



Accident detection and alert system

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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. This 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 the project is to detect accidents and alert the rescue team in time

IndexTerms - IOT, Electric energy, GPS, Arduino.

1. INTRODUCTION:

The development of a transportation system has been the generative power for human beings to have the highest civilization above creatures in the earth. Automobile has a great importance in our daily life. We utilize it to go to our work place, keep in touch with our friends and family, and deliver our goods. But it can also bring disaster to us and even can kill us through accidents. Speed is one of the most important and basic risk factors in driving. It not only affects the severity of a crash, but also increases risk of being involved in a crash. Despite many efforts taken by different governmental and non-governmental organizations all around the world by various programs to aware against careless driving, yet accidents are taking place every now and then. However, many lives could have been saved if the emergency service could get the crash information in time. A study by Virtanen et al. shows that 4.6% of the fatalities in accidents could have been prevented only

if the emergency services could be provided at the place of accident at the proper time. As such, 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.

2. LITERATURE SURVEY:

2.1. Minimizing Accident using Accident detection system: 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.

2.2. Real-Time Monitoring and Alerting Systems: The accidental detection and alert system are designed to detect the accidents and alert rescue team in time. Arduino is major control unit to communicate between devices 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. The accelerometer and gyroscope detect the accident occurrence by the reading produced by the movements of the vehicle. The vibration sensor is also used to detect the accident by producing voltage from the impact of vehicle movements.

2.3. Experimental Validation and Field Trials: To experimentally validate and conduct field trials for an accident detection and alert system, start by integrating and testing hardware and software components in controlled

environments. Collect and analyze data to calibrate detection algorithms, followed by bench testing for robustness. Deploy a pilot in a small fleet under diverse conditions, monitoring real-time data and gathering user feedback. Measure accuracy, response time, and reliability. Ensure regulatory compliance and obtain necessary certifications. Document findings and iteratively refine the system based on experimental and field trial outcomes, continuously improving performance and user experience.

3. PROPOSED SYSTEM:

Arduino Nano is used as controlling unit, communicating between modules for better information transformation at time. Accelerometer can be used for detecting the collision direction from tri-lateral axis movements. Gyroscope can be used for rollover collisions after a threshold of roll and pitch values, the weight and centre of gravity of vehicle plays an important role in rollover. The device also confirms from vibration sensors which detects the collision after a threshold voltage increase. Then a buzzer is provided to abort the false detection of accident to the passenger. Within of limited time of buzzer signal the GPS module collects the coordinates from Google Module. These co-ordinates nearby hospitals are alerted for emergency rescue call to passenger. The hospital approves the accident by verifying the accident at specified location and confirms the accident. The saved personal members of family are informed regarding the accident through GSM module

3.1. Implementation and Working Details

Key Components:

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

The project mainly focuses on Theft Detection and power distribution to consumers. The following block diagram shows the outline of project implementation.

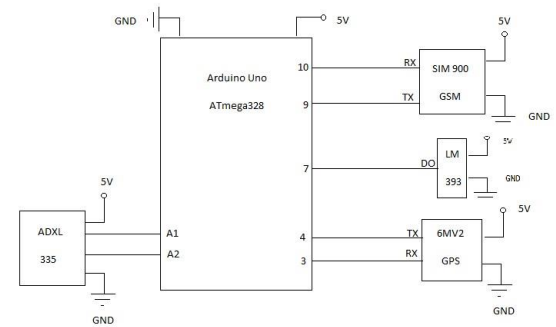


Fig 1: Circuit Diagram

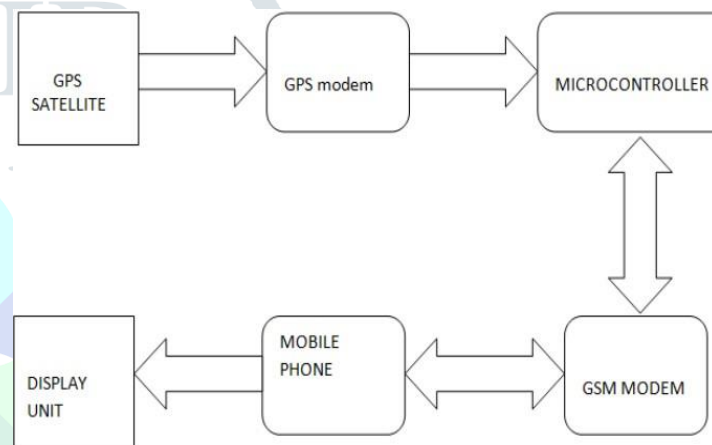


Fig 2. Block Diagram

The Arduino UNO is a widely used open-source microcontroller board based on the ATmega328P microcontroller and developed by Arduino.cc. The Arduino is the major control unit to detect or alert when an accident occurs. It collects the data from vibration sensor, GPRS and GSM modules and reflects the output either in display system or through a message. Here vibration sensor plays a major role. This vibration sensor will receive the vibrations of the vehicle which in turn acts as an accident detection module. Arduino gathers the information from all other modules and sends the message to the receiver through GSM module.

Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the board. To do so you use the Arduino programming language (based on

Wiring), and the Arduino Software (IDE), based on Processing. Over the years Arduino has been the brain of thousands of projects, from everyday objects to complex scientific instruments. A worldwide community of makers - students, hobbyists, artists, programmers, and professionals - has gathered around this open-source platform, their contributions have added up to an incredible amount of accessible knowledge that can be of great help to novices and experts alike. Arduino was born at the Ivrea Interaction Design Institute as an easy tool for fast prototyping, aimed at students without a background in electronics and programming. As soon as it reached a wider community, the Arduino board started changing to adapt to new needs and challenges, differentiating its offer from simple 8-bit boards.

All Arduino boards are completely open-source, empowering users to build them independently and eventually adapt them to their particular needs. The software, too, is open-source, and it is growing through the contributions of users worldwide.

The basic underlying working principle of an accelerometer is such as a dumped mass on a spring. Piezoelectric, piezo resistive and capacitive components are generally used to convert the mechanical motion caused in accelerometer into an electrical signal. Piezoelectric accelerometers are made up of single crystals. A gyroscope is a device designed to have a spinning disc or wheel mounted on a base such that its axis can turn freely in one or more directions in order to maintain its orientation regardless of any movement of the base. However, the orientation changes in response to an external torque and in a different direction.

The vibration sensor is also called a piezoelectric sensor. These sensors are flexible devices which are used for measuring various processes. This sensor uses the piezoelectric effects while measuring the changes within acceleration, pressure, temperature, force otherwise strain by changing to an electrical charge. This sensor is also used for deciding fragrances within the air by immediately measuring capacitance as well as quality.

4. 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 automatically in 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 processed by the processor. The processor must 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

5. RESULT:

The Arduino reads data from MPU-6050 gyroscope + accelerometer module; it is based on MEM technology. Both accelerometer and gyroscope is 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.

U-blox 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.

We must 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.

6. 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.

The proposed system contributes to decreasing death rate caused by accidents. It detects the accidents occurred with the help of proposed methodology, It also fetches the location of the accident using GPS module and sends the

alert message using GSM module to the medical emergency which can get to the location of accident in time which can also save lives of people. By this feature the death rate caused by accidents can be reduced.

7. REFERENCES:

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