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SMART CITY FOR AMBULANCE USING RF COMMUNICATION

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ABSTRACT

Nowadays traffic has become a major issue in large cities. Ambulance is majorly affected due to traffic jams. Since from past few years there is a revolutionary development in the field of Internet of Things (IOT). To overcome this issue we are introducing the 'smart ambulance system' which includes traffic controlling system as well as patient's present status .IR sensors checks the traffic density whether it is low, medium or high traffic. The projected method forms an android app that links both ambulance and nearby hospitals. The ambulance driver makes use of GPS and Google maps to search the nearest hospital and sends message about patient's status. When the ambulance stops near the traffic signal due to heavy traffic, the RF transmitter on the ambulance will communicate with the receiver in the signal post then the LCD displays as EMERGENCY.

Keywords: *Microcontroller, LCD display, Android app, IR sensors, Accelerometer, Trafficcam, GPS tracing system, Ambulance.*

I. INTRODUCTION

Rapid increase in population has led to high traffic jams in cities which is creating problem for vehicles in emergency to reach its destination on time. 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. Traffic monitoring is one of the important step to protect smart city from traffic jams any type of jamming may lead to loss of lives. Any foresight will always help to improve the whole system. Normally the traffic signals are manually maintained. But here the traffic light signals are automatically programmed based on traffic density for particular time intervals. This type of traffic light signaling is nowadays used in all metropolitans.

This particular project is designed for the cities with dense traffic. For e.g.: In Bangalore the traffic will be heavily jammed every time. The traffic will be for long distance so that the traffic police cannot hear the siren from the long distance. Then the ambulance has to wait until the traffic is cleared which may take hours together. By this time there may be chances that the patient can even loose his /her life.so by this project we can try to escape from these kinds of events in the ambulance. The second feature is the information system in the ambulance.

The system will inform the position of the patient to the hospital as the command giving to the system in the ambulance. According to this project if any ambulance at emergency comes to any traffic post the traffic signals automatically stop the red signal and give green signal for this ambulance. We will implement a service in which we can obtain information about the traffic congestion. Through smartphones using android application whenever the victim is in emergency the message will be automatically sent to the saved contacts in the application through shake process.

The message will be sent depending upon the frequency set in the application. When the mobile shakes a popup message is displayed on the screen for around one minute and if he /she is not in emergency he/she can respond to this message. If the victim does not respond to this message the emergency message is directly sent to the saved contacts in the app. After receiving the emergency message by the victim the guardian can respond to the message by asking the location of the victim and the present status of the victim through mails. This system is fully automated, thus controls the traffic lights, helping to reach the hospital in time.

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II. RELATED WORK

There are various reasons for research in the field of traffic surveillance such as losses in human life. In past few years traffic has become major disadvantage for ambulance to reach its destination on time, to reduce this problem we introduce smart city for ambulance system. Traffic may gather rapidly and even road traffic can also happen fast if the traffic control system is not capable to maintain the vehicles queues in fast and smart manner. One of the most important topics is how to gather the traffic information and control the traffic flow. The traffic signal control is based on periodical, time based and sensor based.

The traffic flow is not easy to predict as it is unplanned. The work in [1] proposed IR sensors to detect the traffic density for about some distance whether it is low, medium or high .the work in [2] presented a transmitter which is connected to the ambulance and receiver which is connected to signal post. When the signal post receives the signal from the ambulance and detects the traffic, depending upon the received signal the LCD displays the appropriate output.

III. PROPOSED SYSTEM

The proposed system for smart ambulance system consists of the following phases:

A. Architecture

Figure 1.1 represents the architecture of the smart ambulance system. The ambulance carries an RF transmitter and RF receiver will be placed in the traffic post. The traffic signals can be changed based on the density of the traffic. Three sensors will be placed one after the other upto a distance of 10 meters. When the ambulance comes near the signal post the IR sensors checks the traffic density whether it is low, medium or high traffic.

The signal received from the IR sensors will automatically change the signal to green for a particular time intervals until the ambulance passes through the signal post. An IR sensor uses less power. The power supply given here is 5V.the output obtained from the sensors will be passed to the comparator and displayed on seven segment display.

The keypad will be placed in the ambulance. Whenever the ambulance arrives at the traffic junction if there is a high traffic the keypad will be pressed by the driver so that the arrival of the ambulance can be detected through RF communication which displays as “EMERGENCY” on the seven segment display at the signal post.

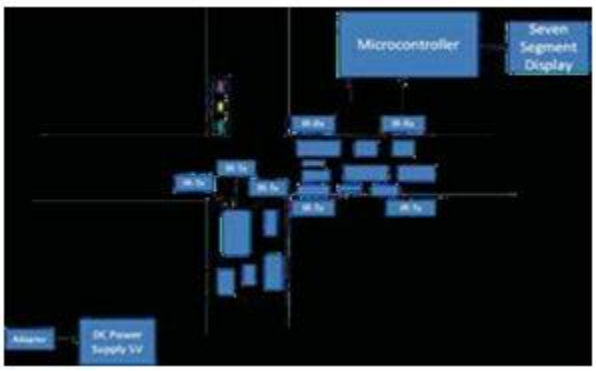

Figure 1.1: Architecture of smart ambulance system

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B. SMS manager module

Figure 2.1 represents victim app which can create contacts and add them to distribution lists. The user creates a contact, like the guardian and the nearest hospital and adds them to distribution lists so that the guardian can receive the message when the victim is in emergency. React to events like message being received or connection going down. The guardian and the hospital receive the message sent by the victim and also the location of the victim is tracked through the net connection.

Figure 2.2 represents the guardian app which can reply to SMS, MMS and email with any type of message. The guardian replies to the message sent by the victim like asking the location of the victim, his present status can be sent through app. Embed multimedia contact like picture and sound in MMS messages, add attachment to email. The victim can send his present status through photo and the voice message like emergency through mail so that the guardian can respond immediately.

Figure 2.1: Victim App

Figure 2.2: Guardian App

C. Traffic density module

As shown in the figure 3.1 the ambulance will be having RF transmitter and the signal post will be having RF receiver .we will have three IR sensors with the distance of 10 meters away from each other. The first IR sensor will detect low traffic, the second sensor will detect medium traffic and the third sensor will detect high traffic. When the ambulance has been struck in the traffic signal if there is low traffic the signal will change the signal timings to 20 seconds, if there is medium traffic the signal timings will be changed to 40 seconds and if there is high traffic the

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signal timings will be changed to 60 seconds. Thus by detecting the traffic density the ambulance can reach the destination earlier.

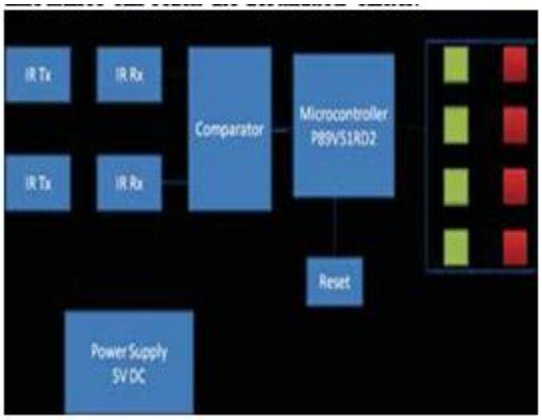

Figure 3.1: Traffic density module

D. Traffic cam

It is a very powerful software especially developed for the transportation system whenever somebody is in travelling they don't have time to find out free routes ways to send a messages, SMS for the routes if they want to find then best free routes all that they have to send photo as an SMS to their smart phone application will capture the photos and it will respond with photo of your mail id**.**

F. GPS

In the proposed system it is used to track the nearest hospital when the patient is in emergency.

G. Accelerometer

When the victim is in emergency through shake process the application will directly send emergency message to the guardian of the victim.

H. IR sensors:

It detects the traffic density and based on the density the timings of the traffic signal will be changed.

I. Android app:

The app is used to detect the victim's location. Using this app the emergency message is sent to the victims saved contact in the app.

IV. CONCLUSION AND FUTURE WORK

In the proposed system the traffic light signals are automatically maintained through the communication between the ambulance and the traffic post the arrival of the ambulance can be detected through RF communication. This project can help to save a few critical minutes of response times by monitoring location of the victim whenever he/she is in emergency. IR sensors will detect the traffic density, based on this signal timings can be changed leaving way to the ambulance to reach its destination so that the patient's life can be saved. Through traffic cam best free routes can be found in which the ambulance can reach earlier.Android app provides communication between the guardian and the victim when victim is in emergency. This project can act as a life saver project. As we are using android app with internet connection for further implementation we can design the android app that can be used without internet connection so that the application can be used anywhere in emergency conditions.

V. RESULTS AND DISCUSSION

Figure 4.1 shows the traffic congestion on roads. The traffic cams provides the images near to the signals and it helps the ambulance to take best free routes .The ambulance driver can know the nearest hospitals by the location through the android apps. Through switch press process the buzzer is on which indicates the arrival of the ambulance, if it is high traffic and automatically it is displayed as emergency in the LED display.

Figure 4.1: Traffic congestion on roads

Three IR sensors will be placed few meters near to the Signal post. The first IR sensor detects for low traffic, second sensor for medium traffic and third sensor for high traffic. When the traffic is low the green and red light is on for 20 sec and for medium traffic the green light is on for 40 sec and for high traffic the green light is on for 60 sec until the ambulance passes through the traffic which results in easy transportation of emergency vehicles.

Table5.1. Density based traffic

Traffic Density	Time intervals for red light	Time intervals for green light
IR sensor1 (low traffic)	20 sec	20 sec
IR sensor2 (medium traffic)	20 sec	40 sec
IR sensor3 (high traffic)	20 sec	60 sec

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