IOT BASED ACCIDENT DETECTION AND

RESCUE SYSTEM

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Submitted By
**JENNI GUNASEKAHR
(4NI16CS041)**

Under The Guidance Of

Mrs. B.R VATSALA   **Mr. SHASHANK S**

Assistant Professor   **Assistant Professor**
Department of CS & E   **Department of CS & E**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
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(An Autonomous College) Mysore-570 008
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THE NATIONAL INSTITUTE OF ENGINEERING

(An Autonomous institution, affiliated to VTU)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
Mysore -570008

<u>CERTIFICATE</u>

Certifies that the seminar work entitled *"IOT based Accident detection and Rescue System"* is a work carried out by **Jenni Gunasekhar** bearing **4NI16CS041** in partial fulfillment for the seminar prescribed by National Institute of Engineering, Autonomous Institution under Vishvesvaraya Technological University, Belgaum for the Eighth Semester B.E, Computer Science & Engineering. It is certified that all correction/suggestions indicated for Internal Assessment have been incorporated. The Seminar report has been approved as it satisfies the academic requirements in respect of the seminar work prescribed for the Eight Semester.

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(Mrs. B.R Vatsala)   **(Dr.V K Annapurna)**

Signature of the Co-Guide

(Mr. Shashank S)

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JENNI GUNASEKHAR

ABSTRACT

An IoT ecosystem consists of web-enabled smart devices that use embedded systems, such as processors, sensors and communication hardware, to collect, send and act on data they acquire from their environments. IoT devices share the sensor data they collect by connecting to an IoT gateway or other edge device where data is either sent to the cloud to be analyzed or analyzed locally. Sometimes, these devices communicate with other related devices and act on the information they get from one another. The connectivity, networking and communication protocols used with these web-enabled devices largely depend on the specific IoT applications deployed. The ability to monitor operations surrounding infrastructure is also a factor that IoT can help with. Sensors, for example, could be used to monitor events or changes within structural buildings, bridges and other infrastructure. This brings benefits with it, such as cost saving, saved time, quality-of-life workflow changes and paperless workflow.

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The advancement in the field of science and technology has led to huge growth in the demand and production of automobiles across the globe. This increase in demand of automobiles has also increased the traffic collisions and road accidents. Life of people is under high risk since these traffic collisions often result in injury, death and property damage. Road traffic injuries are now the leading killer of people aged 5-29 years. The delay in reaching of ambulance to the accident location due to traffic congestion increases the chances of death of the victim. Therefore, an automatic ambulance rescue system can be developed to overcome this problem. This proposed IOT based accident detection system helps to reduce the loss of life and the time taken by the ambulance to reach the hospital.

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INTRODUCTION

The advancement in the field of science and technology has led to huge growth in the demand and production of automobiles across the globe. This increase in demand of automobiles has also increased the traffic collisions and road accidents. Life of people is under high risk since these traffic collisions often result in injury, death and property damage. Road traffic injuries are now the leading killer of people aged 5-29 years. The delay in reaching of ambulance to the accident location due to traffic congestion increases the chances of death of the victim. Therefore, an automatic ambulance rescue system can be developed to overcome this problem. This proposed IOT based accident detection system helps to reduce the loss of life and the time taken by the ambulance to reach the hospital. The development of a transportation system has been the generative power for human beings to have the highest civilization above creatures in the earth. Automobile has a great importance in our daily life. We utilize it to go to our work place, keep in touch with our friends and family, and deliver our goods. But it can also bring disaster to us and even can kill us through accidents. Speed is one of the most important and basic risk factors in driving. It not only affects the severity of a crash, but also increases risk of being involved in a crash. Despite many efforts taken by different governmental and non-governmental organizations all around the world by various programs to aware against careless driving, yet accidents are taking place every now and then. However, many lives could have been saved if the emergency service could get the crash information in time. As such, efficient automatic accident detection with an automatic notification to the emergency service with the accident location is a prime need to save the precious human life.

For this reason, developing systems that actively monitors the motive force and alerting the motive force of any insecure driving condition is important for accident hindrance. Many efforts are reported within the literature for developing an energetic safety system for reducing the amount of cars accidents because of reduced vigilance. We also aim to reduce the road accidents by sending the alert signals. The proposed also system focuses on the analysis of the eye blinking and drowsiness of the driver.

Chapter 2 comprises of literature survey. It also consists of the existing system and their drawbacks. After going through these, we have proposed a system that has enhancements to handle these drawbacks. Also, hardware and software requirements are included. Chapter 3 deals with system design details along with architecture, use case, sequence and context flow diagram.

This is followed by the algorithm we used in chapter 4. The books, papers referred are mentioned in chapter 5.

Chapter 2

SYSTEM ANALYSIS

2.1 LITERATURE SURVEY

2.1.1Research Papers on Existing System

[Mrs. Ramya Kulandaivel, P.Ponmalar, B.Geetha, G.Saranya et al, 2012] have provided a good survey of using GPS, GSM and GIS The general mechanism is to provide the real time geograph- ical position of a vehicle using GPS receiver and send this information to GSM center through configurable software, this is all done by the monitoring centre which is working as a control unit that is connected not only by an optical cable but also connected wirelessly through TCP/IP protocols

[Ioan Lita, Ion Bogdan Cioc, Daniel Alexandru Visan et al, 2006]have provided us with another approach is that vehicle terminal includes a GPS receiver which extracts information about position through GPS satellites and sends it through GSM network and to the control center which reads the information, process it through GIS management system and saves it in the data base system and on user demand displays it on electronic map via MapX tool .

PAPER 3-{Garima Turan, Shefali Gupta, Road Accidents Prevention system using Driver's Drowsiness Detection} suggested that, Driver Fatigue is one of the most common reasons for fatal road accidents around the world. This shows that in the transportation industry especially, where a driver of a heavy vehicle is often exposed to hours of monotonous driving which causes fatigue without frequent rest period. Due to the frequent incidence of driver fatigue this has become an area of great socioeconomic concern. Consequently, road accidents prevention systems by detecting driver's drowsiness, eyelids. This project also gets the output of local camera. It perhaps a digital camera or the other connected camera.

2.1.2. Existing system and its drawbacks

The Existing system only use the information about the distance between the two vehicles provided by the ultrasonic system and does not need to explicitly knows the speed. The advantage of technology has also increased the traffic hazards and the road accident take place frequently which causes huge loss of life and property because of the poor emergency facilities. We do not have accident prevention mechanism in existing system.

2.1.2.1. Drawbacks of existing system:

- The owner device might be lost so he/she will not be able to send SMS to Vehicle's device. Also, the location will be sent only if the SMS is received.

- If the person (in-accident) is fine & want to cancel.

- Impact is not measured.

- Less Reliable.

- Accident prevention mechanism does not exists .

2.1.3. PROPOSED SYSTEM:

Our aim is to develop a system for instant detection of accident with rescue system. There is accelerometer sensor implemented in the system and a GSM/GPS module to send messages about the location to the rescue team. With the help of accelerometer, the severity of the accident can be recognized. Microcontroller used sends the alert message through the module including the location to guardian and the rescue location. Atmega 328P microcontoller is used as controlling unit, it reads the values from accelerometer, when the microcontroller observes any abnormal values, it reads the current location from GPS module, and sends it to given mobile no over SMS by using GSM module.

Before sending the SMS, the microcontroller activates the buzzer which will be buzzing till the SMS is checked by the registered mobile number person. As soon as the message is opened, the buzzer stops buzzing.

2.1.3.1. Advantages of proposed system:

- Proposed system has the feature of sending SMS to the registered number.
- Proposed system satisfies the consumers to a better extent.
- Proposed system makes use of technique called as "Breaking Distance" for the detection system.

2.2 SYSTEM REQUIREMENTS

2.2.1 Hardware Requirements:

- ❖ Operating System   : Windows 7 or higher version ,Linux

- ❖ Programming Language   : C++,C

- ❖ Board Used   : PCB integrated with Atmega 328P microcontroller

- ❖ Any other devices   : SIM808 GSM/GPS Module, Accelerometer, Buzzer, GPS antenna, LCD, Power Adapter

2.2.2 Software Requirements:

- ❖ Processor   : Any GSM compatible device which can receive messages

- ❖ Memory   : 32 MB or more

- ❖ Software   : Arduino IDE

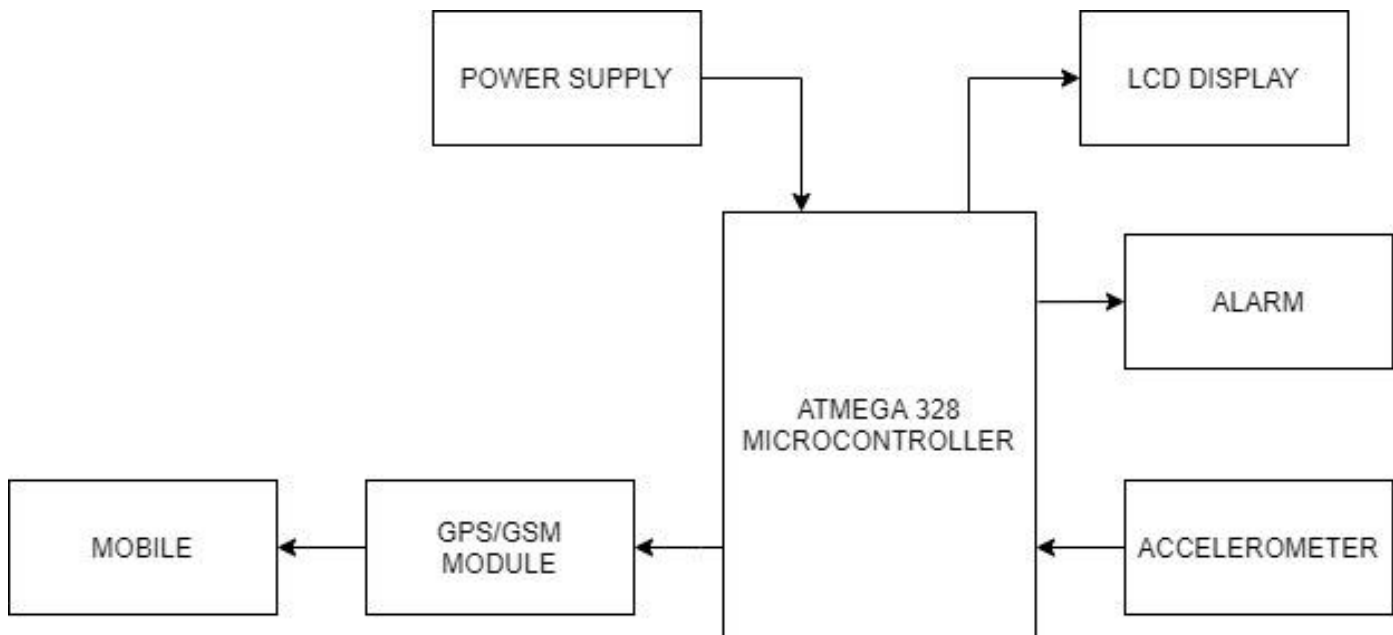# Chapter 3

SYSTEM DESIGN DETAILS

System Architecture
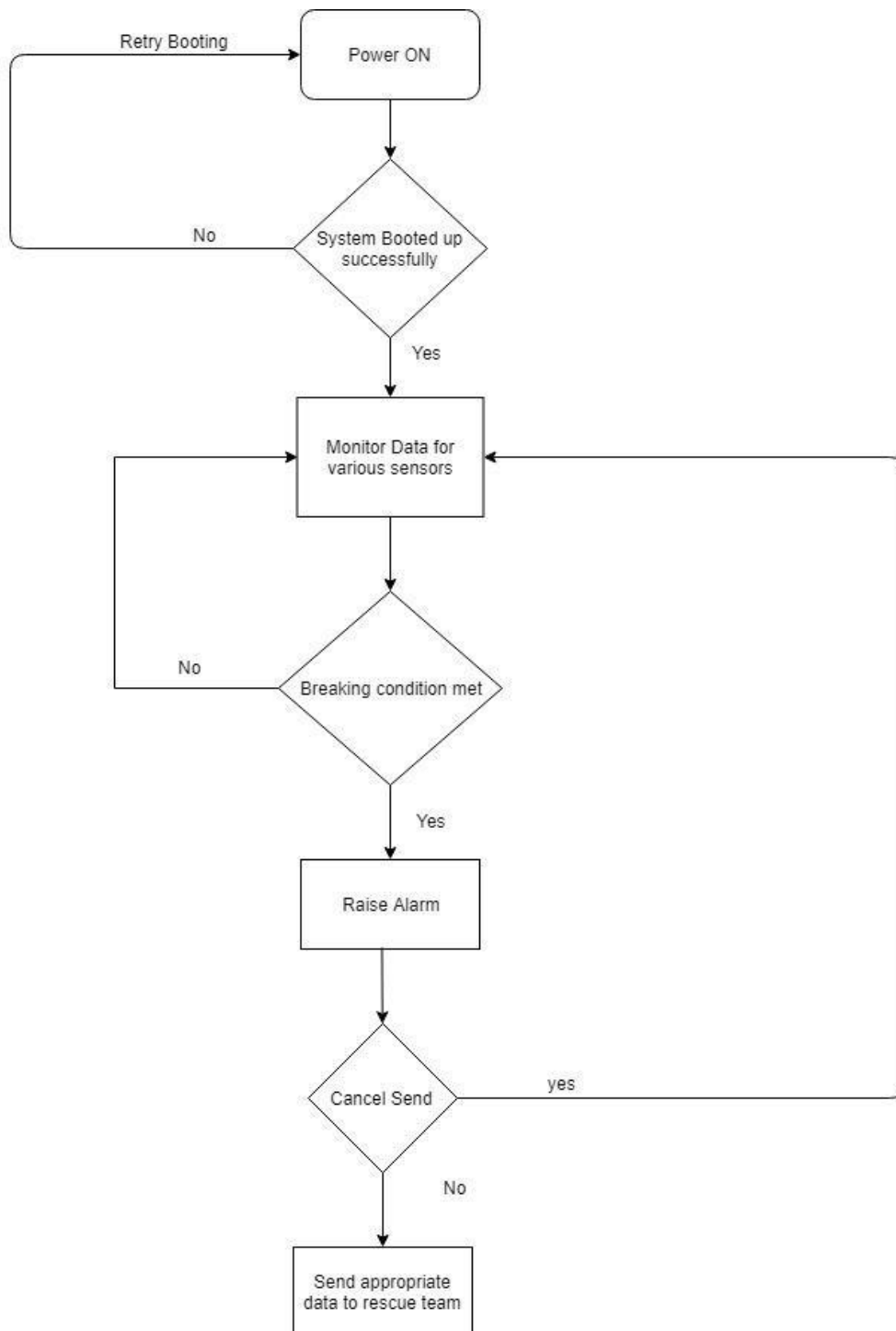

Fig 1: System Architecture

Flowchart

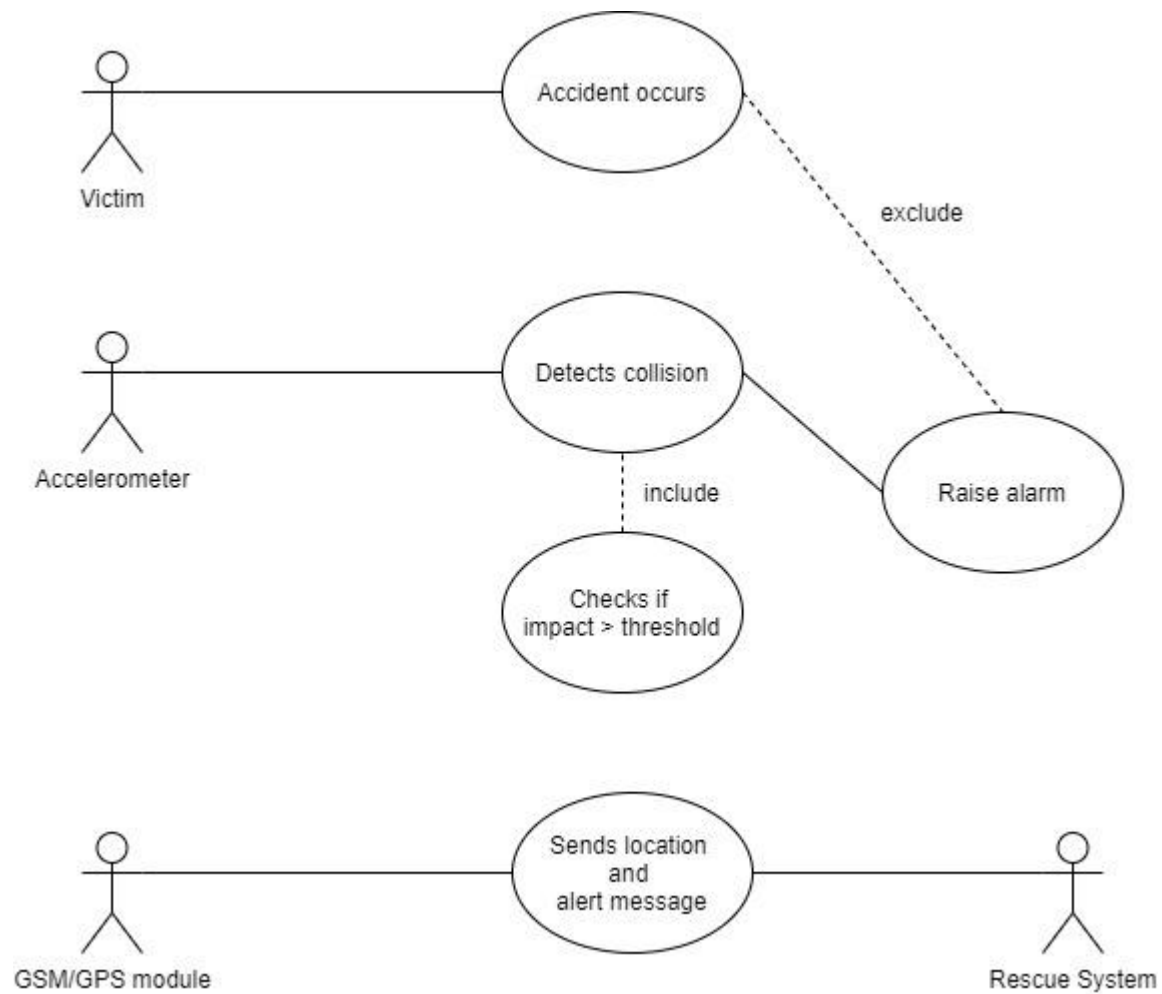**Fig 3: Accident Detection System**
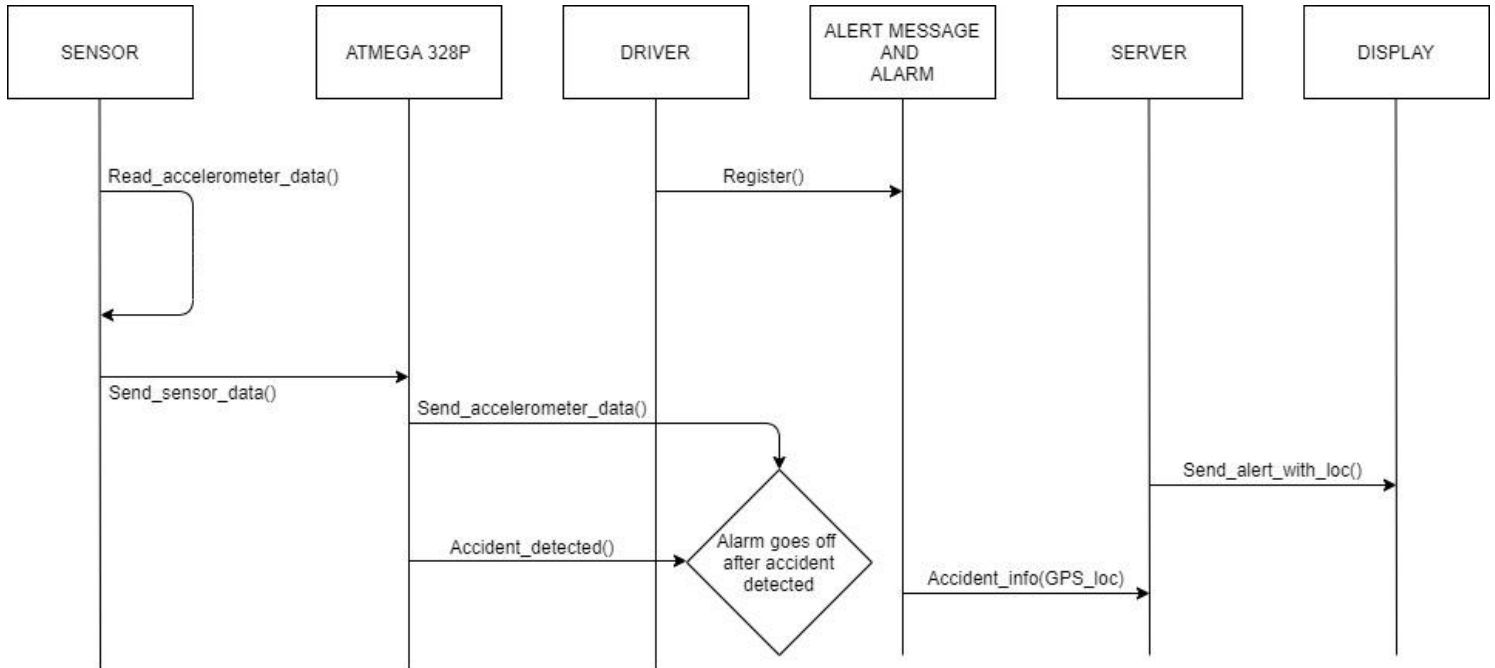
Fig 4: Use Case Diagram

Fig 5: Sequence Diagram

Chapter 4

Algorithm

4.1 Accident detection algorithm

Acceleration is one of the main factors involved in driving. If the body which is moving at a constant acceleration suddenly encounters a sudden fall in its value or experiences a negative peak, we can say that something is wrong and the sudden deceleration experienced may be due to external factors involved such as a collision or application of sudden breaks resulting in crash.

In our algorithm we have used this fact of sudden change in acceleration to detect an accident and provide the victim with necessary treatment by sending the message and location of the happening to a rescue team.

For this, we have used an accelerometer which will be used to collect the data about the acceleration of the car about its x, y and z axis and send the data to the microcontroller i.e. Atmega 328P

The data received is compared to the observed data that we have come across in the paper of breaking distance (Evans, 2013) which in turn has helped us to set up a threshold value which when satisfied will mean that an accident has occurred.
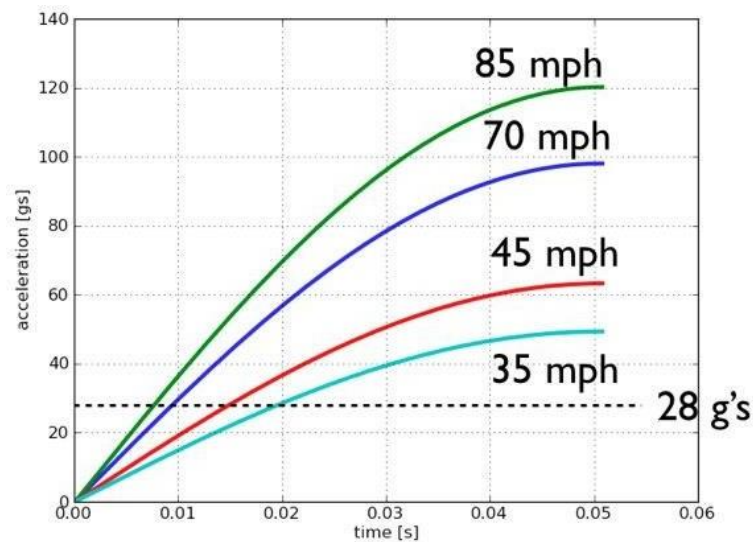

Fig 6: Acceleration at which vehicles collide as a function of velocity

CASE-When accident actually occurs

When the accident occurs due to collision or due to extreme tilting of the automobile, the buzzer will go off and microcontroller will receive the data from the accelerometer, immediately the location coordinates of the accident detected by the GPS are sent by an SMS to the registered mobile number by the GSM module. As soon as the message is checked the coordinates of the location can be traced on the google maps. The LCD displays shows message – 'Alert! Accident Detected' and coordinates of the location.

Chapter 5

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