

A Review on Vehicle Tracking and Accident Detection System using Accelerometer

B.Rani¹

*PG Scholar, Department of Computer Science and Engineering, G. Pulla Reddy Engineering College
Kurnool-518007, Andhra Pradesh, India.*

R. Praveen Sam²

*Professor, Dept. of Computer Science & Engineering, G. Pulla Reddy Engineering College
Kurnool-518007, Andhra Pradesh, India.*

Govardhan Reddy Kamatam³

*Associate Professor, Dept. of Computer Science & Engineering, G. Pulla Reddy Engineering College
Kurnool-518007, Andhra Pradesh, India.*

Abstract

The rapid growth of technology and infrastructure has made our lives easier. The advent of technology has also increased the traffic hazards and the road accidents take place frequently, which causes huge loss of life and property because of the poor emergency facilities. Even with so many modern devices present in the field of vehicle design, road lane design and heavy traffic control accidents do occur at a large scale. Accident threatens human lives more and mainly road accident is common today. During accident many people lose their life because medical services and family member not getting accidental information on time. Any kind of accident detected is automatically sent as an alert to the required destination. Accident detection device installed in a vehicles when meets with an accident will send SMS/messages to the pre-install numbers of the drivers family members, police station, ambulance and nearest hospital. This embedded system is useful for tracking and retrieving the exact position of any vehicle, which has met with an accident by using Global Positioning System (GPS) and sensors.

Keywords: Accident Detection, Vehicle Tracking, Short Message Service SMS, Global Positioning System GPS, Global System for Mobile Communication GSM, Sensors, Renessa's micro-controller.

INTRODUCTION

The major death rates in the world are due to the road accidents. India faces the highest death rate in the world. Reasons for the accident are speed driving, lacking sufficient sleep, drink and drive. Automatic accident detection helps to recognize the location of the accident and to find the location of the accident. For an ambulance vehicle, every second is important. If there is a delay in the arrival of ambulance, there will be a loss of life.

Delay is caused mainly because of the traffic signals. Therefore, time factor is an important task. Radio Frequency module is used to control the traffic signals automatically. Therefore, the ambulance vehicle will reach the hospital in exact time to save the human. In addition, the main goals for

the automatic accident detection techniques are to detect the accident and to send the message automatically to the emergency contacts along with the location. Emergency contacts include family members, friends, hospitals, police station etc.

The incidents of accidental deaths have shown increasing trend during the year 2000-2015 with an increase of 50 percent in the year 2010 as compared to the year 2000. According to Planning Commission of India, the total annual economic loss is 2.5% of India's GDP due to rising number of road fatalities.

Another important reason can be improper medical help. Survey shows that each minute that an injured crash victim does not receive emergency medical care can cause into fatality. Most victims lose their lives due to such reasons. Therefore, this idea of saving lives by curing the problem comes into existence.

Real-time position of the vehicles are informed by the system using the pre-install smart sensing accelerometer equipment. This data is recorded and all the information can be observed by remote location to provide the required services to the victims. Tracking of the vehicle can be done in all-weather condition. GPS and GSM technologies are used in this system to provide all the data to the remote server which are then processed and the extracted information is used to provide the services to the individual at the time of emergency.

The main contributions of this paper are: (a) Vehicle registration and preparation, (b) Passengers 'registration, (c) Monitoring accidents through a web interface located in the PSO headquarter.

PROPOSED SOLUTION

This proposed system is mainly used for tracking various vehicles either small vehicles like cars, motorbikes by their owners or various large size vehicles like buses and loaded trucks by the authorized company. If an accident occurs this tracking system helps to retrieve the exact position of the vehicles. This system sends an automated message to all the

pre-install numbers in the device such as the drivers family members, police station, ambulances and the nearest hospitals. Exact position of the vehicles can be acquired by the help of the GPS (Global Positioning System).

GSM(Global System for Mobile Communication) is used to send and receive the message to the various people of the accident that has happened. All the entire working of the hardware is executed with the help of the Redness's Micro controller. This micro-controller coordinates with all the modules and helps sending the message. When an accident happens the shock triggers the sensors resulting into sending signals to the micro controller. Once the signal is received the micro controller then sends the result according to its programming.

LITERATURE SURVEY

Due to higher accident rates vehicle tracking is very important now days. This can be done easily by the use of the GPS technology. Various other applications can also be used to do so [1]. These applications are also used in fleet management, anti-theft vehicle systems and accident recovery [2].

Vehicle Tracking:

The vehicle tracking technology uses the GPS systems via many applications. These applications are very helpful as the track the vehicles and their partner web applications also monitor the vehicles continuously [1]. There are various ways to track a vehicle. Larger organizations use web services to track large number of vehicles whereas small scale industries can use various mobile apps. To find exact location, distance and estimating time to reach particular destination an android app is developed [3]. Theoretical it is easy to say we can get the exact location of a vehicle, but practically sometimes it is next to impossible. Even though we have advanced technology it is very difficult to actually obtain the geographical coordinates correct all the time. Use Kalman filter can be done, to get an exact longitude and latitude position[9].

Camera Processing System:

New technology namely Image Processing is being used in many countries. Most of the countries use this technology for traffic purposes but there ways where this is used for tracking of vehicle. Two cameras are consequently used one of which is used to track the vehicle and second is used to identify the number on the number plate. By using numerous algorithms, vehicles can be traced and movement of vehicle is captured from first camera [8].

Location Identifier and immediate recovery of accident:

As we already know there are numerous ways to track the location of a vehicle which has already met with an accident. We also know that there are ways where we can notify the

authorized person about the mishap that has happened. When accidents happen it becomes very difficult to send help to the victims as no notification the accident has the reached the hospitals, police or the family members of the victim. Thus resulting in a huge lose of life. To avoid such situations we can send an automated SMS to the predefined numbers in the system. Bluetooth Technology is used as a medium to activate the GPS by the sensors. It is an intermediate between the sensors and the GPS. But now not only Bluetooth technology can be used but also MESA technology can be used to activate GPS and send the location coordinates to the predefined numbers[10].

METHODOLOGY

This accident detection & recovery model consists of various micro-controller, software and hardware components such as:

Vehicle Registration and Preparation: This phase deals with the process of vehicle registration. The vehicle's owner must prepare the vehicle for this system by installing the IoT device. After installing the device, the owner gives the Vehicle ID to the operator responsible for vehicles registration in the headquarter's database. This would lead the PSO to recognize that the registered vehicle satisfies the pre-conditions to be integrated in the system.

The IoT device encompasses four modular components: shock sensor, GPS, NFC reader, and cellular IoT. Those combined modules altogether spontaneously notify the rescue organization headquarter whenever an accident takes place, pinpoint the exact location, and recognize the **passengers inside the vehicle on the headquarter map**. The triggered sensor signal reports the vehicle's identifier along with the accident's location which appear on a web-based interface in the rescue center. This enables the rescue teams to respond immediately.

Passengers' Registration: The mobile application aims at providing a one-time only registration form for passengers' personal data. The personal data include: (a) Full name, (b) Blood type, (c) Phone number, (d) Email, (e) Medical history, (f) Date of birth, (g) Reference phone number. The whole record of passenger's information is uploaded to

The headquarters' database once the registration process is complete.

Shock sensor: Shock sensor can be integrated in various ways to match the vehicle requirements. It could be activated by vibration or triggered by highly effective safety system airbag. This airbag system contains several components and mechanism which all work together to ensure the physical integrity of the passengers to the highest degree [6]. The sensitivity of the employed sensor is adjusted to meet the standards adopted in safety airbag systems. During the accident and transmits the electrical signal to the encoder.

GPS Module

A GPS navigation device, GPS receiver, or simply GPS is a device that is capable of receiving information from GPS satellites and then to calculate the device's geographical position. Using suitable software, the device may display the position on a map and also provide directions. The Global Positioning System (GPS) uses a global navigation satellite system (GNSS) made up of a network of a minimum of 24, but currently 30, satellites placed into orbit. The GPS module has Receiver with antenna which provides the location of the vehicle. The GPS system is commonly used to get information about coordinates, speed, time and distance. In this module, a GPS system is adopted to implement the in-vehicle device.

GSM/GPRS Module

General Packet Radio Services (GPRS), a packet-based wireless communication service. In this device, It is responsible for establishing connection between victim vehicle device and a remote device and for also transmitting the message to all the predefined numbers which contains the information about the vehicle location. GSM/GPRS network uses TCP/IP connection.

CONCLUSION

Proposing an IOT system which may help the community decreasing the death rates resulting from vehicles accidents. It also provides many advantages compared to traditional systems, namely, minimizing injured passengers interaction, providing basic medical information to rescue teams, recognizing exact and accurate accidents locations, and facilitating the routing process. The IOT device keeps sending continuous notification of crash occurrence until it makes sure its reception by the headquarter. Accident detection device installed in a vehicles when meets with an accident will send SMS/ messages to the pre-install numbers of the drivers family members, police station, ambulance and nearest hospital. This embedded system is useful for tracking and retrieving the exact position of any vehicle which has met with an accident by using Global Positioning System (GPS) and sensors. This project provides very good idea of how we can extract a location of accident and send the SMS notifications and help can be provided to the victims.

ACKNOWLEDGEMENT

This survey is done by B.Rani. I deeply honoured in expressing our sincere gratitude to Dr. Praveen Sam who guided us and provided valuable insights. Special thanks to the HOD (CSE Dept.) Dr. N.Kasiviswanath who has extended help in all possible ways. I'm also indebted deeply to all the teaching and non-teaching staff for the facility provided and their guidance.

REFERENCES

- [1] J.S Bhatia and Pankaj Verma:- "Design and Development of GPS-GSM based tracking system with Google map based monitoring", International Journal of Computer Science, Engineering and Applications, Vol.3, Issue. 3, pp. 33-40, 2013.
- [2] Ishan Karande, Gandhar Deshpande, Saurabh Kumbhar, prof. A.V. Deshmukh :- "Intelligent Anti-Theft Tracking and Accident Detection System for Automobiles Based on Internet of Things.", International Journal of Innovative Research in Computer and Communication Engineering, Vol 4,, Issue 3, March 2016
- [3] SeokJu Lee, Girma Tewelde and Jaerock Kwon: "Design and Implementation Vehicle Tracking System using GPS/GSM/GPRS Technology and Smartphone Application", IEEE World Forum on Internet of Things (IoT), pp. 353-358, 2014.
- [4] R.Ramani, S.Valarmathy, Dr.N.Suthanthira Vanitha, S.Selvaraju and M.Thiruppathi, R.Thangam: "Vehicle tracking and locking system based on GPS/GSM", International Journal of Intelligent Systems and Applications, Vol.9, pp 86-93, 2013.
- [5] Pranali More, Ulhas Patil, Prof. Avinash Ingole : Accident Detection, Tracking and Recovery of Vehicles : International Research Journal of Engineering and Technology, Volume: 04 Issue: 10, Oct -2017
- [6] Baburao Kodavati, V.K.Raju, S.Srinivasa Rao, A.V.Prabu, T.Appa Rao and Dr.Y.V.Narayana:"GPS and GSM Based Vehicle Location and Tracking System", International Journal of Engineering Research and Applications, Vol.1, Issue 3, pp.616- 625, 2013
- [7] M. Grewal, L. Weill and A. Andrews, Global positioning systems, inertial navigation, and integration. New York: John Wiley, 2001.
- [8] M. Hendry, Near field communications technology and applications.
- [9] "Cellular networks for massive IoT," Ericsson White Paper, Jan 2016
- [10] W. Chris Veness, "Calculate distance and bearing between two Latitude/Longitude points using haversine formula in JavaScript", Movable-type.co.uk, 2016. [Online]. Available: <http://www.movabletype.co.uk/scripts/latlong.htm>
- [11] M. Behzad, A. Sana, M. A. Khan, Z. Walayat, U. Qasim, Z. A. Khan , N. Javaid: "Design and Development of a Low Cost Ubiquitous Tracking System", The 9th International Conference on Future Networks and Communications (FNC) Procedia Computer science at Elsevier, Vol. 9, pp. 1-8, 2014.