

Women Safeguard Wing Mobile Application

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Abstract: Mobile applications available in smart phone are beneficial in disaster responses. One of that is GPS technology, which can be used in tracking of rescuers by providing location and also can be used for communication. In emergency situation, user can trigger the emergency alert button where it automatically sends an emergency pre-programmed message with the user's current GPS location via SMS to emergency contact by single click. This application contains few modules such as register, login, emergency alert function, locate me function, check in function, post emergency function status function, view account history, siren function, and also account settings. The comparison was successfully done among three existing application and Women Safeguard Wing Application in literature review. Therefore, Women Safeguard Wing application is proposed to solve the problems based on the comparison. The objective of this project is to design a mobile application for alerting, notifying and locating victim's whereabouts. Then, this mobile application is proposed so that can it be used for a personal safety to protect on emergency situation. Moreover, Women Safeguard Wing application is also proposed to evaluate as a simple medium to create awareness. The methodology chosen for implement Women Safeguard Wing Application is System Development Life Cycle (SDLC). Waterfall model is chosen model to build this proposed application. The expected result of this application is to help people during their emergency situation where it also keeps people in touch with their closest by instantaneously sending a photo, GPS information and other information when they need them the most. To conclude, this application will give fastest and easiest way to reach out for assistance on emergency time.

Keywords: Facebook (FB), Global Positioning System (GPS), Short Message Service (SMS), WhatsApp.

1. Introduction

Women's safety is widely discussed everywhere nowadays. Women's safety at night and sometimes even during the day when travelling alone is a concern. Sometimes we just can't prevent emergency situations from happening around us, which could be accidents, fire, robbery or health problems. When faced with these problems, we will try our best to deal with the problems by seeking proper assistance

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in the shortest time possible [1]. The “Women Safeguard Wing Application” project is a mobile-based application that will be developed quickly, easily and efficiently in this project. The application is therefore developed with an effective and easy user interface to make the user feel easier and less burdensome when the application needs to be operated.

The basic concept of the mobile application that is being developed in this project will be like when the user first accesses the application and asks the user to register with their name and email address. After that, the user needs to add emergency contacts, set up alert messages, and check in messages. In addition, an emergency function with an easy-to-click emergency button that immediately sends pre-programmed emergency message with GPS information to the selected contacts. Locate Me function, enables users to send their GPS information to a list of contacts that allows them to view the location on a map. This feature is very useful to keep the contacts up-to-date if the user on a journey or unfamiliar location. Check In function able to send personalized messages to the contacts along with photo and GPS information when the user is out on another adventure. The Facebook alert message is also available in this feature. When the user clicks on Facebook, the pre-saved alert message will be displayed on the user's timeline.

The problem is women panic when they get into unexpected emergency situations. They might forget to alert the situation to their guardian or family members. In the case if women are not panic but they were been kidnaped, she might not know the location that she is being kidnaped. Furthermore, there is no locate me and check in functions. During emergency situation, most of the applications only can use during emergency situation not to notify the contacts about their whereabouts. Therefore, Women Safeguard Wing Application is developed to solve this problem. Objective of this application is to design a mobile application for alerting, notifying and locating victim's whereabouts. Next, to develop a mobile application that can be used for a personal safety to protect on emergency situation and also to evaluate the proposed Women Safeguard Wing application as a simple medium to create awareness.

2. Literature Review

In developing the Woman Safeguard Wing Application, literature survey has been done in order to ensure that the system developed reflects both the advantage and disadvantage. There are several researches that has been done regarding application about woman safety to ensure that the development of the project runs smoothly by reviewing the advantages and disadvantages of other systems. Identified disadvantages in the other systems can be used as a guide in order to be avoided by the Women Safeguard Wing Application. The advantages of these systems also provide guidance to improve the quality of the application. In addition, a literature survey also gives knowledge about the various types of facilities that can be added and provided in this application. Furthermore, there is a way to obtain an idea to introduce new elements which makes Women Safeguard Wing Application different and much more interesting than the existing application.

Table 1: Comparison of existing systems with proposed application

Modules	Emergency Handling System [2]	RescueMe Application [3]	Safety Triggering System [4]	Proposed Application
Login	Yes	Yes	Yes	Yes
Register	Yes	Yes	Yes	Yes
Emergency Alert Function	Yes	Yes	Yes	Yes
Locate Me Function	No	No	No	Yes

Table 1: Comparison of existing systems with proposed application (cont)

Modules	Emergency Handling System [2]	RescueMe Application [3]	Safety Triggering System [4]	Proposed Application
Check In Function	No	No	No	Yes
Post Emergency Status Function	No	No	No	Yes
View Account History	No	No	No	Yes
Siren Function	No	No	No	Yes
Account Settings	Yes	Yes	Yes	Yes

After the observation and studies on the three existing application systems, there are several features and elements will helpful for the developers to apply on the development of this project. Table 1 shows the comparison of the features found in the existing application. The systems that chosen for comparison are Emergency Handling System, RescueMe Application and Safety Triggering System. Register, login, emergency alert function, locate me function, check in function, post emergency status function, account settings, view account history, and siren function are some of the features available. Furthermore, there are some elements that are not present in the existing equivalent systems that are being evaluated, but which can be implemented into the application to be developed to make it more effective than other comparable systems. The function and features of this applications will be guidance during the development of Women Safeguard Wing Application.

3. Methodology

Project methodology discusses the methodology used to develop the Woman Safeguard Wing Application System. The methodology that has been selected for the development of Women Safeguard Wing Application is Waterfall Model. One of the software development life cycle (SDLC) is the waterfall model. The software development life cycle (SDLC) is a framework for determining which tasks will be completed at each stage of a system's development [5].

3.1 Waterfall Model

The software development life cycle (SDLC) is a framework for determining which tasks will be completed at each stage of a system's development [6]. The Waterfall Model, according to [7], is a sequential software development process in which progress is thought to be flowing downward (like a waterfall) through a list of phases that must be completed for software development to be successful. Waterfall Model is suitable for use in developing this project. It's because the Waterfall Model is best for small projects with simple and obvious system requirements [7]. In addition, Waterfall Model has several consecutive phases where these phases must be completed one by one and can only proceed to the next phase when the previous phase is fully completed [7]. This can prevent the occurrence of phase overlap.

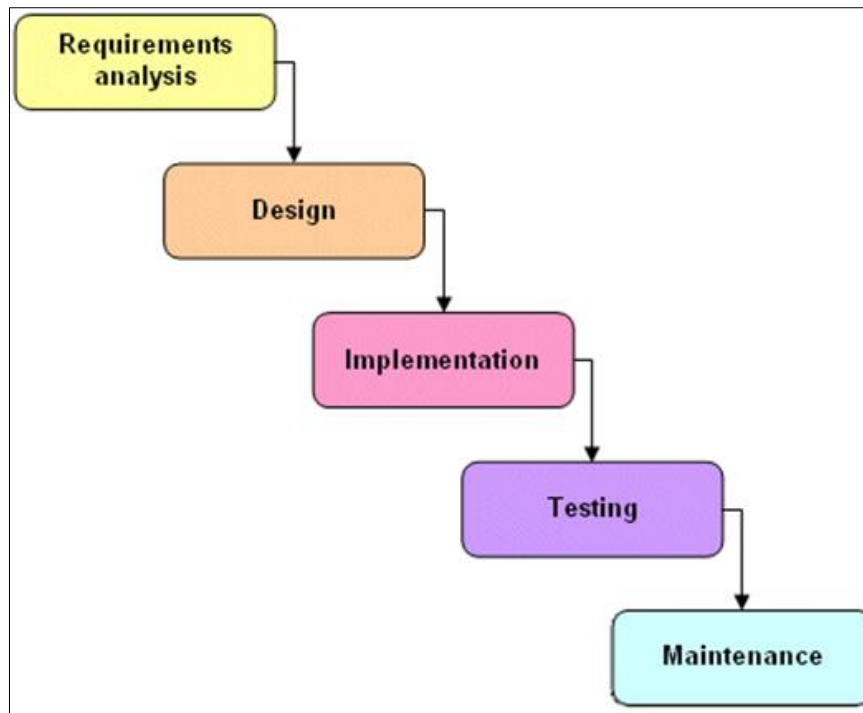


Figure 1: Waterfall Model [7]

3.2 Planning Phase

The activity of identifying the problem's background was carried out by survey users throughout the planning phase. Based on this method, it was found that the existing systems for users does not have locate me function, check in function, post emergency status function, view account history and also siren function. In addition, the project's objectives and scopes are defined during this phase. The proper methodology for developing this project has been determined after identifying the background of the problem, objectives and scope.

3.3 Analysis Phase

In analysis phase, activities to identify system requirements were carried out. Emergency Based Handling System, RescueMe Application, and Safety Triggering System are three existing systems that have been chosen and studied. After identifying the system requirements, an analysis of those requirements has been carried out more carefully. System requirements will then be translated into the form of class diagram, sequence diagram, context diagram and activity diagram. Following that, the required hardware and software are discovered and evaluated. Next, the programming language to be used has also been determined according to the suitability of the system. As a result of this, system requirements specification documents and study documents on equivalent system have been produced.

3.4 Design Phase

During design phase, class diagram, sequence diagram, context diagram and activity diagram have been designed based on the system requirements that have been analysed in the previous phase. Then, the interface for the developed system is also designed according to the user's suitability. The interface design sketch for each module available in developed system will be sketched using Microsoft Office Word 2016 software. The database for the developed system is also designed in this phase, relying on the context diagram, class diagram, sequence diagram, and activity diagram that have been generated. In addition, system interface sketches and system database sketches are also produced.

3.5 Implementation Phase

In implementation phase, system development activities by creating programming code have been carried out. Women Safeguard Wing Application is an android application that can be accessed through any smartphone. Therefore, the appropriate programming languages to develop this application are Extensible Markup Language (XML) and JAVA for application interface programming and SQLite for server programming. System development will begin by developing an interface for each module available in the system. Then, a database for the system is built.

3.6 Testing Phase

In testing phase, system functions and interfaces are tested to ensure the system is functioning properly and has no problems with system functionality. System testing is also done on the user to find out if the system meets the needs of the user and the purpose for which the system is developed. At the end of this phase, a function and interface test document of the system and user test documents are generated.

3.7 Maintenance Phase

In maintenance phase, system modifications and improvements are made based on user feedback and results from the testing phase. Modifications and improvements are carried out to meet the needs of users.

4. Analysis and Design

In the system requirements analysis, several diagrams have been produced to translate the system requirements that have been obtained in the previous chapter into a more easily understood and clear form. This diagram will be used as a reference and guide when designing Women Safeguard Wing Application. Use Case Diagram, Sequence Diagram, Activity Diagram, and Class Diagram are some of the diagrams that will be developed. Furthermore, the functional and non-functional requirements are two major elements in the system requirements. These requirements ensure that the proposed application's capabilities are capable of meeting the project's goals. These requirements are critical in determining the app's usefulness and quality, as well as developing an app that fits the user's needs.

4.1 Functional Requirements

A functional requirement is a set of functions and capabilities that exist in a software system or one of its components. Calculations, technical details, data manipulation and processing, and other particular functionality that define what a system is expected to do are examples of functional requirements. The functional requirements of the system are shown in Table 2.

Table 2: Functional description of each module

No	Module	Functionalities
1.	Register	This module allows user to register to the application using their name, email address and password.
2.	Login	This module allows user to login using their password.
3.	Emergency Alert Function	This module allows user to alert people by sending emergency text including GPS location.
4.	Locate Me Function	This module allows user to view and share their current location with pre-programmed message to contacts.
5.	Check In Function	This module allows user to notify their whereabouts with family members or guardians by sending pre-programmed message with GPS location.

Table 2: Functional description of each module (cont)

No	Module	Functionalities
6.	Post Emergency Status Function	This module allows user to post alert message on Facebook.
7.	View Account History	This module allows user to view the log details.
8.	Siren Function	This module allows user to on the siren button which produces loud siren.
9.	Account Settings	This module allows user to update their profile and emergency contacts.

4.2 Non-Functional Requirements

A non-functional requirement is one that sets criteria rather than particular behaviours that can be used to judge the operation of a system. It's a requirement that specifies the requirements that can be considered of as application limitations. Table 3 lists the system's non-functional requirements.

Table 3: Non- Functional description of each module

No	Data	Description
1.	Operational Requirement	This application will run on a smartphone using Android Studio. The system will only work if you have an internet connection and your GPS is turned on.
2.	Usability Requirement	The application offers users a variety of modules as well as fascinating, user-friendly and easy-to-understand applications.
3.	Security Requirement	User must first input their email and password to use the application.
4.	Portability Requirement	The application is portable because it can operate on any Android smartphone.

4.3 Use Case Diagram

A use case diagram is a visual representation of a user's interaction with a system that demonstrates the user-system connection. There is one actor which is user in the use case diagram. There are nine use cases consisting of register, login, emergency alert function, check in function, locate me function, post emergency status function, view account history function, siren function and account settings. Figure 2 shows the use case diagram of proposed system.

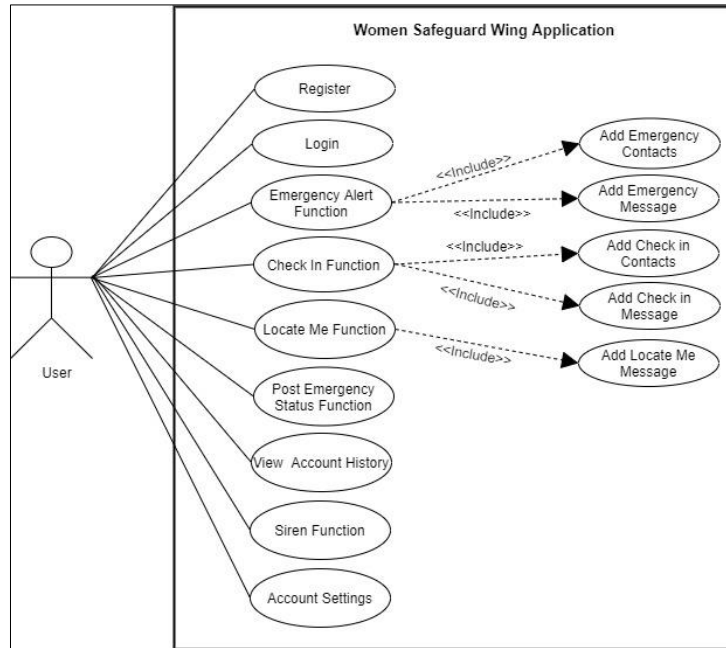


Figure 2: Use Case Diagram

4.4 Sequence Diagram

A sequence diagram is used to show the interactions in this application in greater depth. This implies that the diagrams give a general idea of the actor's performance sequence as well as the correct order in which each event should occur. It also demonstrates how different objects interact with one another. It also shows how objects interact with each other. Figure 3 shows the sequence diagram of proposed system.

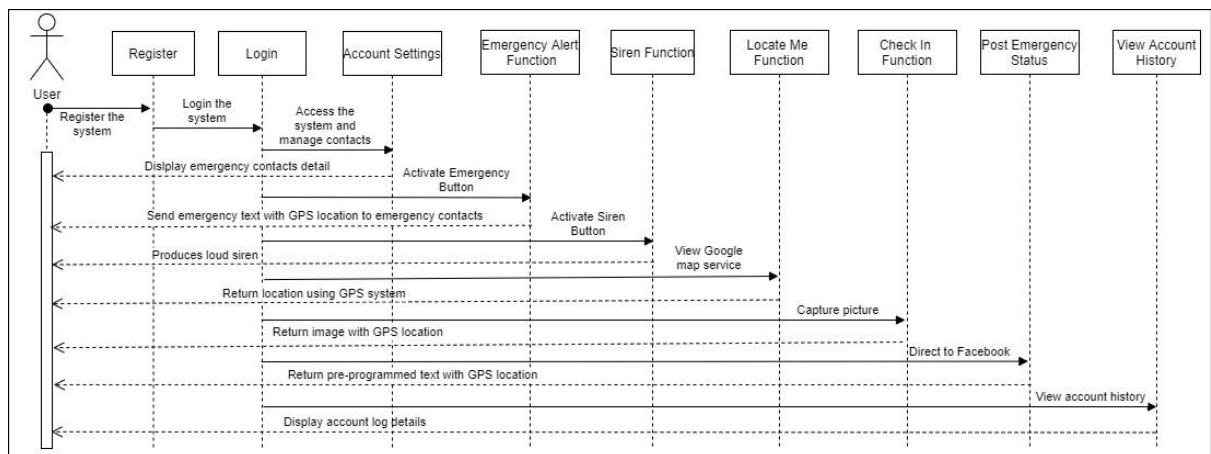


Figure 3: Sequence Diagram

4.5 Activity Diagram

Stepwise selection, iteration, and concurrency management are all supported by activity diagrams, which are graphical representations of activities workflow and actions. One of the UML specifications is the activity diagram. The flow of activities centred on the use case or detailed design methodologies is shown in the activity diagram. There are various symbols used in flow charts in activity diagrams, including input, output, processes, and data flow. Figure 4 shows the activity diagram of proposed system.

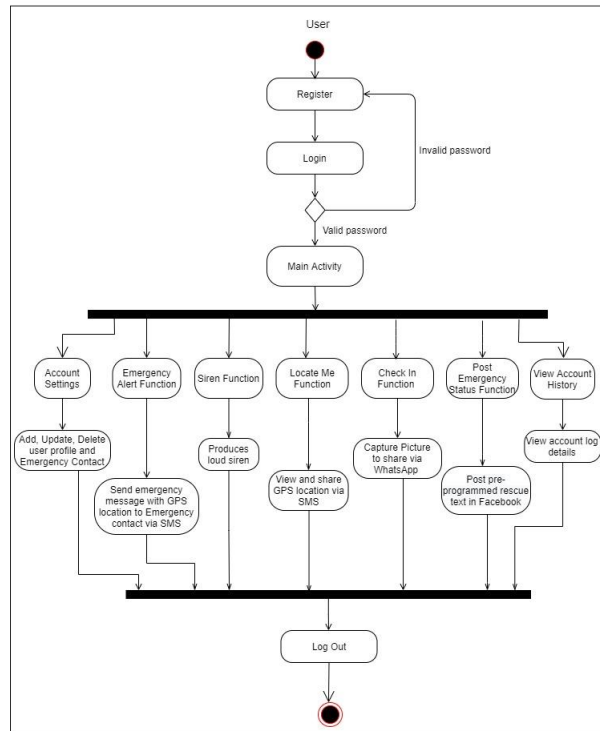


Figure 4: Activity Diagram

4.6 Class Diagram

A class diagram is a static model that illustrates the proposed system's classes and their relationships. Each class has its own internal structures and interconnections with other classes in the class diagram. A class diagram is used throughout the design process to show the common roles and responsibilities of the entities that provide the behaviour of systems. Figure 5 shows the class diagram of proposed system.

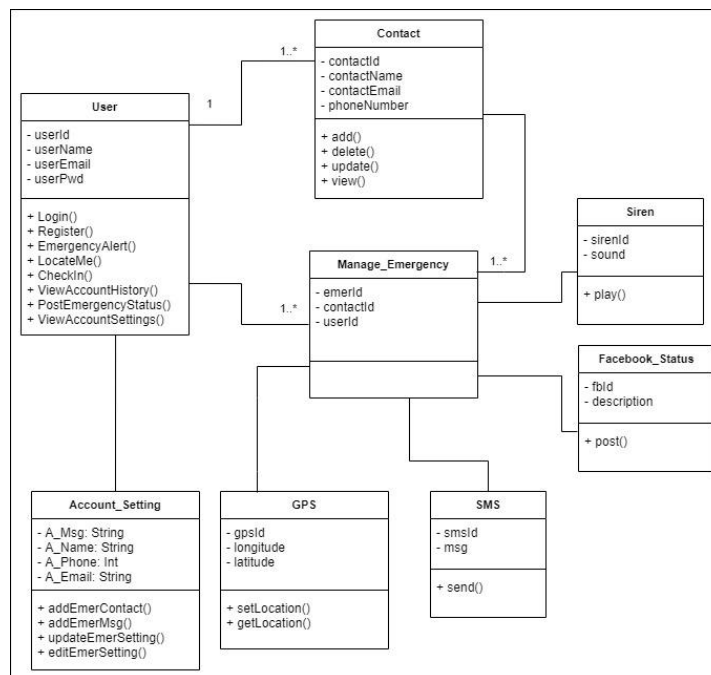


Figure 5: Class Diagram

5. Implementation and Testing

This section focuses on the description of the implementation of the developed system. Android Studio must be installed in order to put the previously created UI and database design into action. Programming is the primary activity during this stage. Writing code is crucial since it is a component of the process of developing and executing all of the previous plans and designs.

5.1 Database Connection

This proposed application is built on SQLite. Android includes SQLite database implementation. In this proposed application, SQLite is used to create, read, update, and remove data. Figure 6 depicts the proposed application's SQLite database connection in Android Studio, where each function is represented by a table.

```
public class DatabaseHandler extends SQLiteOpenHelper {
    // ALL Static variables
    // Database Version
    private static final int DATABASE_VERSION = 1;

    // Database Name
    private static final String DATABASE_NAME = "MySafetyGuard";

    private static final String TABLE_EMERGENCY = "emergency";
    private static final String TABLE_CHECKIN = "checkin";
    private static final String TABLE_HISTORY_EMERGENCY = "historyemergency";
    private static final String TABLE_HISTORY_LOCATEME = "historylocateme";
    private static final String TABLE_HISTORY_CHECKIN = "historycheckin";
    private static final String TABLE_HISTORY_EMERGENCY_DATA = "historyemergencydata";
    private static final String TABLE_HISTORY_LOCATEME_DATA = "historylocatemedata";
    private static final String TABLE_HISTORY_CHECKIN_DATA = "historycheckindata";

    private static final String KEY_EMERGENCY_ID = "emergencyid";
    private static final String KEY_EMERGENCY_MSG = "emergencymsg";
    private static final String KEY_EMERGENCY_NAME = "emergencyname";
    private static final String KEY_EMERGENCY_PHONE = "emergencyphone";
    private static final String KEY_EMERGENCY_EMAIL = "emergencyemail";
    private static final String KEY_EMERGENCY_IMAGE = "emergencyimage";
    private static final String KEY_EMERGENCY_COLOR = "emergencycolor";

    private static final String KEY_CHECKIN_ID = "checkinid";
    private static final String KEY_CHECKIN_MSG = "checkinmsg";
    private static final String KEY_CHECKIN_NAME = "checkinname";
}
```

Figure 6: Source Code for SQLite Database Connection

5.2 Application Interfaces

This section will show the interfaces of the application system.

5.2.1 Register Interface

Figure 7 shows the register interface of the proposed application. User need to register only for the first time in order to use this application. User need to enter name, email, password and retype password to continue to the next interface. The user's data is saved to SQLite database.

The screenshot shows a mobile application interface titled "WSW". It features a registration form with four input fields: "Name", "Email", "Password", and "Retype Password". Below the form is a prominent green button labeled "Register". The background is a dark grey color.

Figure 7: Register Interface

5.2.2 Login Interface

Figure 8 shows the login interface of the proposed application. The user signs in using password. After the verification is successful, user will be redirects to the home (emergency) page of the proposed application.



Figure 8: Login Interface

5.2.3 Emergency Interface

Figure 9 shows the emergency interface of the proposed application. This page contains emergency alert function and siren function. User can click the emergency button to send pre-programmed message with location to their contacts via SMS. User also can click on the siren icon to allow the application runs and produce loud siren. User can read the emergency instructions from the dialogue box.

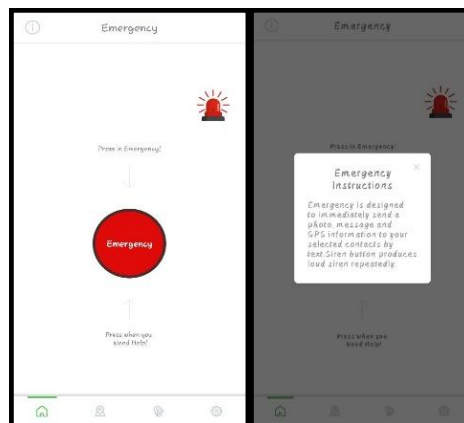


Figure 9: Emergency Interface

5.2.4 Locate Me Interface

Figure 10 shows the locate me interface of the proposed application. This interface contains the current GPS location of the user. User can notify contacts by sharing their GPS location with pre-programmed message. User can read the locate me instructions from the dialogue box.

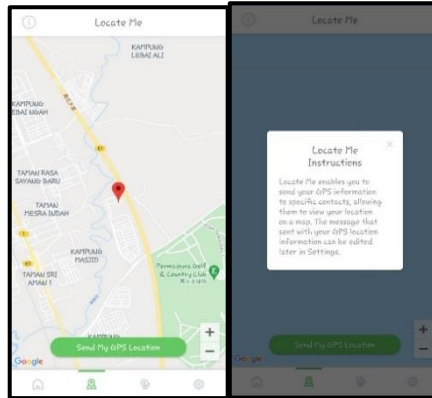


Figure 10: Locate Me Interface

5.2.5 Check In Interface

Figure 11 shows the check in interface of the proposed application. This interface enables user to snap image and share GPS location with pre-programmed message to keep in touch with their contacts. User can click the Facebook icon to share their pre-programmed message with GPS location. User can read the check in instructions from the dialogue box.

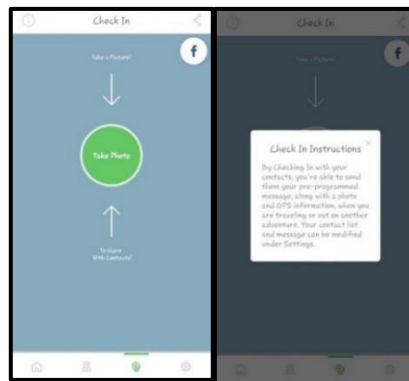


Figure 11: Check In Interface

5.2.6 Settings Interface

Figure 12 shows the settings interface of the proposed application. This page contains Account Settings, Change Password, Emergency Settings, Locate Me Settings, Check In Settings and Account History. User can read the settings instructions from the dialogue box.

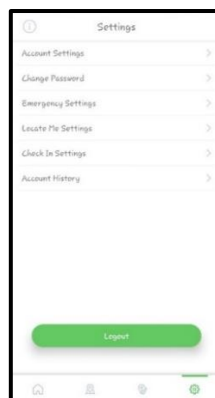


Figure 12: Settings Interface

5.2.7 Account Setting Interface

Figure 13 shows the account setting interface of the proposed application. This page contains name and email address of the user. User can update their details in this interface.



Figure 13: Account Setting Interface

5.2.8 Change Password Interface

Figure 14 shows the change password interface of the proposed application. This page contains name and email address of the user. User can update their details in this interface.

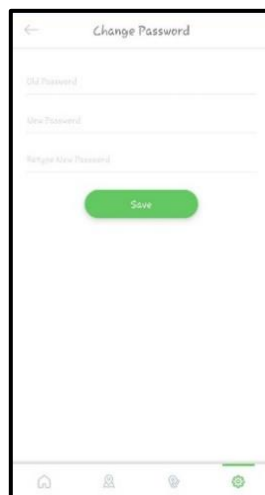


Figure 14: Change Password Interface

5.2.9 Emergency Setting Interface

Figure 15 shows the emergency setting interface of the proposed application. This interface contains edit contacts and edit message. User can add and delete contacts in edit contacts. User can update pre-programmed message in edit message.

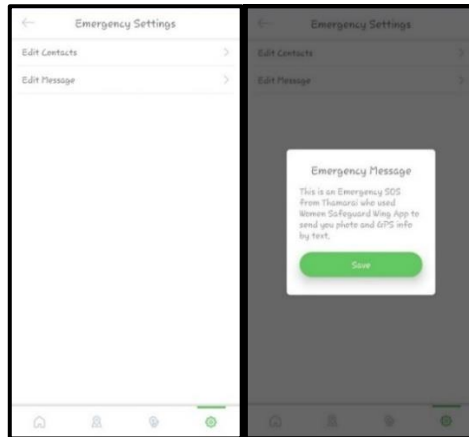


Figure 15: Emergency Setting Interface

5.2.10 Locate Me Setting Interface

Figure 16 shows the locate me setting interface of the proposed application. User can edit their pre-programmed locate me message in this dialogue box.

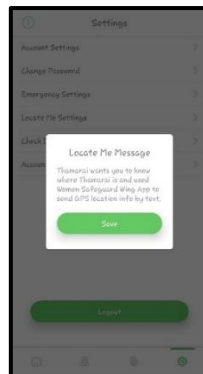


Figure 16: Locate Me Setting Interface

5.2.11 Check In Setting Interface

Figure 17 shows the check in setting interface of the proposed application. This interface contains edit contacts and edit message. User can add and delete contacts in edit contacts. User can update pre-programmed message in edit message.

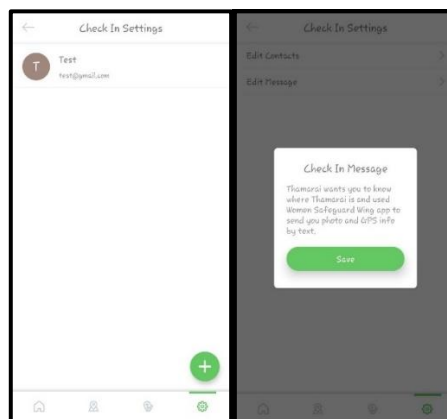


Figure 17: Check In Setting Interface

5.2.12 View Account History Interface

Figure 18 shows the view account history interface of the proposed application. This interface enable user to view the log details of Emergency, Locate Me and Check In Contacts.

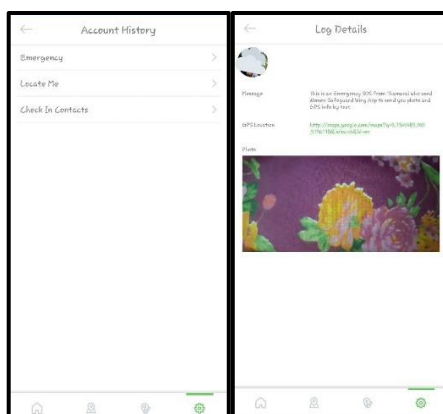


Figure 18: View Account History Interface

5.3 Testing

Women Safeguard Wing Application is tested and documented using functional system testing during the testing phase. Testing is necessary to determine whether the application contains any errors and to assure that the application meets the project's requirements. The results of functional testing of this application are shown in Section 5.3.1.

5.3.1 Functional Testing

The purpose of functional testing is to ensure that all of the application's components and features function efficiently. This is done to make sure that the system performs and functions as it should. Testing elements are combined into test plans based on various test cases for each module. The test reports for the functional testing done on each module in this system are presented in the subsections below.

5.3.2 Test Plan

After the proposed application is installed, the test plan is carried out. It can be used to determine whether the application meets the project's objectives. Tables 4 to 12 show the test plan for all of the elements of the Women Safeguard Wing Application.

Table 4: Test plan for Login

No	Test Cases	Expected Output	Actual Output
1	Enter valid password	A message box with the text "Login successful" will popup if the login is successful	As expected
2	Enter invalid password	If the login attempt fails, a dialog box displays with the message "Password is wrong. Please try again".	As expected

Table 4: Test plan for Login (cont)

No	Test Cases	Expected Output	Actual Output
3	Click forget password	“Email success” dialogue will appear once successfully send user’s password to their registered email.	As expected

The test plan for the user login interface is shown in Table 4. This module can test with the user's password as input.

Table 5: Test plan for Registration

No	Test Cases	Expected Output	Actual Output
1	Register using correct email and password	Registration successful and display login page.	As expected
2	Enter incorrect email address	Error message will be displayed to enter valid email address.	As expected
3	Enter incorrect password	Error message will be displayed to enter valid password.	As expected
4	Attempt to register with zero input.	Error message will be displayed to fill in empty fields.	As expected

The test plan for the user register interface is shown in Table 5. The user's email address and password will be verified on this screen, and they will be able to proceed to the application's next interface.

Table 6: Test plan for Account Settings

No	Test Cases	Expected Output	Actual Output
1	Edit and then select update button	When edit the selected data must be updated and display “Account settings saved successfully” message.	As expected
2	Edit and deselect the update button	Failed no data selected to update.	As expected
3	Enter valid old password, new password and retype password	Change password is successful and a message box with the message “Password is updated successfully” will be displayed.	As expected
4	Enter invalid old password and valid new password and retype password	Error message is displayed as “old password is wrong”.	As expected

Table 6: Test plan for Account Settings (cont)

No	Test Cases	Expected Output	Actual Output
5	Enter valid old password and invalid new password and retype password	Error message is displayed as “Password not same with retype password. Please try again”.	As expected
6	Attempt to update password with zero input	Error message is displayed as “Password cannot be empty. Please try again”.	As expected

The test plan for account settings is shown in Table 6. The user should be able to update general details and reset the password by entering in the relevant characters in this activity.

Table 7: Test plan for Emergency Alert Function

No	Test Cases	Expected Output	Actual Output
1	Allow permission on location setting	The system sends an emergency text with GPS location by single click.	As expected
2	Disallow permission on location setting	The system will repeat permission pop up message for user.	As expected

The test plan for emergency alert function is shown in Table 7. In this interface, user alerts their contacts by sending emergency text.

Table 8: Test plan for Locate Me

No	Test Cases	Expected Output	Actual Output
1	View current location	Display integrated Google maps view with user’s current location.	As expected
2	Click send my GPS location	Select contact from user phonebook and send GPS location with pre-programmed message.	As expected

The test plan for locate me is shown in Table 8. In this activity user should be able to view and share their current location.

Table 9: Test plan for Check In

No	Test Cases	Expected Output	Actual Output
1	Click take photo	User can choose platform to send captured image with pre-programmed message including GPS location.	As expected
2	Cancel the captured image	System returns to Check In interface.	As expected

The test plan for check in function is shown in Table 9. In this page user should be able to share image and pre-programmed text to their family or guardian.

Table 10: Test plan for Post Emergency Status

No	Test Cases	Expected Output	Actual Output
1	Select the Facebook icon	Share pre-programmed message including user's GPS location in Facebook.	As expected
2	Cancel the post	System returns to Check In interface.	As expected

The test plan for post emergency status is shown in Table 10. In this activity user should be able to connect to Facebook to post their alert message.

Table 11: Test plan for Locate Me

No	Test Cases	Expected Output	Actual Output
1	View emergency history	Log details of emergency will be displayed.	As expected
2	View locate me history	Log details of locate me will be displayed.	As expected
3	View check in history	Log details of check in will be displayed.	

The test plan for view account history is shown in Table 11. Users should be able to access log details through this interface.

Table 12: Test plan for Siren Function

No	Test Cases	Expected Output	Actual Output
1	Click siren button for first time	Loud siren will be produced repeatedly.	As expected
2	Click siren button for second time	Siren will be stopped.	As expected

The test plan for siren function is shown in Table 12. Users should be able to activate the siren button on this interface, which will emit a loud siren.

6. Conclusion

In conclusion, The Women Safeguard Wing application was designed and created to run smoothly. The alpha and beta testing were completed to ensure that the user requirements were met and that the users were satisfied. Users can access all of the features included in the proposed application using this application. The Women Safeguard Wing application will function as an emergency aide, assisting users in seeking assistance during a difficult scenario. For the proposed application's registration and login features, phone authentication has been successfully implemented. This application works when the user triggers the button in the home screen to send their GPS location and also pre-programmed message. In addition, the Women Safeguard Wing Application has a social network function that allows users to post emergency status on Facebook. Furthermore, the proposed application has successfully implemented the locate me and check in function by sending GPS location and capture photo to the contacts. The CRUD functionalities were successfully built and performed well for the part of registration emergency contacts. Integrated Google map was implemented successfully, which allows the user to share their current location which contains the longitude and latitude.

6.1 Limitations

This section will discuss the limitations of the proposed application, despite the fact that the project's goals were met. The limitations are as follows:

1. Internet connection is required for Women Safeguard Wing application in order to send GPS location.
2. The emergency alert function is not able to contact user's emergency contact in this process.
3. User only able to share pre-programmed message with GPS link in Facebook but not able to post image.
4. The application works individual as it only able to alert the guardian or emergency contact that user saved and it is not connected directly to police station or any department.

6.2 Future Enhancements

This section will discuss the improvements that can be made in the future. These are a few suggestions as how to improve this application.

1. The Women Safeguard Wing Application should able to work without requiring for internet connection.
2. The application should able to send out GPS locations every 30 seconds to their SOS contacts. It will be very useful to track the victim.
3. The application should have live stream function along with GPS location to notify their contacts.
4. To implement the application in android smart watch platform.

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References

- [1] D.G. Monisha, M, Pavithra, G. R Subhashini, (2016). Women safety device and application-FEMME.Indian Journal of Science and Technology, 9(10), 33-40. <https://doi.org/10.17485/ijst/2016/v9i10/88898>
- [2] Maznah Kamat, Anazida Zainal & Rashidah Kadir (2003), ‘Background and Problem analysis’, Emergency Handling System, pp. 6-7.
- [3] J. B. de Guzman, R. C. C. and R. G. Ado, (2014) ‘Mobile Emergency Response Application Using Geolocation for Command Centers’, International Journal of Computer and Communication Engineering, 3(4), pp. 235–238. doi: 10.7763/IJCCE.2014.V3.327.
- [4] P. Kalyanchakravarthy, et al. (2014) ‘Android Based Safety Triggering Application’, International Journal of Computer Science and Information Technologies, 5(1), pp. 646–647.
- [5] Justin. (2013). *What is the Software Development Life Cycle (SDLC)*. Retrieved from <https://airbrake.io/blog/sdlc/what-is-the-software-development-life-cycle>
- [6] B. Ruparelia,(2010). ACM SIGSOFT Software Engineering Notes, Volume 35, pp8-13. <https://doi.org/10.1145/1764810.1764814>
- [7] Youssef Bassil and Sharma, (2012). A Simulation Model for the Waterfall Software Development Life Cycle, Vol. 2, No. 5.