

Automated Vehicle Crash Detection and Emergency Alert System

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Abstract

Automated Vehicle Crash Detection and Emergency Alert System Accelerometer detects the sudden change in the axes of vehicle and GSM module send the alert message on your Mobile Phone with the location of the accident. The advancing technology has made our day to day lives easier. Since every coin has two sides similarly technology has its benefits as well as its disadvantages. The rise in technology has increased the rate of road accidents which causes huge loss of life. The poor emergency facilities available in our country just add to this problem. Our project is going to provide a solution to this problem.

INTRODUCTION

Now a day's large number of accidents is happening in highways due to increase in traffic and also due to rash driving of the drivers. And in many situations the family members or the ambulance and police authorities cannot able to get information regarding to that accident in an appropriate time. This result in delaying the help which is more important to that person who suffer from that accident.

Our project automatic accident vehicle detection and messaging system using GSM modem is designed to overcome such problem and to prove help for the person who met with accident and save their life too by passing message to rescue team in right time. The high demand of automobiles has also increased the traffic hazards and the road accidents. Life of the people is under high risk. This is because of the lack of best emergency facilities available in our country. An automatic alarm device for vehicle accidents is introduced in this paper.

This design is a system which can detect accidents in significantly less time and sends the basic information to first aid centre within a few seconds covering geographical coordinates, the time and angle in which a vehicle accident had occurred. This alert message is sent to the rescue team in a short time, which will help in saving the valuable lives. When the accident occurs the alert message is sent automatically to the rescue team and to the police station. The message is sent through the GSM module and the location of the accident is detected with the help of the GPS module.

The accident can be detected precisely with the help of both Micro electro mechanical system (MEMS) sensor and vibration sensor. The Angle of the rolls over of the car can also be known by the message through the MEMS sensor. This application provides the optimum solution to poor emergency facilities

provided to the roads accidents in the most feasible way.

The usage of auto mobiles has improved linearly over the past decade, which increased in the risk of human life. This is because due to the insufficient emergency facilities.

LITERATURE SURVEY

After analyzing the requirements of the task to be performed, the next step is to analyze the problem and understanding its context. The first activity in the phase is studying the existing system and other is to understand the requirements and domain of the new system. Both the activities are equally important, but the first activity serves as a basis of giving the functional specifications and then successful design of the proposed system. Understanding the properties and requirements of a new system is more difficult and requires creative thinking and understanding of existing running system is also difficult, improper understanding of present system can lead diversion from solution. The proposed system design involved the following research paper analysis.

"Wireless black box using MEMS accelerometer and GPS tracking for accidental monitoring of vehicles" by Watthanawisuth, N., IEEE conference in Jan, 2012: This survey presents an overview of wireless black box using MEMS accelerometer and GPS tracking system is developed for accidental monitoring. The system consists of cooperative components of an accelerometer, microcontroller unit, GPS device and GSM module. In the event of accident, this wireless device will send mobile phone short message indicating the position of vehicle by GPS system to family member, emergency medical service (EMS) and nearest hospital. The threshold algorithm and speed of motorcycle are used to determine fall or accident in real-time. The system is compact and easy to install under rider seat. The system has been tested in real world. applications using bicycles.

"Development of vehicle tracking system using GPS and GSM modem" by Hoang Dat Pham, IEEE conference in Dec, 2013 The ability to track vehicles is useful in many applications including security of personal vehicles, public transportation systems, fleet management and others. Furthermore, the number of vehicles on the road globally is also expected to increase rapidly. Therefore, the development of vehicle tracking system using the Global Positioning System (GPS) and Global System for Mobile Communications (GSM) modem is undertaken with the aim of enabling users to locate their vehicles with ease and in a convenient manner. The system will provide users with the capability to track vehicle remotely through the mobile network. This paper presents the development of the vehicle tracking system's hardware prototype. Specifically, the system will utilize GPS to obtain a vehicle's coordinate and transmit it using GSM modem to the user's phone through the mobile network. The main hardware components of the system are u-blox NEO- 6Q GPS receiver module, u-blox LEON- G100 GSM module and Arduino Uno microcontroller. The developed vehicle tracking system demonstrates the feasibility of near real-time tracking of vehicles and improved customizability, global operability and cost when compared to existing solutions. absolute forecast errors, average relative forecast errors, and average computing times are the smallest comparing with other forecasting algorithms.

"Automatic Accident Detection: Assistance Through Communication Technologies and Vehicles" by Fogue, M., IEEE conference in August, 2012 In this article, e-NOTIFY system is presented, which allows fast detection of traffic accidents, improving the assistance to injured passengers by reducing the response time of emergency services through the efficient communication of relevant information about the accident using a combination of V2V and V2I communications.

The proposed system requires installing OBUS in the vehicles, in charge of detecting accidents and

notifying them to an external CU, which will estimate the severity of the accident and inform the appropriate emergency services about the incident. This architecture replaces the current mechanisms for notification of accidents based on witnesses, who may provide incomplete or incorrect information after a long time. The development of a low-cost prototype shows that it is feasible to massively incorporate this system in existing vehicles

EXISTING SYSTEM

With the quantity of passing cases expanding There are a few frameworks previously proposed yet there is no appropriate model which can catch the vehicle's area continually. persistently and send the alarm messages when accident happens to overcome this kind of situations, we have developed this model to save the lives of the people.

Street accidents are not kidding aim of passing, wounds and loss of lives each year in India. The current accidents are broadened to a bigger degree. More number of passing during accidents happens because of absence of salvage in the crisis time. If an accident occurs in a clamoring spot where there would be various people around, there will be no difficulty since people around him will manage the driver and do the basic necessities to save the rider. Regardless, if the mishap occurs in a remote zone there is a lot of delay in getting the rescue from the people which prompts the death of a person. Varsha has projected a plan which office on the data dependent on ARM regulator and ultrasonic sensor. This framework is financially savvy. The presentation of the ARM microcontroller enormously relies upon execution if the developer doesn't execute as expected then it requires some investment to work appropriately.

PROPOSED SYSTEM

In order to preserve the life of the driver in all the conditions of the accident, we have proposed this vehicle alert system project using Arduino. In our model, we have used Arduino UNO R3 to integrate with a GPS GY6MV2 receiver and GSM module SIM 800L. MEMS Accelerometer will be capturing the X and Y axis coordinates of the vehicle and GSM SIM 800L sends a notification message to the registered contact number of the family members.

The proposed model is placing one reset button also which comes into handy when the accident is minor. If the accident occurred is minor, the driver will press the reset button which will stop the circuit from sending message directly to the family members. The system waits for a prescribed small amount of time to help driver press the reset button if required. If the reset button isn't pressed in that suggested time, by then it is seen as a critical accident and the alert will be dispatched off the family members.

GPS module captures Latitude

and Longitude of the place and sent to the Arduino. When the value of X and Y co- ordinates go beyond the threshold value, it will send signal to Arduino board and GSM modem gets activated and sends the alert messages to the family members specifying the location of the place through a Google Map link.

SOFTWARE

For developing this project, we mainly used software is Arduino IDE 1.8.19. The Arduino IDE is an open-source software, which is used to write and upload code to the Arduino boards. The IDE application is suitable for different operating systems such as Windows, Mac OS X, and Linux. It supports the programming languages Embedded C and C++. Here, IDE stands for Integrated Development Environment.

METHODOLOGY

In this proposed system, we have designed an Accident Prevention and Identification system for Vehicles. Arduino Controller, Accelerometer, Vibration and GSM and GPS module is used major key components for these projects. Accelerometer is used to measure the Vehicle angle (x and y) position, if it is horizontal to the ground than no action is performed. DC Geared motor is used to demonstrate the Engine Working Condition. If Vehicle angle with respect to ground changes than it is sensed using accelerometer and send signal to Arduino Microcontroller. Controller processes this data and as a preventive measure it first switches off the Engine (DC Motor) than it generates Buzzer Alert as a Signal of Help for near people at Road along with Indicator LED. Arduino retrieves the Current GPS Location of the Vehicle and Send Help SMS to Register Family member Mobile Numbers. It is also interfaced with a Vibration sensor to check if any unknown person is touching the vehicle. If this sensor is triggered than a Alert Message will send to the owner of the Vehicle.

Embedded C Programming language is used to write the program of the Arduino controller. 2,3,4,5,6,7 is interfaced LCD Module, GSM and GPS is connected to Serial terminals. MEMS Sensor is connected to Analog Pins. DC Motor is connector to Digital Pins 8 and Buzzer is connecting to digital pins 13. On board usb programmer is used to upload code on Arduino board.

The power supply setup of the system contains a step-down transformer of 230/12V, used to step down the voltage to 12VAC. To convert it to DC, a bridge rectifier is used. 7805 voltage regulator is used regulate 12V Dc to +5V that will be needed for microcontroller and other components operation. Filter Capacitor are used to remove ripple from DC Voltages.

ADVANTAGES

1. Real Time Vehicle Location on Accident Detection
2. Accident Detection using Accelerometer
3. Buzzer Indicator for Help nearby people
4. Engine Deactivate on Accident detection
5. Sim card can be changed at any time.
6. Anybody and straight forward to operate.
7. Inform to the control station or rescue team immediately.
8. Enlightened protection and Simple in Design.

APPLICATIONS

1. Personal Safety Alert
2. Emergency Response Notification
3. Fleet Management Systems
4. V2X Communication
5. School Bus Safety
6. Insurance Claims assistance

EXPERIMENTAL RESULTS

At the point when our vehicle is hit by another vehicle from the any side then it is supposed to be accident. The MEMS Accelerometer will detect the X and Y co- ordinates of our vehicle and if

(acceleration

< 280 or acceleration >380) finishes up as Accident. Right when a mishap occurs and it is one among the four kinds of mishaps we have given and if the driver didn't press the reset button in the scope of the suggested concede time then the mishap is believed to be a critical one and a caution message will be transported off the family members.

VEHICLE ACCIDENT DETECTED AT LOCATION:

[http://www.google.com/maps
/place/16.8409869,82.0189624](http://www.google.com/maps/place/16.8409869,82.0189624)

shows us the output message that will be sent by the GSM Modem to the registered contact numbers when Accident occurs.

Before Giving The Supply



After Giving The Supply



CONCLUSION

An effective solution is provided to develop the intelligent system for vehicles which will monitor Accelerometer Coordinates and if there is large angle difference found, than Arduino detect it as vehicle accident and send GPS Location to Family Members and Police Station. Using this system we can immediately alert for necessary help at the time of accidents. We have used MEMS Accelerometer ADXL335 to detect the change of axes whenever our vehicle is hit by another vehicle. By capturing the values of X&Y axes, MEMS Accelerometer detects the type of accident occurred. Buzzer is also used to alert people present in the surrounding. Engine also deactivates at the time of Accident.

FUTURE SCOPE

- This system can further be interfaced with multiple sensors like Vibration, Ultrasonic get more efficient data. To demonstrate such system, Vehicle model can be designed.
- We can reveal a few parameters of car like twist of fate area and most important damages.
- We can intimate pals or own circle of relative's man or woman if the car is going out of a certain/pre-determined tune with the assist of location.
- Video streaming enables to realize the precise twist of fate area and may be reached quickly to place.

REFERENCES

1. R. Ganiga, Rohit Maurya, Archana Nanade, " Accident detection system using Piezo Disk Sensor", International Journal of science, Engineering and Technology Research(IJSETR)volume6, Issue 3, March 2017,ISSN 2278-7798.
2. Hemjit Sawant, Jindong Tan, Qingyan Yang Qizhi Wang, " Using Bluetooth and Sensor networks for intelligent transport systems", In proceeding of Intelligent Transport System; 2004
3. Helia Mamdouhi, Sabira Khatun, Javed Zarrin, " Bluetooth Wireless monitoring, Manging
4. and Control for inter vehicle in vehicular adhoc networks", Journal of computer Science, Science Publication: 2009
5. Jules White, Brian Dougherty, Adam Albright, Douglas C, " Using Smartphone to Detect Car Accidents and Provide Situational awareness to emergency responders chirs Wireless Thompson", Mobile Middleware, Operating system and Application;2010
6. MI Ahmed, " A Compact Triangular Ring Patch Antenna For Radio Location And Fixed Satellite Applications", National Journal Of Antennas And Propagation, Volume 1, Issue 1, 2019
7. Ch. Harsha vardhan, K. Raghavendra krishna sai, N. Mohan vamsi Pachipala Yellamma, " A Smart Industrial Pollution Monitoring System using IoT", International Journal of Innovative Technology and Exploring Engineering (IJITEE) ISSN: 2278-3075, Volume-8 Issue- 7 May, 2019