

EmergenCall Mobile Application

By

Umami Salaama Binti Mohd Nawi
16288

A project dissertation submitted in partial fulfillment of
The requirement for the
Bachelor of Technology (Hons)
(Information & Communication Technology)

May 2015

Universiti Teknologi PETRONAS
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CERTIFICATION OF APPROVAL

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Approved by,

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CERTIFICATION OF ORIGINALITY

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

UMMI SALAAMA BINTI MOHD NAWI

ABSTRACT

In this 21st century world, there are mostly zero places and areas that are 100% secure and safe especially for women, elders and children. However, there are about more than 50% of the population around the world have smartphones on their hand. This situation has opened a great opportunity for the developers to develop an application for user's safety. This project aims to study the existing system or application for user self-protection and to develop an application for the ease of use for user's self-security. The EmerGenCall Mobile Application use a mathematically formula to find the area of a certain places whether it is in danger area or safe area. This application has studied the GPS tracker to track current location of the user also the nearest police station or safe places so that the user can avoid danger or take the next action more efficiently, easier and quickly without attracting unnecessary attention of the criminals, pursuers or offenders. The scope of this project is the citizen of Malaysia especially women, elders and children. Using a questionnaire, 45 respondents have been gathered by answering the question distributed using Facebook as a platform. The result has been analyzed and a prototype has been created. Lastly, the application is build according to the requirements gathered.

ACKNOWLEDGEMENTS

This research paper is made possible through the help and support from everyone including my parents, lecturers, friends and people who are involved directly or indirectly. Here, I would like to dedicate my acknowledgement of gratitude towards the following significant advisors and contributors.

First and foremost, I would like to express my deep gratitude to Dr. Rohiza Binti Ahmad, my research supervisor, for her patient guidance, enthusiastic encouragement and useful critiques of this research work. She kindly offered her help throughout the processes involved in this project. I would also like to offer appreciation for her advices and opinions about my project in order to produce the best end product. Without her, I would not be able to complete this project.

Secondly, I would like to express my very great appreciation to all my friends and my seniors; Nur Aqilah, Tengku Hazleen, Abu Zarin and Ratana Hing for their assistance, teaching and help in completing the end product. They have help me throughout the period of my Final Year Project by giving their full support, advice and when I am facing difficulties or confusion about certain problems either to documented this project or the end product.

Finally, I would like to offer my special thanks to my parents who never tired or fail to give their full support either financially or spiritually to me. I am appreciating their moral support and encouragement for me during my hard time and to complete this project. I would not be able to continue in completing this project without all of them.

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CHAPTER 1

INTRODUCTION

1.1 Background of the Study

In this 21st centuries world, there are no safer environment like the old days for our children, friends and even us. The crime rate in the world has increased tremendously. In Malaysia, the crime rate has increased 10% or more every year according to Malaysia 2014 Crime and Safety report [1]. Plus, the victims not only involve the locals but the foreigners and tourists. According to the crime rate 2014 report [1], Malaysia's crime index is considered as "medium" however the crime Index is believed higher in Kuala Lumpur. In addition, the criminal activity against foreigner is limited to non-violent crime such as petty theft, purse snatching; pickpocket and credit card fraud.

However, for the local victims, it is most targeted women or older people. There are a lot of case reported regarding women was getting rape, purse snatched, stalked, and many more. The problem is that the crime defense in Malaysia is still weak and the technology invented is not install or used. We rarely saw security cameras in the household resident. Mostly, there would be the camera in huge cities like Kuala Lumpur however it is limited in certain areas.

So, this project intends to develop a mobile app that can be used to prevent crime especially for women. The application will provide adaptable user-friendly user interface in order for the user to use with the most easiest and safest most importantly to report the crime or getting help.

1.2 Problem Statement

Apparently, the crime rate in Malaysia has increased every year and most of the victims are women. This problem has increased the uneasiness and anxiety of the people. It is no longer safe for women to walk alone to even go to the convenience store just across the street from their house and the crime is literally higher in big cities like Johor Bharu and Kuala Lumpur. Plus, in these recent years of 2013 to 2014 there have been reports that the victims of crime need to walk miles away to get help. There is also a case where a mother carried her son covered in blood hours to get help.

Even though in this 21st century where most people have smartphones on their hand, that technology has not been used to its fullest. Although, mobile phone has multiple usages but in case of emergency or in panic attacked the user unable to use the mobile phone to call for helps or contact people. This case may happen when the victims are in panic and they cannot unlock their phone and search for contact in a short time. This many steps may have trigger the criminal suspicious of victims trying to call for help and may had made the attacker more vicious.

Thus, a technology or application must be invented in order for any crime victims to getting helps either from the authority, close friends or relative or police. Since this is 21st centuries where a smartphone is everywhere so a mobile application is more relatively suitable for any type users. The application is invented based on a user-friendly interface and would be easy to use.

1.3 Objectives

- i. To study existing methods and available applications used for crime prevention by using modern technology
- ii. To develop a mobile application with user-friendly interface for crime victims to seek helps or rescuing
- iii. To evaluate the developed application with a live interview user

1.4 Scope of Study

This study aims to develop an application to detect the whereabouts of crime victims plus for any victim's candidate to seek help immediately from police officers or close relative in smart phone using familiar methods as GPS Tracker in Google Map API with a simple and user-friendly interface. The targeted users are women and elders where they are the highest crime's victim rate.

CHAPTER 2

LITERATURE REVIEW

2.1 Crime in Malaysia

The security of Malaysia's citizen is threatened by the increase of crime rate over the year. It is proven by the index crime statistics plus a devaluation of the Public Safety Index in the Malaysian Quality of Life Index (MQLI)[2]. It is also have been known throughout the world that the era are getting dangerous day by day. The increase of thugs, mafia and underworld business have made their activities more active than the in 70's or 80's. And because of this, they also target the citizens to unleash their crime onto.

In the past where it was still in war era, they are only 0.5% to 1% of crime because of the state of each of the countries. After war era has ended with a peace there comes the era where crime suddenly rose tremendously. It is this time where mafia, yakuza or gangster was fear and ruled the world with black market dealings or underworld business. However, their era had also ended the war era, even though, there are still the groups of these crime-makers.

We cannot abolish crime or those troublemakers in this world however we can prevent it or we can fight it to protect ourselves or love one. The people fear of crime especially if it's a major crime involving murder, violence or property crime. Even though, Malaysia has been able to maintain the calm of the people by broadcast [3] when they are apprehended those criminal either locals or foreigners. Despite this, it is not only show the crimes are running wildly in Malaysia but also has increased their anxiety or fear. In addition, the media has reported, the Democratic Actions Party National Chairman and the Consumer Association of Penang that the Malaysia Quality of Life Index (MQLI) had been worsening over the past few years.

The figure below precisely shows that the increases in each category except Public Safety and Environment. That means among all those 11 indices to make up for a better quality of life in Malaysia, we are still lacking in Public Safety. We still lack to give a secure environment to the citizens.

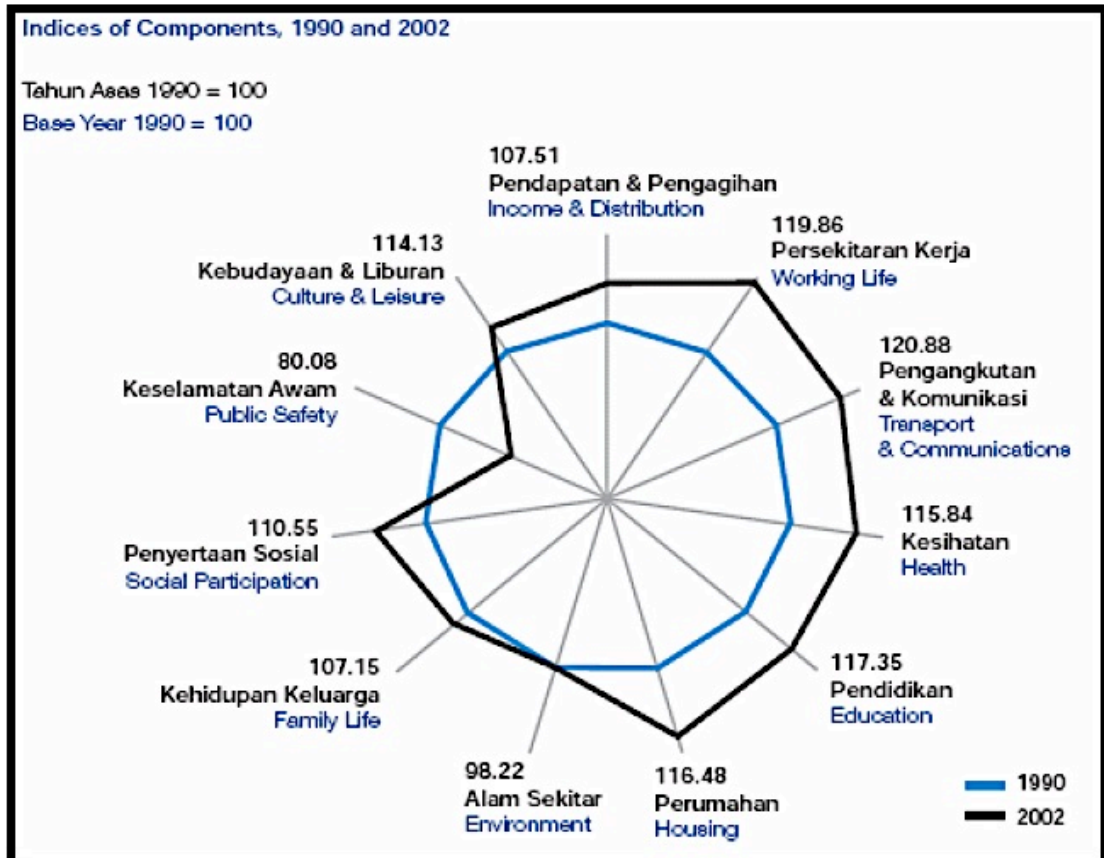


Figure 1: A comparison of indices, which are components of the MQLI [4]

2.1.1 Crime Trends in Malaysia

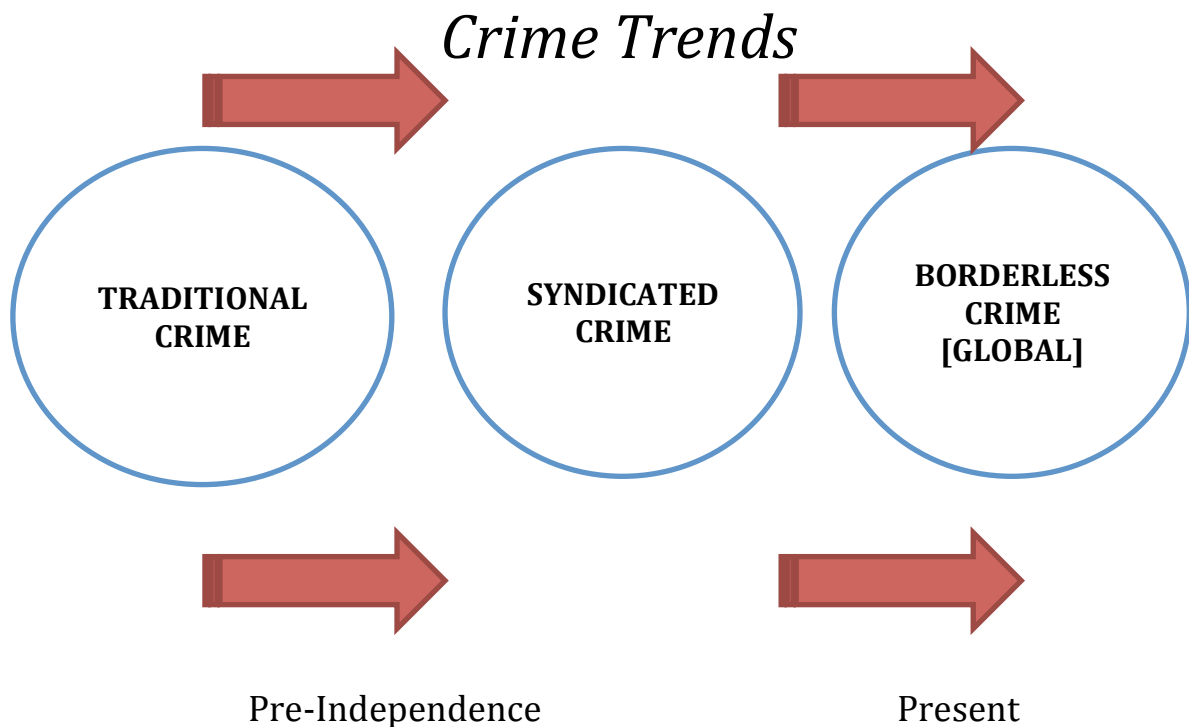


Figure 2: Development of Crime Trends in Malaysia

The above figure has shown the development of crime trends in Malaysia from pre-independence period until the present. If we look at Figure 2, during pre-independence period, the crime only involves traditional crime and moving along to syndicated crime. Traditional crimes are light crime like petty theft, direct confrontation injuries or gang fight, and simple sideway robbery. Even during that time the authorities still have bad times dealing with these criminals. And now the crime has become more complex and has been hard to detect it.

The existent of the technology has not only our lifestyle has been easier or modern, the crime itself has evolved too. There are many types of technological weapon to use and even a simple computer they have can commit to their crime. With the development of high-tech transportation, the crime has become borderless thus causing jurisdiction problems. Plus, criminals also have learned investigative actions so it has made the work of police, investigator or even forensics more difficult and harder.

So, it is not so surprise if the crime has also goes to the extent of our own imagination. The technology has been given multiple choices to the lifestyle of human being good and easy or bad and cunning. In addition, there are a lot of violent or gang and mafia movies shows in the television or cinema that may affected the way of thinking of the people to involve in these kind of thing because it seems cool. In Malaysia, there are a lot of standard in measuring crime and some cases may seem heavy or very violent but it may not affect the Index Crime. So, this has also made Malaysia's state like Kuala Lumpur, Johor Bharu, and Pahang are in the top 10 most dangerous cities in the world and it is a very shocking fact as we are convinced otherwise.

2.1.2 Standards of Measuring Crime

There are many types of crime developing as time goes on but how do the authorities or police forces quantify them so that they can compare between countries? In Malaysia, we use a term named "***Index Crime***" to quantify the crime. According to Inspector General's Standing Order at para D203, Index Crime is reported crime with sufficient regularity and significance to be meaningful data as an index of the crime situation. From this, we can see that the keywords are ***Regularity*** and ***Significance*** that will determine whether the crime will be included in the Index Crime or not. For example, a kidnapping crime is quite irregular or uncommon to be happened however it is quite heavy crime because some of the victims may get killed, raped or even missing without a trace, but it will not be included in Index Crime. At the same time, petty theft may seem as something small however it frequently happened anywhere and anytime so it will be included in the Index Crime.

The Royal Malaysia Police Force or PDRM has divided the Index Crime further into two categories [5]:

1. Violent Crime

A crime, which has general violence act which is generally, and significance occurrences. There are 8 crimes under this category which is murder, attempted murder, gang robbery with firearm, gang robbery without firearm, robbery with firearm, robbery without firearm, rape, and lastly voluntarily causing hurt or injuries.

2. Property Crime

It involves crime or offenses with a loss of property during or after the act without extracting violence to perpetrators. There are seven crimes under this category, which is housebreaking and theft by day, housebreaking and theft by night, theft of lorry and van, theft of car, theft of motorcycles and scooters, theft of bicycles, and lastly any other form of theft.

Thus, following quantities are used to measure crime [5]:

- i. Total Seizable Offenses – the total number of seizable offenses reported in a given time frame
- ii. Overall Crime Rate – refers to the total seizable offenses per 100,000 populations.
- iii. Index Crime – which is made up of nine offenses. They are cheating and related offences, motor vehicle theft, outraging modesty, housebreaking, robbery, snatch theft, rioting, rape, and murder.

So, all of the above are the brief explanation of the crime in Malaysia and the Index Crime. As mention above there is a lot of actions taken in order to preserve prosperity and peace to the citizens, however, there are also a lot of new ways to develop more crime by using modern technology. In that case, why don't we apply the same for the solution?

2.2 Technologies Innovations for Crime Prevention

In this modern day, there are a lot of new researches and technology innovations developed in order to prevent crime and also to improve the police forces performance, however we know oddly so little about how and why certain technology innovations are implemented and also the concerns and effectiveness of technology-driven solutions to the problem of crime. Even a brief analysis of the historical development of the developer's efforts to prevent crime underlines the point that technology or more accurately, technological innovation, has been forceful leading to transformation of crime prevention and crime control strategies, both by citizens, concerned higher-ups groups, and by formal police agencies [6][7][8].

There are two main types of technological innovations that can be identified which is first information-based technologies or can refer to soft technology and second, material-based technologies may also be called as hard technologies. Both types of technological innovation have been linked to “dramatic changes in the organization of police”[6]. Particularly at the turn of the last century, while similar linkages can be offered to more general crime prevention strategies employed by individuals and groups of residents. According to a review of police technology by Harris (2007)[8], in the United States there was the first technology revolution that has changed the way police were ordered and how they operated pinpointed around three technology innovations that were integrated into policing that is the two-way radio, the telephone, and the automobile:

“With the implementation of telephones in the early 20th century, policing has changed. Citizens were encouraged to call the police to deal with a multiple of problems, and the police responded to those calls from communication via a two-way radio, and sped quickly to locations via patrol cars. These technological advances innovations, along with changes in police administrative procedures, helped to create the police as existed today” (Harris, 2007: 153)[8].

However, now we are at the end of second generation and at the beginning of third generation of technological revolution, which will once dramatically, and drastically change police administration and organization plus this will make for crime prevention also [7][8][9]. Between 1995 and 2002, Goff and McEwen (2008: 8) noted that the Office of Community Oriented Policing Services [10] (COPS) program offered endowments that:

“they have helped more than 4,500 law administration organizations to acquire and implement the technology in order to support the efficiency of police operations. The grants totaled more than 1.3 billion and funded crime-fighting technologies that helped reassign the equivalent of more than 42,000 full-time law enforcement professionals into community policing activities”.

The types of technologies acquired in these programs varied from agency to agency, the most commonly used technologies were mobile data centers (MDCs) or laptops, followed by automated field reporting systems (AFRS), record management systems (RMS), personal computers, computer-Aided Dispatch (CAD) Systems, and Automated Fingerprint Identification Systems (AFIS). Of course, the amount of expenditures of implementation of these technologies only tells part story. In a review by Hummer (2007)[11] has reported the possession of a wide range of extra hard technology innovations during the last two decades, including new weapons, less-than-lethal force technologies, body armor, CCTV systems, gunshot location technology, and new patrol car technology. In the second generation of the technological revolution, these are abundant of investment in new technology has bring clear results in fundamental changes of crime prevention and respond to crime. However, at this time, there were critical problems of how to design, implementation and development of these technological innovations to impact the crime prevention and police administration.

2.3 Existing Technology or System for Crime Prevention

The technology innovations are separated into two categories, which is hard technology inclusive hardware or materials and soft technology that is software or information system. Hard technology include materials, equipment and devices in either use to prevent and control crime or commit a crime. There is a distinct difference between criminal justice innovations that have *hard* technology and *soft* technology that have hard material base. Some examples of hard technology that serve to prevent crime are the ever-present CCTV cameras, metal-materials detectors, baggage screening at airports, bulletproof teller windows at banks, and security systems at homes and businesses outlets. There are also technologies for the use of personal protection devices such as Tasers, mace, lifeline/emergency call mechanisms and detonation interlock systems with alcohol-sensor devices to prevent an individual from starting a car while intoxicated. There are also ways to identify hard technology innovations being used by police, including weapons, less than lethal force devices, technology-enhanced patrol cars, and police protective gear.

Meanwhile, soft technology involves the strategic use of information to prevent crime such as the development of risk assessment, threat assessment and most popular nowadays is to hire hackers to hack into criminal databases to gain information about their activities or proof. It is also can be use to improve police performance like predictive policing technology and recording/video streaming capabilities in police vehicles. Examples of soft technology innovations include new software programs, classification systems, crime analysis techniques, and data sharing/system integration techniques. Table 1 shows the types of hard and soft technology innovations in crime prevention, and policing [12][13][14]. Although this table of new hard and soft technologies is not meant to be comprehensive, it captures the range of technological innovations currently being applied in police administration and settings, both in this country and abroad.

Table 1: The Application of Hard and Soft Technology to Crime Prevention and Police

	Hard Technology	Soft Technology
Crime Prevention	<ul style="list-style-type: none"> ➤ CCTV ➤ Street lighting ➤ Citizen protection devices (e.g. mace, Tasers) ➤ Metal detectors, ➤ Ignition interlock systems (drunk drivers) 	<ul style="list-style-type: none"> ➤ Threat assessment instruments ➤ Risk assessment instruments ➤ Bullying ID protocol ➤ Sex offender registration ➤ Risk assessment prior to involuntary civil commitment ➤ Profiling potential offenders ➤ Facial recognition software used in conjunction with CCTV
Police	<ul style="list-style-type: none"> ➤ Improved police protection devices (helmets, vests, cars, buildings) ➤ Improved/new weapons ➤ Less than lethal force (mobile/ riot control) ➤ Computers in squad cars ➤ Hands-free patrol car control (Project 54) ➤ Offender and citizen ID's via biometrics/fingerprints ➤ Mobile data centers ➤ Video in patrol cars 	<ul style="list-style-type: none"> ➤ Crime mapping (hot spots) ➤ Crime analysis (e.g. COMPSTAT) ➤ Criminal history data systems enhancement ➤ Info sharing w/in CJS and private sector ➤ New technologies to monitor communications (phone, mail, internet) to/from targeted individuals ➤ Amber alerts ➤ Creation of watch lists of potential violent offenders ➤ Gunshot location devices

Crime prevention is a concept that has been applied in multiple ways in order to prevent crime from keeps rising. Individuals have used crime prevention to refer to both activities like crime prevention programs and/or strategies and outcomes such as lower levels of crime in communities and/or lower levels of offending/re-offending. In order to gain more research on the name of crime prevention, researchers have examined the influence or role of formal social control mechanisms (e.g. the deterrent effects of police, courts, and corrections) and informal social control mechanisms, with a focus on the influence through mechanisms such as attachment, commitment, and involvement of family, peers, school, work, community and the role of shame and belief systems or even religion. In addition, crime prevention strategies have been targeted at different levels of prevention (primary, secondary, tertiary) and on the need for individual (i.e. private actions), parochial (group actions by neighborhood residents), and public actions (i.e. decisions to call the police) to prevent crime.

To understand crime prevention, it requires studying the intentions, as well as consequences. Amount of prevented crime or number of victims or harmed repeatedly is one of the additional factors in determining measures of crime prevention [15][16][17][18]. Reduction of risk factors of crime such as gang membership and failure to complete school is even broader definition of crime prevention with newer factors. While crime prevention is currently used as an omnipresent, catch-all phrase that can be applied to both criminal justice-based and non-criminal justice-based wits, the focus is on strategies that utilize new technological innovations to either prevent crime or prevent re-offending by targeted groups of offenders such as sex offenders or mentally ill offenders, that do not rely exclusively on traditional actions by the police (arrest), courts (prosecution), and/or corrections (punishment, control, reform).

To utilize technological inventions to its fullest there is a device, which in these days mostly people would have on their possession, which is smartphones. Smartphones has become a very powerful device to make our life easier in terms of business activities or entertainment. There are a lot of research of what will be next

application or new system to smartphones that can be implemented so that it will become even more powerful to the extent people do not need powerful computers anymore. Such powerful hard technology needs to be used in crime prevention. Instead of relying to police administrations in all crime prevention or to catch offenders, why don't we help the officers in maintaining peaceful environment for or future generation?

2.4 Smartphone, the Powerful Modern Technology

There are a lot of modern weapons have been invented for both bad and good use but technology has no limits especially with the worldwide use of smartphone. Nowadays, there is a lot of invention on smartphones and basically people can do everything with just a small gadget on their hands. It is like a small computer that we can carry anywhere and anytime. And day by day there will be new software engineers, developers, programmers and designers who develop and invent new software or application for people to use either free or paid.

So, why don't we use this simple yet powerful technology to our advantage? The use of smartphone to ensure our safety is the best thing that we can do to prevent something bad or dangerous from happening. The smartphone revolution has brought abundant, formidable, and connected sensing hardware to the masses [19]. This holds a great vision to widen research fields. There are already a few self-safety application or software systems invented however not many are accepted or not known at wide area.

Moreover, smartphones are equipped with powerful processors and sensors that can be use for many useful things. These capabilities and the promptly rising of smartphones compromise exceptional opportunities for a great number of research fields including context-aware computing [20], reality mining [21], and community sensing [22,23]. Basically, the smartphones revolution has reveal yet another exciting prospect. As the research and experiment going broader and high scales, the challenge is no longer the hardware as it may be affordable smartphones equipped with multiple and high-end sensors are widely available anywhere, but the software engineering involved in creating and installing the application's code to read, process, and collect valuable desired information.

Mobile phones have become powerful as well as the software and the applications inside it. The research of abundant modern and super application or software needed powerful hardware to support it. As we know, day-by-day, month-by-month and year-by-year the leading technology devices company eagerly produces new products with new specification in order to attract customer. This competition has not only involve mobile developer company like Apple, Samsung or Nokia anymore but they also attracted the supplier to supply and become part of their Research and Development team to come up with new ideas in term of chips, processor, RAM, cameras, motherboard and many more in order to invent desired hard technology. Since it has become more and more powerful there are group of people who considered smartphones as medium in order to main peaceful environment and for crime prevention.

2.5 Existing Mobile Application/System




Mobile App Feature	1. Emergency Button 	2. Self Defense Alarm 	3. HandHelp - EMERGENCY SOS APP 
Enable to send emergency call to police or emergency directing centers	Yes	Yes	Yes
Choose type of contacts	Yes	-	Yes
Personalized message	Yes	-	-
GPS Tracker	Yes	-	Yes
One Touch Application	Yes	-	Yes
Code Pattern Application	-	-	-
Type of Output	Press the big red button image, the distress signal will be sent out to recipients along with GPS/Network location (a google maps link) and a personalized message	Alarm, Sirens or Horn	Transmitting direct notice. Within few seconds & directly is the data transmission to the directing centers

Table 2: Comparison between Existing Applications

1. Emergency Button

User will define a phone number and/or an email address and whenever user press the big red button image, the distress signal will be sent out to these recipients along with their GPS/Network location (a Google maps link) and a personalized message. If the user walk through a dark alley, travel abroad or just need to alert someone of user's whereabouts - this button will simplify explaining exactly where the users are. Help can come faster and within GPS accuracy. Emergency Button will only work if the user is in a place with reception to at least send the SMS text message or email.

This app is presented as is with no guarantee whatsoever. It won't work without reception or connectivity. Emergency Button by itself doesn't do emergency calls to any type of hospitals, law enforcement agencies, medical care unit or any type of emergency services.

2. Self Defense Alarm

This application is useful for the following situations:

- ✓ ASSAULT - LOSS
- ✓ PROTESTS - FIGHTS
- ✓ KIDNAPPING - ACCIDENTS
- ✓ EMERGENCY

User can choose different type of alarm to ensure your safety. There are 3 types of alarm:

- I. Alarm
- II. Sirens
- III. Horn

The application also allows user to connect immediately to the phones useful as Police or Ambulance. This application enables integration with email or Facebook for instant publishing. It is possible to take pictures of an instance and save or publish immediately. Ensure the user's safety and their phone into a device that is always with them anytime they need.

3. HandHelp – Emergency SOS App

The emergency call app for all cases of emergency - Transmitting direct notice, police*, fire brigade*, emergency directing centers* & of course to persons of your trust (*Currently available for the countries: DE, AT, CH, LI).

FUNCTIONS:

- Exact is the detection via satellite (e.g., GPS), GSM, WLAN
- Within few seconds & directly is the data transmission to the directing centers of *police, *fire brigade, *rescue service, *emergency headquarters, as well as to persons of your trust
- Personally and clearly is your profile for the rescue services

ADVANTAGES & FEATURES:

- Speechless – because of easy button solution
- Suited for migrants, travellers, people with partially or completely speech/ or hearing disabilities
- No language knowledge necessarily
- Quiet alarm without attracting attention
- Allows showing courage without endangering yourself
- Picture, tone, documentation to the preservation of evidence (optionally video)
- Mobile home emergency outside used
- Cheap “SOS-system” for private and business

2.6 Improvement

Most of the application existed use on-click picture system where the user will need to click on the alarm or button picture to activate the application. By using this method the user need to unlock their phone first then open the application then click on the image. These actions will take a lot of time plus will attract the criminal's attention then maybe they will start to act more aggressive. There is also an application where user need to type in the message and phone number then press send button to send the "Help" message to intended recipients which will take time and have no differences with using normal SMS system in mobile phone.

However, in EmergenCall Application user does not need to do these actions. User can detect current location using GPS Tracker and send the location with a link of the coordinate that will integrate with Google Map API to police or any contact that has been set beforehand. It also provide a function where user can detect whether in certain area is a "Green Area" which is a safe and less crime are or "Red Area" which is danger and frequent crime area. Below are the summaries of the function in EmergenCall Mobile Application:

- i. GPS Tracker.
- ii. "Green Area" and "Red Area" detection
- iii. Provide a Google Map API with nearest police station or post guard
- iv. A one-click button to send SMS with current location along with a link to Google Map API of user to another person or police

All output types includes the GPS tracker. It will automatically open Google Maps and it will point to the current location even if the user is moving around.

CHAPTER 3

METHODOLOGY

3.1 The Agile Methodology

This project used The Agile Methodology method. Agile Methodology is a method that emphasizes on bringing high-quality operative software frequently and consistently, while minimizing project overhead and increasing business value [25]. By using Agile, it can improve effectiveness and the quality of the project [26]. In other word, Agile is iterative, team-based approach for development. Rather than using Waterfall Model, which emphasizes the task and scheduling by one task at a time, Agile is creating all time “time-boxed” into phases called *sprints*. Sprints is a time duration given (usually a week) with deliverables task given one sprints ahead of time.

Prioritizing deliverables are according to business value, which determine by customer. If all work planned during sprints cannot be completed, the work will be reprioritize. Every time work has completed in each of the sprints, it will be reviewed and valued by the customers or in this case the supervisor. Since, this is a mobile application development project, it is most suitable to use a cycle flow Agile method. Below is the figure of Agile work flow.

Usually, Agile Development Methodology are used in a big project however I choose to use Agile for my project because its nature in continuing cycle flow focuses on delivering high-quality working software frequently and consistently, while minimizing project overhead. With this I am sure that the end results will be more quality and consistent.

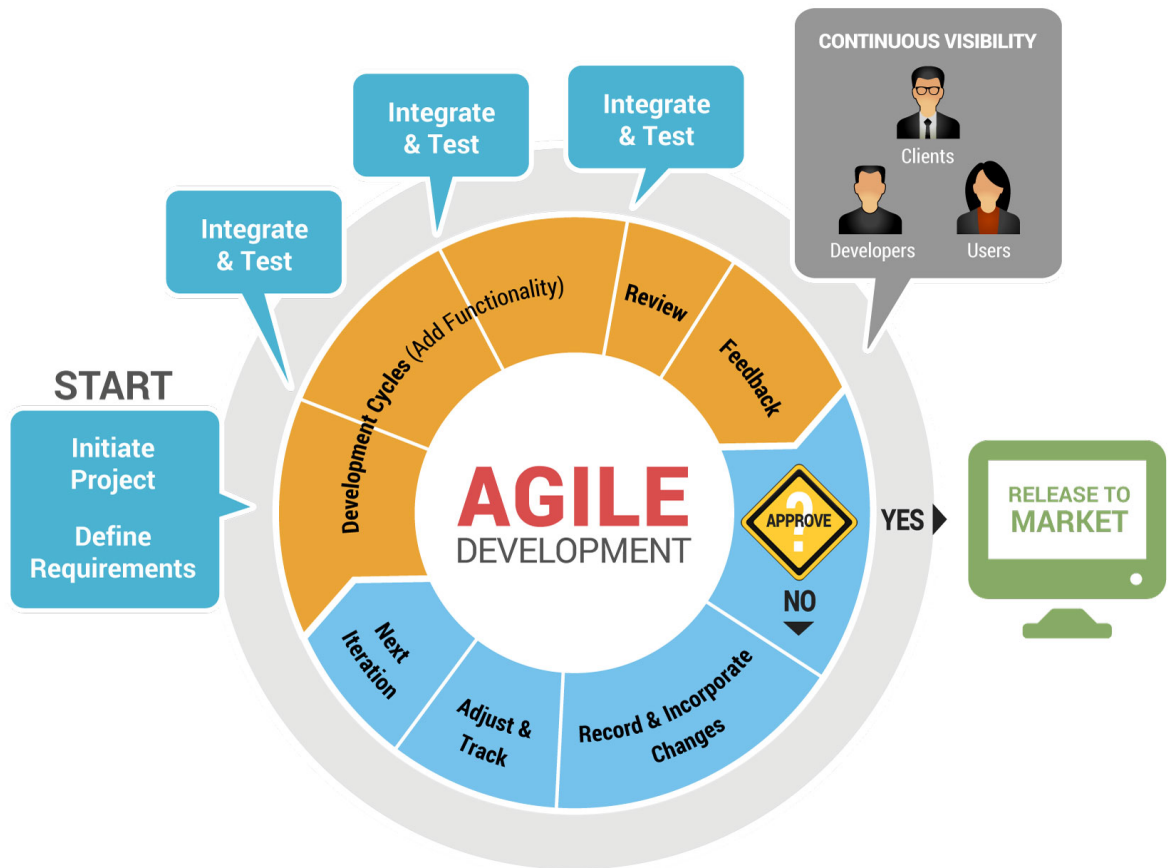


Figure 3: Agile Methodology

3.1.1 Discovery (Requirements Stage)

To start the project, a series of Discovery Sessions and research need to be conducted to understand a client's goals, challenges, business climate, and customers and users. In this case, first I need to define the possible requirements to develop EmergenCall Application according to the research and client's feedback. In Agile, I need to constantly work with the clients, user or stakeholder. So, in order to gather the requirements, I need to get it from possible user of EmergenCall Application. It is important to understand a client's vision and background before starting any project.

To do that, I used an online questionnaire-based approach to obtain data on user's preference towards self-protection application as shown in Appendix (i). The questionnaire is mainly distributed to all Universiti Teknologi PETRONAS's students and also to other people in Malaysia. I used Facebook to advertise and distribute the questionnaire so the result will be based on various people and not just focus on students. The questionnaire is design to ascertain:

- I. The awareness of people of the Index Crime in Malaysia
- II. The precaution steps taken to self-protection
- III. To know whether people know the existence of self-security system
- IV. The factors that influence people's choice to take the precaution
- V. The reasons they would like t have such system or application

The results from the questionnaire distributed are gather and analyzed plus the requirements of the system also being documented. In addition, all information about the existing applications, the Index Crime of Malaysia and Crime area are gather at the same time. To discuss the research findings, descriptive analysis is use.

3.1.2 Product Backlog

Product Backlog is, discovered during Discovery stage, a wish list of useful features and requirements for clients and users. The product owner will work together with clients in order to prioritize the features to determine which the features are elaborated, developed, tested, and delivered. So, I, the developer as well as product owner need to work with my supervisor, Dr. Rohiza Ahmad before start to develop the application. By getting these features prioritized, I can stay focus in delivering highest features following to the lowest features.

Integrated Development Environment

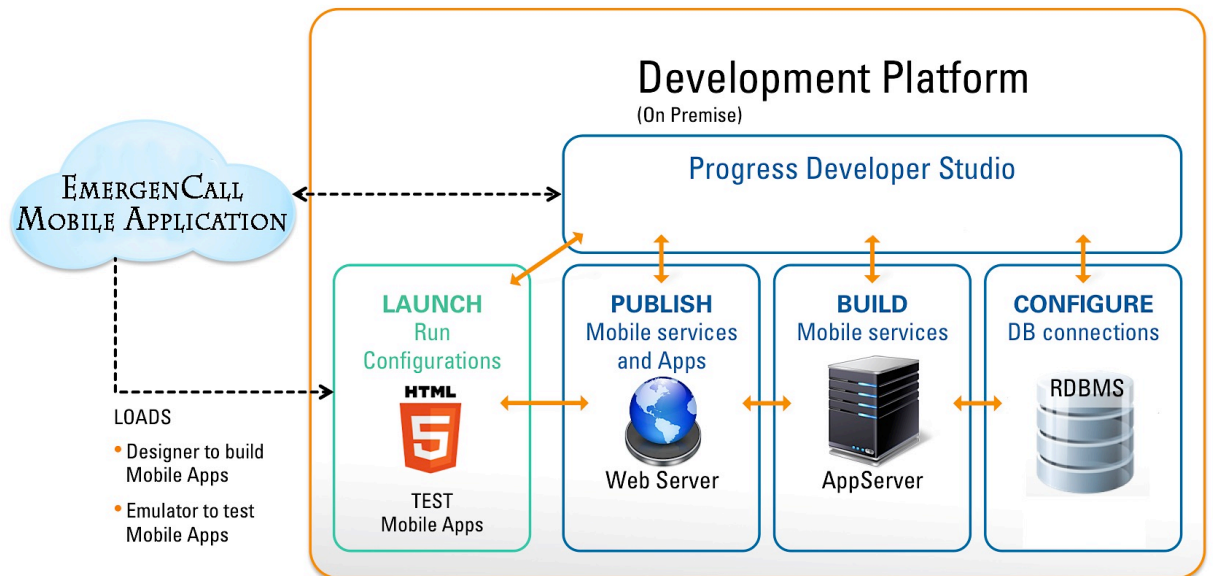


Figure 4: Integrated Development Environment for EmergenCall Application

Figure 4 above is the System Architecture of the important features in EmergenCall will need to have. EmergenCall Application needs to have Database to store user's data, emergency message, the coordinate and the others. The application will trigger the database to send the data to the respective receiver so that is why both the app server and web server need to connect to the database connections. Plus these three servers need to connect to the mobile apps as shown in the figure above.

3.1.3 Iterations

After a high-level backlog of the project features have created and I have fully understood it as well as client's vision, I need to deliver the features through a series of time-boxed iterations. The time-boxed duration is fixed in 1 to 4 weeks to deliver a subset of the overall product backlog.

At the beginning of each iteration, I need to review and elaborate the highest priority of the backlog item, fully understood it and deliver the results as expectation from

client. After that I need to develop, test, and accept each feature, working in priority order.

I need to review completed work, planned future work, and find any issues. In iteration, testing is also conducted frequently with the goal of identifying and resolving defects quickly to reduce its impact later in the project. In addition, daily builds of the software allow me to quickly inspect progress and ensure the software is working as expected. At the end of each iteration, the client and I meet at a Review Meeting to review what was accomplished during the iteration, including a Demo of the newly delivered features. This review provides a valuable checkpoint to identify feedback and a deeper understanding of the solution. At the end of each iteration, the working software is deployed to a demo environment for additional client review and potentially beta testing with real users.

3.1.4 Continuing the Cycle

Additional Iterations are conducted as needed to deliver additional features and incorporate feedback from previous iterations, reviews, and user beta testing [26].

Incorporating Agile methodologies into the development process can have a big impact on the overall success of the program, as well as the interim usefulness of my development and investment. Feedback and correction can occur quickly to fix small glitches before they become big problems. Communication throughout the process is also improved by the Agile approach to project management. Overall, Agile provides a lean and effective model for the successful development of software.

3.2 GANTT Chart

Gantt Chart is created to ensure all project activities to create this project can be achieved within time framework and will be monitored plus will help in keeping track with the planned project activities. It is also useful to illustrate a project schedule, which shows the start and finish dates of each unit in the system. A Gantt Chart was created for this project for Final Year Project (FYP) 1 as shown below:

3.2.1 Gantt Chart for Final Year Project (FYP) I

Activities/Week(s)	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Selection of Project Topic	█	█												
Doing Basic Research Work		█	█	█	█	█	█	█	█	█	█	█		
Submission of Extended Proposal										○				
Discovery (Requirement Phase) Identify the Requirement Specification and important features of the application							█	█	█					
Product Backlog Wish List of useful features and requirement Create system architecture									█	█				
1 st Iterations (feature 1) Analyze the requirements Designing the system Develop the logical design of the system Test prototype											█	█	█	█
Proposal Defense													█	
Submission of Interim Draft Report													○	
Submission of Interim Report														○

Table 3: Gantt Chart and Milestone FYP I

Legend	
█	Estimated Time of Completion
○	Milestone

3.2.2 Gantt Chart for Final Year Project (FYP) II

Activities/Week(s)	1	2	3	4	5	6	7	8	9	10	11	12	13	14
2 nd Iterations (feature 2)	█	█	█	█	□	□	□	□	□	□	□	□	□	□
Analyze the requirements														
Designing the system														
Develop the logical design of the system														
Test prototype	□	█	█	█	█	█	█	█	█	█	█	□	□	
Doing Basic Research Work	□	□	□	□	█	█	█	█	□	□	□	□	□	□
3 rd Iterations (feature 3)	□	□	□	□	█	█	█	█	□	□	□	□	□	□
Analyze the requirements														
Designing the system														
Develop the logical design of the system														
Test prototype	□	□	□	□	□	□	□	█	□	□	□	□	□	
Submission of Progress Report	□	□	□	□	□	□	□	█	□	□	□	□	□	□
Pre-SEDEX	□	□	□	□	□	□	□	□	█	□	□	□	□	□
Submission of Technical Paper	□	□	□	□	□	□	□	□	□	○	□	□	□	□
Submission of Dissertation (Soft Bound)	□	□	□	□	□	□	□	□	□	□	█	□	□	□
Oral Presentation (Viva)	□	□	□	□	□	□	□	□	□	□	□	□	○	□
Submission of Dissertation (Hard Bound)	□	□	□	□	□	□	□	□	□	□	□	□	□	○

Table 4: Gantt Chart and Milestone FYP II

Legend	
	Estimated Time of Completion
○	Milestone

3.3 USE CASE DIAGRAM

Below is the use case diagram for EmergenCall Mobile Application. It contains a user, “Detect Danger Zone” function which detect whether the coordinate the user is in the danger area or not and “Press For Help” function where it will show nearest post guard or police station. And lastly, there is “Alert Message” function where it will send a message to recipient set by user with the link to locate user’s current location in Google Map API.



Figure 5: EmergenCall Use Case Diagram

3.3.1 Use Case Specification

Use Specification below is to describe about the use case diagram in sequence and more detail.

Table 5: Use Case Specification

Use Case: Detect Danger Zone
ID: UC1
Actor: End-User, Database System, Mobile Server
Pre Conditions: The user must select Detect Danger Zone on the Homepage
Main Flow: <ol style="list-style-type: none">1. User need to activate the mobile data and GPS<ol style="list-style-type: none">1.1 If mobile data does not exist then1.2 Connect to wifi2. Else continue to detect current location<ol style="list-style-type: none">2.1 If location is in danger zone then2.2 Background color change to red3. Else area is in Safe zone4. Push Get My Location Button5. Current Location is updated every 5 seconds6. User select Press For Help Button7. Redirect to Google Map API<ol style="list-style-type: none">7.1 If there is nearby police station or post guard then7.2 Set navigation to those locations
Post Condition: <p>The system should get updated user's current location of its particular coordinate and saved in database.</p>

3.4 ACTIVITY DIAGRAM

Figure 6 shows the activity diagram for this project. It shows the sequence of the application when it starts until the end. The sequence is not necessarily as follow. The users can use the application however they want with discretion in order to avoid false alarm.

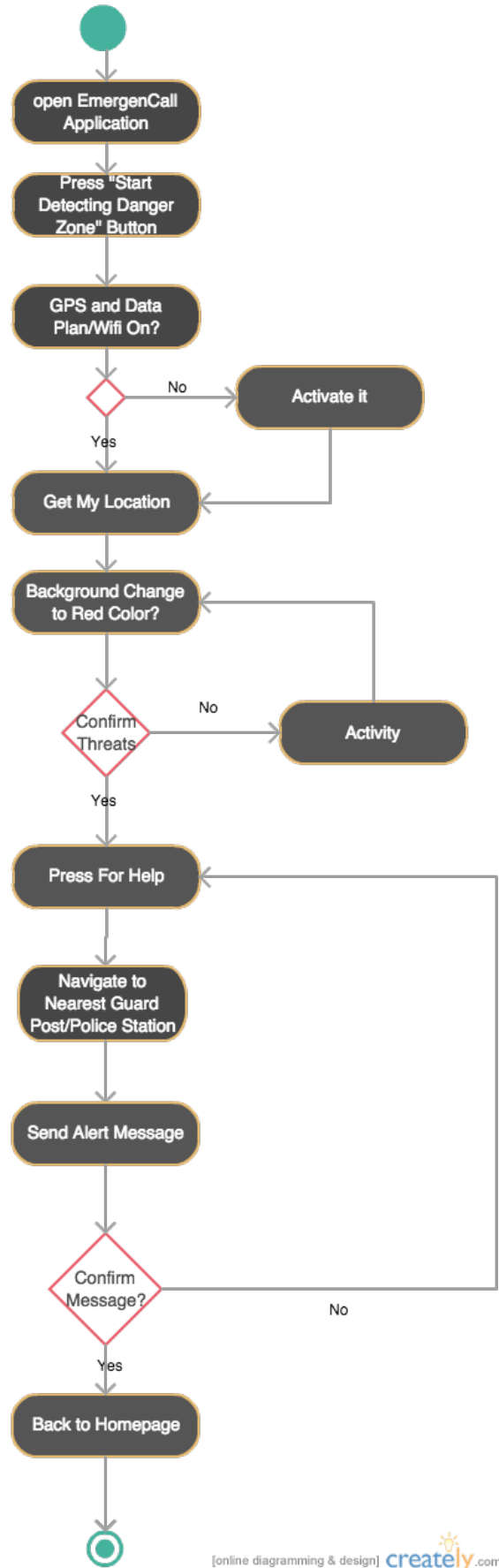


Figure 6: EmergenCall Activity Diagram

3.5 CLASS DIAGRAM

Figure below shows the project's class diagram. In this diagram, it shows the 4 main classes in EmergenCall Mobile Application, which are "User" class, "Interface" class, "CloseContact" class and lastly "Police" class.

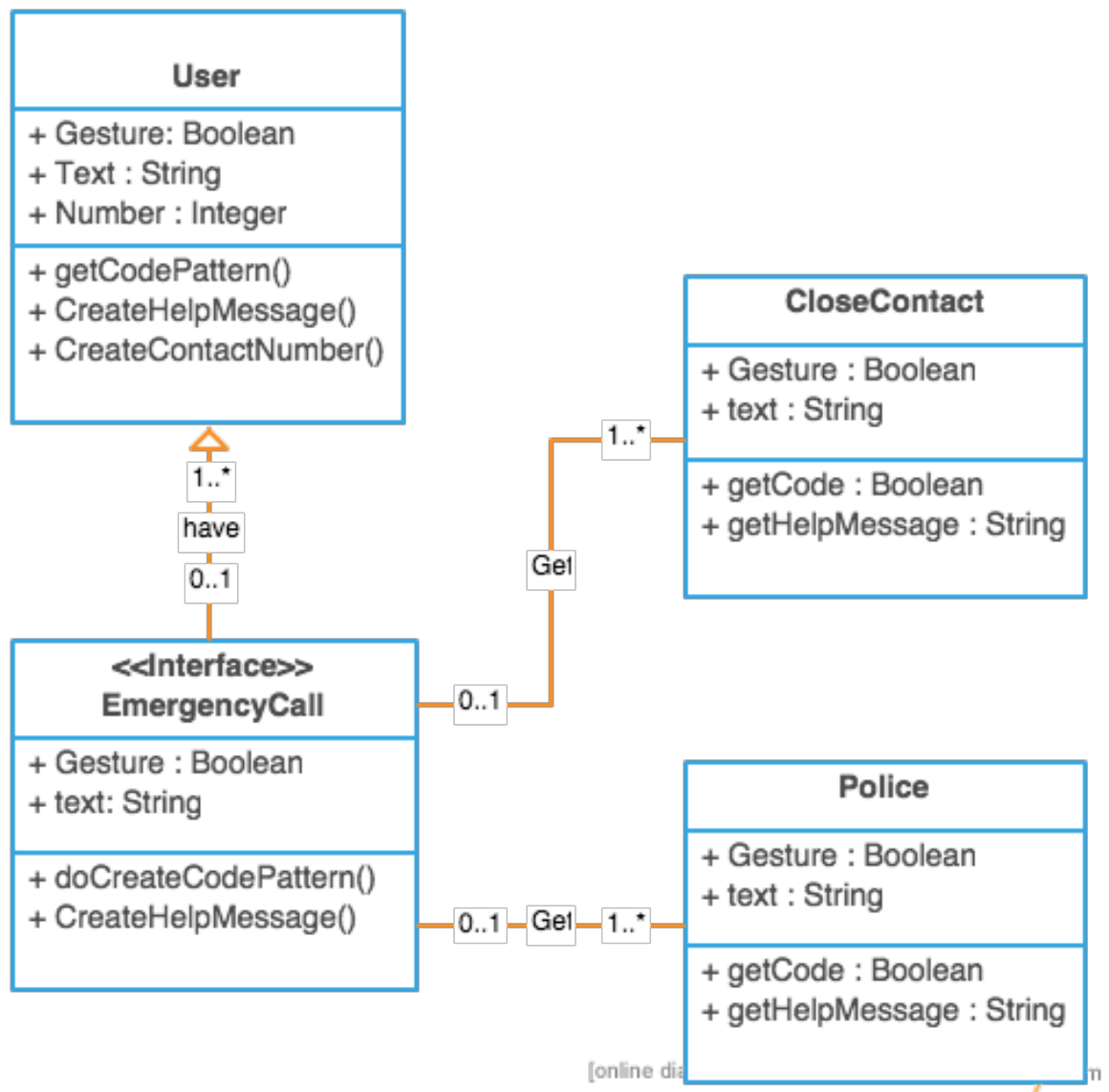


Figure 7: EmergenCall Class Diagram

CHAPTER 4

RESULT AND DISCUSSION

4.1 QUESTIONNAIRE RESULT

The first step in Agile Method is Discovery, which is to search for requirements and other research results. So, in order to gather those data, I have distributed an online questionnaire in Facebook as a platform. I have posted the questionnaire in multiple groups of people; not only categorize to students. The sample of the questionnaire is attached in the Appendix (i). The objectives of the questionnaire is to:

- I. To identify the safety of people nowadays based on current responds
- II. To determine the factor of self safety defense method preferably used
- III. To identify the requirements user will need in the new application

Below are the questionnaire result taken by 45 respondents:

Question 1:

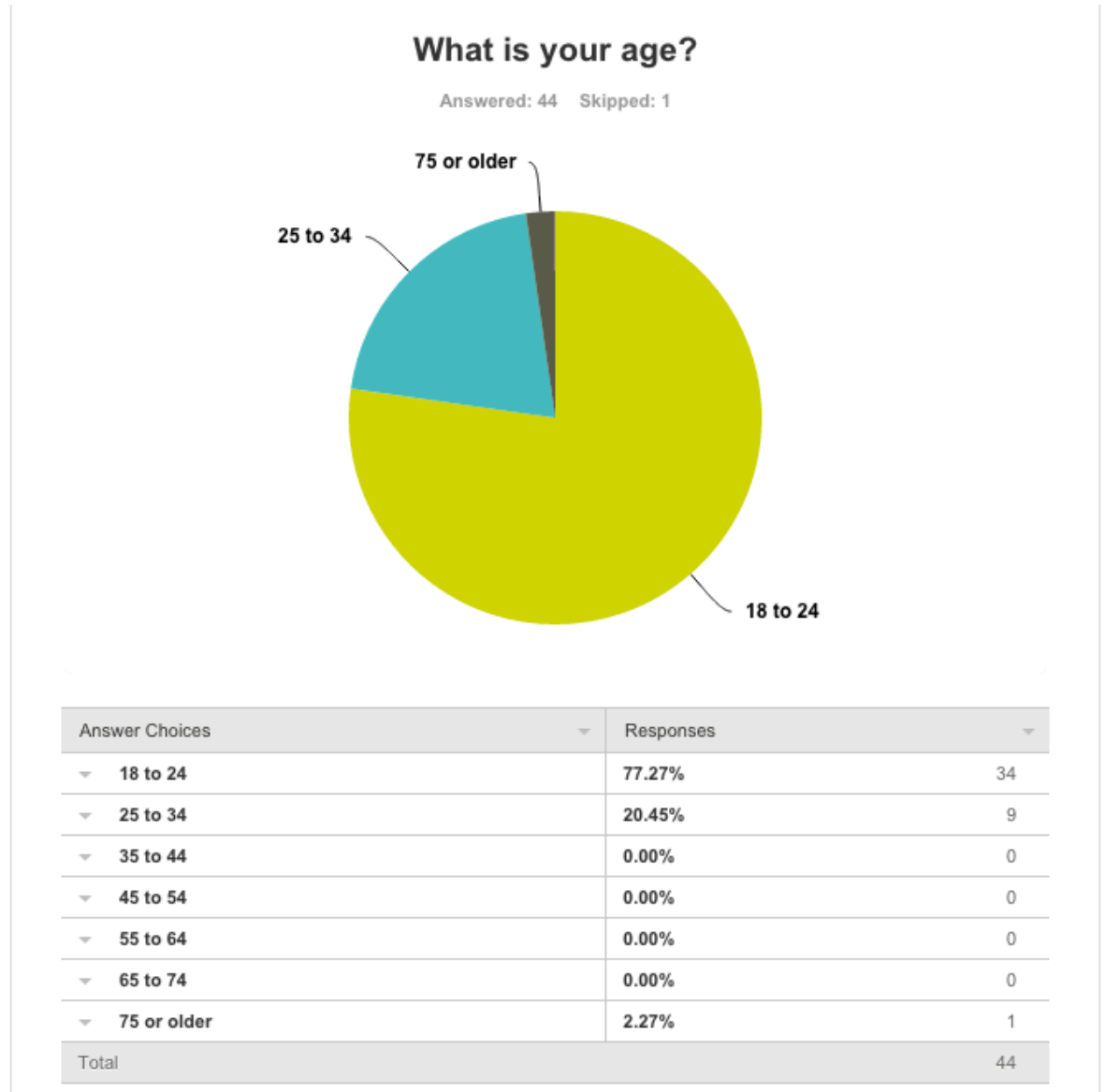


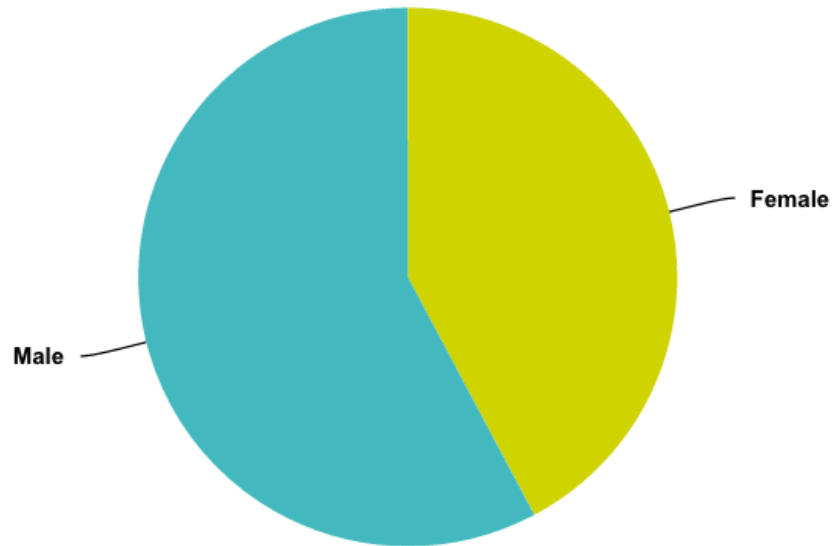
Figure 8: What is your age?

Based on the above question 1 results, among 45 respondent, 77.27% the majority is age 18 to 24 whereas 34 respondent out of 45 respondents. And 9 respondents are age 25 to 34 where make it up 20.45% of total and lastly only 1 person age 75 or older where it is 2.27% out of total. From this result, the goal to collect data from various level of age is completed.

Question 2:

What is your gender?

Answered: 45 Skipped: 0



Answer Choices	Responses	
Female	42.22%	19
Male	57.78%	26
Total		45

Figure 09: What is your gender?

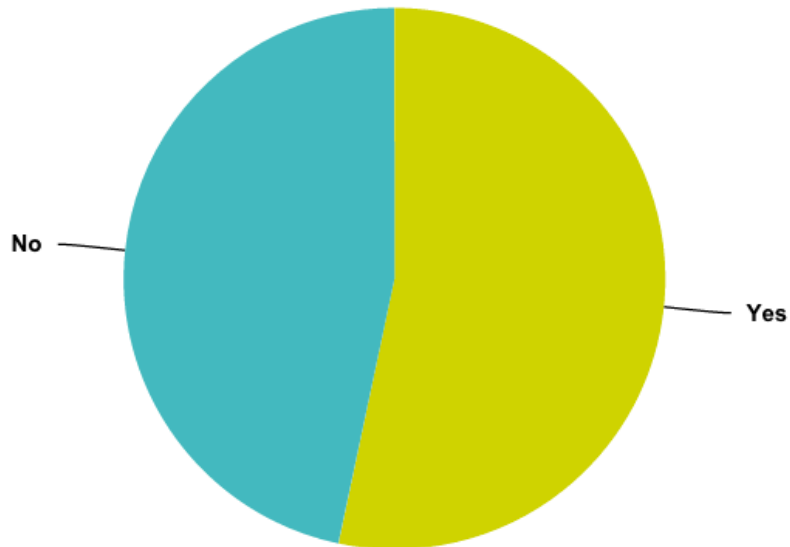
From the above figure, we can conclude that 19 out of 45 respondents are female which makes it 42.22% and the rest 26 respondents are male which is 57.78%. The purpose of this survey is to get female respondent, as many as there are however this is quite satisfying since the female respondent is about as many male respondents are.

The above is the demography questions in order to find the results based on age profile and gender.

Question 3:

Have you ever been in danger situation? (eg: being followed, stalk, pickpocket etc.)

Answered: 45 Skipped: 0



Answer Choices	Responses	
Yes	53.33%	24
No	46.67%	21
Total		45

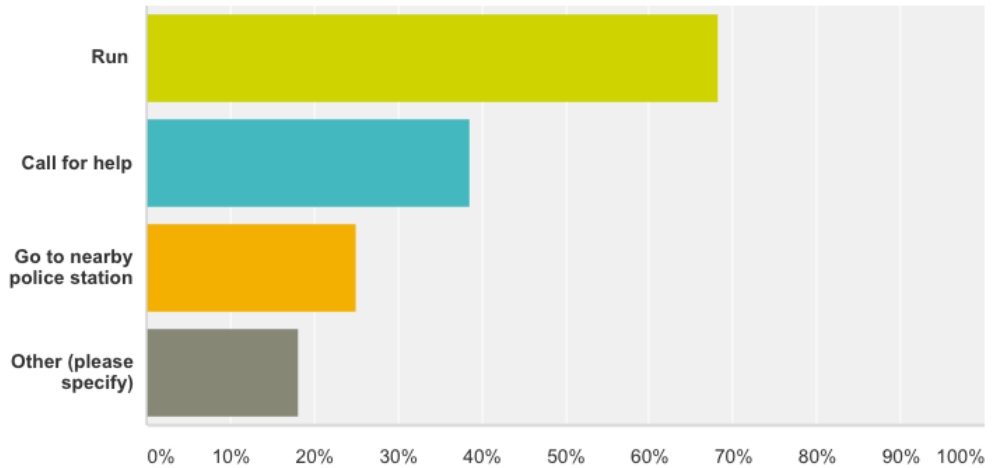
Figure 10: Have you ever been in danger situation?

This question is asked to find whether the respondent has ever been in any minor danger situation such as being followed, stalk or got pickpocketed. Surprisingly, majority of the respondents have been in such situation which 24 respondents, 53.33%, has answered yes. Meanwhile, 21 respondents, 46.67%, answered no.

Question 4:

What is your first action when you are in danger?

Answered: 44 Skipped: 1



Answer Choices	Responses
Run	68.18% 30
Call for help	38.64% 17
Go to nearby police station	25.00% 11
Other (please specify)	18.18% 8

Showing 8 responses

- Get to public places
3/22/2015 3:39 AM [View respondent's answers](#)
- cry
3/21/2015 4:27 PM [View respondent's answers](#)
- Depending on the situation, if they come with group I'll run away but individually I would've fought back.
3/21/2015 12:11 PM [View respondent's answers](#)
- analyze situation, if I can handle it, i will fight
3/21/2015 10:29 AM [View respondent's answers](#)
- Move to places with lot of people
3/21/2015 10:11 AM [View respondent's answers](#)
- fight back
3/21/2015 5:43 AM [View respondent's answers](#)
- Calm down
3/21/2015 5:30 AM [View respondent's answers](#)

Total Respondents: 44

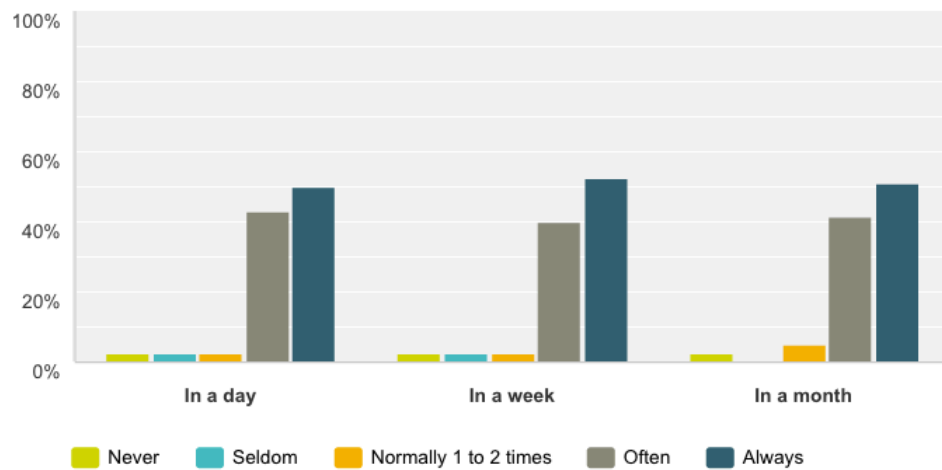
Figure 11: What is your first action when you are in danger?

The above question is to find the results of what will respondents do when they are in danger. From above figure we can see that most of them (68.18%) choose to run which make it 30 out of 45 respondents. Other 38.64% choose to call for help while 25% would go to the nearby police station and the rest choose others (18.18%). In others answer there are 7 different answers as shown in the figure.

Question 5:

How often do you hold your mobile phone?

Answered: 45 Skipped: 0



	Never	Seldom	Normally 1 to 2 times	Often	Always	Total	Weighted Average
In a day	2.27% 1	2.27% 1	2.27% 1	43.18% 19	50.00% 22	44	4.36
In a week	2.50% 1	2.50% 1	2.50% 1	40.00% 16	52.50% 21	40	4.38
In a month	2.44% 1	0.00% 0	4.88% 2	41.46% 17	51.22% 21	41	4.39

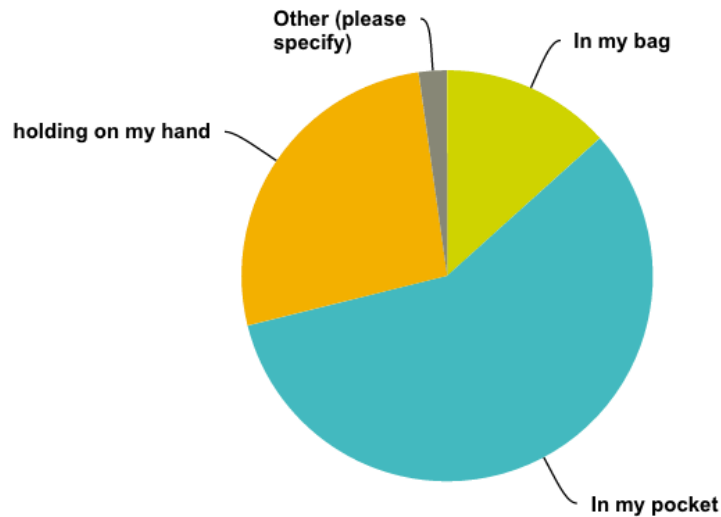
Figure 12: How often do you hold your mobile phone?

This question is to figure how often respondents hold their mobile phone on hand. It is because EmergenCall Application is best used when the users are a frequent mobile phone user who hold phone most of the time on their hand. The question has three answer which is “in a day”, “in a week”, and lastly “in a month”. And the answers are all consistent and about the same as shown in the figure above.

Question 6:

Where do you normally place your mobile phone?

Answered: 45 Skipped: 0



Answer Choices	Responses
▼ In my bag	13.33% 6
▼ In my pocket	57.78% 26
▼ holding on my hand	26.67% 12
▼ Other (please specify) Responses	2.22% 1
Total	45

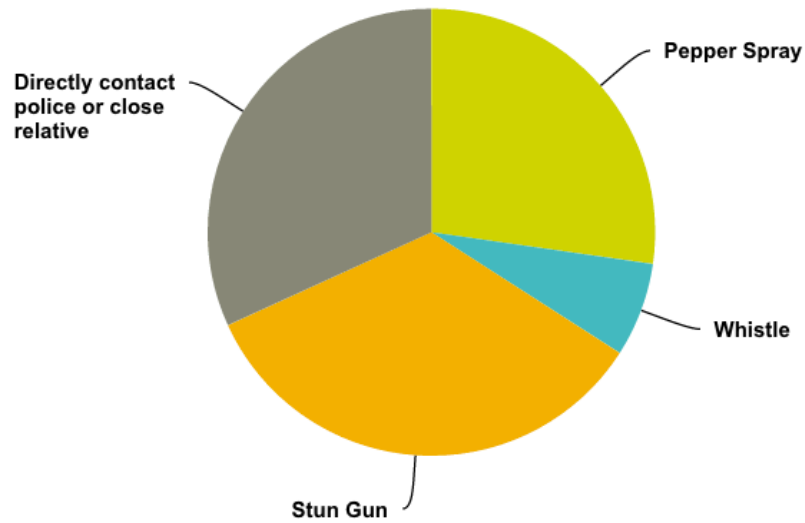
Figure 13: Where do you normally place your mobile phone?

From the above figure we can conclude that majority respondents place their mobile phone in their pocket, which is 26 out of 45 respondents. Second most chosen answer is holding in their hand, which is 12 out of 45 respondents. While 6 out of 45 respondents choose to put their mobile phone in their bag and only 1 answer others which is the answer is “On the desk, occasionally on my pocket as I bring it to the class.” From these answers, we can see that the purpose of the research is about to accomplish where to get requirement when users are easily reach their mobile phone in case of danger or accident situation.

Question 7:

What kind of self-protection do you prefer?

Answered: 44 Skipped: 1



Answer Choices	Responses
Pepper Spray	27.27% 12
Whistle	6.82% 3
Stun Gun	34.09% 15
Directly contact police or close relative	31.82% 14
Total	44

Figure 14: What kind of self-protection do you prefer?

This question is included in the questionnaire to find out the self-protection action respondents would take or prepared in case of emergency or danger situation. The number of respondents for each answer is about the same where 34%, 15 respondents out of 45 answered stun gun would be preferred. 31.82%, 14 respondents out of 45 answered directly contact police or close relative and 27.27%, 12 out of 45 respondents answered pepper spray. While other 6.82%, 3 respondents answered whistle. The purpose of this question is accomplished because we got the response to directly contact police or close relative as their preferable answer.

Question 8:

Do you set speed dial in your mobile phone? If yes, how many people is in there?

Answered: 45 Skipped: 0

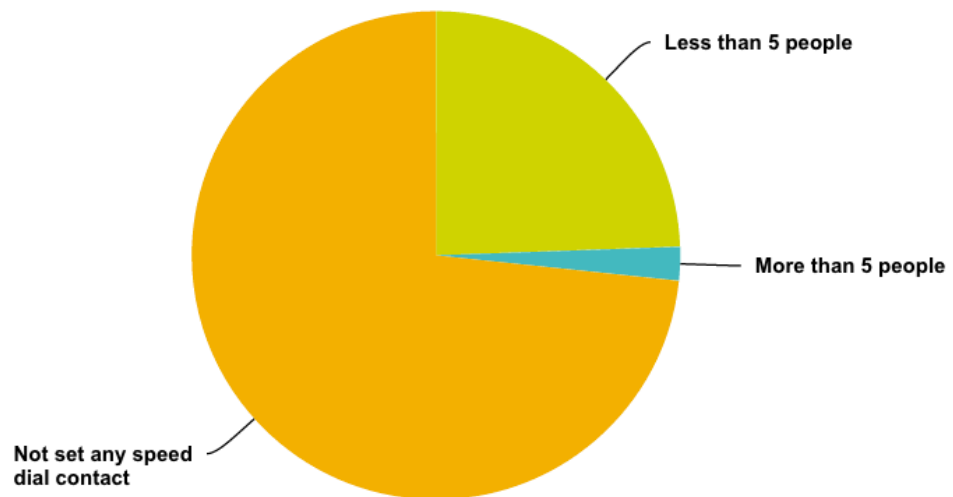


Figure 15: Do you set speed dial in your mobile phone? If yes, how many people is in there?

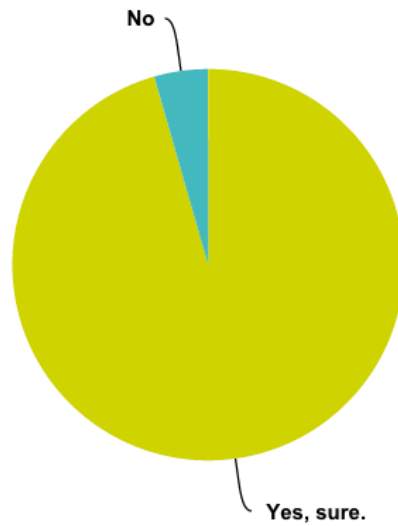
From above figure we can see that 33 out of 45 respondents choose not set any speed dial contact, which makes it 73.33%. Meanwhile, those who has set speed dial is separate to two answers, which is 11 respondents, choose less than 5 people and only 1 respondent choose more than 5 people.

From here we can conclude that people are not keen on using speed dial even though it is very useful especially during emergency case. However, with the new application the use of the speed dial function will be easier and simple.

Question 9:

If there is a new self-protection mobile application system, would you download it and use it?

Answered: 45 Skipped: 0



Answer Choices	Responses
Yes, sure.	95.56% 43
No	4.44% 2
Total	45

Figure 16: If there is a new self-protection mobile application system, would you download it and use it?

This question get a very satisfactory answer where 96.56% which is 43 out of 45 respondents choose yes if there are a new self-protection application. Meanwhile, only 2 respondents choose no.

4.2 Prototype Screenshot

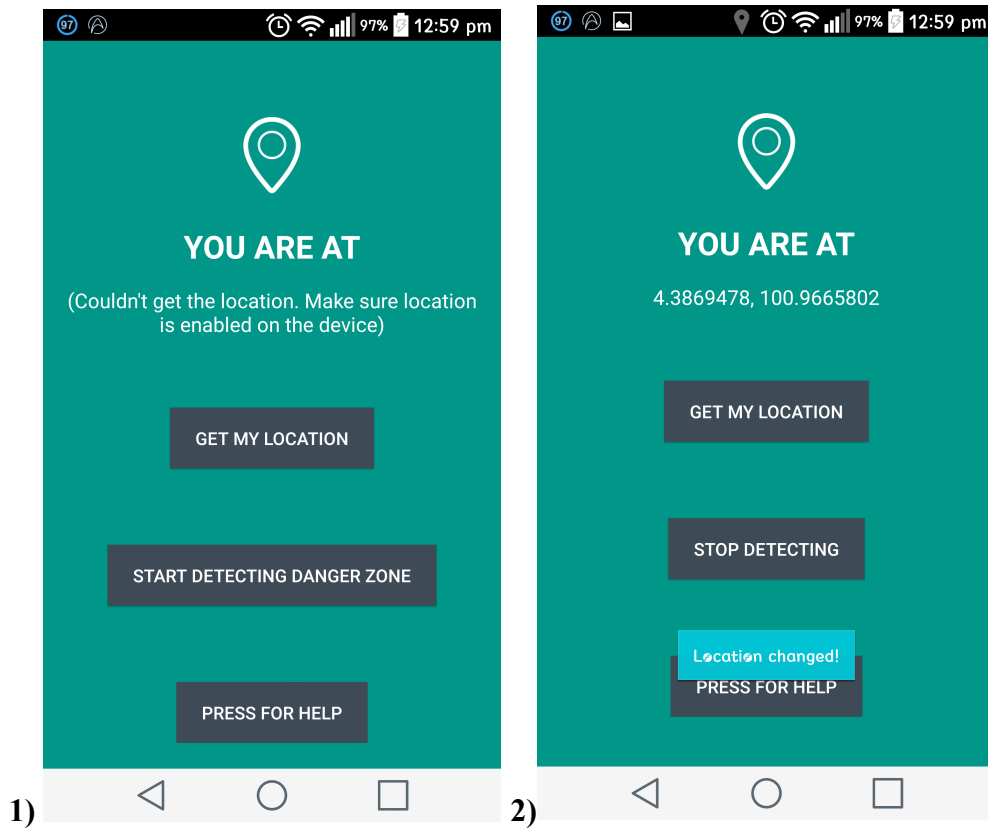


Figure 17: EmergenCall Prototype Screenshot I

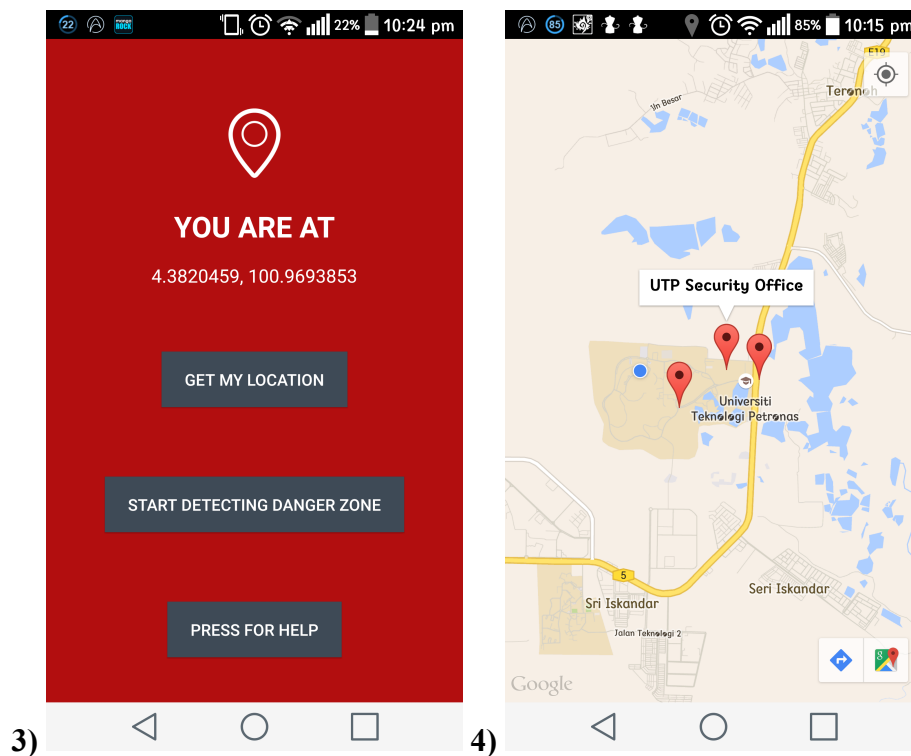


Figure 18: EmergenCall Prototype Screenshot II

- 1) When the user opens the application, the main interface will show up like in picture 1). If user in safe zone the background color will be green color and if in danger zone then the background color will change to red color.

NOTE: To use this application user need to enable their Mobile Data and GPS to highest accuracy

- 2) The location which is the coordinate number shown in the picture change every 5 seconds so the user will get their current location every 5 seconds. This function is important because the message will use the current coordinate for the recipient to locate user in Google Map API with the HELP Message sent containing message and link.
- 3) The background color changes to red color when user are 50 meter from/and danger area. Once the user walks out of the danger area then the background color will turn back to green. As long as the background color stays the same that means user is in danger zone which user needs to be extra careful or if they feel someone is tailing them or they will be in danger then press the button to send HELP message.
- 4) The picture shows Google Map API with 3 points of the nearest safe place from user. In this picture, the nearest safe place is the UTP Security Offices. User can choose which to go then it will navigate user by using Google Map API service.

CHAPTER 5

CONCLUSION

In these modern days, there are a lot of crimes actively runs around the globe. There are two types of crime, which is major and minor crime. Every year, reports come in the state that the number of crime keeps increasing year by year. This especially happens for a minor crime like petty theft, robbery, bag snatching or pickpocket. These minor crimes have occurred frequently that it has become a part of daily life and has increase citizen's anxiety.

Minor crime is the major crime that frequently happens in Malaysia. There are a lot of case where elder women or children get purse snatch or being stalked until something really bad happen like get injured, but they cannot ask any help. This happens a lot in the rural area where there are fewer people and police station is miles away.

That is the purpose of this project where we would like to provide some kind of self-protection application. This project is to develop an application to automatically call for help by using pattern code. This application is very useful to use when user needs to call for help especially in rural or deserted area. So, with developing this application we hope that there will be fewer cases of people were deserted and hurt without getting any help or the help come late.

In conclusion, all objectives of this project are achieved.

5.1 RECOMMENDATIONS

Future recommendations are needed in order to improve the EmergenCall Application for future enhancement. The improvement process will allow the system to have design interfaces, improve user-system interactions and also to ensure the system can run smoothly without any interference. One of the recommendations for this application is to create for all mobile operating systems such as Android, IOS, and Windows. Every operating system is different from one another and the way to develop it is also different. Plus, the number of Android, IOS, and Windows mobile phone users are not much different and it would be a lot beneficial for all people if the application were available for all operating systems.

Another recommendation is to have collaboration with Polis Diraja Malaysia (PDRM) so that user will get to contact nearby police station phone to report what has happened and the police will get the current location by using the GPS system in the system. Plus, we need to get the data for the danger zone in the state so that the data will be up-to-date. Now, the only thing that we can do is to send SMS to mobile phone recipient with a link to nearby police station also a message about the situation and current location however it is not too assurance whether the police will be inform about this or not. So, this collaboration will be a huge achievement and recommendation for this project.

Lastly, to add more function such as more type of message sending function like send an email or make direct call to police station or other recipients. In this way, the message that the user needs to convey or send will be send to multiple recipients or even a single recipient. Depend on the user to set it up.

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Appendices

Questionnaire:

Self-protection mobile application system survey

Greetings, I am a student from Universiti Teknologi Petronas who is currently working on my Final Year Project title 'EmergenCall Application'. This project is to introduce a mobile application/ system that helps and provide self-protection to people when they are in danger situation (minor case). Basically, the user will need to set a code pattern that will trigger the help message and when user tap the unique code the help message will automatically send to the number that has been set earlier without the need to make actual call or message. The purpose of this survey form is to collect your precious feedback on my proposed self-protection application. Your cooperation is appreciated. Thank you.

1. What is your age?

18 to 24

25 to 34

35 to 44

45 to 54

55 to 64

65 to 74

75 or older

2. What is your gender?

Female

Male

3. Have you ever been in danger situation? (eg: being followed, stalk, pickpocket etc.)

Yes

No

4. What is your first action when you are in danger?

Run

Call for help

Go to nearby police station

Other (please specify)

5. How often do you hold your mobile phone?

	Never	Seldom	Normally 1 to 2 times	Often	Always
In a day	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
In a week	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
In a month	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

6. Where do you normally place your mobile phone?

- In my bag
- In my pocket
- holding on my hand
- Other (please specify)

7. What kind of self-protection do you prefer?

-Pepper Spray

-Whistle

-Stun Gun

-Directly contact police or relative

8. Do you set speed dial in your mobile phone? If yes, how many people is in there?

More than 5 people

Not set any speed dial contact

9. If there is a new self-protection mobile application system, would you download it and use it?

Yes, sure.

No