

EMERGENCY SOS SERVICE

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This Report Presented in Partial Fulfillment of the Requirements for the
Degree of Bachelor of Science in Computer Science and Engineering

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APPROVAL

This Project titled “**Emergency SOS Service**”, submitted by Farhad Hasan, ID No: 171-15-8879, Md. Omar Faruk, ID No: 171-15-9114 and Sakib Ibn Abdullah, ID No: 171-15-8575 to the Department of Computer Science and Engineering, Daffodil International University has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of B.Sc. in Computer Science and Engineering and approved as to its style and contents. The presentation has been held on 3rd June, 2021.

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We hereby declare that, this project has been done by us under the supervision of **Mr. Asif Uz Zaman Asif, Lecturer, Department of CSE** Daffodil International University. We also declare that neither this project nor any part of this project has been submitted elsewhere for award of any degree or diploma.

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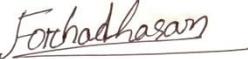
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ABSTRACT

In our daily life, we face various problems and situations. Some problems may be life-threatening like severe chest pain, breathing difficulty, etc. and some situation may harm mentally that means can give anxiety or insecurity which may also lead to physical damage. Serious situations can arise when being alone on a road one is followed by someone or getting a hint of sexual harassment which is a common problem for a woman in our country. Life-threatening problems and serious situations are the main issue here, where time plays a vital role and we will need the easiest way to call out or reach someone for help. That's how we came up with the idea of developing “**Emergency SOS Service**” android application so that we can easily seek help when we are in trouble. This application has an easy interface so users will not have any struggle to use the desired function of the app when in rush. There are two main functions in this android application, one is sending emergency messages to user's preferred numbers and another is sharing live location. There are also two sub-functions, they are customizing messages and adding or removing numbers of user's relatives or friends to which user wants to send an emergency message. To use this application, users have to log in using a phone number and a one-time password (OTP) to confirm the login. The application's main interface consists of two buttons, one for sending emergency messages to the numbers user has added in the number section and another for live location sharing. We didn't make the main user interface overwhelmed by various functions also we have made the emergency button big enough so that users can easily get help during tough conditions with a single tap.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

In our life we face various situations, some we can handle on our own and some need the help of others. Serious situations like someone is following us for ill purposes or severe body condition etc. are those situations where we must need help from persons that we know and those persons may be our relatives or can also be our friends. This is where we will need an easy method to reach someone for help so that reached person can help us to get rid of a troublesome situation. In our country, a woman faces offensive situations more than a man. A study conducted by BRAC shows that 26% of women face different kinds of verbal and physical harassment while walking on the street [1]. So, a woman will feel an extra bit of security which will ease her daily life if she has an android phone with an application where she can get help if she faces a tough condition. There are also some situations one can face when visiting a new place or going to a place which is not well known by oneself then the person can get lost. So regarding this situation, we have got the idea about adding a feature to our application by which users can share live location with another user so that if a person gets lost in an unknown place then the person can share location with that person who has a better understanding to that unknown place and share his thoughts about how the lost person can find the correct way to the desired destination. This live location sharing feature will save time as one can easily get the guidance of others so that getting lost in an unknown place won't be an issue. This feature can also be helpful for elders who live in the village but have come to the town for the first time and they want to go out for a walk or want to visit relatives than by using the application they won't be lost and keep in the right path to the destination. As towns are messier and crowded place compared to rural areas, one can easily lose his path. Having an application that will help to stay on the right path is a big assurance for a person in an unknown place.

1.2 Motivation

Nowadays we see almost everybody and everything is dependent on technology. People are getting used to it. Technologies make daily life easier and comfortable than life without technology. Technologies are advancing rapidly and its advancement is a huge blessing for our life. But there are some cases where technology can also be used for harming someone or damaging assets. We are making our work easy through communication. There are so many communication ways in this modern technology era. Example: Email, Skype, Facebook, WhatsApp and so many others. But we have always a problem finding people according to their location. Some apps have share locations function but the process of using those apps is a bit complicated for general people. That's why we make this app.

1.3 Objectives

Initially, our goal was to design an app for finding the location of a person. There are two ways of sharing your location in this app – offline and online. In offline location sharing, it will send your location coordinates once and these location coordinates will send through phone message. For message, you have to pay some cost. But for online location sharing once you share your location with your friend it will keep updating your location co-ordinate. But there are two conditions, one is your phone should connect through the internet and another is your phone location should be turned on.

1.4 Expected Outcomes

This project has a large perspective on the present world. It has practical value. Example: My relatives came from abroad country they don't know my house location. But he left the airport and lost in the city so they can share current location and I can pick them or I can share my location and they can reach my home safely. We can also use this app in emergencies like an accident, medical problem, security issues like someone following

you. We can use this app in various ways. Our expected output is to know people's current location and problem.

1.5 Features

As our application will mostly be used for emergency purposes so we didn't add any unnecessary features and buttons. We tried to make the user interface as simple as possible so that users will have an easy understanding of the usage of the application. All the features of our application are mentioned below –

- User login using phone number
- Emergency Message (SMS) with location coordinate
- Customizable message
- Number add and delete
- Live location sharing

1.6 Report Layout

Chapter 1: This chapter sheds light on the overview of the application and its features. Also what inspired us to develop this application, what is the purpose of this application and how users can be benefitted by using this application is the content of this chapter.

Chapter 2: We have given a brief description of the background area of our project. Related work to our project, comparative studies between our application and others, the scope of where a problem can arise and what challenges we have faced during project implementation are discussed in this chapter.

Chapter 3: We have used the business process model (BPM), use case model and logical data model to explain the infrastructure of our application. This chapter also includes requirement collection and analysis and required things for designing.

Chapter 4: This chapter covers the entire design-related topic like how we have designed our back-end and front-end of our application, what tools we have used for designing and users feedback upon the designing of the application.

Chapter 5: How we have implemented the design part, is the topic of this chapter. Also, procedures for testing our application and test results are given in this chapter.

Chapter 6: What will be the effect of using our application in both society and environment are mentioned here. We also mentioned our plan to make the application sustain for a longer period.

Chapter 7: Conclusion and future plan of us with the project like planning for adding more features and facilities into our projects are cued in the chapter.

CHAPTER 2

BACKGROUND

2.1 Introduction

In 1999 Mobile phone manufacturer Benefon first developed the first phone with built-in GPS (Global Positioning System) [2]. Before this development, locating someone was a difficult task to do. People have to use manual procedures to locate themselves or sending locations to others. In the era we are living in, almost every phone has a GPS facility. So if someone is in trouble or lost in an unknown place, by sending location information to someone known, the person can be rescued.

In our project, we have used location tracking system using GPS which will help in both emergency purposes or finding someone's location. Emergency SOS service is an android based application and this application can provide both offline and online location service. In offline location service, a mobile SIM (subscriber identification module) card is used to give GPS coordinates which is beneficial during emergencies. In online location service, real-time location can be shared where location is updated on specific time intervals.

2.2 Related Works

We have explored Google by using the keyword "SOS application for android" and we have found some works related to our project.

"BD 999" is an emergency application developed by Bangladesh Police in the year 2019 [3]. This application sends an emergency message with location and a quick video to alert the Bangladesh Police. This is the only application developed in our country as a subsidiary during an emergency.

The idea of the android based emergency alert button was proposed by two Indians, where clicking the SOS button will automatically send messages with location coordinates to the registered numbers [4].

The most popular application “First Aid - American Red Cross” in the area of android based emergency service is developed by American Red Cross [5]. This application has a variety of features like video guidelines of different emergencies, safety tips of what to do during a natural disaster, an emergency call to Emergency medical services (EMS) at any time and other handy features.

Countless free applications are there to provide emergency service in various emergency circumstances. Some notable applications are – Disaster Alert application which alerts the user about an upcoming natural disaster, the FEMA application which provides information about nearby relief centers for service and shelter, Zello Walkie Talkie application which has push-to-talk communication and texting feature to aid in emergencies [6].

2.3 Comparative Studies

Based on our exploration in the area related to our developed application we have found that there exists only one emergency-based android application named “BD 999” developed by Bangladesh Police. This application only alerts police but on the other hand, our application features the ability to alert all the numbers users will register. Alert type is message alert with GPS coordinates.

There are also emergency-based android applications developed in foreign countries. Among those applications, one of the renowned is “First Aid - American Red Cross” which is a heavyweight application with including lots of features compared to others. But we didn’t include that many features to keep the application as lightweight as possible and make the user interface simple so that users don’t have to fall into any complications while using the application.

2.4 Scope of the Problem

Taping the emergency button will only provide the static location of the user that means the location coordinate will indicate that location where the user was while clicking the emergency button. If a user moves to another location then the location coordinate won't update to indicate the new location. If a user wants to alert the desired person with an updated location then the user has to press the emergency button again. One thing to keep in mind that for each message alert sent, the message charge will be deducted from the user's SIM balance.

2.5 Challenges

The role of our developed application is as an aider in emergency. So it was a big challenge to keep the application responsive. Before developing the application we have thought about how to make the application effectively simple from user registration to the user using all the functions of the application. Implementation of the database was another challenge we faced. The challenges with the database were – user authentication, real-time data update, managing data in the database. There were also small challenges here and there like interface design, button management, function to function interaction, etc.

CHAPTER 3

REQUIREMENT SPECIFICATION

3.1 Requirement Collection

One may ask what software requirement is, then the answer is the requirement of software gives an idea about which way should be taken when developing software. Requirements of software should be specified before taking a step to develop the software. Requirements can be specified in a couple of points or also can be written in a brief descriptive way and this document of requirement will state what components software should consist of. Modern technology is being used very widely and using android based mobile phone is very popular among us. For requirements, we tried to fix a specific problem or achieve something. That's why need requirement to develop software to achieve a specific goal. We chose Android for our software.

3.1.1 Android

Android is a very popular operating system for mobile phones nowadays. Because of android's vast development in recent years, now this operating system has become a widely used operating system for nearly every mobile phone. Android phones are now much cheaper compared to other operating systems. Android has various features which make it more user-friendly than other platforms. People now can get android phones very easily as phones using android are very cost-effective and easy to use. Android also features many facilities for its user which comes in handy for various purposes that means an android user can use the phone's various effective features to fulfill a specific goal. Features like an easy user interface, different applications developed for android, supporting various connectivity, easy messaging, easy multitasking and a lot of others are given by android.

3.1.2 Reasons choosing Android

There are many reasons for choosing android and the main reason is its huge expansion in the mobile phone area. Some other reasons for choosing android are given down below:

- Android is an open platform mobile-based operating system so developers can change its functionality the way they want and can use the operating system in their preferable way.
- Improvement of android can be done very easily and one can add new features and change some existing features to an improved feature.
- Developing software or applications for android is very easy because one can use the preferable language like Java or Kotlin or other suitable languages for developing applications and android will support that application.
- As android gives the facility of free sourcing so no permit costs are necessary when improving android.
- Being an android developer is very easy because huge resources are available on the internet and the most interesting thing is most of the resources are free to use.
- Among mobile phone users, android has gained a huge amount of popularity among other mobile operating systems because the development progress of android is very rapid.

3.2 Requirement Analysis

Requirements analysis is a point that must be noticed for better development of software. After collecting requirements, requirement analysis is the next stage where requirements should be analyzed whether the documented requirements are implementable or not. In software development, there may exist some constraints like time, money or resources and depending on these constraints one has to develop software. Requirement analysis gives an idea about what requirements can be fulfilled by not going beyond the constraints. There are some techniques used for analyzing requirements. The techniques we have used are:

- Requirement gathering: We communicate with some people give our idea and some question about what they want in this app.
- Analyzing requirement: After gathering requirements we analyze what we can do.
- Requirement modeling: Then we have used models to structuralize the requirements which indicate the sequential implementation stage of requirements.
- Reviewing: After that, we review with our team

3.3 Use Case Modeling and Description

Use case modeling is the way to give others an idea about what features are there in developed software and who can use those features or what credentials should be met to use the features of the developed software. The model is called UML diagram and inside the diagram, the users are identified as actors. The model must specify all features and sub-features of software and how users can use those features like do they have to login or they should fall into a specific category of users. The model of all the use cases of our application is given in the below diagram.

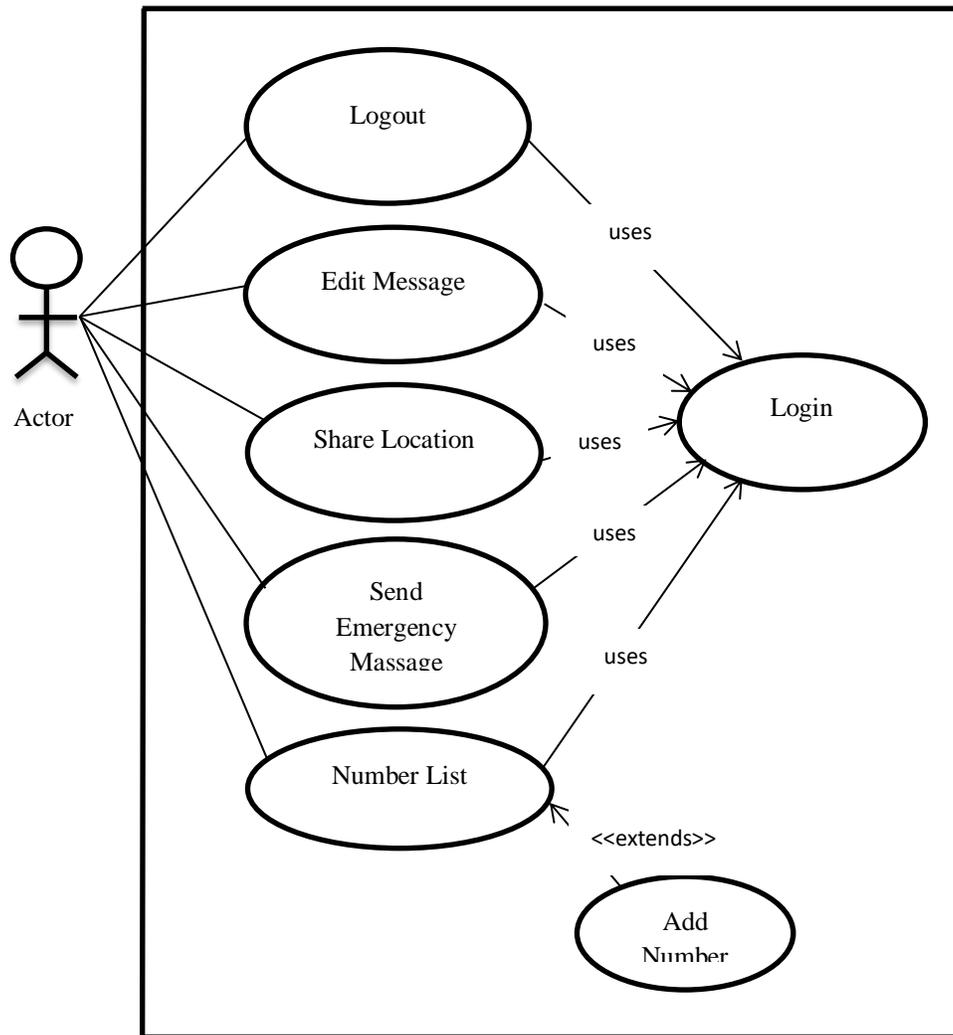


Figure 3.3.1: Use Case Diagram

Description of Use Case:

In figure 3.3.1, the diagram of use cases indicates how a user can use all the components of an application and what the prerequisites are to use those applications or features. From the use case description, one will get an idea about how the application works and what functionalities the application provides to the user. In a use case, all users of a product are indicated as an actor and an actor can be a human being as well as non-human things like a system, robot, etc.

In our application user has to log in using a phone number to use the application. By adding numbers in the number list, users can send emergency messages to all added numbers. User can also share live locations with other user. Users also can change emergency messages to any desired message. A brief description of each use case used in our application is given below.

- **Login Use Case**

Here actors are the users of the application. There are no preconditions for this use case as this is the initial stage of our application. Users will have to enter a valid phone number and an OTP code will be sent that has to be submitted. There are exceptional paths like a phone number can be invalid or verification code can be submitted wrong.

- **Number List Use Case**

Actors are the users of the application. Precondition is the login stage. Users must be logged in to use the number list use case. Users can add a phone number that will be used to send an emergency alert or remove a phone number that is not needed. There is no exceptional path.

- **Add Number Use Case**

Users of the application are the actors. Precondition is the number list use case. Added numbers will be shown in a list manner in the number list. As there are no restrictions or limitations of adding numbers so users can add numbers as much as users' preference. The exceptional path is adding invalid numbers.

- **Edit Message Use Case**

Users are the actors. Precondition is the login use case. Users can edit message which will be sent as emergency alert during a troublesome situation to the numbers users will add. No matter how many numbers are added, all numbers will get an emergency alert. The exceptional path will arise for a long message.

- **Share Location Use Case**

Actors are the users of our application. The precondition is user has to go through the login use case. Users can share live locations with another user. To share live location users have to turn on the phone's location and give permission to the

application for using the phone's location. Exceptional paths are giving invalid numbers and the phone's location is turned off.

- **Send Emergency Message Use Case**

Users are the actors. Precondition is the login stage of the application. Users can send message alerts to desired ones to get help when in need. Message alert will contain default or customized messages with location coordinates in numbers. Exceptional paths are location can be turned off and no numbers added or invalid numbers added.

- **Logout Use Case**

Actors will be the users. The precondition is users must be logged in. Users can log out from the application and logging out will exit from the application. Users can also exit the application by clicking the exit button in the footer area of the application. There is no exceptional path exists for this use case.

3.4 Logical Data Model

A logical data model is used to describe the data necessary and will be used in a backend or the database of software or application. In this model, data is organized in logical form and implemented into physical form based on the logical model. The logical data model describes the relation among all the data and attributes of those data. Entity Relationship Diagram or also called ERD is the physical form of a logical model. An ERD mentions all the entities used in a system and relationships among these entities. Entities of an Entity Relationship Diagram can be human beings or also can be non-living things like product, system, etc. ERD mentions all the primary key, foreign key along with the attributes of all the entities in a system.

Figure 3.4.1 represents ER Diagram of our application

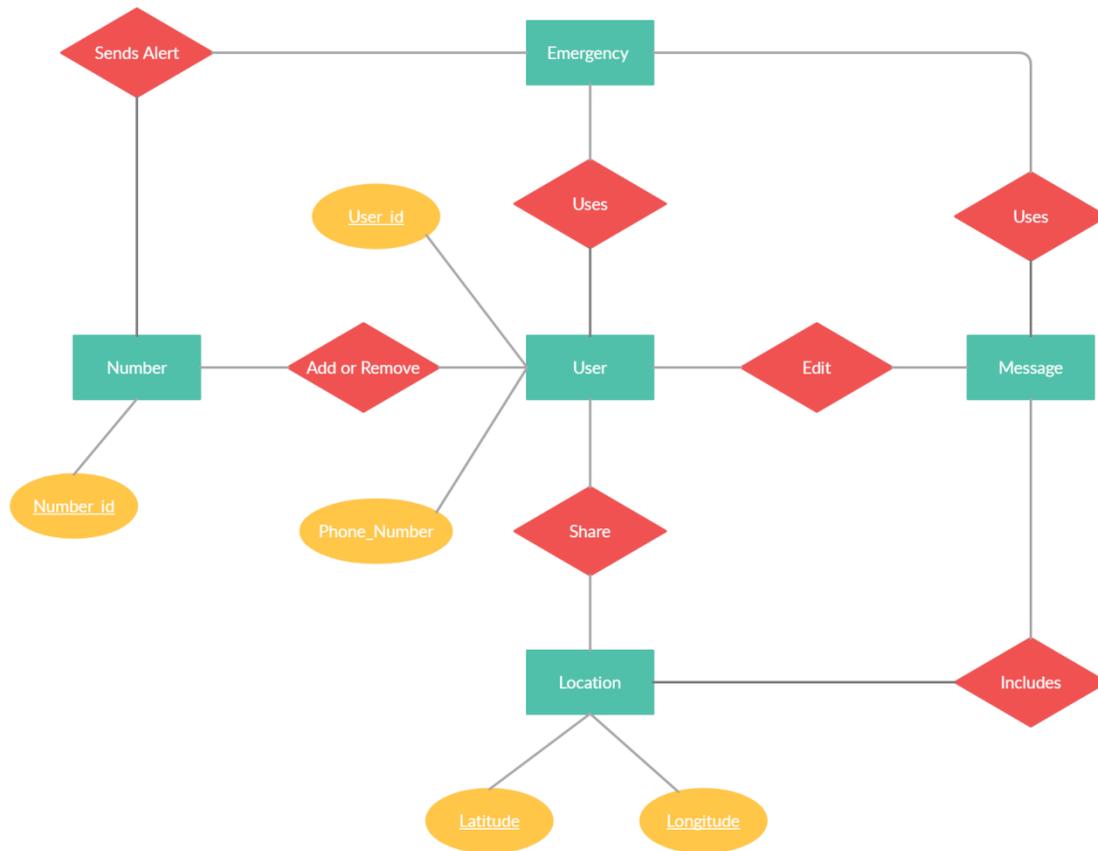


Figure 3.4.1: ER Diagram of Emergency SOS Service

3.5 Design requirement

In software development, design requirement is a crucial part where designing of each object or component is specified and documented and based on this documentation, the software is developed. Design requirements should be documented in a way where each component can interact with each other to get better output from the software. After defining what the design requirements for a product are, the developer team can implement their designing concepts by electing a product design, which is used to describe the product's physical form. And the whole process showed in the below-given figure:

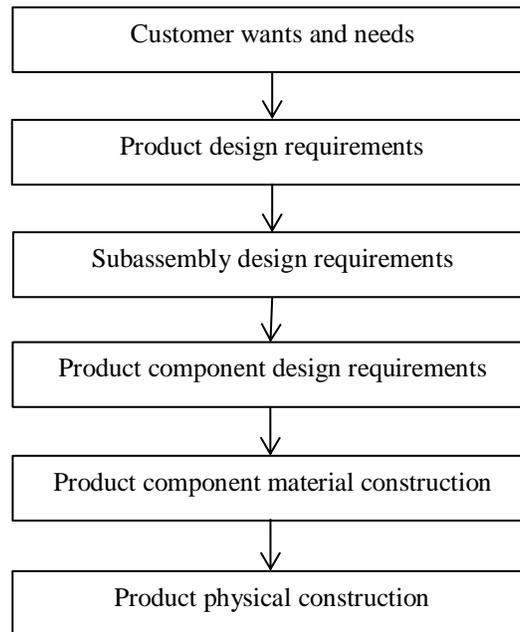


Figure 3.5.1: Steps of Design Requirements

Figure 3.5.1 shows steps that should be done sequentially from beginning to ending in the design requirement part of a project.

After getting user requirement documentation, necessary tools for designing are some software for developing code like the android studio and other tools like android emulator to visualize the design to check if the designing is being implemented according to the requirements.

CHAPTER 4

DESIGN SPECIFICATION

The design specification is that which shows detailed functionality of each stage of the project and the outcome for each action. Design specifications can include screenshots of different operations and descriptions of that operation, database layout and design layout [7]. To perform a smooth implementation of any project from the initial stage to the finishing of the project, design specification plays a vital role as design specification reveals every stage of a project so that one can visualize how to give the project a physical form. So we are using this chapter to cover the user interface as well as database design of the application with the required tools to implement the application.

4.1 Front-end Design

Front-end designing is the stage that mainly refers to the user interface design which means how the application will look when a user uses the application. To make a user-friendly application, front-end design should be count in as an important part of the application. For an android application, Extensible Markup Language (XML) is used to build up the user interface [8].

A pictorial description of front-end design with a brief description of each function and its outcome in a step-by-step manner is given right below.

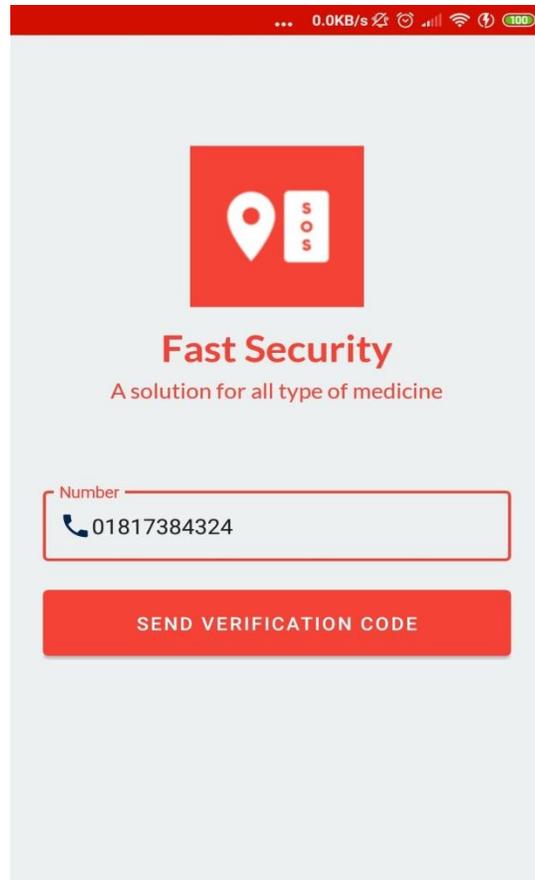


Figure 4.1.1: User Login

Figure 4.1.1 shows the login stage of the application. The user's number has to be used to log into the application. Users should use the number that is inserted into the phone where the application is installed.

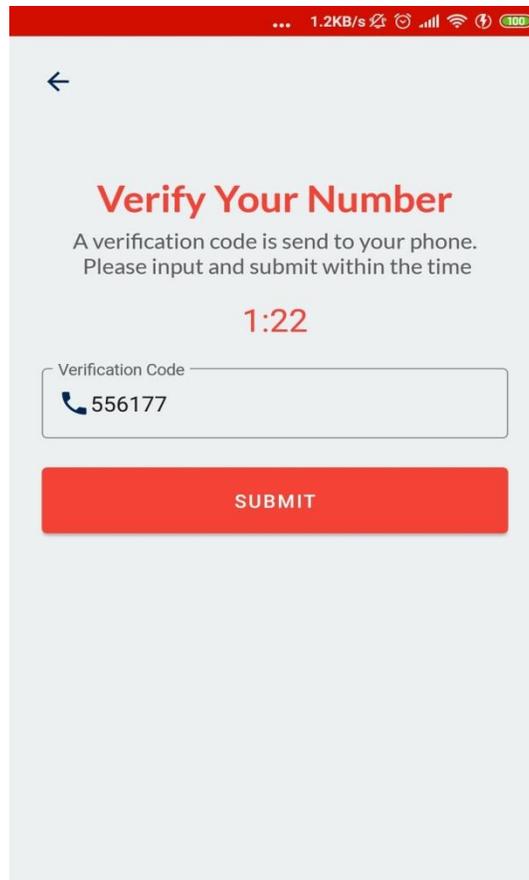


Figure 4.1.2: Number Verification

In figure 4.1.2, number verification using a one-time password (OTP) is shown. A random six-digit number called OTP will be sent via message to the number that the user has used to log in. There is a timer in which in-between a user has to submit the OTP code otherwise the code won't work.



Figure 4.1.3: Main Interface

Figure 4.1.3 displays the main layout which consists of two buttons, one is the emergency button and another is for sharing location. The top portion of the interface which is called an action bar consists of one hamburger menu on the left and one drop-down list or three-dot option on the right.

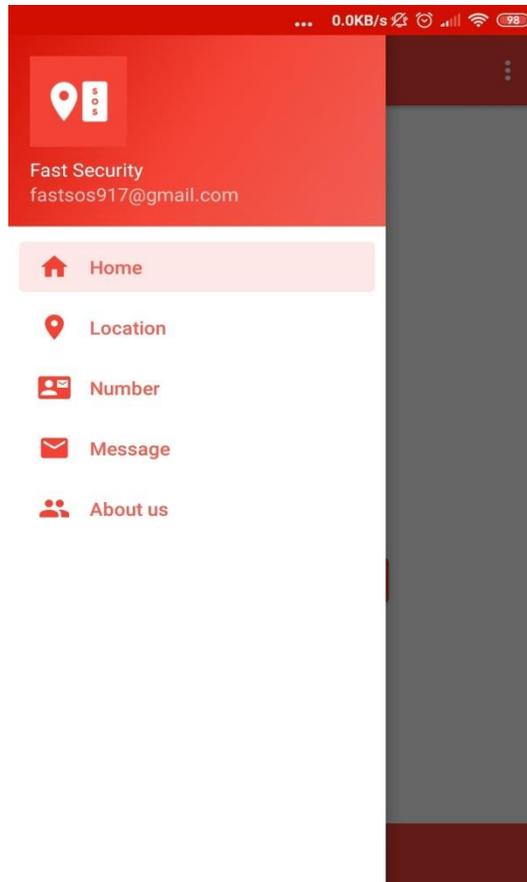


Figure 4.1.4: Hamburger Menu

Figure 4.1.4 is the visualization of all the options inside the hamburger menu. Users will have easy access to all functions of the application through this menu. Users can access this menu from any interface of the application.

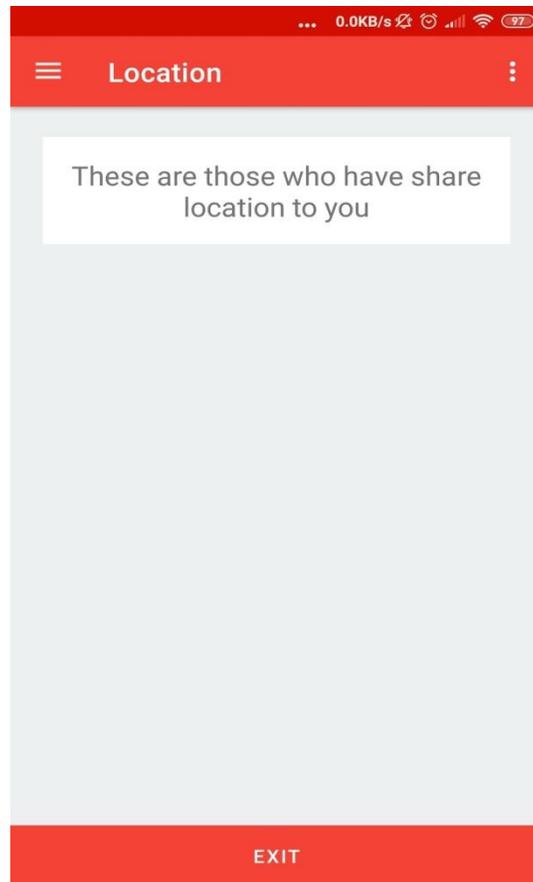


Figure 4.1.5: Location Interface

Figure 4.1.5 exhibits the real-time location sharing interface. If a user shares a real-time location with another user then this interface will show to whom the user is sharing location. Users can also interrupt location sharing anytime from this interface.

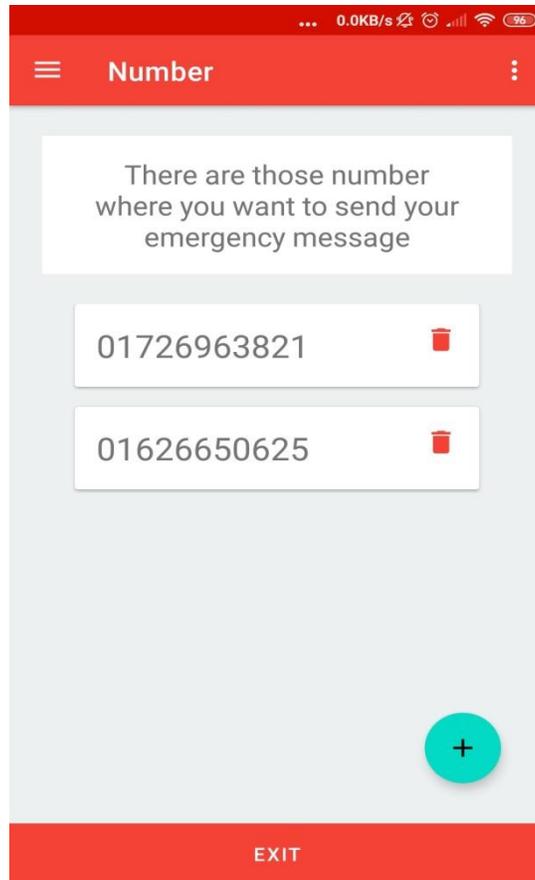


Figure 4.1.6: Emergency Numbers List

Figure 4.1.6 points out the lists of numbers that users will add to send emergency messages during an emergency. Users can also delete numbers and there is no limit to adding numbers.

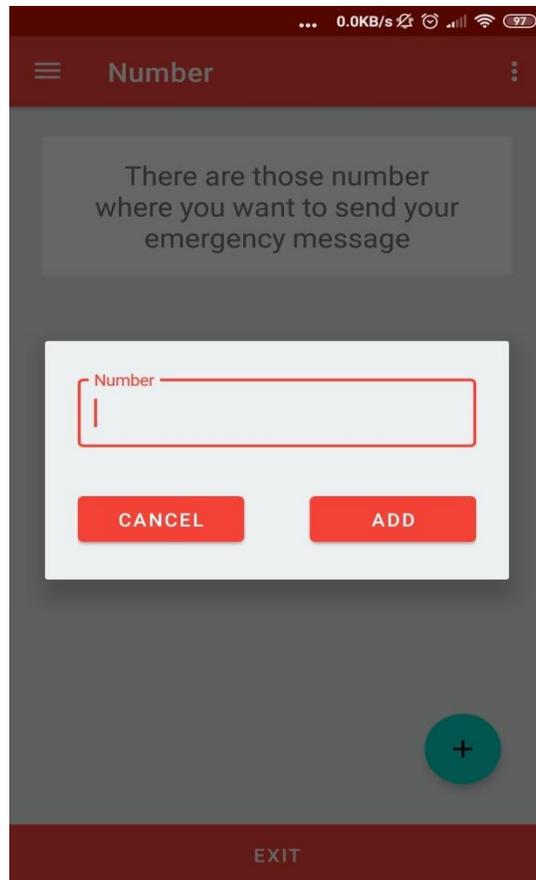


Figure 4.1.7: Number Adding Dialog Box

Figure 4.1.7 points out the dialog box to add a number. This dialog box will appear after the user clicks on the plus sign button in the down right corner of the number interface.

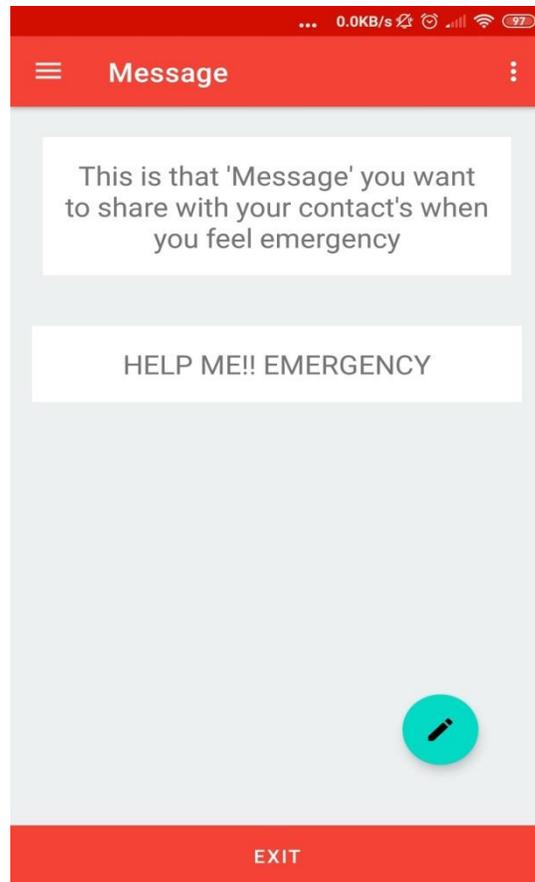


Figure 4.1.8: Emergency Message

Figure 4.1.8 indicates the emergency message that will be sent after a user presses the emergency button. This message can be customized.

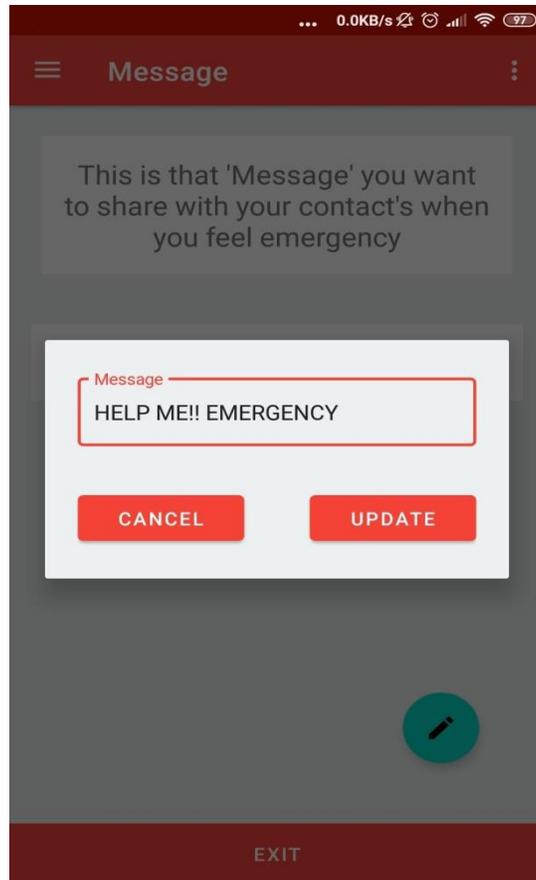


Figure 4.1.9: Message Customization

Figure 4.1.9 discloses the way of customizing the emergency message. By clicking the edit button in the down right corner of the message interface, the user can customize the message.

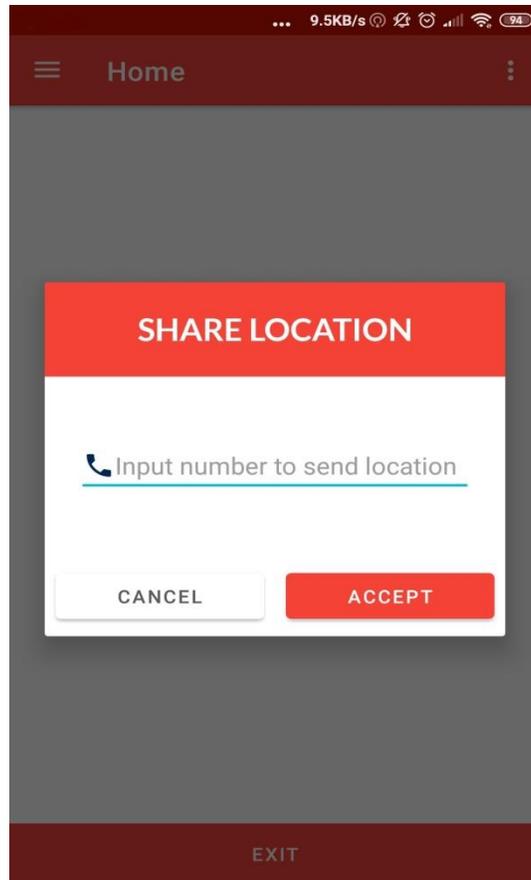


Figure 4.1.10: Live Location Sharing

Figure 4.1.10 demonstrates the process of sharing live location. When a user clicks the share location button in the main interface then this dialog box will pop up where a user has to provide another user's number to whom the user wants to share the location.

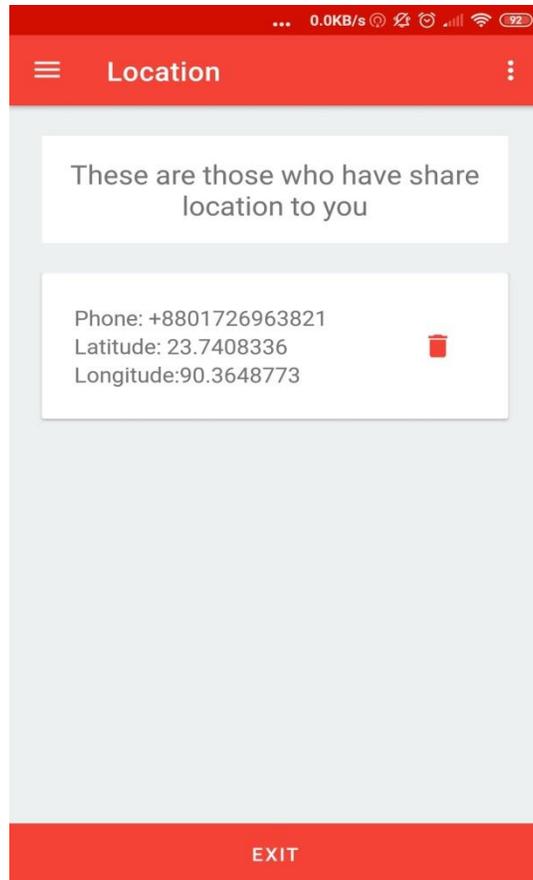


Figure 4.1.11: Shared Location

Figure 4.1.11 implies that to whom a user has shared location. This location will keep updating as long as the user doesn't interrupt the location sharing by turning off the location or canceling the location sharing.

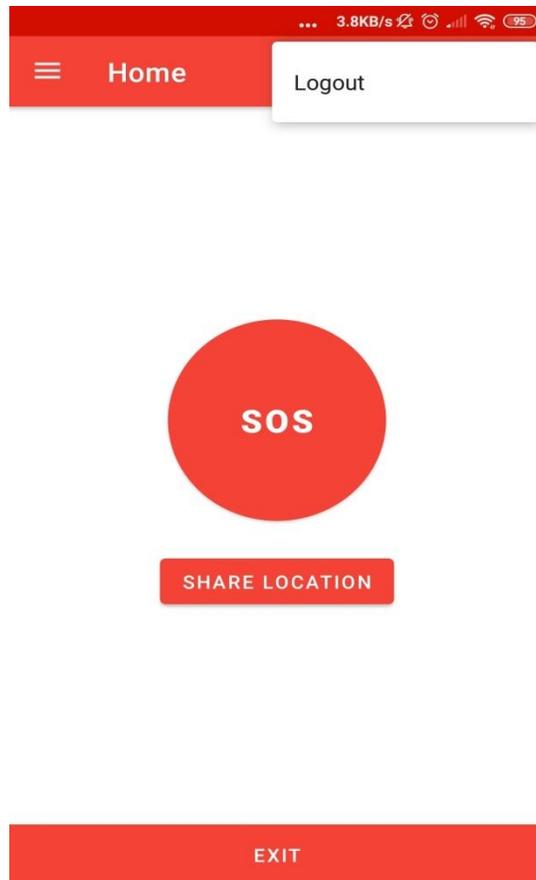


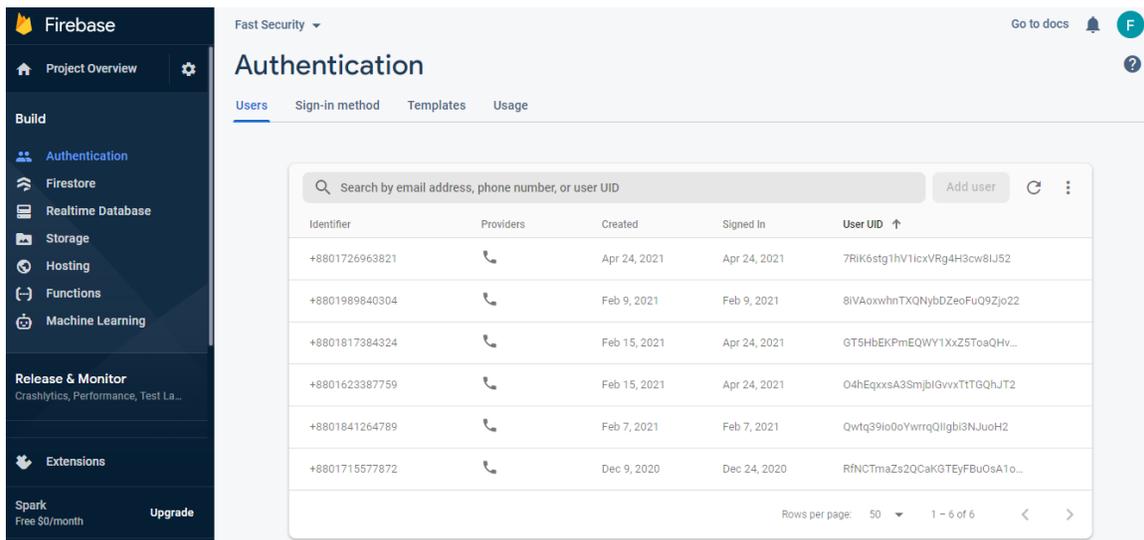
Figure 4.1.12: Logging Out

Figure 4.1.12 reveals the logging out option. By clicking the three-dot option in the top right corner, user can log out from the application. Users will stay logged in as long as the user doesn't log out manually.

4.2 Back-end Design

Back-end designing is that stage that defines all parts that allow an application to functioning properly. All the background processes like coding, server management, database management, etc. are part of the back-end design. A user of an application doesn't need to know how the background processes of that application are working and the user only sees and interacts with the front-end design. Back-end pulls the necessary information which is stacked in the background to the front-end user when necessary or user requests for specific data. Java is a widely used language for designing or implementing the back-end of an android application. For the database of our application, we have used Firebase's real-time database which syncs data in real-time between users [9]. This database is used for user login into the application and user to user real-time location sharing.

Figure 4.2.1 shows a user list of who logged into the application.



The screenshot displays the Firebase Authentication console. On the left is a dark sidebar with navigation options: Project Overview, Build (Authentication, Firestore, Realtime Database, Storage, Hosting, Functions, Machine Learning), Release & Monitor, and Extensions. The main content area is titled 'Authentication' and includes tabs for Users, Sign-in method, Templates, and Usage. A search bar at the top of the table allows searching by email address, phone number, or user UID. Below the search bar is a table with the following data:

Identifier	Providers	Created	Signed In	User UID ↑
+8801726963821	Phone	Apr 24, 2021	Apr 24, 2021	7RiK6stg1hV1icxVRg4H3cw8lU52
+8801989840304	Phone	Feb 9, 2021	Feb 9, 2021	8lVAoxwhnTXQNYbDZeoFu09Zjo22
+8801817384324	Phone	Feb 15, 2021	Apr 24, 2021	GT5HbEKpMEOQWY1XxZ5ToaQHv...
+8801623387759	Phone	Feb 15, 2021	Apr 24, 2021	O4hEqxxsA3SmjblGvxxTlTGQhJT2
+8801841264789	Phone	Feb 7, 2021	Feb 7, 2021	Qwtq39lo0oYwrrqQllgbl3NJu0H2
+8801715577872	Phone	Dec 9, 2020	Dec 24, 2020	RfNCTmaZs2QCakGTEyFBU0sA1o...

At the bottom right of the table, it indicates 'Rows per page: 50' and '1 - 6 of 6'.

Figure 4.2.1: Users of the Application

Figure 4.2.2 shows that sign-in using a phone number is enabled

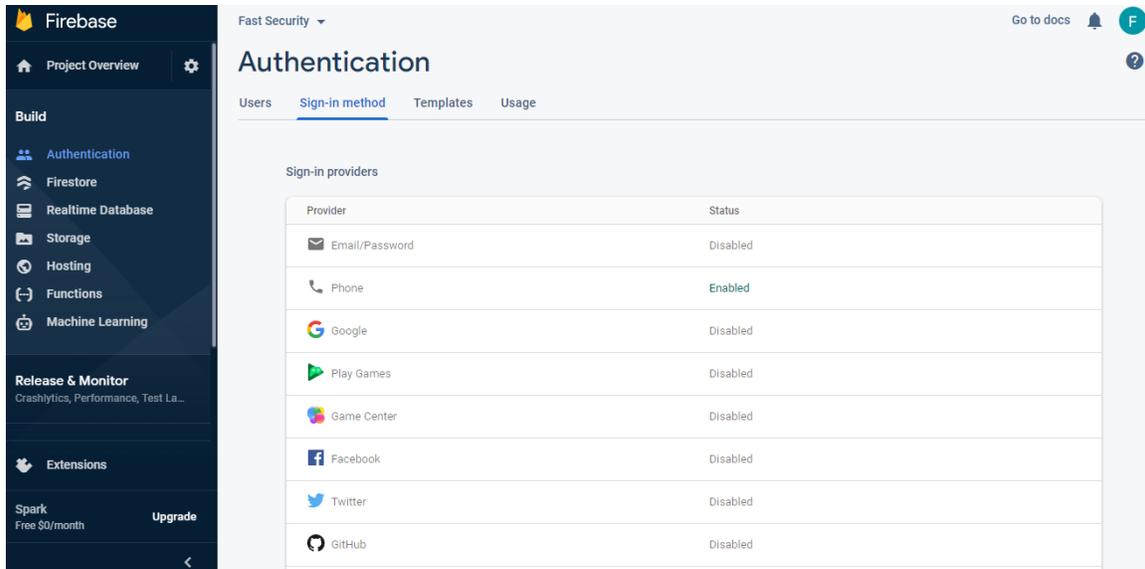


Figure 4.2.2: Sign-in Method

Figure 4.2.3 shows the real-time database which is used in live location sharing in our application.



Figure 4.2.3: Real-time Database

4.3 Interaction Design and User Experience

Interaction design which is also known by its abbreviation IxD is the method of designing interactive products or services. Interaction design mainly points to how a user interacts with a product or a service. The main motive of interaction design is how interaction designers can improve the interactive experience based on the interaction between user and product. To design a better interaction for an application, a couple of things should be followed like – possible ways a user can interact with the interface, giving an idea to the user about what will be the outcome of an action that user wants to do, a proper error message to explain what the user is doing wrong, response time after user interaction with a product, organize elements in the interface in a way that any user can perform an action smoothly using that element [10].

User experience or UX covers all the area of a product that is related to user like what users want in a product, what users prefer most, what users are capable to do with the application and what are the limitations of users when using a product. To boost the user experience with a product, interaction design should be done properly, user can easily find or access any element of a product, exact information should provide to users about a product and the interface should be attractive to users.

To get user experience, we let a couple of people use our developed application. All of them except one were satisfied regarding usage of all functions of the application. One who wasn't satisfied has complaints about getting an OTP code.

4.4 Implementation Requirements

Implementation means executing or performing tasks based on a plan, method or model. Things or tools that will be required for performing those tasks are called implementation requirements. One should have broad knowledge about tools that will be required for a specific task otherwise execution of perfect implementation won't be possible.

To implementing the whole coding part, we have used Android Studio and coding languages were object-oriented programming language called Java and XML [11]. Front-

end implementation or user interface implementation was done by using a markup language called XML. For back-end implementation or database implementation, firebase was used.

Users will require an internet connection to log in and sharing live location. For sending emergency messages, an internet connection isn't required but will charge message cost which will be deducted from the user's phone balance.

CHAPTER 5

IMPLEMENTATION AND TESTING

5.1 Implementation of Database

For the processing of the database of the Emergency SOS Service, we have used the firebase database platform. This database is used in sharing user to user live location where the location will update automatically in a certain period. So when a user shares location, real time database updates the location based on the users' current location and delivers this updated location to the other user to whom the location is shared. We have used the below-mentioned code which generates a reference to the location branch which exists in the firebase real-time database and to get all the data inside the location branch, we used "ValueEventListener" which makes the location data to be updated in realtime.

Firebase also gives the facility to authenticate users using email and password, phone number, Google, etc. So using firebase, one can implement the user login stage and verify that if the user is valid. We have used user login using the phone number and verification using OTP code which we have defined in "firebaseAuth.signInWithCredential()" method. Based on this method, firebase will generate an OTP code which will be sent to the number user will use to log in. Upon submitting the right OTP code, the user can access the application.

To avail firebase real-time database, we have implemented the below code in our application Gradle file:

```
com.google.firebase:firebase-database:19.5.1
```

And to avail firebase authentication, we have implemented the required code in our application Gradle file.

5.2 Implementation of Front-end Design

For designing the layout or user interface of our application, we used the android studio. Interface designing code was written in a markup language called XML. The layout folder of the android studio consists of all designing-related files of the application. We have used various widgets, buttons and containers to arrange the objects on the interface, among them some citable are mentioned below –

- **NavigationView**

This container gives the user easy access to other interfaces of the application. This view contains home, location, number, message and about us interface and by clicking them, a user can go to the desired interface.

- **FloatingActionButton**

This button is used in two interfaces, one is in message interface and another in number interface. Users can use this button for adding numbers and customizing emergency messages.

- **ImageView**

This widget is used for showing images in various parts of our application. ImageView mainly controls and manages all the properties like height, width, size, etc. of images that are being used in applications.

- **RecyclerView**

This container shows elements or data in a list manner. RecyclerView is very efficient in showing a large amount of data. We have used this container to show the number list that users will add to send emergency messages.

- **ScrollView**

We used ScrollView in our application where the layout is long so that user can scroll to see contents which are not visible in users' phone screen. This widget is very useful when showing a large amount of data in a single layout.

- **TextView**

Whenever we needed to show non-editable texts to the users, we have used this tool. We have tried to give enough information and instructions about our application through various TextView.

- **EditText**

We used EditText in our application so that users can input information where needed or customize an existing text. Some components need information from users to function properly and that's where this widget comes in handy.

5.3 Testing Implementation

There are some components we have used for our software testing. Number One is an Android phone (because our application is based on android), number two is Wi-Fi or mobile network and the third one is phone location must be on, for location checking which needs an additional software named Google Map.

Testing of our application is done in the mid-development stage and also in the post-development stage. In mid-development testing, we mainly used the android emulator for testing most of the functions. As our application has two main functions, one is sending emergency messages and sharing live location so our main focus during testing was whether these two functions work properly or not. But for working the two main functions appropriately, other sub-functions should also work properly which means we didn't neglect to test the sub-functions of our application. Now in the post-development testing, we used our android phones to give final testing of whether all the components of our application work perfectly or are there any malfunctions that exist. We have also let other users use our application so that they can give feedback whether they like the application or not and if someone didn't like our application, we have also asked the reasons behind not liking the application.

As the location is an important part of our project so following tests have been done to provide an accurate location –

- Checked whether location permission is added in the manifest file.
- Also checked if the methods in the Location Listener interface are implemented correctly. Methods in this interface are used for providing a specific user's

location, requesting updated location and update location coordinates in a given period.

5.4 Test Results and Reports

Based on our testing we have seen that after clicking the emergency button, the application sends a static location coordinate in the numbers that we have added for sending emergency messages. After clicking on the coordinates, Google Map will open to show the location indicated by the coordinates.

Upon testing the live location sharing option we have seen that it creates an element in the list of shared location which exists in location layout. The element consists of some information related to live location sharing and they are – phone number of that user to whom location is shared and the location coordinates in latitude and longitude. This location can be stopped either by clicking the trash icon on the right side of each element or pressing the cancel location sharing button in the home layout.

CHAPTER 6

IMPACT ON SOCIETY, ENVIRONMENT AND SUSTAINABILITY

6.1 Impact on Society

Emergency SOS Service will have a notable influence on society. To lead an untroubled life by someone being a woman is very difficult as they have to face trouble not only outside but also in their own home. Some trouble may lead to serious mental or physical conditions. In case of these types of situations, a woman can seek help using this application. We hope that this application will decrease the percentage of wrongdoings to women in our society. This application will help to ease the life of a woman anywhere. We can also train our elder ones to use this application so when they face an emergency but there is no one nearby, the person can use this application to get help. This application also offers a live location sharing facility. Using this feature, a user can track another user's position. This feature is also very helpful in various cases like if users want to track their children of where they are going or if they are lost then the user can easily locate where the children are and rescue them from the location where the application is pointing.

6.2 Impact on Environment

There are no negative impacts on the environment that will be caused by this application rather there are some positive impact will be created from using this application like a better and worriless environment, safe workplace environment for women, etc. This application doesn't promote nor has any relation to those objects which will cause damage to the environment and also there are no features that are being used in this application that will cause harm to our surroundings.

6.3 Ethical Aspects

This application is spam-free so that users don't have to be irritated while using this application. The interface of this application is kept very easy so that users of any age can use this application. This application isn't heavily featured so users don't have to struggle to find any desired feature to act. We don't collect any private data of the user and any data of the user is used with the consent of the user. This application also uses proper ways to inform the user of what permission should be allowed to function the application perfectly. Enough information is given in the user interface of the application so that when interacting with the interface user will easily understand the operation of each element in the interface and what will be the outcome if the user performs any action.

6.4 Sustainability Plan

Sustainability means how an application will be relevant or sustain in the long term. Sustainability plan makes an application more stable and effective so that after a certain time users don't lose interest upon using the application. Sustainable applications are those which are developed with new features from time to time or refurbish the existing features for better effectiveness of the application. Applications sustainability can also be maintained by developing an application in that area where users need don't run out after a certain period.

We have built the application to get help during emergencies. Emergency situations are part of our life and these situations can be faced by us or by our relatives or friends. So having this application is always beneficial as we don't know when an emergency will arise. From this perspective, we can say that this application is sustainable. We have also the planning of adding more features to the application in future development which will make the application more sustainable. We will try to get user-review in a broad way to know which feature users like and which users don't for future development which will be a great way to make the application sustain.

CHAPTER 7

CONCLUSION AND FUTURE PLAN

7.1 Discussion and Final Thoughts

Our project completion process was done step by step by following various plans or methods for each step like categorizing requirements and analyzing them, use case model for understanding the structure of the application, interaction design, users experience with the application and finally testing the application to make the application efficient and able to give better output. This application will only take required data from the user and no other data that will hamper the user's privacy. We didn't place an age restriction to use this application. Internet connection is required but the application consumes a nominal amount of data which means a user can use this application even with a slow internet connection.

The main objective of this application is to ease daily life by giving the feel of safe knowing that getting help from closed ones is just one click away. If anyone gets salvation from an emergency by using this application, we will feel that the implementation of the project is fruitful in every way.

7.2 Future Plan for Further Developments

We have planned for developing the application with a feature that will give mobile security which means if the phone is lost or is in the wrong hand then this feature will help to secure the data of the phone by making the phone unusable to the others except for the owner of the phone. The reason we are planning to add this feature is, as the application already gives human security so why not let the application also secure the user's phone. We have also planned to add the necessary number's list of nearby hospital, police station and fire brigade.

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