

Accident Detection and Reporting System Using GPS and GSM Module.

¹Mr.Dinesh Kumar HSDK, Shreya Gupta², ³Sumeet Kumar, ⁴Sonali Srivastava

¹Professor, ²Student, ³Student, ⁴Student

¹Department of Electronics and Instrumentation Engineering

¹Galgotias College of Engineering and Technology, Greater Noida – 201306, India.

Abstract-With the growing population the use of vehicles has become superfluous, and this has led to the accidents increasing at an alarming rate resulting in a large loss of property and human life. This project aims at finding the occurrence of any accident and reporting the location of accident to the previously coded numbers so that immediate help can be provided by ambulance or the relatives concerned. GSM technology is used to intimate the vehicle position in the form of latitude and longitude coordinates through sms. The location spot is retrieved using Global Positioning System which is a navigational system using a network of satellites orbiting the earth. Sensors such as vibration, alcohol and fire detectors detect signal in case of an accident occurrence and send a signal to the connected microcontroller. The controller in turn operates the relay to blow the airbag and automatically lock the brakes. Meanwhile a message reaches to the necessary help, and thus ambulance service and required aid can reach in the shortest time possible. This system can also aid companies in the rental vehicle business to keep a track of the vehicular activity by sending message at regular intervals to the authorised numbers.

Index Terms- GPS (Global Positioning System), GSM (Global Service for Mobile Applications), Vibration sensor accelerometers (piezoelectric), SMS (Short Message Service), Microcontroller, Alcohol Sensor.

I. INTRODUCTION:

In today's world there is a severe increase in the use of vehicles. Such heavy automobile usage has increased traffic and thus resulting in a rise in road accidents. This takes a toll on the property as well as causes human life loss because of unavailability of immediate safety facilities. Complete accident prevention is unavoidable but at least repercussions can be reduced. Proposed system makes an effort to provide the emergency facilities to the victims in the shortest time possible. In big organizations the drivers make illegal use of the vehicles thus resulting in financial, time loss of the organisation. Apart from these purposes the system can be used for tracking of stolen vehicles or travelling luggage, fleet management and vehicular sales etc. The system incorporates a single-board embedded system that contains GPS and GSM modems connected with a microcontroller. The entire set-up is installed in the vehicle. A vibration sensor is used. It measures the vibration at the location it is placed. The signal is then compared with the standard values which further confers the accident of the car, unnecessary shock or vibration produced by machines, tilt of the car with respect to the earth's axis can be identified with the level of acceleration. Global Positioning System (GPS) is used to identify the location of the vehicle. GSM is used to inform the exact vehicular location to the precoded numbers. Message will give longitude and latitude values. From these values location of accident can be determined. GSM modem provides a two way communication by using a sim card. Such a module works the same as a regular phone. The project aims at intelligent security system providing situational awareness and agile safety.

II. BLOCK DIAGRAM-

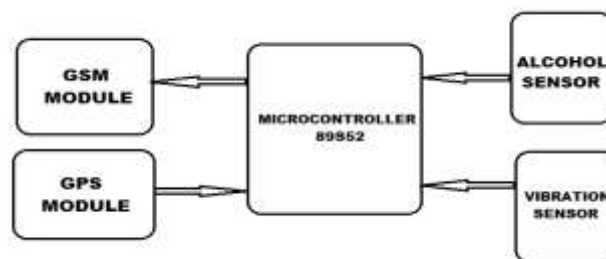


Figure1. Functional Block Diagram

The system incorporates 89S52 microcontroller, Alcohol sensor, vibration sensor, Global Positioning System (GPS), Global System for Communication (GSM). The vibration sensor works on the piezoelectric property of the crystals and produces an electric signal as it senses vibrations of the unit and gives the signal as input to the microcontroller. The controller analyses the signal with its output given to relays. A relay is an electrically operated switch. It is used where electrical isolation is to be provided between

controlled and controlling system. In running condition the 1st relay is in normally closed state and is connected to the car's engine. It ensures that the vehicle runs under the normal working condition. As soon as an accident is detected, that is if the sensor signal values deviate from the specific limits then microcontroller gives an active high signal. The relay's connection gets opened and the engine will stop working, thus stopping the car. Another relay is connected to the air-bag and it is in normally open state. The air compressor is activated and airbag blows as soon as the controller signal goes high. At every instant the current location of the vehicle is sent by the GPS's receiver to microcontroller. GSM sends a message to previously coded numbers. GSM is connected to microcontroller with the accident location details. MAX232 IC converts signals from an RS-232 serial port to signals suitable for use in TTL compatible digital logic circuits. It synchronizes baud rates of microcontroller and GSM modem.

A. Vibration Sensor

Here a simple **Vibration sensor** to protect door or window is used. It generates a loud beep when somebody tries to break the door or window. The alarm stops automatically after three minutes. The circuit uses a piezoelectric element as the vibration sensor. It exploits the piezoelectric property of the piezo electric crystals. The piezoelectric effect may be direct piezoelectric effect in which the electric charge develops as a result of the mechanical stressor or indirect piezoelectric effect (Converse piezoelectric effect) in which a mechanical force such as vibration develops due to the application of an electric field.

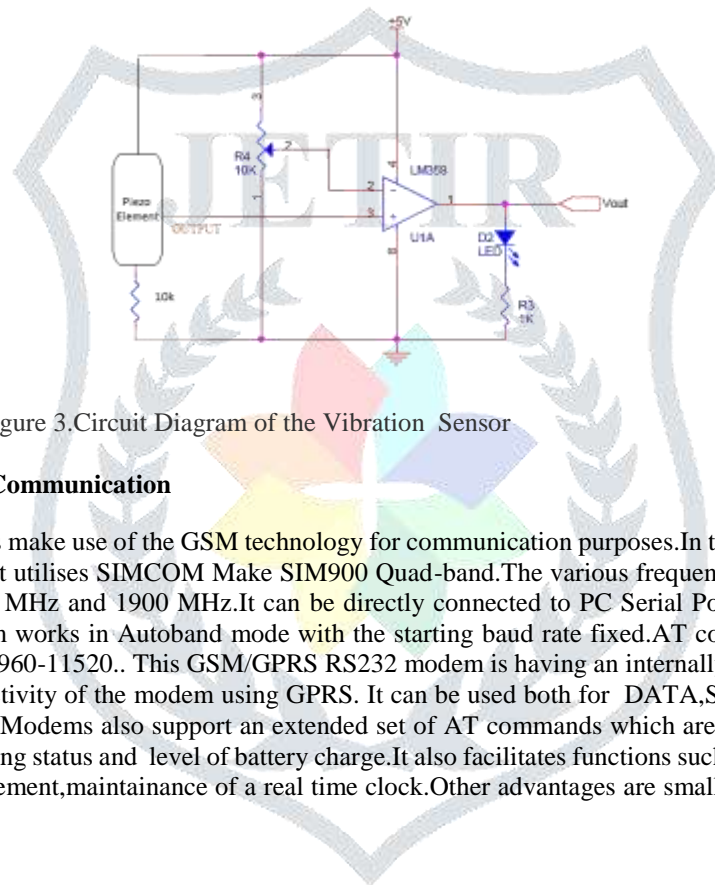


Figure 3. Circuit Diagram of the Vibration Sensor

B. Global System for Mobile Communication

Most modern cellular networks make use of the GSM technology for communication purposes. In the project we use RS232 module manufactured by rhydoLABZ. It utilizes SIMCOM Make SIM900 Quad-band. The various frequencies on which the modem works are 850 MHz, 900 MHz, 1800 MHz and 1900 MHz. It can be directly connected to PC Serial Port as it has inbuilt RS232 Level converter circuitry. The modem works in Autoband mode with the starting baud rate fixed. AT commands can be used for setting various baud rates ranging from 960-11520. This GSM/GPRS RS232 modem is having an internally available TCP/IP stack can be used to provide internet connectivity of the modem using GPRS. It can be used both for DATA, SMS transfers. In addition to the standard AT commands, GSM Modems also support an extended set of AT commands which are useful for reading, editing SMS messages, monitoring the charging status and level of battery charge. It also facilitates functions such as manipulation of phone book entries, SIM Phonebook management, maintenance of a real time clock. Other advantages are small size and easiness to use as plug in GSM Modem.

C. Global Positioning System

The System (GPS Global Positioning) is a navigational system that uses a network of 24-32 satellites to determine the exact position of any object on earth. The satellites are positioned in orbits about an altitude of 12,000 miles from the earth surface. The satellites send microwave signals which are collected by GPS receivers. The collected information is used to infer the distance using velocity and time.

D. Microcontroller

The microcontroller being used here is AT89S52. It belongs to the 8051 mc family. It is a 40 pin device. All 8051 microcontrollers have 4 I/O ports each comprising 8 bits which can be configured as inputs or outputs. Accordingly, in total of 32 input/output pins enabling the microcontroller to be connected to peripheral devices are available for use. Pin configuration, i.e. whether it is to be configured as an input (1) or an output (0), depends on its logic state, in order to configure a microcontroller pin as an input, it is necessary to apply a logic one (1) to appropriate port. In this case, voltage level on appropriate pin will be 5V (as is the case with any TTL input).

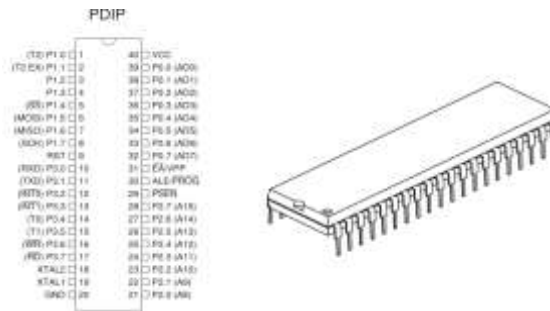


Figure4. Pin Diagram of AT89S52 microcontroller.

Flowchart :-

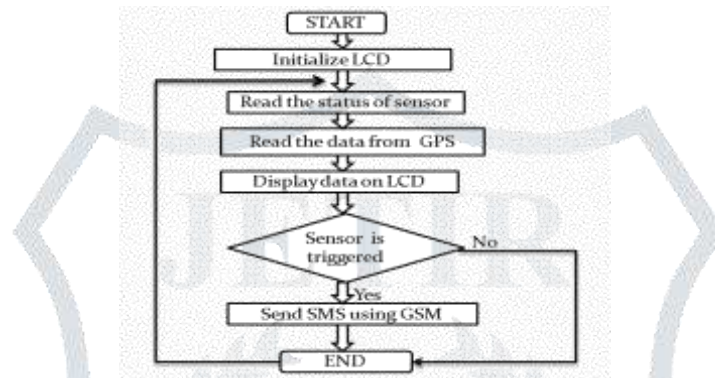


Figure 5. Operational Flow Chart.

III. LITERATURE REVIEW:-

Some of the previous important literatures which have been studied are discussed below.

Ashish Kushwaha et al. in [1] have proposed GPS And GSM Based Accident Alarm System. The purpose of this work is to find the vehicle accident location by means of sending a message using a system which is placed inside the vehicle system. Author has used assembly programming for better accuracy along with GPS and GSM. In this project, whenever a vehicle meets with an accident immediately vibration sensor will detect the signal and send it to the microcontroller. Microcontroller sends the alert message through the GSM to an authorized mobile no. An alternate condition can be allowed by pressing a switch, in order to interrupt the flow of sending the message in case of no casualty.

Hu Jian-ming, Li Jie, Li Guang-Hui et al. in [2] proposed a stolen vehicle recovery system. The system ensured increased 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.

C. Prabha et al. in [3] have presented Automatic Vehicle Accident Detection and Messaging System Using GSM and GPS. In this paper an accelerometer can be used in a car alarm application so that dangerous driving can be detected. This paper is useful in detecting the accident precisely by means of both vibration sensor and Micro electro Mechanical system (MEMS) or accelerometer. In this project GPS is used for tracking the position of the vehicle, GSM, ARM controller is used for saving the mobile number in the EEPROM and sending the message to it when an accident has occurred.

T. Krishna Kishore et al. in [4] emphasized on a system that is cost effective and also inculcates the modern internet facility for networking purposes. Linux operating system has been used along with General Packet Radio Service (GPRS). Advancements include more exact identification of the vehicle location at all times, data transfer facilitation, and freedom from software monitoring.

Nirav Thakor et al. in [5] have presented Automatic Vehicle Accident Detection System Based on ARM & 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 modem, which contains the co-ordinates values. One more facility is also provided which can be very handy during the critical times. If a person requires help due to other reasons 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 the user.

IV.CONCLUSION AND SCOPE:-

- This paper gives a design which has many benefits like low cost,portability,small size. This system uses the microcontroller in conjunction with vibration and alcohol sensor;GPS and GSM.interfacing which reduces the alarm time to a large level and give the location of accident accurately. It can also overcome the issue of lack of automated system for the detection of the site of accident. As a result, the time for detecting the site is reduced and the person can be treated as soon as possible which will save many lives. As per the above survey, the scope of the work can be listed as follows:
- A wireless webcam can be added in this for capturing the images which will help in providing driver`s assistance.
- This can also be bettered by locking all the brakes automatically in case of accident.Mostly in accidents, it becomes serious as the drivers lose control and fail to stop the vehicle. In such cases,the vibration sensor will be triggered because of the vibrations received and also processed by the processor. The processor has to be linked to the devices which can lock the brakes when triggered. With this improvement, we can stop the vehicle and can weaken the impact of the accident.
- This system can also be utilized in fleet management,food services,traffic violation caases,rental vehicle services etc.

V.ACKNOWLEDGEMENT

It gives us a great sense of pleasure to present the review paper of the B. Tech Project undertaken during B. Tech. Final Year. We owe special debt of gratitude to our supervisor Mr.DINESH KUMAR, Department of Electronics and Instrumentation Engineering, Galgotias College of Engineering & Technology for his constant support and guidance throughout the course of our work. His sincerity, thoroughness and perseverance have been a constant source of inspiration for us. It is only his cognizant efforts that our endeavors have seen light of the day.

Our deep sense of gratitude is accorded to Professor & Head PRAVEEN MADURI Head, Department of EIE for his constant official support, encouragement and motivation for our project work.

We wish to express our sincere thanks to our Project Coordinator Mr Gulshan Dubey and Project Incharge Mrs Jaspreet Kaur for the enthusiasm they transmitted, for their competence, as well as for the richness of their guidelines and invaluable suggestions throughout the project.

We also do not like to miss the opportunity to acknowledge the contribution of all faculty members and lab-Instructors of the department for their kind assistance and cooperation during the development of our project. Last but not the least, we acknowledge our friends for their contribution in the completion of the project.

[SHREYA GUPTA]

[SONALI SRIVASTAVA]

[SUMEET KUMAR]

VI. REFERENCES:-

- [1]. Ashish Kushwaha, Gaurav Katiyar, &Harshita Katiyar, Hemant Yadav, Saxena ‘GPS And GSM Based Accident Alarm System’ ;*National Student Conference On “Advances in Electrical & Information Communication Technology” AEICT-2014 .*
- [2]. Hu Jian-ming; Li Jie; Li Guang-Hui, "Automobile Anti-theft System Based on GSM and GPS Module," *Intelligent Networks and Intelligent Systems (ICINIS), 2012 Fifth International Conference on* , vol., no., pp.199,201, 1-3 Nov. 2012
- [3]. C.Prabha , R.Sunitha , R.Anitha ;Automatic Vehicle Accident Detection and Messaging System Using GSM and GPS Modem;International Journal of Advanced Research in Electrical,Electronics and Instrumentation Engineering.
- [4]. T. Krishna Kishore, T. Sasi Vardhan, N. Lakshmi Narayana “Vehicle Tracking using A Reliable Embedded Data Acquisition System with GPS and GSM” *International Journal of Computer Science and Network Security*, February 2010.
- [5]. NiravThakor, TanmayVyas, Divyang Shah; Automatic Vehicle Accident Detection System Based on ARM &GPS ;*International Journal for Research in Technological Studies ISSN: - Applied (Online) Vol-1, Issue - 1, Dec 2013.*
- [6]. Raj Kamal, “*Embedded System Architecture Programming and Design*” (2nd edition) ,Tata McGraw Hill.
- [7]. Sri Krishna Chaitanya Varma, Poornesh, Tarun Varma, Harsha; Automatic Vehicle Accident Detection And Messaging System Using GPS and GSM Modems; *International Journal of Scientific & Engineering Research*, Volume 4, Issue 8, August-2013.