Vehicle accident alert system

Dr. Manoj Singh Adhikari[1], Ch Sai Kumar[2], K Rama Linga Reddy[2], L Syam Sundar[2], Ch Leela Pavan Kumar[2], M Krishna Tarun[2]

Dept of SEEE, Lovely Professional University, Jalandhar, Punjab, India[1]

Student, Dept of ECE, Lovely Professional University, Jalandhar, Punjab, India[2]

Abstract

Now-a-days road accidents are increasing rapidly due to carelessness of driving, Over Speeding, Drunken Driving and many others. If we see a newspaper and we will find at least one or two news about road accidents daily. A road accident is where a vehicle crashes into another vehicle or a person or an object. These accidents can lead to very dangerous injuries and also death in some cases. For quick proclamation and identification regarding an accident there is no system. This paper deals win the accident detection and alerting system. The main focus of this paper is to detect the accident immediately after it has been occurred and inform to the emergency services and family members and friends so that proper action can be taken quickly to avoid severe injuries. This system focuses to alert the registered mobile number and gives the information to the nearby medical center about the accident to provide instant intensive care. The main motto of our framework is to pass an alert stating that such an accident has taken place at particular coordinates of latitude and longitude to the registered m obile using wireless communication techniques. In a short span of time, the message will be sent to the registered Mobile using the GSM module at any place or any city, whenever an accident occurs. Arduino is the Centre of our System, that will help in performing the communication between the peripheral devices. Whenever the accident occurs sensor get activated and a message is passed to a registered mobile number with help of GSM.GPS will help us to find out the location that where the accident occurs.

Keywords: Embedded system, Accident detection, Accident Alert message.

Introduction

Now-a-days, there is great demand for vehicles, as an impact of this control becomes hectic and its end up in road accidents. In case of accident, long response to locate the victims may leads to increase number of death[1]. In an literature several paper discuss accident detection and vehicle tracking[2]. In an imaginative remote discovery utilizing MEMS accelerometer and GPS following framework is used for detection of accident[3]. According to the proposed framework, when an vehicle met with an accident, the implanted vibration sensor will detect the signal either left accident or right accident or car roll over and it is intimated to Arduino. The ardunio gets an trace of it. After the havoc is recognized, short initiative information containing position of accident is sent through the GSM system[4]. An interaction between the unit which is installed in vehicles and control stations. By enable the tracing modules of GPS/GSM, location will be tracked in real time with the assist of cellular networks. In case of an havoc(accident) occurs, the device will transmit an

message containing locations obtained from the GPS module to the nearest base station with the assistance of GSM network module. It is an instantaneous and worthwhile result to the victims as a sign of indication in case of accident[5]. The accident location can easily be traced, spot out and send the basic details to the rescue agency covering the accident location coordinates and also the circumstances during which an accident passed off. Road accidents in Bharat kill nearly 1.5 lakh people annually as of fig1. Accordingly, India accounts practically 11% of the accident connected deaths in the World[6].

The software installed inside the microcontroller will assist multiple operations of the device by tracing out the waveform from the vibration sensor[7]. This framework will send an message containing the location achieved from the GPS module and transmits them to control station using GSM network[8]. It is an immediate and comprehensive effective solution to the save the victims in case of accident situation happens[9]. This proposed framework binds both the advanced hardware design and revealing control technology into an simplified, reliable package [10]. The projected technique considerably shorten the interval of accident identification.
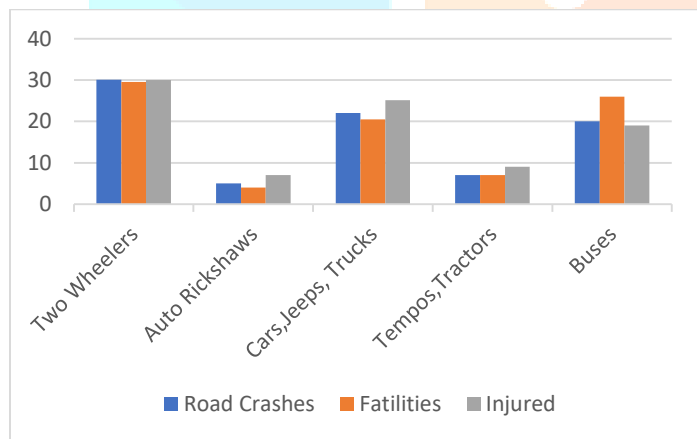

Figure 1: Road Accidents based on Types

Arduino

The Arduino is an development board designed by an Italian company named "Arduino" for designing the projects as shown in figure2. Ardunio supplies both open-source hardware and software ecosystem. The main motive of the Arduino is to interact with the peer devices and attain several procedures in the physical world.

The Arduino board has an inbuilt programming tool called the IDE (Integrated Development Environment). Since it has an minimum number of 14 input/output pins,

it can communicate with many devices. And it also also supports Serial Communication, COM ports, I2C communication and so on. Hence programming is also quite easier as it supports multiple programming languages like C &C++ which are the of basics all other programming. This board is especially chosen, as it provides the flexibility to communicate with other devices in a much easier way. An connection is established through an Universal Serial Bus(USB) transmission line to the program console, so as to upload programs and communicate.

Figure 2: Arduino UNO

GPS Module

Global Positioning System(GPS) is a satellite based system that is used to measure and calculate The position on object Using Satellites. GPS is also Called as NAVSTAR (Navigation Satellite Timing and Ranging) as shown in figure3. GPS does not send the data directly, GPS receivers Collect the data from minimum 4 satellites for precision purpose. GPS receiver doesn't transmit any Data directly to the satellites. To calculate the distance, both the satellite and GPS receiver generate a signal at the same time. The generated signal is called as Pseudocode Signal. And when the satellite transmits the pseudocode received by the GPS receiver, these two signals are compared and the difference between the signals is the time of travel.

Figure 3: GPS Module

GSM Module

GSM (Global System for Mobile Communication) module also known as General Packet Radio Service(GPRS) module is used to communication between mobile device and GPRS system as shown in figure4. GSM module requires a SIM card to be inserted in the GSM Module. The GSM Module can be connected to the desktop through serial connection, USB or an Bluetooth connection as per the users requirement. To establish a communication between the GPS And GSM The Preferred GSM Module is GSM SIM900.The GSM Module has a Working Frequency Of 900MHZ to 1900MHZ. To Communicate the GSM and GPS Module We Want to connect the Receiving Pin of GSM Module to the Transmitting Pin GPS Module. By this way we can get the Message to phone Through GSM Module.

Figure 4: GSM Module

LCD display

The LCD (16×2) is an display module that uses liquid crystal to display an image, Number or Name as shown in figure5. The 16×2 LCD module is used to Display The output of the projects. The 16×2 LCD Module Consists of 2 columns and each column consists of 16 characters. In the LCD Module each Character is shown in a 5x7 Pixel matrice.

Figure 5: LCD Display

Vibration Sensor

The Vibration Sensor is also called as Piezoelectric Sensor as shown in figure6. The Sensor uses the piezoelectric effect to measure the changes in the acceleration, Pressure, Temperature and force. Vibration Sensor is used to Identify the equilibrium position of the machine or any other component. The transducer present in the Vibration sensor converts the mechanical force to electrical current using the piezoelectric effect. The mechanical force is caused due to the change in the motion of the machine or component

Figure 6: Vibration Sensor

Flow Diagram Of Propose Frame Work

Then figure below shows the flow diagram of the proposed framewok as shown in figure7.

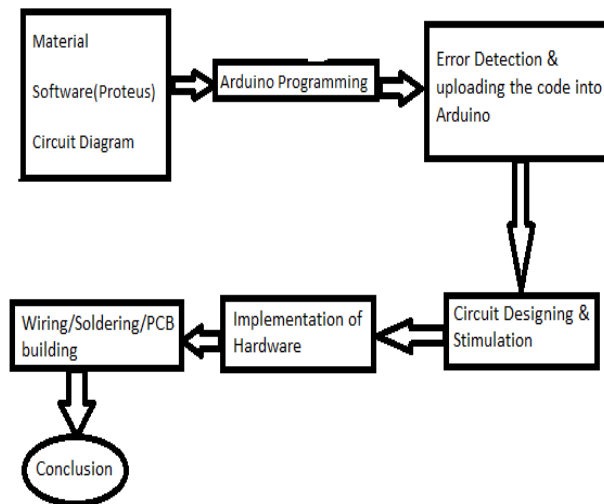Figure7: Showing the flow chart

Methodology

An procedure of an Accident Detection and transmitting the message technique using the following steps is described below:

1. The framework is described in the form of Flow chart and Block Diagram as stated below.

2. The Vibration sensor detects the happening of the accident and it is transmitted to the Aurdino.

3. The Location of the Latitude and Longitude are traced using GPS module and it is sent as an message to the predefined emergency contact list through the GSM module.

4. The receivers number is pre stored in the internal memory EEPROM.

Block Diagram of Framework

Figure8 shows the basic block diagram of the designed framework. Here Arduino plays an keyrole in this circuit, while the LCD display is used to display the result of an incident And the GPS and GSM modules are used for acquiring and transmitting the latitude and longitude location
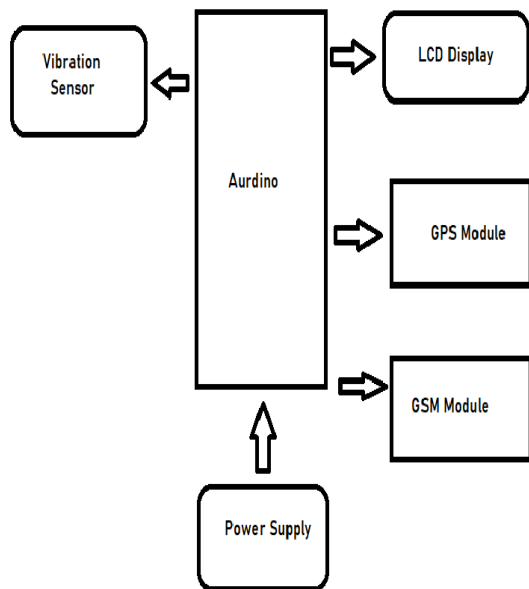

Figure 8: Displaying the block diagram
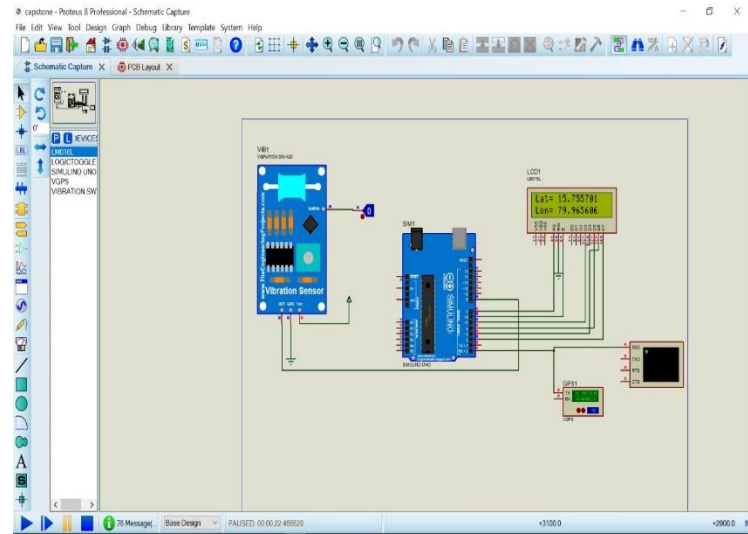
Circuit Diagram

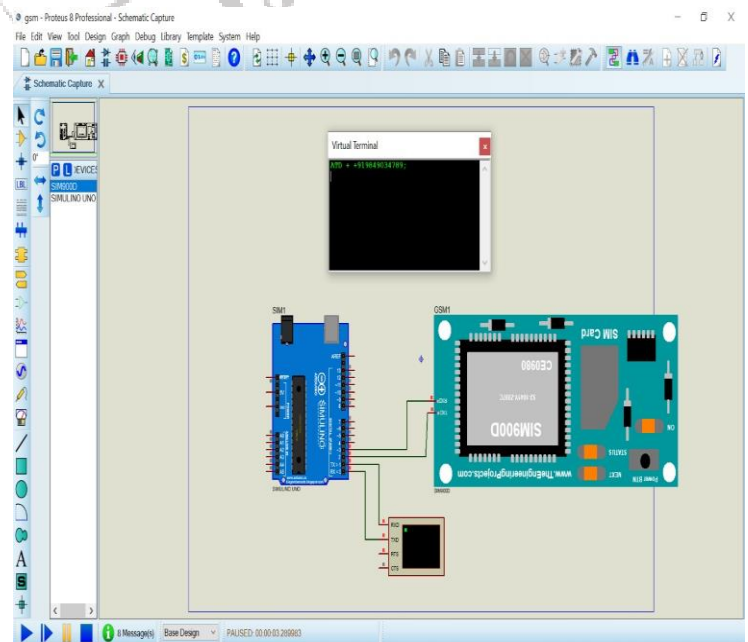Figure 9: Displaying the connection with an GPS module acquiring the Latitude and Longitude values

Figure 9: Displaying the connection with an GSM module

Output of Proposed System

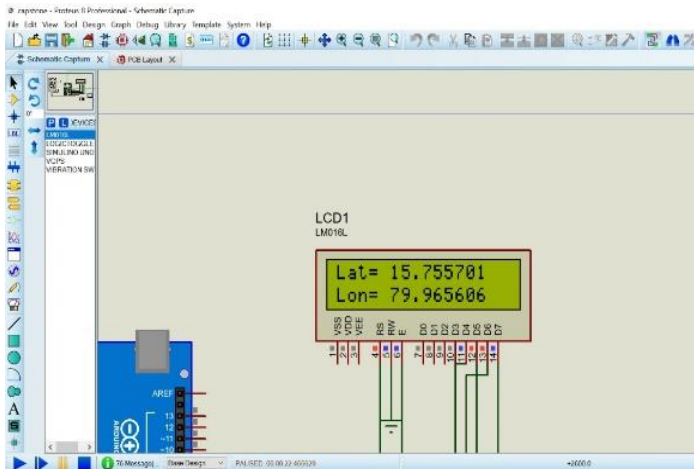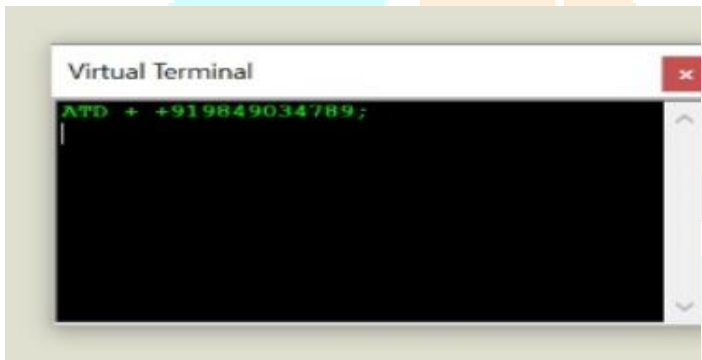Figure 10: LCD Display showing Latitude and longitude

Figure 11: Displaying the contact number in emergency contact list

Result

The value of the Latitude and Longitude are obtained from the GPS module as shown in figure10. And with the help of GSM module text message will be send the pre-stored emergency contact number as shown in figure11. As soon as an connection is established between the GPS and GSM module and when an accident takes place then and there an alert message will be send to the pre-stored contact number.

Implementation of Hardware

Figure 12: Showing the hardware connection establishment

Working Principal

In this framework, Aurdino is used for controlling the whole process. The GPS module is used to detect the co-ordinates of the object. And the GSM Modis used to send an alert with the help of GPS module data to the victims Emergency contact list. Vibration sensor is used for detecting an accident or any sudden drop out in the speed of the object. The 16x2 LCD is used for displaying the status.

Whenever an accident takes place, there is an drop down in the speed. An intimation is send to the aurdino and it checks for any change in axis. And if any change in axis occurs, then the extracts the co-ordinates from the GPS module and sends an alert message to the predefined numbers of the victim. An alert message containing the Latitude and Longitute is send to the predefined emergrncy contact list. The framework can be observed in fig 12.

Further Implementation

The developed framework will ensure the safety of the victims and reduce risk of loss of life by giving an intimation to the user. As the use of technology is increasing day by day an updated framework of the

proposed system can reduce the amount of accidents by providing an alert system that stops and gives an intimation to overcome the accident. An mechanized system can be converted to smart system by further updating the framework by placing an sensor that takes the control of the whole system such that it can be easier to detect the fault without manually monitoring the whole machine. And further it is possible to introduce an smoke sensor so as to notice if in case an fire accident takes place

Conclusion

Automatic vehicle accident detection and reporting is proposed in this paper. This framework provides an feasible solution to the victims in an road accident. With the help of this framework, an tentative action is taken when an accident occurs. In the forthcoming years, it plays an major role in day to day life. The main theme of the accident alert system is to reduce the risk of loss of life thereby providing an alert.

References

[1]Chris T., White J., Dougherty B. , Albright A. and Schmidt DC.," WreckWatch: Automatic Traffic Accident Detection and Notification with Smartphones ", International Journal of mobile network and application, Springer, Hingham, MA, USA., Vol. 16, Issue 3, PP. 285-303, March 2011.

[2]"Traffic-incident detection-algorithm based on nonparametric regression", S.M.Tang and H.J.Gao, IEEE Transactions on Intelligent Transportation Systems, vol 6, 2005, pp. 38-42.

[3]Vikram Singh Kushwaha , Deepa Yadav, Abuyeed Topinkatti, Amrita Kumari . "Car Accident Detection System using GPS And GSM", Volume 2, Issue 1(Jan-Feb 2015), PP12-17

[4] "Providing Accident Detection in Vehicular Networks Through OBD-II Devices and Android based Smartphones" Juan Carlos Cano, Jorge Zaldivar, Carlos T. Calafate, Pietro Manzoni in 5th IEEE Workshop On User Mobility and Vehicular Networks 2011

[5] "Method of Freeway Incident Detection Using wireless Positioning, "H. Ru-fu,L Chuan-zhi, Y.E. Hong-wu, in Proceedings of the IEEE International Conference on Automation and Logistics, 2008, pp. 2801 -2804.

[6]"GPS-free terrain-based vehicle tracking on road networks,",Jerath, K, Brennan S.N, American Control Conference (ACC), 2012, pp.307, 311, 27-29 June 2012

[7]   Jog,   S.R.Sutaone,   M.S,Badawe,   V.V, "Ruggedisation methodologies for GPS based Vehicle Tracking System," (ICECT), 2011 3rd International Conference on , vol.2, no., pp.214,218, 8-10 April 2011.

[8]Nimisha Chaturvedi, Pallika Srivastava . "Automatic Vehicle Accident Detection and Messaging System Using GSM and GPS Modem ",Volume: 05 Issue: 03 | Mar-2018

[9]Lih-Jen Kau, Member, IEEE, and Chih-Sheng Chen, "A Smart Phone-Based Pockert Fall Accident Detection, Positioning And Rescue System", Dec 2013.

[10]Vikram Singh Kushwaha , Deepa Yadav, Abuyeed Topinkatti, Amrita Kumari . "Car Accident Detection System using GPS And GSM", Volume 2 , Issue 1(Jan-Feb 2015), PP12-17

[11]Sneha R.S. and   Gawande A. D., "Crash Notification System for Portable Devices", International Journal of Advanced Computer Technology (IJACT), Vol.2, No-3, PP.33-38, June 2013.