Final Year Project Report

Accident Detection and Smart Emergency Response System

Bahria University Islamabad

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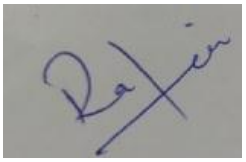
DECLARATION

Certified that this project report SAFE LIFE is the bonafide work of **M. Haroon Rashid (01-131162-052)** and **Zeeshan Mazhar (01-131162-034)** who carried out the project work under my supervision.



(Signature of Supervisor)

Rafia Hassan:

Certificate

I accept the work contained in this report as a confirmation to the required standard for the partial fulfillment of the degree of BSE.

_____	_____
Head of Department	Project Supervisor
_____	_____
Internal Examiner	External Examiner

Acknowledgment

First of all, we are immensely grateful to ALMIGHTY ALLAH, the creator and sustain-er of the universe, for having given us the ability and prospects to complete this work. To my supervisor, Mr/ Mrs…… Their sincerity, thoroughness and perseverance have been a constant source of inspiration, encouragement and motivation for our project work. It is through such efforts that our endeavors have seen light of the day.
Words cannot say the gratitude for my parents whose affection and prayers have always been the key to my success. Sincere thanks to all my classmates for the richness of their guidelines and invaluable suggestions throughout the project.

Abstract

Many deaths are caused by Traffic accidents globally. The worldwide crisis of road safety can be seen by examining the considerable number of deaths and injuries that are caused by road traffic accidents. There are many situations in which the family members or emergency services are not informed well in time. This results in delayed emergency service response time, which can lead to an individual's death or cause serious injury. The purpose of this work is to reduce the response time of emergency services in situations like traffic accidents By utilizing on board sensors of a smart phone to detect vehicular accidents and report it to the nearest emergency res-ponder available and provide real time location tracking for res-ponders and emergency victims, will radically increase the chances of survival for emergency victims, and also help save emergency services time and resources.

List of Figures

CHAPTER-1

INTRDUCTION

CHAPTER – 1: INTRODUCTION

1.1 Motivation

About 1.24 million people die each year as a result of road traffic crashes. Without action, road traffic crashes are predicted to result in the deaths of around 1.9 million people annually by 2020. Decades of action for Road Safety (2011-2020) the aim of saving millions of lives by improving the safety of Roads, vehicles and improving emergency services.

1.2 Problem Statement

The number of deaths due to traffic accidents is very high. In many situations the family members or emergency services are not informed in time. To resolve such issue a detection system is required that reduce fatalities due to vehicle accidents by decreasing the response time of emergency services.

1.3 Goals / Objectives

- Carry out the public service.
- Directly sends emergency notifications to the nearest available responder.
- Real time location tracking for both res-ponders and victims on a Google map.
- An android application for emergency res-ponders that directly receives notifications about the emergency that occurs near to them and is provided with real time location of the victim and is also provided with the details about victim such as name, blood group, address.
- Provide directions to the nearest hospital during medical emergencies.
- Use internet infrastructure like 3G/4 G, GPRS and edge to create an efficient emergency response system.

1.4 Main Contribution

In our country, currently, there is a lack of utilization of modern technology in the emergency services area. Therefore, creating a system that will not only direct the fast growing smart-phone usage into another positive aspect. This application will assist the victim to detect accident and send notification in real time. Moreover, another major benefit of this product is that it is based on efficient and affordable technology. Smart-phones are quite affordable nowadays and android devices are largely used. Wi-Fi and internet services are very affordable for most of the people.

This system will have two major types of users:

1. **Victim(s):** The victims can use the application by registering themselves in the system and can add emergency contacts. Upon detection of the accident, an emergency alert is sent to nearest responder.

Perspective:

a. Sign Up
b. Login
c. Add Contacts
d. Detect Accident
e. Cancel Alert
f. Notify Emergency Contacts
g. Notify Nearest Res-ponder

2. **Responder(s):** These users can use the application by registering themselves in the system and can monitor their victims. Upon receiving an emergency alert, they have real time tracking of victim and respond quickly.

Perspective:

a. Sign Up
b. Login
c. Get Emergency Notifications
d. Receive victim's information
e. Navigate through shortest route
f. Real time tracking of victim

CHAPTER-2

Literature Review and Analysis

CHAPTER – 2: Literature Review and Analysis

The number of deaths due to traffic accidents is very high. Looking at the number of deaths and injuries due to road traffic accidents shows the global crisis of road safety.

Nearly 1.3 million people are killed every year and about 50 million injured worldwide due to road accidents, which averages to 3,287 lives lost every day. More than 50 percent of road traffic deaths affect young adults between the ages of 15-44.

Around 400,000 individuals under the age of 25 dies in road traffic accidents every year. Even in countries with very good road safety measures, the number of road accident deaths is getting higher every year [1]. More than 90% of road traffic deaths occur in middle-income countries. In low-income countries the figure is even higher.

In Pakistan the last 10 year of statistics shows that an average of 15 individuals lost their lives due to traffic accidents daily. According to data from Pakistan Bureau of Statistics on traffic accidents in Pakistan from 2004 to 2013 [2], the overall deaths in road accidents are about 55 percent, which according to the specialists is very high. According to the data, total 51,416 individuals died in 97,739 road accidents across the country.

The most likely reason for an individual's death in an accident is lack of the first aid provision that is because of emergency services not receiving information about accident in time. Emergency response time is extremely vital when it involves incidents involving vehicle accidents. Analysis shows that if we decrease just 1-minute in accident response time that can increase chances of saving an individual's life up to six percent [4]. In order to reduce response time, implementation of enhanced traffic technologies would be necessary, which will help scale back response time and therefore reduce fatalities.

The purpose of this report is to design and implement such an automated system that uses smart phone to detect vehicle accidents and report it to the nearest available responders to help counter these emerging problems and reduce casualties as much as possible. The detection system would help reduce fatalities due to vehicle accidents by decreasing the response time of emergency services.

Using smartphones to identify road traffic accidents is not a new subject. There are completed algorithms for systems which utilizes accelerometer as well as GPS to detect vehicle accidents using smartphones to detect accidents dates back to 2011. Because there is already a lot done on this subject, what we decided to do was to develop a complete system that is more reliable and have much more functionality than the existing ones, designed for the ongoing project in mind.

In [5] the authors developed a system which used Android smart-phones and ODB-II connection in a vehicle. When the system detects an accident, will sends an SMS to emergency contacts specified by the user, SMS will contain information about the accident and also a call to the emergency services is made automatically. All modern vehicles have ODB-II connection installed which transmits data about the vehicle in real-time such as acceleration, oil pressure, speed, etc. For the system to work a vehicle must support OBD-II standard. In US and this standard is necessary since 2001, European countries have also implemented a version of this standard, so vehicles in the US and in Europe can use this system and is not available to all vehicle

in other countries. Other than that, upgrading and maintenance of this system is very expensive process [6].

In [7], the authors at the University of Baghdad Iraq developed a system which made use of the accelerometer, GPS and microphone to detect accidents. Upon detection of an accident sends an emergency notification to the web server and also sends an SMS to the emergency contacts, emergency responders have to access the web server to find out about an accident. Their system made use of the same sensors and hardware that the algorithm presented in this research work makes use of, except for a few features.

The main issue with this system is that the notifications are sent to a web server and responders needs to check the web server for accident notification, there is no system for individual res-ponder that responds to the emergency to track victim's location and also the system lacks the functionality to send emergency notification to the nearest emergency center in case there is more than one emergency center in the area.

In [8], the authors developed a system called WreckWatch which involves reading data from the accelerometer and acoustic data from the microphone to detect accidents. If an incident has occurred, the application contacts nearby emergency services and provides GPS-coordinates of accident location.

In [9], the authors have developed an android application that uses accelerometer sensor to detect accidents. After sensing the accident, application automatically sends a voice message to 108 ambulance emergency response service that is running in India. The issue is that this system is for specific emergency response services, only applicable in India. Also, the system is prone to increased false positives because there is no filter in place to verify if an accident detected by the smartphone is a real accident or just false alarm due to dropping smartphone, etc.

In this study we looked at various technologies and existing systems providing us with broad analysis and helped us in developing our system. From analysis we found that these systems can play a very important role in saving human lives. A new system is to be developed based on unique features that will help counter emergencies.

2.1 Technologies Utilized

1. Android Studio
2. Accelerometer Sensor
3. Google Play Services
4. Google Location API
5. Android Google Map API
6. Google Places API
7. Google Directions API
8. Fire base

Upon detecting the accidents, the system will generate an alert containing a timer on the victim's phone. Users will be able to cancel sending alert to emergency responders in case of false alert (accident didn't occurred) under 60 seconds. Safe Life will get victim's location using Google Location API and save it to fire base real time database, then search for nearest emergency responders from victim's location and will send an alert notification to the nearest emergency responder (containing victim's location).

Safe Life will also send SMS to the emergency contacts. When emergency responder accepts the request sent by victim, Safe Life will show real time location tracking of responder to the emergency victim on a Google map.

This application will show emergency notifications that are sent by victims and provide real time location tracking of their locations. In case of medical emergencies, the system will also guide responders to a nearest hospital from emergency location. Safe Life will also show details about victims (name, address, etc.). Safe Life will guide responders to the nearest hospital from emergency locations by utilizing Google Places and Google Directions API.

In case the system detects an accident, the system will generate a countdown alert dialog for 60 sec. In case of false alert (accident didn't occur) the user will be able to cancel sending emergency alert to responder under 60 secs. This will help in reducing false positive, as the user will be able to cancel sending an emergency notification in case of false event.

Safe Life victims' and responders side application is developed in Java programming language using Android Studio as IDE. This prototype application is developed for android operating system having a minimum API level 16, and target API level 29. The application is fully working and implemented on the Android smartphone.

CHAPTER-3

System Requirements

CHAPTER-3: System Requirements

3.1 Interface Requirements

The main interface for the users to interact with the application to generate an emergency response. When the application will be installed for the first time the user will be prompted for user name and password for him/ her to be authenticated. In addition to above the user will also be prompted to for Location and SMS permission.

The system should detect the accidents automatically and prompt the user for confirmation. Auto-detection will be done by monitoring the accelerometer sensor. The user shall be prompted through alert dialog on the screen which shall be clicked to confirm the occurrence of the accident. If user does not respond within 1 minute then the notification services will be invoked and SMS send to emergency contacts.

The application should assist the user to get nearby locations such as hospitals. The user shall be assisted in fetching the locations of nearby locations. Through the use of Google Maps API the nearby locations will be displayed. The application shall determine the location coordinates of the user using GPS and mobile network. According to the user's location coordinates obtained, the application shall automatically give locations through the use of nearby search algorithm.

3.2 Functional Requirements

3.2.1 Functional Requirement (FR1)

ID: FR1
TITLE: Register
DESC: The user shall be able to register to use the application.
Primary Actor: Victim/ Responder
Scope: Accident detection and smart emergency response system
Goal Level: User goal
Success End Condition: User Successfully Register to the system
Precondition: User need to register himself / herself into the system
Main Success Scenario:

1. User enters the User Name, Email Id, Password, and confirms Password
2. User Clicks on Sign Up button
3. System creates new account and User will be successfully Sign Up.

Alternate Flow:

a. Service not available
b. Email is already in use.
   i. System reports the user that email is already in use.
c. Passwords do not match.
   ii. System reports the user that password and confirm password do not match.

3.2.2 Functional Requirement (FR2)

ID: FR2
TITLE: Login
DESC: The user shall be able to send a default SMS to the friends.
Primary Actor: Victim
Scope: Accident detection and smart response system
Goal Level: User Goal
Success End condition: User successfully login to the system
Pre-Condition: User is registered
Main Success Scenario:

1. User enters the Email Id, and Password
2. User Clicks on Sign In button
3. System verifies the credentials of user from database and then User will be successfully signed into the system.

Alternative:

a. Service not available.
b. User needs to register first in order to login.
c. Email or password is incorrect.
   I. System reports to the user that email or password is incorrect. Please re-enter user email and password.
   II. System provide to user a "forgot password" option.

3.2.3 Functional Requirement (FR3)

ID: FR3
TITLE: Detect Accident
DESC: The application shall be able to detect the accident.
Primary Actor: The User
Scope: Mobile Application
Goal Level: User goal
Success End Condition: Users are successfully notified
Precondition: The location of the victim is switched on, on the user's device, and the mobile data option or Wi-Fi is on.
Main Success Scenario:.

1. Accelerometer detects the accident

Alternate flow:

1. Service not available
2. Victim does not start the application
3. Accelerometer is unable to detect the accident

3.2.4 Functional Requirement (FR4)

ID: FR4
TITLE: Generate Alert
DESC: The user should be able to report an incident
Primary Actor: Victim
Scope: Accident detection and smart response system
Goal Level: System goal
Success End Condition: User Successfully Sign Up to the system
Precondition: Accident is detected by the system
Main Success Scenario:

1. Connection between accident detection and alert generation
2. Alert is generated by the application

Alternative:

1. Service not available
2. Alert not generated

3.2.5 Functional Requirement (FR5)

ID: FR5
TITLE: Cancel Alert
DESC: The user should be able to cancel the generated alert
Primary Actor: Victim
Scope: Accident detection and smart response system
Goal Level: User Goal
Success End condition: User is safe and able to cancel the alert/ press abort button
Pre-Condition: Accident is detected by the system
Main Success Scenario:

1. User will be able cancel alert within defined time.
2. Victim module will not send any notification to the responder.

Alternative:

1. Service not available.
2. User does not press the button in the given time.
3. Notification is automatically sends to the responder and emergency contacts.

3.2.6 Functional Requirement (FR6)

ID: **FR6**
TITLE: Notify Nearest Emergency Responder
DESC: The application shall be able to send an emergency alert to the nearby responders
Primary Actor: Victim
Scope: Accident detection and smart response system
Goal Level: System Goal
Success End condition: System sends notification to responders and emergency contacts.
Pre-Condition: Victim does not press the abort button
Main Success Scenario:

1. System finds the nearby responders
2. Sends notification to the responder and emergency contacts.

Alternative:

1. There is no emergency contacts addded
2. Notifications are not sent to the responder

3.2.7 Functional Requirement (FR7)

ID: FR7
TITLE: Receive victim's information
DESC: The responder shall be able to revive victim's information
Primary Actor: Responder
Scope: Accident detection and smart response system
Goal Level: User Goal
Success End condition: Responder can get the victim's detail
Pre-Condition: Responder gets notification of accident
Main Success Scenario:

1. Responder will be able to view victim's details.
2. Responder can check the location and id of the victim.

Alternative:

1. Details are not shown to the victim
2. Service not available.

3.2.8 Functional Requirement (FR8)

ID: FR8
TITLE: Real time tracking of victim
DESC: The responder shall be able to track the victim
Primary Actor: Responder
Scope: Accident detection and smart response system
Goal Level: System Goal
Success End condition: Responder can easily get to the victim location
Pre-Condition: Responder can get the victim's information i.e. location
Main Success Scenario:

1. Responder can get the location of the victim
2. Responder reaches the victim location

Alternative:

1. Service not available.
2. Responder unable to get the notification
3. Responder unable to get victim's location

3.2.9 Functional Requirement (FR9)

ID: **FR9**
TITLE: Get Nearby Hospitals
DESC: The system shall be able to find the nearby hospitals
Primary Actor: Responder
Scope: Accident detection and smart response system
Goal Level: User Goal
Success End condition: Responder gets the nearby hospitals easily
Pre-Condition:
An alert is generated on the victim side and a notification is sent to reponder
Main Success Scenario:

1. User cancel the notification
2. User gets the nearby hospitals

Alternative:

1. Cancellation service is not available
2. System is unable to find hospitals
3. Hospitals unavailable

3.2.10 Functional Requirement (FR10)

ID: **F R 1 0**
TITLE: Navigate through Shortest Path
DESC: The responder shall be able to navigate through the best route
Primary Actor: Responder
Scope: Accident detection and smart response system
Goal Level: System Goal
Success End condition: Responder able to navigate through the shortest path
Pre-Condition: User got the location and details of victim
Main Success Scenario:

1. Responder has the victim's information.

2. Responder navigates through shortest path.

Alternative:

1. Service not available.

2. Google API not working.

3.3 Use Cases

3.3.1 Use Case for Driver/Victim

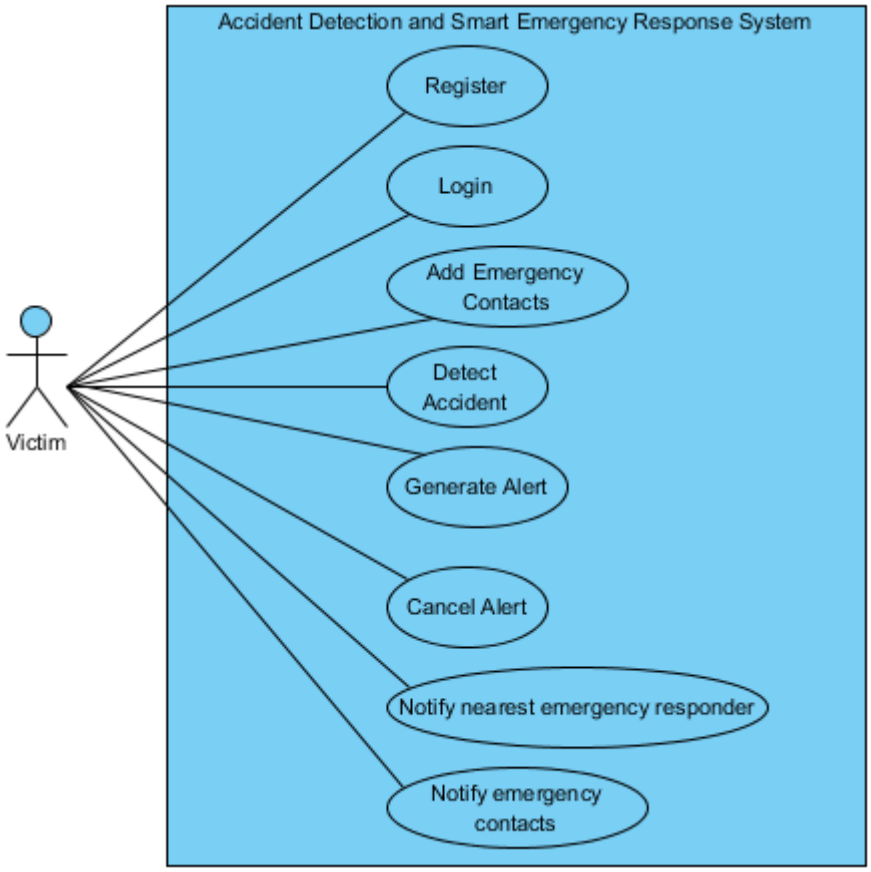


Figure 1: UC01 Victim Use Case

The use-case diagram depicts the interaction of the victim with the mobile application. The user first sign up then login through Email ID and password. The user enters the contact details of the friends/ concerned people to be contacted in case of an emergency, upon using the app for the first time. The user can send an emergency text through the mobile application, respectively. Upon detecting the accidents, the system will generate an alert containing a timer on the victim's phone. Users will be able to cancel sending alert to emergency responders in case of false alert (accident didn't occur) under 60 seconds.

3.3.2 Use Case for Responder/Emergency Service

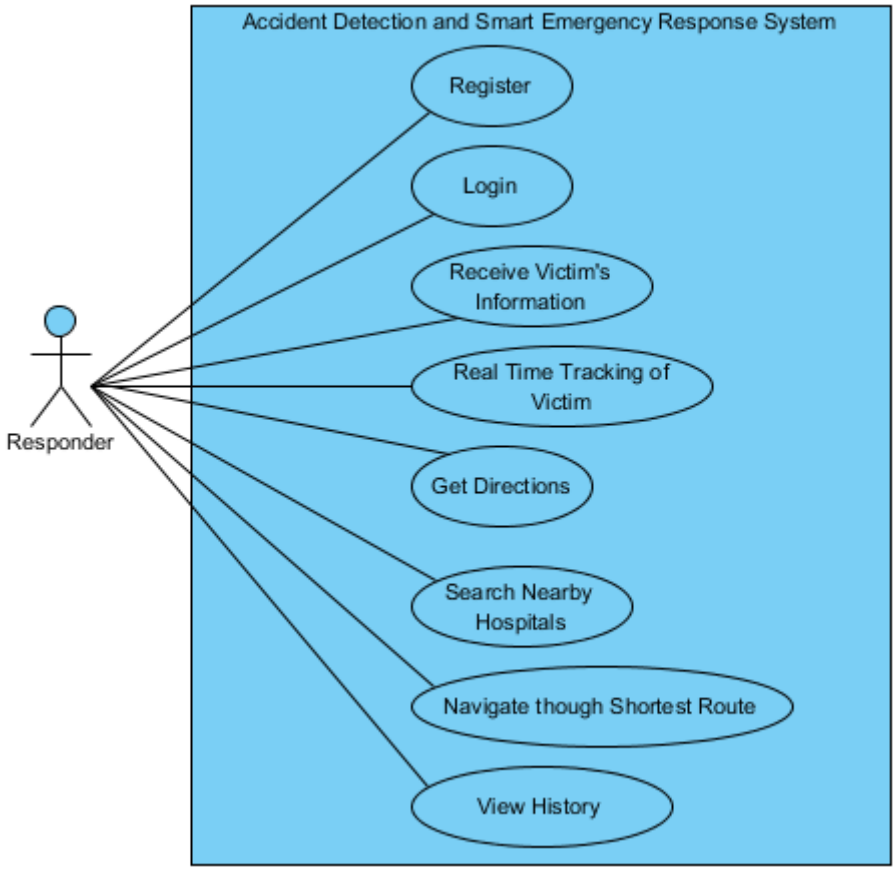


Figure 2: UC02 Responder Use Case

The above use-case depicts the interaction of the responder. The user first signup then login. This application will show emergency notifications that are sent by victims and provide real time location tracking of their locations. In case of medical emergencies, the system will also guide responders to a nearest hospital from emergency location. Safe Life will also show details about victims (name, location etc.). Safe Life will guide responders to the nearest hospital from emergency locations

3.4 Non Functional Requirements

- Performance: Response Time:
  The time that will take to send the location to the Responder is about few seconds because it will automatically send it.

- Availability:
  The system is available all the time, once the sensor sensed the accident it will immediately send the SMS.

- Reliability:
  whatever is needed and wanted will happen exactly, i.e. the option selected by the user is exactly what will happen which means that the system is reliable.

- Manageability:
  As explained earlier, the user can easily manage the system through pressing the buttons that is needed and wanted.

- Usability:
  It can be used easily since it can be installed in smart phones.

3.5 Resource Requirements

1. Android Studio
2. Accelerometer Sensor
3. Google Play Services
4. Google Location API
5. Android Google Map API
6. Google APIs
7. Firebase

3.6 Database Requirements

The brain of the whole system is Firebase. All information about victims and responders are stored at Firebase real time database. Information about notifications sent from victims' side is also stored and is processed by matching attributes of the request to a nearest responder**.**

CHAPTER-4

SYSTEM DESIGN

CHAPTER-4: System Requirements

1.1 Design Approach

Designed using XML and the idea was to make the app easy on ayes and easy to use for end user. The design approach was to make the design simple and elegant. Rather it should ease the complexity of the design in every possible way.

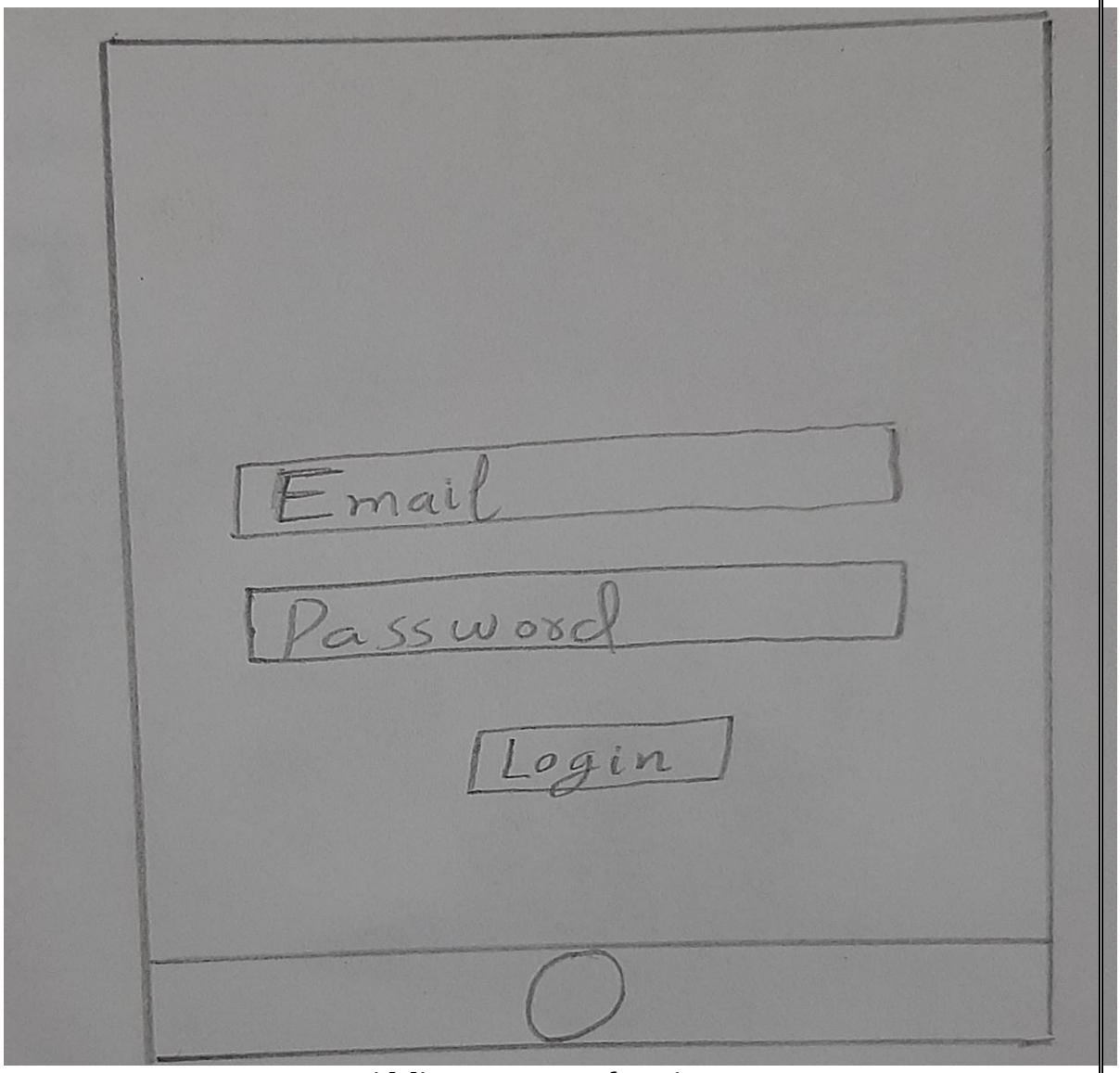
1.2 Design Constraints

Design will not fail on any device.

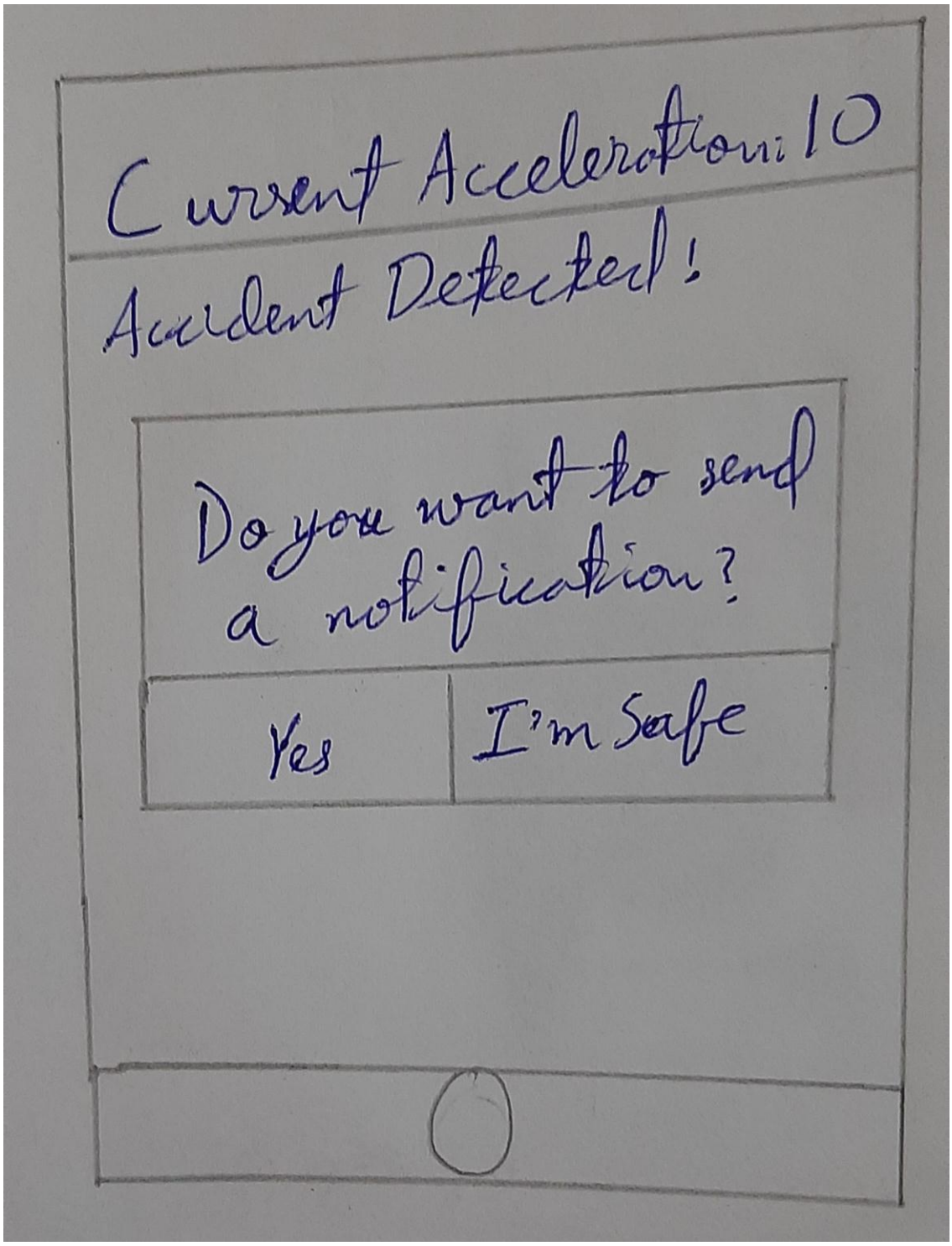
1.3 Interface Design

1.3.1 Low Fidelity Prototype

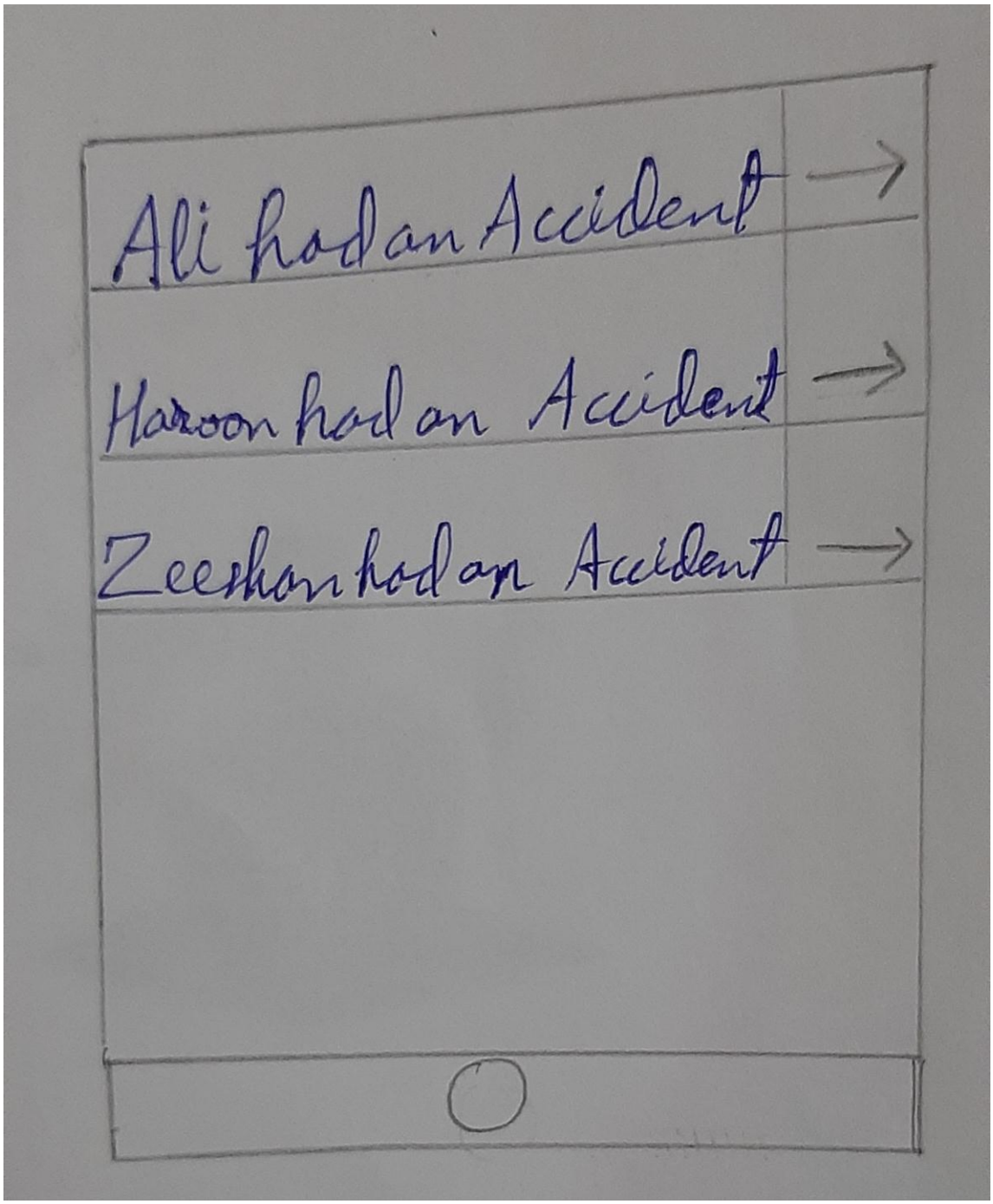
First we designed the prototype with the sketch of what was in our mind. We design the prototype that where we should be placing map and where should be main feature goes so that they may ease the end user.



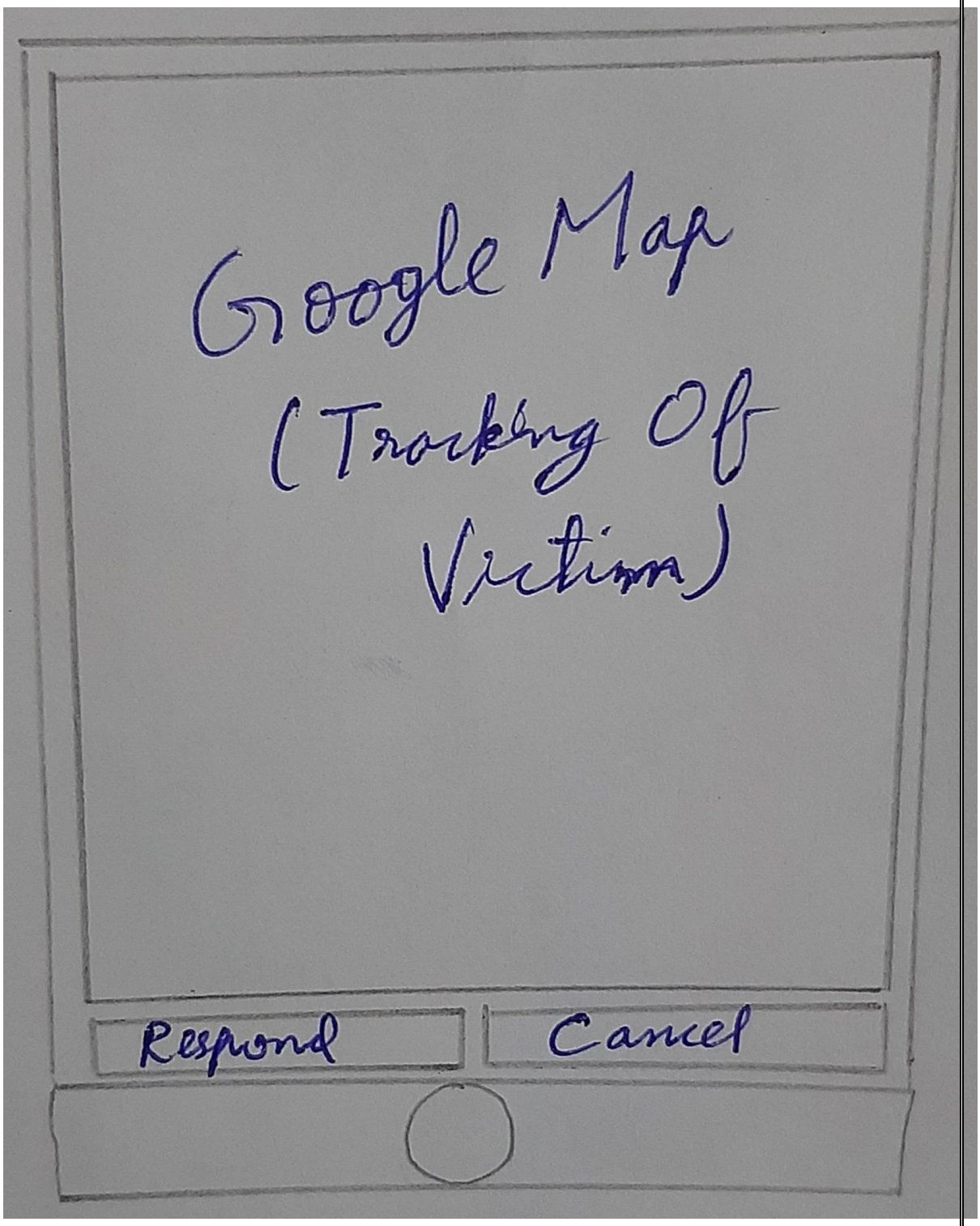
Low Fidelity Prototype of Login



Low Fidelity Prototype Of Accident Detection and Alert deneration



Low Fidelity Prototype O Receiving Notifications



Low Fidelity Prototype Of Real time Tracking of Victim

1.3.2 High Fidelity Prototype

Designed UI using Photo shop as a tool. In order to be able to turn our sketch to eye concept and closer to the final product

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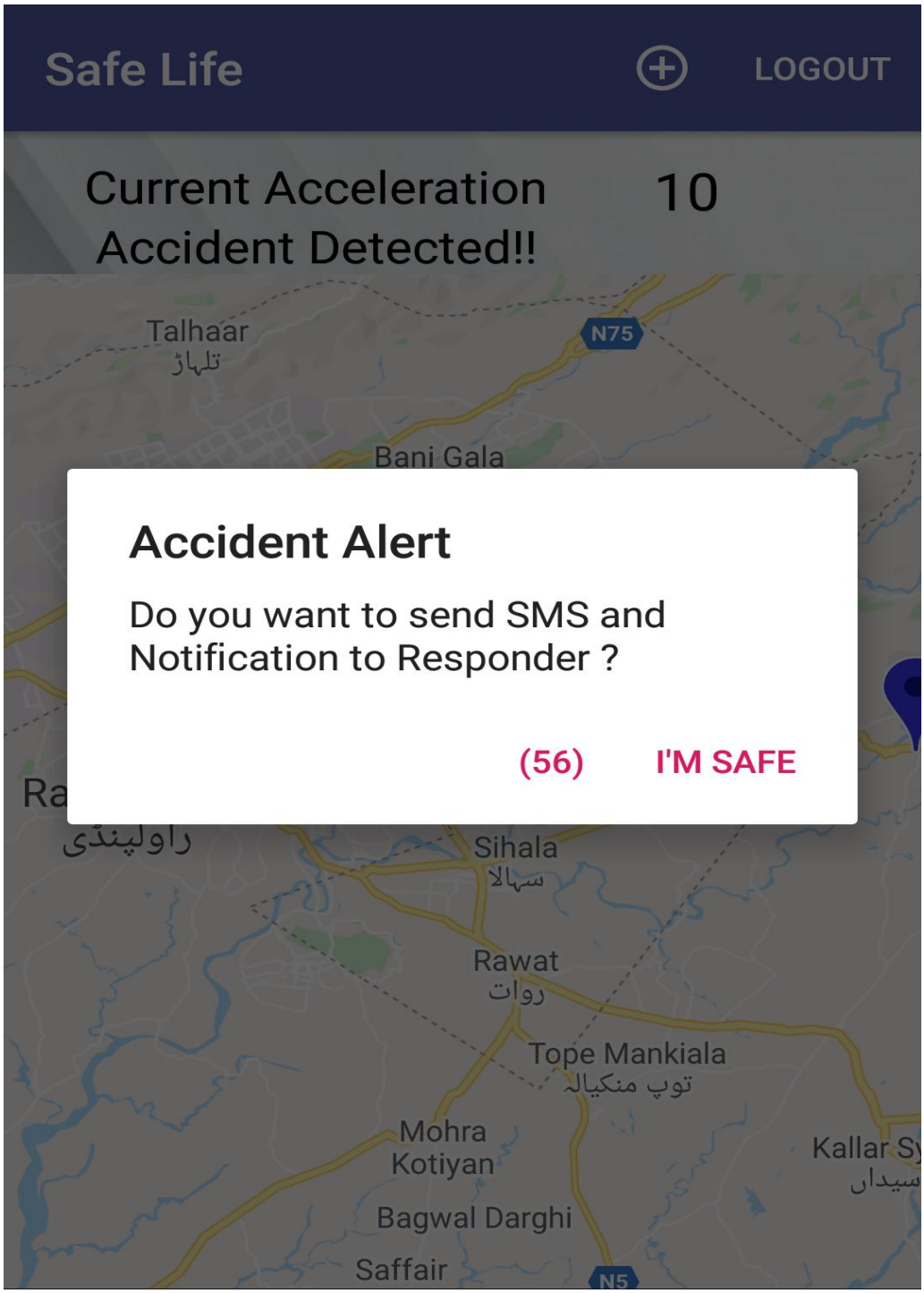
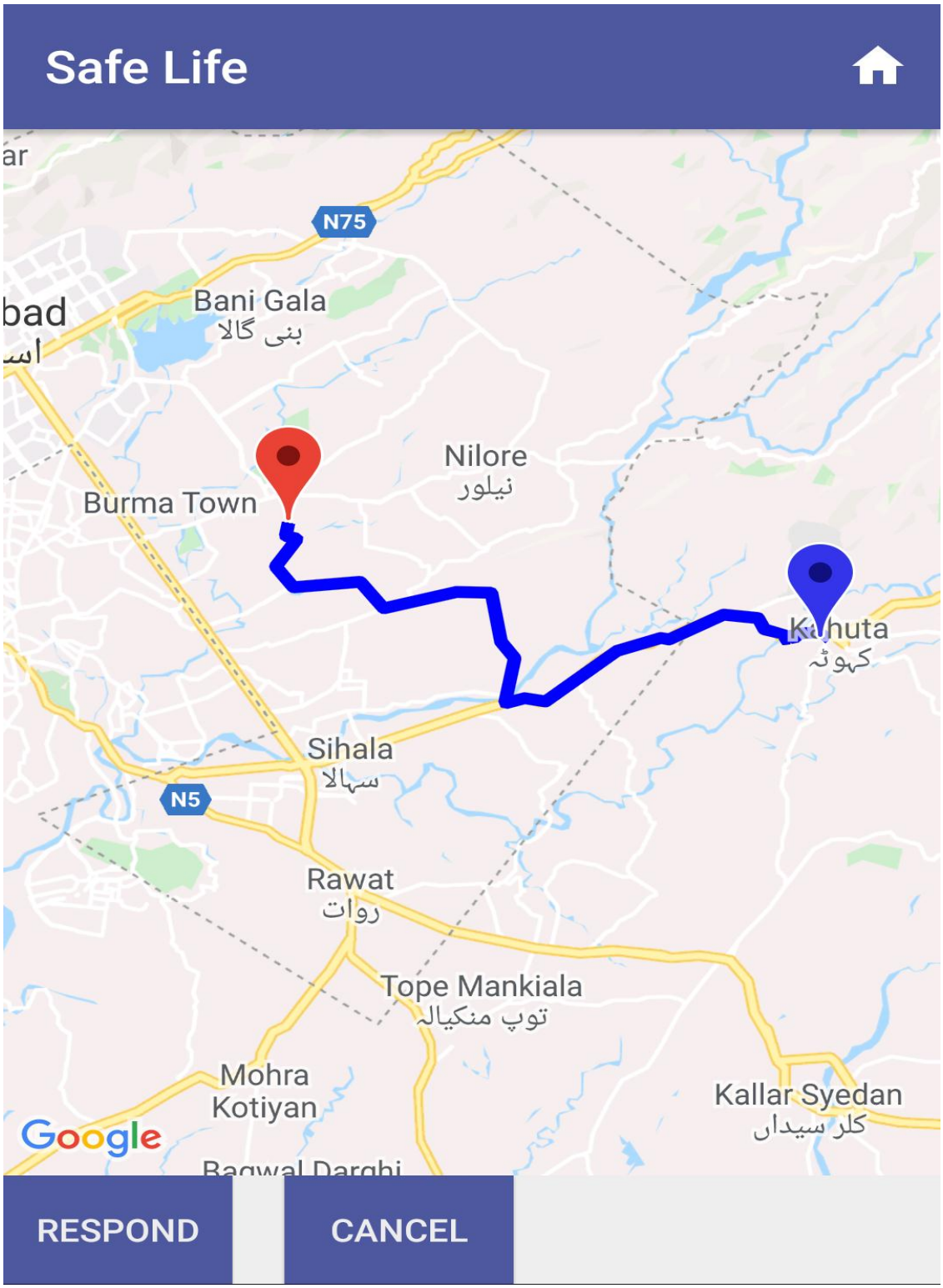


High Fidelity Prototype of Accident detection and Alert Generation



High Fidelity Prototype of Tracking of victim

High fidelity prototype of Receiving Notifications

1.4 Data Flow Diagram

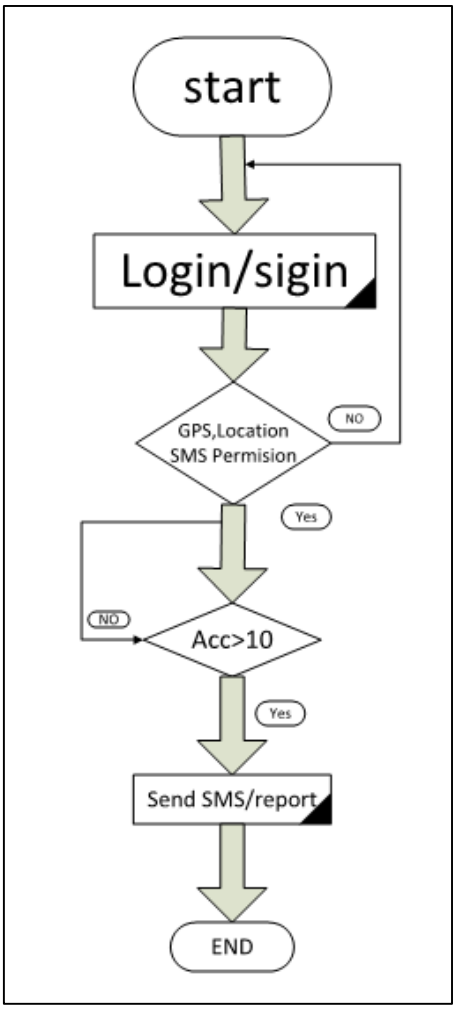


Figure 3: Data Flow Diagram

1.5 Activity Diagram

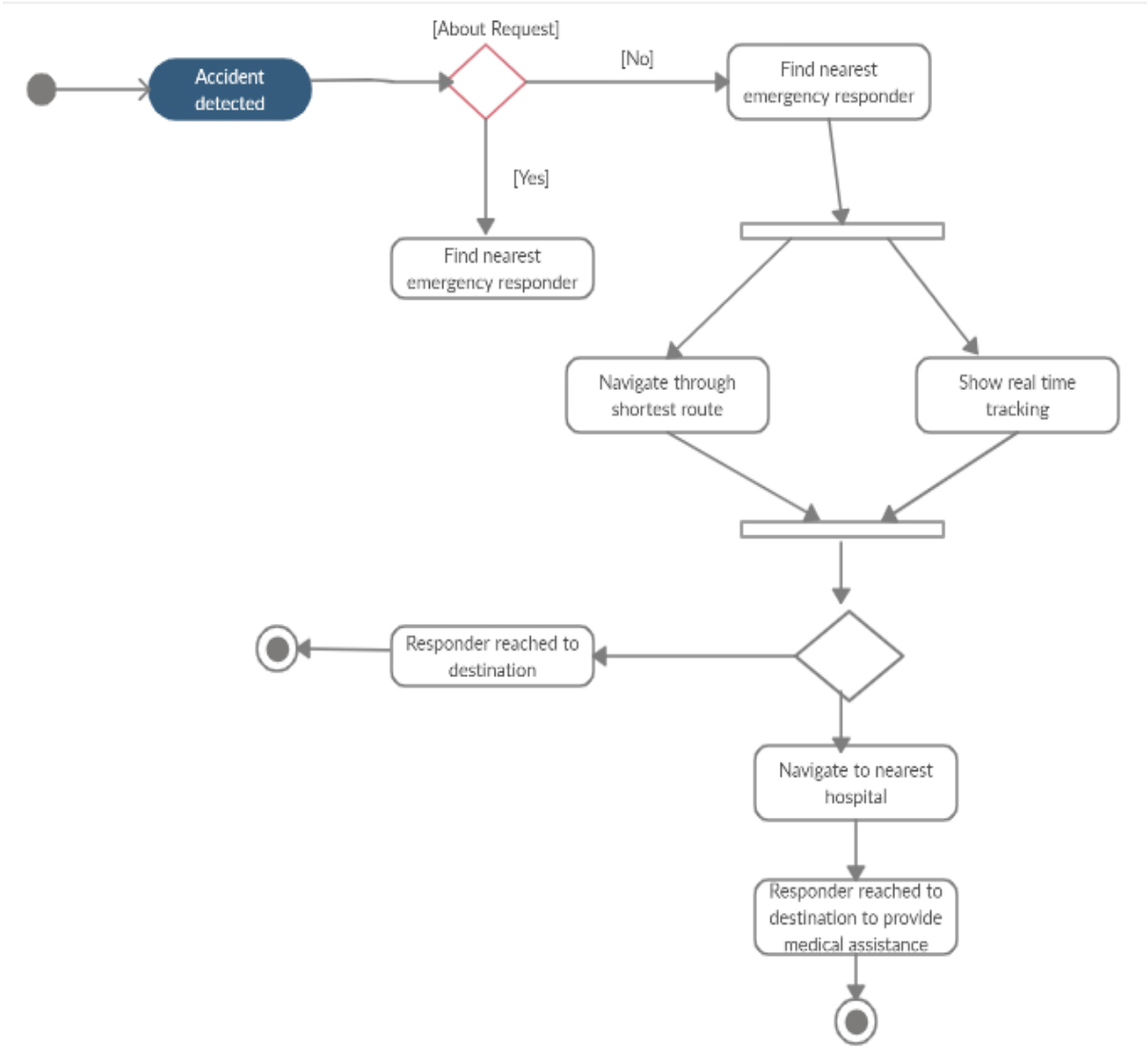
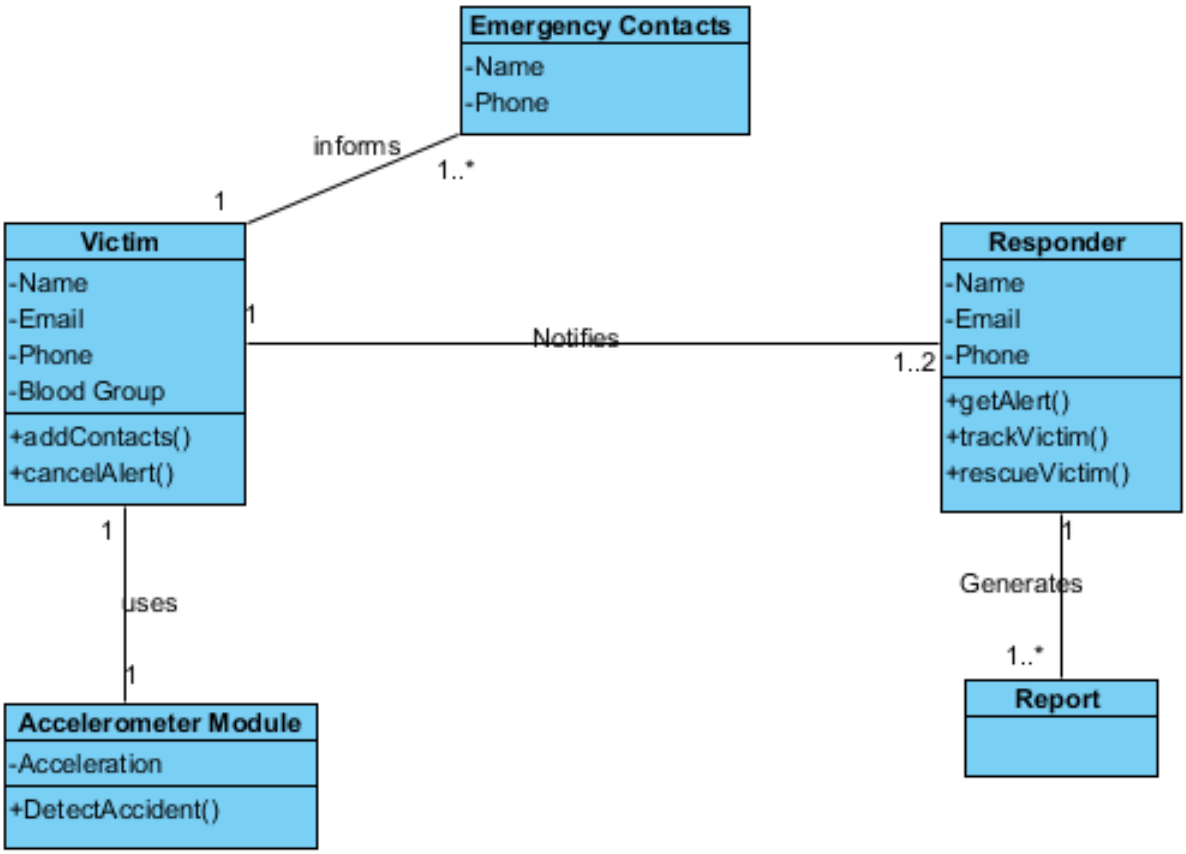


Figure 4: Activity Diagram

1.5.1 ClassModel



1.5.2 Domain Model

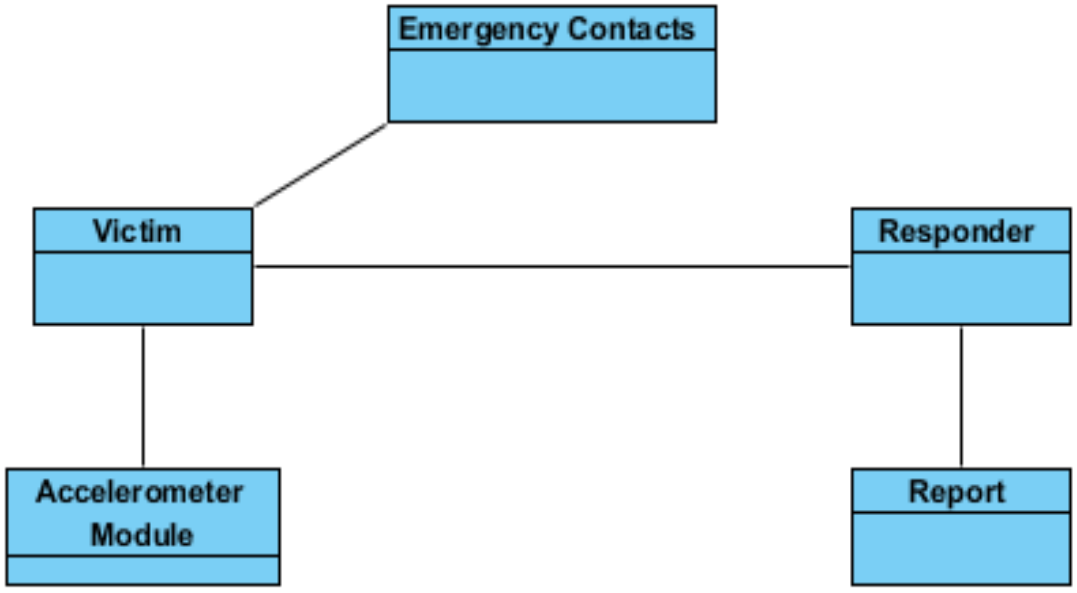


Figure 5: Domain model for the system

1.5.3 Design Approach

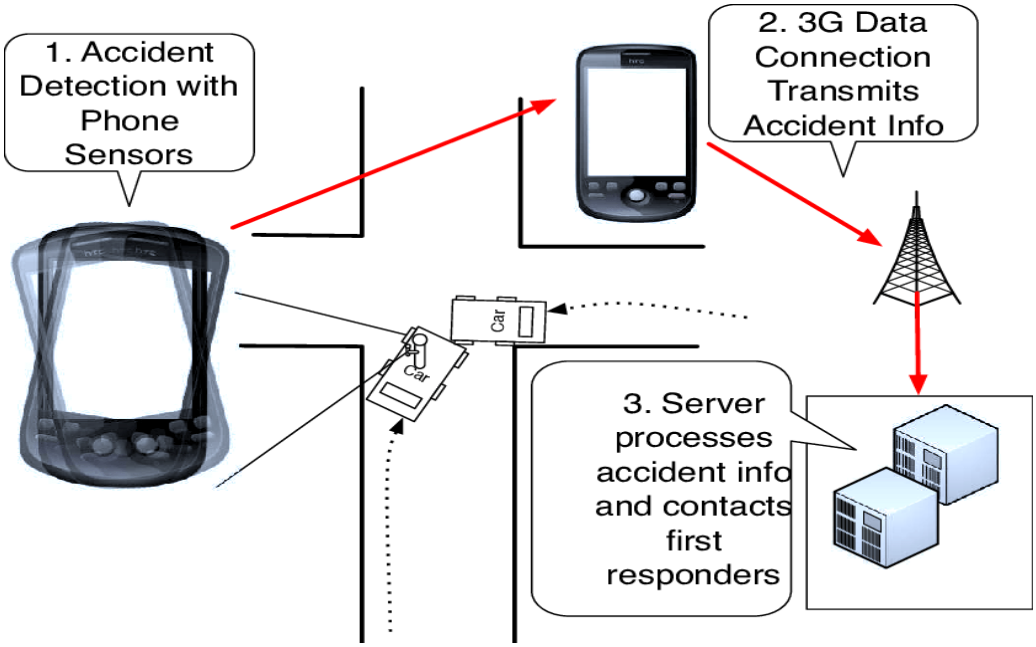
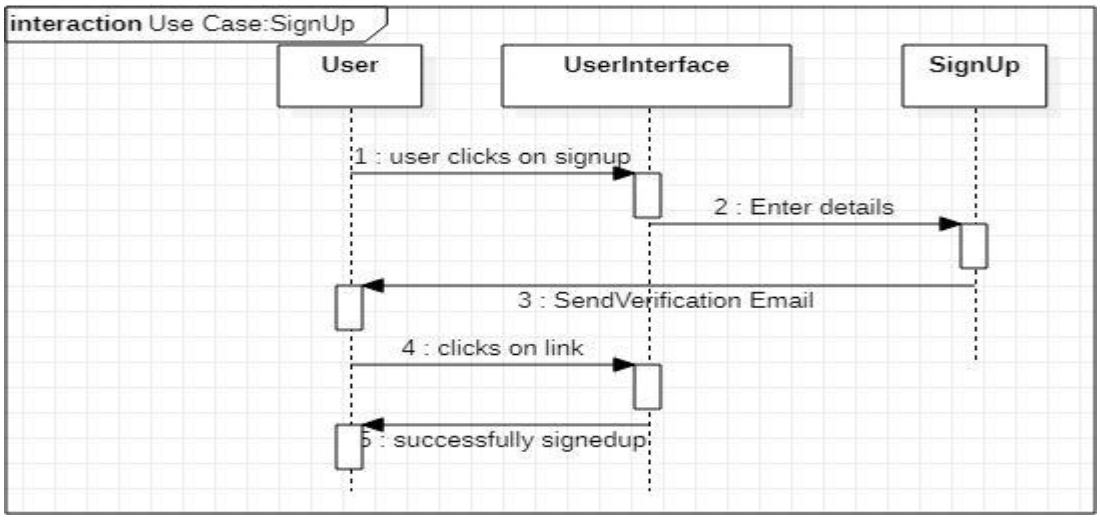


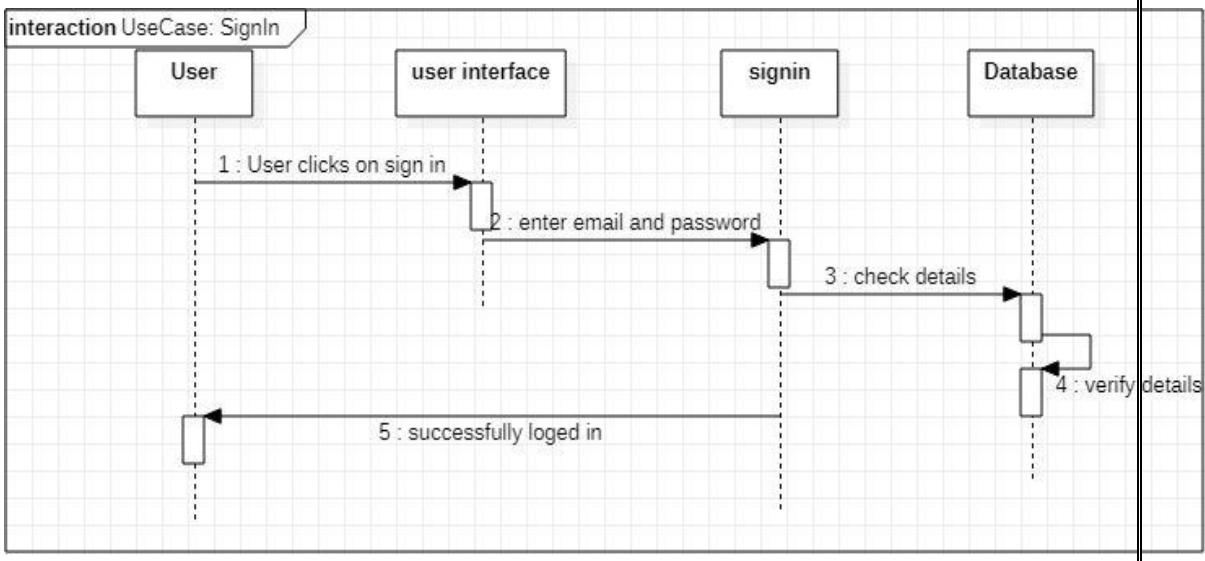
Figure 6: Design Approach

1.5.4 Sequence Approach

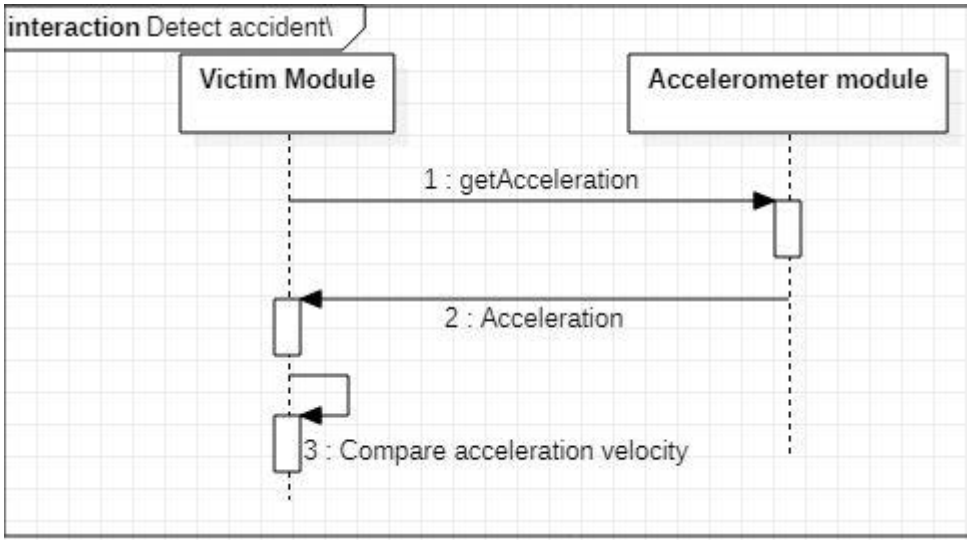
Use Case: Sign Up



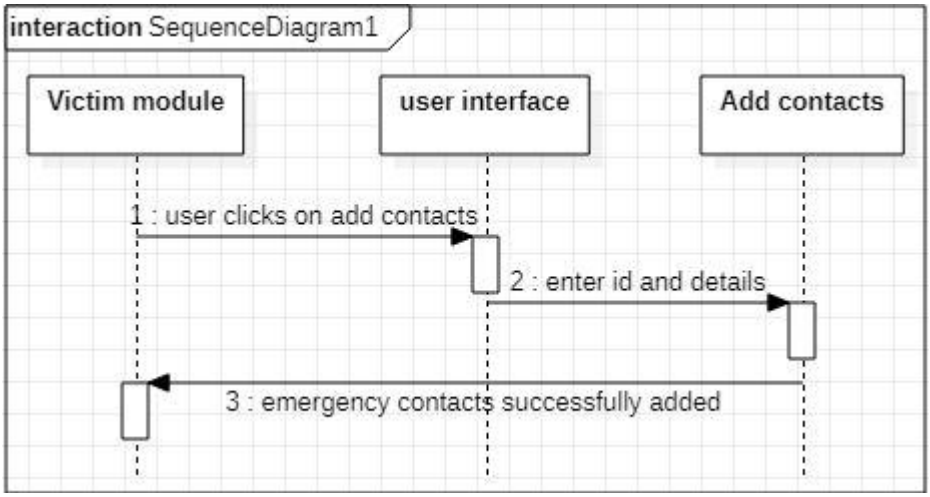
Use Case: Sign In



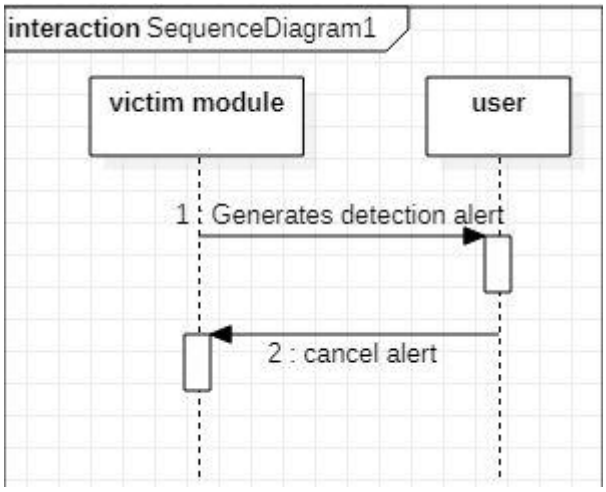
Use Case: Detect Accident



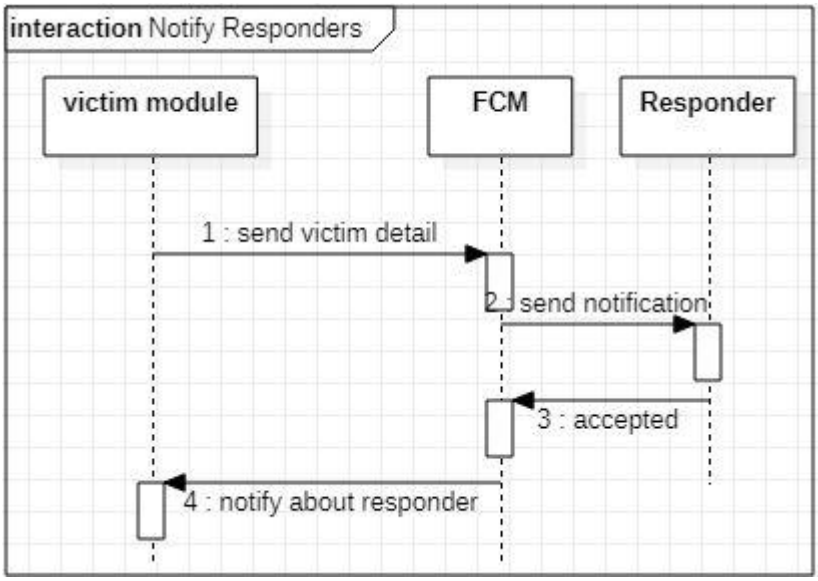
Use Case: Add Contacts



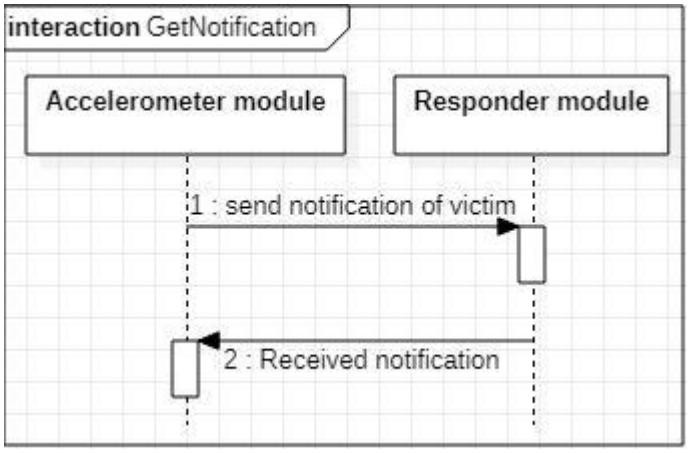
Use Case: Cancel Alert



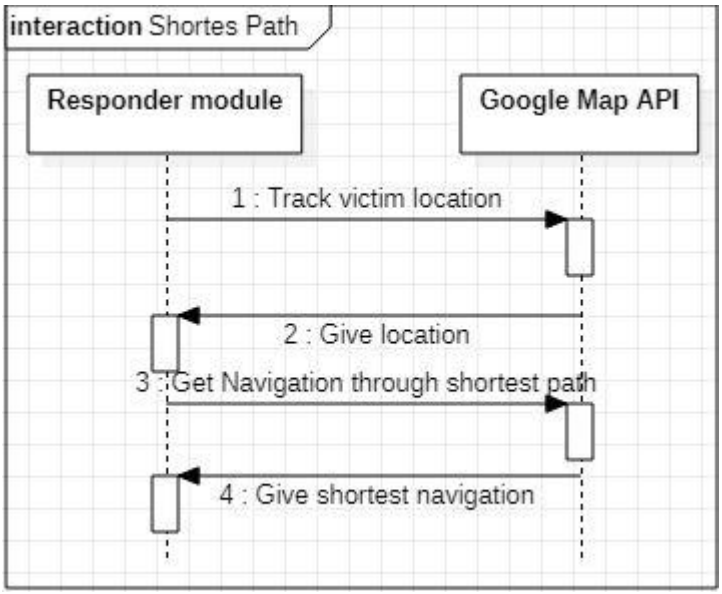
Use Case: Notify Responder



Use Case: Receive Notifications



Use Case: Navigate shortest path



1.6 Logical Data Models & Functional Flows

1.6.1 Functional Flow

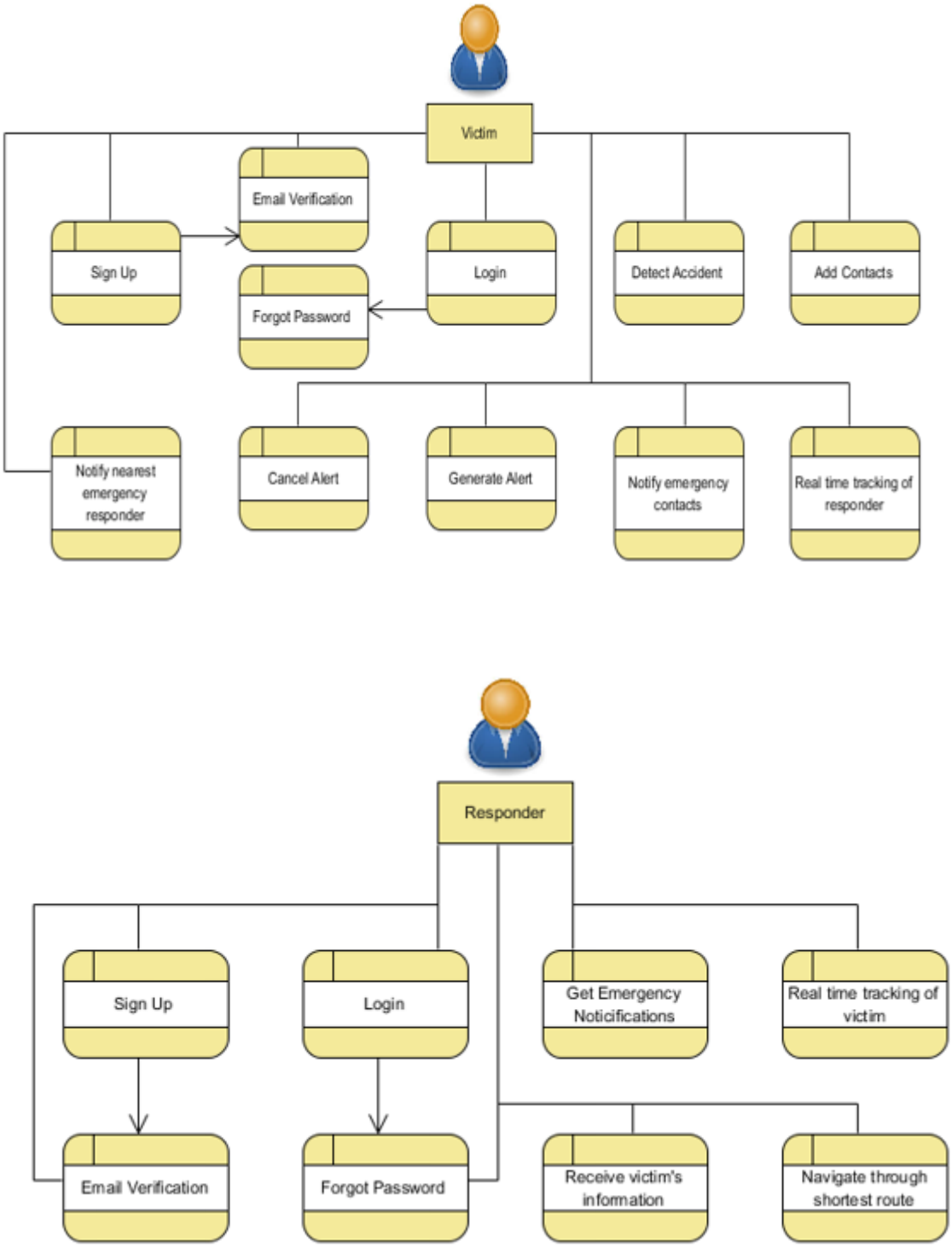


Figure 8: Functional Flow

CHAPTER-5

SYSTEM IMPLEMENTATION

CHAPTER – 5: SYSTEM IMPLEMENTATION

5.1 Strategy

The Emergency Response System was implemented using a hybrid of Code-and- Fix and Incremental Model. The basic features that were agreed upon during requirements phase were implemented and then improvements upon those features were made with every iteration as more and more code was generated. The model followed during implementation can be depicted by the diagram below.

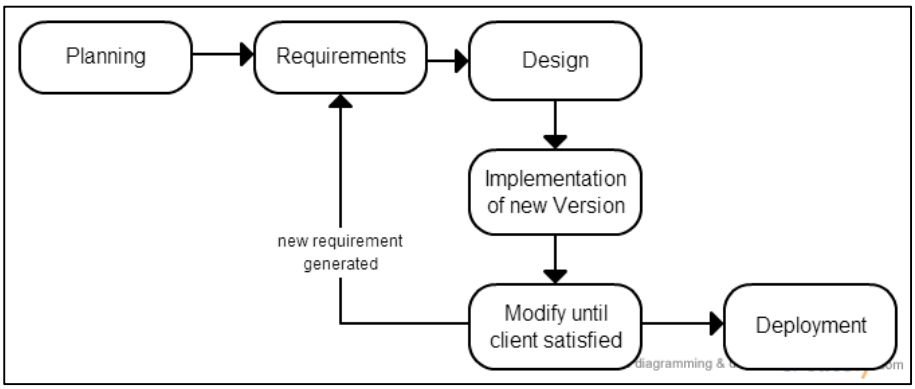


Figure 12: Safe Life Process Model

5.2 Tools Used

The tools used in implementing the system are:

5.2.1 Android Studio

Android studio was used for developing the interface and coding and implementation of the application logic. The latest SDK version was used.

5.2.2 Firebase

The brain of the whole system is Firebase. All information about victims and responders are stored at Firebase real time database. Information about notifications sent from victims' side is also stored and is processed by matching attributes of the request to a nearest responder available.

5.3 System Architecture

The system Architecture is depicted in the diagram below.

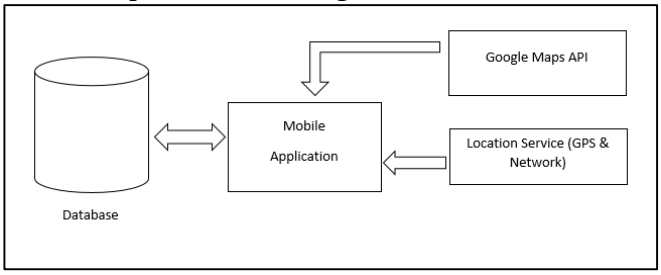


Figure 13: System Architecture

The figure above shows the system architecture depicting the relationship among the different components of the system. The mobile application retrieves data from the location services and maps API and sends it to the database.

5.3.1 Data Layer

The brain of the whole system is Firebase. All information about victims and responders are stored at Firebase real time database. Information about notifications sent from victims' side is also stored and is processed by matching attributes of the request to a nearest responder available.

5.3.2 Processing Layer

Processing layer is the core of 3 layers architecture. Data layer sends raw data. It is job of processing layer to do all the business logic and to extract the information from raw data we got from data layer. When extracting history for the user data layer sends the information which contains information which is not for the user but mainly for the logic/business purpose so this is the duty of processing layer to extract information and pass it on to the presentation layer.

5.3.3 Representation Layer

Presentation layer is specific to the end user. Data extracted from firebase gets ready by processing layer to be shown to the user in the presentation layer. This information is specific to the user only. User does not see any data irrelevant to him/her.

VICTIM SIDE:

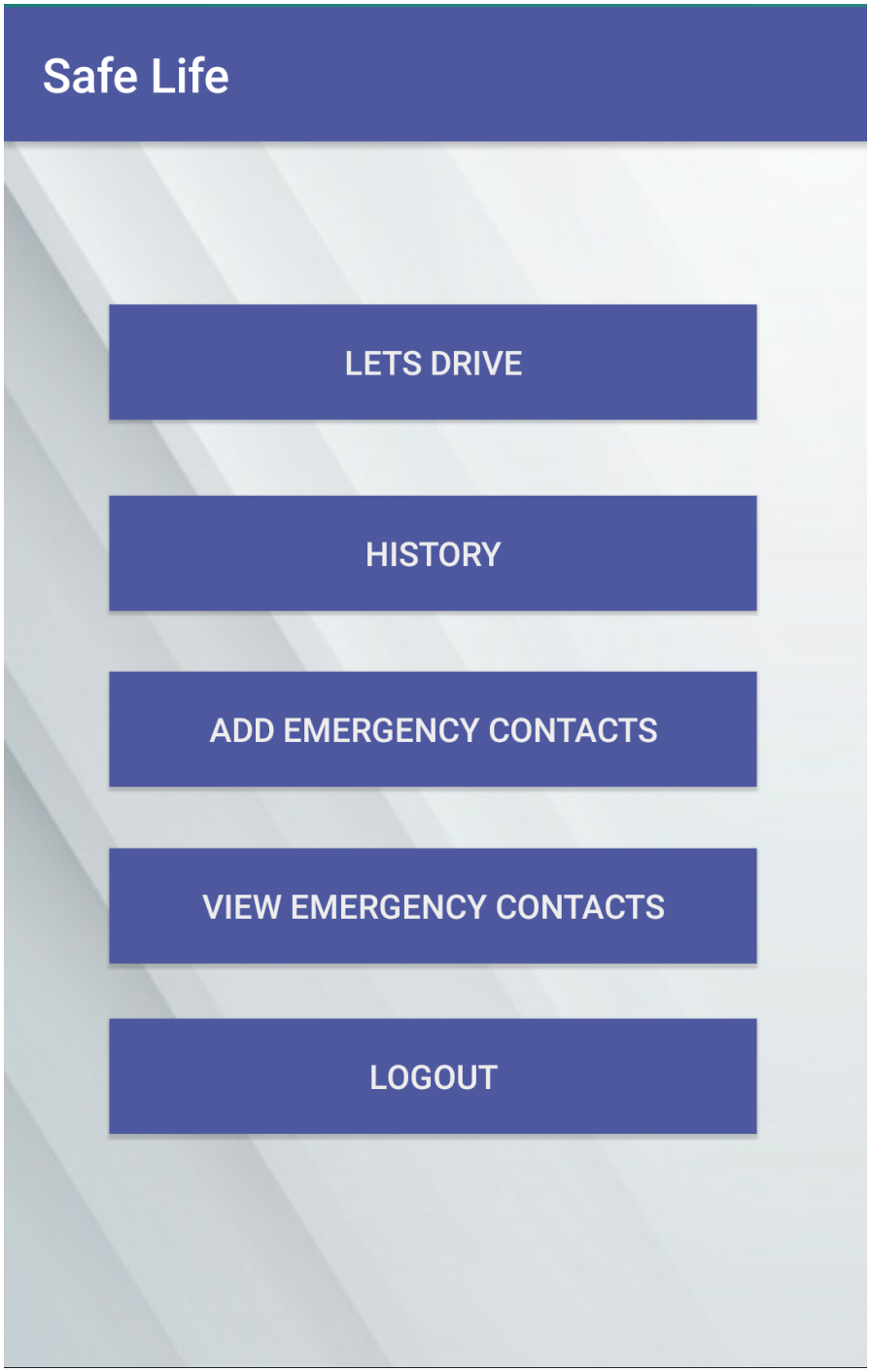


Figure 9: Victim's Menu

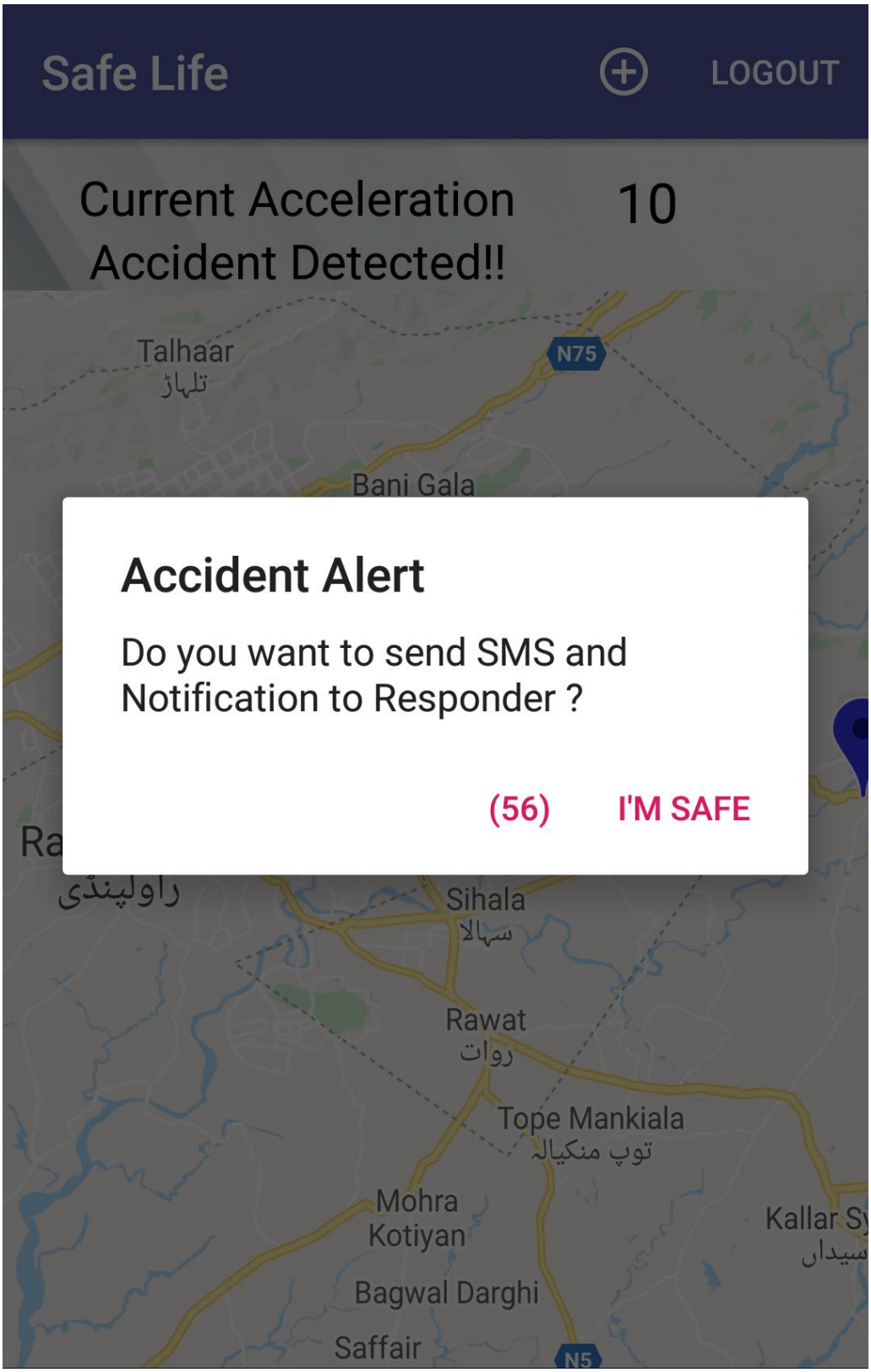


Figure 10: Detect Accident and Send Notification

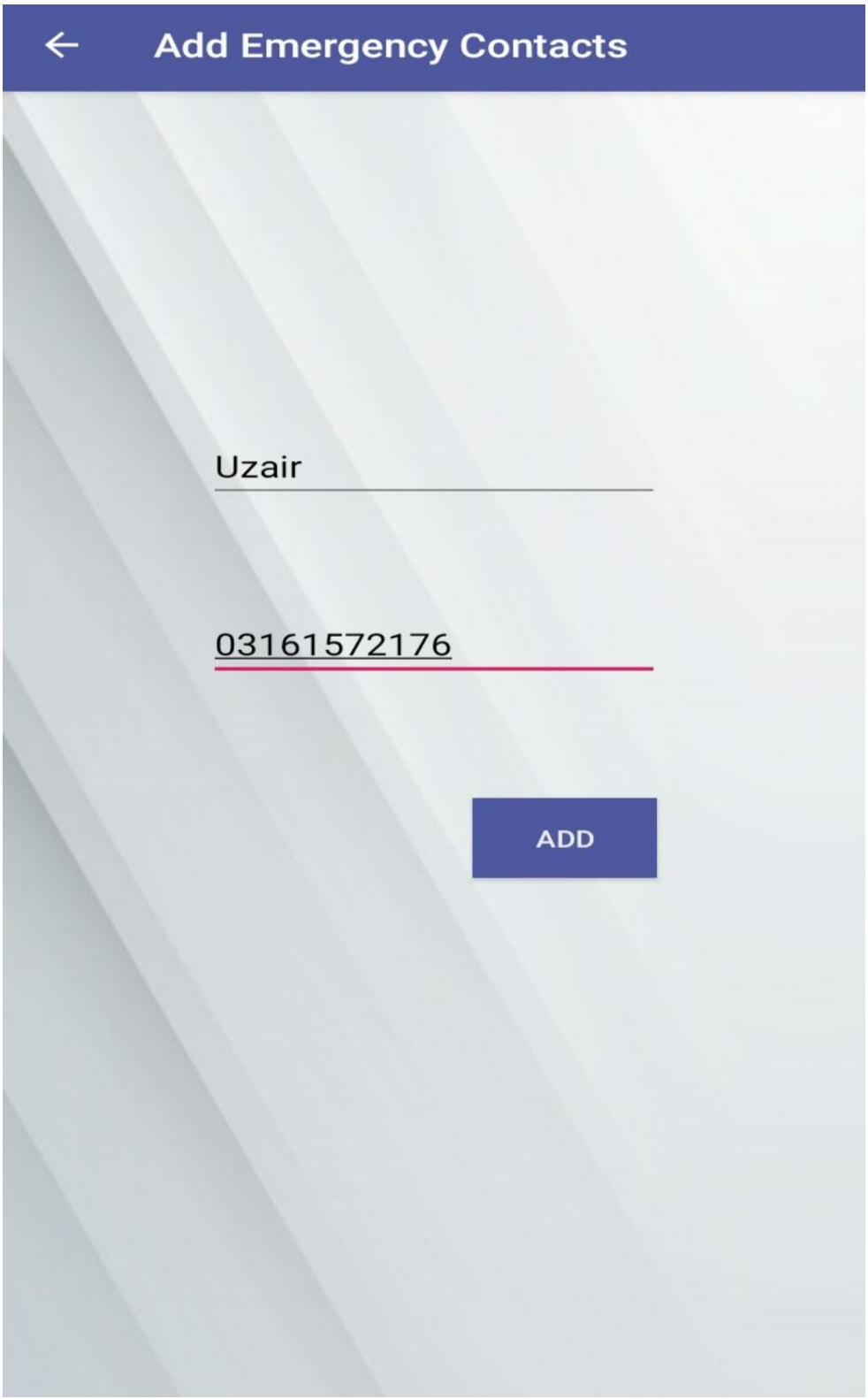


Fig 11: Add Emergency Contacts

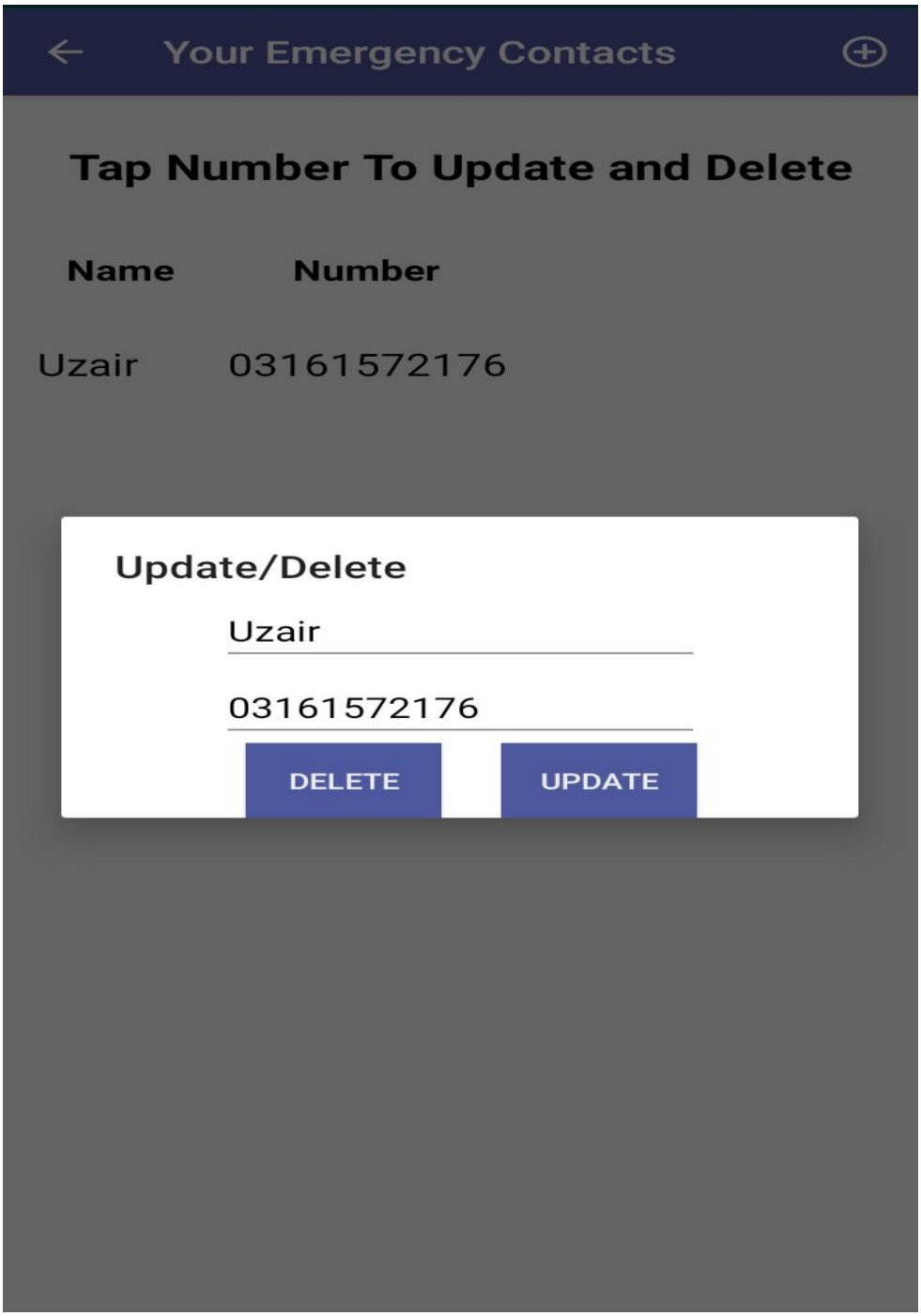


Fig 12: Update/Delete Emergency Contacts

RESPONDER SIDE:

Figure 13: Received Notifications on Responder Side

Figure 14: Nearby Hospitals

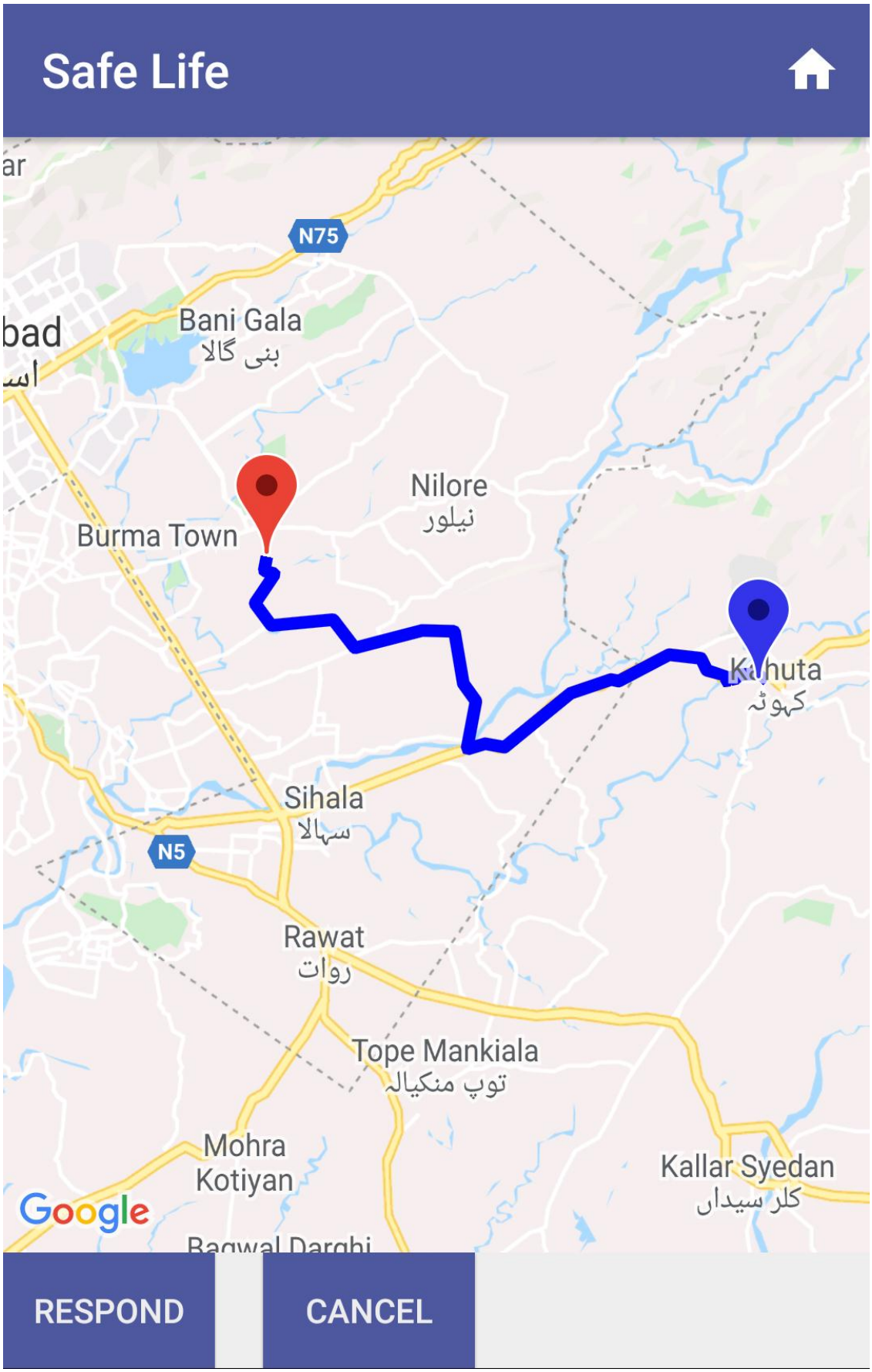


Figure 20: Respond to Victim

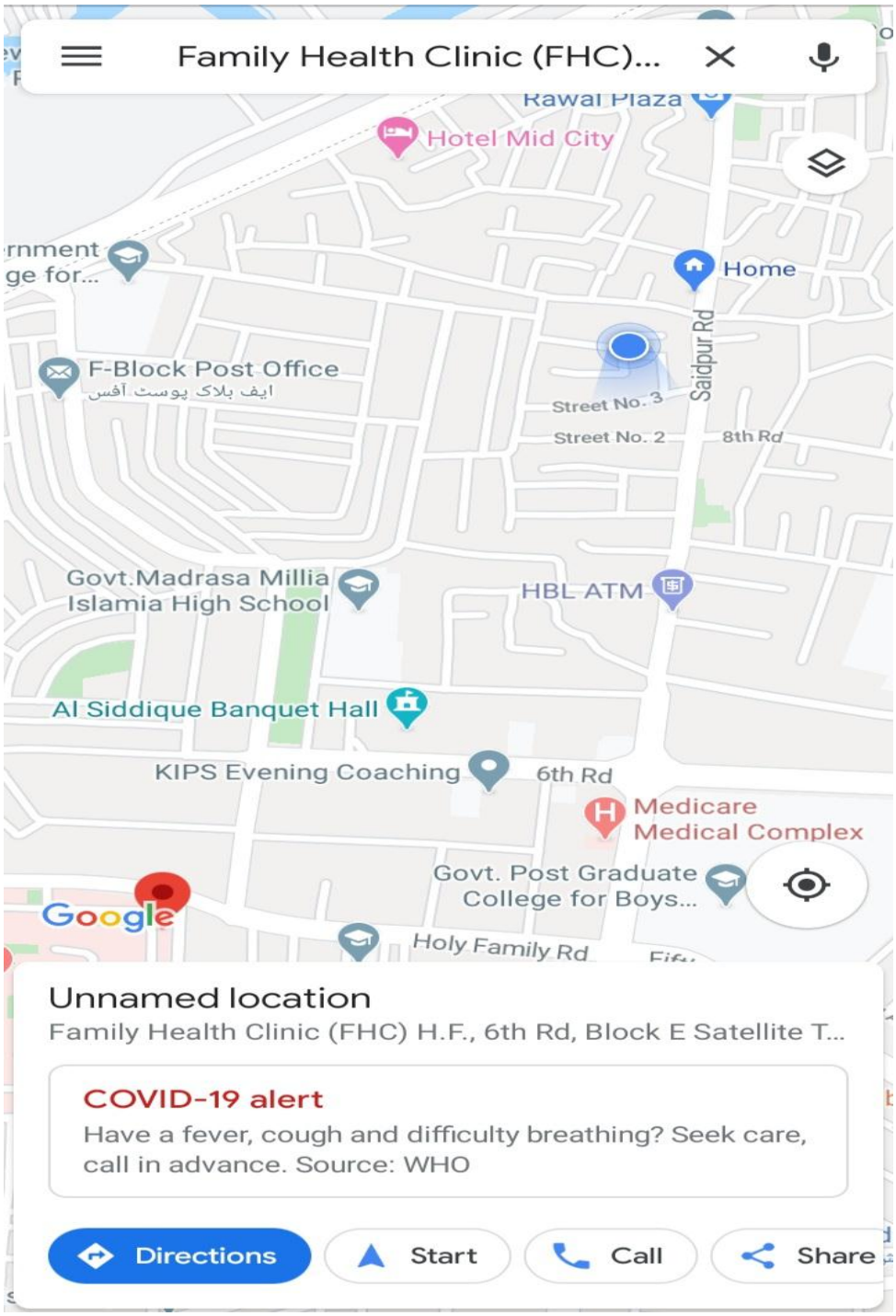


Fig 21: Get Directions

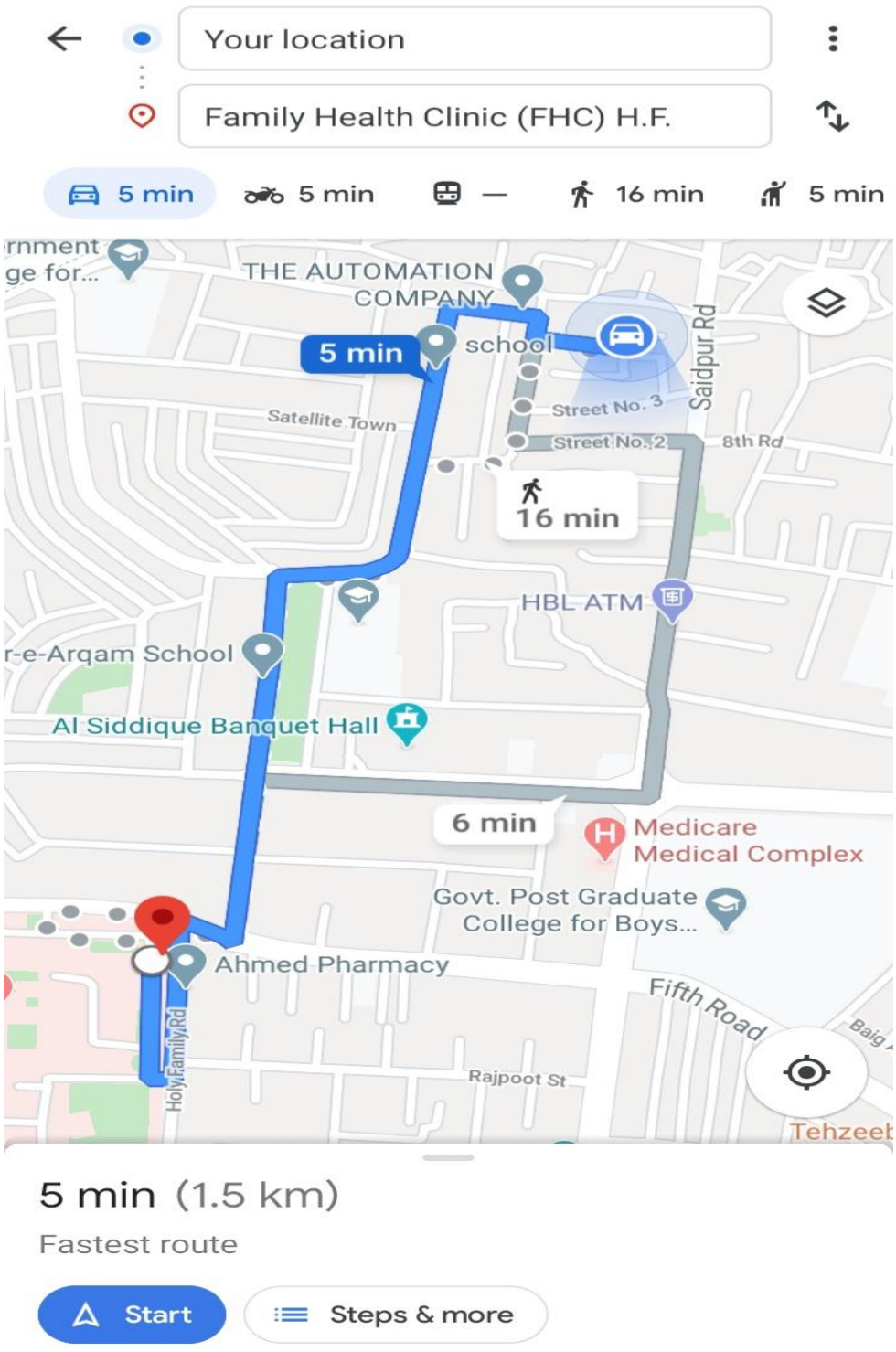


Fig 22: Shortest Route

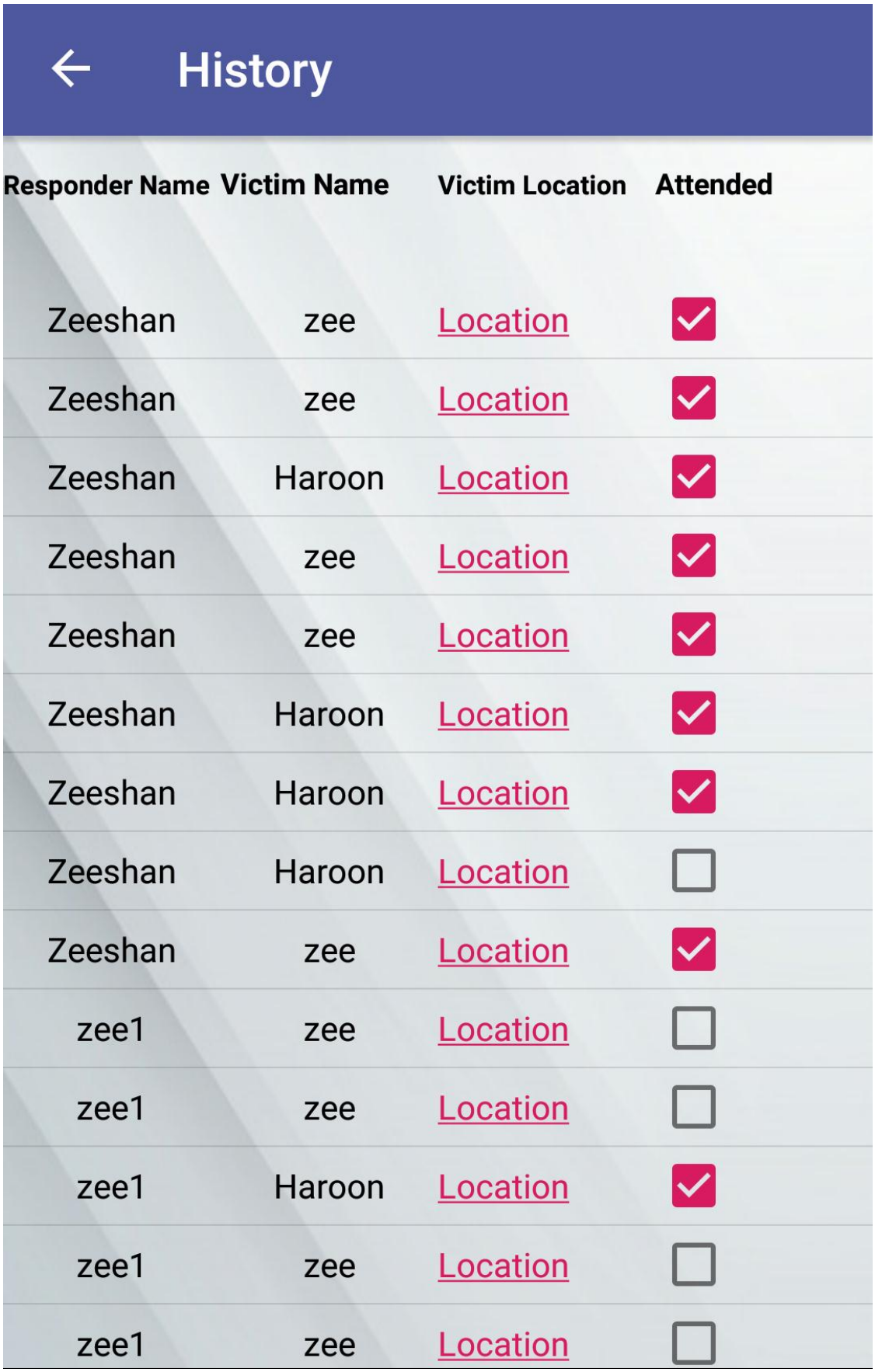


Figure 23: Responder History

5.4 Methodologies

This system is developed using agile model.

5.5 Algorithm

Step 1: start

Step 2: Declare variables lastAcc, currentAcc, finalAcc, delta, x, y, z

Step 3: calculate acceleration and take square root of x,y,z

Step 4: perform low cut filter

finalAcc=finalAcc*0.9+delta

Step 5: check condition on finalAcc

If(finalAcc>10)

Accident Detected

Step 6: Stop

CHAPTER-6

SYSTEM TESTING

CHAPTER – 6: SYSTEM TESTING

6.1 Test Strategy

The mobile application were tested in different chunks or components. The unit test were carried out simultaneously with development by the developer and components were tested once complete functionality for that component was implemented. Integration tests were carried out among the individual components of the mobile application. Finally Black box testing of the system against the specific requirements was done.

6.1.1 Component Testing

Following are the components tested for mobile application:

- Save emergency Contacts
- Sending Emergency Text
- Searching For Nearby Emergency Services on Google Maps
- Interface of victim side application
- Registering new user
- Interface of responder side application (View Reports)
- Google maps for displaying location

6.1.2 Unit Testing

Unit testing on mobile application was done for the following:

- Intents for starting activities
- Intents for starting and stopping services
- Passing data among activities through intents
- Activity life cycle functions
- Checks placed to determine if mobile data or location are available
- Log in form
- Form for registering new user

6.1.3 Integrated Testing

Integration testing on mobile application was done for the following:

- Saved Emergency Contacts and Emergency Text
- Location and address acquisition and Reporting Incident
- Location acquiring and Searching Nearby Emergency Services
- Receive Emergency text
- Upload report to database for admin/responder

6.1.4 System Testing

System tests on mobile application:

- Ensure application support different android versions
- Compatible UI for all Android Devices

6.2 Test Strategy

The test cases below are carried out in accordance with the functional requirements. This is the black box testing and is a form of Acceptance test of the system as it tests all the functionality of the system.

6.2.1 Test Case#1

ID	1
Title	Send SMS Text for emergency
Performed By	Muhammad Haroon
Preconditions	Mobile device has valid SIM card
Assumptions	Valid SIM card Installed and location and mobile data turned on when prompted
Inputs	• Some names of contacts: Ali • Send Message
Action/Steps	1. Select numbers of contacts 2. Accident detected and send under 60 seconds 3. Turns on location and mobile data if/when prompted
Expected Result	• Application checks if location and mobile data are turned on other wise prompts user to turn them on. • Coordinates of location are acquired and address also is acquired • Message sent to the selected contacts along with the coordinates of user and address
Actual Result	• Application checks if location and mobile data are turned on other wise prompts user to turn them on. • Coordinates of location are acquired and address also • Message sent to the selected contacts along with the coordinates of user and address
Status	Success

6.2.2 Test Case#2

ID	2
Title	Send SMS Text for emergency
Performed By	Muhammad Haroon
Preconditions	Mobile device has valid SIM card
Assumptions	Valid SIM card installed permission not given, location and mobile data not turned on when prompted
Inputs	• Some mobile numbers of people to send text to • Send Message when accident detected
Action/Steps	1. Do not turn on location if/when prompted 2. Accident detected and send under 60 seconds
Expected Result	• Application checks if location and mobile data are turned on other wise prompts user to turn them on. • Coordinates of location are not acquired nor is the address • Message sent to the contacts without the coordinates of user and address
Actual Result	• Application checks if location and mobile data are turned on other wise prompts user to turn them on. • Coordinates of location are not acquired • Message sent to the selected contacts without coordinates or address
Status	Success

6.2.3 Test Case#3

ID	3
Title	Fetch Nearby Location Markers
Performed By	Zeeshan Mazhar
Preconditions	Android Device has Google play services installed.
Assumptions	Device already has latest version of Google play services and Google maps application installed and supports OpenGL version 2.0 or higher.
Inputs	• Selection nearby hospital from menu
Action/Steps	1. User Runs Application 2. User Selects nearby locations 3. User does turn on mobile data and location when prompted 4. User clicks Get Direction Button
Expected Result	• Application checks if location and mobile data are turned on other wise prompts user to turn them on. • Application fetches user current location • Markers of nearby places specified by the user appear on the map
Actual Result	• Phone checks if location and mobile data are turned on other wise prompts user to turn them on. • Application fetches user current location • Markers of nearby places specified by the user appear on the map
Status	Success

6.2.4 Test Case#4

ID	4
Title	Inserting Emergency Contact Details
Performed By	Haroon
Preconditions	User must have contacts saved on device
Inputs	• Contact name
Action/Steps	1. Enter name and number of contact to add into the text box provided. 2. Press save button
Expected Result	• Contact is saved into firebase and message is displayed to user
Actual Result	• Contacts number appears in the activity. • Contact is saved into firebase and message is displayed to user
Status	Success

6.2.5 Test Case#5

ID	5
Title	Sign in
Performed By	Zeeshan
Preconditions	There must be a user registered to use the app
Assumptions	N/A
Inputs	• User-Email: zeesha.mazhar9090@gmail.com" • Password: 123
Actions/Steps	1. Enter User email 2. Enter password 3. Select Category 4. Click login button
Expected Results	• Email ‘zeesha.mazhar9090@gmail.com"’ appears in email text box • Password appears in ’*’ form • Log in successful, main menu of victim side opened.
Actual Results	• Email ‘zeesha.mazhar9090@gmail.com"’appears in email text box • Password appears in ‘*’ form • Log in successful, main menu of victim side opened.
Status	Success

CHAPTER-7
CONCLUSION

CHAPTER – 7: CONCLUSION

We have achieved greater performance and robustness by implementing and optimizing our proposed system. We developed the accident detection and smart rescue system, which uses on board accelerometer sensor to detect accident and generate emergency alert and send it to the nearest emergency responder and will also send an SMS to emergency contact. Emergency responder will be able pin point victim's location on a Google map in real time.

Through the completion of this respective project, we got aware of a number of vital aspects necessary in the process of converging the theoretical concepts with the practical skills in formation of a proper software product;
A major aspect we learnt about, during the course of the project, is the importance of coping up with the rapid changes occurring in the development of the project. Managing the requirements, schedule and plan turned out to be a challenge or us; however, this experience taught us the importance of catering the change management process with due attention since its affects can impact the project's completion negatively, if not dealt with properly.

Another aspect of importance we got familiar with is the role the communication between the team members plays in the successful conduction of the respective project. In order to get the desired results and outcomes, it is necessary to maintain a healthy relationship with all the team members for them to work up to their maximum potential and contribute their best efforts that should reflect in the project.

Through this project we got to know how important the supervision is and what effect it has on the team members and the project. Positive and disciplined super- vision plays a key role in the process of the development of the project, especially the effects it has on the project team in achieving the desired goals matter significantly.

Safe Life has been developed for android based mobile devices due to their large market of consumers present in our country, however, our product can be developed for other platforms too, in future.

For future work, more research is needed in order to make the accident detection part more reliable and accurate. Adding additional sensors in combination with accelerometer for accident detection like gyroscope, microphone, camera (to automatically take pictures of the accident) and a voice recognition module to detect noises during a vehicle crash, will drastically increase the reliability and accuracy of the system. This product can be refined to include the support of different languages.

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