# Arduino Based Vehicle Accident Alert SystemUsing GPS, GSM and MEMS Accelerometer

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ABSTRACT

The system works in conjunction with an Arduino (Microcontroller), GPS GY6MV2 beneficiary and GSM moduleSIM 800L to achieve this operation. TheRapid growth of technology and infrastructure has made our lives easier.The advent of technology has alsoincreased the traffic hazards and theroad accidents take place frequentlywhich causes huge loss of life andproperty because of the poor emergencyfacilities. Our project will provide an optimum solution to this draw back. An accelerometer can be used in a car alarm application so that dangerous drivingcan be detected. It can be used as a crashor rollover detector of the vehicle duringand after a crash. With signals from anaccelerometer, a severe accident can berecognized. According to this projectwhen a vehicle meets with an accidentimmediately Vibration sensor will detectthe signal or if a car rolls over, and Microelectro mechanical system (MEMS) sensor will detect the signal and sends it to ARMcontroller. Microcontrollersends the alert message through theGSM MODEM including the location to police control room or a rescue team. So,the police can immediately trace the location through the GPS MODEM,after receiving the information. Thenafter conforming the location necessaryaction will be taken. If the person meets with a small accident or if there is no serious threat to anyone`s life, then the alert message can be terminated by thedriver by a switch provided in order toavoid wasting the valuable time of themedical rescue team. This paper is useful in detecting the accident precisely by means of both vibration sensor and Micro electro Mechanical system (MEMS) or accelerometer. As there is a scope for improvement and as a future implementation, we can add a wireless webcam for capturing the images which will help in providing driver`s assistance.

## I. INTRODUCTION

Vehicle Tracking systems are very used in fleet management and asset tracking applications. Today these systems can not only track the location of the vehicle but canalso report the speed and even control it remotely. In general, tracking of vehicles is a process in which we track the vehicle location in form of Latitude and Longitude (GPS coordinates). GPS Coordinates are the value of a location. This system is very efficient for outdoor application purposes. This kind of Vehicle Tracking System Project is widely in tracking Cabs/Taxis, stolen vehicles, school/college buses, etc. In this project, weare going one step ahead with GPS buildinga GSM and GPS based vehicle tracking system using Arduino. This vehicle tracking system can also be used to track a vehicle using GSM and GPS.

- Now-a-days, it has become very difficult to know that an accident has occurred and to locate the position

where it has happened.

- The main intention of this project is to find the accident spot at any place and intimating it to the ambulance through the GPS AND GSM networks.

- The GPS based vehicle accident identification module contains MEMS, GSM module and a GPS modem connected to the microcontroller.

- GPS and GSM make the usage for intimation and identification of place.

- The approach that we have proposed in this paper basically focuses on three modules. They are:

1. Accident Detection
2. Location tracking of the vehicle.
3. Sending the alert messages

## II. LITERATURE SURVEY

Introduction to Vehicle Accident Detection System The advent of technology has also increased the traffic hazards and the road accidents. Due to the lack of best emergency facilities available in our country the lives of the people are under high risk. An automatic alarm device for vehicles is introduced in this paper which sends the basic information to the medical rescue team within a few seconds of an accident. This device can detect accidents and sends an alert message to rescue teams in significantly less time which will help in saving the lives of the people. The alert message contains the geographical coordinates, time and angle in which the accident has occurred. In cases where there is no casualty the message can be terminated with the help of a switch in order to avoid wasting the valuable time of the rescue team. Accident Prevention System In this project work, we have studied and implemented a complete working model using a Microcontroller. The programming and interfacing of microcontroller has been mastered during the implementation. This work includes the study of GSM and GPS modems using sensors. The biggest advantage of using this project is, whenever the sensor is 2activated, we will be getting the acknowledgement from GSM modem to our mobile numbers which are stored in EEPROM and GSM network operators have roaming facilities, and finding the location and sending information to user so that they can often continue to use their mobile phones when they travel to other countries etc.

Project Paper Analysis

The following is the list of patents analysed before designing the Accident Alert System. It helped us to understand the interfacing of various components used in the project, such as GSM and GPS modems, and also the practical implementation of such projects in real life. The analysis of these Research Papers helped to understand the current technologies prevalent in the field of accident notification system and to find better yet simpler alternatives to modernize such notification systems.

The following review related work show papers analysed along with the names of their inventors, applicants and publication number.

Review of Related Work

In the authors have developed car accident detection and notification system that has combined smart phones

with vehicles through the second generation of On-Board- Unit (OBD-II) interface to achieve smart vehicle modelling. The authors have developed an Android application that sent SMS to a pre-specified format with relevant data if an accident has encountered and could make an emergency call automatically. The OBD-II standard is mandatory since 2001 in the U.S and there is also a European version of this standard. So, this solution is applicable to all vehicles in the U.S and European countries but not available in all vehicles in other countries. Besides, the maintenance or upgrading process of this system is an expensive operation.

## III. METHODOLOGY

WORKING

i.  A sensor will sense the occurrence of an accident and give its output to the microcontroller. Here a button sensor is used for detection which will get pressed when the vehicle meets with an accident.

ii.  A buzzer is present in this system with starts beeping indicating that the system is now activated.

iii.  The GPS detects the latitude and longitudinal position of the vehicle. It is essential to locate the position to provide medical assistance.

iv.  The phone numbers are pre saved in the EEPROM by the user. These numbers can be changed at any point of time.

v.  The microcontroller sends an alert message to these pre saved numbers using the GSM module. Any message can be pre entered in the system by the user.

vi.  A LCD screen displays the status of the output.

In case there is no casualty, the sending of the message can be terminated with the help of a switch. The switch will restart the microcontroller and its function will start from the beginning.

GSM- Global System for Mobile Communication

GSM is an open, digital cellular technology used for transmitting mobile voice and data services. The GSM system is the most widely used cellular technology in use in the world today. It has been a particularly successful cellular phone technology for a variety of reasons including the ability to roam worldwide with the certainty of being able to operate on GSM networks. It is also highly economic and less expensive.



Fig-1: GSM Module

GPS- Global Positioning System

GPS(Global Positioning System) is a satellite navigation system used to determine the ground position of an object.It is a global navigation satellite system that provides geolocation and time information to a GPS receiver

anywhere on or near the Earth. Here GPS is used for both tracking and navigation. This enables a base station to



keep track of the vehicles and navigationsystem helps the driver to reach thedestination.

Fig-2: GPS Tracking System

## IV. HARDWARE DESCRIPTION

SENSOR: A button sensor is used here as accident detection sensor. This sensor is pressed when an accident occurs whichactivates the device. The sensor sends a message to the microcontroller.

MAX232: The MAX232 is a dual transmitter/dual receiver that typically is used to convert the RX, TX, CTS and RTS signals. It is an integrated circuit which converts the signals from the RS232 serialport to the proper signal which are used in the TTL compatible digital logic circuits.

BUZZER: A buzzer is an electrical device that makes a buzzing noise and is used for signalling. The buzzer beeps when an accident occurs to indicate that the device has been activated.

EEPROM: The phone numbers of police and relatives can be stored in EEPROM by the user which can be changed anytime. The data stored will retain evenif the power is off for long time.

GPS: The GPS detects the latitude and longitudinal positions of the vehicle. It is used for both tracking and navigation, GPS receiver can pinpoint the location using a process called trilateration.

GSM: The GSM sends the message withthe location to the pre saved numbers. It is also used to control and monitor the transformer load from anywhere by sending a message.

LCD: The LCD screen is used to displaythe operating instructions and status of theoutput.

**RESET**

The reset button is used to resetthe microcontroller at any stage of work. It can be used to terminate the sending of the message. If the reset switch is pressed, the microcontroller restarts and the function will start from the beginning. The reset button is used to reset the microcontroller at any stage of work. It can be used to terminate the sending of the message. If the reset switch is pressed, the microcontroller restarts and the function will start from the beginning.
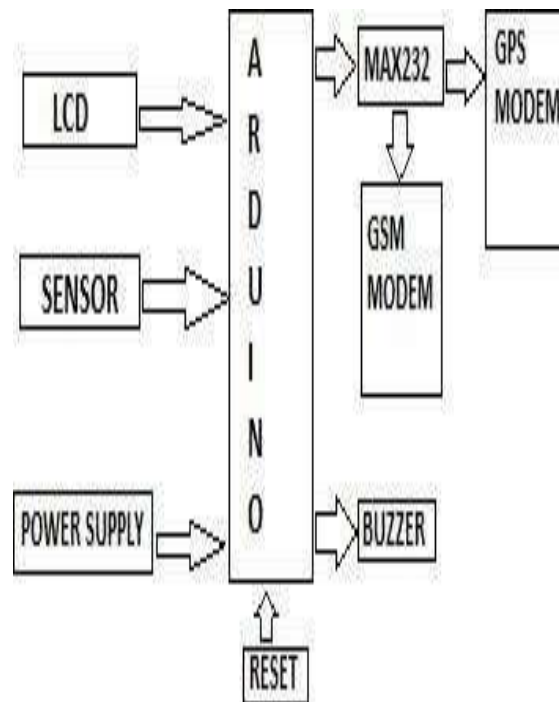
Fig-3: Block Diagram

## V. ADVANTAGES

Provides security against theft

i. Monitors hazards and threats.

ii. Alerts police and medical unitsabout accidents.

iii. Simple design and can be interfaced with other systems.

iv. Easy to operate by the user.

v. Reliable system.

## VI. APPLICATIONS

i. Stolen Vehicle Recovery: In case of theft, the vehicle can be tracked by using vehicle positioning system. The GPS system allows the tracking of vehicle from anywhere.

ii. Airbag System: This system can be interfaced with vehicle airbag system for safety. When an accident occurs both the systems will be activated for the safety of the victim.

Bomb Detection: This system can be used for bomb detection by connecting it to a bomb detector. The buzzer can be used toalert the presence of a bomb in the vehicle.

iv. Fleet Management: When managing a fleet of vehicles, knowing the real-time location of all drivers allows management to meet customer needs more efficiently. Whether it is delivery, service or other multi-vehicle enterprises, drivers now only need a mobile phone with telephony or Internet connection to be inexpensively tracked by and dispatched efficiently.

## VII. CONCLUSION

This system provides the optimum solution to poor emergency facilities provided to victims in road accidents in the most feasible way. With the help of this technology immediate action can be taken when an accident occurs by alerting the respective people by sending a message. The drawback with this system is that it does not work without network. So in areas where no network is available the system will not be able to send the alert message. The proposed method is highly beneficial to the automotive industry. This will help the medical teams to reach the accident spot in time and save the valuable human lives. There is always scope for new improvements by interfacing it with different systems.

## REFERENCES

1) Yellamma Pachipala1, Tumma srinivasRao2,

2) G Siva Nageswara Rao3, D Baburao4," An IoT Based Automatic Accident Detection and Tracking System for EmergencyServices", Jour of Adv Researchin Dynamical & Control Systems, Vol. 12, Issue-02, 2020, PP:111-117, DOI:10.5373/JARDCS/V12I2/S2022 Elie Nasr, Elie Kfoury, David Khoury,"An IoT Approach to Vehicle AccidentDetection, Reporting, and Navigation", IEEE Explore

3) Gowshika , Madhu Mitha and Jayashree

4) ,"Vehicle Accident Detection System By Using GSM And GPS" IRJET ,2019.

5) Himanshu Arora , Samyak Jain , SanketAnand - Real Time Safety Alert System for Car published in the year 2019 in IEEE.

6) Rajvardhan Rishi , Sofiya Yede, Keshav Kunal, Nutan V. Bansode - Automatic Messaging Model for tracking vehicles and Accident Detection published in IEEE in the year 2020

7) J. White, C. Thompson, H. Turner, B. Dougherty, and D. C. Schmidt, "Wreckwatch: Automatic traffic accident detection and notification with smartphones," *Mobile Networks and Applications*, vol. 16, no. 3, pp. 285-303, 2018

8) J. Zaldivar, C. T. Calafate, J. C. Cano, and P. Manzoni, "Providing accident detection in vehicular networks through OBD-II devices and Android-based smartphones," *in 2011 IEEE 36th Conference on Local Computer Networks*, 2011: IEEE, pp. 813-819.