

**FRNDY: A WOMEN SAFETY MOBILE APPLICATION**

**BY**

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Dissertation submitted in partial fulfilment  
of the requirements for the  
Bachelor of Information Technology with (Hons)  
September 2021

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CERTIFICATION OF APPROVAL

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Information Technology Programme

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Approved by,

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SEPTEMBER 2021

## CERTIFICATION OF ORIGINALITY

This is to certify that I am responsible for the work submitted in this project, that the original work is my own except as specified in the references and acknowledgements, and that the original work contained herein have not been undertaken or done by unspecified sources or persons.

*Premi*

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PREMI A/P PARAMANATHAN

# Contents

<b>Chapter 1 : Background of study</b> .....	1
1.1 Problem Statement .....	2
1.2 Objectives .....	3
1.3 Scope of study .....	3
1.4 Significance of Project .....	5
<b>Chapter 2: Literature Review</b> .....	6
2.1 Women safety in public places .....	6
2.2 Global status of women safety .....	9
2.3 Crimes related to women in Malaysia.....	10
2.4 Smartphone's efficiency in enhancing women's safety.....	11
2.5 Existing Emergency Applications.....	13
2.5.1 bSafe .....	13
2.5.2 RapidSOS+ .....	15
2.5.3 SaveME 999.....	16
<b>Chapter 3: Methodology</b> .....	17
3.1 Introduction.....	17
3.2 Flow Process of the Methodology .....	18
3.3 Tools .....	20
3.3.1 Android Platform .....	20
3.3.2 Android Studio.....	21
3.3.3 Android SDK .....	21
3.3.5 Firebase .....	22
3.4 Gantt Chart.....	24
3.5 Key Milestones .....	25
<b>Chapter 4 : Result and discussion</b> .....	26
4.1 Data Gathering .....	26
4.2 Survey and discussion.....	28
4.3 System Design .....	33
4.3.1 Data flow diagram.....	33
4.4 Activity Diagram .....	35
4.4.1 Login Activity Diagram.....	35
4.4.2 Sign Up Activity Diagram .....	35
4.4.3 Call SOS Activity Diagram.....	36
4.4.4 Share Location Activity Diagram .....	37
4.5 Firebase Structure Design .....	38

4.6 Prototype.....	39
<b>Chapter 5 : Conclusion and Future Work.....</b>	<b>47</b>
5.1 Overview.....	47
5.2 Impact and Contribution .....	48
5.3 Future Work.....	49
<b>References.....</b>	<b>50</b>

## List of Figures

Figure 1 : Gender based sexual harassment bar chart from 2013-2017 .....	2
Figure 2: Number of sexual harassment cases according to the states in Malaysia.....	3
Figure 3: Number of rape cases according to the states in Malaysia .....	4
Figure 4: Number of domestic violence cases according to the states in Malaysia .....	4
Figure 5: Time when women feel insecure in public places according to Empirical Study on Women Safety Concerns at Public Places: Case Study of Lahore City. Architecture & Urban Planning, 14(1).7	
Figure 6: bSafe main interface and setting fake call.....	13
Figure 7: Setting emergency contact list and sample of SOS message.....	14
Figure 8: Main screen of RapidSOS and helping friend request emergency help .....	15
Figure 9: Option for type of emergency when request as shown in left, nearby agencies as shown in 16	
Figure 10: SDLC methodology phases .....	17
Figure 11: Prototype flowchart .....	18
Figure 12: Android platform in 5 layers .....	20
Figure 13: Firebase Logo .....	22
Figure 14:Transportation between Pulling transport and WebSocket Transport.....	23
Figure 15: Project Gantt Chart.....	24
Figure 16: Telenita Statistics during MCO TO RMCO .....	26
Figure 17: Number of sexual harassment cases in 2000-2017.....	27
Figure 18: Gender breakdown of sexual harassment survivors in 2013-2017.....	27
Figure 19: Gender Chart .....	28
Figure 20: Sexual harassment/violence chart.....	28
Figure 21: Incident report chart .....	29
Figure 22: Scenario likelihood chart.....	29
Figure 23: Self-defence chart.....	30
Figure 24: Self-defence or precaution materials chart .....	31
Figure 25: Women safety in Malaysia .....	31
Figure 26: Safety app chart .....	32
Figure 27: Testing app chart .....	32
Figure 28 : Data flow diagram of the app .....	33
Figure 29: Frndy Application system architecture.....	34
Figure 30: Login Activity Diagram .....	35
Figure 31: Sign Up Activity Diagram.....	35
Figure 32: Request SOS Activity Diagram.....	36
Figure 33: Share Location Activity Diagram.....	37
Figure 34: Firebase structure diagram .....	38
Figure 35: User.class used to create firebase structure .....	38
Figure 36:Sign up and Login screen .....	39
Figure 37: Firebase database authentication .....	40
Figure 38: Main menu.....	41
Figure 39: Share location feature .....	42
Figure 40: My location feature.....	43
Figure 41: SOS mode feature.....	44
Figure 42: Fake call feature .....	45
Figure 43: User Setting Page .....	46

## **List of Tables**

Table 1: Key milestone of Final Year Project 1.....	25
Table 2: Key milestone of Final Year Project 2.....	25

## **Abstract**

Women's personal security has always been a major concern, and numerous potential solutions have been discussed regarding how technology can be used to address the issue. Because of the rapid rise in smartphone usage, it is now possible to integrate personal security effectively using both hardware and software. Existing security methods necessitate some form of human input and the use of only pre-selected contacts. Many tragic occurrences have occurred in the case of women. Problems can arise from a variety of sources, including women walking on the street after work, going to the supermarket, or a variety of other reasons for which they go alone. There has been a spike in women related crimes in Malaysia as well. Therefore, to enhance women safety in Malaysia this project suggests a mobile application which can come in handy for women who find themselves in dangerous situations. This project which may be launched with a single click if the need arises.

A single click on this app recognizes the location of a place using GPS and sends a message to the registered contacts containing the location URL, as well as calling the first registered contact to assist the person in a difficult situation. Authentication of their identity is also provided by this application. The primary goal of this project is to ensure and enhance personal safety. As a result, the primary goal of this project is to make it easier for users to get assistance in a timely manner. In addition, a secure pin is used to verify the user's identity and prevent an anonymous or malicious attack. This project makes use of the agile methodology to make certain that testing is carried out in each module. It creates opportunities to reevaluate throughout the development lifecycle to make sure the entire project fulfils outcome and operate well. After several iterations of refinement and debugging, the final system is considered bug-free. In this report the first few phases will be discussed and for future works the second part consisting of the development phases will be discussed.



## **Acknowledgement**

To begin, I would like to express my heartfelt appreciation to Universiti Teknologi Petronas (UTP) for providing me with the opportunity to complete my final year project. I am grateful that the university believed in my potential and the abilities of many others to complete a final year project. It's uplifting to see myself and my fellow university graduates applying the knowledge they've gained over the course of four years. This serves as a springboard for the majority of us to further explore our true potentials.

Second, I'd like to express my heartfelt appreciation to my esteemed final-year supervisor, Ts Dr Savita A/P K. Sugathan. She has enhanced my overall experience with this project to a new level. She not only guided me, but also demonstrated remarkable organisational abilities. At times, she would initiate meetings and entertain our questionnaire regardless of the hour or minute. By collaborating with her, I was able to acquire perspectives on how a project should be performed. I am indebted to her for all of the help and feedback she has given me thus far.

Additionally, I want to express my gratitude to the coordinator of the Final Year Project course, Ts Dr Said Jadid Abdulkadir. Both coordinators' meticulous organisation and attention to detail ensured that the entire programme ran smoothly. The updates on due dates and requirements kept students, including myself, on their toes, particularly in terms of their understanding of how certain issues are handled differently during this pandemic. This facilitated the program's successful implementation.

## **Chapter 1 : Background of study**

Women are a vital part of our society. In today's society, women play critical roles not only in the home, but also in politics, economics, and nation-building. Women's safety has long been a critical and sensitive issue in our society. There is not a single day that goes by without hearing of an attack on a girl or a woman. Females being murdered, molested, raped has become a recurring theme in emerging news headlines. Women's safety is a crisis in almost every underdeveloped, developing, and developed country. Women's violence is a serious act. The tragedy is that these crimes are frequently justified by blaming the victim (Annuar, 2019).

Despite being ranked fifth safest country in the Asia Pacific region by the 2018 Global Peace Index, Malaysia continues to lag behind in terms of legal protection and economic gender equity, according to a separate study. Some of the most prevalent crimes against women in Malaysia are similar to those in other countries, including sexual harassment, domestic abuse, and some workplace discrimination against women. Additionally, according to Malaysian government profiles, police took allegations seriously and efforts were made to raise awareness, but as long as women do not report crimes, offenders will be able to escape or feel encouraged to continue their behaviours.

Numerous preventative measures have been implemented by the government to put an end to these misbehaving activities, but they have had no effect on the increasing rate of these crimes and have remained unaffected (Annuar, 2019). Thus, it is sensible to provide an application that assists women in quickly and efficiently resolving this issue. In today's society, the number of people who own smart phones has increased rapidly, and thus a smart phone can be used effectively for personal security or other types of protection. The horrifying incident has reawakened many to the vital importance of addressing safety concerns, and as a result, a slew of new apps has been developed to provide women with protection systems via their phones ( Bhanushali et al., 2018).

The primary goal of the woman safety alert system is to provide a quick means of contacting for assistance, such as nearby police stations, relatives, or other nearby users, through the use of alert messages and location tracking. Additionally, this application can be enhanced in the future through the use of smart gadgets such as accessories, mobile phones, and watches. A single click on this app recognises the location of a location using GPS and

sends a message containing the location URL to the registered contacts, as well as calling the first registered contact to assist the person in a difficult situation. (Sathyasri et al., 2019).

### 1.1 Problem Statement

When confronted with a potentially life-threatening circumstance such as kidnapping, mugging, or robbery, the victim has very little time to choose the best way out. Seeking help, on the other hand, is the most effective method that the victim can think of in a severe circumstance. According to Women's Aid Organisation. (2021, January 19), the impact of this violence includes injury, death, depression, PTSD, sexually transmitted diseases, unwanted pregnancy which then leads to abortion. In view of the growing concern about safety, mobile apps may be developed to include personal safety measures. This project would be only focused on women in Malaysia as of now. Therefore, the problem statement of this project would be on discussing how to minimise the crime rates related to women and enhance women safety in Malaysia as well spreading awareness on the emerging crime rates against women.

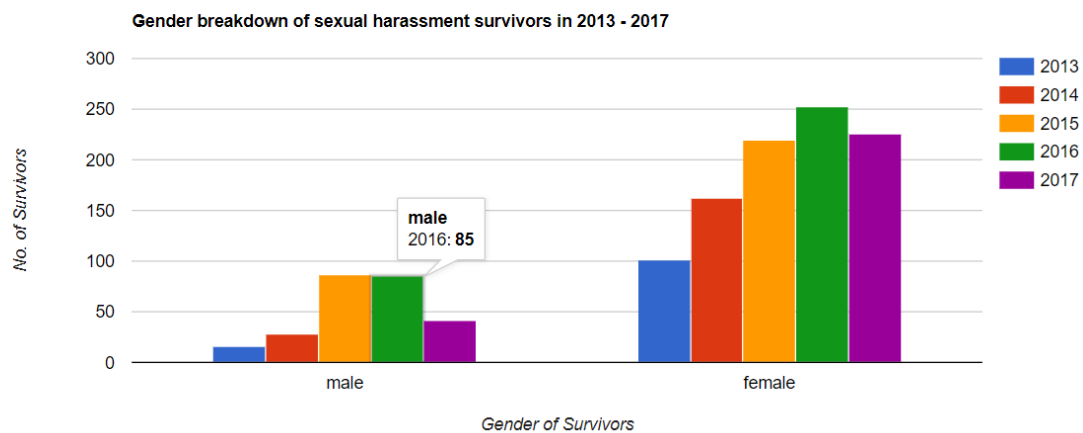


Figure 1 : Gender based sexual harassment bar chart from 2013-2017

## 1.2 Objectives

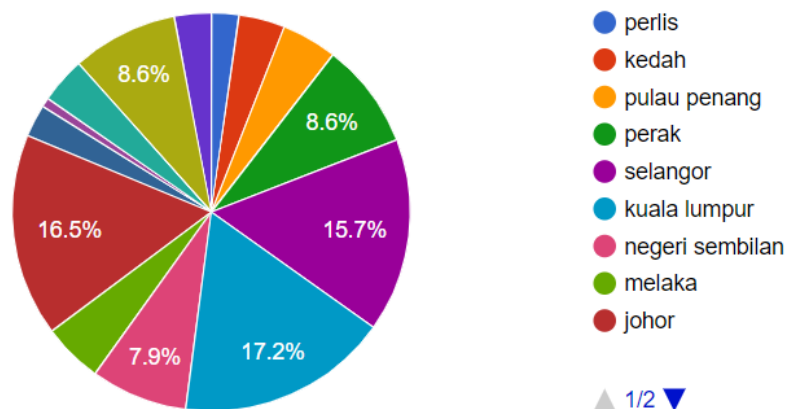
The objectives this project aims to achieve are as the following:

- To study on the existing mobile application for women personal safety features and carry out the study on the effectiveness of smartphone towards the purpose of women safety
- To develop a mobile application that enhances the safety of women by provide a reliable app which can used during threatening situations
- To ensure personal safety and access to an emergency helpline with immediate assistance by using the application through one S.O.S. button whenever they need additional assistance on their journey back.

## 1.3 Scope of study

According to the previously stated objectives, this project will primarily focus on Malaysian women from urban areas in Malaysia. The study emphasizes the importance of women safety in Malaysia by using the data sets that are based on the statistics of women harassment & violence cases.

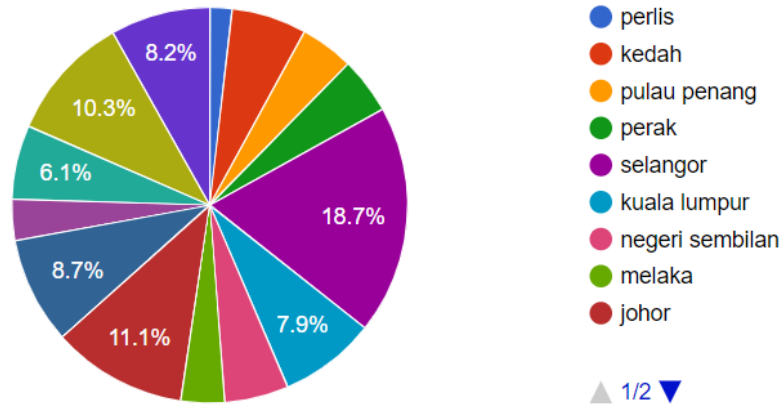
**Number of sexual harassment cases, by state, in 2017**



*Figure 2: Number of sexual harassment cases according to the states in Malaysia*

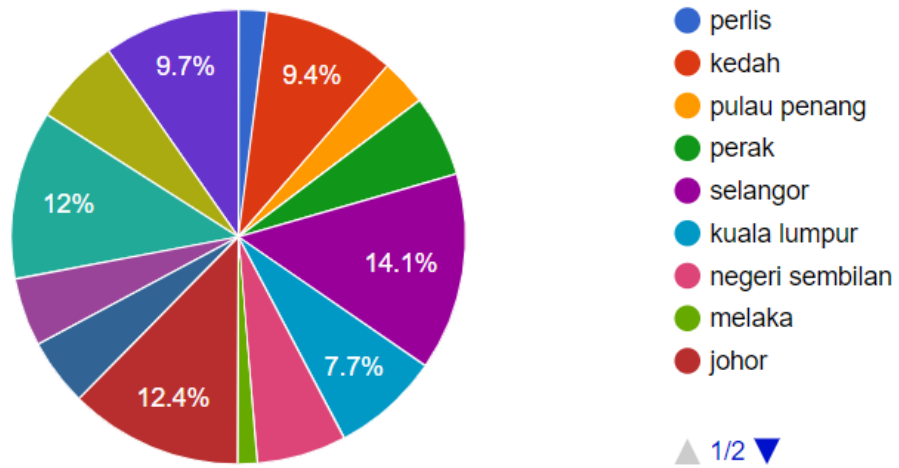
*by Women's Aid Organisation Malaysia*

**Number of rape cases, by state, in 2017**



*Figure 3: Number of rape cases according to the states in Malaysia  
by Women's Aid Organisation*

**Number of domestic violence cases, by state, in 2017**



*Figure 4: Number of domestic violence cases according to the states in Malaysia  
by Women's Aid Organisation*

#### 1.4 Significance of Project

Based on the problem statement, this project suffices features that allows women to reach their destination safely, identifies safe and unsafe areas and create awareness on the increasing dependency of safety apps. The success of this project brings forth a meaningful help towards those who are mostly likely to find themselves in dangerous situations which could lead them to be a victim of sexual harassment or sexual abuse. Additionally, this project contributes to the achievement of one of the Sustainable Development Goals, goal 5, which is to achieve gender equality and empower all women and girls. Women and girls worldwide ought to have equal rights and opportunities, as well as the ability to live in an environment free of harassment and violence. By 2030, gender equality will require immediate action to address the numerous root causes of discrimination that continue to limit women's rights in both the private and diverse societies.

## Chapter 2: Literature Review

This chapter will discuss deeper about sexual harassment and sexual assault and current problems that happens in the society. It will also discuss about the current technology advancement in enhancing women's safety in Malaysia.

### 2.1 Women safety in public places

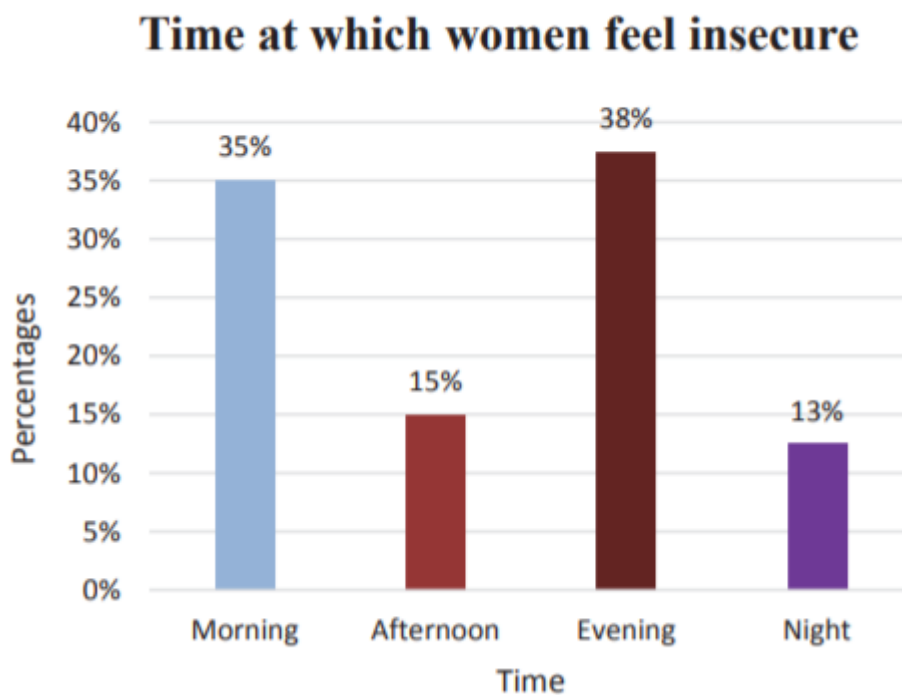
The meaning of urban life is best conveyed in a public place. When people come together in public places like a park or a shopping mall, they meet each other, and at times they become victims of crime. It is essential for a person to be able to move around in a sustainable city in order to maintain a sense of place and improve one's quality of life (Cecato, 2017). According to Cecato (2017) several environmental characteristics affect the safety of public places, yet it is safety perception that plays a significant role in making places appear safe or unsafe to people.

Public transportation, in particular, has long been a place where women have been subjected to sexual harassment, and this problem has not gone away. The lack of punishment and a lack of gender mainstreaming in the respective authorities present significant obstacles to recompense. This fact severely restricts the freedom of movement for women and girls. For example, it affects their academic, professional and social abilities. Violence against women and girls, especially sexual harassment in public places, is still largely ignored despite the fact that violence in the private domain is now readily recognized as a human rights violation (Vera-Gray et al., 2020).

According to Harrison (2012), despite the fact that not all men are viewed pragmatically as perpetrators of violence against women, all women are viewed as potential victims, which ultimately reinforces the dominant discourse of safety and protection. This teaches and convinces women to stay away from areas where there is a possibility of encountering some form of violence. Gender has a significant impact on perceived safety in green spaces, with women reporting a greater fear of crime than men in these settings. (2017) (Cecato).

When it comes to using public spaces, females use them in a variety of ways that are distinct from those used by men. Women have traditionally been said to be more afraid of urban environments than men are, in part because of the differences in how men and women interact

with and make sense of these environments (Cecato, 2017). The physical environment and spatial patterns of towns and cities are predominantly linked to work habits of men and women (Bajwa et al., 2018). Traveling at night or early morning is a necessity for women living in impoverished and unsafe areas. Harassment, eve teasing, slut-shaming, unwanted comments, kidnapping, and violence are all possible outcomes of these activities. The analysis of the study revealed that 35 % of females feel unsafe in the morning and 38 % in the evening (Bajwa et al., 2018).



*Figure 5: Time when women feel insecure in public places according to Empirical Study on Women Safety Concerns at Public Places: Case Study of Lahore City. Architecture & Urban Planning, 14(1).*

Women's experiences with harassment on public transportation, as well as how harassment is interpreted and understood by both sexes, must be examined. According to Harrison, J. (2012), this is especially relevant in contexts where sexual harassment is considered as the greatest risk to women's safety in public spaces and where public transportation spaces are reported as areas with a high rate of sexual harassment.

According to ActionAid's research, women face a slew of negative consequences as a result of harassment on public transportation, including "negative psychological effects such as decreased confidence and self-esteem, feelings of blame and frustration, and mistrust or hatred of men." Women have lost focus and productivity at work, and in some cases have lost



their jobs as a result" (Harrison, J., 2012). When women's self-esteem and confidence are eroded by the threat of sexual harassment in the public sphere, their abilities to complete their frequently necessary role as working women is harmed, and their standing in the community is ruined, perpetuating the established gender hierarchy. According to theories about women's relationships with space, men seek to maintain the existing gender hierarchy by restricting women's access to public space through sexual misconduct as a form of VAW, which, in addition to causing psychological and physical harm, creates a threat of possibility intimidation and intrusion for women who occupy public spaces, including public transportation (Harrison, J., 2012).

## 2.2 Global status of women safety

Women are the most persecuted individuals in every culture, country, religion, and society, throughout history and around the world. They have fewer options, more limited political choices, less adaptability, less access to healthcare, fewer educational opportunities, and are more vulnerable to violence. Women's crimes are not declining but are increasing at an alarming rate, particularly harassment, molestation, eve-teasing, rape, kidnapping, and domestic abuse. The government has attempted several preventative steps to prohibit these misbehaving acts, but they have had little effect on the rising number of these crimes and have remained untouched (Pavitra & Karthikeyan, 2017). Sexual harassment in the workplace is becoming more prevalent by the day. Sexual harassment at work is when one person engages in unwelcome behaviour that causes the other to feel uncomfortable, offended, or distressed (Sathyasri et al., 2019).

According to UN Women, one in three women around the world experience some form of sexual assault at least once in their lifetime. According to Sathyasri et al. (2019), a woman is kidnapped every 44 minutes, raped every 47 minutes, and there are 17 dowry deaths each day. The fear of harassment against women is not limited to the outside world; it can occur in the home as well. Because women are less physically fit than men, a helping hand would be a boon to them in times of need. There are numerous existing systems aimed at enforcing women's safety. The core problem in police investigating cases of female abuse resides in limitations that prohibit them from responding promptly to distress signals. These limitations include not knowing the exact position of the crime, and not recognizing the violence is happening at all: it is a challenge at the end of the victim to approach the law enforcement officers with certainty and discretion (B.R et al., 2020).

In conclusion, we cannot advance as a nation until women feel secure and confident; women play a critical role in the economy and society. Education has a critical part in developing a person's character and aids in the reduction of crimes against women (B.R et al., 2020). In recent years, technology has created an excellent platform for pursuing a safe environment for women, but the lack of action and self-awareness poses a barrier to assuring women's safety.

### 2.3 Crimes related to women in Malaysia

According to WAO's statistics on violence against women shows that domestic violence has increased from 2000 to 2018. In 2000, there have been 3468 cases of domestic violence. While in 2018, the number increased to 5513. According to KAH LENG, L. E. E., & NAIR, S. H. A. R. M. I. L. A. (2019), in a newspaper article author has discussed crimes against women that took place at Petaling Jaya whereby a single mother of two was allegedly raped by a Grab driver in Seri Kembangan, while a Vietnamese woman was allegedly molested by an Uber driver in Penang. Moreover, a woman in Puchong also suffered a miscarriage after she was reportedly robbed and left stranded by her Uber driver.

Additionally, according to a newspaper article TODAYonline. (n.d.), a female Grab driver was allegedly sexually assaulted at knifepoint by a male passenger on Sunday (March 3) morning in Puchong. At approximately 5.36 a.m., the alleged incident occurred in a dimly lit area near the KOI Prima condominium in Taman Mas. Chief Superintendent Azizan Tukiman of the Kuala Langat district police said the victim picked up the passenger at a petrol station near the Awan Besar rest and recreational area. He stated that as the car approached the dimly lit area, the suspect, who was in the back passenger seat, pulled out a knife and threatened her.

## 2.4 Smartphone's efficiency in enhancing women's safety

According to Akter et al., (2017) mobile technology is rapidly evolving. Mobile phone usage is increasing by 58 percent year over year. The majority of cell phones are used for personal purposes. Modern smartphones have features such as GPS navigation, different sensors, a high-resolution digital camera, high-speed internet access, powerful processing and capacity, and long-lasting battery life. Smartphones running on the Android operating system now account for a major portion of the global market, leaving other platforms in the dust. Personal safety triggering system is a well-known application.

Bhanushali et al., (2018) has mentioned that people using smartphones have increased rapidly and hence, smart phone can be used efficiently for personal security or various other protection purposes. Women security practises today fall into a variety of categories, ranging from android applications developed for mobile phones to fashionable apparel that can be worn and carried in daily life. However, our focus is on developing a safety system that combines the advantages of existing techniques and results in a solution that guarantees both defence and the establishment of a seamless pathway for the victim to initiate legal proceedings, if any; must be taken (Bhanushali et al., 2018).

According to Cardoso et al. (2019), the most commonly quoted type of violence that technology could protect against is sexual or physical assault (57.2 %), followed by cyber or in-person stalking (36.6 %) and cyber or in-person harassment (36.6 %) (29.7 % ). Mobile phones (37.2 %), wearable devices (19.4 percent), apps (18.8 %), and social media (18.8 %) were all used as protective technologies (18.4 % ). Almost all (95.6 %) of the articles retrieved discussed an individual's use of technology for protection, rather than the development of policy solutions involving technology (5.9 percent ). Individuals can use technology in a variety of ways, as described in the articles: Half (53.3 percent) of respondents described technologies that alert a potential victim's support network, such as the Circle of 6 app, which sends a text message and GPS coordinates to the user's six friends and family members. Over a third (38.5 percent) emphasised the importance of cyber security technology. For example, Google's App Notifier can notify users via email when new software is installed on their smartphone. Another 24.3 percent discussed how technology can provide useful information for protection. Cardoso et al., (2019).

Cardoso et al., (2019) mentioned that technologies such as mobile phones and the Internet can help women seek assistance, these new products can be a discreet way for a woman being stalked or otherwise abused by an intimate partner to summon help. There might be a

situation in which the person has to travel alone a long distance at an odd hour and perhaps even by public transport and may face some danger. At such a time, a personal safety app might not only be wise to have easy access to, but it might also give the user a lot of confidence needed. The fast advancement of technology has ramifications for women and girls that are both good and negative. Given the breakneck speed with which technical and big data developments occur. The ability of smartphones to empower women appears to be growing all the time. What has become clear is that, after a boom in interest in mobile technology for women between 2010 and 2018, this engagement appears to have diminished in recent years (Cardoso et al.,2019).

## 2.5 Existing Emergency Applications

In today's market, there are a plenty of of similar emergency applications, all of which share one common goal: ensuring the user's safety. Their distinctiveness, functionality, features and competitive advantages make each of them stand out from the rest. Apps that will be used for comparison are listed below.

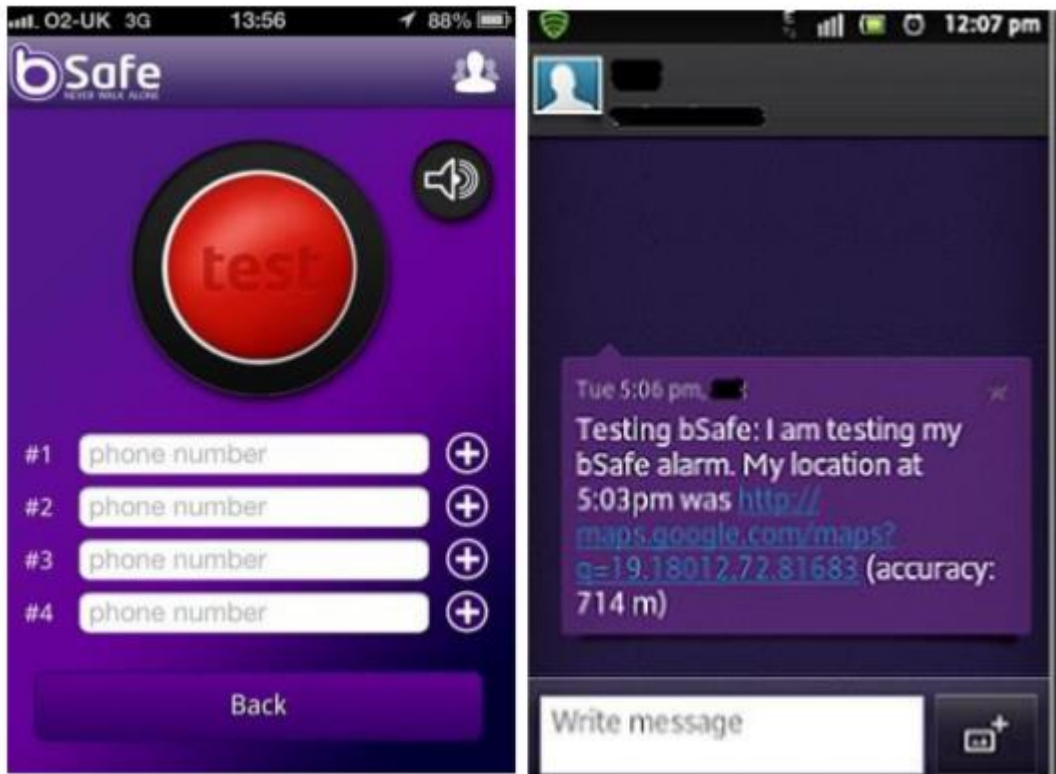
- bSafe

### 2.5.1 bSafe

An app that allows the user to invite friends to walk with them to avoid being alone on the way back home. In the event that a user does not check in for a predetermined amount of time, the app will notify the user via an automated alarm, and it will also notify your friends of your location. When the SOS alarm is activated, a 10-second video will begin to record. Other than that, bSafe has a Fake Call feature that other apps don't have. It is possible to use this fake call function to make it easier for the user to get out of a dangerous or uncomfortable situation by making a fake call to themselves (Satapathy, 2012). As a side note, it can be a fun feature for children to play with, or their friends to trick.



Figure 6: bSafe main interface and setting fake call



*Figure 7: Setting emergency contact list and sample of SOS message*

**Strengths:** To get the user out of an uncomfortable or dangerous situation, you can use a fake phone call function to call the user's own phone.

**Weakness:** Users can invite friends to join them for a walk if they so prefer. Although this option allows the user to find friends to accompany or walk with, it can cause a lot of problems if other people hack into the user's friends' account.

## 2.5.2 RapidSOS+

A highly effective emergency application created by three Harvard MBA students (TechCocktail, 2015). As with the prior application, this one also provides SOS alerts with a single touch, but more interestingly, it can call 9-1-1 on behalf of a loved one, transmitting their current location and information to the nearest patrol officer centre. As a result, their request can be accelerated if necessary (RapidSOS, n.d.) Additionally, it enables users to monitor their family members' safety via GPS and to verify in when they arrive at their destination.

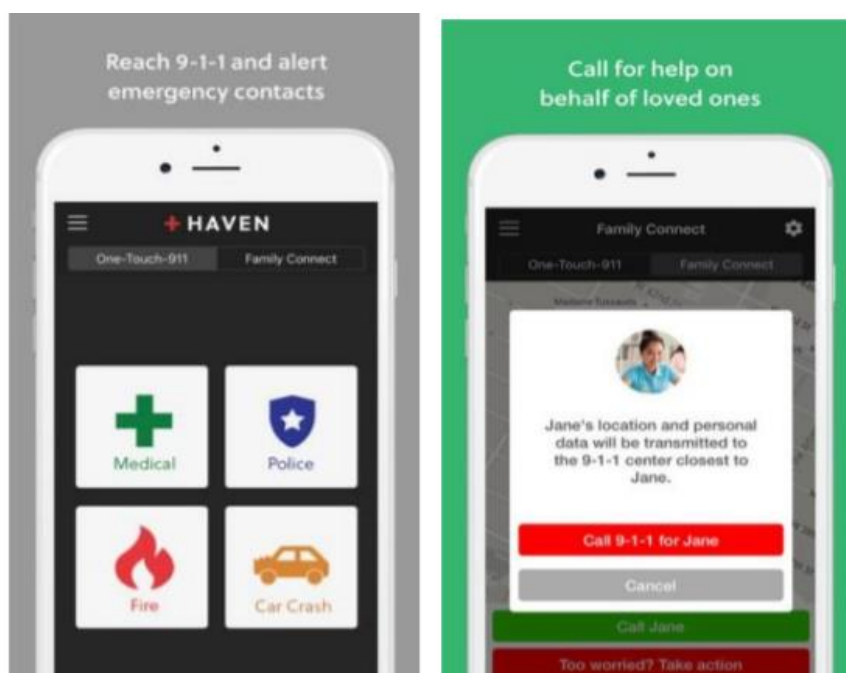


Figure 8: Main screen of RapidSOS and helping friend request emergency help

**Strengths:** Transmit significant information to 9-1-1 dispatchers and provide critical information about the victim's emergency to emergency contacts, ensuring that the victim's family remains connected and informed.

**Weakness:** The application is only available for a free trial period of 90 days. After the trial version expires, the user must buy.



### 2.5.3 SaveME 999

This application, developed in collaboration with Telekom Malaysia (TM) and the Royal Malaysian Police (PDRM), is accessible to Malaysian citizens and enables victims to seek assistance through the use of a panic button. When the panic button is pressed, the current location and victim information are transmitted to the MERS 999 Response Centre (MERS 999 RC); if additional information is required, it can be included with the emergency message and transmitted to the MERS 999 RC (thecinnaboy, 2016). With the user's location discovered, he or she can contact helpline agents to obtain information and details about nearby emergencies.

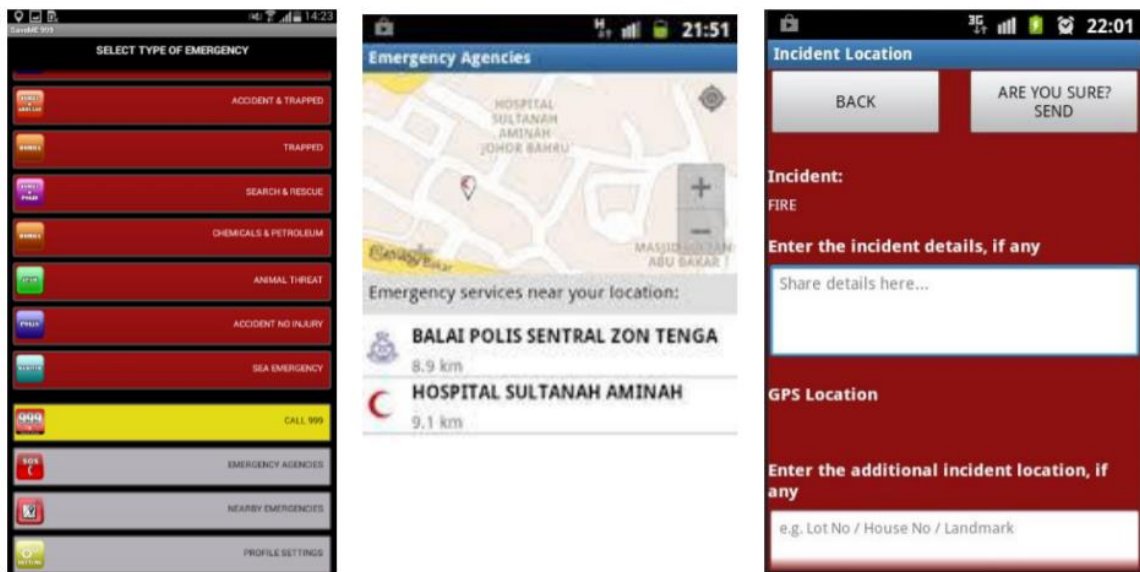


Figure 9: Option for type of emergency when request as shown in left, nearby agencies as shown in

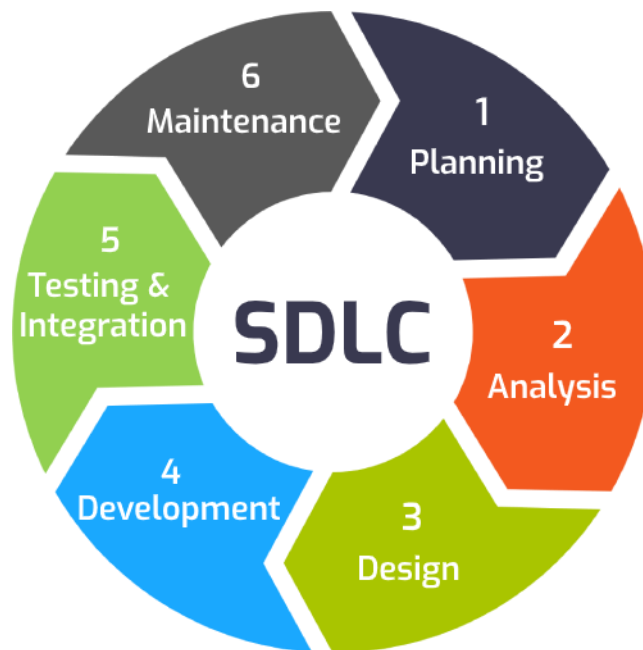
**Strengths:** Information about emergency services is provided. Emergency requests are handled immediately upon receipt by MERS 999 RC.

**Weakness:** Requires multiple steps to contact emergency assistance; while in an emergency situation, the user must first select the type of emergency and then request assistance.

## Chapter 3: Methodology

### 3.1 Introduction

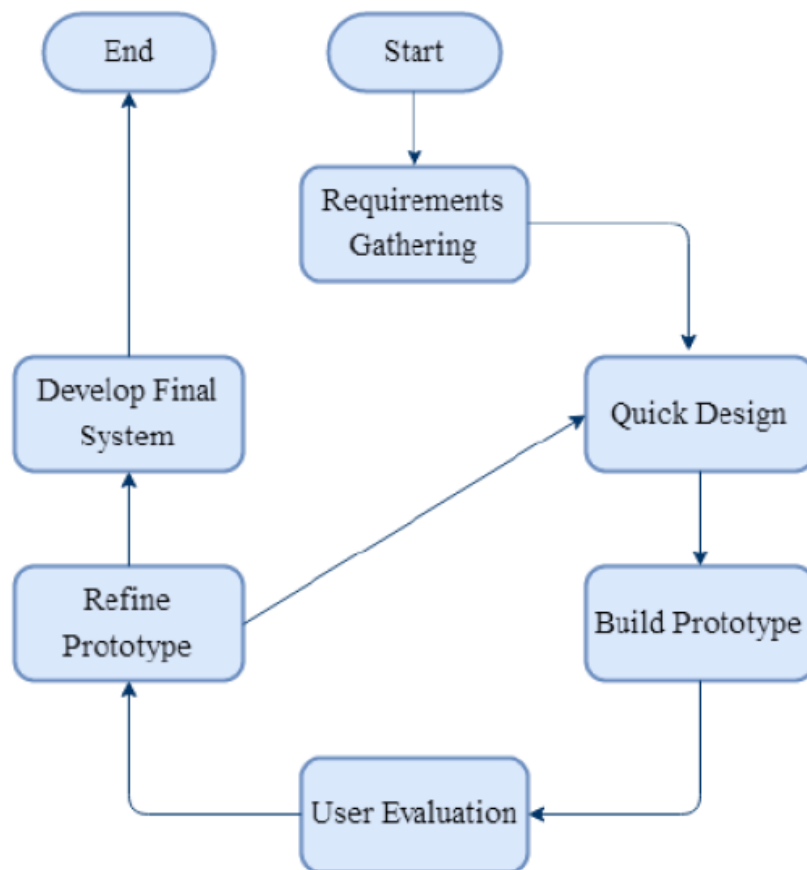
This project will follow the SDLC methodology, which is an abbreviation for "software development life cycle." Agile SDLC is a method for developing software with the highest possible quality at the lowest possible cost and in the shortest possible time. This project requires the collection of data on crime rates in three different cities, which requires a significant amount of work, and the use of a GPS system to pinpoint unsafe and safe areas in order to develop a mobile app in a short amount of time. As a result, for projects involving these steps, the Agile SDLC is the optimal choice. The major steps in developing a mobile app for women's safety are data collection on crime rates such as rape, sexual harassment, and abuse, software design such as architectural design, testing, and deployment.



*Figure 10: SDLC methodology phases*

### 3.2 Flow Process of the Methodology

The entire methodology process entails as the following flow chart:



*Figure 11: Prototype flowchart*

The flow chart in Figure 11 depicts the entire prototype development process for the personal safety mobile application. When developing a mobile application, certain workflow constraints apply. Authors can create a simple prototype from a quick design, but it can be improved later on after user testing.

The methodology used in this study is divided into three stages and can be thought of as a System Development Life Cycle methodology: Stage I, Stage II, and Stage III. Stage-I describes the methodology used to conduct the research and analysis of the problems, as well as the proposed solution. Stage-II discusses user interface design and mobile application development. Finally, stage III will consist of testing and evaluation of the mobile application.

### **Stage I: Research Planning and Analysis**

During the requirement and analysis stages, research on sexual harassment and violence against women was conducted. A choice between Android and iOS was also made, but the author chose Android due to its open source, Linux-based software stack. Android was also chosen due to statistics indicating that more users in Malaysia use Android than iOS. Additionally, surveys on women's safety in Malaysia have been conducted. The current issues confronting women are defined. Existing mobile apps that promote women's safety are examined, and the issues with those apps are defined. The current system's strengths and weaknesses, with an eye toward improvement as the goal is defined. The determines the data resources required to develop this application during this stage of the SDLC. The data was gathered from a variety of sources, including a Malaysian women's aid organisation. It is determined whether the project is feasible and can be implemented successfully with the least amount of risk.

### **Stage II: Developing and Designing**

The design and development stage requires you to download Android Studio, which is the official Integrated Development Environment (IDE) for Android application development. It is based on IntelliJ IDEA and requires coding in XML, C++, and Java. In addition to user interfaces, safety features such as location sharing and SOS mode have been developed during the prototype phase. This phase of the SDLC begins with the transformation of the software specifications into a design plan referred to as the Design Specification. Design and analysis of the user interface.

### **Stage III: Testing and Evaluation**

Testing and evaluation come after the project is completed. The apps will be given to a group of women to test whether the application itself is helpful and reliable. Their feedback is gathered through a survey of whether this device will help them to avoid dangerous situations. In this stage, the app will be tested for defects and deficiencies. The issues will be fixed until the product meets the original specifications. At this stage, the goal is to deploy the software to the production environment so users can start using the product.

### 3.3 Tools

#### 3.3.1 Android Platform

Android is a free and open-source software stack based on Linux that was designed to run on a wide variety of devices and form factors. Android is a collection of software components that are roughly divided into five categories. The following diagram depicts the Android platform's major components.

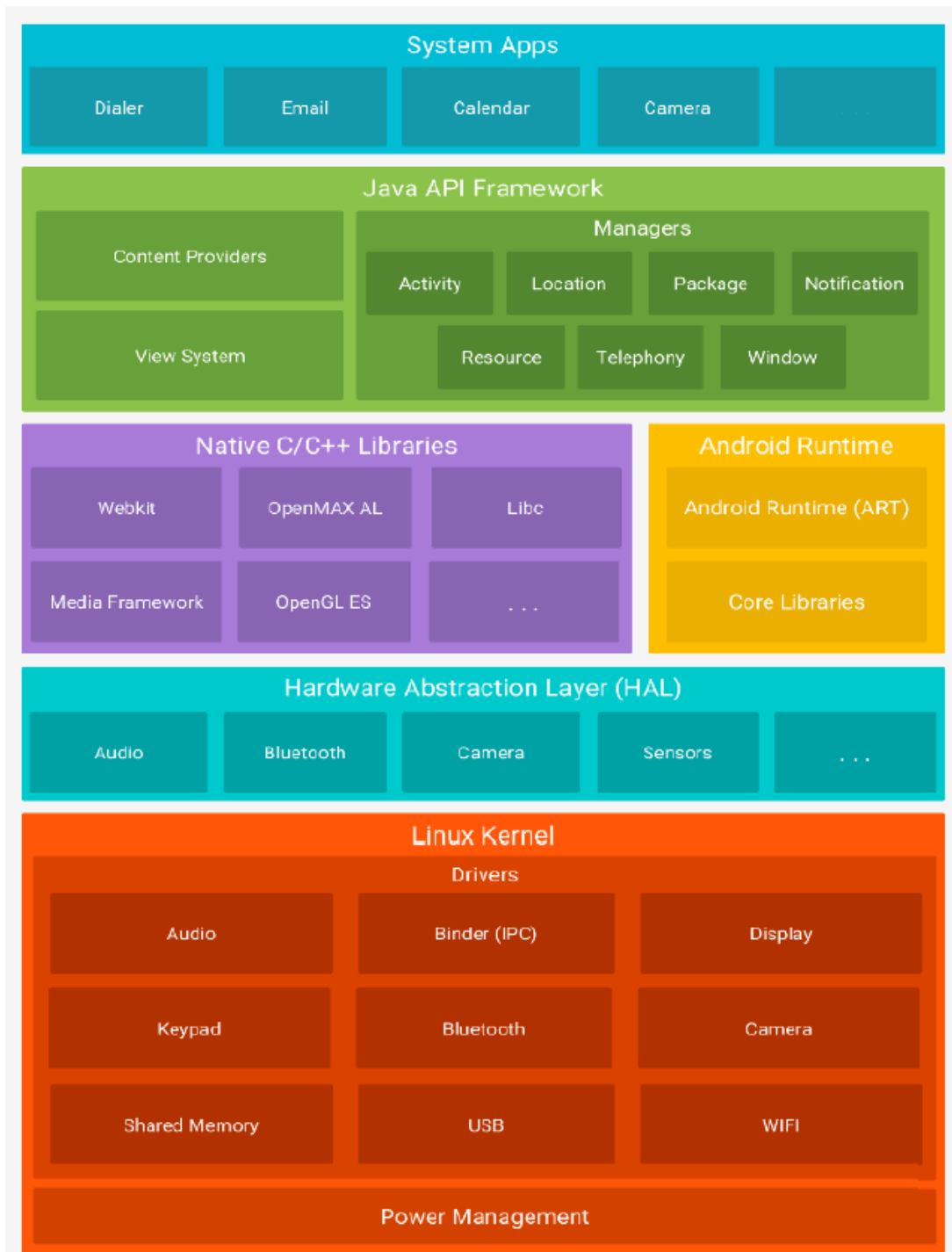


Figure 12: Android platform in 5 layers

### 3.3.2 Android Studio

Android Studio is the official Integrated Development Environment (IDE) for Android app development, based on IntelliJ IDEA. On top of IntelliJ's powerful code editor and developer tools, Android Studio offers even more features that enhance productivity when building Android apps. It also has IntelliSense, which can help developers code faster and correct their syntax errors while developing. In addition, it has a drag-and-drop feature that makes it easy for developers to design their GUI (Graphic User Interface).

- Problem Encountered

It was discovered that, despite its convenient tools and environment for app development, when a developer makes the slightest change to it, it takes a long time to rebuild the apps and show the results to the developer. Occasionally, the application had to be reconfigured in order to see the results.

### 3.3.3 Android SDK

Developers can use the SDK to create applications and services for all versions of Android (Anon., n.d.). Android IDE, Eclipse IDE, Android Studio, and others were used to develop Android applications. Using the Android SDK, a developer can create and test their apps on a virtual Android device. This virtual emulator enables the developer to see the results in a more efficient and convenient manner.

- Problem Encountered

If the developer changes their work environment or if multiple developers work on the same project, they must download the required platform manually in order to run their apps.

### 3.3.4 Android Emulator

Users can run their app on the android emulator using this virtual android device. This emulator can run on a tablet, a smartphone, a wearable, and a TV. Using this emulator, a developer can test and develop their application without having to use a physical device.

- Problem Encountered

While it is convenient for developers without access to a physical device to use this emulator, there have been reports of performance issues. For example, because this emulator uses a large amount of RAM and memory space when running on a computer, it has been found to significantly reduce overall pc performance. For example, respond more slowly.

### 3.3.5 Firebase



*Figure 13: Firebase Logo*

The illustration above depicts the Firebase logo. Firebase is a toolkit for "building, improving, and growing your app," and the tools it provides developers with cover a large portion of the services that developers would normally have to build themselves using PHP SQL and so forth. The reason for this is that the developer believes it is more beneficial to concentrate on the app experience itself. This encompasses functions such as analytics, authentication, database management, configuration, file storage, and push messaging, to name a few. The services are cloud-based and scale with little to no effort on the developer's part. The advantage of using Firebase is that it is API-free. Due to the fact that Firebase acts as a server, the API and data store will be written in such a way that they can be modified to suit the majority of needs.

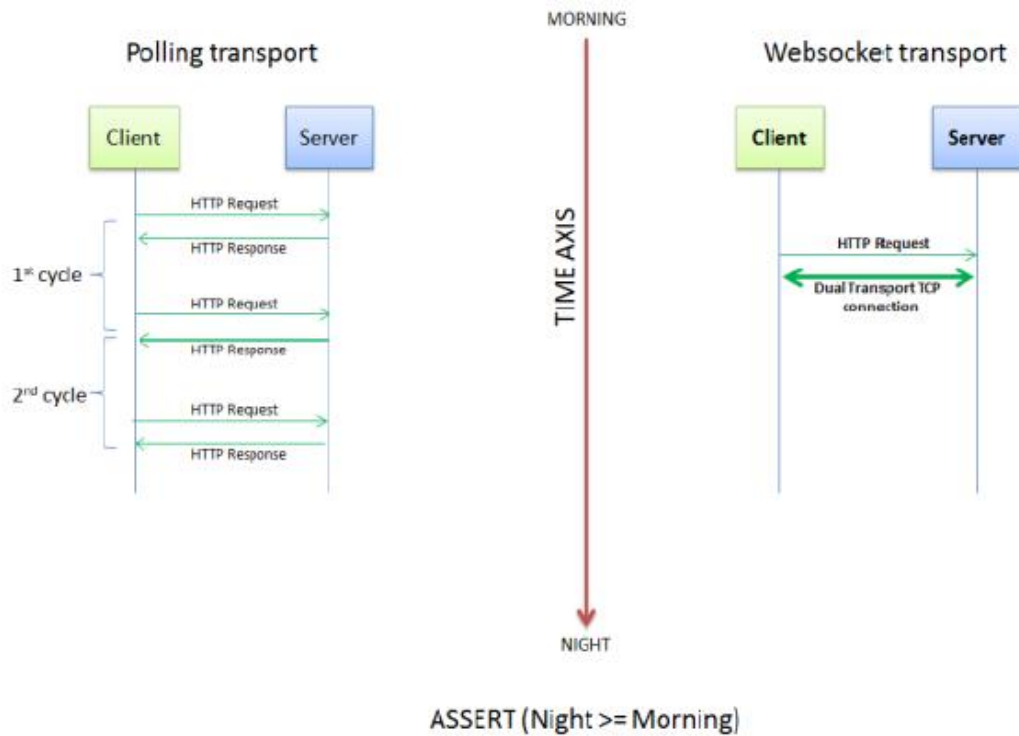


Figure 14: Transportation between Pulling transport and WebSocket Transport

Firestore is a Real-Time Database Management System. Which is the correct course of action in IR 4.0. The world is changing faster than we can keep up with it; having a real-time database simplifies development, administration, and user interaction. While real-time data is not interchangeable with dynamic data, the advantage of real-time data is that it can be archived for later or off-line analysis. Firestore is not accessed via standard HTTP, but rather via WebSocket, which is significantly faster than HTTP. As illustrated in Figure 3.2.2, HTTP required two trips between client and server, requiring additional run-down time, whereas WebSocket only requires one trip and can still communicate back and forth.

- Problem Encountered

This firestore had a problem with the supported version. The framework of Firestore has been updated and maintained. As a result, developers must also upgrade to the latest version of Firestore. Apps that are running on a lower version of firestore may not function properly because of an issue with Google's service.



### 3.4 Gantt Chart

The project is divided by two phases where phase one is mainly on Final Year Project 1 and Phase 2 are focused on Final Year Project 2 as shown in Figure 10.

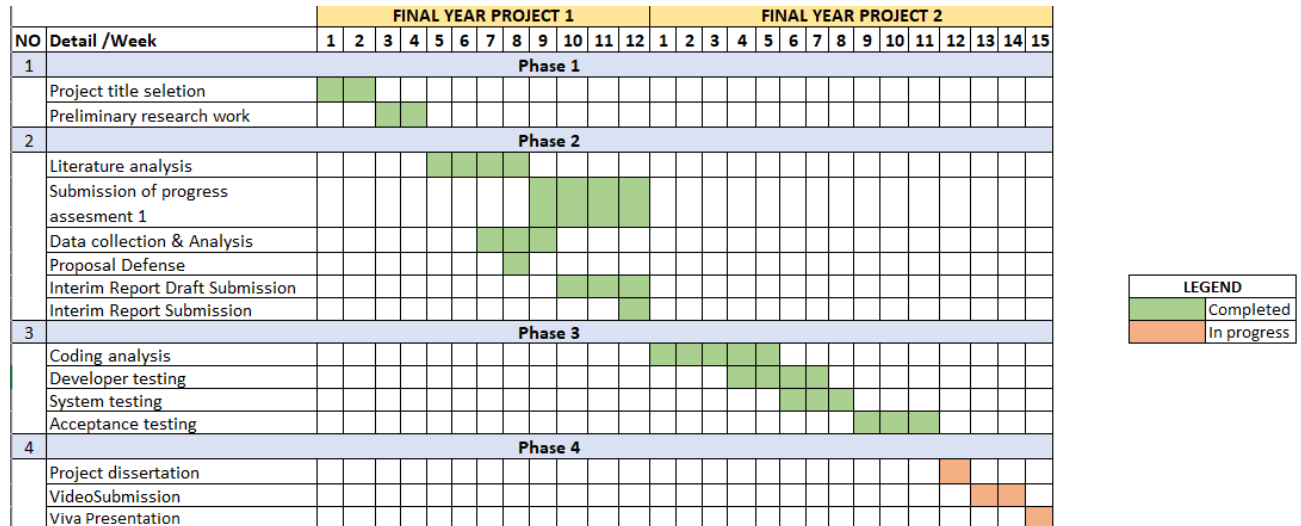


Figure 15: Project Gantt Chart

### 3.5 Key Milestones

Prior to initiating a new project, it is critical to create a key milestone plan that details the end dates for each phase. The table primarily focuses on the deadlines for each phase to be completed within the timeline. The following figure depicts the significant milestones for the final year projects 1 and 2.

Week 1-3	<ul style="list-style-type: none"> <li>• Submission of Titles and Project Synopsis</li> <li>• Approval on Project Proposal and Assignment of Supervisor</li> </ul>
Week 4 – 6	<ul style="list-style-type: none"> <li>• Information gathering</li> <li>• Literature review</li> </ul>
Week 7-10	<ul style="list-style-type: none"> <li>• Extended proposal submission</li> <li>• Proposal defense</li> </ul>
Week 11-12	<ul style="list-style-type: none"> <li>• Interim report submission</li> <li>• Prototype development</li> </ul>

*Table 1: Key milestone of Final Year Project 1*

Week 1-3	<ul style="list-style-type: none"> <li>• Data gathering</li> <li>• Literature review</li> </ul>
Week 4-6	<ul style="list-style-type: none"> <li>• App Development</li> <li>• App requirement gathering</li> </ul>
Week 7-10	<ul style="list-style-type: none"> <li>• Firebase Authentication</li> <li>• User UI development</li> </ul>
Week 11-12	<ul style="list-style-type: none"> <li>• App functionality analysis</li> <li>• Testing</li> <li>• Dissertation Submission</li> </ul>

*Table 2: Key milestone of Final Year Project 2*

## Chapter 4 : Result and discussion

This chapter will discuss about the result from the proposed solution that will be used for this entire project and the design for the user interface.

### 4.1 Data Gathering

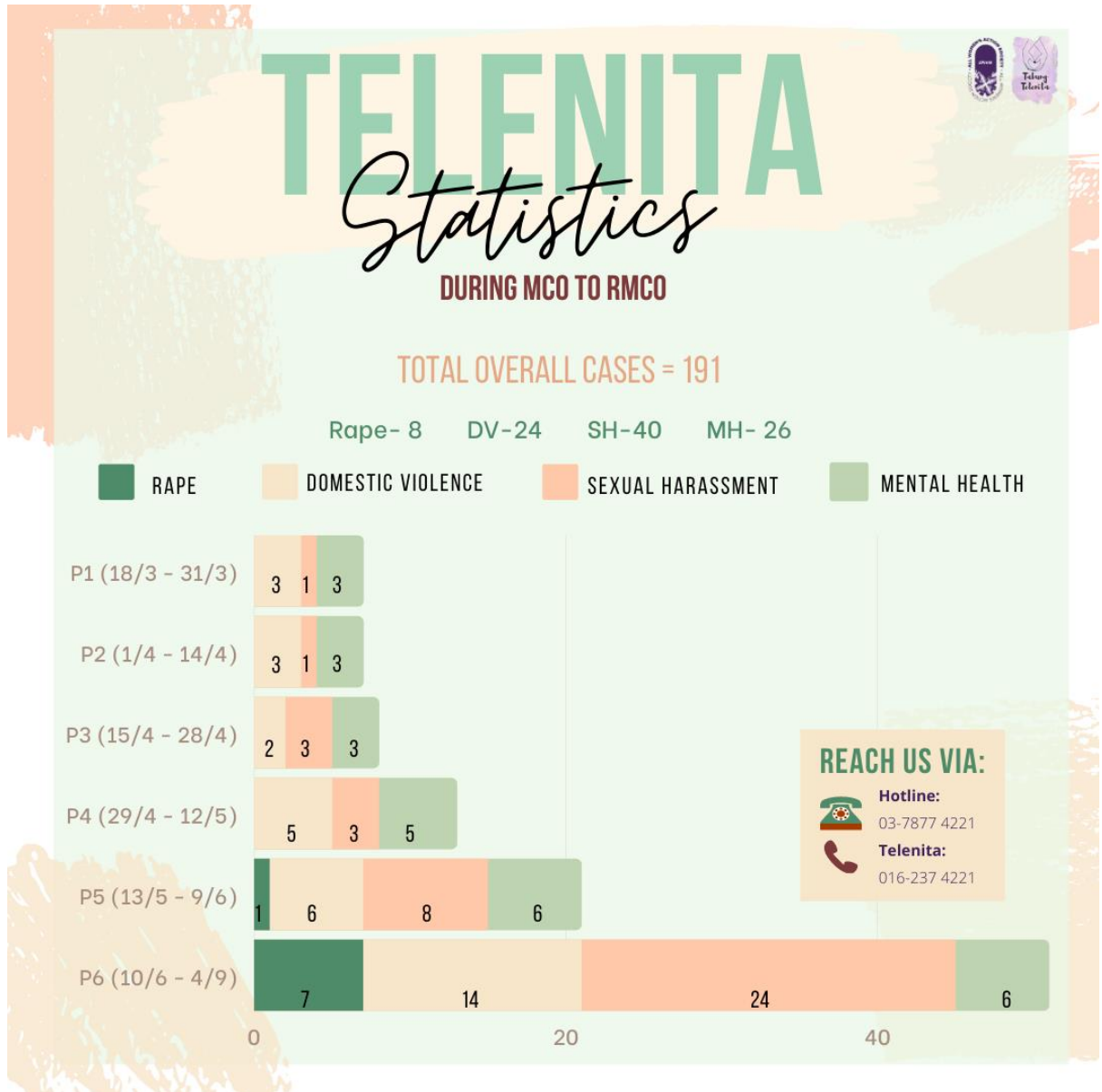


Figure 16: Telenita Statistics during MCO TO RMCO

According to, all Women's Action Society. AWAM. (2020, November 8), the statistics shows that during MCO TO RMCO the cases related to sexual harassment, rape, and domestic violence have increased rapidly within 4 months. This proves that day by day violence against women keep on increasing even during the pandemic whereby movement has been limited.

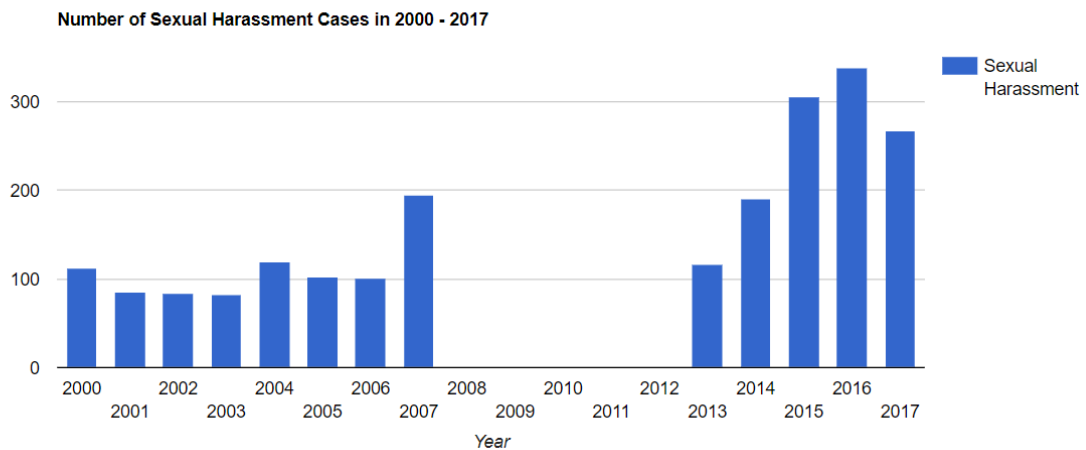


Figure 17: Number of sexual harassment cases in 2000-2017

According to Women's Aid Organisation. (2021, January 19), sexual Harassment Statistics in Malaysia can be seen to be increasing from the year of 2000 to 2017. This shows the severity of women safety in Malaysia and the need of women safety app to minimise these issues.

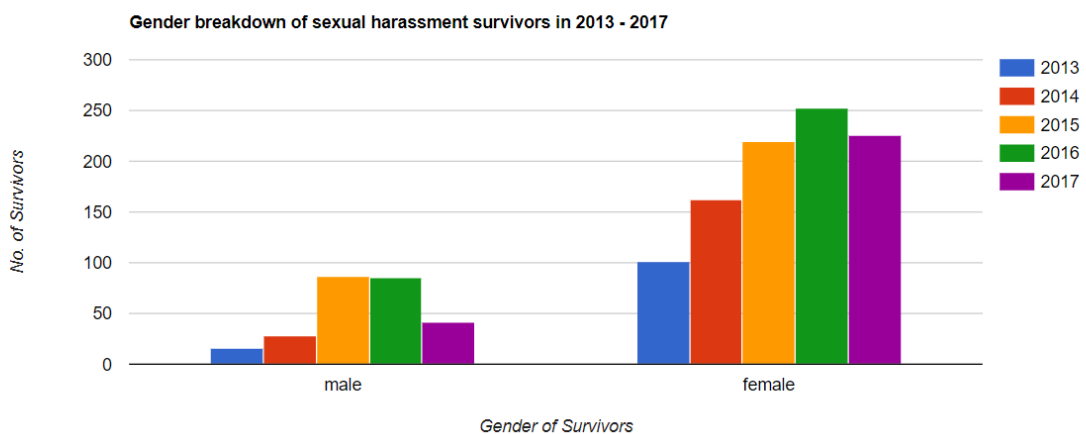


Figure 18: Gender breakdown of sexual harassment survivors in 2013-2017

This data also has been collected from Women's Aid Organisation. (2021, January 19), whereby this statistic proves that women are vulnerable to sexual harassments compared to men and this is why women safety should be enhanced in Malaysia by implementing women safety app.

## 4.2 Survey and discussion

A survey by google form has been done to analyse women safety in Malaysia. The survey has been responded by 32 people as of now.

### 1. Gender

[More Details](#)

● Woman	29
● Man	3
● Non-binary	0

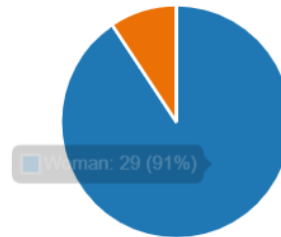


Figure 19: Gender Chart

The survey was done in between short amount of time and got a good feedback, and this shows the seriousness of the problems in Malaysia. To beat the stereotypical that harassment and rape has only been done towards women, this survey opens the floor to anyone.

### 3. Have you ever encountered any type of sexual harassment/violence?

[More Details](#)

● Yes	19
● No	5
● Maybe	8



Figure 20: Sexual harassment/violence chart

According to the survey results, the author can conclude that some of the respondents are not even aware whether certain gestures they have experienced falls under sexual abuse or harassment. This shows that Malaysians have a very limited education on these issues.

#### 4. Did you speak about this incident or report it to anyone?

[More Details](#)

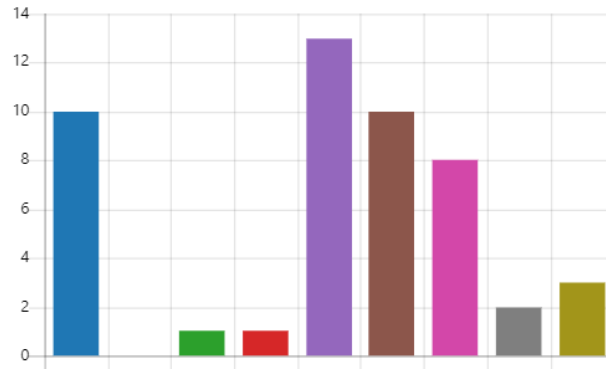
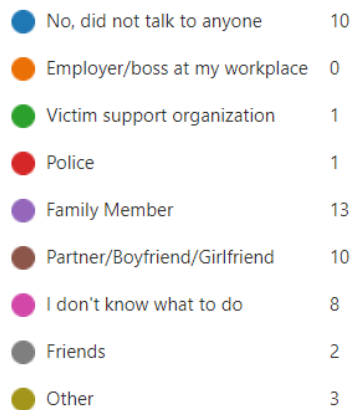


Figure 21: Incident report chart

In the survey the respondents were also asked if they spoke about any incident that is related to sexual harassment to anyone they know and about 13 out of 32 respondents only talked on it to their family members and about 10 out of 32 respondents did not talk about it to anyone. From this we can conclude, most of the victims are unaware of what they are supposed to do or who they supposed to seek out to when they experience sexual harassment. It can be assumed it's either they do not want to lengthen the issue, or they do not have sufficient evidence.

#### 5. Please read the statements and answer with the likelihood of each scenario

[More Details](#)

Very Unlikely Neutral Somewhat likely Very likely

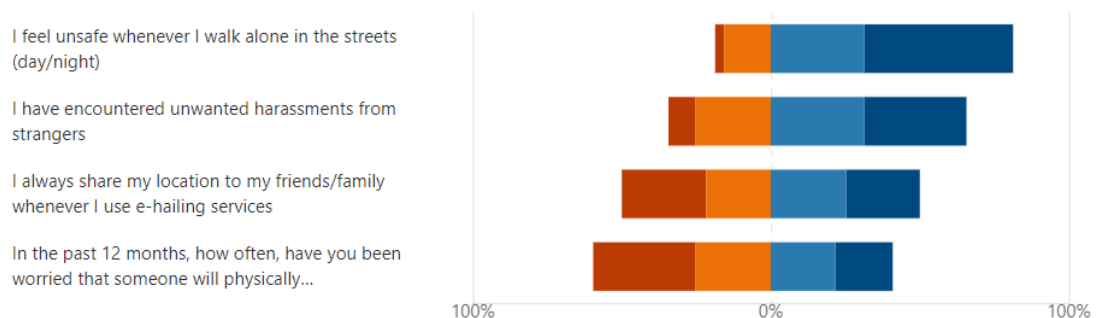


Figure 22: Scenario likelihood chart

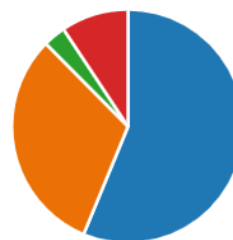
The respondents were given few scenarios and they were asked to answer the likelihood rating of each scenario that mostly likely to least likely they have experience. For an example, from the results we can mention that about 50% of them very likely to feel unsafe when they

walk alone in the streets, 34.4% of them very likely to encounter unwanted harassments from strangers, and 21.9% of them somewhat likely to be worried that someone will physically attack or hurt them. This clearly shows that Malaysian women are actually have been exposed to sexual abuse or harassments which causes them to think it is more likely for each scenario to occur.

8. During the past 12 months have you carried with you something that can be used for self-defense, as a precaution for threatening situations?

[More Details](#)

● Never	18
● Sometimes	10
● Often	1
● Always	3



*Figure 23: Self-defence chart*

According to the results shown in the pie chart, about 50% of the respondents did not carry something that can be used for self-defence as a precaution during threatening situation. Knowing the crime rate against women is increasing rapidly each and every day, it is very crucial for each Malaysian women to carry something that can be used during threatening situation to avoid themselves being a victim of sexual harassment or sexual abuse.

9. What are things that you have used or carried with you as a precaution during threatening situations?

[More Details](#)

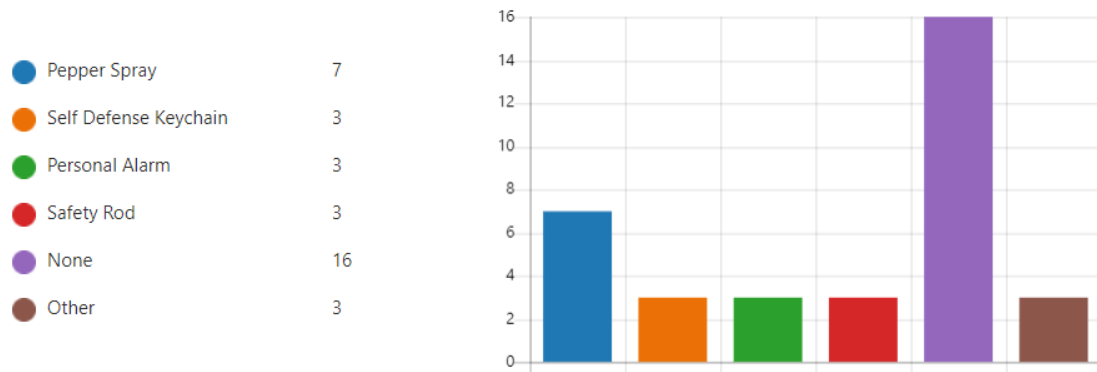


Figure 24: Self-defence or precaution materials chart

In relation with the previous question, the respondents we are what types of things or device they carry with them during dangerous situations and as the bar chart shows that only about 19 of them carry things such as personal alarm, pepper spray and etc. Meanwhile the others have respondents have answered that they do not carry anything with them. This could possibly make them more vulnerable to such crimes as nowadays it has become for a women to carry such things wherever they go.

10. In general, how common do you think violence against women by partners, acquaintances, or strangers is in Malaysia?

[More Details](#)

32  
Responses

2.38  
Average Number

Figure 25: Women safety in Malaysia

Next, the respondents were asked how common they think violence against women is in Malaysia, and the results shows that it is in a average of 2.38 out of 5. Even though, it is not in the alarming rate in Malaysia according to the respondents' precautions measures need to be taken immediately before it gets worse.



11. Do you think women's safety apps are helpful?

[More Details](#)

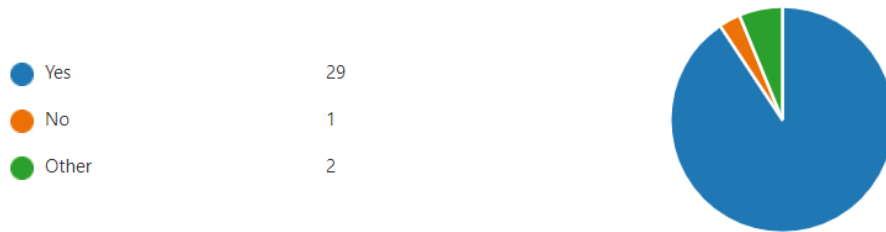


Figure 26: Safety app chart

The respondents were also asked on their opinion on women safety app whether if it is helpful. About 29 out of 32 respondents answered “yes” meaning that this type of apps are actually in demand and apps such as that is not been implemented among Malaysia women.

13. Are you interested to be a part of the team to test the women's safety app?

[More Details](#)

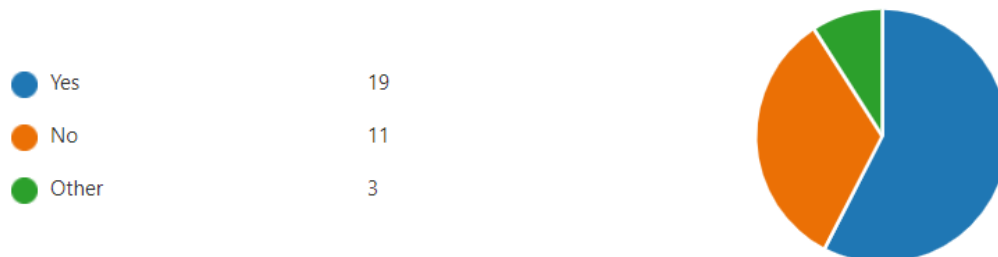
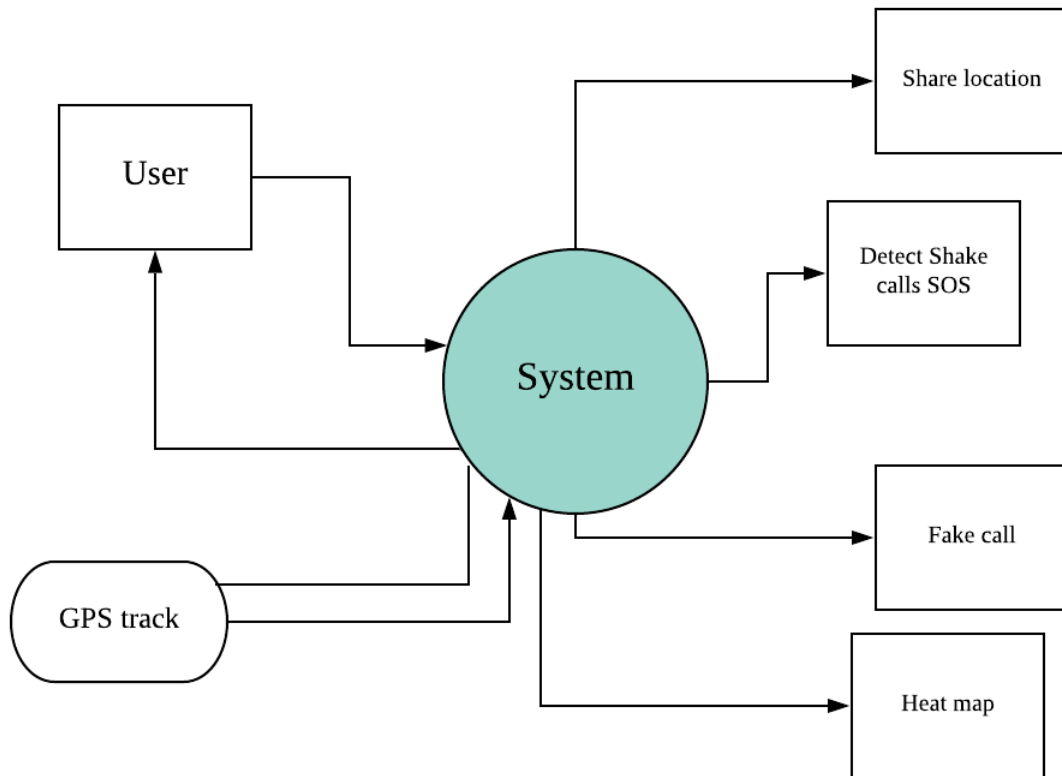


Figure 27: Testing app chart

Moreover, the respondents were asked if they are interested to be part of the testing team to help the author to perform quality and performance testing. All the respondents who were interested in participating for the app testing also were requested to share their email address as the author will be to contact them during the testing phase.

## 4.3 System Design

### 4.3.1 Data flow diagram



*Figure 28 : Data flow diagram of the app*

A data flow diagram is a visual representation of how data moves through a system or process. Each object's and the process's outputs and inputs are also included in the DFD. As from the diagram shown above the data of user such as location is tracked from the GPS function in user's smartphone. From the help of Google Map's API key, the system will be able to share the user's current location to the saved contacts. The information also can be used to perform the app's functions such as fake call, heat maps and call SOS due to any emergency.

### 4.3.2 System Architecture

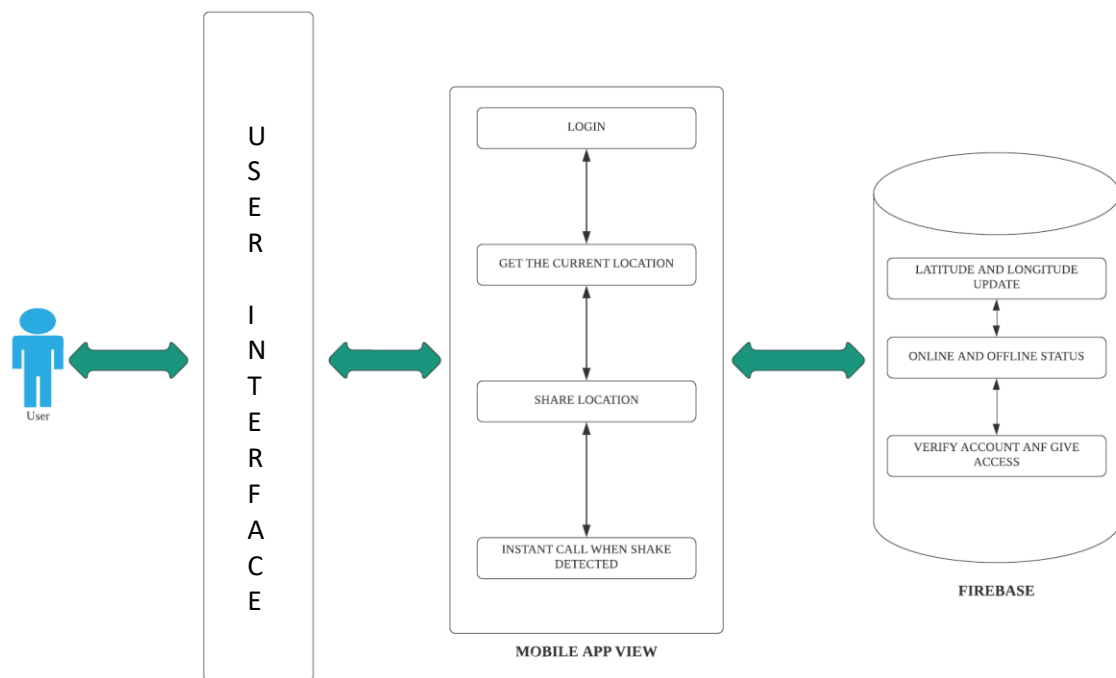


Figure 29: Frndy Application system architecture

The following diagram depicts the Android app's overall system architecture. User Interface, functionalities, and key functions are all included in this architecture, as are the backend Fire Base Real Time Database, which outlines the online users and displays their Latitude and Longitude positions. The Firebase Real Time Database application also handles the verification process.

## 4.4 Activity Diagram

### 4.4.1 Login Activity Diagram

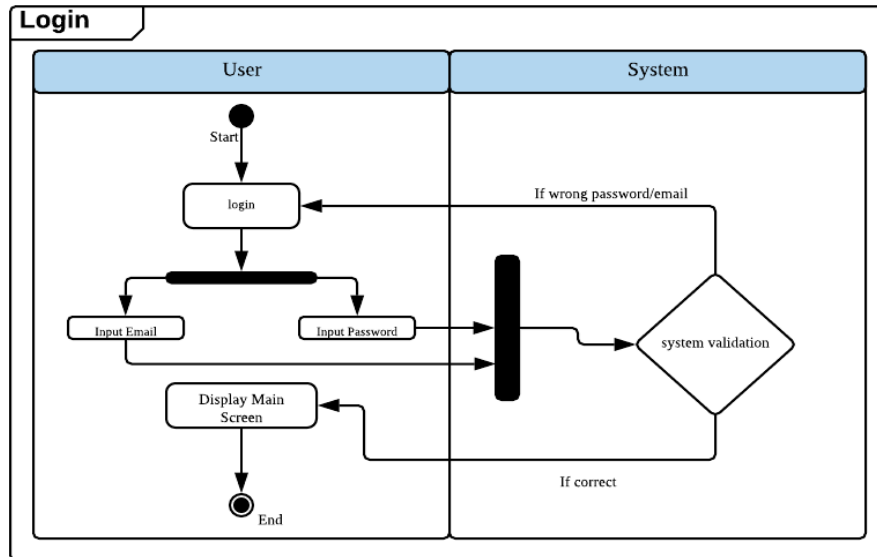


Figure 30: Login Activity Diagram

After clicking login, the user is prompted to enter their email address and password, which the system then verifies. Login screen is redirected if password or email is incorrect; otherwise, the application's main screen is shown.

### 4.4.2 Sign Up Activity Diagram

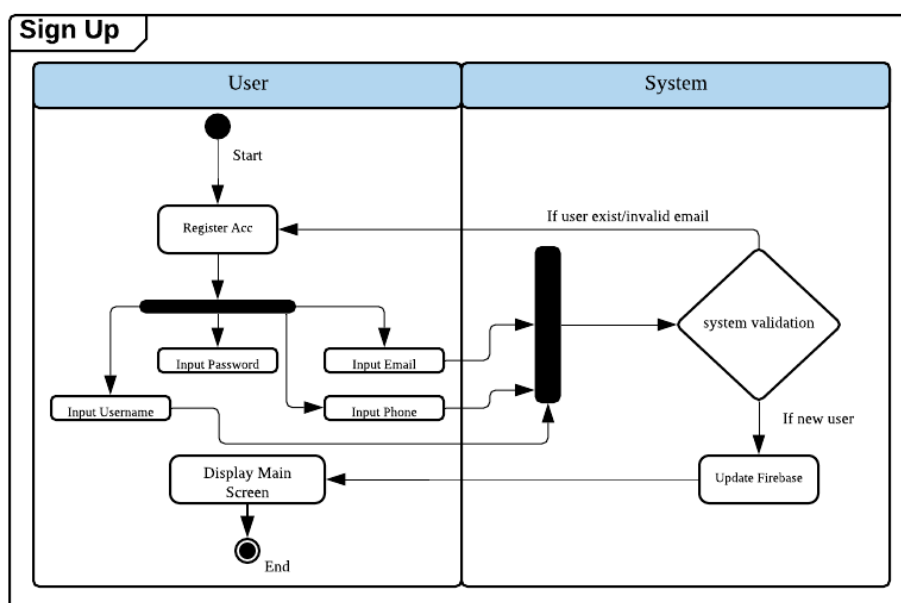


Figure 31: Sign Up Activity Diagram

If the user does not already have an account, they must create one in the sign-up activity diagram. For registration, a user must enter their password, username, phone number and email address into the appropriate fields. If a user already exists, the system will link the user to register an account again; otherwise, it will perform an update on Firebase and return the user to the main screen.

#### 4.4.3 Call SOS Activity Diagram

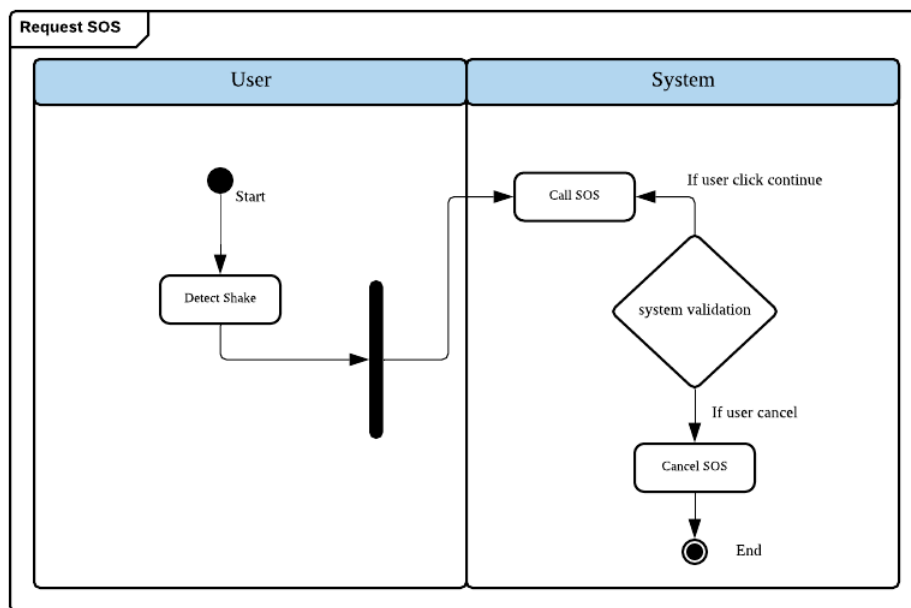


Figure 32: Request SOS Activity Diagram

In request SOS activity diagram, when the user shake their smartphone, the system will straight call the SOS number. However, users will be given the option to cancel SOS if they have accidentally shaken their device and they will redirected to the main screen.

#### 4.4.4 Share Location Activity Diagram

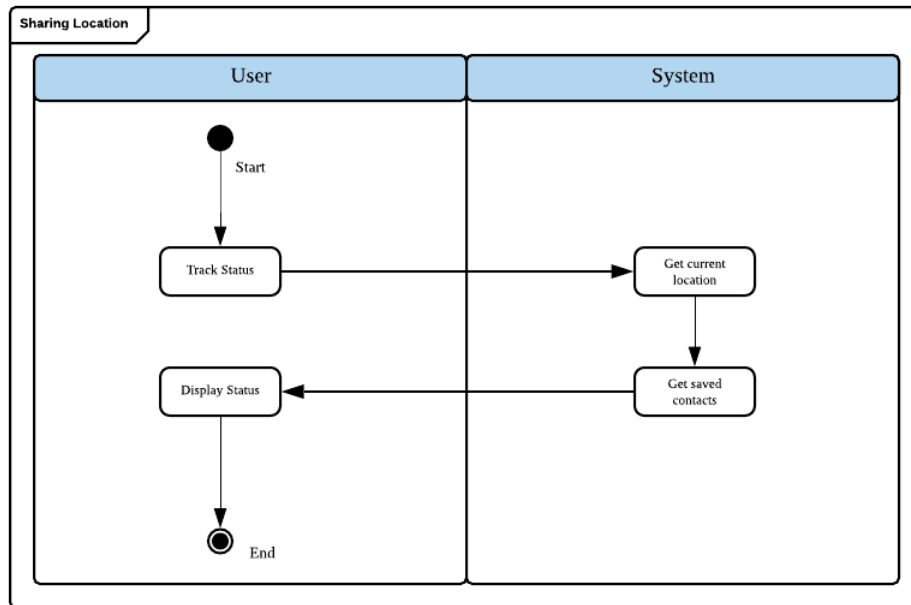


Figure 33: Share Location Activity Diagram

When a user clicks on the share location status option in the tracking activity diagram, the system will first get their current location, then their member list, and finally share the location to a specific user.

## 4.5 Firebase Structure Design

Traditional SQL is not coherent with Google's firebase database. Json trees are used to store all of the data in this application. An object class is used to generate the attribute in Firebase as part of this structure. In User. Class, for example, every user attribute is refined. When a new user is registered, this user class will be used to create a structure in firebase. Figure below shows a sample structure.



Figure 34: Firebase structure diagram

```
package com.example.authenticatorapp;

import ...

public class register extends AppCompatActivity {
    EditText mFullName, mEmail, mPassword, mPhone;
    Button mRegisterBtn;
    TextView mLoginBtn;
    FirebaseAuth fAuth;
    ProgressBar progressBar;

    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_register);

        mFullName = findViewById(R.id.FullName);
        mEmail = findViewById(R.id.Email);
        mPassword = findViewById(R.id.password);
        mRegisterBtn = findViewById(R.id.registerbtn);
        mLoginBtn = findViewById(R.id.createText);
        mPhone = findViewById(R.id.Phone);

        fAuth = FirebaseAuth.getInstance(); // current instances from DB
        progressBar = findViewById(R.id.progressBar);
    }
}
```

Figure 35: User.class used to create firebase structure

## 4.6 Prototype

A system prototype was developed based on the results of the survey analysis. It consists of a web, a mobile app, and an IoT device. The web application will be used by both the police department and the Women Organization Center to track and manage rape cases and keep victims informed. For the time being, the user interface of mobile apps is primarily geared toward women in this project. The user interface for mobile apps will require the user to log in or register.

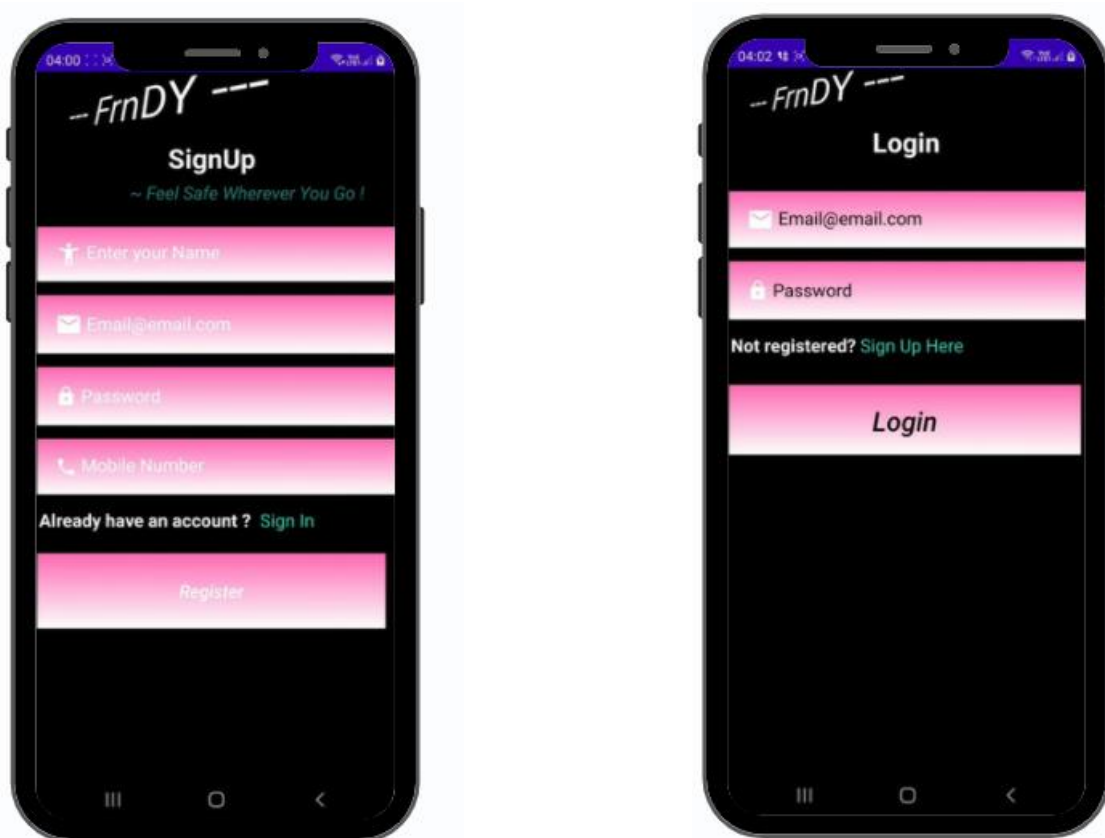


Figure 36: Sign up and Login screen

The figure above shows what it will displayed once the user have clicked the app icon. Over here, the user has to fill up their personal details such as name, email, password and mobile number. If the user already has an account, they can click the sign in, and it will display a login screen to the user. Next, the user can create their account in the sign-up page by entering their email and password. It is crucial if it is a new user, for them to create an account thus it can be authenticated via firebase authentication when they want to login the next time.



Search by email address, phone number or user UID					Add user	↻	⋮
Identifier	Providers	Created ↓	Signed in	User UID			
ash@email.com	✉	6 Dec 2021	6 Dec 2021	YvR5tKZyGggoK7hqf6Lf2TgoXnb2	📄		⋮
premi18@gmail.com	✉	6 Dec 2021	6 Dec 2021	xg56Ej9YdwMymih2JID0IOLPIP73			
premiparamanathan@gma...	✉	6 Dec 2021	6 Dec 2021	W7UXVAeRr0Pw5XZJBCYUIAPcx1...			
tri@gmail.com	✉	6 Dec 2021	6 Dec 2021	pwLyRzwJyPcELQdu90MbNg7kC...			
qwtYW@email.com	✉	6 Dec 2021	6 Dec 2021	Re3OB5508ee4QxH5Cmta4KDnMt...			
nikhil@email.com	✉	4 Dec 2021	4 Dec 2021	jf0Mc2WNODXBv5eLXM5vNZT1P...			
qwerty@email.con	✉	4 Dec 2021	6 Dec 2021	VRM1DtclzqY6dFV4BGN01Sdskj02			
loki@email.com	✉	4 Dec 2021	4 Dec 2021	osnD3RXakbXdR5iuGaPOWC8Whr...			

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Figure 37: Firebase database authentication

Firestore Database was used in order to store the Unique ID of user. All the database includes authentication, storage, and hosting for the authorities to view on webpage. Over here the admin can check the users who have logged in the app and keep track of user activity.



*Figure 38: Main menu*

Next, once their account is set up the user must allow to turn on live location as always. Once location services have been turned on the user can see their location in their screen. The pink button in the middle allows their user to activate the SOS mode by shaking their smartphone. As the user successfully logged in the screen takes the user to the main menu where there will be 4 buttons, each with distinctive functionality. The my location button allows user to view their current location. Meanwhile, the fake call button allows user to receive fake call from the app which allows them to use it during threatening situations. The my profile button leads user to their profile where they can make certain changes. Meanwhile the share location button allows the user to share their location over any platform.

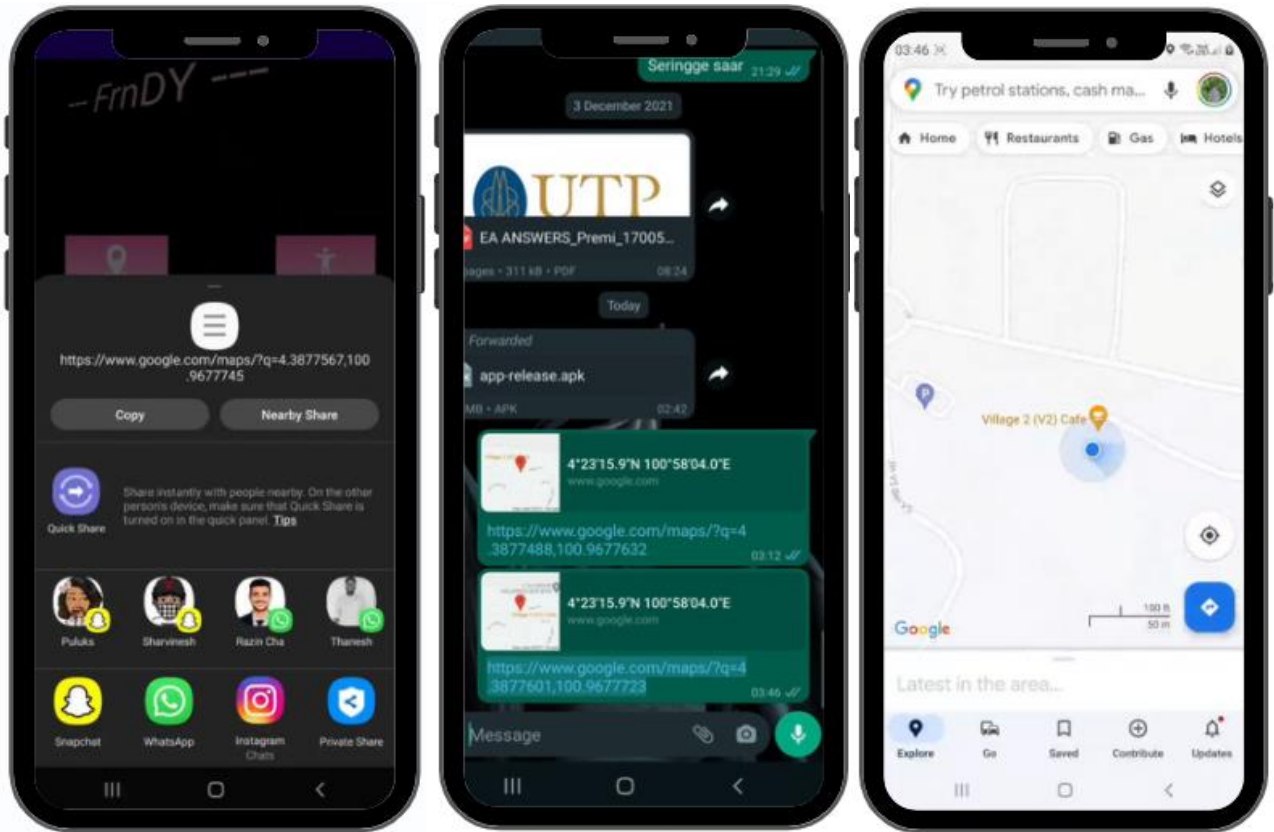
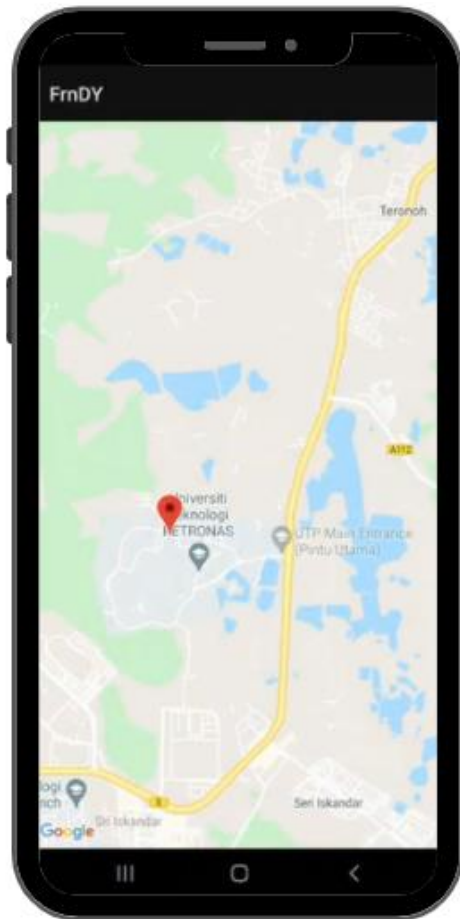


Figure 39: Share location feature

### 1. Share location

When the user clicks the share location feature the above screen will display and user can choose in which platform, they would like to send their location to his or her friend. A google map link of the user’s live location will be sent to the chosen friend. If the other person who received the link and they clicked it, they will be led to Google Maps where they can view the user’s movements and location.



*Figure 40: My location feature*

## 2. My Location

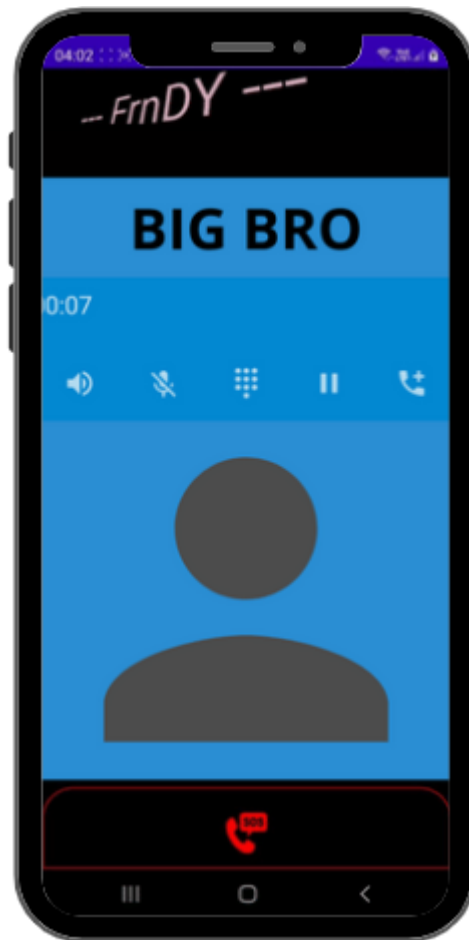
This feature allows user to check their current location. In the future work this feature is useful when incorporated with heatmaps whereby user can check the areas around them. Red colour indicates they are in dangerous area (highest crime rate recorded).



Figure 41: SOS mode feature

### 3. SOS mode

Meanwhile, once the SOS mode is activated when shake is detected, the screen will straight away display a button to call 999. However, to prevent accidentally calling due to unintentional shake detects the user will be given options to cancel the call. If cancel button is clicked, then the process is terminated automatically.



*Figure 42: Fake call feature*

#### 4. Fake Call

The fake call button is basically a fake voice message will be played when the user clicks the function. It will display a call screen where the voice message will be asking the user certain questions which will allow the user to fake a situation as if they are talking to someone and updating the situation, they are in. This feature can be used when a user is getting into a public transportation such as Grab or Taxi, they can prevent any unwanted communication from the driver. They can indirectly let the driver who has bad intentions on the user that they are not alone and they are updating the situations.

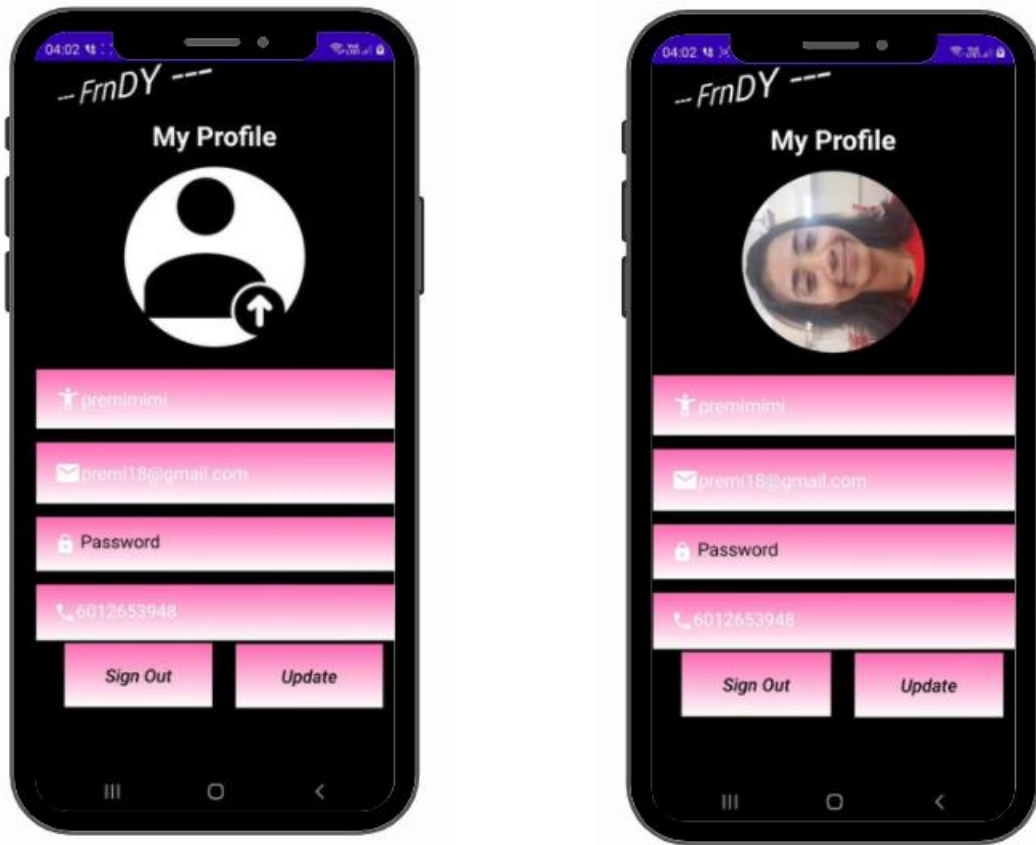


Figure 43: User Setting Page

Next, if the user clicks my profile icon in the main menu, they will be led to their profile page where they can update their profile picture, password and PIN. When user updates their details here it will also be updated in the Firebase database for the app.

## Chapter 5 : Conclusion and Future Work

### 5.1 Overview

This chapter concludes the entire project and the proposed solution for the mentioned problems statement. This chapter also recommend future works for this particular application.

According to WAO's statistics on violence against women shows that domestic violence has increased from 2000 to 2018. In 2000, there have been 3468 cases of domestic violence. While in 2018, the number increased to 5513. It can be stated that sexual abuse cases been increasing rapidly and “Frndy” is designed to assist women who have unexpectedly found themselves in an emergency scenario. It also contributes to a lifestyle and the awareness of women safety amongst Malaysians. The only way to completely eliminate and significantly reduce this issue is to develop a mobile application. Mobile is a small, custom-built software application that is simple to download and install on mobile devices. Apple's App Store, as well as Google's Play Store, have democratised the use of apps.

With familiar mobile phones that can activate SOS mode simply by shaking the phone, a person in danger will automatically notify family and friends to his or her location and authorities to the situation they are in and the victim's location. "Such an application will improve the lives of all citizens by providing them with a greater sense of security in our society," one could argue (Biswas, 2017). The purpose of notifying authorities is to reassure the victim with the evidence that has been gathered and to allow authorities to check on the victim's health.

There are some issues with the current system that have been raised. Maintaining and controlling the real-time database is a challenge. It is possible for a developer to encounter difficulties while developing in firebase because the database structure is different from that of a SQL database and uses a tree-dimensional structure. Despite the fact that there are a number of tutorials available online, different compilation configurations may provide a different programming environment.



## 5.2 Impact and Contribution

Although there are numerous emergency applications, the majority of them require payment in order to unlock additional features. For example, rapidSOS+ requires an annual subscription fee of \$49.99 US dollars for the family packet and \$29.99 US dollars for the individual packet. Women can access immediate assistance through this application if they encounter a problem or are in a difficult situation. Women's increased participation in the paid workforce is arguably the most significant economic change of the last century, and it has created a situation in which women must travel and forth to continue performing their daily duties. Users can use the features of this application to determine whether the areas through which they will travel are safe from offences. Not only is this application useful for tracking, but it also includes an SOS emergency alert. This emergency alert feature can assist users in escaping dangerous situations or even prevent unfortunate or uncomfortable events from occurring.

The primary goal of these safety applications is to send alerts to individuals who can take action quickly. Instant alerts can provide immediate assistance and help protect women from becoming victims of assault. Women are now aware that certain measures can be taken when confronted with potentially dangerous situations as a result of the development of such an app. Additionally, this app demonstrates the critical nature of having a mobile application that can protect women from sexual assault and raises awareness about women's safety in Malaysia. Although women's security apps are likely to play a minimal role in security these days. Nonetheless, its continued use and daily updates in accordance with requirements, as well as a heightened awareness of security, will help the apps see a more righteous future.

### 5.3 Future Work

The application's usability will be further improved in the near term. In addition, the future plan is to improve and enhance security by incorporating the latest smart device built-in technology, such as fingerprint recognition and NFC. Fingerprints or NFC tags can be used by users to check in more quickly and easily. Other than that, the application will include a forum or discussion area. In the application, the user can now post warning cases, the most recent emergency tip, and other relevant information. In addition, the interface's user-friendliness and the navigation steps on the page can be improved and refreshed to keep users interested at all times. The future works activities will be conducted according to remaining SDLC phases while being kept on track using the Gantt Chart previously presented.

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