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Smart Traffic Management for Emergency Vehicle

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Abstract— Traffic congestion is a major problem in developing countries. This project is 3-way lanes crossing of real-time scenario. Firstly, we concentrate on an emergency vehicle like ambulance by using the RFID concept to provide the green signal to the particular lane. Secondly, the traffic density is controlled by the IR transmitter and receiver and finally, the optimized light signal can prevent the traffic congestion. We make use of cloud services to store the data of particular lane with emergency vehicles. So this allows us to save the time of delay in more efficient and economical manner and save the life.

Keywords— Internet of things, RFID reader, Renesas microcontroller, Cloud storage and Traffic light signalling

I. INTRODUCTION

As there is a growth in industrialization and urbanization there has been tremendous growth in the traffic. This increased traffic provides a hindrance to the moment of emergency vehicles like ambulance, so here we are providing the traffic light priority for the ambulance using RFID. The traffic lights are changed when the emergency vehicle is detected by the RFID reader. The Renesas microcontroller is the main module in this project which controls the whole system. The traffic density is calculated by IR sensors. The ambulance data and the traffic light control data can be stored in the cloud.

Most of them use the sensor to calculate current volume traffic, but this approach has the limitation to its technique is based on counting the vehicles and treats emergency vehicles than ordinary vehicles while which means no priority to the ambulance, fire brigade or V.I.P vehicles. As a result, emergency vehicles are stuck in traffic signal a waste their valuable time [1]. In today's world hazards is a major issue. So this paper has a smart traffic light controller, this makes use of sensor network along with the embedded technology.

Here the traffic light will be smartly determined based on total traffic on all adjacent roads. So traffic light optimization increases road capacity, traffic flow and can prevent traffic congestion. If at all the ambulance meets the traffic jam in the route, the RFID is used as a remote controller to control the traffic signals. The special signal is made green for a predetermined amount of time and after the ambulance passes, it is recycled original flow of order of signal. The emergency vehicle can reach the destination in less time [1].

The problem of controlling traffic lights can be solved by an RFID based system. This system takes into account the priority of several types of vehicles and also the density of traffic on the road by installing RF reader on the road crossings. Radio frequency identification is a technique that uses the radio waves to uniquely identify the object. RFID is the technique it is widely used in the various application areas [6].

II. DESIGN METHODOLOGY

Several embedded systems have significantly different designs based on their functions and utilities. In this project design, the structured modular design concept is assumed and system mainly consists of single microcontroller, comparator, LED's and an RFID reader. The microcontroller in the middle of the block diagram forms the control unit of the entire project. Embedded in the microcontroller is a program that helps the microcontroller to take action based on the input of the output of the sensors. The use of infrared sensors and replaced the imaging system so that it has the wide range of detection capabilities which can be enhance [2]. To detect the presence of ambulance we are placing RFID reader on the road intersection, this uses the radio waves to identify the particular emergency vehicle. There are two main components of RFID that is RFID tag and RF reader. The tags has three different frequency ranges: low frequency tags lies between 30 – 300KHZ, high frequency tags lies between 3-20MHZ and ultra frequency tags lies between 300-3GHZ

A. System architecture

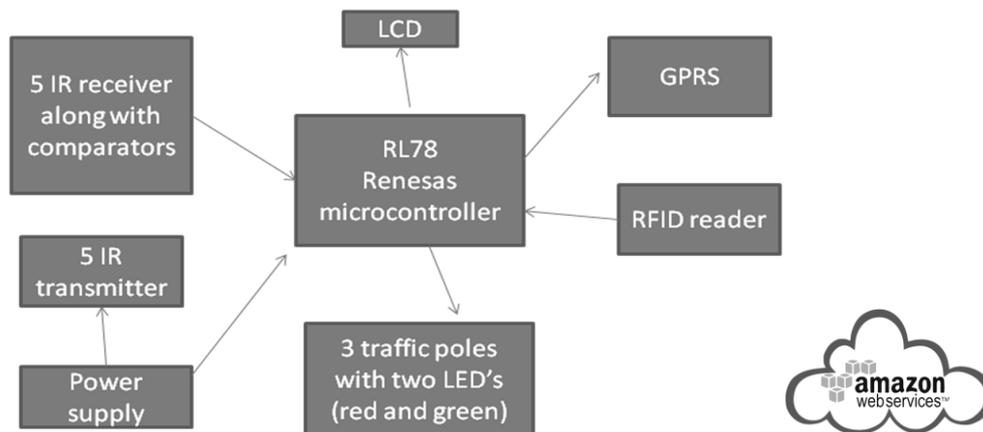


Figure 1: Block diagram of traffic management.

This system is controlled by the RL78 Renesas microcontroller. The IR transmitter and IR receiver are used to check the density of the particular road, RFID reader checks for the emergency vehicle and here amazon web services are used for the traffic data storage.

B. Proposed work

Here the model works as, by default, green signal for a certain road is activated for 10 seconds. When the first IR receiver on certain is blocked green signal is displayed for 15 seconds. If the second IR receiver is on one certain road is blocked, the green signal is displayed for 20 seconds. When the ambulance or VIP vehicle passes on the certain road, the green signal will be displayed for 25 seconds. Here the first priority is given to the ambulance [5] then the next priority goes to VIP vehicles and then to others. As the emergency vehicle is detected the particular road is turned into green signal until the ambulance moves on [4] and the other vehicles of that particular road also goes along with the ambulance in order to prevent the conflict and also prevent the delays in time to other vehicles. The RFID tag is the identification device attached to the item to be tracked. Every emergency vehicle has RFID tag, so these tags are detected by the RFID reader through the electromagnetic waves; the vehicle identification number is stored in the microcontroller [7]. When the RFID reader detects that stored RFID tag then there is an emergency vehicle, so we provide the first priority to that emergency vehicle to pass on.

IR transmitter sensors communicate in a line of straight with IR receivers on the other side of the road [2]. This RFID tech deals with the multi-vehicle, multilane, multi road junction area. Each RFID tag has eight digit unique serial numbers. These RFID tags are on the vehicle. When the vehicle passes, the RFID obtains the serial number of the tag via EM waves. The microcontroller is the database that contains the label number of the relevant vehicle. So when an ambulance passes on the road, the serial number of the associated tag is obtained and the corresponding vehicle or the ambulance is displayed on the LCD screen.

III. RESULT

This system will give minimum latency for vehicles and also the management of the traffic load. The traffic light will be smartly decided on the basis of the total traffic. When the RFID on the ambulance is detected by the recipient the traffic lights are checked based on the timer. The model of the smart traffic management for an ambulance with LCD screen and traffic light signal is demonstrated. The complete traffic light signalling data and the ambulance data with date and time are stored in the cloud.

This model helps the traffic policeman to give the road to the ambulance when there is a heavy traffic on the road. The design and the implementation of this technique are directly targeted for traffic so emergency vehicles on the way to reach the destination in less time and without any human break.

IV. CONCLUSIONS

We have proposed a self-organized traffic lane clearance for an ambulance in urban areas. This system not only considers the priority of the vehicle it can also show the density of the particular lane and controls the sequence of traffic lights efficiency and more accurately by using IR sensors and the RFID gives more accuracy than the cameras. The traffic light signals are switched based on the maximum of traffic density. In future, the patient can be monitored and the data of the patient can be sent to the hospital via GSM technology.

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