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Traffic Management for Emergency Vehicles Using IOT

[1]Dr. N Srikanth, [2]Gunavardhan K.V.N, [3]Aravind K.E.S, [4]Mythili K

[1]Assistant Professor, M.Tech, Ph.D., Department of Electronics and Communication Engineering, St. peter's Engineering College, Hyderabad, Telangana, India

[2,3,4] UG Student, Department of Electronics and Communication Engineering, St. Peter's Engineering College, Hyderabad, Telangana, India

ABSTRACT: Traffic is a first-rate issue for emergency vehicles in crowded countries such as India. Making a way for emergency vehicles is primary trouble in city regions, therefore the emergency vehicles could not able to reach nearby hospitals in a short time. Many human beings are dropping their lives due to the late arrival or unavailable of emergency automobiles. To conquer this trouble, this paper offers a solution by introducing a transmitter circuit for an ambulance and a receiver circuit for a traffic signal, which manipulates signals. When the traffic signal receiver receives the transmitted signals for the ambulance or transmitter, the traffic signal changes from red to green. Also, this paper gives solutions for private vehicles by providing a facility to act as an emergency vehicle during the unavailability of the ambulance. This is done by getting their coordinates and guiding them to reach the hospitals within the time with the help of the android application.

KEYWORDS: Transmitter Circuit, Receiver Circuit, Signal manipulation, Android application development.

I. INTRODUCTION

India is one of the most populated countries. In this type of country controlling traffic is a hectic and impossible job for the traffic officials. Generally, at the signals and traffic jams, traffic officials are doing their best for controlling the traffic and making way for emergency vehicles by manually operating the traffic signal. In many cases, traffic police ran kilometers for clearing the traffic for the emergency automobiles[1].

Figure 1 Ambulance stuck in traffic

Figure 2 police clearing traffic for EV

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This first-rate issue made public to violate rules and cause trouble to the ambulances in reaching their destination. In the countries like India and Thailand, it is impossible to make a separate way for emergency automobiles. It is a very difficult and impossible task for the official's create a separate way for every emergency vehicle. In the case of traffic, traffic lights and their management play a major role in the smart traffic management system[2]. The immediate signal manipulation from red to green and increasing the green light duration are important aspects of intelligent traffic management. The fixed traffic signal sequence and the fixed green light duration are all these fixed traffic management methods that are only suitable for regular and low populated and stable traffic areas but not for dynamic traffic management situations. By observing the present situation, the traffic signal management is not bothered the presence of emergency automobiles and due to this ambulances and other emergency automobiles need to wait in the traffic jam until the signal and traffic get cleared. Emergency automobiles such as ambulances, fire extinguishers, and cars of policemen it is a responsibility to reach within the required time for the emergency calls[3]. If not, there is a chance of human beings losing their lives.

There is a need for intelligent traffic management for emergency vehicles to resolve this issue. This paper resolves this problem and provides a solution. Hear an RF transmitter circuit is embedded and installed in the ambulance. An RF receiver circuit is embedded and installed upon the traffic signal. When the ambulance is nearby the traffic signal then the transmitter transmits the RF signal to the receiver[4]. Then the receiver receives the RF signal then there will be a signal manipulation takes place. Where the traffic sign color changes from red to green. And there will be a siren blown. Which is the indication of the arrival of an emergency vehicle. This solution will solve the problem of the timely arrival of the ambulances to their destinations.
There are many other cases where people suffer from the unavailability of emergency automobiles to encounter this problem this paper provides a solution with an android application. The users should download this application and get registered in it. The registration is very simple where they need to answer three details: patient name, vehicle number, and the hospital name[5]. By collecting these details for the user, they will be provided the free route with signal manipulation and traffic clearance with the help of their GPS coordinate. These GPS coordinates help in tracking them and these details will help in uninterrupted travel to the nearby hospital. This solution is completely cost-effective and

Figure 3 public carrying patient

user-friendly. The transmitter and receiver circuits are introduced using embedded systems, including Arduino Uno, RF 433 MHz transmitter, and RF 43 MHz receiver[6]. These tools are of very low cost and provide 80 to 90 percent efficiency in their output. Also, the android application that was developed is very simple to install, very easy to get register, and user-friendly. Android studio/ MIT app inventor is the tools/software used to develop the application. This is a solution for the present trending issue which saves many innocent lives from the emergency cases to reach hospitals within a short time.

III. LITERATURE SURVEY

Abubakr S. Eltayeb, Halla O. Almubarak, TahaniAbdallaAttia: In this paper, the authors have provided a solution for an intelligent traffic control system using only a GPS System. Here the vehicles are only tracked using and provided a way for emergency vehicles. It ensures the arrival of emergency vehicles to their destinations in the minimum time possible. And also estimate the time that will be taken by the emergency vehicles.

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P.N.S. Sailaja, N. Surekha, Ch.Malathi, G. Vamsi Krishna: Here in this paper authors gave basic solution for traffic control by measuring the traffic density and changing the signal timer physically. Using this, the emergency vehicles gave priority and are provided way at the heavy traffic areas.In this case though the duration of traffic signal is changed according to traffic density the problem of traffic jams for emergency vehicles is not solved.
Diksha A. Chaudhari, Lakxmi S. Gadhari, Gaurav H. Damage In this paper, the authors discussed the traffic problems caused by traffic jams for emergency vehicles. So, there is a need for a system that can make use of the GPS coordinates of the emergency vehicles. Used the GPS coordinates to clear the traffic for emergency vehicles, by tracking them. And also provides a free route for emergency vehicles.
Mohammad MoazumWani, Samiya Khan, Mansaf: In this paper, the authors described the problem of traffic signal control for emergency vehicles. So, to deal with this problem the paper presents a novel, easy-to-implement alternative for traffic management during emergencies. By using the concept of embedded systems like Arduino UNO and GPS coordinates. Here authors invented the concept of embedded systems for smart traffic control.
Kapileshwar Nellore, Gerhard P. Hancke, PaoloBellavista: This paper was published in Nov 2016, in this paper authors gave a solution for terrible traffic jams that occur at the traffic signals. They presented an approach that schedules emergency vehicles in the traffic. They calculated and measured the distance between the emergency automobiles and the traffic signals by using visual sensing methods, vehicle counting, and time-sensitive alert.
KarthikGuptha, PragatiJagdale, ReetAgarwal, RishabhSaraswat, HanumantMagar: In this paper, the authors discussed different methods to detect an emergency automobile and a normal automobile. These methods are used to control the traffic in two different situations such as for normal vehicles and emergency automobiles. These methods of controlling the traffic include a traffic signal timer changing and upgrading. Manual operation of the signal during emergency cases.

IV. PROPOSED SYSTEM

This paper support clearing the traffic even before the emergency vehicles arrive at the traffic signal and make way for emergency automobiles. In the block diagram, there is a microcontroller called nodemcu in the middle andan RFID reader is input to the nodemcu others all I2C LCD, LED, and Buzzer are the outputs from the nodemcu. Nodemcu is used for IOT concepts and here it is also linked to the cloud called blink where the outputs are visible on the mobile application.

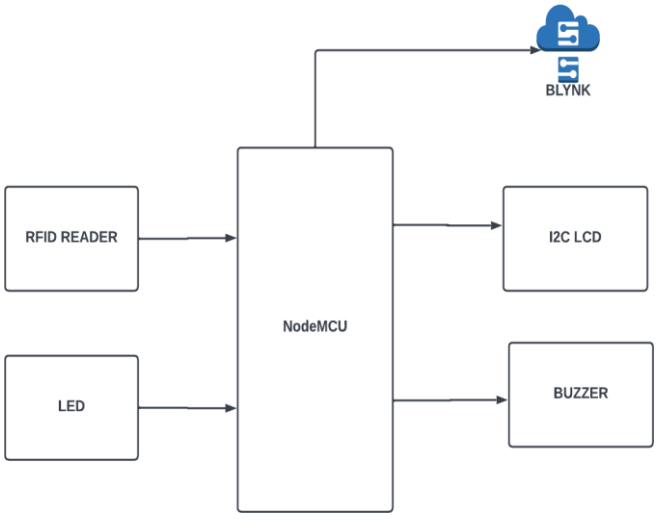

Figure 4 Block Diagram

Here RFID reader is a receiver and placed on the road side away from the traffic signal. The transmitters ie., RFID tags are placed on the emergency vehicles. Now when the receiver reads the RFID tags the rredsignal will be manipulated to green color but if the signal is green in color, then the duration of the traffic signal will increase or the green color will remain constant until the emergency vehicles cross the signal[7]. There will also be given a buzzer/alarm which will be an indication of the arrival of the emergency vehicles. In this project, a private vehicle can also be used as an emergency vehicle during any emergency by using an IoT system. In case of the unavailability of ambulances, private

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vehicles can be used as emergency vehicles. We provide registered/authorized transmitter tags by which patients can get authorized simply and when they arrive near to the signal immediately the signal will be manipulated from red to green color.. By transmitting and receiving RF waves at the traffic signal, the signal manipulation and buzzer/ alarm will be activated. For private vehicles, 1st rregester and get authorization then the information of patient and vehicle will be collected by providing the free route, and also signal manipulation is done by displaying the details of the vehicles on the display. These details are sent to the traffic control room so that the vehicle will not get interrupted during the journey and can be avoided by imposing fines. In this IOT system, we take their details and guide them on a traffic-free route until they reach the hospital.

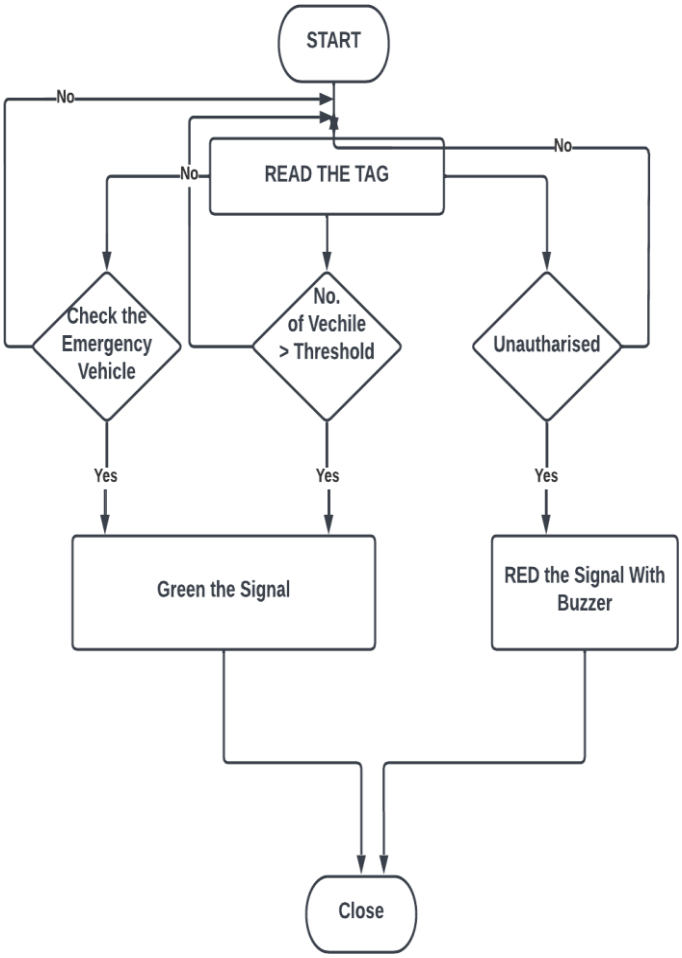

Figure 5 Flow Chart

In this project traffic management for emergency vehicles using IOT, we will be clearing the traffic even before the emergency vehicles arrive at the traffic signal and makes way for those emergency vehicles[8]. In the above flow chart when the project kit is started we must place the RFID transmitter tags near to the RFID reader then based on the signals and the information if it is an emergency vehicle signal manipulation an alarm will be activated. If in case it is a private authorized vehicle they also will get signal manipulation and buzzer activation. In the last case, if it is an unauthorized fake tag, there will be no signal manipulation[9].

As we see in the figure 6 circuit diagram there are 8 pins to the RFID reader which are connected to the nodemcu i.e., to the microcontroller. The I2C LCD display contain 4 pins vcc, gnd, sda, scl where VCC and ground are connected to the power and other 2 pins are connected to the nodemcu. Buzzer have 2 pins ground is connected to GND and the signal pin is connected to the digital pin of nodemcu. Similarly there are 2 LEDs in the figure 6 one is red color and other one is green color these two have two each pins where they are connected to ground and signal pin respectively.

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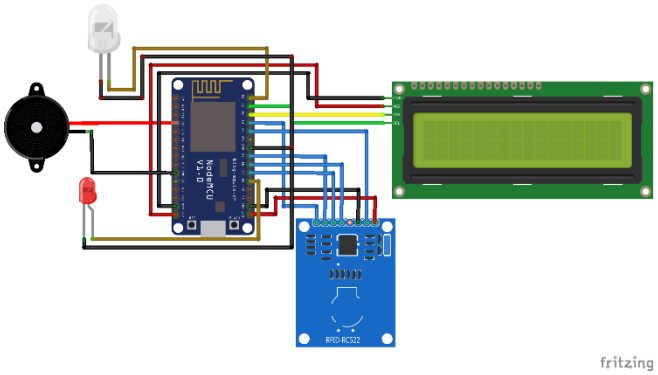

Figure 6 circuit Diagram

The signal pin is connected to the digital I/O pins of the Arduino board and the ground pin is connected to the power supply. Now the traffic signal will be received by the receiver circuit at the traffic signal. So, when the signal is red, then it will be manipulated to green color but if the signal is green in color, then the duration of the traffic signal will increase or the green color will remain constant until the emergency vehicles cross the signal[10].
There will be a given buzzer/alarm which will be an indication of the arrival of the emergency vehicles.

In this project a private vehicle can also be used as an emergency vehicle during any emergency by using an IoT system. In case of the unavailability of ambulances, private vehicles can be used as emergency vehicles. We provide anregistered RFID tag which patients can get registered simply by providing the details like patient name, vehicle number. By using these details, we can provide free routes to the public. By transmitting and receiving RF waves at the traffic signal, the signal manipulation and buzzer/ alarm will be activated. For private vehicles, 1st register and get authorizationto the RFID tags, then the information of patient and vehicle will be collected by providing the free route, and also signal manipulation is done. These details are sent to the traffic control room so that the vehicle will not get interrupted during the journey and can be avoided by imposing fines. In this IOT system, we take their details and guide them on a traffic-free route until they reach the hospital[11].

V. RESULT

The result of the project was observed practically by connecting the elements as shown in the circuit diagrams i.e., the transmitter circuit and the receiver circuit. The connections are made using the jumping wires and used soldering for the permanent connection. The result is shown below.

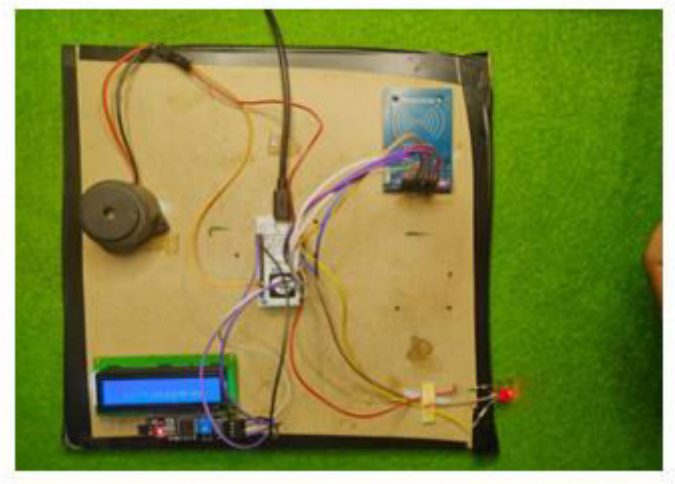

Figure 7 Result/Output

As shown in figure 7 when the RFID tags are placed on the reader it reads the tags and provides the information to the nodemcu and now according to the tag information, the output activations will be activated.

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V. CONCLUSION

This project has presented an approach to emergency vehicles in traffic. Many people are losing their lives because of emergency vehicles stuck in traffic jams and unavailability of the emergency vehicles. Below are the pictures of the situation's problems for the emergency vehicles.By following the proposed system this project helps in the elimination of the traffic problem for emergency vehicles with a simple solution[12]. This project provides a system for the emergency vehicles such as ambulances which includes the transmitting system for the ambulance and the receiving system for the traffic signal. These systems communicate with each other and provide a freewayto the emergency vehicles[13].This is the general problem for the emery vehicles to cross the traffic signals and this project simply eliminates the problem. Also, in the next stage as the extension for the previous concept during the unavailability of emergency vehicles/ambulances private vehicles can be used as emergency vehicles with the help of an android application and here in this case we collect their details and provide them a free route with the signal manipulation[15]. This project decreases the death rate caused by the late arrival of ambulances to the hospitals and unavailability of the emergency vehicles also saves the lives of many innocent people.

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