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IOT Based Vehicle Accident Detection & Rescue System

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Abstract

Smart accident detection systems are systems that automatically detect accidents. IOT (Internet of Things) can connect different hardware, especially sensors, and can do processes using the information received from sensors, which lead to accident detection; and then this information is made available to relevant authorities such as medical emergencies and the police. In this research, some of the most recent methods for car accident detection using IOT technology are investigated and then obstacles, challenges and future trends are analyzed and compared.

Keywords— IOT (Internet of Things); GPS (Global Positioning System); GSM (Global System for Mobile); IDE (Integrated Development Environment)

1. INTRODUCTION

Now a day, with the world's population continually rising, finding someone or anything is getting more difficult. The growing demand for autos and cars, on the other side, has aggravated traffic hazards and road coincidences. Public's be alive are at more danger. Road accidents account for the majority of accident worldwide.

India has the world's highest mortality rate. Speeding, not getting enough sleep, and drinking and driving were all factors in collision. Between 2000 and 2022, there was a 50 percent rise in the number of unintentional deaths, compared to 2000. According to the Planning Commission of India, the growing number of traffic deaths costs India 2.5 percent of its GDP each year. "Delay in rescue" is the leading cause of accident. The issue is that determining whether or not an accident has occurred and locating the location where it occurred is challenging. Another key factor is in effective medical assistance. According to a study, every minute that an injured crash victim does not receive immediate medical treatment might result in death. The majority of victims die as a result of such circumstances. As a result, the concept of saving lives through solving the problem emerges. In this project, develop an autonomous automobile accident detection system. This system can identify automobile accidents in a much shorter time, and it will send a collision alert signal to the built cell phone digit (saving squad, household participants, and so on...),which can assist in protecting important life [8]. These consist of an ADXL- 355 module that detects sudden angle changes that might indicate an accident. The signal is sent using the GSM system, and the accident position can find using the GPS module. Vehicle tracking is possible in any weather condition [9]. This technology is designed to provide the best solution to bad emergency services for traffic accidents in the most efficient manner possible.

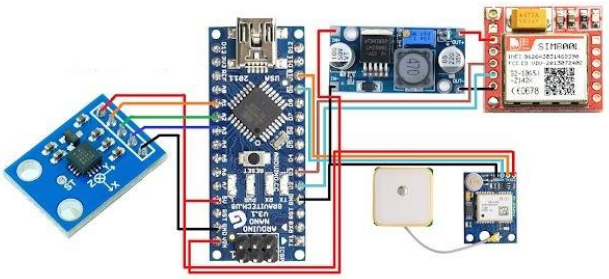
2. PROPOSED METHOD

When accidents occur, no one would get know what happened and where it happened. Thus, resulting in a huge loss of life. Air bags and Automatic Breaking System (ABS) safety are available in vehicles but having all these safety systems also there is a chance of getting hurt and person's dies by delay and none gets to know the accident locations. To overcome all such problem Accidental detection and rescue system has following proposed solutions:

1. Detects and reports the accidents that occurs in vehicles through sending message to family and also send data to cloud using IOT.
2. The GPS module in this system assists in locating and analysing the latitude and longitudinal coordinates of the accident site.

3. METHODOLOGY

When an accident occurs, the motion state of the vehicle will change dramatically. Therefore, many researchers proposed the accident detection method by monitoring motion parameters, such as acceleration, velocity. On Board Diagnosis (OBD) system to monitor speed and engine status to detect a crash, and utilized smart-phone to report the accident by Wi-Fi or cellular network developed an accident detection and reporting system using GPS, GPRS, and GSM. The speed of vehicle obtained from High Sensitive GPS receiver is considered as the index for detecting accidents, and the GSM/GPRS modem is utilized to send the location of the accident. Presented a prototype system called e-NOTIFY, which monitors the change of acceleration to detect accident and utilize V2X communication technologies to report it. To a certain extent, these methods can detect and report car accidents in short time, and improve the efficiency of car accidents warning. However, the vehicle running condition before car accidents is complex and unpredictable, and the accuracy of accident detection only based on speed and acceleration may be low. In addition, they rely too heavily on vehicular monitoring and communication equipment, which may be unreliable or damaged in some extreme circumstances, such as heavy canopy, underground tunnel, and serious car accidents.



4. HARDWARE REQUIREMENTS

Arduino:-

Arduino Nano V3Nano is one of the smallest Arduino boards. It is a full analog of Arduino Uno – also works on the chip ATmega328P (although you can still find options with ATmega168), but with a smaller form factor. Due to its size, the board is often used in projects where compactness is important. The board does not have an external power socket. Arduino works via USB (mini-USB or micro-USB). Otherwise,

GSM MODEM:-

A GSM modem are specialized sort of modem which accepts a SIM card, and operates over a subscription to a mobile operator, a bit like a mobile. From the mobile operator perspective, a GSM modem looks a bit like a mobile .When a GSM modem is connected to a computer, this enables the pc to use the GSM modem to communicate over the mobile network. While these GSM modems are most often wont to provide mobile internet connectivity, many of them also can be used for sending and receiving SMS and MMS messages.

GPS MODULE:-

GPS Module continuously receives the info from the satellite and transmits correspondingly to the UART of microcontroller. The GPS signal is applied to the antenna input of module, and an entire serial data message with position, velocity and time information is presented at the serial interface. The Valid data Received are going to be within the format of RMS. latitude and longitude positions.

ACCELEROMETER SENSOR:-

ADXL335 complete, low-power 3-axis accelerometer measures dynamic acceleration (motion, shock, or vibration) and static acceleration (tilt or gravity) over a ±3 g range with 0.3% nonlinearity and 0.01%/°C temperature stability.

The user selects the bandwidth of the accelerometer using the CX, CY, and CZ capacitors at the XOUT, YOUT, and ZOUT pins. Measurement bandwidth can be selected to suit the application from 0.5 Hz to 1600 Hz for X- and Y- axes and from 0.5 Hz to 550 Hz for the Z-axis.

Operating on a single 1.8 V to 3.6 V supply, the ADXL335 consumes 350 µA. Available in a 16-lead LFCSP package, it is specified from -40°C to +85°C.

SOFTWARE REQUIREMENTS:-

INTRODUCTION TO ARDUINO (IDE)

The Arduino integrated development environment (IDE) is a cross-platform application (for Windows, macOS, Linux) that's written within the programming language Java. It is wont to write and upload programs to Arduino compatible boards, but also, with the assistance of 3rd party cores, other vendor development boards. The ASCII text file for the IDE is released under the GNU General Public License, version 2. The Arduino IDE supports the languages C and C++ using special rules of code structuring. The Arduino IDE supplies software library from the Wiring project, which provides many common input

and output procedures. User-written code only requires two basic functions, for starting the sketch and therefore the main program loop, that are compiled and linked with a program stub main() into an executable cyclic supervisory program with the GNU tool chain, also included with the IDE distribution. The Arduino IDE employs the program avrdude to convert the executable code into a document in hexadecimal encoding that's loaded into the Arduino board by a loader program in the board's firmware

INSTALLING THE ARDUINO* IDE

This guide contains steps to install the Arduino* IDE on a system with Windows*, OS X®, or Linux*.These steps were tested using the 1.6.8 version of the Arduino IDE. Requirements You have connected your board to your computer and gathered any required components. See the list of requirements for details. Choose your operating system & windows.

Working of the Accident Detection and Alert System using Arduino :-

1. When accident is occurred, the location details of vehicle/object collected by the GPS module from the satellite, this information is in the form of latitude and longitude scale.
2. Thus, collected information is then fed to arduino uno. Necessary processing is completed and therefore the information is passed to the LCD and GSM modem.
3. The GSM modem collects the information for arduino uno and then transfer it to the mobile phone through the SMS which is in text format.

5. CONCLUSIONS :-

In this paper, new methods for car accident detection based on IOT are analyzed and their characteristics, advantages and disadvantages are compared. Smart accident detection systems must balance automation and autonomy against human monitoring and intervention so that the system, most of the time, can do its job properly and minimize casualties in the event of malfunctioning. Such a system should be able to compensate for human negligence. The best accident detection systems are those that require less hardware equipment and are easier to implement. The hardware requirements of such systems are the biggest obstacle to their implementation and widespread use because they may not be economically viable. To implement this system, communication channels between private companies and aid organizations must be very powerful. If governments and private companies work together to implement this system, it can save many lives.

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