# Intelligent Traffic Control System

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**Abstract –** Now a day all over the world, there has been a rapid increase in vehicle numbers. There are approximately 1 million licensed vehicles in the last year. Due to that traffic problems has increased in the last few years and the present traffic light controllers have limitations because it uses the fixed hardware. They do not have the flexibility of modification on real time basis. The time intervals of green, orange and red signals are fixed therefore the waiting time is more. To make this traffic light controlling more efficient we emerge new technique called as "Intelligent Traffic Control System". This uses sensors along with embedded technology .The timings of the red and green lights will be smartly decided based on the traffic on roads. As compared to previous fixed mode traffic light controller this new system is more efficient and flexible. It also has facility to pass the emergency vehicles such as ambulance, fire brigade etc. and also detect and track the stolen vehicles. The design also has scope for further expansion.

**Keywords** – Congestion control, Traffic control, Emergency vehicle, Ambulance, stolen vehicle

## I INTRODUCTION

The growth of industrialization and urban population causes the tremendous increase in the traffic. Traffic management has become one of the severe problem today. With the increase in traffic there arise a number of problems such as heavy traffic jams, ,violation of traffic rules, long waiting times, loss of fuel and money etc. It is therefore necessary to have a fast, economical and efficient traffic control system .The problems of conventional traffic light Controller are as mentioned

### A. Wastage of Time in Heavy Traffic Jams

With increasing number of vehicles on road, heavy Traffic jams are happened usually at the main junctions commonly in the morning, before office hour and in the evening, after office hours. The main effect of this is increased time wasting of the people on the road. The solution for this problem is different time delay settings for red, orange and green signals at different junctions. The delay for junctions that have high volume of traffic should be set longer than the delay for the junction that has low traffic heavy.

### B. Need to wait at no traffic

People have to wait at certain junctions, even if there is no traffic. Because the traffic light remains red for the preset time period, the road users should wait until the light turns green. The solution of this problem can be obtained by developing a system which detects traffic flow on each road and set timings of the signals accordingly.

### C. Emergency vehicle stuck in traffic jam

The emergency vehicle, such as ambulance, fire brigade etc. get struck in the traffic jam. This is because the road users wait for the traffic light to turn green. This is very critical problem because it can cause the emergency case to become complicated, involving life.

### D. Detect the stolen vehicle

To detect the stolen vehicle is a very difficult task, the stolen vehicle can be found only by its number and it is a bit tedious task.

## II LITERATURE SURVEY

Traffic Congestion is a major issue of transportation system in most of all the cities of developing Countries. This is especially true for countries where population is increasing at higher rate. There is phenomenal growth in vehicle population in recent years. As a result, many of the arterial roads and intersections are operating over the capacity and average journey speeds are lower than 10 Km/h at the peak hour. The main challenges are management of constantly increasing vehicles, annual growth of 7–10% in traffic, roads operating at higher capacity , less travel speed at some central areas in peak hours, insufficient or no parking space for vehicles, limited number of policemen. Currently a video traffic surveillance and monitoring system is used in most of the cities. It involves a manual analysis of data by the traffic management team to determine the traffic light duration in each of the junction. It will communicate the same to the local police officers for the necessary actions[1]

## III.REVIEW OF PREVIOUS WORK

For congestion detection several technologies have been proposed such as inductive loop, magnetometer, visual camera, radar etc [2].

*Inductive Loops*

They can be placed on the roadbed work at all traffic speeds and are effective at estimating traffic speeds. They require maintenance and installation is quite difficult. Along with these disadvantages, they are susceptible to high error rate in detection and transmission of traffic information.

*Magnetometer*

Another technology used is a magnetometer. The magnetometer detects the change in the earth's magnetic field when a magnetic object like a car crosses it.

*Visual Camera*

Cameras are used as input sensors which collect real time traffic condition data and analyzed these conditions to provide real time outputs. In bad weather conditions they are not working.

*Conventional traffic signals*

These traffic signals have been programmed with a fixed timer. They do not consider the volume of the traffic on the street before taking a decision of green or red light. Hence if the volume of traffic is large, it may result in accumulation of traffic on the street and the junctions

*Micro controller Based Traffic Signals*

The micro controller-based traffic light system allocates green, red & yellow signal time for each path. When the vehicles along one path will move , the other vehicles from the other path will stop at road intersection control. Without any collision microcontroller based traffic signal system direct the movement of vehicles meeting at a road junction . When the time allocated for a specific path has been exhausted, the red light will be ON meaning stop and the next line will be ON (green light) which means the vehicle in that path should start moving. When the time is about to be exhausted, the yellow light will be ON in the third path informing the vehicles in that path to be ready to move, and after some seconds the green light will be ON.. Disadvantage of Micro controller Based traffic system is traffic light timing is fixed.

Some intelligent traffic control system based on microcontrollers are

**Traffic Control Based on RFID**

Problems that usually arise with standard traffic control systems, especially those related to image processing and beam interruption techniques are avoided using RFID based traffic control system. 8 RFID readers are used for each intersection.. The road is divided into two lanes. RFID reader in each lane track the vehicles passing through it. Every vehicle has a RFID enabled device that stores a vehicle identification number (VIN). VIN number that provides the information regarding the priority of the vehicle and type of the vehicle. Readers collects the information regarding the vehicles approaching towards the junctions. The Central processing unit calculates the volume and speed of vehicles on each road according to information collected by readers. Speed of vehicle is determined by the time taken for it to cover the distance between two readers. If speed of a vehicle is below a specified threshold, it is detected as congestion and the Central Processing System notifies the preceding traffic signal about this. On receiving such information, traffic on that corresponding road is halted for certain duration to avoid congestion on the proceeding road.[3]
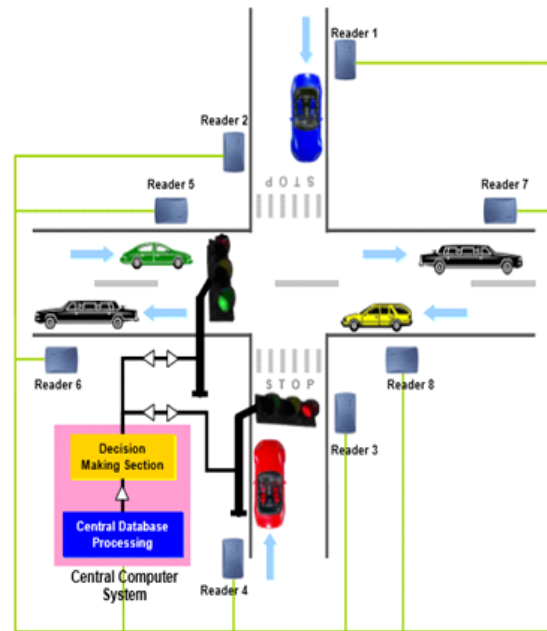


Figure 1 .Intelligent Traffic Control System using RFID [3]

**Green Wave System**

This system is developed for emergency and stolen vehicles. In the case of emergency vehicles like ambulances, VIP vehicles also may wait in the signal for a long time until the red signal turns into green signal. This may also leads to loss of human lives because of not reaching their destinations in proper time. To overcome this problem a new trend technology is implemented by categorizing the vehicles into three types High priority, Normal, Stolen vehicles. If the vehicle is at high priority and then if the signal is in red it automatically turns into green by giving way to that vehicle. For monitoring the high priority vehicle an arrangement is made at every traffic signal and also a GPS is used at every traffic signal to trace a stolen vehicle. Thus this setup is implemented for both the emergency vehicles and stolen vehicles.[4]

The system consists of RFID tag, RFID reader, GSM and GPS.

The RFID Tag is placed into the vehicle provided with the details of the vehicle model, unique ID number and its category. When the vehicle reaches the traffic signal the RFID reader present on top of the road tracks the vehicle if it is an emergency vehicle or normal vehicle. If the priority of the vehicle is emergency then it automatically turns the signal ON to green if it is in red. If the priority of the vehicle is medium or stolen then it takes action according to it. The priority of the vehicle is updated with the help of GSM which is connected to the main system.
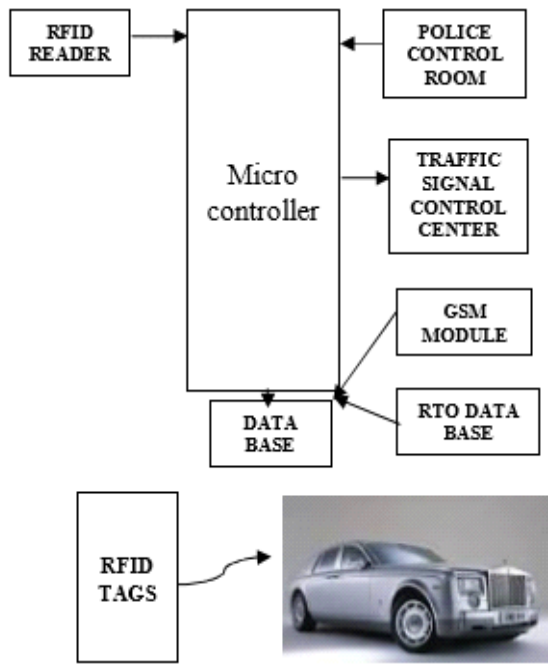
Figure 2 . Green Wave System[4]

## RFID and GPS  based Automatic Lane Clearance System for Ambulance

In developing countries like India due to congestion on roads and shortage of efficient traffic control results in to loss of  lives due to ambulances getting stuck in traffic jams. ,where the lives of the patients is depending on the speedy arrival of the ambulances to hospital. Like western countries Indian cities cannot think of having separate lanes for emergency purpose due to shortage of road  planning and infrastructure.

To overcome this problem a RFID and GPS based Automatic Lane Clearance System for Ambulance can be used. The main point of this system is to reduce the delay in arrival of the ambulance to the hospital by automatically clearing the lane in which ambulance is travelling, before it reaches the traffic signal. This can be achieved by turning the traffic signal, in the path of the ambulance, to green when the ambulance is at a certain distance from the traffic junction. The transceivers and GPS are used for communication between the ambulance and the traffic signal post..

The  system consists of two units Ambulance Unit  and Junction Unit. The Ambulance Unit, to be installed in the ambulance, consists of an RFID reader, GPS receiver and a transceiver interfaced with a microcontroller. The GPS receiver continuously receives the GPS co-ordinates of the ambulance by calculating its position using the timing signals from the GPS satellites. When an ambulance leaves the hospital for an emergency case, a RFID card is swiped near the RFID reader, which when authenticated activates the transmission of GPS co-ordinates through the transceiver.

The Junction Unit, to be installed at the traffic signal post, consists of a transceiver interfaced with a microcontroller. The GPS co-ordinates transmitted by the Ambulance Unit are received by the transceiver. Some co-ordinates of a point at a

particular distance are specified in the Junction Unit's microcontroller program, which when crossed by the ambulance turns the traffic signal green. A suitable delay is given for the signal to remain green till the ambulances passes through the junction. The distance of the point from the signal may differ according to the traffic scenario across different junction and may be programmed as per its need.[5]
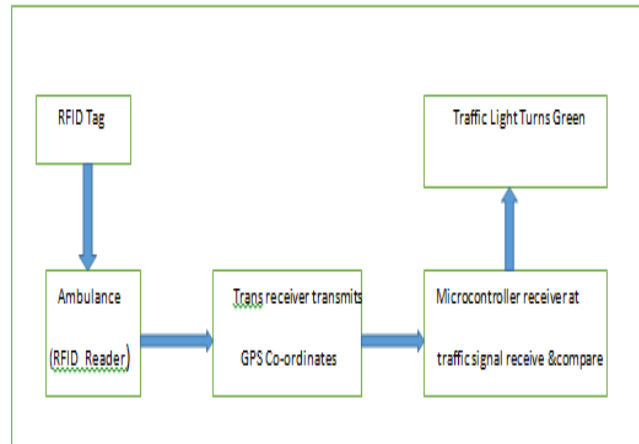


Figure 3.Block Diagram of complete System

## IV CONCLUSION

Green wave system was used to provide clearance to any emergency vehicle by turning all the red lights to green on the path of the emergency vehicle, The biggest disadvantage of green waves is that, when the wave is disturbed, the disturbance can cause traffic problems that can be exacerbated by the synchronization. In such cases, the queue of vehicles in a green wave grows in size until it becomes too large and some of the vehicles cannot reach the green lights in time and must stop. This is called over-saturation.[4] The disadvantage of  RFID based traffic control is that it does not discuss what methods are used for communication between the emergency vehicle and the traffic signal controller[3].In RFID and GPS based automatic lane clearance system for ambulance, it needs all the information about the starting point, end point of the travel. It may not work, if the ambulance needs to take another route for some reasons or if the starting point is not known in advance.[5]

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