Accident Detection and Alert System (A.D.A.S)

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Abstract: **When an individual riding his/her Vehicle, meets with a mishap, quite possibly the individual may experience the ill effects of genuine damage or lapse immediately and there is nobody around to help him/her. Thus, the systems will make the decision and sends the information to the smartphone, connected to the accelerometer through GSM and GPS modules. The Android application in the mobile phone will send text messages to the nearest medical center and friends. Application also shares the exact location of the accident and it can save time.**

Index Terms: **Microcontroller, Ultrasonic Sensor, Accelerometer, GSM Module, GPS Module etc.**

1. Introduction

Well, this project is an answer to the issue. The system acts as an accident detection and avoidance system that gathers all the information and sends it to the close person or anyone whose number the driver has assigned.

In this task, Arduino is utilized for controlling entire the procedure with a GPS Receiver and GSM module. GPS Receiver is utilized for identifying directions of the vehicle, GSM module is utilized for sending the ready SMS with the directions and the connection to Google Map.

An accelerometer can be used in a car alarm application with the goal that risky driving can be distinguished. It can be utilized as a crash or rollover identifier of the vehicle amid and after a crash. With signals from an accelerometer, a severe accident can be recognized.

According to this project when a vehicle meets with an accident immediately Vibration sensor will detect the signal or if a car rolls over and informs microcontroller.

Now the microcontroller sends this change detection signal to an GSM module. The GSM module now intern begins transmitting this accident data along with the exact position of victim through google maps link .

2. Overview

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This can help to save lives of many people and reduce such types of mishaps.
The GPS and GSM modules will help to send necessary data to our emergency contacts through which they can trace the location and alert the nearby police station or can send emergency services to that location.

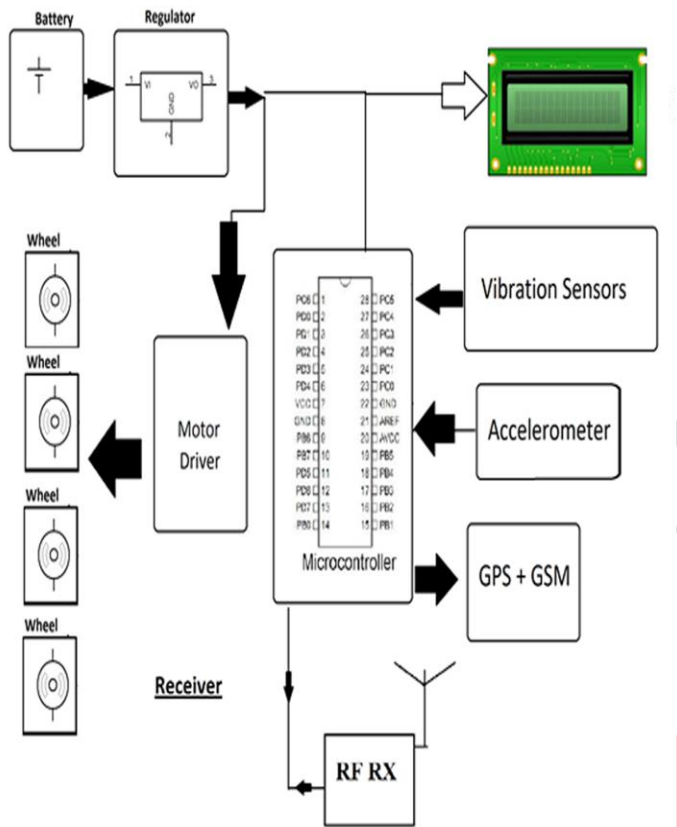### 2.1.1 Accelerometer Sensor

2.1. Block Diagram of System

Accelerometer sensors are ICs that measure acceleration, which is the change in speed (velocity) . Measuring acceleration makes it possible to obtain information such as object inclination and vibration.
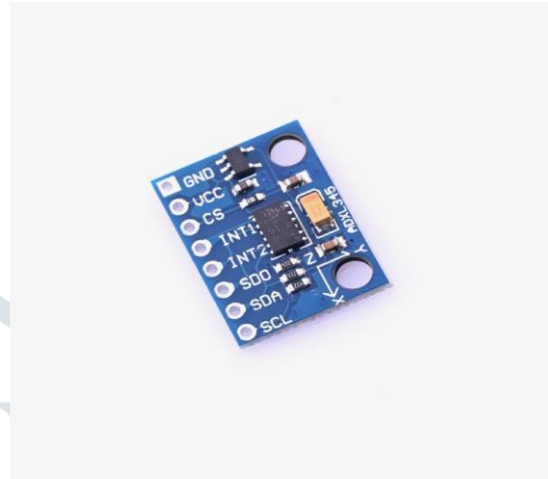

Fig. 1. Block Diagram of A.D.A.S

Fig. 2. Accelerometer Sensor

2.1.2 Ultrasonic Sensor

Fig. 2. Ultrasonic Sensor

The above figure, contains the block diagram of Accident Detection and Alert System. This system performs three main functions. First one is detection of intensity of vibration; second one is tracking the vehicle which is carrying the patient and the third one is to send details to emergency contact using a GSM technology.

With the help of this project, we can find out the location of the vehicle. A text SMS containing location is sent to the emergency contact mobile and the link can be opened using Google maps.

The main purpose of block diagrams is to show graphical representation of a system, project, or scenario. It provides a functional view of a system and illustrates how the different elements of that system interlink. Engineers, in particular, use block diagrams to model the elements of a system and understand how they are all connected. But these tools are also helpful in many other use cases.

Creating a block diagrams helps everyone involved in a project understand and visualize exactly what's needed for something to work as a whole. They create a coherent understanding of the elements required to link together to create the desired end result. In this way, they keep everyone on the team on the same page and working toward a common goal.

The ultrasonic sensor is a non-contact type of sensor used to measure an object's distance and velocity. This sensor operates on sound wave property to measure the velocity and distance of the object. In this project ultrasonic sensor is been used to detect any obstruction.

2.1.3 Microcontroller

Arduino is a single-board microcontroller meant to make the application more accessible, which are interactive objects and its surroundings. It is based on the microchip ATmega328P microcontroller and developed by Arduino.cc. Current models consist of a USB interface, 6 analog input pins and 14 digital I/O pins that allow the user to attach various extension boards.

Parameters :-

Power Supply:　　　5V
Analog Pins:　　　6　Pins　(A0-A5)
Input/Output Pins: 14 Digital Pins (0-13)
Serial Pins:　　　2 Pins (0 Rx, 1 Tx)
PWM Pins:　　　6 Pins (3, 5, 6, 9,10, 11)

Fig. 4. Arduino UNO

2.2　Global System for Mobile　Communication

Main function of GSM module is to send all the parameters to user or Doctor through a text SMS. For sending SMS, Microcontroller needs to give various AT commands to GSM module using a serial communication port. In project we are using GSM Module of SIM900A Series.

Parameters: -

Dual-Band:　　　　900/ 1800 MHz
Supply voltage range:　　3.4V　~　4.5V
Operation temperature:　　-40°C to +85 °

Fig. 5. GSM Module

2.3　　　Global Positioning System

Main function of GPS – **Global Positioning System** modem is to provide longitude and latitude of the ambulance. The GPS modem receives data from satellite. And then it gives this bunch of data to Microcontroller through serial communication. As ambulance moves along the way from patient's home to hospital, the co-ordinates of ambulance location will change and these variations are given to Microcontroller. In our project we are using GPS Modem of BLOX NEO 6M Series.

Parameters: -

Serial baud rate:　　　4800, 9600(default), 19200, 38400, 57600, 115200, 230400
Operating temperature:　　-40°C ~ 85°C
Operating voltage:　　　2.7V~5.0V
Operating current:　　　45m
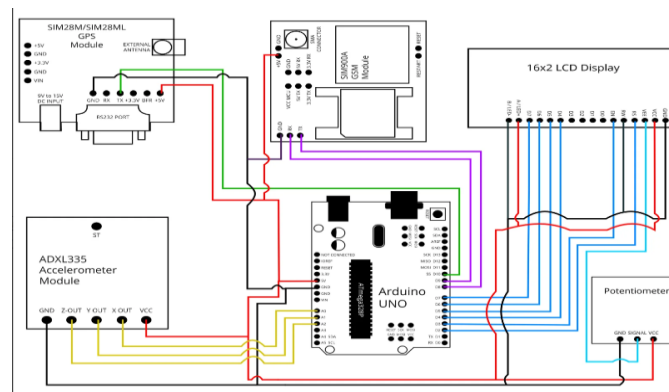
3.　Circuit Structure and Implementation

Fig. 6. Circuit Structure of proposed project

The above figure, shows the circuit diagram of accident avoidance and detection system. The systems will make the decision and sends the information to the smartphone, connected to the accelerometer through GSM and GPS modules.

To keep the moment of the sensors on the vehicle, the wireless sensors are required to be minimized and portable. These sensors are ultrasonic sensor, accelerometer sensors which are the basic requirements of the vehicle.

For controlling action, AVR Microcontroller is used. It is an 8- bit microcontroller with inbuilt 128 bytes of internal random-access memory, 4K read only memory, timers/counters, four general purpose input/output ports. Controller will match the limit predefined in the code of the microcontroller. GSM is required in tracking systems because GPS system can normally only receive location information from satellites but cannot communicate back with them. Hence, we need some other communication system like GSM to send this location information to central control room.

4. Flowchart
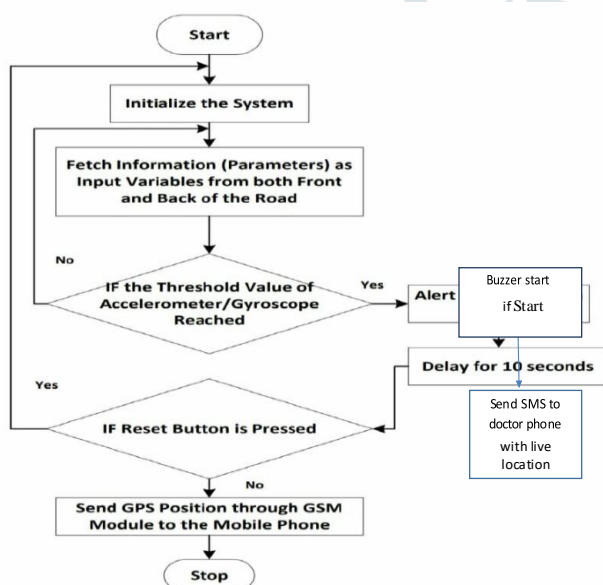
5. Advantages

The main advantage of "Accident Detection and Alert System" is that with the help of GSM technology, the data of patient health can be sent to a longer distance through SMS. With the help of this, doctor could have all prior information ready inhand before the patient reaches to the hospital.

With the use of GPS technology, the exact co-ordinates of vehicle can be tracked. The co-ordinates can be opened and tracked on Google Maps.

As this system is fully automated, it does not require any human interaction. This system receives the longitude and latitude and sends SMS automatically after a period interval of time.

6. Disadvantages

We cannot implement the GPS & GSM in each and every vehicle, it will lead to be expensive.

Also, we cannot do the many more arrangements for the patient who is in a very serious condition.

7. Future Development

This can also be bettered by locking all the brakes automatically in case of accident.

This can be extended by providing medication to the victims at the accident spot.

By increasing the technology, we can also avoid accidents by providing alerts systems that can stop the vehicle to overcome the accidents.

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8. Conclusion

This innovative system offers an optimal solution to the inadequate emergency facilities provided to victims of road accidents.

By utilizing advanced technology, immediate action can be taken to alert the relevant parties through messaging. It is important to note that this system is network-dependent and may not function in areas with poor network coverage.

The proposed method is highly advantageous to the automotive industry, enabling medical teams to respond promptly and save precious human lives.

The primary objective of the accident alert and detection project is to reduce fatalities resulting from unavoidable accidents. By alerting paramedics promptly, the chances of saving lives are significantly increased.

This vehicle tracking and accident alert feature is expected to become even more critical in our day-to-day lives in the future. However, communication may be challenging in areas with no GSM network provision.

9. References

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