

# Accident Identification and Alert System

Kranti Harpale<sup>1</sup> Prof. C. K. Bhang<sup>2</sup>

<sup>1,2</sup>Department of Electronics & Telecommunication Engineering

<sup>1,2</sup>All India Shri Shivaji Memorial Society's Institute of Information Technology, Pune-01, India

**Abstract**— Security is the major concern in day to day life. People often loose their life because of poor security. The accidents which occur cannot be minimized but the effect of the accident can be minimized. This system is based on detection and alert of accident using GSM and GPS module. The GSM acts as an output and the GPS acts as an input to the microcontroller. So to provide security to the vehicle we use this system which can be fitted into the vehicle. It uses an accelerometer sensor to detect an accident. An accelerometer monitors the acceleration of the vehicle. It will detect the dynamic acceleration resulting from shock, motion or vibration. If the deceleration is greater than the threshold value it will send the data to the microcontroller. Then the microcontroller will compare the received data with the threshold value and after comparison it will send the message to the given number via GSM. The controller will also send the location which is detected by the GPS module. So this detected location is sent to the authorized user when an accident have occurred, so that the person can be able to help the people who have met with an accident. So this system will help the identification and rescue of vehicles that have met with an accident.

**Key words:** GSM, GPS, Accelerometer, Microcontroller, Relay

## I. INTRODUCTION

In today's world transportation have become the basic need of life. As there is an increasing demand for transportation there are more possibilities of accident rate. Due to road accidents the death rate is more. So to avoid these accidents it is necessary to provide security to the vehicles. By providing security to the vehicle we can be able to detect the accident and it would become easy to help the people who have met with an accident. Main aim of this is to take precautions and to avoid the accident. The use of satellite communication have increased a lot in today's world. By using the GPS system it have become easy to track any vehicle.

### A. Information about the System

In this system we use a PIC microcontroller, accelerometer sensor, GPS module, GSM module and a LCD display and a relay. The accelerometer sensor is used to sense the shock or vibration in 3-axis. The three axis are x, y and z. The GPS module is used to track the location of the vehicle continuously. The main purpose of the GSM module is used to send a message to the authorized user. The LCD is used to display the message about the delivery of messages through the GSM and the Relay is used to switch the operation between the GSM and GPS. C programming is used for better understanding.

### B. Proposed Work

To detect that an accident has occurred, we use an accelerometer sensor. This sensor will turn on or become active when an accident has occurred. The accelerometer

sensor detects the vibrations or shocks occurred due to the accident. Then the accelerometer sends the information to the PIC microcontroller. The information sent to the controller is in the form of analog signal. The microcontroller which has an inbuilt ADC converts the analog signal of accelerometer into the digital signal.

Then the relay is used to switch between the GSM and GPS module. The GPS tracks the location of the of the accident occurred. This location is sent to the microcontroller. Then the microcontroller sends this location via GSM to the authorized user. In this manner we can help the person who have met with an accident.

## II. PAST WORK

There are some literatures which are taken into consideration for checking all the possibilities and get the needed result:

- B. Venkateswara Reddy, D. V. SubbaRao (2015) describes vehicle tracking and accident identification system. In this paper they have proposed a system used to track the vehicle by using GPS and GSM technology. In this method it is easy to track vehicle place and know the status of vehicle.
- Malathi B.N.(2015) describes accident notification system by using two modems GSM and GPS. The main idea of this project is when the occurrence of fire or accident, the limit or temperature sensor will be pressed automatically then sending signal to microcontroller for activating GSM and GPS module.
- VirajChoksi, Ashish Patel, M B Potdar (2014) describes automatic accident alert and safety system using embedded GSM interface. They have designed the system by which the action time can be minimized and exact location of an accident can also defined with GPS service and also the information regarding the accident can be sent to a particular contact number.
- R. Thangam, S.Selvaraju,R.Ramani (2013) describes Vehicle Tracking and Locking System Based on GSM and GPS. They have designed this system to easily track the vehicle place and doors locked.

The first literature study shows the vehicle tracking and accident identification system using an ARM LPC2148 in their system.

The second literature study shows the accident identification and the occurrence of fire.

The third literature survey shows the accident alert and safety which needs an external ADC to convert the analog output of accelerometer into digital signal needed for the microcontroller.

The fourth literature survey shows the vehicle tracking and locking system. When the theft is identified, the responsible people send the message to the microcontroller, then issue the control signals to stop the engine motor.

Finally, after studying all the literatures have given me the information about the application and working of the system. And also the working of GSM and GPS system

### III. PRESENT SYSTEM

Present system consists of:

#### A. Hardware

##### 1) Controller

This controller has 32kB of internal ROM and 1536 bytes of RAM. Its operating frequency is DC-40MHz.

Its operating voltage range is 2V to 5.5V. It has 4MHz-10MHz oscillator/clock input. When an accident has occurred the accelerometer sends analog signal to PIC microcontroller.

This analog signal is converted to digital signal via inbuilt ADC. Then the microcontroller will send a message via GSM to the control room along with the latitudes and the longitudes received from the GPS module.

##### 2) Accelerometer Sensors

It is small, thin, low power, complete 3-axis accelerometer with signal conditioned voltage outputs. It can measure the static acceleration of gravity in tilt-sensing application, as well as dynamic acceleration resulting from motion, shock or vibration. When accident occurs the accelerometer senses the vibration and sends the signal to PIC microcontroller which converts the analog signal to digital signal.

##### 3) GPS (Global Positioning System)

The Global Positioning System (GPS) is a satellite-based navigation system consists of a network of 24 satellites located into orbit. The system provides essential information to military, civil and commercial users around the world and which is freely accessible to anyone with a GPS receiver. GPS works in any weather circumstances at anywhere in the world. Normally no subscription fees or system charges to utilize GPS. A GPS receiver must be locked on to the signal of at least three satellites to estimate 2D position (latitude and longitude) and track movement. With four or more satellites in sight, the receiver can determine the user's 3D position (latitude, longitude and altitude). Once the vehicle position has been determined, the GPS unit can determine other information like, speed, distance to destination, time and other. GPS receiver is used for this research work to detect the vehicle location and provide information to responsible person through GSM technology[5].

GPS data is displayed in different message formats over serial interface. There are standard and non-standard (proprietary) message formats. Nearly all GPS receivers output NMEA data. The NMEA standard is formatted in lines of data called sentences. Each sentence contains various bits of data organized in comma delimited format (i.e. data separated by commas). Here's example NMEA sentences from a GPS receiver with satellite lock (4+ satellites, accurate position):

```
$GPGGA,235317.000,4003.9039,N,10512.5793,W,1,08,1.6,1577.9,M,-20.7,M,,0000*5F
```

For example, the GPGGA sentence contains the follow:

- Time: 235317.000 is 23:53 and 17.000 seconds in Greenwich meantime
- Longitude: 4003.9040, N is latitude in degrees. decimal minutes, north

- Latitude: 10512.5792, W is longitude in degrees. decimal minutes, west
- Number of satellites seen: 08
- Altitude: 1577 meters

##### 4) GSM (Global System for Mobile Communication)

The GSM-900 has a down link frequency range of 935-960 MHz and an up link frequency of range of 895-915 MHz. The modem needed only 3 wires (Tx,Rx,GND) except Power supply to interface with microcontroller/Host PC. The built in Low Dropout Linear voltage regulator allows you to connect wide range of unregulated power supply (4.2V -13V). Yes, 5 V is in between !! .Using this modem, you will be able to send & Read SMS, connect to internet via GPRS through simple AT commands.

##### 5) Electromechanical Relay

This type of relay is made of a coil that induces a magnetic field when it get energized and moves the armature, which closes or opens the contacts.

##### 6) LCD(Liquid Crystal Display)

A 16\*2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data. The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed on the LCD. The data is the ASCII value of the character to be displayed on the LCD. Click to learn more about internal structure of a LCD.

#### B. Software

- Proteus: For designing the circuit diagram.
- MPLAB X: used for coding the microcontroller in C.
- PICkit 2: used to burn the program onto the  $\mu$ C.

#### C. Working

The logic of the entire system is described here: The value of the accelerometer is continuously checked. If the value exceeds the accelerometer will send the signal to the microcontroller which identifies that the accident have occurred. Then microcontroller will convert the analog signal to digital signal. The relay is used to switch between the GSM and GPS module. First the relay switches to GPS and the location traced is sent to the controller. Then the relay switches to the GSM and this location is sent to the authorized user by the GSM.

When the message is sent to the authorized user they would provide emergency service to the person who have met with an accident.

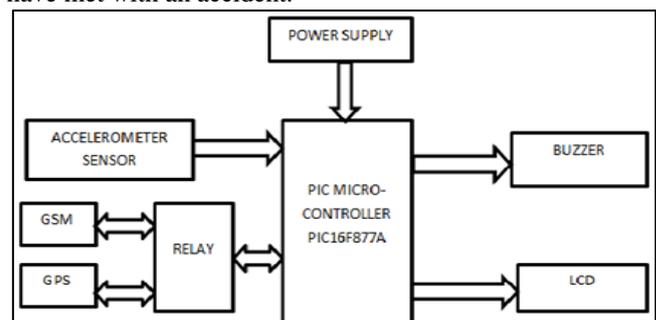


Fig. 1: Block diagram of the system

#### IV. TESTING

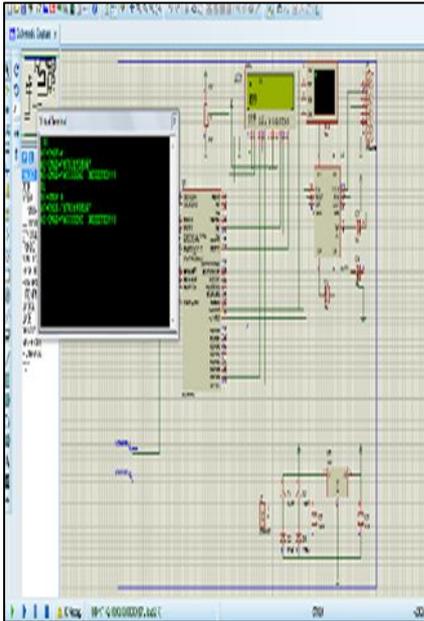


Fig. 2: Testing

The testing of LCD is done by simulation process. The simulation is done in the proteus software.

The first message displayed on the LCD is “Accident Detection using GSM and GPS X Y”.

On virtual terminal the AT command CMGF and CMGS is displayed which contains the number and “Accident Detected” message.

#### V. RESULT



Fig. 3: Result

The above picture shows the circuit of PIC microcontroller, GSM, GPS and an accelerometer sensor.

The message is sent through the GSM module to the authorized user and at the same time the location of the vehicle is displayed on the LCD. The message received to the authorized user is shown in the picture below.

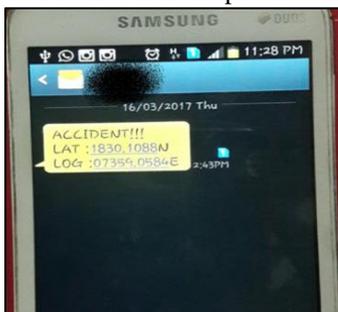


Fig. 4: Result

#### VI. FUTURE SCOPE

This system has a vast scope of future expansion which includes the addition of more sensors which can be used to alert the parameters like fire, alcohol detection etc.

This system can also be used in school buses for the safety of children's.

#### VII. CONCLUSION & DISCUSSIONS

This system will detect the location where the accident has occurred. This location will be sent to the authorized user via the GSM module. Hence it is easy to detect the location and the emergency services can be given to the people who have met with an accident.

#### REFERENCES

- [1] Kranti Harpale, Prof. C.K.Bhange” Accident Identification and Alert System”, International Engineering Research Journal (IERJ) published in MD Infotech special edition pages1-4, 8 June 2017.
- [2] B.Venkaterswara Reddy, D.V.Subba Rao “vehicle tracking and accident identification system” ,International Journal of applied sciences, Engineering and Management, volume 04, No 1,January 2015.
- [3] Malathi B.N., Hajer Salim Hunaid Al-Farsi in “Accident Notification system by using two modems GPS and GSM”, International journal of applied information system (IJAIS) Volume 8, No. 3, February 2015.
- [4] Kajal Nandaniya, Viraj Choksi, Ashish Patel, MB Potdar “automatic accident alert and safety system using embedded GSM interface, International journal of computer applications. Volume 85, No.6, January 2015.
- [5] R.Ramani, S. Valarmathy, Dr. N. Suthanthira Vanitha, S. Selvaraju, M. Thirupathi, R. Thangam “vehicle tracking and locking system on GSM and GPS” .I.T. Intelligent system and application, 2013.
- [6] Jazim Baramy ,Pagya Singh, Aryasheel Jadhav, Kruti Kesh Javir, Ms. Sonali Tarleka “accident detection and alerting system”, International journal of technical research and appl6