

Emergency Push Notification Mobile Application
A Study on Personal Safety Using Mobile Phone and Prototype Design

by

Mior Suffian Thuri Bin Mior Khir

16458

Dissertation submitted in partial fulfillment of the requirements for the

BACHELOR OF TECHNOLOGY (HONS)

(INFORMATION & COMMUNICATION TECHNOLOGY)

May 2015

Universiti Teknologi PETRONAS

32610 Bandar Seri Iskandar,

Perak Darul Ridzuan

CERTIFICATION OF APPROVAL

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Approved by,

(YEW KWANG HOOI)

UNIVERSITI TEKNOLOGI PETRONAS

BANDAR SERI ISKANDAR, PERAK

May 2015

CETIFICATION OF ORIGINALITY

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

MIOR SUFFIAN THURI BIN MIOR KHIR

ABSTRACT

Mobile application has become a mainstream and ideal way for everything. This includes the implementation of mobile application in personal safety purpose. However, the effectiveness of the existing personal safety mobile applications is still questionable. This is because the help requestor still needs to undergo a series of step to request for help even with the use of mobile application. This proves to be time- consuming and inefficient in the kind of situation that involves the victim's life in jeopardy. Requesting for help in such desperate situation such as kidnapping supposed to be quick and effective with most minimum procedure needed for the victim to request for help. Therefore, this research is to solve all the above mentioned problems by eliminating the series of procedure to request for help and in the same time addressing the issues associated with it. To achieve the goal of this research, the author aims to develop a prototype of a personal safety mobile application that addresses the mentioned concerns above. A series of methodology which involves qualitative and quantitative methodology will be executed in light of this research. Together with it, developmental tools of the prototype will be used by the author including Android Software Development Kit among others. The scope is fully focusing on the society of Malaysia as the research methods are executed by survey and other existing issue regarding personal safety among Malaysian citizen. Finally, the end product of this research is a

mobile application prototype that sends help request by the victim to the pre-stored contacts in the mobile application earlier will be developed as the evidence of concept.

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Besides that, I would like to thank all the parties and friends who willing to assist me in completing the research survey and system evaluation. These responses helped me to acquire as much data and information as much as possible. Besides that, without their cooperation, I would not have been able to complete the project.

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CHAPTER 1

INTRODUCTION

1.1 Background Study

On May 27, 2012, the country is rocked by an incident involving a young girl named Chin Xin- Ci. She was the survivor of a horror kidnapping attempt happened in the parking lot of a famous shopping mall in Petaling Jaya, The Curve. She stated that “I found out that the entire ordeal from the moment I left the parking ticket payment machine, to my escape, happened in about four minutes. To me, it felt like one long nightmare” .

The general public does not escape from a variety of security threats, both internal and external. Such threat can cause physical harm, and also death. Among these death causes are heart disease, traffic accident, up to criminal-caused death. Related to this issue, various cautious incentives have been carried out in Malaysia. One of them is the launch of the centre channel of emergency telephone number 999. The use of mobile phone is one application of a good security system safety. By phone, relatives or institution in charge can get more information about the victim, either the current condition or even location.

However, if the victim had an accident while driving a vehicle, or sudden fainting due to illness, or even experiencing a panic attack in the case of robbing or kidnapping, obviously the victim will have difficulties to provide emergency news by phone or SMS. When this process is delayed, the victim will be too late to be helped, and the longer the response time of the help will worsen the condition of the victim. Therefore, this project will develop a personal emergency situation triggering system on

mobile application, which will trigger the pre-registered number(s) in the application about their location during when the emergency incident takes place.

As the technology advances, it offers alternative, and solution began to appear. One of the suggested technologies is a personal emergency situation notification mobile application. In any development of mobile application, user – friendliness and effectiveness of the mobile application towards the user is the ultimate objective of any mobile application. In this project, user- friendliness would mean the minimum procedure for the user to activate the personal emergency situation triggering system on his/her mobile phone/smartphone. Whereas, from the aspect of effectiveness, our objective is to make sure that once the emergency request has been sent, it would very useful information for the relatives or institution in charge to take action based on the valuable information(s) collected by the mobile application.

With this application, then the public can send emergency messages easily to family, friends, or any other institution in charge. Hence, the application will assist the evacuation in knowing the position and shape of threat experienced by the sender. In the end, this application is expected to contribute practically to the community, with a means of rapid communication during critical situations. And this application is also expected to contribute to the authorized agencies to support emergency assistance services that already exist.

1.2 Problem Statement

When confronting a potential life- threatening situation 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. In light of rapid concern of safety issue, mobile apps implementation may be extended into personal safety procedures.

1.3 Significant of Project

This project is to bring positive implications to the society in the issue of requesting for help during critical or emergency situations. Users will experience a more effective and

faster way of requesting for help by using this mobile application as it implements to most minimum procedure for help requesting by using mobile devices.

1.4 Objectives of Study

The objectives of this research are:

- To study on the existing mobile- application for personal safety features.
- To propose the design of a personal safety mobile application as the result of this research.
- To carry out the study on the effectiveness of smartphone towards the purpose of personal safety.

1.5 Scope of Study

The focus of the research will be the:

1. Existing problem faced by mobile user to request help when in need.

As stated in the Introduction of the study, victims of a criminal situation have problems of requesting help during these situations. Without the ability to think fast, the victim would be unable to think of any relevant way of escaping the potentially life threatening situation. Calling for help using the mobile devices would be almost impossible if the victims were involved in a kidnapping situation. Therefore, this study will be focusing on the solution for requesting help during these critical situations.

2. Users' perspective regarding the implementation of mobile application towards personal safety.

With the significant rise in technological development of mobile application, the author will take a closer look regarding the implementation of mobile devices in the issue of personal safety. This initiative will make use of the data collected via the literature review and other research methodology planned later for the research process.

3. Review and analysis of the existing mobile application for personal safety purpose.

The author will also focus on identifying the essential attributes for a personal safety mobile application to be effective towards the user and compare the

proposed idea of the study with other related studies of the implementation of mobile application toward personal safety.

1.6 Relevancy of Study

The study is relevant from the aspect of:

1. The user

The most affected party by the implementation of the mobile app would be the user. In other words, the help requestor. When the user activates the app, the emergency message will directly be sent to the preferred contacts of the user. This would enable the receiver of the message to take immediate action after being notified by the message.

2. The message receiver.

Once the message is received, the receiver will immediately know that the victim (user) is in danger. Therefore, the receiver can take relevant actions towards helping or rescue the user from the danger of the critical situation.

3. Towards technology

The rapid development of mobile technology has triggered many useful applications in humans' life. Whether it is from the aspect of social networking, e-commerce, and other areas. Therefore it is appropriate and necessary for personal safety to be enhanced with the optimization of mobile application.

1.7 Feasibility Study

From the aspect of technical feasibility, the study would involve developing the mobile application once thorough research procedures have been executed in order to identify the crucial requirements of the proposed solution which is; mobile application.

Considering from the aspect of economic feasibility, the cost of developing the mobile application would be subsidized by the university within the expense range of RM 500.00. Therefore, the author is confident it would be a sufficient amount for this study.

Whereas, from the aspect of time feasibility, FYP1 would only involve the research aspect of the study and FYP2 would be the development phase of the mobile application and testing phase of the software. Therefore, the author believes it would sufficient to complete the study.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction to Safety.

In London, UK, the Women's Design Service, has created Making Safer Places procedure in Bristol, Wolverhampton, London and Manchester, applying a protocol named 'fear-o-meter' to explore what causes women terrified(Whitzman, Legacy et al. 2013). By applying highly participatory equipment, the women held a survey of their domestic neighbourhood, estate and playground to identify the characteristics of the physical environment that requires improvements. For example, locating and re-locating vegetation, rerouting roads and building fences.

The existing environment of our society could be improved more in order to tackle the problem of public safety as well as personal safety. We cannot deny that the abandoned infrastructure that we have in our cities as well as the rural areas are the area that should be focused on and be improved so that these locations would not be an attraction for crime activities to happen.

Technological exploration have enable humans to explore the type of technological security devices currently in exist that will enable a person or an organization to effectively improve the capabilities of any security plan(Katz and Caspi 2003). Nowadays, there are devices of such specifications exist to the public market as to near confirming that it will be impossible to have access to a secured facilities without being detected and effectively intercepted before any crime occurs (Katz and Caspi 2003).

The optimization of technology usage should be implemented and growing in the aspect of public and personal security as we are moving towards in the era of globalization. This is crucial as the risks of security in every aspects of our life are in jeopardy as we move forward in the globalization timeline.

Study on crime statistics has proved that crime occurrence is not simply an event where criminals live but also reflects the focus of chances for crime to happen. Crime tend to be happening more in some places or “hot spots”, theft is increasingly focused on specific hot products, and some repeat victims are tend to be experiencing crime than other people (Roberson and Birzer 2010). They also propose that assessing opportunities that specific environment encourage for crimes to happen, can go a long path in prevention efforts.

As the saying goes, “Prevention is better than cure”, the law enforcers should really consider the implementation of technology in preventing crime. This could benefit the law enforcers in terms of their duties as it would be potentially efficient and effectively improve the result of crime prevention.

Disaster management is generally understood to consist of four phases: Mitigation, Preparedness, Response and Recovery (Zlatanova and Li 2008). Mainly, preparedness emphasizes on regular preparation within the law enforcers and rescue forces (e.g., police, ambulance, fire) for emergency situations. While all phases are inter connected and crucial, the response and recovery phase phases are regularly seen as the most critical from the aspect of saving lives.

Therefore, the law enforcers should really emphasize on responding the calls from the crime victims as soon as they received the call. Critical times such as this should be tread carefully and as fast as possible in order to reduce the after effect of a crime towards the victim(s) who have made the call.

One widely used concept in emergency response is that of the event timeline. This describes the sequence of incidents, emergency calls, responses, and actions etc. which occur during an event(Sene 2008). Timelines are used in post event assessment of response, and may also be available in real time to assist other responders in understanding the situation.

One matter that we can all agree upon is regarding the emergency responses of our law enforcers. Emergency response should always take the least time that they could so that the victims of crimes could be save from further harm from the already happening crime during the emergency situation. To keep Citizens safe, city police departments are

constantly looking for an edge to make themselves faster and more responsive in the face of criminal activity(INFOHOWN 2012).

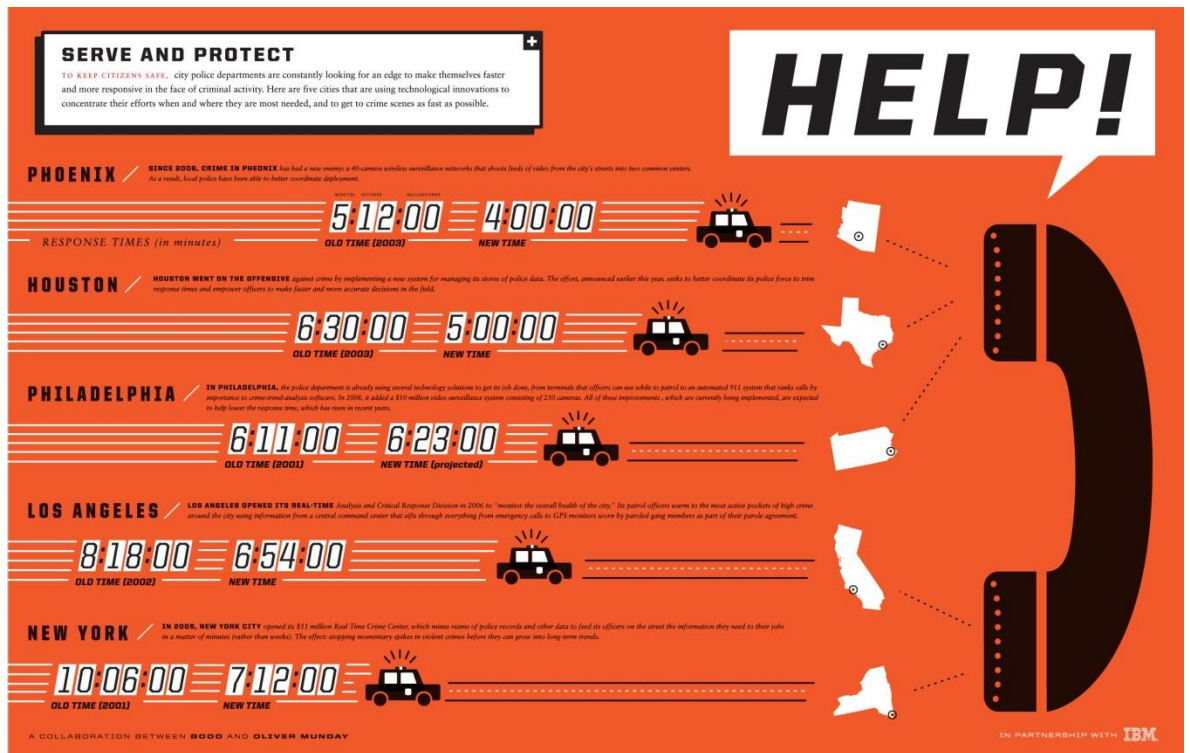


Figure 1: Statistics of emergency response time in cities in U.S.A (INFOHOWN 2012)

2.2 The Implementation of Mobile Application in Personal Safety

For a personal safety mobile application to be effective, it has to be user- friendly, and the triggering time of the request for help has to take the least time, (P.Kalyanchakravarthy, Lakshmi et al. 2014). They further discuss on the matter that this particular feature has to be made as the crucial feature so that the emergency parties could avoid arriving late at the crime spot and thus hindering emergency help.

Therefore, this specific aspect of the mobile ‘apps’ should be taken in consideration and be made as the main goal of any personal safety mobile ‘apps’ because a crime or emergency requires help from people as fast as possible. Besides that, to avoid further harm to the victim, the emergency response by the law enforcers and other emergency institution could be improved with the existence of this mobile ‘app’.

Research has proved that, the use of mobile devices have significant impact on the duty of the law- enforcers, (Straus, Bikson et al. 2007). Moreover, the recent generations of information & communication technologies will assist the spread of technological implementation to fulfill the requirements of emergency responses and also other professional fields than the law enforcers. Therefore it is required to learn about the recent launch of technology in the field of safety to assist potential implementation and usage.

In today's world, technology has become the most significantly developed field and it is normal for some of the industries including the security industry to implement and optimize the usage of technology to become more efficient and effective in terms of what they supply to the public, which is the tool for private (personal) security.

It is very important for the public to optimize the usage of the mobile devices in emergency situations because it would help the law enforces to extract the necessary information(s) needed for the necessary action to be taken, (Erickson, Weinert et al.). According to (Columbia 2015), the essential information when one makes a phone call to report a crime are contact number, location where the crime took place and the description of people involved in that particular crime.

In order to ease the emergency help protocol, the law enforcers would need any useful information(s) regarding the situation of the emergency, so that necessary help could be delivered to be more effective. Moreover, with this information, the emergency response could plan additional emergency help to be delivered to the incident scene so that further harm and trauma towards the victim could be avoided.

When a victim of an emergency or criminal activity is struggling to request for help in the situation, the process of requesting help is delayed, and the victim will be too late to be helped, if it takes a long time and the longer the response time of the help will worsen the condition of the victim,(Wijaya, Setiawan et al. 2013). Besides that, delayed response from the law enforcers and emergency help could result in a more severe harm to the victim of crime(Wijaya, Setiawan et al. 2013).

An instant response by the law enforcers towards delivering help during emergency could be a major factor avoiding potential harm towards the victims. For an

effective emergency help to occur, emergency institutions have to be prepared all the time in the case of any call from a potential victim.

In a research by (Westmarland, Hardey et al. 2013), they explore the significance of smartphone usage in relation to domestic and sexual violence behaviour. Their findings concluded that, most of the existing personal safety mobile ‘apps’ has a quite similar main functionality which was built on system architecture with a form of ‘panic button’ in their respective ‘apps’. Moreover, based on their tests, they found the benefits of information and proof gathering capabilities and their value towards the law enforcers once the law enforcers have received them.

With the significant advancement of smartphone technology nowadays, ‘apps’ developers should consider exploring more potential of smartphones towards the personal safety aspect. Besides that, ‘apps’ developer should make use and optimize the existing functionalities in the smartphones or mobile phones such as the GPS function, camera, audio recorder, and etc. and implementing these functionalities towards the objective of personal safety.

While women regularly become the victim(s) in criminal situation, (Mandapati, Pamidi et al. 2015), gender shouldn’t be the argument in the case of personal safety. Crime and disaster happens to everyone without considering which gender they are.

Besides that, not only women and men are affected with personal safety issues, children and golden ages society are too affected by this issue. Therefore, we should always consider every level of the society when discussing the matter such as this.

As stated by (Ramalingam, Dorairaj et al.), security threat can occur anywhere at any time. Therefore, it is important for people to be prepared in case of anything bad should happen to them. In terms of preparedness, pepper spray and stun gun is a good example of self- defense tools that have been implemented for quite some time, but the usage of mobile phones in terms of personal safety is not very regularly heard of.

These statements are pivotal in ensuring that the aspect of personal safety should be taken in consideration heavily by everyone for them to realize the importance aspect of preparedness towards crime and the potential of mobile phone usage in the terms of ensuring personal safety in the modern era.

The objective for each location based information system is: “To assist with the exact information, at right place in real time with personalized setup and location sensitiveness” (Kushwaha and Kushwaha 2011). The research regarding location based services emphasizes on the need of accessing the essential information of potential threats such as seeing a suspicious car that has been reported missing and the ability to check the legitimacy of the car in a trusted public database.

Further application of location based services can be potentially implemented in the case of personal safety issue. Law enforcers could benefit the information of the exact location which the is sent by the victims and plan ahead on which emergency help could be used can effective to response to the emergency requests.

Another in built functionality of most smartphones in the market is the accelerometer. Android proved to be a versatile processing system which allow us to manipulate various in built feature of an Android mobile which can be developed into various applications in life (Nirbhavane and Prabha 2014). The growing displays and internet connectivity also makes these phones excellent sinks of just-in-time information, including information from other sensors deployed in the infrastructure (Yu, Bamis et al.).

As mentioned in earlier paragraph of this section, manipulation of in built functionalities in smartphones should be a major development effort for any ‘apps’ developer. This is because, it would be a waste if these in built features are not being enhance further as it would bring so many benefits to the society including in the aspect of personal safety.

CHAPTER 3

METHODOLOGY

3.1 Qualitative Research Methodology

The qualitative research methodology is chosen and implemented by the author for the purpose of this study:

1. Review existing study by other researchers

Several journal articles, newspaper articles, and books were referred in this study to get a clear and more in depth knowledge regarding the subject mattered. This approach is necessary for the author to determine whether the chosen topic of study is feasible or not.

3.2 Quantitative Research Methodology

Besides that, quantitative research methodology is also implemented by the author for data gathering purpose for this study:

1. Surveys

A set of questionnaires were made to collect the necessary data on the opinions of the public towards the matter regarding the use of mobile application ('apps') towards the personal safety. This approach is a logical step to identify the opinion of the public (selected respondents) regarding the subject mattered. The approach is also an effective way for the author to come out with a conclusion towards the completion of the study.

3.3 Comparative Research Methodology

The comparative study is executed and defined by two categories:

1. Comparative study between existing researches.

Three journal articles regarding the study of personal safety and mobile application have been selected for further analysis. These journals are carefully read and analyzed by the author to gain information regarding the subject matter. In the end, the author came up with a table to display the different attributes from these selected journals.

2. Comparative study between existing personal safety mobile application.

Three existing mobile applications for the purpose of personal safety have been selected for the comparative study procedures. Since the study focuses on Android mobile application, these three existing mobile application is selected from among the highest counts of download by the users that have downloaded it from the Google PlayStore and use it in their mobile devices and also from the aspect of relevancy towards personal safety.

Author/Title	A Mobile Based Women Safety Application- I Safe Apps (Mandapati, Pamidi et al. 2015)	Android Based Safety Triggering Application (P.Kalyanchakravarthy, Lakshmi et al. 2014)	Personal Safety Triggering System On Android Mobile Platform (Ramalingam, Dorairaj et al.)
Operating System	Android	Android	Android
Safety features	In proposed system, with the push of one button, people can alert selected contacts that the person is in danger and share location.	The user can directly press the power button and thereby, popping up an alert screen and user can directly click the safety triggering button to trigger the application, sending the location (latitude & longitude) to all pre- registered phone numbers in the application.	When the emergency button is pressed, the application senses that user is under security risk and waits for the user to press the send button. If the user is not interactive to press the button after pressing the emergency button, the system automatically counts down for 14 seconds and then starts to get the location information which contains the latitude and longitude coordinates. Subsequently, the latitude and longitude coordinates are converted into city and country location information, this is sent via SMS, email
Unique suggestion(s)	First- aid measure/ guide during emergency situation.	Once the user click on the alert button, it continuously send updated locations messages to all authorized persons and the user can stop it using password.	The emergency message will also be posted on Facebook wall of the registered user

Table 1: Comparative study of selected journal articles




Mobile Application			
Name	bSafe - Personal Safety App	Family Locator	Personal Safety Family Locator
Main feature	-Alert button will directly alert your friends & family that you need help.	-View the real-time location of Circle Members on a private family map that's only visible on Family Locator	-Family real-time Location tracking (Family Locator)
Runs in Background	No	No	-No
System Requirement(s)	-Global Positioning System (GPS), -Instant Messaging -E-mail of message receiver -Alert message receiver must install the same application in their devices.	-Global Positioning System (GPS), -Instant Messaging -E-mail of message receiver	-Global Positioning System (GPS)
Procedure to activate application	-Unlock mobile phone -Activate GPS -Touch application icon to activate application -Tap "Alert Friend" button to send emergency alert.	-Unlock mobile phone -Activate GPS -Touch application icon -Tap "Panic " alert button to trigger the application to send emergency message.	-Unlock mobile phone -Activate GPS -Tap application icon -Push the alert button to send emergency alert to pre-stored contacts

Table 2: Comparative study of existing personal safety mobile applications and proposed mobile application

3.4 Development Methodology

The development methodology that is going to be implemented for this study is the Rapid Application Development (RAD) methodology. RAD is one of the alternative methodologies under the System Development Life Cycle (SDLC). The RAD methodology enables the project to enhance, altering as newer project requirements are to be added. The RAD methodology is believed to be more flexible than the traditional waterfall methodology, thus becoming the standard of today's software engineering development process (TDAXP 2007). There are four level of development in this methodology which is Planning, Analysis, Design and Implementation. The development model is further illustrated in the figure below;

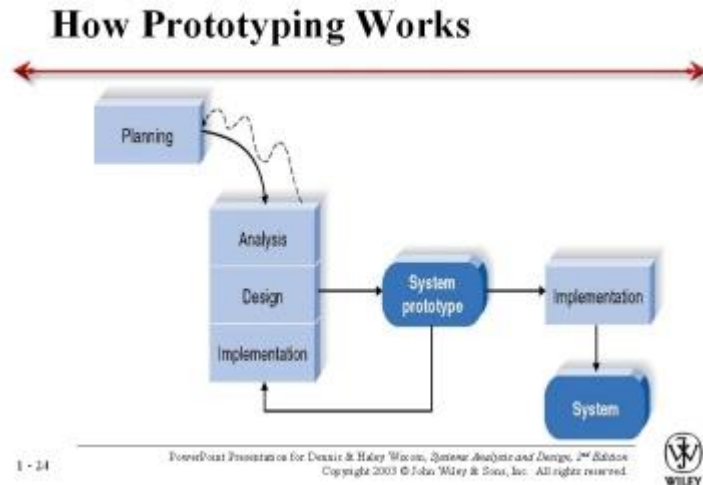


Figure 2: Rapid Application Development (TDAXP 2007).

1. Planning phase

On week 2, the author has submitted the proposed project title together with the brief description of the project title. Afterwards, the author is being assigned to be under the supervision of the selected supervisor for the rest of FYP 1 and FYP2. Proceeding with the successful project title, the author has engaged with the assigned supervisor to further discuss the potential development procedures to be done, background study, objective, etc. to get a clearer understanding as a result of discussion with the more experienced supervisor. Besides that, in this phase the author has to collect the relevant information to fulfill the requirements by the user of the project. Studies and research regarding the subject mattered to

the project is executed by referring to the journals, libraries, and other sources of information available. Literature review should be conducted and written with the correct citation so that the author could determine whether the project is feasible or not. If the feasibility level of the project is unachievable, the scope of the project should be reviewed by the author with the help of the supervisor.

2. Analysis Phase

In this phase, the author is going to collect the information regarding the problem statement that has been determined in the planning phase, from the perspective of the public (potential user). This step is crucial to identify the requirements of the system. This is done by distributing a set of questionnaire to the public which consist of questions with regards to the project's objective and solution. Besides that, interview session with the necessary party involved in the field of safety/security is to be conducted during this phase. Then, the author is required to analyze all the collected information and data to extract the requirements of the system for further reference in the design and implementation phases.

3. Design Phase

Analysis of the data that have been collected during the previous phase are classified and further analyzed to come up with suitable system architecture. The system architecture will be supported by other tools of system architecture (use-case diagram, activity diagram, etc.) that will help to portray the system. The design will be shown and reviewed by the supervisor and further discussed to carefully decide on the final architecture so that it will positively affect the stakeholders. Towards the end of this phase, the author is required to submit the analysis and design phase of the project development as the requirement for FYP 1.

4. Implementation Phase

For this phase, it is required to build the mobile app based on the designs that have been determined in the design phase. Key deliverables in this phase is the functionalities of the mobile app. When the mobile app development is completed, the deployment of the mobile app should be executed to the user. In the same time, usability testing will undergo during this procedure. At this stage,

any flaw (bugs) in the mobile app is to be detected and fixed. With the implementation of RAD methodology, the author should focus on the analysis or design phase to fix the bugs.

3.5 System Architecture Design

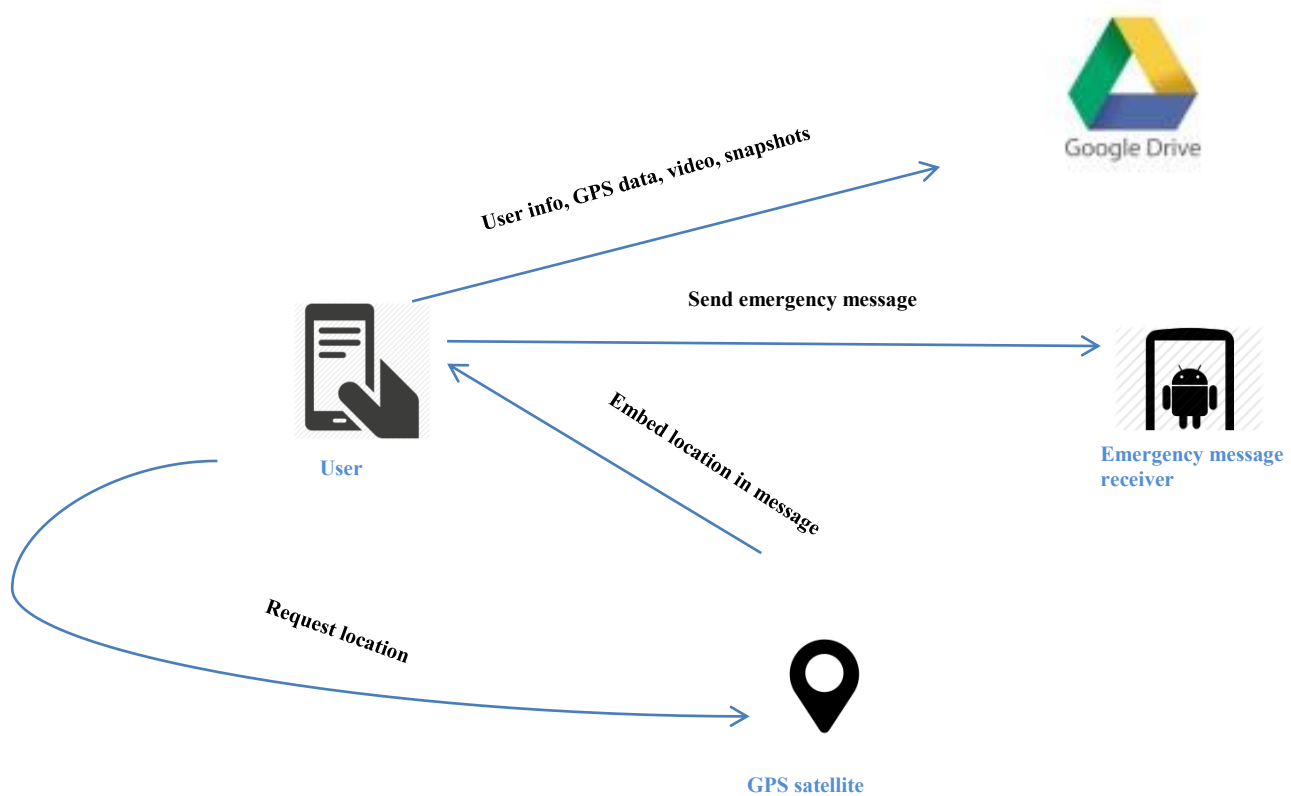


Figure 3: System architecture design

Figure above displays the system architecture of the mobile app. For the user to use the app, it must be downloaded and installed in his/her respective smartphone. Initially, the user needs to register their personal information and will be stored in the app's cloud storage. When the app is activated, the GPS feature of the smartphone will track the current location of the smartphone. Then, the location data is embedded in the emergency message before it is sent to the pre stored safety contacts. Simultaneously, all of the data recorded by the GPS, video recorder and camera will be stored in the app's cloud storage.

3.6 Use Case Diagram

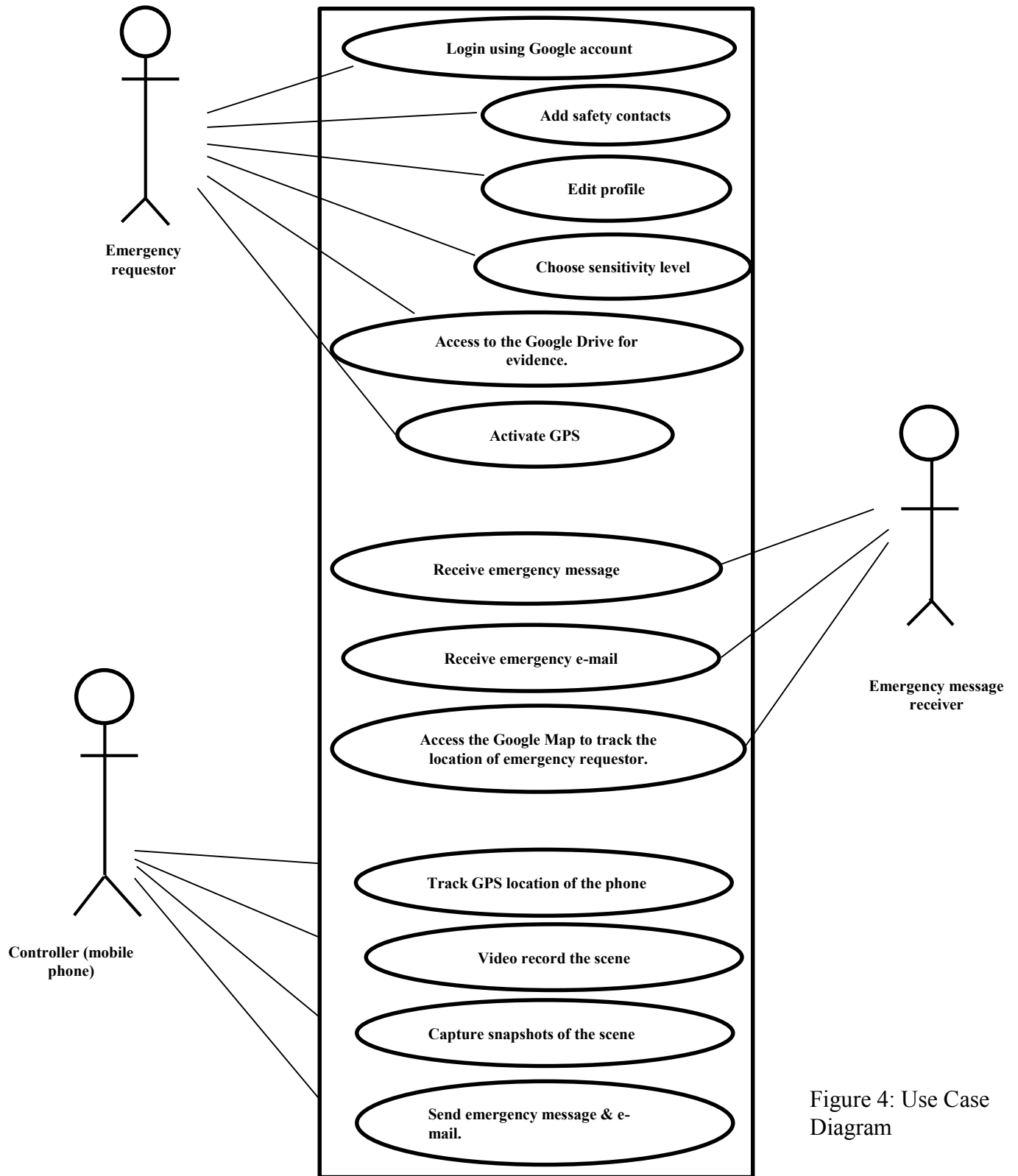


Figure 4: Use Case Diagram

3.7 Activity Diagram

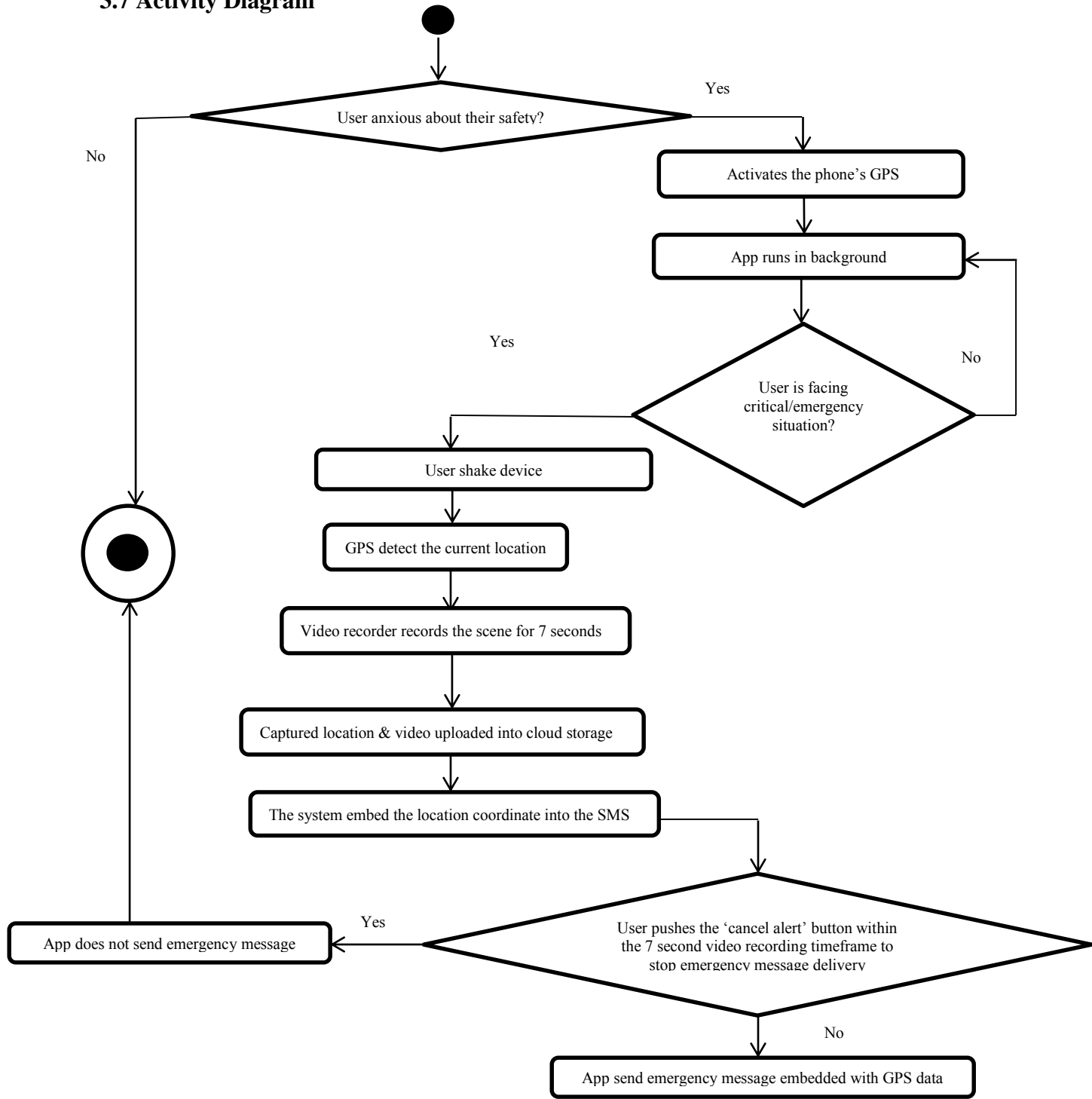


Figure 5: Activity Diagram

Figure 6 shows the process when the user is in the situation of emergency. The app is already run in background, meaning it does not need to be activated by the user via pressing the app's icon. If the user is anxious about his/her safety before travelling somewhere, they just need to activate the GPS of their smartphone. Therefore, if the user is really in danger or an emergency/crime victim situation, the user has to simply shake the mobile phone.

Simultaneously, the video recorder and camera are in ready mode and ready to execute. These data collected by the GPS and camera will be stored in the user's Google Drive once the data collection is completed. Next, the user would have the choice to send the emergency message embedded with the GPS information to the receiver, or to cancel the emergency message delivery in case the user is no longer in danger. The application will always be running in background once the GPS feature of the mobile phone is activated.

Why Google Drive?

Google Drive is a free service from Google that allows users to store files online and access them anywhere using the cloud. Google Drive also gives us access to free web-based applications for creating documents, spreadsheets, and more.

Google Drive is one of the most popular cloud storage services available today, offering 15 gigabytes (15GB) of free storage space. Because files can be accessed from any computer with an Internet connection, Drive eliminates the need to email or save a file to a USB drive.

Therefore, in the case of any emergency, the informations (coordinate and video that has been collected by the phone via the usage of the mobile application will be automatically uploaded into the site. Allowing the user (victim) of the emergency to make use of these informations in the future to help them improve their personal safety aspect. Hence, the collected informations, or as we call it evidence, could become a useful element for the victims and also the law enforcers to investigate further the emergency event.

Finally, the most essential justification of implementing cloud based storage is to make sure that the informations collected by the smartphone can be accessible and viewed by the user even if their smartphone is stolen/ damaged during the emergency.

3.8 Requirements Analysis and Specifications.

After the analysis of data has been done, the author has identified the prototype's requirements which are divided into functional and non- functional requirements as shown in the Table below:

Table 3: Functional Requirement #1

Function	Storing the user's profile
Area	Functional (User)
Description	Upon registration, the mobile application should be able to store all the details of the user that has been inserted by the user.

Table 4: Functional Requirement #2

Function	Ability to login as first time user using the user's existing Google account.
Area	Functional (User)
Description	The user is automatically logged in as a first timer using their own Google account

Table 5: Functional Requirement #3

Function	Ability to add preferred contacts
Area	Functional (User)
Description	The application should be able to store the preferred contacts of the user to up to 10 contacts.

Table 6: Functional Requirement #4

Function	Ability to store the chosen level of shake sensitivity of mobile phone
Area	Functional (User)
Description	The application should be able to remember the cosen level of sensitivity chosen by the user to trigger the applicaion.

Table 7: Non- Functional Requirement #5

Function	Operates in Android-based platform
Area	Non- functional (User)
Description	Android is chosen as the development platform because it is more significant compared to other OS

Table 8: Functional Requirement #6

Function	Ability to backup data
Area	Functional –Security (user)
Description	The database is design to store the details inserted by the user and should be able to provide data backup with the implementation of cloud storage.

Table 9: Functional Requirement #7

Function	Ability to run in background
Area	Functional (User)
Description	The application should run in background once the configuration of it has been completed by the user.

Table 10: Funtional Requirement #8

Function	Ability to automatically activate the video recorder.
Area	Functional (User)
Description	The application should automatically trigger the video recorder and record the scene for 7 seconds.

3.9 Gantt Chart

Task	Weeks																											
	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	
Planning phase																												
Identify problem	█																											
Study feasibility	█																											
Study the background	█	█																										
Approval of project title			█	█																								
Literature review			█	█	█																							
Extended Proposal Submission					█	█																						
Analysis phase																												
Distribution of questionnaires						█	█	█																				
Data tabulation									█	█																		
Analysis collected data									█	█																		
Design phase																												
Process modeling									█	█																		
Design & sketch the interface										█	█																	
System Architecture Design										█	█																	
Interim Report											█																	

3.10 Key Milestones

Table below shows the milestones of this study:

No	Deliverables/Activities	Schedule
1	Title Selection and Proposal	Week 2
2	Project Approval	Week 4
3	Problem Identification and Feasibility Study	Week 5
4	Extended Proposal	Week 6
5	Requirements Gathering	Week 8
6	Process and System Modelling	Week 10
7	Interface Design	Week 12
8	Interim Report	Week 12
9	Proposal Defence	Week 14
10	Architecture and System Design	Week 15
11	System Complete	Week 17
12	Progress Report	Week 20
13	Usability Testing	Week 21
14	Pre- Sedex	Week 24
15	Viva	Week 27
16	Final Dissertation	Week 28

Table 12: Key milestones

3.11 Tool and Equipment

Hardware

- ASUS laptop for software IDE installation platform
- Android Smartphone (OnePlus One) for mobile application testing.

Software

- Android Studio that support Java, web-application development language and other programming language.

Programming Language

- Java will be used to develop the mobile application for the user.

CHAPTER 4

RESULT AND DISCUSSION

4.1 Results and Findings

Based on the research methodology that has been conducted, the author has set the goal to achieve the following output for the research execution:

Author/Title	Emergency Push Notification Mobile Application- A Study on Personal Safety Using Mobile Phone and Prototype Design (Mior 2015)
Operating System	Android
Safety Features	The application will run in background. Once the user triggers the application by shaking the device, the application will activate the GPS and tracks the location of the phone. Simultaneously, video recorder and camera will be in ready mode to record and snap pictures during the critical event. During the process of data collection by the GPS and camera, the data will immediately be stored into the cloud storage and not into the phone memory.
Unique suggestions	-Application will run in background. -All recorded data will be stored in cloud database and could be used as evidences. -Video recording.

Table 13: Output of the research

Whereas, for the proposed prototype development, the author aims to achieve the following goals:


Mobile Application	
Name	SaveMe
Main feature	Once triggered when the user shake the device, the app will immediately alert your friends & family that you need help with location data.
Runs in Background	Yes.
System Requirement(s)	-Global Positioning System (GPS), -Instant Messaging -E-mail address of message receiver
Procedure to activate application	-Shake the device to the level of shaking sensitivity that has been determined by the user.

Table 14: Expected features of prototype

4.2 System Interface Design for Prototype of the Proposed Mobile Application

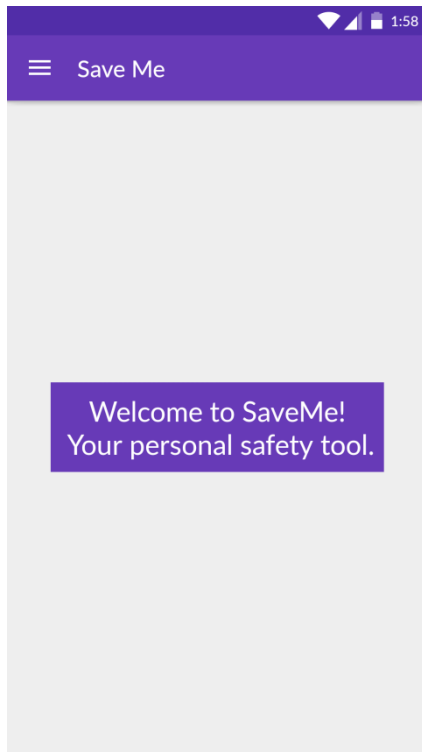


Figure 6: Main page

The figure shows the interface of the app once user has downloaded it and activates it for the first time. The user will be logged in using their existing Gmail account.

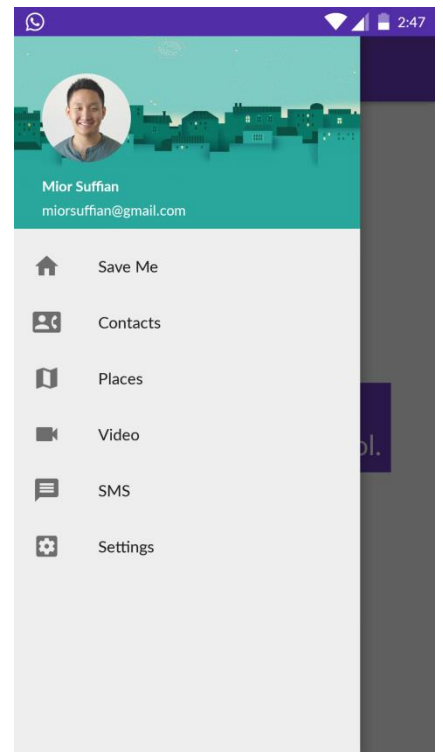


Figure 7: Menu Tray

After successful login, the app will configure itself to integrate with the user's Google Account, thus sync itself to the Google Drive.

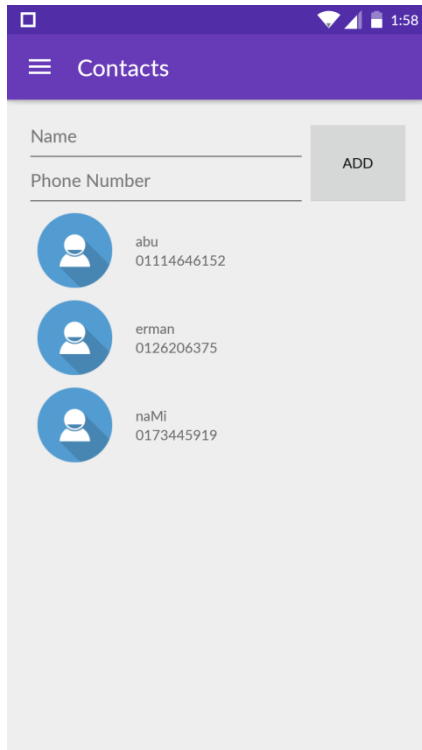


Figure 8: Add Contacts

The user then is required to save their emergency contacts to up to 10 contacts. These contact(s) will be notified simultaneously when the user triggered the emergency request.

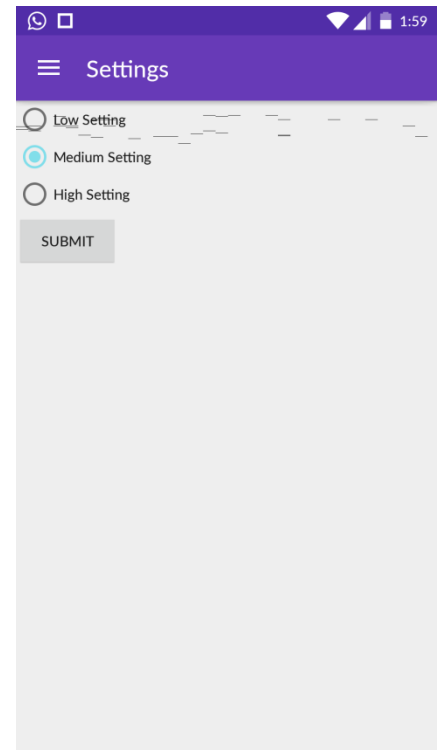


Figure 9: Setting Page

The figure shows the interface of the app for the configuration of the app. In this section, the user is required to choose the sensitivity level of device shaking. This is a crucial part because it determines between the shaking level of a genuine emergency request and an unintentional request.

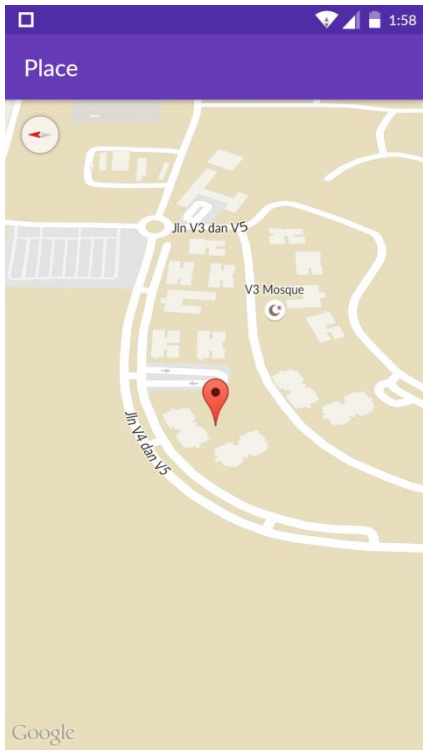


Figure 10: GPS detect location

When the GPS feature of the phone is activated by the user, the app will be running in background. Therefore when the phone is shaking, it will trigger the app to automatically detect the user's current location.

The coordinate of the GPS will be embedded in the emergency message later on.



Figure 11: Cancel Emergency Message Delivery

Once the user's current location is detected, the app then automatically trigger the video recorder of the phone and records the scene for 7 seconds. Within the 7 seconds of video recording, the user will be given the option to cancel the delivery of emergency message to pre- stored contact in case of a 'false alarm' situation.

After the process of location detection by the GPS feature and video recording by the camera, this collected information will be uploaded into the user's Google Drive site.

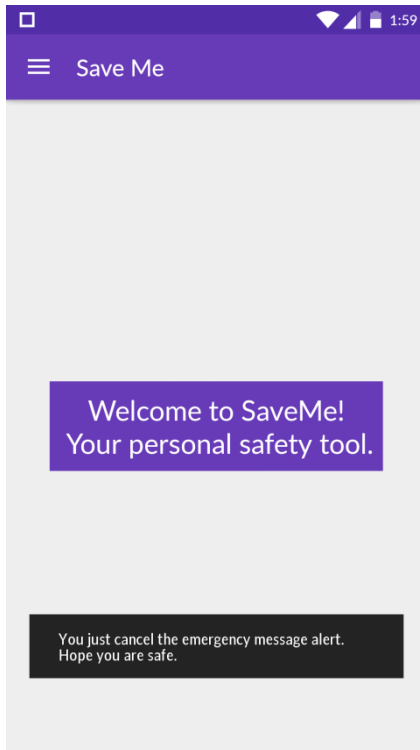


Figure 12: Notification

Once the user has cancelled the delivery of the emergency message, the app will notify them.

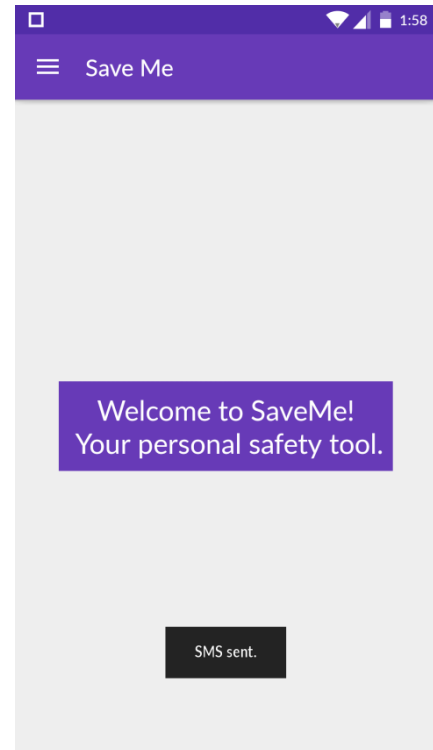


Figure 13: Notification

After successfully delivering the emergency message, the app also will notify the user. Embedded in the emergency message is the coordinates of the user's current location. Therefore, the message receiver will react to the request by arriving at the emergency scene to help the victim.

4.3 System Testing

The purpose of the system testing is to check the functionalities system. Table 11 shows the functional testing of the mobile application.

Component	Expected Function	Testing Frequency	Testing Results		Remark
			Success	Failure	
Side tray for menu	Slide according to user's desire	20	20	0	
Save Me 'button'	Navigate to home page of the application	20	20	0	
Contacts 'button'	Navigates to the Add Contact page and list existing contacts saved.	25	20	0	
Places 'button'	Detects the current location of user.	20	18	2	First failure due to lost of Mobile Data connection
					Second failure due to GPS inability to detect location
Video 'button'	Records video for 7 seconds	20	19	1	Failure due to overload processing task
Save Contact 'button'	Saves the contact that has been filled by the user	19	19	19	
Save & Add Another 'button'	Saves the contact and prompts user to add another contact.	20	19	19	
Light 'button'	Update the shake	25	25	0	

	sensitivity to 'light' and navigates to homepage				
Medium 'button'	Update the shake sensitivity to 'medium' and navigates to homepage	25	25	0	
Hard 'button'	Update the shake sensitivity to 'hard' and navigates to homepage	25	25	0	
Shaking mechanism	The app is triggered and proceed with its intended function	20	18	2	First failure due to other app is also running
					Second failure due to excessive shaking.
Cancel alert 'button'	Cancels the delivery of the emergency message.	20	19	1	Failure due to slow touch reaction of the phone screen.

Table 15: System Functional Testing for Mobile Application

4.4 User Testing

The user testing is done mainly for the evaluation of the mobile application (prototype) effectiveness towards personal safety. The main features that is being tested for the mobile application is:

- The time taken reduced for emergency request.
- Procedures reduced for emergency request using the mobile application.
- Usefulness of informations collected by the mobile/smart phone as evidences.
- Ease of executing the mobile application.

30 civilians which owns an Android smartphone has been selected to perform the testing, mainly the people in Seri Iskandar area. Targeted user are provided with the application setup on their mobile phone and required to connect to the provided WiFi connection or mobile data. After the testing, users are required to fill in the questionnaire as shown in the Appendix.

The first part of testing is to test the time taken reduced on the registration process. Users are expected to log in using their existing Google Account. Then they will fill in the Add Contacts page with their preferred contacts to call during emergency. Finally, they will be required to activate their smartphone's GPS feature to execute the mobile application.

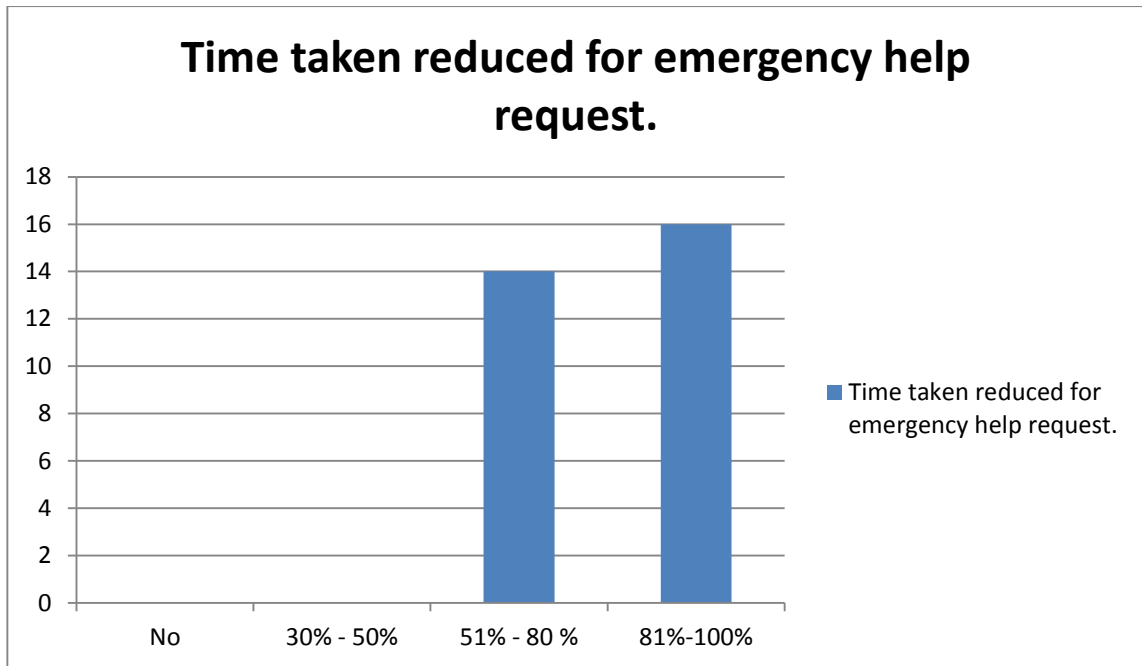


Figure 14: Evaluation Results for time taken reduced for emergency help request

There are more than half of the user believe that this application have help them to reduce the time taken for requesting help during emergency. In Figure , 16 user says that it save more than 81% of their time to perform the process of emergency request using their mobile phone, while the rest also believe that the time taken have been reduced at least by 50%. This is because the application only requires the user to activate their GPS feature of the mobile phone and shake the device when they are in danger. Instead of raching the phone and press the number pad to call someone for help. The process of emergency request can be done with one simple gesture which is by shaking the device.. It prove that the use of the mobile application can reduce the time for emergency request without performing the conventional way of requesting help using mobile phone which is by dialing someone.

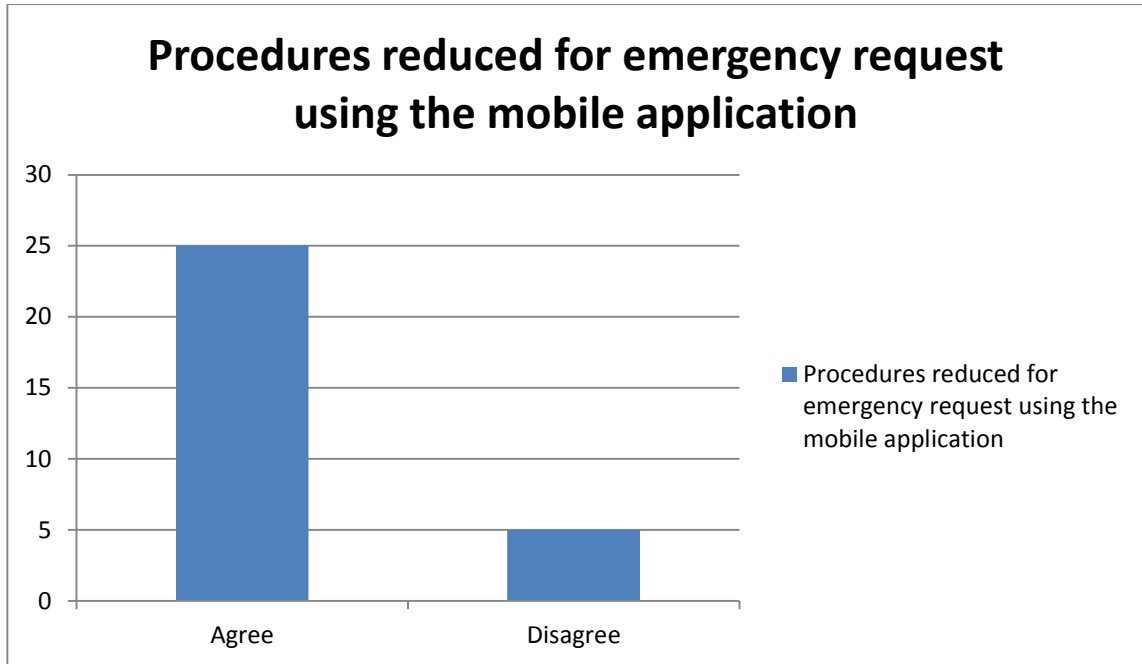


Figure 15: Evaluation Results for Procedures Reduced for emergency request using the mobile application

In Figure , the evaluation result shows that majority of the user agrees the number of procedures to request for emergency helping their mobile phone is reduced when using the mobile application. A minority of user disagree that with the execution of the mobile application, the procedures is reduced in requesting for help during emergency. This is because the minority of the user expects that the GPS feature of their mobile phone is activated automatically by the mobile application without even the user have to do it themselves. This aspect could be considered in future improvement of the mobile application..

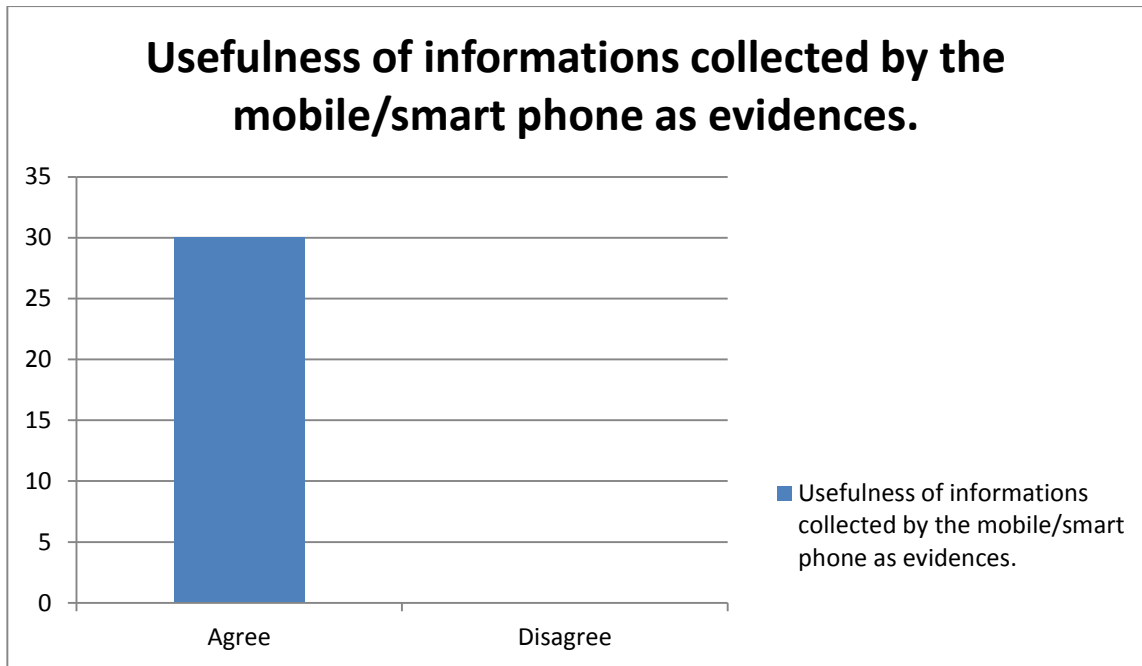


Figure 16: Evaluation results for Usefulness of informations collected by the mobile/ smart phone as evidences.

Figure shows that 100% of the user agrees that the informations collected by the mobile phone, through the usage of the mobile application is useful in terms of personal safety. This could be justified because the information of location of the victim is the most important data for anyone who would want to respond to the emergency request. Therefore, this make the users feel that it is the most important element to be included automatically in the emergency request.

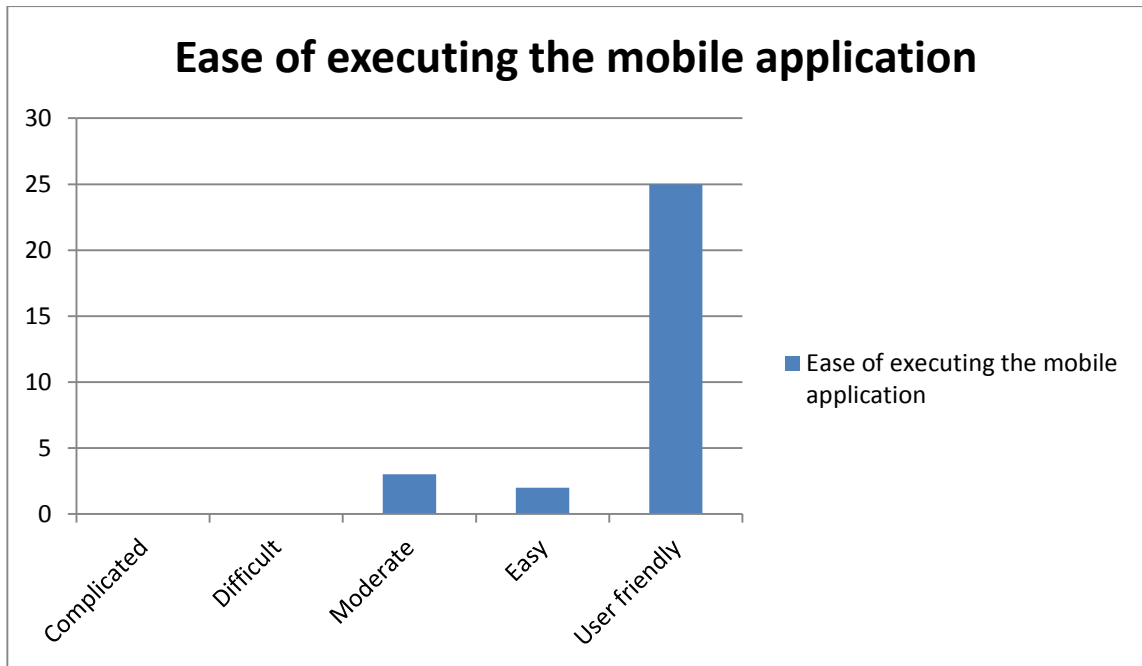


Figure 17: Evaluation results for Ease of executing the mobile application

Figure shows the majority of the user agrees that the mobile application is easier and user-friendly to execute for requesting emergency help rather than dialing to request for help. A minority of users still approves the ease of executing the mobile application although they believe it is only easier than dialing for help during emergency. Therefore, the mobile application proves to be a more convenient and efficient way of requesting for help using a mobile/ smart phone.

CHAPTER 5

CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

From the perspective of potential users, the author expects that the mobile application will bring positive implications towards the way of requesting help during critical situations. From the analysis, the author has identified the most important aspect of applying the usage of mobile application in personal safety which is, the procedure of requesting help must be at the most minimum. In this study, the author focuses on optimizing the “shaking device” feature in the smartphone towards the process of requesting help. Therefore, the author expects that the user will be **satisfied and realize on the ease of use and effectiveness of the mobile application during the situations of crime.**

5.2 Recommendations

Among the recommendation for this project is,

1. Send/ call the nearest law- enforcers (e.g. police stations) during critical situations.

This feature could be developed into the mobile application as one of the core or main ability for the future works. During the time of this study, the author initially considered to include this feature into the development of the mobile application, but it seems infeasible during the time of study due to privacy and confidential issue between the law- enforcers and the author's intention towards the study.

2. Alert nearest person who also has the same application in their mobile devices.

The extent of help request could be enhance more with this feature. The same user of this app could deliver help to the requestor nearby them by notifications in their mobile devices. By using the same mobile application, other user could be alert about other user who is in dangerous situation and offer help to them.

5.3 Limitations

Along the process of completing this research, the author has faced difficulty such as:

-Manipulating the existing features of a mobile phone fully towards personal safety, where the included features such as GPS, accelerometer, and video recorder has to be integrated into one purpose which is to address the aspect of personal safety.

-Making sure that the design of the application is effective towards saving people's lives during critical situations, where the design phase of the mobile application is totally critical. The author has to thoroughly make sure that the design ensures the effectiveness of ensuring the emergency request is easily delivered while ensuring the least count of procedures implemented.

CHAPTER 6

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CHAPTER 7

APPENDIX

7.1 Questionnaire for public survey

What kind of mobile devices do you own? *

- Smartphone
- Mobile phone
- Tablet
- Other:

What is the operating system in your smartphone? *

- Android
- Apple iOS
- Windows Mobile
- Other:

Which types of apps are most useful to you? (you may choose more than one) *

- Game apps (puzzles, charades, etc.)
- Search tool apps (directions, phone numbers, recipes, etc.)
- Personal safety apps (panic button, emergency calls, etc.)
- Social networking apps (location check-ins, friend status updates, etc.)
- Other:

Is your mobile data activated 24/7 ? *

- Yes
- No

Do you have a mobile app for personal safety?

- Yes
- No

Have you experienced a crime activity (mugging, robbery, kidnapping, etc.) as a victim?

- Yes
- No

Which party would you prefer to notify first when experiencing an emergency or crime?

- Police
- Family
- Friends
- Nearest person around you
- Other:

Do you feel safe when travelling alone to isolated or even familiar places without your mobile phone?

- Yes
- No

Do you agree that requesting for help using mobile phone during critical situation (kidnapping, robbery, mugging, etc.) is difficult due to the panic situation?

- Yes
- No

If there's an app that will send emergency message to your selected contacts during emergency/crime situation,without you having to type in the message, will you download and use it?

- Yes
- No

What are the main features that you think are compulsory in the app? (you may choose more than one)

- GPS tracking of the smartphone
- Push notification to selected contact numbers consisting the emergency message
- Video recording capability
- (Siren or loud noises, etc.) audio to notify nearest people
- Direct call to the nearest authority offices (e.g police station, fire station, paramedic, etc.)
- Other:

7.2 Questionnaires for User Testing

1. How much do you think the application help reduce the time taken for you to request for help during emergency?

a) No b) 30 – 50% c) 51% - 80% d) 81% and above

2. Does this application reduce the number of procedures to request for help in an emergency?

a) Agree b) Disagree

3. Do you agree that the informations collected by the mobile phone is useful as evidences in the future?

- Yes

- No

4. How do you rate the ease of this application towards the aspect of personal safety?

a) Complicated b) Difficult c) Moderate d) Easy e) User Friendly

7.3 Results for Data Collection & Analysis.

The author has executed a survey by producing the questionnaires that is related to the study. The objective of this execution is to collect the data regarding the usage of mobile apps in personal safety, the public's opinion towards personal safety and to identify the existing phenomena that is implemented in our society in terms of personal safety issue. From the survey, a total of 52 respondents have been surveyed by answering the questionnaires. The range of society involved in this survey is undetermined. They are random people and not specifically targeted to be involved in this survey. This aspect is crucial because as stated earlier, while women regularly become the victim(s) in criminal situation, (Mandapati, Pamidi et al. 2015), gender shouldn't be the argument in the case of personal safety.

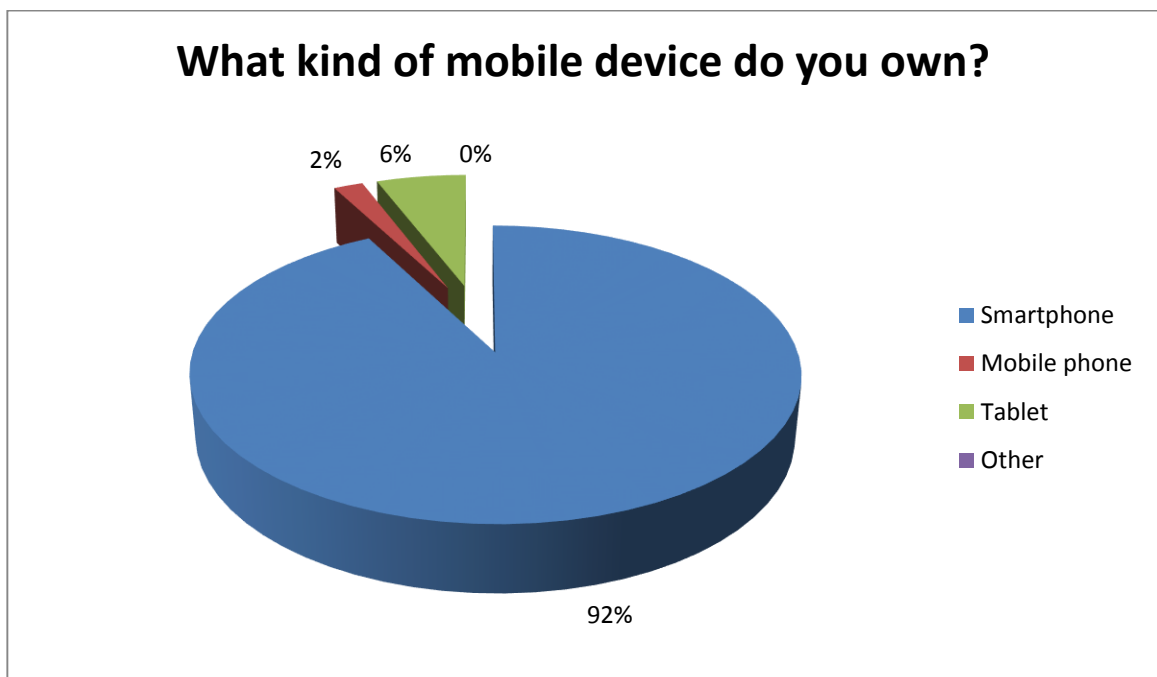


Figure 18: Type of mobile device

Figure above shows the portion of respondents who owns a mobile device. It shows that the majority (92 %) of the respondents owns a smartphone in their possession. However, another 8% of the respondents own either the conventional mobile phone or tablets. Hence, we can conclude that Malaysians do have at least a mobile device as their means of communication nowadays.

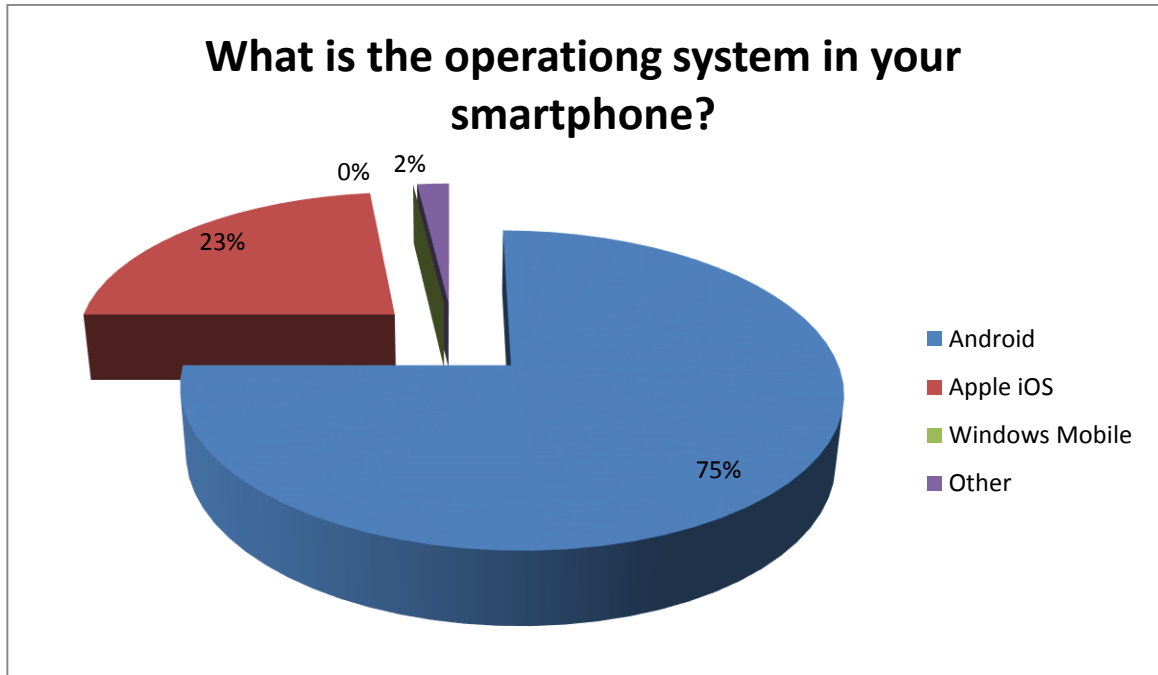


Figure 19: Mobile operating system

In the figure above, 76% of the respondents' mobile devices operate Android operating system in their devices. Another 23% of the respondent's mobile device operates the Apple iOS operating system in their mobile devices. Finally another 1% operates an operating system in their mobile device other than Android and the Apple iOS. It can be concluded that Android is the preferred operating system (OS) for Malaysians to use in their mobile devices. One of the reason for this matter is Android devices is cheaper in term of price compared to other operating devices that implements other operating system.

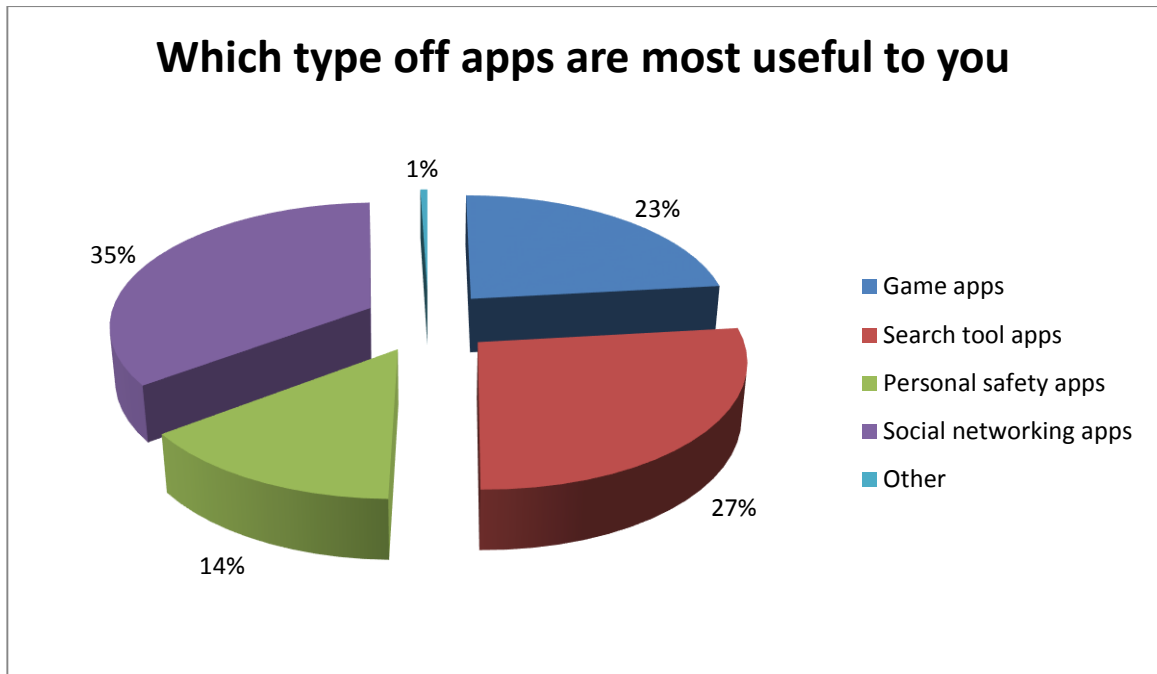


Figure 20: Types of mobile application

Figure above emphasize on the important apps for the perspective of users. 35% of the respondents agree that social network apps are the most important apps to them. Another 27% of the respondents agree that search tool apps are the most important apps to have in their mobile devices. For a portion of 23% of the respondents also agreed that game apps are the most crucial to be downloaded and used in their mobile devices. Whereas, only 14% of the respondents agree that personal safety apps are crucial to have in their mobile devices. It can be concluded that personal safety issues are not heavily emphasize in our society.

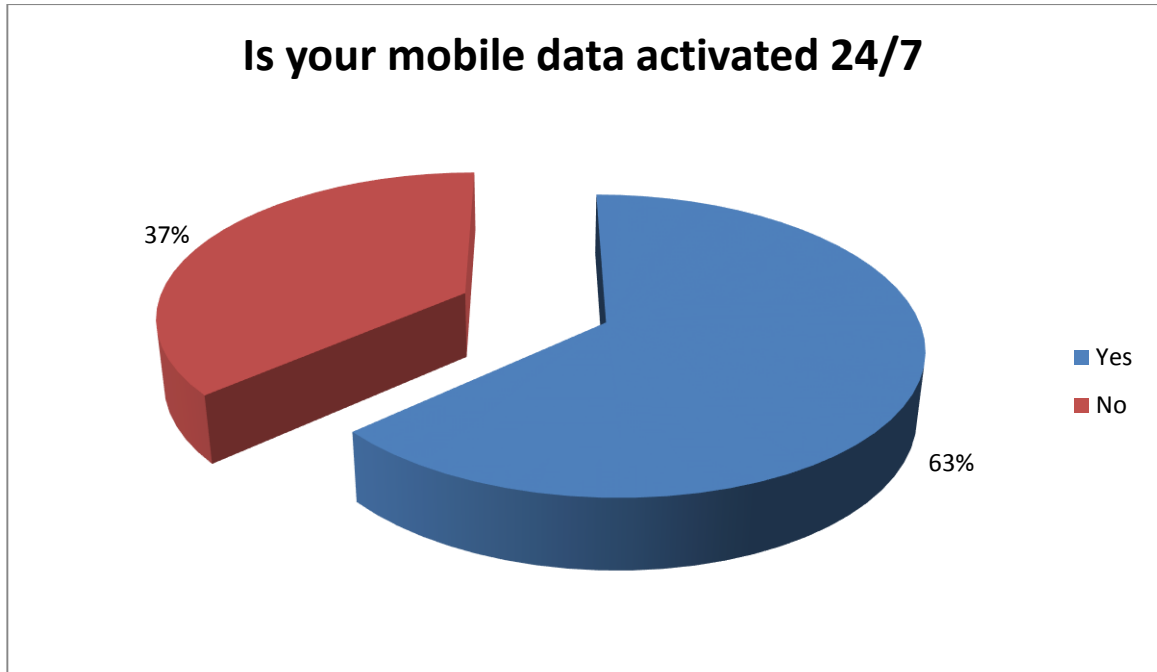


Figure 21: Mobile data activation

Figure above shows that 63% of the respondents activate their mobile data 24 hours a day without deactivating it. Another 37% of the respondents do not activate their mobile data 24 hours a day. The factor behind this matter is the energy consuming by the mobile data communication once it is activated. The longer the mobile data is activated, the more energy it consumes from the battery life of the mobile device.

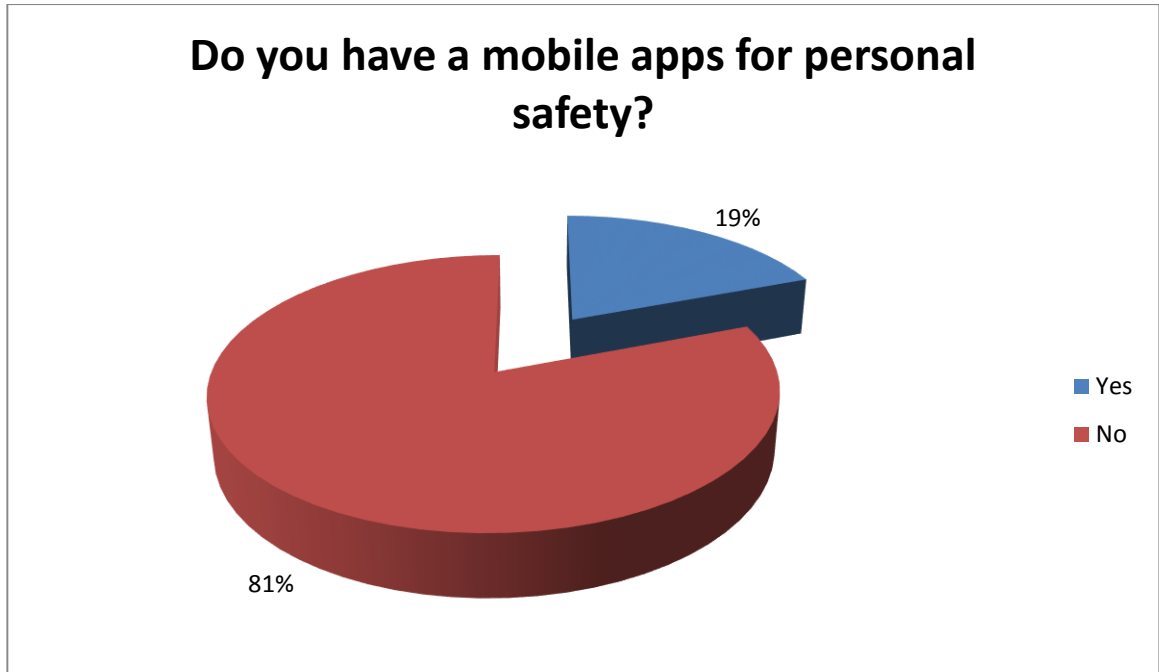


Figure 22: Personal safety mobile app

Figure above displays the portion of respondents (19%) that does have at least a personal safety app in their mobile devices. Another 81% of them do not own any personal safety apps in their mobile devices. A factor for this matter is probably because the app store is highly saturated with entertainment apps rather than other apps for other purposes (e.g. personal safety).

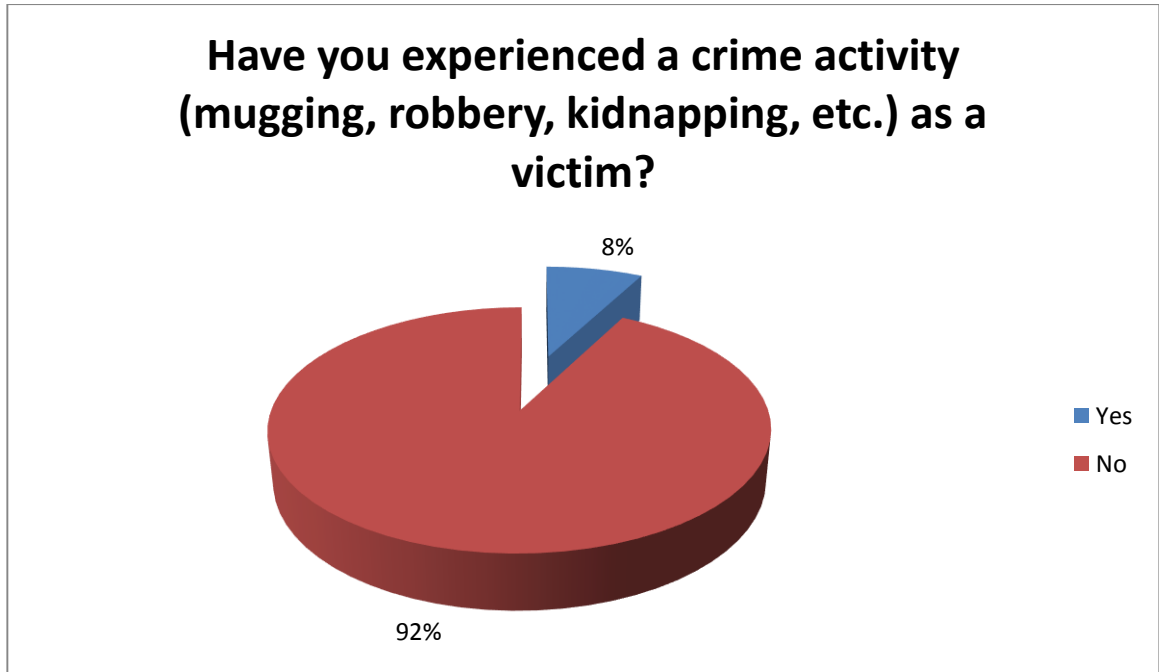


Figure 23: Crime activity experience

Figure above shows the statistics of the respondents who are actually have experienced a crime activity in their life such as mugging, robbery, kidnapping, etc. as a victim. 8% of them have actually been a victim to a crime in their life. Whereas, 92% of the respondents did not actually experienced a crime activity as victim. This statistics actually encourages the implementation of mobile devices apps to take control of the personal safety issue.

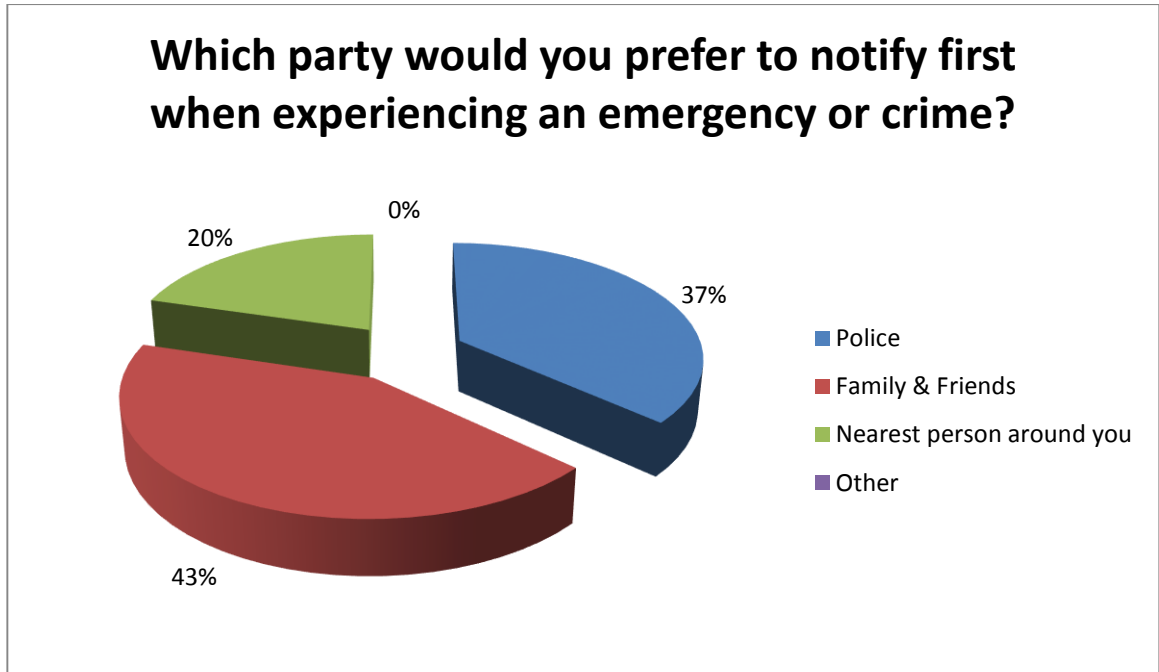


Figure 24: Contact preference

Figure above shows the statistic from the respondent on which party should they notify first when experiencing an emergency situation or crime situation. A majority of 43% of the respondents agree that they should notify their family or friends first during the critical situations. Another 37% of them agree that they should notify the police when confronting a critical situation. Whereas a portion of 20% of the respondents is prefer to notify the police or law enforcers when dealing with critical situations. The reason behind this statistic is probably because the response time for a call or message is faster when it is executed between family and friends when it is made.

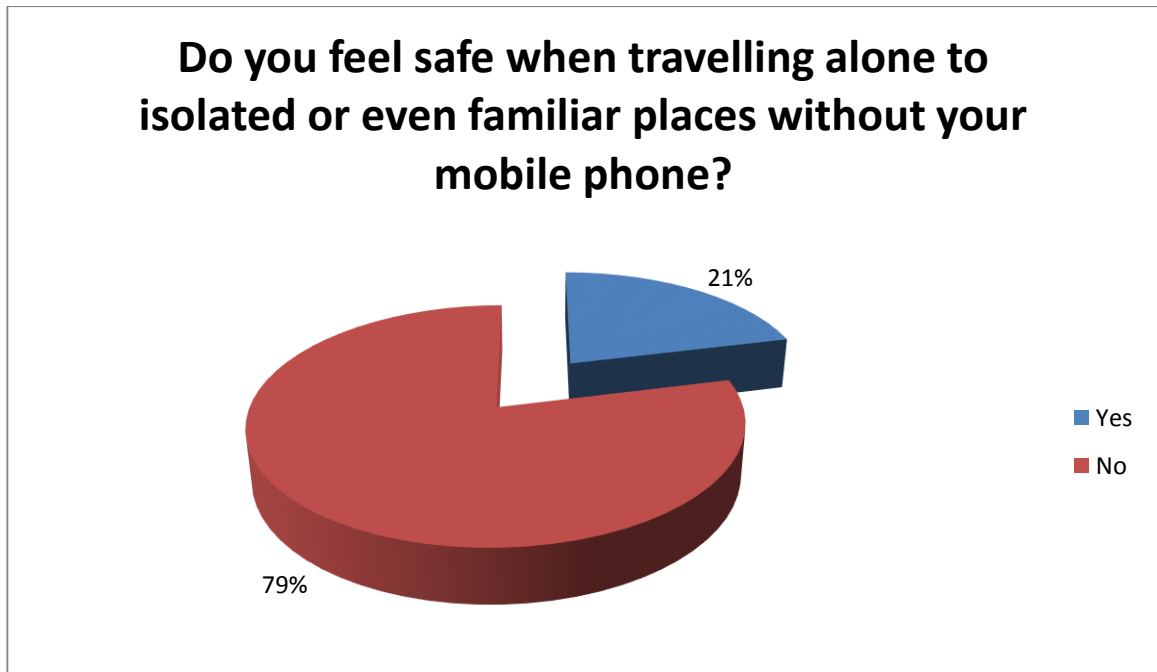


Figure 25: Travelling alone

Figure above shows the statistic which respondent agrees whether they feel safe travelling with their mobile devices to isolated or familiar place. 79% of them feel safe travelling with mobile phone with them. Instead, another 21% of the respondents do not feel safe travelling without their mobile devices. This matter is probably because the respondents are more concern about their safety when travelling, specifically alone. Therefore, with the presence of mobile phone, they feel safer because with it, they could notify their contacts regarding an emergency matters when they are faced with one.

Do you agree that requesting for help using mobile phone during critical situation (kidnapping, robbery, mugging, etc.) is difficult due to the panic situation?

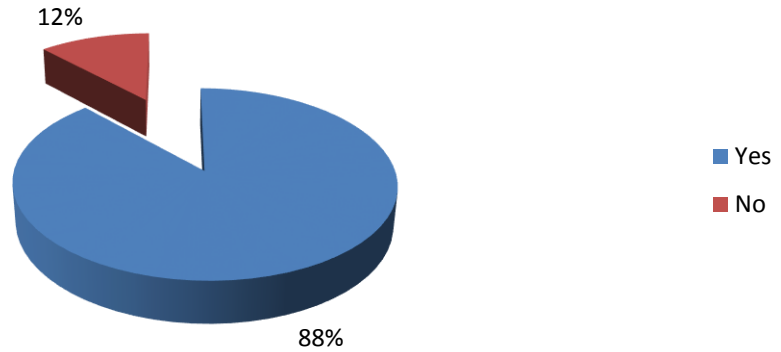


Figure 26: Difficulty during panic situation

The figure above portrays the public opinions regarding the difficulty of requesting help using mobile phone during critical situation. A majority of 88% of the respondents agree to the fact that requesting for help during critical situations does get difficult due to the panic situation. Another 12% of the respondents disagree with the posed question. We can conclude that the public is concerned with the ability to request help during emergency/ critical situation.

If there's an app that will send emergency message to your selected contacts during emergency/crime situation, without you having to type in the message, will you download and use it?

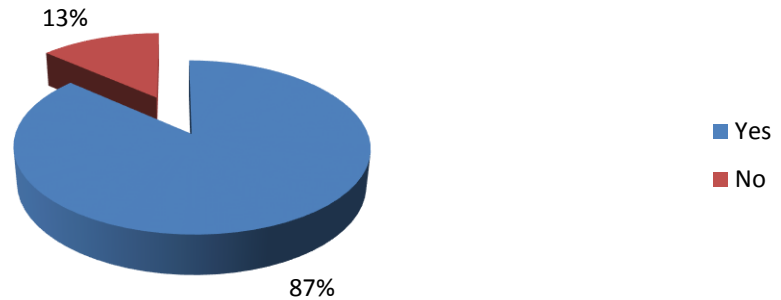


Figure 27: Personal safety mobile app download

Statistic above shows that 87% of the respondents would download and use the proposed mobile application due to its ability to send emergency message to pre-stored contacts. Another 13% of the respondents were not very confident of the ability of the proposed mobile application. Therefore, we can conclude that the public is strongly concern of notifying their family and friends when they are in a dangerous situation. This statistic strengthens the public view on how important it is to notify their family and friends during dangerous situation as stated in the previous question above.

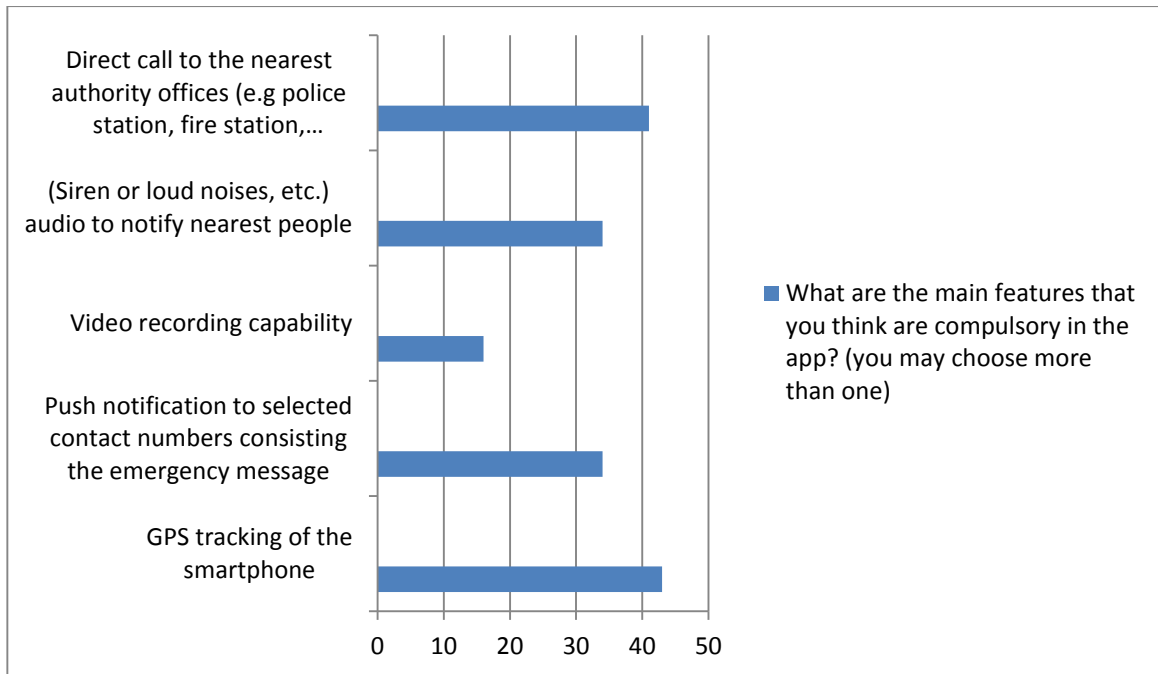


Figure 28: Main features of a personal safety mobile app

Figure above shows the statistic of compulsory features that the public feels compulsory to have in the proposed mobile application. A majority of 43 respondents agrees that GPS feature should be implemented in the mobile application to track the location of the mobile device once the mobile application is activated. We can conclude that the public is really concern about notifying their family and friends about their location if they feel they are in dangerous situation.