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# Vehicle Accident Detection, Prevention and Tracking System

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**Abstract -** *Abstract- The expanding number of road mishaps is because of an expanding populace and a huge number of vehicles on the street. We can't stop mishaps yet we can find a way to forestall it. As indicated by the statistics, an enormous number of individuals lose their life since they don't get legitimate or quick assistance. This paper presents a method to prevent and provide the necessary help immediately. This is an IoT(Internet of Things) based system consisting of Arduino board, Ultra Sonic sensor, temperature sensor, accelerometer GPS(Global Positioning System) module, and GSM(Global System for Mobile communication) module. At the point when an accident will happen, the location of the accident is detected by a GPS module and an alert message will be sent with location via GSM module to the registered mobile numbers. This alert message will help in giving quick assistance to the victim. The response time of the proposed device is too little, it implies when the vehicle meets mishap, within a couple of moments the message is transmitted, hence helps in saving the lives of a large number of people.*

***Key Words***: *IoT, GSM, GPS, Ultra Sonic sensor, Accelerometer, temperature.*

## 1. INTRODUCTION

With the headway of innovation, it has seemed, by all accounts, to be both a gift and blast. Innovation has filled our heart with joy to day life simple, then again; it has additionally showed up as a danger to human life. Insights show that consistently more than 1.25 million individuals lose their life because of street mishaps.

The presented paper is based on IOT. This framework is utilized to detect the location of the vehicle and prevent the vehicle from an accident by the use of an alarm. The person needs to introduce the application in their cell phone and register by giving the immediate contact numbers to which the alarm message would be sent. For eg., if the driver feels sluggish while driving and the vehicle is going to be smashed, the alarm buzzes, which makes the driver mindful of his status. This application uses GPS for locating the position of the vehicle. Through this it is additionally conceivable to compute the distance traveled by the vehicle in 'X' seconds by means of its coordinates. To begin sending location to the server, the user has to first login to the application on his phone via the credentials used during the registration.

### 1.1 Arduino Mega 2560 Microcontroller Board

Arduino Mega 2560 consist of 54 digital input/output pins and 16 analog inputs. This Arduino Microcontroller board also features 16MHz crystal oscillator, 4 UARTs (hardware serial ports), a power jack, an In-Circuit Serial Programming (ICSP) header, a USB connection and a reset button.

### 1.2 GSM Module

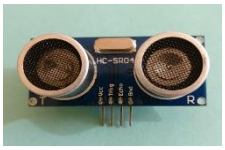
A GSM module put together a GSM modem with standard communication interfaces like RS-232, USB etc., so that it can be easily linked with a computer or a microcontroller based system. The power supply circuit is likewise made in the module that can be triggered by using a viable adaptor.

### 1.3 GPS Module

By using the GPS device anyone can easily get the position coordinates of the device present anywhere on the globe. To process this, what all required is to associate the 'TX' (Transmitter) pin of the GPS to the 'RX' (receiver) pin on the microcontroller.

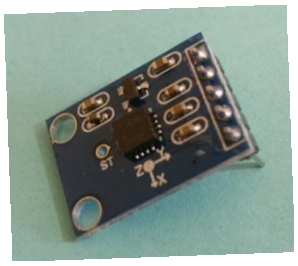
### 1.4 Ultra-Sonic Sensor

Ultra-Sonic is an instrument used for measuring the distance to an object by the use of ultrasonic sound waves.



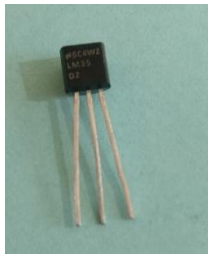
The device consists of two significant components- Triggers and Echo. Trigger is like a transmitter, it sends a wave from the device. Echo is a receiver. The wave transmitted from the trigger gets reflected back after hitting the object and echo receives that wave, thus calculating the distance.

### 1.5 ADXL335 Accelerometer Module



An accelerometer is an electroic device which is used to measures the acceleration force. The device will calculate acceleration simply due to cause of gravity i.e. g force. It measures acceleration in g unit. The accelerometer can be used for tilt-sensing applications as well as dynamic acceleration resulting from motion, shock, or vibration.

### 1.6 LM35 temperature sensing element



The LM35 is a reasonably frequently used temperature sensor that can be used to measure temperature with associate degree electrical output comparative to the temperature (in °C). The LM35 has an output voltage that's proportional to the Celsius temperature.

The paper is organized in the following sections: Section I contains the introduction of paper and details about the devices being used, Section II notifies about the related work, Section III explains the process flow of the system, Section IV described the Results and Analysis done, Section V is the conclusion and Section VI contains the future scope of the work done.

## 2. Related work

Patole Gitanjali and team [1] created a case study "IOT based Vehicle Tracking & Vehicular Emergency System" which focuses on the Architectural functioning of different units of the System which include the Vehicle and Ambulance Unit, Traffic and Server Unit. "Smart on-board transportation management system Geo-Casting featured", by Saed Tarapiah and team [2] aims to send the notification regarding the Geographical Location of the Vehicle to the Subset. Aishwarya and others [5] implemented a system "An IoT Based Accident Prevention & Tracking System for Night Drivers" in which the primary role of the device proposed is to provide an Eye Blinking Monitoring System (EBMS) that alerts the night drivers during drowsiness. Parveen Sultana and the team imported their work by creating the recording equipment which gets connected to the cloud to produce continuous updates which helps to tell the closest hospital of a crash instantly [6].

The work carried by M.Kavya and Shakeel Ahmed in "IOT BASED REAL-TIME AUTONOMOUS VEHICLE TRACKING SYSTEM" [8] is a study which would inform about an accident that just happened to the rescue team and to the relatives of the person who met with the accident. It uses MEMS sensor which may find the abrupt vibration once an accident is occurred and additionally used ultrasonic sensors for distance calculation.

The project "Arduino premised Vehicle Accident Detection System" by Pooja Shindalkar and the team uses an accelerometer device that may sight the unevenness of vehicle associated vibrations once an accident occurs. This sends a symbol to the microcontroller. Vehicle accident detection system victimization GSM and GPS modems are completed. Messages notifications are unit sent to the mobile number which is prescribed. [12]

"Accident Alert and Vehicle Tracking System" by Priyanka and the team proposed a work in which the system is represented as the foremost application of early accident detection. It will automatically sight traffic accidents by applying vibration sensors and immediately inform a central emergency dispatch server that an accident had occurred by making use of GPS coordinates. In conjunction with that information it will send an ambulance that is closest to the accident location. The technique uses devices named Raspberry Pi, Vibration Sensors, GPS and GSM modules to discover traffic accidents. [16]

## 3. Process Flow

**IoT Device:**

The device comprises of different sensors which are Ultra sonic sensor, Accelerometer, Temperature sensor, GSM module and GPS module. All these sensors and modules are combined and connected to each other through Arduino board, which is the Microcontroller.

**Accident Detection:**

The main advantage of this system is that along with the detection of an accident it is also capable of preventing it. The Ultra sonic sensors situated at all the 4 sides of the vehicle will prevent the car from being too close from any object. If in case car meets an accident or small scale collision, the device will detect the accident.

**Ultra-Sonic:**

Ultra-sonic will compute the distance between your vehicle and the surroundings. If any object or vehicle draws close to the set limit, it will buzz an alarm which will only turn off if you maintain the specified distance.

**Accelerometer:**

Accelerometer will trace the X, Y and Z coordinates of the vehicle. These coordinates will help in detecting whether the vehicle is left, right or top tilted. This will also help in detecting the amount of damage during the accident.

**GPS Module:**

GPS module will trace the location of the vehicle after every 30 seconds by satellite so that if vehicle is fully damaged and all the sensors including the car is destroyed, at least the recent location is tracked.

**GSM Module:**

GSM module is used to send a message with the current location. When the accident is detected, it will send an alert message to respective people, nearby police station and hospital.

**Message Sent:**

All the data from the sensors, the message sent and the location are stored in Cloud storage. The alert message will be sent to the people whose mobile numbers would be listed during the time of registration.

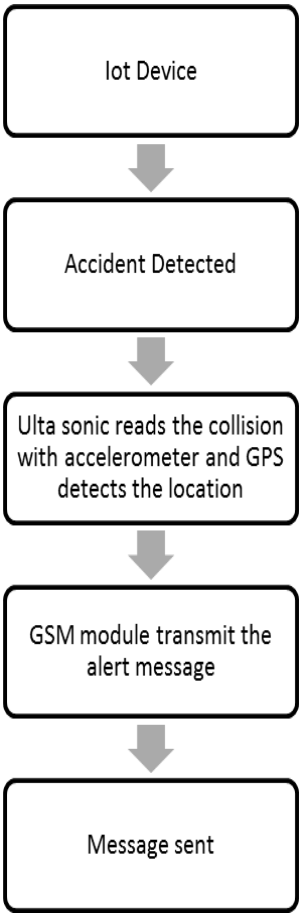



Figure 1. System Flow

## 4. Results and Analysis

The system was run on the prototype corresponding to the paper and produced positive results. As a matter of fact, the assembling of this system in the vehicle will increase the vehicle cost but this as preventive measure would prove to be very propitious. The proposed system is found to be highly beneficial in terms of determining the accident status and to provide the immediate rescue to the injured person.

```
OBJECT TOO CLOSE
distance= 19
Xsensor1 = 350    output1 = 87
Ysensor2 = 366    output2 = 91
Zsensor3 = 417    output3 = 103
right side damaged

OBJECT TOO CLOSE
distance= 14
Xsensor1 = 349    output1 = 86
Ysensor2 = 362    output2 = 90
Zsensor3 = 417    output3 = 103
right side damaged
```

Figure 2. Observation

Figure 2 depicts the results of the Arduino Board Serial Monitor. It shows the readings of Ultrasonic Sensor and the Accelerometer. When an object comes way too close to the vehicle, it shows the alert message. Explaining the results from Fig. 2 in the following table (Table 1)

| S.no | Alert Message | Distance (cm) | XSensor | | YSensor | | ZSensor | | Damaging Statement |
|---|---|---|---|---|---|---|---|---|---|
| | | | L | O | L | O | L | O | |
| 1. | OBJECT TOO CLOSE | 19 | 350 | 87 | 366 | 91 | 417 | 103 | Right side damaged |
| 2. | OBJECT TOO CLOSE | 14 | 349 | 86 | 362 | 90 | 417 | 103 | Right side damaged |

Table 1. Detailed Explanation of Figure. 2

L – Set Limit for sensor

O – Output

## 5. CONCLUSIONS

As per the study, this can be observed that a variety of tasks have been done till now in this field. Many performed the tasks to detect the accident, detect the location of accident, giving alert message to the driver etc.

In this project, the system "Vehicle Accident Prevention, Detection and Tracking System" is designed by using GSM and GPS. When an accident occurs, the coordinates of the location of accident obtained by GPS, are sent via GSM network to the registered mobile numbers. This paper provides the work to not only detect an accident but also to prevent that.

The implementation of the system to the vehicle would lead to increased vehicle cost on one hand, but on the other hand would also increase the chances of being safe on road and preventing one from any mishap. The proposed system is found to be highly beneficial in terms of determining the accident location to provide the immediate rescue to the injured person.

## 6. FUTURE SCOPE

Vehicle mishaps are increasing day by day. Therefore, it becomes extremely important to find a way to reduce it. From this paper it can be observed that such a system can spare numerous lives. As of now, the system is using the location based on GPS and employing an alert message by the GSM module. This system can be expanded in the future by integrating it with Google Maps. Another up-gradation could be in the message sending module. Apart from sending the message to the registered numbers only, an alert message would likewise be sent to the nearby available ambulance or the hospitals.

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## BIOGRAPHIES

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