Smart Traffic Signal using Raspberry PI

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Abstract— The road accident in the present era is increased to greater extent. The loss of human life due to accident must be avoided. Traffic congestion and tidal flow are major facts that cause delay to ambulance. In order to save human life from accidents we introduce a scheme called STSR (Smart Traffic signal using raspberry pi). The main concept behind this scheme is to provide a smooth flow for the emergency vehicles like ambulance to reach the hospitals in time and thus minimizing the delay caused by traffic congestion. The idea behind this scheme is to implement STSR which would control automatically the traffic lights in the path of the ambulance. For this we have created a project which uses raspberry pi, arduino, IR transmitter and receiver.

Key words: Raspberry Pi, Arduino, IR Receiver, IR Transmitter

I. INTRODUCTION

These days with the increase in the population and due to luxurious living there is an increase in the traffic on roads. Amidst all these frenzied life, one forgets the importance of human life. This is a very serious problem even in case of road accident one even doesn’t care to call the emergency unit. On road due to high traffic people are unable to provide the freeway to the emergency unit which also becomes one of the factors of late first aid to the patient due to which one can die on the way to hospital. So to overcome their negative factors and to provide the first aid to the victim this system - "Smart Traffic light using raspberry pi" is proposed in this paper.

II. BLOCK DIAGRAM

![Fig. 1: Block Diagram](image)

III. PROJECT OVERVIEW

The system uses two arduino and the raspberry pi installed in control room identifies the particular place thereby finding the location of the ambulance unit. IR transmitter installed in the ambulance and the traffic junction helps to communicate with each other at a greater speed. The position of the ambulance was obtained by the IR receiver. The IR receiver receives the receiving signal at the traffic signal. After receiving the signal arduino sends the signal to raspberry pi in control room. If the IR receiving signal is nearby indicating that the ambulance or the emergency vehicle is near to the traffic junction, then the corresponding signal in traffic is green for the Ambulance to pass through without waiting. This technique consists of two main units which co-ordinates with each other and makes sure that the Ambulance reaches the hospital without any delay. The system consist of two unit

1) Ambulance unit
2) Traffic junction unit

IV. RELATED WORK

1) Ambulance Unit For faster movement of vehicles without the hindrance of any traffic signal, we have used IR transmitter for sending the signals to the traffic light. The traffic signal immediately receives using the IR receiver.

2) Traffic controlling in cities due to high traffic density patient may lose life; hence the goal is to optimize the traffic density. Therefore a traffic controlling method is described to provide congestion free path for ambulance to reach hospital within a short time.

A. Signal Post and Signal Control Algorithm

The receiver mounted on the signal post detects the incoming signal from IR receiver and forwards it to the control room. The binary signal is used to control the traffic lights considering the information sent by the ambulance driver. In this mode if original signal is red then it is made green for ambulance. The driver of ambulance has a priority for choosing path. This is implemented in the control room. A particular path will be selected by the by driver in ambulance. Based on this information, the signal will be controlled. During these operations signals from all other lanes will be red and the priority will be given to ambulance only. When ambulance crosses that lane the controller will again continue with the original sequence of traffic signals.

![Fig. 2: Demo smart traffic signal detecting the path of ambulance](image)
V. FUTURE SCOPE

The project will change the way signals are controlled for emergency vehicles. This will ensure faster moving of vehicles without the breakage in traffic signals.

VI. CONCLUSION

In this paper, a novel idea is proposed for controlling the traffic signals in favor of ambulances during the accidents. With this system the ambulance can be reached to the hospital without time lag. The system can be proved to be effectual to control not only ambulance but also authoritative vehicles. Thus this system if implemented in countries with large population like INDIA can produce better results. The STSR is more accurate with no loss of time. If two ambulance reaches the lane opposite to each other at the same time, priority is given based on FIFO. The probability of the ambulance reaches the lane opposite to each other at the same time is less.

In cities due to high traffic density patient may loses life, hence the goal is to optimise the traffic density. Therefore in second system a traffic controlling method is described to provide congestion free path for ambulance to reach hospital within a short time. This will help in optimization of the time taken by the ambulance to reach the hospital. Also, the monitoring of the patient will help the doctors to give him the necessary treatment for the time being. Considering the real time scenario this system can be improved by adding an actual GPS navigation system along with a congestion detecting module for an optimized traffic control algorithm. The data center implemented the changing of traffic light control algorithm that gives green signal when the ambulance being nearby. Additionally, the selecting of optimal path from patient to hospital locations and in the opposite direction has been performed at the data center depending on the crowd sensor readings fixed at the road.

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