

# Vehicle Accident Alert System

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**Abstract**— *The advancement of technology has made our lives easier. Any technology has its advantages as well as its disadvantages. The advancement in automobile technology has increases the rate of road accidents which causes huge loss of life. Keeping this in our mind we have prepared a project, 'Vehicle Accident Alert System' which may provide a solution of this problem to some extent. Here we have used Arduino, GPS (Global Positioning System), GSM (Global System for Mobile Communication) and Accelerometer. Accelerometer detects the sudden change in the axes (X, Y, Z direction) of vehicle and GSM (Global System for Mobile Communication) module send the alert message on specified Mobile Phone with the location of the accident.*

**Keywords**— *Arduino, GPS, GSM, Accelerometer*

## I. INTRODUCTION

Now a days with the increase of population and advancement in automobile industry the number of vehicles in the road increases which leads the traffic jams and road accidents [4]. In the entire world 80% death is caused by vehicle accident. This is because of the lack of best emergency facilities available in our country [3]. Keeping this in our mind we decided to develop a project 'Vehicle accident alert system' which can mitigate the loss of lives. It can detect accidents in significantly less time and sends the basic information about the accident such as geographical coordinates and the time of the vehicle accident to first aid center, nearest police station and relatives. As this alert message will reach to the rescue team in a short time, they will be able to rush to the place quickly which will help in saving the valuable lives.[4][6]

To prepare the prototype of this project we have used Arduino UNO as microcontroller unit which is the brain of this project along with GSM module (Global System for Mobile Communication), GPS module (Global Positioning System) LCD (Liquid Crystal Display) and ADXL335 which is an accelerometer sensor.

## II. METHODOLOGY

The Prototype of this Vehicle Accident Alert System uses the following steps:

1. ADXL335 is an accelerometer sensor which is used to detect the vibration in X, Y, Z axis of the vehicle. The vibration limit is pre stored in the EEPROM (Electrically Erasable Programmable Read-Only Memory). If the vibration level increases the pre stored vibration limit then ADXL335 accelerometer will send signal to microcontroller unit. This sensor

has 5 pins VCC, GND, X, Y, Z which are connected to Digital Pins of Arduino.

2. GPS module (GLOBAL POSITIONING SYSTEM) is used to detect exact geographical Location
3. (Latitude & Longitude) where the accident happened. It collects coordinates from satellite for each and every second with time and date and sent as message to the rescue team through GSM. It has 4 pins VCC, GND, RX, TX which are connected to Arduino.
4. GSM MODULE (GLOBAL SYSTEM FOR MOBILE COMMUNICATION) is used to send SMS to Victim's family member. It consists of SIM slot in which SIM can be inserted. When accident happened, microcontroller receive data from GPS and transmit to GSM. Then it sends SMS to the mobile numbers which are pre stored in the EEPROM.
5. LCD DISPLAY – Here we have used 16\*2 LCD Display. It is used to show different functions, Latitude & Longitude and some other information that helps understand whether the system is working properly or not.
6. POWER SUPPLY – For running all the modules, we need a power supply. Here Arduino, ADXL335, LCD Display works on 5V. GPS, GSM works on 12V. So, we have used 12v Power adapter and rest with good quality power bank which provide output of 5v.
7. Last but not the least the microcontroller which controls the entire circuit module that has been used in this project.

## III. PRODUCT SPECIFICATIONS

### A. ARDUINO UNO

The Arduino Uno is a microcontroller board based on the ATmega328. It has 20 digital input/output pins (of which 6 can be used as PWM outputs and 6 can be used as analog inputs), a 16 MHz resonator, a USB connection, a power jack, an in-circuit system programming (ICSP) header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.



1	Operating voltage	5V
2	DC current per I/O Pin	40mA
3	DC current for 3.3 volt Pin	50mA
4	Clock frequency	16 MHz

**B. GSM Module**

GSM is a mobile communication modem; it stands for global system for mobile communication (GSM). The idea of GSM was developed at Bell Laboratories in 1970. It is widely used mobile communication system in the world. GSM is an open and digital cellular technology used for transmitting mobile voice and data services operates at the 850MHz, 900MHz, 1800MHz and 1900MHz frequency bands.

GSM system was developed as a digital system using time division multiple access (TDMA) technique for communication purpose. A GSM digitizes and reduces the data, then sends it down through a channel with two different streams of client data, each in its own particular time slot. The digital system has an ability to carry 64 kbps to 120 Mbps of data rates.



**C. ADXL335 Accelerometer Module**

An accelerometer is an electromechanical device that will measure acceleration force. It shows acceleration, only due to cause of gravity i.e. g force. It measures acceleration in g unit. The ADXL335 gives complete 3-axis acceleration measurement.

- This module measures acceleration within range  $\pm 3$  g in the x, y and z axis.

- The output signals of this module are analog voltages that are proportional to the acceleration.

- It contains a polysilicon surface-micro machined sensor and signal conditioning circuitry.



Pin configuration

VCC: Power supply pin i.e. connect 5V here.

X\_OUT: X axis analog output.

Y\_OUT: Y axis analog output.

Z\_OUT: Z axis analog output.

GND: Ground pin i.e. connect ground here.

ADXL335 accelerometer provides analog voltage at the output X, Y, Z pins; which is proportional to the acceleration in respective directions i.e. X, Y, Z.

**D. GPS Module**

GPS stands for Global Positioning System by which anyone can always obtain the position information anywhere in the world.

**NEO-6MV2 GPS Module Pin Configuration**

The module has four output pins and we will describe the function each pin of them below. The powering of module and communication interface is done through these four pins.

Pin Name	Description
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VCC	Positive power pin
RX	UART receive pin
TX	UART transmit pin
GND	Ground

**E. LCD display**

LCD modules are very commonly used in most embedded projects, the reason being its cheap price, availability and programmer friendly. Most of us would have come across these displays in our day to day life, either at PCO's or calculators. The appearance and the pinouts have already been visualized above now let us get a bit technical.

16x2 LCD is named so because; it has 16 Columns and 2 Rows. There are a lot of combinations available like, 8x1, 8x2, 10x2, 16x1, etc. but the most used one is the 16x2 LCD.

**Features**

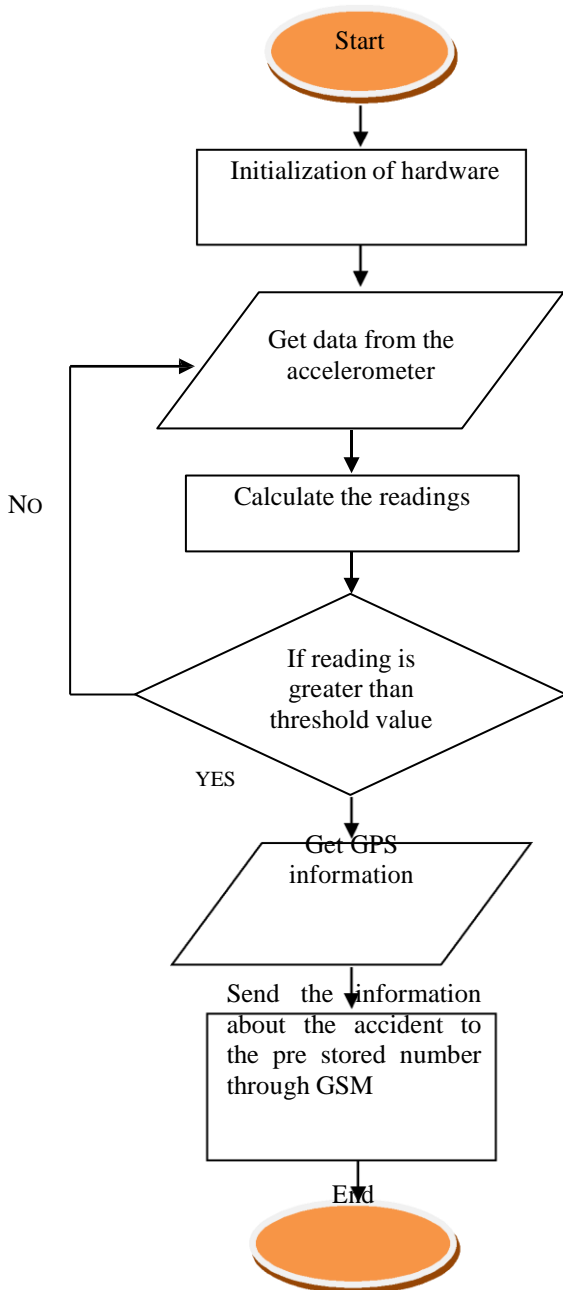
- Operating Voltage is 4.7V to 5.3V



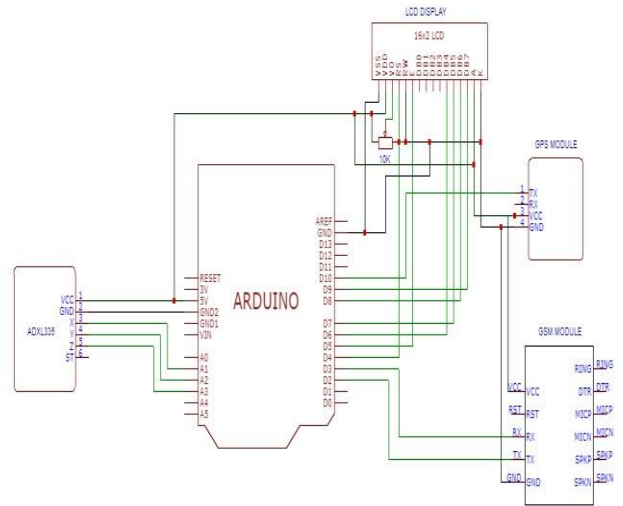
- Current consumption is 1mA without backlight

- Alphanumeric LCD display module, meaning can display alphabets and numbers
- Consists of two rows and each row can print 16 characters.
- Each character is build by a 5×8 pixel box
- Can work on both 8-bit and 4-bit mode
- It can also display any custom generated characters
- Available in Green and Blue Backlight

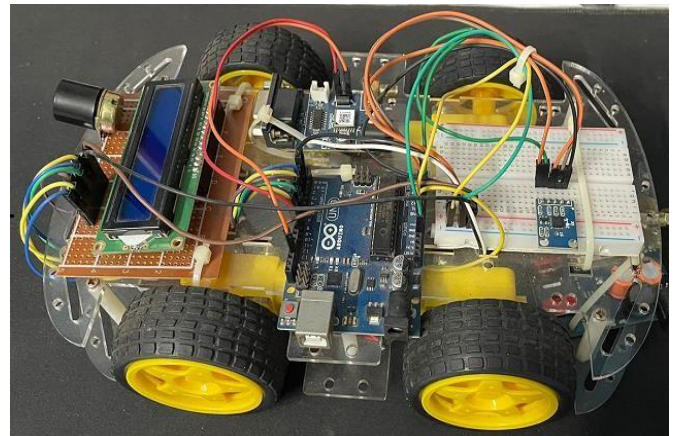
IV. FLOW CHART



VI. CIRCUIT DIAGRAM



VII. HARDWARE STRUCTURE OF THE PROJECT



VIII. ADVANTAGES

- System is reliable.
- Design is simple and can be interface in any system easily.
- Alerts police and medical units about accidents.
- Easy to operate and maintenance.
- Easy to operate by the user.
- As each module are separated to each other to it is easy to identify the fault.

IX. DISADVANTAGES

- If the phone battery is dead by any means, then it can't able to provide information about the accident to those pre stored number.
- If the vehicle faces an accident in the tunnel or in underground road, the GPS module may not be able to provide exact location.

Though the research work is going on for tracking the position of the vehicle even in dark clumsy areas where there is no network is available.

#### X. FUTURE SCOPE

In future few features can be added to improve its functionality:

1. A wireless webcam can be added to capture the images which will help in providing driver's assistance.
2. We can minimize the impact of the accident by using auto breaking system.
3. Also, we can modify it by using the concept of engine locking system if the pollution level of the vehicle exceeds the desired level.

#### XI. CONCLUSION

The aim of his project is to detect accident and provide automatic emergency assistance services. This system will send SMS to the nearest Emergency assistance service provider as well as to the relatives of the victim from accident location with exact latitude and longitude. If this feature can implemented in vehicles the death rate caused by accidents can be reduced.

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