

VEHICLE ACCIDENT ALERT SYSTEM

INTERNET OF THINGS

Meghana Hubli
Computer Science
SUNY Binghamton
Binghamton NY
mhubli1@binghamton.edu

Yagna Theja Daggupati
Computer Science
SUNY Binghamton
Binghamton NY
ydaggup1@binghamton.edu

ABSTRACT

Internet of things is defined as the objects that talk to each other. Internet of Things is made up of devices from simple sensors to smartphones etc., connected together. IoT enables the objects to perform actions without human intervention. Pretty much any object can be converted into IoT device if it is connected to internet or any other communication means. We can see IoT in every step we take from dawn to dusk.

We know this world runs on vehicles, as the number of vehicles are inflating day to day, the world is gaining its probability of accidents occurring. Most of the people who involved in the accident are not dying due to the accident but because of not getting assistance soon. For instance, the accident was occurred in the middle of an empty road, the person will not get any help until he/she was noticed. This delay is resulting in the deaths of many. We cannot always stop the accidents but we can try getting the casualty assistance sooner with the help of IoT and some sensors.

CONCEPTS

• Internet of Things • Arduino • GPS and GSM

KEYWORDS

Internet of Things, Accident alert system, Arduino, GSM, GPS

I. INTRODUCTION

This is an interesting call doing this project. Basically after a lot of groundwork we made some list of factors we can take into consideration to detect the accident. The factors are acceleration, vibration, pressure, airbag sensors and heat

sensors. Out of all these we felt acceleration or vibration sensors works at its best.

The reason why we ruled out other factors are:

- Heat sensor: Not all cars will catch fire that are crashed. So this is not feasible to use.
- Pressure sensor: Sometimes sudden braking also results in the accident, at these instances this sensor is not useful.
- Airbag sensors: We cannot always rely on these, if the occupant is unbelted in case then airbags won't work. Airbags will not work if the collision is rollover or rear or side.

Accelerometer is not a vibration sensor but vibration sensor can work as accelerometer pretty much both do the same work. As all the cars are preinstalled with accelerometer but not the vibration sensor, so it is feasible to prefer accelerometer as our main sensor to detect the accident.

The question is how we are going to use the accelerometer as a sensor to detect accident? The concept is that the vehicle comes to immediate halt after the collision, then there will be drastic variation in the accelerometer readings. If that variation exceeds the threshold value then it is considered as accident.

Now what after it is considered as accident? Here a reset button is installed, the rider of the vehicle should press the reset button if he is safe. Here comes the crucial part, if the rider failed to press the reset button within few seconds now it is considered as the rider is in danger and he needs immediate assistance.

Now we knew that the rider is in jeopardy and what next? In this alert system we will preinstall the phone numbers that the alert system has to contact them immediately at the time

of danger. The alert system sends the location of the casualty with latitude and longitude readings and google maps link to the location. It also alerts the local emergency authorities (Eg: 911) by sending them location. (As it is class project emergency numbers are not used while testing).

Now we will see what hardware and software we have used and how we pulled this project.

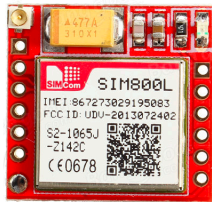
II. HARDWARE REQUIREMENTS

The hardware required are:

- Arduino UNO R3: It is a micro controller board which is having an extensive set of support libraries and hardware add on shields resulting as a great starter kit for embedded electronics. It is an open source platform.



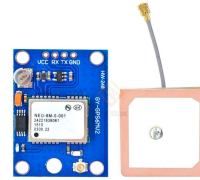
- SIM 800L GSM module: It is a GSM/GPRS module with a tiny GSM modem that can be integrated to the Arduino. It is used to send and receive messages and phone calls.



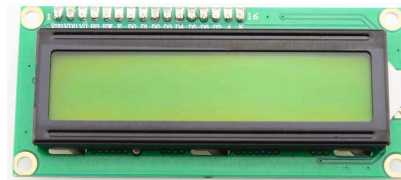
- MPU 6050 Accelerometer: It is low power and low cost speed tracking device where we can install in any device and track the speed of the movement of the object. It uses the 3 axis gyroscope.



- Neo 6M GPS module: It is a GPS module with satellite search capability. It is used to track the location and it also saves the data it is shutdown.



- Breadboard is used as a platform to integrate all the modules with the Arduino.
- Connecting wires are used to connect each module. M/F, F/F and M/M are used. 2 LEDs are used.
- LCD Display: 16x2 LCD display is used to display the output. The location latitude and longitude readings are displayed.

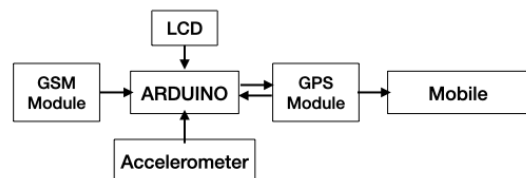


- A cable to connect the laptop to the Arduino is used to transfer the code from Arduino IDE to the Arduino

III. SOFTWARE REQUIREMENTS

The only software used was Arduino IDE. Here we program the Arduino in “Arduino language”. It is mostly similar to C++. It is an open source platform which is flexible and easy to use. We can transfer all the code from IDE to device by connecting a wire.

IV. DESIGN



The flowchart design indicates the data flow between the modules. Only from the GPS module there is two way data transmission between Arduino and GPS. Finally the data is sent to the mobile.

V. IMPLEMENTATION

Circuit connections are implemented the following way. The transmission serial pin of the GPS module is connected to the Arduino digital pin number 10. Now allow the serial communication between the pins 10 and 11, so that we made them receiver and transmitter respectively. Receiver pin of GPS module is kept open. The 12V power supply is used for Arduino. GSM module's transmitter and receiver pins are connected to the D2 and D3 of Arduino. LCD D4, D5, D6 and D7 are connected to pin 6, 7, 8 and 9 of the Arduino. Accelerometer x, y and z pins are directly connected to the Arduino's ADC pins.

Now all the coded program is transferred to the Arduino and the whole setup is to be installed on the vehicle. Now the accelerometer reading will start if there are drastic changes then the google map link is sent to the predefined numbers.

VI. CONCLUSION

We have shown the simple way of detecting the accident and how we can utilize the simple modules to detect that accident. It is useful is saving lives of many. There are different kinds of alert systems like these which just use other means to detect accident. These kind of devices are to be encouraged and used in every vehicle which may act as final line of safety.

VII. ACKNOWLEDGMENT

We would like to thank our Professor Mo Sha for all the guidance given through out the semester. We also want to thank our TA Junyang Shi for his contribution and reaching us immediately if we want any help. We request feedback and suggestions.

VIII. REFERENCES

- [1] <https://www.arduino.cc/>
- [2] <https://randomnerdtutorials.com/guide-to-neo-6m-gps-module-with-arduino/>
- [3] <https://lastminuteengineers.com/sim800l-gsm-module-arduino-tutorial/>

[4] <https://www.electronicwings.com/sensors-modules/mpu6050-gyroscope-accelerometer-temperature-sensor-module>

[5] <https://www.ijitee.org/wp-content/uploads/papers/v8i4s2/D1S0048028419.pdf>