Vehicle Tracking and Accident Alert System Using Arduino Through GPS & GSM

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Abstract **- Speed is one of the basic reasons for vehicle accident. Many lives could have been saved if emergency services could get accident information and reach in time. The project deals with accident detection system when the accident occurs it uses various components and alerts the Rescue team for help. An efficient automatic accident detection with an automatic notification to the emergency service with the accident location is a prime need to save the precious human life. The proposed system deals with accident alerting and detection. It reads the exact latitude and longitude of the vehicle involved in the accident and sends this information to nearest emergency service provider. The goal of our project is to detect accidents and alert the rescue team in time. GPS has become an integral part of a vehicle system nowadays. The accelerometer senses a sudden shift in the vehicle's axles. It will be tested by Arduino. The Arduino sends the warning message via the GSM module to the police control room or a rescue team, including the location. So, after receiving the information, the police can automatically track the location via the GPS module. Then, the appropriate action will be taken after verifying the venue**

Index Terms **– GSM, GPRS, PCB, GPS, ARDUINO, Gyroscope**

I. INTRODUCTION

The electric bicycle offers a cleaner alternative to travel short-to-moderate distances rather than driving a gasoline-powered car. The price of crude oil has increased significantly over the past few years and there seems to be no turning back The scope of the project is to design an accidental detection system that detect the accidents and alert rescue team in time.

Arduino is major control unit to detect or alert when an accident occurs, which helps in transferring messages to different devices in the system. Receiving pin of GSM module and transmitting pin of GPS module are used to communication.GPS module will find the location of the vehicle and the information is fetched by the receiver through the coordinates and the received data is sent to Arduino and the alert to rescue team by GSM module.

2. OBJECTIVES

These are the objective to be performed before continuing to proceed with this project.

- The objective is to overcome accidents by monitoring any change in the speed of the vehicle whereas the accelerometer can detect the fall.
- The Arduino is the major control unit to detect or alert when an accident occurs. It collects the data from the accelerometer, GPS, GSM modules and reflects the output.
- This will reach the rescue service in time and save lives.

3. HARDWARE REQUIREMENTS

- Arduino
- GPS module
- GSM module
- Accelerometer and Gyroscope
- Vibration Sensor
- Power Supply
- Connecting Wires
- Breadboard or PCB

3.3.1. POWER EQUATION WORKING OF GPS

This GPS module will find the location of the vehicle and the information fetched by the GPS receiver is received through the coordinates and the received data is first send to Arduino and the information is transmitted to the saved contact through GSM module. The frequency is operated in the range of 1575.42 MHz and the output of GPS module is in NMEA format which includes data like location in real time.

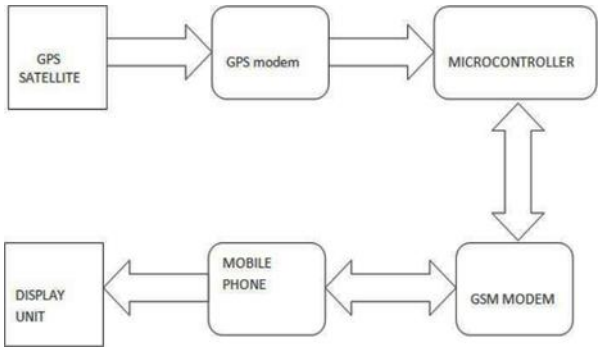

Fig1. Block diagram of GPS.

4. SYSTEM DESIGN

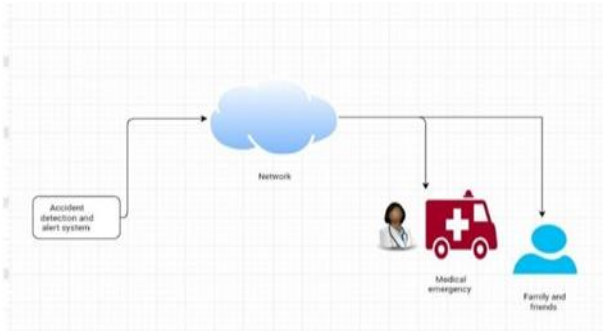

Fig:2 System Design.

- At start the hardware will be initialized and it takes the reading from hardwareevery second.
- If the reading overcomes the threshold reading of sensors, then Arduinosends the GPS co-ordinates to emergency dial via GPS.
- Emergency dialer checks the coordinates at portal and contacts the nearbyhospitals for emergency need and waits for its approval.
- After the hospital approval the rescue team reaches the location of accident and upon confirmation it informs their family members.

5. METHODOLOGY

- Monitoring the speed of the vehicle and detecting if there is any sudden drop in the speed of the vehicle.
- Arduino UNO is used as controlling unit, it reads the values from accelerometer. Accelerometer detects if there is any fall in axis.
- If Arduino observes any drastic change in the speed of the vehicle. It reads the current location from GPS module and sends it to the mobile number through SMS by using GSM module.
- Before sending the SMS Arduino activates the buzzer, after thirty seconds of beeping it goes off and the SMS will be sent.
- But if the passenger is not in danger, he can press the "IAM OKAY" button. This is done to prevent the situations where it would it lead false accident rescue.

6. TESTING

6.1 Reading data from MPU-6050 module

The Arduino reads data from MPU-6050 gyroscope + accelerometer module; it is based on MEM technology. Both accelerometer and gyroscope are embedded into single chip. This chip uses I2C bus interface which is used for communicating with host interface. It has 8 pins in the chip, in order to check I2C connection between the Arduino and MPU 6050, code should be generated. Wire library's header is included, we define and some variables after this, convert function has to be defined, Setup function which usually checks for serial connection which has to be established.

Fig:3 Testing of Arduino

6.2 Location data Reading from GPS module

U-box Neo-6M GPS module has to be tested to check if it is able to point the location. GPS receivers actually work by figuring out how far they are from a number of satellites. They are pre-programmed to know where the GPS satellites are at any given time. The satellites transmit information about their position and the current time in the form of radio signals towards the Earth. These signals identify the satellites and tell the receiver where they are located. It indicates the position fix, it will blink at various

rates depending on what state it is in. No Blinking indicates that it is searching for the satellites. If it blinks every second which indicates that the position is found.

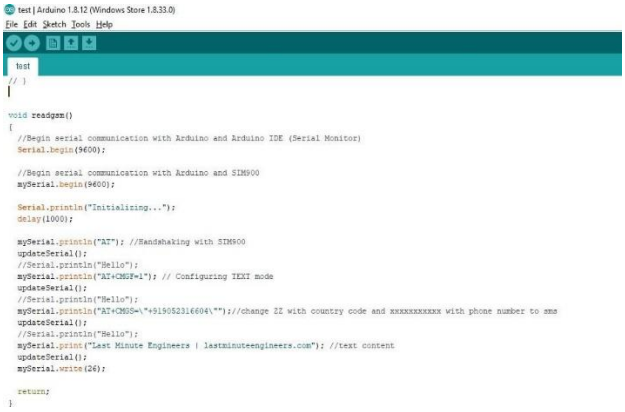

Fig:4 Testing of GPS Module

6.3 SENDING ALERT MESSAGE BY GSM SIM900A MODULE

We have to make sure that the connection is established between Arduino and GSM. There are two ways of doing it, one is to connect TX pin of GSM to RX pin of Arduino and RX pin of GSM module to TX pin of Arduino. Two is by selecting two PWM enabled pins of Arduino (Pin 9, 10). It uses software serial library of Arduino, when the connection is established, the data can be fed directly to GSM.

Fig:5 Testing of GSM

6.4 DISPLAYING ON LCD

Interfacing between LCD and Arduino is also tested. We should study the schematic carefully. Next is to place your LCD on the bread board. Make sure that the connection is done according to the circuit diagram. Instead of the potentiometer, you can use a 1k resistor and connect Pin 3 of LCD to Vcc via the resistor. Carefully check whether all the connections are tight and correct. Power up your Arduino via USB and check whether the LCD lights up. If yes, proceed.

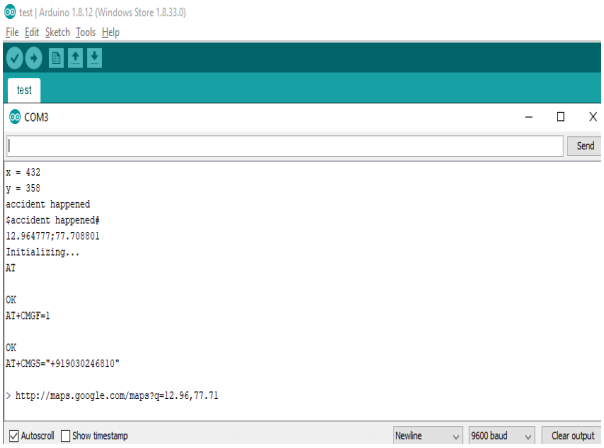

Fig:6 Testing of accident detection

7. HARDWARE RESULTS

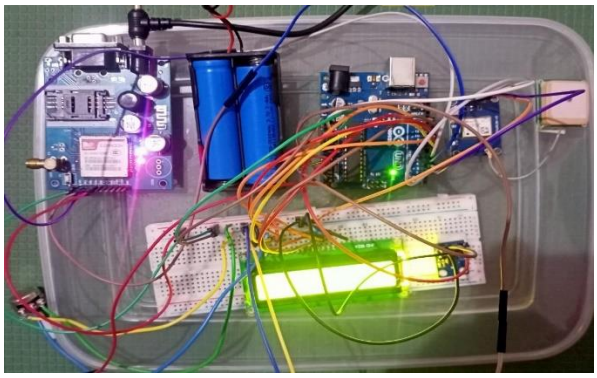

Fig:7 EMF Interfacing Controller with all other modules

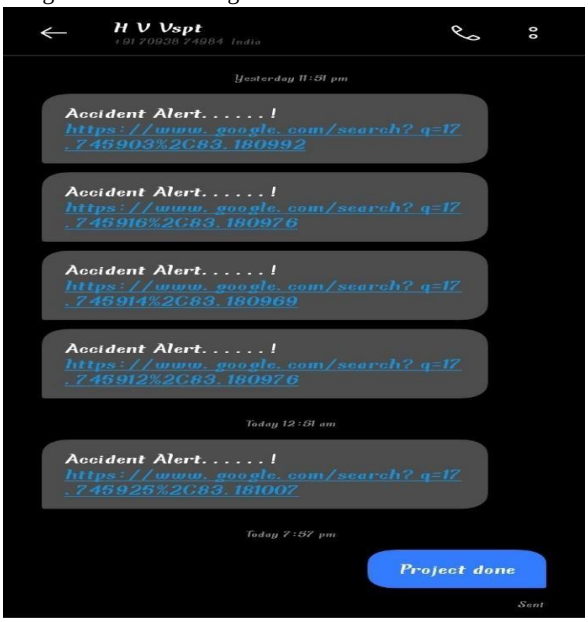

Fig:8 Alert message

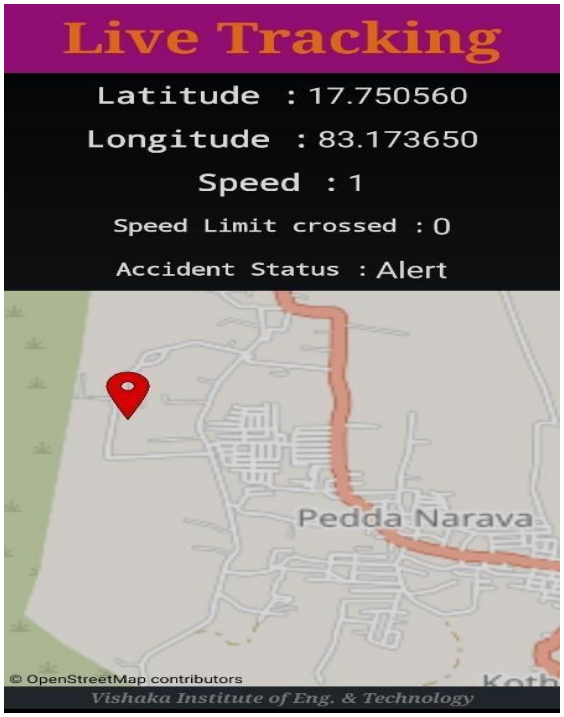

Fig:9 Live Tracking and Location

8. CONCLUSION

A system to detect an event of accident has been developed. The proposed system deals with accident alerting and detection. It reads the exact latitude and longitude of the vehicle involved in the accident and sends this information to nearest emergency service provider. Arduino helps in transferring the message to different devices in the system. Accelerometer monitors the accident happening direction and gyroscope is used to determine rollover of the vehicle. The information is transferred to the registered number through GSM module. Using GPS, the location can be sent through tracking system to cover the geographical coordinates over the area.

9. FUTURE SCOPE

The future scope of this system can have some improvisation using a wireless webcam can be added in this for capturing the images which will help in providing driver`s assistance. This can also be bettered by locking all the brakes automaticallyin case of accident. Mostly in accidents, it becomes serious as the drivers lose control and fails to stop the vehicle. In such cases, the vibration sensor will be triggered because of the vibrations received and also processed by the processor. The processor has to be linked to the devices which can lock the brakes when triggered. With this improvement, we can stop the vehicle and can weaken the impact of the accident. This system can also be utilized in fleet management, food services, traffic violation cases, rental vehicle services etc.

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