



e-ISSN: 2319-8753 | p-ISSN: 2347-6710

IJRSET

International Journal of Innovative Research in
SCIENCE | ENGINEERING | TECHNOLOGY



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 13, Issue 4, April 2024

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 8.423

9940 572 462

6381 907 438

ijrset@gmail.com

www.ijrset.com

Fabrication of Arduino Based Vehicle Accident Alert System using GPS, GSM and Vibration Sensor

Elavarasu K, Gopinath P, Jeeva. M, Ramesh C, Dr. R. Senthilkumar, M.E, PhD Professor

Department of Mechatronics Engineering, Muthayammal Engineering College, Rasipuram, Namakkal, Tamil Nadu, India.

ABSTRACT: In our preceding tutorials, we have realized about How to interface GPS module with Computer, how to construct an Arduino GPS Clock and how to Track automobile the use of GSM and GPS. Here in this project, we are going to construct an Arduino primarily based car accident alert gadget the usage of GPS, GSM and accelerometer. Accelerometer detects the unexpected exchange in the axes of automobile and GSM module sends the alert message on your Mobile Phone with the vicinity of the accident. Location of accident is despatched in the shape of Google Map link, derived from the latitude and longitude from GPS module. The Message additionally includes the velocity of automobile in knots. See the Demo Video at the end. This Vehicle Accident alert venture can additionally be used as a Tracking System and a whole lot more, by using simply making few adjustments in hardware and software program.

KEY WORDS: GSM Module, GPS Modem, Ardunio Uno, Google Map Link.

I. INTRODUCTION

The important purpose of the accident warning gadget is to shop humans in crashes. This system helps the proprietor to look at and discover out automobile endeavor and its previous automobile movements, the present day such as GPS are exceedingly beneficial now-a-days.

Over the previous decade, the use of auto mobiles has increased linearly, which elevated the chance of human life. This is due to the fact the emergency offerings are inadequate. We use an alert machine in this paper that helps to support the emergency gadget of the crash system.

This system senses the incidence of the accident and the coordinated accident is stated to the emergency team. In the match of no causality, a switching mechanism is used to shut off. Using the Accelerometer Sensor, an accident is observed. The perspective the place the vehicle rolled off is proven by way of a message, this software goals to grant the vulnerable emergency amenities with a appropriate alternative. This accident warning gadget identifies the accident and the area of the accident and sends GPS coordinates to the Smart Phone, device, etc. listed in it.

II. LITERATURE REVIEW

G. Boopathi Raja, Keerthika A, Keerthika S G, Nandhini AGSM based Vehicle Accident Alert System

One of the basic reasons for road accidents is speed. Road accidents are rising suddenly today and are one of the key causes of human deaths. Human life is more important than anything else, and timely assistance is more important than lending a helping hand. If emergency service could get accident reports and reach it in time, more lives could have been saved. In saving human lives, the time between the accident and when the ambulance reaches the site of the accident plays an important role. If we reduce the time between when an accident happens and when a medical ambulance is dispatched to the area, we can save human lives by reducing mortality rates. GPS has become an integral part of a vehicle system nowadays. The accelerometer senses a sudden shift in the vehicle's axles. It will be tested by Arduino. The Arduino sends the warning message via the GSM module to the police control room or a rescue team, including the location. So, after receiving the information, the police can automatically track the location via the GPS module. Then, the appropriate action will be taken after verifying the venue.

L Vijayaraja R Dhanasekar, Magesh Krishna R, Mahidhar M, Prakash D and Shashikumar P
A low cost and user-friendly vehicle crash alert system using arduino

This paper is aimed at developing a vehicle crash detection system using Arduino, GPS, GSM and accelerometer. Accelerometer detects the sudden change in the axes of vehicle and GSM module sends the alert message on your mobile phone with the location of the accident. Location of accident is sent in the form of Google map link, derived from the latitude and longitude from GPS module. The message also contains the speed of vehicle in kilometers per hour. The proposed model can also be used as a tracking system and much more, by just making few changes in hardware and software. The alert system has been developed in real time and performance is discussed.

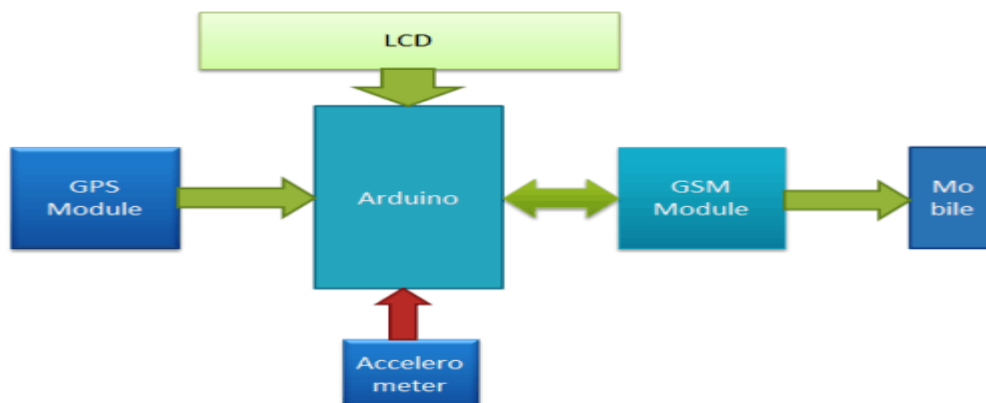
Seema Shukla, Pooja Paswan, Dipika Singhaniya, Digvijay Nishad, K M. Neha, Shovana Khan Yusufzai
 Arduino based Vehicle Accident Alert System using GPS, GSM and Accelerometer

The aim of our project is to find the vehicle accident location by sending a message using a system which is placed inside the vehicle system. The purpose of this work is to find spot of vehicle where the accident is occurred. Most of the times we don't know about where the accident is actually occurred or if accident happens then we cannot be able to present at the accident location so in this project we will find accident spot in order to rescue the injured person. First, we need to know that where the case of accident is actually happened and that is done through location tracking and then a SMS is send to your related one. GPS and GSM modules are used in this project which can be used for navigate the vehicle anywhere on the globe. In this project when an accident occurs and vehicle tilt then, immediately accelerometer detect the change in axis of vehicle from these it collects some data and sends it to Arduino. The Arduino sends the alert message through the GSM to an authorized mobile number. Through GPS the authorized mobile number gets the exact location of where the accident has occurred and the location is seen with the help of Google map link. Viplove Rohilla1, Monica Bazzad.

III. METHODOLOGY

- Latitude and Longitude of any vicinity on the Earth, with actual UTC time (Universal Time Coordinated). GPS module is used to tune the place of accident in our project. This gadget receives the coordinates from the satellite tv for pc for every and each second, with time and date. We have before extracted \$GPGGA string in Vehicle Tracking System to discover the Latitude and Longitude Coordinates.
- GPS module sends the information associated to monitoring role in actual time, and it sends so many statistics in NMEA structure (see the screenshot below). NMEA structure consists various sentences, in which we solely want one sentence. This sentence begins from \$GPGGA and incorporates the coordinates, time and different beneficial information. This GPGGA is referred to Global Positioning System Fix Data. Know greater about NMEA sentences and analyzing GPS statistics here.
- We can extract coordinate from \$GPGGA string through counting the commas in the string. Suppose you locate \$GPGGA string and shops it in an array, then Latitude can be determined after two commas and Longitude can be discovered after 4 commas. Now, this latitude and longitude can be put in different arrays.
- In this project, Arduino is used for controlling complete the technique with a GPS Receiver and GSM module. GPS Receiver is used for detecting coordinates of the vehicle, GSM module is used for sending the alert SMS with the coordinates and the hyperlink to Google Map. Accelerometer specifically ADXL335 is used for detecting accident or unexpected exchange in any axis. And an non-obligatory 16x2 LCD is additionally used for showing popularity messages or coordinates. We have used GPS Module SIM28ML and GSM Module.

Block diagram



- A. **Arduino Uno** The Arduino UNO is a standard board developed by Arduino.cc, based on an ATmega328P microcontroller. Its name, UNO, meaning 'one' in Italian, was chosen to mark the first release of Arduino Software and also because it was the first USB board released by the company. With its digital and analog Input/Output pins, shields, and other circuits, the Arduino UNO is a powerful board that is widely used in various projects. Compared to other boards such as the Arduino Mega, the UNO is easy to use and includes 6 analog pin inputs, 14 digital pins, a USB connector, a power jack, and an ICSP header. It is programmed through IDE, which stands for Integrated Development Environment, and can run on both online and offline platforms. The IDE is common to all available boards of Arduino, making it a versatile and reliable tool for developers and hobbyists alike.



Fig 1: Arduino uno board

- B. **GSM SIM900 A** The use of GSM technology in monitoring and controlling transformer load is a highly efficient and cost-effective means of communication. With its deterministic character, GSM enables the remote control of DC motors, stepper motors, temperature sensors, and solid-state relays through a simple message sent via a GSM modem. This eliminates the need for manual operation and transportation, making it an ideal solution for industrial controls, automobiles, and appliances. The SIM900A modem, equipped with a SIM900A GSM chip and RS232 interface, allows for easy connection to a computer or microcontroller using USB to Serial or RS232 to TTL converters. By opening a serial connection and sending AT commands, the modem can be easily configured to perform various functions. With its reliability and ease of use, GSM technology is the preferred choice for remote control and monitoring applications.



Fig 2: GSM board

- C. **LCD (Liquid Crystal Display)** A liquid crystal display, commonly known as LCD, derives its definition from the unique combination of two states of matter - solid and liquid. By utilizing liquid crystal technology, LCD screens produce a visually stunning image that is widely used in laptops, televisions, cell phones, and portable video games. Unlike the bulky cathode ray tube (CRT) technology, LCD's ultra-thin composition is made possible by its multiple layers, including polarized panel filters and electrodes. LCD technology is a popular choice for displaying images in electronic devices like mini computers and notebooks. As light passes through a lens, it interacts with the liquid crystal layer, creating a grayscale image that is then combined with colored

light to produce a vivid, high-quality image on the screen. In summary, LCD technology offers a sleek and efficient alternative to traditional display screen.

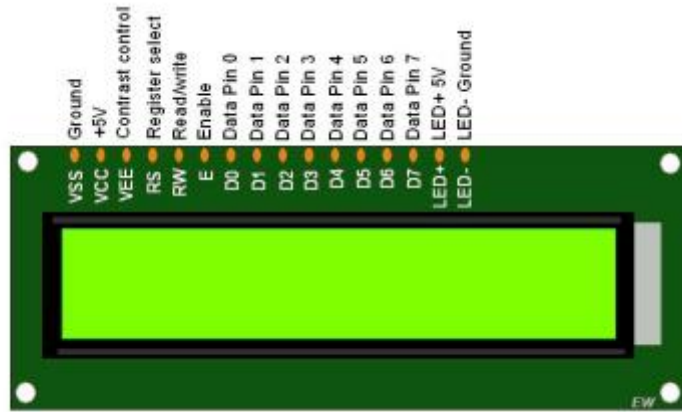


Fig 3: LCD Display

- D. GPS NEO 6M GPS technology has revolutionized the way we navigate and track vehicles. With tracking systems, a base station can monitor vehicle movement without driver intervention, while navigation systems assist drivers in reaching their destination. Although the two systems differ in function, their architecture remains similar. In the event of an accident, the GPS system can pinpoint the vehicle's location and relay the information via GSM, alerting the relevant party through SMS or call. Our NEO 6M GPS module utilizes cutting-edge technology to provide accurate positioning information, complete with a battery for faster GPS lock. It's also compatible with ardupilot mega v2, offering optimized performance for your multirotor control platform. Trust us to provide the best GPS solution for your needs.

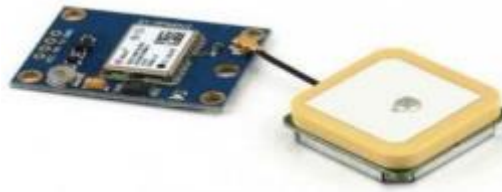


Fig 4: GPS module

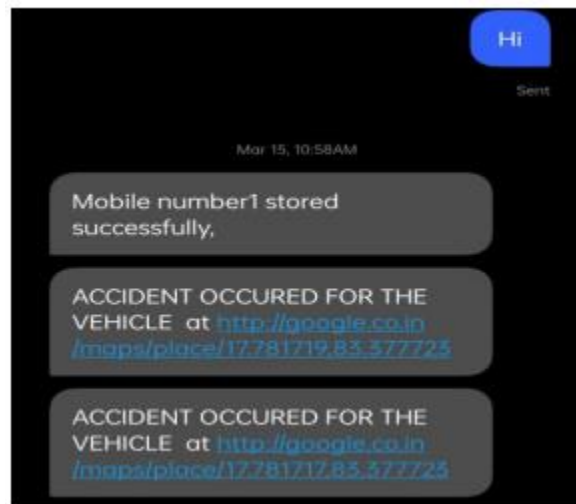
- E. Vibration Sensor the Normally Open Vibration Sensor Module is a versatile device designed to activate a variety of functions, including theft alarms, smart cars, and electronic building blocks. It is important to note that this module is designed to detect small vibrations and has a short trigger time, which may not be sufficient to drive a relay. However, it can be directly connected to some information displays or relay modules, although its effectiveness may vary. When the product is not vibrating, the vibration switch remains in the off state, and the output is high, causing the green light to remain off. When the product is vibrating, the vibration switch enters momentary conduction mode, causing the output end to go low and the green indicator light to turn on. The output can be easily connected to a microcontroller to detect high and low levels and determine if there is any vibration in the environment, thereby playing an essential role in alerting users of potential danger.



Fig 5: vibration module

IV. SIMULATION RESULTS

When an accident occurs the vibration sensor detects collisions and passes that signal to the microcontroller, by using GSM and GPS a SMS is sent to the registered mobile number mentioned in the code and the latitude and longitude is also sent in the form of Google maps. The message is received by the registered mobile number along with the specific location.



V. CONCLUSION

This innovative system offers an optimal solution to the inadequate emergency facilities provided to victims of road accidents. By utilizing advanced technology, immediate action can be taken to alert the relevant parties through messaging. It is important to note that this system is network-dependent and may not function in areas with poor network coverage. The proposed method is highly advantageous to the automotive industry, enabling medical teams to respond promptly and save precious human lives. Vehicle tracking systems are also essential for efficient fleet management, leading to increased profits through better scheduling and route planning. Both for personal and business use, vehicle tracking enhances safety and security, communication, performance monitoring, and productivity. It is evident that this technology will play a significant role in our daily lives in the years to come. The primary objective of the accident alert and detection project is to reduce fatalities resulting from unavoidable accidents. By alerting paramedics promptly, the chances of saving lives are significantly increased. This vehicle tracking and accident alert feature is expected to become even more critical in our day-to-day lives in the future. However, communication may be challenging in areas with no GSM network provision.

REFERENCES

1. Manuel Fogue, Piedad Garrido, Francisco J. Martinez, JuanCarlos Cano, Carlos T. Calafate, and Pietro Manzoni (2012) "Assistance through Communication Technologies and Vehicle", IEEE vehicular technology magazine.
2. PL Needham, Collision prevention: The role of an accident data recorder. Automated Emergency Call for Road Accident, European Commission Press G. Singh and H. Song, Using Hidden Markov Models in Vehicular crash detection, IEEE Transactions.
3. Aldunate R.G., Herrera O.A., Cordero J.P. (2013) Early Vehicle Accident Detection and Notification Based on Smartphone Technology. In: Urzaiz G., Ochoa S.F., Bravo J., Chen L.L., Oliveira J. (eds) Ubiquitous Computing and Ambient Intelligence. Context-Awareness and Context-Driven Interaction. Lecture Notes in Computer Science, vol 8276. Springer, Cham. https://doi.org/10.1007/978-3-319-03176-7_46.
4. Thompson C., White J., Dougherty B., Albright A., Schmidt D.C. (2010) Using Smartphones to Detect Car Accidents and Provide Situational Awareness to Emergency Responders. In: Cai Y., Magedanz T., Li M., Xia J., Giannelli C. (eds) Mobile Wireless Middleware, Operating Systems, and Applications. MOBILWARE 2010. Lecture Notes of the Institute for Computer Sciences, Social Informatics and Telecommunications Engineering, vol 48. Springer, Berlin, Heidelberg. https://doi.org/10.1007/978-3-642-17758-3_3.
5. Borker S., Lohani R.B. (2010) A Low Cost GPS Based Vehicle Collision Avoidance System. In: Das V.V., Vijaykumar R. (eds) Information and Communication Technologies. ICT 2010. Communications in Computer and Information Science, vol 101. Springer, Berlin, Heidelberg. https://doi.org/10.1007/978-3-642-15766-0_107.



INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

 9940 572 462  6381 907 438  ijirset@gmail.com



www.ijirset.com

Scan to save the contact details