

# Accident Monitoring and Smart Rescue System

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**Abstract**— Security in travelling has become a primary concern due to advancement in automobiles. There is always a risk of losing lives because of poor emergency facilities. One cannot predict the accidents but certain measures can be taken to reduce after effects. To resolve such problems, a system is developed and an application is introduced in this research work. All these problems are overcome by this system. Global Positioning System (GPS) is one of the technologies that are used in a huge number of applications today. One of the applications is tracking human and keeps regular monitoring on them. Main objective is to design a system that can be easily installed and to provide platform for further enhancement. This project completely covers the whole system from accident avoidance and necessary measures to be taken after the accident. So, this paper deals with the system which allows us to know about the accident spot and provides situational awareness. This system uses GPS and Global System for Mobile Communication (GSM) technologies.

**Key words:** GPS, GSM, Panic Switch, Accelerometer, Fire Sensor

## I. INTRODUCTION

There are more and more traffic jams as demands for vehicle are getting high day by day. So, transportation needs more improvement. Vehicle accidents are one of the leading cause of the fatalities. It will be serious consequence if people can't get help on right time. Currently there are only few technologies for accident detection. The accident victims depend on the mercy of others to rush him to the hospital. Many a times an accident goes unnoticed for hours before help comes in. Due to all these factors there is a high rate of mortality of the accident victims.

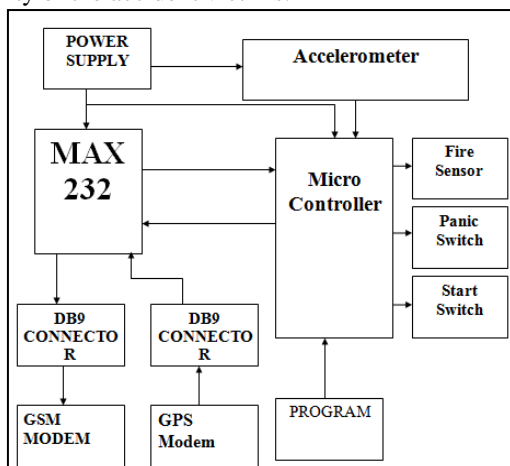


Fig. 1: Block Diagram of Proposed Model

The purpose of this project is to find the vehicle and locate it by means of sending a message using a system which is placed inside of vehicle system. This system is based on the technology whose purpose is to detect an accident and alert to the nearby hospital or people, so the victim can find some

help. This vehicle tracking system takes input from GPS and send it through GSM module to desired mobile. Figure 1 shows the block diagram of the proposed model which consists of fire sensor, accelerometer, panic switch, start switch, GPS modem, GSM modem, DB9 connector, MAX232, microcontroller and power supply.

## A. Problem Identification

Whenever accident happens, the nearby people call the ambulance. The problem associated with this is that the victims depend on the mercy of the nearby people. There is a chance that there are no people nearby the accident spot or people who are around neglects the accident. This is the flaw in the manual system.

## II. LITERATURE REVIEW

Tracking systems are used around the globe in the fields like vehicle position tracking system, vehicle anti-theft tracking system, fleet management system etc. Lau [1] proposed simple bus tracking system in UCSI University, Kuala Lumpur Malaysia. The tracking system provides student with the location information of the bus within a fixed route. Ramadan, and AL-Khedher, [2] proposed design and implementation of a vehicle tracking and anti-theft system for protecting a vehicle from any intruder using GPS/GSM technology based on tracking system. The utilization of ARM7 microcontroller, GSM and GPS module together with a accelerometer and temperature sensor is carried out by Joshi and Mahajan [3].

A security system based on RFID, GPS and GSM [4] consolidate the establishment of an electronic gadget in a vehicle with reason planned machine programming to empower the organization to track the vehicle's area. Shaikh et al. [5] describe arm7 based smart car security system. The principle point of this undertaking is to offer a development security framework in automobile, which comprise of a face detection subsystem, GPS module, a GSM module and a control stage. In [6], a vehicle tracking system is an electronic device, installed in a vehicle to enable the owner or a third party to track the vehicle's place. In [7], Face Detection System used to detect the face of driver, and compare with the predefined face. The car owner is sleeping during the night time and someone theft the car. Then Face Detection System obtain image by one tiny web camera, which is hidden easily in somewhere in the car. If the image do not match, then the information sends to the owner through MMS. The owners get the image of the thief in mobile phone and trace the place through GPS.

H Jain-Ming, Li Gung-Hui. In [8] proposed a stolen vehicle recovery system. The system ensured safety and credibility. It used C8051F120 microcontroller and a vibration sensor. The vehicle owner gets the message regarding the vehicle location at specific intervals through GSM.

Nirav Thakkar et al. in [9] have presented Automatic Vehicle Detection System Based on ARM and GPS. The system detects the vehicle accident with the help of vibration sensor or MEMS Sensor. GPS Module captured the location of vehicle accident and a message is transmitted with the help of GSM module, which contains the co-ordinates value. One more facility is also provided which can be very handy during the critical times. If a person requires help due to other reason like having symptoms of heart attack in such a situation all he has to do is to press a single switch provided in the system. By pressing this switch a message is transmitted by the GSM module to the help centre which contains the location of car provided by GPS with the information of user. Le-Tien, T; Vu Phuong gives a idea about a system which is based on GPS and GSM. It describes the practical model for routing and tracking with mobile vehicle in a large area outdoor. This system have compass sensor-YAS529 of Yamaha Company and Accelerator sensor-KXSC72050 of Koi nix Company to obtain moving direction of a vehicle. This system will obtain position of the vehicle using GPS receiver.

### III. DESIGN AND IMPLEMENTATION OF PROPOSED SYSTEM

The software used for the development of system is Proteus and Keil compiler. It shows the system is initialised on power ON. When the system is detected to be abnormal, it can be concluded that the accident has occurred. The vibration of the vehicle is detected to confirm the cause of the accident. As soon as the accident is detected, the message is automatically sent to the rescue team after the location is detected by the GPS.

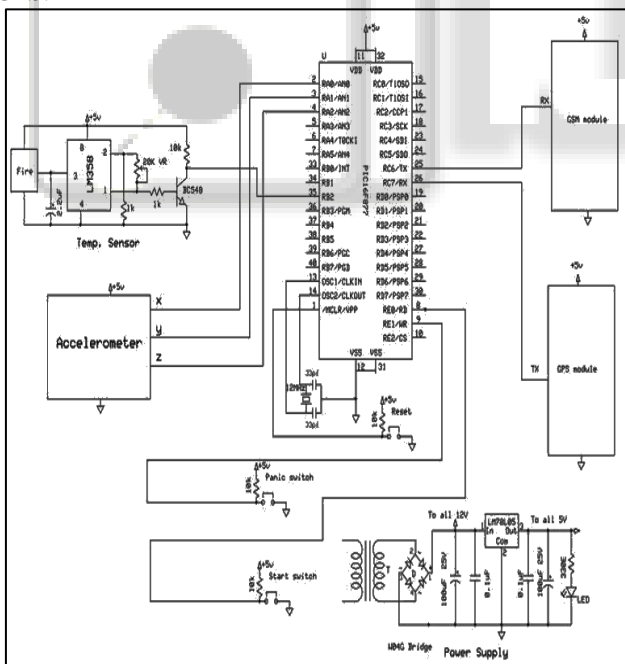


Fig. 2: Circuit Diagram of Proposed Model

Figure 2 shows the circuit diagram of the proposed system. The circuits connected here are of GPS, GSM, Fire Sensor, Panic Switch and Start Switch. In this project PIC 16F877A microcontroller is used. Accelerometer is an electro mechanical sensor, when an accident occurs, accelerometer gets disturbed and sends the output signal to the microcontroller so that the location is identified using GPS. In this project it is proposed to design an embedded system,

which is used for monitoring and positioning of any vehicle by using GPS and GSM.

Whenever accident occurs, accelerometer sensor detects and sends the signal to microcontroller, by using GPS we will get particular locations where accident has occurred, then GSM sends message to the person whose phone number is given. This system takes input from GPS and which goes into RS232. This sends the data into MAX232 and converts the data format and send it to the RX of microcontroller and this microcontroller stores this data in Universal Synchronous Asynchronous Receiver Transmitter (USART) buffer. The data stored is sent again through TX pin into MAX232 and this MAX232 sends the data to GSM via RS232. The whole system is connected to the vehicle. At the other end, one GSM mobile phone is attached to the computer. So the GPS system will send the longitudinal and latitude values corresponding to the position of vehicle.

For example:

Accident occurred at location

Latitude=1531.5095

Longitude=1625.4502

The above values are sent to the mobiles using GSM for which the mobile numbers are dumped in the program. The same process takes place in fire detection and at the time of theft. The owner of vehicle can use panic switch at the time of theft. Immediately after the accident monitoring, the fire sensor activated in the same way. Hence by using PIC, GSM and GPS accident location is detected and the information is sent to the mobile.

### IV. RESULTS AND DISCUSSION

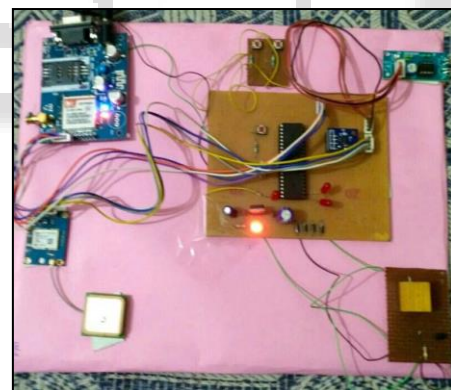


Fig. 3: Physical Realization of System

Figure 3 shows the physical realization of the system. When the power is on, LED will glow which indicates that the system has started.

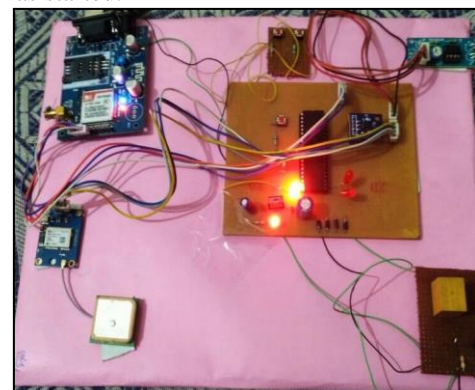


Fig. 4: System in Mode 1

Figure 4 shows the system in mode 1. When an accident is occurred the LED glows and a message is sent to the registered mobile number including the position of latitude and longitude.

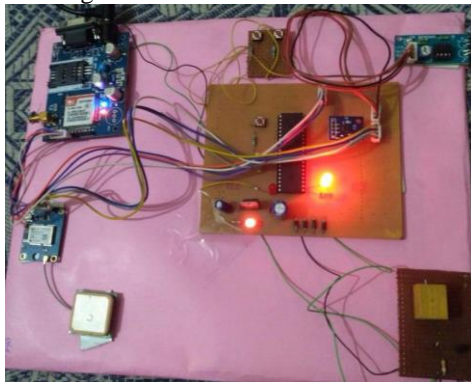


Fig. 5: System in Mode 2

Figure 5 shows the system in mode 2. This mode refers to anti theft system. In this case, if anyone starts the vehicle the LED glows and message is sent to the registered number “CAR LOCK OPEN”. On receiving the message the owner of the vehicle sends the message “LOCK” which locked the ignition and turns off the LED.

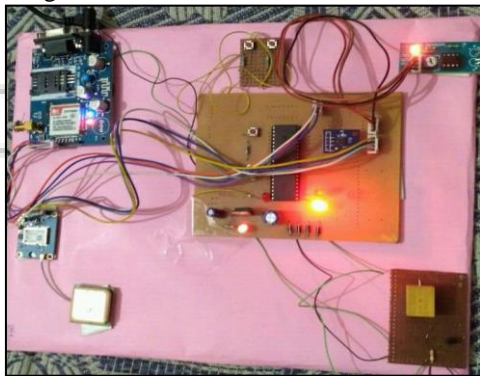


Fig. 6: System in Mode 3

Figure 5 shows the system in mode 4. This refers to the smart rescue system. If the owner of the vehicle feels any theft around him/her, then by pressing the panic switch, he/she can send to the registered number or nearby police station. Also there is a fire sensor which we have included in the system. In case of fire, the LED on the upper right half of the picture glows and a message is sent to the registered number.

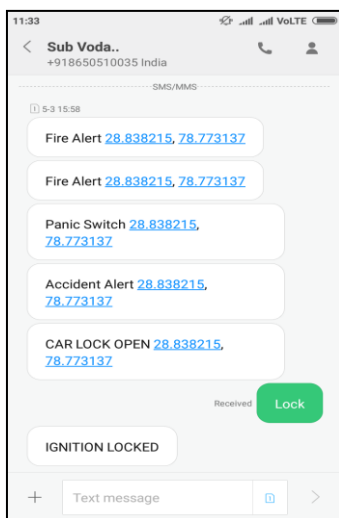


Fig. 7: Snapshot of Alert Messages

## V. CONCLUSION

Main motto of this project is to decrease the chances of losing life in such accident which we can't stop from occurring. Whenever accident is happened, the paramedics are reached to the particular location to increase the chances of life. This device invention is much more useful for the accidents occurred in deserted places and midnights. This vehicle tracking and accident alert feature plays much more important role in day to day life in future.

The biggest advantage of our research is whenever the sensor is activated we immediately get the acknowledgement from GSM modem to our mobile numbers which are stored in EEPROM, without any delay. This system locates the accident spot accurately, realizing the automation of accident detection and messaging system. Consequently, it will save precious time required to save the accident victims.

## VI. FUTURE SCOPE

It could be used as a valuable tool for real time traveller information, congestion monitoring and system evaluation. The system can be used to quickly respond to the unexpected accidents which occur on highways or busy roads in cities. This can be done by arranging these systems in various ambulances which cover the entire city so that the nearest ambulance could be contacted for help.

It can be extended for alcohol detection. The system will detect the driving person whether the person is drunk or not. If the person has taken alcohol, the vehicle will not start. By using these applications, up to some consistent accidents can be reduced and many lives can be saved. A wireless webcam can be added in this for capturing the images which will help in providing driver's assistance.

This system can also be utilised in fleet management, food services, traffic violation cases, rental vehicle services etc.

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