

Ambulance Rescue System using RF Technology

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Abstract: Road accidents and traffic congestion are the major problems in urban areas. Currently there is no technology for accident detection. Also due to the delay in reaching of the ambulance to the accident location and the traffic congestion in between accident location and hospital increases the chances of the death of victim. There is a need of introducing a system to reduce the loss of life due to accidents and the time taken by the ambulance to reach the hospital. To overcome the drawback of existing system we will implement the new system in which there is an automatic detection of accident through sensors provided in the vehicle. A main server unit houses the database of all hospitals in the city. A GPS and Wi-Fi module in the concerned vehicle will send the location of the accident to the main server which will rush an ambulance from a nearest hospital to the accident spot. Along with this there would be control of traffic light signals in the path of the ambulance using RF communication. This will minimize the time of ambulance to reach the hospital. A patient monitoring system in the ambulance will send the vital parameters of the patient to the concerned hospital. This system is fully automated, thus it finds the accident spot and helping to reach the hospital in time. Recently technological and population development, the usage of vehicles is rapidly increasing and at the same time the occurrence accident is also increased. Hence, the value of human life is ignored. No one can prevent the accident, but can save their life by expediting the ambulance to the hospital in time. The objective of this scheme is to minimize the delay caused by traffic congestion and to provide the smooth flow of emergency vehicles

Index Terms: GPRS, TCP/IP. RF transmitter, RF Receiver.

1. INTRODUCTION

In today's worlds as the population increased day by day the numbers of vehicles also increase on the roads and highways. This result in more accident that interns leads to the traffic jams and public get help instantaneously. This module provides information about the accident to the hospital and police station. As a result, the sudden help may save public life and the traffic jams are reduced. The development of vehicular design brings public much convenience in life but also brings many problems at the same time, for example, traffic congestion, difficulty in monitoring dispersive vehicle, theft and other series of problems.

The intelligent traffic light controller that was introduced saves the waiting time and avoids the traffic load. With an embedded sensor network technology, the congestion road is detected and managed accordingly with controllers. Alarm device predict the accident vehicle using the algorithm developed. Nowadays Wireless Sensor Networks (WSN) has been applied in various domains like weather monitoring, military, home automation, health care monitoring, security and safety etc. Satellite based navigation uses Global Positioning System (GPS) to send and receive the radio signals that serves the user with the required information. Cloud is used to send an exact location of the vehicle to the ambulance. With the help of GPS and GSM module vehicle is traced

1.1 Overview

The use of RF (radio frequency) technology in ambulance rescue systems can significantly improve the speed and efficiency of emergency medical services. The system works by utilizing RF signals to enable communication between ambulances, hospitals, and emergency response teams. The sensors used the car determine whether the accident is occurred are not. As soon any SMS is received to the police station and hospital the rescue process will be initiated. The ambulance uses the RF technology to indicate the traffic signal that the ambulance is coming on the wave, the range of the RF module use is around 100m. The concept is to

green the traffic signal in the path of ambulance automatically so that the ambulance can reach the spot in the shortest time and to reach the hospital in time to save human life.

1.2 Existing System

The existing model is very expensive and accident detection is done by only using one sensor. In our model we are using multiple sensors like accelerometer and Vibration Sensors so that the accident detection will be so accurate and the possibility of error to reduce. There is loss of life due to the delay in the arrival of ambulance to the hospital in the golden hour. This delay is mainly caused by the waiting of the ambulance in the traffic signals. It would be of great use to the ambulance if the traffic signals in the path of the hospital are ON. Thus, we propose a new design for automatically controlling the traffic signals and achieving the above-mentioned task so that the ambulance would be able to cross all the traffic junctions without waiting

2. Literature Review

To solve the short coming of present system we will implement the new system in which there is an automatic detection of accident. The position of the accident is sent to a primary server unit, which has the database of all the local hospitals, via a sensor, GPS, and GSM unit installed in the car that detects the accident. In addition to transporting the patient to the hospital and monitoring important indicators like temperature and pulse rate while doing so, an ambulance is dispatched to the scene of the accident. Additionally, in order to provide the ambulance a clear way, traffic light signals in its path would be controlled by RF transmission. This will cut down on the amount of time it takes the ambulance to arrive. 2.1 Survey Papers

Hu Rufua, Li Chuanzhia, He Jieb, Hang Wenb and Tao Xianglib, This module describes about a solution to block a vehicle by sending a SMS, and only an authorized person unlocks using security code, and helps the injured person. They used GSM and GPS modem [2]

Rajesh Kannan Megalingam, Ramesh Nammily Nair, Sai Manoj Prakhya, The use of microcontroller-based GSM communication helps to recognize the missing vehicles. GSM modem had the authorized user registered details. The intelligent traffic light controller that was introduced saves the waiting time and avoids the traffic load. With an embedded sensor network technology, the congestion road is detected and managed accordingly with controllers [3].

Tang S Huming, Gong Xiaoyan Wang Feiyue, Feiyue, Senior Alarm device predict the accident vehicle using the algorithm developed. The acceleration sensors and angle sensors module provide the necessary data to the controller. The area of accident is detected using detection algorithm built in the controller. Nowadays Wireless Sensor Networks (WSN) has been applied in various domains like weather monitoring, military, home automation, health care monitoring, security and safety etc [1].

Yogita Jadhav and Ganesh Wayal, The vehicle system is placed inside the vehicle which detects the accident location by means of sending a message. With the help of GPS and GSM module anywhere in the vehicle is traced. GSM modem used to send an exact location of the vehicle [5].

Md. Syedul Amin, Jubayer Jalil, M. B. I. Reaz, The number of deaths due to traffic accidents is very high. Looking at the number of deaths and injuries due to road traffic accidents shows the global crisis of road safety. Nearly 1.3 million people are killed every year and about 50 million injured worldwide due to road accidents, which averages to 3,287 lives lost every day More than 50 percent of road traffic deaths affect young adults between the age of 15-44. Around 400,000 individuals under the age of 25 dies in road traffic accidents every year. Even in countries with very good road safety measures, the number of road accident deaths is getting higher every year [6].

Dr.D.K.Nayana, Shadab Hussain, K.Srinivas Pavan Reddy R, More than 90% of road traffic deaths occur in middle-income countries. In low-income countries the figure is even higher. In Pakistan the last 10 year of statistics shows that an average of 15 individuals lost their lives due to traffic accidents daily. According to data from Pakistan Bureau of Statistics on traffic accidents in Pakistan from 2004 to 2013 [7].

ER. Kaushik Babhure, MS. Mona Mulchandani, Dr. Pradnya Borkar, The overall deaths in road accidents are about 55 percent, which according to the specialists is very high. According to the data, total 51,416 individuals died in 97,739 road accidents across the country. Furthermore, the data shows that deaths per accident are 55 per cent around the country. When the system detects an accident, will sends an SMS to

emergency contacts specified by the user, SMS will contain information about the accident and also a call to the emergency services is made automatically[8].

J. C. Cano and P. Manzoni, The most likely reason for an individual's death in an accident is lack of the first aid provision that is because of emergency services not receiving information about accident in time. Emergency response time is extremely vital when it involves incidents involving vehicle accidents. Analysis shows that if we decrease just 1- minute in accident response time that can increase chances of saving an individual's life up to six percent [9].

J. Zaldivar, C. T. Calafate, J. C. Cano and P. Manzoni, All modern vehicles have OBD- II connection installed which transmits data about the vehicle in real-time such as acceleration, oil pressure, speed, etc. For the system to work a vehicle must support OBD- II standard. In US and this standard is necessary since 2001, European countries have also implemented a version of this standard, so vehicles in the US and in Europe can use this system and is not available to all vehicle in other countries. Other than that, upgrading and maintenance of this system is very expensive process [10].

Zainab S. Alwan Hamid M. Ali the authors at the University of Baghdad Iraq developed a system which made use of the accelerometer, GPS and microphone to detect accidents. Upon detection of an accident sends an emergency notification to the web server and also sends an SMS to the emergency contacts, emergency responders have to access the web server to find out about an accident. In [11],

3. Motivation

Nowadays the Accident rate is increasing rapidly due to the traffic jam and lose of human life is more. Although different governmental and non-governmental organizations all around the world carry out workshops and other training programs to make people aware of the effect of careless driving, yet this whole process has not been very successful till the day we live.

In Our Country, deaths due to traffic accidents became a major problem adding to those emergency actions by hospitals or police that are not provided at the place of accident at required time, ignoring the fact that these people's lives could have been saved. Basically, in the event of a road accident, No one can predict the accident, but can save their life by expediting the ambulance to reach the hospital in time. The objective is to minimize the delay caused by traffic congestion and to provide the smooth flow of emergency vehicles.

4. Problem Statement

In emergency condition, each and every second is important is saving human's life. The use of vehicles increases in the proportion of the population. Due the traffic congestion, the accidents are also increasing day by day. This causes the loss of life due to the delay in the arrival of ambulance to the accident spot or from the accident spot to the hospital. So, it necessary to take the accident victim to the hospital as possible. Whenever, the accident is occurred, it has to be informed to the investigation unit. so, it is also beneficial if the intimation is reached to the enquiry section so that the time for the investigation can be minimized. The idea is to automatically green the traffic signals in an ambulance's path, so that the ambulance can reach the spot in time and save a human life.

5. Methodology

Working of the model on different phase: Car, Ambulance and Traffic

Car: The system is on and initialization. If vehicle is normal, no message has been sent to rescue team. And the sensors are monitored all the time; if it reaches the threshold level then the action has been taken automatically. Whenever accident occurred, the Vibrator sensor, accelerometer sensor detects the accident occurred with vehicle. The controller gets the input from sensors and sends the accident alert information to hospital and police station unit. The message is sent to the rescue team and also GPS finds location of the vehicle and that also send to the rescue team. It will facilitate connectivity to the nearest hospital and police station provide medical help through GSM technology

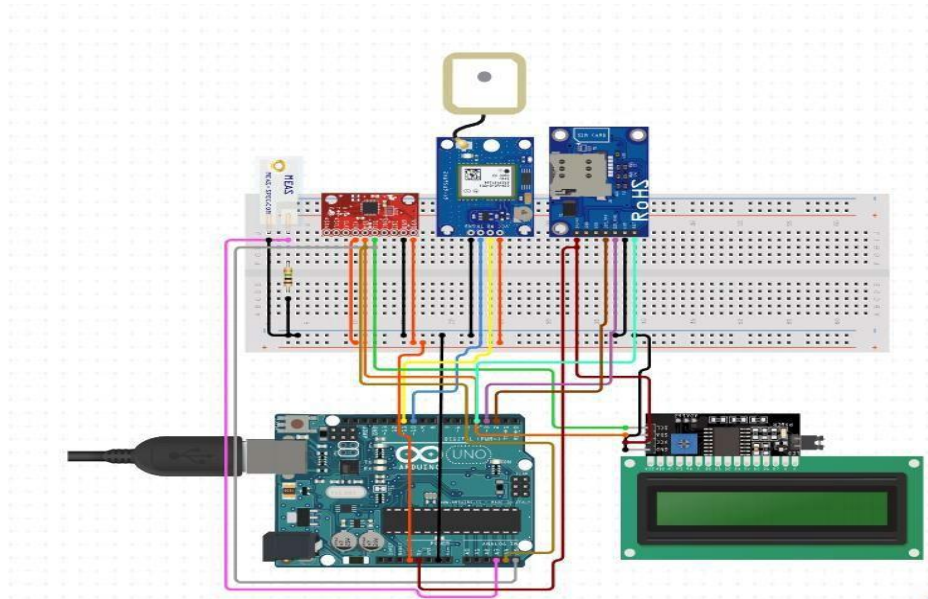


Figure1: Circuit Diagram of the Car

Ambulance: In the ambulance model it's only the RF transmitter with the encoder IC (HT12E) and a battery to power the model. As soon as the SMS is received for the hospital the hospital will initiate an ambulance and the ambulance will on the RF transmitter by using a switch. Transmitting section of RF system with two switches indicate that information for the traffic control signal by the ambulance. This RF transmitter is attached to emergency vehicle ambulance. As a prototype we are demonstrating the four directions of NORTH, SOUTH and EAST we kept four switches. One of the switches in RF transmitter section indicated one traffic direction. If we press the first button data send to receiver, then whichever the traffic signal is working don't care automatically traffic signals will indicate green signal corresponding direction

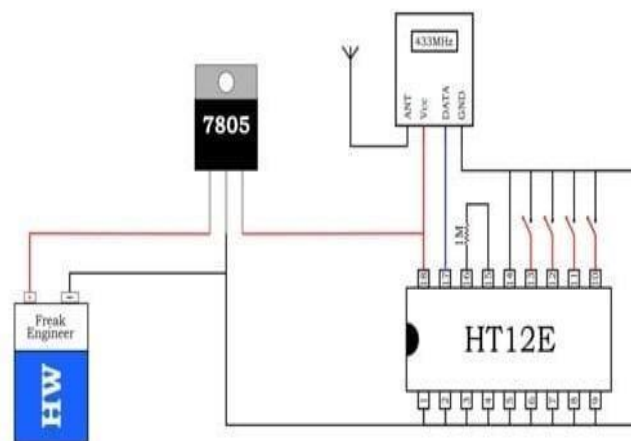


Figure: 2 Circuit Diagram of the Ambulance

Traffic: This is implemented by ARDUINO Module with having RF receiver antenna to control the traffic lights. Normally we programmed that for every 10 sec the traffic signal change between RED to GREEN for to show the basic operation of the traffic system. When the RF receiver receive the data then any case of traffic signal should change to green indication to clear traffic for emergency vehicle called ambulance.

6. Result & Analyzing



Figure3: Car before accident accrue

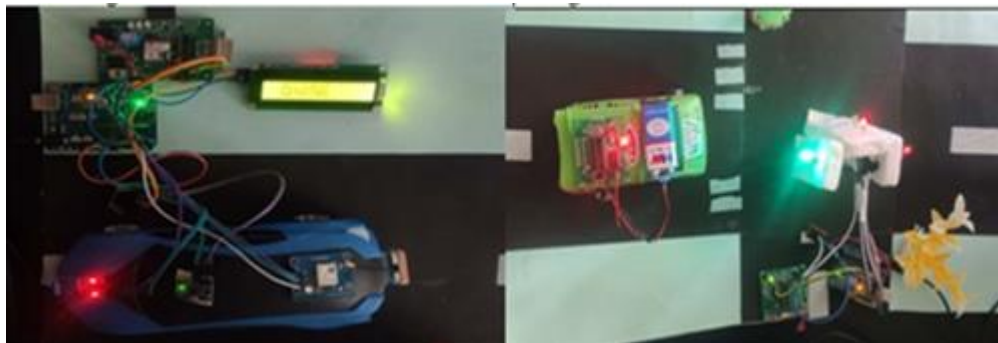


Figure4: Ambulance before on the RF transmitter

When accident is occurred, the location details of vehicle/object collected by the GPS module from the satellite, this information is in the form of latitude and longitude scale.

Thus, collected information is then fed to arduino uno. Necessary processing is completed and therefore the information is passed to the LCD and GSM modem.

The GSM modem collects the information for arduino uno and then transfer it to the concerned hospital & Traffic police control room through the SMS which is in text format.

The system helps in detecting the severity of the accident based on the accelerometer sensor that is connected and send message with the help of GSM module. The GPS module tracks the location in which the accident has occurred and helps communicate to the rescue system using GSM module.

The system is more efficient and is very much helpful in detecting the accidents at the earliest and reduces the rate of deaths that occurs due to accident. Since the severity is measured the rescue team can arrive to the accident spot with all medical aid and rescue the victim at the earliest. Thus, this system rescues the victim at the earliest and help in reducing the rate of deaths to a greater extent.

7. Conclusion

The completed module is successfully detecting accidents using both accelerometer sensor and vibrator sensor, this module is connected to GSM and GPS to send the data via message or notification. The proposal of the project is to find the shortest path by controlling traffic signals in favour of ambulance. By this new system the time lag is reduced by applying the RF technologies that controls the traffic signals. The priority of service to the ambulance follows the queuing methodologies through server communication. This ensures the reduced time lag between the accident spot and hospital.

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