Review on Smart Traffic Control for Emergency Vehicles

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ABSTRACT

Today's scenario is people on the earth are rapidly increased and according to that the number of vehicles on the road is also increased. Therefore the problem of traffic management is arises specially for EMERGENCY Vehicles. The idea behind this paper is to implement a system which would easily control the traffic and helps for the emergency vehicles to reach at their destination. This scheme relies completely on automatic intelligent control. Here the goal is to reduce the latency of emergency vehicles with minimum or less disruption to regular traffic flow is possible. However there is still problem for an emergency vehicle to bypass near the traffic junction. The emergency vehicles could not be going as fast as it can. So to overcome that problem we have to find the new methods.

Keywords
Sensor, Controller, Different LEDs for Traffic Light, Traffic management, Emergency management center, incidents, Fire, Intelligent transportation system

Algorithm
The sensor is used here which can detect the upcoming emergency vehicle and send this signal to traffic junction. By this way the first priority is given to the emergency vehicles. And after the emergency vehicle passes by its route then regular flow came into existence.

1. INTRODUCTION
The traffic lights are used mainly for pedestrians to be protected when they cross the roads. The normal function of traffic system is to control the coordination to ensure that traffic moves as smoothly and safely as possible. It was reducing collisions, both vehicular and pedestrians. It was encourage travel within the speed limit to meet the green lights.

The emergency will occur any way, any time and on any location. In that case the speedily response is required. The number of vehicles using the limited road networks infrastructure which was slowly increased. I feel that the major consequence of this increase is the traffic management problem. One of the most critical consequences of traffic problem is the delay of emergency vehicles such as, ambulance during accidents to reach hospitals on time, Fire brigade vehicles, police van to catch the thief, and VIP (minister or president) vehicles.

There are traffic jams occur on main way in special seasons and rush hours. That was lead to a long waiting time of peoples and high cost of fuel consumption on the road. And in that delay the Emergency vehicles are stuck in traffic jams. Sometimes even if there is no traffic then also people have to wait because there is a certain time limit of traffic signal. So road users have to wait till the traffic signal turned to green light. Therefore we have to find new methods which solve this problem.
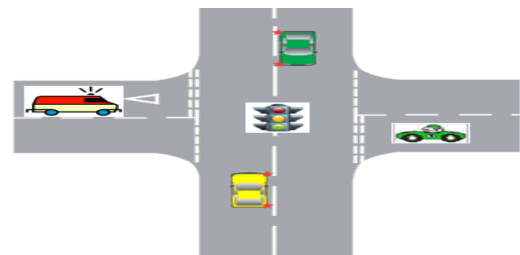

Fig. 1: Ambulance passes through Traffic junction

The EMERGENCY services began six years ago in India. With in starting total 14 ambulances are started in Ahmadabad and Gandhinagar, Which was slowly increased. Recently most of deaths are caused due to the traffic congestion. And ambulance also could not go fast as because of traffic jams near to the traffic junction. Solution of this problem is to control the traffic system so that it would be helpful to protect someone's life by giving first priority to the ambulance. [1] In accordance with this, now a day's turning to the manual control it will sometimes solve the problem. But to do this automatic control is a very big task in today's scenario.

Particularly in India, Most of people cannot give a way for an ambulance because of traffic. [10] The Indian ambulance experiment was done around 400 cars on the road. There was 0% response to an Indian ambulance. Suppose someone has suffered a heart attack and needs ambulance immediately. But by this way the patient will die before the ambulance could reach to the hospital.

The Indian people could not do even an effort to pass the ambulance first. The person died before the ambulance reach to the hospital. Then who is responsible for him or her death? On the other end in foreign, every people are giving a first priority to an ambulance. So why could not done with Indian peoples? The Indian peoples can also do the same thing while their family members are lying in this ambulance. At that time they feel this situation. So why could we have to wait for this much time? Why we could not implement this from today itself? Just think this by giving the first priority to an ambulance, we can save someone's life and on him/her depends the life of them family. India has the highest number of deaths due to delay of ambulance. And remember we can overcome this by giving 'Right of Way' to the ambulance. Along with

implementing traffic signals, 10 out of 10 lives can be saved. Also you can save lives and save humanity.

Utilization of time after an accident is golden hours. [2] so that Recovery action should be taken immediately. Also we have to minimize the delay that is caused by traffic congestion. [5]

2. RELATED WORK

There are few papers which describe that to overcome the problem of traffic jam and they gave some ideas for ambulance to reach the hospital speedily. This is explained below one by one.

IEEE Standard DOI 10.1109 [1]

According to IEEE standard DOI 10.1109, the ambulance can be easily cross all the traffic junctions without waiting over that traffic junction. And also the smooth flow towards the hospital is available. This is possible by displaying the rote towards hospital in the ambulance. There are may be several paths are available to reach the hospital. But here the shortest route is displayed in ambulance, so that the driver got the smooth flow towards the hospital and helps patient to reach hospital speedily and take their best care before time out. In this the server maintains a database for each node and controlling them, the GPS co-ordinate is also stored. Therefore based on this the ambulance is guided to hospital.

This whole system is worked under the GPS and GSM system. GPS is used to indicate the upcoming emergency vehicles. And GSM is used here to make connection with emergency vehicles and traffic junction. But the one problem is exists here. Which is the delay is coming in transfer of message via GSM. Because the GSM is a queue based technique, so longer time it was taken for transferring a message. So we have to think the alternative way of this. [1] K. Athavan and G. Balasubramanian states that this system is not only helpful for the ambulance, but also it would be helpful for all the another emergency vehicles like Fire brigade, police van and VIP vehicles.

IOSRJEN Guidelines [2]

In IOSRJEN, K.Sangeetha, P.Archana, M. and P. Ramya discusses the need to meet a smart traffic light system. They wrote in this paper, whenever an emergency vehicle is near to traffic junction, than according to programming done the traffic signal turned to green light. But I think that the after the green signal ON, no one will wait for an ambulance. Everyone start to go, and by this way the ambulance could not be go as fast as it can.

In accordance with this, they wrote that the nodes are controlled before the ambulance reaches a 100 meter from that node. And whenever two ambulances reach the same lane or different lane on same time then FIFO (First In First Out) will work.
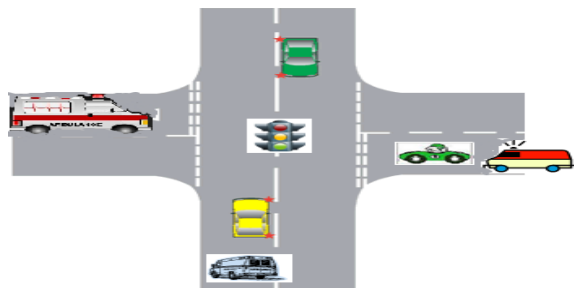

Fig. 2: More than 2 ambulances passes though junction

But I think that, the patient in first coming ambulance does not require urgent care and the patient in next coming ambulance require urgent recovery, so in that circumstances FIFO will not work. We have to think a new idea for overcoming such a problem.

IEEE standard 2008 [3]

In this IEEE standard paper, as a sensor Infrared transmitter and receiver is used for detecting the upcoming emergency vehicles. But the problem in that is the Infrared is transmitted in straight line. The authors also suggest its solution, which is by using of Radio frequency it is transmitted in radius. They also suggest that instead of using LED for the purpose of traffic signal, use the laser which has highest beam width. So that the signal which can be transmitted in longer range.

3. HARDWARE ARCHITECTURES

The architecture of this system is divided in two systems. One of them is fitted in ambulance, so it is called an ambulance system. And another one is fitted at traffic junction. So that it is called a traffic junction unit. The both systems are explained as below:

3.1 Ambulance Unit

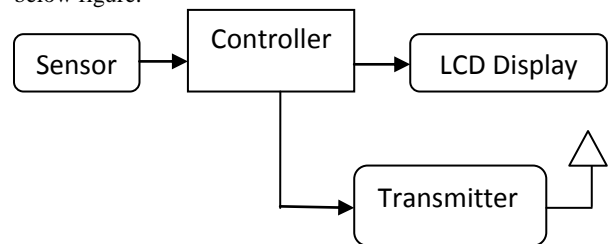The stepwise flow of an ambulance unit is as shown in below figure:

Fig 1: An ambulance Unit

The ambulance unit which consists of a sensor and it is used for detecting an upcoming emergency vehicle. [6] After detecting send this signal to the controller. And after processing send this signal to the wireless transmitter. This transmits the signal via an antenna to the Receiver on the other end means to the traffic junction unit. [8] Here the LCD display is used. In that the route towards destination is displayed in emergency vehicle. The benefit of that is get to the driver of an emergency vehicle.

3.2 Traffic Junction Unit

The stepwise flow of an traffic junction unit is as shown in below figure:
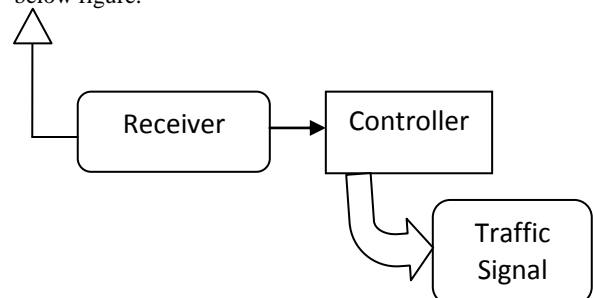

Fig 2: A Traffic Junction Unit

Here the receiver will receive the transmitted data and send it to the controller. Controller is controlling all other components. And according to received data give the instruction that the lane on which ambulance is coming,

turn the green signal on in that lane. So by this way the first priority is given to the EMERGENCY Vehicles.

Recent Publications and Guidelines

Till now the traffic of India is increasing a day by day. So the major concept came into existence is to control the traffic junction in such a way that peoples does not affected and all problems can be overcome. No doubts, ambulance could not have to be waiting on the traffic junction even when the traffic signal is red. The Bangalore city thinks to implement a traffic control system in a sense of emergency vehicles. In some of the area this system is already implemented before few months. The working of traffic control in that city is, whenever an emergency vehicle is passes through traffic junction than the traffic junction was detect this emergency vehicle and controlling the traffic signal in a sense that to turn on the green color of that traffic junction. So by this way the emergency vehicle passes through that junction and does not have to wait till the route clear.

4. CHALLENGES

There are traffic jams on the roads. In that people have to wait for a long time on the traffic junction. And because of that it is very hard for emergency vehicles to pass through that junction. So it would be helpful to change the traffic signal in accordance to emergency vehicles.

Turning to manual control of traffic jam and pass the ambulance over traffic junction is sometimes solve the problem of emergency vehicles. In today's system, it is operated manually. Why we can not think to make it automatically? By doing so, it will reduce the time of traffic officer to stay over there.

It would guarantee a clear path for an emergency vehicle. But obviously some interruptions are possible over there with road users. They have to compromise with this to protect some one's life.

System can display a message on traffic junction through LCD or play an alarm to indicate the upcoming EMERGENCY Vehicles. [7]

5. SUMMARY

Due to delay of ambulance, the loss of life came into existence. If traffic signal is in path of the hospital is ON than it would be great use of ambulance. Thus many people have proposed a new design for automatically controlling the traffic signals. By doing this, the ambulance would be able to cross all the traffic junctions and can be reached to the hospital without delay. It would guarantee a clear path and smooth flow for an emergency vehicle. The red signal will be displayed till the emergency vehicle is passes through the traffic junction. Particularly I think that by displaying the data on LCD, peoples can know the upcoming ambulance and give the way for the same.

6. ACKNOWLEDGEMENTS

7. REFERENCES

[1] K. Athavan, G. Balasubramanian, S. Jagadeeshwaran, and N. Dinesh, ACCT 2012. Automatic Ambulance Rescue System.

[2] K. Sangeetha, P. Archana, M. Ramya and P. Ramya, IOSRJEN 2014. Automatic Ambulance Rescue with Intelligent Traffic Light System.

[3] Mohd Azwan Azim Rosli, Mohd Helmy Abd Wahab, Rahmat Sanudin and Mohd Zainizan Sahdan, ITSim 2008. A Hardware based approach in designing Infrared Traffic Light System.

[4] Shipa S. Chavan, Dr. R.S. Deshpande and J.G. Rana, ICETET – 09. Design of Intelligent Traffic Light Controller Using Embedded System.

[5] Dian-liang XIAO and Yu-jia TIAN, IEEE 2009. Reliability of Emergency Rescue System on Highway.

[6] Sarika B. Kale and Gajanan P. Dhok, IJITEE 2013. Design of Intelligent Ambulance and Traffic Control.

[7] Soufiene Djahel, Mazeiar Salehie, Irina Tal and Pooyan Jamshidi, IEEE 2013. Adaptive Traffic Management for Secure and Efficient Emergency Services in Smart Cities.

[8] Ahmed S. Salama, Bahaa K. Saleh and Mohamad M. Easaa, ICCTD 2010. Intelligent Cross Road Traffic Management System.

[9] Marcos papageorgiou, Christina Diakaki, Vaya Dinopoulou, Apostolos Kotsialos and Yibing Wang, IEEE 2003. Review of Road Traffic Control Strategies.

[10] www.emri.in, 2014. Emergency Response Service.