

Automatic Lane Clearance System For Emergency Vehicles

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ABSTRACT: Traffic management is the severe problem of today's society because of growth of the urbanization. This cause the traffic jam at the traffic junctions which in turn causes delay to ambulance and it causes loss of life. In order to overcome this problem, this paper presents a simple ambulance controlled traffic system. The main objective of this system is that to control the traffic, allowing an ambulance to arrive at a particular location without it having to stop anywhere until the destination is reached. This system includes RFID technology. This device will be interfaced with the signal approached by the ambulance in its desired destination. The signals will be turned green, a particular time before the ambulance reaches the signal, thus making the route clear for the ambulance. By using this system, we can save lot of time of the ambulance which is usually wasted due to heavy traffic on signals in metropolitan cities. In green wave system was discussed, which was used to provide clearance to any emergency.

KEYWORDS: Intelligent Traffic management, Emergency Vehicle, Ambulance, Image Processing, Wireless Technology.

I. INTRODUCTION

Traffic administration on the road has become a biggest severe problem of today's society. Traffic congestion is a major problem in cities of developing. Increase in urban population and the middle-class segment contribute significantly to the increasing number of vehicles in the cities.

Congestion on roads eventually results in slow moving traffic, which boost-up the time of travel, thus stands-out as one of the major issues in metropolitan cities like India shortage of efficient traffic control and administration has many a times lead to loss of lives due to ambulances getting stuck in traffic jams. Unlike western countries, Indian cities cannot think of having separate lanes for emergency purpose due to shortage of road planning and infrastructure. Where the lives of the patients is depending on the speedy arrival of the ambulances to hospital, a substitute solution to the above problem is the need of the hour.

If we implement separate emergency lane system one of the disadvantage is that apart from the huge cost, this lane will always remain underutilised. It is a static system, static means we are not providing services on real time. This lane is not useful every time and it is not an adequate system. Moreover, because of this system the width of road for general use is reduced which cause in traffic congestion and inconvenience.

There are so many examples that ambulance got struck in the traffic load, Ambulance has to wait for some minutes to hours to clear the traffic load. Patient may die because of lack of treatment at proper time. To overcome this hazard and to save many lives, [1] A new model proposed in this paper which provides the functionality of one path clearance i.e. the ambulance going path will be cleared. This scenario is done by upgrading technology called Internet of Things in this the peripherals are connected to the internet and those peripherals can be controlled via internet from being in some other place. This has great importance since the object that represents itself digitally makes itself something greater than the object by itself. Traffic administration on the road has become a severe problem of today's society because of

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly Peer Reviewed Journal)

Vol. 5, Issue 1, Januray 2016

increase in the urbanization, industrialization and population; there has been a tremendous growth in the traffic. With increase in traffic, there is existence of bunch of problems too; these problems include traffic jams, accidents and traffic rule infringement at the heavy traffic signals. This in turn has an adverse effect on the economy of the country as well as the destruction of lives. So problem given above will become worst in the future. Traffic lights play a significant role in traffic administration. Traffic lights are the signalling devices that are placed on the intersection points and are used to control the traffic flow on the road. In 1868, the traffic lights only installed in London and today these have installed in most of the cities around the world. Most of the traffic lights around the world follow a planned timing circuit. Sometime the vehicles on the red light side have to wait for green signal even though there is some or no traffic. It results in the loss of valuable time.

Traffic control at intersections is a matter of worry in large cities. Different experiments have been done to make traffic light's sequence dynamic so that these traffic lights serve according to the current amount of the traffic. Most of them use the sensor to calculate current amount of traffic but this approach has the restriction that these techniques based on counting of the vehicles and treats an emergency vehicles as the ordinary vehicles has no priority to ambulance, fire brigade or V.I.P vehicles. As a result, emergency vehicles get stuck in traffic signal and waste their valuable time .

At present, very less system are available which are proving helpful for ambulance to cross the traffic or signals on road.

II.RELATED WORK

Following are the few popular systems:

A. Embedded System

Intelligent Traffic Signal Control System by Dinesh Rota & Prof. Swapnili Karmore[1] (2012). Here the embedded system uses IR sensors, AVR-32 microcontroller with the programmable flash memory, with built in 8-channels ADC. IR (i.e. Infrared) sensor is programmed to identify emergency vehicle and microcontroller is designed in such a way that it gives red signal to all other lane but one with the emergency vehicle.

Limitations: In this system IR sensors are used, due to various climate conditions present in developing countries like India, IR sensors may need to keep in safe place or a strongbox. The Price factor of implementation of this system is high. So it is not advisable to implement this kind of system.

B. Wireless Technologies

The next one is, Priority Based Traffic Lights Controller Using Wireless Sensor Networks by Shruthi K R and Vinodha K[2] (2012). Wireless Sensor Network (WSN) is being used as communication infrastructure in the proposed traffic light controller. System uses fuzzy logic to define the direction of the emergency vehicle. Central monitoring system collects all the information and gives the appropriate response.

Limitations: Communication in the Wireless Sensor Network (WSN) is still a research field. Data exchange in between Sensor is not reliable. And as specified before Sensors need to be robust in order to survive in Indian weather.

C. Automatic Traffic management

In order to remove the most weak link (i.e. human) in the above system, an automatic traffic management scheme is suggested. This system includes a simple three colour traffic signal, which we see every day. Generally for each lane 120 seconds of green light is on. Before green light ,the yellow light flashes for 20 second, signifying to start your vehicle and be ready to go. For all the time the red light is on, ordering each vehicle to stop.

Limitations: This system cannot detect the emergency vehicle, it treats the normal car and ambulance in the same way. So there are chances of delaying the emergency services. Drivers disobeying signal rules are also headache, sometimes they causes serious accidents.

D. Image Processing

The Image Processing Based on Intelligent Traffic Controller by Vikram aditya Dangi, Amol Parab, Kshitij Pawar and S.S Rathod[5] (2012). A camera is fixed on the polls or other tall structures to overlook the traffic scene. Images extracted from the video are then analysed to identify and count vehicles. Then depending on the signal cycle, time is allotted to each lane. The system also takes into consideration the emergency vehicles at the intersection. If such a vehicle is detected, then that lane is given priority over the others.

International Journal of Innovative Research in Science, Engineering and Technology

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Vol. 5, Issue 1, Januray 2016

Limitations: Camera used, have to be robust. When the ambulances arrive from more than one lane the system fails, it gives green light to all lanes.

III. EXPERIMENTAL RESULTS

The problem of ambulance getting stuck in a traffic jam can be addressed by ensuring that the lane in which the ambulance is travelling is cleared.. That is, the arrival of the ambulance is to be communicated to the nearest traffic signal, so that it can turn the light to green and hence clear the traffic. To overcome this difficulty, we propose to make a system combining RF Module and GPS. The Global Positioning System (GPS) is a space based satellite navigation system that provides location and time information in all weather, anywhere on or near the Earth, where there is an unobstructed line of sight to four or more GPS satellites. A GPS receiver's job is to locate four or more of these satellites, figure out the distance to each, and use this information to deduce its own location.

An RF module (radio frequency module) is a small electronic device used to transmit and/or receive radio signals between two devices. In an embedded system it is often desirable to communicate with another device wirelessly. This wireless communication may be accomplished through optical communication or through radio frequency (RF) communication. For many applications the medium of choice is RF since it does not require line of sight. RF communications incorporate a transmitter and/or receiver.

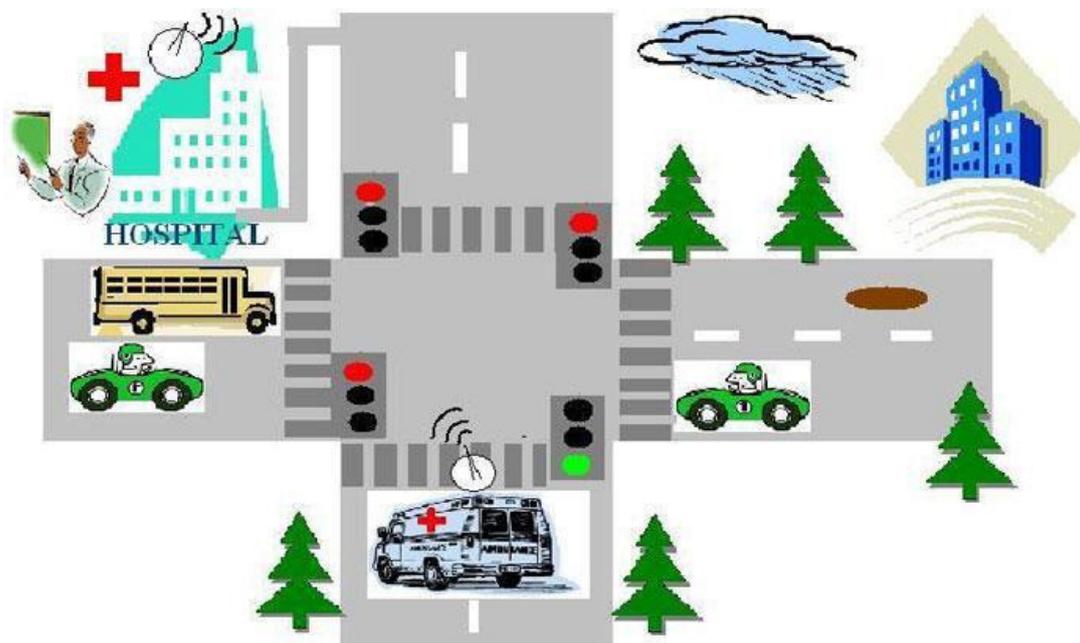


Fig: Logical block diagram of intelligent ambulance and automatic traffic control.

The proposed system consists of two units, namely:

1. Ambulance Unit
2. Junction Unit

1. Ambulance Unit:

The Ambulance Unit, to be installed in the ambulance, consists of an RF module, GPS receiver interfaced with a microcontroller. The GPS receiver continuously receives the GPS coordinates 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, driver enters this destination, which when authenticated activates the transmission of GPS co-ordinates through the transceiver. Thus the option of shortest path is given to driver to towards his destination.

International Journal of Innovative Research in Science, Engineering and Technology

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2. Junction Unit:

The Junction Unit(JU), to be installed at the traffic signal post, consists of a transceiver interfaced with the microcontroller. The GPS co-ordinates transmitted by the Ambulance Unit(AU) are received by the transceiver. The co-ordinates of the point at a particular distance are being specified in the Junction Unit's microcontroller program, which when crossed by the ambulance turns the traffic signal green. The distance of the point from the signal may differ according to the traffic scenario across the different junction and may be programmed as per its need. A suitable delay is given for the signal to remain green till the ambulance passes through the junction. A four-lane junction is assumed in this case. In case of presence of the ambulance at more than one of the lane of the junction, the ambulance which arrives first is given priority.

Traffic administration on the road has become a severe problem of today's society because of growth of the urbanization and population; there has been a vigorous growth in the traffic. In city because of this traffic problem emergency vehicle are also wait for signal. That's why we will implement this system.

The driver of ambulance will initially set the destination of the ambulance. After setting the destination our system will display various routes available to the driver and out of this it will highlight the shortest route to the destination. Thus, it will make easier for the driver to select the shortest route.

Once the destination is set, then the GPS system will calculate and display the distance from the hospital to every signal which will be approached in that route. When the ambulance departs from the hospital towards its destination, the distance of the first signal will be calculated and displayed. Now when the ambulance is at sufficient distance away from the signal, then automatically the signal of that route will turn green making all other signals red. The signal will remain green for particular time which will help ambulance to move from the signal without any traffic. After this, the signal will work in its regular way. This system will work similarly every time the ambulance approaches the signal in its specified route.

In this paper, we will interface GPS system with the model of signals and show the real time working. For making model of signals small part of electronics will be used.

IV.ADVANTAGES AND DISADVANTAGES

1. ADVANTAGES

1. Helps in tracking shortest distance.
- 2.Lot of time is saved at signals.
- 3.GPS helps in accuracy for calculating the distance between hospital and every signal.

2. DISADVANTAGES

- 1.Initial cost is high.
- 2.Driver needs to enter the destination every time.

V.APPLICATIONS

- 1) Can be used in all ambulances.
- 2) Can be used for VIP cars.
- 3) Traffic management and control.
- 4) Used for road safety control.
- 5) Defence vehicle in emergency cases.
- 6) Fire Extinguishing vehicle.
- 7) Police van in emergency cases.

VI.CONCLUSION

This system will definitely help to traffic police to give the way to the ambulance when there is heavy traffic on the road. The design and implementation of this technique is directly targeted for traffic management so that emergency vehicle on road gets clear way to reach their destination in less time and without any human interruption. The main feature of this operation is the ability to communicate with purpose using GPS and trace the shortest path to reach the

International Journal of Innovative Research in Science, Engineering and Technology

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Vol. 5, Issue 1, Januray 2016

destination as soon as possible. It is very smart to find the location of emergency of VIP vehicle and get clear path to pass on.

ACKNOWLEDGMENT

We have taken efforts to complete this project. However, it would not have been possible for us to complete it without the kind support and help of Prof. Mr. A.M Hattarge. who guided us throughout this project, and always been there providing encouragement, support and guidance. We would also like to express our special gratitude and thanks to Prof. Mr. Avinash Devare for their continuous help for developing the project. Our gratitude also goes to our respected HEAD OF DEPARTMENT, Prof. Mr. H. A. Hingoliwala for his motivations and guidance throughout the work.

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