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## Intelligent vehicle accident detection and ambulance rescue system

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### ABSTRACT

*The accident is the major fatalities in the world. Where the victims die with lack of emergency personnel or remain unnoticed over the night. Road accident is a collision between any vehicles or it can be with any pedestrian, animal and any obstacle placed on or off the road. The mortality rate of the victim depends on the time taken to reach the accident location and to reach the hospital by ambulance. As time increases the mortality rate of the victim also increases. In this paper, we introduce a system that automatically detects the accident occurrences and notifies the recorded ambulance through GSM and GPS module, and the time delay is minimized by introducing RF module at the traffic signals. Whenever an accident occurs the vibration sensor senses the accident occurrence automatically makes microcontroller to retrieve the location of the accident through GPS and GSM will notify the recorded ambulance driver with messaging which consist of longitude and latitude coordinates of the location. If the current ambulance which received the message is not available then the message is sent to the next ambulance number, so that immediate help can be provided. This system also controls the traffic signals in the path of an ambulance by providing RF communication between the ambulance and traffic section. The methods used in the paper are fully automated which finds the accident spot, controls the traffic lights, helps to reach the hospital as soon as possible.*

**Keywords**— Ambulance, GSM, GPS, Vibration sensor, Switch, RF module

### 1. INTRODUCTION

The world first automobile accident occurred in Ohio City, Ohio in 1891, as the technology and the population of the world increases the vehicles used by the people also increases which results in a maximum number of accidents and increase in traffic. Road crashes are caused by human error some of them are speeding, traffic, drunk driving, night driving, running red lights, and construction sites and also by natural causes like

rain, brake failure etc. Road traffic has been getting more and more congested due to the increase in the number of vehicles. The main aim of this project is a scheme to detect an accident, find accident location, notify accident location to the ambulance and provide a smooth flow for an ambulance to reach the hospital in time. In the proposed system vibration sensor and GPS tracking system are used for accident detection. When an accident occurs, this system sends a short message to ambulance driver numbers via GSM modem. Message consist of longitude and latitude of the location on browsing these values location of the victim is telecasted on the screen of the ambulance driver mobile if the current ambulance which receives the message is not available then the message is sent to the next recorded ambulance driver number, so that immediate help can be provided. After accepting the request, the ambulance section will start its rescue operation with the help of the traffic section. If there is no serious threat to a victim's life, then the alert message can be terminated by the victim by a switch provided in order to avoid wasting the valuable time of the ambulance. Whenever the ambulance reaches near to the traffic signal (approximately 100m), the traffic signal will be made to green through RF communication. Thereby reducing delay in the rescue operation. Vehicle section installed in the vehicle automatically informs accident to the recorded ambulance driver numbers.

### 2. RELATED WORKS

#### 2.1 Vibration Sensor

A vibration sensor is a device that senses vibration and converts it into an electrical signal. The vibration sensor needs to attach to the machine that is being measured. Various types of sensors are available but sensor with the most advantage is an accelerometer, which produces an electric signal that is proportional to the acceleration of the vibrating component to which the sensor is attached. Every sensor is provided with the threshold frequencies' exceeding this frequency causes the sensor to work and send the data to the respective module. In the process of accident detection beyond the threshold

frequency sensor will tell microcontroller that accident has occurred send location message to the ambulance driver number.

### 2.2 GPS

Global Positioning System, that provides geolocation and time information to a GPS receiver anywhere on the earth. GPS is a network of about 30 satellite orbiting the earth at an altitude of 20,000 km. GPS works on Trilateration principle.

### 2.3 Trilateration

Imagine you are standing somewhere on earth with three satellites in the sky above you. If you know how far away you are from satellite A, then you know you must be located somewhere on the dotted circle. If you do the same for satellite B and C, you can work out your location by seeing where the three circles intersect. This is what your GPS receiver does, although it uses overlapping spheres rather than circles. The more satellites there are above the horizon more accurately your GP unit can determine where you are.

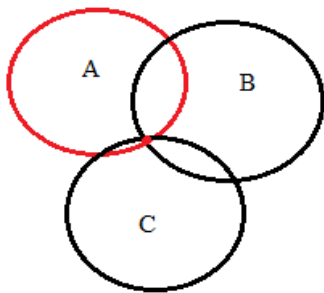


Fig. 1: Principle of Trilateration

### 2.4 GSM

Global System for Mobiles communication is a digital mobile network that is widely used by the mobile phone user. It is an open and digital cellular technology used for transmitting mobile voice and data services operate at 850MHz, 900MHz, 1800MHz and 1900MHz frequency bands. The GSM modem which has SIM card mounted in it, upon receiving the digit command by SMS from any cell phone it sends that data to the microcontroller through serial communication. When the program gets executed, the GSM modem receives 'STOP' command to develop an output at the MC, the contact point of which is used to disable the ignition switch. The command which is sent by the user is based on an intimation received by him through the GSM modem 'ALERT' a programmed message only if the input is driven low.

### 2.5 RF Transmitter and Receiver

The RF module is used to transmit and receive the radio signals between two devices. RF module works in different frequency ranges from 30 kHz to 300 GHz, the commonly used frequency range is 433MHz. The RF module is comprised of an RF Transmitter and an RF Receiver. RF transmitter transmits the radio signals and modulates the radio signals for carrying the data. When the RF transmitter receives serial data it is transmitted wirelessly through RF by its antenna connected at pin4. The RF transmitter and receiver work at the same frequency which carried out at the speed of 1kbps -10kbps. The transmitted data is then received by an RF receiver which is operating at the same frequency as that of the transmitter receives and demodulates radio signals. The RF module consists of an encoder and decoder pair. Where encoder encodes the parallel data and decoder decodes the data received. For e.g., HT12E-HT12D, etc. are commonly used encoder/decoder pair ICs.

## 3. PROPOSED SYSTEM

In our system, if a vehicle has met with an accident, Arduino Nano microcontroller receives analog signals from the vibration sensor. The certain limit is set to a vibration sensor; if the vibration frequency exceeds the threshold frequency then a delay of 10 seconds will be introduced. On retrieving the latitude and longitude values from the GPS, the microcontroller sends the message consisting of coordinate values to the recorded ambulance driver number. The ambulance driver has to reply to the sent message by pressing yes or no. If the ambulance is an available driver will accept the request else decline the request sent by vehicle section. The message is sent to the next ambulance number if a current ambulance is not available. A switch is introduced to abort the process in case of an abnormal accident or if the victim is safe. In the path of the ambulance, the traffic signal will be made to green through RF communication.

## 4. SYSTEM IMPLEMENTATION

In our project, there are three sections which coordinate with each other to limit the time delay between the ambulances to reach victims location an ambulance to reach the hospital from the victim's spot to rescue the victim. The three sections are as follows

- The Vehicle Section
- The Ambulance Section
- Traffic section

### 4.1 Vehicle section

The vehicle section is installed in all the vehicles; the vibration sensor senses the accident occurrence and sends the location information through the GSM to the ambulance driver number. This section includes buzzer, vibration sensor, Arduino Nano microcontroller, GSM, GPS, switch and the board. The vibration sensor is used in the vehicle section will continuously sense for any large scale vibration in the vehicle. The sensed analog data is converted to digital and send to the Arduino Nano microcontroller.

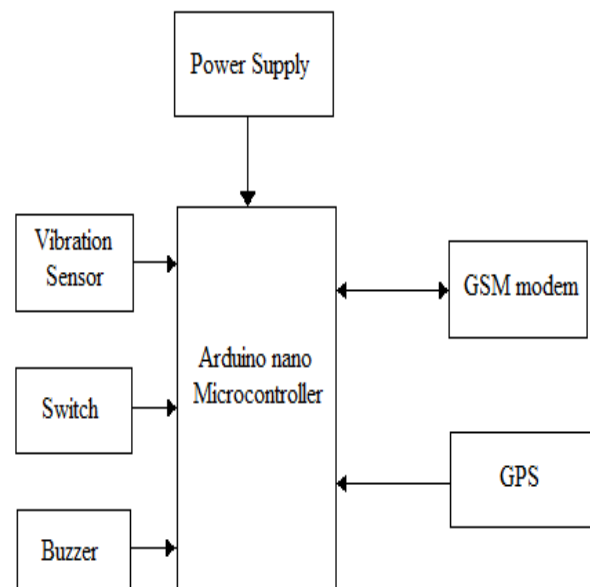


Fig. 2: Block diagram of the vehicle section

This microcontroller is dumped with an execution code where it's going to perform the specified job. Once the sensor intimates the microcontroller, it will retrieve the current location of the accident spot from GPS and sends to GSM in the form of message, which consists of longitude, latitude and time. The message is sent to the recorded ambulance number. A

switch is used to abort the process if the victim is safe. The buzzer is provided to aware the victim to press the switch if the victim is safe.

#### 4.2 Ambulance section

Ambulance section consists of recorded mobile, RF transmitter and antenna. Whenever the vehicle met with the accident, ambulance section receives the message by the vehicle section GPS modem, if the ambulance is an available driver will accept the request by replying with Yes else decline the request by replying with No, to the message sent by vehicle section. The ambulance section turns ON the RF transmitter, this will lead to communicate with the traffic section. RF transmitter transmits the data encoded by the HT12E encoder.

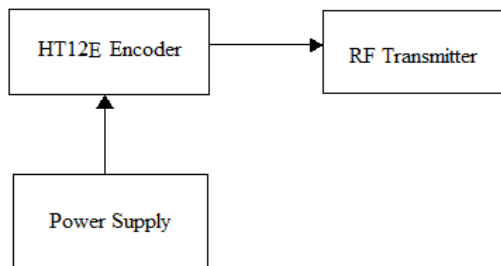


Fig. 3: Block Diagram of Ambulance section

#### 4.3 Traffic section

The data transmitted by RF Transmitter is received by an RF receiver operating at the same frequency (433 MHz) as that of the transmitter. The encoded data received from the transmitter is decoded by HT12D decoder. Whenever the ambulance reaches near to the traffic signal, the traffic signal will be made to green through RF communication. So that ambulance can reach the accident location and hospital as soon as possible.

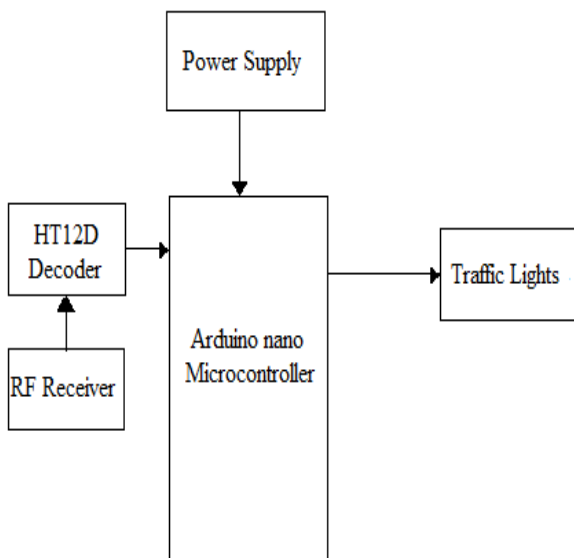


Fig. 4: Block Diagram of the traffic section

### 5. CONCLUSION

This paper presents a system for automatically detecting the accident and notifying it to the user-defined mobile numbers of ambulance drivers along with the location with an SMS. In the embedded system domain, the GPS tracking and GSM alert based algorithm are designed and implemented. This system can also be used in an authorized vehicle. Thus, if this system is implemented in countries with a large population like India can produce better results. This system is more accurate with no loss of time.

### 6. FUTURE ENHANCEMENT

The proposed system doesn't notify the victim regarding the arrival of the Ambulance, so voice message can be sent to the vehicle section to notify the victim and people who might try to help the victim. Adding additional sensors in combination with an accelerometer for accident detection like a gyroscope, impact sensor and camera (to automatically take pictures of the accident), will drastically increase the reliability and accuracy of the system. Both consumer and commercial vehicles can be outfitted with GPS sections to allow police to do tracking and recovery. In the case of LoJack, the police can activate the tracking section in the vehicle directly and follow tracking signals.

### 7. REFERENCES

- [1] Mr S. Iyyappan, V. Nandagopal "Accident Detection and Ambulance Rescue with Intelligent Traffic Light System" International Journal of Advanced Research in EEIE-2013.
- [2] K. Sangeetha, P. Archana, M. Ramya, P. Ramya "Automatic Ambulance Rescue with Intelligent Traffic Light System" International Organization of Scientific Research Journal of Engineering-2014.
- [3] Mr SahilGadroo, Mr PinkeshJodhwani, Mr Gunveer Singh, Mr A.D. Londhe "Automatic Accident Detection and Ambulance Rescue System" International Journal of Scientific& Engineering Research-2015
- [4] M. Papageorgiou, C. Diakaki, V. Dinopoulou, A. Kotsialos, Yibing Wang "Review of Road Traffic Control Strategies" Proceedings of the IEEE 91.12 (2003): 2043-2067.
- [5] N. Bulusu, "Wireless Sensor Networks", Artech House, Inc. 2005.
- [6] M. Lee, C. Yao, H. Liu," Passive Tag for Multi-carrier RFID Systems", IEEE 17th International Conference on Parallel and Distributed Systems, 2011.
- [7] Y. Khalil, M. Al-kariki, "Intelligent Traffic Light Flow Control System using Wireless Sensor Networks", Journal of Information Science and Engineering, 26, 753-768 (2010).
- [8] Hrishikesh Murkut, FazalPatil, Vishal Yadav, Meghana Deshpande "Automatic accident detection and rescue with ambulance" SSRG International journal of ECE-2015.