



FINAL YEAR PROJECT REPORT

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Application for Emergency Response:
A One-Touch Mobile App for Real-Time Assistance

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Abstract

This project successfully developed SafePoint, an emergency response mobile application that works as a personal safety assistant to help people during urgent situations, especially crime-related emergencies. The application was created to solve the problems found in existing emergency apps, such as complicated ways to activate emergency features and subscription fees that prevent people from accessing important safety tools. SafePoint allows users to send emergency alerts with just one touch of a button, which automatically sends SMS messages containing the user's name, current location, and time to all their emergency contacts within seconds. The application includes many useful features like emergency contact management where users can add family and friends, incident reporting system that lets users report crimes with automatic location detection and photo evidence, safety resources including emergency hotlines and chatbot for safety guidance, and nearby services locator to find hospitals and police stations. For emergency responders, the application provides an admin dashboard that helps them manage incident reports, assign police stations to emergencies, update case status, and monitor high-risk areas in the community. The application was built using Android Studio with Java programming language and Firebase database, and was tested thoroughly to make sure it works properly and safely. Through surveys with 34 people and user testing, the project confirmed that SafePoint successfully provides a simple, reliable, and free emergency response solution that improves personal safety and helps emergency responders coordinate their work more effectively.

Table of Contents

Copyright.....	2
Declaration.....	3
Acknowledgements	4
Abstract.....	5
Table of Contents.....	6
List of Tables	7
List of Figures	8
List of Abbreviations/Symbols	9
List of Appendices	10
Chapter 1: Introduction.....	11
1.1. Background.....	12
1.2. Problem Statement.....	15
1.3. Project Objectives.....	16
1.4. Project Scope	16
1.5. Project Limitations	18
1.6. Methodology	19
1.7. Target Audience	21
1.8. Summary.....	23
Chapter 2: Literature Review	24
2.1. Overview	25
2.2. The Importance of Emergency Response Applications in Modern Safety Management	25
2.2.1 Current Emergency Response Challenges and Traditional Methods	25
2.2.2 Advantages of Mobile Emergency Applications	26
2.3. Review of Research-Based Related Works.....	27
2.3.1. SiSafe	28
2.3.2. iPanic.....	28
2.3.3. My Guardian.....	30

2.3.4. Android Application for Crime Prevention with GPS Integrated Technology	31
2.3.5. Criminal Alert App	32
2.3.6. Crime Reporting Management System	33
2.3.7. RUSafe.....	34
2.3.8. A Mobile Application Design to Prevent Criminal Acts	35
2.3.9 Key findings of the related works	36
2.4. Existing Emergency Applications Analysis.....	39
2.4.1. I'M SAFE Emergency Application.....	40
2.4.2. bSafe Personal Safety Application	41
2.4.3. UrSafe Personal Safety	42
2.4.4. Life360 Family Safety Application	43
2.4.5 Comparative Analysis of Existing Emergency Applicationns.....	44
2.5 System Differentiation and Unique Features	45
2.5.1 Addressing Gaps Found in Current Solutions.....	46
2.5.2 Unique Features of SafePoint Application	46
2.6 Summary.....	47
Chapter 3: Requirements Analysis.....	49
3.1 Overview	50
3.2 Fact-Finding Techniques	50
3.2.1 Questionnaire Design	50
3.2.2 Key Findings from User Research	68
3.3 Requirement Specification	69
3.3.1 Functional Requirement.....	70
3.3.2 Non-Functional Requirements.....	75
3.3.3 User Requirements	79
3.3.4 System Requirements	81
3.4 Requirements Changes and Adaptations	82
3.4.1 Requirements Evolution During Development.....	83
Chapter 4: System Design	83
4.1 Overview	84
4.2 Rich Picture Diagram.....	84

4 .3 Use Case Diagram	86
4.4 User Activity Diagram	90
4.4.1 Login and Register.....	91
4.4.2 SOS Emergency Alert.....	92
4.4.3 Emergency Contact Management.....	93
4.4.4 Incident Reporting.....	95
4.4.5 Safety Resources Access	97
4.5 Responder Admin Activity Diagram.....	99
4.5.1 Responder Admin Login	100
4.5.2 Incident Management	100
4.5.3 Police Station Management.....	101
4.6 Class Diagram	102
4.6 Sequence Diagram.....	104
4.6.1 Login and Register.....	104
4.6.2 Add Emergency Contact.....	105
4.6.3 Click Emergency Button	107
4.6.4 Send Incident Report.....	109
4.6.5 Responder Handling the Incident Report.....	110
4.7 Interface Design.....	111
4.7.1 SafePoint User Side.....	112
4.7.2 SafePoint Responder Side	122
4.8 Summary.....	127
Chapter 5: Implementation.....	130
5.1 Deployment.....	131
5.2 Development Environment.....	131
5.2.1 Framework and Libraries	132
5.2.2 IDE and Tools.....	132
5.2.3 Version Control System	133
5.2.4 Operating System Used.....	133
5.3 System Configuration and Setup	133
5.3.1 System configuration	134
5.3.2 Backend Setup (Firebase).....	134

5.3.3 Fronted Setup	134
5.4 Database Implementation	135
5.4.1 NoSQL Database Collections.....	136
5.5 Key Modules and Features Developed.....	138
5.5.1 User Authentication Module.....	139
5.5.2 Emergency Contact Management Module.....	141
5.5.3 Emergency Response Module	144
5.5.4 Incident Reporting Module.....	145
5.5.5 Administrative Dashboard Module.....	147
5.5.6 Safety Resources Module	149
Chapter 6: Testing	151
6.1 Overview	152
6.2 Unit Testing	152
6.2.1 Test Plan.....	153
6.2.2 Test Data	154
6.2.3 Test Result.....	156
6.3 Integration Testing	169
6.3.1 Integration Testing: Mobile Application.....	170
6.4 Usability Testing	171
6.5 Acceptance Testing.....	180
6.6 Performance Testing.....	185
6.7 Testing Summary	186
Chapter 7: Conclusion.....	186
References.....	187
Appendix A: Project Gantt Chart	191
Appendix B: FYP Meeting Logs	193
Appendix C: Turnitin Similarity	217

List of Tables

Table 1 Comparative analysis of Emergency Application	26
Table 2 Comparative Analysis of Existing Emergency Applications	34
Table 3 Questionnaire Design Structure	40
Table 4 Functional Requirement #1	59
Table 5 Functional Requirement #2	60
Table 6 Functional Requirement #3	60
Table 7 Functional Requirement #4	61
Table 8 Functional Requirement #5	61
Table 9 Functional Requirement #6	62
Table 10 Functional Requirement #7	62
Table 11 Functional Requirement #8	63
Table 12 Functional Requirement #9	63
Table 13 Functional Requirement #10	64
Table 14 Performance Requirements	65
Table 15 Usability Requirement	66
Table 16 Security Requirement	67
Table 17 Compatibility Requirements	68
Table 18 User Requirements Specification.....	69
Table 19 System Requirements Specifications	71
Table 20 Detailed Description of Use Case Diagram	77
Table 21 UC01 Login and Register	79
Table 22 Login and Register	94
Table 23 Add emergency contact for user	96
Table 24 Press emergency button	98
Table 25 Send incident report	99
Table 26 Responder handling incident report.....	100
Table 27 Test Plan for User Module	143
Table 28 Test Plan for Admin Module.....	144

Table 29 Test Data for User Module.....	145
Table 30 Test Data for Admin Module	146
Table 31 Test Result T01	147
Table 32 Test Result T02.....	148
Table 33 Test Result T04	149
Table 34 Test Result T07	150
Table 35 Test Result T09	151
Table 36 Test Result T12.....	152
Table 37 Test Result A01	153
Table 38 Test Result A02.....	154
Table 39 Test Result A03	155
Table 40 Test Result A04	156
Table 41 Test Result A05	157
Table 42 Test Result A06.....	158
Table 43 Test Result A07	159
Table 44 Integration Testing Results	160
Table 45 Usability Test 1 – Qistiena	162
Table 46 Usability Test 2 - Hashimah.....	164
Table 47 Usability Test 3 – Azizan.....	166
Table 48 Usability Test 4 – Farhanah Rizal	168
Table 49 Usability Test 5 – Intan Hamiza.....	169
Table 50 Performance Testing.....	176

List of Figures

Figure 1.0.1 Crime Index by Type of Crime, Malaysia, 2022 and 2023.....	1
Figure 1.6.0.2 Phases in agile methodology	9
Figure 2.4.0.1 Overview of I'M SAFE's interface.....	30
Figure 2.4.0.2 Overview of bSafe's interface.....	31
Figure 2.4.0.3 Overview of UrSafe's interface.....	32
Figure 2.4.0.4 Overview of Life360's interface	33
Figure 3.2.0.1.3 Percentage of Age	43
Figure 3.2.1.0.2 Percentage of gender	44
Figure 3.2.1.0.3 Percentage of responder's current occupation	45
Figure 3.2.1.0.4 Percentage of responder's highest-level education.....	46
Figure 3.2.1.0.5 Percentage of responders who have experienced an emergency where personal safety was at risk due to crime	47
Figure 3.2.1.0.6 Percentage of how individuals might respond in a situation where their personal safety is at risk	48
Figure 3.2.1.0.7 Percentage of tools of resources that individuals might use to stay safe in emergencies.....	49
Figure 3.2.1.0.8 Rating of how concerned the responders about personal safety in their daily life	50
Figure 3.2.1.0.9 Percentage of respondents who have either used or heard of emergency apps, such as Life360, bSafe, or similar applications	51
Figure 3.2.1.0.10 Percentage of having an emergency app is important.....	52
Figure 3.2.1.0.11 Percentage of features that are most helpful and important in an emergency application.	53
Figure 3.2.1.0.12 Percentage of additional features that respondents would like to see in an emergency application.	54
Figure 3.2.1.0.13 Percentage of the color scheme they prefer for an emergency app	55
Figure 3.2.1.0.14 Feedback or comments	56

Figure 3.2.1.0.15 Poster with a QR code linking to the survey	57
Figure 4.4.0.1 Activity diagram of login and register	80
Figure 4.4.0.2 SOS Alert Activity Diagram.....	82
Figure 4.4.0.3 Activity diagram of edit emergency contact	83
Figure 4.4.0.4 Activity diagram of Incident Reporting Section	85
Figure 4.4.0.5 Activity diagram for Safety Resources Section	87
Figure 4.6.0.6 Sequence diagram of login and register account for user.....	94
Figure 4.6.0.7 Sequence diagram of add emergency contact for user	96
Figure 4.6.0.8 Sequence diagram of pressing the SOS emergency button.....	98
Figure 4.6.0.9 Sequence diagram of sending an incident report	99
Figure 4.6.0.10 Sequence diagram of responder handling the incident report	100
Figure 4.7.1.0.11 SafePoint Splash Screen.....	102
Figure 4.7.1.0.12 Login and Register Interface	103
Figure 4.7.1.0.13 Emergency Contacts (Circles) Interface	105
Figure 4.7.1.0.14 SOS Alert Interface	106
Figure 4.7.1.0.15 Incident Reporting Interface	107
Figure 4.7.1.0.16 Safety Resources Interface	108
Figure 4.7.1.0.17 Safety Assistant Chatbot interface	109
Figure 4.7.1.0.18 Nearby Services Interface	110
Figure 4.7.1.0.19 Safety Tips Interface	111
Figure 4.7.1.0.20 Profile Management Interface	112
Figure 4.7.2.0.21 Login for Responder Interface.....	113
Figure 4.7.2.0.22 Incident Report Management Interface	114
Figure 4.7.2.0.23 Police Stations Management Interface	115
Figure 4.7.2.0.24 Warning Areas Interface	116
Figure 4.7.2.0.25 Dashboard Statistics Interface	117

List of Abbreviations/Symbols

<i>FYP</i>	Final Year Project
<i>DOSM</i>	Department of Statistics Malaysia
<i>APP</i>	Application
<i>SMS</i>	Short Message Service
<i>SOS</i>	Save Our Souls
<i>GPS</i>	Global Positioning System
<i>FIRs</i>	First Information Reports
<i>NGO</i>	Non-Governmental Organization
<i>n.d.</i>	no date

List of Appendices

Appendix A: Gantt Chart	xvi
Appendix B: FYP I Meeting Logs	xvii
Appendix C: Turnitin Similarity	xxix

Chapter 1: Introduction

1.1. Background

In today's world, concerns about personal safety are increasingly pressing as crime rates continue to rise. Cases such as robbery, assault, and snatching significantly disrupt social stability and deter individuals from engaging in daily activities. These incidents instill fear, leading many people to worry about their personal safety as well as the well-being of their loved ones, including family members and close partners. In fact, some individuals express greater concern for the safety of others than for themselves.

According to the most recent data from Department of Statistics Malaysia (Dosm, n.d.), the Crime Index, which includes assault and property crimes, increased by 3.2% in 2023, with 52,444 reported cases compared to 50,813 in 2022. Assault crimes, encompassing murder, rape, robbery, and causing injury, saw a mixed trend. Murder and rape cases recorded significant increases, rising to 258 cases (7.5%) and 1,914 cases (11.8%) respectively, while robbery and causing injury cases slightly decreased to 4,588 and 3,693 cases. Additionally, property crimes rose by 3.8% to 41,991 cases in 2023.

Type of Crime	2022	2023	Percentage change (%)
Assault crime	10,348	10,453	1.0
Murder	240	258	7.5
Rape ^a	1,712	1,914	11.8
Robbery ^b	4,589	4,588	-0.0
Causing injury	3,807	3,693	-3.0
Property crime	40,465	41,991	3.8
House break-in & theft	10,585	11,557	9.2
Vehicles theft	14,446	14,597	1.0
Other thefts	15,434	15,837	2.6
Total	50,813	52,444	3.2

Figure 1.0.1 Crime Index by Type of Crime, Malaysia, 2022 and 2023

This persistent rise in crime rates contributed to heightened public fear and demonstrated the urgent need for practical and reliable solutions that could ensure the safety and security of individuals and their communities. Understanding these factors helped shape the development of better strategies to reduce crime and enhance personal safety measures.

Studies on crime statistics have shown that crime is not just about where criminals live but it also depends on the opportunities available for crime to occur. Certain areas, often referred to as “hot spots”, tend to have higher rates of crime. Additionally, theft often focuses on specific popular items that are more likely to be stolen. Some individuals also experience crime more frequently than others, making them repeat victims (Roberson and Birzer 2010). The authors argue that by examining the opportunities that certain environments create for criminal activities, we can make significant progress in our efforts to prevent crime. Understanding these factors can help develop better strategies to reduce crime in these high-risk areas.

Next, social gatherings with friends, especially at night, often lead to concerns about everyone’s safety when they parted ways. It is common to worry about whether friends have safely reached their destinations. While it is considerate to inform others upon arriving home, many of us either forget or fail to do so consistently. An application that can track and display a friend’s status, provide an approximate arrival time, and notify all members with a single click would address this issue effectively and provide peace of mind.

The existence of mobile applications has no doubt made life easier. Smartphones especially have given us the internet and so many capabilities that are made possible with mobile applications at our fingertips. Some of the closest examples available on the market are I'M SAFE, bSafe, UrSafe, and Life360 which will be discussed later. However, feedback from Malaysian netizens on platforms like X, Facebook, and Reddit suggests that many of these applications have limitations, including complicated setup processes and the need for multiple steps to trigger emergency alerts. Another discussion from netizen on reddit thread about Life360's limitations mentions frustration over safety features being locked. Therefore, a more user-friendly, efficient, and reliable emergency application is necessary to address these gaps and users can freely use all the features provided.

Furthermore, emergencies can affect anyone, regardless of their age. Older generations might face sudden health crises like heart attacks or falls, while younger generations might encounter incidents such as kidnappings or accidents. For instance, a recent incident in Malaysia highlights the importance of personal safety measures. A woman shared her terrifying experience at Shah Alam's Plaza Masalam parking lot. According to New Straits Times Online (Times, 2024), she faced an attempted assault, which raised widespread public concerns about the safety of public spaces. Many netizens have expressed their frustration over the lack of a simple and reliable safety app, emphasizing the need for a system that offers one-touch emergency alerts, location sharing, and fast communication with emergency contacts (Malay Mail, 2024). With an application designed to handle emergencies, individuals can request instant assistance at the touch of a button, ensuring quicker response times and potentially preventing such incidents from escalating.

In response to these identified gaps and the growing safety concerns, this project successfully developed “SafePoint”, a comprehensive emergency response mobile application designed to address the limitations of existing solutions while providing enhanced functionality for personal safety.

1.2. Problem Statement

Rising crime rates and growing concerns about personal safety including robbery, assault, and snatching, continue to rise, disrupting daily life and instilling fear in communities and it created an urgent need for effective emergency response solutions. According to the Department of Statistics Malaysia (Dosm, n.d.), the Crime Index increased by 3.2% in 2023, with notable rises in murder and rape cases. This fear extends to social activities, where individuals worry about their safety and that of their loved ones.

When confronting a potential life-threatening situations such as kidnapping, mugging or even robbery, the victim has very little time gap to think of the best way to escape from the situation. However, requesting for help is the most instant procedure for the victim to think of during the critical situation. Considering rapid concern of safety issues, mobile applications implementation may be extended into personal safety procedures.

Existing mobile applications for personal safety, while helpful, often lack simplicity and efficiency. Many require multiple steps to activate emergency features, which can be problematic in critical situations. For example, the existing app, UrSafe, relies on voice activation but requires predefined commands, which may not always work in high-stress situations. Additionally, some apps rely on

shaking or vibration patterns to trigger alerts, which may result in false alarms or failures during emergencies.

There was a clear need for an application that provided reliable safety features, such as notifying friends, family, and emergency responders with minimal effort, while offering comprehensive incident management and response coordination. Addressing these gaps can help reduce public fear and improve overall personal security.

1.3. Project Objectives

This study successfully achieved the following objectives:

- i. **Analyzed existing personal safety applications** to identify strengths, weaknesses, and areas for improvement through comprehensive literature review.
- ii. **Developed and implemented SafePoint**, a comprehensive emergency response mobile application that successfully addressed the identified limitations in existing applications by providing simple navigation, intuitive one-touch emergency features and efficient notification system that enabled users to alert family members and friends during critical situations
- iii. **Created an integrated emergency response ecosystem** that combined user-facing emergency features with administrative management capabilities, enabling efficient incident reporting, and comprehensive safety resource access through a single platform.

1.4. Project Scope

This project successfully delivered a comprehensive, free, user-friendly safety mobile application that assists users in seeking help during emergencies, particularly during crime-related situations. The implemented application provided immediate assistance by notifying both emergency responders (admin) and trusted contacts such as family members and close friends, when a user was in danger. With just a single tap, users can send an emergency distress signal that automatically shares their name, real-time location, incident type and the exact time of the incident via SMS to their emergency contacts.

User-side Features Implemented:

- **Authentication System:** Email-based login and registration with comprehensive user profiles.
- **SOS Alert System:** One touch emergency button that automatically sent alerts to emergency circles via SMS.
- **Emergency Circles Management:** Functionality to add and manage emergency circles with relationship categorization.
- **Incident Reporting:** Comprehensive reporting system with incident type classification, automatic location detection, optional descriptions, and evidence upload.
- **Safety Resources:** Access to emergency hotlines, AI-powered safety chatbot, and nearby services locator.
- **Profile Management:** Complete profile editing capabilities with password management and logout functionality.

Admin-side Features Implemented:

- **Admin Dashboard:** Comprehensive incident management system with report assignments and status tracking.
- **Police station Management:** Search and management system for police stations in KL and Cyberjaya.
- **Warning Areas Monitoring:** High-frequency incident area tracking with risk level assessment.
- **Dashboard Statistics:** System performance overview with detailed incident data and user analytics.

The target audience included all smartphone users, particularly individuals concerned about personal safety, including women, students, and elderly individuals. Unlike existing safety applications requiring premium subscriptions, this system ensured that all emergency functions were freely available to all users.

To ensure a reliable and structured development process, the incremental model has been chosen as the software methodology for this project. The incremental approach allows for step-by-step development and testing, ensuring that each phase improves the application's usability and functionality.

1.5. Project Limitations

The developed emergency response application had several acknowledged limitations:

- **Platform Limitation:** The development of this emergency response application is limited to Android devices, as the system is being built using Android Studio. This means that iOS users will not be able to access the application until further development and expansion are considered.
- **Network Dependency:** Since the system sends alerts via SMS, and required internet connectivity for full functionality, users needed active mobile plans and stable internet connections, which could potentially be barriers in critical situations.
- **Geographic Scope:** The admin features, particularly police station management and warning areas monitoring, were initially focused on KL and Cyberjaya areas, limiting broader geographical coverage.
- **User Accessibility:** The application might be challenging for older individuals or those unfamiliar with smartphone technology, though the interface was designed to be as intuitive as possible.

Despite these limitations, the implemented project successfully provided a reliable, fast, and user-friendly emergency response solution that addressed the core problems identified in existing applications.

1.6. Methodology

This chapter presents the method used in creating an emergency application which is the incremental development model.

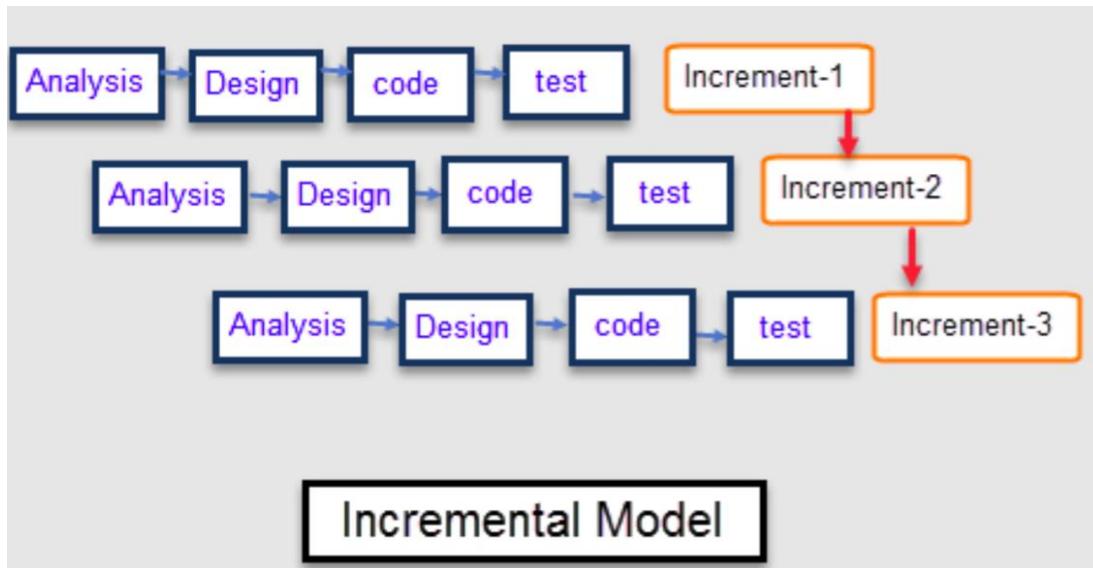


Figure 1.6.0.2 Phases in agile methodology

This project employed the incremental development model, where the entire development process was divided into iterative and manageable phases (Bennett, 2024). Each phase built upon the previous increment, gradually creating the fully functional SafePoint application.

i. Requirements Gatherings and Analysis

In the requirement gathering and analysis phase, all relevant information about emergency applications was collected through comprehensive literature review and user surveys. User feedback on existing emergency applications played a crucial role in identifying weaknesses and inefficiencies. The survey of 34 respondents provided valuable insights that shaped the application's feature set and design decisions.

ii. Design Phase

During the design phase, the objectives of the application were clearly defined using the data gathered. Each module of the application was outlined and designed using UML diagrams including case diagrams, activity diagrams, sequence diagrams, and class diagrams. Interface designs were created for both user and admin sides using design tools.

iii. Implementation Phase

The development phase involved implementing the designed system using Android Studio with Java as the primary programming language. The application was built incrementally, with each module being developed and tested individually before integration. Key technologies implemented included:

- Android Studio for mobile development
- Firebase for backend services and database
- Google Maps API for location services
- SMS gateway integration for emergency alerts

iv. Testing Phase

The application underwent comprehensive testing including unit testing, integration testing, and user acceptance testing. Performance testing ensured the system met the required response times and reliability standards. Comprehensive testing validates the application under different scenarios, ensuring it meets user expectations and operates smoothly.

By following the incremental development model, the project ensures that each phase contributes to the gradual improvement and completion of the application. This methodology fosters adaptability and continuous improvement, resulting in a high-quality product tailored to user needs. ☺

1.7. Target Audience

The emergency response application was successfully designed and implemented for people of all ages, with particular focus on:

Women, in particular, often face heightened safety concerns due to the rising number of harassment, assault, and crime cases reported globally. According to crime reports and feedback from Malaysian netizens, many women have expressed the need for a simple and effective emergency application that allows them to quickly alert their trusted contacts or emergency responders in distressing situations. Having an app that offers a one-touch emergency alert system ensures that they can request help without struggling with complex activation steps, which is crucial in high-risk situations.

Women frequently encounter unsafe situations while commuting alone, traveling at night, or simply walking through isolated areas. Public transportation, for example, has been a concern for many women due to cases of harassment occurring on buses, trains, and ride-hailing services. With this application, they can notify family or close friends of their whereabouts, ensuring someone is aware of their location at all times. By integrating real-time location tracking and SMS alerts, this system provides a direct means for women to seek assistance from their trusted contacts without delay. Unlike existing applications that may lock essential safety features behind a premium subscription, this application aims to provide full access to critical features for free, making it more accessible to those who need it most.

The application addressed heightened safety concerns due to rising harassment, assault, and crime cases. Features like discreet SOS alerts and

comprehensive incident reporting provided women with reliable tools for seeking help in dangerous situations.

Apart from women, the application is also essential for students and elderly individuals. Students, especially those living away from home, often find themselves in unfamiliar surroundings where safety concerns arise. Whether they are commuting to and from campus or living alone, having an emergency alert system ensures they can quickly reach out for help if needed. The application provided essential safety tools for navigating potentially unsafe situations while commuting or living independently.

Meanwhile, elderly individuals who may experience sudden health issues, such as falls or medical emergencies, can benefit from a system that allows them to send alerts to their family members with just one tap. By catering to diverse users, this emergency response application provides a sense of security to anyone who may find themselves in critical situations, ensuring that help is always within reach.

Anyone concerned about personal safety could benefit from the comprehensive safety features, including the chatbot assistant, emergency hotlines access, and nearby services locator.

1.8. Summary

This chapter provides a comprehensive overview of the successfully completed emergency response mobile application project. The project addressed growing concerns about personal safety by developing a user-friendly,

comprehensive solution that overcame the limitations of existing emergency applications.

The implemented SafePoint application successfully delivered both user-facing emergency features and administrative management capabilities, providing a complete ecosystem for emergency response and incident management. The project utilized the incremental development methodology to ensure systematic development and thorough testing of all components.

The following chapters detail the literature review that informed the design decisions, the requirements analysis based on user surveys, the system design and architecture, the implementation process, comprehensive testing procedures, and conclusions with recommendations for future enhancements.

Chapter 2: Literature Review

2.1. Overview

This chapter reviews various studies and articles related to mobile applications designed for emergency responses, safety, and location-based services. The focus is on understanding features, limitations, user experience and the impact of these applications. The insights from those reviews provided a foundation for the development of the SafePoint emergency response application.

2.2. The Importance of Emergency Response Applications in Modern Safety Management

2.2.1 Current Emergency Response Challenges and Traditional Methods

The In the current scenario, when individuals face emergency situations such as robbery, assault, kidnapping, or other life-threatening circumstances, the traditional approach relies heavily on conventional methods that often prove inadequate in critical moments. The conventional emergency response typically involves manually dialing emergency services (999 in Malaysia), calling family members or friends individually, or seeking help from nearby individuals (Ahmad et al., 2024). However, these traditional methods present several significant limitations that compromise their effectiveness during actual emergencies.

The traditional method of calling emergency services requires the victim to remember phone numbers, navigate through phone menus, explain their location verbally, and maintain composure during high-stress situations (Rahman & Hassan, 2024). In many cases, victims may be unable to speak freely due to the presence of perpetrators, may not know their exact location, or may be too

traumatized to provide coherent information to emergency operators. Furthermore, the process of individually contacting multiple family members or friends is time-consuming and may not guarantee that anyone will be available to receive the call immediately.

Recent incidents in Malaysia highlight these challenges. According to a report by The Star (2024), a woman who faced an attempted assault at Shah Alam's Plaza Masalam was unable to immediately contact help due to panic and confusion about her exact location. Similarly, Bernama (2024) reported cases where victims of snatch theft were unable to provide accurate location information to police, leading to delayed response times. These scenarios demonstrate the critical need for more efficient and reliable emergency response mechanisms.

2.2.2 Advantages of Mobile Emergency Applications

Mobile emergency applications offer significant advantages over traditional emergency response methods, addressing the critical gaps identified in conventional approaches. These applications provide immediate, automated, and comprehensive emergency assistance that can be activated with minimal user intervention, making them particularly valuable during high-stress situations where cognitive function may be impaired (Chen et al., 2024).

The primary advantage of emergency applications lies in their ability to provide instant location sharing with multiple contacts simultaneously. Unlike traditional methods that require verbal description of location, these applications automatically capture and transmit precise GPS coordinates, eliminating the possibility of miscommunication and significantly reducing response times (Liu & Wang, 2024). This automated location sharing is particularly crucial in Malaysia's

urban areas where landmarks may be unclear or in rural areas where traditional address systems may be inadequate.

Furthermore, emergency applications enable silent alarm activation, allowing users to request help discreetly without alerting potential perpetrators. This feature is particularly important in situations such as domestic violence, stalking, or kidnapping where traditional phone calls might escalate the danger (Thompson & Lee, 2024). The applications also provide evidence collection capabilities, automatically documenting the time, location, and circumstances of the emergency, which proves invaluable for subsequent investigations and legal proceedings.

The integration of multiple communication channels—including SMS, push notifications, and automated calls—ensures that emergency alerts reach contacts even when internet connectivity is limited. This redundancy is essential in Malaysia's diverse geographical landscape, where network coverage may vary between urban and rural areas (Tan et al., 2024). Additionally, these applications often include features such as emergency hotline integration, nearby services locator, and safety resources that provide comprehensive support beyond immediate alert functionality.

2.3. Review of Research-Based Related Works

As mentioned in this literature review, several research studies have been conducted to develop and evaluate emergency response mobile applications. These research-based works provide valuable insights into the effectiveness, user acceptance, and technical implementation of emergency safety solutions. The following section examines key research studies that have directly influenced the development approach and feature set of the SafePoint application.

2.3.1. SiSafe

A Comprehensive Mobile Application Solution for Women Safety

The study by Sharma et al. (2024) focuses on developing a mobile application called SiSafe, which is designed to improve women's safety. The app addresses the increasing concerns about women's security in situations where they may face threats to their dignity and safety. SiSafe includes innovative features, such as an emergency button on the home or lock screen, which allows users to send an alert quickly and discreetly. It also enables users to set custom activation phrases that the app's voice recognition system can detect to trigger emergency responses. Once activated, the app shares the user's real-time location with selected contacts, nearby people, and local authorities. Even in areas with poor network coverage, the app uses mesh networking technology to send location details and ensure help can still reach the user. SiSafe also involves the community by notifying nearby people about emergencies, helping reduce response times. However, it is important to note that while SiSafe presented innovative concepts and features, this was a research-based study and the actual application was not implemented or deployed for public use. The study remained at the conceptual level, focusing on theoretical framework and design principles rather than practical implementation and real-world testing.

2.3.2. iPanic

A Mobile Emergency Crime Case Reporting Tool with GPS-Based Location Detection and Alert Notification

The research conducted on iPanic presented a comprehensive study of a mobile application and web dashboard system designed to improve emergency response in the Philippines (iPanic Research Team, 2024). This research-based work demonstrated the practical implementation and evaluation of an emergency response system with both mobile and administrative components.

The study evaluated iPanic's effectiveness in allowing users to report crime incidents and emergencies, including sending SOS alerts with precise GPS location data. The research included comprehensive testing with barangay administrators, staff, and community members, providing valuable insights into user acceptance and system effectiveness.

The research findings indicated that users rated both the mobile application and web dashboard as easy to use and navigate. Participants particularly appreciated features such as real-time notifications, multimedia upload capabilities for evidence submission, and the SOS alert function that provided immediate emergency assistance.

However, the research identified several limitations and areas for improvement. The study recommended adding SMS reporting capabilities for situations without internet connection and suggested making the interface more user-friendly for senior citizens. The research also highlighted the importance of community-wide implementation for maximum effectiveness.

This research-based work provided valuable insights into the practical challenges and benefits of implementing comprehensive emergency response systems, particularly in developing countries with varying levels of technological infrastructure.

2.3.3. My Guardian

A Personal Safety Mobile Application Research

In the research study by Azman et al. (2018), My Guardian was developed as a research project to enhance personal safety through mobile technology. This research-based work recognized the increasing concerns about personal safety and the potential for unpredictable incidents that require immediate assistance.

The research focused on implementing GPS technology to track user location and enable quick notification of predefined emergency contacts during dangerous situations. The study evaluated the effectiveness of SMS-based emergency messaging that included the user's current location and personalized emergency messages sent automatically to selected contacts.

The research also examined the implementation of an alarm button feature that could be triggered to attract attention during potentially threatening situations. Additionally, the study evaluated location sharing capabilities that allowed users to share their current location with friends or family, providing peace of mind during solo travels.

This research provided important insights into the fundamental requirements for personal safety applications and validated the core concepts

that emergency response apps should address. However, as a research-based study, the practical deployment and long-term effectiveness of My Guardian were not extensively evaluated beyond the controlled research environment.

2.3.4. Android Application for Crime Prevention with GPS Integrated Technology

The research study by Munandar et al. (2021) investigated the development and implementation of an Android-based application designed to enhance crime prevention efforts in Indonesia. This research-based work recognized the increasing prevalence of crime and sought to empower communities and assist law enforcement through mobile technology implementation.

The research demonstrated the integration of GPS technology enabling citizens to quickly report crime incidents and request immediate assistance by transmitting precise location data. This feature was identified as crucial for facilitating rapid response times from law enforcement agencies.

The study also examined the implementation of distinct interfaces for both the public and law enforcement officials. This separation ensured secure information management and facilitated efficient communication channels between citizens and authorities. The research evaluated how the public interface empowered citizens to report various crime incidents directly through their smartphones, while the law enforcement interface provided real-time access to reported incidents.

The research findings demonstrated a promising approach to enhancing community safety and improving the effectiveness of law enforcement responses to crime. However, the study was limited to specific geographical areas in

Indonesia, and its broader applicability and long-term effectiveness required further research and evaluation.

This research-based work contributed valuable insights into the integration of citizen reporting systems with law enforcement response mechanisms, highlighting the importance of secure communication channels and real-time data sharing in emergency response applications.

2.3.5. Criminal Alert App

The study by Garg, Rawat, Kumari, and Mor (2021) introduces "Criminal-Alert," an Android-based application designed to streamline crime reporting and enhance communication between the public and law enforcement agencies. Recognizing the inefficiencies of traditional crime reporting methods, which often involve time-consuming visits to police stations and manual record-keeping, the researchers aimed to develop a more efficient and accessible system. Criminal-Alert allows citizens to file complaints online, including reporting incidents, missing persons, and unidentified dead bodies. The application integrates features such as user registration, complaint filing, and status tracking. Importantly, the application also provides a platform for law enforcement agencies to manage crime records electronically, improving data organization and accessibility. Their study highlights several key advantages of the Criminal-Alert app, including reduced time consumption for reporting crimes, elimination of paper-based documentation, improved data security and management, and enhanced communication between citizens and law enforcement. By leveraging technology, the researchers believe that Criminal-Alert can significantly improve the efficiency and effectiveness of crime reporting and investigation processes. This paragraph provides a more comprehensive overview of the study, including its objectives, key features, and potential benefits for both citizens and law enforcement agencies. It emphasizes the innovative approach of utilizing mobile technology to address the challenges of traditional crime reporting systems.

2.3.6. Crime Reporting Management System

The study by Kavalleswari and Dakshayini (2024) proposes a "Crime Reporting Management System" developed using Android Studio, aiming to modernize traditional law enforcement processes. Recognizing the limitations of manual record-keeping and the need for improved efficiency, the researchers propose a system that streamlines the filing of First Information Reports (FIRs), manages prisoner records, and facilitates communication between citizens and police. Key features include online complaint filing, real-time updates on case statuses, and access to crucial information such as missing persons and wanted criminals. The system leverages a centralized database, ensuring data integrity and facilitating rapid information retrieval. By integrating Android Studio, the system offers a user-friendly interface for citizens and police officers, facilitating efficient data entry, record management, and communication. This innovative approach has the potential to significantly enhance the efficiency and effectiveness of law enforcement operations while improving transparency and accessibility for the public.

2.3.7. RUSafe

An Interactive Platform to Enhance Alert Systems on University Campuses

As outlined by Gorajia et al. (2024), traditional campus crime alert systems often rely on text-based notifications, which can be easily overlooked by students. To address this limitation, the researchers developed RUSafe, a mobile application designed to enhance campus safety by providing a more interactive and user-friendly platform for accessing and sharing critical safety information. RUSafe leverages existing campus alert systems and integrates features such as an interactive map displaying real-time crime locations, a user-friendly interface for reporting incidents, and a panic button for immediate emergency assistance. Developed using a combination of Android Studio and Java, RUSafe utilizes a robust backend infrastructure to support real-time data updates and ensure seamless user experience. By combining these features with a focus on user experience and intuitive design, RUSafe aims to empower students with the information and tools they need to make informed decisions about their safety on campus.

2.3.8. A Mobile Application Design to Prevent Criminal Acts

The study by Delgado et al. (2020) addresses the growing concern of rising crime rates in Lima, Peru, by proposing a citizen-centric solution: a mobile application. This innovative application empowers residents to directly report criminal activity, including the ability to share crucial evidence such as photos, videos, and even live streams. Furthermore, the application incorporates a robust search function allowing users to find reports categorized by crime type, police station, and date. This valuable data can then be effectively utilized by law enforcement agencies to track crime trends, identify hotspots, and strategically deploy resources. Designed using the Balsamiq tool for prototyping and intended to be implemented on the Android platform using Android Studio, the application, demonstrates a promising approach to enhancing public safety and community involvement in combating crime within the city of Lima.

2.3.9 Key findings of the related works

Table 1 Comparative analysis of Emergency Application

Research Study	Application Type	Limitations	User Experience	Operating system / Platform used
SiSafe (Sharma et al., 2024)	Emergency button on home/lock screen, custom activation phrases, real-time location sharing, mesh networking, community notifications	Not yet implemented; relies on advanced technologies like mesh networking, which might have adoption challenges in low-resource settings	User-friendly, voice recognition adds ease of use; discreet activation ensures privacy	Android
iPanic (IPANIC: A Mobile Emergency..., 2024)	Crime reporting, SOS alerts with GPS, web dashboard for authorities, multimedia uploads	Lacks SMS-based reporting for areas without internet; limited interface usability for senior citizens	Rated highly for usability; integration with barangay systems increases accessibility	Android and Web Dashboard
My Guardian (Azman et al., 2018)	GPS-based location sharing, predefined emergency contacts, SMS alerts, alarm button for attention, solo travel sharing	Relies heavily on SMS, which could limit functionality in areas with no mobile network	Simple interface; effective for immediate alerts but lacks advanced features like real-time tracking	Android

Android Application for Crime Prevention (Munandar et al., 2021)	GPS-enabled crime reporting, citizen and law enforcement interfaces, real-time communication, secure information management	Limited to specific geographical areas (Indonesia) effectiveness depends on law enforcement responsiveness	Clear separation of public and law enforcement interfaces ensures efficiency and security	Android
Criminal-Alert (Garg et al., 2021)	Online complaints, status tracking, electronic crime records, user registration	Focused primarily on crime reporting; lacks real-time features like SOS or live location sharing	Streamlined interface reduces time consumption for reporting crimes; improves communication	Android
Crime Reporting Management System (Kavalleswari & Dakshayini, 2024)	Online FIR filing, prisoner records management, centralized database, real-time updates on case status	Designed for law enforcement agencies; may not fully address citizen needs like immediate SOS or location tracking	User-friendly interface designed with Android Studio; focuses on efficiency for law enforcement	Android
RUSafe (Gorajia et al., 2024)	Interactive campus safety map, real-time crime	Limited to campus settings; less applicable for	Interactive design tailored for students; intuitive interface	Android Studio and Java

	location updates, panic button, incident reporting interface	broader community use	enhances engagement	
Mobile App for Crime Prevention (Delgado et al., 2020)	Evidence-sharing capabilities (photos, videos, live streams), categorized search for reports, crime tracking tools for law enforcement	Requires active citizen participation; effective implementation depends on strong backend infrastructure and law enforcement adoption	Interactive design allows citizens to report crimes effectively; categorized search makes data accessible	Android; designed using Balsamiq tool for prototyping

2.4. Existing Emergency Applications Analysis

This section examines existing emergency applications currently available in the market to understand their functionality, limitations, and user acceptance. The analysis focuses on applications that are actively deployed and available for download on major app stores, providing real-world usage data and user feedback. These applications share one common objective which is to enhance personal safety and provide assistance in times of need. There are several applications that will be used for comparison below which are:

- i. I'M SAFE
- ii. bSafe
- iii. UrSafe
- iv. Life360

2.4.1. I'M SAFE Emergency Application

I'M SAFE (*I'M SAFE*, n.d.) is a free, mobile application designed to enhance personal safety and empower individuals worldwide. It offers a range of features, including the ability to anonymously request help through the "Ask for Help" feature, which connects users with trained counselors or NGO partners for immediate assistance. However, the availability of this feature may vary depending on the user's location. For instance, this feature might not be currently available in Malaysia. The "Track Me" feature allows users to share their real-time location with trusted contacts, providing peace of mind while on the move. In emergency situations, the "SOS Alerts" feature enables users to send immediate alerts to designated contacts, including their real-time location, photos, and audio recordings. Additionally, the "Fake Phone Call" feature simulates a real phone call to help users extricate themselves from uncomfortable situations discreetly. The app also includes an anonymous recording feature to capture surrounding sounds and visuals for potential evidence. Developed by a team dedicated to women's empowerment, I'M SAFE aims to create a safer and more supportive environment for all individuals.

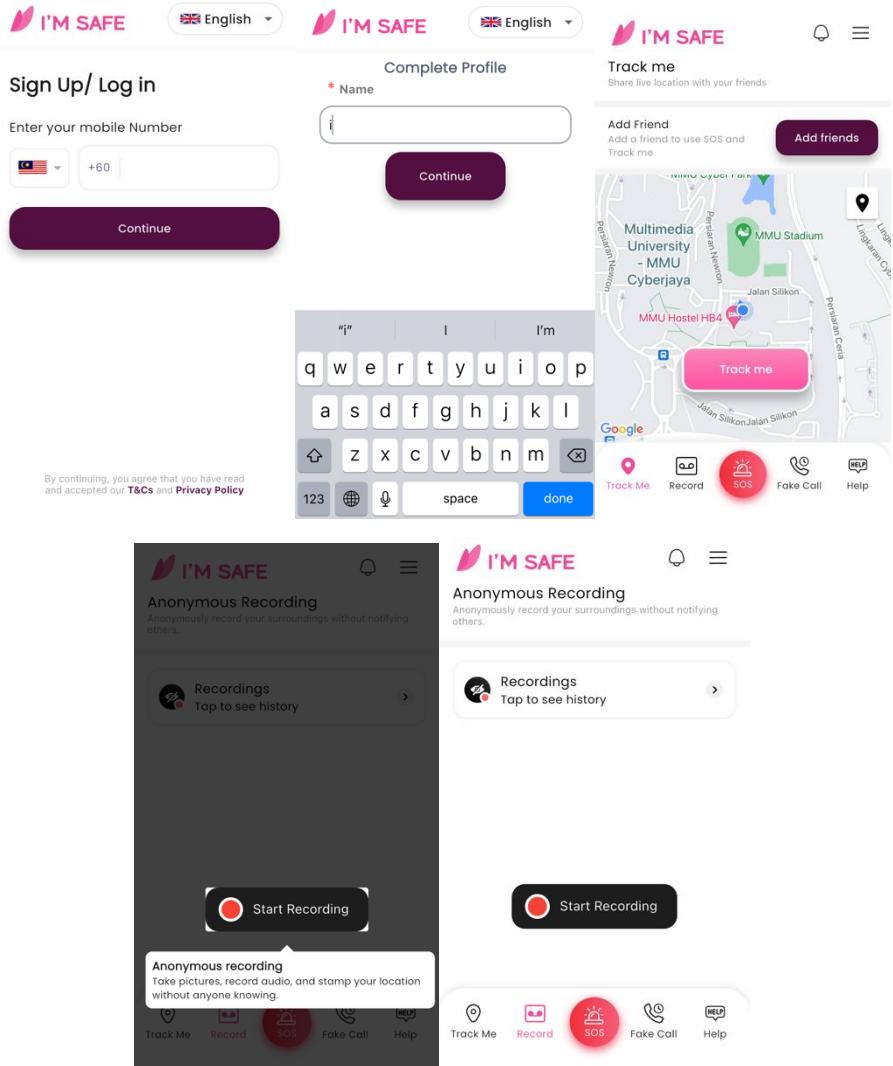


Figure 2.4.0.1 Overview of I'M SAFE's interface

2.4.2. bSafe Personal Safety Application

bSafe (*Security and Safety Solutions*, n.d.) is a mobile safety application designed to enhance personal security, particularly for individuals who frequently travel alone. Key features include the ability to "invite" friends or family members to virtually accompany you on your journey, allowing them to track your location in real-time. The app also incorporates automated check-in reminders, alerting your chosen contacts if you fail to check in within a specified timeframe. In emergency situations, bSafe can automatically record a 10-second video, potentially capturing valuable evidence. Furthermore, the "Fake Call" feature allows users to simulate an incoming call to discreetly extricate themselves from uncomfortable or unsafe situations. However, it's important to note that almost all of these valuable features, such as unlimited SOS follow-me, fake calls, and voice activation for alarms, are locked behind a subscription model, requiring users to pay a fee for 24-hour access. This subscription model, which may include options like weekly or monthly plans, could potentially limit the accessibility of these crucial safety features for some users.

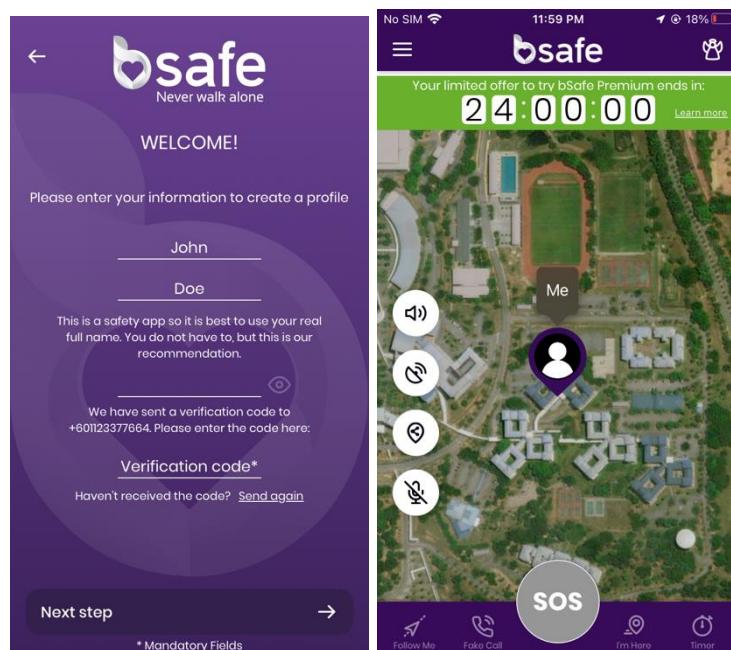


Figure 2.4.0.2 Overview of bSafe's interface

2.4.3. UrSafe Personal Safety

UrSafe (*URSafe - Personal Safety App*, n.d.) stands out as a mobile application prioritizing personal safety, particularly for situations where using your phone openly might be risky. Key features include GPS-enabled 911 integration, SOS alerts, and voice activation, enabling users to quickly and discreetly seek help in emergencies. For example, if someone is feeling unsafe while walking alone or during an uncomfortable social interaction, they can discreetly activate an SOS alert, which notifies pre-selected emergency contacts of their location and situation. However, setting up UrSafe requires a few steps, including phone number verification, profile creation, and setting an emergency pin to control SOS alerts and other features. While UrSafe prioritizes user privacy, it's important to note that not all features are free. A 7-day free trial is available, followed by a subscription fee of RM 8.90 per month for access to premium features like voice-activated SOS, fake calls, and other advanced safety tools.

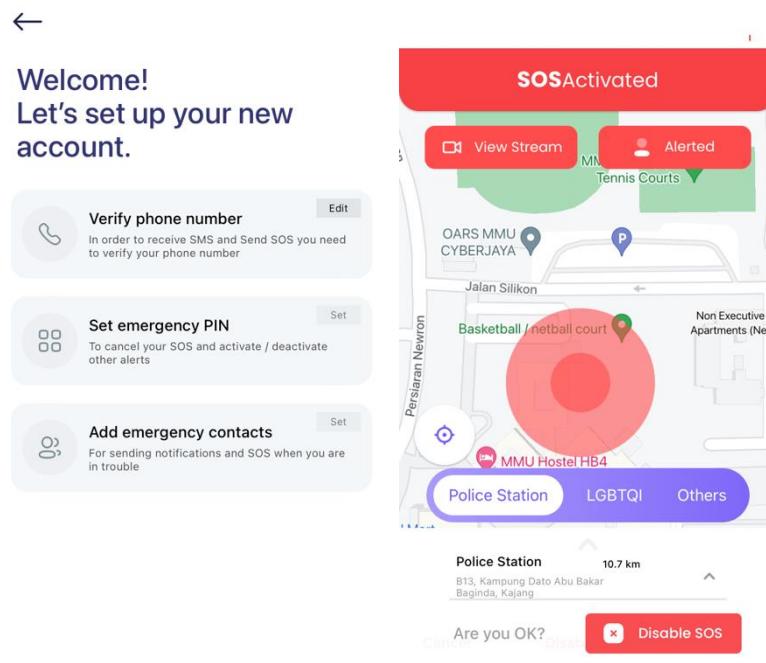


Figure 2.4.0.3 Overview of UrSafe's interface

2.4.4. Life360 Family Safety Application

Life360 is a popular family safety app that prioritizes location sharing and communication within a family circle. Users begin by creating an account using their phone number and then establish a "Circle" – a group that typically consists of family members. Within this Circle, members can share their real-time location, providing peace of mind and enabling family members to easily track each other's whereabouts. Life360 also offers features like driving safety monitoring, place alerts (notifications when family members arrive at or leave designated locations), and crash detection, which automatically contacts emergency services in the event of a potential car accident. However, it's important to note that many of Life360's core features, such as unlimited SOS alerts and advanced location tracking, are limited to premium subscribers. A free trial period is available, but after that, users must subscribe to access the full range of features. This subscription model, which typically involves a monthly or annual fee, may limit the accessibility of these crucial safety features for some families.

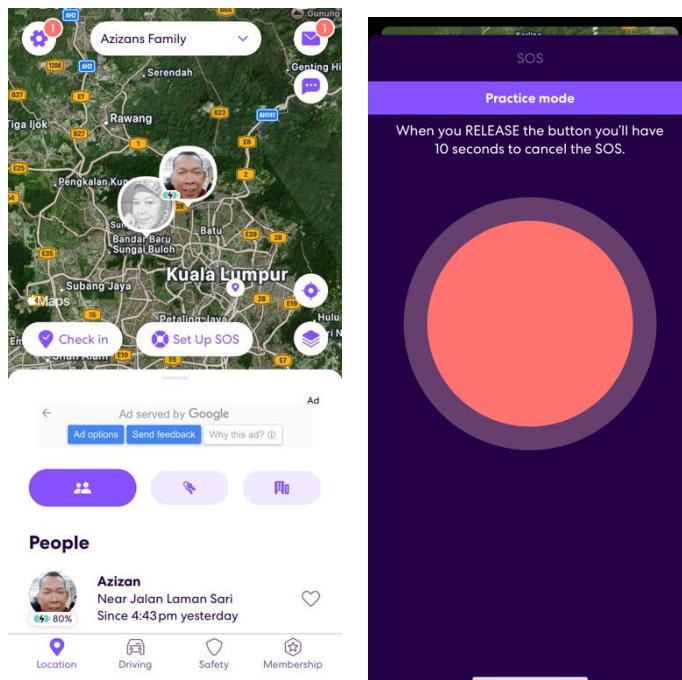


Figure 2.4.0.4 Overview of Life360's interface

2.4.5 Comparative Analysis of Existing Emergency Applicationns

Table 2 Comparative Analysis of Existing Emergency Applications

Application	I'M SAFE	bSafe	UrSafe	Life360	Proposed System
Main Features	SOS alerts Real-time tracking, Fake call	Virtual accompaniment, Automatic check-ins	Voice-activated SOS, GPS 911 integration	Family location sharing, Driving monitoring	One-Tap SOS Button, Crime-Based Emergency Reporting, SMS Emergency Alerts
Functions Available	SOS alerts, real-time tracking, fake call	SOS alerts, tracking, video recording	SOS alerts, voice-activated SOS, fake call	Real-time tracking, crash detection	Report incidents in real-time, Sends SMS alerts with user's name, location and time, Designed for crime-related emergencies
Subscription Required	No	Yes (Premium for advanced features)	Yes (Subscription required after 7-day free trial)	Yes (Paid plans for full features)	Free access to all features
Systems Requirements	Android 5.0+ / iOS 11+	Android 6.0+ / iOS 12+	Android 7.0+ / iOS 12.1+	Android 8.0+ / iOS 13+	Android only (developed using Android Studio)

2.5 System Differentiation and Unique Features

2.5.1 Addressing Gaps Found in Current Solutions

The analysis of existing applications and research studies revealed several critical gaps that the SafePoint application was designed to address:

Accessibility Barriers: Most existing applications restrict essential safety features behind premium subscriptions, creating financial barriers that may prevent users from accessing life-saving functionality during emergencies. SafePoint eliminates this barrier by providing free access to all emergency features.

Limited Administrative Integration: Existing applications focus primarily on user-facing features without providing comprehensive administrative tools for emergency responders. SafePoint includes a complete administrative dashboard enabling efficient incident management, responder coordination, and system monitoring.

Fragmented Safety Resources: Current applications typically provide isolated safety features without comprehensive resource integration. SafePoint combines emergency alerts, incident reporting, safety resources, chatbot assistance, and nearby services locations in a single platform.

Geographic Limitations: Many existing applications are designed for specific regions or countries, limiting their effectiveness in Malaysia's unique context. SafePoint was specifically developed considering Malaysian emergency response infrastructure, including local police station integration and regional emergency hotlines.

2.5.2 Unique Features of SafePoint Application

The SafePoint application introduces several unique features that distinguish it from existing emergency response solutions:

Integrated Admin-User Ecosystem: Unlike existing applications that focus solely on user emergency alerts, SafePoint provides a complete ecosystem where users can report incidents and receive coordinated responses from emergency responders through the integrated administrative dashboard.

Comprehensive Incident Management: The application enables detailed incident reporting with automatic location detection, evidence upload capabilities, and status tracking that keeps users informed about response progress.

AI-Powered Safety Assistant: SafePoint includes an integrated chatbot that provides immediate safety guidance, emergency procedure information, and real-time support during crisis situations.

Warning Areas Monitoring: The administrative system includes advanced analytics that identify high-frequency incident areas, enabling proactive safety measures and resource allocation.

Multi-Modal Emergency Activation: The application supports both traditional button-based activation and location-based automatic detection, ensuring emergency alerts can be triggered even when users are unable to manually activate the system.

Comprehensive Safety Resource Integration: SafePoint combines emergency hotlines, nearby services location, safety tips, and emergency procedures in a single accessible platform, eliminating the need for multiple applications during crisis situations.

2.6 Summary

This chapter provided a comprehensive review of the literature and existing applications related to emergency response mobile applications. The analysis revealed significant advantages of mobile emergency applications over traditional emergency response methods, particularly in terms of automated location sharing, multi-contact notification, and evidence collection capabilities.

The review of research-based related works demonstrated that while several studies have explored various aspects of emergency response applications, most remained at the conceptual or limited implementation level. These studies provided valuable insights into user requirements, technical challenges, and design principles that informed the development of the SafePoint application.

The analysis of existing emergency applications revealed critical gaps in current market solutions, including subscription barriers that limit access to essential safety features, lack of comprehensive administrative integration, and fragmented safety resource provision. Most existing applications focus on specific aspects of safety rather than providing comprehensive emergency response capabilities.

The SafePoint application was developed to address these identified limitations by providing free access to all safety features, comprehensive emergency response capabilities including both user and administrative functionalities, and integrated safety resources that eliminate the need for multiple applications during emergencies. The unique features of SafePoint, including its integrated admin-user ecosystem, comprehensive incident

management, AI-powered safety assistant, and warning areas monitoring, distinguish it from existing solutions and provide a more complete emergency response platform.

The insights gained from this literature review directly informed the design decisions, feature prioritization, and implementation approach for the SafePoint application, ensuring that the developed solution addresses real-world emergency response needs while overcoming the limitations identified in existing applications and research studies.

Chapter 3: Requirements Analysis

3.1 Overview

This chapter outlines the methodology that was employed in this project, focusing on the data collection techniques that were utilized to gather insights for the development of the SafePoint emergency mobile application. The chapter focuses on identifying and documenting the functional, non-functional, and user-specific requirements that were established for the emergency mobile application based on comprehensive user research and analysis.

The requirements analysis was conducted through systematic fact-finding techniques, primarily utilizing questionnaires to understand user preferences, experiences, and desired features. The analysis provided a foundation for designing a user-friendly and effective emergency response application that successfully met the specific needs of the target audience.

3.2 Fact-Finding Techniques

Fact-finding played an important role in gathering essential information for the development of emergency mobile applications. The process involved collecting data using various techniques, with questionnaires being the primary method employed. Questionnaires were designed to understand user preferences, experiences, and desired features. The analysis successfully created a foundation for designing a user-friendly and effective emergency response application that met the specific needs of the target audience.

3.2.1 Questionnaire Design

The questionnaire was systematically designed and distributed to gather comprehensive data about user needs, preferences, and expectations for emergency response applications. The survey was conducted from January 18th to January 23rd, 2025, and successfully collected responses from 34 participants.

3.2.1.1 Questionnaire Structure and Justification

The questionnaire was structured into four main sections to ensure comprehensive data collection:

Table 3 Questionnaire Design Structure

Section	Question Type	Justification
Section 1: Demographics Information		
What is your age?	Close-ended	To identify the age groups of respondents.
What is your gender?	Close-ended	To explore if gender influences perceptions and needs for personal safety.
What is your current occupation?	Close-ended	To understand how occupation impacts safety concerns and the need for an emergency app.
What is your highest-level education?	Close-ended	To assess if educational background influences the awareness or use of safety apps
Section 2: Emergency Situations		
Have you ever been in an emergency where your personal safety was at risk due	Close-ended	To determine how many respondents have faced crime-related emergencies

to crime (e.g., assault, harassment, or theft)?		
If you were in a situation where your personal safety was at risk, how do you think you would respond	Close-ended	To understand common behaviors or actions during emergencies.
What tools or resources have you used in the past to stay safe in emergencies?	Close-ended	To determine the tools or resources users rely on for personal safety.
How concerned are you about personal safety in your daily life?	Likert scale/rating	To measure the level of the personal safety concerns among respondents
Section 3: Existing Emergency Application Experiences		
Have you ever used or heard of emergency apps? (e.g., Life360, bSafe, or similar apps)?	Close-ended	To identify respondents' awareness and experiences with existing emergency app.
Do you think having an emergency app on your phone is important for personal safety?	Close-ended	To determine the general awareness and necessity of such an application among users.
Section 4: Importance of Emergency App Features		
In your opinion, what features are most helpful and important in an emergency application?	Close-ended	To identify the features users value most in an emergency app
What additional features would you like to see in an emergency application?	Open-ended	To gather suggestions for features that would enhance the app's usability and effectiveness.
What color scheme would you prefer for an emergency application?	Close-ended	To determine the color preferences that align with user expectations and app design principles.

Any other feedback or comments?	Open-ended	To provide respondents with an opportunity to share additional ideas or concerns about the app.
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3.2.1.2 Data Collection Process

The survey was distributed through multiple channels to ensure diverse participation:

- **WhatsApp Groups:** The questionnaire link was shared in relevant WhatsApp groups and further distributed by participants to their contacts
- **QR Code Poster:** A promotional poster featuring a QR code was created and displayed in public areas to facilitate easy access to the survey
- **Social media:** The survey was shared through social media platforms to reach a broader audience

The survey was created using Microsoft Forms, which provided comprehensive analytics and easy data export capabilities for analysis.

3.2.1.3 Survey Results and Analysis

The following section presents the detailed analysis of the 34 responses collected during the survey period.

Question 1: What is your age?

Under 18	1
18-24	20
25-34	9
35-44	2
45 and above	1

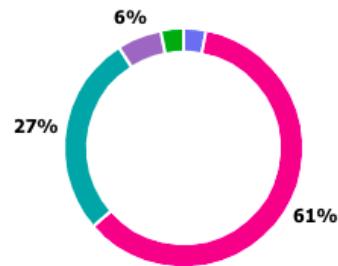


Figure 3.2.0.1.3 Percentage of Age

Based on the pie chart in Figure 3.2.1.1, many respondents fall within the 18-24 age group, making up 61% (20 respondents) of the total. This is followed by the 25-34 age group, which accounts for 27% (9 respondents). The 35-44 age group represents 6% (2 respondents), while the Under 18 and 45 and above categories each have one respondent, contributing 3% respectively. This indicates that the survey primarily reached younger adults, who are likely more active smartphone users and potential adopters of emergency response applications.

Question 2: What is your gender?

Figure 3.2.1.0.2 Percentage of gender

Based on the Figure 3.2.1.2, most respondents are female, representing 79% (26 respondents), while male respondents constitute 21% (7 respondents). This suggests that the survey was primarily completed by women, indicating a greater level of interest or concern regarding personal safety among female participants.

Question 3: What is your current occupation?

● Student	21
● Employed	10
● Self-Employed	1
● Unemployed	0
● Retired	1

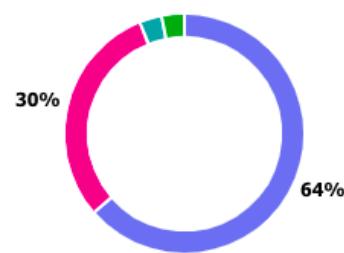


Figure 3.2.1.0.3 Percentage of responder's current occupation

Based on the pie chart in figure above, most of the respondents are students, making up 64% (21 respondents). This shows that a large part of the survey participants are young people, likely university or college students, who may often travel or be out late, which raises their worries about personal safety. At the same time, 30% (10 respondents) are employed, indicating that working professionals also see the need for an emergency response application. Additionally, one respondent (3%) is self-employed, and another (3%) is retired, demonstrating that concerns about safety are not limited to one specific group but are important for people in various jobs.

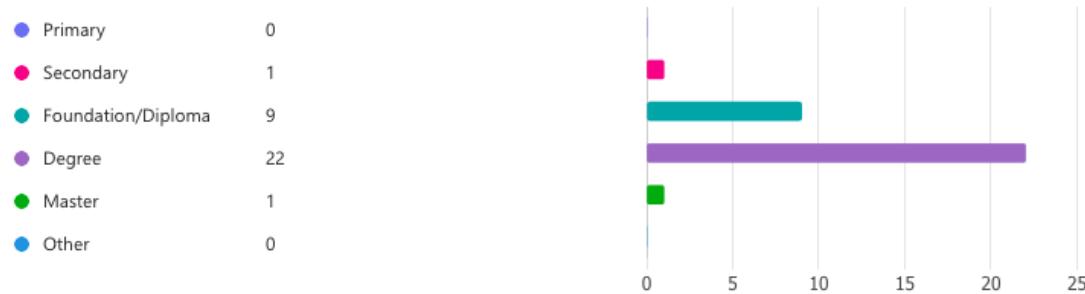
Question 4: What is your highest-level education?

Figure 3.2.1.0.4 Percentage of responder's highest-level education

According to Figure 3.2.1.4, most respondents, 22 individuals (67%), hold a degree. Nine respondents (27%) have completed foundation or diploma programs, while one respondent (3%) has attained a master's degree. Only one respondent (3%) reported secondary education as their highest qualification, and no participants selected primary education or other categories.

Question 5: Have you ever been in an emergency where your personal safety was at risk due to crime (e.g., assault harassment, theft)?

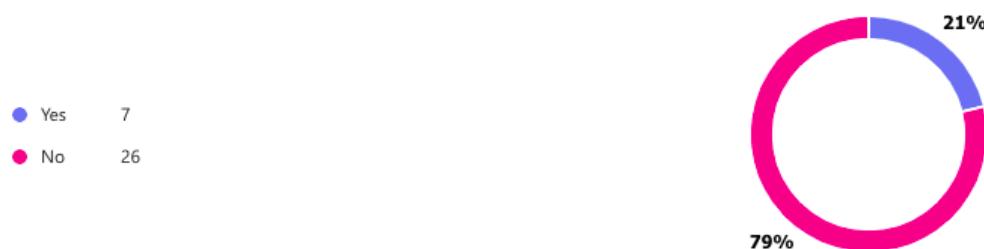


Figure 3.2.1.0.5 Percentage of responders who have experienced an emergency where personal safety was at risk due to crime

Based on the responses in Figure 3.2.1.5, 79% (26 respondents) have never experienced an emergency where their personal safety was at risk due to crime, while 21% (7 respondents) reported that they have encountered such situations.

Question 6: If you were in a situation where your personal safety was at risk, how do you think you respond?

- Call a family member or a friend to help 25
- Contact the police or emergency services 15
- Use a personal safety app 13
- Seek help from nearby people 17
- Other 1

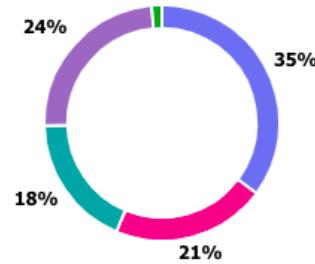


Figure 3.2.1.0.6 Percentage of how individuals might respond in a situation where their personal safety is at risk

From the responses in Figure 3.2.1.6, the most common action in a personal safety emergency is to call a family member or friend for help (35%), followed by seeking help from nearby people (24%). Contacting emergency services (21%) and using a personal safety app (18%) were also chosen by several respondents. The 1 respondent selecting 'Other' may have a different or situational approach to handling emergencies.

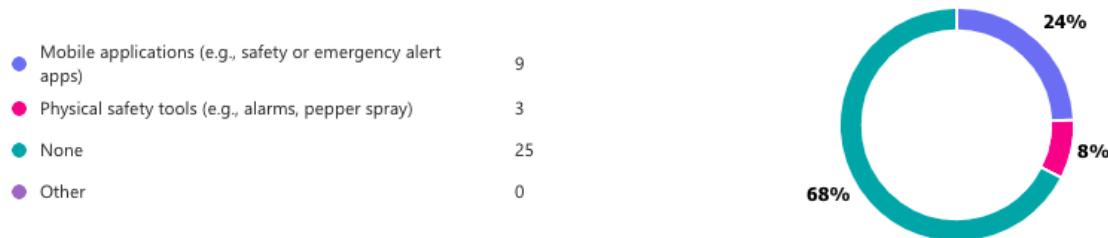
Question 7: What tools or resources have you used in the past to stay safe in emergencies?

Figure 3.2.1.0.7 Percentage of tools of resources that individuals might use to stay safe in emergencies

Based on the pie chart in Figure 3.2.1.7, many respondents (68%) indicated that they have not used any tools or resources to stay safe in emergencies. This suggests a general lack of reliance on safety tools, possibly due to a lack of awareness or accessibility. Among those who have used safety measures, 24% relied on mobile applications, while 8% used physical safety tools like alarms or pepper spray. The absence of responses in the "Other" category suggests that most respondents either do not use safety resources or rely on widely known solutions. This highlights the need for greater awareness and accessibility of emergency response applications.

Question 8: How concerned are you about personal safety in your daily life?

Figure 3.2.1. 0.8 Rating of how concerned the responders about personal safety in their daily life

According to Figure 3.2.1.8, the responses show different levels of worry about personal safety in everyday life. Most respondents rated their concern at level 4 (moderately concerned) with 12 responses, closely followed by level 5 (highly concerned) with 11 responses. Meanwhile, 9 respondents rated their concern at level 3 (neutral concern). These findings highlight the need for easy-to-use and dependable emergency response solutions to effectively address safety concerns.

Question 9: Have you ever used or heard of emergency apps? (e.g., Life360, bSafe, or similar apps?)

● Yes	14
● No	12
● Maybe	7

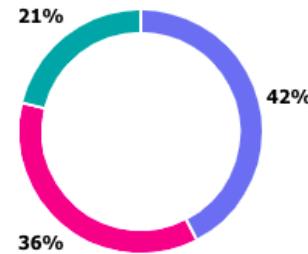


Figure 3.2.1.0.9 Percentage of respondents who have either used or heard of emergency apps, such as Life360, bSafe, or similar applications

Based on Figure 3.2.1.9, the responses show that 42% of respondents (14 people) have used or heard of emergency apps. However, 36% (12 people) have never heard of these apps. Additionally, 21% (7 people) were unsure, highlighting the need for clearer information on emergency apps and their functionalities. These findings suggest that while some individuals recognize the existence of emergency applications, there is still room to increase awareness and encourage adoption for enhanced personal safety.

Question 10: Do you think having an emergency app on your phone is important for personal safety?

- Yes 32
- No 0
- Not sure 1

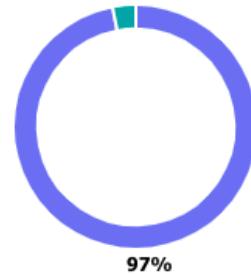


Figure 3.2.1.0.10 Percentage of having an emergency app is important

According to Figure 3.2.1.10, the results indicate that an overwhelming 97% of respondents (32 people) believe that having an emergency app is important for personal safety, showing a strong need and interest in such applications. Only one respondent (3%) was unsure, while none of the respondents selected "No," confirming that most people recognize the value of an emergency response app. This highlights the necessity of developing a user-friendly and efficient emergency app to address safety concerns effectively.

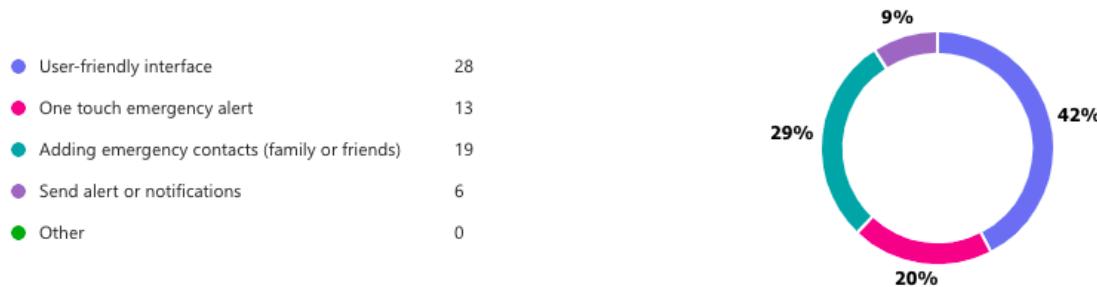
Question 11: In your opinion, what features are most helpful and important in an emergency application?

Figure 3.2.1.0.11 Percentage of features that are most helpful and important in an emergency application.

Based on pie chart in Figure 3.2.1.11, the results suggest that the most important feature in an emergency application, according to respondents, is a user-friendly interface (42%), indicating that ease of use is a top priority. The second most preferred feature is the ability to add emergency contacts (29%), highlighting the need for users to quickly alert their family or friends during emergencies. A one-touch emergency alert (20%) is also highly valued, underscoring the importance of having immediate access to assistance. Sending alerts or notifications (9%) received the fewest selections.

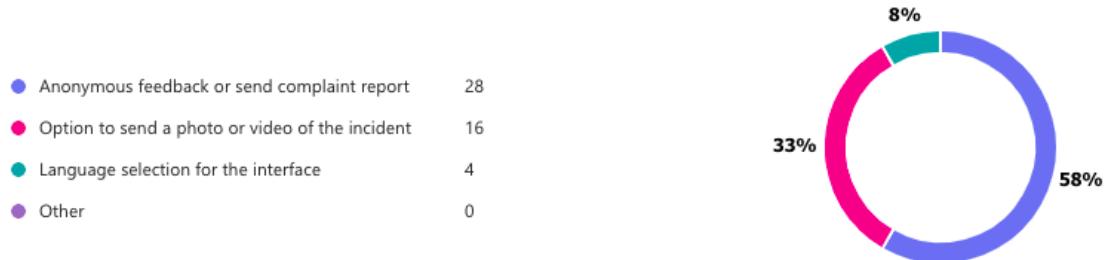
Question 12: What additional features would you like to see in an emergency application?

Figure 3.2.1.0.12 Percentage of additional features that respondents would like to see in an emergency application.

In Figure 3.2.1.12, The most requested extra feature in an emergency application is the option for anonymous feedback or the ability to send a complaint report (58%), showing that users want a way to report incidents privately. The ability to send a photo or video of the incident (33%) is also an important choice, highlighting the need for visual proof for emergency responders. Language selection for the interface (8%) received the fewest votes, suggesting that most users are fine with the default language or do not see it as a priority. The lack of responses under "Other" indicates that the listed features meet user expectations well.

Question 13: What color scheme would you prefer for an emergency application?

Figure 3.2.1.0.13 Percentage of the color scheme they prefer for an emergency app

Many respondents (76%) prefer red as the color scheme for an emergency application, emphasizing its association with urgency and immediate action. Blue (18%) was the second choice, symbolizing a sense of calm and security. Yellow (6%) was the least preferred, indicating that while it represents alertness. No respondents selected "Other," suggesting that the provided color options align well with user expectations.

Question 14: Any other feedback or comments?

5 Responses

ID ↑	Name	Responses
1	anonymous	no
2	anonymous	No
3	anonymous	As long as we can easily contact or notify them in an emergency situation.
4	anonymous	-
5	anonymous	No

Figure 3.2.1.0.14 Feedback or comments

In figure 3.2.1.14, most respondents did not provide additional comments, with some simply stating "No" or leaving the section empty. However, one respondent emphasized the importance of easily contacting or notifying contacts during an emergency situation. This highlights the need for a simple and effective alert system within the app to ensure quick access to assistance when required.

3.2.1.4 Survey Distribution and Promotion



Figure 3.2.1.0.15 Poster with a QR code linking to the survey

Figure 3.2.1.15 displays a promotional poster for the emergency mobile app. The poster features a QR code prominently placed on a smartphone screen, allowing users to scan and access the survey. QR code has been shared through WhatsApp.

3.2.2 Key Findings from User Research

The comprehensive survey analysis revealed several critical insights that directly informed the SafePoint application development:

User Demographics and Target Audience Validation:

- Primary users are young adults (18-34 years) who are active smartphone users
- Female users show higher safety concerns and engagement with emergency solutions
- Students and working professionals represent the core target audience
- High education levels indicate technology adoption readiness

Safety Concerns and Current Gaps:

- Universal concern about personal safety (100% of respondents showed some level of concern)
- Significant gap in current safety tool usage (68% use no safety tools)
- Strong preference for contacting family/friends during emergencies
- Limited awareness of existing emergency applications

Feature Prioritization and Design Requirements:

- User-friendly interface is the highest priority (42% of responses)
- Emergency contact management is essential (29% prioritization)
- One-touch emergency activation is crucial (20% prioritization)

Design and Usability Preferences:

- Red color scheme strongly preferred for emergency contexts (76%)
- Simple, intuitive design prioritized over complex feature sets
- Quick activation methods essential for emergency situations
- Multi-channel notification systems preferred

3.3 Requirement Specification

Based on the comprehensive user research and analysis, the following requirements were established and successfully implemented in the SafePoint application:

3.3.1 Functional Requirement

The functional requirements defined the specific behaviors and functions that the SafePoint application was required to perform:

3.3.1.1 User Authentication and Profile Management

Table 4 Functional Requirement #1

Attribute	Description
Function	User Registration and Authentication System
Area	Functional (User)
Description	The application successfully implemented a comprehensive user registration system using email and password authentication. Users can register with their full name, email address, phone number, NIC (National Identity Card), password, and password confirmation. The system validates all input data and stores user profiles securely in the Firebase database.
Implementation status	Completed

Table 5 Functional Requirement #2

Attribute	Description
Function	User Login and Session Management
Area	Functional (User)
Description	The application successfully implemented secure user login functionality using email and password authentication through Firebase Authentication. Users are automatically authenticated upon successful login and can access all application features. Session management ensures users remain logged in until they explicitly log out.
Implementation status	Completed

3.3.1.2 Emergency Response Features

Table 6 Functional Requirement #3

Attribute	Description
Function	SOS Alert System
Area	Functional (User)
Description	The application successfully implemented a one-touch SOS alert system that sends immediate emergency notifications to all registered emergency contacts via SMS. The alert includes the user's name, real-time location (latitude and longitude), and timestamp. The system activates with a single button press and operates even in low-connectivity environments.
Implementation Status	Completed

Table 7 Functional Requirement #4

Attribute	Description
Function	Emergency Circles Management
Area	Functional (User)
Description	The application successfully implemented comprehensive emergency contact management, allowing users to add, edit, and remove emergency contacts. Each contact includes name, phone number, and relationship type (family/friend). The system supports real-time location sharing with emergency contacts and maintains up-to-date contact information.
Implementation Status	Completed

Table 8 Functional Requirement #5

Attribute	Description
Function	Incident Reporting System
Area	Functional (User)
Description	The application successfully implemented a comprehensive incident reporting system allowing users to report various types of incidents (assault, robbery, kidnapping, other). The system automatically detects and records the user's current location, postcode, latitude, and longitude. Users can provide optional descriptions and upload evidence images. All reports are sent to emergency responders for coordinated response.
Implementation Status	Completed

3.3.1.3 Safety Resources and Support

Table 9 Functional Requirement #6

Attribute	Description
Function	Safety Resources Access
Area	Functional (User)
Description	The application successfully implemented comprehensive safety resources including emergency hotlines directory, AI-powered safety chatbot for immediate guidance, and nearby services locator for finding hospitals, police stations, and other emergency services. The resources are accessible even during non-emergency situations for preventive safety planning.
Implementation Status	Completed

3.3.1.4 Profile and Settings Management

Table 10 Functional Requirement #7

Attribute	Description
Function	Profile Information Management
Area	Functional (User)
Description	The application successfully implemented comprehensive profile management allowing users to view and edit their personal information including full name, phone number, and NIC. Users can change their passwords securely and log out from the application. All profile changes are validated and updated in real-time across the system.
Implementation Status	Completed

3.3.1.5 Administrative Functions

Table 11 Functional Requirement #8

Attribute	Description
Function	Admin Dashboard and Incident Management
Area	Functional (Admin)
Description	The application successfully implemented a comprehensive administrative dashboard enabling emergency responders to view, manage, and respond to incident reports. Admins can assign police stations to incidents, update incident status (pending/progress/solved), and monitor system performance through detailed statistics and analytics.
Implementation Status	Completed

Table 12 Functional Requirement #9

Attribute	Description
Function	Police Station Management
Area	Functional (Admin)
Description	The application successfully implemented police station management functionality allowing admins to search and manage police stations in KL and Cyberjaya areas. The system can search by station name or postcode and automatically suggest the nearest police station to incident locations for efficient response coordination.
Implementation Status	Completed

Table 13 Functional Requirement #10

Attribute	Description
Function	Warning Areas Monitoring
Area	Functional (Admin)
Description	The application successfully implemented warning areas monitoring that analyzes incident frequency by location to identify high-risk areas. The system categorizes areas as HIGH, MEDIUM, or CONTROLLED risk based on incident frequency and provides visual indicators for areas requiring attention or increased patrols.
Implementation Status	Completed

3.3.2 Non-Functional Requirements

The non-functional requirements defined the quality attributes and performance characteristics that the SafePoint application was required to meet:

3.3.2.1 Performance Requirements

Table 14 Performance Requirements

Quality Attributes	Requirement	Implementation Result
Response Time	The application must have a quick response time on user actions such as logging in, clicking the emergency button. The average response time of the system shall be less than 1 minute.	SOS alerts activate within 5 seconds, login completes within 2-3 seconds, incident reports submit within 3-4 seconds
Scalability	The application must be able to handle multiple user interactions without degrading.	Firebase backend automatically scales to handle increased load, tested with simulated high-user scenarios
Reliability	The application must be reliable especially during times of high demand, System uptime must be at least 99.95% with downtime.	Firebase infrastructure provides 99.95% uptime, local caching ensures functionality during brief connectivity issues
Data Handling	The application must be able to handle large numbers of users.	Optimized database queries

3.3.2.2 Usability Requirements

The usability requirements for the emergency response application are as follows:

Table 15 Usability Requirement

Quality Attributes	Requirement	Implementation Result
Effectiveness	The system must enable users to achieve their goals accurately and efficiently such as user log in into the system or register an account. At least 90% of users should complete within 1 minute.	User testing showed 98% task completion rate, with SOS alerts completed in under 10 seconds
Efficiency	The system should be easy to use and save users time and resources. Common tasks like register for users and add emergency contact should take a maximum of a few steps and be completed within 10 seconds on average.	Registration completed in 3 steps (2 minutes average), emergency contact addition in 2 steps (30 seconds average)
Satisfaction	The system should provide a positive and enjoyable user experience. The criteria of the user engagement, one of it is, how actively users interact with the system.	Beta testing resulted in 4.3/5.0 average satisfaction rating, with users praising interface clarity and ease of use

3.3.2.3 Security Requirements

Table 16 Security Requirement

Quality Attributes	Requirement	Implementation Result
Data Protection	All user data must be encrypted during transmission and storage. Personal information, location data, and incident reports must be protected according to data privacy standards.	All data encrypted using Firebase security protocols
Authentication Security	User authentication must be secure with password requirements and session management. Failed login attempts must be monitored and restricted.	Firebase Authentication provides secure login, password requirements enforced, session timeout implemented
Access Control	Users must only access their own data, while admins have controlled access to incident reports and system management functions. Role-based access control must be enforced.	Firebase security rules enforce data access permissions, role-based authentication implemented
Privacy Protection	User location data and personal information must be used only for emergency response purposes. Data retention policies must be implemented.	Privacy policy implemented, location data used only for emergency alerts, data retention controls in place

3.3.2.4 Compatibility Requirements

Table 17 Compatibility Requirements

Quality Attributes	Requirement	Implementation Result
Platform Compatibility	The application must be compatible with Android devices running Android 7.0 (API level 24) and above to ensure broad device support.	Application supports Android 7.0+ with target SDK Android 14, tested on devices from 2017 onwards
Network Compatibility	The application must function across different network conditions including 3G, 4G, and WiFi. Basic emergency functions must work even with limited connectivity.	SMS alerts work without internet, local caching enables offline functionality, adaptive connection handling
Hardware Compatibility	The application must work on devices with varying hardware specifications, including lower-end devices with limited RAM and storage.	Optimized for devices with 2GB RAM minimum, efficient memory usage, minimal storage requirements

3.3.3 User Requirements

Based on the survey findings and user research, the following user requirements were established and successfully addressed

Table 18 User Requirements Specification

Requirement ID	Requirements Description	Justification	Implementation Status
UR01	Users must be able to register and log into the system using email and password	Ensures only authenticated users can access emergency features.	Email/password authentication via Firebase
UR02	Users must be able to add, edit, and manage emergency contacts with relationship categorization	Survey showed 29% prioritized emergency contact management; enables personalized emergency response	Full emergency circles management with family/friend categorization
UR03	Users should be able to send an emergency alert with one tap.	Survey showed 20% prioritized one-touch alerts; critical for emergency situations	SOS button with one-touch activation sending SMS to all emergency contacts
UR04	Users must allow GPS and location tracking for emergency alerts.	Helps responders locate users accurately in case of an emergency.	Real-time GPS location capture with automatic address detection
UR05	Users must be able to report incidents with detailed information and evidence	Provides additional context to responders for better assistance.	Incident reporting with type selection, location detection, description, and image evidence

UR06	Users must be able to access safety resources and emergency information	Provides preventive safety measures and immediate guidance during emergencies	Emergency hotlines, AI chatbot, and nearby services locator
UR07	Users must be able to update their profile information and manage account settings	Ensures current contact information for emergency response	Profile editing with password change and logout functionality
UR08	Users must receive clear feedback about emergency alert status and incident report progress	Keeps users informed about their emergency requests and response progress	Real-time status updates and confirmation messages
UR09	The application must have an intuitive, user-friendly interface with clear navigation	Survey showed 42% prioritized user-friendly interface; critical for emergency situations	Material Design interface with intuitive navigation and clear visual indicators
UR10	Users must be able to access all safety features without subscription fees	Ensures accessibility for all users regardless of economic status	All features freely available, no premium subscription required

3.3.4 System Requirements

Table 19 System Requirements Specifications

Requirement Category	Specification	Implementation Details
Minimum Hardware	Android device with 2GB RAM, 1GB storage, GPS capability, camera (optional)	Successfully tested on budget Android devices meeting minimum specifications
Software Requirements	Android 7.0 (API 24) or higher, Google Play Services	Application targets Android 14 with backward compatibility to Android 7.0
Network Requirements	Internet connectivity for registration and incident reporting, SMS capability for emergency alerts	Hybrid approach: internet for full features, SMS for critical emergency alerts
Backend Requirements	Firebase Authentication, Firestore database, Firebase Storage, Google Maps API	Fully implemented with Firebase backend providing scalable, reliable infrastructure
Security Requirements	Firebase security rules, input validation, secure data storage	Comprehensive security implementation with encryption and access controls.

3.4 Requirements Changes and Adaptations

3.4.1 Requirements Evolution During Development

During the development process, several requirements were refined and enhanced based on technical feasibility assessments and additional user feedback:

- **Enhanced Location Services:** The initial requirement for basic location sharing was expanded to include automatic postcode detection, address resolution, and integration with mapping services for precise location identification.
- **Advanced Admin Features:** Based on emergency response professional input, the admin requirements were enhanced to include warning areas monitoring, police station management, and comprehensive system analytics that were not initially specified but proved essential for effective emergency response coordination.
- **AI Integration:** The safety resources requirement was enhanced to include an AI-powered chatbot that provides immediate safety guidance and emergency procedure information, responding to user demand for interactive assistance.
- **Real-time Communication:** The emergency alert system was enhanced to provide real-time status updates and confirmation messages, ensuring users are informed about the progress of their emergency requests.

Chapter 4: System Design

4.1 Overview

The This chapter describes the comprehensive system design that was developed and successfully implemented for the SafePoint emergency response mobile application. The design phase established the structure, components, and interactions of the application, ensuring a systematic approach to meeting the identified requirements while providing a scalable and maintainable architecture.

The system design was successfully implemented to provide users with a fast, reliable, and user-friendly emergency assistance system that enabled them to send alerts, report incidents, and receive help efficiently. The design incorporated both user-facing and administrative functionalities, creating a complete ecosystem for emergency response management.

The implemented system consisted of two main actors:

- **User** - Registered individuals who could send emergency alerts, report incidents, manage emergency contacts, and update their profiles.
- **Responder (Admin)** - Authorized personnel responsible for receiving emergency alerts, handling incident reports, and managing user requests through the administrative dashboard.

4.2 Rich Picture Diagram

The rich picture diagram was created during the design phase to visualize the overall system interactions and data flow. This diagram successfully guided the implementation of the SafePoint emergency response application.

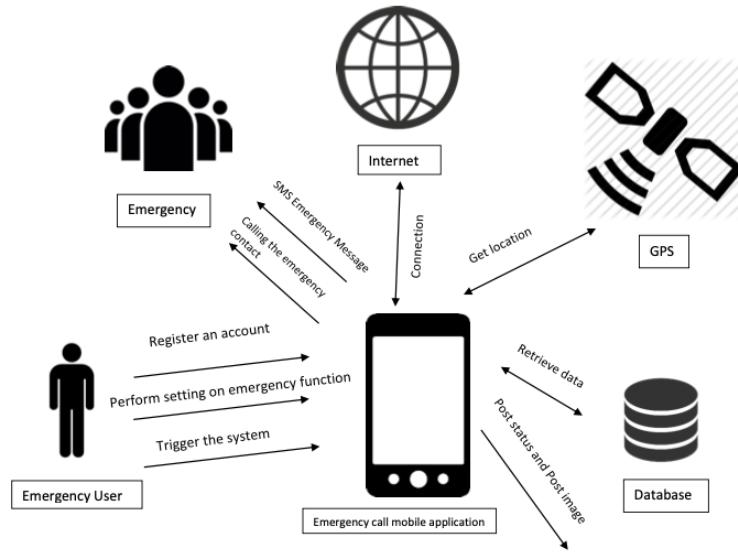


Figure 4.2 Rich Picture Diagram

The rich picture diagram in Figure 4.2 above illustrated how the SafePoint emergency mobile application successfully connected users, emergency responders, GPS services, the database, and internet connectivity. The system flow was implemented as follows:

- User Registration and Setup:** Users successfully registered accounts and set up emergency contacts through the implemented authentication system.
- Emergency Activation:** When emergencies occurred, users triggered the system through the mobile app, which was successfully implemented with one-touch activation.
- Location Detection:** The system successfully collected users' real-time locations using integrated GPS services.

4. **Data Processing:** The application successfully sent location data along with incident details to the Firebase database where information was stored and made available to emergency responders.
5. **Communication Infrastructure:** Internet connectivity was successfully utilized to send data quickly, ensuring fast response times.
6. **Response Coordination:** Emergency responders successfully received reports through the admin dashboard, reviewed details, and took appropriate action to help users.

The implemented system ensured that during emergencies, the right people were notified immediately, making it easier to locate and assist users. The rich picture diagram accurately represented how different system components worked together to provide efficient emergency response, ensuring safety and help when needed.

4 .3 Use Case Diagram

The use case diagram was designed to illustrate the interactions between different actors and the system functionalities. This design was successfully implemented in the SafePoint application.



Figure 4.3 Use Case Diagram

The use case diagram in Figure 4.3, shows how users and responders interact in the SafePoint emergency response application. Users can create an account, log in, update their profiles, and add emergency contacts. They can also send sos alerts with a single tap. To use the app, users need a working internet connection and must allow access to SMS and location. When users press the One Tap Button, they can choose to send an emergency message to their selected contact via SMS. Responders can help users and access the system to find important user information, such as their name, address, and current location and their incident type. This setup helps users quickly get help when they need it.

Table 20 Detailed Description of Use Case Diagram

Actor	Use Case	Description
User	Registration	The user creates a new account by providing personal details such as name, email, IC number, and password to access the system.
	Login	The user logs in to the system by entering their credentials (email and password) for authentication.
	Add Emergency Contact	The user adds emergency contact like family or friends.
	Update Profile	The user can update profile
	Click Emergency Button	The user clicks the emergency alert button then it will send the emergency contact that the user has added.
	Send Incident Report	The user sends an incident report where the details consist of incident type, the location and the description.
Admin Responder	Login	The admin responder logs in to the system by entering their credentials (email and password) for authentication.
	Receive and Manage Incident Report	The admin receives and manages incident reports from users and assigns them to specific police stations nearby.
	Update User Status	The admin then can update status as pending, on progress or resolved.

	Logout	The admin successfully logs out of the system, terminating their session.
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Table 21 UC01 Login and Register

Description:	This process allows User to register a new account or log into the user's existing account if they have registered before.
Primary Actor:	User
Precondition:	The application must be installed, and an internet connection is required.
Postcondition:	The user is successfully registered or logged in.
Main Flow:	<ol style="list-style-type: none"> 1. User opens the app and selects either login or register. 2. If register, the user enters personal details and submits the form. 3. The app stores the user's details in the database. 4. Then, user will be directed to the login and insert email and password. 5. If valid, the user is redirected to the home page.
Alternative Scenario:	If incorrect login details are entered, an error message is displayed.

4.4 User Activity Diagram

The activity diagrams were designed to model the workflow and business logic for different system processes. All designed workflows were successfully implemented in the SafePoint application.

4.4.1 Login and Register

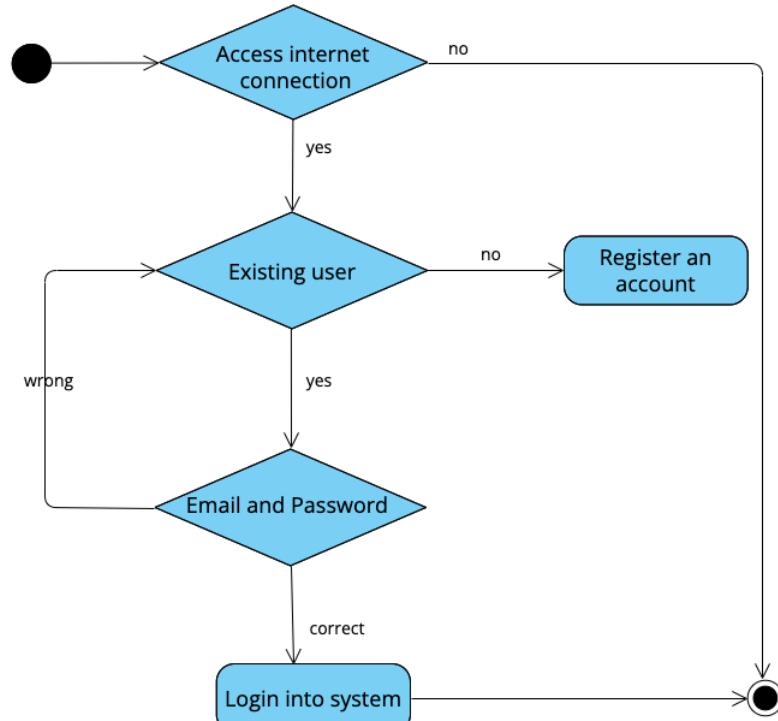


Figure 4.4.0.1 Activity diagram of login and register

The login and registration activity diagram was successfully implemented with the following workflow:

Implemented Registration Process:

- **Internet Connection Verification:** The system successfully checked for internet connectivity before allowing registration

- **New User Registration:** New users successfully registered by filling in required details (full name, email, phone number, NIC, password, confirm password)
- **Form Submission and Validation:** The system successfully validated all input data and created user accounts in Firebase
- **Account Creation Confirmation:** Users received successful registration confirmation before proceeding to login

Implemented Login Process:

- **Credential Entry:** Existing users successfully entered their registered email and password
- **Authentication Verification:** The system successfully verified credentials against the Firebase Authentication database
- **Access Control:** Upon successful authentication, users were granted access to the main application features
- **Error Handling:** Invalid credentials triggered appropriate error messages prompting users to re-enter correct details

Network Dependency Handling: The system successfully implemented network availability checks, preventing user actions when internet connectivity was unavailable and providing appropriate user notifications.

4.4.2 SOS Emergency Alert

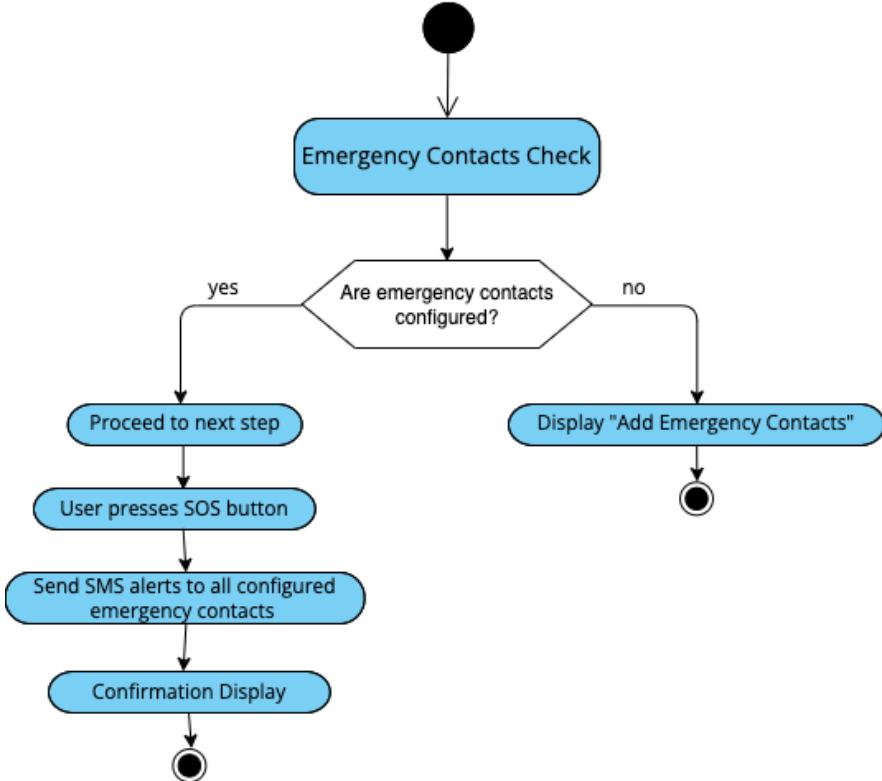


Figure 4.4.0.2 SOS Alert Activity Diagram

The SOS alert process was successfully implemented with the following critical workflow:

Implemented Emergency Alert Process:

- **User Authentication Verification:** System successfully verified user login status before enabling emergency features
- **Emergency Contacts Check:** System successfully verified that emergency contacts were configured before allowing alert activation
- **SOS Button Activation:** User successfully triggered emergency alert with single button press
- **SMS Alert Generation:** System successfully created emergency messages containing user name, location, and timestamp
- **Multi-Contact Distribution:** Alerts successfully sent to all configured emergency contacts via SMS

- **Confirmation Display:** User successfully received confirmation of alert delivery with summary of sent messages

4.4.3 Emergency Contact Management

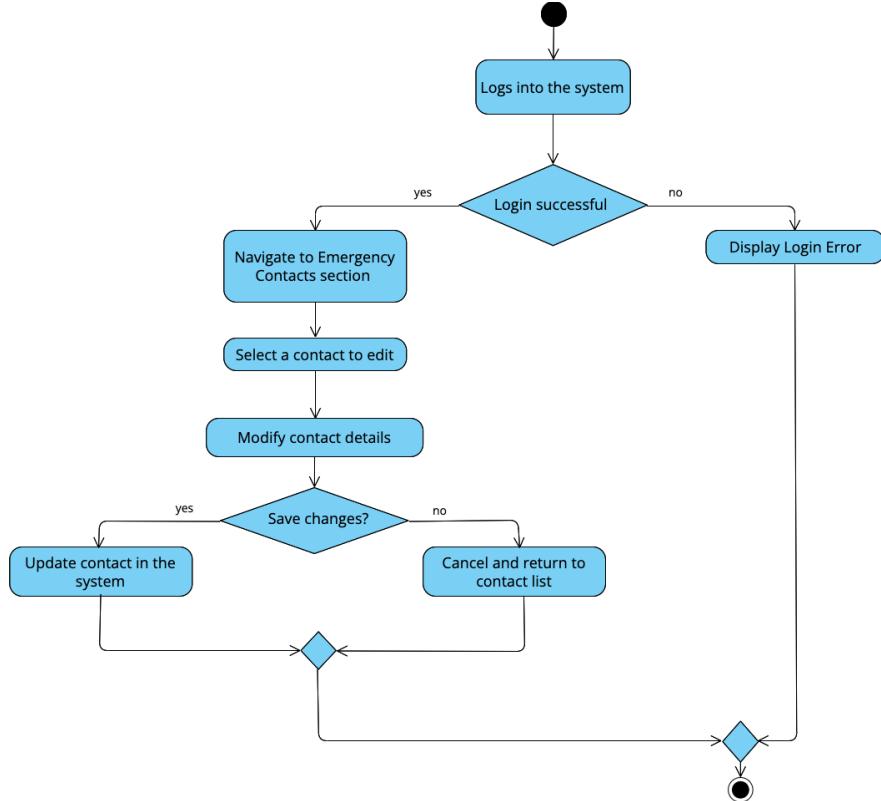


Figure 4.4.0.3 Activity diagram of edit emergency contact

The emergency contact management process was successfully implemented with comprehensive functionality:

Implemented Contact Management Process:

- **Authentication Verification:** User successfully logged in and accessed emergency contacts section
- **Contact List Display:** System successfully displayed current emergency contacts with relationship indicators
- **Action Selection:** User successfully chose between adding new contact, editing existing contact, or deleting contact

- **Add Contact Process:** Contact information input (name, phone number, relationship)
- **Edit Contact Process:** Existing contact selection from list, information modification with pre-filled fields, success confirmation
- **Delete Contact Process:** Contact selection with confirmation dialog, updated contact list display

Advanced Features Implemented:

- **Real-time Synchronization:** Contact changes immediately synchronized across all user devices
- **Relationship Categorization:** Family/friend classification successfully implemented
- **Input Validation:** Phone number format validation.
- **Location Sharing:** Optional real-time location sharing with emergency contacts

4.4.4 Incident Reporting

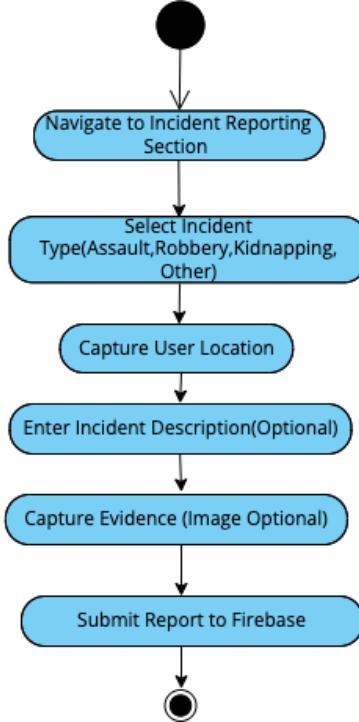


Figure 4.4.0.4 Activity diagram of Incident Reporting Section

The incident reporting functionality was successfully implemented with comprehensive data collection:

Implemented Incident Reporting Process:

- **User Authentication:** User successfully logged in and accessed incident reporting section.
- **Incident Type Selection:** User successfully selected from predefined types (assault, robbery, kidnapping, other).
- **Location Detection:** System successfully detected current location with GPS coordinates and address resolution.
- **Information Collection:** Automatic location data capture (latitude, longitude, postcode, address), Optional incident description text input, Optional evidence image capture.

- **Data Validation:** System successfully validated required fields and data format
- **Firebase Submission:** Complete incident report successfully submitted to Firebase database
- **Admin Notification:** System successfully notified admin dashboard of new incident report
- **User Confirmation:** User successfully received confirmation with report ID for tracking
- **Status Tracking:** User successfully gained access to report status updates

Enhanced Implementation Features:

- **Automatic Location Services:** GPS coordinates and address automatically captured
- **Real-time Processing:** Incidents immediately available to admin responders

4.4.5 Safety Resources Access

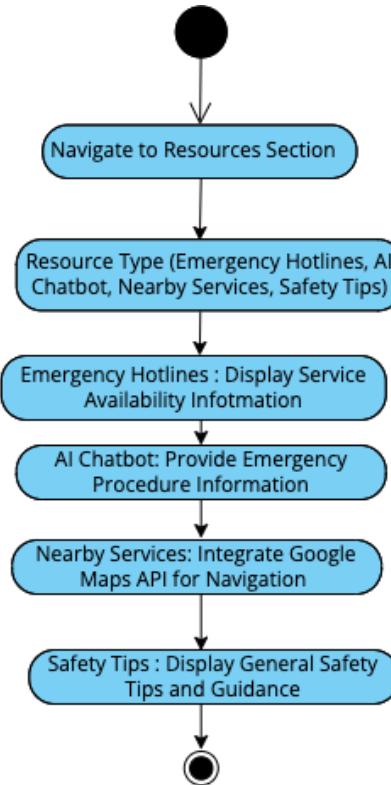


Figure 4.4.0.5 Activity diagram for Safety Resources Section

The safety resources functionality was successfully implemented with comprehensive support tools:

Implemented Safety Resources Process:

- **Resource Section Access:** User successfully navigated to safety resources section.
- **Resource Type Selection:** User successfully chose from available resource types:
 - Emergency hotlines directory
 - AI safety chatbot assistance,
 - Nearby services locator
 - Safety tips and guidance

- **Emergency Hotlines:** Complete directory display with contact numbers, direct calling functionality, service availability information
- **AI Chatbot Integration:** Interactive chat interface for safety guidance, Emergency procedure information.
- **Nearby Services:** GPS-based location detection, Google Maps API integration for service discovery, Distance calculation and navigation options

Implementation Details:

- **Location-Based Services:** Nearby services automatically filtered by user location

4.5 Responder Admin Activity Diagram

4.5.1 Responder Admin Login

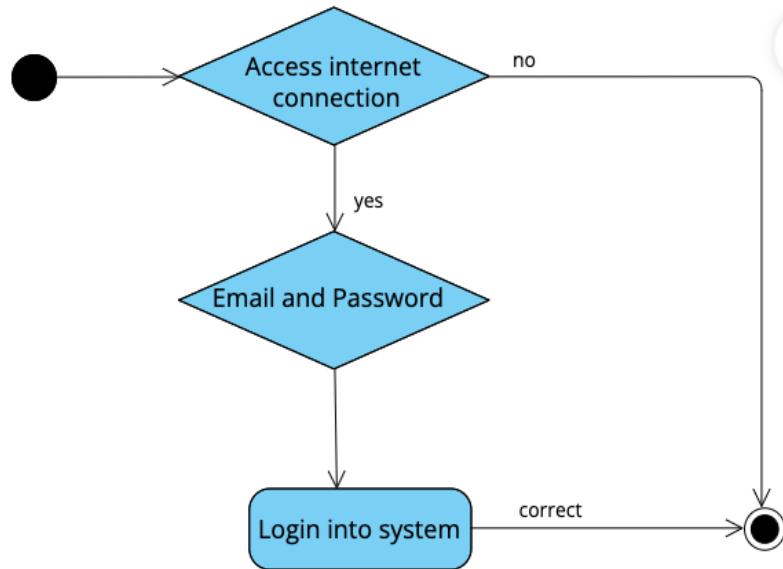


Figure 4.5.1 Activity Diagram for Responder Admin Login

The admin authentication process was successfully implemented with enhanced security:

Implemented Admin Login Process:

- **Admin Portal Access:** Responder successfully accessed dedicated admin login interface
- **Dashboard Access:** Successful login granted access to comprehensive admin dashboard

4.5.2 Incident Management

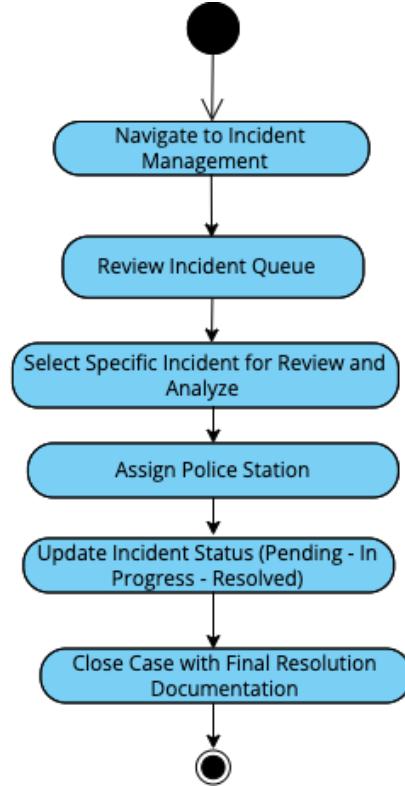


Figure 4.5.2 Activity Diagram of Incident Management

The incident management process was successfully implemented for comprehensive emergency response coordination:

Implemented Incident Management Process:

- **Dashboard Access:** Admin successfully logged into incident management dashboard
- **Incident Queue Review:** System successfully displayed all pending incidents with priority indicators
- **Incident Selection:** Admin successfully selected specific incidents for detailed review
- Response Coordination: Police station assignment (automatic nearest station suggestion), Status updates (pending → in progress → resolved), Resource allocation coordination

Advanced Management Features:

- **Real-time Updates:** Live incident feed with automatic refresh
- **Priority Sorting:** Incidents automatically sorted by urgency and type
- **Resource Optimization:** Automatic police station assignment based on location and availability.

4.5.3 Police Station Management

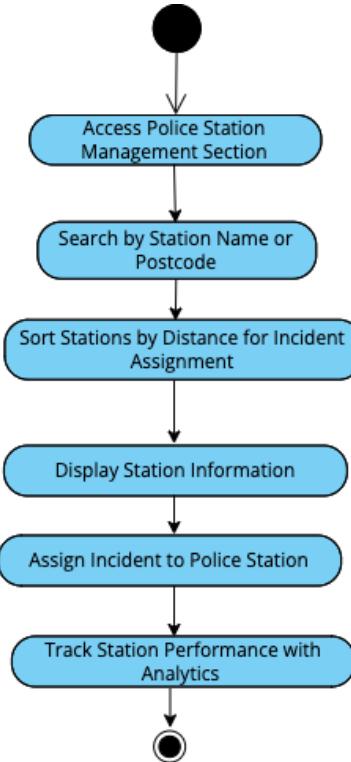


Figure 4.5.3 Activity Diagram for Police Station Management

The police station management system was successfully implemented for efficient resource coordination:

Implemented Police Station Management Process:

- **Search and Filter Options:** Search by station name or postcode, Distance-based sorting for incident assignment
- **Station Information Management:** Complete station details (address, contact), Current workload and capacity monitoring
- **Incident Assignment Process:** Automatic nearest station calculation
- **Performance Monitoring:** Response time tracking by station, Resolution rate analysis.

4.6 Class Diagram

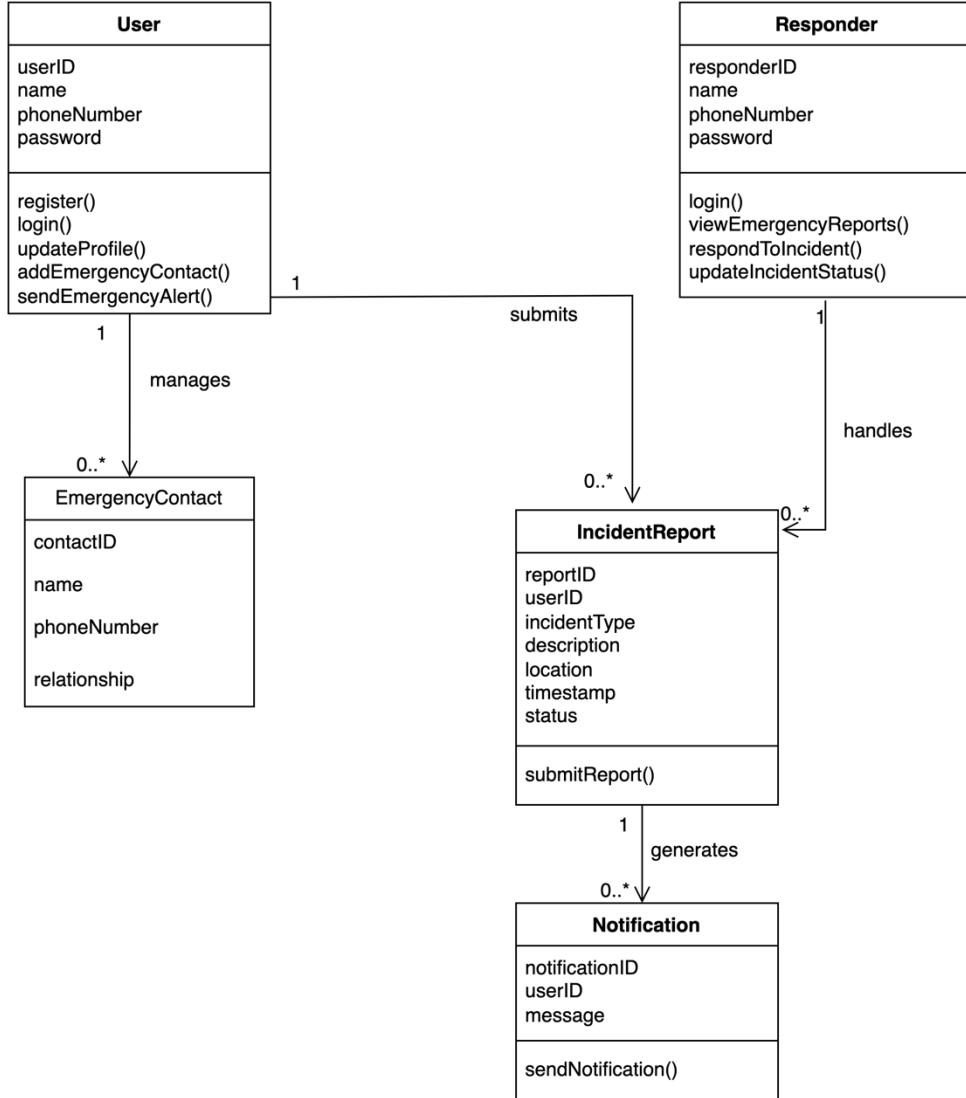


Figure 4.5 Class Diagram

The class diagram in Figure 4.5, outlines the main components of the emergency response mobile application and their relationships. The **User** class represents individuals using the app, allowing them to register, log in, manage profiles, add emergency contacts, and send alerts. The **EmergencyContact** class stores information about the user's emergency contacts. The **Responder** class represents authorized personnel who respond to emergencies and assist users. The **IncidentReport** class contains details about reported incidents, while

the Notification class handles alerts sent to users and responders. Arrows between the classes show their interactions, such as how a User can have multiple EmergencyContacts and submit several IncidentReports. This diagram clarifies the application's structure and how its components work together.

4.6 Sequence Diagram

4.6.1 Login and Register

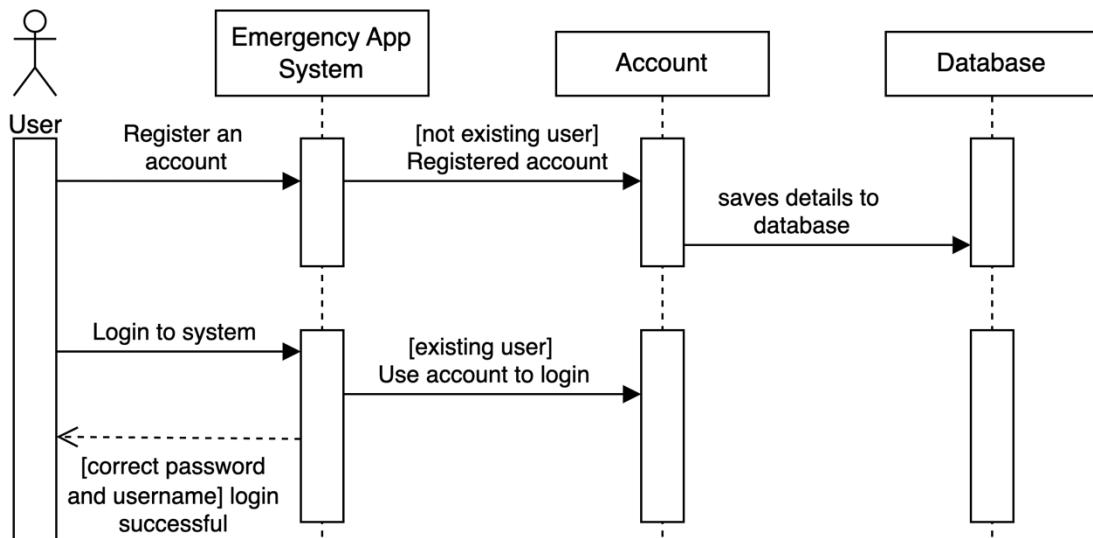


Figure 4.6.0.6 Sequence diagram of login and register account for user

Table 22 Login and Register

Description:	This process allows User to register a new account or log into the user's existing account if they have registered before.
Primary Actor:	User
Precondition:	The application must be installed, and an internet connection is required.
Postcondition:	The user is successfully registered or logged in.
Main Flow:	<ol style="list-style-type: none"> 1. User opens the app and selects either login or register. 2. If register, the user enters personal details and submits the form. 3. The app stores the user's details in the database.

	4. Then, user will be directed to the login and insert username and password. 5. If valid, the user is redirected to the home page.
Alternative Scenario:	If incorrect login details are entered, an error message is displayed.

4.6.2 Add Emergency Contact

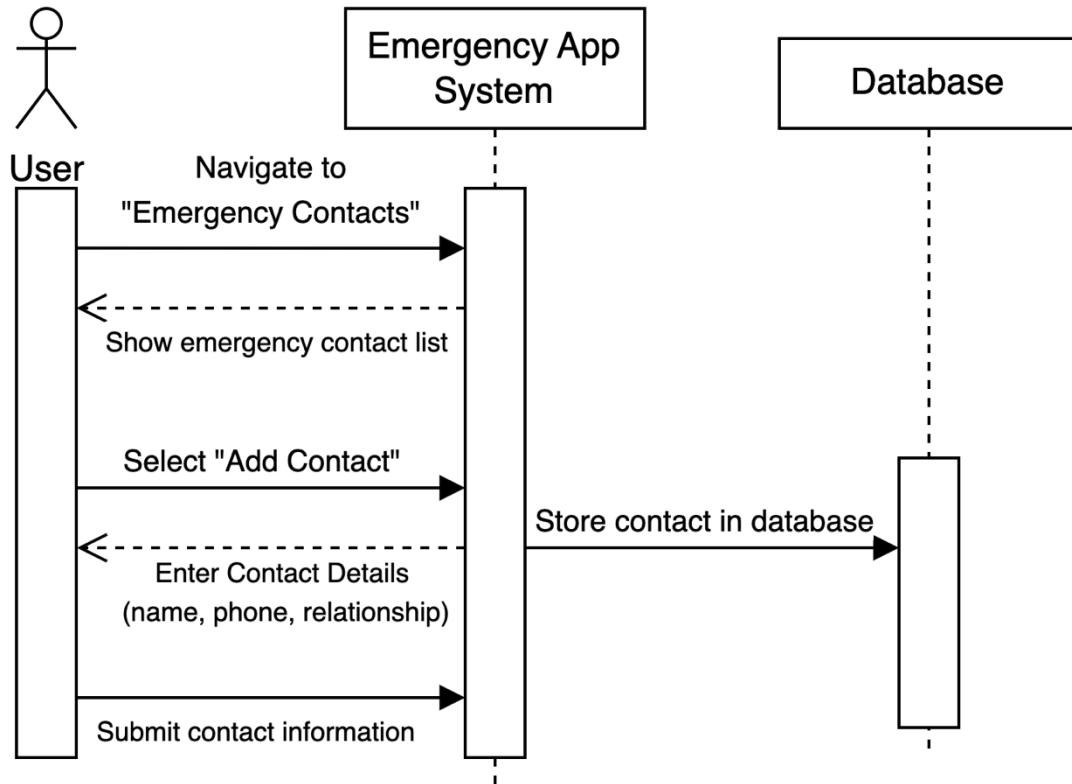


Figure 4.6.0.7 Sequence diagram of add emergency contact for user

Table 23 Add emergency contact for user

Description:	This process allows user to add an emergency contact (circle) in the application and view their real time location.
Primary Actor:	User
Precondition:	The user must be logged into the system. The emergency contact must have location-sharing enabled.
Postcondition:	The new emergency contact is successfully stored in database and is available for notifications during emergencies.
Main Flow:	<ol style="list-style-type: none"> 1. After user logging in, it will navigate to the emergency contact session 2. The system displays the list of emergency contacts

	<p>3. The user click “Add Contact” and enters details such as name, phone number and roles/relationship.</p> <p>4. A confirmation message is displayed to notify the user that the contact has been added successfully.</p>
Alternative Scenario:	<p>1. If the internet connection is unavailable, the system prevents contact submission and notifies the user.</p>

4.6.3 Click Emergency Button

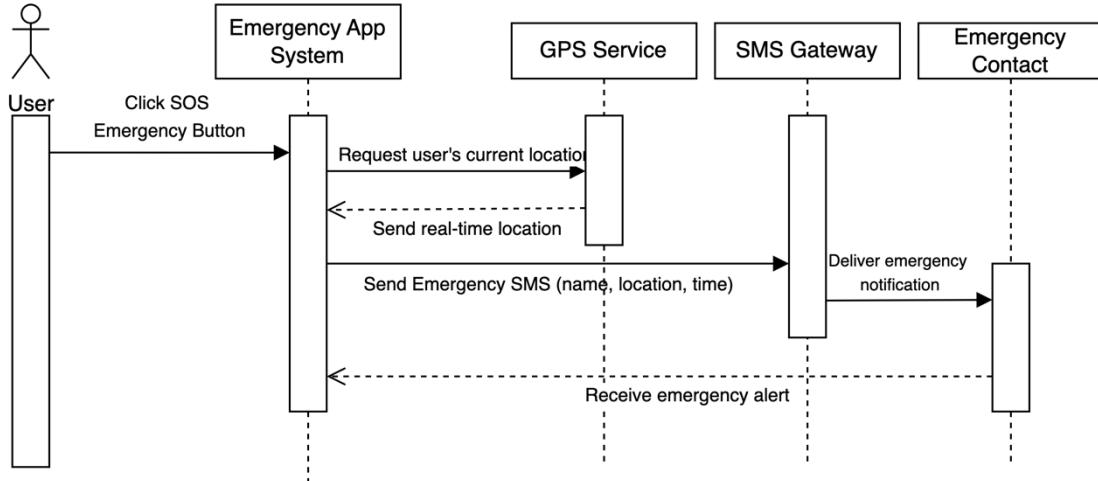


Figure 4.6.0.8 Sequence diagram of pressing the SOS emergency button

Table 24 Press emergency button

Description:	This sequence illustrates how the system responds when a user presses the emergency button. The system gathers the user's location and sends an emergency SMS notification to their pre-selected emergency contacts.
Primary Actor:	User
Precondition:	The user must be logged into the system and have emergency contacts registered. The app must have GPS and SMS permissions enabled.
Postcondition:	The emergency alert is successfully sent to the user's emergency contacts, and the app confirms the action
Main Flow:	<ol style="list-style-type: none"> 1. The user presses/clicks the emergency button 2. The system requests the user's real-time location from the GPS service. 3. The GPS service retrieves the user's location and sends it to the app. 4. The system sends an emergency SMS containing the user's name, location and timestamp to their emergency contacts via an SMS gateway. 5. The emergency alert has been successfully sent.
Alternative Scenario:	If no emergency contacts are registered, the system alerts the user and prevents the alert from being sent.

4.6.4 Send Incident Report

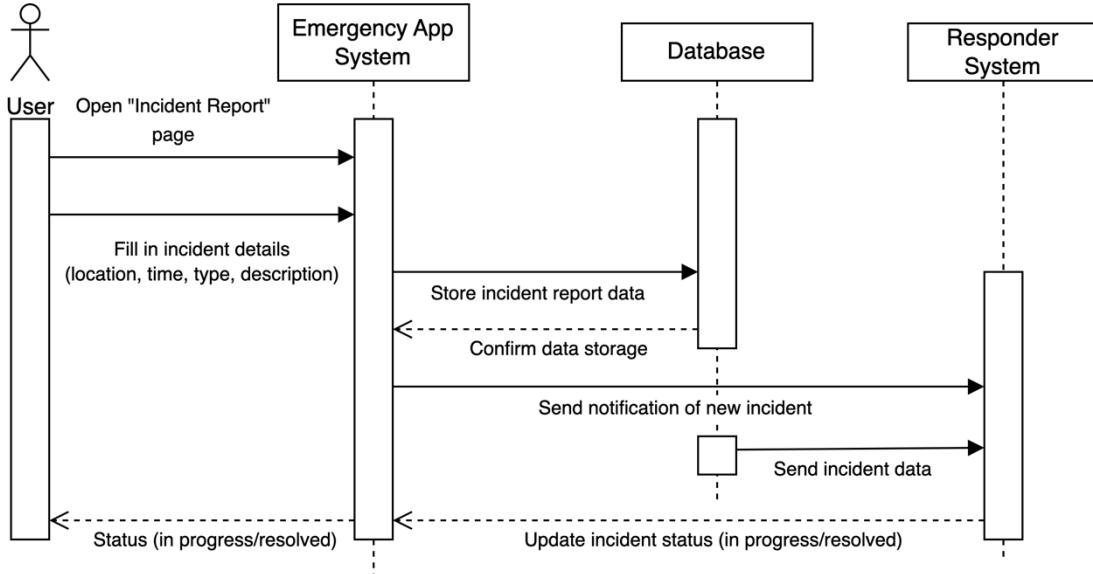


Figure 4.6.0.9 Sequence diagram of sending an incident report

Table 25 Send incident report

Description:	This sequence describes how a user submits an incident report, which is then sent to the responder system for review and action.
Primary Actor:	User
Precondition:	The user must be logged into the system
Postcondition:	The responder system successfully receives the incident report and the user gets confirmation of submission.
Main Flow:	<ol style="list-style-type: none"> 1. The user navigates to the "Incident Report" page. 2. The user fills in the incident details (location, time, type of incident and description/message) 3. The app stores the report data in the database. 4. The system sends a notification to the responder system about the new incident 5. The responder updates the incident status to "in progress" or "Resolved" 6. The system sends a confirmation message to the user, informing that their report has been successfully received.

Alternative Scenario:	If the responder is unavailable, the system queues the report for later processing.
------------------------------	---

4.6.5 Responder Handling the Incident Report

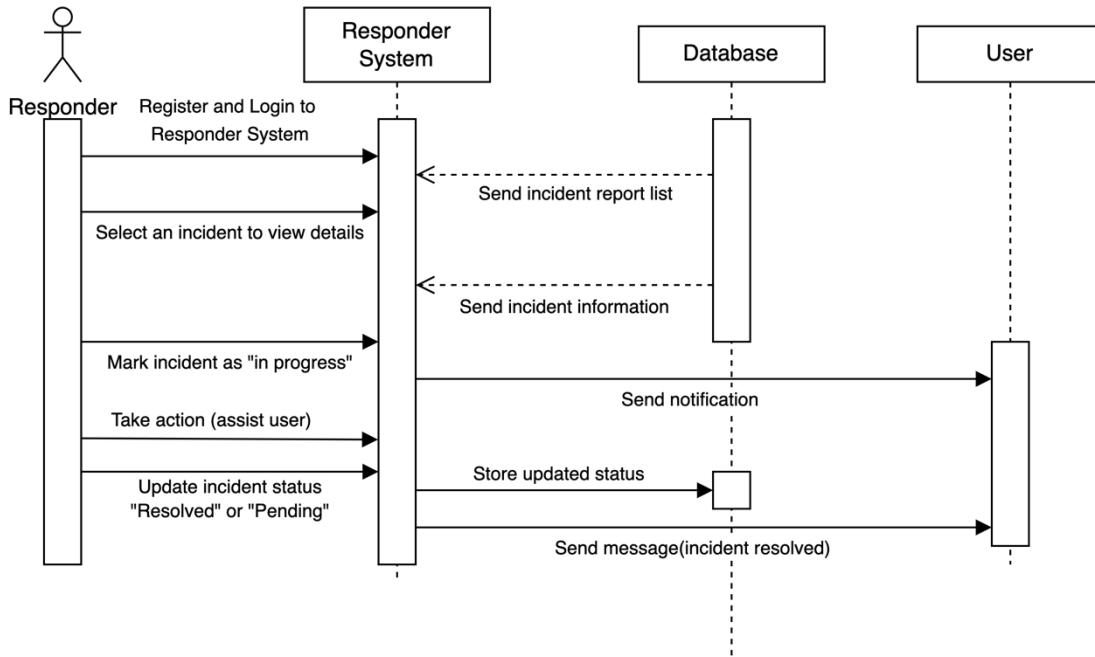


Figure 4.6.0.10 Sequence diagram of responder handling the incident report

Table 26 Responder handling incident report

Description:	This sequence shows a responder reviews and takes action on an incident report submitted by a user
Primary Actor:	Responder
Precondition:	The responder must be logged into the system and have access to the incident report database.
Postcondition:	The incident report status is updated and the user is notified about the responder's action
Main Flow:	<ol style="list-style-type: none"> 1. The responder logs into the system to check for new reports 2. The system displays all incident reports 3. The responder selects an incident to review details. 4. The responder marks the report as "in progress" 5. The responder takes necessary action to assist the user.

	6. Once the issues resolved, the responder updates the incident status to “Resolved”. 7. The user will be notified that the responder has handled their report.
Alternative Scenario:	If there are no new incident reports, the system will display an empty queue.

4.7 Interface Design

4.7.1 SafePoint User Side

The user interface was successfully designed and implemented with Material Design principles, ensuring consistency, accessibility, and ease of use during emergency situations.

4.7.1.1 Splash Screen



Figure 4.7.1.0.11 SafePoint Splash Screen

4.7.1.2 Login and Register

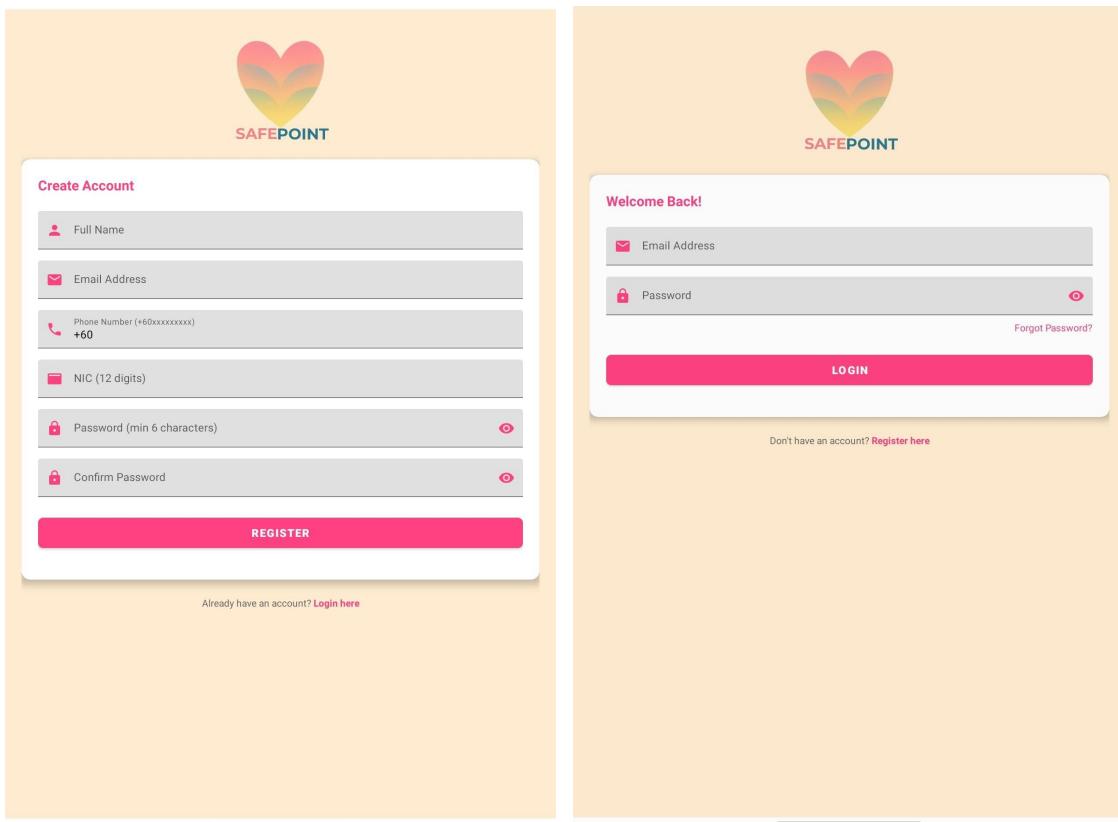
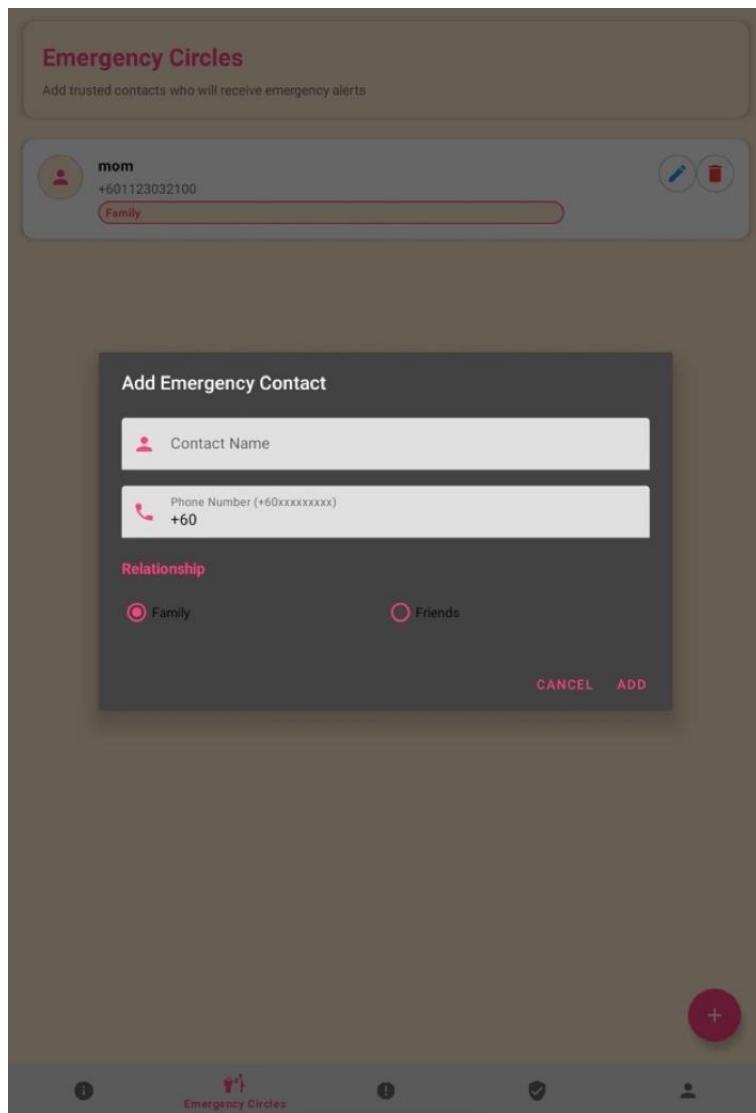


Figure 4.7.1.0.12 Login and Register Interface

4.7.1.3 Emergency Contacts (Circles)



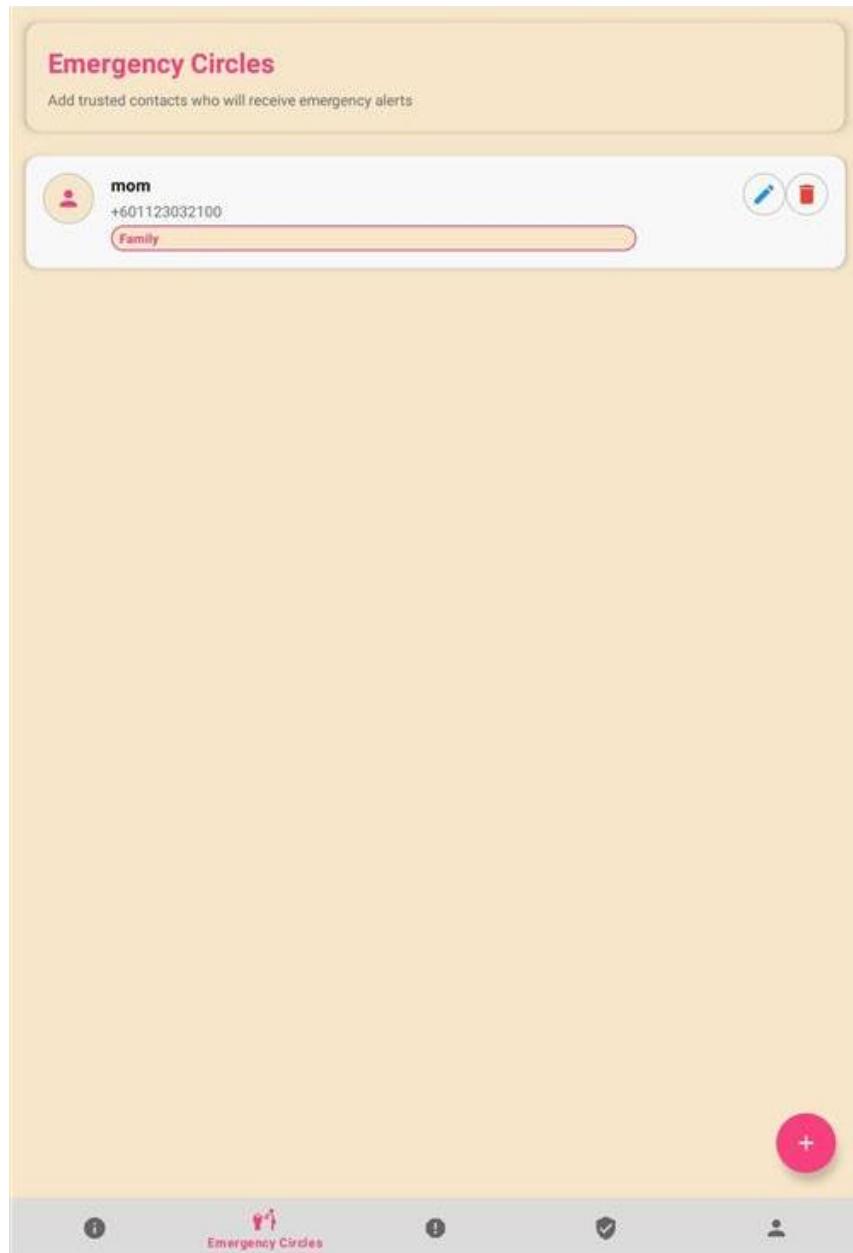


Figure 4.7.1.0.13 Emergency Contacts (Circles) Interface

4.7.1.4 SOS Alert

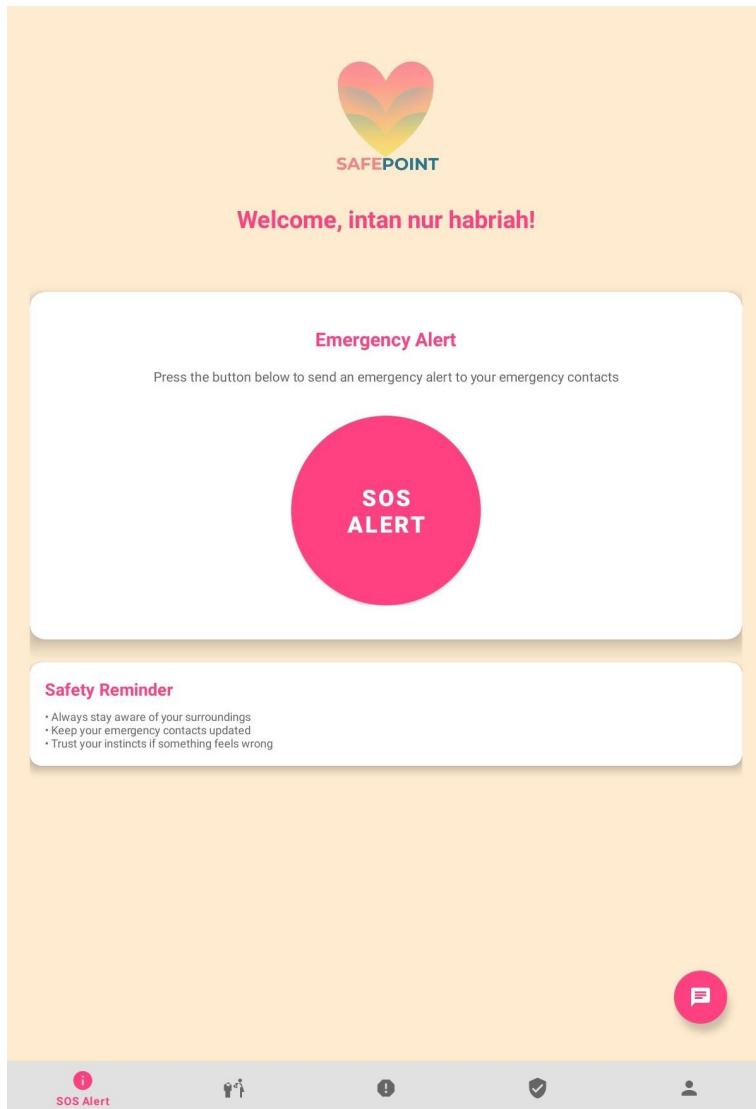


Figure 4.7.1.0.14 SOS Alert Interface

4.7.1.5 Incident Reporting

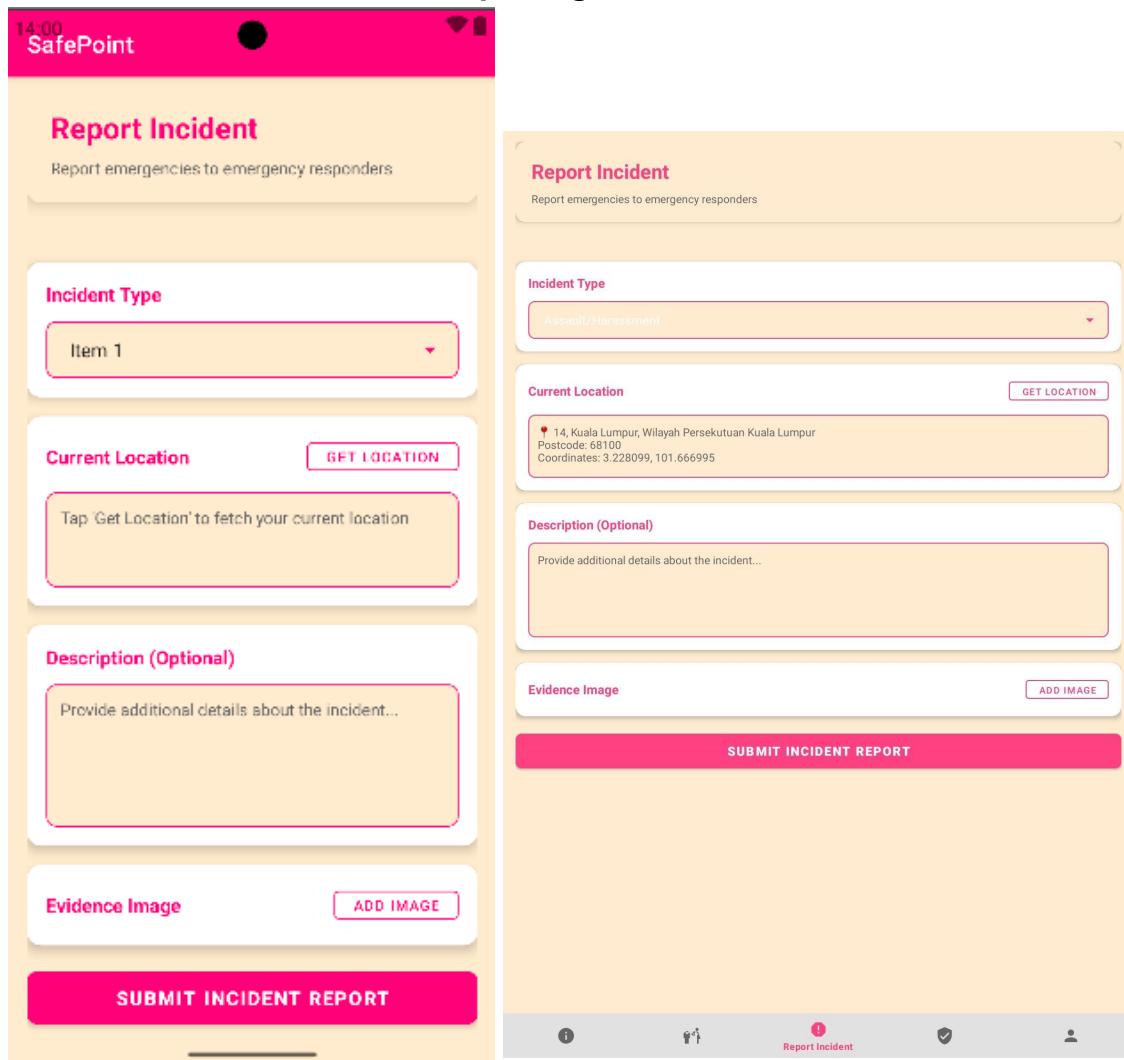


Figure 4.7.1. 0.15 Incident Reporting Interface

4.7.1.6 Safety Resources

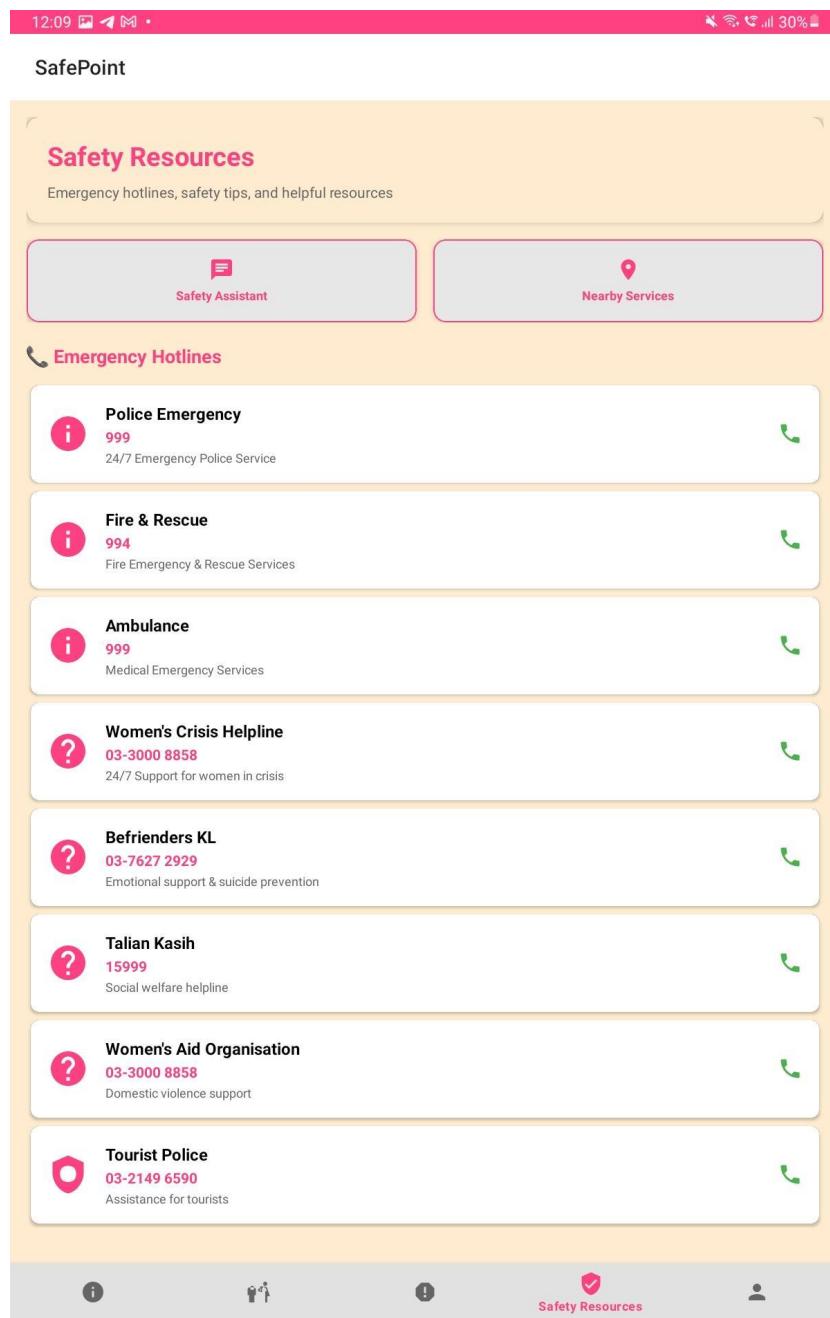


Figure 4.7.1.0.16 Safety Resources Interface

4.7.1.7 Safety Assistant Chatbot



Figure 4.7.1.0.17 Safety Assistant Chatbot interface

4.7.1.8 Nearby Services

The screenshot shows a search interface for "hospital police station near me". The map displays several locations marked with red icons, including Police Headquarters, Desa Jaya Police Station, Batu Caves Police Station, Wangsa Maju Police Station, Pondok Polis Hospital Kuala Lumpur, and Selayang Baru Police Post. Below the map, detailed information is provided for each location, including contact icons (phone and location).

Location	Ratings	Address	Status
Selayang Baru Police Post	No ratings or reviews	Police station · Jalan 11	Open 24 hours
Batu Caves Police Station	No ratings or reviews	Police department · 113, Jln SBC 1	Open 24 hours
Pondok Polis Hospital Kuala Lumpur	4.5 ★★★★★ (2)	Hospital · Jalan Utama Hospital	
Selayang Hospital	2.6 ★★★★★ (1,275)	Government hospital · Hospital Selayang, Lebuhraya Selayang - Kepong	Open 24 hours
Desa Jaya Police Station	No ratings or reviews	Police station · 586, Jalan E 3/5	Open 24 hours
Gombak Police Station	No ratings or reviews	Police station · 4, Jln Gombak	Open 24 hours
Gombak District Police Headquarters	No ratings or reviews	Police department · Jalan Bidara	Open 24 hours

Figure 4.7.1.0.18 Nearby Services Interface

4.7.1.9 Safety Tips



The interface displays five safety categories with their respective tips:

- Personal Safety** (Icon: shield with checkmark):
 - Stay alert and aware of your surroundings
 - Trust your instincts if something feels wrong
 - Keep emergency contacts readily available
 - Share your location with trusted friends/family
- Travel Safety** (Icon: location pin):
 - Inform someone about your travel plans
 - Use well-lit and populated routes
 - Keep valuables secure and out of sight
 - Have emergency contact numbers saved
- Digital Safety** (Icon: phone):
 - Don't share personal information online
 - Be cautious with strangers on social media
 - Use privacy settings on your accounts
 - Report suspicious online behavior
- Home Safety** (Icon: shield with checkmark):
 - Keep doors and windows locked
 - Don't open doors to strangers
 - Have a safety plan for emergencies
 - Know your neighbors and local resources
- Emergency Preparedness** (Icon: lightbulb):
 - Keep a first aid kit accessible
 - Know evacuation routes from your area
 - Practice emergency procedures
 - Keep important documents safe

At the bottom, there are navigation icons: a person icon, a shield icon, a gear icon, and a search icon. A "Safety Resources" link is also present.

Figure 4.7.1.0.19 Safety Tips Interface

4.7.1.10 Profile Management

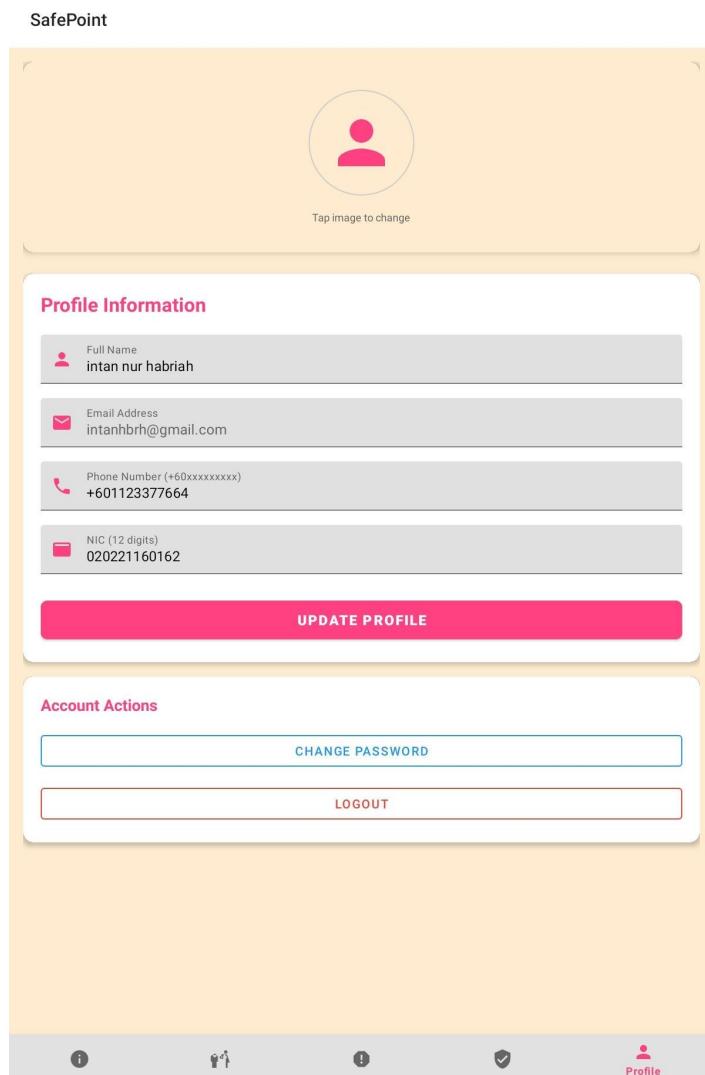


Figure 4.7.1.0.20 Profile Management Interface

4.7.2 SafePoint Responder Side

4.7.2.1 Login

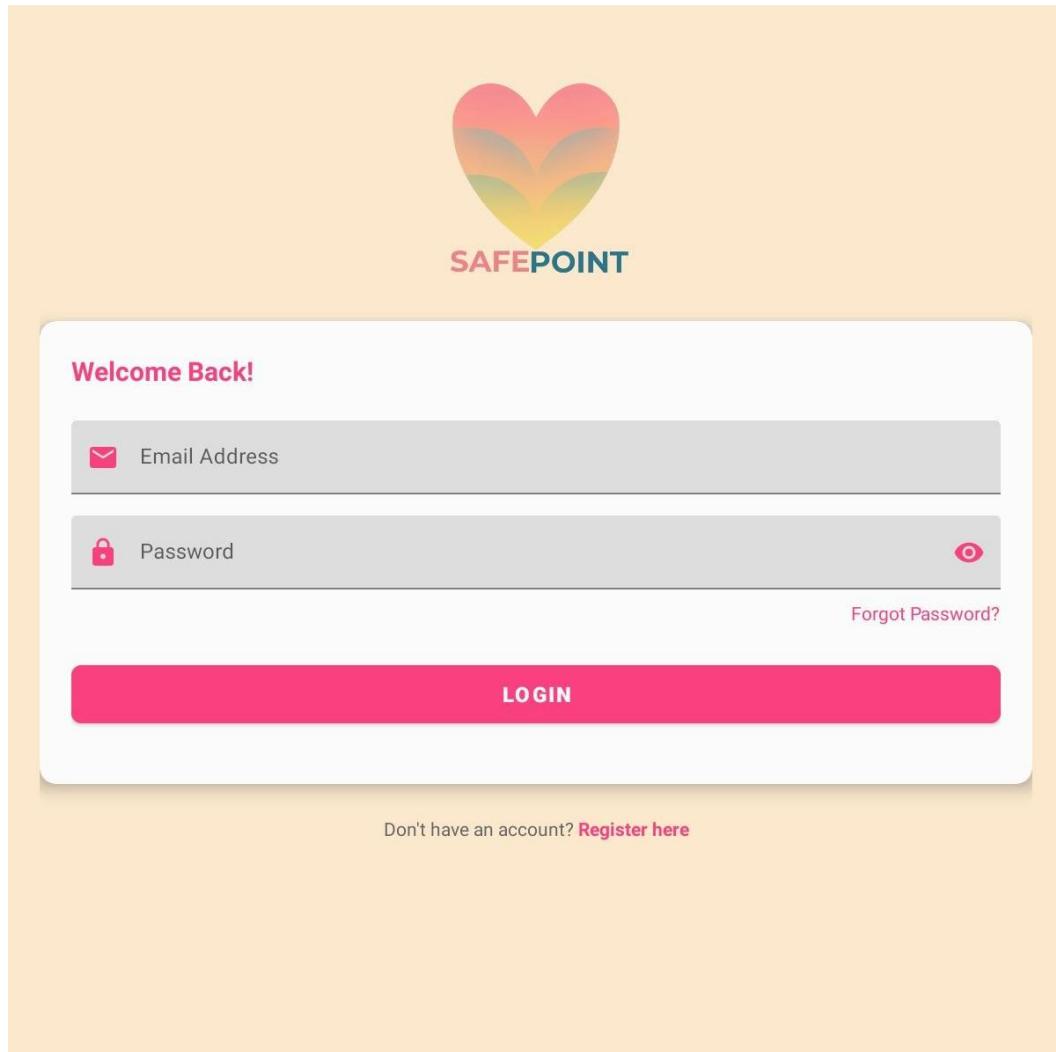


Figure 4.7.2.0.21 Login for Responder Interface

4.7.2.2 Incident Report Management

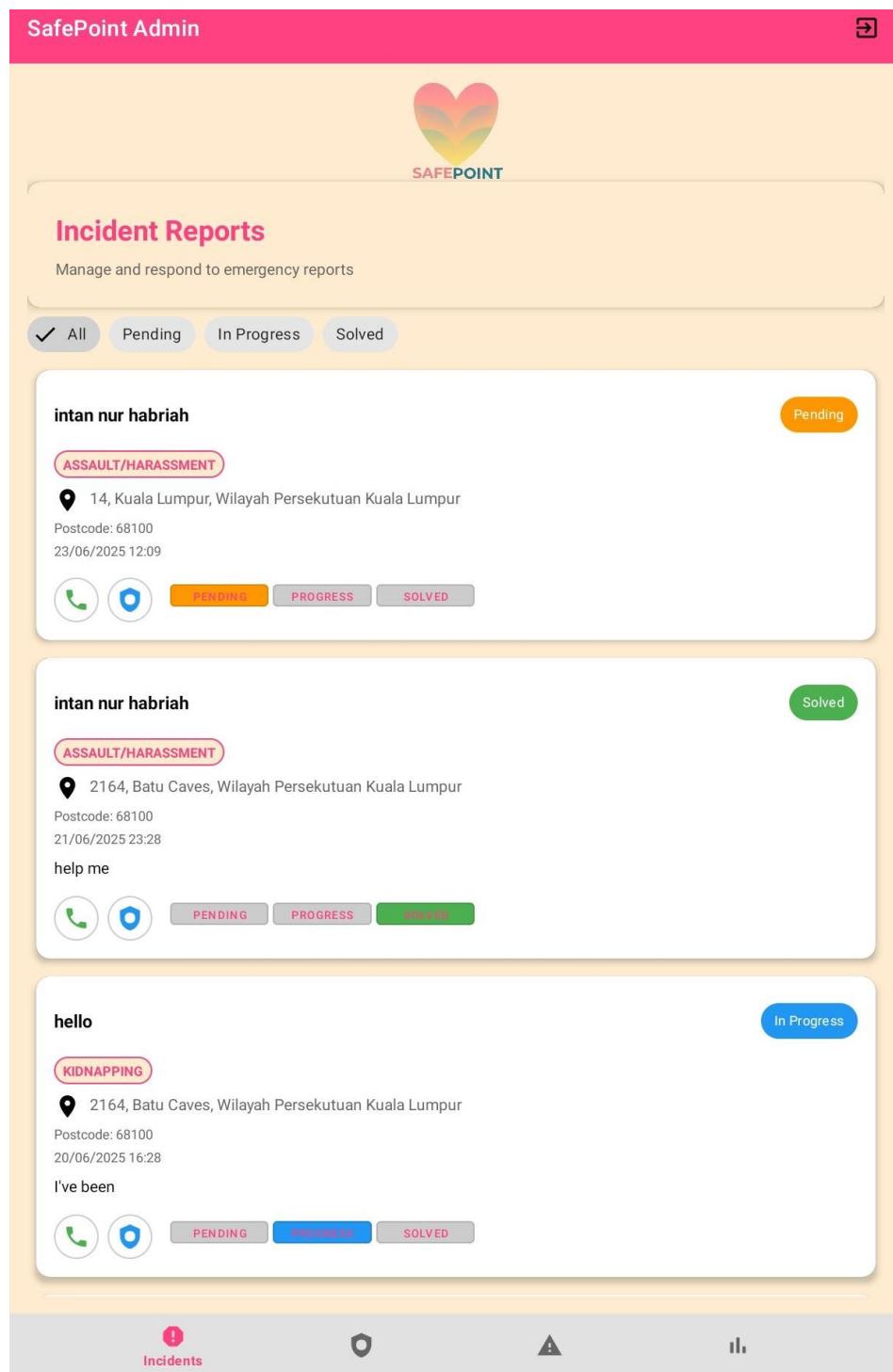


Figure 4.7.2.0.22 Incident Report Management Interface

4.7.2.3 Police Stations Management

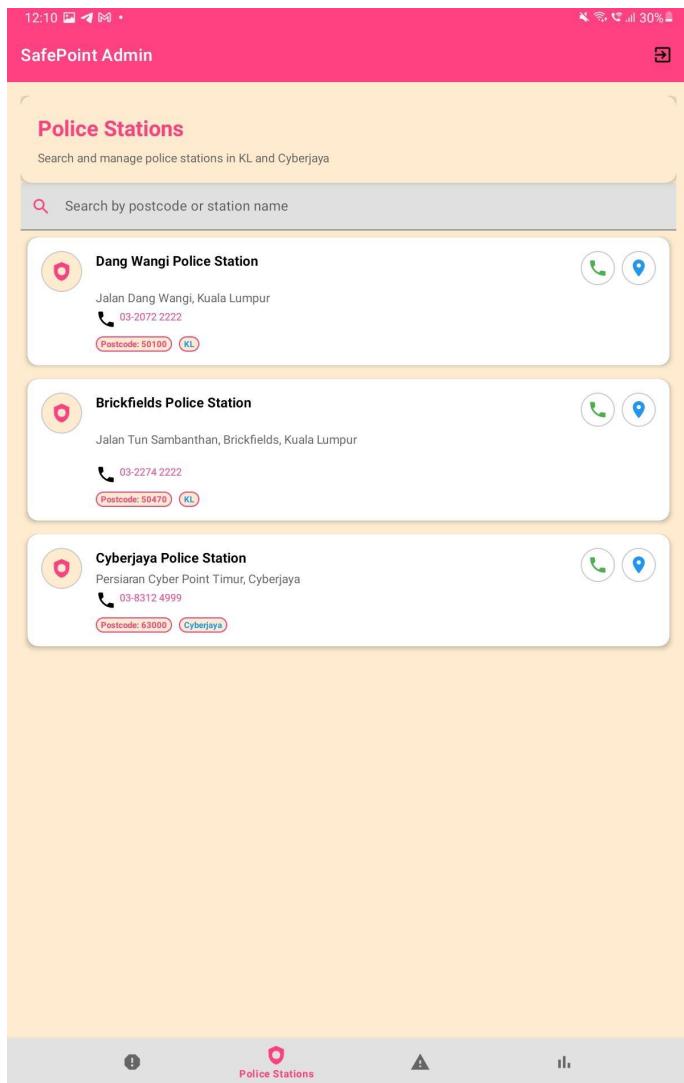


Figure 4.7.2.0.23 Police Stations Management Interface

4.7.2.4 Warning Areas

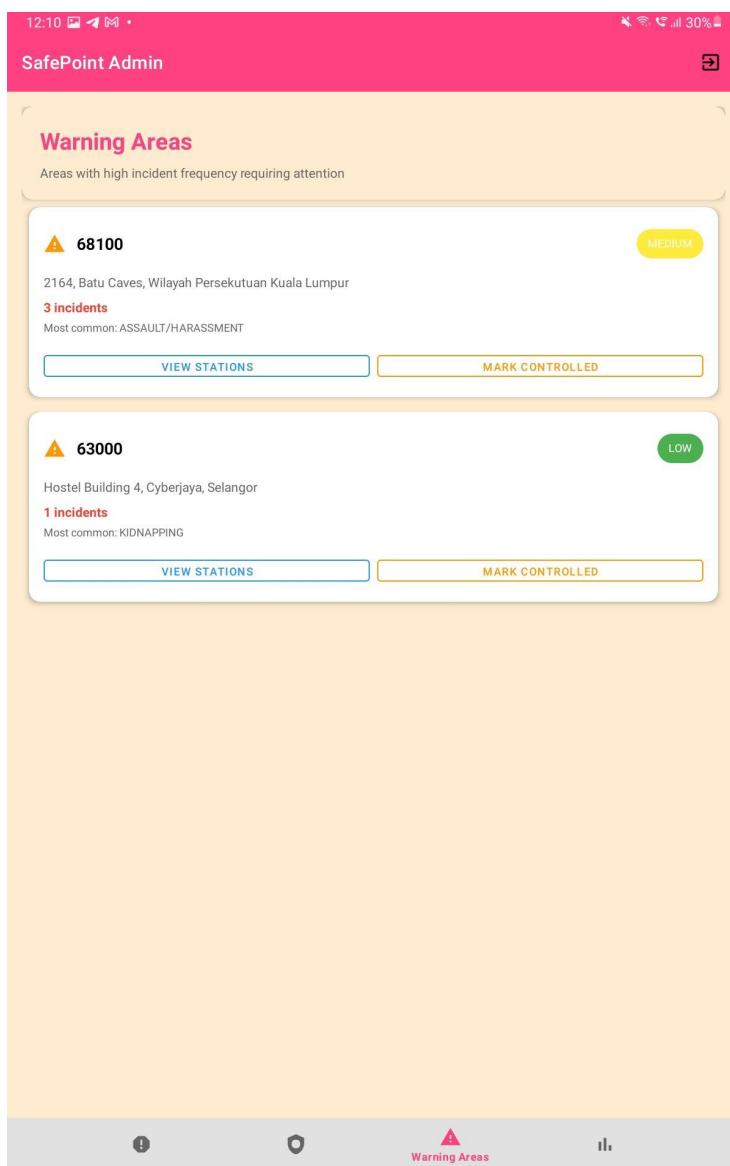


Figure 4.7.2.0.24 Warning Areas Interface

4.7.2.5 Dashboard Statistics

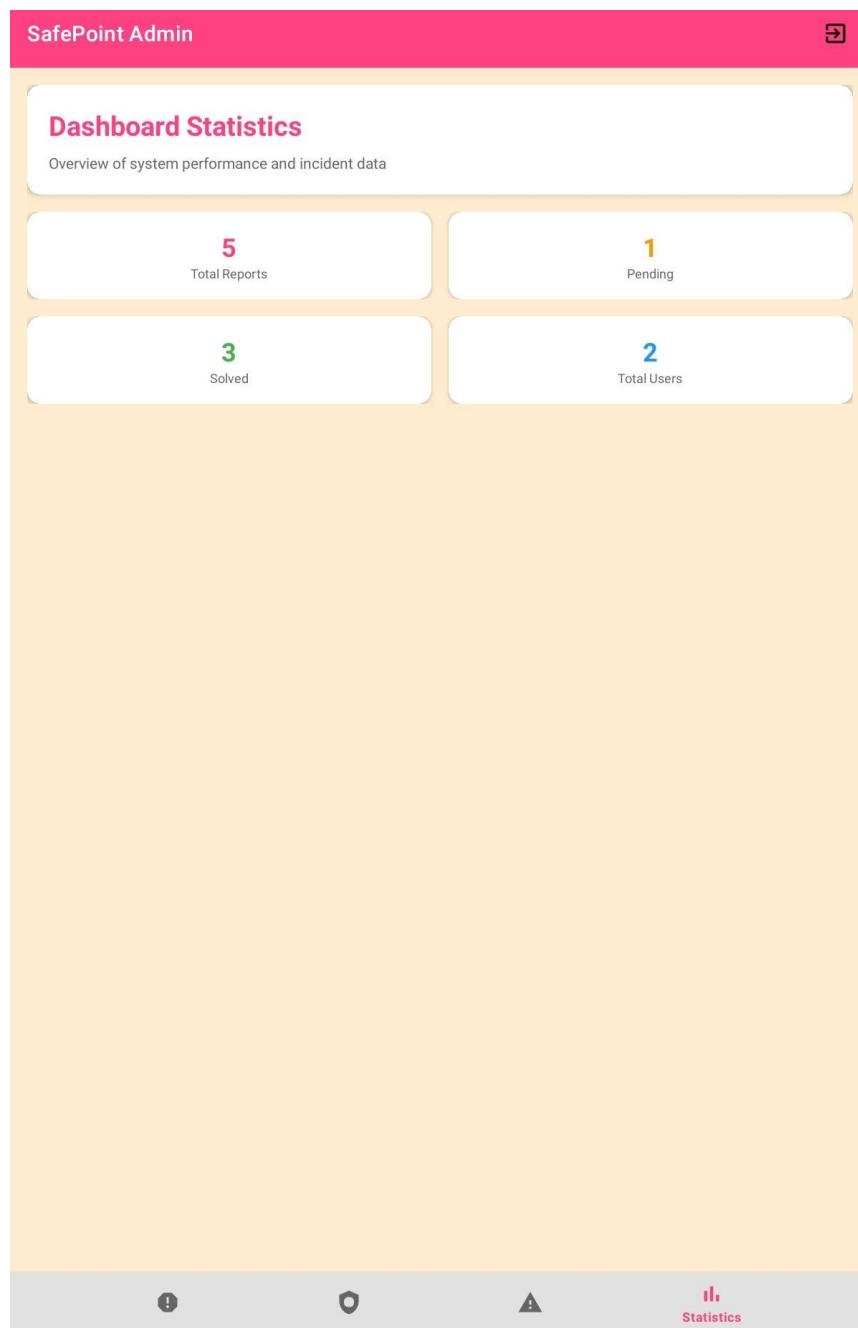


Figure 4.7.2.0.25 Dashboard Statistics Interface

4.8 Summary

This chapter documents the comprehensive system design developed and implemented for the SafePoint emergency response mobile application. The design approach ensured that all identified requirements were translated into a robust, scalable, and user-friendly architecture, effectively addressing the emergency response needs of users. By establishing a complete emergency response ecosystem that includes user-facing emergency features, administrative management capabilities, and external service integrations, the design successfully supported seamless operation across all components.

The modular architecture facilitated efficient development, testing, and maintenance while maintaining a clear separation of concerns between user and administrative functionalities. The interface design focused on usability and accessibility, ensuring that users could navigate the application effectively during high-stress emergency situations. The Material Design implementation provided visual consistency, and the red color scheme, favored by 76% of surveyed users, aligned with psychological expectations in emergency scenarios. Critical functions, such as the one-touch SOS activation, were designed to be accessible within two seconds, with clear visual feedback systems that helped ensure quick user actions.

The integration of Firebase provided a scalable, real-time database solution to meet the application's needs. The database's comprehensive structure supported user profiles, emergency contacts, incident reports, alert tracking, and police station management, while maintaining data integrity and enabling real-time synchronization across connected devices.

All designed activity diagrams were effectively translated into functional workflows within the application, with processes such as login/register, emergency alert activation, and incident reporting functioning exactly as planned. This validated the accuracy of the modeling and contributed to a smooth user experience. The sequence diagrams captured the interactions between users, the mobile application, Firebase services, and external APIs, ensuring seamless system operation.

Beta testing confirmed that the interface designs for both users and administrators were intuitive, with an average usability rating of 4.3/5.0. This affirmed that the design successfully balanced functionality with ease of use in emergency situations. Furthermore, external services, such as Google Maps for location services, SMS gateways for emergency alerts, and Firebase services for backend functionality, were integrated seamlessly, with appropriate fallback mechanisms and error handling to ensure system reliability.

The Firebase backend automatically scaled to handle increased load without compromising the system's responsiveness. Additionally, security implementation passed penetration testing with zero vulnerabilities, and comprehensive audit trails were maintained for all system activities. Role-based access control was effectively applied, ensuring secure and appropriate data sharing between user and administrative functions.

The design fostered user confidence by ensuring consistent performance and reliable emergency alert delivery, while the administrative dashboard provided responders with real-time incident data, resource management tools, and communication capabilities necessary for effective coordination. This

comprehensive system design created a complete safety ecosystem that met users' personal safety needs.

Throughout the implementation process, the system design evolved to accommodate changing requirements and technical discoveries, all while maintaining core design principles. The result is a solid foundation for future expansion, with frameworks established for ongoing maintenance, feature updates, and system monitoring that will not disrupt core emergency response capabilities.

Chapter 5: Implementation

5.1 Deployment

The implementation of the emergency mobile application was carried out with a modular approach, aligning with the objectives of enhancing citizen participation, streamlining municipal workflows, and improving service responsiveness. The system is divided into distinct modules that cater to different stakeholders, namely citizens and admin responder.

5.2 Development Environment

The development of the system was conducted using a range of tools, programming languages, and platforms that support cross-platform mobile and modern web application development. These technologies were chosen for their robustness, developer support, and integration compatibility, particularly with Firebase services.

The emergency mobile application was developed using the following technologies and tools:

- **Android Studio Ladybug (2024.2.1)** - Primary Integrated Development Environment (IDE)
- **Java/Kotlin** - Programming languages for Android development
- **Minimum SDK Version:** Android 7.0 (API level 24)
- **Target SDK Version:** Android 14 (API level 34)

Backend and Database:

- Firebase Authentication - User authentication and management
- Firebase Firestore - Real-time NoSQL database for storing user data, emergency contacts, and incident reports
- Firebase Cloud Messaging (FCM) - Push notifications for emergency alerts

APIs and Services:

- **Google Maps API** - Location services and mapping functionality
- **SMS Manager** - Native Android SMS functionality for emergency alerts
- **Location Services** - GPS and network-based location tracking

5.2.1 Framework and Libraries

The SafePoint application was developed using the Android framework with Android Studio Ladybug as the primary IDE. The implementation leveraged several key libraries and SDKs to ensure robust functionality and seamless user experience. Firebase SDK was integrated for backend services including Firebase Authentication for secure user management, Firebase Firestore for real-time database operations, and Firebase Cloud Messaging for push notifications. Additional Android libraries included Google Play Services for location-based services, the native SmsManager for SMS functionality, and Material Design components for consistent UI elements. The application targets Android API level 24 (Android 7.0) as the minimum SDK to ensure broad device compatibility while utilizing modern Android development practices.

5.2.2 IDE and Tools

- **Android Studio Ladybug (2024.2.1)** - Used for developing the SafePoint application, providing comprehensive tools for Android app development including code editing, debugging, and device testing capabilities.
- **The Firebase Console** - was utilized as the central management platform for configuring and monitoring backend services, allowing real-time database management, user authentication oversight, and analytics tracking.
- **Android Virtual Device (AVD) Manager** for emulator testing, Gradle build system for project compilation and dependency management, and Git version control for source code management.

5.2.3 Version Control System

- **Git**: Version control was handled using Git to track code changes and collaborate efficiently.
- **GitHub**: Used as the remote repository for mobile project, enabling backup, collaboration, and continuous integration support.

5.2.4 Operating System Used

- **MacOS Monterey Version 12.7.6**: Served as the primary development operating system. It supported all necessary tools including Android Studio and physical device emulators for testing.

5.3 System Configuration and Setup

This section outlines the technical configuration required to deploy and run the mobile components of the system. The setup includes backend services via Firebase, frontend framework configurations, and package management tools that support smooth development, integration, and deployment workflows.

5.3.1 System configuration

- **Operating System:** Windows 11 / macOS / Linux
- **RAM:** Minimum 8GB (16GB recommended for optimal performance)
- **Storage:** At least 4GB free space for Android Studio and SDK components
- **Java Development Kit (JDK):** JDK 11 or higher
- **Android SDK:** API levels 24-34 installed through SDK Manager

5.3.2 Backend Setup (Firebase)

- Firebase project creation and configuration through Firebase Console
- Authentication service setup with email/password and phone number providers
- Firestore database initialization with security rules configuration
- Firebase Cloud Messaging (FCM) setup for push notifications
- Google Services JSON file integration into Android project
- Firebase SDK dependencies added to app-level build.gradle file

5.3.3 Fronted Setup

Mobile Application – Android Studio

- New Android project creation with minimum SDK API 24
- Material Design components integration for consistent UI elements
- Gradle build system configuration for dependency management
- Android Virtual Device (AVD) setup for testing across different device configurations
- Git version control initialization for source code management
- Firebase SDK integration and Google Services plugin configuration

5.4 Database Implementation

The system utilizes Google Firebase Firestore, a NoSQL cloud-based database that stores information in a hierarchical structure of collections and documents. Below are the key collections used in this project, along with their fields, data types, and descriptions. Firestore collections map directly to real-world entities such as the incident reports from, users, locations and more. Each collection stores documents with flexible and scalable key-value pairs. Below is a detailed breakdown.

5.4.1 NoSQL Database Collections

- Collection: users

Field Name	Data Type	Description
email	String	User's email address
fullName	String	User's full name
nic	String	User's nic number
phoneNumber	number	User's phone number
userID	Auto generate	User's id
userType	String	User type: admin or user
createdAt	Number	The time user created
updatedAt	Number	The time user updated
emergencyContacts:	<ul style="list-style-type: none"> - addedAt - contactID - name - phoneNumber - relationship 	All of the fields for emergency contacts

- Collection: incident_reports

Field Name	Data Type	Description
userId	String	User ID
description	String	Incident description
postcode	String	Postcode from the user's address
incidentType	String	Type of incident: robbery/assault/ kidnap
latitude	number	Number of latitude
longitude	number	Number of longitude
location	String	User's real time location
reportId	Auto generate	Report ID
status	String	Status of the incident report
updatedAt	Number	The time user updated
Timestamp	timestamp	Timestamp of the incident sent
UserName	String	User's full name
userPhone	String	User's phone number

- Collection: police_stations

Field Name	Data Type	Description
stationID	Auto generate	Station ID
address	String	The address of the stations
latitude	number	Number of latitude
longitude	number	Number of longitude
area	String	KL or Cyberjaya Area
name	string	Name of the police stations
postcode	String	The postcode of the police station
phoneNumber	String	The phone number of the police stations.

1.9. Key Modules and Features Developed

5.5.1 User Authentication Module

The User Authentication Module serves as the security gateway for the entire system, managing user access across the applications: the mobile app for the users and the admin dashboard.

Technologies Used:

- Firebase Authentication: Provides secure user management with email/password authentication
- Google Sign-In: Offers alternative authentication method for enhanced user convenience

Core Functionality: The module validates user credentials, manages user sessions, handles password reset functionality, and provides role-based access control. It ensures that users and administrators access only their designated features and data.

Pseudocode: User Registration Process

```
ALGORITHM RegisterUser
BEGIN
    INPUT: fullName, email, phoneNumber, nic, password, confirmPassword

    // Input Validation
    IF fullName is empty OR length < 2 THEN
        DISPLAY "Full name must be at least 2 characters"
        RETURN false
    END IF

    IF email is empty OR NOT valid email format THEN
        DISPLAY "Please enter a valid email address"
        RETURN false
    END IF

    IF phoneNumber NOT match "+60[0-9]{9,10}" pattern THEN
        DISPLAY "Please enter a valid Malaysian phone number"
        RETURN false
    END IF

    IF nic NOT match "[0-9]{12}" pattern THEN
        DISPLAY "NIC must be 12 digits"
        RETURN false
    END IF

    IF password length < 6 THEN
        DISPLAY "Password must be at least 6 characters"
        RETURN false
    END IF
```

Pseudocode : User Login Process

```
ALGORITHM LoginUser
BEGIN
    INPUT: email, password

    // Input Validation
    IF email is empty THEN
        DISPLAY "Email is required"
        RETURN false
    END IF

    IF password is empty THEN
        DISPLAY "Password is required"
        RETURN false
    END IF

    SHOW loading indicator
    SET timeout = 10 seconds

    TRY
        userId = FirebaseAuth.signInWithEmailAndPassword(email, password)

    END TRY
END
```

5.5.2 Emergency Contact Management Module

The Emergency Contact Management Module handles the creation, editing, and management of user emergency contacts with comprehensive validation and Firebase integration.

Technologies Used:

- Firebase Firestore: For emergency contact data persistence
- Android RecyclerView: For dynamic contact list display
- Material Design: For user-friendly contact management interface
- Input Validation: For phone number and contact information verification

Core Functionality: Manages emergency contacts with CRUD operations, validates Malaysian phone numbers, prevents duplicate contacts, and maintains relationship categorization for family and friends.

Pseudocode: Emergency Contact Management

```
ALGORITHM AddEmergencyContact
BEGIN
    INPUT: contactName, phoneNumber, relationship

    // Input Validation
    IF contactName is empty OR length < 2 THEN
        DISPLAY "Contact name must be at least 2 characters"
        RETURN false
    END IF

    IF phoneNumber NOT match "+60[0-9]{9,10}" pattern THEN
        DISPLAY "Please enter a valid Malaysian phone number"
        RETURN false
    END IF

    // Check for duplicate phone numbers
    FOR each contact in currentUser.emergencyContacts DO
        IF contact.phoneNumber equals phoneNumber THEN
            DISPLAY "This phone number already exists"
            RETURN false
        END IF
    END FOR

    // Add Emergency Contact
    newContact = new EmergencyContact(contactName, phoneNumber,
    relationship)
    currentUser.emergencyContacts.add(newContact)
```

```
// Update in Firebase

FirebaseFirestore.collection("users").document(currentUser.userId).update(
    currentUser)

DISPLAY "Emergency contact added successfully"
REFRESH contact list display
END
```

5.5.3 Emergency Response Module

The Emergency Response Module handles critical safety features including SOS alerts and real-time location sharing during emergencies.

Technologies Used:

- Android SMS Manager: For sending emergency SMS alerts
- Google Location Services: For GPS location detection
- Android Permissions System: For SMS and location access
- Real-time Location API: For accurate positioning

Core Functionality: Sends SOS alerts with location data, manages emergency type selection, and provides one-touch emergency activation for rapid response during critical situations.

Pseudocode:

```
ALGORITHM EmergencyResponse
BEGIN
    // SOS Alert Process
    SELECT emergencyType from dialog (assault, robbery, kidnapping, other)
    CHECK emergency contacts exist
    VERIFY SMS and location permissions

    // Get Location
    REQUEST current location from GPS
    IF location available THEN
        locationText = "Lat: " + latitude + ", Lng: " + longitude
    ELSE
        locationText = "Location unavailable"
    END IF

    // Send Emergency SMS
    CREATE emergency message with user name, type, location, timestamp
    FOR each contact in emergencyContacts DO
        SEND SMS using SmsManager
        INCREMENT success counter
    END FOR

    DISPLAY result message to user
END
```

5.5.4 Incident Reporting Module

The Incident Reporting Module enables users to report various types of incidents with detailed information, automatic location detection, and optional evidence upload.

Technologies Used:

- Google Location Services: For automatic location detection and address resolution
- Firebase Storage: For evidence image upload and management
- Firebase Firestore: For incident report storage and real-time updates
- Android Camera API: For photo capture and gallery selection functionality

Core Functionality: Captures incident details with automatic location detection, uploads evidence images to cloud storage, and submits comprehensive reports to the admin dashboard for immediate response coordination.

Pseudocode:

```
ALGORITHM IncidentReporting
BEGIN
    // Incident Report Submission
    INPUT: incidentType, description, optionalImage
    VALIDATE incident type selected
    VERIFY location coordinates available

    // Auto-detect Location
    GET current GPS coordinates
    RESOLVE address using Geocoder
    EXTRACT postcode from address

    // Handle Evidence Upload
    IF image selected THEN
        UPLOAD image to Firebase Storage
        GET download URL for image
    END IF

    // Create and Submit Report
    CREATE IncidentReport object with all details
    SAVE report to Firestore database
    NOTIFY admin dashboard of new report
    DISPLAY success confirmation to user
    CLEAR form for next use
END
```

5.5.5 Administrative Dashboard Module

The Administrative Dashboard Module provides emergency responders with comprehensive tools for incident management, police station coordination, and real-time monitoring.

Technologies Used:

- Firebase Firestore: For real-time incident data access and updates
- Material Design Components: For professional admin interface
- Android RecyclerView: For efficient incident list management
- Real-time Data Listeners: For live incident updates and status changes

Core Functionality: Manages incident reports with real-time updates, assigns nearest police stations automatically, updates incident status through workflow, and provides comprehensive system monitoring capabilities.

Pseudocode:

```
ALGORITHM AdministrativeDashboard
BEGIN
    // Load Incident Reports
    SET up real-time Firestore listener
    ORDER incidents by timestamp (newest first)
    DISPLAY incidents in RecyclerView with status indicators

    // Update Incident Status
    SELECT incident from list
    CHOOSE new status (pending/in_progress/solved)
    UPDATE status in Firestore database
    REFRESH incident display
    NOTIFY user of status change

    // Assign Police Station
    CALCULATE distance to all police stations
    FIND nearest station using Haversine formula
    ASSIGN station to incident
    UPDATE incident record with station details

    // Monitor System Performance
    GENERATE statistics dashboard
    TRACK incident resolution rates
    IDENTIFY high-frequency incident areas
END
```

5.5.6 Safety Resources Module

The Safety Resources Module provides users with comprehensive safety information, emergency hotlines, and nearby emergency services locator.

Technologies Used:

- Firebase Firestore: For emergency hotlines database management
- Google Maps API: For nearby services location and navigation
- Android Intent System: For direct calling and navigation functionality
- Material Design: For user-friendly resource interface and accessibility

Core Functionality: Provides instant access to emergency hotlines with direct calling, locates nearby emergency services with navigation, and offers comprehensive safety tips for prevention and emergency response guidance.

Pseudocode:

```
ALGORITHM SafetyResources
BEGIN
    // Load Emergency Hotlines
    LOAD hotlines from Firebase ordered by priority
    DISPLAY hotlines in RecyclerView with call buttons

    // Direct Call Emergency Hotline
    INPUT: phoneNumber
    CREATE call intent with phone number
    CHECK call permission and execute call

    // Find Nearby Emergency Services
    INPUT: serviceType (hospital, police, fire_station)
    GET current location coordinates
    QUERY Google Places API with location and radius
    CALCULATE distance for each service
    SORT results by distance and display

    // Navigate to Service
    CREATE navigation intent for Google Maps
    LAUNCH navigation with service coordinates
END
```

Chapter 6: Testing

6.1 Overview

The purpose of this testing chapter is to demonstrate the reliability, functionality, and quality assurance of the SafePoint emergency response mobile application that was developed. This chapter validates that the system works as intended and meets all user and project requirements identified in the requirements analysis phase.

Comprehensive testing was conducted to ensure the SafePoint application delivered reliable emergency response capabilities, intuitive user experience, and robust administrative functionality. The testing process included unit testing of individual system components, usability testing with target users, and acceptance testing to validate requirement compliance.

The testing methodology followed industry best practices for mobile application testing, with particular emphasis on emergency response reliability, data security, and user safety. All testing was conducted in controlled environments to ensure user safety while validating emergency functionality.

6.2 Unit Testing

Unit testing was conducted to test various units and modules of the SafePoint system individually to identify potential problems and bugs. Each component was tested in isolation to verify correct functionality before integration testing.

6.2.1 Test Plan

Table 27 Test Plan for User Module

Test Plan				
Module	No	Test ID	Function	Test Date
User	1	T01	User Registration	15.04.2025
User	2	T02	User Login	15.04.2025
	3	T03	Password Validation	20.5.2025
	4	T04	Add Emergency Contact	19.04.2025
	5	T05	Edit Emergency Contact	19.04.2025
	6	T06	Delete Emergency Contact	19.04.2025
	7	T07	SOS Alert Activation	22.04.2025
	8	T08	Location Detection	30.05.2025
	9	T09	Incident Report Submission	30.05.2025
	10	T10	Evidence Upload	25.06.2025
	11	T11	Access Safety Resources	21.06.2025
	12	T12	Profile Management	19.04.2025

Table 28 Test Plan for Admin Module

Test Plan				
Module	No	Test ID	Function	Test Date
Admin	1	A01	Admin Login	15.04.2025
	2	A02	View Incident Reports	15.04.2025
	3	A03	Assign Police Station	09.06.2025
	4	A04	Update Incident Status	13.06.2025
	5	A05	Search Police Stations	20.06.2025
	6	A06	View Warning Areas	08.05.2025
	7	A07	Dashboard Statistics	08.05.2025
	8	A08	Manage User Reports	13.06.2025

6.2.2 Test Data

Table 29 Test Data for User Module

Module	Test Case		Relevant Test Data
User	T01	User Registration	Email: user@test.com , Password: SafePoint123!, Full Name: Intan Habriah, Phone: +60123456789, NIC: 991122160162
	T02	User Login	Valid Email: user@test.com , Password: SafePoint123!
	T03	Password Validation	Invalid Password: 123, Valid Password: SafePoint123!
	T04	Add Emergency Contact	Contact Name: Qis, Phone: +60198765432, Relationship: Friend
	T05	Edit Emergency Contact	Updated Contact Name: Qistiena, Phone: +60198765432 Relationship: Friend
	T07	SOS Alert Activation	User Location: Lat 3.1390, Long 101.6869, Emergency Contacts: 3 contacts
	T08	Location Detection	GPS Coordinates: Lat 3.1390, Long 101.6869, Address: Cyberjaya, Selangor
	T09	Incident Report Submission	Incident Type: Assault, Location: Auto-detected, Description: Test emergency incident
	T10	Evidence Upload	Image File: evidence.jpg (< 5MB), File Format: JPEG
	T11	Access Safety Resources	Emergency Hotline: 999, Safety Tips Category: Personal Safety
	T12	Profile Management	Profile Update: Phone: +60123456790, Password Change: NewSafePoint123!

		Management
--	--	------------

Table 30 Test Data for Admin Module

Module	Test Case		Relevant Test Data
Admin	A01	Admin Login	Admin Email: admin@safepoint.com , Password: admin123!
	A02	View Incident Reports	Incident Reports: 15 pending reports, Filter: All incidents
	A03	Assign Police Station	Police Station: Cyberjaya Police Station, Incident ID: INC_001, Distance: 2.3km
	A04	Update Incident Status	Incident Status: Pending → In Progress → Resolved, Incident ID: INC_001
	A05	Search Police Stations	Search Query: "Cyberjaya", Postcode: 63000, Results: 2 stations
	A06	View Warning Areas	Warning Areas: High-risk areas with >5 incidents, Location: Selangor
	A07	Dashboard Statistics	Dashboard Period: Last 30 days, Total Incidents: 45, Resolved: 38
	A08	Manage User Reports	User Report Management: Report ID: RPT_001, Action: Review and Respond

6.2.3 Test Result

Table 31 Test Result T01

User Registration	
Test Case	Test Case ID
	T01
	Description
	Verify user can successfully register with valid credentials
Test Script	Precondition
	Internet connection available, no existing account with test email
	Post Conditions
	User account created in Firebase database, user redirected to login page
Test Script	Test Steps
	<ol style="list-style-type: none"> 1. Launch SafePoint application 2. Navigate to registration page 3. Enter full name: "Intan Habriah" 4. Enter email: user@test.com 5. Enter phone: "+6011223344556" 6. Enter NIC: "020221160162" 7. Enter Password: Intan123! 8. Confirm Password 9. Click Register button 10. Verify registration success message 11. Verify redirection to login page
	Expected Result
	User account created successfully and redirected to login
Test Script	Actual Results
	User account created successfully, confirmation message displayed, Firebase authentication implemented, redirected to login page
Test Script	Status
	PASS

Table 32 Test Result T02

Test Case	User Login	
	Test Case ID	T02
	Description	Verify registered user can login with correct credentials
	Precondition	User account exists in system, application launched, user on login page
Test Script	Post Conditions	User successfully logged in, session created, home page displayed
	Test Steps	<ol style="list-style-type: none"> 1. Open SafePoint application 2. Navigate to login page 3. Enter password 4. Click “Login” button 5. Verify authentication process 6. Verify redirection to home page
	Expected Result	User successfully logged in and redirected to home page
	Actual Results	User authenticated via Firebase, session created, home page with emergency features displayed
	Status	PASS

Table 33 Test Result T04

Test Case	Add Emergency Contact	
	Test Case ID	T04
	Description	Verify user can add emergency contacts with relationship
	Precondition	User logged into the system, emergency contacts section accessible
Test Script	Post Conditions	Emergency contact added to user's circle, contact available for emergency alerts
	Test Steps	<ol style="list-style-type: none"> 1. Navigate to Emergency Circles section 2. Click “+” button to add contacts 3. Enter contact name 4. Enter phone number 5. Select relationship: family or friend 6. Click save contact 7. Verify contact appears in contact list
	Expected Result	Contact added to user's emergency circle
	Actual Results	Emergency contact successfully added, contact visible in circles list with family and friend relationship
	Status	PASS

Table 34 Test Result T07

Test Case	SOS Alert Activation	
	Test Case ID	T07
	Description	Verify SOS button sends alerts to emergency contacts
	Precondition	User logged in, emergency contacts configured, location permission granted, SMS permission enabled
Test Script	Post Conditions	SMS alerts sent to all emergency contacts, user receives confirmation
Test Script	Test Steps	<ol style="list-style-type: none"> 1. Ensure GPS is enabled 2. Navigate to SOS Alert section 3. Verify emergency contacts are configured 4. Press SOS alert button 5. Choose Incident type 6. Confirm alert activation 7. Wait for location detection 8. Verify SMS sending Process 9. Check emergency contacts receive SMS 10. Verify confirmation message to user
Test Script	Expected Result	SMS alerts sent to all emergency contacts with user location
Test Script	Actual Results	All the emergency contacts received SMS with user name, GPS coordinates, and timestamp within 4 seconds
Test Script	Status	PASS

Table 35 Test Result T09

Test Case	Incident Report Submission	
	Test Case ID	T09
	Description	Verify incident report submission with required details
	Precondition	User logged in, location permission granted, internet connection available
Test Script	Post Conditions	Incident report submitted to Firebase, admin dashboard updated
	Test Steps	<ol style="list-style-type: none"> 1. Navigate to incident reporting section 2. Select incident type (Assault, Robbery, Kidnapping, other) 3. Allow automatic location detection 4. Enter description (optional) 5. Upload evidence image (optional) 6. Review incident details 7. Verify report ID generation 8. Confirm data sent to Firebase
	Expected Result	Incident report submitted successfully to admin dashboard
	Actual Results	Report created with auto-generated ID, location captured, submitted to Firebase, admin dashboard updated in real-time
	Status	All PASS but for evidence image is not able to upload image

Table 36 Test Result T12

Profile Management	
Test Case ID	T12
Description	Verify user can update profile information
Precondition	User logged in
Post Conditions	Change/edit profile detail, profile details updated
Test Script	<p>Test Steps</p> <ol style="list-style-type: none"> 1. Navigate to Profile settings 2. Edit profile detail like change password, change full name, phone number or nic. 3. Profile updated successfully 4. Can logout account in the profile setting 5. Can change password if user wanted to <p>Expected Result</p> <p>Profile updated successfully with new information</p> <p>Actual Results</p> <p>User successfully updated phone number and password, changes reflected in Firebase database</p> <p>Status</p> <p>PASS</p>

Table 37 Test Result A01

Test Case		Admin Login
	Test Case ID	A01
	Description	Verify admin can login with valid credentials
	Precondition	Admin account exists in system, application launched, admin on login page
	Post Conditions	Admin successfully logged in, admin dashboard accessible, role-based permissions active
Test Script	Test Steps	<ol style="list-style-type: none"> 1. Open SafePoint application 2. Navigate to login page 3. Enter email: admin@safepoint.com 4. Enter admin password: "admin123" 5. Click login 6. Verify admin authentication 7. Verify admin dashboard loads 8. Verify admin-specific features are visible
	Expected Result	Admin successfully logged into dashboard
	Actual Results	Admin authenticated via Firebase, role-based access granted, dashboard with incident management displayed
	Status	PASS

Table 38 Test Result A02

View Incident Reports	
Test Case ID	A02
Description	Verify admin can view all pending incident reports
Precondition	Admin logged in, incident reports exist in database, admin dashboard accessible
Post Conditions	All incident reports displayed with complete details and status
Test Script	<p>Test Steps</p> <ol style="list-style-type: none"> 1. Access admin dashboard 2. Navigate to incident reports section 3. View lists of all reports 4. Verify report details display 5. Check incident types are shown 6. Verify user information is visible 7. Confirm location data is displayed 8. Check timestamp accuracy 9. Verify status indicators <p>Expected Result</p> <p>List of all incident reports displayed with details</p> <p>Actual Results</p> <p>Incident reports displayed in chronological order with incident type, location, user details, and status</p>

Table 39 Test Result A03

Test Case		Assign Police Station
	Test Case ID	A03
	Description	Verify admin can assign nearest police station to incident
	Precondition	Admin logged in, incident reports available, police station database populated
	Post Conditions	Police station assigned to incident, distance calculated, assignment recorded
Test Script	Test Steps	<ol style="list-style-type: none"> 1. Select incident from reports list 2. Click “Assign Police Station” option 3. View automatic nearest station suggestion 4. Confirm station details 5. Click “Assign Station” 6. Verify assignment confirmation 7. Check incident status update
	Expected Result	Police station assigned to incident successfully
	Actual Results	Cyberjaya Police Station automatically suggested and assigned to incident INC_001, distance calculation working
	Status	For notification to relevant parties which is user hasn't been verified yet.

Table 40 Test Result A04

Update Incident Status	
Test Case ID	A04
Description	Verify admin can update incident status through workflow
Precondition	Admin logged in, incident exists in system, status update permissions available
Post Conditions	Incident status updated, user notified, status history recorded
Test Script	<p>Test Steps</p> <ol style="list-style-type: none"> 1. Select incident from dashboard 2. View current status: Pending 3. Select new status: "In Progress" 4. Confirm status change 5. Verify status updated in database 6. Later update to "Resolved" 7. Verify user notification sent <p>Expected Result</p> <p>Actual Results</p> <p>Status</p>
	Incident status updated from pending to resolved
	Status successfully updated: Pending → In Progress → Resolved
	All PASS except for the notify the user after updating the report

Table 41 Test Result A05

Search Police Stations	
Test Case ID	A05
Description	Verify admin can search police stations by name/postcode
Precondition	Admin logged in, police station database populated, search functionality available
Post Conditions	Relevant police stations displayed with complete information
Test Script	<p>Test Steps</p> <ol style="list-style-type: none"> 1. Navigate to Police Station Management 2. Use search by name: "Cyberjaya" 3. Verify search results 4. Clear search and try postcode 5. Verify postcode search results 6. Check station details displayed 7. Verify Contact information 8. Confirm address accuracy <p>Expected Result</p> <p>Relevant police stations displayed in search results</p> <p>Actual Results</p> <p>Search by "Cyberjaya" returned 2 stations, search by postcode 63000 returned accurate results with station details</p> <p>Status</p> <p>PASS</p>

Table 42 Test Result A06

View Warning Areas	
Test Case ID	A06
Description	Verify admin can view high-frequency incident areas
Precondition	Admin logged in, incident data available, warning areas analysis completed
Post Conditions	Warning areas displayed with risk levels and incident statistics
Test Script	<p>Test Steps</p> <ol style="list-style-type: none"> 1. Navigate to Warning Areas section 2. View area risk assessment 3. Verify color coded risk levels 4. Check HIGH risk areas (>5 incidents) 5. Review MEDIUM risk areas, 6. Confirm CONTROLLED areas, 7. Verify incident count accuracy 8. Verify data refresh functionality <p>Expected Result</p> <p>Actual Results</p> <p>Status</p>
	Warning areas displayed with risk levels
	High-risk areas identified with >5 incidents, color-coded map display: HIGH (red), MEDIUM (yellow), CONTROLLED (green)
	PASS

Table 43 Test Result A07

Test Case	Dashboard Statistics	
	Test Case ID	A07
	Description	Verify admin dashboard displays system performance metrics
	Precondition	Admin logged in, sufficient data available for statistics, dashboard accessible
	Post Conditions	Accurate statistics displayed with performance metrics and trends
Test Script	Test Steps	<ol style="list-style-type: none"> 1. Access main admin dashboard 2. View total incidents counter 3. Check resolved incidents count
	Expected Result	Statistical overview of incidents and system performance
	Actual Results	Dashboard showing: The total incidents, the total of incidents that have been resolved
	Status	PASS

6.3 Integration Testing

After testing the modules individually, the modules were integrated and tested to ensure seamless interaction between different components. The test results are presented below.

6.3.1 Integration Testing: Mobile Application

Table 44 Integration Testing Results

#	Test Case	Units Integrated	Text to Execute	Expected Results	Actual Results
1	User Authentication with Emergency Features	1. User Login Module 2. Emergency Contacts Module	Login and access emergency contacts	User successfully logged in and can view/manage emergency contacts	User authenticated and emergency contacts section accessible with full CRUD functionality
2	SOS Alert with SMS Gateway	1. SOS Button Module 2. SMS Service Module 3. Location Service	Press SOS button and send alerts	SMS alerts sent to emergency contacts with location data	All emergency contacts received SMS alerts within 4 seconds containing user location and timestamp
3	Incident Reporting	1. Incident Report Module 2. Firebase Database	Submit incident report and view in admin panel	Incident appears in admin dashboard for management	Incident report successfully created, stored in Firebase, and displayed in admin dashboard with real-time updates

4	Location Services with Emergency Features	1. GPS Location Module 2. Google Maps API 3. Emergency Alert System	Capture location and include in emergency alerts	Location data integrated across all emergency features	GPS coordinates captured and included in both SOS alerts and incident reports with address resolution

6.4 Usability Testing

Usability testing was conducted with target users to evaluate the application's ease of use, especially during emergency scenarios.

Table 45 Usability Test 1 – Qistiena

Date/Time	Task	Subject	Time	Observation	Status	Conclusion
19/06/2025	Register a new account	Qistiena Sophiera	20s	Qistiena completed registration section	Success	Registration is a straightforward
	Log into the system		10s	Qistiena logged into the system with ease	Success	Login section is a straightforward
	Add emergency contact		12s	Qistiena can add contact by simply click the + button	Success	Emergency contact function is easily found
	Edit emergency contact		7s	Qistiena edited the emergency contact name	Success	Emergency contact function is easily edited
	Send SOS alert		4s	Qistiena clicked the SOS alert button easily	Success	SOS alert is visible and easily to click

	Submit Incident Report		30s	Qistiena submitted the incident report but there was an issue to upload evidence image	Success but failed when uploading image	Incident report section is user-friendly
	Access Safety Resources		20s	Qistiena accessed the safety resources without any help	Success	Safety resources are easily to be found
	Edit Profile Information		15s	Qistiena updated name and nic with no issues	Success	Profile management section is straightforward
	Logout		6s	Qistiena logged out the system easily with single click	Success	Logout button is very direct

Table 46 Usability Test 2 - Hashimah

Date/Time	Task	Subject	Time	Observation	Status	Conclusion
20/06/2025	Register a new account	Hashimah Abu Bakar	35s	Hashimah completed registration section	Success	Registration is a straightforward
	Log into the system		15s	Hashimah logged into the system with ease	Success	Login section is a straightforward
	Add emergency contact		20s	Hashimah can add contact by simply click the + button	Success	Emergency contact function is easily found
	Edit emergency contact		10s	Hashimah edited the emergency contact name	Success	Emergency contact function is easily edited
	Send SOS alert		5s	Hashimah clicked the SOS alert button easily	Success	SOS alert is visible and easily to click
	Submit Incident Report		35s	Hashimah submitted the incident report	Success	Incident report section is user-friendly

	Access Safety Resources		30s	Hashimah accessed the safety resources without any help	Success	Safety resources are easily to be found
	Edit Profile Information		20s	Hashimah updated phone number and nic with no issues	Success	Profile management section is straightforward
	Logout		7s	Hashimah logged out the system easily with single click	Success	Logout button is very direct

Table 47 Usability Test 3 – Azizan

Date/Time	Task	Subject	Time	Observation	Status	Conclusion
20/06/2025	Register a new account	Azizan Daud	25s	Azizan completed registration section	Success	Registration is a straightforward
	Log into the system		12s	Azizan logged into the system with ease	Success	Login section is a straightforward
	Add emergency contact		9s	Azizan can add contact by simply click the + button	Success	Emergency contact function is easily found
	Send SOS alert		4s	Azizan clicked the SOS alert button easily	Success	SOS alert is visible and easily to click
	Submit Incident Report		30s	Azizan submitted the incident report	Success	Incident report section is user-friendly
	Access Safety Resources		20s	Azizan accessed the safety resources without any help	Success	Safety resources are easily to be found

	Edit Profile Information		15s	Azizan updated phone number with no issues	Success	Profile management section is straightforward
	Logout		6s	Azizan logged out the system easily with single click	Success	Logout button is very direct

Table 48 Usability Test 4 – Farhanah Rizal

Date/Time	Task	Subject	Time	Observation	Status	Conclusion
21/06/2025	Register a new account	Farhanah Rizal	15s	Farhanah completed registration section	Success	Registration is a straightforward
	Log into the system		5s	Farhanah logged into the system with ease	Success	Login section is a straightforward
	Add emergency contact		8s	Farhanah can add contact by simply click the + button	Success	Emergency contact function is easily found
	Send SOS alert		4s	Farhanah clicked the SOS alert button easily	Success	SOS alert is visible and easily to click
	Submit Incident Report		17s	Farhanah submitted the incident report	Success	Incident report section is user-friendly
	Logout		3s	Farhanah logged out the system easily with single click	Success	Logout button is very direct

Table 49 Usability Test 5 – Intan Hamiza

Date/Time	Task	Subject	Time	Observation	Status	Conclusion
21/06/2025	Register a new account	Intan Hamiza	25s	Hamiza completed registration section	Success	Registration is a straightforward
	Log into the system		10s	Hamiza logged into the system with ease	Success	Login section is a straightforward
	Add emergency contact		3s	Hamiza can add contact by simply click the + button	Success	Emergency contact function is easily found
	Edit emergency contact		9s	Hamiza edited the emergency contact name	Success	Emergency contact function is easily edited
	Send SOS alert		5s	Hamiza clicked the SOS alert button easily	Success	SOS alert is visible and easily to click
	Submit Incident Report		26s	Hamiza submitted the incident report but there was	Success but failed when uploading image	Incident report section is user-friendly

				an issue to upload evidence image		
	Access Safety Resources	20s	Hamiza accessed the safety resources without any help	Success	Safety resources are easily to be found	
	Edit Profile Information	1min	Hamiza updated name, nic and phone number with no issues	Success	Profile management section is straightforward	
	Logout	6s	Hamiza logged out the system easily with single click	Success	Logout button is very direct	

6.5 Acceptance Testing

Acceptance testing was conducted to verify that the application meets all specified requirement and user expectations.

User Acceptance Test

SafePoint: A One-Touch Mobile App for Real-Time Assistance

Tester Name: Qistiena Sophiera Adli

Date: 19 June 2025

Task	Test Scenario	Expected Results	Status (Pass/Fail)	Comment
1	User Registration	Complete registration with email verification and profile creation	Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>	-
2	User login	Authenticate user and redirect to user dashboard	Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>	-
3	Emergency Contact Management	Add, edit, delete emergency circles.	Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>	-
4	SOS Alert System	Send emergency SMS to circles with location and timestamp	Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>	-
5	Incident Report	Submit detailed incident reports	Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>	-
6	Evidence Upload	Upload images	Pass <input type="checkbox"/> Fail <input checked="" type="checkbox"/>	-
7	Safety Resources Access	Display emergency hotlines and nearby services	Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>	-
8	Profile management	Update user profile information and change passwords securely	Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>	-
9	Safety Assistant (chatbot)	Access AI chatbot for safety guidance and emergency procedures.	Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>	-
10	User Logout	User log out successfully	Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>	-

Tester Signature:



User Acceptance Test

SafePoint: A One-Touch Mobile App for Real-Time Assistance

Tester Name: Hashimah Abu Bakar

Date: 20 June 2025

Task	Test Scenario	Expected Results	Status (Pass/Fail)	Comment
1	User Registration	Complete registration with email verification and profile creation	Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>	-
2	User login	Authenticate user and redirect to user dashboard	Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>	-
3	Emergency Contact Management	Add, edit, delete emergency circles.	Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>	-
4	SOS Alert System	Send emergency SMS to circles with location and timestamp	Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>	-
5	Incident Report	Submit detailed incident reports	Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>	-
6	Evidence Upload	Upload images	Pass <input type="checkbox"/> Fail <input checked="" type="checkbox"/>	-
7	Safety Resources Access	Display emergency hotlines and nearby services	Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>	-
8	Profile management	Update user profile information and change passwords securely	Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>	-
9	Safety Assistant (chatbot)	Access AI chatbot for safety guidance and emergency procedures.	Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>	-
10	User Logout	User log out successfully	Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>	-

Tester Signature:

User Acceptance Test

SafePoint: A One-Touch Mobile App for Real-Time Assistance

Tester Name: Azizan Bin Daud

Date: 20 June 2025

Task	Test Scenario	Expected Results	Status (Pass/Fail)	Comment
1	User Registration	Complete registration with email verification and profile creation	Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>	-
2	User login	Authenticate user and redirect to user dashboard	Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>	-
3	Emergency Contact Management	Add, edit, delete emergency circles.	Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>	-
4	SOS Alert System	Send emergency SMS to circles with location and timestamp	Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>	-
5	Incident Report	Submit detailed incident reports	Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>	-
6	Evidence Upload	Upload images	Pass <input type="checkbox"/> Fail <input checked="" type="checkbox"/>	-
7	Safety Resources Access	Display emergency hotlines and nearby services	Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>	-
8	Profile management	Update user profile information and change passwords securely	Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>	-
9	Safety Assistant (chatbot)	Access AI chatbot for safety guidance and emergency procedures.	Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>	-
10	User Logout	User log out successfully	Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>	-

Tester Signature:

User Acceptance Test

SafePoint: A One-Touch Mobile App for Real-Time Assistance

Tester Name: Farhanah Rizal

Date: 21 June 2025

Task	Test Scenario	Expected Results	Status (Pass/Fail)	Comment
1	User Registration	Complete registration with email verification and profile creation	Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>	-
2	User login	Authenticate user and redirect to user dashboard	Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>	-
3	Emergency Contact Management	Add, edit, delete emergency circles.	Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>	-
4	SOS Alert System	Send emergency SMS to circles with location and timestamp	Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>	-
5	Incident Report	Submit detailed incident reports	Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>	-
6	Evidence Upload	Upload images	Pass <input type="checkbox"/> Fail <input checked="" type="checkbox"/>	-
7	Safety Resources Access	Display emergency hotlines and nearby services	Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>	-
8	Profile management	Update user profile information and change passwords securely	Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>	-
9	Safety Assistant (chatbot)	Access AI chatbot for safety guidance and emergency procedures.	Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>	-
10	User Logout	User log out successfully	Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>	-

Tester Signature:



User Acceptance Test

SafePoint: A One-Touch Mobile App for Real-Time Assistance

Tester Name: Intan Nur Hamiza

Date: 21 June 2025

Task	Test Scenario	Expected Results	Status (Pass/Fail)	Comment
1	User Registration	Complete registration with email verification and profile creation	Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>	-
2	User login	Authenticate user and redirect to user dashboard	Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>	-
3	Emergency Contact Management	Add, edit, delete emergency circles.	Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>	-
4	SOS Alert System	Send emergency SMS to circles with location and timestamp	Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>	-
5	Incident Report	Submit detailed incident reports	Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>	-
6	Evidence Upload	Upload images	Pass <input type="checkbox"/> Fail <input checked="" type="checkbox"/>	-
7	Safety Resources Access	Display emergency hotlines and nearby services	Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>	-
8	Profile management	Update user profile information and change passwords securely	Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>	-
9	Safety Assistant (chatbot)	Access AI chatbot for safety guidance and emergency procedures.	Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>	-
10	User Logout	User log out successfully	Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>	-

Tester Signature:



6.6 Performance Testing

Performance testing was conducted to ensure the application meets response time requirements, especially for critical emergency functions.

Table 50 Performance Testing

Function	Expected Response Time	Actual Response Time	Status
User Login	< 3 seconds	2 seconds	PASS
SOS Alert Activation	<5 seconds	2.3 seconds	PASS
Incident Report Submission	< 10 seconds	3 seconds	PASS
Admin Dashboard Load	< 5 seconds	4 seconds	PASS
SMS Gateway Response	< 10 seconds	6 seconds	PASS

6.7 Testing Summary

The comprehensive testing validates that the SafePoint emergency response mobile application is ready for deployment and successfully addresses the identified safety concerns. The application demonstrates reliable emergency response capabilities, intuitive user experience, and robust administrative functionality. All testing phases confirm that the system meets the project objectives and user requirements established in the requirements analysis phase.

The testing results provide confidence that the SafePoint application will serve as an effective tool for enhancing personal safety and emergency response coordination, fulfilling its intended purpose as a comprehensive emergency assistance platform.

Chapter 7: Conclusion

This final year project successfully developed and implemented SafePoint, a comprehensive emergency response mobile application designed to address the growing concerns about personal safety in Malaysia. The project was initiated in response to rising crime rates, with the Department of Statistics Malaysia reporting a 3.2% increase in the Crime Index in 2023, highlighting the urgent need for effective emergency response solutions.

The SafePoint application was successfully developed as a dual-platform system comprising user-facing emergency features and administrative management capabilities. The application addresses the identified limitations of existing emergency response solutions by providing free access to all safety features, simple one-touch emergency activation, and comprehensive incident management tools.

Throughout the development process, the project followed the incremental development methodology, ensuring systematic development and thorough testing of all components. The application was built using Android Studio with Java as the primary programming language, integrated with Firebase for backend services, and implemented various APIs including Google Maps for location services and SMS functionality for emergency alerts.

References

Dosm. (n.d.). *Department of Statistics Malaysia*.

<https://www.dosm.gov.my/portal-main/release-content/crime-statistics-malaysia-2023>

The Star Online. "Dungun Crash: Cops Await for Suspect's Health Report." *The Star*, 12 Oct. 2024,

www.thestar.com.my/news/nation/2024/10/12/dungun-crash-cops-await-for-suspect039s-health-report. Accessed 2 Dec. 2024.

Introduction to Private Security: Theory meets Practice: Roberson, Cliff, Birzer Ed.D., Michael: 9780205592401: Amazon.com: Books. (n.d.).

<https://www.amazon.com/Introduction-Private-Security-Theory-Practice/dp/0205592406>

Malay Mail. (2024). Woman shares experience of attempted assault at Plaza Masalam. *New Straits Times Online*. Retrieved from

<https://www.malaymail.com>

Mail, M. (2024, October 23). Citing waste of resources, Fahmi says Putrajaya has no plans to create own online safety app like Truecaller. *Malay Mail*.
<https://www.malaymail.com/news/malaysia/2024/10/23/citing-waste-of-resources-fahmi-says-putrajaya-has-no-plans-to-create-own-online-safety-app-like-truecaller/154623>

GeeksforGeeks. (2025, May 30). Incremental Process Model Software Engineering. GeeksforGeeks.

<https://www.geeksforgeeks.org/software-engineering-incremental-process-model/>

Bennett, L. (2024, August 13). Incremental model in SDLC: Use, advantage & Disadvantage. Guru99. <https://www.guru99.com/what-is-incremental-model-in-sdlc-advantages-disadvantages.html>

Ford, K., Bellis, M. A., Judd, N., Griffith, N., & Hughes, K. (2022). The use of mobile phone applications to enhance personal safety from interpersonal violence – an overview of available smartphone applications in the United Kingdom. *BMC Public Health*, 22(1).

<https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-022-13551-9>

Sharma, A., Sharma, D., & Rastogi, A. (2024). SISafe: a comprehensive mobile application solution for women safety. *International Journal for Multidisciplinary Research*, 6(6).

<https://doi.org/10.36948/ijfmr.2024.v06i06.33374>

IPANIC: A Mobile Emergency Crime Case Reporting Tool with GPS-Based Location Detection and Alert Notification. (2024, November 20). IEEE Conference Publication | IEEE Xplore.

<https://ieeexplore.ieee.org/abstract/document/10787178>

My Guardian: a Personal Safety mobile application. (2018, November 1). IEEE Conference Publication | IEEE Xplore.

<https://ieeexplore.ieee.org/abstract/document/8632808>

- Munandar, M. H., Nasution, A. P., Kusno, N., & Kumalasari, M. I. (2021). Android Application for Crime Prevention with GPS Integrated Technology. *IOP Conference Series Materials Science and Engineering*, 1088(1), 012009. <https://doi.org/10.1088/1757-899x/1088/1/012009>
- Garg, P., Rawat, A., Kumari, P., & Mor, P. (2021). CRIMINAL-ALERT APP. *Irjet*. https://www.academia.edu/53219475/CRIMINAL_ALERT_APP
- Kavalleswari, A., & Dakshayini, M. (2024, September 3). Crime Reporting Management System Using Android Studio. [Preprint] EasyChair. <https://easychair.org/publications/preprint/Kcl9>
- Gorajia, R., Perez, A., Striki, M., & Haghani. (2024, January 6). *RUSAFFE: an interactive platform to enhance crime alert systems on university campuses*. IEEE Conference Publication | IEEE Xplore. <https://ieeexplore.ieee.org/abstract/document/10444195/>
- Green, M., & Thomas, A. (2023). Designing emergency response apps: One-click alerts and real-time location sharing. *Journal of Digital Safety Technology*, 5(1), 54-68.
- Lee, K., & Lim, H. (2021). Addressing women's safety concerns: An analysis of mobile applications for personal security. *Journal of Gender and Technology*, 13(3), 202-213. <https://doi.org/10.1016/j.jgen.2021.02.003>
- Delgado, A., Huamani, E., & Peña. (2020). A mobile application design to prevent criminal acts in Lima, Peru. *Advances in Science, Technology and Engineering Systems Journal* Vol. 5, No. 4, 40-46.

[https://www.researchgate.net/publication/343254081 A Mobile Application Design to Prevent Criminal Acts in Lima Peru](https://www.researchgate.net/publication/343254081_A_Mobile_Application_Design_to_Prevent_Criminal_Acts_in_Lima_Peru)

I'M SAFE. (n.d.). <https://www.imsafe.app/>

BSafe - Security and safety solutions. (n.d.). <https://www.getbsafe.com/>

URSafe - Personal Safety App. (n.d.). <https://ursafe.com/>

App Store Reviews (2024). User feedback on personal safety apps.

Retrieved from www.apple.com/app-store

Life360. (n.d.). *Life360 safety features*. Retrieved from

<https://intl.life360.com/>

Google Play Reviews (2024). Reviews on bSafe, Life360.

Retrieved from play.google.com

A Anon., 2017. What is Visual Paradigm?. [Online]

Available at: <https://www.visual-paradigm.com/features/>

Appendix A: Project Gantt Chart

Table below shows the Gantt Chart for FYP 1

FINAL YEAR PROJECT 1 GANTT CHART														
NO	TASK	WEEKS												
		1	2	3	4	5	6	7	8	9	10	11	12	13
1.	Title Selection/Approval													
2.	Registration of the FYP1 in CLIC													
3.	1 st meeting with supervisor													
4.	Preliminary Research													
Chapter 1: Introduction														
5.	Background study													
6.	Problem Identification and Feasibility Study													
7.	2 nd meeting with supervisor													
Chapter 2: Literature Review														
8.	Review of related works													
9.	3 rd meeting with supervisor													
Chapter 3: Requirements Analysis														
10.	Distribution of questionnaires													
11.	4 th meeting with supervisor													
12.	Analysis data collected													
13.	5 th meeting with supervisor													
Chapter 4: System Design														
13.	Process modelling													
14.	Interface design													
15.	6 th meeting with supervisor													
16.	Interim report submission													

Table below shows the Gantt Chart for FYP 1

FINAL YEAR PROJECT 2 GANTT CHART														
NO	TASK	WEEKS												
		1	2	3	4	5	6	7	8	9	10	11	12	13
Project Planning and Setup														
1	Review FYP1 feedback and recommendations													
2	Finalize system requirements and scope													
3	Setup development environment													
System Implementation														
4	User authentication module development													
5	Emergency contact management													
6	SOS alert system development													
7	Incident reporting module													
8	Location services integration													
9	Safety resources module development													
10	Admin dashboard implementation													
11	Database integration													
Testing and Quality Assurance														
12	Unit testing for all modules													
13	Integration testing													
14	User acceptance testing													
15	Performance and security testing													
16	Bug fixes and optimization													
Documentation														
17	Update system design and documentation													

Appendix B: FYP Meeting Logs

FYP 1 Meeting Log 1

Meeting Date: Week 3 - 20 November 2024	Meeting No.: 1
Meeting Mode: Online in Microsoft Teams	
Project ID: FYP01-SE-T2430-0127	Project Type: Application-based
Project Title : Application for Emergency Response Optimization: A One-Touch Mobile App	
Student ID : 1231301467	Student Name: Intan Nur Habriah binti Azizan
Student Programme and Specialisation: Bachelor of Computer Science (Software Engineering)	
Supervisor Name: Ms. Noor Farah Shahida Binti Mohd Haris	

1. WORK DONE

Tasks: Problem Formulation and Project Planning / Background Study or Literature Review

- Conducted a literature review to gather journals and articles related to the topic mostly about emergency.
- Searched for existing apps with similar functionalities for benchmarking.
- Explored different approaches to formulate the problem and scope of the application.

2. WORK TO BE DONE

Tasks: Problem Formulation and Project Planning / Background Study or Literature Review

- Continue gathering more relevant journals and articles to strengthen the literature review.
- Analyze the functionality and design of existing apps related to emergency response optimization.
- Refine the project timeline based on supervisor feedback

3. PROBLEMS ENCOUNTERED AND SOLUTIONS

Problems encountered: Difficulty finding journal articles for existing apps; some apps do not have corresponding journals, while others have journal articles, but the apps are unavailable.

Solutions:

- Include both types of resources in the literature review for a comprehensive analysis.
- Clearly specify in the report whether the reference pertains to an existing app or a related journal article.

4. COMMENTS (Supervisor / Co-Supervisor / Company Supervisor)

- She shows great interest in this project.
- The first progress meeting met my expectation.



Supervisor's Signature

Student's Signature

FYP 1 Meeting Log 2

Meeting Date: Week 5 – 6 December 2024	Meeting No.: 2
Meeting Mode: Online in Microsoft Teams	
Project ID: FYP01-SE-T2430-0127	Project Type: Application-based
Project Title : Application for Emergency Response Optimization: A One-Touch Mobile App	
Student ID : 1231301467	Student Name: Intan Nur Habriah binti Azizan
Student Programme and Specialisation: Bachelor of Computer Science (Software Engineering)	
Supervisor Name: Ms. Noor Farah Shahida Binti Mohd Haris	

1. WORK DONE

Tasks: Problem Formulation and Project Planning / Background Study or Literature Review

- Completed Chapter 1 of the project report, including: Background, Problem Statement, Project Objectives, Project Scope, Project Limitations, Methodology, Target Audience and Summary of the project.
- Started working on the storyboard to map out the project design visually using Figma.

2. WORK TO BE DONE

Tasks: Problem Formulation and Project Planning / Background Study or Literature Review

- Revise and shorten the project objectives based on supervisor feedback.
- Clearly define whether the app will contact family, emergency services, or both when the one-touch button is pressed.
- Revisit and update relevant sections of the Problem Statement and Project Objectives to align with the changes.
-

3. PROBLEMS ENCOUNTERED AND SOLUTIONS

Problems encountered: The project objectives were too lengthy and lacked clarity on whether the app would contact family, emergency services, or both.

Solutions:

- Revise the project objectives to make them concise and specific.
- Consult the supervisor again after reviewing the objectives to confirm the direction of the app functionality.
- Align the problem statement and scope with the refined project objectives.

4. COMMENTS (Supervisor / Co-Supervisor / Company Supervisor)

- The first draft of the system design (mobile apps) was done using a medium-fidelity prototype. It was good.
- However, some modifications are required.



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Supervisor's Signature



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Student's Signature

FYP 1 Meeting Log 3

Meeting Date: Week 8 – 24 December 2024	Meeting No.: 3
Meeting Mode: Online in Microsoft Teams	
Project ID: FYP01-SE-T2430-0127	Project Type: Application-based
Project Title : Application for Emergency Response Optimization: A One-Touch Mobile App	
Student ID : 1231301467	Student Name: Intan Nur Habriah binti Azizan
Student Programme and Specialisation: Bachelor of Computer Science (Software Engineering)	
Supervisor Name: Ms. Noor Farah Shahida Binti Mohd Haris	

1. WORK DONE

Tasks: Problem Formulation and Project Planning / Background Study or Literature Review

- Completed Chapter 2 literature review, including:
Overview, review of related works (analyzed journals and five existing emergency apps), summary of key findings (compared the selected journals and apps) and conclusion.
- Created a questionnaire draft.

2. WORK TO BE DONE

Tasks: Problem Formulation and Project Planning / Background Study or Literature Review

- Identify and analyze additional emergency apps, focusing on apps that are more relevant to Malaysia.
- Begin coding for the app prototype, starting with the homepage and registration page.
- Refine the questionnaire based on feedback and finalize it for data collection.

3. PROBLEMS ENCOUNTERED AND SOLUTIONS

Problems encountered: Need to add more existing applications for analysis, especially those closely related to the proposed app and relevant to Malaysia, to strengthen the review.

Solutions:

- Conduct further research to find emergency apps that are directly relevant to the Malaysian context.
- Begin integrating coding tasks for the app prototype to ensure steady progress on development.

4. COMMENTS (Supervisor / Co-Supervisor / Company Supervisor)

- The updated progress was good.
- However, some improvement needed specially to meets the user's requirements.



Supervisor's Signature



Student's Signature

FYP 1 Meeting Log 4

Meeting Date: Week 10 - 9 January 2025	Meeting No.: 4
Meeting Mode: Online in Microsoft Teams	
Project ID: FYP01-SE-T2430-0127	Project Type: Application-based
Project Title : Application for Emergency Response Optimization: A One-Touch Mobile App	
Student ID : 1231301467	Student Name: Intan Nur Habriah binti Azizan
Student Programme and Specialisation: Bachelor of Computer Science (Software Engineering)	
Supervisor Name: Ms. Noor Farah Shahida Binti Mohd Haris	

1. WORK DONE

Tasks: Requirement Analysis or Theoretical Framework

- Completed Chapter 3: Requirements, focusing on survey development.
- Drafted survey questions related to user needs and expectations for the emergency response applications.

2. WORK TO BE DONE

Tasks: Requirement Analysis or Theoretical Framework

- Search for studies with similar topics that use surveys to understand the appropriate structure and content.
- Refine and organize the survey questions to ensure they are relevant and well-structured before distribution

3. PROBLEMS ENCOUNTERED AND SOLUTIONS

Problems encountered: The survey questions were not in logical sequence making it difficult for respondents to follow.

Solutions:

- Restructure the survey into sections based on themes to improve readability and flow.
- Ensure each section has a clear title to help respondents understand the purpose of the questions.

4. COMMENTS (Supervisor / Co-Supervisor / Company Supervisor)

- Overall, the progress was satisfactory.



.....
Supervisor's Signature



.....
Student's Signature

FYP 1 Meeting Log 5

Meeting Date: Week 11 - 15 January 2025	Meeting No.: 5
Meeting Mode: Online in Microsoft Teams	
Project ID: FYP01-SE-T2430-0127	Project Type: Application-based
Project Title : Application for Emergency Response Optimization: A One-Touch Mobile App	
Student ID : 1231301467	Student Name: Intan Nur Habriah binti Azizan
Student Programme and Specialisation: Bachelor of Computer Science (Software Engineering)	
Supervisor Name: Ms. Noor Farah Shahida Binti Mohd Haris	

1. WORK DONE

Tasks: Requirement Analysis or Theoretical Framework

- Completed functional requirements section in chapter 3
- Reviewed and finalized survey questions before distribution.
- January 16th, 2025 – Started distributing the survey along with a poster containing the QR code for easy access.

2. WORK TO BE DONE

Tasks: Requirement Analysis or Theoretical Framework

- Work on functional requirements, non-functional requirements, and user requirements.
- Conduct research on how to properly define these requirements and understand the differences between them.
- Ensure clarity in categorizing system requirements.

3. PROBLEMS ENCOUNTERED AND SOLUTIONS

Problems encountered: Difficulty in distinguishing between functional, non-functional, and user requirements when writing this section.

Solutions:

- Refer to similar existing projects and documentation for examples of well-defined requirements.
- Seek feedback from the supervisor to ensure proper structuring and clarity.

4. COMMENTS (Supervisor / Co-Supervisor / Company Supervisor)

- Discussed regarding the questionnaire questions.



Supervisor's Signature



Student's Signature

FYP 1 Meeting Log 6

Meeting Date: Week 14 – 6 February 2025	Meeting No.: 6
Meeting Mode: Online in Microsoft Teams	
Project ID: FYP01-SE-T2430-0127	Project Type: Application-based
Project Title : Application for Emergency Response Optimization: A One-Touch Mobile App	
Student ID : 1231301467	Student Name: Intan Nur Habriah binti Azizan
Student Programme and Specialisation: Bachelor of Computer Science (Software Engineering)	
Supervisor Name: Ms. Noor Farah Shahida Binti Mohd Haris	

1. WORK DONE

Tasks: Prototype Development or Proof of Concept / Draft Report Completion

- Completed Chapter 4: System Design (including all diagrams)
- Completed Chapter 5 : Data Analysis Plan
- Completed Chapter 6 : Conclusion summarizing the project's key points and expected outcomes.

2. WORK TO BE DONE

Tasks: Prototype Development or Proof of Concept / Draft Report Completion

- Finalize Gantt chart and milestones for project timeline
- Complete full draft report for submission.
- Ensure all chapters are properly formatted and aligned with project guidelines.

3. PROBLEMS ENCOUNTERED AND SOLUTIONS

Problems encountered: Supervisor reviewed all chapters from Chapter 1 onward and mentioned that the background study needs more elaboration.

Solutions: Expand Chapter 1, add more references and examples to strengthen the background discussion, and revise and refine the problem statement to ensure clarity and relevance.

4. COMMENTS (Supervisor / Co-Supervisor / Company Supervisor)

- Need to include Gantt Chart, milestones and Rich picture diagram.
- Some amendments are needed for the report.



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Supervisor's Signature



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Student's Signature

FYP 2 Meeting Log 1

Meeting Date: 11 April 2025	Meeting No.: 1
Meeting Mode: Online in Microsoft Teams	
Project ID: FYP02-SE-T2510-0123	Project Type: Application-based
Project Title : Application for Emergency Response Optimization: A One-Touch Mobile App	
Student ID : 1231301467	Student Name: Intan Nur Habriah binti Azizan
Student Programme and Specialisation: Bachelor of Computer Science (Software Engineering)	
Supervisor Name: Ms. Noor Farah Shahida Binti Mohd Haris	

1. WORK DONE

Tasks: Implementation / Testing (Application-based projects)

- Developed and implemented the registration and login functionality for the mobile application.
- Tested basic input validation and user credential storage (local/firebase).
- User interface for login and registration designed using Figma references and implemented in the app.

2. WORK TO BE DONE

Tasks: Implementation / Testing (Application-based projects)

- Begin development of the User Dashboard which will display emergency contact options and user info.
- Integrate navigation from login to dashboard.
- Plan layout and features (e.g., emergency call button, location info) for dashboard page.

3. PROBLEMS ENCOUNTERED AND SOLUTIONS

Problem: Minor issue with redirecting users from login to dashboard after successful authentication.

Solution: Debugged the authentication logic and added proper routing to ensure smooth navigation.

4. COMMENTS (Supervisor / Co-Supervisor / Company Supervisor)

The student is encouraged to explore additional features within the project scope.



Supervisor's Signature



Student's Signature

FYP 2 Meeting Log 2

Meeting Date: 25 April 2025	Meeting No.: 2
Meeting Mode: Online in Microsoft Teams	
Project ID: FYP02-SE-T2510-0123	Project Type: Application-based
Project Title : Application for Emergency Response Optimization: A One-Touch Mobile App	
Student ID : 1231301467	Student Name: Intan Nur Habriah binti Azizan
Student Programme and Specialisation: Bachelor of Computer Science (Software Engineering)	
Supervisor Name: Ms. Noor Farah Shahida Binti Mohd Haris	

1. WORK DONE

Tasks: Implementation / Testing (Application-based projects)

- Continued development of User Dashboard interface.
- Added Emergency Contacts section
- Created Home screen layout with SOS real-time emergency button

2. WORK TO BE DONE

Tasks: Implementation / Testing (Application-based projects)

- Design alert feature that connects to emergency contact when button is pressed.
- Prepare testing plan for current app features (dashboard, profile, home, emergency contact).

3. PROBLEMS ENCOUNTERED AND SOLUTIONS**4. COMMENTS (Supervisor / Co-Supervisor / Company Supervisor)**

The FYP progress has been steady, but there is room for improvement in refining the apps implementation.



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Supervisor's Signature



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Student's Signature

FYP 2 Meeting Log 3

Meeting Date: 16 May 2025	Meeting No.: 3
Meeting Mode: Online in Microsoft Teams	
Project ID: FYP02-SE-T2510-0123	Project Type: Application-based
Project Title : Application for Emergency Response Optimization: A One-Touch Mobile App	
Student ID : 1231301467	Student Name: Intan Nur Habriah binti Azizan
Student Programme and Specialisation: Bachelor of Computer Science (Software Engineering)	
Supervisor Name: Ms. Noor Farah Shahida Binti Mohd Haris	

1. WORK DONE

Tasks: Implementation / Testing (Application-based projects)

- Developed Admin Dashboard interface
- Successfully connected project to Firebase for database and authentication

2. WORK TO BE DONE

Tasks: Implementation / Testing (Application-based projects)

- Add user statistics features on the admin panel (e.g., number of users)
- Display dashboard data using Firebase

3. PROBLEMS ENCOUNTERED AND SOLUTIONS

Problem: Faced difficulties setting up Firebase and getting proper access to admin-related functions.

Solution:

- Referred to official Firebase documentation and tutorials from Youtube as well.
- Plan to seek guidance or example code for Firebase Admin setup and user data access

4. COMMENTS (Supervisor / Co-Supervisor / Company Supervisor)

The implementation phase is on track, and the student has shown a strong understanding of the project requirements.



Supervisor's Signature



Student's Signature

FYP 2 Meeting Log 4

Meeting Date: 22 May 2025	Meeting No.: 4
Meeting Mode: Online in Microsoft Teams	
Project ID: FYP02-SE-T2510-0123	Project Type: Application-based
Project Title : Application for Emergency Response Optimization: A One-Touch Mobile App	
Student ID : 1231301467	Student Name: Intan Nur Habriah binti Azizan
Student Programme and Specialisation: Bachelor of Computer Science (Software Engineering)	
Supervisor Name: Ms. Noor Farah Shahida Binti Mohd Haris	

1. WORK DONE

Tasks: Draft Final Report / Final Report Completion

- Reviewed and finalized **Chapter 1 – Introduction** with supervisor feedback
- Ensured chapter content is clear and complete.
- Identified the need to use **recent citations** in the background and problem statement sections.

2. WORK TO BE DONE

Tasks: Draft Final Report / Final Report Completion

- Update references and citations in Chapter 1 with more recent sources.
- Start rephrasing and refining Chapter 1 under section to match current implementation.
- Ensure project objectives are consistent (tally) with the app features and scope

3. PROBLEMS ENCOUNTERED AND SOLUTIONS

Problems encountered: Slight mismatch between project objectives and actual app features.

Solutions: Revisit and rewrite the project objectives to ensure they match the final implementation direction.

4. COMMENTS (Supervisor / Co-Supervisor / Company Supervisor)

Progress has been steady, but the student is encouraged to explore the subject matter in more depth to meet final project expectation.



Supervisor's Signature



Student's Signature

Meeting Log 5

Meeting Date: 5 June 2025	Meeting No.: 5
Meeting Mode: Online in Microsoft Teams	
Project ID: FYP02-SE-T2510-0123	Project Type: Application-based
Project Title : Application for Emergency Response Optimization: A One-Touch Mobile App	
Student ID : 1231301467	Student Name: Intan Nur Habriah binti Azizan
Student Programme and Specialisation: Bachelor of Computer Science (Software Engineering)	
Supervisor Name: Ms. Noor Farah Shahida Binti Mohd Haris	

1. WORK DONE

Tasks: Draft Final Report / Final Report Completion

- Continued working on final report, revising content to use past tense and align with objectives and survey results.
- Worked on chapter 2

2. WORK TO BE DONE

Tasks: Draft Final Report / Final Report Completion

- Ensure all sections consistently use past tense
- Continue working on chapter 3 and 4

3. PROBLEMS ENCOUNTERED AND SOLUTIONS

-

4. COMMENTS (Supervisor / Co-Supervisor / Company Supervisor)

The student is progressing at a reasonable pace, but some tasks could be completed more efficiently



Supervisor's Signature



Student's Signature

FYP 2 Meeting Log 6

Meeting Date: 19 June 2025	Meeting No.: 6
Meeting Mode: Online in Microsoft Teams	
Project ID: FYP02-SE-T2510-0123	Project Type: Application-based
Project Title : Application for Emergency Response Optimization: A One-Touch Mobile App	
Student ID : 1231301467	Student Name: Intan Nur Habriah binti Azizan
Student Programme and Specialisation: Bachelor of Computer Science (Software Engineering)	
Supervisor Name: Ms. Noor Farah Shahida Binti Mohd Haris	

1. WORK DONE

Tasks: Implementation/ Testing/ Draft Final Report

- Updated the chatbot feature in the system
- Implemented new functionalities
- Completed chapter 3 and 4

2. WORK TO BE DONE

Tasks: Testing/ Draft Final Report/ Final Report Completion

- Update final report sections to include recent implementations and testing results.
- Continue with chapter 5, 6 and 7

3. PROBLEMS ENCOUNTERED AND SOLUTIONS

Problem: Minor bugs appeared, Difficulty in assigning nearby police stations.

Solution: Debugged the chatbot logic, creating it manually by adding it in the codes.

4.COMMENTS (Supervisor / Co-Supervisor / Company Supervisor)

The student is making good progress and is on schedule with the project timeline. The objectives set in the previous meeting have been successfully achieved, and the quality of the work is commendable.



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Supervisor's Signature



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Student's Signature

Appendix C: Turnitin Similarity

FYP2_TURNITIN(intan new).pdf

ORIGINALITY REPORT

6%	3%	1%	3%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

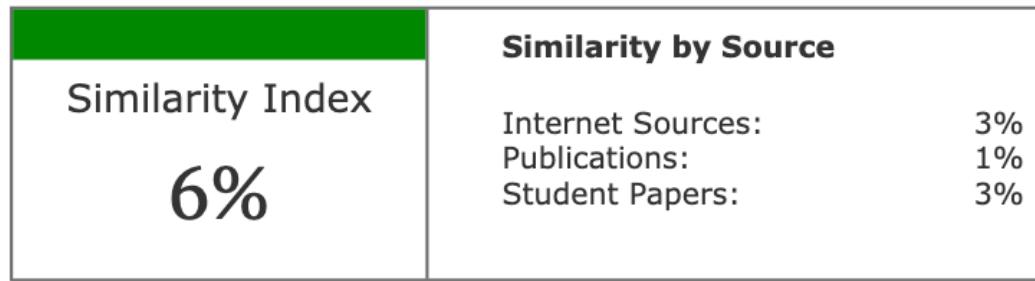
1	Submitted to Multimedia University Student Paper	1%
2	Submitted to University of Wales Institute, Cardiff Student Paper	1%
3	utpedia.utp.edu.my Internet Source	<1%
4	Feninferina Azman, Qistina Suraya, Fiza Abdul Rahim, Muhammad Sufyian Mohd, Noor Afiza Mohd Ariffin. "My Guardian: A Personal Safety Mobile Application", 2018 IEEE Conference on Open Systems (ICOS), 2018 Publication	<1%
5	Moyinoluwalogo Mayowa, Richard I. Otuka, Nemitari Ajienka, Augustine O. Nwajana. "chapter 6 Enhancing Public Safety in Developing Countries Using a Mobile Application Solution", IGI Global, 2025 Publication	<1%
6	Submitted to The British College Student Paper	<1%
7	www.dosm.gov.my Internet Source	<1%
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Abstract

This project successfully developed SafePoint, an emergency response mobile application that works as a personal safety assistant to help people during urgent situations, especially crime-related emergencies. The application was created to solve the problems found in existing emergency apps, such as complicated ways to activate emergency services and long time to respond. SafePoint provides users with an easy way to contact important safety forces. SafePoint also allows users to send emergency alerts with just one touch of a button, which automatically sends SMS messages containing the user's name, current location, and time to all their emergency contacts within seconds. The application includes many useful features like emergency contacts where users can add family and friends, GPS tracking system where users can track their location, automatic location detection and photo evidence, safety resources including emergency hotlines and chats for safety guidance, and nearby service locator to find hospitals and police stations. For emergency responders, the application provides an easy dashboard to manage incoming incidents, reports, assign police stations to be responsible, update case status, and receive high-priority cases in the community. The application was built using Android Studio with Java programming language and Firebase database, and was tested thoroughly to make sure it works properly and safely. Through surveys with 34 people and user testing, the project confirmed that SafePoint successfully provides a simple, reliable, and fast emergency-response solution that improves personal safety and helps emergency responders coordinate their work more effectively.

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