



IMMEDIATE RESCUE OPERATION FROM VEHICLE ACCIDENTS BY USING SMART PHONE WITH ARDUINO

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Abstract: Speed is one of the basic reasons for vehicle accident. Many lives could have been saved if emergency service could get accident information and reach in time. Nowadays, Smartphone has become an integral part of human life. Invention of Arduino (Uno) and sensors made large scale things to small scale. This paper proposes to utilize the capability of Arduino and sensors to monitor the condition of vehicle and detect accident basing on strength of signal from vibration sensor and accelerometer sensor and send it to Smartphone which is connected to Arduino by Bluetooth. Smartphone equipped with app sends the information to uploaded phone numbers. The Arduino will monitor axis and vibration of a vehicle and compare with the previous axis and vibration signal in every second through sensors. Whenever the axis range will be below or above the specified limit, it will assume that an accident has occurred. The system will then send the information to smartphone then it will send the accident location acquired from the phone GPS (Global Positioning System) along with the time and name of location. This will help to reach the rescue service in time and save the valuable human life.

I. INTRODUCTION

A Report on Road Accidents in India 2017[11], published by Transport Research wing under Ministry of Road Transport & Highways, Government of India, has revealed that more people died on roads accidents in India last year, as compared to the number of deaths in 2016. The data has further revealed that the states of Andhra Pradesh and Tamil Nadu have accounted for maximum number of deaths this year. As per the data cited in the report, the country recorded at least 4,50,602 accidents in 2016, leading to 1,00,956 deaths. This is indicating that at least 305 people died every day in 970 road accidents. Furthermore, the data reveals that at least 20 deaths occurred in road accidents in 49 accidents Every hour in the given time period. In these 20 deaths half of them are because of delay in emergency services As per the research results as shown above half of the deaths were because of the delay in emergency services. The main reason for delay in emergency services is, accidents in night times and non-mobility areas, so no one is there to inform about the accident to concern department and even some of them thought it would be burden to them. If somebody notify about the accident but response time is very poor and ambulance services are facing difficulties in locating the accident place exactly. Many papers were published on this thesis but there is no implementation of the project, this is because the proposed projects are ideal in nature and when it comes to implementation there were many difficulties arising. In all projects response should be sent by victim from their mobile app and it is very difficult if they are in unconscious stage.

So to change this scenario, from our research we find that every state in India holding a command control room, which is maintained by police and through this they check traffic updates about 24 hours, and in taking this as view we got an idea of sending accident information to their control room and they can react immediately and guide the concern department to accident place

The contribution to project from our side is

- 1) Designing an android app
- 2) Connecting sensors to Arduino
- 3) Interconnecting Arduino and mobile app
- 4) Sending information to control room
- 5) Sending information to IOT cloud

The remaining of the paper is organized as follows:

Section 2 underlines the architecture of the AS system and highlights the components of the system. In section 3, we present the details of the system implementation and hardware/software used in the prototyping phase. Section 4 describes the results the system. Finally, section 5 concludes the paper by listing the future aspects.

Many papers have some limitation in real life implementation and from our research we have some papers.

SOSmart app: this app is designed for sending accident information to specified numbers only when victim send the sms. There is no external module to detect severity of the Accident. So there is need to implement certain hardware to sense the accident

The author in the [7] used automatic crash notification with GPS sensor. The crash sensor detect the accident and GPS locates accident place and used GM OnStar which is high cost and there is necessity to implement low cost devices.

Similarly, the author in [3] implemented automatic smart accident detection. The system used the fuzzy logic support to decide the severity of the accident instead of fixed values and information sent to web server. The device is able to send information to one mobile number which is a disadvantage and does not mentioned about way of transmitting information to web server. The device is complex to implement. Instead of separate processor and fuzzy logic for decision, Arduino is best solution because it can be programmed easily

In [6] the author implemented accident detection reporting system which is associated with the user. It detect the accident and send the information through RF transmitter to nearby service provider. Service providers should be installed at every 100meter. This article mainly depended on the ZigBee (service providers) which is high cost and Installing and maintaining the service providers is difficult task

II. SYSTEM DESIGN

Figure 1 shows an overall flow of the proposed system. The accelerometer, vibration and speed sensor measures the parameter of the vehicle and inputs the data to Arduino where the signals are processed. The Arduino then check the condition of inputs in every interval if any value exceeds the certain limits it send the information to smartphone by using the Bluetooth module. The mobile app is responsible to send the information to command control room as text message which contains latitude, longitude and address of location.in addition to this app update the cloud center (thingspeak.com) where the vehicle owner can keep track with vehicle.

AS (accident sensing) module should be place in the vehicle in safe place which is under seat as it is safest place when accident occurred. The app is developed in such way that whenever driver approaches vehicle the app will automatically connect with AS module and no need to

A. Initial stage:

The initial stage consists of accelerometer sensor, vibration sensor and Arduino Uno board. Sensors send the condition of vehicle to Arduino board It is responsible for taking decision

Accelerometer: This accelerometer acquires the information about the 3-axes of the vehicle. Whenever there is an accident, there is a possibility of change in the axis of vehicle, it is continuously send to Arduino board for monitoring.

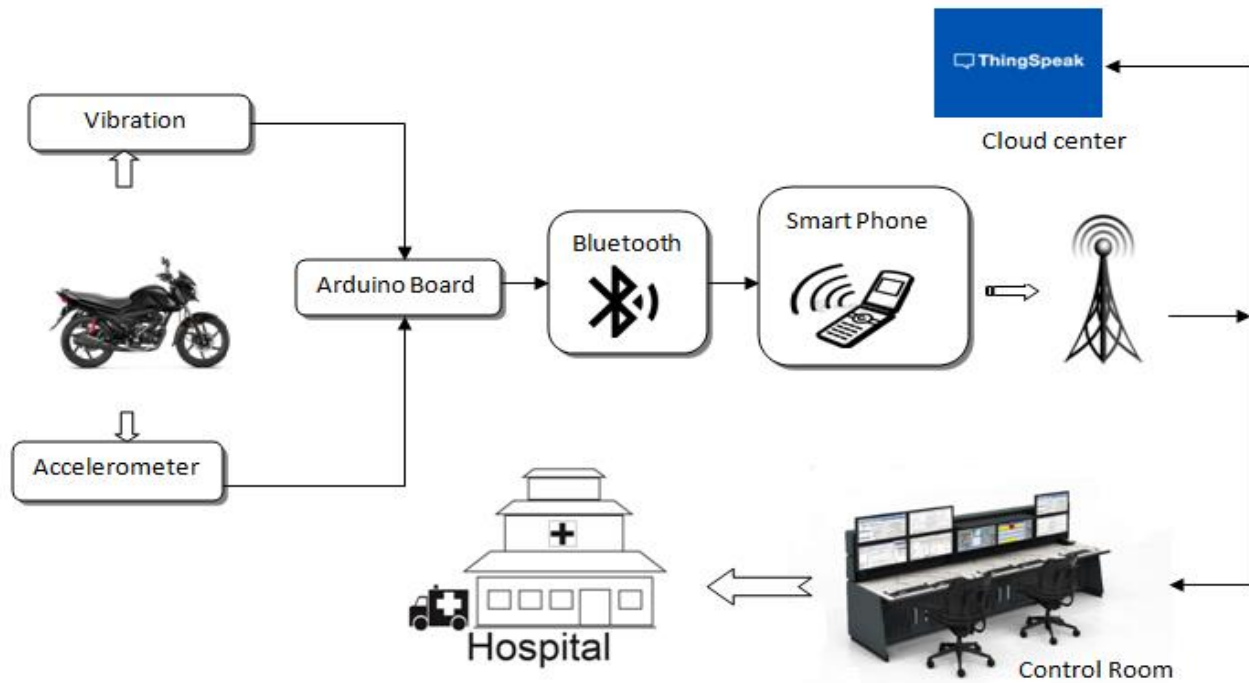


Fig .1 architecture of AS module

Vibration sensor (airbag module): Whenever there is a sudden force variations occurs within our vehicle, this sensor will detect and send to the Arduino board.

Arduino Uno Board: Arduino Uno is a microcontroller based on the ATmega328. The Arduino used for both software and hardware purpose. The Arduino Uno Board runs on any software. The Arduino board get the information from the sensors. It checks the axis of vehicle by accelerometer sensor, vibration of the vehicle by vibration sensor. These values are continuously compared with threshold limit .if it exceeds certain limit, Arduino board send information to mobile App by using internal bus as Bluetooth.

Middle Stage:

Bluetooth Module: Using Bluetooth, the information can be exchanged within a range of 100 meters. The RXD and TXD pins of the module used to exchange the information. This module acts as the bus between the Arduino and the smart phone.

Mobile Application: Smart phone App plays a vital role in transferring the information to command control room. the app automatically get the location information from phone GPS and no need to use separate GPS module.

Registration: After the installation of the App, enter the details of the vehicle (car number) and also the details of owner (name, phone number,adhar number).To transfer accident information to other than control room, there is option like enter phone numbers in App i.e., enter phone numbers of your immediate caretakers. Then the accident information send to the command control room and saved phone numbers, so that control room authorities can easily track the vehicle location and arrange ambulance immediately.

Functioning of App: Whenever vehicle starts, app automatically enables Bluetooth and GPS and no need to launch it separately

Whenever any accident occurs:

Case1: values of sensors exceeds the limit and Arduino senses it as accident and send Information to mobile app through Bluetooth. App acquires location from mobile and send location information to command control room and IOT cloud center (thingspeak.com)

Case2: DON'T SEND SMS

before sending information as sms, App makes the mobile phone to vibrate and ring about 2 minutes, If victim is safe after the accident then they can simply press the button called DON'T SEND SMS i.e., information does not transfer to control room and it saves manpower and fuel the ambulance. It also helps in situation where the App misinturrupts the condition and want to send sms

Final stage:

Command Control Room: Whenever an accident takes place, the vehicle location information sent to the command control room by using the app. Then they will immediately takes action by Passing this information to the respective nearby hospitals of where the accident has occurred

ThingSpeak: It is an open source cloud to store and retrieve data from things (sensors) using the HTTP protocol over the Internet or via a Local Area Network. The sensor information sent to ThingSpeak through smart phone.it enables to display the sensors information on the graphs in web (iot).So that owner of the vehicle can keep track with the vehicle from anywhere in the world. It automatically react to problems by manually programing in ThingSpeak (web) i.e. if any values exceeds certain limit it intimate owner. The figure showing vibration values.

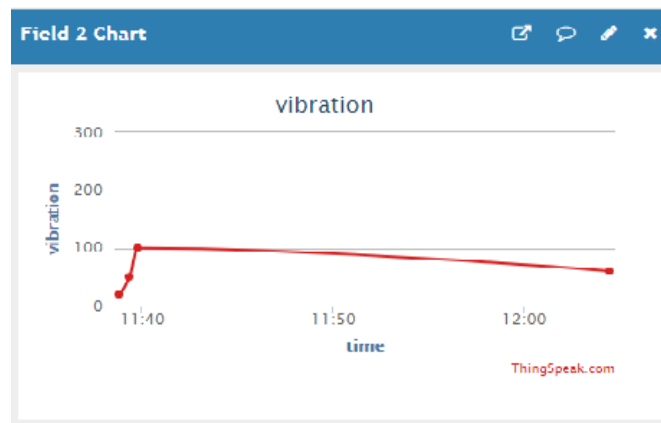


Fig.2vibration sensor values in thingspeak.com

III. AS (accident sensing) IMPLEMENTATION

The implementation architecture shown in figure that it contains ADXL335 accelerometer to measure the angle of the vehicle, vibration sensor to measure the intensity of vibration after the accident, Arduino board to read data from sensors and to manipulate the data to check whether the accident has occurred or not and Bluetooth module to transfer data from Arduino board to smartphone. The system also contains smartphone that runs an application provides a gateway to transfer accident location information acquired from smartphone GPS to control room where they react immediately and arrange an ambulance from nearby hospitals

The module consists of hardware components as

- 1.ADXL 335 accelerometer sensor
2. Arduino UNO
3. Vibration sensor
4. Bluetooth

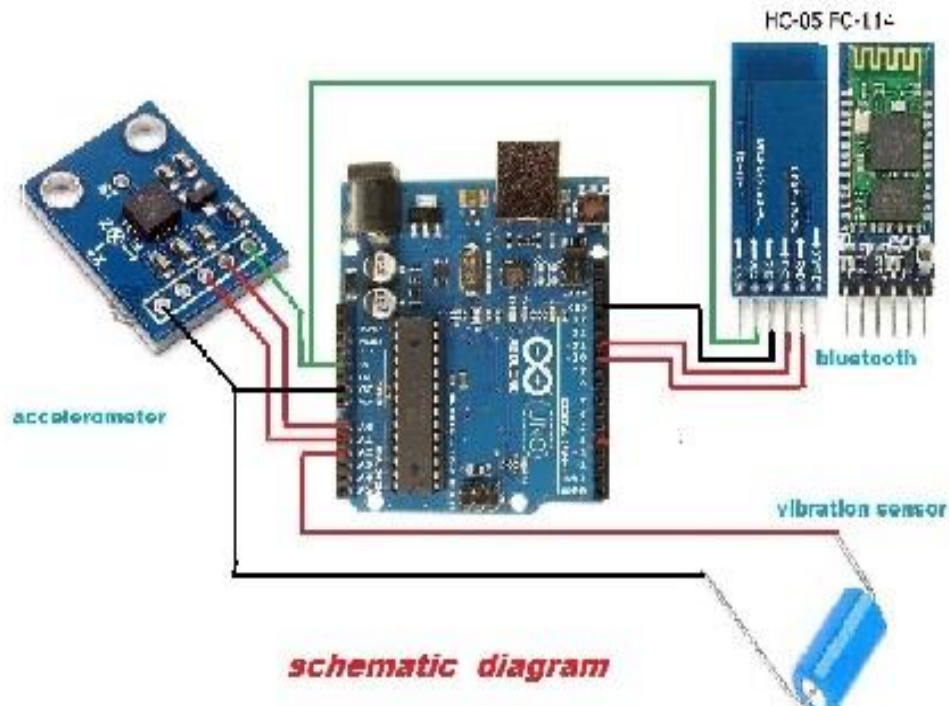


Fig.3 hardware implementation

For the software development we used 1) eclipse IDE 2) Arduino IDE 3) MIT appinventor

IV. RESULTS

To make it more realistic we checked the performance of the system by using bike, we installed it under the seat as it

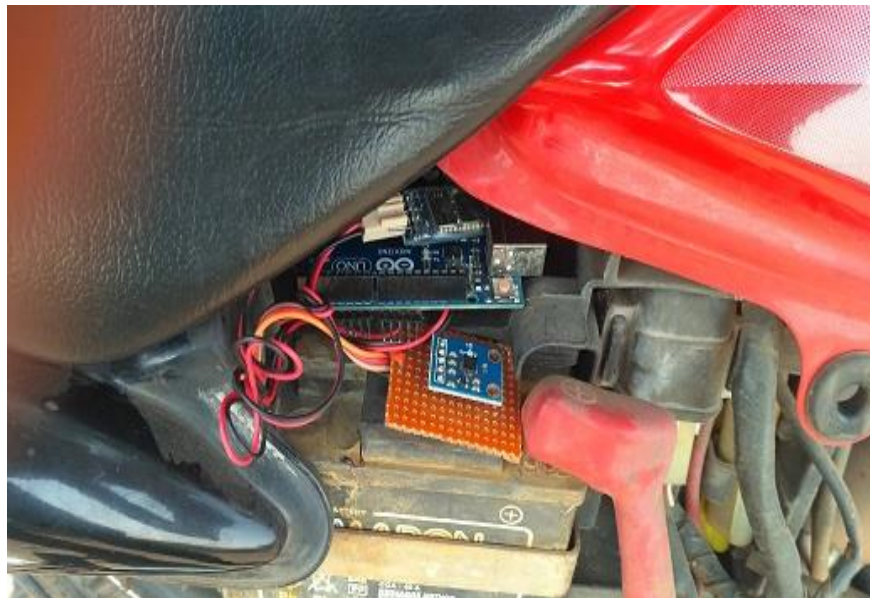


Fig.4.AS module arrangement is safest place as shown in figure

After travelling some distance, we our self inclined the vehicle, this makes to satisfies the condition of axis ($x > 45$ & $y > 135$) in Arduino board and send information to mobile application, it send text message to registered mobile numbers with location information as shown in figure.5.

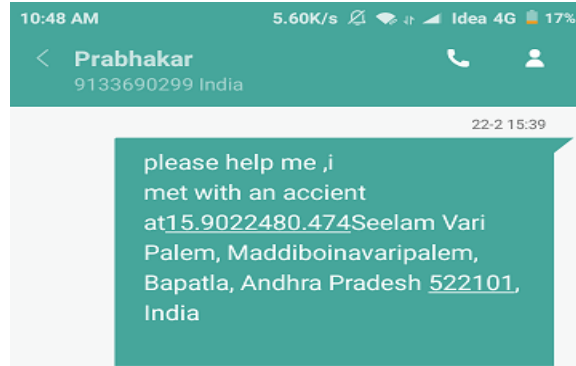


Fig.5. Text message

It also send information to command control room as shown in figure 6, 7. In control room it displays the latitude and longitude values of the accident location, there by the control room authorities transfer this information to hospitals which are nearby the accident location. This process efficiently useful for immediate rescue operation of victims from accidents by using smartphone with Arduino as it is title of the project

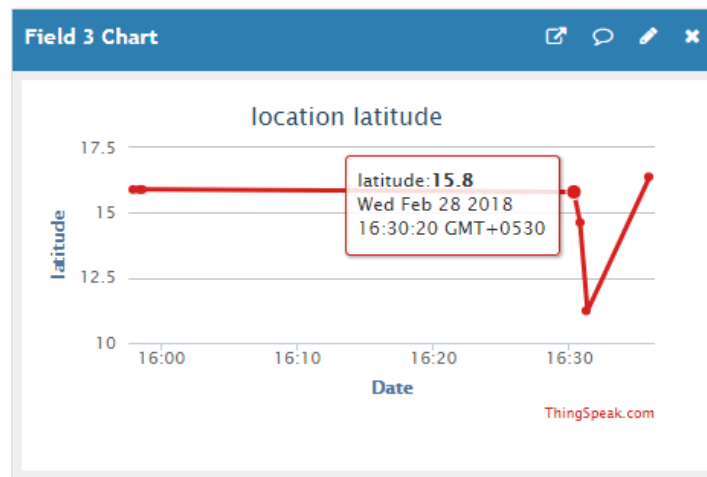


Fig.6. accident location latitude values in control room

We tried it with vibration sensor, it also shown a good response as shown in figure.2. We checked it in different places as shown in the above longitude and latitude graphs. It has given the accurate location of accident place.

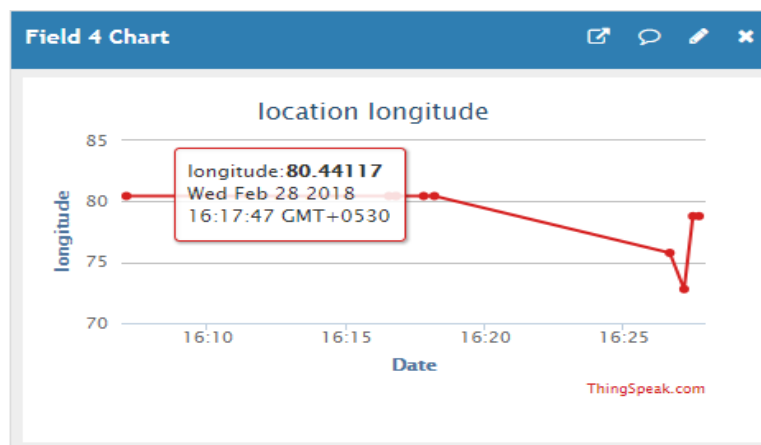


Fig.7. accident location longitude values in control room

But it has few disadvantages i.e., it fails at internet less areas and sending only accident information and it didn't provides location information .

please help me ,i met with
an accient at00No address
available

This problem may not arise in future because broadband is spreading around (google balloons, Facebook Aquila) the world in jet speed.The cost of the device is very less which is about ₹ 1200.So

v. CONCLUSION

This paper presents immediate rescue operation of victims from accident. After accident and it send the location information to control room authorities and they inform it to nearby hospitals and arrange ambulance. It provides high efficiency with internet. The cost of the device is very less which is about ₹ 1200.So we can make this into reality.

Coming to the further development And we have another assumption ,that is we will implement another technology which will track the nearby hospital numbers and nearby people and send the information about the accident to them so we can save at least victims by nearby people first aid before the arrival of ambulance.

Life is an important factor than which car we are travelling or which bike we are riding. We can make use of existing technology and we can save the life of family. This prototype is cost effective and we can easily implement it in any vehicle.

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