



# Accident Detection & Alert System

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## ABSTRACT

*This project presents an automotive localization system that utilizes GPS and GSM-SMS services. The system enables the localization of the automobile and transmits its position to the owner's mobile phone via SMS upon request. Additionally, it can be integrated with the car alarm system to alert the owner on their mobile phone. The tracking system is composed of a GPS receiver, a microcontroller, and a GSM modem. GPS Receiver gets the location information from satellites in the form of latitude and longitude. The microcontroller processes this information, and the processed information is then sent to the user/owner using the GSM modem. The presented application is a low cost solution for accident prevention using Alcohol detection for monitoring adolescent drivers by their parents as well as in car tracking system applications. The proposed solution can be used in other types of application, where the information needed is requested rarely and at irregular period of time (when requested).*

## 1. INTRODUCTION

The major death rates in the world are due to the road accidents. India faces the highest death rate in the world. Reasons for the accident are speed driving, lacking sufficient sleep, drink and drive. Automatic accident detection helps to recognize the location of the accident and to find the location of the accident. For an ambulance vehicle, every second is important. If there is a delay in the arrival of ambulance, there will be a loss of life. Delay is caused mainly because of the traffic signals. Therefore, time factor is an important task. Radio Frequency module is used to control the traffic signals automatically. Therefore, the ambulance vehicle will reach the hospital in exact time to save the human. In addition, the main goals for the automatic accident detection techniques are to detect the accident and to

send the message automatically to the emergency contacts along with the location. Emergency contacts include family members, friends, hospitals, police station etc. The incidents of accidental deaths have shown increasing trend during the year 2000-2015 with an increase of 50 percent in the year 2010 as compared to the year 2000.

According to Planning Commission of India, the total annual economic loss is 2.5% of India's GDP due to rising number of road fatalities. Another important reason can be improper medical help. Survey shows that each minute that an injured crash victim does not receive emergency medical care can cause into fatality. Most victims lose their lives due to such reasons. Therefore, this idea of saving lives by curing the problem comes into existence. Real-time position of the vehicles are

informed by the system using the pre-install smart sensing accelerometer equipment. This data is recorded and all the information can be observed by remote location to provide the required services to the victims.

Tracking of the vehicle can be done in all-weather condition. GPS and GSM technologies are used in this system to provide all the data to the remote server which are then processed and the extracted information is used to provide the services to the individual at the time of emergency. The main contributions of this paper are: ( ) Vehicle registration and preparation, (b) Passengers registration, (c) Monitoring accidents through a web interface located in the PSO headquarter.

**Overview of the project:**

In the case of an accident the system detects it using the fact that the vehicle would be suddenly decelerated in such a condition. An accelerometer continuously monitors the acceleration of the vehicle and will detect decelerations greater than threshold value and send the data to the microcontroller via an ADC.

**Objective:**

The main aim of the project is to design and develop a system to monitor the vehicle status, quickly and accurately detect when an accident has occurred and alert the appropriate authorities or emergency services as quickly as possible. Certainly, if the accident happens due to other cases, the used electronic devices will be able to provide the spontaneous message and exact location to police and ambulance in order to recover victims. Avoiding casualties caused by road accidents is the main goal of this paper, with the help of Accelerometer and GPS present in the mobile phones. Based on the data collected from these sensors, which are present in most mobile phones, the location of the accident is sent at the same time of the accident to the friends and relatives which the user allowed and stored, and also to the rescue and emergency services.

**Expected Outcome:** The expected output of the Accident Alert and Detection System leveraging IOT encompasses prompt and accurate detection of road accidents, followed by immediate alert dissemination and efficient emergency response coordination. Upon detection of an accident, the system will generate realtime alerts containing precise location details, vehicle information, and potentially, visual data from onboard cameras. These alerts will be transmitted to relevant authorities,

emergency services, and designated contacts for swift intervention. Additionally, the system will facilitate continuous monitoring of road conditions and vehicle movements, providing valuable insights for proactive safety measures. The expected outcome is a significant reduction in emergency response times, minimizing the severity of injuries and fatalities resulting from road accidents. Overall, the system aims to enhance road safety by leveraging IoT technologies to enable proactive incident detection and rapid response mechanism.

**2. DISCUSSION**

**System Architecture:** In this system, the external disturbance is detected by the accident detection module and when it is detected, a function is called to find the current location of the user with the help of GPS in the Location Detection Module. The location data obtained from the GPS is sent to the emergency services to request help. Vehicle unit consists of an accelerometer which keeps on informing the coordinate of vehicle position to the microcontroller. If it is found at random, the GPS location tracker tracks and informs the emergency number with values of latitude, longitude and google map position using the GSM SIM module.

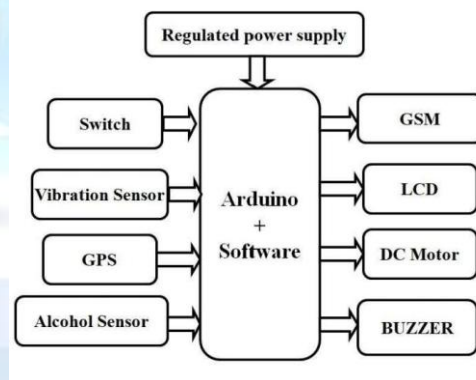


Fig: 2.1

**System Architecture**

**1. Risk Assessment:**

- Identify potential risks and uncertainties associated with the project.
- Develop risk mitigation strategies to address these risks and uncertainties.

**2. Market Feasibility:**

- Analyze the target market for the accident detection and alert system.
- Identify potential competitors and assess the uniqueness of the proposed system.

- Conduct market research to understand the demand for such a system and willingness of customers to pay for it.

**3. Financial Feasibility:**

- Estimate the costs associated with developing and deploying the accident detection and alert system.
- Perform a cost-benefit analysis to determine whether the expected benefits outweigh the investment costs.

**4. Legal and Regulatory Feasibility:**

- Investigate any legal and regulatory requirements related to the deployment of such a system.
- Ensure compliance with relevant standards and certifications.

**5. Environmental Impact:**

- Assess any environmental implications of deploying the accident detection and alert system.
- Consider measures to minimize the environmental footprint of the system.

**6. Social Impact:**

- Evaluate the potential social benefits of the accident detection and alert system.

protocol for serial communication between the modems and the microcontroller. A serial driver IC is used for converting TTL voltage levels to RS-232 voltage levels. Different types or sensors such as infrared sensors and fire detector are used for detecting different types of problem encountered in the vehicle such as theft, accident, fire warning etc. In any of these cases messages will be automatically send to the intended receiver. When a request by user is sent to the number at the modem, the system automatically sends a return reply to that particular mobile indicating the position of the vehicle in terms of latitude and longitude. A Program has been developed which is used to locate the exact position of the vehicle and also to navigated track of the moving vehicle on Google Map.

**3. RESULTS**

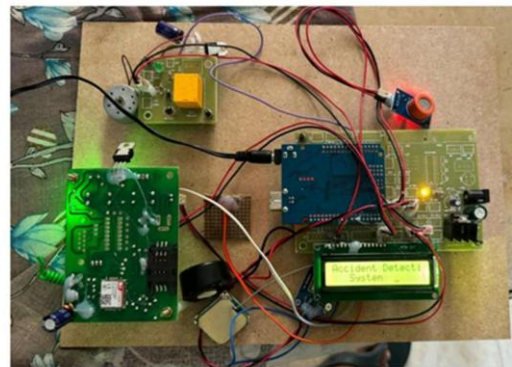


Fig: 3.1 It is the complete infrastructure of the accident detection and alert system. The integration of GSM, Buzzer, Arduino micro controller, LED & LCD, motor Driver

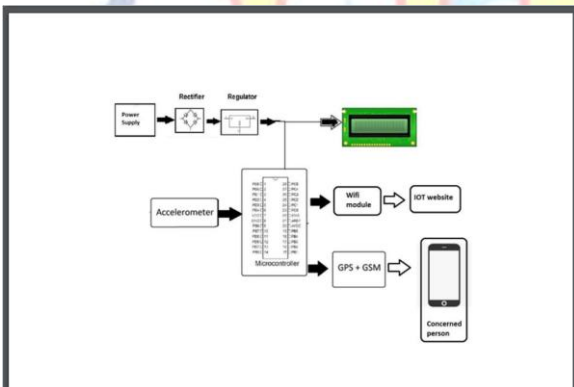


Fig: 2.2 Arduino microcontroller

A GSM modem is used to send the position (Latitude and Longitude) of the vehicle from a remote place. The GPS modem will continuously give the data i.e. the latitude and longitude indicating the position of the vehicle. The GPS modem gives many parameters as the output, but only the NMEA data coming out is read and displayed on to the LCD. The same data is sent to the mobile at the other end from where the position of the vehicle is demanded. An EEPROM is used to store the data received by GPS receiver.

The hardware interfaces to microcontroller are LCD display, GSM modem and GPS Receiver. In order to interface GSM modem and GPS Receiver to the controller, a MUX is used. The design uses RS-232

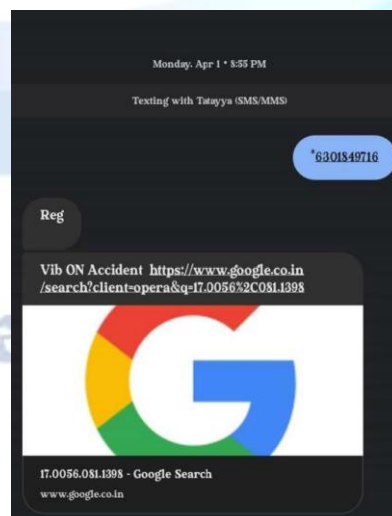


Fig: 3.2 The authorized person first have to register to the given SIM, then message such as "\*" and then number.

It will be activated and when accident happened it gives the alert message to the authorized persons.

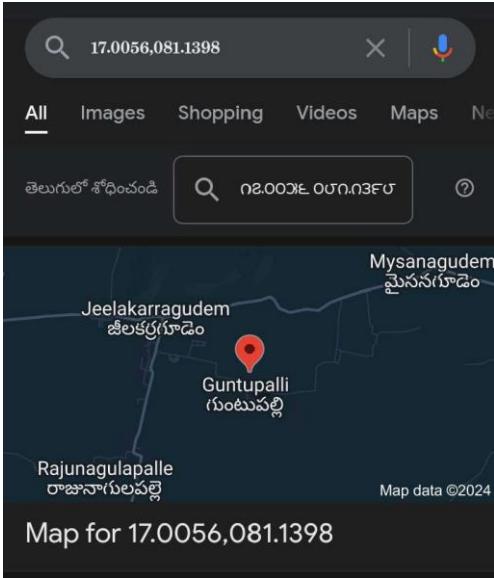


Fig: 3.3 The location has been sent as SMS to the mobile device.

The above Fig shows location of the accident happened

#### 4. CONCLUSION

In conclusion, The vehicle tracking system works mainly by receiving messages from a mobile phone. There is a message command by which we can track the vehicle. And this command is to send an SMS; "TRACK VEHICLE" to the registered SIM card number in the GSM modem. This command initiates the GPS modem and receives the latitude and longitude position and this information will then be sent as SMS to the mobile device. Whenever theft occurs or on demand request of the vehicles location, the device sends a message to the vehicle owner's mobile.

#### Conflict of interest statement

Authors declare that they do not have any conflict of interest.

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