore the most important dynamics that impact individual's decision toward accepting and adopting a mobile service. The overall objective of this is to identify several mobile service characteristics which have been previously discussed in traditional acceptance theories. It will then be easier to differentiate the importance of service characteristics over the concepts in traditional acceptance theories. Moreover, the discussion sheds some light to our understating regarding the individual IT acceptance.

Index Terms- Mobile Banking, service characteristics, Individual's Adoption, technology adoption models

I. INTRODUCTION

Mobile Banking Services

In general „mobile“ means “fully portable, real-time access to the same information, resources, and tools that, until recently, were available only from the desktop” Bhattacharjee, (1998). It has been argued that the future of mobile communication will rely on mobile services (Carlsson et al., 2006). The rapid development in Telecommunication technologies as a subset of Information and Communication Technology (ICT) can be a plausible reason for Carlsson's prediction. Mobile services are digital services which are added to mobile phone networks or integrated to the mobile devices other than traditional voice services, and it is postulated that the benefit offered by such services are highly diverse (Bouwman et al., 2011). There are numerous different mobile services and applications available to consumers in the telecommunication market. But, many prior researches indicated that the individual acceptance and adoption of mobile services have not been proliferated (Bouwman et al., 2012) or shown an asynchronous pattern (Carlsson, 2005).

From service providers' perspective the mobile service market has not yet reached its optimal level in order to return the massive investments made by Telecommunications industries and Telecom carriers globally. A mobile service will be accepted and will be used by users, if that particular service offers value to its users. It means, there are several factors and criteria that make a service successful or a failure. A mobile service should be easy to use, provide hedonic value, improve user's performances and in general it should be perceived to be useful. Many of the current mobile services available in mobile communication market do not provide any value to its users. Another critical issue that may stimulate the individual mobile service adoption is the users' demographic information. Gender, age, education, and income are considered to play critical role with regard to mobile service acceptance. For instance, a service might fit to men's preferences (mobile game), while, some services may only target females 'mobile web browsing' (mWomen, 2012). According to 'mwomen', in a research for comparing male and female mobile web browsing usage, it has been found that on an international basis, it is South Africa wherein the largest proportion of users are female, whilst the UK sits in fourth place on this particular measure (mWomen, 2012). Provider of mobile services also has been identified to have impact on users' decisions. While, until recently users have to be locked to a specific telecom operator, after the changes in telecommunication regulations, users can easily switch from one operator to another without being forced to give up their mobile number. In order to understand the individual acceptance of Information Technology (IT), several acceptance theories such as Technology Acceptance Model (TAM) (Davis, 1989), Diffusion of Innovation (DOI) (Rogers, 1995) or Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003) have been postulated and systematically been tested in many prior studies.

In most of the prior researches the acceptance and adoption of mobile services were the main theme of the research. Many of prior researches were interested in studying on how and why a new innovation or technology spread. There is an extensive body of literature in which, researchers have used one or sometimes even a combination of the acceptance/adoption theories aiming to find an answer to contribute to the understanding of the acceptance and sustainable usage of the mobile services. For example, service perception and mobile service characteristics (Bouwman et al., 2011; Nysveen et al., 2005) and mobile commerce (Mahatanankoon et al., 2005), acceptance of advanced mobile services (López-Nicolás et al., 2008), service platforms (van Halteren and Pawar, 2006) and the impact of use context with regard to mobile ticketing (Mallat et al., 2009) have been extensively under researched. However, none of the prior research results have shown a complete solution for the acceptance and adoption of mobile services problems. To this end, we have discussed issues and problems that hinder the acceptance of mobile services. Having said that, still there are other issues which are more related to technology, Telecommunication standards, context of use, and cultural diversity which also will be

discussed throughout this study. The rapid advancement in technologies and ease of use, coupled with the falling prices of devices, present the mobile phone as an appropriate and adaptable tool to bridge the digital divide. Cell phones have not yet achieved these levels of quality, but they do offer "anywhere" convenience, a disruptive innovation advantage. The wireless industry is one of the most dynamic and growing industry in the world economy today. The rapid technological advancement that the world has witnessed in the recent years especially in the electronic industry has also changed the means of production around the world. I.E.C.(2005). This can be evidenced in the banking sector where, since the introduction and evolution of the mobile phones, the ways and means of business information transfer have changed leading to more effective in service rendered to customer by the banking sectors. However, mobile banking services are often differentiated as „push“ or „pull“. Pull is when a customer explicitly requests a service or information from the bank. While push, occurs when a bank sends an alert to a customer when their accounts goes below a threshold level. Pull services are often of higher security measures. Researchers in numerous spheres of the world had contributed in varied degrees to the existence of mobile banking and its originality into servicing customers effectively. Those scholars have evaluated some of the services mobile banking can offer. Such services include:

Account information:

Mini statements and checking account history, Alerts on account activity or passing of set thresholds Monitoring of term, deposits Access to loan statements, Access to card statements Status on cheque, stop payment on cheque

Payments and transfers:

Domestic and international funds transfer, Micro-payment, handling Mobile recharging

Investments:

Portfolio management service, Real-time stock quotes, personalized alerts and notification on security prices and etc.

Service Delivery and Mobile Banking

An understanding of the role of e-service delivery is critically important because a study has suggested that as much as \$8billion in potential sales were lost on 2001 due to inadequate e-service. Sichel, et al (2010). More importantly, as mainstream consumers begin to explore the world available to them on the web, they are likely to be less willing to put up with poor service. With the emergence of the mobile banking, customer focus has to be presented on the mobile electronic facilities platform. A key component of improving customers focus is the implementation of tools that allow development of better relations between banks and their customers (customer bank relationship). The banking industry today is witnessing heavy IT revolution to the extent that customers now have freedom to pay bills; plans payments while held in traffic jams, receive updates on banks transaction other. Mobile banking also welcomed other financial services like share trading, sophisticated enquiry based banking services for transaction alerts, minimum balance alerts, account balance enquiry, cheque book request, and bill payment alerts.

Several banks have launched the mobile banking services that enable customers to carry out simple transactions based on Short Message Services (SMS) technology with customer's mobile phones serving as the terminals. Such transactions include account balance enquiries, funds transfers between customer's own accounts and to other account with the same bank, transaction tracking and third party payments, such as bill payments, cheque book request and balance confirmation. The security controls used are PIN code and pass code identification. Mobile banking service, also secure SMS messaging for confirmation of receipt to the beneficiary of services, mobile banking services have a very exciting potential within Tanzania, given the low infrastructural requirements and a rapidly increasing mobile phone penetration. Furthermore, increased service quality on mobile banking facilities can enhance more effective mobile banking service product and can help them to achieve higher levels of customer satisfaction.

Challenges of Mobile Banking Mobile phone operability:

There are a large number of different mobile phone devices and it is a big challenge for banks to offer mobile banking solution on any type of device. Some of these devices support Java ME and others support s Application Toolkit, a WAP browser, or only SMS. Initial interoperability issues however have been localized, with countries like India using portals like R-World to enable the limitations of low end java based phones, while focus on areas such as South Africa have defaulted to the USSD as a basis of communication achievable with any phone. The desire for interoperability is largely dependent on the banks themselves, where installed applications (Java based or native) provide better security, are easier to use and allow development of more complex capabilities similar to those of internet banking while SMS can provide the basics but becomes difficult to operate with more complex transactions.

Security of transactions: Security of financial transactions, being executed from some remote location and transmission of financial information over the air, are the most complicated challenges that need to be addressed jointly by mobile application developers, wireless network service providers and the banks' IT departments.

Advantages of Mobile Banking

- Mobile banking reasonably reduces the cost of rendering services to customers.
- For service providers, mobile banking offers the next surest way to achieve growth by offering suitable services to attract new customers or retain old ones.
- Mobile banking helps alert customers on trends happening in their accounts in order to minimize fraud.
- It also encourages them and wishes customers well on special occasions like birthdays of customers

II. Mobile Service Innovations Characteristics

Mobile devices with embedded software can support users' functionalities in their day-to-day lives or in their social systems. The benefits offered by these vast variety of advanced mobile services and applications are diverse. In other words, mobile services, applications and devices enable users to access all kind of information, interact with each other, perform a task, communicate, make banking transaction and even entertain themselves. Presumably, one can argue that the opportunities and benefits in mobile technology based on its ubiquitous character make the adoption/acceptance of these technologies inevitable. However, disregard for many opportunities and benefits in mobile services and application, many prior researches show the failure of the adoption/acceptance of mobile service innovations (Bouwman et al., 2008a) and (López-Nicolás et al., 2008).

Generally speaking, the users expect mobile services or applications to be available at any moment, and any place, disregard for a specific context. In other words, it means that users want to use mobile services wherever they are and whenever they want to. Thus, we can argue that "mobility" plays a significant role in adoption/acceptance of mobile services. Mobility can be defined as moving around, either in time or in a place. Individual carry their mobile devices at anytime, anyplace to be in touch. Regardless of many effective attributes and benefits that mobile services offer, the concept of mobility is not the only character which has to be taken into account. Mobile services and applications, due to its ubiquitous characteristics, should be classified into many different ways to understand better individual acceptance toward mobile services and applications. Therefore, it is necessary to classify mobile services and applications in very understandable manner. Although, due to recent technological advancement many mobile services can fit in more than one group, however, we will classify them in the following ways (Bouwman et al., 2011), (Varshney, 2005), (Open Garden, 2009), (Kuo and Chen, 2006) and (Jeon and Lee, 2008).

Services such as telephony and SMS have been available to users for a quite long time, while some other service have recently been introduce and are available to uses such as social network services (Facebook) and Mobile monitoring RFID (Radio-Frequency Identification) information.

While some services are designed specifically for individual, some other services are only designed for groups. Some of the mobile services can be used to access information such as looking for weather forecast, while other services provide information to the users such as advertisements via SMS. Some mobile services are designed to have information consumption purposes such as watching video or reading news. While some mobile services have the users participation purposes such as mobile chat or uploading a video in YouTube. In a discussion on user-generated content, (Shao, 2009) categorized mobile services into two groups, (i) consumption, and (ii) participation. In another research (Feijoo et al., 2009) has introduced a taxonomy for mobile services having two dimensions, (i) processed information (mobile stock market information) versus creative content (mobile game), and (ii), existing content adapted to mobile (mobile banking, mobile email) versus content which specifically developed for mobile (location based services or mobile augmented reality).

Context of Use

In order a mobile service to be accepted and adopted by a user, the service should provide values to its user. In other words, it means that the service should enhance user performance in doing a particular task. However, many prior researches indicated that context of use influences the user attitude and behaviour. If the contextual aspects match with the user requirement for using a particular service, the acceptance of that particular service will be increased. As the usage of mobile phones become increasingly pervasive, people carry their devices almost anywhere (Mallat et al., 2009). Consequently, the use context has become increasingly important (Dourish, 2004). It is important to address that some contextual use poses implication to use a mobile service. For instance, due to lack of technological infrastructures or lack of network coverage in some areas, therefore, using a service might not be possible. One can argue that, use context plays a significant role in individual decision making toward acceptance and adoption of mobile services. In general, user expects that in every situation the ubiquitous computing will be available. Thus, this can be an indication for mobile service providers and developers to take contextual aspects of mobile service into an account while designing a service.

The most widely accepted definition of perceived value is the Zeithaml's definition that is "the overall assessment on the product (or service) utility determines by customer's perceptions of what is received and what is given" In services, it involves the comparison of what one is getting (i.e., benefits) and what he has to give up (i.e., sacrifices) in order to receive the service .Therefore, perceived value of mobile banking service in this study mean the customers' overall perception of it benefits and sacrifices needed to use it. From the conceptualization, perceived value consists of benefits and sacrifices. This study based on the thought that benefits and sacrifices are sometimes not equal. The difference could be positive or negative. The positive result will be customer perceived value, and the negative result will be customer perceived worthlessness. The benefits include the value desired by the customer while sacrifices include monetary and non-monetary considerations. Monetary sacrifice includes the price of the service, while non-monetary sacrifice includes elements like time and efforts. Therefore, to maximize the customers' perceived value, firms must either enhance the perceived value like quality, relative advantages and/or decrease their sacrifice (e.g. cost paid, risk to take).

A. Benefit Factors

Customers are highly interested in the benefits that a service would offer them once it is used. In essence, the customer seeks to establish the value that the service will add in his or her life before making the decision to adopt. Accordingly, the service must be able to satisfy the needs of the customer and provide benefits that make the service worth to adopt. This study addresses the benefit

factors that mobile banking customers look out for performance expected and level of effort required. Performance expectancy denotes the degree to which customer believes that using the system will likely to improve his or her job performance. Customers basically have high expectations whenever they undertake a particular service to satisfy their needs. They expect that the service will guarantee value for their money and that it will perform in accordance to their expectations. Information System adoption research proposes that “a system that does not help people perform their jobs is not likely to be received favorably”. In the context of the mobile banking services usage, performance expectancy can be defined as the degree to which the mobile banking could extend benefits to individuals in their banking activities. Effort expectancy denotes the degree of ease with which an individual is likely to grasp the use of a system. Ease of use is enhanced by the use of simple technology and applications that are easy to operate; such that little technical knowledge is required in using the system. Low effort expectancy can be said to be a benefit factor in the adoption of new technology and thus an important factor in explaining the usage of mobile banking. In this study, effort expectancy is defined as the degree of effort that a bank customer believes he or she needs to spend on using mobile banking service.

B. Sacrifice Factors

In the process of making decision, customers are expected to analyze various characteristics of the services, including the costs and benefits they are likely to encounter before and after using the service. Sacrifice factors denote what the customer is expected to part with or forego, in exchange for obtaining the service. These may include cost and risk associated with the use of a particular service; in this study, mobile banking services usage. The costs of the service is considered as one of the most imperative factors in the decision making process. This is because it determines the customer’s ability to use the service depending on availability of the specified amount and their set budget. Perceived cost is the perceived quantifiable costs of acquisition and use of technology. Referring to Luarn and Lin’s definition, perceived financial cost is defined as “the extent to which a person believes that using mobile banking will cost money.” Customers also think of the risks they undergo if they adopt the new banking through mobile services; especially due to the rising number of hackings and identity theft that has invaded the e-commerce sector. Many people feel like they have exposed themselves to the possible theft and misuse of their bank accounts in the event that hackers get access to their secret codes or from friends and relatives who are likely to access their mobile phones. The customer may feel at risk and exposed to insecurity and uncertainty that makes him or her anxious about adopting mobile services such that they end up not enjoying the benefits derived from the mobile banking. This study adopted Featherman and Pavlou’s definition of perceived risk in electronic service context. Thus, perceived risk is defined as “a bank customer’s expectation of potential loss in the pursuit of a desired outcome of using mobile banking.

Consumer’s Acceptance toward New Technology

Advanced mobile technology has an impact on consumers’ service perception. Over the last years, mobile communication has been identified as the fastest growing segment of telecommunications (Glodsmith, 2005). Mobile devices and in particular smart-phones have become increasingly important device for people around the world. It has been argued that the number of mobile devices in many countries has already exceeded the number of fixed access lines. According to, (ITU, 2011), "At the end of 2011, there were 6 billion mobile subscriptions, estimates The International Telecommunication Union (2011). That is equivalent to 87 percent of the world population. And is a huge increase from 5.4 billion in 2010 and 4.7 billion mobile subscriptions in 2009". Users can use their mobile devices to make or receive calls and videos and perform other tasks such as shopping and banking transactions. These are services which are specifically designed to perform certain tasks. Therefore, if services are designed according to users’ preferences, then users’ acceptance toward technology and particularly mobile technology will be increased. Figure 1 presents the research model as well as the proposed hypotheses and relationship between the eight constructs and the behavioral intentions to accept and use the mobile Internet. The study to investigate the relative impact of factors contributing to mobile Internet as a mean of Information and Communications technology acceptance across several consumers with different ages, experience, and educational backgrounds was also done by, Davis et al (1989), Thompson et al (1991), Igbaria (1993), and Davis (1993) attempted something similar when investigating the acceptance of IT.

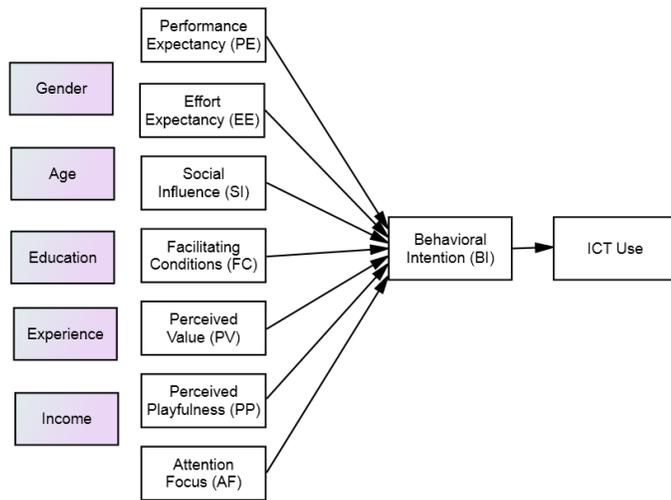


Fig 1: The Proposed Research Model

Agarwal (2000) defines technology adoption as the use, or acceptance of a new technology, or new product. In Information Technology and Information System (IT/IS) research, numerous theories are used to understand users' adoption of new technologies. Various models were developed including the Technology Acceptance Model (TAM), Theory of Reasoned Action (TRA), Theory of Planned Behavior (TPB), Innovation Diffusion Theory (IDT), Task Technology Fit (TTF), and recently, the Unified Theory of Acceptance and Use of Technology (UTAUT) are often used as the theoretical bases. Each of these models has sought to identify the factors which influence a citizen's intention or actual use of information technology.

TAM proposes that perceived ease of use and perceived usefulness are two main beliefs affecting user adoption (Davis, 1989). Due to its parsimony, TAM has been used to explain user adoption of various mobile services, including mobile payment (Chandra et al., 2010), short message services (Lu et al., 2010), mobile shopping (Lu and Su, 2009), mobile ticketing (Mallat et al., 2009), and mobile Internet (Shin et al., 2010). IDT notes that relative advantage, complexity, compatibility, trialability and observability predict user adoption (Rogers, 1983). IDT has been examined in the context of multimedia message services (Hsu et al., 2007), mobile payment (Mallat, 2007), and mobile banking (Lin, 2011). TTF proposes that only when task characteristics fit technology characteristics will user performance be improved (Goodhue and Thompson, 1995). TTF has been used to examine user adoption of location-based services (Junglas et al., 2008), and mobile work (Yuan et al., 2010).

UTAUT was developed by Venkatesh et al. (2003) to predict user adoption of an information technology. UTAUT integrated eight theories, including the TAM, IDT, the theory of reasoned action (TRA), the motivational model, the theory of planned behavior (TPB), a model combining the TAM and TPB, the model of PC utilization and social cognitive theory (SCT). With empirical analysis, Venkatesh et al. (2003) found that performance expectancy; effort expectancy, social influence and facilitating conditions are the main factors determining user adoption. Among them, performance expectancy is similar to perceived usefulness and relative advantage. Effort expectancy is similar to perceived ease of use and complexity. Social influence is similar to subjective norm. Since its inception, UTAUT has been used to explain user adoption of a variety of information technologies, including location-based services (Xu and Gupta, 2009), mobile technologies (Park et al., 2007), mobile banking (Zhou et al., 2010), Internet banking (Im et al., 2011), and health information technologies (Kijisanayotin et al., 2009). Due to the relatively low adoption rate of mobile services, extant research has paid much attention to prior work of Venkatesh (2003, 2012) and Zohu (2011) when identifying the factors affecting mobile user behavior.

Performance Expectancy reflects the perceived utility associated with using mobile Internet. Mobile Internet frees users from temporal and spatial limitations, and enables them to acquire information or services at anytime from anywhere. This can improve users' living and working performance and efficiency. According to the expectation confirmation theory, when users' expectation is confirmed, they will be satisfied (Bhattacharjee, 2001). Thus performance expectancy will affect user satisfaction. Extant research has also noted the effect of perceived usefulness (similar to performance expectancy) on satisfaction (Bhattacharjee, 2001; Lee et al., 2007a). In addition, performance expectancy will also affect continuance intention.

Effort Expectancy reflects the perceived difficulty of using mobile Internet. The constraints of mobile terminals such as small screens and inconvenient input have made it relatively difficult for users to search for information on mobile Internet (Lee and Benbasat, 2004). If users need to invest great effort on learning to use or skillfully using mobile Internet, they cannot feel satisfied. Thus effort expectancy will affect user satisfaction. In addition, users may discontinue their usage if mobile Internet service providers cannot present an easy-to-use interface to them. Prior research has revealed the effect of perceived ease of use (similar to effort expectancy) on user satisfaction (Lee et al., 2007a) and continuance usage (Shin et al., 2010). Social Influence reflects the effect of referees' opinion on individual user behavior (Zhou, 2011). According to social influence theory, users tend to comply with other important

referees' opinions (Bagozzi and Lee, 2002). Thus when others who are important to a user recommend him or her to use mobile Internet, he or she may follow their suggestions. Hong et al. (2008) also found that social influence has a significant effect on the continuance intention of mobile data services.

Facilitating Conditions mean that users have the resources and knowledge necessary to use mobile Internet. Users need to bear the costs of using mobile Internet, such as communication fees and service fees. In addition, they need to be equipped with necessary knowledge to operate mobile Internet, which represents an emerging technology. If users do not own these resources and knowledge, they may not continue their usage of mobile Internet (Zhou, 2011).

Perceived Value is defined as the consumer's overall assessment of the utility of a product based on perceptions of what is received and what is given (Zeithaml, 1988). In the case of mobile Internet, potential users would probably compare all the attributes of mobile Internet usage with prices of previous mobile phone calls and stationary Internet access. The price value is positive when the benefits of using a technology are perceived to be greater than the monetary cost and such price value has a positive impact on intention. Thus, we add price value as a predictor of behavioral intention to use a technology (Venkatech et al, 2012).

Perceived Playfulness reflects the pleasure and enjoyment associated with using mobile Internet. Perceived enjoyment is an intrinsic motivation that emphasizes the usage process, whereas perceived usefulness is an extrinsic motivation that emphasizes the outcome (Davis et al., 1992). Users expect to acquire enjoyment when they adopt mobile Internet to obtain ubiquitous information and services. When this expectation is met, users will feel satisfied. Thus perceived enjoyment may affect satisfaction. O'Cass and Carlson (2010) also noted that flow affects user satisfaction with professional sporting team websites. Lee et al. (2007b) reported that flow affects online banking users' satisfaction. In addition, perceived enjoyment may also facilitate continuance usage. If users cannot obtain enjoyment from using mobile Internet, they may discontinue their usage due to an unpleasant experience. The effect of perceived enjoyment on user behavior has been validated in extant research (Koufaris, 2002; Dickinger et al., 2008).

Attention Focus reflects a user's immersion when using mobile Internet. Mobile users often perform multiple tasks on movement, such as listening to music and accessing mobile Internet. Thus their attention allocated to mobile Internet may be limited. If they cannot focus their attention, their experience may be affected (Zhou, 2011). This may decrease their satisfaction and continuance usage intention. Koufaris (2002) also noted that concentration (similar to attention focus) affects online shoppers' return intention.

Behavioral intention is defined as a person's perceived likelihood or "subjective probability that he or she will engage in a given behavior" (Committee on Communication for Behavior Change in the 21st Century, 2002, p. 31). With increasing experience, consumers have more opportunities to reinforce their habit because they have more time to encounter the cues and perform the associated behavior (Kim and Malhotra 2005). With increasing experience, routine behavior becomes automatic and is guided more by the associated cues (Jasperson et al. 2005). As a result, the effect of behavioral intention on technology use will decrease as experience increases.

Cultural Characteristics and Diversities

For long, cultural differences between people have been a central topic of the research, this issue has also been discussed in mobile service adoption and how cultural differences impact the service adoption (Gallivan and Srite, 2005). Moreover, cultural traits have also been identified as one of the most important factor that impacts users' perceptions towards different features of IT and mobile services (Hiller, 2003). Cultural differences have undeniable effect on organizations and behaviour (Sarala, 2010). Firstly, in different cultures people have different values on the same topic. Secondly, cultural differences also lead to diverse type of behaviour. Thirdly, way of thinking is also different in different countries. For instance, due to the cultural differences between the Asian and the European users, some mobile services are perceived to be more useful than the other ones. Mobile game, for example is very popular in Japan, South Korea and China, but not in the European countries. Another example, is mobile TV, as people in Japan and Korea spend hours for commuting in daily bases, therefore they have more spare time to kill, consequently they use more entertainment services. On the other hand, people in Finland for example, they do not spend time as much as Asian for commuting, therefore the adoption and acceptance of mobile TV has failed. The perception of IT artifacts (mobile services in this study) is greatly influenced by cultural traits.

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Android Mobile Application Build on Eclipse

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Abstract- Android is now the most used mobile operating system in the world. Android now has more users, more phones and more tablets worldwide than any other mobile operating system. The Google Play app store has been growing at breakneck speed and with almost as many apps as the Apple app store. This, for entrepreneurs and developers, is the chance of a lifetime to make even more money and reach an even broader audience base.

This paper gives a complete knowledge of how to start working on eclipse and develop an application and get it run on emulator.

Index Terms- Android SDK, ADT plug-in, AVD manager, Eclipse-IDE, java/c++, Android Apps Development.

I. INTRODUCTION

Android is a Linux-based, **open source** mobile operating system developed by Open Handset Alliance led by Google to develop apps for Android devices. To start with we use a set of tools that are included in the Android SDK. Once we have downloaded and installed the SDK, we can access these tools right from our Eclipse IDE, through the ADT plug-in, or from the command line. Developing with Eclipse is the preferred method because it can directly invoke the tools that we need while developing applications..

The basic steps for developing applications are shown in Figure 1. The development steps encompass four development phases, which include:

- **Setup:** During this phase we install and set up our development environment. We also create Android Virtual Devices (AVDs) and connect hardware devices, on which we can install our applications.
- **Development:** During this phase we set up and develop our Android project, which contains all of the source code and resource files for our application.
- **Debugging and Testing:** During this phase we build our project into a debug gable .apk package that we can install and run on the emulator.
- **Publishing:** During this phase we configure and build our application for release and distribute our application to users.



Figure 1. Steps for Application Development

This paper is distributed in following sections:

- 1) Abstract
- 2) Introduction
- 3) Eclipse
- 4) Tools and environment
- 5) Development of an app
- 6) Conclusions

II. ECLIPSE

Eclipse is an integrated development environment (IDE). It contains a base workspace and an extensible plug-in system for customizing the environment. Written mostly in Java, Eclipse can be used to develop applications in Java.

The initial codebase originated from IBM. The Eclipse software development kit (SDK), which includes the Java development tools, is meant for Java developers. Users can extend its abilities

by installing plug-ins written for the Eclipse Platform, such as development toolkits for other programming languages, and can write and contribute their own plug-in modules. Released under the terms of the Eclipse Public License, Eclipse SDK is free and open source software (Table 1).

Codename	Date	Platform version	Projects
N/A	June 2004	3.0[14]	
N/A	June 2005	3.1	
Luna	June 2014 (planned)	4.4	Luna projects
Kepler	June 2013	4.3	Kepler projects
Juno	June 2012	4.2[15]	Juno projects
Indigo	June 2011	3.7[Notes 1]	Indigo projects
Helios	June 2010	3.6	Helios projects
Ganymede	June 2008	3.4	Ganymede projects
Galileo	June 2009	3.5	Galileo projects
Europa	June 2007	3.3	Europa projects
Callisto	June 2006	3.2	Callisto projects

Table 1. Eclipse Releases

III. TOOLS AND ENVIRONMENT

Here we will discuss installation details for our software.

- a. Android SDK Tools, revision 20 or newer.
- b. SDK Platform Android 3.0 (API 11).

The minimal platform supported by Java API is Android 2.2 (API 8). But for successful compilation the target platform should be set to Android 3.0 (API 11) or higher. It will not prevent them from running on Android 2.2.

Figure 2 gives the look of the window, where we have to select our required android settings.

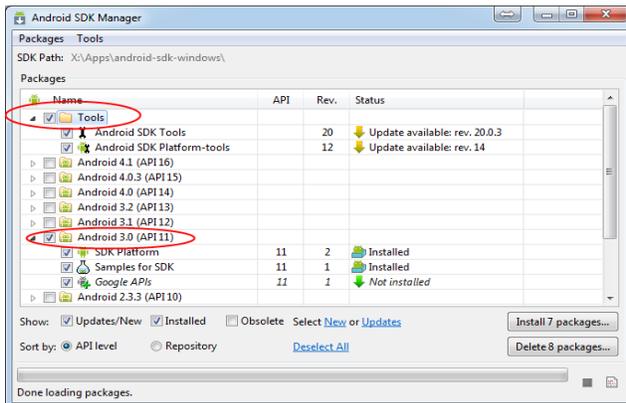


Figure 2. Android SDK Manager

- c. Eclipse IDE
There is a list of Eclipse versions that are compatible with the Android SDK. In this paper we are using Eclipse 3.7 (Indigo).
- d. ADT plug-in for Eclipse

Android Development Tools (ADT) is a plug-in for the Eclipse IDE that is designed to give us a powerful, integrated environment in which to build Android applications.

ADT extends the capabilities of Eclipse to let us quickly set up new Android projects, create an application UI, add packages based on the Android Framework API, debug applications using the Android SDK tools, and even export signed (or unsigned) .apk files in order to distribute the application.

Developing in Eclipse with ADT is highly recommended and is the fastest way to get started. With the guided project setup it provides, as well as tools integration, custom XML editors, and debug output pane, ADT gives us an incredible boost in developing Android applications.

Following steps are used to download and install the ADT plug-in:

- o Start Eclipse, then select Help ▸ Install New Software.
- o Click Add (in the top-right corner).

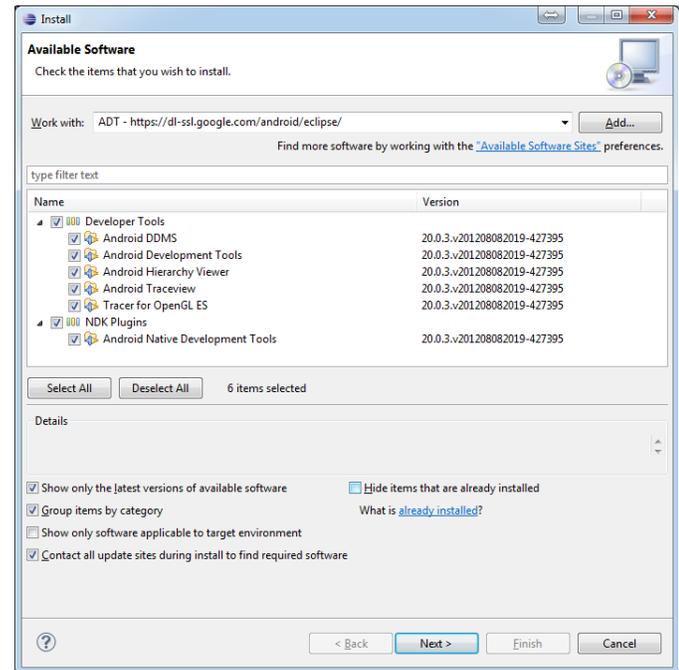


Figure 3. ADT-Plugin/Tool Installation

- o In the Add Repository dialog that appears, enter “ADT Plug-in” for the Name and the URL refer to Figure 3.
- o Click OK (System must be connected to internet).

- In the Available Software dialog, select the checkbox next to Developer Tools and click Next.
- In the next window, we'll see a list of the tools to be downloaded. Click Next.
- Read and accept the license agreements, then click Finish.
- When the installation completes, restart Eclipse.

e. AVD Manager

The AVD Manager provides a graphical user interface in which we can create and manage Android Virtual Devices (AVDs), which are required by the Android Emulator.

- For emulation, we need to define a device.
- Select Window -> Android AVD Manager from the menu (Figure 4).



Figure 4. AVD Manager

f. Importing Project

- Open the import Dialog
- Select File > Import ... to open the import dialog.
- Import the "MyProject" project
- In the import dialog, expand the General node and select Existing Projects into Workspace, then click Next to move to the Import Projects step. Make sure that Select root directory is selected, then click the Browse... button.
- In the Browse for Folder dialog, locate the "MyProject" folder, select it and click OK. Then, click Finish to import the project. The project now shows up in the Package Explorer.
- Launch the "MyProject" project
- Right click the "MyProject" in the Package Explorer window, and then select Run As > Android Application from the menu.

g. Deleting Project

Here is the project-wise solution. Right click the "MyProject" in the Package Explorer window, and then select Delete from the menu. In the dialog that appears, ensure that delete project contents on disk is not selected if we want to use the project's folders in workspace. If not, we can check it before be click OK.

IV. DEVELOPMENT OF AN APP

This app will start with a homepage, here we will setup background image and set a mp3 sound and welcome text. Then an automatic intent will fire and app will go on to next page, on 2nd page we will set a counter which will contain 3 buttons: ADD , SUB , EXIT.

Follow these simple 10 steps carefully.

1. Go to file>new>android application project.
2. Open project go to res>layout>activity_main.xml Here we can start layout design:

```
<?xml version="1.0" encoding="utf-8"?>
<LinearLayout
xmlns:android="http://schemas.android.com/apk/res/android"
    android:orientation="horizontal"
    android:layout_width="fill_parent"
    android:layout_height="fill_parent">

    <Button
        android:id="@+id/badd"
        android:layout_width="wrap_content"
        android:layout_height="78dp"
        android:text="ADD"
        android:layout_gravity="center"/>

    <Button
        android:id="@+id/bsub"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="SUB"
        android:layout_gravity="center" />

    <TextView
        android:layout_width="fill_parent"
        android:layout_height="wrap_content"
        android:text="YOUR TOTAL IS 0"
        android:gravity="center"
        android:id="@+id/tvDisplay"
        android:textSize="25sp"
    >
    </TextView>
</LinearLayout>
```

3. For creating action to these buttons, in project Go to src>app.com>MainActivity.java

```
package myapp.com;

import android.os.Bundle;
import android.app.Activity;
import android.view.Menu;
import android.view.View;
import android.widget.Button;
import android.widget.TextView;

public class MainActivity extends Activity {

    int counter;
```

```

Button add,sub;
TextView display;

@Override
protected void onCreate(Bundle savedInstanceState) {
    super.onCreate(savedInstanceState);
    setContentView(R.layout.activity_main);
    counter = 0;
    add = (Button) findViewById(R.id.badd);
    sub = (Button) findViewById(R.id.bsub);
    display = (TextView) findViewById(R.id.tvDisplay);
    add.setOnClickListener(new View.OnClickListener() {
        @Override
        public void onClick(View v) {
            // TODO Auto-generated method stub
            counter++;
            display.setText("your total is " + counter);
        }
    });

    sub.setOnClickListener(new View.OnClickListener() {
        @Override
        public void onClick(View v) {
            // TODO Auto-generated method stub
            counter--;
            display.setText("your total is " + counter);
        }
    });

    @Override
    public boolean onCreateOptionsMenu(Menu menu) {
        // Inflate the menu; this adds items to the action bar if it is
        present.
        getMenuInflater().inflate(R.menu.main, menu);
        return true;
    }
}

```

4. On desktop copy one sound file with mp3 extension and one image for setting background (rename it in small letter, example aaa.jpg,splash.mp3).
5. Right click on res>layout>new>folder. Save mp3 file here.
6. Click res>drawable-hdpi. Save image file here.
7. Right click on layout>new>others>example.xml Here we create new xml file for our welcome page and we will set our background image.

```

<?xml version="1.0" encoding="utf-8"?>
<LinearLayout
    xmlns:android="http://schemas.android.com/apk/res/android"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:orientation="vertical"
    android:background="@drawable/splash_background">
</LinearLayout>

```

8. Here we will create a new class for the new xml page

here we will use mp3 song and set an intent for 5 seconds. This will cause the page automatic exit after 5 seconds

Click on Src>app.com(right click)>new>class

```

package myapp.com;
import android.app.Activity;
import android.content.Intent;
import android.media.MediaPlayer;
import android.os.Bundle;

public class Splash extends Activity {
    MediaPlayer oursong;
    @Override
    protected void onCreate(Bundle savedInstanceState) {
        // TODO Auto-generated method stub
        super.onCreate(savedInstanceState);
        setContentView(R.layout.splash);
        oursong = MediaPlayer.create(Splash.this,R.raw.splashsound);
        oursong.start();
        Thread timer = new Thread(){
            public void run(){
                try{
                    sleep(5000);
                }catch(InterruptedException e){
                    e.printStackTrace();
                }finally{
                    Intent n = new Intent("myapp.com.MainActivity");
                    startActivity(n);
                }
            }
        };
        timer.start();
    }
    @Override
    protected void onPause() {
        // TODO Auto-generated method stub
        super.onPause();
        oursong.release();
    }
}

```

9. Set Android Manifest file
Click AndroidManifest.xml
Copy Activity area and set one action class as LAUNCHER and another class as DEFAULT.

```

<activity
    android:name="myapp.com.Splash"
    android:label="@string/app_name" >
    <intent-filter>
        <action android:name="android.intent.action.MAIN" />
        <category
            android:name="android.intent.category.LAUNCHER" />
    </intent-filter>
</activity>
<activity
    android:name="myapp.com.MainActivity"
    android:label="@string/app_name" >
    <intent-filter>
        <action android:name="myapp.com.MainActivity" />
        <category
            android:name="android.intent.category.DEFAULT" />
    </intent-filter>
</activity>

```

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10. Right click on project>Run As>1 Android Application

The above steps will help us in System Environment, Developing Application and get it run on emulator.

These are all basic steps of android programming. Here main work is carried out in following sections:

- xml layout
- java class
- string class
- manifest files

Android apps have reached a new level of construction where it is working on the concept of Apple's SIRI application, voice command apps, home security etc.

In this paper basic structure for building an android app is covered.

V. CONCLUSION

Our objective behind this paper presentation was to discuss all basic details to start android application and to overcome the technical jargons which come as a big constraint on the way of beginner programmer.

Simplicity was the major factor in explaining all installation process of eclipse and a simple android application, which will give a bust to all aspiring android developers.

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Problems and Changing Needs of Consumers in Fast Food Industry: The Indian Perspective

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Abstract- Fast food industry is one of the world's fastest growing sectors in food industry. However, over a period of time, with a growth in the number of nuclear families, economic growth and increasing per capita income as well as globalization, fast food culture gained prominence in India. The study reveals that absence of healthy menu, no new varieties of fast food and slow delivery time were major problems perceived by the consumers in fast food restaurants. It could be inferred that absence of healthy menu, no new varieties of fast food and slow delivery time were major problems perceived by the consumers in fast food restaurants.

Index Terms- Fast food industry, Consumer Needs

I. INTRODUCTION

Fast food industry is one of the world's fastest growing sectors in food industry. Fast food is the food item that can be prepared and served very quickly (Webster Dictionary, 1951). Encyclopedia Wikipedia defines fast food as "food sold in a restaurant or store with preheated or precooked ingredients and served to the customer in a packaged form for take-out/take-away". Because of commercial emphasis on speed, uniformity and low cost, fast food products are often made with ingredients formulated to achieve a certain flavour or consistency and to preserve freshness.

Fast Food industry in India

The emergence of the fast food industry has, transformed urban food culture in India to some extent. In India, fast food culture emerged after independence. Eating at home used to be a significant aspect of Indian culture. However, over a period of time, with a growth in the number of nuclear families, economic growth and increasing per capita income as well as globalization, fast food culture gained prominence. Similarly, children also resorted to fast food due to their exposure to global urban culture and western cuisine which accelerated their desire for cheap and delicious fast food. Moreover, fast food costs less than traditional meals commencing with appetizer and concluding with dessert. With the liberalization of the economy in 1992, new multinational fast food giants targeted India as a huge potential market with their outlets. Burger King, Pizza Hut, Domino's Pizza, McDonald's and KFC outlets are functioning in shopping malls and other public areas. Changing consumer behaviour and favourable demographics led India to witness a tremendous growth in fast food restaurant industry (Shanker, 2010).

OBJECTIVES OF THE STUDY

An attempt was made in the present study entitled "Analysis of Mutual Fund Investors" to understand the attitude, awareness and preferences of mutual fund investors, along with the factors influencing the investors in selection of fund and their preferences for various investment avenues. To be specific following are the main objectives of the present research s Objectives

The overall objective of the study is to analyze the food consumption lifestyle behavior of consumers segment for developing new marketing strategies in fast food sector. The specific objectives of the study are:

1. To identify the influence of demographic factors on consumption of fast food by the sample respondents,
2. To identify the problems in consumption of fast food items and the services provided by the fast food restaurants, and

II. METHODOLOGY

The study was conducted in 2 major cities in India Hyderabad and Coimbatore by selecting randomly 100 respondents who step in at major fast food restaurants. A questionnaire for the same has been prepared for this purpose. Statistical methods like Percentages, factor analysis, 't' test, multifunction regression function are used.

III. FINDINGS AND DISCUSSIONS

The information collected from 100 sample respondents in the study area of Coimbatore city were tabulated, analyzed and the findings of the study are presented under the following headings.

1. Demographic Profile of Sample Respondents
2. Influence of Demographic Factors on Fast Food Consumption
3. Problems in Fast Food Consumption
4. Consumer's Changing Need on Food related Lifestyle

1 Demographic Profile of Sample Respondents

The general characteristics of the sample respondents with respect to age, gender, education, occupation, income and marital status of the sample respondents were analyzed and the results are presented in this section.

1.1. Age

Age is an important demographic factor which determines individual person's lifestyle attitudes like thinking, decision making, risk bearing, etc. The age wise distribution of sample respondents are presented in the table 1.1.

Table 1.1 Age Distribution of Sample Respondents

S.No.	Age (in years)	Percent to total
1	Less than 25	30.00
2	25 to 35	70.00

Total	100.00
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It could be inferred from the table 1.1 that 70 per cent of the sample respondents were belonged to the age group of 25 to 35 years and 30 per cent of them were in the age group of below 25 years. It shows that majority of the respondents are in the age group of 25-35 years and are classified as young consumers.

1.2. Gender

Men and women tend to have different attitudinal and behavioural orientation based partly on genetic makeup and partly on socialization. Gender role varies in terms of region and social development of a country. Hence, gender role is important in lifestyle behavior particularly in food habits. The details on distribution of sample respondents with respect to gender are analyzed and presented in the table 1.2.

Table 1.2 Gender Profile of Sample Respondents

S. No.	Gender	Percent to total
1.	Male	50.00
2.	Female	50.00
Total		100.00

It could be observed from the table 1.2 that male and female gender accounted for 50 per cent i.e. half of the sample respondents belonged to male gender and the remaining 50 per cent were belonged to female gender. So, it could be concluded that male and female gender has equal lifestyle behaviour with regard to consumption of fast food.

1.3. Education

Education plays a major role in influencing consumers in their approach and attitude towards spending and their lifestyle activity. The educational status of sample respondents are presented in the table 1.3.

Table 1.3 Educational Status of Sample Respondents

S. No.	Education Category	Percent to total
1.	Graduate	66.00
2.	Post Graduate	30.00
3.	Above Post graduation	4.00
Total		100.00

It is revealed from the table 1.3 that majority (66 per cent) of sample respondents were completed graduation, 30 per cent of respondents had post graduate level of education and only 4 per cent of them were completed above post graduate qualification. Thus, it could be inferred that sample respondents holding degree level education forms the major consumer group in the present study.

1.4. Occupational Status

The occupational status of sample respondents were analyzed and the results are presented in the table 1.4.

Table 1.4 Occupational Status of the Sample Respondents

S. No.	Occupation	Percent to total
1.	Private Employees	77.00
2.	Business Owners	23.00

Total	100.00
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It could be observed from the table 1.4 that most of the respondents (77 per cent) belonged to working professionals (private sector employment) and 23 per cent were business owners. It shows that majority of the sample respondents are working group and earn income from private entities.

1.5. Income

Income level of consumers has significant role in influencing the decision making process on their own. Increasing disposable income of young consumers define their lifestyle and food habits. Hence, income levels of sample respondents were analyzed and the results are presented in the table 1.5.

Table 1.5 Income Distribution of Sample Respondents

S. No.	Monthly Income (Rs.)	Percent to total
1.	15000- 20000	30.00
2.	21000-25000	47.00
3.	26000-30000	15.00
4.	> 30000	8.00
Total		100.00
Average Income (Rs./Month)		25260

It could be observed from the table 1.5 that 47 per cent of sample respondents had monthly income ranging from Rs.21000 to Rs.25000 followed by 30 per cent of the respondents earn between Rs.15000 to Rs.20000 and 15 per cent of respondents having income range of Rs. 26000 to Rs.30000. It is also observed that only 8 per cent of them are earning a monthly income of above Rs.30000. Hence, it is inferred that majority of the sample respondents earn monthly income ranges from Rs.15000 to Rs. 25000 and the average monthly income for the sample respondents was Rs. 25260 per month.

1.6. Marital status

The marital status of sample respondents have major role in spending towards fast food. Hence, the details on marital status of sample respondents were analyzed and the results are presented in the table 1.6.

Table 1.6 Marital Status of Sample Respondents

S. No.	Marital Status	Percent to total
1.	Single	87.00
2.	Married	13.00
Total		100.00

It could be observed from the table 1.6 that among the total sample respondents, 87 per cent of them were belonged to single (unmarried) group and remaining 13 per cent were married. Thus, in the present study single, unmarried consumer groups formed the major category having convenient lifestyle towards consumption of fast food. These findings are contradicted with results of Chae and Ryu (2010) where among the total respondents in Korea, 56.3 percent were single unmarried group and 43.7 per cent belonged to married group.

2.1. Influence of Demographic Factors on Fast Food Consumption

To identify the influence of demographic variables such as age, income, gender, education, occupation and frequency of eating on fast food consumption, multiple linear regression was used.

The results indicated that coefficient of multiple determination (R^2) was 0.53 implying that 53 per cent of variation in expenditure on consumption of fast food was explained by the independent variables selected for the study.

Among the six variables identified for the study, three variables viz., age, income and occupation were found to have significant relationship with consumption expenditure on fast food.

Age of the respondent was found to be significant at five per cent level but had negative influence on fast food consumption expenditure. This implied that an increase in age of the respondent by one year would decrease consumption expenditure on fast food by Rs.91.65 per capita per month. It is clearly evident that as the age of consumer increases, the tendency to consume fast food will decrease and naturally consumption expenditure will decrease.

Similarly, income of the sample respondents was found to be statically significant at one per cent level and had positive relationship with fast food consumption. This implies that as income increases by one rupee, the consumption expenditure on fast food will increase by Rs.0.05 per month. It is clearly evident that as income increases, the consumers lifestyle changing towards convenience lifestyle.

Occupation of the sample respondents was found to be significant at 10 per cent level but had a negative influence on fast food consumption expenditure. This indicated that sample respondent who are working in private companies are found to spend less towards fast food when compared to business owners.

Hence, it is concluded that age, income and occupation of the respondents had significant influence on consumption expenditure towards fast food.

3.1 Constraints in Consuming Fast Food

The problems perceived by respondents in fast food menus and services provided by organized fast food restaurants were analyzed and the results are presented in the table 3.1.

Table 3.1 Problems in Consumption of Fast Food

S. No.	Constraints	Percent to total
1.	Unhealthy /high fat content	41.00
2.	No new variety	38.00
3.	Delivery is not fast	14.00
4.	Lack of Information about menu	7.00
Total		100.00

It could be seen from the table 2.2 that 41 per cent of respondents perceived that high fat content in fast food menu is the major problem in consumption of fast food and 38 per cent of the respondents revealed that no new varieties in fast food restaurants. Time taken for serving the fast food menu is too slow in fast food restaurants was another major constraint which was expressed by 14 per cent of the sample respondents. Thus, it could be inferred that absence of healthy menu, no new varieties of fast food and slow delivery time were major problems perceived by the consumers in fast food restaurants.

4.1. Changing Need on Food related Lifestyle

To capture the consumer's interests on changing needs of product or service is the part of lifestyle approach. Hence, the changing needs of respondents on fast food was analyzed.

4.2. Opinion on Food suits for lifestyle

Respondent's opinion on the kind of food suits for their lifestyle was analyzed and the results are presented in the table 4.2.

Table. 4.2 Opinion on Changing Needs on Lifestyle

S. No.	Particular	Number of Respondents	Percent to total
1.	Home made food	55	55.00
2.	Balanced nutritious food	16	16.00
3.	Low fat food	16	16.00
4.	More vegetable ingredients	13	13.00
Total		100	100.00

Results revealed that 55 per cent of respondents expressed that home made food is the healthy food followed by balanced nutritious food (16 per cent), low fat food (16 per cent) and food contains more vegetable ingredients (13 per cent) to lead a healthy life. Hence, It is inferred that young consumers are in need of looking for healthy food and healthier lifestyle and they consider foods which are homemade, nutritious and more of vegetable ingredients which are suitable for their healthy lifestyle.

These results were supported by similar findings observed in South Africa by Steyn and Marais (2010) among young consumers which found that 78 per cent of the total sample consumers indicated that they would choose a healthier option if it is available in fast food menu.

4.3 Respondent's Suggestions for New Fast Food menus

The sample respondents were asked to suggest the new fast food items that are expected from the organized fast food restaurants were analyzed and the results are presented in the table 4.3.

Table 4.3. Suggestions given by Sample Respondents for Introducing New Fast Food Items

S. No.	Expectation of New Fast Food Items	Number of Respondents	Percent to total
1.	Dry Fruit Pizza	14	14.00
2.	Variety of Soups	13	13.00
3.	Mushroom Sandwich	10	10.00
4.	Green Peas Sandwich	5	5.00
5.	Sweet Corn Pastas	5	5.00
6.	Pumpkin Ice cream as dessert	5	5.00
7.	Garlic Pizza	5	5.00
8.	Fish Burgers	3	3.00
9.	No suggestions	50	50.00
Total		100	100.00

It is observed from the table 4.3 that 50 per cent of the respondents did not give any suggestions with regard to expectation of new fast food menu. The remaining 50 per cent of the respondents revealed that dry fruit pizzas as a new fast food (14 per cent) followed by more soup varieties (13 per cent) and sandwich based fast food categories (15 per cent) were expected by them. Thus, it is inferred that vegetable based fast food items are expected by the young consumers.

These findings were similar to the study done by Steyn and Marais (2010) which shows that three most popular options which the respondents would like to have on fast food menus were more vegetable options (36.5 per cent), more salad options (22.2 per cent) and more grilled foods (14.9 per cent).

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Consumer Preference and Spending Pattern in Indian Fast Food industry

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Abstract- Fast food industry is one of the world's fastest growing sectors in food industry. However, over a period of time, with a growth in the number of nuclear families, economic growth and increasing per capita income as well as globalization, fast food culture gained prominence in India. The study reveals that. The average visits made by the sample respondents was three times in a month and that young consumer lifestyle trend consists of taste, convenience and seeking alternate food items which formed the major reasons for consuming fast food. Analysis on reasons behind eating fast food by the sample respondents revealed that taste (56 per cent) is major reason to consume fast food followed by convenience (15 per cent) and alternate to home food (11 per cent). They also expressed that relaxation and wider variety of menu were the other reasons to consume fast food.

Index Terms- Fast food industry, spending pattern, Consumer preference

I. INTRODUCTION

Fast food industry is one of the world's fastest growing sectors in food industry. Fast food is the food item that can be prepared and served very quickly (Webster Dictionary, 1951). Encyclopedia Wikipedia defines fast food as "food sold in a restaurant or store with preheated or precooked ingredients and served to the customer in a packaged form for take-out/take-away". Because of commercial emphasis on speed, uniformity and low cost, fast food products are often made with ingredients formulated to achieve a certain flavour or consistency and to preserve freshness.

Fast Food industry in India

The emergence of the fast food industry has, transformed urban food culture in India to some extent. In India, fast food culture emerged after independence. Eating at home used to be a significant aspect of Indian culture. However, over a period of time, with a growth in the number of nuclear families, economic growth and increasing per capita income as well as globalization, fast food culture gained prominence. Similarly, children also resorted to fast food due to their exposure to global urban culture and western cuisine which accelerated their desire for cheap and delicious fast food. Moreover, fast food costs less than traditional meals commencing with appetizer and concluding with dessert. With the liberalization of the economy in 1992, new multinational fast food giants targeted India as a huge potential market with their outlets. Burger King, Pizza Hut, Domino's Pizza, McDonald's and KFC outlets are functioning in shopping malls and other public areas. Changing consumer behaviour and favourable demographics led India to witness a tremendous growth in fast food restaurant industry (Shanker, 2010).

Objectives of the Study

The overall objective of the study is to analyze the food consumption lifestyle behaviour of consumers segment for developing new marketing strategies in fast food sector. The specific objectives of the study are:

3. To analyze the consumer's spending behaviour on fast food consumption and their preference on fast food menu and fast food restaurants,
4. To analyze the consumer's consumption expenditure towards fast food with respect to gender,

II. METHODOLOGY

The study was conducted in 2 major cities in India Hyderabad and Coimbatore by selecting randomly 100 respondents who step in at major fast food restaurants. A questionnaire for the same has been prepared for this purpose. Statistical methods like Percentages, factor analysis, 't' test, multifunction regression function are used.

III. FINDINGS AND DISCUSSIONS

The information collected from 100 sample respondents in the study area of Coimbatore city were tabulated, analyzed and the findings of the study are presented under the following headings.

1. Spending Behaviour and Consumer's Preference on Fast Food
2. Consumer's Preference on Fast Food Restaurants
3. Analysis of Consumption Expenditure on Fast Food
4. Spending Behaviour and Consumer's Preference on Fast Food

Understanding young consumer's behaviour on fast food helps the marketing firm to know their interests towards fast food as part of lifestyle analysis. To analyze the sample respondents' behaviour on fast food in terms of frequency of consuming fast food, timing of visits, reasons for consumption, consumption expenditure on fast food, etc., were analyzed and results are presented in this section.

1.1. Frequency of eating of Fast Food

The frequency of consumption of fast food by the sample respondents in fast food chains were analyzed and the results are presented in the table 1.1.

Table 1.1 Frequency of eating of Fast Food

S.No.	Frequency of eating	Percent to total
1	Once in a Week	9.00
2	3 times in a Month	45.00
3	Once in a Month	34.00

4	Occasionally (once in 2 months or more)	13.00
Total		100.00
Average (No. of times)		

It is observed from the table 1.1 that 45 per cent of the sample respondents were consumed fast food three times in a month, 34 per cent of them were consumed fast food for about once in a month and 13 per cent of the respondents consumed fast food occasionally i.e. once in two months or more. It is also observed that only 9 per cent of them consumed fast food, once in a week regularly. The average visits made by the sample respondents was three times in a month. It shows that young consumers in Coimbatore city are in the beginning stage of fast food culture as part of their lifestyle and there is a lot of potential for fast food industry to grow in the upcoming years.

These findings are similar to those of a study done by Steyn and Marais (2010) in South Africa showing that 11 per cent of the participants ate fast food daily, 27.6 per cent ate two to three times a week and 20.8 per cent ate fast food at least once a week. Only 3.8 per cent of the participants had fast food less than once per month.

1.2. Favourite Timing for eating of Fast Food

The consumer's preference towards favourite time for eating fast food in an organized fast food restaurant was analyzed and the results are presented in the table 1.2.

Table 1.2 Favourite Time of Eating Fast Food by Sample Respondents

S. No.	Time of Eating Fast Food	Percent to total
1.	Morning	15.00
2.	Afternoon	4.00
3.	Evening	81.00
Total		100.00

It could be seen from the table 1.2 that 81 per cent of respondents expressed their views that evening is their favorite time to eat fast food and 15 per cent of them revealed their preference is morning time. Hence, it is inferred that fast food is more demanded in evening times and hence the fast food restaurants may introduce or customize new fast food items to suit for these timings.

1.3. Reasons for eating Fast Food

The major factors which influenced the consumers for eating fast food was analyzed and the results are presented in the table 1.3.

Table 1.3 Reasons for Eating Fast Food

S. No.	Reasons	Percent to total
1.	Taste	56.00
2.	Convenience	15.00
3.	Alternative food	11.00

4.	Relaxation	9.00
5.	Variety of menu	9.00
Total		100.00

It could be observed from the table 1.3 that majority of the (56 per cent) respondents expressed their opinion that taste is the only reason to eat fast food in the restaurants followed by convenience (15 per cent) and alternative to home food (11 per cent). Moreover, relaxation and variety of menu in fast food were the other reasons for eating fast food. The results are in similar to the results given in the study by O'Dougherty *et al.* (2006) that taste and convenience were the important reasons for consuming fast food. Hence, it could be inferred that young consumer lifestyle trend consists of taste, convenience and seeking alternate food items which formed the major reasons for consuming fast food.

1.4. Per Capita Monthly Expenditure on Fast Food

The consumption expenditure towards fast food by the sample respondents was analyzed and the results are presented in the table 1.4.

Table 1.4. Consumption Expenditure on Fast Food (Per capita/ month)

S. No.	Consumption Expenditure (Rs.)	Percent to total
1.	500-1000	15.00
2.	1000-1500	49.00
3.	1500-2000	21.00
4.	2000-2500	15.00
Total		100.00
Average expenditure(Rs.)		

It could be observed from the table 1.4 that of the total income, 49 per cent of the respondents spent on fast food ranges from Rs.1000-1500 per month whereas, 21 per cent of the sample respondents spent on fast food ranges between Rs. 1500-2000 per month. About 15 per cent of them spent Rs. 2000-2500 per month on eating outside and 15 per cent of the respondents spent Rs.500-1000 per month. On an average, the sample respondents spent Rs. 1430 per month towards fast food. Hence, it is clearly evident that sample respondents spend considerable amount of their income for eating outside due to convenient lifestyle as it saves their time.

1.5. Consumer's Satisfaction towards Consumption of Fast Food

The kind of satisfaction or benefits realized by the sample respondents on consumption of fast food was analyzed and the results are presented in the table 1.5.

Table 1.5 Consumers Satisfaction on Fast Food

S. No.	Satisfaction	Percent to total
1.	Taste Satisfaction	63.00
2.	Relaxation/Spending time with friends	15.00
3.	No benefits	22.00
Total		100.00

From the above table 1.5, it could be observed that 63 per cent of the sample respondents realized satisfaction with consuming tasty foods and 15 per cent of the respondents revealed that sharing time with friends and relaxation was the next important benefit by consuming fast food in the fast food chains. However, 22 per cent of the sample respondents revealed that they did not realize any benefits by consuming fast food and visit to fast food chains. Hence, it could be inferred that fast food restaurants provides satisfaction to the young consumers in the form of matching their taste needs and relaxation with friends. Hence, fast food chains may concentrate on introducing new and more variety of fast food menus with different flavours to attract young consumers.

1.6. Consumer`s Preference towards Fast Food Menu

There are variety of fast food menus available in organized fast food restaurants. Generally, these wide varieties of menu are categorized into three and the preference towards these menus by the sample respondents was analyzed and the results are presented in the table 1.6.

Table 1.6 Consumer`s Preference towards Fast Food Menu

S.No.	Type of Fast Food	Percent to total
1.	Burgers	23.00
2	Sandwich	45.00
3	Pizzas	30.00
4	Others	2.00
	Total	100.00

From the above table, it could be observed that 45 per cent of the sample respondents preferred Sandwich followed by Pizzas (30 per cent) and Burgers (23 per cent). Hence, it could be inferred that Sandwich was the most preferred fast food menu by the young consumers among other varieties available in fast food chains.

These results are coincides with the results of Mahna *et al.* (2004) (i.e.) adolescents and young adults in New Delhi preferred pizza, burgers, ice-cream, french fries and sandwiches.

1.7. Preference towards Fast Food Flavours

The sample respondent`s preference towards various type of flavours in fast food was analyzed and the results are presented in the table 1.7.

Table 1.7 Preference on type of Flavour in Fast food

S.No.	Type of Flavour	Percent to total
1	Spicy Flavour	67.00
2	Sweet Flavour	20.00
3	Fruit Flavour	15.00
4	Other Flavours	7.00
	Total	100.00

It is observed from the table 1.7 that majority of the sample of respondents (67 per cent) preferred spicy flavour as their most favourite choice followed by sweet flavour (20 per cent) and fruit flavour (15 per cent). Hence, it is inferred that spicy flavour is the most preferred flavour in fast food by the young consumers.

2.1 Consumer`s Preference towards Fast Food Restaurants

In the present study, to analyze the preference towards fast food restaurants by the sample respondents, factor analysis was used. Ten variables relating to preference on fast food restaurants by the sample respondents were developed. To identify the most important factors which influence them to prefer the fast food restaurants from large number of variables identified, Principal Component Analysis (PCA) was employed using Varimax Rotation method.

A variable with factor loading more than 0.50 has higher importance among all the other variables in the group which has more influence on consumer preference towards fast food restaurants. Hence, the variables with factor loading of more than 0.50 were identified and categorized into composite factors viz., Affordability and Social Influence, Health and Service Quality, Taste and Location-orientation and Ambience. The results are presented in the table 2.1.

Table 2.1 Analysis on Consumer`s Preference towards Fast Food Restaurant- Factor Analysis

Particulars	Factors	Variables	Factor loading	Eigen values	% Variance	Cumulative % variation
Factor 1	Affordability and Social Influence	Price	.596	1.557	15.567	15.567
		Wide Choice of Menu	.561			
		Friends Influence	.524			
		Delivery time	.523			
Factor 2	Health and Service Quality	Service staff ambience	.797	1.401	14.013	29.580
		Healthy Menu Availability	.718			
Factor 3	Taste and Location-Orientation	Taste	.673	1.237	12.365	41.966
		Location Proximity and Accessibility	.564			
Factor 4	Ambience	Restaurant Environment	.735	1.158	11.575	53.521

It is observed from the table 2.1 that eigen values of Affordability and Social Influence, Health and Service Quality, Taste and Location-orientation and Ambience were worked out to 1.557, 1.401, 1.237 and 1.158, respectively. Since, eigen values of these four factors are more than one, these four factors were considered to be the most important factors influencing the consumer's preferences towards fast food restaurants.

It is also observed that four composite factors constitute 53.52 per cent of the total variance. Hence, it is concluded that Affordability and Social Influence was found to be the most important factor which influenced the young consumers to prefer fast food restaurants followed by Health and Service Quality, Taste and Location-orientation and Ambience.

3.1. Consumption Expenditure on Fast Food

To analyze the consumption expenditure on fast food items by the sample respondents with respect to gender, 't' test was employed. The results are presented in the table 3.1.

Table 3.1. Consumption Expenditure on Fast Food by the Sample Respondents

S.No.	Particulars	Male (N= 50)	Female (N=50)	Calculated 't' value	Table Value
1.	Consumption Expenditure (Rs/month/capita)	2270	1580	3.74* (0.0003)	1.960

Note: * denotes significance at one per cent level

(Figures in parenthesis indicate the probability)

It is observed from the table 3.1 that on an average the male and female gender spent Rs. 2270 and Rs.1580 per month towards fast food. The mean difference between the consumption expenditure between male and female gender was found to be Rs.690 per month which is significantly higher in male respondents i.e. male and female consumers differ with each other in terms of amount spending on fast food consumption. Hence, it is clearly evident that it is essential to customize the menus according to gender specifically in growing fast food markets to attract more young consumers.

Conclusion

4.1. Spending Behaviour and Consumer's Preference on Fast Food

The analysis on frequency of eating fast food by the sample respondents revealed that 45 per cent of them were consumed fast food three times in a month and 34 per cent of respondents were consumed fast food once in month. The average visit made by the sample respondents was three times in a month. Of the total sample, 81 per cent of the respondents opined that evening was their favorite time to eat fast food.

Analysis on reasons behind eating fast food by the sample respondents revealed that taste (56 per cent) is major reason to consume fast food followed by convenience (15 per cent) and alternate to home food (11 per cent). They also expressed that relaxation and wider variety of menu were the other reasons to consume fast food.

Analysis on consumption expenditure on fast food revealed that majority (49 per cent) of the sample respondents spent between Rs.1000-1500 per month and 21 per cent of them spent between Rs. 1500-2000 per month. The average per capita expenditure on fast food was Rs.1430 per month.

The kind of satisfaction or benefits realized by the sample respondents on consumption of fast food revealed that taste satisfaction and sharing time with friends and relaxation were the two important benefits realized by the young consumers.

Among the different type of fast foods, sandwich (45 per cent) was preferred most by the sample respondents followed by Pizza (30 per cent) and Burgers (23 per cent). Moreover, spicy flavour was the most preferred flavour by them followed by sweet and fruit flavours.

4.2. Consumer's Preference towards Fast Food Restaurants

The analysis on consumer's preference towards fast food restaurants using factor analysis revealed that Affordable price and Social Influence, Healthy menu and Service Quality, Taste and location and Restaurant ambience were found to be the most important factors which influenced the young consumers to prefer the fast food restaurants.

4.3. Consumption Expenditure on Fast Food

The analysis on consumption expenditure on fast food items by the sample respondents with respect to gender revealed that the per capita consumption expenditure on fast food by the male and female gender were Rs.2270 and Rs.1580 per month, respectively. The mean difference between consumption expenditure on fast food between male and female gender was found to be Rs.690 per month and it is significantly higher in male gender. It shows that male and female consumers differed each other in terms of amount spending on fast food consumption. Hence, it is essential to customize the menus according to gender specifically in fast food sector.

CONCLUSIONS

The following conclusions could be drawn from the results of the present study:

- Young, unmarried, working professionals having own lifestyle and well educated persons forms major consumer segment in fast food sector. Male and female gender has equal lifestyle behaviour with regard to consumption of fast food.
- Young consumers have lifestyle behaviour of consuming fast food for about three times in a month which shows that fast food consumption trend in Coimbatore city is growing and has lot of market potential in future.

- Taste, convenience and alternate to home food were found to be major reasons for consuming fast food by the young consumers. Young consumers are spending considerable amount of their income for eating outside due to convenient lifestyle as it saves their time.
- Young consumers preferred major fast food types such as sandwiches, pizzas and burgers with spicy flavours.
- Fast food restaurants provide satisfaction to the young consumers in the form of matching their taste needs and relaxation with friends.
- Male and female consumers differed in their spending behaviour on fast food with respect to consumption expenditure. Affordable price of the menu and friends influence, Healthy menu and Service Quality, Taste and location proximity and Restaurant ambience were important factors which made the young consumers to prefer fast food restaurants.
- Young consumers perceived that lack of healthy content of menu, no new varieties and slow delivery time were the major problems in consumption of fast food.
- Young consumers are looking for healthy food for their lifestyle and they expect foods which are home made, nutritious and more of vegetable ingredients to suit for their healthy lifestyle.

RECOMMENDATIONS

Based on the results obtained from the study, following are the marketing strategies and opportunities recommended for fast food chains to tap the market potential and to attract young consumer segment.

- Fast food and eating out has become lifestyle activity for both genders of younger segments. Hence, it is essential for existing fast food chains to make their brand image and advertisements appealing as lifestyle product, rather than a routine product.
- As the average frequency of visits made by the consumers were three times in a month, fast food chains may introduce reward schemes. They may reward consumers according to their frequency of visit and amount spent. The reward points may be added and they may be given with discounts or offers.
- New Fast food chains may develop product based segmentation of consumers like pizza lovers, burger eaters, etc., in order to increase the sales of particular product segment. Fast food restaurants must customize fast food menu and services separately for 18-24 age segment and 25-35 age segment to attract young consumers.
- Relaxation and sharing time with friends give satisfaction to the young consumers upon eating fast food. Hence, creating fun strategies such as entertainment week, birthday fun, friends feast, etc., could increase the sales for existing fast food chains.
- As the young consumers expect healthier lifestyle, fast food chains may introduce variety of healthy food items to attract and retain the young consumers. To develop awareness on healthy menu among consumers, nutritional information of each fast food menu in the menu card may be provided.
- Consumers are expecting fast food items that resemble home food and this gives opportunity for players in organized fast food markets. To meet this expectation, it is essential to understand and find out young consumer's favorite home foods. Hence, fast food chains may customize these home made food items in fast food menu to tap the market potential.
- As consumers are more interested in new fast food items such as Dry Fruit Pizza, Mushroom Sandwich, Green Peas Sandwich etc., these menus may be introduced in fast food restaurants.

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Indoor Sulfur Dioxide (SO₂) Pollutant in Wamena Papua Province, Indonesia

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Abstract- The use of biomass in Honai indoor (traditional house) in Wamena has been done for decades and became a habit honai dwellers. Because of the cold temperatures community burns Kasuari wood to warm their body. As a result, they continue to inhale sulfur dioxide (SO₂) and contaminated air in the room which can lead to various diseases. This study aims to analyze the level of indoor air contamination honai based on the SO₂ parameters, measuring the level of contamination and inhalation lung vital capacity of honai dwellers. Samples were collected from 30 Honai house before and after modification by measuring the concentration of SO₂ levels. Similarly, 30 respondents occupants of Honai house measured for their lung vital capacity and the level of their air inhalation. SO₂ samples were collected using midjet impinger technique and concentration were measured using Pararosaniline - spectrophotometry. In addition, lung vital capacity was measured using spirometry while personal inhalation measured by the Personal inhalation tool. The results showed that, of the five villages average SO₂ concentration was between 0.650 ± 0.454 before modification and 0.057 ± 0.048 after modification. Statistical test results of t - test showed that the decrease in SO₂ concentrations indicated with p values of 0.000, or no effect modification in a decrease in the concentration of SO₂ honai. Of the 13 respondents to rate on a standard inhalation, there was 92.3 % which decreased vital capacity of the lungs and of the 17 respondents to the category of sub-standard level of inhalation, all respondents have a capacity of lung function were normal. The results of statistical tests using yate's correction showed that the value of $p = 0.000$ which means that there is a relationship between the degree of inhalation with decreased lung function capacity.

Index Terms- Sulfur dioksida, modifikasi honai, polusi udara, tingkat inhalasi dan kapasitas vital paru.

I. INTRODUCTION

Indoor air pollution in developing countries is a major contributor to the global burden of illness and is becoming the second biggest environmental pollutant contributor to ill health in the world (WHO., 2002). The sources of air pollution mostly generated by the industry, forest fire, vehicles and the burning of biomass that are currently threatening the inhaled air quality in the entire world (McKenzie., James, Pinger., Robert, & Kotecki Jerome, 2002). At this era, most of people spent their time more in the indoor; the kind and varied range of indoor sources of emission and the increased magnitude of

concentration of some pollutants indoors compared with the outdoors pollution (Harrison, 1997). In the last three decades, some evidence have been accumulating about the effect of health impacts of exposure to air chemical substances pollutants in childhood and of adult. Research from the United States, Poland, and Austria recorded significant relationships between decrements in lung function growth and chronic exposures to total suspended particulates (TSP), ozone, Sulfur Dioxide (SO₂) and nitrogen dioxide (NO₂) (Horak et al., 2002; Jedrychowski, Flak, & Mroz, 1999; Shwartz, 1989).

Some other examples were, the indoor air quality close to the industrial area is tightly associated to pollutant substances concentration rate, because the pollution from outdoor heavily influences air quality and, as the consequent of the inhabitants indoor health. Here, a pollution management system is necessary for human health protection especially from indoor pollution. Both manual or automatic air quality management systems have become a imperative research issue with strong implications for community's health. In this study we develop a chimney and modify the Honai ventilation based on neural networks for SO₂ and NO₂ concentration control indoor of Honai traditional houses (Brunelli, Piazza, Pignato, Sorbello, & Vitabile, 2008). In addition, Air pollution from fossil fuel from vehicles combustion has been known to affect human health for region. More detailed insights developed in the 20th century, as a result of studies prompted by severe air pollution episodes such as those in the Meuse Valley, Belgium in 1930, and London, UK in 1952. The focus in the early studies was on local pollution produced by industry, power generation and home heating sources. (Brunekreef, 2010).

Some researches relate to the indoor air pollution have been done, although most of these studies were snapshots of a small number of locations, but Biersteker, de Graaf, & Nass, 1965 reported a larger study that measured indoor and outdoor chemical concentrations in 60 homes in Rotterdam, Netherlands. The study revealed that the mean concentrations of indoor smoke were about 80% of those outdoors, mean concentrations of indoor SO₂ were about 20% of those outdoors. However, it was also found that a small number of homes had indoor concentrations much higher than those in outdoors, and the authors speculated on their contribution to elevated mortality during smog episodes. It is likely that higher concentrations would have been found in homes with open coal fires, as was common in the UK during the 1950s, than in this Dutch sample of homes primarily using gas for heating. The reasons for the much lower indoor concentrations of SO₂ were considered by Spedding (Spedding, 1974), who summarized studies showing a large variation in the capacity of indoor materials to absorb SO₂. He used measured

deposition velocities and surface areas in a typical UK house to identify emulsion paint as the most important sink for SO₂. In this study area, the common forms of cooking energy in use in Wamena are fuel wood, kerosene, limited liquefied petroleum gas (LPG) and very limited electricity. Here in this study site of Wamena District, water boiling and cooking experiments using the common household energy sources from biomass where Casuari wood that available in the area and surround are available in large quantity. The experimental data obtained, the energy price data, cooking energy intensity and the frequency biomass were used for cooking as well as the major diseases suffered by community who occupy *Honai* the traditional house. The effect on air quality arising from consumption of these biomass energy types was computed using emission factors (EPA., 1995; WHO., 1992). No initial data relate use of biomass, the frequency of the cooking and the duration of wood burning during the cold in the evening. This study cover of five village in Kurulu District and similar studies have not been reported elsewhere, however, relate to the current trends regarding the penetration of air conditioners in homes, this suggests that domestic air pollution may be an issue of concern for the foreseeable future.

II. MATERIAL AND METHODS

2.4 Study Area

This study was commenced in five villages, namely; Punakul Village, Wenabubaga Village, Musalfak Village, Kilugaba Villages and Mulimah Village in Kurulu District, Wamena Province, Papua-Indonesia. District Kurulu was selected to be sampling areas on the basis that this region is a zone has many traditional housing (*Honai*) and they use wood for cooking and for warming the indoor air temperature daily. In addition the majority of illnesses suffered by residents of this area were found of *asthma*, *pneumonia* and *tuberculosis*.

2.2 Sample Design

Data were collected both for subject and objects samples of population, then we measure lung vital capacity for those *Honai* occupants by using a *spirometer* and proceeds with inhalation rate measurements for SO₂ by using a personal sampler inhalation. The ambient indoor *Honai* air samples were taken for SO₂ as the object samples for the *honai* house communities. All samples were recorded at 16:00 to 17:00, 17:00 to 18:00 or 18:00 to 19:00 in the evening. Each sample was collected for 60 minutes at every house. Numbers of sampling points were 15 *Honai* houses done before and after the chimney installation. We do the installation of chimney (close technology) with a diameter of 30 cm that is placed along the 2.5 m above the furnace roof and wall edges out of *Honai*. The aim of this chimney installation was to flow out the smoke in *Honai*. In addition, these object sampling sites were divided into 5 regions based on availability of *Honai* or *Honai* density at those five selected villages. We also taking into account the willingness of residents to involve during this research as the explained in the ethical consideration. Likewise, we took into account the distance between *Honai* sample points where about 300 to 500 m each *Honai* were

selected that subsequently obtained through a Global Positioning System coordinates (Carlson & Clay, 2011). Moreover, the number of respondents or subject samples in this study was 30 respondents. They were split evenly by the large number of traditional houses *Honai* in each village, in this study we got 6 respondents every village who voluntarily wanted to involve during this study.

2.3 Consideration of Ethical Clearance

All respondent living in the five villages area who were requested as the respondent signed an informed consent letter prior to inclusion in the study commencement. The collection of samples of Inhalation rate and lung vital capacity were done base on the ethical clearance consideration issued by Medical Faculty of Hasanuddin University number UH13070282. The measurement of those samples were base on the voluntary case of people. Confidentiality of initial information and freedom to withdraw from the study anytime was stipulated and without any force from the third parties. Those found to have health concerns such as disease symptoms or any illness will be informed individually or provided with the appropriate management and informed secretly, as necessary. All questions and complaints were also adopted and answered directly by authors if required.

2.4 Samples Analysis

The collection of SO₂ samples were done by using impinger method and measurement techniques using pararosanine-spectrofotometri accordance with the Indonesian National Standard (SNI 19-7119.7-2005) (SNI., 2005). Principle of this method is based on the absorption of SO₂ gas from the air on absorbent solution of potassium tetra kloromerkurat (TCM). In this case the complex formed diklorosulfito merkurat air oxidation resistant. Furthermore the complex is then reacted with formaldehyde to form pararosanine and sulfonic acid methyl pararosanine colored. The color intensity is measured with a spectrophotometer that occurs directly associated with the amount of SO₂ in the air sample has been taken. The measurement method is based on Schiff reaction that can measure the concentration of SO₂ in the range of 25-1000 µg/m³ in the air sample flow rate, while for the smaller than 25 µg/m³ could be measured by the volume of air that a larger sample. All the sequences were done in accordance by laboratory staffs in Accredited Chemical Laboratory of Makassar Indonesia

III. RESULTS AND DISCUSSION

3.1. Lung capacity base on NO₂ parameter

Table 1. Distribution of lung vital capacity of respondents by category inhalation rate of SO₂ in Five Villages Kurulu District, Wamena 2013

SO ₂	Lung Vital Capacity				Total		Statistical value
	Decrease of function		Decrease of function				
	n	%	N	%	n	%	
> standard	12	92.3	1	7.7	13	100	P =0,000
< standard	0	0	17	100	17	100	
Total	12	40	18	60	30	100	

Lung vital capacity was measured by using spirometer to 30 respondent who stay in the area of concern and occupy the traditional house of Honai.

Table 1 implied showed that of the 13 respondents with inhalation rate above allowed standard, there were 92.3% who had a reduction in lung vital capacity. Of those 17 respondents the rate inhalation category under allowed standard, all of them have normal lung capacity function. Results of statistical tests using yate's correction showed that the value of p = 0.000, which means that there is a relationship between inhalation rate with decreased lung function capacity.

Table 2. Distribution concentrations SO₂, air temperature, and humidity, before and after the installation of closed model chimney, in Five Villages, Kurulu District, Wamena 2013

Variable		Mean ± SD	Minimum	Maximum	Statistical test	
					t-test	P
SO ₂ concentrations (µg/Nm ³)	Before modification	0.650 ± 0.454	0.086	1.247	5.249	0.000
	After modification	0.057 ± 0.048	0.007	0.150		
Temperature Udara (°C)	Before modification	26.487 ± 2.606	21.700	29.200	2.182	0.047
	After modification	25.813 ± 2.515	21.700	29.700		
Humidity (%)	Before modification	70.827 ± 2.377	67.900	74.800	-2.378	0.032
	After modification	71.420 ± 2.462	67.900	74.800		

The wide range of building design leads to large variations in infiltration rate and hence indoor and personal exposure. Compare to Honai building that has a closed model design it may lead to a hazard of indoor air pollutant. Concentration of SO₂ indoor of Honai might be reduced by the proper installation of chimney that may flow out the contaminated air. Although new houses do not necessarily mean air tight houses, but it need the installation of chimney to flow out the pollutant. Study relate the indoor pollution relate to the house design conducted by

In line with study conducted by Fernandez [16] who compared the use of biomass in home for cooking and those homes cook without biomass. The results indicated that the concentration levels of SO₂ and NO₂ were much higher at home with biomass in cooking or 9.8 times compared with that home that cook without biomass. Likewise, the potential diseases associated with respiratory disturbance among patients illustrated that residents with biomass will be faster and more likely to suffer higher than those without biomass.

3.2 SO₂, air temperature, and humidity, before and after the installation of closed model chimney

We measured the concentrations of SO₂, air temperature, and humidity, before and after the installation of closed model chimney indoor of the honai.

Table 2 revealed the average concentration of SO₂ prior to the modification of honai was 0.650 µg/Nm³ with a standard deviation of ± 0.454 µg/Nm³. The concentration was higher when compared to the average concentration of SO₂ after the home / honai modification 0.057 µg/Nm³ with a standard deviation of 0.048 µg/Nm³. Based on the statistical t -test showed that a decrease in the concentration of SO₂ is shown with p values of 0.000, or no influence Honai modification to decrease the SO₂ concentration.

Sherman and Matson (Sherman & Matson, 2002) implied that the main reasons for tighter construction are to reduce energy costs and maintain thermal comfort which is more efficient.

For the air temperature, the average temperature before the honai modification was from 26.487 °C with ± 2,606 °C for its standard deviation. This concentration was lower when compared to the average air temperature after a honai modification which leveled to 25.813 °C with a standard deviation of 2,515 °C. Based on the test statistic t -test showed that an increase in air temperature indicated by a p value of 0.047, or in

other words no influence honai modifications to the increase of air temperature. This increase is relatively small at an average of only 0.674 °C.

Likewise, the average humidity of the air before the honai modification was 70.827 % with a standard deviation of ± 2.377 %. This concentration was lower when compared to the average air humidity after the honai modification which amounted to 71.420 % with a standard deviation of $\pm 2,462$ %. Based on the statistical t -test showed that there was an increase in air humidity indicated by the p value of 0.032, or we can say that no influence of honai modifications to the increase of air humidity. This increase is relatively small at an average of only 0.593.

IV. CONCLUSION

It can be concluded that indoor air concentration of SO₂, in the *Honai* house mostly exceeded the standard. Measurement of lung capacity in 30 respondents who stayed in *Honai* for more than 10 years as well as inhalation rate measurements were found that all concentrations of SO₂ in the honai has exceeded the threshold value both set by Nasional and International standards. Furthermore, the value of lung capacity and inhalation rate for SO₂ parameters showed decreased lung capacity and some of respondents have experienced pneumonia and lung vital capacity were not normal.

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Synthesis, Physicochemical Studies and Structure Determination of Some Novel Manganese (III) Complexes of Azo Dyes Derived from 4-Aminoantipyridine

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Abstract- Some novel manganese(III) complexes with the ligand 2,3-dimethyl-1-phenyl-4-(3-methoxy-2-phenyl azo)5-pyrazolone, GAAP, guaiacol azoantipyridine, L, having the formulae $[Mn(L)_2(X)_3]$, $[Mn(L)_2(Y)_2Cl]$, where $X = Cl^- / NO_3^- / ClO_4^-$; $Y = NCS^-$ were synthesized and characterized by elemental analysis, molar conductance and magnetic susceptibility measurements and spectral (IR, UV-Visible, FAB-mass) studies. The ligand was characterized by elemental analysis and spectral (IR, UV-Visible, 1H NMR,) studies. The X-ray diffraction study of the complex $[Mn(L)_2(Cl)_3]$ indicated that it is not perfectly crystalline. The electrochemical properties of the complex $[Mn(L)_2(Cl)_3]$ was investigated by cyclic voltammetry. Based on elemental analyses, thermo gravimetric and FAB-mass studies of the complexes a seven coordinate structure is tentatively proposed for the complexes.

Index Terms- Manganese (III), azo dye, thermal analysis, FAB-mass

I. INTRODUCTION

There has been considerable interest in the coordination chemistry of manganese involving nitrogen and oxygen donor ligands due to increasing recognition of the role of this metal in biological systems. Manganese often plays an important role in numerous biological process associated with utilization or generation of hydrogen peroxide or dioxygen. At least five functions of these types are known, viz., manganese superoxide dismutase, manganese catalase, manganese peroxidase, manganese rib nucleotide reductase and oxygen evolving complex in photosystem-II. This has prompted recent attempts to understand the coordination chemistry of Mn(III) ions, which are believed to play a role in at least three of the above enzymes: manganese superoxide dismutase[1], manganese catalase and oxygen evolving complex in photosystem-II. These The ground state for manganese(III) is $t_{2g}^3e_g^1$ or 5E_g and has a term symbol 5D . Because of the odd electron in e_g in octahedral surrounding manganese(III) is subject to Jahn-Teller distortion. Considerable elongation of the two trans bonds with little difference in the length of the other four has been observed in many Mn(III) complexes[2]. For a d^4 state, only one spin allowed transition is to be expected. The transition is $^5E_g \rightarrow ^5T_{2g}$ and is in the visible region. This usually appears as a broad band near 20000 cm^{-1} which accounts for the red brown color of manganese(III) complexes Mn(III) forms a wide range of geometries – 6,4,5,7 or

even 8 coordinated complexes. Azo dyes play an important role in fabrication.

In view of these we have prepared and characterized few new complexes of an azo dye derived from 2,3-dimethyl-1-phenyl-4-(3-methoxy-2-phenyl azo)5-pyrazolone, GAAP, guaiacol azoantipyridine, L.

II. RESEARCH ELABORATIONS

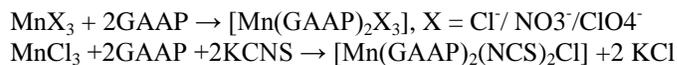
4-Aminoantipyridine (Fluka, Switzerland), Guaiacol (Lobochemie, Mumbai) were used as supplied.

$MnAc_3 \cdot 2H_2O$ was prepared by Christensen's method[3]. Methanol was purified by standard method. All other chemicals were of A.R. grade.

Synthesis of the ligand: The ligand GAAP, L was synthesized by diazotization of 4-aminoantipyridine followed by coupling with guaiacol, 2-methoxy phenol below $5^\circ C$, washed with cold water, dried and kept in a desiccator[4].

Synthesis of the Complexes

Metal : Ligand (milli molar) ratio was kept 1:2 with metal salt in slight excess. The solvent used was methanol. Refluxed for 6 hrs. Transferred in a beaker, crystallized by slow evaporation, washed with aqueous methanol, benzene and finally with ether, dried and kept in a desiccator (yield 65%).



The metal, halogen and perchlorate were estimated by standard methods[5]. Microanalysis (CHNS) were performed on VarioEL III CHNS Elemental Analyzer. The IR spectra of the ligand and its Mn(III) complexes were recorded in the region, $4000-400\text{ cm}^{-1}$ on a JASCO FTIR 430 and on SHIMADZU spectrophotometers using KBr pellets. The 1H NMR spectra of the ligand were recorded in CD_3OD on a 300 MHz (Bruker Advance dPx-300) FTNMR instrument using TMS as reference. The electronic spectra were recorded in the solid state by reflectance method on a Varian Cary 5E UV-Vis-NIR spectrometer.

Magnetic susceptibilities of the complexes at room temperature ($300 \pm 3K$) were measured on a magnetic susceptibility balance, Sherwood Scientific, Cambridge, UK. Diamagnetic corrections (χ_{Dia}) for various atoms and structural units were computed using Pascal constants Thermal analysis of

the complex $[\text{Mn}(\text{L}_2)_2(\text{NCS})_2\text{Cl}]$ was carried on Perkin Elmer Diamond TG/DTA. Cyclic voltammetric profile of the complex $[\text{Mn}(\text{L}_2)_2\text{Cl}_2]$ was run on BAS-CV-50W Voltammetric analyzer, using glassy carbon as working electrode. X-ray powder diffraction patterns of the complex $[\text{Mn}(\text{L}_2)_2\text{Cl}_3]$ was carried out on Philips X-ray diffractometer (PW1710) using $k\alpha$ radiation with $\lambda = 1.5405 \text{ \AA}$ and was indexed using Hesse and Lipson's procedure.

III. RESULTS AND DISCUSSIONS

3.1. Analytical measurements and magnetic susceptibilities

All the complexes are dark brown colored, non-hygroscopic solids and nonelectrolytes (Table I) [6]. They are soluble in nitrobenzene and acetonitrile and sparingly soluble in other organic solvents. The analytical data are in agreement with the proposed seven coordinate[22] structure. The magnetic susceptibility measurement shows that the magnetic moments of the complexes are much greater than that of the pure octahedral complexes and suffers Jahn-Teller distortion and spin orbit coupling confirming that they are paramagnetic[5]. Diamagnetic corrections[6], χ_{Dia} were computed using Pascal's constants ($\chi_{\text{Dia}} = -10.0 \times 10^{-6}$ C.G.S. units for Ni^{2+}).

3.2. Spectral Characterization

3.2.1. The ^1H NMR spectrum

The ^1H NMR spectrum of the ligand GAAP, L shows three singlets[7] at δ (2.7-2.98) ppm, δ (3.05-3.39) ppm and δ (3.83-3.91) ppm corresponds to methyl protons of $>\text{C}-\text{CH}_3$, $>\text{N}-\text{CH}_3$ and $-\text{OCH}_3$ respectively. The signal due to five aromatic protons of the antipyrine phenyl ring appear as multiplet between δ (7.38-7.59) ppm and those due to protons of phenyl ring of phenol moiety are observed as multiplet between δ (6.85-6.88) ppm. The signal due to phenolic $-\text{OH}$ proton appears as a hump[8] at δ 5.56 ppm.

3.2.2 Infra Red spectrum

The infra-red spectrum of the ligand possess a broad band of medium intensity $\sim 3103 \text{ cm}^{-1}$ is assignable to hydrogen bonded $-\text{OH}$ group[9]. This band is replaced by a new band $\sim 3400 \text{ cm}^{-1}$ indicating the non-participation of the $-\text{OH}$ group in the complex formation[10]. The $\text{C}=\text{O}$ stretching frequency occurring at 1637 cm^{-1} in the spectrum of the ligand shows a downward shift to $(1620 - 1599) \text{ cm}^{-1}$ in all the complexes showing the evidence of participation of $\text{C}=\text{O}$ group in complexation[11]. Similarly a band of medium intensity observed $\sim 1458 \text{ cm}^{-1}$ in the spectrum of the ligand shows a red shift to $\sim (1427 - 1411) \text{ cm}^{-1}$ in the spectra of all the complexes is suggesting the participation of azo group in coordination[12] with the metal ion. The evidence suggests the neutral bidentate nature of the ligand in all the complexes.

The nitrate complex shows bands at 1317 cm^{-1} and 1022 cm^{-1} assignable to ν_1 and ν_2 modes respectively of unidentately coordinated nitrate[13] group. The N- coordinated nature of the thiocyanate group[14] in its complex is indicated by $\nu_{\text{C-N}}$ ($\sim 2061 \text{ cm}^{-1}$), $\nu_{\text{C-S}}$ ($\sim 758 \text{ cm}^{-1}$) and δ_{NCS} ($\sim 507 \text{ cm}^{-1}$). The perchlorate complex shows bands at 1108 cm^{-1} , 1015 cm^{-1} , 925 cm^{-1} and

625 cm^{-1} are assignable to ν_4 , ν_1 , ν_2 and ν_3 modes respectively of unidentate[15] coordination of perchlorate group.

3.2.3 Electronic Spectra: The electronic spectrum of the ligand shows an intense band at 380 nm is attributed to $n \rightarrow \pi^*$ transition. The electronic spectra of the present complexes are similar and characterized by absorption band $\sim 380 \text{ nm}$ and $\sim 500 \text{ nm}$ is characteristics of $n \rightarrow \pi^*$ and d-d transitions[16].

3.2.4 FAB Mass Spectrum

The FAB mass spectrum of the complex (Figure.1) $[\text{Mn}(\text{L}_2)_2(\text{NCS})_2\text{Cl}]$, shows the molecular ion peak devoid of One $-\text{CH}_3$ group with m/z 867.61.

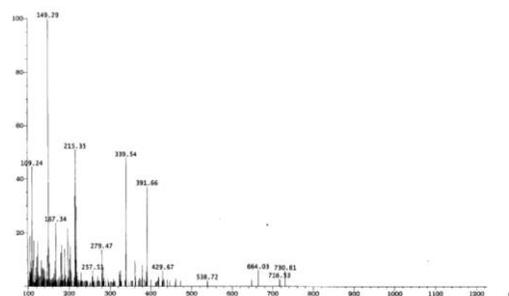


Figure 1: The FAB mass spectrum of the complex $[\text{Mn}(\text{L}_2)_2(\text{NCS})_2\text{Cl}]$,

The important peaks [17] are that of $m/z = 730.86$, $[\text{Mn}(\text{L}_2)_2]^+$; $m/z = 392.59$, $(\text{MnL})^+$, the base peak; $m/z = 149.32$, $(\text{C}_3\text{H}_3\text{N}_2\text{OMn})^+$.

3.3 Thermo gravimetric analysis

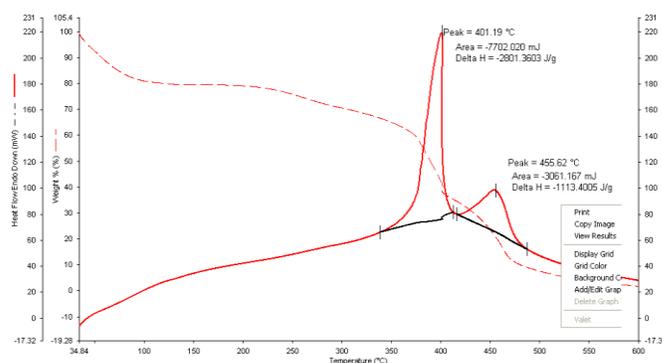


Figure 3: TG-DTACurve of the Complex $[\text{Mn}(\text{L}_2)_2(\text{NCS})_2\text{Cl}]$

The decomposition stages are represented as at $50^\circ\text{C}-75^\circ\text{C}$ the mass loss due to $(1\text{NCS} + 1\text{Cl})$ which occurs at lower temperature due to the steric factors of seven[18] coordinate system. The stage II occurs at $250^\circ\text{C} - 390^\circ\text{C}$ which is due to 31.44% mass loss is that of second NCS and part of the first ligand. The stage III occurs at $390^\circ\text{C} - 510^\circ\text{C}$ which is due to the mass loss of the remaining[19] part of the first ligand and part of

the second ligand. The final residue is that due to the formation of Mn_2O_3 , 17.80 % (expected 17.90 %).

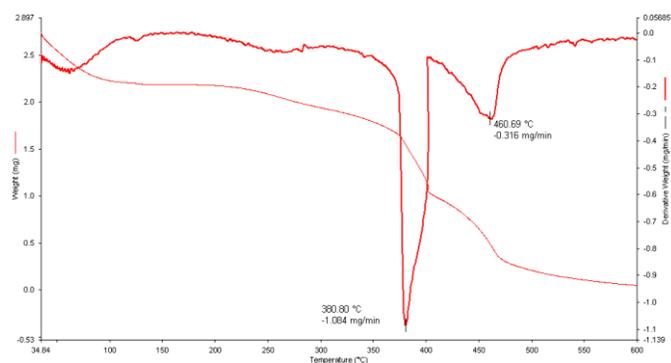


Figure 2: TG-DTG Curve of the Complex $[Mn(L)_2(NCS)_2Cl]$

3.4 Electrochemical Analysis

The redox process $Mn(III) / Mn(II)$, with quasi reversible peaks, $E_{pc} = 1102$ mV, indicating [20] covalent nature of the metal-ligand linkage.

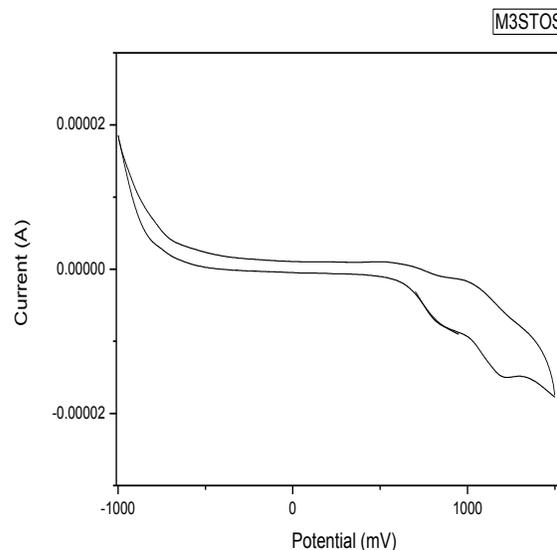


Figure 4: Cyclic Voltammogram of $[Mn(L)_2Cl_3]$

3.5 X- Ray Diffraction Studies

The powder XRD of the complex $Mn(L)_2(NO_3)_3$ shows that (Figure 5) the complex [21] behaves as it is not a perfectly crystalline substance.

Table I : Analytical and Physical Data of GAAP, L and Mn(III) Complexes

Ligand /Complex	Analytical data (%): Found (calcd.)						Molar conductance in Nitrobenzene $\Omega^{-1} cm^2 mol^{-1}$	μ_{eff} μ_B .
	Metal	Cl/Br	C	H	N	S		
GAAP, L	-	-	63.6 (63.9)	5.3 (5.3)	16.5 (16.5)	-	-	-
$[Mn(L)_2Cl_3]$	6.5 (6.5)	12.8 (12.7)	51.6 (51.5)	4.2 (4.2)	13.5 (13.7)	-	3.6	4.1
$[Mn(L)_2(NCS)_2Cl]$	6.2 (6.2)	4.0 (4.0)	51.7 (51.6)	4.1 (4.0)	15.7 (15.8)	7.1 (7.2)	8.6	5.0
$[Mn(L)_2(ClO_4)Cl_2]$	6.5 (6.5)	11.7 (11.8)	48.0 (47.9)	3.9 (3.9)	16.5 (16.7)	-	2.2	3.9
$[Mn(L)_2(NO_3)_3]$	5.8 (5.9)	-	47.0 (47.1)	3.9 (3.9)	16.4 (3.9)	-	1.3	3.4

Table II : Decomposition Parameters of $[Mn(L)_2(NCS)_2Cl]$ –as per Coats- Red fern Equation

Decomposition Stage	Order of the Reaction	Correlation Coeft., R	Arrhenius Parameters/ Sec^{-1}	$E_a / KJ mol^{-1}$	$\Delta S / JK^{-1} mol^{-1}$	Transition Temp. / $^{\circ}C$
I	1.4	-0.9982	3.54×10^8	75.76	- 86.48	65
II	1.3	-0.9917	1.98×10^{14}	202.92	19.63	380.80
III	1.4	-0.9805	1.42×10^6	137.01	134.57	460.69

IV. CONCLUSION

The ligand behaved as a neutral bidentate in nature and Mn(III) ion exhibits seven coordination in its[22] complexes. The structure of the ligand is as shown in (Fig. 6)

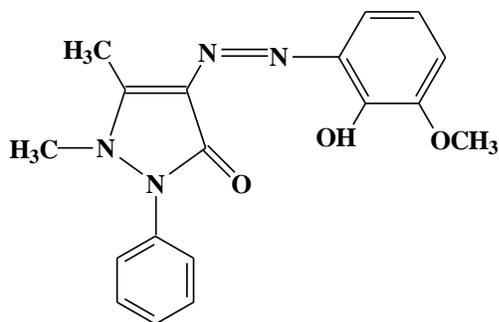


Figure 6: GAAP, L

The complexes are having highly distorted pentagonal bipyramidal structure.

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Philosophy for Children: A Model for Unhu/Ubuntu Philosophy.

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Abstract- The African communitarian way of life, unhu/ubuntu, has suffered unprecedented decline in recent years. This is mainly attributed to cultural pluralism. Notwithstanding the decline in morality, unhu/ubuntu still exists. The essentials of unhu/ubuntu must continually get emphasis from societal institutions. It is for this cause that this paper seeks to justify the use of philosophy for children model in schools to foster unhu/ubuntu. A brief account of unhu/ubuntu will be given. The philosophy for children model will be discussed relative to ubuntu. Lastly the paper will suggest ways of employing philosophy for children to revive unhu/ubuntu.

Index Terms- Ubuntu; philosophy for children

I. INTRODUCTION

Pre-modern Africa was characterised by an enduring moral fibre which sustained traditional societies. The main force behind this cultural moral presentation was the philosophy of ubuntu. This entails an African communitarian way of life which can be easily summed up by the popular aphorism, “a person is a person through relationships with other people”. In African traditional societies an individual was defined according to the environing community. Everything was viewed in terms of common good, even individual talents were treated as common assets (Makuvaza, 1996; Samkange and Samkange, 1980). Immorality by an individual was a disgrace to the whole community. On the other hand, the success of a community member was a community’s success. This was because any behaviour pattern was supposed to be a reflection of the community’s values. Although not much formalised, traditional education had the main aim of producing people who were acceptable in that particular community. Ubuntu was not confined to individual communities as the values could be exhibited beyond the bounce of these communities.

The advent of political societies (when central governments emerged) and general cultural pluralism brought with it adverse effects on African morality. There is high incidence of moral degeneration in Zimbabwe today (Nziramasanga, 1999). This can be attributed mainly to a culturally plural environment in which children are socialised. The community group ethic which subjected all children to some form of discipline from any old person has declined. Formal schools have become critical places for children’s moral development as they spend most of their time at these institutions starting from a tender age. It is therefore imperative to resuscitate the African moral ethic, ubuntu, through exploitation of philosophy for children advocated by Lipman at Montclair University in the 1970s

(Kennedy, 2000; Daniel and Auriac, 2009). This philosophy, if adopted in an African setting, is hoped would resuscitate the declining African morality. This may be done in light of the methodologies used in philosophy for children which are compatible with African traditional moral values. It can be argued that if these values begin to have emphasis at a tender age through the education system, ubuntu can be realised. It must, however, be appreciated that ubuntu can no longer be captured in its pre-modern genre due to cultural dynamism (Makuvaza, 1996). The essentials can be instilled in learners for cultural moral revival. Our argument is that, since the concept of philosophy for children has distinct overlaps with African moral values, its introduction at an early age is expected to foster communal and democratic ethics among other values espoused by ubuntu. This will in turn lead to a society with morally upright citizens who respect fellow citizens, tolerate people of diverse cultures and citizens who work towards common objectives for the betterment of the society.

II. CONCEPTUAL FRAMEWORK

This piece of work is mainly hinged on the nature of philosophy for children, its pedagogy and how these qualities can help resuscitate the concept of ubuntu in view of the current moral degeneration in our society. It is therefore imperative to first discuss the rationale for introducing philosophy, the nature and principles of the two concepts under discussion, thus, philosophy for children and ubuntu.

III. NATURE OF PHILOSOPHY FOR CHILDREN

For many years, dating back from classical times, philosophy was considered to be the domain for adults. Plato clearly showed his intention to restrict the accessibility of philosophy to youngsters when he maintained that the dialectic was a double edged sword that could prove to be subversive if used by a person who lacked the necessary rationality and maturity (Daniel and Auriac, 2009). This assertion even got more support following Piaget’s theory of cognitive development with some philosophers maintaining that youngsters are not capable of thinking critically and reflectively. Some arguments against engaging children in philosophy were based on the premise that there are certain conditions needed for one to study this discipline. These are the learners’ knowledge and maturity as well as his intrinsic motivation to comprehend philosophical texts. Such motivation, it was argued, is rather absent in children (Murriss, 2000).

As this discipline was considered unfit for children, it is no wonder why it seems to be exclusively offered to students in colleges and universities (Kennedy, 2000). In consideration of the notion that the essence of philosophy is critical thinking (Daniel and Auriac, 2009), Lipman (1988) getting the influence from Vygotsky (1985) sees critical thinking as the main element prevalent in children through verbal exchange among peers. Although some philosophers contest the introduction of philosophy for children in the classroom suggesting that the discussions by children it fosters are not philosophical, Socrates argues that through questioning, critical thinking is enhanced and children discover knowledge. For Socrates, knowledge is not a preserve for adults, but would rather be discovered by the learner himself. Knowledge is considered a never achieved awareness that is constructed and reconstructed in and by the questioning (Murriss, 2000). As Lipman et. al, (1980) view it, this complex philosophical thinking needs to be nurtured in children as it is neither innate nor magic. We consider Daniel and Auriac's (2009) sentiments that it is not because one enters adulthood that one automatically becomes a critical thinker. In the same vein Mathews (1994:18) says maturity brings staleness and uninventiveness to the exploitation of philosophical ideas while children are often "fresh and inventive thinkers". In most cases adults' perceptions maybe taken differently by children, so childhood can be said to be the best time to capture children's philosophical aptitudes.

An American philosopher, Mathew Lipman, proposed a philosophy for children programme in the 1970s (Kennedy 2000; Daniel and Auriac, 2009), and to date the programme has been implemented in fifty countries, its material has been translated into twenty languages (Daniel and Auriac, 2009). This is being done in the light of the need to develop critical thinking in children through philosophical dialogue which evolves in a perspective to enrich group perspective as opposed to argumentation for individual ends (Lipman, 2003). In reference to the good qualities of Philosophy for children, Accorinti (2000) saw it as an education proposal that makes it possible for teenagers to develop complex thinking and therefore their reasoning abilities, critical, caring and creative thinking.

There are defined procedures to be followed in philosophy for children. In most cases children begin by reading texts in form of stories. These stories might be fictional but related to children's experiences. These stories should have themes which enable children to reason more effectively and show how they can apply their reasoning to life situations. The stories which should be used in a classroom setting should have many themes touching on children's experiences. Children will use the democratic processes to choose the themes to discuss. All members (children) are treated as equals in the dialogical process. Alternatively, children may come up with questions concerning ambiguous or paradoxical situations that intrigue them for discussion. Philosophy for children can be fostered through the holding of a dialogue in a group to construct elements of response to their questions so as to fulfil their common objectives. This can be done in a community of inquiry setting. The community has the guiding principles to be followed by all members. A brief reference to the nature and principles of the community of inquiry is essential.

IV. THE COMMUNITY OF INQUIRY

The term community of inquiry was first used by Charles Saunders Pierce to refer to the interaction among scientists (Ndofirepi, 2011). The tradition of community of inquiry also found its roots from Socratic philosophy as it values dialogue to solve problems and find possibilities and limitations to different situations (Retyunskikh, 2003). This community entails a micro-society in which children are initiated into the ethics of social life. The community offers democratic settings in which children are free to air their views on any subject under discussion in a classroom set up. The relationship among the community members is horizontal (members have equal power in dialogue) as opposed to a vertical setting (where others have more power). The class sits in a circular formation and they read a story, sentence by sentence. After completing reading the story, children suggest questions to discuss. These questions come from the themes in the story or from paradoxes and ambiguities emerging from the text. The role of the teacher is to facilitate critical dialogue within the community of inquiry. It is the way the teacher guides community members which makes the discussions more philosophical as opposed to mere conversations (Accorinti, 2000). When children are used to this exercise, they develop to be critical thinkers thereby fulfilling the main purpose of the discipline. A spirit of tolerance is fostered through a communal setting which also instils empathy in community members. The fact that the community members are pursuing the common objectives, the spirit of oneness is instilled, cutting across individual and cultural differences. As children get used to this learning situation, their extrinsic motivation is gradually transformed into intrinsic motivation to act voluntarily in order to solve the common problem by means of dialogue (Daniel, et.al, 2000).

It must be noted that the social qualities obtained through the community of inquiry are extended beyond the particular micro-community into the larger community. This is in line with Splitter and Sharp's (1995) view that classroom community of inquiry expanding outwards and make connections with other communities thereby enabling participants to be exposed to different others and develop a broader world view thereby influencing other communities to become more like the democratic community of the philosophy for children classroom. In order to come up with a more critical quality discussion, philosophy for children advocates the exposure of children to various aspects of reasoning skills so that they will be able to draw a line between critical and non-critical reasoning, identify ambiguities and fallacies in the thought process. This can be done through designing banks of exercises to illustrate the aspects like assumptive reasoning, critical and non-critical thought, fallacies, precision, and consistency among other aspects.

This philosophy will see children growing to be critical thinkers who tolerate diverse cultures. This is very essential as all societies have developed to be multicultural. In their diversity, the communal ethic will be maintained and children will be pursuing the same objectives. Developing this communal ethic, tolerance and a democratic spirit is likely to see the societies producing morally upright citizens who consider other citizens before engaging into certain behaviours.

V. THE NATURE OF UNHU/UBUNTU

African philosophy is centred on the concept of unhu or ubuntu. Literally translated unhu/ubuntu means humanness. Ubuntu is a complex concept that underlies the complexity of humanness itself. Chitumba (2013) takes ubuntu to be complex, elusive and multifaceted. It necessarily has to be; for it describes the very essence of Africanness. It describes human existence not only in spatio-temporary terms but also in thought and experience as lived in the community. The concept of unhu/ubuntu is embedded in African tradition. It is therefore an expression of all that constitutes the African way of life.

The African way of life is one that is communitarian. It is one in which the individual is not solitary. The individual defines his or her existence with reference to others, his or her relationship with them (Samkange and Samkange, 1980). The relationship that an individual has with others is taken to be very significant in the life set up of the African people. This is clearly captured by the aphorism 'umuntu ngubuntu ngabantu' that is "I am because we are; and since we are, therefore, I am" (Louw, 2010). According to Ramose (1999) to be human is to affirm one's humanity by recognizing the humanity of others and, on this basis, establish respectful relations with them. In other words my human-ness is constituted by the human-ness of others, and vice versa. And the relations between human beings, other persons and me, are characterized by mutual recognition and respect (Kimmerk, 2011). The relationship between the individual and these others is one of interdependence; he or she depends on others and they depend on him or her.

Ubuntu is a bundle of cherished values in African societies. It articulates values such as respect for human beings, human dignity, and compassion, hard work leading to achievement, honesty, tolerance, generosity, kindness, gentleness, humility, and love (Mayer, 1980; Chitumba, 2011). These bind the community together. In the African communitarian way of life the success of the individual is shared among all he or she relates with. Similarly the misfortune of the individual is the misfortune of many through relational ties. Thus sharing is not only sharing the good things of life. This is exactly what Jordan Kush Ngubane (1963: 76) means when he says

Supreme virtue lay in being humane, in accepting the human being as part of yourself, with a right to be denied nothing that you possessed. It was inhuman to drive the hungry stranger from your door, for your neighbour's sorrow was yours. This code constituted a philosophy of life, and the great Sutu- nguni family...called it, significantly, ubuntu or botho... the practice of being humane.

This is further reinforced by the other aphorism: 'If when faced with a decisive choice between wealth and the preservation of the life of another human being, then one should opt for the preservation of life' (Kimmerk, 2011). Ubuntu can therefore be taken to refer to humanness; it is an African philosophy emphasizing African ethics and practical morality and, as Kimmerk (2011) says, this is a basic principle of social philosophy.

VI. PHILOSOPHY FOR CHILDREN: A MODEL FOR UNHU/UBUNTU

The morality of community members is mainly the product of social experience stemming from childhood. It is believed that children develop some social dispositions in many aspects of life through interaction with their community in general and their peers in particular (Vygotsky, 1985). Societies which emphasise individualism through its structures normally produce societal members who are egoistic and have no feeling for their fellow community members. On the contrary, products of a community which is bound by communal ethic are likely to be communal in their living. The communities of this nature are characterised by empathy and tolerance of people of diverse cultural, social and economic backgrounds (Peresuh and Nhundu 1999; Bodunrin 1991; Fafunwa and Aisiku, 1982).

These social qualities which have the potential to strengthen the moral fabric of the community, it can be argued, can be moulded through learning paradigms and pedagogies if well exploited in the classroom setting. As alluded to above, introducing children to philosophy through the philosophy for children programme advocated by Lipman (2003) entails fostering a communitarian way of life. Through the community of inquiry, the spirit of treating everything in terms of the common good is instilled, a collective conscience is nurtured. This cultivates the feeling of empathy and the spirit of tolerance among group members. These desirable social aspects are expected to go beyond the immediate classroom into the larger community (Accorint, 2000; Splitter and Sharp 1995).

Naturally, children find comfort in groups of peers (Ndofirepi, 2011). During preschool period, children learn different ways of conduct. Some form of discipline and some corrective measures are evident in communities of peers. Children have a tendency of learning some forms of behaviours from their peers which they may not necessarily learn from adults. These disposition children have before school must be taken as strong foundations for moral development at school. A school as a community with children of different learning levels and diverse social and economic backgrounds must be taken as the best place to give children an opportunity to express themselves in a democratic environment through the philosophy for children approach (Lipman, 2003; Kennedy, 2000).

One of the most important aspect of philosophy is critical thinking (Daniel and Auriac, 2009). Sutcliffe (2003) asserts that the community of inquiry recognises the classroom as a community in which thinking that is critical, creative, caring and collaboration is promoted. In his argument on the relationship between critical thinking and communal ethic, Ndofirepi (2011) concludes that a person cannot be truly critical if he does not care about what and whom he is being critical of. The community of inquiry is made more effective by the sharpening of children's reasoning aptitudes. This is done through exposing them to exercises that foster critical thinking, precision and consistency (Kennedy 2000). With these skills the dialogues within the community of inquiry becomes more philosophical as opposed to mere conversations (Daniel and Auric, 2009). Philosophy for children socialises children for a communal social ethic desirable for contemporary societies. Cultural pluralism has become a global phenomena and some communal living in any society is inevitable. Differences in culture, religion, levels of thinking and

maturity and general social and economic backgrounds can be divisive factors. Philosophy for children can therefore play an important role in bringing social harmony through the elements of tolerance, critical thinking and democratic dispositions it fosters.

Taking into cognisance that the African concept, ubuntu, was the main basis for the sustenance of the African moral fabric, lines of similarities can be easily drawn between ubuntu and philosophy for children. This can be done upon the realisation that the communal ethic in philosophy for children is greatly entrenched in the African group philosophy (ubuntu). We therefore argue that the implementation of philosophy for children approach in schools will help resuscitate the essentials of ubuntu philosophy whose decline is characterised by moral decay in our communities.

The main aim of education in African traditional societies was the transmission of cultural heritage from one generation to the next (Peresuh and Nhundu, 1999; Fafunwa and Aisiku 1976; Taberondwa, 1998). This includes the maintenance of moral values cherished by the society. The production of morally upright members who had a feeling for their fellow community members was the ultimate goal of education (Ramose, 1999). This entails the nurturing of individuals who depended on other individuals for survival, individuals who go by the community morality, thus people with ubuntu or personhood.

Beginning from early childhood, in African traditional societies, children were identified by their extended families and in turn their immediate communities. Every activity was done communally (Gyeke, 1997; Peresuh and Nhundu, 1999), any individualism was frowned at. All elders bore the responsibility of nurturing desired moral values in children. This communal ethic was fostered in these elders by the preceding generations. The end result was the desired product, a person with ubuntu or personhood (Chitumba, 2011). Because of this African nurturing, moral degeneration, as it is today, was not known.

Although ubuntu led to the sustenance of traditional societies, one cannot necessarily advocate a return to an African past in its entirety (Makuvaza, 1996). This is because community structures have changed, communities are no longer unicultural in nature. It can however be argued that the essentials of ubuntu can be retained through exploitation of modern approaches like philosophy for children. We must consider the view by the critics of traditional education in Africa that point to the fact that the system failed to promote critical thinking (Ndofirepi, 2011). Education, it is argued, was characterised by the presence of unquestioned obedience to authority. The shortfalls of African traditional education can well be addressed through the use of modern approaches at the same time paying attention to the essentials of African morality. Higgs (2003) believes that Africa can use philosophy in a particular sense to address social issues, philosophy is expected to be pragmatic and render a service to society, in this case, the moral degeneration which has become a major ill in our society must get a remedy through philosophy. Ndofirepi (2011) calls for situating philosophy for children within the African milieu. This is expected to resuscitate the African moral values relevant for the 21st century.

Traditional African education being authoritarian, a democratic flavour is essential for the discourse to be relevant in

the 21st century. Wayhid (2004) has the same view as he advocates for a new philosophy of education for Africa that emphasises achieving reasonableness whereby children are regarded as reasonable people who are more open to interpreting, analysing and looking beyond texts. A democratic setting espoused by the community of inquiry suitably places African moral development in the 21st century.

As texts, stories, paradoxes and ambiguities are used in the community of inquiry, African moral development can be easily enhanced through the inclusion of African themes through the medium used in traditional societies. Gyekye (1997) stresses that stories and proverbs are primary ways through which a great deal of African philosophical thought, knowledge, has been taught. Through philosophy for children, children are exposed to do philosophy at an early age by reflecting on, analysing and interpreting their traditional beliefs, customs, habits and histories (Gyekye 1997). Their languages must also be used as a medium of analysis (Fasiku, 2008). Basing on the strength of communal moral teaching, philosophy for children can be used to resuscitate ubuntu. As children spend most of their time at school, it can be argued that employing philosophy for children taking into cognisance African moral values will resuscitate ubuntu. As the setting promotes tolerance of children from a diverse social and economic backgrounds, children become empathetic and generally morally upright.

A continual exploitation of the philosophy for children approach will lead to the appreciation of the group ethic by learners thereby promoting the philosophy of ubuntu with a democratic flavour (Ndofirepi, 2011). These learning experiences are likely to nurture children into morally upright citizens because they will be endeavouring to meet the community values arrived at through critical thinking. As philosophy for children has the potential qualities to develop morally upright members for a multicultural society, this is the situatedness of ubuntu in the 21st century.

VII. CONCLUSION

Against the background of moral degeneration in our community philosophy for children if properly implemented in schools may help resuscitate morality. The emphasis put on communal learning in philosophy for children appeals well to African moral teaching (ubuntu). Contemporary plural societies are well accommodated as the approach fosters tolerance in the learners. Although it can be argued that capturing ubuntu in its natural state is an illusion, essential principles which are in tune with the 21st century can be realised. As the major elements of philosophy for children are compatible with the philosophy for children approach, the moral foundation from the home will be supported through this teaching approach. A democratic flavour of philosophy for children will make societies realise the essentials of ubuntu in tandem with contemporary times.

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Improving Password Security Using Location –Based Intelligence.

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Abstract- Information technology users are increasingly dependent on mobile devices while computers are stationed in offices and cyber cafes. Most of these mobile devices like smartphones use location applications such as Google maps for reporting their locations. With computers in offices and cyber cafes, and people able to log in to other accounts in their mobile devices, it is likely that a trusted workmate who gets access to your authentication credentials i.e. user name and password to use them to access, interfere, or copy your work in your absence. With the mobile device able to report your location, security can be improved by integrating location based intelligence with password authentication. This technique works by comparing the location of a person's mobile device and where the log in attempt is being made. If the two match then log in succeeds but if the two locations are different, log in does not succeed.

Much research has already gone into the field of information security more so, password management, and location based authentication. These methods look at strength of passwords and ability to log into a system within a particular location.

The proposed system tends to apply a technology where the location of a mobile device possessed by a user is compared with the location of the other device where log in attempt is being made. Access is only granted when the two devices are in the same location.

Index Terms- passwords; authentication; location-based intelligence; location

I. INTRODUCTION

In this information technology age, computer and information security is an important issue when businesses conduct transactions online, host customer accounts, and field officers accounts. Authentication is the most ubiquitous form of identification method as user access control to a system [2]. User authentication is the combination of username and password [3]. A username is identity by which a user is identified. A password is information associated with user name that confirms the user's identity, which may be used to grant or deny access to user from a secure connection.

The use of a user identification and password is not an absolute proof of a user's identity. The use of a specific user identification and password by a user only means that the user is aware of the existence of the user identification and associated password; it does not necessarily mean that the person using the identity and password is the person associated with this user identification and password.

Meanwhile, smart phones are gaining popularity all over the world [1]. Most of these smart phones are equipped with inbuilt global positioning system (GPS) chips that can accurately detect the location of the user. This is evidenced by the explosion of location-based services, such as Google Maps. In addition, a lot of innovation is constantly occurring in the area. Companies such as Skyhook, Google and Apple continually improve their location detecting technologies by creating large databases of wireless access point and cell tower locations. The overall results have been the improvement in the accuracy of the detected locations. It is now feasible to determine the location of a user within meters of his/her actual location [1].

Integrating location-based intelligence in password authentication benefits the user in the following important ways:

- If an unauthorised user attempts to authenticate from a location far from the user's mobile phone, an authentication mechanism can reject the attempt even if he/she has the right username and password.
- A user does not have to worry about storing or writing down the password. It is difficult to memorize passwords hence the user can write them down and still be secure.

Based on these facts described above, smart phones can be a potential solution for integration of location-based intelligence with password authentication. Smart phones can be used to detect and send the location of a particular user to back-end servers, which shall verify the location as a factor for authentication and authorization purpose.

This project carries out research on password protection mechanisms and weaknesses, then goes ahead to discuss a technique which ensures that the person using a user identification and password is the actual person to whom this user identification and password belongs.

In the described technique, location based intelligence is integrated in the authentication process.

II. RELATED WORK

In 2006 Willem G. de Ru, and Jan H.P. Eloff presents a methodology for reinforcement of password authentication through the installation of typing biometrical mechanisms. This technique analyses the keystroke patterns unique to each user. The analysis is done transparently indiscernible to the user while typing to gain system access via a password authentication mechanism in the normal way i.e. through entering of a user identification and password string. It then shows that the integration of fuzzy logic based typing biometrics with current password mechanism which constitute the most universal authentication device, can only serve to enhance security.

They further conducted an experiment to identify the ability of the system to identify an intruder and to identify a genuine user.

The system was however not able to do these at 100% accuracy, since an intruder can still log in using credentials that do not belong to him. It is as a result of this that this proposed system identifies the location of where the log in is being done, and where the user is with a mobile device which may be a phone.

In 2013, Shazia Rahman Obedur says that passwords are a critical part of information security. Then goes ahead to say that passwords when poorly chosen can be compromised and put the entire work at risk. Many users do not understand why good passwords and password management are important for information systems. Using a password or having a password policy is not enough. Understanding and practicing the policy is important to keep accounts secure. The author has ten conducted a survey to check password habits for user accounts on 113 subjects. This survey allowed the author to understand password habits of users according to sensitivity of their accounts, and revealing some critical issues associated with password choice. The author has considered data on password strength, types, and length of passwords chosen and how they vary by site and sensitivity.

The author further identified that that selecting a strong password continues to be a problem to most users, those who create strong passwords tend to reuse them for several accounts hence putting them at risk.

The proposed system will tend to secure the use of simple passwords, or even strong passwords which are written down. If someone has to access an account then the actual user as to be around with his mobile device. If in a different location, access will not be granted even if someone has the password.

Takamizawa and Kaijiri proposed and designed an authentication method using location information obtained from mobile telephones that is suitable in web-based education applications. A student who wants to login into the web-based application, in addition to using username and passwords, has also to provide his/her location through a mobile telephone in order to prove the authenticity. In their method, location from a mobile phone is determined using GPS. For that, mobile phone must be equipped with a GPS receiver and a clear view of the sky is needed for the process to work. QR codes are also used for web applications to prompt the mobile phone for the location. The user has to scan the code from the screen using his/her mobile phone and therefore a phone needs a camera. In addition, the authors did not pay attention to security threats and vulnerabilities for their location-based authentication method and as such the mechanism may be susceptible to trivial attacks. For example, the location could be easily spoofed or modified.

Despite the security features that they offer, most of these solutions however have suffered from problems such as practicality, usability, reliability and cost. In addition since the location signature depends on GPS, the mechanism suffers a lot of reliability issues especially indoors or in places where there is no clear view of the sky. Others have proposed protocols, which however apply only to specific scenarios or require specific devices. A general and flexible approach that can be applied in different situations is still lacking.

A method that takes advantage of the recent advancement in location-sensing technologies, especially provided by smart phones, is needed. These advancements have led to the improvement and reliability of location information and thus rendering it more useful. Earlier approaches have relied on technologies, once considered state-of-the-art, but currently either obsolete or mainly not adequate. In addition, these approaches require extensive user involvement making them less user-friendly. With the current technology it is possible to make this technology transparent and convenient for users.

III. STRUCTURE AND COMPONENTS

The proposed solution comprises four components, which are combination of various servers and applications:

- **Reference Local Location server (RLLS)**

This is component which stores the location information of the computer where log in attempt is being made. It provides location registration, authentication and authorization services;

- **Authentication server**

This provides authentication service for all participants whose username and passwords are stored in it. It stores usernames and passwords of users and is connected with the RLLS server and SP server to provide location-based authentication service.

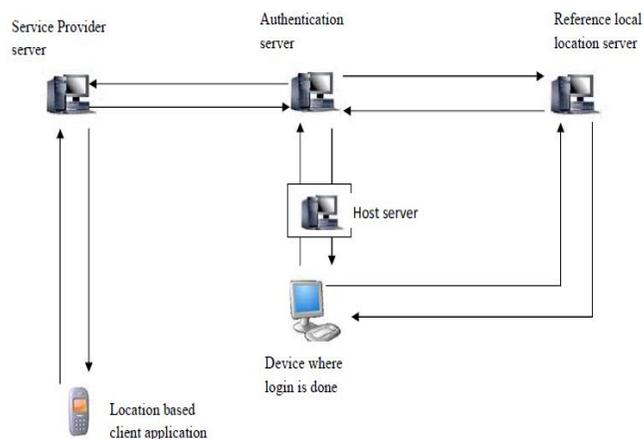
- **Service Provider (SP) server**

These are the providers of various mobile services. They provide the information on location of the mobile phone of the users.

- **Location-based Client (LBC) Application**

This is an application running on user's mobile device, capable to collect location information from trusted Location Providers (LP) and relay the same to the authentication server.

The architecture components are as shown in the diagram below



IV. PROTOCOLS

The design of the proposed system takes into consideration the fact that the registration process is already complete. It is therefore designed with one protocol i.e. authentication protocol.

Only one protocol is proposed in the system since during email or account registration, mobile phone numbers are always captured. It is this mobile phone number whose location will be determined each time a log in is requested. Authentication is performed at the beginning of each session, based on principles of single sign-on protocol. In our system, two types of location information are used: reference location and mobile location. Reference location refers to the location of the device being used to log in and stored in the database on RLLS server for future comparison during authentication. Reference location usually remains the same until it is explicitly changed by the user. Mobile location refers to the location information captured every time when user requests access to some resources or accounts. Mobile location always changes based on the user's movement and current location. The location information (both mobile and reference) that is captured by the LBC and sent to the server comprise four parameters: longitude, latitude, range of location accuracy and the underlying technology that was used to determine the location. In addition, the reference location also contains the user specified location range that specifies the area within which if the user is present user's account log in attempt can be authenticated successfully. The longitude and latitude are used to identify a specific precisely a geographical location. Every location estimate contains a level of uncertainty as the result of the location sensing technology used. The range of location accuracy is used to express this uncertainty to the server in order to facilitate in making valid authentication decisions.

V. AUTHENTICATION

This is when the actual location comparison process is performed. The protocol is performed every time when the user requests access to some resources or service from the system. Our solution can be integrated with any existing authentication systems. In this case, there is the authentication server providing the existing authentication service. The proposed solution can be integrated with them.

The process begins when the user tries to access the protected resource (e.g. login into his/her account). The process is initiated by user sending a service request to the authentication server. The server verifies the username and password, and if they are correct, sends location information request to the user's mobile phone and Reference Local Location server to compare location information then goes ahead to authenticate the user.

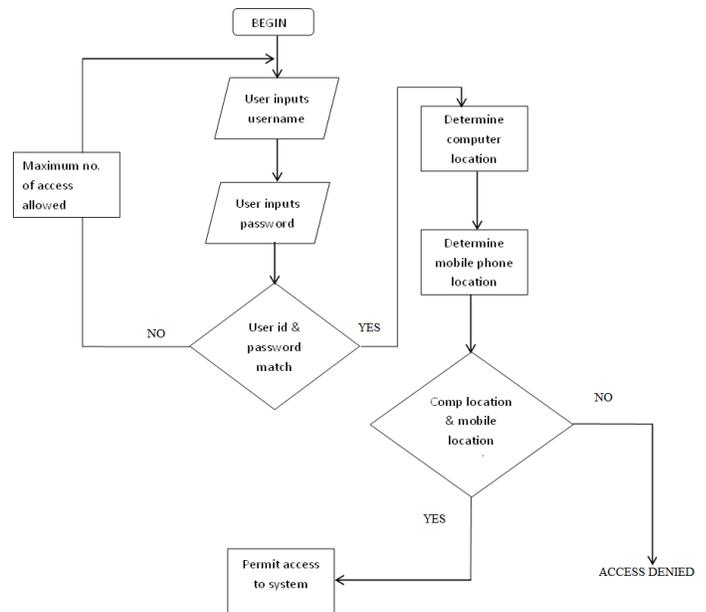


Fig 2. Summary on the whole authentication process.

The Authentication server sends a location information request to the user's mobile phone. The phone responds back to the Authentication server with the location information for the authentication purpose, which can be any existing mechanism depending on the implementation of the particular system.

It then compares user's location information with the log in device location data stored in its database during the installation phase, namely compare reference location with mobile location. If the authentication succeeds, authentication server sends authorization request, comprising user's access request and user's location information, to the host server. The server first performs existing authorization mechanisms, based on the locally stored policies [1]. After that, host server decides whether to approve user's service request based on the authorization result.

VI. LOCATION VERIFICATION

One of the most crucial steps in a location-based authentication mechanism is the verification of the location provided by the user's phone [1]. The security of the whole systems can either succeed or fail depending on the effectiveness of this step. The decision whether a user is authenticated or not depends on the validity of his/her presented location. When a user's mobile authenticates to the system he/she presents his/her location, which has been captured and calculated by the location sensing client. The verification algorithm then has the responsibility to check the reported location, verify its validity, compare it to the reference location and make a decision whether the user is authenticated or not. The goal of this process is to prevent location mismatch of location information and make sure that the clients' reported location is the actual locations that they are so that someone may not have access yet the actual user is not nearby.

VII. CONCLUSION

In this paper a technique for strengthening password security using location-based intelligence proposed and described. The proposed solution provides a system for ensuring that the person login in using a password is the actual owner of the password. For location verification, we propose an approach, which focuses on checking if the mobile number is in the same location as the computer where login is being attempted. This technique for integrating password authentication with location based intelligence improves the confidence of using and storing passwords, compared with other solutions where a long or complicated password has to be used, and where a password is not supposed to be written down but to be memorized. As a result, our system of integrating location based intelligence to password authentication comes out as more secure and valid.

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Socio - Economic Impact of Lake Bosomtwe Shoreline Changes on Catchment Residents in Ghana

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Abstract- People living along lake Bosomtwe basin in Ghana relies largely on fishing in the lake and farming on the marginal lands. The relationship between the land use practices in the catchments, people's livelihood and the lake fishing environment is fascinating, because of the belief that the catchment forests and streams help make the lake basin a rich habitat. However, recent human activities and shoreline changes of the lake are believed to have subjected the catchment areas to undue deforestation from uncoordinated farming practices. The unparalleled degradation of the catchments has disrupted the fish ecology, hence dwindling livelihood opportunities. The local population has had to diversify livelihood strategies. This study examined the impacts of the shoreline changes on the livelihood of the surrounding communities. The study employed the mixed methods approach to undertake the research by triangulating primary and secondary source data. In-depth interview and questionnaire were used to solicit information from eighty seven (87) respondents on their knowledge and perception on Lake Bosomtwe shoreline change and its impacts on their livelihoods. The main findings of the study are that the gradual depletion of the lake is being felt by the population who depend on the lake for their means of livelihood. It is recommended that committees be set up within the three districts to provide environmental education and proper management of the lake as it serves as the highest income generating venture.

Index Terms- Ghana, Livelihood, Shoreline, Lake Bosomtwe, Environmental.

I. INTRODUCTION

Lake Bosomtwe is a natural inland freshwater lake in the Ashanti region of Ghana. It is located about 30 km south-east of Kumasi in the northern tip of the Adansi mountains in the forest zone of Ghana. The lake has a centripetal drainage system; its diameter is 106 km², and is about 11 km at its widest part; it has a maximum depth of 78 meters. The lake covers an area of about 52 km² (Turner, Gardner & Sharp, 1995). Studies by Jones, Bacon, and Hasting, (1981), (cited by Turner *et al*, 1995) confirm that the lake is the result of a meteoritic impact. The rim of the crater has been partly eroded, and is situated in dense rainforest, making it difficult to study and confirm its origin by meteorite impact. It is believed that, it was formed by an explosion of volcanic gases and was gradually filled with rain (Moon & Mason 1965). Shanahan, Overpeck, Sharp, Scholz and Arko, (2007) opined that, periods of heavy rainfall filled the crater with water, causing the lake level to rise above the lowest points of

the rim. Such periods are evidenced from fossils of fish found on hilltops. Water even flowed from the basin through an overflow channel. However, there were also times when the water level was so low that the rainforest probably had it way into the basin rendering the lake only a small pond. Such a period, according to legend and now proved by paleoclimatic records, lasted until about 300 years ago (Shanahan *et al*, 2007). The lake is fed by surface runoff and the 'Aberewa', 'Ebo' and 'Konkoma' Rivers. Fish species found in the lake belong mainly to the family Cichlidae. The main species are tilapia *busumana*, *T. discolor*, *T. zilli*, *Hemidiromis faciatius* and *Sarotherodon galila multifaciatius*. *Clarias species* and *hetero bronchus species* are sometimes caught in the lake (Dontwi, Dontwi, Buabeng, & Ashong, 2002). The major economic activities among the communities surrounding Lake Bosomtwe is fishing in the lake and farming on the steep crater slopes which provide them with their livelihood. To this end reconnaissance survey in some of the communities around the lake reveals substantial evidence of the threats to the fishes and fishery in Lake Bosomtwe. The community leaders and the fisher folk attribute the decline in the fishery to the interferences of the following,

- the natural processes on the lake and by scientific investigations;
- holiday makers and tourist who physically scare fishes to deeper waters; and
- the neglect of custom due to non- performance of rites by the people to the god Bosomtwe.

According to Dontwi *et al*, (2002) there are about 1000 fishermen operating in Lake Bosomtwe. They use 18 metres wooden planks as fishing boat, and employ three types of fishing gears, namely;

- The wire mesh traps
- Efficient gillnet 25m x 2-3m and 4cm stretched mesh; and
- 3.1-2m radius cast net.

The lake currently has no outlet, although it has apparently overflowed in the recent geologic past (Turner, Gardner, & Sharp, 1996a). The most important controls on the water balance of the lake are rainfall directly onto, and water evaporating directly from, the surface of the lake (Turner *et al*, 1996a). Of lesser importance is the runoff contributed by the lake's surrounding watershed. It is reasonable to assume, when considering the hydro-geological conditions that, little or no groundwater enters or leaves the basin. According to Turner,

Gardner, Sharp and Blood (1996a, 1996b), the lake level is very sensitive to small changes in rainfall and other weather parameters, such as annual mean temperature and evaporation. The lake level has risen more than 6.8m since regular monitoring began in 1932 (Koeberl & Reimold, 2005) and villages had to move several times as the lake transgressed (Turner *et al* 1996). Although the lake level in the past has been both much higher and lower than that at present, studies of the paleoflora of the basin reveal that the climatic factors have not changed drastically. There is, thus, the potential of the lake overflowing its crater rim, inundating all surrounding communities and ecology. Hence, the potential changes in the lake's level and its socio-economic impacts are therefore paramount for investigation. Therefore, the main aim of the study was to examine the impacts of the shoreline changes on the livelihood of the surrounding communities.

II. CONCEPTUAL FRAMEWORK OF THE STUDY

It is difficult, if not impossible, to isolate and quantify the entire specific factors causing shoreline changes. However, in order to evaluate the various factors and their interrelationships, it is necessary to discuss not only major factors but also minor factors. The basis for future prediction comes from this evaluation. To this end various models were evaluated to assess their weaknesses and strength, and afterward the model below was chosen after carefully considering the various variables that it contained with their explanations and relevance to this present study. the framework look at the interplay of factors responsible for the shoreline changes and its socio economic impacts. this is illustrated below in figure 1.

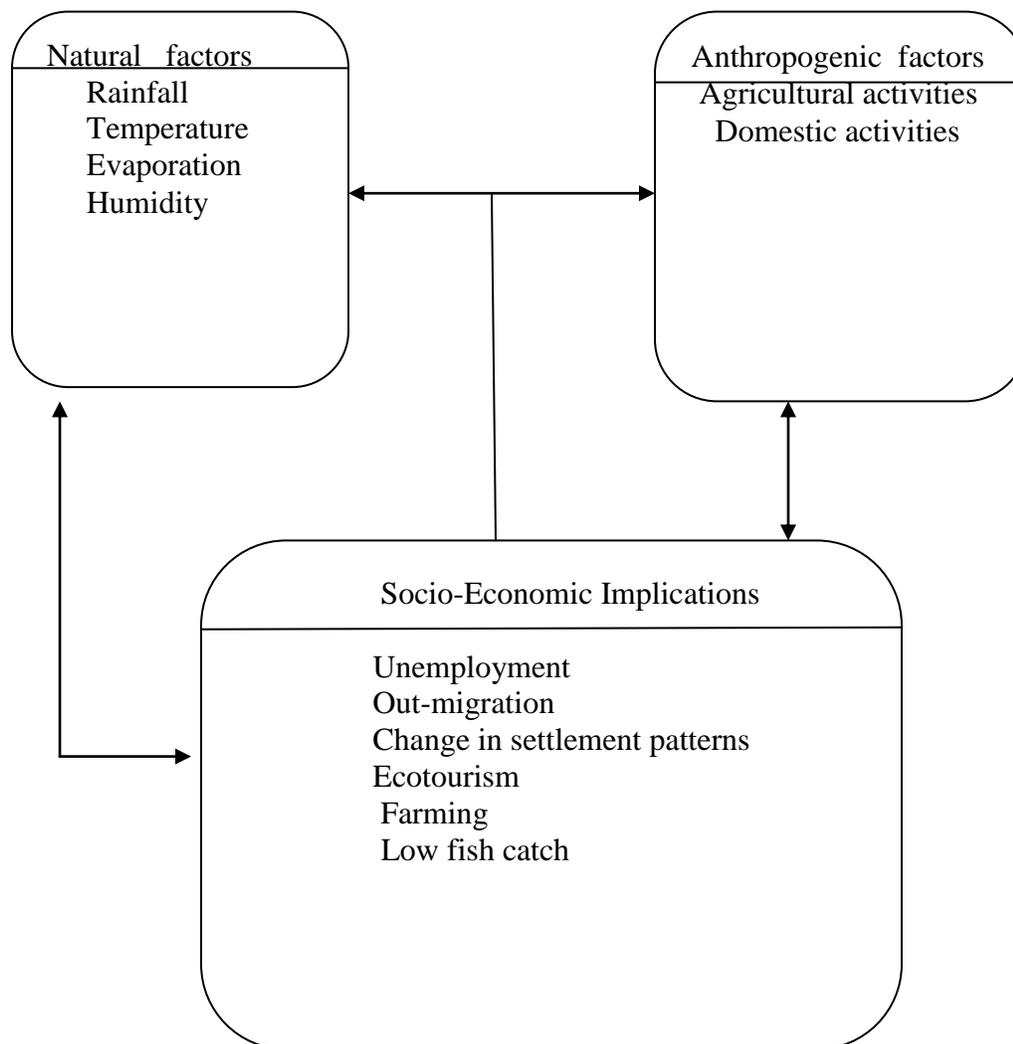


Figure 1: Underlying and proximate factors influencing inland lakes shoreline changes

Source: Adapted from National Research Council (1995)

III. MATERIAL AND METHODS

Study site

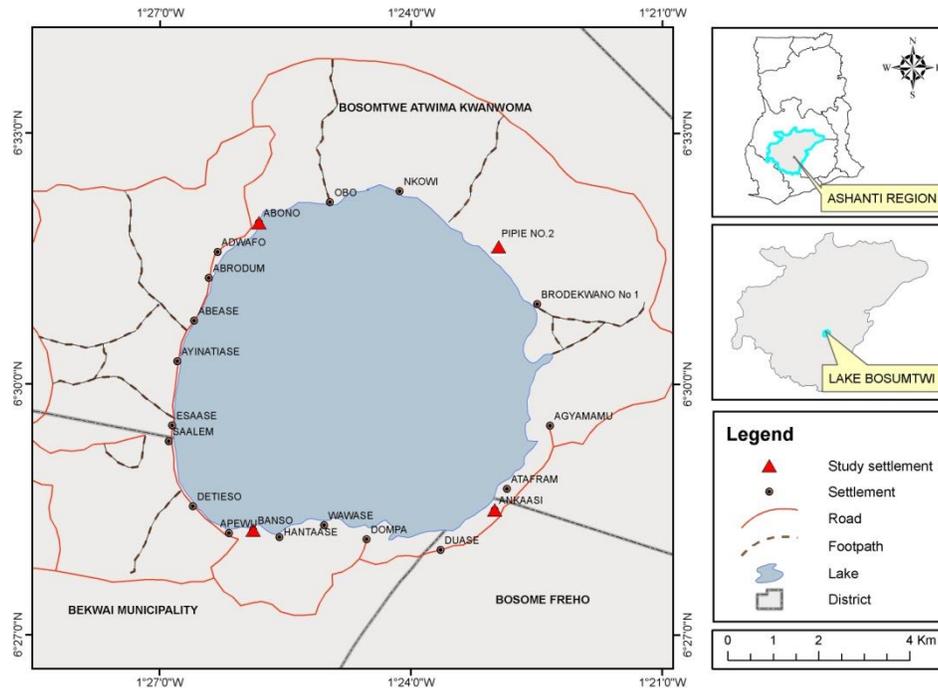


Figure 2: Map of Kumasi showing the study area in the national and regional context.

Source: Fieldwork, 2012

IV. DATA COLLECTION

The data for the study were gathered through in-depth interview as well as the administration of questionnaire to the respondents. The specific subjects examined included the assessment of the knowledge base of inhabitants around the lake; changes in the land use pattern, changes in socio-economic activities, and changes in lake level, as well as the socio economic profile of the residents. The questionnaire were administered in the Asante Twi language and the respondents were purposively selected from four settlement which were Ankaase in the Bosome Freho district Assembly, Abono and Pipie in the Bosomtwe Atwima Kwanwoma district Assembly and Bansa in the Bekwai Municipality. In all (eighty) 80 respondents who were (fifty-five) 55 years and over and seven (7) key informant were consulted.

V. RESULTS AND DISCUSSION

Age distribution of respondents

Attempts were made to purposively select respondents who were old enough to have noted all, or most of the changes in the shoreline of the lake and the effects of the changes on the local folks. As indicated in Table 1 respondents whose ages were 55 years and above were selected for the study. Respondents within

the 55 -70 ages constituted the majority (56.3 %); this was followed by those in the 71 -85 years (37.5%) group. Respondents in the 86 and above age group were (6.2%); these formed the minority. The ability of the old people to give the historical account of the lake makes age an important variable in a research of this nature.

Table 1: Age category of respondents

Age (years)	Frequency	Percent
55 – 70	45	56.3
71 – 85	30	37.5
86 and above	5	6.2
Total	80	100

Source: Fieldwork, 2012

Sex of respondents

The research shows that men on the field were more observant than women. The men were able to show the specific locations of the former shorelines than their female counterparts. Eighty (80) respondents comprising those who were 55 years and over were purposively selected to explore their knowledge on the changing shoreline of Lake Bosomtwe and its implications on the socio-economic activities of the surrounding communities.

Table 2 shows that 56.2 percent of the respondents were males while 43.8 percent were females.

Table 2: Sex distribution of respondents

Sex	Frequency	Percent
Male	45	56.2
Female	35	43.8
Total	80	100

Source: Fieldwork, (2012)

Level of education of respondents

It was assumed that education will enhance one’s knowledge and perceptions on the shoreline changes of Lake Bosomtwe. Education brings enlightenment. Hence, the higher one’s education the deeper the person’s knowledge. As illustrated in Figure 3 the educational attainments of the entire respondents were as follows; twenty two percent of the respondents had no formal education; 10 percent had primary education, 60 percent middle, 5 percent secondary and 3 percent tertiary education. Literacy within the basin can thus be described as low, since only 8 percent of the respondents could be associated with higher education. Though the level of education is low, the respondents had knowledge about Lake Bosomtwe shoreline changes.

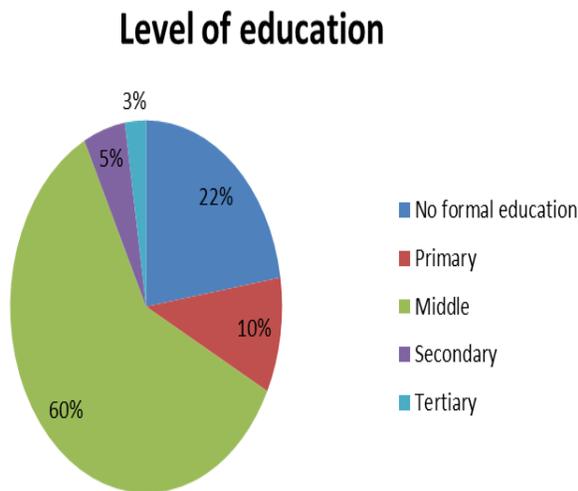


Figure 3: Highest level of education of respondents

Source: Fieldwork, (2012)

Occupation of respondents

Table 3 illustrates the data on respondents’ occupation. Farming and fishing were the main occupations of the respondents. Whereas fishing constituted 31.2 percent of the population, another 20 percent of the respondents were involved in fish mongering and farming. Those in fishing and farming constituted 8.8 percent, while almost 18 (017.5%) percent farming only. The fish mongers constituted the minority group (12.5%). These show that fishing rather farming is the major occupation of the respondents in the lake Bosomtwe catchment area (Table 3). With the shoreline changes of the lake, fishermen

are the most affected group in the area and this has resulted in the fishermen being laid off. This was brought about by the reduction in fish catch and fish composition from Lake Bosomtwe.

Table 3: Types of occupation of respondents

Occupation	Frequency	Percent
Fishing	25	31.2
Farming	14	17.5
Fishing and Farming	15	18.8
Fish mongering	10	12.5
Fish mongering and Farming	16	20.0
Total	80	100

Source: Fieldwork, (2012)

Income level of respondents

In the case of financial standing, respondents whose income was GH ¢ 20 a month were in the majority (47.5%), this was followed by those earning between GH ¢ 30 – 40 (31.1%). Those earning GH ¢ 50 – 60 (12.5%) were the next group, whilst those who earned GH ¢ 50 -70 (8.7%) were the lowest (Table 4). The relatively small size of the farms, lack of farming equipment (comprising rudimentary instruments such as cutlass, hoe, and axe) and limited access to funds for purchasing fertilisers and pesticides were some of the difficulties mentioned by the people. There is also seasonal character of many of the crops and fish. All these factors had resulted in limited income for the people surrounding the lake and often only at the subsistence level. It was indicated that fish catch was declining in amount and size, and attributed the decline in fish catch to recent scientific activities by certain Austrians. In their view, the removal of mud sediment from the lake has affected the shoreline of Lake Bosomtwe and its area extent. The significance of the income in this regard is that, as a result of the decrease in the area of the lake, and hence the fish population. Emphasis is now shifted to farming which is not as lucrative as fishing.

Table 5: Monthly income distribution of respondents

Amount (GH ¢)	Frequency	Percent
Up to 20	38	47.5
30 – 40	25	31.3
50 – 60	10	12.5
50 -70	7	8.7
Total	80	100

Source: Fieldwork, (2012)

Social impacts of Lake Bosomtwe shoreline changes

One of the research objectives was to explore from the residents’ point of view the impacts of the lake Bosomtwe shoreline changes on their socio-economic activities. This subsection presents a number of the impacts of the shoreline changes. The factors to be considered include unemployment, change settlement pattern, low income level, out-migration.

Unemployment

The main economic activities of the communities surrounding the lake are farming and fishing. The people depend more on the fishing industry than farming. Young and old, men and women are employed in the fishing sector. The reduction in the fish stock has laid off many of the fishermen, and this has affected their employment status as well as their livelihoods. The increasing lake temperature has reduced the total fish catch; hence, the income level of those in the fishing sector has reduced considerably.

One fisherman had this to say:

Due to the reduction in the fish catch, I cannot even pay for my children's school fees; and they are most of the time driven from school for not having good school uniform and for non payment of extra classes.

To further explain the effects of the shoreline changes on the lives of the people, the indigenes had resorted to farming on the receded shoreline to compensate for the reduction in fish catch.

One fishmonger also commented that:

I have seven (7) children and I took care of them, educated them to the university level, through the money I had from selling fish, but now, I do not even get some of the fish to buy and this has made life very unbearable and the cost of living very high. We have now shifted our attention to salmon as the substitute for fish in our diet.

Out – migration

Lake Bosomtwe shoreline changes have had an impact on the surrounding communities. The research discovered that the activities of the subsistence-based economy (fishing and farming) are closely integrated and depends on the lake for their survival. Due to the absence of employment opportunities in the basin, the area has observed massive out-migration. There has been an increase in out migration of the youth in the region. People are constantly moving out of the communities and a chunk of them are the able bodied youth who are migrating to seek greener pastures elsewhere, thus leaving the communities for the aged who are inactive. Prakash *et al*, (2005) made a similar observation that most of the youth in the area moved out of the basin and more were expected to move as the lake kept on shrinking in size and depth affecting job opportunities as well as education.

Changes in fish landings and nature of sales

Fishing activities near-shore has proved futile as there has been a reduction in fish catch. Whereas some men try fishing in deep waters, others now travel up to the less degraded coast of neighbouring villages. The temperature of the lake has changed and this probably has forced the fishes to move to deep waters, hence both fishing styles and fishnets are changing. Temperature changes have affected the volume and the area extent of the lake, hence, the shoreline of the lake has changed significantly. Due to this, the small net is replacing the old style and tradition, and the government has prohibited the use of small nets to conserve biodiversity in the lake. With regard to the nature of sales of fish, there has been an increase in women's involvement in the fish trading, even though volumes of fish catch have reduced; women

no longer wait for fish at home but interact with men who buy fish at the coast. This participation of women confirms Nindi's (2007) observation of the women participation in fishing as result of the reduction in the fish catch among the men who work on Lake Nyasa.

Settlement changes

One of the implications of the Lake Bosomtwe shoreline changes is the changes that occurred in the settlements in some villages. The fear of been flooded and the possibility of losing property and human beings as well as animal lives culminated in the resettlement of some of the communities. The people of Konkoma abandoned their original settlement and established a new town away from the lake in order to protect themselves against the incidence of flooding. This same phenomenon made the people of Pipie (Plate. 1) move to higher and safer grounds where they established new settlements. These communities now use the old settlement as farms. This has shifted their economic activity from fishing to intensification of farming and petty trading.



Plate 1: An old cooking utensil showing an abandoned settlement

Source: Fieldwork, (2012)

Economic impacts of Lake Bosomtwe shoreline changes

Low level income

Fishing has remained an important source of income for the residents of the Lake Bosomtwe basin. There are indications of falling productivity based on the respondents' recollections of what fishing conditions were like some decades ago. Examination of fish catch shows a significant reduction in the number and the size of the fishes the fishermen bring home. The subsistence nature of the activities of the inhabitants coupled with poor road network has contributed to low income within the area. The seasonal character of many of the crops results in an uneven income for the surrounding communities. Respondents mentioned that the fish catch is declining in amount and size. The reduction in fish stock by the fishermen has exacerbated the impact of poverty which is the hallmark of the Lake Bosomtwe basin. Though there is no specific per capita indicator for the basin, it can be estimated that about 95 per cent of the population live below the poverty line, which is, living on less than US \$1 per day (Government of Ghana, 2004). The study shows that the

growing need for outside finances in this impoverished region has led many communities to sell or lease a number of plots of land to foreign investors who are interested in tourism around the lake for building guest houses. Inadequate compensation to farmers who lose their agricultural plots to foreign investors has led to political squabbles around the lake.

Low fish- catch

The residents of the lake basin reported noticeable declines in catches during the past seven years and raised concerns about the possibility of over fishing in the lake. But the most commonly given reason for the declining fish catch was the scientific activities conducted by some researchers about over a decade ago. The residents also see the intensification of tourism activities on the lake as enhancing the movement of the fish deep into the lake. Again, the respondents associated the decline to the Lake Bosomtwe shoreline changes and its associated temperature changes to the intensification of tourism in the area. Previously, a study by Whyte (1975) found that Lake Bosomtwe was inhabited by a number of fish species in the mouth of the tributaries. A recent food web study by Poste, Hecky and Muir (2008) found that many fish species were destroyed and one species of Tilapia was now restricted to only the Aberewa River.

Impact on ecotourism

The results showed that ecotourism development in the Lake Bosomtwe basin undoubtedly depends to a large extent on the lake. However, a parabolic view of the lake shows the absence of tourism facilities in the basin. The reduction in the area extent has created a place for the construction of tourism facilities in the catchment area. However, tourism developers should be careful of the kind of structures that they put up as the lake has the possibility of increasing and decreasing its area extent and if permanent structures are built they may be affected. Again, Pollution of the lake water has affected ecotourism development in the basin as tourist report of the plastic materials that float on the lake; all these have affected the aesthetic beauty of the lake as result of dirty water and dead aquatic life. This will perhaps reduce the recreational and tourism value of the lake. Thus, ecotourists are not enjoying nature as they want to. For instance, swimming, in the lake has become unfavourable. Moreover, polluted waters provide a very favourable habitat for waterborne and insect disease vectors such as diarrhoea, bilharzias, typhoid, cholera, and dysentery. With the declining shoreline of the lake, tourist arrival to the basin would be affected and scientific research and studies would also be hampered. Scheren (2003) observed that there has been an outbreak of water related diseases in the catchment area.

Impact on farming

The Lake Bosomtwe shoreline changes have affected the livelihood opportunities of the communities. The local population has had to diversify livelihood strategies to ensure survival. The major economic activities of the people surrounding the lake are fishing and farming. Among the crops grown on the outer rim of the lake, that is, on the steep slopes include cocoyam, plantain, cassava, yam, cocoa, banana, and vegetables such as okro, tomato, and onion. Most of the men are farmers as well as fishermen, and the women sell fish and farm

on the land. The farmers have now intensified farming and grow more crops to consume and to sell at the nearby markets in Kumasi and Bekwai. The implications of shoreline changes on the communities is that, the farmers have to grow crops which take a short time to mature as the lake has the possibility of changing its position.

VI. CONCLUSION

The people living along the lake have limited income to acquire most of their needs. Their endogenous development depends on the relationship among humans (social organisation, knowledge, skills, and insights), nature (water, land, and ecosystem), and the spiritual realm (rituals, religion, beliefs, norms, and values). However, there is a need to improve their local knowledge systems, livelihood capitals and a practice to enhance in situ development built out of people's needs and locally controlled development alternatives. Shoreline changes have had an impact on the local communities and there is also every possibility of the lake to change its position in the near future. These suggestions if carried out can contribute to the sustainability of Lake Bosomtwe and also improve upon the livelihood of the surrounding communities. The range of the lake shoreline change problems is so wide that a restricted research strategy is not feasible for the time being. Again, non structural strategic options which are simplest, cheapest, and most effective means and involve re-planting native vegetation within the accreted area to create shades as well as prevent people from farming on the accreted land and also serve as barrier to the sediment entering the lake, are needed. There should be the provision of employment avenues by the state and other Non Governmental Organisations in the catchment area to absorb the people living in the lake Bosomtwe basin. This will ensure the improvement in the livelihood of the people. It will further reduce the incidence of migration within the area. Furthermore, there should be the establishment of committees within the three districts to provide environmental education, and proper management of the lake as it serves as the highest income generating venture for the Bosomtwe Atwima Kwanwoma District, to borrow the words of the planning officer of the District. Finally eco-tourism should be encouraged to protect the lake from losing its vegetation cover.

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Intrusion Detection & Fault Tolerance in Heterogeneous Wireless Sensor Network: A Survey

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Abstract- Research problems are to enhance an Intrusion Detection System (IDS) of a clustered HWSN to prolong its lifetime operation in the presence of unreliable and malicious nodes. Also, to address the energy consumption and QoS gain in reliability, delay and security with the goal to maximize the lifetime of a clustered HWSN while satisfying application QoS requirements in the context of multipath routing. The proposed research is a highly scalable cluster-based hierarchical trust management protocol for wireless sensor networks (WSNs) to effectively deal with selfish or malicious nodes. The proposed work consider multidimensional trust attributes derived from communication and social networks to evaluate the overall trust of a sensor node. System describes a heterogeneous WSN comprising a large number of sensor nodes with vastly different social and quality of service (QoS) behaviors with the objective to yield “ground truth” node status through “weighted voting” leveraging knowledge of trust/reputation of neighbor nodes. To demonstrate the utility of the hierarchical trust management protocol, it can be apply to trust-based intrusion detection and trust-based geographic routing. For trust-based intrusion detection, there exists an optimal trust threshold for minimizing false positives and false negatives probability. Furthermore, trust-based intrusion detection outperforms traditional anomaly-based intrusion detection approaches in both the detection probability and the false positive probability. The proposed research also present a new multipath routing protocol which provides strong fault tolerance by increasing the number of constructed paths up to four times, as well as tackle the “what paths to use” problem in multipath routing decision making for intrusion tolerance in WSNs. The protocol relies on a new multipath constructions paradigm that is defined specifically for heterogeneous WSN. The approach leverages a reasonable increase in the network lifetime and a higher resilience and fault tolerance.

Index Terms- Intrusion detection system (IDS), multipath routing, fault tolerance, trust management, heterogeneous WSN (HWSN)

I. INTRODUCTION

Advances in wireless communication and miniature electronics have enabled the development of small, low-cost, low-power sensor nodes (SNs) with sensing and communication capabilities. Therefore, the issues of Wireless Sensor Networks (WSNs) have become popular research subjects. WSN is infrastructure based network, and through the mass deployment of SNs, a WSN is formed. The major function of WSN is to collect and monitor the related information which about the specific environment. The SNs detect the surrounding environment or the given target and deliver the data to the sink using wireless communication. The data is then analyzed to find out the state of the target. However, due to the design of their hardware, WSNs suffer from many resource constraints, such as low computation capability, limited memory and limited energy. Because

WSNs are composed by numerous low-cost and small devices which are usually deployed to an open and unprotected area, they are vulnerable to various types of attacks. A prevention mechanism is used to counteract well-known attacks. However, prevention mechanisms cannot resist overall attacks. Therefore, the attacks are required to be detected. An Intrusion Detection System (IDS) is used frequently to detect the packets in a network, and determine whether they are attackers. Additionally, IDS can help to develop the prevention system through acquired natures of attack. Many wireless sensor networks (WSNs) are deployed in an unattended environment in which energy replenishment is difficult. Due to limited resources, a WSN must not only satisfy the application specific QoS requirements such as reliability, minimum delay and security, but also minimize energy consumption to prolong the system useful lifetime.

Recently, prior research efforts have been made to develop network architectures and sensor hardware in order to effectively deploy WSNs for a variety of applications. However, Due to a wide diversity of WSN application requirements, a general-purpose WSN design cannot fulfill the needs of all applications. Network parameters such as sensing range, node density and transmission range have to be carefully considered according to specific applications, at the network design stage. In order to achieve this, it is essential to capture the impacts of network parameters on network performance with respect to application specifications. Intrusion detection (i.e., object tracking) in a WSN can be regarded as a monitoring system for detecting the intruder that is invading the network domain. Thus, it is necessary to develop the intrusion detection system (IDS) which is capable of handling more extensive malicious attacks with energy conservation mechanism to increase system lifetime.

In a WSN, there are two ways for the detection of an intruder: single-sensing detection and multiple-sensing detection. The intruder can be successfully detected by only a single sensor, in the single-sensing detection. On the other hand, in the multiple-sensing detection the intruder can only be detected by multiple sensors. In some applications; the sensed information provided by a single sensor might not be adequate for recognizing the intruder, because single sensors can only sense a portion of the intruder. The intrusion detection can be analyzed according to the capability of sensors in terms of the transmission range and sensing range. In a heterogeneous WSN some sensors have a large power to achieve a longer transmission range and large sensing range. Recent studies [2], [3] demonstrated that using heterogeneous nodes can enhance performance and prolong the system lifetime. In the latter case, nodes with superior resources serve as CHs performing computationally intensive tasks while inexpensive less capable SNs are utilized mainly for sensing the environment. Thus, the heterogeneous WSN increases the detection probability for a given intrusion detection system. It is commonly believed in the research community that clustering [4], is an effective solution for achieving scalability, energy conservation, and reliability. Therefore the cluster based heterogeneous WSN can further improve the performance of the network. Cluster-based Wireless Sensor Network (CWSN) is shown in Figure 1.

Multipath routing is considered an effective mechanism for fault and intrusion tolerance to improve data communication and data delivery in WSNs. Most prior research focused on using multipath routing to improve reliability [5], [6], and to tolerate insider attacks [7]. However, these studies largely ignored energy consumption which can adversely shorten the system lifetime. The research problems are to enhance an Intrusion Detection System (IDS) of a clustered HWSN to prolong its lifetime operation in the presence of unreliable and malicious nodes. Also, to address the energy consumption and QoS gain in reliability, minimum delay and security with the goal to maximize the lifetime of a clustered HWSN while satisfying application QoS requirements in the context of multipath routing. More specifically, to analyze the optimal amount of redundancy through which data are routed to a remote sink or base station in the presence of unreliable and malicious nodes, so that the data delivery success probability is maximized while maximizing the HWSN lifetime.

II. RESEARCH ELABORATIONS

Over the past few years, many protocols exploring the energy consumption and QoS gain particularly in reliability in HWSNs have been proposed. In [8], the optimal communication range and communication mode were derived to maximize the HWSN lifetime. In [9], the authors devised intra-cluster scheduling and inter-cluster multi-hop routing schemes to maximize the network lifetime. They considered a HWSN with CH nodes having larger energy and processing capabilities than normal SNs in the network. The solution is drawn as an optimization problem to balance energy consumption across all nodes within the network along with their roles. In either work [8], [9], no consideration was taken in to the account about the existence of malicious nodes in the network. Relative to [9] the proposed work considers heterogeneous nodes with different densities and capabilities. However, the work also considers the presence of malicious nodes and explores the tradeoff in energy consumption and QoS gain in both security and reliability to maximize the system lifetime.

Compared with existing works cited above, the proposed research work extends from [1] with considerations given to explore more extensive malicious attacks, each with different implications to energy, security and reliability, and also investigate intrusion detection and multipath routing based tolerance protocols to react to these attacks. In addition to this the proposed work also consider smart and insidious attackers which can perform more targeted attacks, capture certain nodes with high probability, alternate between benign and malicious behavior and concatenate with other attackers to avoid intrusion detection. Also to investigate the use of trust/reputation management [12], [13] to strengthen intrusion detection through “weighted voting” [14] leveraging knowledge of trust/reputation of neighbor nodes. Using weighted voting scheme in intrusion detection system (IDS) would considerably reduce the false positives (FPs) and false negatives (FNs) ratio. The accuracy is the percentage of whole traces that are determined accurately, while the efficiency indicates that the voting algorithm performs better on reducing both FP and FN ratios. The weighted voting scheme achieved 90% - 95% accuracy and 90% - 94% efficiency. The propose work also tackle the “what paths to use” problem in multipath routing decision making for intrusion tolerance in WSNs, so to maximize the system lifetime of a HWSN in the presence of unreliable and malicious nodes.

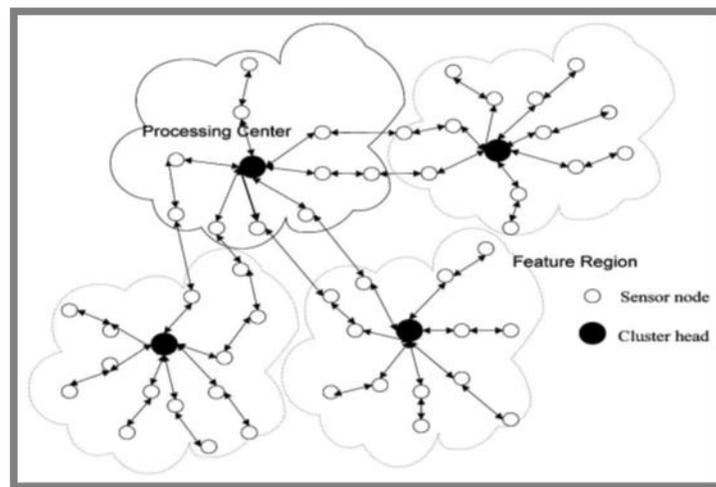


Figure 5 : Cluster-based WSN Architecture.

III. CONCLUSION

The proposed hierarchical dynamic trust management protocol for cluster-based wireless sensor networks, considering two aspects of trustworthiness, namely, social trust and QoS trust. The research work will include the development of a probability model utilizing various techniques to analyze the protocol performance, and

validated subjective trust against objective trust obtained based on ground truth node status. Based on the protocol the algorithm for trust-based intrusion detection will be developing using weighted voting. The algorithm will identify the best way to form trust out of social and QoS trust properties (i.e., identifying weights to assign to individual trust properties) and to assign the minimum trust threshold, so that the performance of trust-based intrusion detection is maximized, i.e., both false positives and false negatives are minimized.

Also, the research will deal with the challenging issue of providing fault tolerance in wireless sensor networks. Firstly a new multipath paradigm for heterogeneous wireless sensor networks will be define and analyzes upon various parameters. Then, propose a new fault tolerant multipath routing protocol which discovers an important number of energy node disjoint paths with the slightest overhead of one message per node. Intensive simulations will be conducted to evaluate our protocol with different scenarios, sensor nodes densities and deployment strategies.

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