An Undergraduate Internship/Project on ArmsCall, an emergency response system

By

Md. Zahiduzzaman

Student ID: **1720147**

Summer, 2021

Supervisor:

Mr. Sheikh Abujar

Lecturer

Department of Computer Science & Engineering

Independent University, Bangladesh

September 11, 2021

Dissertation submitted in partial fulfillment for the degree of Bachelor of Science in Computer Science

Department of Computer Science & Engineering

Independent University, Bangladesh

Attestation

This is to certify that the report is completed by me, Md. Zahiduzzaman (ID:1720147), submitted in partial fulfillment of the requirement for the Degree of Computer Science and Engineering from Independent University, Bangladesh (IUB). It has been completed under the guidance of Md. Sheikh Abujar. I also certify that all my work is genuine which I have learned during my Internship. All the sources of information used in this project and report have been duly acknowledged in it.

Signature	Date
Md. Zahiduzzaman	
Name	

Acknowledgement

First and foremost, I would like to express my gratitude to Almighty Allah for blessing me with the endurance and capability to work hard and bestowing upon me the opportunity to do my internship at Essential Infotech. I would also like to thank my parents for their unconditional love and support, especially when working from home during the lockdown. I would like to thank my honorable faculty and supervisor Mr. Sheikh Abujar, Lecturer, Department of Computer Science Engineering, Independent University, Bangladesh, for his invaluable guidance, patience, time, constructive criticism and thoughtful advice regarding various aspects of my internship and preparation of this report. Finally I would like to express my gratitude to Mr. Mostahid Ahmed, Director of Essential Infotech, for giving me the opportunity to complete my internship at their company. The learning experience that I have gained from here has helped me learn a lot about Mobile Application development, in particular, cross-platform development frameworks, API integration, use of Google Cloud Services and deployment of mobile apps to the different app stores. I would like to also thank my colleagues for helping me out in certain parts of my work and making my internship process a much easier and enjoyable one.

Letter of Transmittal

September 7, 2021
Mr. Sheikh Abujar
Lecturer
Department of Computer Science and Engineering, Independent University, Bangladesh.

Subject: Internship Report submission Summer, 2021.

With due honor and respect, I, Md. Zahiduzzaman, from Summer 2021, Section 7, would like to submit my Internship report. This report is written to kindly inform you that I have completed my internship program and its report. My internship was conducted from 4th April 2021 to 30th June 2021. I have completed my internship at Essential Infotech.

This report is based on my experience and the work I did at Essential Infotech during my internship. The primary goal for my internship was to gain experience in cross-platform Mobile Application development which would include working with cross-platform frameworks like Flutter, making use of Google Cloud services, REST API integration, app store deployment, as well as creating documentation for users and developers, and also repository management.

Over the period of my internship at Essential Infitech, I have learned and applied a lot of these new skills and technologies. The company comprises a dedicated team of developers who never hesitate to come forth in helping newcomers get used to the company culture.

I would like to thank you immensely for all your guidance and support. I hope and pray that this report fulfills all the requirements and is up to your expectations.

Sincerely,
Md. Zahiduzzaman, 1720147

Evaluation Committee

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Signature

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Supervisor

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Internal Examiner

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External Examiner

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Abstract

In the dire circumstances presented by the COVID-19 pandemic, many people are unable to get access to many of the emergency services, either due to the service providers being short-staffed or, the lack of space in places like hospitals. That is why many organizations have come forth to provide dedicated emergency services in these times. But most of them have no convenient way for users to get in touch with them. These organizations are in need of systems that can help them reach out to people easily, and can also help people to get quicker access to their services. One of the most convenient ways of attaining services is through mobile applications. With mobile applications, people can attain any form of service, anywhere within the palm of their hands. So, it would be a wise decision to make the services of these organizations be made available using mobile applications.

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Chapter 1

Introduction

1.1 Overview/Background of the Work

In these dire times of the COVID-19 pandemic, many people are unable to attain any form of emergency assistance from any emergency service provider, either due to the service providers being short-staffed or the lack of availability of space when it comes to service providers such as hospitals. As a result, many organizations have created dedicated teams that are engaged in providing those emergency services where the service providers are unable to do so. However, these organizations often don't have the means of making it easier for customers to reach them in time of need. As such, our company received a project from a client where there could be a system to make it easier for customers to access their services. And thus our company started working on an emergency response system which consists of a mobile app to make the system more accessible to not only the customers but also the service providers.

1.2 Objectives

The project that was presented to me was provided by a client who was in need of an emergency response system in the form of a cross-platform mobile application. In the system, users are to create accounts using their email address. After the account creation is successful, users can enter more of their personal details in order to create their user profile. Once a user has completed their profile creation, they can then continue using the application. From the app, a user can access a list of all the other available users whom they can contact in time of an emergency. Once the user has selected a responder, the responder receives a notification containing the users' name, current location and contact number. Upon requesting for help, payment will be automatically deducted from the user's wallet, which will be powered by a payment gateway. The app will also let users create calendar events for scheduling certain emergency calls. The app can let users

access their personal accounts for the payment gateway, and finally the app will provide contact numbers for emergency services like hospital, fire department and police.

1.3 Scopes

- **Call for Help:** Users can use the app to call other service providers in times of emergencies
- **Call Scheduling:** Users can set calendar schedules for certain calls to an emergency service provider
- **Access to General Services:** Users will also have access to the contacts of general emergency service providers such as hospitals, police department and fire department.
- **Payment Gateway:** A payment gateway is to be set up for the users to be able to conduct payments for the services they request.
- **Profile Creation:** Users are to create their profiles which make them identifiable by the emergency service providers.

Chapter 2

Literature Review

2.1 Relationship with Undergraduate Studies

The following courses that I had been a part of during my undergraduate studies have helped me immensely during the development process for the project. The courses are briefly discussed below:

- **CSE213 - Object Oriented Programming:** This course was responsible for understanding the concepts of object-oriented programming using classes and objects. It also taught us concepts like encapsulation, creation of super-classes and models and basic UI design which were a vital part of the project creation.
- **CSE303 - Database Management:** This course taught us how to create and manage databases for any system as well as give us lessons on tools like Rich Pictures and the Six-elements analysis.
- **CSE307 - System Analysis and Design:** This course taught us how to project documentation as well as software development methodologies such as Software Development Life-Cycle (SDLC), agile method etc.
- **CSE437 - Theory of Computation and Automata:** This course helped me learn about regular expressions, which were used in the project for creating validator functions for form fields.
- **CSE464 - Mobile Application Development:** Finally, the course responsible for teaching me most of what is required for creating the internship project. This course taught us how to create layout for mobile devices, how forms are handled in mobile applications, some good practices for UI design for mobile apps, app state management, use of local database, use of cloud database service like Google Firebase and then provided us with app ideas where the acquired knowledge could be implemented.

2.2 Related works

TAC-Pulse: Recently our company worked on another, more comprehensive emergency response system, given to us by a client by the name TAC-Pulse. With TAC-Pulse, users are able to get access to emergency services provided by the client themselves, in a quicker and more accessible way. The system consists of a website and two mobile apps, one for dispatch units and one for regular users. The dispatch unit can monitor incoming requests straight from the app and provide the emergency services that are requested. The users on the other hand can request for emergency services, stating their reason of emergency, which then gets sent to TAC-Pulse along with the user's contact details and location, be it current location or any selected location.

Chapter 3

Project Management & Financing

3.1 Work Breakdown Structure

A Work Breakdown Structure helps us see the work done on the project in smaller tasks that collectively lead to the project's completion. Below is a Work Breakdown Structure diagram shown for ArmsCall:

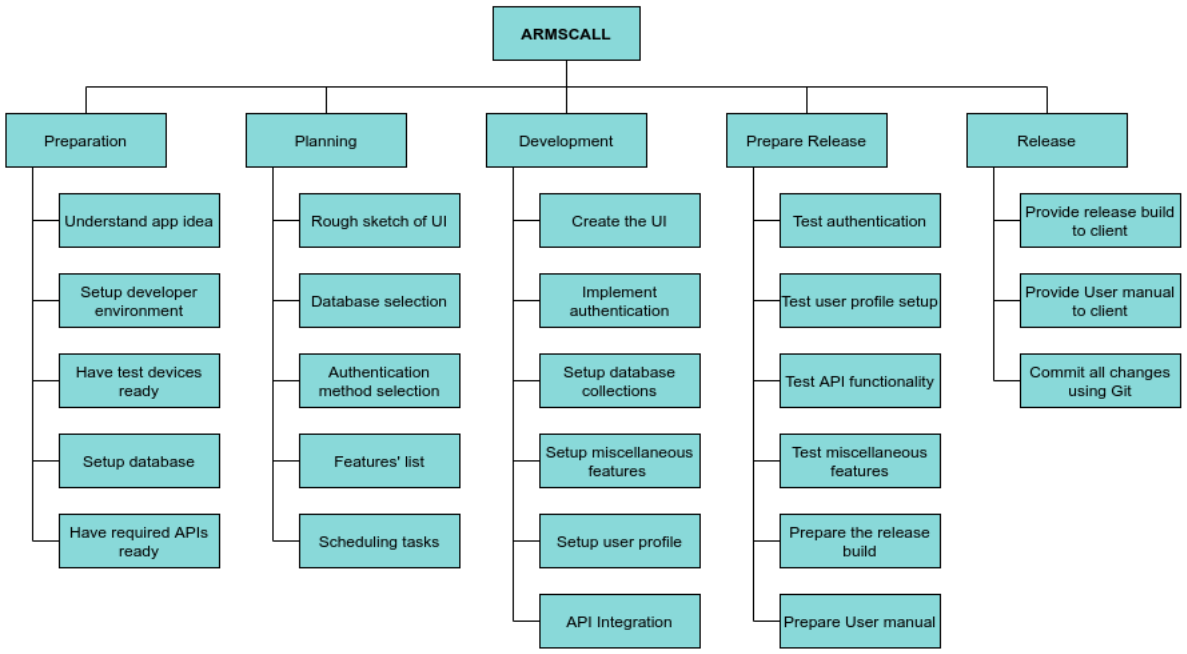

Figure 3.1: Work Flow Diagram for ArmsCall

In the preparation phase, it was required to understand the idea behind the app and get all the development tools ready. When doing the planning, a rough sketch of the app's UI was drawn. The database to be used for the app was selected to be Google Firebase. We set out the authentication method and the list of features and started to schedule the

tasks accordingly. First the UI design was implemented, along with the user interactions. After setting up Firebase Authentication, the database was set up using Cloud Firestore. The necessary collections and their documents for them were then set. Using the stored data, the user profiles were set up. At last the necessary APIs for location tracking, as well as miscellaneous functions such as adding calendar events, SMS notifications and access to other emergency services were implemented. Before preparing the release build, the app, APIs and the miscellaneous were tested among company staff. Finally, the release build was prepared and sent off to the client along with a User manual.

3.2 Process/Activity wise Time Distribution

For every process that is part of the development of ArmsCall, they were distributed into smaller time frames and it was made certain that those time frames were met in order to deliver the product to the client in due time. The time distribution for each of the major processes are displayed below and shown using Critical Path Method:

Activity	**Activity Name**	**Immediate Predecessor**	**Duration (in days)**
A	Design the UI	-	5
B	Setup Authentication	-	3
C	Setup Database	B	5
D	Setup User Profiles	C	2
E	Access to Other services	-	1
F	Setup Calendar Events	C	2
G	Setup SMS Service	C	2
H	Setup Map SDKs	C	3
I	Test and Release	-	5

Table 3.1: Activity Wise time distribution for ArmsCall

Edge	Node 1 → Node 2
A	1→2
B	1→3
E	1→4
I	1→9
d	2→9
C	3→5
d	4→9
D	5→6
F	5→7
G	5→8
H	5→9
d	6→9
d	7→9
d	8→9

Table 3.2: Activity edges and their preceding and succeeding nodes

We have now found the edges and their preceded and succeeded nodes. Using the Forward Pass Method, we get,

$E1 = 0$
$E2 = E1 + t1, 2[t1, 2 = A = 5] = 0 + 5 = 5$
$E3 = E1 + t1, 3[t1, 3 = B = 3] = 0 + 3 = 3$
$E4 = E1 + t1, 4[t1, 4 = E = 1] = 0 + 1 = 1$
$E5 = E3 + t3, 5[t3, 5 = C = 5] = 3 + 5 = 8$
$E6 = E5 + t5, 6[t5, 6 = D = 2] = 8 + 2 = 10$
$E7 = E5 + t5, 7[t5, 7 = F = 2] = 8 + 2 = 10$
$E8 = E5 + t5, 8[t5, 8 = G = 2] = 8 + 2 = 10$
$E9 = Max[Ei + ti, 9][i = 12, 4, 5, 6, 7, 8,]$
$= Max[E1 + t1, 9; E2 + t2, 9; E4 + t4, 9; E5 + t5, 9; E6 + t6, 9; E7 + t7, 9; E8 + t8, 9]$
$= Max[0 + 5; 5 + 0; 1 + 0; 8 + 3; 10 + 0; 10 + 0; 10 + 0]$
$= Max[5; 5; 1; 11; 10; 10; 10]$
$= 11$

Again using Backward Pass Method, we get,

$L9 = E9 = 11$
$L8 = L9 - t8, 9[t8, 9 = d = 0] = 11 - 0 = 11$
$L7 = L9 - t7, 9[t7, 9 = d = 0] = 11 - 0 = 11$
$L6 = L9 - t6, 9[t6, 9 = d = 0] = 11 - 0 = 11$
$L5 = Min[Lj - t5, j][j = 98, 7, 6,]$
$= Min[L9 - t5, 9; L8 - t5, 8; L7 - t5, 7; L6 - t5, 6]$
$= Min[11 - 3; 11 - 2; 11 - 2; 11 - 2]$
$= Min[8; 9; 9; 9]$
$= 8$
$L4 = L9 - t4, 9[t4, 9 = d = 0] = 11 - 0 = 11$
$L3 = L5 - t3, 5[t3, 5 = C = 5] = 8 - 5 = 3$
$L2 = L9 - t2, 9[t2, 9 = d = 0] = 11 - 0 = 11$
$L1 = Min[Lj - t1, j][j = 94, 3, 2,]$
$= Min[L9 - t1, 9; L4 - t1, 4; L3 - t1, 3; L2 - t1, 2]$
$= Min[11 - 5; 11 - 1; 3 - 3; 11 - 5]$
$= Min[6; 10; 0; 6]$
$= 0$

The critical path can be found by finding the events where the E-values and the L-values are equal. Here, the critical path is $1 \rightarrow 3 \rightarrow 5 \rightarrow 9$, and the critical activities are B, C and H.

3.3 Gantt Chart

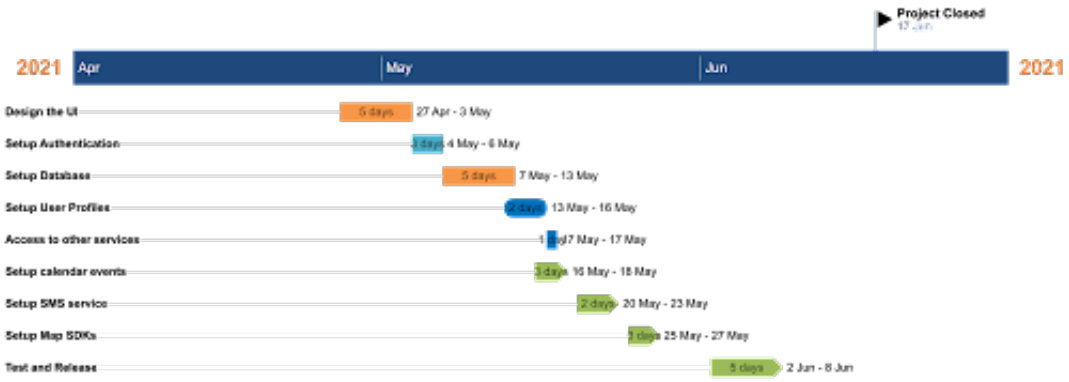

Figure 3.2: Gantt Chart for ArmsCall

From the Gantt chart it is possible to visualize the time distribution set for each of the major processes that went into the development of ArmsCall. The entire development process ended within a month and the project was closed on June 17 of this year. The processes that took the longest time to complete were the UI design, as there was no pre-made template used and everything was built from scratch, the database setup as I was unfamiliar with the use of Firebase and Cloud Firestore at the time, the Google Maps integration as I was fairly new in terms of API integration, and lastly the testing phase, were people within our company ran tests for a work week to find any potential bugs, glitches or errors.

3.4 Estimated Costing

Currently, the only costing required for ArmsCall would be that required for the publishing the app on Google Play Store and Apple App Store. To upload to both the app stores, one must invest in their respective Developer Programs. The costing for enrolling to the programs are listed below:

Program	Cost
Google Play Developer Program	$25 - one-of payment
Apple Developer Program	$99 per membership year

Table 3.3: Estimated Costing for ArmsCall

Chapter 4

Methodology

Here we discuss the software development methodology that was utilized during the creative process of the project. For this project, agile methodology was used. Agile methodology is briefly discussed below:

4.1 Agile Methodology

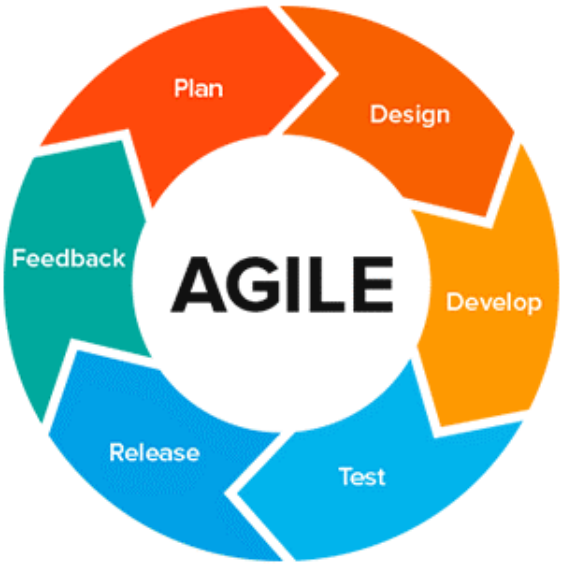

Figure 4.1: Steps of Agile Methodolody

Agile methodology is considered to be a results-focused, people-focused methodology, which can respond to the rapid changes in this ever evolving world of ours [1]. The methodology is centered around adaptive-planning, self-organization and short-delivery times which makes it fast and flexible. Some of the benefits of the Agile Methodology are listed below:

- **It's fast:** One of the major selling points of the Agile Methodology is speed. A faster development process ensures that customers get their desired products in much less time than usual.
- **Increased customer satisfaction:** With Agile, gone are the old processes of 'plan, design, build, test, deliver'. Instead, customers can get something very close to what they want, and with constant communication, the product can iteratively evolve into the final desired product. [2]
- **Increased productivity:** Agile methodology gives us total hands-on control of the development process. This helps in identifying problems that might arise during development and puts us in a better position to respond to them accordingly and meet the goals at hand. This in turn leads to increased productivity as we are always on the lookout for any emerging issues and responding accordingly.
- **Elimination of rework:** As the customer is more involved in every step of the Agile methodology process, any change to desired product can be applied at the very moment, reducing the amount of downtime between product delivery and customer revisions.

Chapter 5

Body of the Project

5.1 Work Description

The project that was presented to me was provided by a client who was in need of an emergency response system in the form of a cross-platform mobile application. In the system, users are to create accounts using their email address. After the account creation is successful, users can enter more of their personal details in order to create their user profile. Once a user has completed their profile creation, they can then continue using the application. From the app, a user can access a list of all the other available users whom they can contact in time of an emergency. Once the user has selected a responder, the responder receives a notification containing the users' name, current location and contact number. Upon requesting for help, payment will be automatically deducted from the user's wallet, which will be powered by a payment gateway. The app will also let users create calendar events for scheduling certain emergency calls. The app can let users access their personal accounts for the payment gateway, and finally the app will provide contact numbers for emergency services like hospital, fire department and police.

5.2 System Analysis

5.2.1 Six Element Analysis

Process	Human	NCH	Hardware	Software	Database	Networking
Account Create	User	-	Smartphone	App	Firebase	WAN/LAN
Request Help	User	-	Smartphone	App	Firebase	WAN/LAN, SMS
Geolocation	-	-	Smartphone	Maps SDK	-	WAN/LAN. GPS
Calendar Events	User	-	Smartphone	App	Firebase	WAN/LAN
Other Services	User	-	Smartphone	App	-	Phone Call

Table 5.1: Six Element Analysis of ArmsCall

5.2.2 Feasibility Analysis

In this section, we discuss how feasible ArmsCall was for our company as well as in terms of development. The feasibility is therefore discussed in the following sections:

- **Needs Assessment:** We first needed to know what the current business process of our client was. Then we looked into whether our client can get used to the new system. Finally, and most importantly we looked into why the client would be in need of such a system. Once that was established, we moved on to the next step.
- **Resources Assessment:** Next, we looked into how we are going to allocate the resources required to bring the project to fruition. Since we chose Google Firebase and the number of users would be fairly limited, our focus for resource allocation shifted towards the eventual publishing of the mobile app to the different mobile app marketplaces.
- **Technical Assessment:** Now comes the important bit, which is whether our company would be able to provide technical support in case anything goes wrong with the system. Since the authentication and data storage part was handled by Google Firebase, we geared towards checking whether the app is able to provide the client requested features accordingly. We also made sure to provide technical assistance if the client either has difficulties in understanding or expresses dissatisfaction with the implementation of any of the provided features in the app.

5.2.3 Problem Solution Analysis

There were some problems that did arise during the development of ArmsCall. Those problems and their workaround solutions are briefly discussed below:

- **Invalid Data:** If users entered invalid data during account creation or user profile setup, it would lead to authentication issues with Google Firebase. So a Regex based user input validation method was implemented.
- **Push Notifications:** Having event based push notifications from the app was proving to be quite difficult. This was then mitigated using the implementation of the SMS service.
- **Calendar View:** Implementing a calendar event feature with the Calendar View would lead to the UI breaking. So event adding was done with a list view of all the events that have been created. Proper User detection: Detecting the proper user for any action such as sending the proper information of one user to another when requesting for help. It was solved by adding the users' unique IDs as part of their profile data.
- **Display Name:** When users would update their display names, it would update in the database but would not be updated in the authentication part. So, a function was added that updated the display name not only in the database but also in the Firebase Authentication part.
- **Payment Gateway:** Implementing the Payment Gateway using API integration was simply not functioning as desired. So a workaround was to pass all the Payment Gateway functions through webviews. That way, those events are handled on the web where they perform as intended.

5.2.4 Effect and Constraints Analysis

Through this app, users can reach out to other users quickly in times of emergency. Not only that, but users can also access the contact details of other major emergency departments eg. Police, hospitals etc. However, there are some constraints to the execution of the app. One of them being the lack of a chat system [3]. Work on getting the necessary knowledge and skill for the implementation of the chat system is ongoing. Plus the app could also benefit from a design overhaul, as many of the design implementations could be changed to make them not only easier for more developers to understand if they work on it in the future, but will also enhance the experience on the users' part.

5.3 System Design

5.3.1 Rich Picture

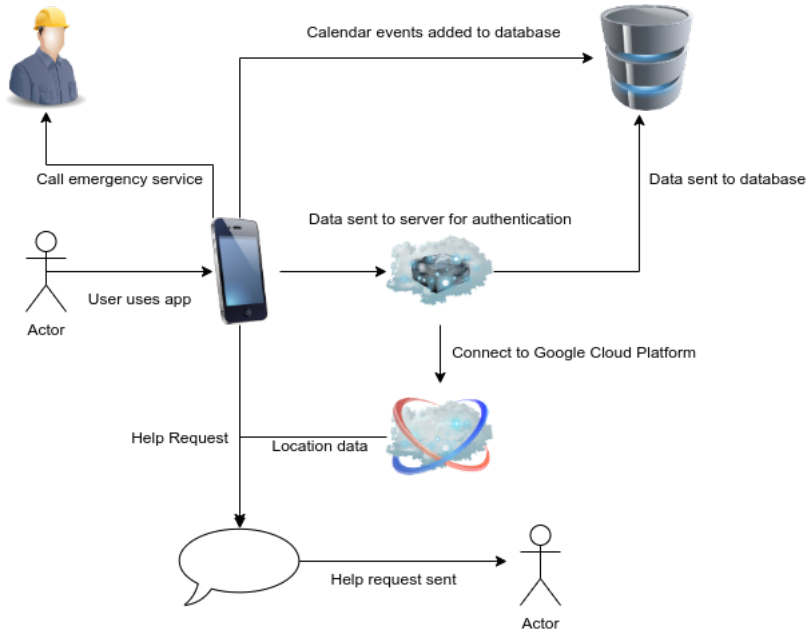

Figure 5.1: Rich Picture for ArmsCall

5.3.2 UML Diagrams

Below is the UML activity diagram shown for ArmsCall:

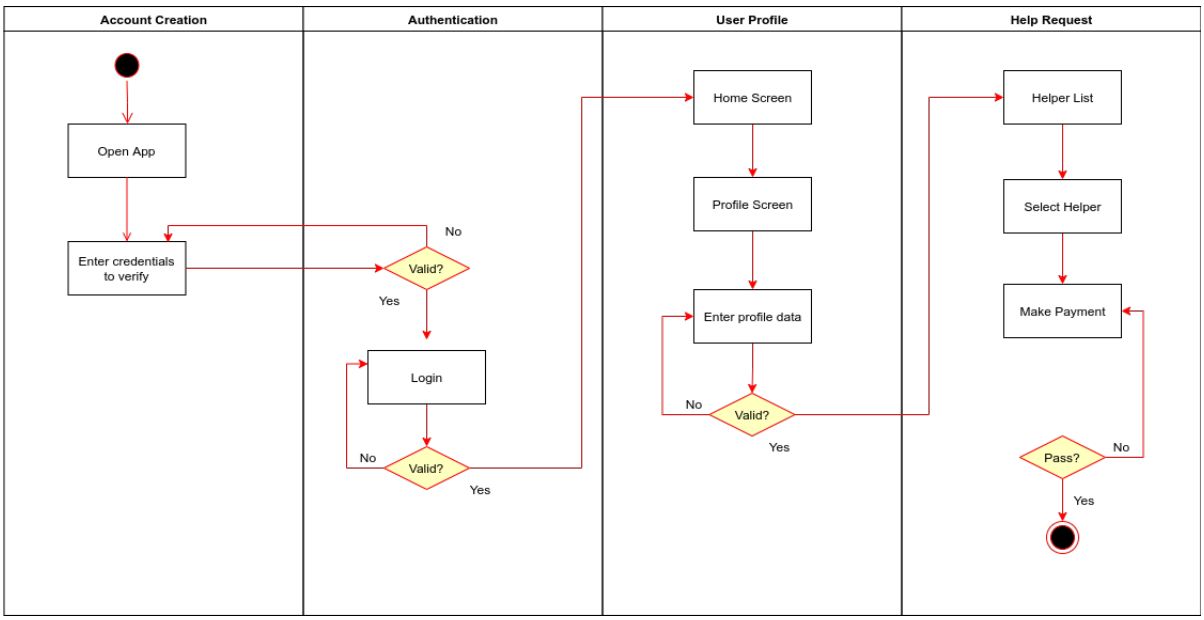

Figure 5.2: UML Diagram for ArmsCall

5.3.3 Data Flow Diagrams

The data flow diagrams for help requests and call scheduling in ArmsCall are given below:

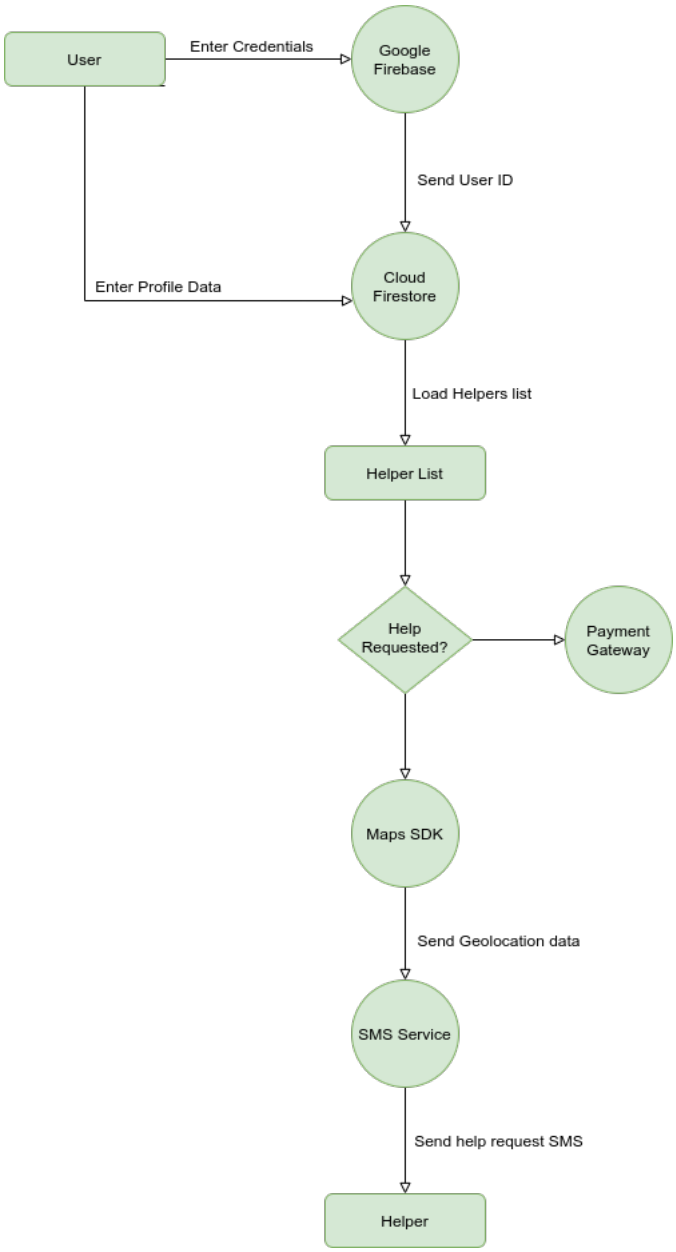

Figure 5.3: Data Flow Diagram for ArmsCall help request process

5.3.4 Use Case Diagram

The purpose of a use case diagram is to demonstrate the different ways that a user might interact with a system. The Use Case Diagram for ArmsCall is given as follows

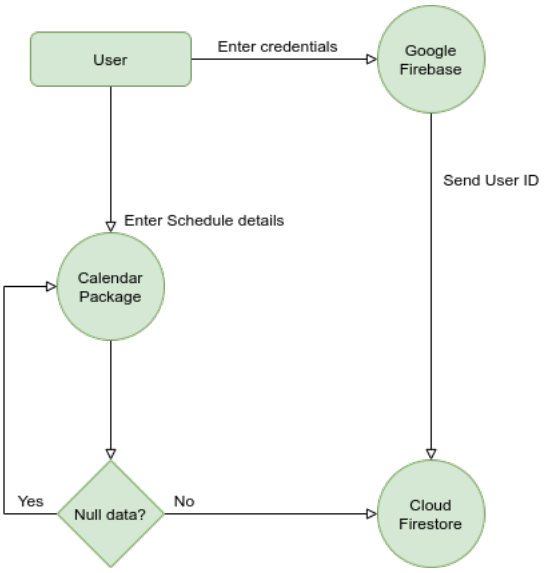

Figure 5.4: Data Flow Diagram for ArmsCall call schedule addition

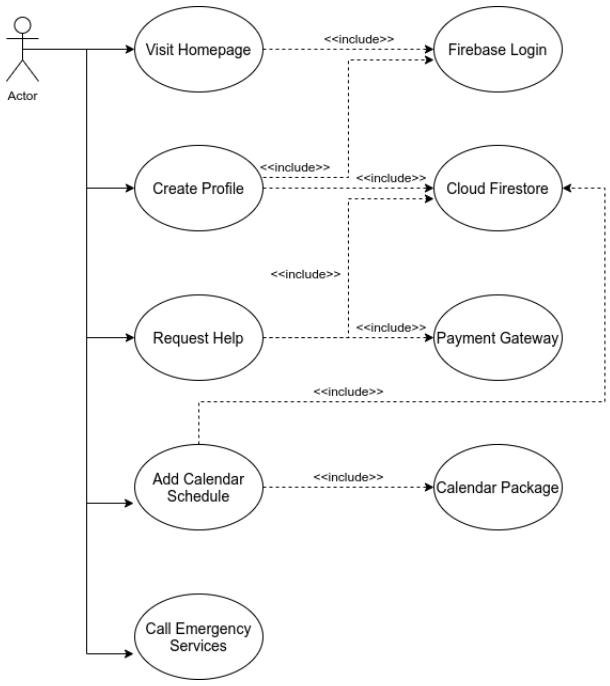

Figure 5.5: Use Case Diagram for ArmsCall

5.3.5 Functional and Non-Functional Requirements

Functional Requirements:

1. Firebase Authentication will authenticate users using valid email and password and will generate a unique user ID for each user
2. The user ID will then be sent to Cloud Firestore as a part of User Profile details
3. If user provides invalid data, the app will use Regex based validation to make sure users provide valid data

4. If user profile does not exist, Firebase will provide appropriate alert messages
5. When creating user profile, Regex based validation is again used to ensure user is inputting valid data
6. Since the APIs for the payment gateway were not functioning as desired, the alternative was to implement it using a WebView
7. Google Maps SDK will help in detecting the user's current location on both Android and iOS devices

Non-Functional Requirements:

1. **Scalability:** Since we are using Google Firebase, we do not have to worry about server allocation issues. That will be handled by Google
2. **Maintenance:** Our company will provide technical support in case any issue arises with the mobile app
3. **Usability:** The app will feature a good looking UI with user friendly controls for navigating throughout the app
4. **Service:** Users will be able to use the app from any place in the world

5.4 Product Features

In this part, the input, output as well as the architecture of ArmsCall is being displayed. They are given as follows:

5.4.1 Input

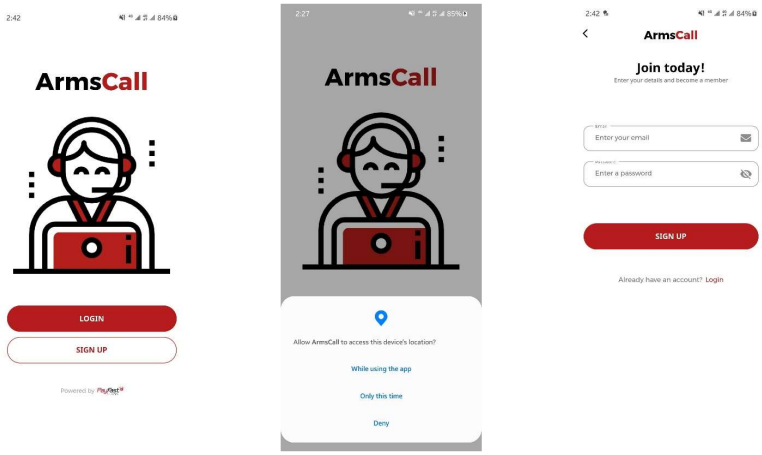

Figure 5.6: Welcome Screen, Permission Handler, Signup Screen of ArmsCall

5.4.2 Output

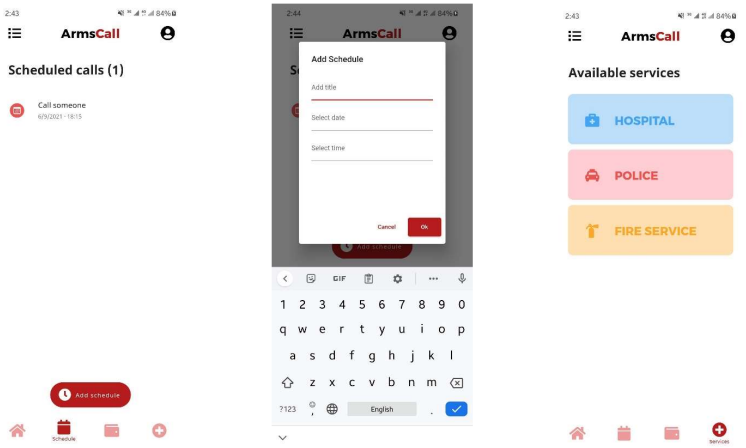

Figure 5.7: Call Schedule screen, User Profile and Emergency Services screen

5.4.3 Architecture

Every app developed in Flutter carries along the Flutter architecture, which itself is divided into three parts, the Framework, the Engine and the Embedder. A diagram showing the three parts of the Flutter architecture is given below:

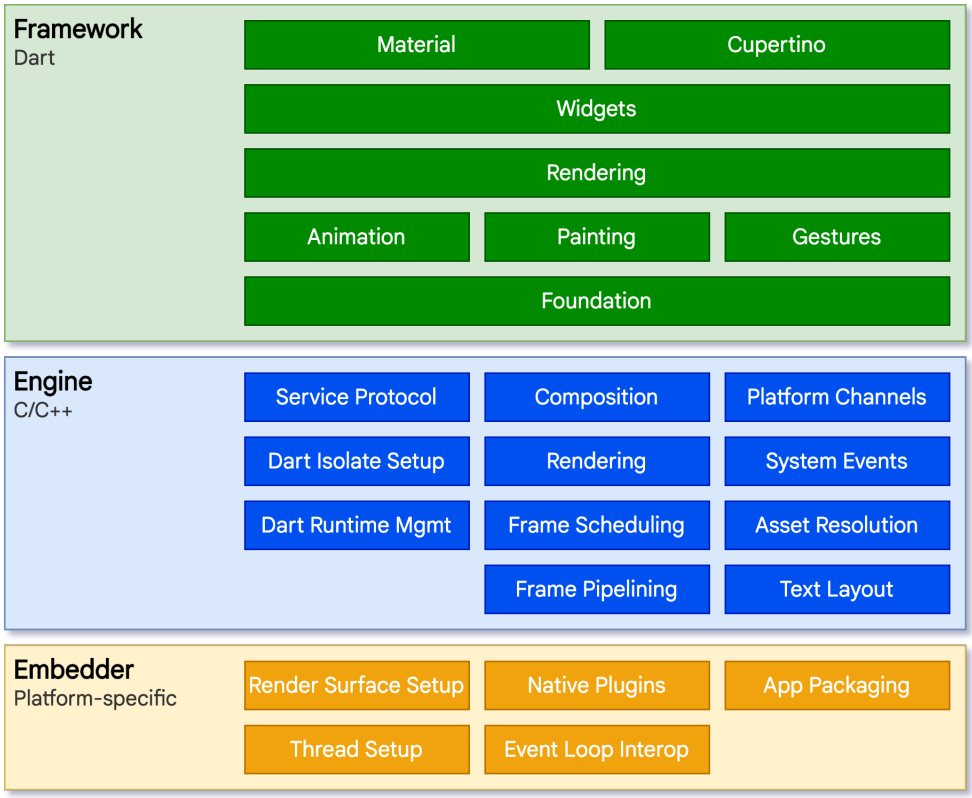

Figure 5.8: Architectural view of Flutter

Chapter 6

Results & Analysis

The client previously had no direct means of providing emergency services to their user base other than contacting them via phone and requesting for the service, which was very time consuming. With ArmsCall, the users are able to quickly ask for emergency services in time of need.

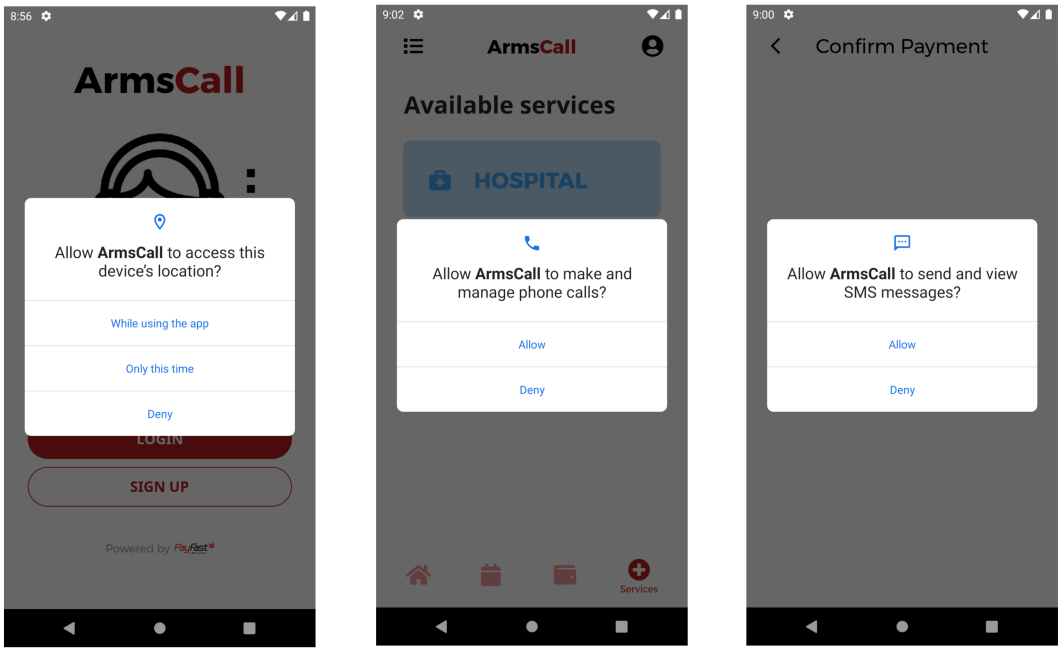

Figure 6.1: Permission handling in ArmsCall

For every action that would require permission to access background services, they are handled by ArmsCall. If the proper permissions are not provided, then the desired functionality will not work until the user has granted the necessary permissions.

After signing up, users will have an empty profile with their necessary details. The users are to fill up each detail in order to complete setting up their profile.

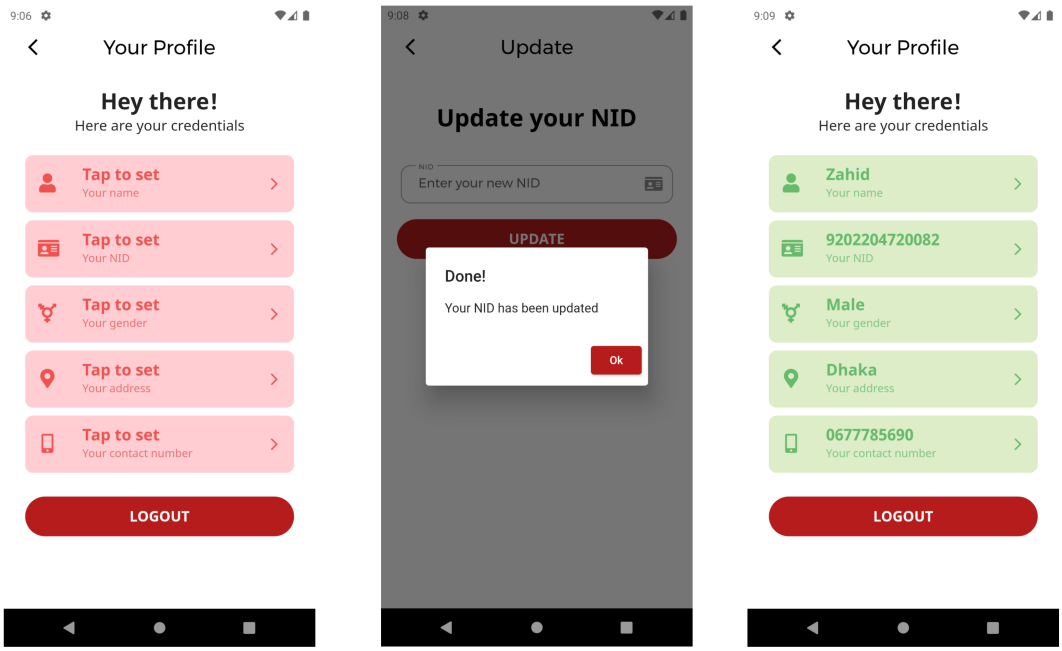

Figure 6.2: User Profile setup

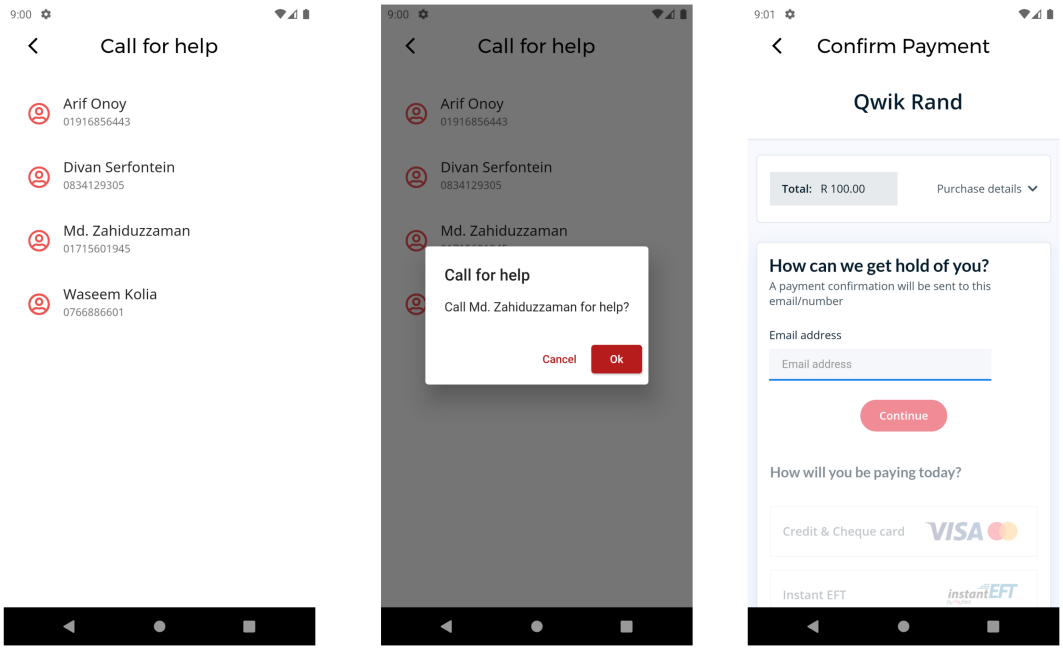

Figure 6.3: User requesting for help in ArmsCall

Opening the helpers list, a user can select who they want to receive help from. Once the request for help has been confirmed, they are taken to the Payment Gateway to complete the transaction.

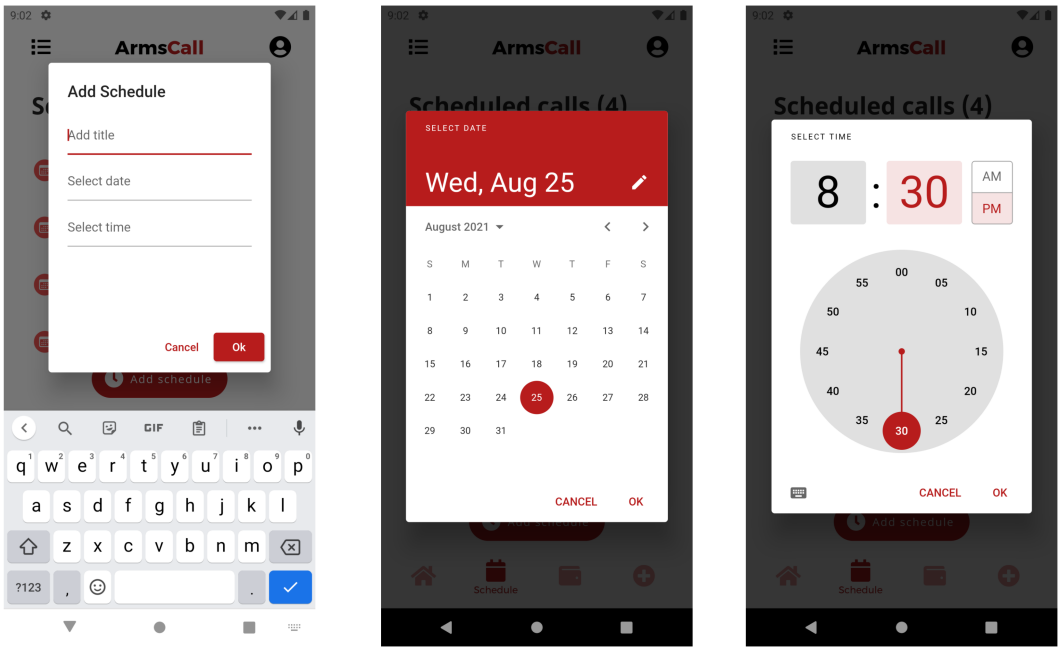

Figure 6.4: Adding Calendar events

When creating a new calendar event, users can add titles to each event. For the selection of date and time, users are presented with a DatePicker and TimePicker respectively. [4]

Chapter 7

Project as Engineering Problem Analysis

7.1 Sustainability of the Project/Work

When it comes to the sustainability of any project, what matters most are the reliability of the technologies that were used to finish the project, and the people who are present to provide technical support if anything ever goes wrong with the work.

For ArmsCall, we have used Flutter as the main framework which is now growing in popularity. The community behind Flutter is also growing at a rapid pace. Should any changes take place within this framework, it can be very easily applied to the Project. Firebase is used as the database, which is maintained by Google themselves, so we don't have to worry about any server maintenance for this project. As most of the services used are free, there are also no issues regarding payments for subscriptions to services. If there is ever a need to include a paid service to the app, our company will be able to handle that. As for technical support, we will be always available to provide support whenever the client pleases.

7.2 Social and Environmental Effects and Analysis

7.2.1 Social Effects

One of the prime social aspects of ArmsCall is the availability of emergency services at any given time. There is no waiting for emergency service providers to pick up your calls when there are dedicated people that are allocated to provide you that service that can be contacted immediately using the app.

7.2.2 Environmental Effects

The service provided by an app ArmsCall is very dire in these horrid times of the COVID-19 pandemic. Hospitals constantly seem to be filled with COVID patients. As such, people with other medical issues often can't get any medical services as the staff remain occupied with the COVID affected. With an app like ArmsCall, users no longer have to rush to hospitals. Instead they can request emergency services from their homes

or, wherever they are at the moment. We do hope that the services provided via ArmsCall can really benefit its users.

Chapter 8

Lesson Learned

8.1 Problems Faced During this Period

One of the major challenges faced during the internship period was maintaining the schedules for both the internship and online classes. Often, I would have to attend online classes while being at work. This situation made it difficult to concentrate on either event. Another issue was the lack of familiarity with the tools I was given to work with. Being experienced in native Android Development, it was a bit of a challenge to get used to a cross-platform framework like Flutter. The last issue I faced was being the only person in my department at the company. When I joined as an intern, the former Mobile Application developer had left the company. As a result, I was on my own when working on the project.

8.2 Solution of those Problems

The issue of classes and work being at the same time was somewhat mitigated when the work from home policy was started [5]. When at home, it was easier to manage online classes and work on the project, as the home environment was much more lenient and comfortable compared to the work environment. For the lack of experience part, since Flutter is a framework that is firstly, developed by Google and secondly, becoming one of the most popular frameworks that is being adopted by Mobile Application developers all across the globe. There have been countless tutorials and thorough documentation regarding the many applications of the Flutter framework that not having associates did not feel so problematic as time passed. Though I am still the only Mobile Application developer in our company as of yet, I can say that I have gained a lot of fruitful experience working with the Flutter framework. Should any new Flutter developers join, I hope I can pass down what I learned to them and may also be able to learn something from them as well.

Chapter 9

Future Work & Conclusion

9.1 Future Works

In future, there are plans to add many additional features to the ArmsCall app, such as Real-time chat feature, Push Notifications, Alarms for scheduled tasks, better user profiles and more if the client so chooses. Once there is any client feedback, the work on these features will commence.

9.2 Conclusion

Working on ArmsCall has been quite the experience for me. I got to finally experience what it's like to work in a corporate environment. Not only that, due to the pandemic, I also got to experience what it's like to work from home. I got to learn many new technologies like Flutter, Google Firebase, Google API integration and I still continue to work with them. Whenever there was any issue, I always let my supervisor know, and he would whole-heartedly take part in helping me resolve the issue. This internship also led to fruitful communication with my current associates which helped me get a better insight into the current trends and demands in the world of software development. With that, I would like to conclude this report and thank everyone who made this internship such an amazing experience.

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