A PROJECT REPORT

ON

"ACCIDENT ALERT AND POTHOLE DETECTION SYSTEM"

Submitted to
UNIVERSITY OF MUMBAI

In Partial Fulfilment of the Requirement for the Award of

**BACHELOR'S DEGREE IN
COMPUTER ENGINEERING
BY**

KHAN SARFARAZ HAFIZULLAH	**14CO42**
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**UNDER THE GUIDANCE OF
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Plot No. 2 3, Sector - 16, Near Thana Naka,
Khandagaon, New Panvel - 410206

**2017-2018
AFFILIATED TO**
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CERTIFICATE

This is certify that the project entitled

"Accident Alert And Pothole Detection System"

submitted by

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is a record of bonafide work carried out   by them, in the partial fulfilment of the requirement for the award of Degree of Bachelor of Engineering (Computer Engineering) at *Anjuman-I-Islam's Kalsekar Technical Campus, Navi Mumbai* under the University of MUMBAI. This work is done during year 2017-2018,   under our guidance.

Date: **/**   **/**

Prof. MUBASHIR KHAN   **Prof. KALPANA BODKE**
 Project Supervisor   **Project Coordinator**

Prof. TABREZ KHAN   **DR. ABDUL RAZAK HONNUTAGI**
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Project II Approval for Bachelor of Engineering

This project entitled *Accident Alert And Trench(Pothole Detection System)* by *KHAN SARFARAZ HAFIZULLAH , USAMA MALIM IRFAN KHATOON,MOHD JU-NAID ANSARI ISTIYAK* is approved for the degree of *Bachelor of Engineering in Department of Computer Engineering.*

Examiners

    1. ....

    2. ....

Supervisors

    1. ....

    2. ....

Chairman

    ....

Declaration

We declare that this written submission represents our ideas in our own words and where others ideas or words have been included, we have adequately cited and referenced the original sources. We also declare that we have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in our submission. We understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

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ABSTRACT

India witnessed one of the highest road accidents in the world, as stated by Union road transport and highways ministry in 2016. Road accident often takes place due to bad road weather condition, reckless driving etc. Accident occurring are often not noticed or reported late that leads to loss of victim's life or serious injuries caused permanently. One of the problems associated with bad road condition is the pothole on road.

Accident Alert Pothole Detection System (AAPDS)is a system designed for reporting of accident and potholes on roads. The System consists of various sensors that are used for sensing accident's and pothole's on roads. A smartphone is used to provide exact location of accidents using GSM GPS module present in smartphone after the response from the sensor is taken. A map is provided to navigate the location of accident. Similarly a sensor is used for sensing pothole's. This data is then processed by the processing module send to the smartphone, where the map is used to display the location of pothole's. Further the collection of such data can be send to concern authorities where this kind of data is stored and managed for managing the road condition and providing prior warning of accident prone area.

Keywords: AAPDS, GPS, GSM, Accident, Pothole.

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Chapter 1

Introduction

The number of accident occurrence has increased in the past few years. The growth in economy and population lead more automobile is running on the roads. Bad road condition and weather condition leads to cause of accident. As accident occurs now it is important that the victim must be treated as fast as possible.   For the victim to be treated quickly as possible now it is accurate information must be provided of the location. The accurate information provided can save life of victim.System will use the smartphone as medium for alerting the authorities and providing required location The problem related to accident is potholes on road.This issue are solved in system while using data provided by the sensor. The System uses the data taken from the sensor and provides the data to the processing unit.   The location of the potholes is displayed using a a map.   The map display the data in the from of pin. The area on the road where the potholes are present are marked on the road.

1.1 Purpose

Travelling is a part of our daily life.We often travel by road,due to certain reason if we meet an accident,it is in the hand of the person reporting the accident that can save our life we are at his/her mercy for such case were accident are caused an alert system is required which report the accident in a jiffy to save victim's life.The associated with accident is the condition of the road.   Roads are often not maintained or are in poor condition due to bad weather condition's, for such there is a requirement of a system for alerting the driver the condition of the road,that it i able to detect the pothole on road's.

1.2 Project Scope

   The accident alert and pothole detection will be useful for everyone who drives the car and have registered to the system. By using this app many of the life's would be saved.It will be useful for the emergency department to know about the accident and provide help to the victim.It is also useful for the road development department

to know the road conditions and the accident prone areas.

1.3 Project Goals and Objectives

1.3.1 Goals

Accident alert and pothole detection system should detect the location of the pothole and accident that has occured.The system should send the alert message when the pothole is detected to the user.The system should also send the alert message when the accident has ocured.

1.3.2 Objectives

Accident when caused are often reported by nearby people they call for ambulance or any other authorities.The problem associated with this is that if the person doesn't detect accident or neglect it.This is a flaw in manually reporting the accident.Due to increase in the vehicle on road due to which the traffic increases and the road are used which eventually result in deterioration of road condition. Due to this road consist of wear and tear for this purpose we have a system,which consist of a detecting of pothole's on road which assist the driver in making adjustment for a afford less driving experience and it also help's save fuel economy of car.

1.4 Organization of Report

In Chapter 1, We have considered Project overview under which we have explained various important terminologies like Introduction of the project,Motivation(what exactly motivated us to create Accident Alert And Trench(Pothole) Detection System),Problem definition,About current system, Problems in current system,Advantages over current system, Goals, Objectives,Scope Application.

In Chapter 2, We have discussed about various papers that we have referred for our project.We have mentioned the description, Pros and cons,and how to overcome the problems under every paper. A total of four papers have been referred.

In Chapter 3, We have discussed about the requirement analysis, under it we have considered about platform requirement(supporting OS for the software),Software requirement and Hardware requirement along with feasibility study.

In Chapter 4, We can see the system design and its architecture, Various diagrams can be seen in thus chapter which represents the software, diagrams included are - System architecture, Use case diagram,Class diagram, Data Flow diagram and Component diagram.

In Chapter 5, We can see the methodology. Here we have explained the project in detail by dividing it into Modules(Modular design). Various modules of the accident alert and pothole detection system are explained with the help of few diagrams viz;,Sequence diagram,Activity diagram.

In Chapter 6, We discuss about implementation details, the assumptions and dependencies. this part contains details of the implementation of the methodology that we discussed earlier, In short it describes how the methodology is implemented.

In Chapter 7, We have shown the test cases and results along with analytical discussion. This part contains the results of the output of our project.

In Chapter 8, We have concluded the whole project and future scope along with the limitations followed up by references and chapter 9 with Appendix.

Chapter 2

Literature Survey

2.1 Vehicle Accident Alert and Locator

Due to increase in road accident this system was develop to provide immediate treat-
ment to the victim once accident occurs. As soon as the occurrence of accident is
detected the signal is send to respective authorities to take action against the event.
For this a they use GSM/GPS module, the system can also help with the recovery of
stolen vehicle.

2.1.1 Weakness

Provide raw data with no proper integration for display.Just provide longitude and
latitude.Use various component which are integrated together which increases cost
and time.

2.1.2 How to overcome the problems mentioned in Paper

The purposed is that   we use the existing airbag sensor for detection of accident
and the respected authorities are informed about the accident occurred with the co-
ordinates of the location were the accident occurred . Less hardware so cost efficient.

2.2 Automatic vehicle over speed, accident alert and locator system for public transport

Due to major problem in road condition,there were major accident caused.The causes
of accident were due factors such as over speeding bad road condition etc thus asys-
tem was develop to provide solution to this problem the system deals with the vehicle
over speeding and alerting the authorities on time. This system is divided into three
unit onboard processing unit,control database server. The system was efficient and
fast.

2.2.1 Weakness

Using various component when all the component are integrated in smartphone where we can use the gsm and gps service without any external component cost.

2.2.2 How to overcome the problems mentioned in Paper

Having existing airbag sensor we purpose a high efficient system for reporting of accident and informing authority and providing accurate information of location.

2.3 An Image Processing Approach to Detect Lanes, Pot Holes and Recognize Road Signs in Indian Roads

The system was developed due to requirement for a guidance system for Indian due to its poor road conditions. This System uses image processing for detection of road potholes and road sign. The system requires a On-Board computer for processing the image. The system take images of the road and the images are than processed and used for detecion of bad road and detection of road sign.

2.3.1 Weakness

There is no mechanism for processing blur image so one has to capture image properly.The mechanism doesn't provide the necessary speed on should drive to avoid the potholes

2.3.2 How to overcome the problems mentioned in Paper

We will connect our raspberry pi with the sensor. we also purpose that we use the ultrasonic sensor for detection of pothole. We will be using concept of simple machine learning.

2.4 Review on Accident Alert and Vehicle Tracking System

The global population is increasing day by day. The high demand of vehicles has also increased the road accidents.India had an increase of 30 percent in car registrations over the past two years. Life of the people is under high risk. The time between an accident occurrence and the emergency centres(police , hospitals) are dispatched to the accident location is the important factor in the survival rates after an accident. By eliminating that time between an accident occurrence and the first responders are dispatched to the scene decreases mortality rates so that we can save lives.

2.4.1   Weakness

Uses centralized server to receive location and inform to nearby hospitals(ambulance). GSM modem (hardware) is used which increases the cost.GPS module is used which increases the cost.Does not have module so that the person met accident can inform that its a small accident.

2.4.2   How to overcome the problems mentioned in Paper

Our system will detect the accident and will inform the others .Our system have an android application , bluetooth module , raspberry pi , piezoelectric sensor. Less hardware will be used so less cost   effective. A real time implemention .   Death caused due to the lack of time in responding the emergency incident after accident can be drastically decreased by sending alert message to the third party.

2.5   Technical Review

2.5.1   Ultrasonic Sensor

Sound consists of oscillating waves through a medium (such as air) with the pitch being determined by the closeness of those waves to each other, defined as the frequency. Only some of the sound spectrum (the range of sound wave frequencies) is audible to the human ear, defined as the "Acoustic" range. Very low frequency sound below Acoustic is defined as "Infrasound", with high frequency sounds above, called "Ultrasound". Ultrasonic sensors are designed to sense object proximity or range using ultrasound reflection, similar to radar, to calculate the time it takes to reflect ultrasound waves between the sensor and a solid object. Ultrasound is mainly used because it's inaudible to the human ear and is relatively accurate within short distances. You could of course use Acoustic sound for this purpose, but you would have a noisy robot, beeping every few seconds.

Advantages of Sensor

a.   The ultrasonic sensor has high frequency, high sensitivity and high penetrating power therefore it can easily detect the external or deep objects.

b.   These sensors have greater accuracy then other methods for measuring the thickness and depth of parallel surface.

Reasons to use this Technology

a.   Their high frequency, sensitivity, and power make it easy to detect objects

2.5.2 Firebase

The Firebase real-time database provides us with the ability to save, retrieve and sync our data with our NoSQL cloud database. The Firebase Real-time Database uses data synchronization every time data changes, so any connected device receives an update within a few seconds.

Advantages of firebase

a. It is build to help developers to share various features between cross-platform apps related Database, Config, and Notifications.

b. You can perform various complex operation easily with firebase to build high-quality and bug-free apps for Android, iOS, and The Web.

Reasons to use this Technology

a. To keep in sync easily, it's possible for different devices using Firebase to get events on data changes.

b. As its native format, the database uses JSON, a good fit for a web or mobile application.

Chapter 3

Project Planning

3.1   Members and Capabilities

Table 3.1: Table of Capabilities

SR. No	Name of Member	Capabilities
1	Usama Malim	Database, UI Design
2	Sarfaraz Khan	Database,Hardware
3	Junaid Ansari	UI Design,Documentation

Work Breakdown Structure

3.2   Roles and Responsibilities

Table 3.2: Table of Responsibilities

SR. No	Name of Member	Role	Responsibilities
1	Usama Malim	Team Leader	UI Design,Database
2	Sarfaraz Khan	Member	Hardware,Database
3	Junaid Ansari	Member	UI Design,Documentation

3.3   Assumptions and Constraints

3.3.1 Assumptions

The team member should know the android coding.
To develop a system better available in the market.
No significant changes in technology to change our system.

3.3.2 Constaints

The project should be completed before the deadline.
The module which is to be added should be known in advance.
The customer should be able to understand how the system works.

3.4   Project Management Approach

In our project we had used spiral model for implementing all the phases success-fully.This model involves strategies, which is a combination of incremental and pro-to type models. This model is suitable for planning and implementing to achieve the goal of the project.It maintains a systematic step wise approach.
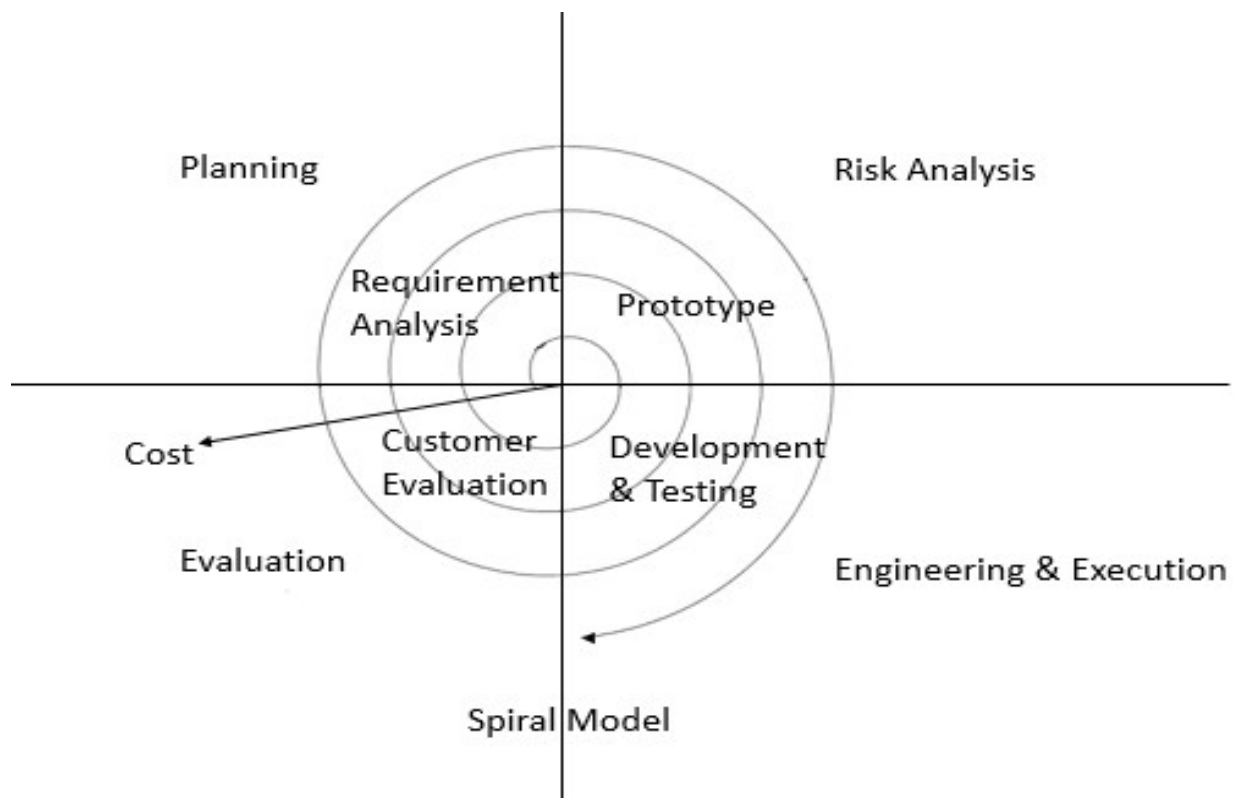
Figure 3.1: Spiral Model

3.4.1   Planning

In any project planning phases are most important phase whenever we are going to make any project.So we need to gather proper information related to our project so therefore we had searched different websites which are related to conferences to understand the structure of the websites to scarp.

3.4.2   Risk Analysis

In the risk analysis phase, a process is undertaken to identify risk and alternate solutions. A prototype is produced at the end of the risk analysis phase. If any risk is found during the risk analysis then alternate solutions are suggested and implemented.

3.4.3   Engineering

In this phase software is developed, along with testing at the end of the phase. Hence in this phase the development and testing is done.

3.4.4   Evaluation

This phase allows the customer to evaluate the output of the project to date before the project continues to the next spiral.

3.5   Ground Rules for the Project

1. We treat each other with respect.
2. We intend to develop personal relationships to enhance trust and open communication.
3. We value constructive feedback. We will avoid being defensive and give feedback in a constructive manner.
4. As team members, we will pitch in to help where necessary to help solve problems and catch-up on behind schedule work.
5. Additional meetings can be scheduled to discuss critical issues or tabled items upon discussion and agreement with the team leader.
6. One person talks at a time; there are no side discussions.
7. When we pose an issue or a problem, we will also try to present a solution.

3.6   Project Budget

The budget for this project is high as most of the tools we have use are open source but we are using the hardware.Following are the budget for the project:-

Software

1. Operating System: linux mint (Open Source).
2. IDE: Android Studio (Open Source).
3. API: Google places API,Vision Api,Open Weather Api (Open Source).

Hardware

1.Raspberry pi (INR 4000/-)
2.Sensors (INR 600/-)
3.Breadboard and Wires(INR 1600/-)
4.Memory card (INR 800/-)

3.7 Project Timeline

	Task Name		Q3			Q4			Q1			Q2	
			Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
1	Requirement Gathering				Junaid								
2	Selecting Sensor and Database Technologies					Sarfaraz							
3	Designing Interface						Junaid						
4	Detection through Sensor							Sarfaraz					
5	Data Handling								Usama				
6	Interfacing									Usama			
7	Connection										Usama		
8	Performnance Testing											Usama	
9	Documentation												Junaid
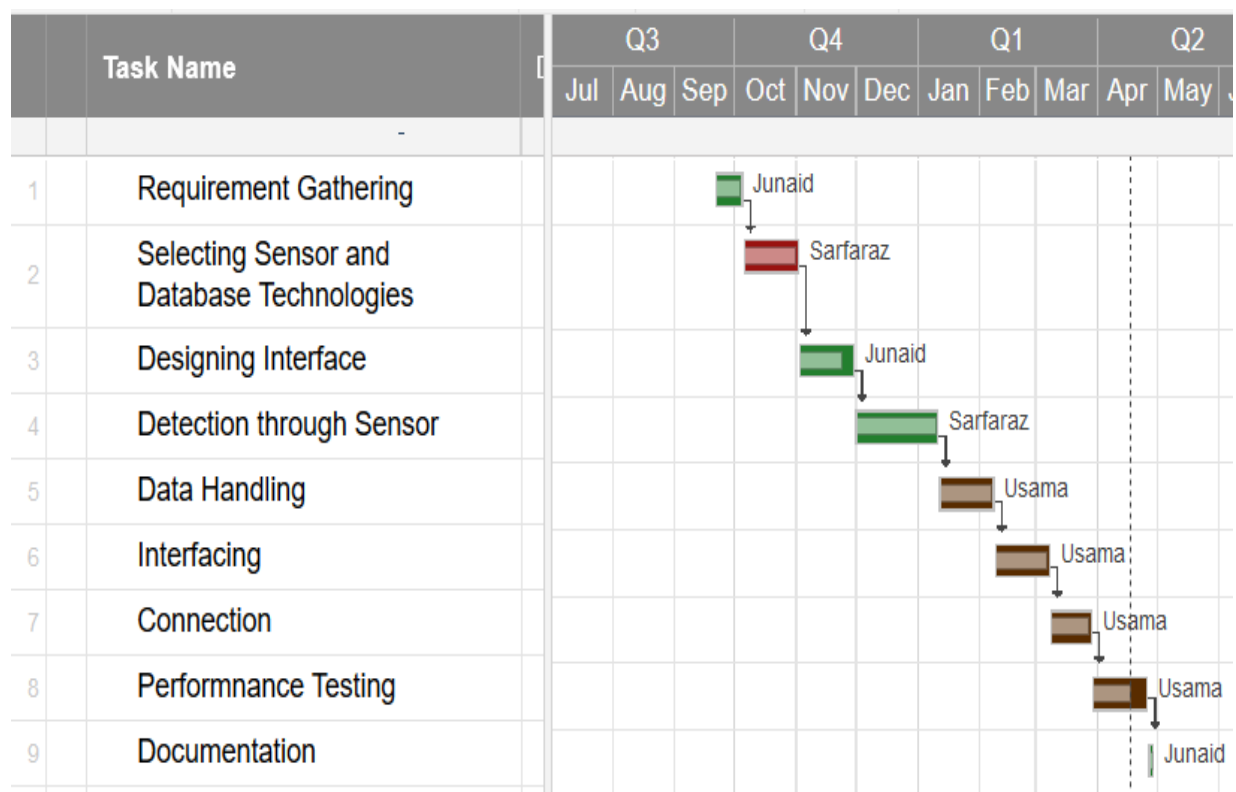
Figure 3.2: Gantt Chart

Chapter 4

Software Requirements Specification

4.1 Overall Description

4.1.1 Product Perspective

The Accident Alert And Pothole Detection System is a new product intended to use on the android platform.While the Accident alert and pothole is the main focus of the project, there is also a server-side component which will be responsible for database and synchronization services.The scope of the project encompasses both server- and client-side functionalities, so both aspects are covered in detail within this document.

4.1.2 Product Features

The following are the major features of Accident Alert And Pothole Detection System.

- Accident detection using the airbag sensor.
- Accident alert via app.
- Pothole Detection using the ultrasonic sensor.
- Pothole alert via app.

4.1.3 User Classes and Characteristics

The Accident Alert And Pothole Detection project is meant to offer accident alert and pothole location that is faster, easier, and more convenient .Consequently, the application will have little or no learning curve,   and the user interface will be as intuitive as possible. Thus, technical expertise and Android experience should not be an issue.

4.1.4   Operating Environment

The environment in which the software will operate is Android and the hardware platform on which the software will run be any android based Smart Phone with GPS enabled.The android Version should be 5.1 that is Android Lolly pop or higher and the software will run peacefully Co-exist in the smart phone until it is uninstalled.

4.1.5   Design and Implementation Constraints

The major challenge that will hurdle the development of the system is the incorrect gps location,if the location of the user is not fetched correctly than whole system is of no use.Another constraint would be the internet connectivity,if there is no internet connection available than all the services will not be provided to the user.   Also of the firebase data connectivity is lost with the application than the system will fail to authenticate the user.

4.2   System Features

The major feature of our project is to provide the location of the accident and to alert the emergency authorities and the relatives of the victim which the user has entered while the registration.Another main feature is to provide the location of the pothole to the user.

4.2.1   System Feature

1. Accident detection.
2. Accident alert.
3. Pothole detection.
4. Pothole alert.

Description and Priority

1. Accident detection
The accident will be detected with the help of the automative airbag sensor. As soon as the car hits the another car in the front the accident gets detected .
2. Accident alert
As soon as the accident is detected by the air bag sensor it will send the message to the raspberry pi and from raspberry pi it will be sent to the app. And the emergency authorities will be informed with the location of the accident.
3. Pothole detection
Whenever the car comes near to the pothole the ultrasonic sensor will   detect the pothole and it will send the data to the raspberry pi and from raspberry pi the data

will be stored in the database.
4. Pothole Alert
whenever the car comes close to the pothole the app will alert the user that there is a pothole.

Stimulus/Response Sequences

1. The user need to login in to the system.
2. The user will enter the source and destination.
3. The route will be drawn on which pothole location would be mapped.
4. Whenever the system detects potholes ,it would upload the location of the pothole.
5. Whenever user meet with an accident, system alerts the user personals and control station.

Functional Requirements

1. The user should login in to the system.
2. The user should enter correct source and destination location.
3. The correct details of the potholes should be available.
4. The servers should response quickly.

4.3   External Interface Requirements

4.3.1   User Interfaces

User shall be able to login in the system.After the login session shall be maintain.The user can search for destination.   The user can view the profile and update it. The user can update the emergency contacts.The user can add the profile picture from gallery or can take the picture from the camera.

4.3.2   Hardware Interfaces

Android enabled device:The android enabled device should have andriod version lollipop or above.Inorder for the smooth functioning of the application the android device must have atleast 512mb of ram and atleast 200mb of free storage on device.The application can also function on a tablet device.

4.3.3   Software Interfaces

Operating System : Android lollipop or above.
Databaes : Google Firebase.
Tools : Andriod studio IDE.
Apis : Google maps, Google direction,REST api.

4.3.4 Communications Interfaces

1.The major communication for location purposes will be done by google api,the data is accessed by the google by using the google apis.
2.The interface between the firebaseDB and the system will be done by using http protocol.

4.4 Nonfunctional Requirements

4.4.1 Performance Requirements

Pothole Detection:The performance for this features is mainly depend upon the data in the database,as per the data the suggestion will be given to the user. Accident Alert:The performace of this features is depend on the overall locational access,if the gps is unable to get the correct location than whole system fails.

4.4.2 Safety Requirements

If there is any damage to the large amount of the data in the database than the whole system will go down.The database should be periodically maintained and have to keep upon it.The data which is updated by the user should be commited in the database.

4.4.3 Security Requirements

The major security requirements for the system will be the safeguarding of the user data from any kind of exploit.Inorder to protect the user data the data is not stored in local databases we will be storing in the cloud for better security.

Chapter 5

System Design

5.1   System Requirements Definition

Our system is an android application on a mobile device,the system will function overall on the basis of the location which is captured by the gps location.we have survey various application related to our project.we have decided the system specification for our project.we have studied the end-user requirements and based on that we have decided the functional and non-functional requirement.

5.1.1   Functional requirements

1.The user must register for creating the account and login using username and password to use function in the application.
2.Collect data of user personal information (Name,Contact number,Emergency contact number).
3.The user can view or find the information of potholes.
4.The user can search for location and get   routes which displays pothole on the roads.

Use-case Diagram

   In our system we have two main actors , user using the app and emergency contacted person. User first register's with appropriate details with emergency contacts pre-saved and then starts using app which will help in sending an alert message via App to the contacts in emergency list and also to the user's selected colleagues saved in emergency contacts after the accident has occured so that the victim's life can be saved .   It also sends pothole location's information to the server and display the pothole location to the user from server via App. So that the other cars in future can get info about the road condition from the sever and can also update about the road condition.
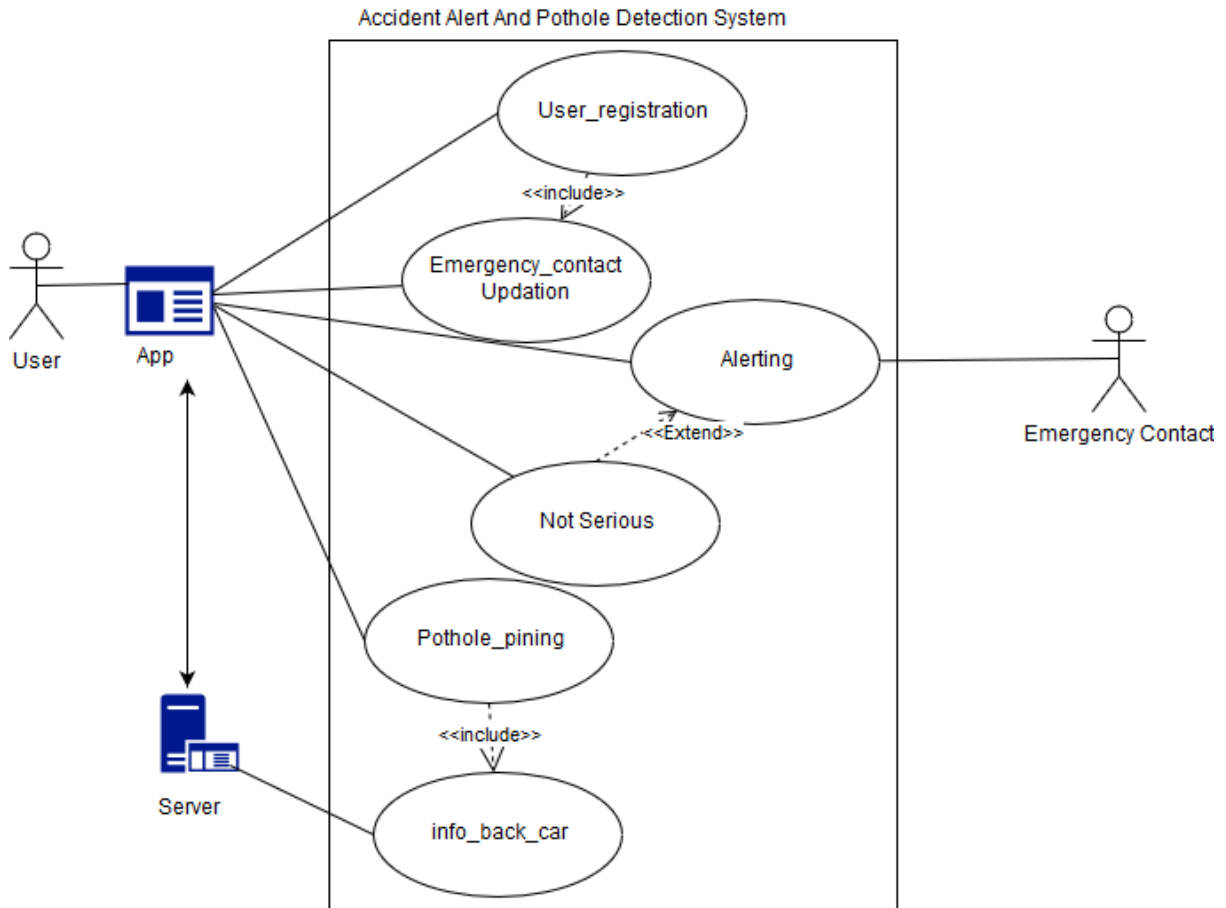
Figure 5.1: Usecase Diagram

Data-flow Diagram

This is the Data flow diagram level 0 of the system in which the modules which will be there after the deployment are shown.The driver will enter the login details into the app and the app will check the details in the firebase if the details are authentic then the app will respond to the driver.
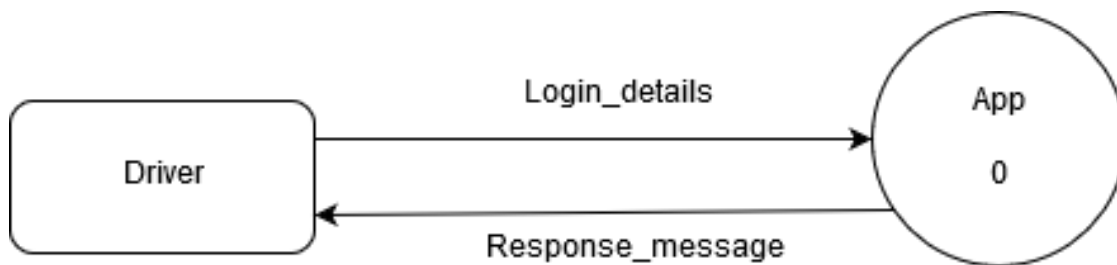
Figure 5.2: DFD Level 0

This is the Data flow diagram level 1 of the system.The user will enter the login details after entering the details it will be processed and validate the user.If the user is authentic then data will be updated in the firebase database.
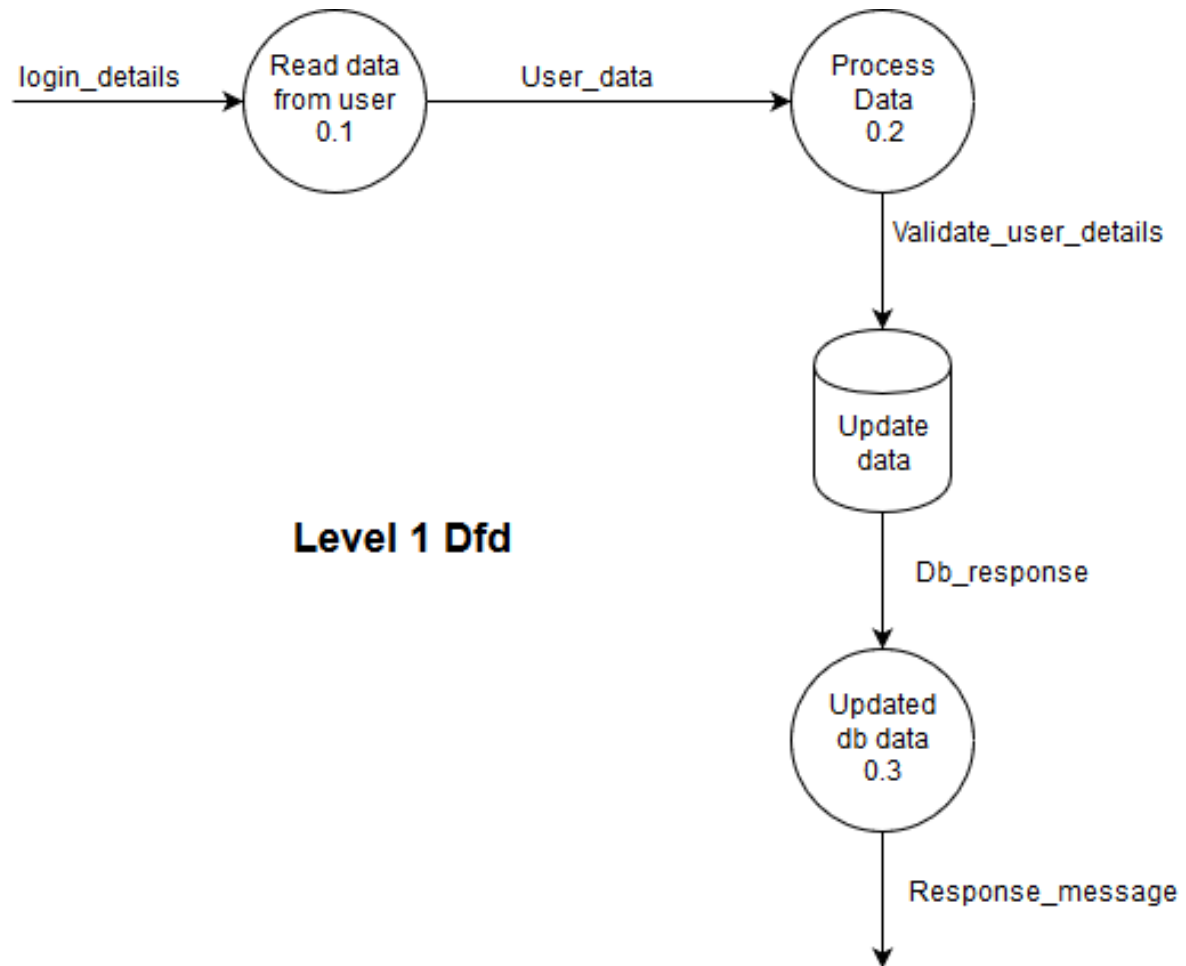
Figure 5.3: DFD Level 1

5.1.2 System requirements (non-functional requirements)

Usability requirement-A user interface for updating the information for the pothole that would allow the system to better adapt the overall system.
Efficiency requirement-The application should be able to response quickly to the user's request.
Performance requirement-The application should be able to response the queries submitted by the user without delay.
Reliabilty requirement-The application should work under all conditions and perform the required functionality.

Database Schema/ E-R Diagram
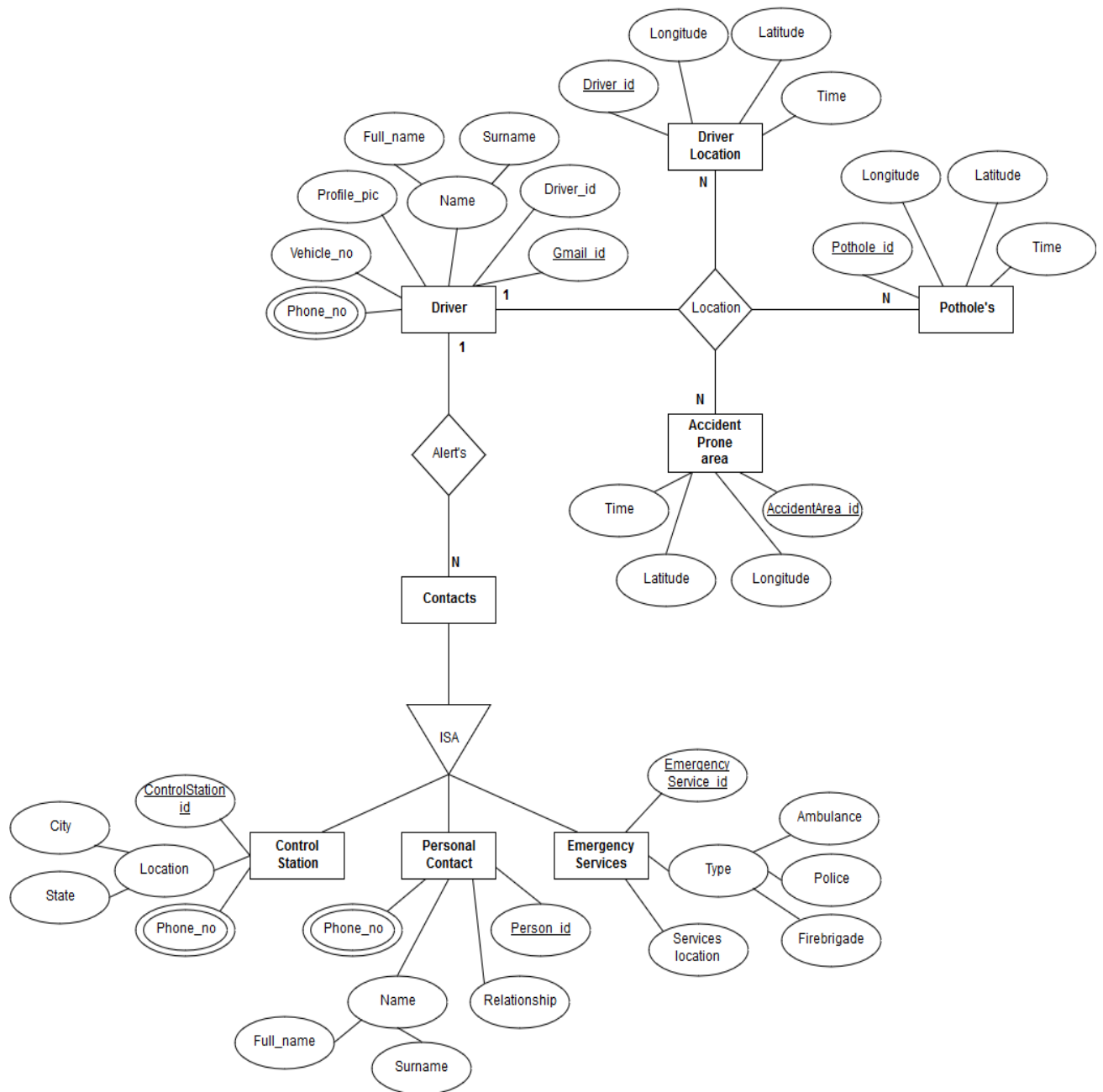
Figure 5.4: ER Diagram

5.2 System Architecture Design
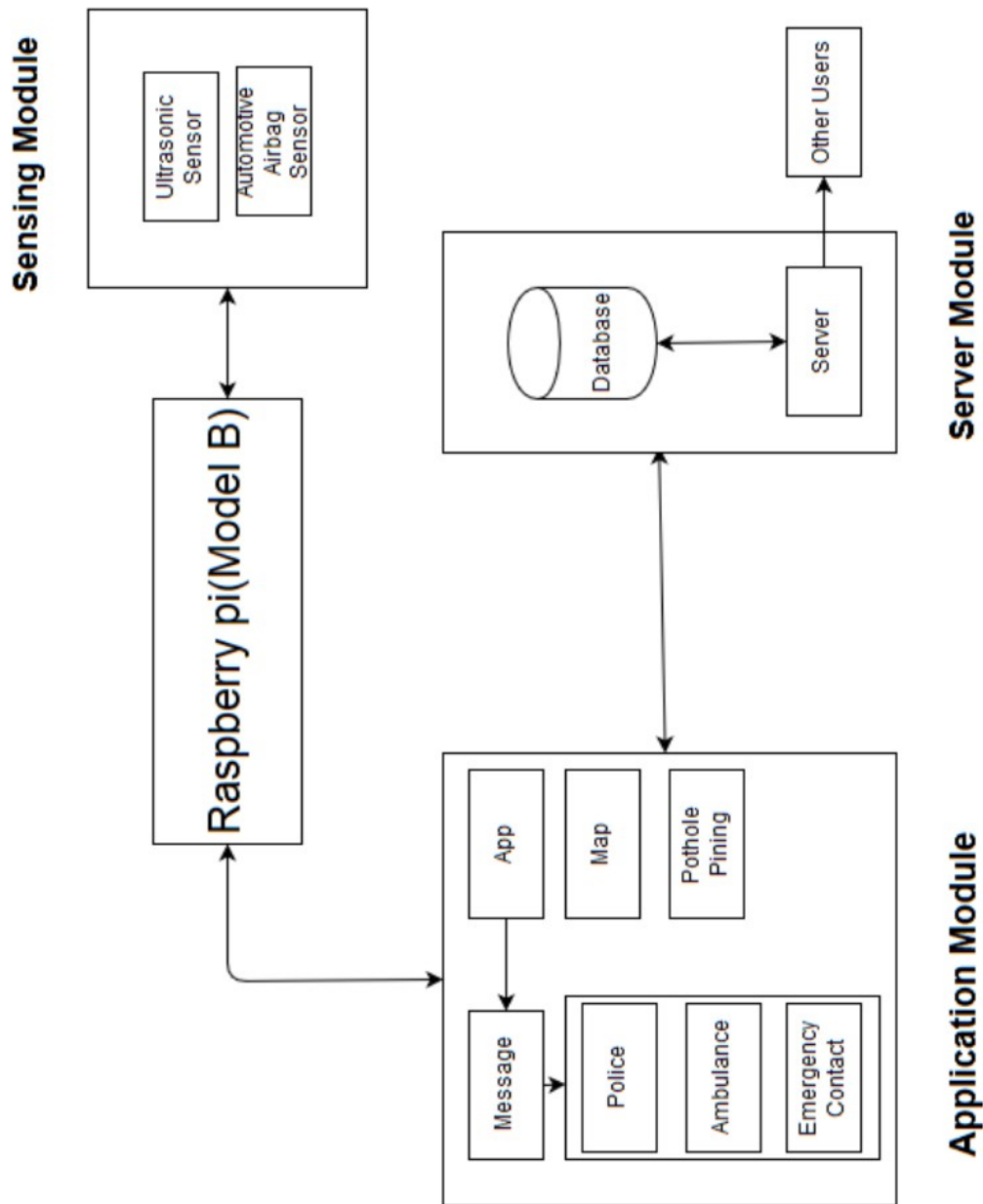
Figure 5.5: System Architecture

In the above System Architecture,we have basically divided the diagram in four parts.First is the Sensing module which has all the sensors that we are using in the system.Second is the Processing module which is the Raspberry pi which processes the data which is sensed by the sensing module.Third is the application module in which the processed data is displayed to the user.Fourth is the Server module which stores the processed data and maintains the data.

5.3   Sub-system Development

The sensing module consist of various sensor that are the automotive airbag sensor and ultrasonic sensor we are the sensing unit responsible for all input to whole system.This system provide constant reading to the processing system were all data is processed. The processing unit is used for processing the constant reading and make a sensible collection of data which can be further passed to the application module. The processed data is displayed on the application module in a sensible manner,were the all data is then send over to the server module. The Server module is responsible for the collection and maintenance of all the collected data and this data is distributed to various module.

5.3.1   Sensing Module

The Sensing module is the responsible for Detection of accident and pothole's on road. This module continuously takes data from the environment and provide data to the processing unit. The Sensor responsible for sensing the pothole continuously captures the data in it's vicinity and provide that   data to the processing data.   It interacted with only the processing module.

Sensing Module Flow Diagram or Modular Diagram

```
              ┌───────────┐
              │   Start    │
              └───────────┘
                    │
                    ▼
              ┌───────────────┐
              │Starting Sensing│
              └───────────────┘
                    │
                    ▼        No
                  ◇ Check ◇ ──────┐
                 obstacle or      │
                  accident  ◇─────┘
                    │
                   Yes
                    │
                    ▼
              ╱──────────────╱
             ╱ Details of   ╱
            ╱  Pothole or  ╱
           ╱   Accident   ╱
          ╱──────────────╱
                │
                ▼
              ( A )
```
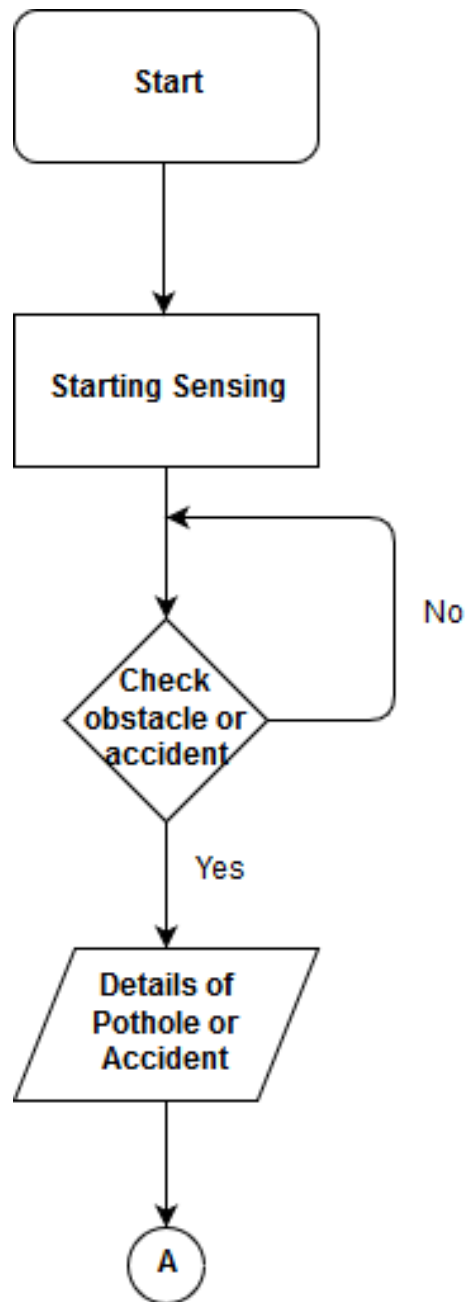
Figure 5.6: Sensing module

Sensing Module Flow Diagram or Modular Diagram

5.3.2 Processing Module

The processing module is processing the continuous data received from the sensors. The processing module is a raspberry pi. This data is then send to the app where the data is then Send over to the server and then the data is distributed.

Processing Module Flow Diagram or Modular Diagram
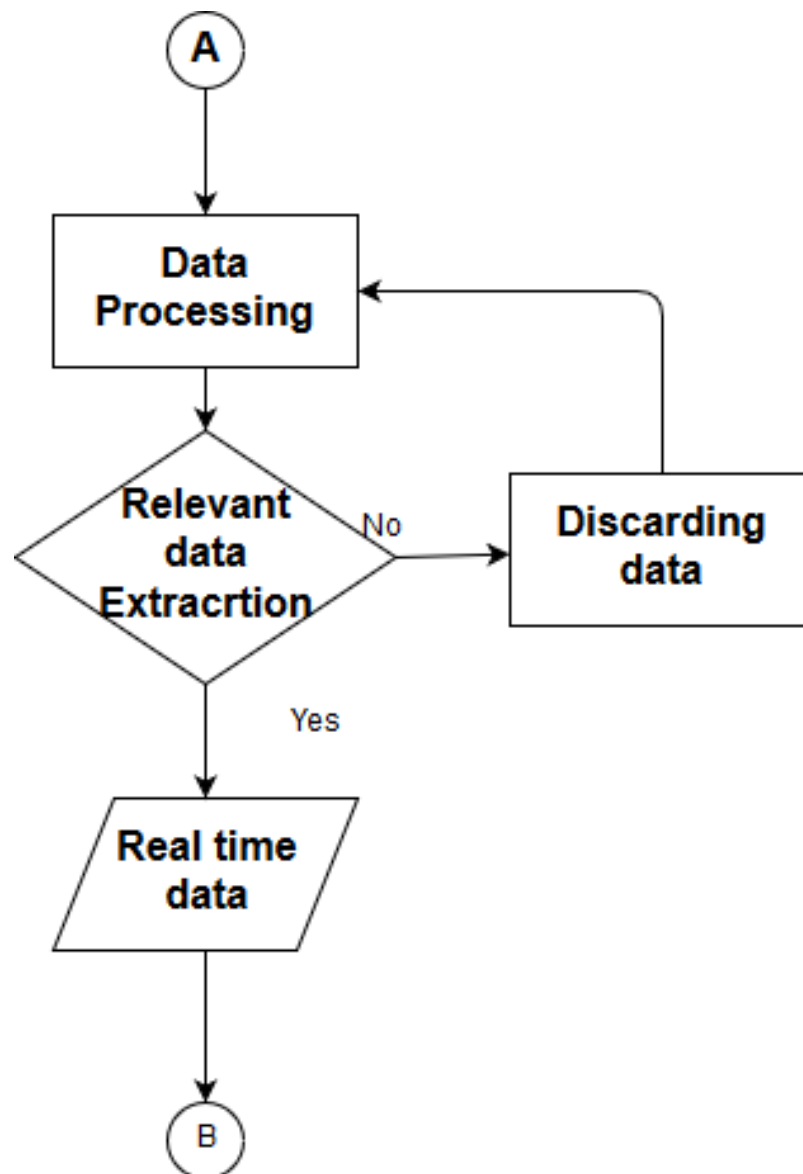
Figure 5.7: Processing module

5.3.3 Application Module

This application will be android based and it will provide a simple interface to user and provide a map which displays the road condition and pothole's on that road on which the car is drown .The interface of app will be kept simple so user can use it without any age constraint.

Application Module Flow Diagram or Modular Diagram
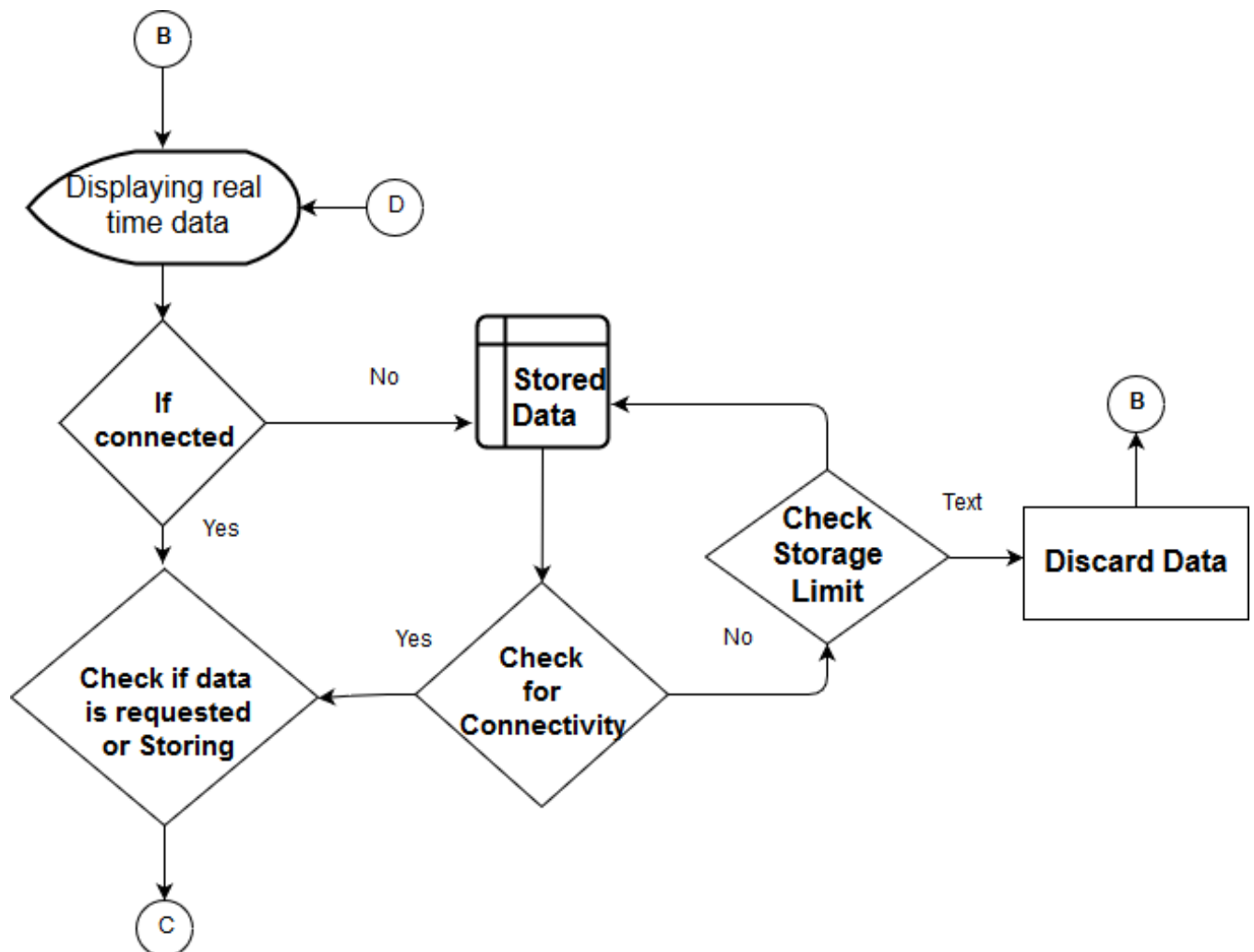
Figure 5.8: Application module

5.3.4 Server Module

This module is about fetching the information form the different user from their apps. Here the data that is been fetched is in the JSON format and it is then stored in the database that is of MySql format. From this, the data is provided as to the user based on the user location or it can be preload's accordingly.

Server Module Flow Diagram or Modular Diagram
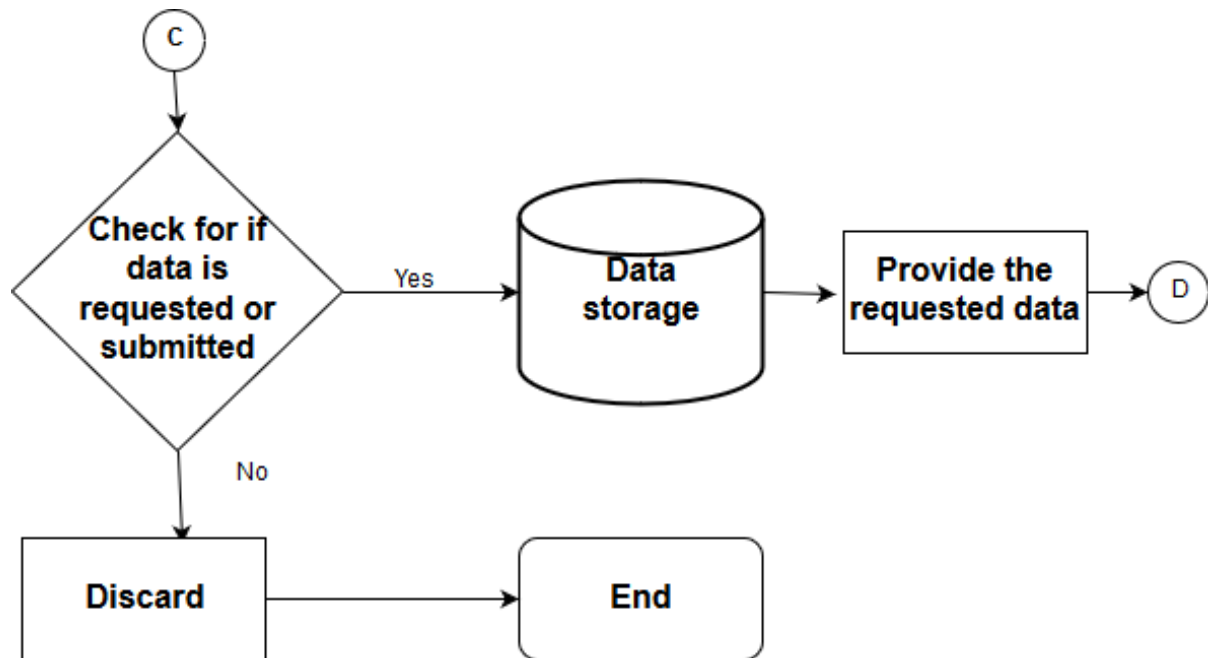
Figure 5.9: Server module

5.4   Systems Integration

In the above System Architecture,we have basically divided the diagram in four parts.First is the Sensing module which has all the sensors that we are using in the system.Second is the Processing module which is the Raspberry pi which processes the data which is sensed by the sensing module.Third is the application module in which the processed data is displayed to the user.Fourth is the Server module which stores the processed data and maintains the data.
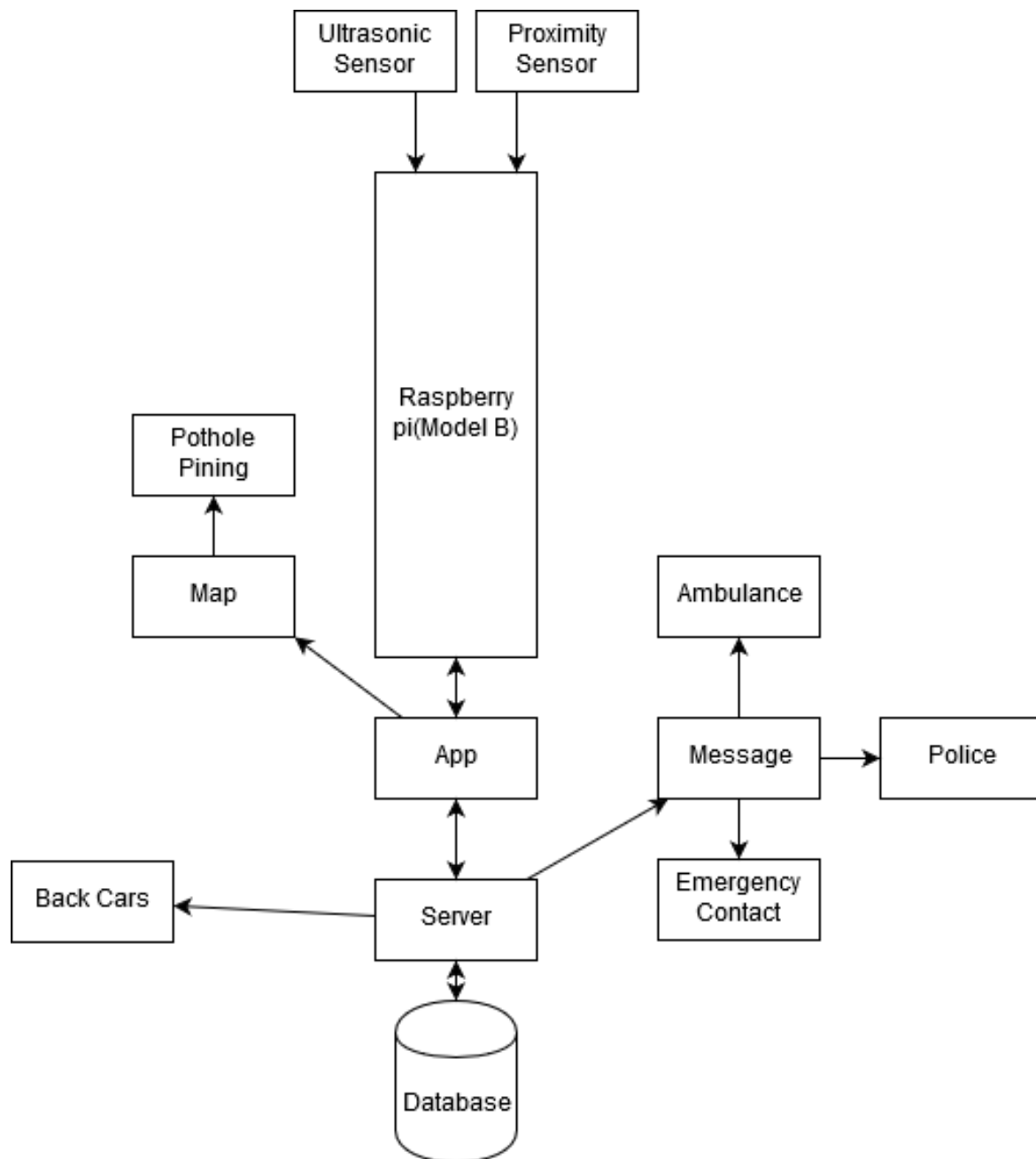
Figure 5.10: System Integration

5.4.1 Class Diagram

A class diagram is an illustration of the relationships and source code dependencies among classes in the Unified Modeling Language (UML). In this context, a class defines the methods and variables in an object, which is a specific entity in a program or the unit of code representing that entity. Class diagrams are useful in all forms of object-oriented programming .
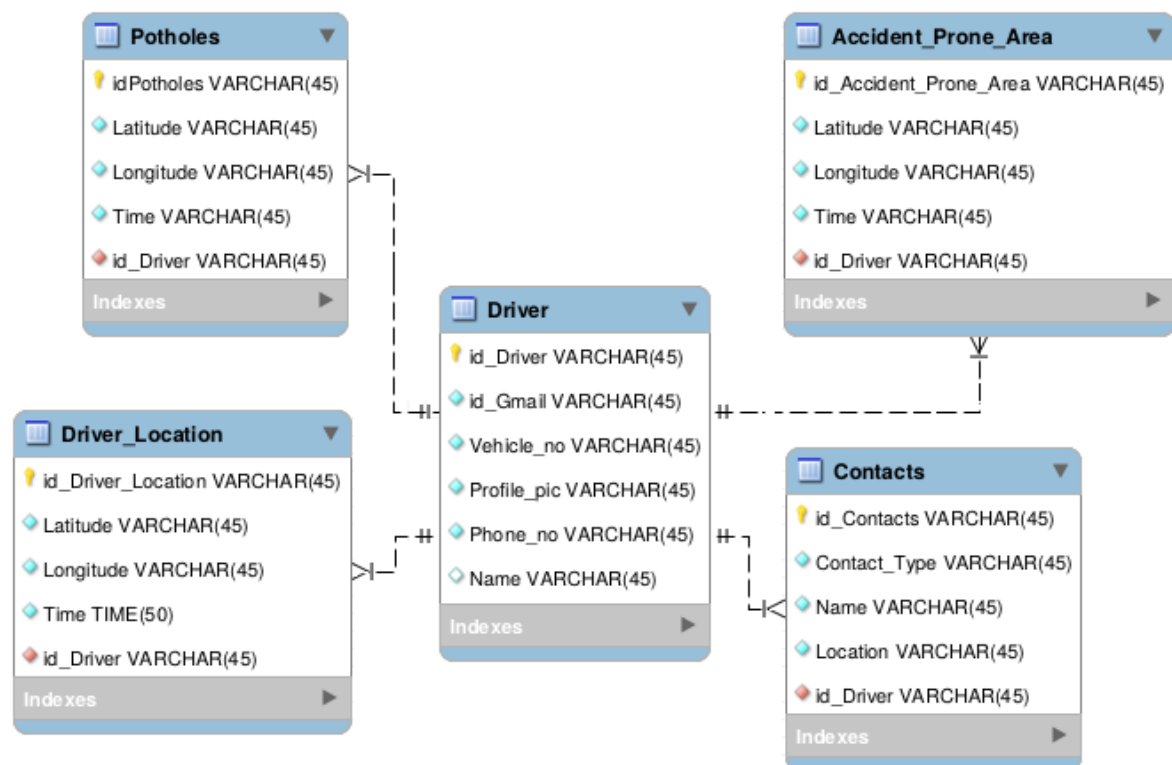
Figure 5.11: Class Diagram

5.4.2 Sequence Diagram

Sequence diagrams describe interactions among classes in terms of an exchange of messages over time. They're also called event diagrams. A sequence diagram is a good way to visualize and validate various runtime scenarios. These can help to predict how a system will behave and to discover responsibilities a class may need to have in the process of modeling a new system.

We have different objects communicating with each other.

1. A driver/user registers with appropriate details.

1.2 Validate user.

1.3 Server sends acknowledgement after validation.

1.4 App sends request to raspberry pi to start sending.

1.5 Raspberry pi activates sensor

2. Sensor start sensing continuously.

2.1 Sends sensed data to the raspberry pi.

2.3 Checks the data and selects useful data discarding unnecessary data.

2.4 Sends data about the accident or pothole to the App.

3. Via App it is forwarded to the Server.

4. If theres an accident sends info to the receiver.

5. Back car request server for pothole locations.

6. Server sends pothole locations to the back cars.

7. If not serious then driver/user can inform it too.

8.1 End/Stop.
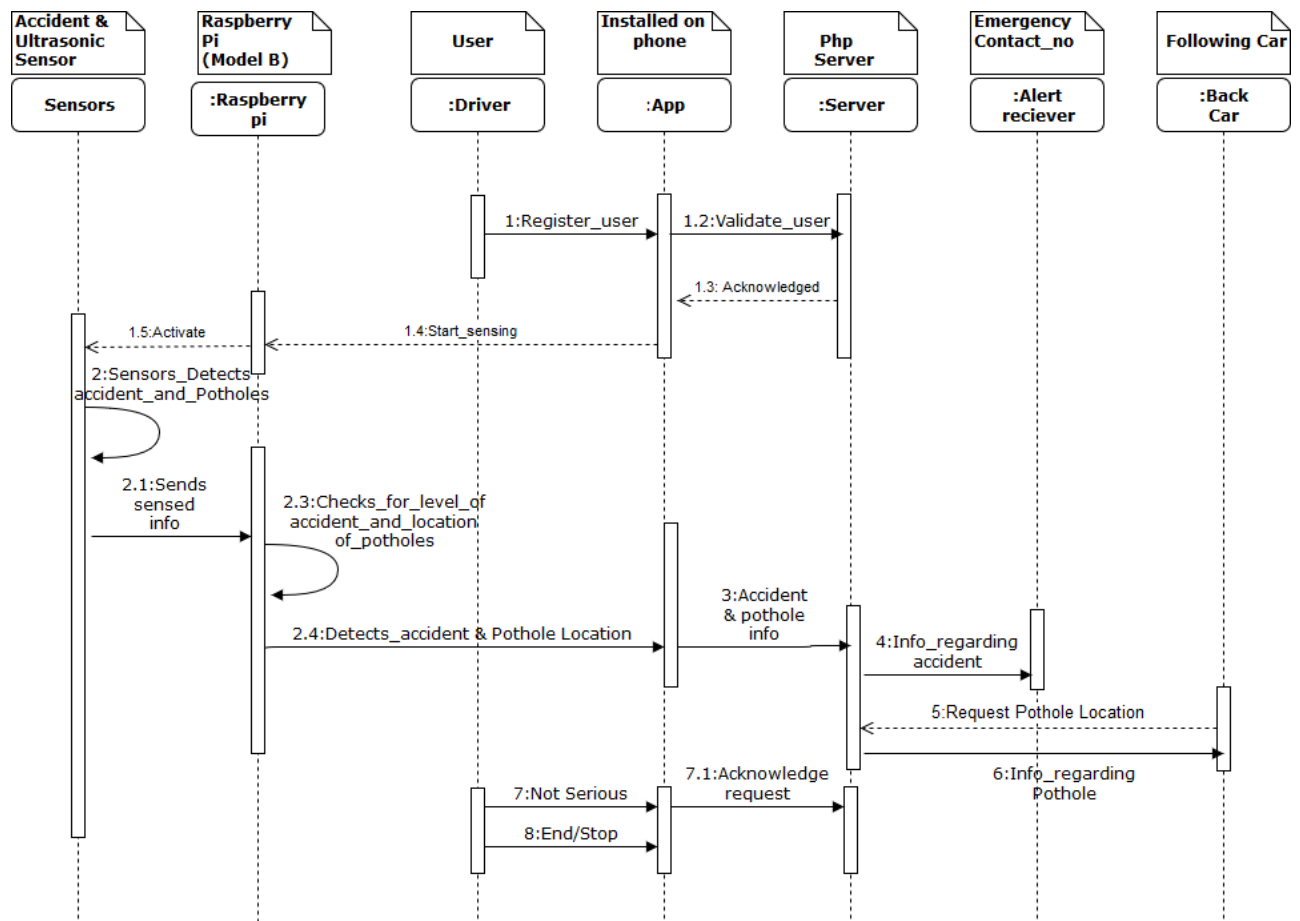
Figure 5.12: Sequence Diagram

5.4.3   Component Diagram

In Component diagram , the system module consist of various components to be used and they are sensing module ,   processing module , application module and server module . The sensing module will sense and sends the data to the processing module so that the data will be processed and then sends to the server module via application module.
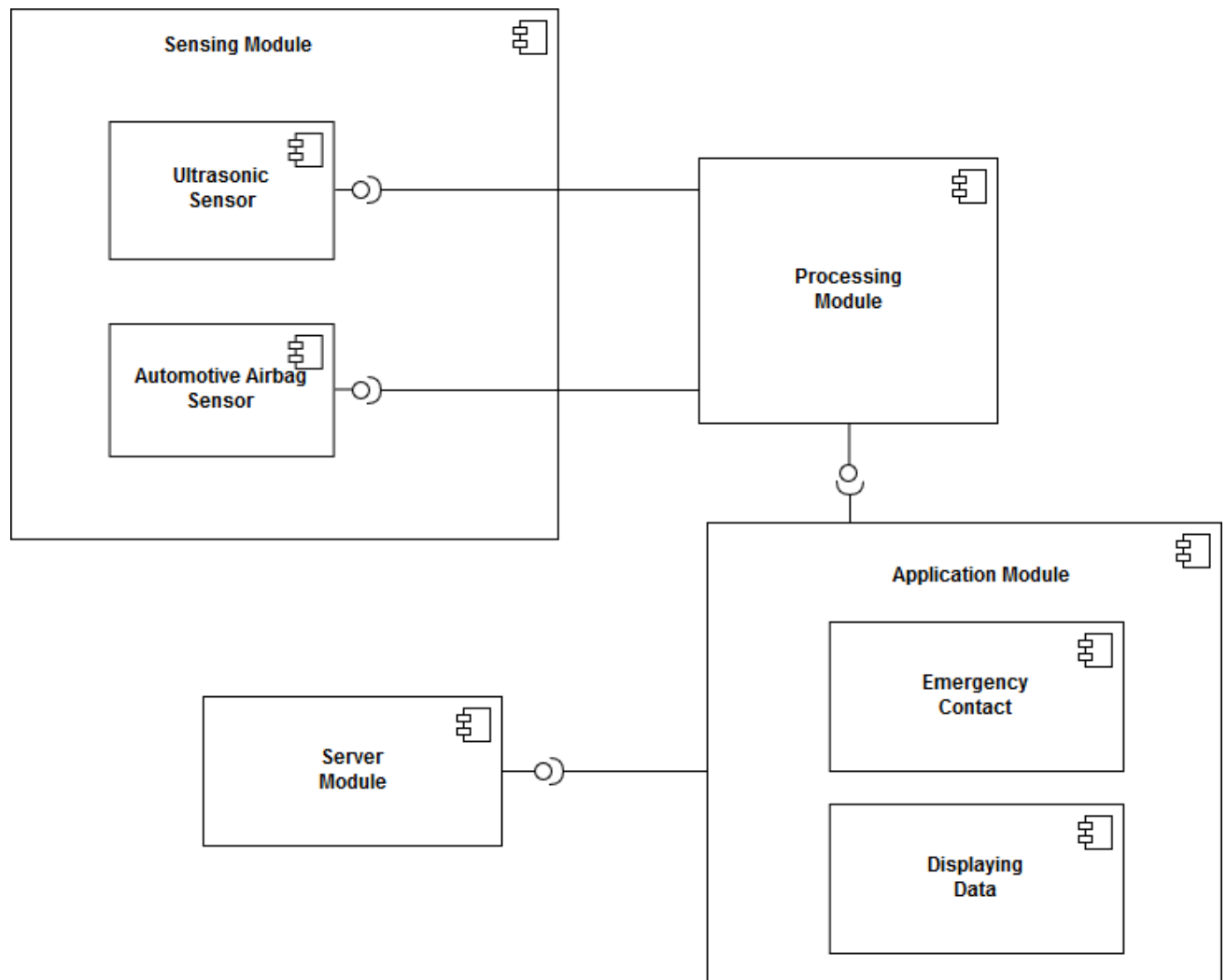
Figure 5.13: Component Diagram

5.4.4 Deployment Diagram

In Deployment diagram , the system itself necessary module required to be deployed physically are shown here. In our deployment diagram there are mainly four modules used they are processing module , application module , sensing module and DB server module which will complete our system to be fully working.
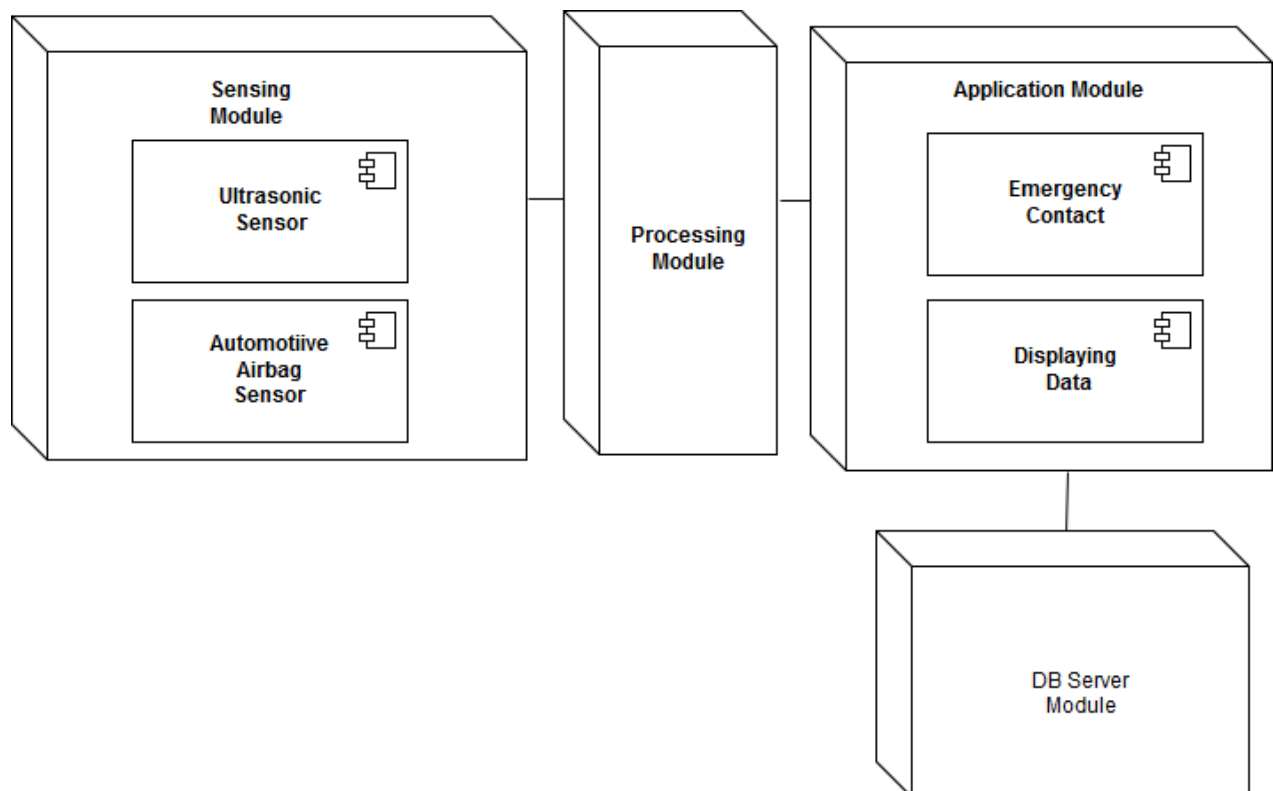
Figure 5.14: Deployment Diagram

Chapter 6

Implementation

6.1 Sensing Module

The Ultrasonic sensor output (ECHO) will always output low (0V) unless it's been triggered in which case it will output 5V (3.3V with our voltage divider!). We therefore need to set one GPIO pin as an output, to trigger the sensor, and one as an input to detect the ECHO voltage change.

First, import the Python GPIO library, import our time library (so we make our Pi wait between steps) and set our GPIO pin numbering. Next, we need to name our input and output pins, so that we can refer to it later in our Python code. We'll name our output pin (which triggers the sensor) GPIO 23 [Pin 16] as TRIG, and our input pin (which reads the return signal from the sensor) GPIO 24 [Pin 18] as ECHO. We'll then print a message to let the user know that distance measurement is in progress. Next, set your two GPIO ports as either inputs or outputs as defined previously.

```python
import RPi.GPIO as GPIO
import time

GPIO.setmode(GPIO.BCM)

TRIG = 23
ECHO = 24
print "Distance Measurement   In Progress"
GPIO.setup(TRIG, GPIO.OUT)
GPIO.setup(ECHO, GPIO.IN)
GPIO.output(TRIG, False)
print "Waiting For Sensor To Settle"
time.sleep(2)
GPIO.output(TRIG, True)
time.sleep(0.00001)
GPIO.output(TRIG, False)
while GPIO.input(ECHO) == 0:

    pulse_start = time.time()
    while GPIO.input(ECHO) == 1:
    pulse_end = time.time()
    pulse_duration = pulse_end - pulse_start
```

6.2 Processing Module

Raspberry Pi 3 Model B is the latest iteration of the world's most popular single board computer. It provides a quad-core 64-bit ARM Cortex-A53 CPU running at 1.2GHz, four USB 2.0 ports, wired and wireless networking, HDMI and composite video output, and a 40-pin GPIO connector for physical interfacing projects.

```python
#!/usr/bin/env python3
# -*- coding: utf-8 -*-

"""
Created on Fri Mar 16 15:19:31 2018
@author: sf
"""

import asyncio
import time
import dist
from time import ctime
import RPi.GPIO as GPIO
#from datetime import datetime

HOST=''
PORT=21567
BUFSIZE=1024
ADDR= (HOST, PORT)

tcpSerSock=socket(AF_INET, SOCK_STREAM)
tcpSerSock.bind(ADDR)
tcpSerSock.listen(5)

*while True:
    print("Waiting for Connection")
    tcpCliSock,addr=tcpSerSock.accept()
    print("Connected", addr)
    try:
        while True:
            data=''
            data=''
tcpSerSock.close();
```

The speed of sound is variable, depending on what medium it's travelling through, in addition to the temperature of that medium. However, some clever physicists have calculated the speed of sound at sea level so we'll take our baseline as the 343m/s. If you're trying to measure distance through water, this is where you're falling down – make sure you're using the right speed of sound!

We also need to divide our time by two because what we've calculated above is actually the time it takes for the ultrasonic pulse to travel the distance to the object and back again. We simply want the distance to the object!   We can simplify the calculation to be completed in our Python script as follows:

```python
#Libraries
import RPi.GPIO as GPIO
import time
from firebase import firebase
firebase = firebase.FirebaseApplication('https://aap5f5acc.firebaseio.com/',
    None)

#GPIO Mode   (BOARD / BCM)
GPIO.setmode(GPIO.BCM)

def setup():
    GPIO.setup(GPIO_TRIGGER, GPIO.OUT)
    GPIO.setup(GPIO_ECHO, GPIO.IN)
def distance():
    # set Trigger to HIGH
    GPIO.output(GPIO_TRIGGER, True)
    # set Trigger after 0.01ms to LOW
    time.sleep(0.00001)
    GPIO.output(GPIO_TRIGGER, False)
    StartTime = time.time()
    StopTime = time.time()
    # save StartTime
    while GPIO.input(GPIO_ECHO) == 0:
        StartTime = time.time()
    # save time of arrival
    while GPIO.input(GPIO_ECHO) == 1:
        StopTime = time.time()
    # time difference between start and arrival
    TimeElapsed = StopTime - StartTime
    # multiply with the sonic speed (34300 cm/s)
    # and divide by 2, because go and come back
    #distance = TimeElapsed * 17150
    #return distance
    return(TimeElapsed * 17150)
def sendsdata():
        result = firebase.post('/Potholes',{'Longitude':'18.25365236','
            Latitude':'19.25631'})


if __name__ == '__main__':
        pothole=0.0
    try:
        GPIO_TRIGGER=18   #Pin no. 12
        GPIO_ECHO=24      #Pin no. 18
        setup()
        GPIO_TRIGGER=25   #Pin no. 22
        GPIO_ECHO=7       #Pin no. 26
        setup()
        for i in range(1,11):
                            GPIO_TRIGGER=18
            GPIO_ECHO=24
            pothole+=distance()
            print ("Measured Distance1 = %.1f cm" % pothole)
            time.sleep(1)
        pothole=pothole/10
                    print ("mean distance = %.1f cm" % pothole)

        while True:
            GPIO_TRIGGER=18
            GPIO_ECHO=24
            #print("Inside while loop")
```

```python
60        dist=distance()
61        if(dist>pothole+10):
62                              print ('pothole detected')
63        print ("Measured Distance1 =%.1f  cm"%dist)
64        time.sleep(1)
65
66        GPIO_TRIGGER=25
67        GPIO_ECHO=7
68        #print("Inside while loop")
69        dist=distance()
70        if(dist < 4):
71                              print ('Accident detected')
72        print ("Measured Distance2 =%.1f  cm"%dist)
73        time.sleep(1)
74
75          # Reset by pressing CTRL + C
76    except KeyboardInterrupt:
77      print("Measurement stopped by User")
78      GPIO.cleanup()
```

6.3 Android Application Module

Android Application first page consist of login and register page where user register.The user will   login if he is a user or will   register,the app will   authenticate the user and the user will be redirect to map and the location of potholes are displayed.Whenever user meet with an accident an alert signal will send over.

```java
1
2  public class LoginActivity extends AppCompatActivity {
3
4      double latitude,longitude;
5      Button btnSignIn,btnRegister;
6      FirebaseAuth auth;
7      FirebaseDatabase db;
8      DatabaseReference users;
9      RelativeLayout rootLayout;
10     FirebaseStorage firebaseStorage;
11     StorageReference storageReference;
12
13     @Override
14     protected void attachBaseContext(Context newBase) {
15         super.attachBaseContext(CalligraphyContextWrapper.wrap(newBase));
16     }
17
18     @Override
19     protected void onCreate(Bundle savedInstanceState){
20         super.onCreate(savedInstanceState);
21         CalligraphyConfig.initDefault(new CalligraphyConfig.Builder().
               setDefaultFontPath("fonts/Arkhip_font.ttf").setFontAttrId(R.attr.
               fontPath)build());
22         setContentView(R.layout.activity_login);
23
24         auth = FirebaseAuth.getInstance();
25         db = FirebaseDatabase.getInstance();
26         users = db.getReference("Users");
27         firebaseStorage = FirebaseStorage.getInstance();
```

```java
28          storageReference = firebaseStorage.getReference();
29          btnRegister = (Button)findViewById(R.id.btnRegister);
30          btnSignIn = (Button)findViewById(R.id.btnSignIn);
31          rootLayout = (RelativeLayout)findViewById(R.id.rootLayout);
32
33          btnRegister.setOnClickListener(new View.OnClickListener() {
34              @Override
35              public void onClick(View view) {
36                  showRegisterDialog();
37              }
38          });
39
40          btnSignIn.setOnClickListener(new View.OnClickListener() {
41              @Override
42              public void onClick(View view) {
43                  showSignInDialog();
44              }
45          });
46
47
48      }
49
50   private void showSignInDialog() {
51       final AlertDialog.Builder dialog = new AlertDialog.Builder(this);
52       dialog.setTitle("SIGN IN");
53       dialog.setMessage("Please Use email to SignIn");
54
55       LayoutInflater inflater = LayoutInflater.from(this);
56       View signin_layout = inflater.inflate(R.layout.layout_signin, null);
57       final MaterialEditText edtEmail = signin_layout.findViewById(R.id.
                edtEmail);
58       final MaterialEditText edtPassword = signin_layout.findViewById(R.id.
                edtPassword);
59
60       dialog.setView(signin_layout);
61
62       dialog.setPositiveButton("SIGN IN", new DialogInterface.OnClickListener
                () {
63
64
65
66          @Override
67                  public void onClick(DialogInterface dialogInterface, int i)
                        {
68                          dialogInterface.dismiss();
69                          btnSignIn.setEnabled(false);
70
71
72                      if (TextUtils.isEmpty(edtEmail.getText().toString())) {
73                          Snackbar.make(rootLayout, "Please Enter Email
                                Address", Snackbar.LENGTH_SHORT).show();
74                          return;
75                      }
76                      if (TextUtils.isEmpty(edtPassword.getText().toString()))
                            {
77                          Snackbar.make(rootLayout, "Please Enter Password",
                                Snackbar.LENGTH_SHORT).show();
78                          return;
79                      }
80
81                      final SpotsDialog waitingDialog = new SpotsDialog(
```

```java
                                      LoginActivity.this);
82                           waitingDialog.show();


85                           auth.signInWithEmailAndPassword(edtEmail.getText().
                                 toString(),edtPassword.getText().toString())
86                                 .addOnSuccessListener(new OnSuccessListener<
                                    AuthResult>() {
87                                    @Override
88                                    public void onSuccess(AuthResult authResult)
                                         {
89                                        FirebaseUser user = auth.getCurrentUser
                                            ();
90                                        if(user!=null)
91                                        {
92                                            String userId = user.getUid();
93                                            Intent i = new Intent(
                                                getApplicationContext(),
                                                MainActivity.class);
94                                            i.putExtra("userId","user.getUid()")
                                                ;
95                                            startActivity(i);
96                                        }
97                                        waitingDialog.dismiss();
98                                        startActivity(new Intent(LoginActivity.this,
                                            WelcomeActivity.class));
99                                        finish();
100                                      }
101                                 }).addOnFailureListener(new OnFailureListener()
                                      {
102                               @Override
103                               public void onFailure(@NonNull Exception e) {
104                                   waitingDialog.dismiss();
105                                   Snackbar.make(rootLayout,"Failed", Snackbar.
                                        LENGTH_SHORT).show();
106                                   btnSignIn.setEnabled(true);
107                               }
108                           });
109                       }
110                   });
111
112      dialog.setNegativeButton("CANCEL",new DialogInterface.OnClickListener()
             {
113           @Override
114           public void onClick(DialogInterface dialogInterface,int i) {
115               dialogInterface.dismiss();
116           }
117      });


120      dialog.show();


123   }


126   private void showRegisterDialog(){
127       final AlertDialog.Builder dialog = new AlertDialog.Builder(this);
128       dialog.setTitle("REGISTER");

130       LayoutInflater inflater = LayoutInflater.from(this);
```

```
131      View register_layout = inflater.inflate(R.layout.layout_register, null);
132      final MaterialEditText edtName = register_layout.findViewById(R.id.
             edtName);
133      final MaterialEditText edtEmail = register_layout.findViewById(R.id.
             edtEmail);
134      final MaterialEditText edtPassword = register_layout.findViewById(R.id.
             edtPassword);
135      final MaterialEditText edtPhoneNo = register_layout.findViewById(R.id.
             edtPhoneNo);
136      final MaterialEditText edtFamilyPhoneNo = register_layout.findViewById(R
             .id.edtFamilyPhoneNo);
137      final MaterialEditText edtVehicleNo = register_layout.findViewById(R.id.
             edtVehicleNo);
138      dialog.setView(register_layout);
139
140  dialog.setPositiveButton("REGISTER", new DialogInterface.OnClickListener
         () {
141      @Override
142      public void onClick(DialogInterface dialogInterface, int i) {
143          dialogInterface.dismiss();
144          if(TextUtils.isEmpty(edtEmail.getText().toString())){
145              Snackbar.make(rootLayout, "Please Enter Email Address",
                     Snackbar.LENGTH_SHORT).show();
146              return;
147          }
148          if(TextUtils.isEmpty(edtName.getText().toString())){
149              Snackbar.make(rootLayout, "Please Enter Name", Snackbar.
                     LENGTH_SHORT).show();
150              return;
151          }
152          if(TextUtils.isEmpty(edtPassword.getText().toString())){
153              Snackbar.make(rootLayout, "Please Enter Password", Snackbar.
                     LENGTH_SHORT).show();
154              return;
155          }
156
157          if(TextUtils.isEmpty(edtPhoneNo.getText().toString())){
158              Snackbar.make(rootLayout, "Please Enter Phone Number",
                     Snackbar.LENGTH_SHORT).show();
159              return;
160          }
161          if(TextUtils.isEmpty(edtFamilyPhoneNo.getText().toString())){
162              Snackbar.make(rootLayout, "Please Enter Relative Phone Number
                     ", Snackbar.LENGTH_SHORT).show();
163              return;
164          }
165          if(TextUtils.isEmpty(edtVehicleNo.getText().toString())){
166              Snackbar.make(rootLayout, "Please Enter Vehicle Number",
                     Snackbar.LENGTH_SHORT).show();
167              return;
168          }
169
170
171          auth.createUserWithEmailAndPassword(edtEmail.getText().toString
                 (), edtPassword.getText().toString())
172                  .addOnSuccessListener(new OnSuccessListener<AuthResult
                     >() {
173                      @Override
174                      public void onSuccess(AuthResult authResult){
175
176                          User user = new User();
```

```java
177                                          user.setName(edtName.getText().toString());
178                                          user.setEmail(edtEmail.getText().toString());
179                                          user.setPassword(edtPassword.getText().toString
                                             ());
180                                          user.setPhoneno(edtPhoneNo.getText().toString())
                                             ;
181                                          user.setFamilyphoneno(edtFamilyPhoneNo.getText()
                                             .toString());
182                                          user.setVehicleno(edtVehicleNo.getText().
                                             toString());
183
184                                          users.child(FirebaseAuth.getInstance().
                                             getCurrentUser().getUid())
185                                                 .setValue(user).addOnSuccessListener(new
                                                     OnSuccessListener<Void>() {
186                                              @Override
187                                              public void onSuccess(Void aVoid) {
188                                                  Snackbar.make(rootLayout,"Register
                                                      Successfully",Snackbar.LENGTH_SHORT
                                                      ).show();
189                                              }
190                                          }).addOnFailureListener(new OnFailureListener()
                                             {
191                                              @Override
192                                              public void onFailure(@NonNull Exception e)
                                                  {
193                                                  Snackbar.make(rootLayout,"Failed    ",
                                                      Snackbar.LENGTH_SHORT).show();
194                                              }
195                                          });
196                                      }
197                                  })
198                 .addOnFailureListener(new OnFailureListener() {
199                     @Override
200                     public void onFailure(@NonNull Exception e) {
201                         Snackbar.make(rootLayout,"Failed",Snackbar.LENGTH_SHORT)
                             .show();
202
203                     }
204                 })

206                 ;
207                 }
208         });
209
210         dialog.setNegativeButton("CANCEL",new DialogInterface.OnClickListener()
                {
211             @Override
212             public void onClick(DialogInterface dialogInterface,int i) {
213                 dialogInterface.dismiss();
214             }
215         });
216           dialog.show();
217     }
218     }
```

6.4 Firebase Module

Firebase is a mobile platform that helps you quickly develop high-quality apps, grow your user base, and earn more money. Firebase is made up of complementary features that you can mix-and-match to fit your needs, with Google Analytics for Firebase at the core. The library provides all the correspoding methods for those actions in both synchoronous and asynchronous manner. You can just start an asynchronous GET request with your callback function, and the method

To fetch all the users in your storage simply do the following:

```
1    from firebase import firebase
2  firebase = firebase.FirebaseApplication('https://your_storage.firebaseio.com',
       None)
3  result = firebase.get('/users',None)
4  print result
5  {'1': 'John Doe', '2': 'Jane Doe'}
```

```
1    from firebase import firebase
2  firebase = firebase.FirebaseApplication('https://your_storage.firebaseio.com',
       None)
3  new_user = 'Ozgur  Vatansever'
4
5  result = firebase.post('/users',new_user, {'print': 'pretty'}, {'X_FANCY_HEADER
       ': 'VERY FANCY'})
6  print result
7  {u'name': u'−Io26123nDHkfybDIGl7'    }
8
9  result = firebase.post('/users',new_user, {'print': 'silent'}, {'X_FANCY_HEADER
       ': 'VERY FANCY'})
10 print result == None
11 True
```

Chapter 7

System Testing

The System is tested in every environment,we have done unit testing and make them intergrated together for intergration testing.We have done Beta testing by the person apart from our group.

7.1 Test Cases and Test Results

Test ID	Test Case Title	Test Condition	System Behavior	Expected Result
T01	Login	Should be registered user.	Will Connect to firebase.	Should Login into System.
T02	Maps	Should accept location	Will connect to Google API	Calculate the route
T03	Data Fetching	Correct data	Firebase API call	Display potholes data
T04	Accident report	Accident occured	Send Alert Message	Alert message sent

7.2 Login

Title: Sign-In Page – Authenticate Successfully on App
Description: A registered user should be able to successfully sign-in at App.

Precondition: The user must already be registered with an email address and password.

Assumption: A supported App is being used.

Test Steps:

1. Navigate to AppCorrect data API call InDisplay potholes dat 'email'

field, enter the email of the registered user.

2. Enter the password of the registered user

3. Click 'Sign In'

4. If not register click Sign Up link for registration.

Expected Result: A page displaying the map should load with the current location.

Actual Result: When successful sign-in on App through firebase login a new page should open to the user displaying the map with current location.
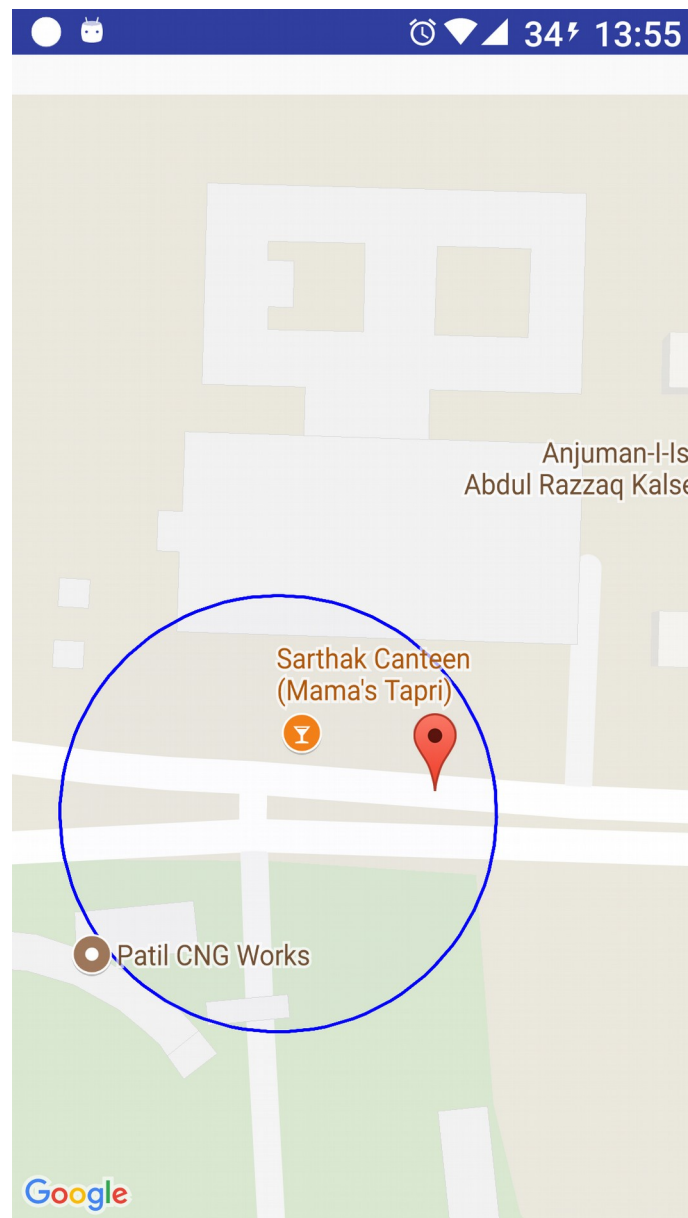
7.2.1   Software Quality Attributes

1. Availability: The system should not be down,whenever the user use the system the specific data should be available to the user.

2. Correctness: As per the data of the pothole and accident   prone area the location should be showed correct to the user.

3. Maintainability: The administrators of the system will   maintain the system with effective updates though on air update if needed.

4. Extensibility: The system is capable to be modified by changing some modules or by adding some features to the existing system.

Chapter 8

Screenshots of Project

8.1   Sign-In
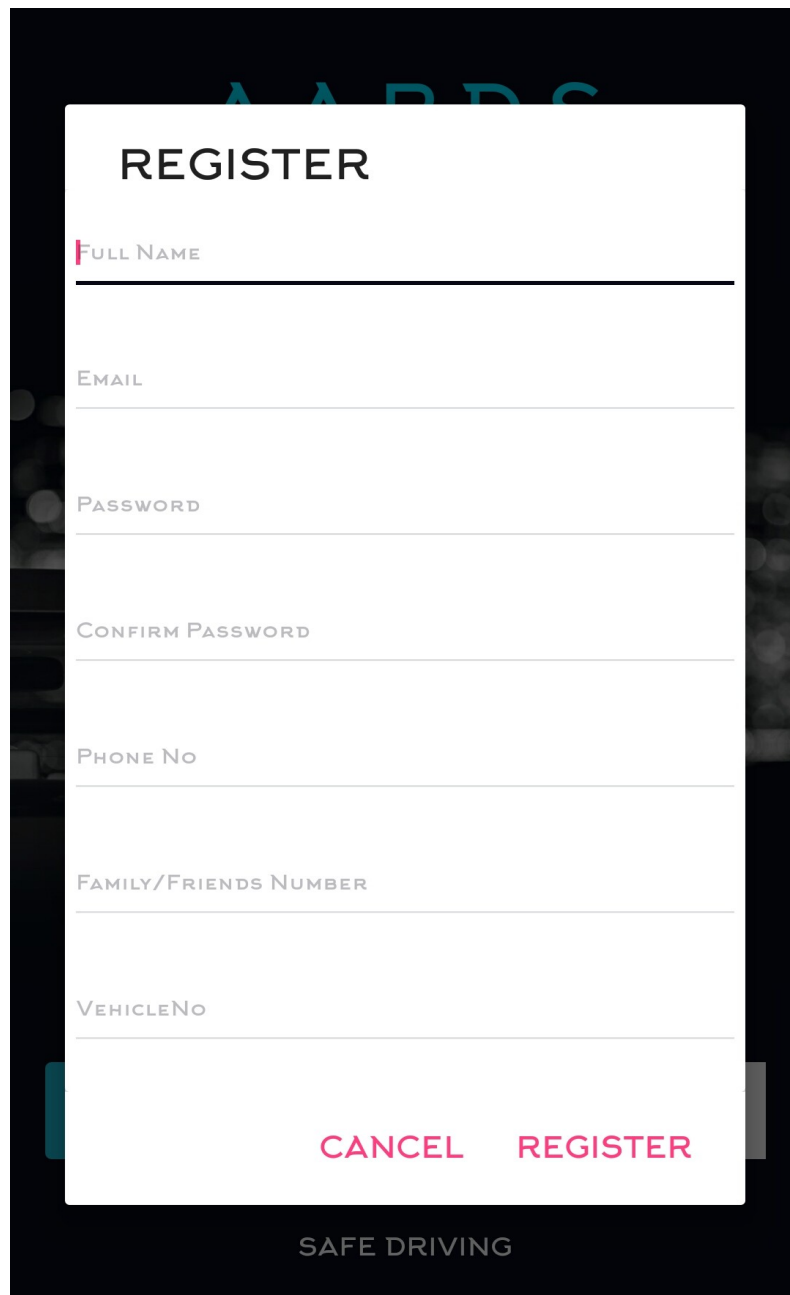
Figure 8.1: Screenshot of Sign-In

8.2   Sign-Up

Figure 8.2: Screenshot of Sign-Up

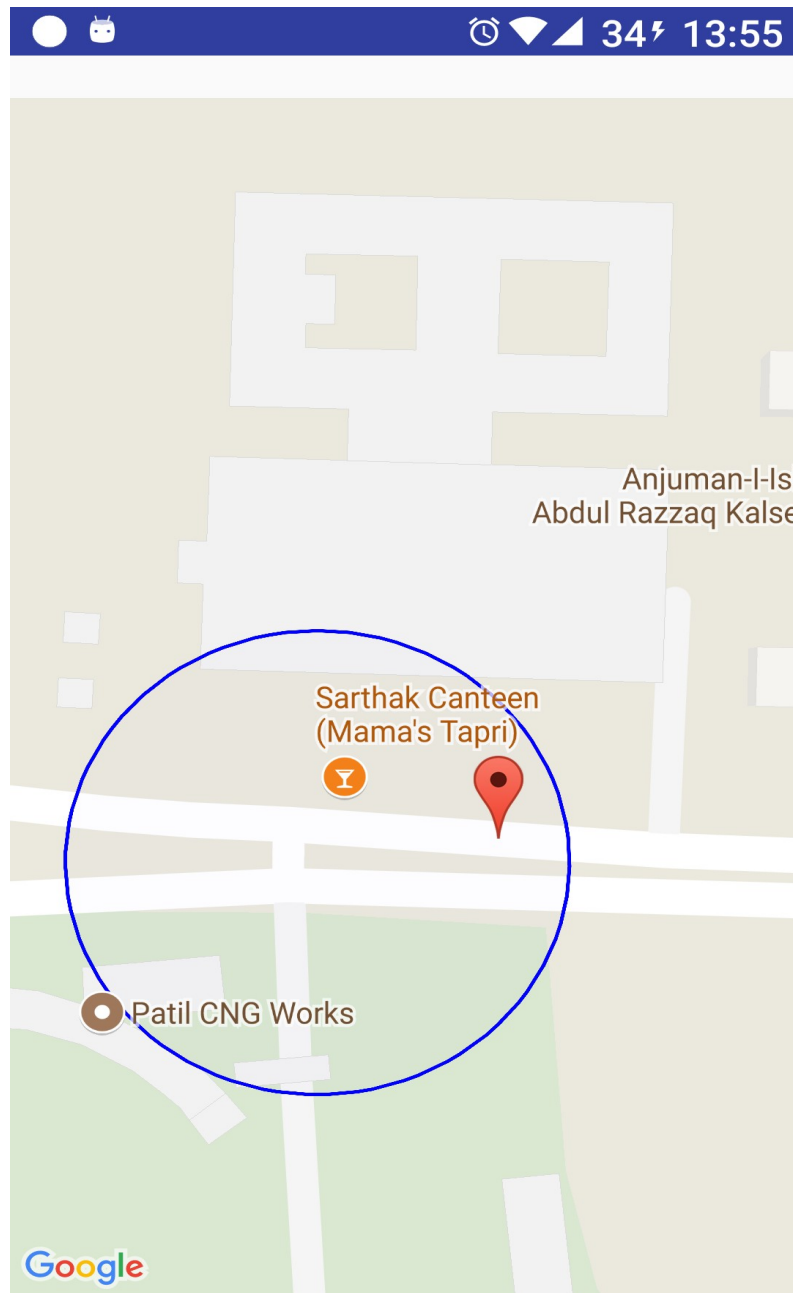## 8.2   Sign-Up

8.3   Home Screen

Figure 8.3: Screenshot of Home Screen

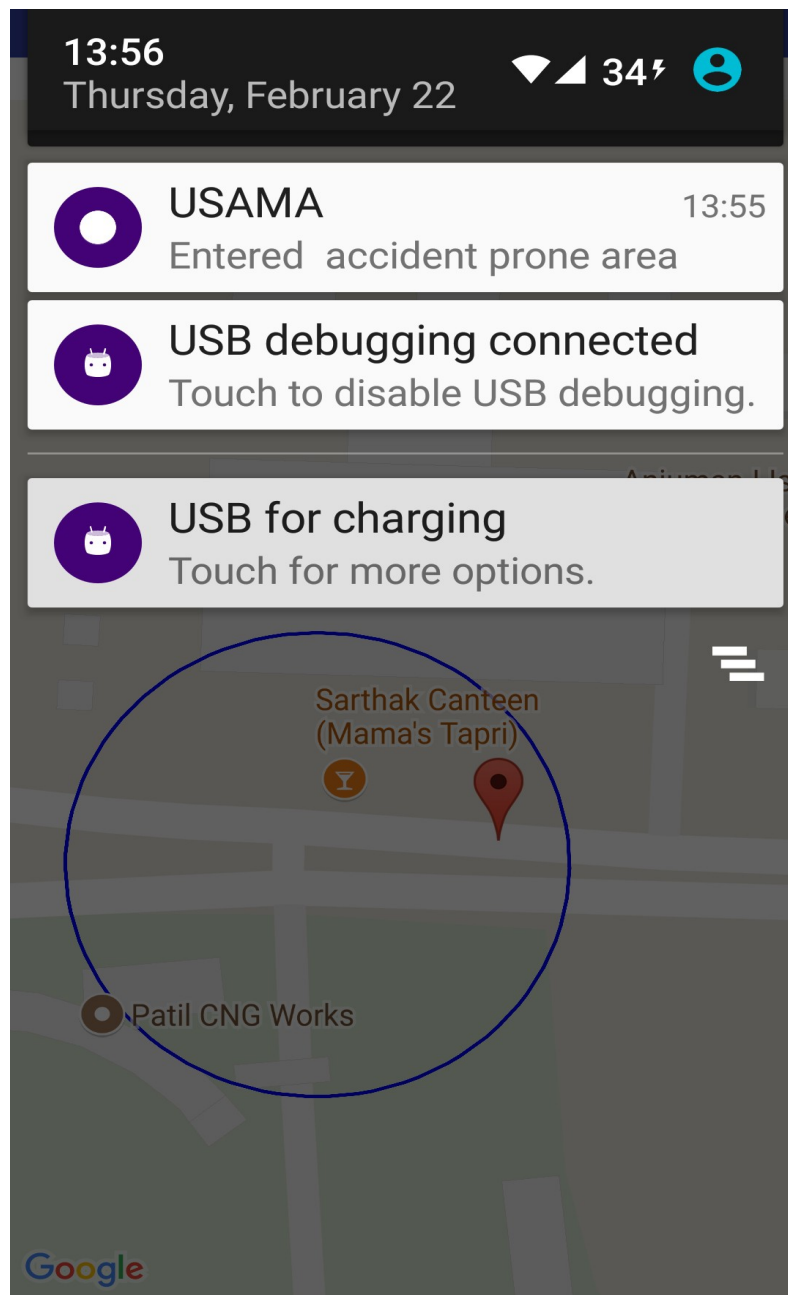## 8.4   Entered Into Accident Prone Area

Figure 8.4: Screenshot of Entering Accident Prone Area

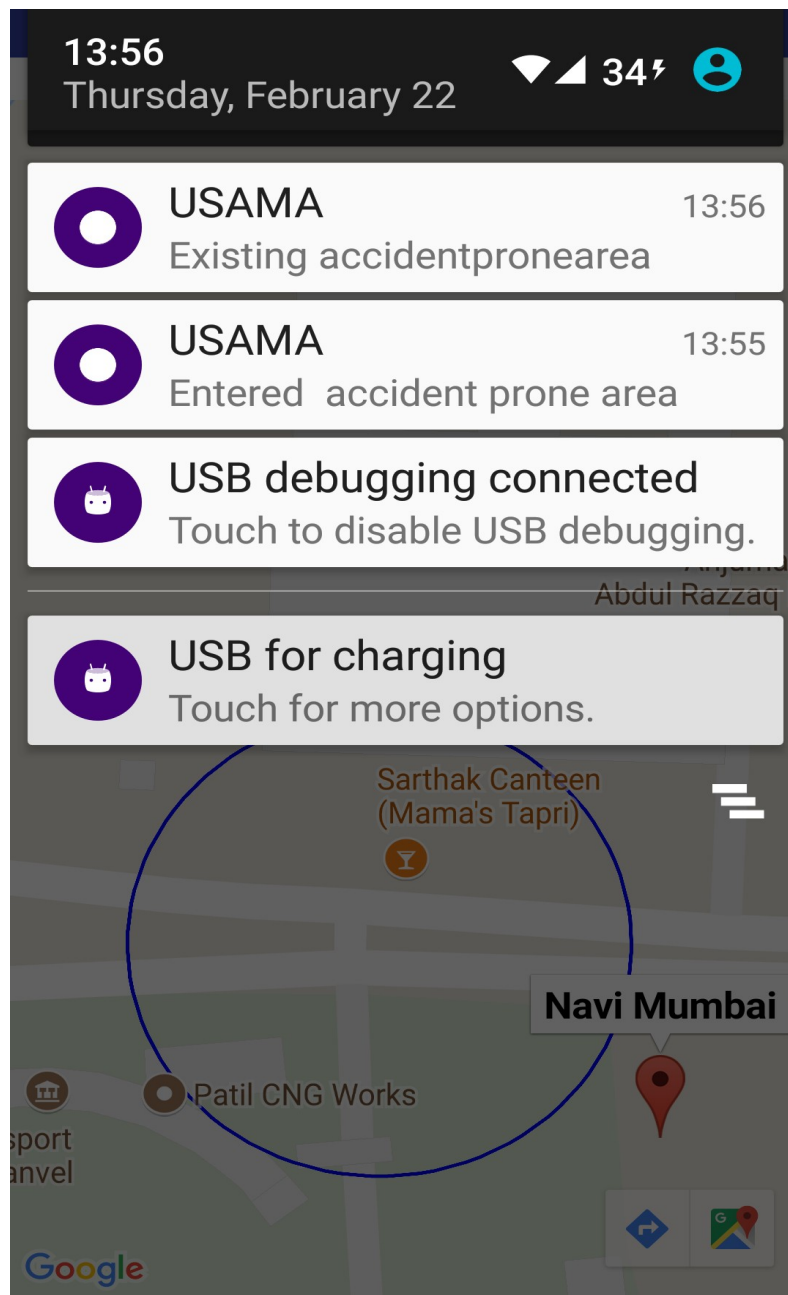## 8.5   Exited From Accident Prone Area

Figure 8.5: Screenshot of Exiting Accident Prone Area
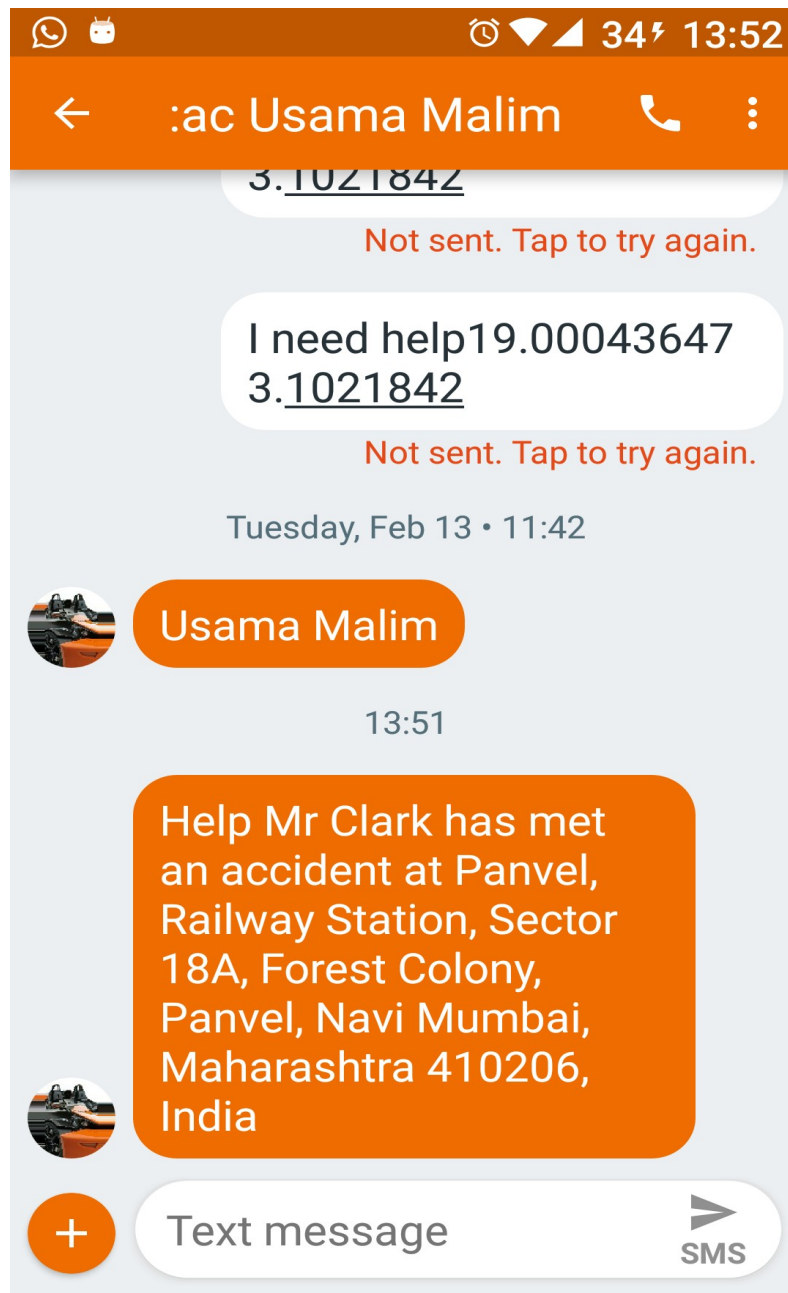
8.6 Received Accident Alert Message

Figure 8.6: Screenshot of Received Accident Alert Message
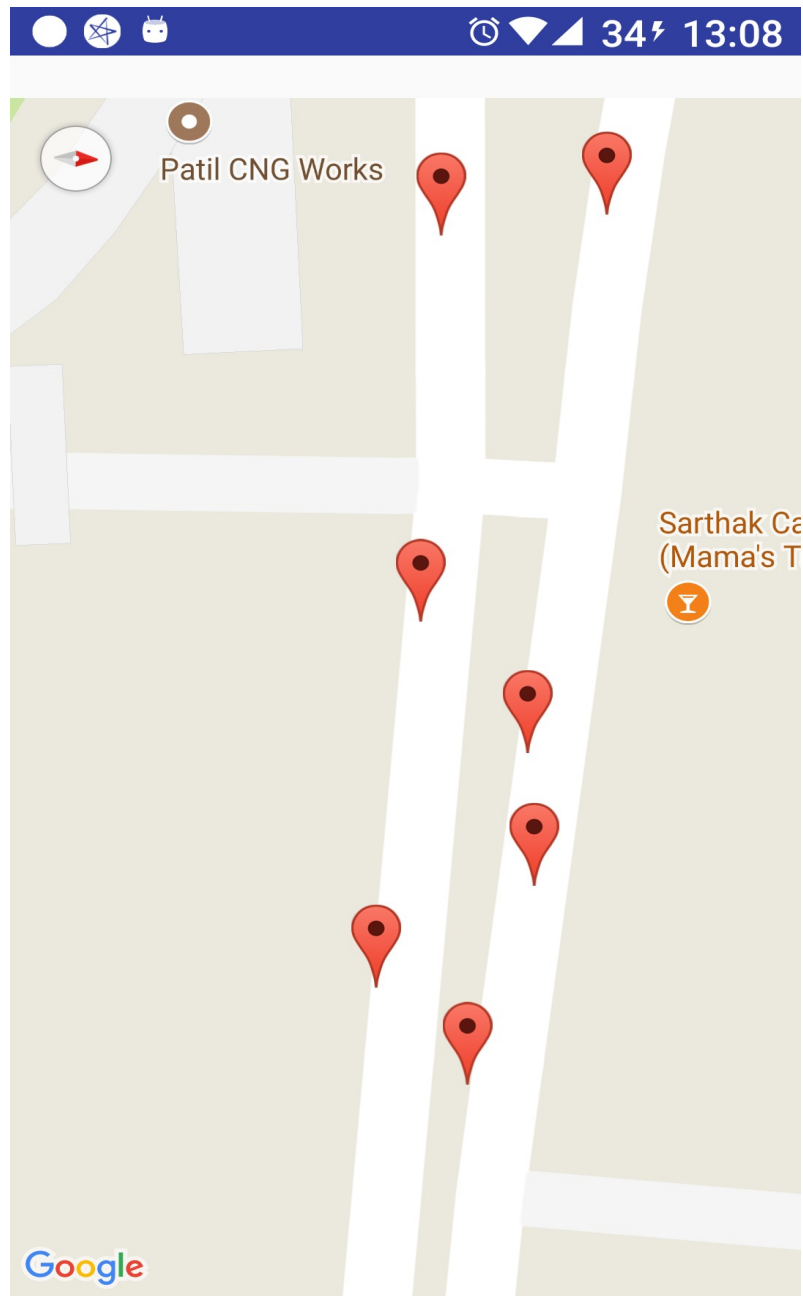
8.7   Potholes On Road

Figure 8.7: Screenshot of Potholes on Road

Chapter 9

Conclusion and Future Scope

9.1   Conclusion

The System will be able to provide a efficient platform for providing alerting the authorities if an accident   has occurred and provide the location of the occurred accident.It will be low in cost compared to other solution available.Will provide a facility for alerting the person relatives.The system responsible for pothole detection will be able to detect and pinpoint the location of potholes and display it on map.

9.2   Future Scope

- An accelerometer can be used for detection of dangerous or rash driving.
- A system for detecting the serevity of accident.
- The height and width of pothole can be provided.
- A proactive system can be detected.

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[9] *Vehicle Accident Alert and Locator*;Victor Olugbemiga MATTHEWS , Emmanuel ADETIBA , April 2011

Achievements

1. Publications

   (a) *Accident Alert And Trench(Pothole) Detection System* ; Khan Sarfaraz,Usama Malim,Junaid Ansari, Mubashir Khan,IJISRT,Oct 25, 2017 (ijisrt.com/accident-alert-trench-pothole-detection-system)

2. Conferences

   (a) *Accident Reporting And Road Surface Detection System*; Khan Sarfaraz,Usama Malim,Junaid Ansari, Multicon-W , February 2018(Venue : Thakur College Of Engineering And Technology)

3. Project Competitions

   (a) *Accident Alert And Trench(Pothole) Detection System*; Khan Sarfaraz,Usama Malim,Junaid Ansari, Avishkar Research Convention , December 2017(Venue :Ramrao Adik Institute of technology)

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Accident Alert & Trench (Pothole) Detection System

Usama Malim, Sarfaraz Khan, Junaid Ansari, Khan Mubashir
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Department of Computer Engineering, University of Mumbai

Abstract:-India witnessed one of the highest road accidents in the world, as stated by Union road transport and highways ministry in 2016. Road accident often takes place due to bad road & weather condition, reckless driving etc. Accident occurring are often not noticed or reported late that leads to loss of victim's life or serious injuries caused permanently. One of the problems associated with bad road condition is the pothole on road.

Accident Alert Pothole Detection System (AAPDS)is a system designed for reporting of accident and potholes on roads. The System consists of various sensors that are used for sensing accident's and pothole's on roads. A smartphone is used to provide exact location of accidents using GSM & GPS module present in smartphone after the response from the sensor is taken. A map is provided to navigate the location of accident. Similarly a sensor is used for sensing pothole's. This data is then processed by the processing module & send to the smartphone, where the map is used to display the location of pothole's. Further the collection of such data can be send to concern authorities where this kind of data is stored and managed for managing the road condition and providing prior warning of accident prone area.

Keyword:- AAPDS, GPS, GSM, Accident, Pothole.

I. INTRODUCTION

The number of accident occurrence has increased in the past few years. The growth in economy and population lead more automobile is running on the roads. Bad road condition and weather condition leads to cause of accident. As accident occurs now it is important that the victim must be treated as fast as possible. For the victim to be treated quickly as possible now it is accurate information must be provided of the location. The accurate information provided can save life of victim.System will use the smartphone as medium for alerting the authorities and providing required location.

The problem related to accident is potholes on road.This issue are solved in system while using data provided by the sensor. The System uses the data taken from the sensor and provides the data to the processing unit. The location of the potholes is displayed using a a map. The map display the data in the from of pin. The area on the road where the potholes are present are marked on the road.

II. WHAT IS ACCIDENT ALERT AND POTHOLE DETECTION SYSTEM

When an accident occurs, sometimes often accidents are unnoticed in order to stop this from happening we use a system such that when an accident occurs it sends the alert to respective authority. Through this we will be able to notice accident that occurred and will not go unnoticed. As we know there is bad road condition and sometimes leads to accident. Whenever there is a trench on a road the vehicle enters it may cause some problem.Thus the system uses a sensor to provide exact position of pothole's.

III. NEED OF ACCIDENT ALERT AND POTHOLE DETECTION SYSTEM

Accident often occurring can result in lose of victim's life. Thus the need arises for a system for detecting and reporting of accident so that he help is provide as soon as possible. Due bad weather condition and low maintenance the condition of roads in India are poor. Due to such condition there are formations of potholes on the road. The System is designed to detect the pothole on roads and provide their location, with the help of a map inbuilt in the map

IV. SYSTEM ARCHITECTURE

All required modules for system architecture for accident alert and pothole detection are explained below.
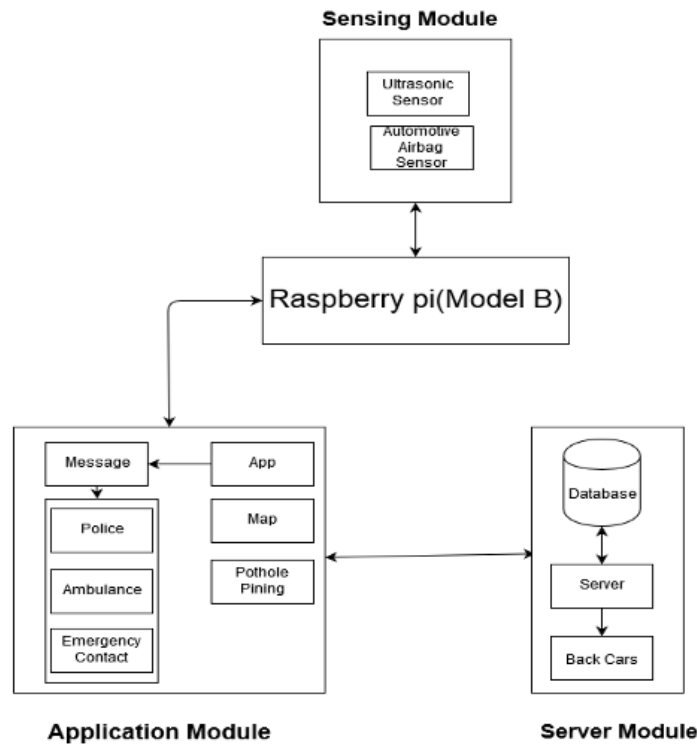
Fig. 1: System Architecture for Accident Alert and Pothole Detection

A. Sensing Module

The Sensing module is the responsible for Detection of accident and pothole's on road. This module continuously takes data from the environment and provides data to the processing unit. The Sensor responsible for sensing the pothole continuously captures the data in it's vicinity and provide that data to the processing data. It interacted with only the processing module.

B. Processing Module

The processing module is processing the continuous data received from the sensors. The processing module is a raspberry pi. This data is then send to the app where the data is then Send over to the server and then the data is distributed.

C. Application Module

This application will be android based and it will provide a simple interface to user and provide a map which displays the

road condition and pothole's on that road on which the car is drown .The interface of app will be kept simple so user can use it without any age constraint.

D. Server

This module is about fetching the information form the different user from their apps. Here the data that is been fetched is in the JSON format and it is then stored in the database that is of MySql format. From this, the data is provided as to the user based on the user location or it can be preload's accordingly.

V. FUTURE DEVELOPMENT

The system can be able to sense the potholes proactively using real time data. The Problem related to the severity of the potholes can be solved. The accident alert can not be used in a area were the network is not present

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Accident Report & Road Surface Detection System

Usama Malim, Sarfaraz Khan, Junaid Ansari, Khan Mubashir
Anjuman-I-Islam Kalsekar Technical Campus,
Department of Computer Engineering, University of Mumbai

Abstract:-India observe one of the highest road accidents in the world, as stated by highways ministry and Union road transport in 2016. Road Accident often occurs due to the bad road conditions, bad weather and rash driving etc. Accident occurring are often not noticed or they are reported late which often leads to severe injuries permanently or loss of the victims life. One of the major problems of bad road is the potholes on the road.

Accident Report And Road Surface Detection System(ARARSDS)is a system which is designed for accident reporting and potholes on roads. This System has various sensors that are used for accident sensing and pothole's on roads. Using smartphone's GSM&GPS the exact location of the accident is provided as well as the location of the potholes is also provided. Using the MAP in the ARARSDS we can navigate the location of the accident. Similarly by using the sensor the potholes are being sensed.This data which is being sensed by the various sensors and then processed by the processing module and the location of the potholes are displayed on the map in ARARSDS.
Further this kind of data can be send to the authorities where such kind of data are stored and managed, which may be useful for maintaining the roads and providing the accident prone areas.

Keyword:- ARARSDS, GPS, GSM, Accident, Pothole.

I. INTRODUCTION

The number of road accident has been seen increasing in the last few years . In the last few there has been drastic change in the economy as well as population which often leads to more running automobiles.One of the major cause of road accident is the bad road condition and the weather condition. As soon as the accident occurs it is important to treat the sufferer as soon as possible. For the sufferer to be treated fast as possible now it is important to provide accurate information where the accident has taken place. The accurate information provided can save life of sufferer. This system uses the smartphone as medium for providing the required location and alerting the authorities.

The potholes on the road are the problem related to the accident.By using the data provided by the sensor this issue can be solved. The data which is taken by the sensor is provided to the processing unit by the system.

Map is used for displaying the location of the potholes. The location of the potholes is displayed using a a map.The data is displayed in the form of the pin on the map.On the road the area where the potholes are present are marked with the help of the pin.

II. WHAT IS ACCIDENT REPORT AND ROAD SURFACE DETECTION SYSTEM

Accident that occurs are usually unnoticed, in order to avoid this from happening we use such system that whenever the accident takes place it sends the alerting message with the location to the respective emergency authorities. With the help of this we will be able to recognize that the accident has taken place and we will not go unnoticed. As we now one of the major problem of the accident is bad road condition, whenever there is a pothole on the road and the vehicles enter in it may cause some problem.thus this system is using the sensor for providing the location of the pothole.

III. NEED OF ACCIDENT REPORT AND ROAD SURFACE DETECTION SYSTEM

Accident usually occurring may lead to loss of the sufferers life. Accident often occurring can result in lose of victim's life.
Thus the need turn up for a system that should detect and report the accident so as to provide help as soon as possible.
The condition of the roads are poor in India due to the bad weather condition and low maintenance of the road .Due to this there is an emergence of the potholes on the road.This system is designed to detect the potholes and provide location of the potholes with the help of the map.

IV. SYSTEM ARCHITECTURE

All the modules which are been used are shown below and are also explained below.

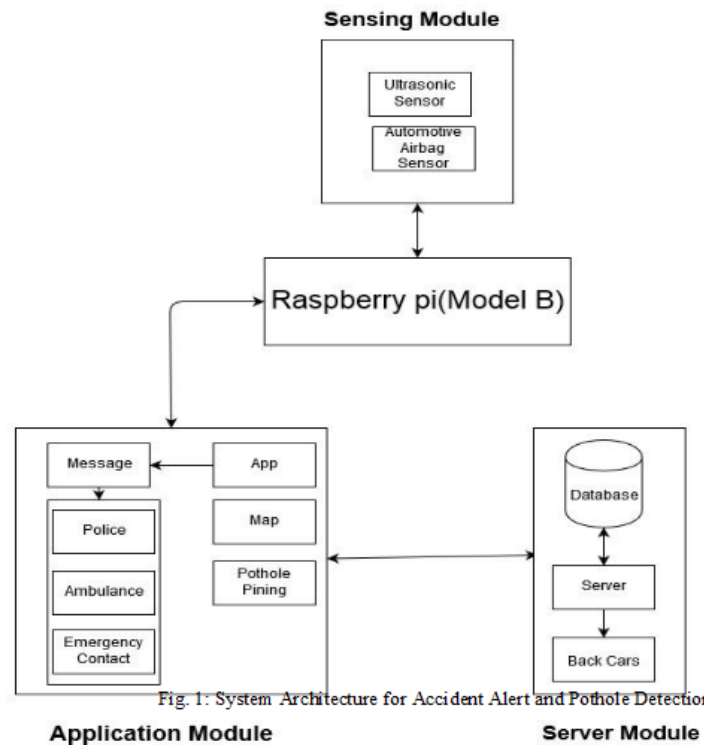## System Architecture of Accident Alert and Pothole Detection System

Fig. 1: System Architecture for Accident Alert and Pothole Detection

A. Sensing Module

The Sensing module is responsible for detecting the accident and potholes on the road. The Sensing module is the responsible for Detection of accident and pothole's on road. The sensing module incessant takes the data from the backdrop and provides data to the processing unit. The Sensor is responsible for sensing the trench incessant captures the data in it's domain and provide that data to the processing unit. It interacts only with the processing module.

B. Processing Module

The main aim of the processing module is to process the incessant data received from the sensors. Raspberry pi is the processing module. Then this processed data is send to the app and then it is send on the server and then the data is distributed.

C. Application Module

The application is android based, which provides simple user interface to user and displays the road condition and trench on the road on which the car is drown with the help of a map. The user interface in kept simple so that any one can use it easily.

D. Server

The server module is used for fetching the information of the users with the help of their apps.The data which is fetched is in the JSON format and then it is stored in MySql database format.The is provided to the user based on the location of the user or it can be pre-loaded accordingly.

V.   FUTURE DEVELOPMENT

The system will be able to sense the trench using the real time data. The problem related to the seriousness of the trench can be solved.Where there is no network present the accident report can not be used.
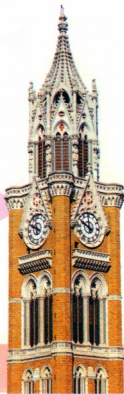
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[7]. Accident Alert And Trench (Pothole) Detection System International Journal of Innovative Science and Research Technology Volume 2, Issue 10, October– 2017 ISSN No:-456 – 2165.

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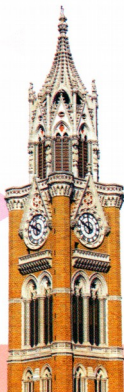
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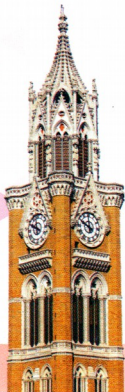Department of Students' Development,
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