AN EFFICIENT ANTI-KIDNAPPING AND ANTI HARASSMENT MOBILE APPLICATION FOR UNWANTED CIRCUMSTANCES

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APPROVAL

This thesis titled on "**An Efficient Anti-Kidnapping and Anti-Harassment Mobile Application for Unwanted Circumstances**", submitted by **Md. Elias Hossain**, **ID: 161-35-1426** to the Department of Software Engineering, Daffodil International University has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of Bachelor of Science in Software Engineering and approval as to its style and contents.

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DECLARATION

It hereby declere that this thesis has been done by **me** under the supervission of **Dr.Md.Mostafijur Rahman, Assistant Professor,** Department of Software Engineering, Daffodil International University. It also declere that nithor this thesis nor any part of this has been submitted elesewhere for award of any degree.

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ABSTRACT

Women all over the world are facing problem day by day. This research reflect on the issues of women harassment in Bangladesh. This research proposed an efficient anti-kidnapping and anti-harassment mobile application for unwanted circumstances. The compact solution ensures safety of the women in unwanted circumstances. This research developed a model based on the safety. This research consists of ten interconnected modules such as, SOS Key module, Phone shaking module, Voice recognition module, Fake calling module, Hidden camera module, Hidden video recording module, Area zone module, Harassment filter module, Place module and Siren module. The complete application is tested by System Usability Scale (SUS) method. It is found that the SUS score of the developed system is 67.22 % which assures that the proposed system is suitable for use. This research also assures the analysis of tested data in the rural and urban areas based on system response time, message and phone calls and the time it takes to reach the users current location. This research also assures that the proposed system is efficiently tested based on the response time of the system, the time it takes to reach message and phone calls and average response time for the existing system has found 8.6405 millisecond and the average response time of the proposed system has found 8.439 millisecond

Which indicated that the proposed system is fasted than other existing systems. Lastly, the proposed system has been compared to the feature of the existing solutions.

Keywords: SOS, SUS, Circumstances, Safety, screaming, notification, shaking, module.

CHAPTER 1

INTRODUCTION

1.1 Background

Girl's safety is an import issue. Girls play a vital role in the development of a country. Nowadays, girls, especially school-going girls, are being victimized especially in public transport in Bangladesh, girls are being harassed regularly. According to the World Health Organization (WHO) report, 2013 explained that there is 35 percent of women all over the world have been victimizing sexual harassment [1]. Some national survey report has shown that there are 75 % of women faces physical and sexual harassment. A case study has been done by Dhaka Medical College, Bangladesh on the issues of Violence against women in Bangladesh on the victim who endured treatment at One-Stop Crisis Centre (OCC) [2].]. Bangladesh policed also published some statistics on their official website based on the kidnapping and harassment report that described in Table 1 outside in Bangladesh.

Table 1.1.1: Crime report of Bangladesh

Year of Kidnapping	2010	2011	2012	2013	2014	2015	2016	2017	2018
Kidnapping rate	870	792	850	879	920	805	639	509	444

On the contrary, an android application is very popular in recent years and people are depending day by day. Nowadays, a mobile application made something magically which was previously unimaginable. The online shopping apps, food delivery, and taxi service apps, banking apps, entertainment apps, educational apps, social media apps, etc. which makes our life faster. So it would be great things if an android application is used as a weapon of the women. This is the motivation for our work. So that we have pick android technology for ensuring the safety of the women in Bangladesh, not only Bangladesh but also all over the world. This research shows the design and development of a mobile application which mainly focused on the safety of the women. This research proposed a model and by this model safety and security of people especially of women in Bangladesh become very light and facile. Therefore the objective of this paper is to ensure the safety of the women, spreading safety awareness, and find out how usable this application in Bangladesh.

1.2 Motivation of the Research

According to the Federal Bureau of Investigation (FBI) report in 2014, there were 635,155 cases of the missing adults and children [4] and 1500 were kidnapped. So it is a matter of important anxiety about safety and security related issues for women, especially in Bangladesh. This is our main purpose to develop an effective way to protect women from kidnapping and harassment.

1.3 Problem Statement

Kidnapping and Harassment is not only global issues but it is a historical issues of the world. According to the statistics of Bangladesh government, more than 17000 rape case registered have been registered in past four years in Bangladesh but criminal cannot be identified due to lack of proper evidence. Many women do not report rape case because of lack of proper evidence. The victim and victim family member remain silent due to lack of proper evidence. This is the main problem of this research.

1.3 Research Questions

1. Question 1: Does this research ensure the safety of girls??
2. Question 2: What is the purpose of this study??
3. Question 3: How has this study examined the effectiveness of the proposed system?

1.5 Research Objectives

- Ensure safety of the women.
- Guaranteed to collect Evidence.
- Find out how usable this application in Bangladesh.

1.6 Research Scope

- Efficiently safety of the women.

- Can be used to identify criminals.
- Can be used as a safety tools.
- Can be used to inform situation to family member.

1.7 Thesis Organization

Chapter 2, research methodology are described. In Chapter 3, working principle are described. In Chapter 4, Result and Discussion are described. In section 4.1, user interface design are shown. In section 4.2, comparison table are described. In section 4.3 system usability scale are described. In section 4.4, testing and analysis are described. In chapter 5 conclusion and future work are described.

CHAPTER 2

LITERATURE REVIEW

2.1 Background

However, there are a lot of android applications based on safety and security are available in the play store and IOS store. The researcher is working hard to ensure the safety of the women by inventing their research and development in the field of android technology. E.Hossain et al. [5] proposed a manifesting mobile application that ensures the safety of the women. There is some interconnected component of this mode such as SOS pressing, location sending, automatically calling, phone shaking, etc. By pressing SOS then automatically calling to the trusted contact number and by shaking phone it will act such as, calling to one top number and location sending to the trusted phone number. E.Hossain et.al [6] proposed Efficient Anti-Kidnapping and Anti-Harassment (Avoidance-Detection-Notification) Mobile Application for Unwanted Incident. The author shows the kidnapping protection module. There are some interconnected module of this system for safety of the people such as voice module, notification module, phone shaking module [6]. M.Pradeep et al. [7]

developed Intelligent Safety System to Prevent Acid Attacks. The paper [7] ensure safety of the women and proposed women safety model. The model consists of PIC microcontroller, acid reorganization sensor, hit reorganizations sensor, secure camera, GPS and GSM modules. D. G. Monisha et al. [8] proposed system name is women safety device and application- FEMME. The author used ARM controller and android application that communicated to the Bluetooth and can be activated easily. The device FEMME track current location and sending the location to the contact number and record audio for keep evidence. R. Sriranjini et al. [9] developed GPS and GSM Based Self Defense System for Women Safety. Main purpose of this system is notifying police and parents by pressing SOS button. D. Chand et al. [10] proposed mobile application entitled is A Mobile Application for Women's Safety: WoSApp. User notifying current situation to family member by pressing SOS or phone shaking. After shaking phone then it will active automatically and act. P. Chaudhari et al. [11] design and developed application entitled is Street Smart': Safe Street App for Women using Augmented Reality. This paper consists of some interconnected module such as GPS Navigation, digital camera, high speed internet [11]. Author K.Sharma et al. [12] described women safety by using android technology. Researcher build android application which can sending alert notification to the trusted contact number, automatically voice calling to the predefined number. Each of the features are developed based on the women safety. Y. Rathod et al. [13] demonstrate children tracking system on android mobile terminal. J.A. This proposed system ensure safety of the children. Sheikh et al. [14] proposed research title is #MeToo: An App to Enhancing Women Safety. This research demonstrate why women do not feel secure [14]. M.I.A. Mane et al. [15] developed safety application name is Stay Safe Application. This developed system ensure safety of the people. This application [15] track current location in the background and sending situation with image to trusted contact number. Author R. S. Yarrabothu et al. [16] developed mobile application name is ABHAYA which ensure safety of the people. This application send current location continuously to the contact number every five minute later. This system continuously sending location until pressing stop button [16].

2.12 Summery Related to this Chapter

Table 2.1.1: Summary of this chapter

App name	Platform	Features
Manifesting mobile application [5]	Android	SOS pressing, Location sending
Anti-kidnapping [6]	Android	Sending location by phone shaking, SOS pressing
WoSApp [10]	Android	User notifying current situation to family member by pressing SOS or phone shaking
Street Smart [11]	Android	GPS Navigation, digital camera, high speed internet
MeToo [14]	Android	Notifying current situation to family
Stay Safe [15]	Android	Track current location in the background and sending with image to contact number.
Abhaya [16]	Android	Sending current location continuously to the contact number every five minute later. This system continuously sending location until pressing stop button

CHAPTER 3

METHODOLOGY

There are ten interconnected module of this model such as SOS Key module, Voice Reorganization module, Area zone module, Location tracking & share module, Fake calling module, Siren module, Shaking module, Hidden camera module, Hidden video recording module. Each of this module are connected to this proposed model. Figure 1 shows the proposed system model. The details sequence are shown in bellow.

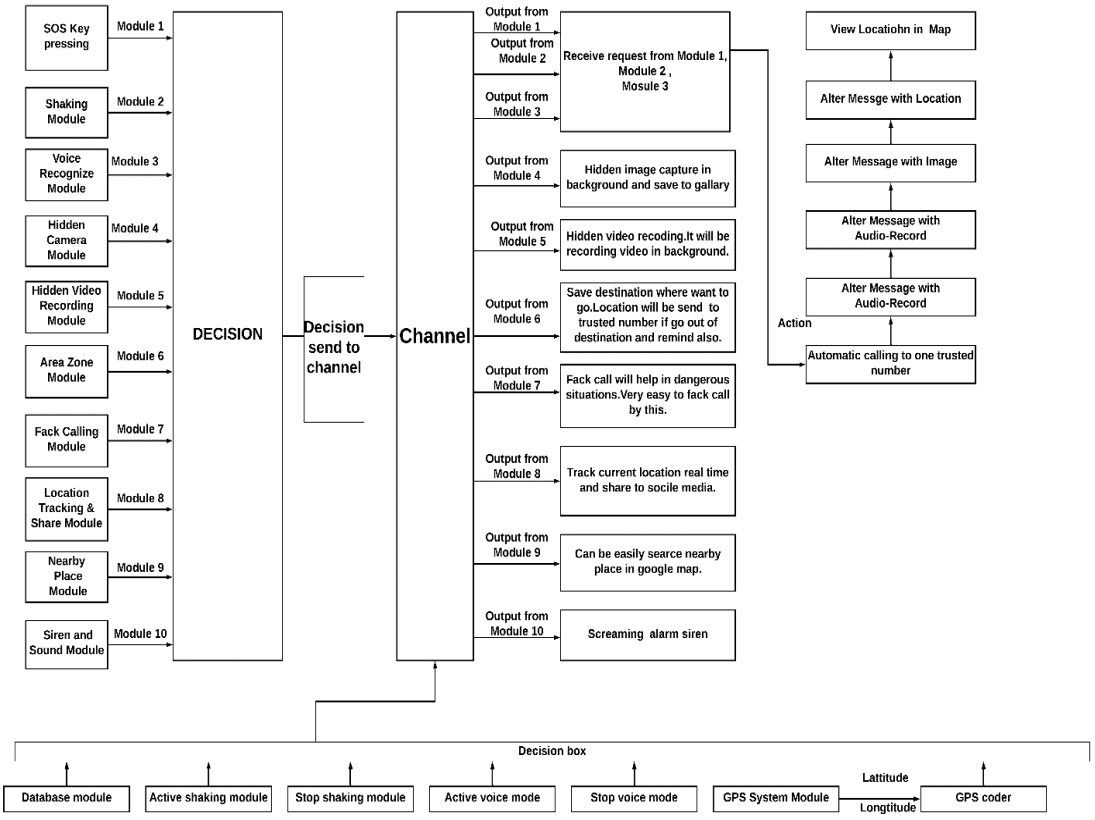

Figure 3.3: Proposed system model

3.1 SOS Key module

Figure 3.1.1 shows the SOS key module working procedure. This component starts by pressing the SOS button manually. The SOS Key can be phone power button.
Pressing phone power button four times then system automatically does the following action such as, automatically calling to the one selected contact number, automatically

sending the real-time current location to the all register contact number. The details sequence and working flow are shown in the Figure 3.1.1

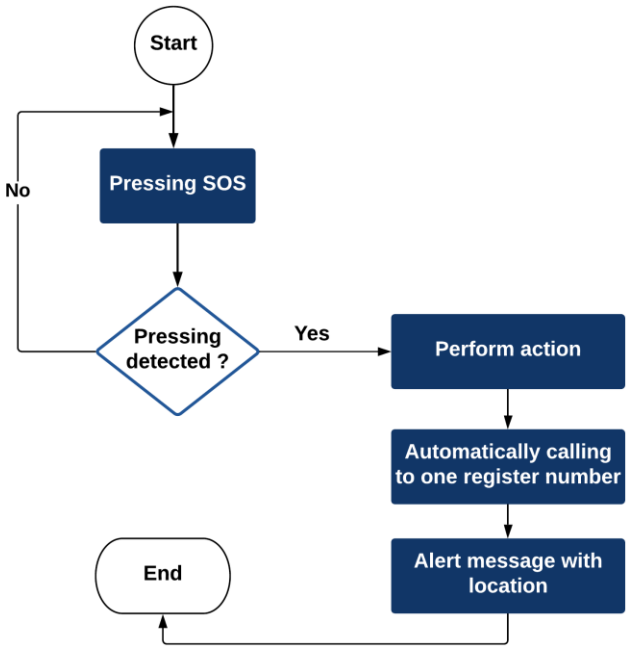

Figure 3.4.1: SOS Key module working flow

3.2 Shaking module

Figure 3.2.1 shows the Shaking Module working flow. This module integrate an accelerometer sensor. Most of the smartphone has a built-in accelerometer sensor and it's a matter of regret that the accelerometer sensor provides some functionality and shaking is one of them. This module starts by phone shaking three times. Aim of this module is notify situation to the trusted people when the phone is locked mode and if the problem happens when can't able to notify the situation by opening phone. In this case, if phone shake three times then it will active and perform action such as automatically calling to the one selected contact number and automatically sending the current location to the all register contact number.

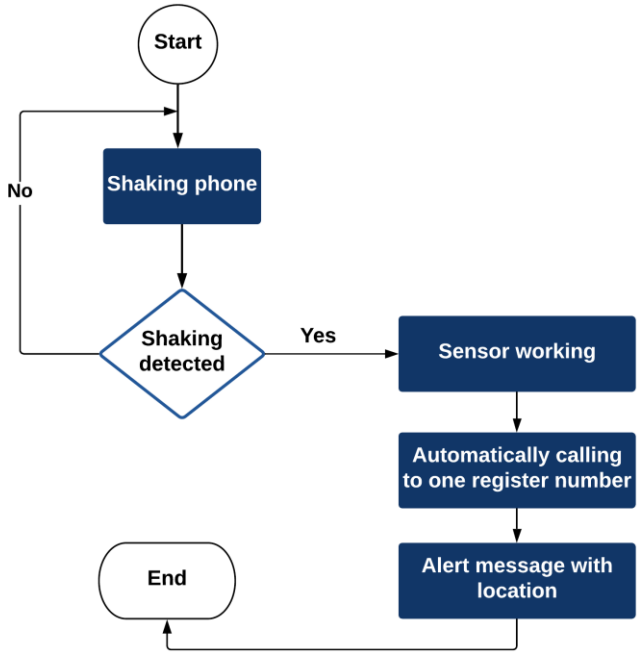

Figure 3.2.1: Shaking module working flow

3.3 Voice recognition module

Voice recognition is a subfield of computational linguistics that developed algorithm that able the recognition and translation the spoken language to text. Whenever system receives voice then digitalizing it to create identical voice format. Figure 3.3.1 shows the Voice reorganization module working flow. This module activated on voice command. The command can be “I’m in danger”, “Help me”, “Safe me” etc. This module integrated Google speech recognition API for voice recognition. The system takes the action whenever it receives the command. The action can be such as, automatically calling to one top contact number, automatically sending location to the trusted contact number. The working procedure and speech recognition procedure are shown in Figure 3.3.1.

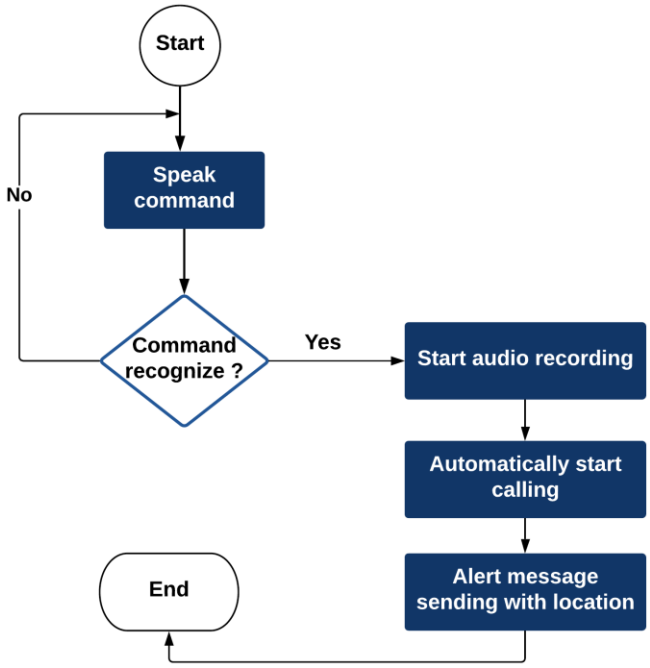

Figure 3.3.1: Voice recognition module working flow

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3.4 Hidden camera module

Fig 3.4.1 shows the Hidden camera module working flow. This module starts by pressing the button manually. It has the flush option so that able to take picture in the dark mode as well. This module capture image in the locked mode and background as well and save the image to phone storage as well. Details working flow are shown in the Fig 3.4.1

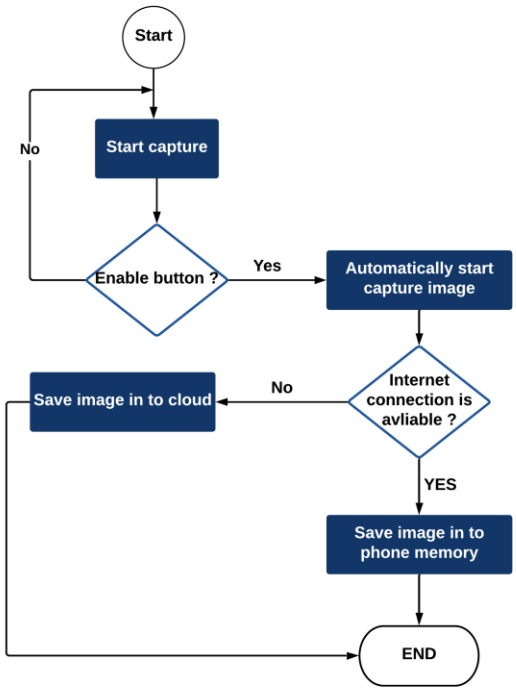

Figure 3.4.1: Hidden camera module working flow

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3.5 Hidden video recording module

This module activated by pressing the start button manually. Whenever pressing the start button then it will activated and running in the background automatically and capture video and save to phone storage. It is necessary to identify or record the culprit in times of danger or in bad situations. This module is integrated on the basis of collection of evidence. Collecting evidence using phone camera is not a right way. If someone wants to take a record using a phone camera in a time of danger or in a bad situation, then the offender can easily understand. Since every smartphone has a camera, it is best to collect the event using this camera efficiently. This module does video recording in the background where the phone's camera does not need to be open. Fig 3.5.1 shows the hidden video recording module working flow.

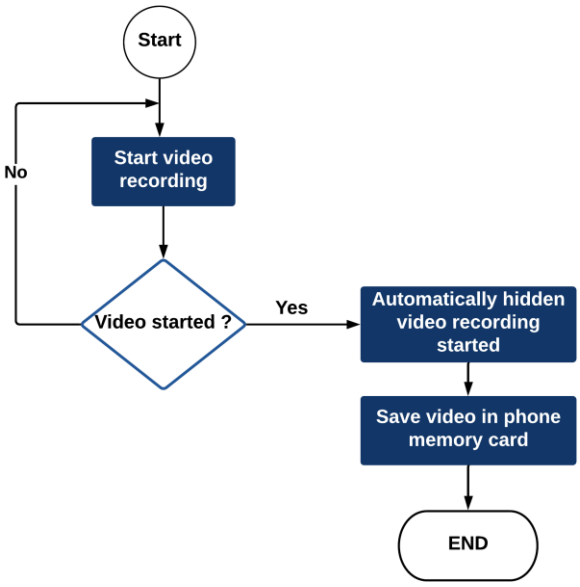

Figure 3.5.1: Hidden camera module working flow

3.6 Area zone module

This module has been integrated for Location Reminder. This module is designed so that people don't forget their destination, especially when traveling, because sometimes people fall asleep and forget to go to the destination. Whenever you arrive at the destination then automatically system will notified that “You have reached your destination”.

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3.7 Fake calling module

Fake is a free calling module that does exactly what you need. It calls you to enable you to get away from your circumstances. In the critical moment when need to leave a place or if someone will follow activities but cannot take action then fake calling module will help user to do something. Whenever start fake calling module then automatically calling display will be visible. It shows like real calling display. Fig 3.7.1 shows the fake calling module working flow.

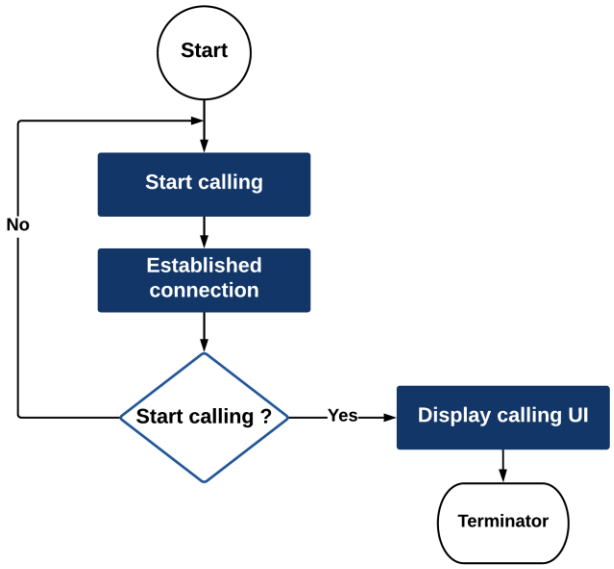


Figure 3.7.1: Fake calling module working flow

3.8 Harassment filter module

Harassment filter module allows user to block incoming call from specific mobile number. First set the number and system automatically block incoming call.

3.9 Nearby place module

This module is designed to search nearby place. Fig 3.9.1 shows the nearby place module working functionality. By this module user are able to search nearby place such as, nearby hospital, nearby police station, nearby school, nearby fuel station etc. This module requires internet connection and GPS must be enable. Place API has been used in this module.

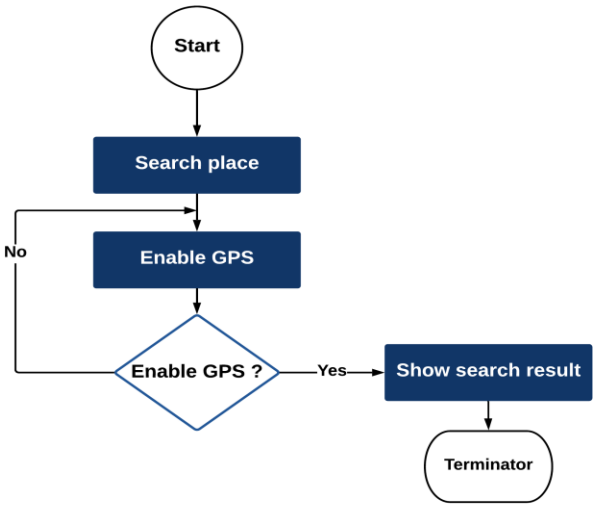


Figure 3.9.1: Nearby place module working flow

3.10 Siren module

Sirens and sound modules can help with unwanted situations. If it is not possible to call someone in times of danger, or if the abductor is trying to abduct, it will be possible to inform everyone by the siren module. It will screaming alarm siren. Fig 3.10.1 shows the siren and sound module working flow.

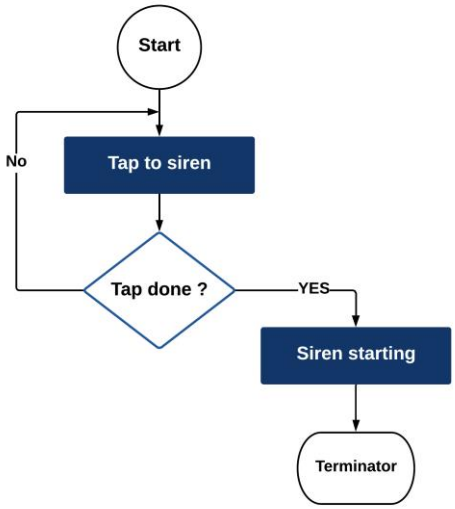


Figure 3.10.1: Siren module working flow

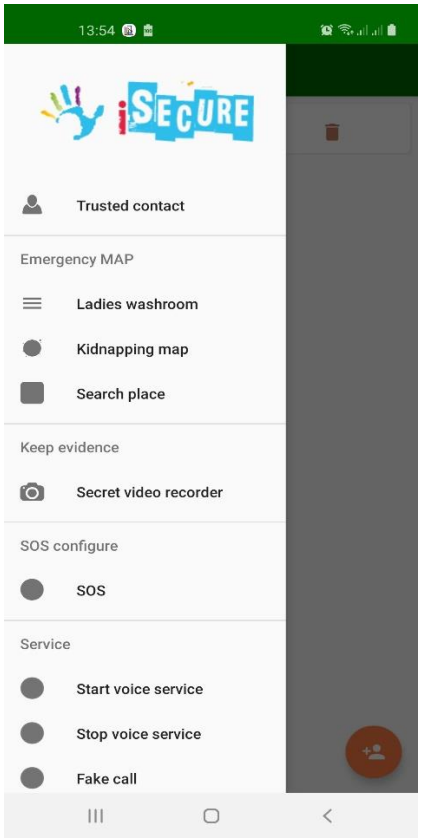
CHAPTER 4

RESULTS AND DISCUSSION

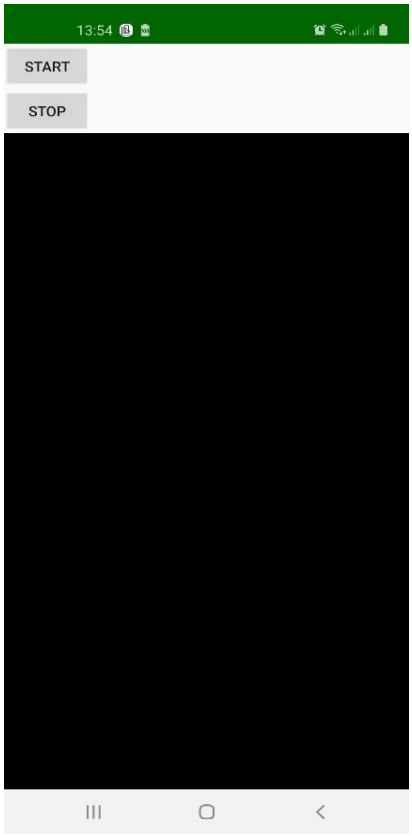
This section discusses three phases. The first phase discusses user interface design, the second phase discusses comparison table, the third phase discuss the system usability scale (SUS), and the four phased discuss the system efficiency testing and analysis.

4.1 System User Interface Design

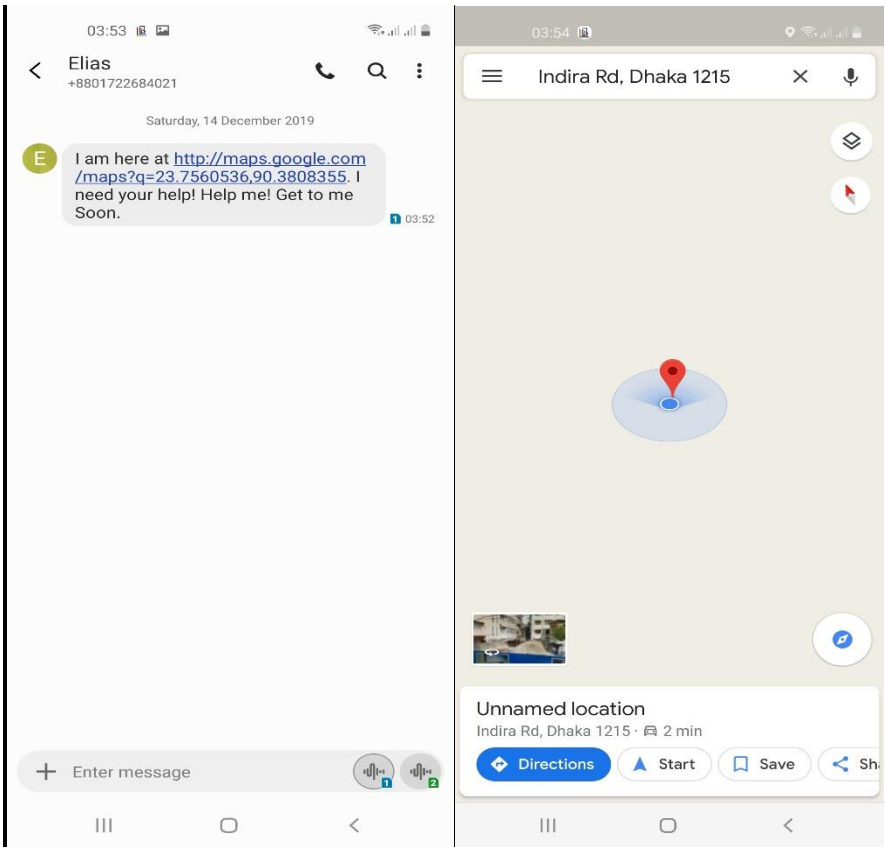
Fig 4.1.1 shows the system user interface design. Figure 4.1(A) shows the app menu page, figure 4.1(B) shows the hidden video recording module interface, figure 4.1(C) shows the message arrive interface, figure 4.1(D) shows the location in map after open the message, figure 4.1(E) shows the nearby place module interface, figure 4.1 (F) shows the fake calling module interface, figure 4.1(G) shows the world kidnapping map, 4.1(H) shows the apps interact with the system.



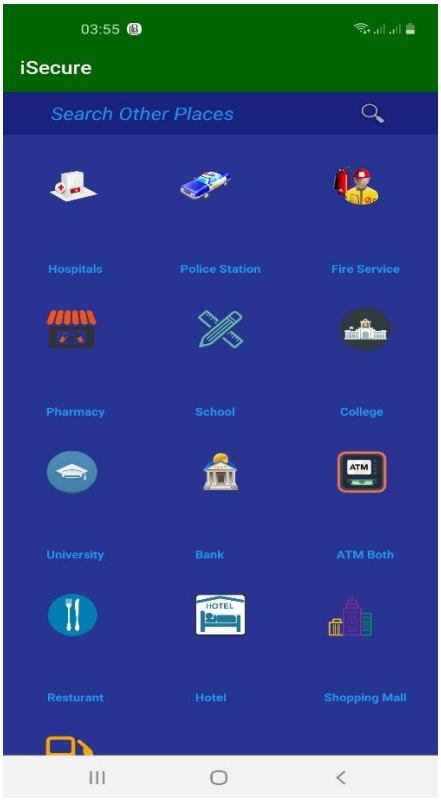
(a) App menu page



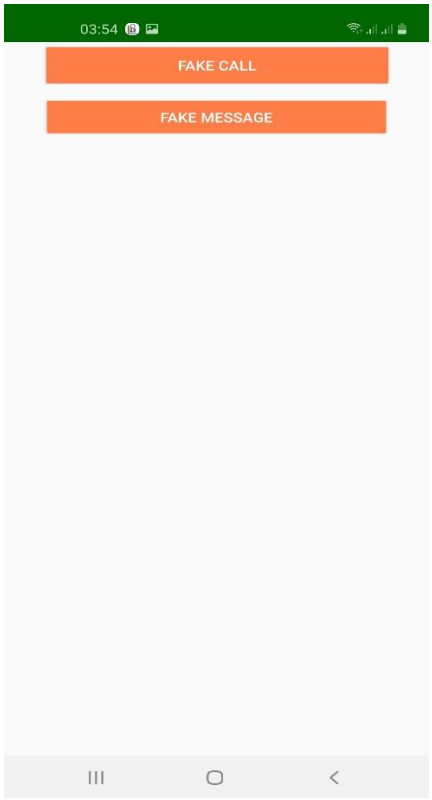
(b) Hidden video recording interface



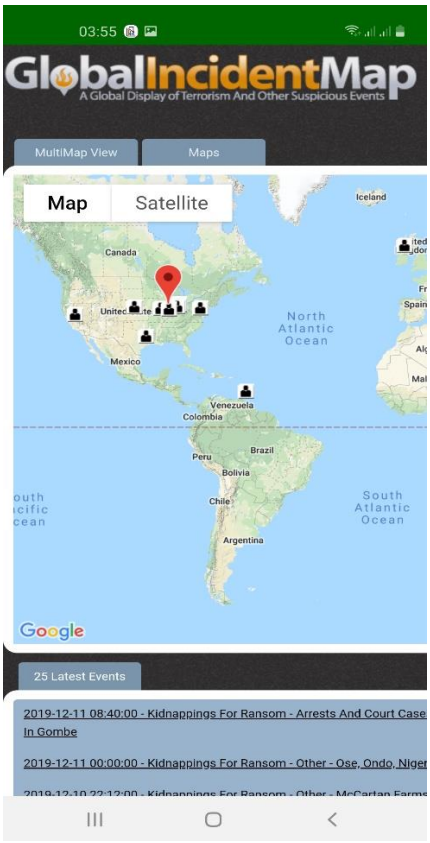
(C) Message arrive (D) Location in map



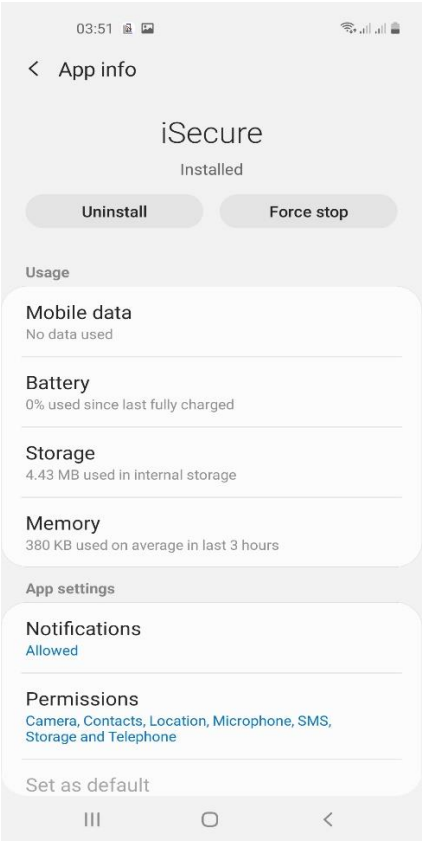
(E) Nearby place



(F) Fake calling



(G) World kidnapping map



(H) App interact with the system

Figure 4.1.1: System User Interface Design

4.2 Comparison Table

The proposed application in this study compares the features of the existing seven mobile applications. Each of the applications is safety and security related. This study compares the features of the existing mobile applications with the proposed system and gives an idea about the existing feature and unique features. The details sequence and consequence are shown in Table 4.2.1

Table 4.2.1: Comparison Table

App name	Platform	Features	Free/Paid	Matches feature
Manifesting mobile application [5]	Android	SOS pressing, Location sending	Free	Yes
Anti-kidnapping [6]	Android	Sending location by phone shaking, SOS pressing	Free	Yes
WoSApp [10]	Android	User notifying current situation to family member by pressing SOS or phone shaking	Free	Yes
Street Smart [11]	Android	GPS Navigation, digital camera, high speed internet	Free	Yes
MeToo [14]	Android	Notifying current situation to family	Free	
Stay Safe [15]	Android	Track current location in the background and sending with image to contact number.	Free	No
Abhaya [16]	Android	Sending current location continuously to the contact number every five minute later. This system continuously sending location until pressing stop button	Free	No

4.3 System Usability Scale (SUS)

The System Usability Scale (SUS) [17] is used to measure the usability by measuring user satisfaction. The complete application is tested by System Usability Scale (SUS) method. It is found that the SUS score of the developed system is 67.22 % which assures

that the proposed system is suitable for use. Figure 4.3.1 shows the SUS score graphical representation.

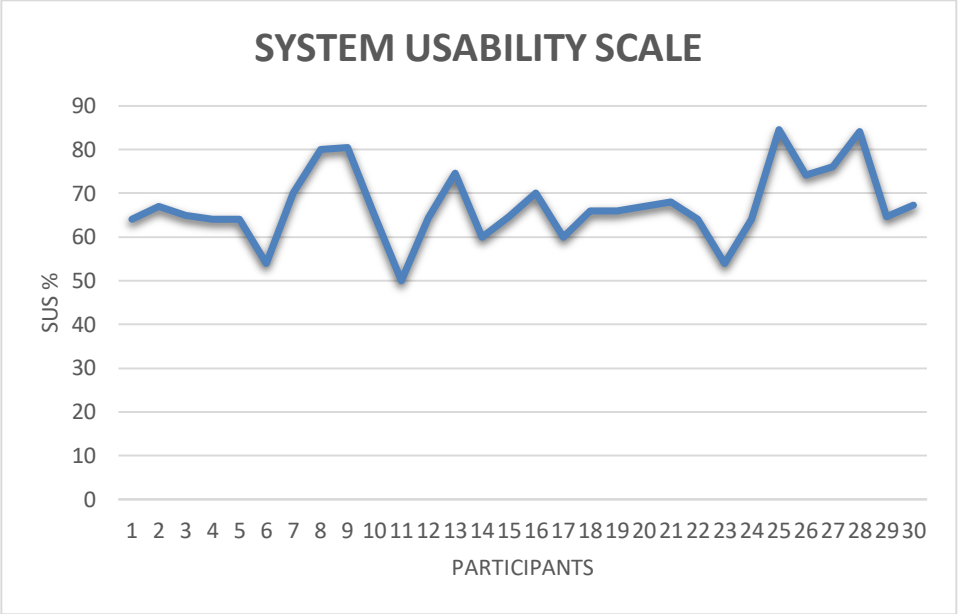


Figure 4.3.1: System Usability Scale

4.4 Testing and analysis

This research also assures the analysis of tested data in the rural and urban areas based on system response time, message and phone calls and the time it takes to reach the users current location. The tested experiment has been done by the SOS and Shaking module, this research found the average response time is 8.439. Table 4.4.1 shows the response time.

Table 4.4.1: Efficiency checking through SOS and shaking module

Experiment No	Performance time (millisecond)	Data arrived distance (km)	Name of the data arrived place
01	5.87	245.4 km	Rajshahi
02	3.98	245.4 km	Rajshahi
03	7.5	333.5 km	Dinajpur
04	6.3	237.8	Khulna
05	12.10	240.5	Sylhet
06	14.88	245.4 km	Rajshahi
07	9.90	245.4 km	Rajshahi
08	7.67	155.7 km	Pabna
09	4.67	333.5 km	Dinajpur
10	9.5	248.4 km	Chittagong
11	6.21	145.2 km	Ullapara
12	5.80	138.7 km	Sirajganj
13	5.89	20.5 km	Uttara, Dhaka
14	16.58	3.3 km	Azimpur, Dhaka
15	11.10	1.4 km	Rayer Bazar, Dhaka
16	7.87	2.0 km	Lalmatia, Dhala
17	11.12	1.3 km	Dhanmondi 32
18	10.19	333.5 km	Dinajpur
19	3.98	138.7 km	Sirajganj
20	7.67	242.6	
Average	8.439	145.2 km	Ullapara

Table 4.4.2 shows the response time comparison with the other existing solution. The proposed system is efficiently tested based on the response time of the system, the time it takes to reach message and phone calls. After data analysis the proposed system assures that this system is faster than other existing solution. Details are shown in Table 4.4.2

Table 4.4.2: Efficiency comparison table

Test No	App Name	Module use	Response time (0.001s)	Response time (0.001s) proposed system	Data arrived distance (km)	Name of the data arrived place
01	Chilla: Women safety app with scream detection	Pressing power button 5/6 times	5.88	5.87	245.4 km	Rajshahi
02	Eyewatch SOS for Women	Pressing SOS button manually	9.12	3.98	245.4 km	Rajshahi
03	Emergency SOS Safety Alert- Personal Alarm App	SOS button pressing manually	8.86	7.5	333.5 km	Dinajpur
04	Be Safe	Shaking the phone	16.48	6.3	237.8	Khulna
05	Raksha	SOS button pressing manually	6.45	12.10	240.5	Sylhet
06	Carelife- Emergency SOS & Personal Safety App	SOS button pressing manually	7.63	14.88	245.4 km	Rajshahi
07	BEAWARE- Personal Safety App	SOS as a phone power button pressing	11.67	9.90	245.4 km	Rajshahi
08	ICE: Personal Safety App	Location share	3.45	7.67	155.7 km	Pabna
09	Mayday Safety	Tap 3 times to alert	8.34	4.67	333.5 km	Dinajpur
10	PROtec	Location share	8.5	9.5	248.4 km	Chittagong
11	GetHomeSafe	Location share	8.67	6.21	145.2 km	Ullapara

12	Baxta-personal Safety Assistant	SOS button pressing manually	9.43	5.80	138.7 km	Sirajganj
13	ICRISIS: Personal safety	Panic button pressing manually	6.75	5.89	20.5 km	Uttara, Dhaka
14	WeHelp-Personal Security	SOS button pressing	9.89	16.58	3.3 km	Azimpur, Dhaka
15	Stay Vigil-Safety App	Panic Button pressing manually	11.23	11.10	1.4 km	Rayer Bazar, Dhaka
16	Joy(Bd) government approved safety apps)	Submit problem	5.57	7.87	2.0 km	Lalmatia, Dhala
17	Report2 RAB (bd)	Report submit	8.39	11.12	1.3 km	Dhanmondi 32
18	Emergency messenger (SOS) service	SOS button pressing manually	11.78	10.19	333.5 km	Dinajpur
19	Emergency Location SMS	One click emergency	8.53	3.98	138.7 km	Sirajganj
20	Call For Help (SOS apps)	Single button click	6.19	7.67	333.5	Dinajpur
Average			8.6405	8.439		

Table 4.2.2 shows the Comparison of efficiency. Average response time for the existing system has found 8.6405 millisecond and the average response time of the proposed system has found 8.439 millisecond. These tests show that the efficiency of the proposed system is faster than other existing solutions. Figure 4.2.2.1 shows the graphical representation of the system efficiency checking.

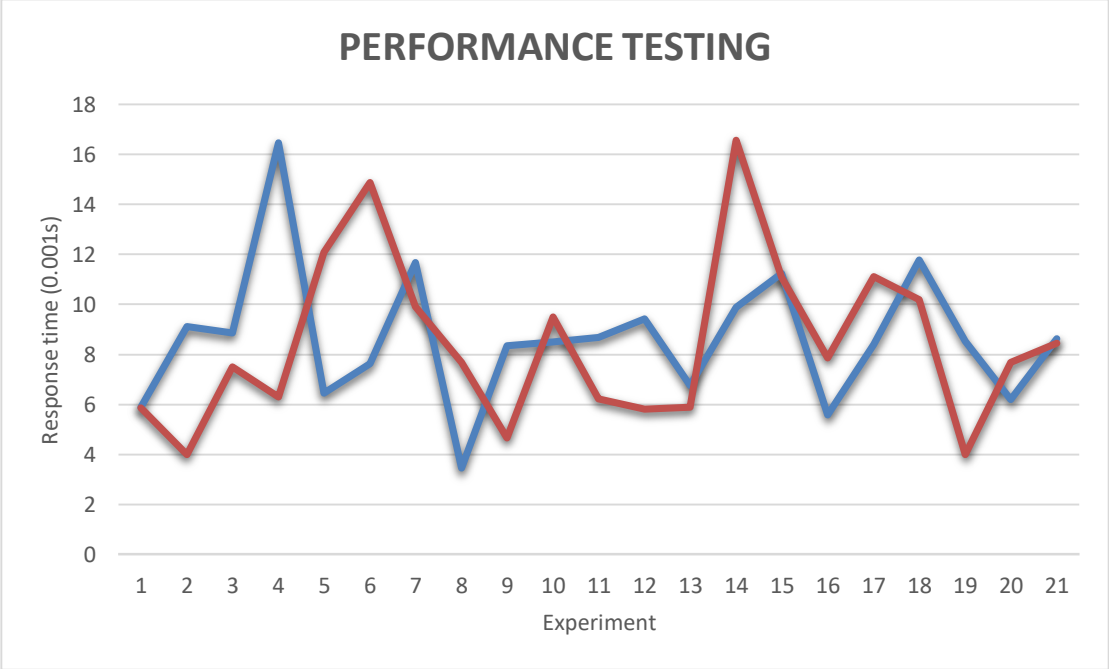


Figure 4.4.2.1: Performance testing graphical representation

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

5.1 Findings and Contributions

The objective of this research is achieved. The proposed system is tested by System Usability Scale (SUS) method. It is found that the overall System Usability Scale (SUS) score of the developed system is 67.22 % which assures that the proposed system is suitable for use. This research also assures that the proposed system is efficiently tested based on the response time of the system, the time it takes to reach message and phone calls and indicated that the proposed system is fasted than other existing systems. There are many safety related applications but no application has all the features. This main contribution of this research is integrating various safety features and ensure safety.

5.2 Recommendations for Future Works

Packages that will be included in this research in the future:

- Integrating crowd module that will help user to find out nearby crowded place.
- Integrating Bluetooth headphone module that will help user used as SOS.
- Can be implemented on IOs platform.

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