IMPLEMENTATION ON AN ARDUINO BASED ACCIDENT IDENTIFICATION

Anumol Mariyam Shaji
Dept. of CSE
MBC College Of Engineering And Technology
Kuttikkanam,India

Gayathri S
Dept. of CSE
MBC College Of Engineering And Technology
Kuttikkanam,India

Sharon Koshy Varghese
Dept. of CSE
MBC College Of Engineering And Technology
Kuttikkanam,India

Sreejith Chandran
Dept. of CSE
MBC College Of Engineering And Technology
Kuttikkanam,India

Anju Rachel Oommen
Dept. 0f CSE
MBC College Of Engineering And Technology
Kuttikkanam, India

***Abstract*—An Arduino based accident identification system deals with identifying the accidents on the spot. The main component is MPU 6050 which detect the tilting of the vehicle. The system is equipped with a GSM Module to send messages to registered numbers and a GPS module to send the location of the vehicle. Ultrasonic sensors are used to measure distance between adjacent vehicles to improve safety**

Keywords—Arduino UNO, GPS, GSM Module, MPU 6050, Ultrasonic Sensor .

I. INTRODUCTION

The growth of technology and infrastructure has made the life of people easier. The revolution in technology has also increased the traffic hazards and the road accidents. Many of the loss of life causes due to the late response by emergency services. Our project will provide an optimum solution to this draw back. An MPU 6050 can detect the tilting of the vehicle. If the tilting exceeds a specific threshold, then a signal through Arduino Uno is send to GSM module. The GSM module will send message indicating that an accident has occurred to the pre-registered numbers. The GPS Module will send the location of the vehicle. The ultrasonic sensors can measure the distance between vehicles. If the distance is too close, then drier will be alerted.

II. RELATED WORKS

Accident detection and messaging system using GPS and GSM aims to alert ambulance and police about the accident and take necessary steps. A work on alarm system to detect the location of IoT-based public vehicle accidents. There are MQ-135 sensor detects smoke, fire sensor detect fire and there is a push button to detect the collision. This system also has GSM SIM800L module to provide information to the security agency.

Design And Implementation Of Vehicle Tracking System Using GPS And GSM Technology And Smartphone Applications. This work combines a smart phone application with a microcontroller. Smartphone application constantly monitor the vehicle location. The google map API is used to display the vehicle map on smart phone.

A Smart System for Driver's Fatigue Detection, Remote Notification and Semi-Automatic Parking of Vehicles to Prevent Road Accidents. This is an EEG based system which alerts the driver by alarm and put the vehicle in semi automatic parking mode.

Smart Collision Avoidance and Driver Alert Recognition System. This system sensing unit, driver alert system and braking system.

Implementation of microcontroller based driver assistance and vehicle safety monitoring system. This paper aims in measuring various driver assistance

parameter. A gas sensor is used to sense the leakage of gas. A buzzer alarm is used to alert the driver.

IoT based framework for vehicle over speed detection . The system contains GPS module, Radar, Google maps and IoT module. The safe regions are identified automatically using GPS and IoT technologies. An over speeding sensor is employed in order to decrease the vehicle's speed at particular places like accident-prone zones.

An IoT Cloud System for Traffic Monitoring and Vehicular Accidents Prevention Based on Mobile Sensor Data Processing. This system contain a mobile sensors based on a tracker device installed in public and private transportation vehicles that collect data about their positions so that it is possible to calculate the speed ,acceleration. The system requires two specific M2M workflows for both gathering data from vehicles and notifying to drivers' mobile. All geo-location data collected by vehicles are sent in real- time to an Open GTS server that stores them in a SQL database.

III. SYSTEM HARDWARE

The various hardware used in this system are as follows.

A. ARDUINO UNO

The heart of the system is Arduino Uno. It is a open-source microcontroller. Arduino Uno is based on ATmega328P.It is developed by Arduino.cc. The board contain a set of digital and analog pins .The board has 14 Digital pins and 6 Analog pins .The board is programmable with the Arduino IDE through a type B USB cable.

B. MPU 6050

The MPU 6050 is a six-axis IMU sensor. It gives six values as output: three values from the accelerometer and three from the gyroscope. MPU 6050 is a sensor based on micro electro mechanical systems technology. MPU 6050 are used in self-balancing robots, UAVs, smartphones e.t.c. IMU sensors get the position of an object attached to the sensor in three-dimensional space. These values are usually in angles to help determine its position. They are used to detect the orientation of smartphones, or in wearable gadget. The MPU 6050 communicates with the Arduino through the I2C protocol. If MPU 6050 has a 5V pin then connect it to arduino's 5V in . Otherwise connect it to 3.3V pin of Arduino. To set up the I2C lines , the pin labeled SDA on the MPU 6050 are connected to the Arduino's analog pin 4 , and the pin labeled as SCL on the MPU 6050 to the Arduino's analog pin 5 .

C. GSM Module

GSM is an open and digital cellular technology. GSM is used for transmitting mobile voice and data services. It operates at the 850MHz, 900MHz, 1800MHz and 1900MHz frequency bands.

The components of GSM Modules are :

A Mobile Station: It is the mobile phone that has the display and the processor . A SIM card operating over the network controls mobile station.

Base Station Subsystem: This is an interface between the mobile station and the network subsystem. The Base Transceiver Station contains the radio transceivers. It also handles the protocols for communication with mobiles. It also consists of the Base Station Controller that controls the Base Transceiver station .It also serves as a interface between the mobile station and mobile switching centre.

Network Subsystem: Provides the basic network connection to the mobile stations. It also consists of the Home Location Register and the Visitor Location Register, which provides the call routing, and roaming capabilities of GSM and the Equipment Identity Register, which maintains an account of all the mobile equipments wherein its own IMEI number identifies each mobile.

D. GPS Module

The Global Positioning System or GPS is a satellite-based navigation system . GPS works in any weather conditions. . GPS satellites circle the Earth twice a day in a precise orbit. Each satellite transmits a unique signal and orbital parameters that allow GPS devices to decode and compute the precise location of the satellite. GPS receivers use this information to calculate the exact location of a user. With distance measurements from a few more satellites, the receiver can determine a user's position and display it. To calculate latitude and longitude, a GPS receiver should be locked on to the signal of at least 3 satellites. With 4 or more satellites in view, the receiver can determine latitude, longitude and altitude.

While a GPS Module is used with Aruino Uno , certain libraries has tp be imported. They are software serial library and tiny GPS library.

The Software Serial Library allow serial communication to take place on the other digital pins of boards, using software to replicate the functionality of the hardwired RX and TX lines. The tiny GPS library converts NEMA format global positioning data into easy-to-use variables for Latitude, Longitude, Time e .t .c.

D. Ultrasonic Sensors

Ultrasonic sensors measure distance by using ultrasonic waves.There is a sensor head that emits an ultrasonic wave and receives the wave reflected back from the target. Ultrasonic Sensors measure the time between the emission and reception and thus calculates the distance. . In a reflective model ultrasonic sensor, a single oscillator emits and receives ultrasonic waves alternately. This enables miniaturization of the sensor head.

The operation of ultrasonic sensor is not affected by sunlight or black material. But soft materials like cloth can be difficult to detect.

The Ultrasonic sensor has four terminals namely, +5V, Trigger, Echo, and GND .

Trigger pin is used to transmit the signal. Echo pin is used to receive the signal.

IV. SYSTEM SOFTWARE

Arduino uses the open-source Arduino Software (IDE).It is easy to write code and upload it to the board. Arduino Software runs on Windows, Mac OS X, and Linux. The environment is written in Java and based on Processing and other open-source software. This software can be used with any Arduino board. It is a free software.

The Arduino language is a set of C/C++ functions. These functions can be called from the code. The sketch undergoes changes and then is passed directly to a C/C++ compiler.

In previous version of the Arduino IDE, all libraries were stored in the contents folder of the Arduino application. In newer versions of the IDE, libraries added through the Library Manger can be found in a folder named 'libraries' found in Arduino Sketchbook folder.

V. PROPOSED SYSTEM

This is a GPS and GSM based system equipped with MPU 6050 as main component. When the value of the velocity and tilting will exceed a particular threshold then a SMS will be sent through Arduino with real time coordinates to registered numbers. Ultrasonic sensors equipped on both sides of the vehicle to measure the distance between two vehicles.

VI. SYSTEM IMLEMENTATION

The vehicle may move normally on the road in a fixed speed. When the speed exceeds and tilting of vehicle happens, the tilting is sensed by the MPU 6050 which is a combination of accelerometer and gyroscope.

MPU 6050 senses the tilting of vehicle continuously and sends the signal to Arduino Uno. A threshold value of tilting will be already fixed. When Arduino Detects that the tilting is more than the fixed value then it can be assumed that an accident has occurred.

All of a sudden Arduino makes the GSM Module to send an alert message to the registered emergency numbers. Along with that the longitude and latitude of the vehicle will be send to the registered number through GPS module.

The purpose of ultrasonic sensors is much more highlighting. The ultrasonic sensors detect the distance between two vehicles. When the distance is sensed as too close then the driver can be alerted to slow sown or to apply the break.

Also when the vehicles are close to each other the speed of vehicles are automatically set to low.

VII. CONCLUSION

The rate of accident and death caused by accidents are very high nowadays. The lacks of emergency services are the main cause of loss of lives. This accident identification system using Arduino Uno is being introduced with accident identification for vehicles that will give a higher probability to reduce the accidents taking place every day on roads and at the same time if accident occurs, the system will locate its place and will automatically inform those people who will be able to take immediate actions. Here, an Arduino based system has been developed by using Global Positioning System (GPS) and Global System for Mobile Communication (GSM) technology. The system is of low cost and user friendly. Further improvements like fitting several sensors can also be made o this proposed system. Thus the system is of high social relevance.

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