



International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Website: www.ijirccce.com

Vol. 5, Issue 5, May 2017

Automatic Accident Detection and Alerting System Based on IOT

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ABSTRACT: Now-a-days lots of accidents happen on highways due to increase in traffic and also due to rash driving of the drivers and in many such situations the family members or the ambulance and police authority is not informed in time. This result in delaying the help reached to the person suffered due to accident. Road accidents constitute the major part of the accident. The purpose of the project is to find the vehicle where it is and locate the vehicle by means of sending a message using a system which is placed inside of vehicle system, most of the times we may not be able to find accident location because we don't know where accident will happen. Project Automatic Accident Detection and Alerting System Based on IoT is designed to avoid such situation.

KEYWORDS: Accident detection and alert; Internet of Things; Acceleration sensor; Global Positioning System;

I. INTRODUCTION

Transportation has great importance in our daily life and its development has made many of our chores much easy. But it can cause disaster to us and even can kill us through accidents. During 2008, Road Traffic Injuries ranked fourth among the leading causes of death in the world. Nearly 1.3 million people die every year on the world's roads and 20 to 50 million people suffer non-fatal injuries, with many sustaining a disability as a result of their injury. Road traffic injuries are the leading cause of death among young people aged 15-29 years and cost countries 1-3% of the gross domestic product (GDP). If no action is taken, road traffic crashes are predicted to result in the deaths of around 1.9 million People annually by 2020. The purpose of project is to find the vehicle where it is and locate the vehicle by means of sending location using a system which is placed inside of vehicle system. Most of the times we may not be able to find accident location because we don't know where accident will happen. In order to give treatment for injured people, first we need to know where the accident happened through location tracking and sending a message to your related one or to the emergency services. So in this work the Arduino controller is used for cost effective and also for easy understanding. Here assembly programming is used for better accuracy and GPS and GPRS modules which helps to trace the vehicle anywhere on the globe. The exact location of the vehicle is sent to our remote devices (mobile phones).

II. LITERATURE REVIEW

The recently developed solutions for the accident detection and alerting include Smartphone Applications, stolen vehicle recovery unit, vehicle tracking hardware kit. Some of the previous important solutions are discussed below. Ashish Kushwaha have proposed GSM Based Accident Alarm System. The purpose of this work is to find the vehicle accident by means of sending a message using a system which is placed inside the vehicle system. Author has used

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assembly programming for better accuracy along with GSM. In this project, whenever a vehicle meets with an accident immediately vibration sensor will detect the signal and send it to the microcontroller. Microcontroller sends the alert message through the GSM to an authorized mobile number. Hu Jian-ming, LiJie, Li Guang-Hui proposed an stolen vehicle recovery system. The system ensured increased safety and credibility. It used C8051F120 microcontroller and a vibration sensor. The vehicle owner gets the message regarding the vehicle location at specific intervals through GSM. C.Prabha have presented Automatic Vehicle Accident Detection and Messaging System Using GSM and GPS. In this paper an accelerometer can be used in a car alarm application so that dangerous driving can be detected. This paper is useful in detecting the accident precisely by means of micro electro mechanical system (MEMS). In this project GSM, ARM controller is used for saving the mobile number in the EEPROM and sending the message to it when an accident has occurred. T. Krishna Kishore emphasized on a system that is cost effective and also inculcates the modern internet facility for networking purposes. Linux operating system has been used along with General Packet Radio Service(GPRS). Advancements include more exact identification of the vehicle location at all times, data transfer facilitation, and freedom from software monitoring. NiravThakor have presented Automatic Vehicle Accident Detection System Based on ARM &GPS. The system detects the vehicle accident with the help of vibration sensor or MEMS sensor. GPS module captured the location of vehicle accident and a message is transmitted with the help of GSM modem, which contains the co-ordinates values.

III. SYSTEM DESIGN

A 9V portable power supply will power the Arduino board. The GPS + GSM shield and the impact sensor will derive power from the Arduino board itself. The circuit is first initialized and the GPS + GSM module is turned on. The system waits till the GSM module acquires a signal and is registered with the network. The system then goes on standby until the impact sensor gives a positive output. Once the accident is detected, Arduino acquires the current location of the vehicle using the GPS module and the co-ordinates are then sent via SMS to emergency services and/or contacts the user may have stored.

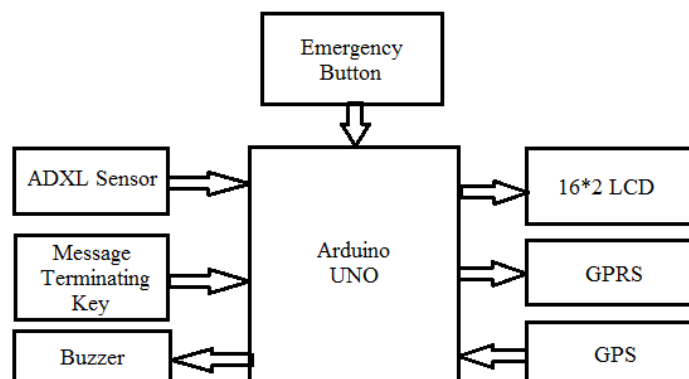


Figure 1. Block diagram of the proposed system

Figure 1 shows the block diagram of proposed system. The block diagram shows the components used in the system. Arduino UNO is the microcontroller used in this system. System also consist of an ADXL sensor, keys, an 16*2 LCD, a GPRS and a GPS module. The arrow indicating the path of signal or data from Arduino to different modules. When the system is switched on, LED will be ON indicating that power is supplied to the circuit. When the ADXL that we are using in this system sense any obstacle, they send interrupt to microcontroller. The GPS receives the location of the vehicle that met with an accident and gives the information back via GPRS. This information will be sent to a mobile number through a message. This message will be received using GSM modem present in the

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circuit. The message will give the information of longitude and latitude values. Using these values the position of the vehicle can be estimated.

IV. WORKING METHODOLOGY

The flow chart of the accident detection is shown in the figure 2. It shows the system is initialized on power ON. When the system is detected to be abnormal, it is confirmed that the accident has occurred. The vibration/acceleration of the vehicle is detected to confirm the cause of the accident. If the driver needs immediate attention of others, driver can gained it through pressing emergency switch.

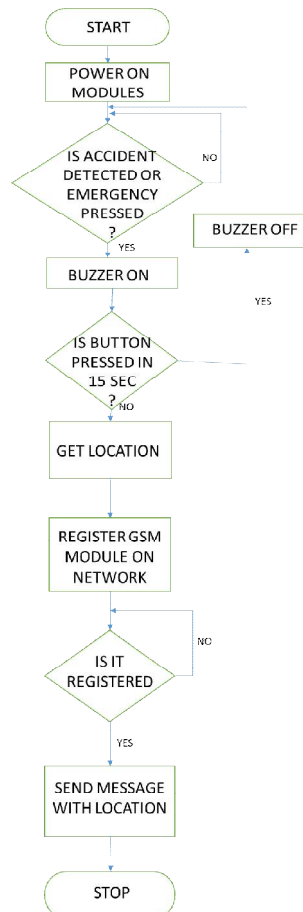


Figure 2. Flowchart for accident tracking

Figure 2 shows the flowchart of accident detection and tracking. When accidents occurs the ADXL sensor detects it and alert the microcontroller. In case of emergency key pressed then also alert will send to microcontroller. As soon as the accident is detected the buzzer (alarm) is ON. The message cancel button is scanned first, if it is a minor accident driver can use this button. If it is a minor accident then the switch is ON so that messaging is terminated. If the switch is not pressed within a certain timeout it can be taken as a major accident. If it is a major accident, the switch remains OFF and the message is sent automatically to the rescue team after the location is detected by the GPS. The message will send as SMS and location can be traced by using the application.



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ALGORITHM:

- Step 1: Start
- Step 2: Power on all the modules
- Step 3: Wait for the shock sensor to detect accident
- Step 4: Once accident detected turn on the buzzer immediately.
- Step 5: Check whether the message cancel button is pressed within 15 seconds.
- Step 6: If button is pressed turn off the buzzer and go to step 3.
- Step 7: If button is not pressed get the current location from the GPS modem.
- Step 8: Check whether the GSM modem is registered on the network.
- Step 9: Send the SMS with the location.

V. IMPLEMENTATION

The following hardware components are used in this system

ARDUINO UNO: The Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller. Simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

GPS MODULE: The Global Positioning System (GPS) is a U.S. space-based global navigation satellite system. It provides reliable positioning, navigation, and timing services to worldwide users on a continuous basis in all weather, day and night, anywhere on or near the Earth. GPS is made up of three parts: between 24 and 32 satellites orbiting the Earth, four control and monitoring stations on earth, and the GPS receivers owned by users. GPS satellites broadcast signals from space that are used by GPS receivers to provide three-dimensional location (latitude, longitude, and altitude) plus the time.

GSM/GPRS MODULE: Here a GSM mobile hand set is used. GSM networks are originally from the most popular standard for mobile phones in the world, GSM differs from its predecessors in that both signaling and speech channels are digital, and thus is considered a second generation (2G) mobile phone system. This has also meant that data communication was easy to build into the system. GSM is a cellular network, which means that mobile phones connect to it by searching for cells in the immediate vicinity.

SHOCK SENSOR: The sensor used to detect accident is shock sensor. This is a single stage shock sensor, it detects any hard impact acted on it. The output from sensor after impact will be +5v and connected to INT (pin 12) of processor. These sensors are fixed on all sides of the car to detect impact occurred on it. These outputs from sensors is send into OR gate to detect at least one impact. It is integrated in the circuit system by connecting all the sensors to or gate whose output is connected to the interrupt pin of microcontroller. These sensors are connected in such a way that they detect force impact occurring from any side of the car. This is concerned to the safety of the system of the human driving the car so that once accident is detected the paramedics can reach to the location as soon as they can.

The software requirements of the system are android 4.4 or later operating system, eclipse 3.4 (min) IDE, Proteus 8 and Isis 7.

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VI. RESULTS AND OBSERVATIONS

When the accident occurs message is send to the predefined numbers. When the accelerometer senses an acceleration it sends the signal to Arduino microcontroller. The microcontroller will send an alert to the predefined numbers. After the message is send the LCD display on the accident alert system will show message sent alert.



Figure 3. Alert message sent

Figure 3 shows a screenshot of LCD screen attached in the system. When accident occurs the system will send alert message and location to a number. Then the LCD screen will show a message as message sent. This message is sent only after the message has been successfully sent to the predefined number. Figure 3 shows the message on a LCD screen after an accident occurs.



Figure 4 Location details

Figure 4 shows the screenshot of the application which contains the location. Which is showing location which the system is present at that time. Map is shown in the application which will help in identifying the location very easily. In every 3 seconds the location will be updated as per the latitude and longitude getting from cloud. Figure 4 is also showing a settings option which is provided in the application for set the device ID. It will show the location as per the latitude and longitude given by the GPS. When accident occurs the system will send the location to cloud and the application uses the cloud data to locate the vehicle. Using the data the application will show the location in map.



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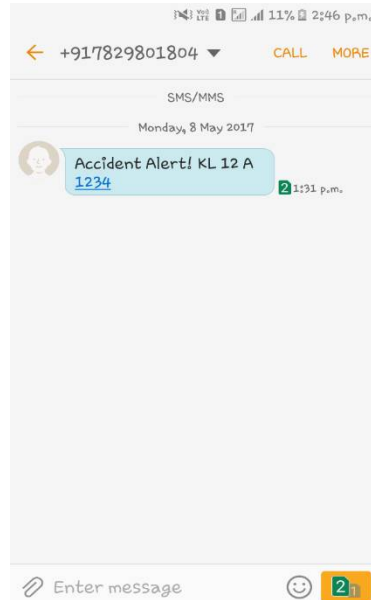


Figure 5 Message alert in phone

The figure 5 shows the screenshot of the alert message sent to the mobile of authorized users or emergency services when an accident has occurred. The message contains the vehicle number and also the alert message as shown. In the figure 5 the number of the sender is shown. The number shown is the number of sim card inserted in the system. The message will come through the GSM in the system. When an accident occurs the system will send the message to the predefined numbers. The predefined numbers can be numbers of parents, relatives or control rooms of various departments.

VII. CONCLUSION

The system provides the design which has the advantages of low cost, portability and small size. The platform of the system is IDE along with accelerometer sensor, GPS and GSM, interfacing which reduces the alarm time to a large extent and locates the site of accident accurately. The system can overcome the problems of lack of automated system for accident location detection. Consequently, the time for searching the location is reduced and the person can be treated as soon as possible which will save many lives. Main motto of the accident alert system project is to decrease the chances of casualties in such accident. Whenever an accident occurs, paramedics are alerted and they reach the particular location to increase the chances of saving life. This device invention is much more useful for accidents occurring in deserted places and those occurring at night time which usually go unattended. This system will have broad application prospects and it will play an important role in day to day life in future.

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ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

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