CHAPTER 1

INTRODUCTION

1.1. Overview

Women's safety is a big concern which has been the most important topic till date. Women safety matters a lot whether at home or working place. We are all aware about the safety of women, but we must realize that they should be properly protected. Women are not physically strong as men; in an emergency a helping hand would be a relief for them. As some women travel in nights, it's necessary to remain alert and safe. Although government is taking necessary measures for their safety, we need to be alerted every minute. Most of the women carry smartphones these days with them, so it is necessary to have one safety app installed in the phones.

Here we introduce an app which ensures the safety of women. This helps to identify and call on resource to help the one out of dangerous situations. These reduce risk and bring assistance when we need it and helps us to find the location of the one in danger. This is a user friendly and can be accessed by anyone who has installed in their smart phones. Our intention is to provide fastest and simplest way to contact your nearest help. User can activate this service by adding emergency contacts. The system sends an alert message with user location to one of the registered phone numbers. This app is an ultimate tool that can be used in real case emergency situations.

1.2. Applications

Personal safety apps are designed specifically for you to communicate with others that you may need help. These apps will provide you peace of mind, immediate communication and access to help in an emergency. User can stay in constant contact with their family and friends. Access to GPS location in the app will keep the track of real time location. Instant alerts from the app can be helpful so that women can be saved by becoming the victim of attacks.

1.3. Problem Statement

At any emergency situation people get panicked and, in that situation, they may not be able to operate their smart phone applications and cannot immediately defend the attacker and protect themselves. The proposed system can be useful for woman and children for security purpose and is to share the current location of the person which has an android enabled mobile by extracting the longitude and latitude of that target person.

1.4. Objectives

The objectives of the proposed system are:

- To provide safety to women.
- To provide integrity, confidentiality, and security to user's data.
- To collect data of primary contacts of the user.
- To alert the primary contacts when user is in danger.

1.5. Overview of Android

1.5.1. Architecture of android

Android architecture contains different number of components, which supports any android device. Android software contains an open-source Linux Kernel having collection of number of C/C++ libraries which are exposed through an application framework service. Among all the components Linux kernel provides main functionality of operating systems. Which functions to smart phones and DVM [Dalvik virtual machine] that provides platform for running an android application.

The main components of android architecture are:

- Applications
- Application frameworks
- Android runtime
- Platform libraries
- Linux kernel

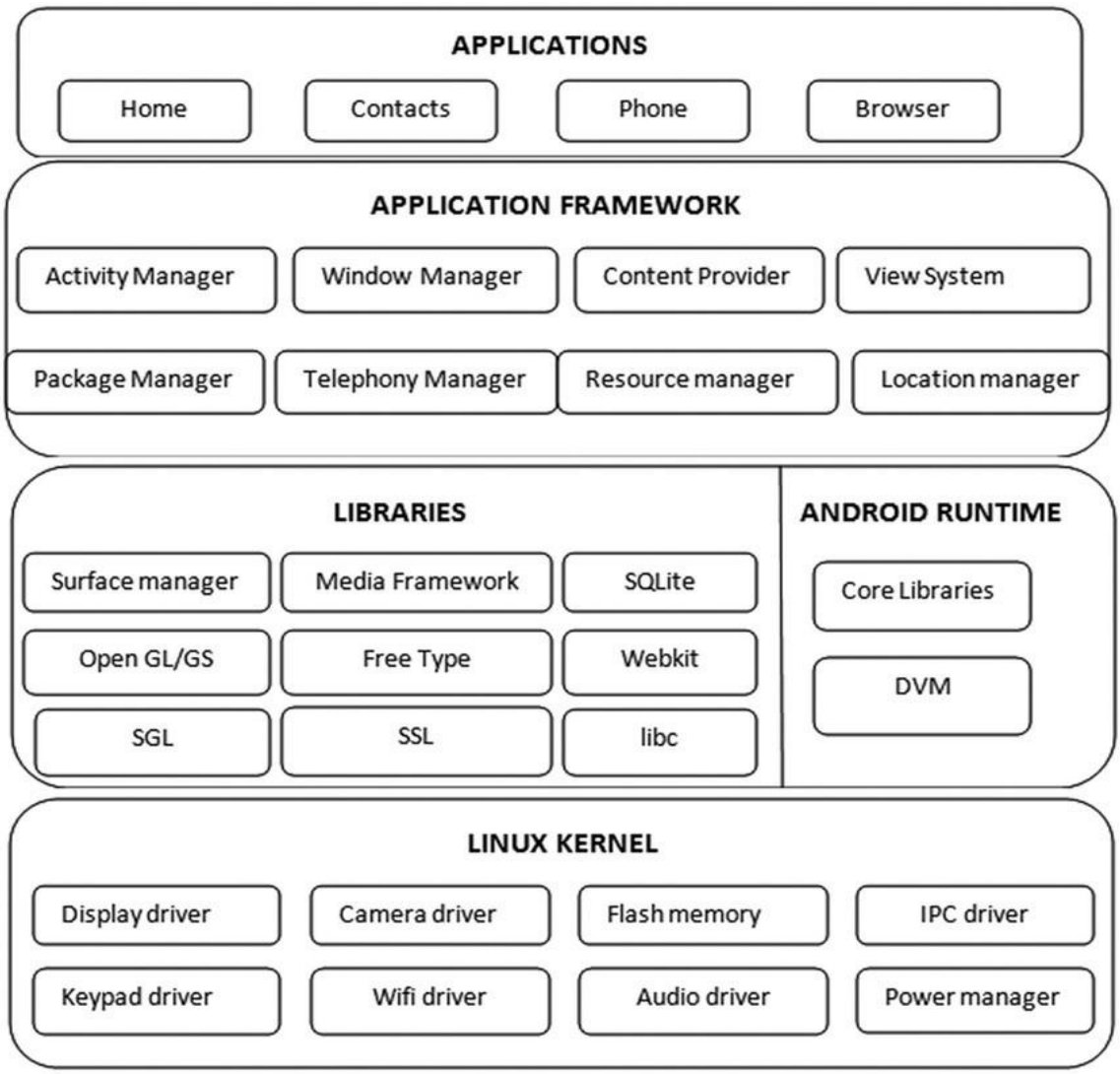

Figure 1.1: Pictorial representation of android architecture

1.5.1.1. Applications

Applications are the top layer of android architecture. The pre-installed applications like home, contacts, camera, gallery and the third-party applications downloaded from the play store will be installed on this layer. It runs within the android run time with the help of classes and services provided by application frameworks.

1.5.1.2. Application frameworks

Application frameworks provide several classes which are used to create android application. It provides the generic abstraction for hardware access and helps in managing the user interface with application resources. That includes different types of services activity manager, notification manager, view system, package manager etc.

1.5.1.3. Application runtime

Android runtime environment is one of the most important parts of android. It contains components like core library and DVM which mainly provides base for our application and powers with help of core library. Like JVM [Java virtual machine] DVM is also a register base virtual machine and specially designed and optimised for android. It depends on layer Linux kernel and low-level memory management.

1.5.1.4. Platform libraries

The platform libraries include various C/C++ core libraries and java based libraries such as media graphics, surface manager, openGL etc. to provide support android development. Media library provides support to play and record audio and video formats, surface manager is responsible for managing access to display subsystem, SGL and openGL both are cross platform API used for 2D and 3D computer graphics.

1.5.1.5. Linux kernel

Linux kernel is heart of android architecture. It manages all the available drivers such as display drivers, camera drivers, Bluetooth drivers, memory drivers. This provides an abstraction layer between hardware and other components of android architecture. It is also responsible for memory and power of the devices.

1.5.2. Features of android

Android is a powerful operating system competing with Apple 4GS and supports great features. Few of them are:

Sr. no	Feature	Description
1.	Beautiful UI	Android OS basic screen provides a beautiful and intuitive user interface.
2.	Connectivity	GSM/EDGE, IDEN, CDMA, EV-DO, UMTS, Bluetooth, Wi-Fi, LTE, NFC, WiMAX
3.	Storage	SQLite lightweight relational database is used for data storage purpose.
4.	Media support	H.263, H.264, MPEG-4 SP, AMR, AMR-WB, AAC, HE-AAC, MP3, JPEG, PNG, GIF
5.	Messaging	SMS and MMS

6.	Web browser	Based on open-source Web Kit layout engine coupled with chrome V8 JavaScript engine supports HTML and CSS.
7.	Multi touch	Android has native support for multi touch was initially made available in handsets such as HTC hero.
8.	Multi-tasking	User can jump from one task to another, at same time various application can be run simultaneously.
9.	GCM	Google cloud messaging is a service that lets developers send short messages data to users on android devices.
10.	Wi-Fi direct	A technology that lets apps discover and pair directly, over a high-bandwidth peer-to-peer connection.

Table 1.1: Features of android architecture

1.6. Overview of Kotlin

Kotlin is a modern, trending programming language that was released in 2016 by JetBrains. It has become very popular since it is compatible with java. Kotlin is used for mobile applications, web development, server-side applications, data science. Kotlin is expected to make android app development process faster.

1.6.1. Features of Kotlin

There are 12 important features of Kotlin:

a. Kotlin is an open source: The very first thing you should know about Kotlin is that it is an open-source programming language. But, apart from being opensource, Kotlin also provides a single click tool using which, developers can convert existing Java code. And if you're an Android app developer who is new to Kotlin and interested in learning it from scratch, we recommend starting with the beginner course available on Udemy and Udacity. These courses will help you to sharpen your skills.

b. Kotlin Supports Full Java Interoperability: One of the major as well as the best features of Android Kotlin is its deep interoperability with Java. This, in fact, has attracted many Java developers as well as Android app developers to learn Kotlin. It basically runs on JVM and also supports Java libraries as well as tools, providing full Java interoperability. Both the languages co-exist, and this makes it easier for developers to be productive. Developers can easily compile one Android project in both languages with the help of this feature – interoperability function. This will allow the developer to switch the programming language instead of changing the codes. It will also save time for them to develop more Android apps. It can show 100% interoperable. So, if you need access to a Kotlin method from a Java class or vice versa, you can do it without any extra parameters.

c. Kotlin Comes with Lazy-Loading Feature: The lazy-loading feature basically increases the start-up time, which is very useful when using it for Android development. In simple words, it's the best solution for all developers who want to reduce their Android app start-up time so that their apps' content can be shown faster. With the lazy-loading feature, Android developers can load the only resources into main memory which are necessary. If you are looking for this feature, then Kotlin is the best choice. For example, if you have a shopping app, the majority of users will only browse your selection, that means you could have the payment API be lazy loaded.

d. Data Classes in Kotlin: The necessity of a class is always argued by programming language designers/makers. Typically, a data class in Java contains lots of boilerplate code which developers have to skip in order to find out the real use of that class. But now in Kotlin, Android developers can write the equivalent of the same Java code in a simple manner, and with lesser code. Therefore, the data classes in Kotlin are also known to be one of the useful features.

e. Collection Filtering: We all know that when working with an API, we developers need to deal with quite often. But by using Kotlin's collection filtering feature, it's easier to tell what your resulting list should contain.

Features	Java	Kotlin
Fully OOP(Object-Oriented Programming)	Not pure OOP	Fully OOP
Null Safety	No	Yes
Checked Exception	Yes	No
Invariant Array	No	Yes
Smart Casts	No	Yes
Lambda Expression	No	Yes
Singletons Object	Yes	Easily create Singleton objects
Functional Reactive Programming	No	Yes

Table 1.2: Difference table of java and Kotlin

1.6.2. Advantages of Kotlin

1. It's Completely Interoperable with Java: As already mentioned above, one of the biggest conveniences with using Kotlin is that it's compatible with Java, with all its tools and frameworks, you can just add these to your Kotlin projects, nice and easy, with no need to change the entire project in Java.

2. Safer Code: We've already settled that Kotlin's code is more concise, therefore it goes without saying that a concise, compact, and clear code is implicitly a safer code. Being more compact, it allows fewer errors.

3. It Comes with a Smarter and Safer Compiler: Adding a good compiler has been one of Kotlin's development team's main goals when they created this programming language.

4. It's Easier to Maintain: It's not for no reason that Kotlin's a “one-stop language” for all application development, it supports lots of IDEs, Android Studio included. Therefore, you're free to use all those already tried and tested development tools that you're comfortable with for maintaining your codebase at scale. This is another one of those "hard-to-resist-to" advantages of Kotlin over Java.

5. It's Been Created to Boost Your Productivity: Another one of the key advantages of Kotlin over Java is that it has been built with developer productivity in mind. And, it goes without saying that enhanced productivity goes back to concise code itself, including to its intuitive syntax and its overall clean language design. It'll take you less time to write new code in Kotlin, to deploy it and to maintain it at scale.

6. It Has Null in Its Type System: Nullability issues have been one of Java's wellknown sore points. Since it's a common thing in Android for the absence of certain values to be represented as “null”, Kotlin comes to address these issues by placing null right in its type system.

1.6.3. Role of Kotlin in app development

Kotlin is the preferred language for Android development in 2021. Both Java and Kotlin can be used to build performant, useful applications, but Google's libraries, tooling, documentation, and learning resources continue to embrace a Kotlin-first approach; making it the better language for Android today.

CHAPTER 2

DESIGN & IMPLEMENTATION

2.1. Functional Requirements

Here are the functional requirements for developing women safety app:

2.1.1. Software requirements

- The required language is Kotlin.
- Editor of android studio lang- Kotlin and xml
- API [Application programming Interface]
- Google chrome, Firefox, Microsoft edge or brave browser with extension support.

2.1.2. Hardware requirements

- Operating system: Windows
- Processor: intel (i3) minimum
- RAM: 8GB minimum
- Hard disk: 256GB minimum

2.1.3. Non-Functional requirements

- When user downloads this App, they have to first sign in using their email. When they click Sign in, they automatically sign in with their email from which their google account is linked.
- When they get signed in, they can fill guardian details that is their closer ones contact details, user has to fill name, email, phone number of the guardian and have to submit.
- After submitting user can view the guardian details which they have filled.
- Whenever the user feels unsafe in some location, user just have to open the “Women Safety App” and click on Emergency button.
- Then guardians of that user will get SMS as “Emergency at Location!!” with their current location.

2.2. Design

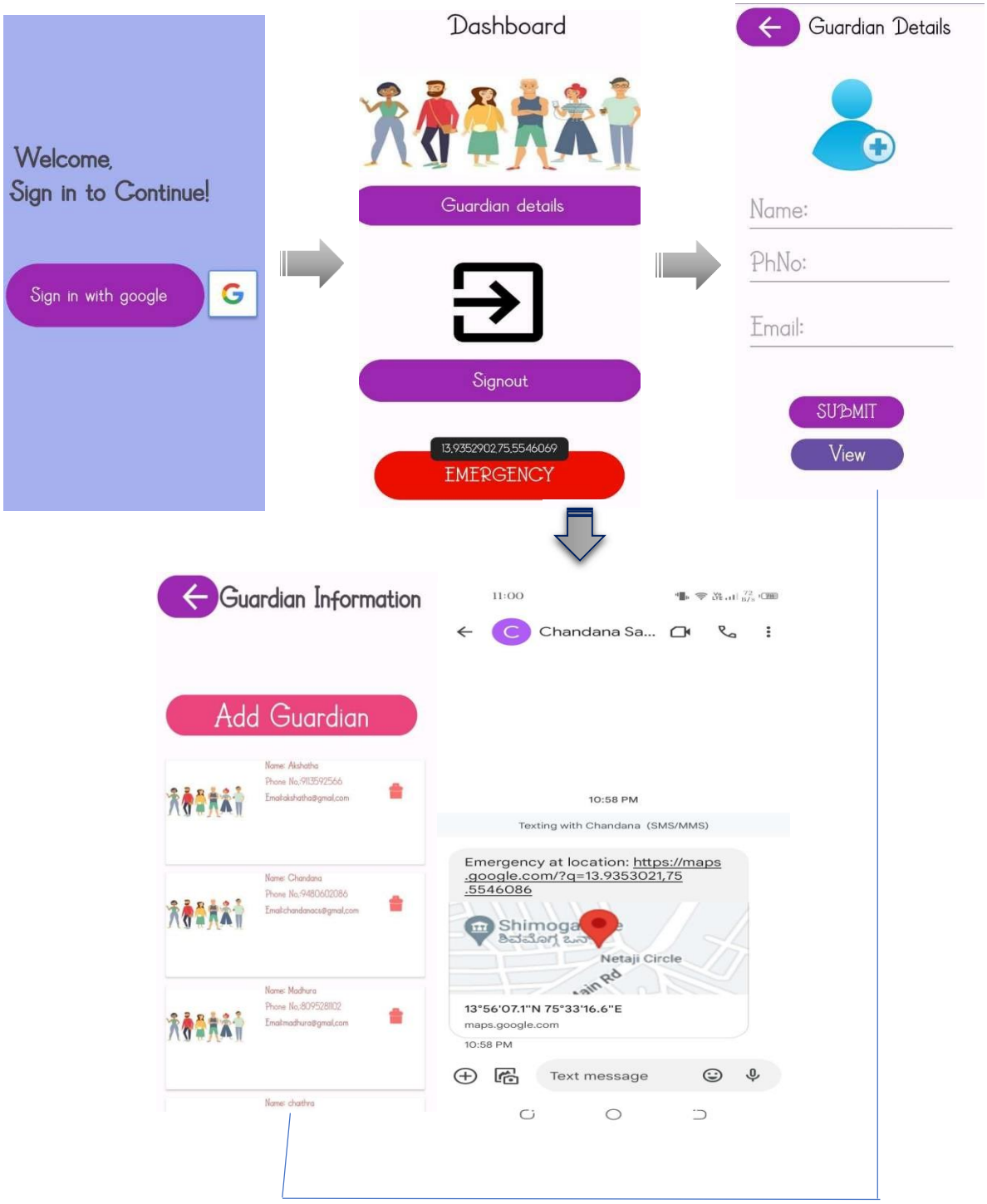

Figure 1.2: Blueprint of the App

2.3. Fire store

2.3.1. Overview of Firebase technologies

Firebase is a product of Google which helps developers to build, manage, and grow their apps easily. It helps developers to build their apps faster and in a more secure way. No programming is required on the firebase side which makes it easy to use its features more efficiently. It provides services to android, iOS, web, and unity. It provides cloud storage. It uses NoSQL for the database for the storage of data. Firebase initially was an online chat service provider to various websites through API and ran with the name Envolve. It got popular as developers used it to exchange application data like a game state in real time across their users more than the chats. This resulted in the separation of the Envolve architecture and its chat system. The Envolve architecture was further evolved by its founders James Tamplin and Andrew Lee, to what modern day Firebase is in the year 2012.

2.3.1.1. Features of firebase

Mainly there are 3 categories in which firebase provides its services.

1. Build better applications

This feature mainly includes backend services that help developers to build and manage their applications in a better way. Services included under this are:

- Realtime database: The firebase real-time database is a cloud-based NoSQL database that manages your data at blazing speed of milliseconds. In simplest term, it can be considered as big JSON file.

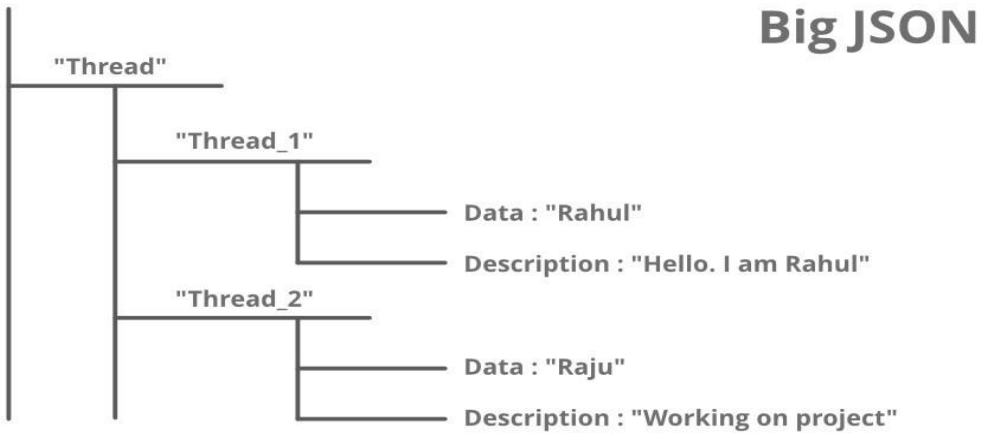

Figure 1.3: Big JSON

- Cloud fire store: The cloud fire store is a NoSQL document database that provides services like store, sync, and query through application on global site. It stores data as objects in form of documents.

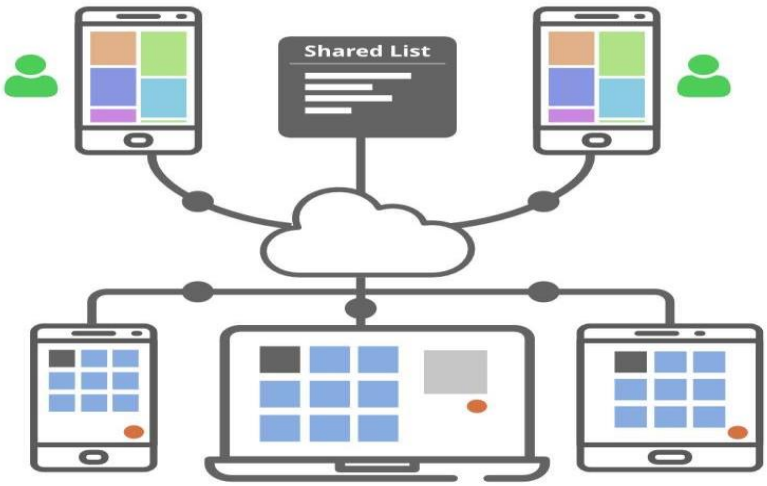

Figure 1.4: Cloud fire store

- Authentication: This service provides easy to use UI libraries and SDK to authenticate users to your app. It even handles tasks like merging accounts which manually can be hectic.

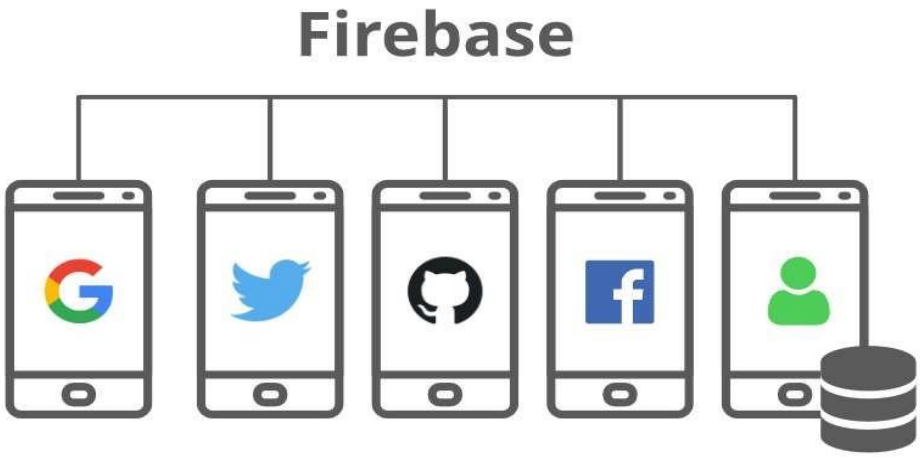

Figure 1.5: Authentication

- Remote config: This service helps in publishing updates to user immediately. These are often used while publishing seasonal offers and content that has limited life.
- Hosting: This service provides hosting of applications with speed and security. It can be used to host static and dynamic websites and microservices.

- Firebase cloud messaging [FCM]: This service provides a connection between server and application end users, which can be used to receive and send notifications.

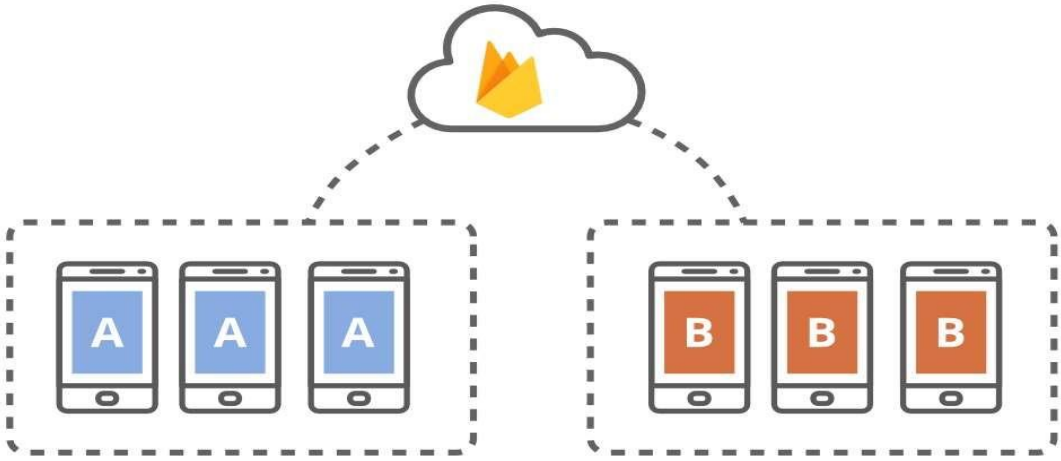

Figure 1.6: Firebase 1

2. Improve app quality:

- Crashlytics: This is used to get real time reports. These can be used to improve quality of application.
- Performance monitoring: This service gives insight to performance;
- characteristics of applications.
- Test lab: This service helps to test your applications on real and virtual devices provided by google which are hosted on data centres.
- App distribution: This service is used to pre-release applications that can be tested by trusted testers.

2.3.1.2. Advantages of firebase

- Free plans for beginners.
- Real time database available.
- Growing community.
- Available numerous services.

2.3.1.3. Disadvantages of firebase

- It uses NoSQL, so people migrating from SQL may feel it as difficult.
- It's still in growing, so not tested to extent.

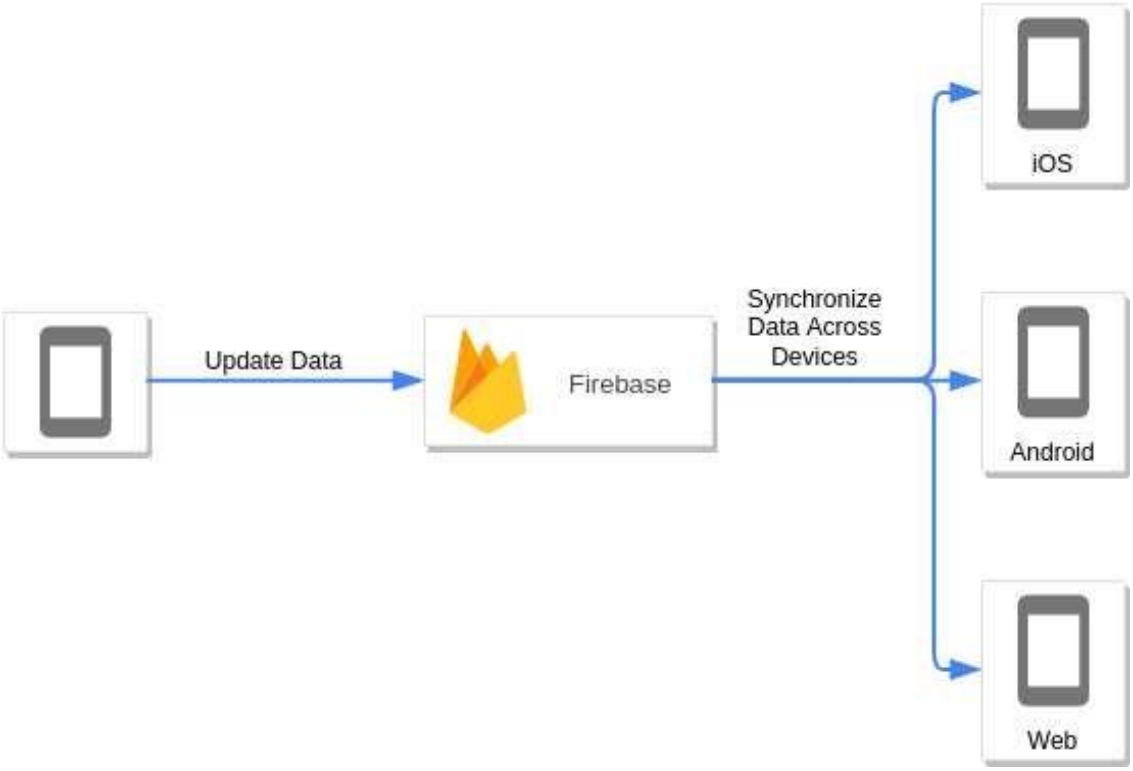

Figure 1.7: Firebase 2

2.3.2. Fire store structure

Figure 1.8: Structure of firebase

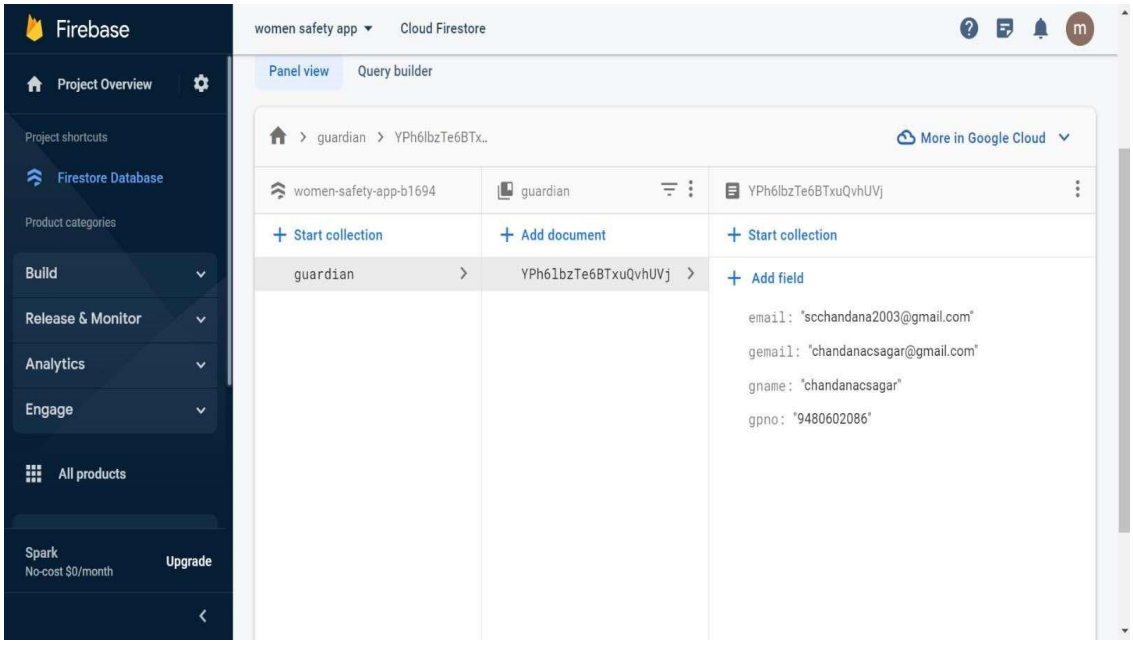

Figure 1.9: Data stored in firebase

In Figure 1.9 shows the database stored in the firebase. When we register with particular details such as Name of the guardian, Email, Phone number, those details will be stored in the firebase. When we try to fill the guardian details of the user, it stores the details in the backend and when we click on view button it fetches the data from backend and displays.

2.4. Implementation

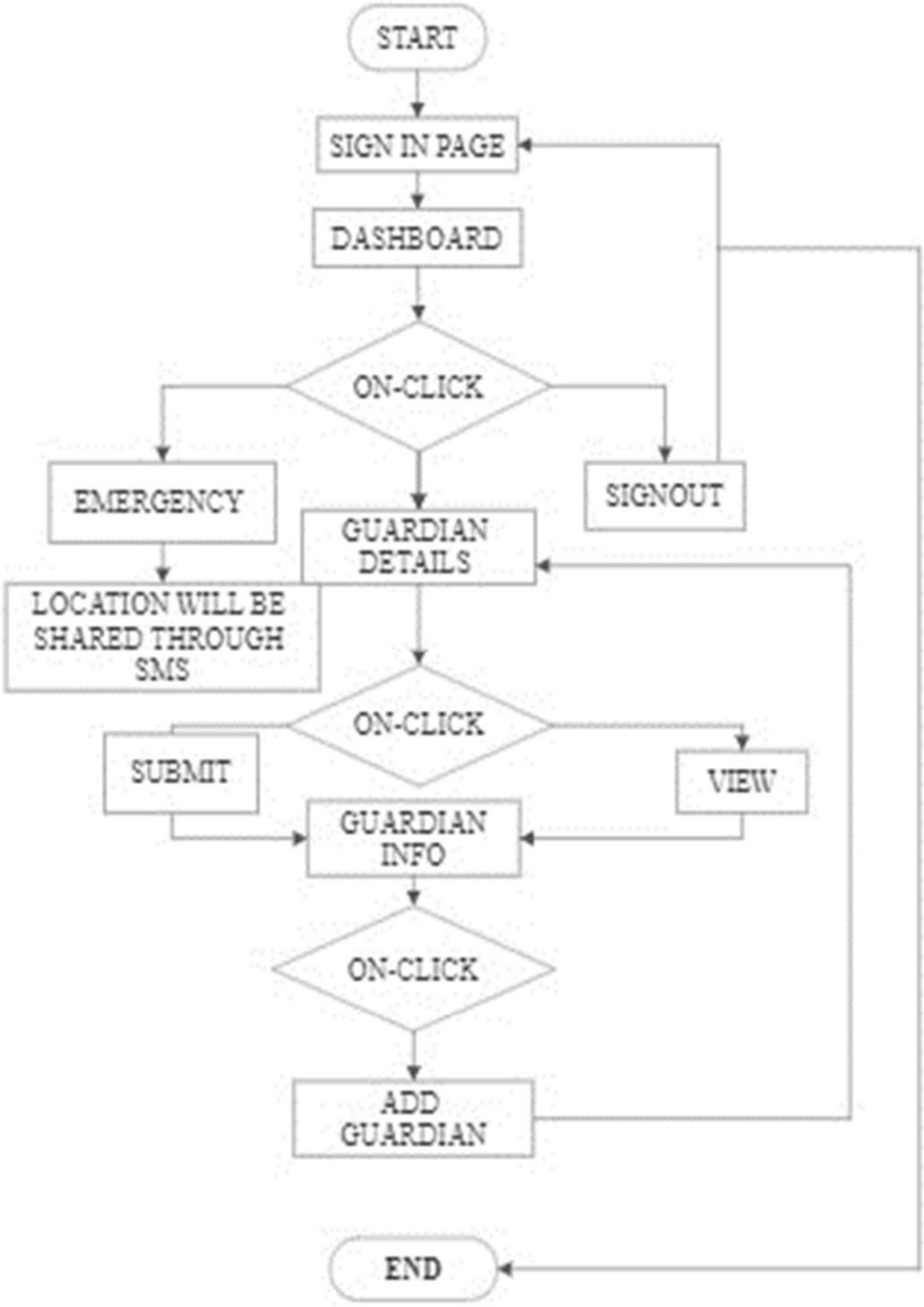

Figure 2.0: Flowchart of the women safety app

2.5. APIs used

Android APIs	
APIs used	Explanation
FirebaseAuth.getInstance()	The entry point of the Firebase Authentication SDK. First, obtain an instance of this class by calling getInstance().
FirebaseFirestore.getInstance()	Firebase Firestore provides the getInstance() method, which opens a socket (only one, at any time of execution of the app) and instanciate the Firestore client.
findViewById<View>(id)	Finds a view that was identified by the id attribute from the XML that was processed in OnCreate(Bundle).
AppCompatActivity()	Alternate constructor that can be used to provide a default layout that will be inflated as part of super.onCreate(savedInstanceState).
GoogleSignIn()	A user always has the option to revoke access to an application at any time. This describes how to complete a basic Google Sign_in integration.
GoogleSignInClient()	You don't need to implement any register and login for every time, instead this describes the linked account of the user with google account.
GoogleSignInOptions()	It describes the options that is emails that user is having.

Table 1.3: API used

CHAPTER 3

RESULTS

Snapshots:

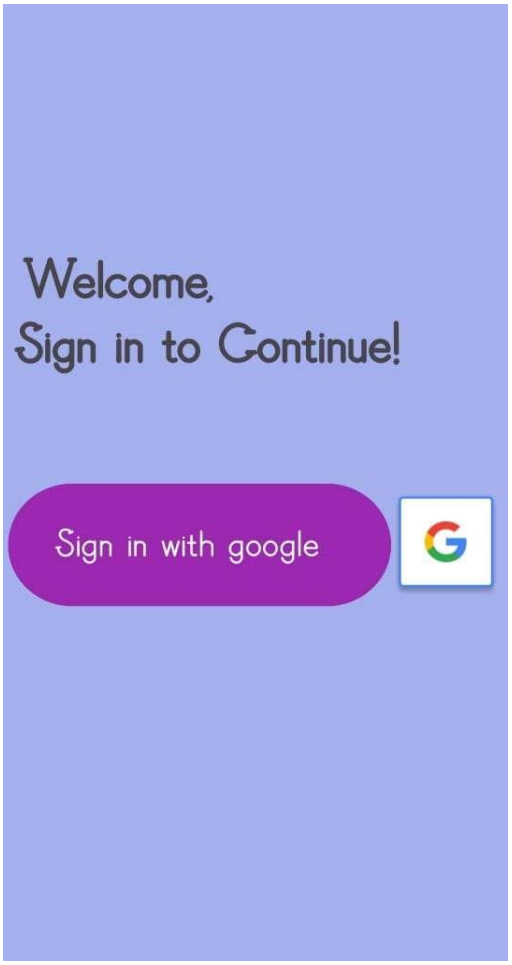

Figure 2.1: Sign-In Page

Figure 2.1 is the Sign-In page for the user who are new to the app and those who are signed out from the application and user will have options for choosing the email and after choosing email, they are signed in for the women safety application, once user have signed in they just can simply use the app.

Figure 2.2: Dashboard Page

Figure 2.2 is the Dashboard page, it includes guardian details button and sign-out, and emergency button.

Figure 2.3: Add guardian Page

Figure 2.3 is the Guardian details page, it includes Name, Phone No and Email text fields where the user can enter closer ones contact details and submit and view.

Figure 2.4: Guardian details Page

Figure 2.4 is the Add Guardian page, it displays the guardian details which user has entered and user can delete whenever wants to delete.

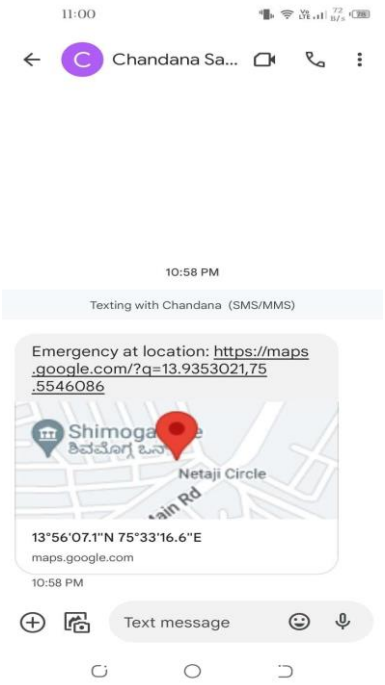

Figure 2.5:SMS Page

Figure 2.5 is the SMS page; it shows the message sent by user with current location.

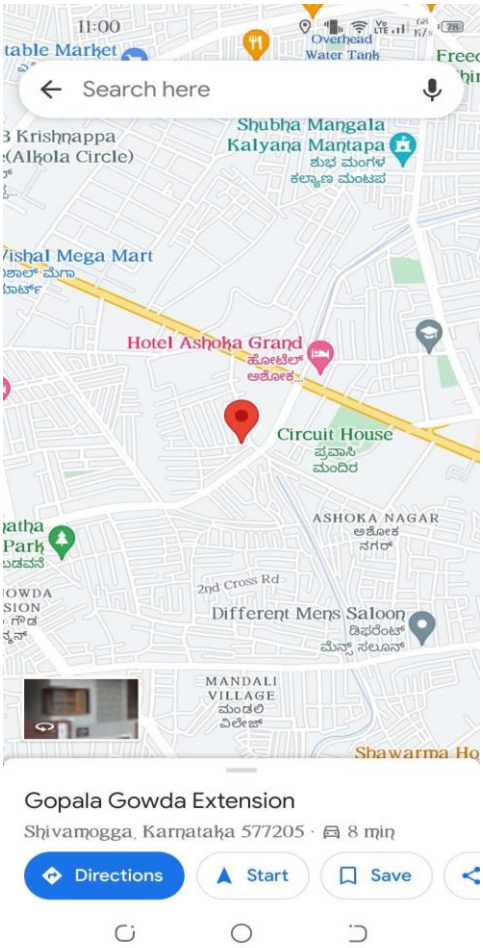

Figure 2.6: Google map Page

Figure 2.6 is google map page, it shows current location of the user via Google map.

CHAPTER 4

CONCLUSION & FUTURE SCOPE

4.1. Conclusion

Unfortunately, safety of women is in doubt and security is not concerned. Many headlines are coming across, so we are trying to contribute little efforts towards women which will ensure the safety and respect for women. The mobile application is much helpful for everyone. This is to let women is now safe to travel alone as someone is getting their updated location.

4.2. Future scope

This project we made is small scale but has a large development scope and we look further to the day it can be extended and used by all common people so in totally this project is an initiative by youth community to contribute to the betterment of society.

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4. https://www.youtube.com