Android Based Car Alert System in Alerting Incoming Sharp Corner and Updating Emergency Places via GPS Assistance

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CERTIFICATION OF APPROVAL

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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 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.

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Abu Zarin bin Zulkafli

ABSTRACT

Six percent of all deaths in this country are caused by road accident fatalities. This is an alarming fact despite our authorities bragging about the decreased road accident deaths over the past few years and the safety standard of cars has improved dramatically.

Global Positioning System (GPS) to be one of the alternatives that could help in decreasing the accidents. Popular GPS system for navigation like Waze, PapaGo implemented some of the features which give warning if the car exceeding speed limit in long straight road.

Hence, these existing systems are provide alternatives to reduce the percentage of car accident by giving alert to slow down the car which can prevent the drivers over speed that lead to accidents.

To minimize the accidents rate in this country, this project will develop a GPS application which provides “buzz” sound as alertness to tell the drivers that there are dangerous corner ahead. This feature will also come out with the adaptable user-friendliness features according to the context surrounding the drivers in giving the suggestions to the closest emergency places by only refresh the list of the place rather than type the name of the places.

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INTRODUCTION

1.1 Background of Study

Driving from point A to point B has gotten much easier over the years, as tracking technology like GPS (Global Positioning System) brings the added convenience of many different capabilities. Cars nowadays have been built in with GPS application to assist driver in many circumstance. GPS system can give the direction to the desire locations precisely, reduces the possibility from lost and helps a lot in finding the points of interest around us like place to having food , historical heritage etc.

Some drivers are likely to have built in GPS system in the car's dashboard and the rest are likely install the GPS application in their mobile device. However, the society knows that the aim of GPS system is to ease the drivers task, hence it will make the drivers can drive without any fear of lost in direction in finding the place and give new driving experience that bring so much joy that GPS offers. However, alarming indeed, according to a research done by the University of Michigan on February 2014, Malaysia is among the top 25 most dangerous countries for road users, which the statistic of 30 fatalities per 100,000 individuals. That means about six percent of all deaths in this beloved country are caused by road accident fatalities. This is utterly shocking fact despite our authorities bragging about the decreased road accident deaths over the past few years and the safety standard of cars has improved dramatically.

Bad driving attitude, poor driver's education and terrible road conditions are one of the factors that contributed towards our high accident rate. Because of these, Information Technology experts introduce GPS based system to be one of the alternatives that can help in reducing the car rate accidents. Popular GPS system like Waze, PapaGo implemented some of the features which give warning if the car exceeding speed limit in long straight road and trace whether there are Automated Enforcement System (AES) camera. Yet, this system is very helpful in reducing the car accidents. However, these techniques still produce not well satisfy results when

applied to some critical situations. Hence, I believe that the reason for the above is the some new features need to be implemented together to suit the context in which the GPS system are giving benefits in all situation to prevent accidents.

However, not all the cause of death accidents are because of the drivers over speeding, we also need to take the terrible road conditions into the cause of accident (e.g. sharp corners at the down hills). As such, this project will develop a GPS application which provides “buzz” sound as alertness to tell the drivers that there are dangerous corner ahead. This feature will also come out with the adaptable user-friendliness features according to the context surrounding the drivers in giving the suggestions to the closest emergency places by only refresh the list of the place rather than type the name of the places.

Effectivity of alertness adaptability, and user-friendliness might be defined differently by different people. In this project, Effectivity of alertness would mean that every time the drivers reach the corners, the “buzz” alerting sound will effective enough to alert (in terms of efficient volumes and rhythm) the driver to get ready to overtake the corner. Adaptable would mean the GPS Application are well built in the car dashboard are fit in shape, does not interrupt driver focus on the road. As for user-friendliness, the definition It offers clear, easy to read icons and colourful map graphics, font readability, and always makes everything large and easy to glance at quickly while behind the wheel will be adopted.

1.2 Problem Statements

There are major problems in some roads in Malaysia that had cause many death accidents to occur. The structures of the roads sometimes are very steep and it is dangerous for the drivers to control their car down the hills that have many dangerous corners especially in the rural area and hills. It is almost impossible for the new and novice drivers to handle their car on the dangerous corner without proper experiences, notification sign and alert system.at worst scenarios, we can see rural roads does not well maintained e.g. the signboards are dull , the road lines are weary and solar lamp at the dangerous corners does not works and not being maintain properly by authority.

This problem has negatively impacted the drivers because they may have serious injuries and most of them died in the accidents which resulted Malaysia is the 17th country that has most dangerous for road users in the world. We once cannot buy the live of a person and it brings bad results to the productivity of the country as many peoples died.

Thus a study which investigates on how to reduce the death car accidents ratio in Malaysia by Implemented an Android Based Car Alert System in Alerting Incoming Sharp Corner via GPS Assistance could remedy the situation. How it is possible to works? By buzzer-like sound that are clear enough to be heard by the drivers and make them ready to get the car in optimum speed to handle the sharp corners ahead.

Besides that, there will be additional features in which there is a need to go to emergency places like the passenger have heart attack in the middle of nowhere or planning to go to police station to evacuate from the road-bully there is a more user friendly to search the nearest emergency place.

1.3 Objectives and Scope of Study

1.3.1 Objective

The main objectives of this project including:

- To develop an Android Based Car Alert System in Alerting Incoming Sharp Corner via GPS Assistance that be able to help the driver in handling the car for incoming dangerous corners.
- To reduce the risk of death car accidents ratio throughout the year.
- To provide the drivers list of nearby emergency places(e.g. <50km , <90km) during emergency situation with only clicks of button(without need to key in place name) and navigate them to the emergency place as well.

1.3.2 Scope of Study

There are several scopes of study of this project including:

- Understand the flow and process of the android application.
- Implement and testing the prototype of the GPS based android application.

Generally, this project will focus on LCD-radio android on the vehicles dashboard platform and develops for Malaysian drivers that have Authorize Driving licenses which are Car, Van, Lorry and Bus. Due to the development phase that need to be executed in the personal computer, the mobile phone is used instead of LCD-radio car as it is portable and easy to debug. Besides that, the area of the online Maps would be in Malaysia to ensure the feasibility of the project. The maps are degrading in size to cover the maps of Perak only for a demonstration.

1.4 Relevancy of the Project

The project is purposely to be developed to reduce the risk of accidents at the sharp corners as we aware that there are several dangerous corners have been discovers already take numerous numbers of death accidents e.g Genting Highland-Batang Kali Road. As the system is built in on the dashboard of the car, it is likely the devices will operates at its best as it get stable power and android platform that are very convenient and affordable to develop.

This system also will use the mobile phone, which has speaker installed and built in GPS. There is no need to buy a GPS System from any provider and only free Google License key is used to get navigation service from google. Hence , it requires no money to set up the environment.

The added features of this Car Alert System are providing information regarding the nearest emergency place in case we are at the place that we are not familiar enough. Therefore, this Car Alert System is very suitable to be used by the drivers as it would provide a complete guidance in handling the car during the corners and give direction to the emergency place in emergency situation. Besides, the ability of the maps to be work offline giving the drivers ability to use GPS without the need to connect with internet network.

1.5 Feasibility of the Project Within the Scope and Time Frame

In terms of time frame, this project requires a high time commitment in the development process. Since the research period is very short, the process of finding the research outcome and transfer it into the working system is quite challenging.

The time frame for this project to be developed is two semesters of study. For the first semester the project will be focused on the planning, analysis, research and design phase. Meanwhile, in the second semester will be developing the prototype and usability testing.

Moreover, in terms of technical, this Android Based Car Alert System in Alerting Incoming Sharp Corner via GPS Assistance focuses on two different features which are alerting the driver before taking the sharp corners and provides the directory to nearby emergency place. Besides that, the function and process of the mobile application are feasible to program within the time frame. It is adequate of time to develop this system within 28 weeks. The validity testing is able to run at the end of the development to check the system has quality and safe for the driver to use it in real environment.

1.6 Limitation

The limitations of this project development include:

- The experiment of the project need to be implemented in real car in handling the simple corner to check the ability of the system in alerting the driver and the accuracy of the system in giving information and direction to nearby emergency places. GPS Simulator might be the solution.

- The measurement of the GPS accuracies is hard to measured due to some obstacles to the signals such as buildings and satellite signal strength

- The desire users of this system need to have the Android devices and internet connection in order to install the application.

- GPS requires that there is clear opening to sky without any obstruction to the signals by overhanging branches or structures. Further, there may be limited applications in densely settled urban areas. As the dangerous roads are mainly in the suburban/village areas, there are some issues about the stability of the GPS signal.

CHAPTER 2

LITERATURE REVIEW

2.1 Roads of Malaysia

2.1.1 History of Roads in Malaysia

Road construction has begun since before independence in Malaysia. Before 1957, there has been a road system linking Johor Bahru in the south with Kangar in the north and Kota Bharu in the East Coast, connecting main cities between the other cities. After the country gained independence in 1957, efforts to improve the road system has been done properly and through the rapid development planning, especially Malaysia Plan every five years which was launched by the Federal Government. Construction of roads in Malaysia is implemented mainly by the Federal Government and State Government. However, since the mid-1980s, construction of toll roads has been started by private companies who then authorized by the government to charge tolls to road users. This road is an alternative to the existing road network and built with various facilities provided to users.

Roads in Malaysia are classified into two broad categories, namely Federal Roads and State Roads. Federal roads are all roads declared under the Federal Roads Ordinance (1959) and the major interurban roads joining the state capitals and roads leading to points of entry to and exit from the country. State roads generally comprises of the primary roads providing intra-state travel between the district administrative centres. Other roads included in this category are the urban collector roads under the municipalities and other minor roads within the villages and the rural inhabited areas under the Districts Offices.

2.1.2 Road Accidents in Malaysia

We can read and hear many tragic and unfortunate news about the road accidents that causes many innocent lives die or injuring-suffered. Road safety has becoming the serious issues nowadays as traffic accidents in Malaysia has been raising at the average rate of 9.7% per annum over the last three decades (Mohamad Nizam Mustafa, 2006). Although the multiple bodies regarding on road safety has been formed within the government departments, private agencies and voluntary organizations and launches many road safety campaigns previously, the road accidents still happens every time and everywhere whether at the normal days or festival seasons.

We can see the accidents rate keep increasing in Malaysia drastically. As compared to the earlier days, total number of road accidents had increased from 24,581 cases in 1974 to 328,264 cases in 2005, reaching more than 135% increase of accident cases over 30 years. The number of fatalities (death within 30 days after accident) also increased but at slower rate compared to total road accident from 2,303 in 1974 to 6,200 in 2005.

As stated by Law, T.H. (2004), the upward trend of fatalities dropped in 1997 after Malaysia Government established a 5-year national road safety target to reduce road accident deaths by 30% by the year 2000. This means the road accidents can be reduced by any parties especially from government or any organizations as long as there are progressive actions taken seriously.

As stated by Law, T.H. et al (2004), an earlier national road safety target was to reduce deaths rate to 4 traffic accident deaths per 10,000 registered vehicles by the year 2010. This target was based on the statistical model developed by Road Safety

Research Centre of University Putra Malaysia which predicted 9,127 deaths in year 2000 if the traffic continued to increase at the continuing linear growth with 1989 as its base year.

Compared to the nation's safety performance, the deaths rate is still far behind other developed countries, which is below 3 deaths per 10,000 vehicles. According to Radin Umar (2005), the national road safety target to reduce the death rate to 4 traffic accident deaths per 10,000 registered vehicles by the year 2010 was established in 2001. Following the positive trend in reducing fatality by safety intervention measures carried out, new safety targets have been established based on 10,000 registered vehicles, 100,000 population and billion kilometre travelled. By the year 2010, Malaysia has set up her target to reduce death rates by 2.0 per 10,000 registered vehicles, 10.0 per 100,000 peoples and 10.0 for every billion kilometres travelled.

There are various aspects of causes that need to be looked out and investigated before we can find the solutions or steps to prevent or at least, reduce the numbers of road accidents in Malaysia at the future. Nordin Abdul Rahman (2013) stated that statistics from Royal Malaysian Police (RMP) have revealed an increase in numbers of death due to road accident from 6,286 deaths in 2003 to 6,917 in 2012. According to the statistics of Road Accidents in Malaysia 2012 by RMP, the totals of road accidents had increased from 298,653 cases in 2003 to 462,423 cases in 2012 which reaching more than 64.58% of accident cases over 9 years.

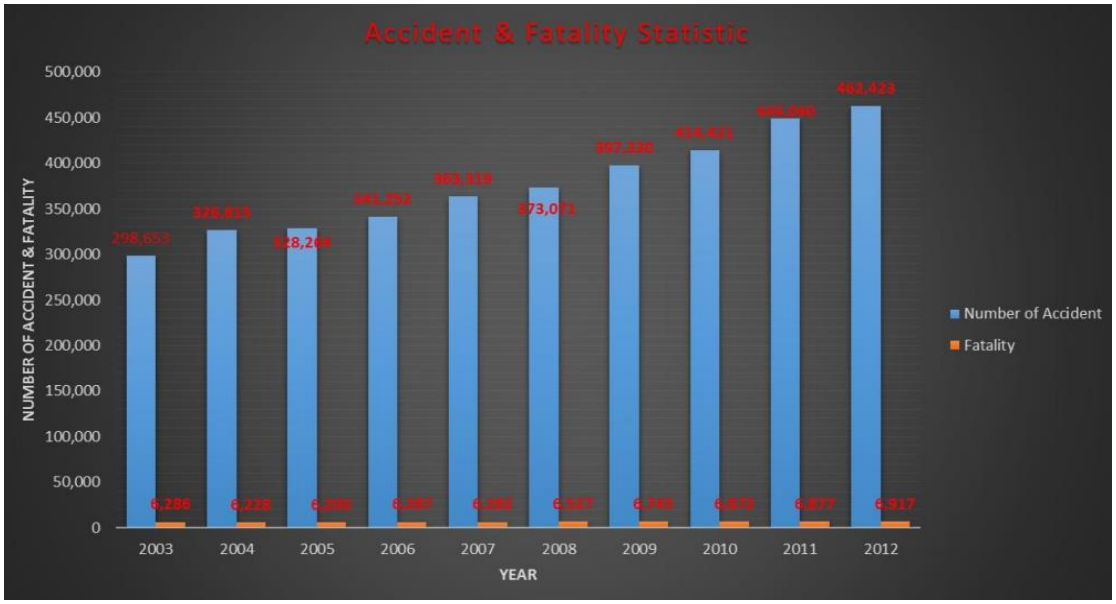


Figure 1: Malaysia Accident & Fatality Statistic by Royal Malaysia Police

Total of 462,423 accidents occurred in 2012 which means a total of 1267 accidents occur every day in Malaysia in 2012. Thus, the Android Based Car Alert System in Alerting Incoming Sharp Corner via GPS Assistance need to be developed to help in reducing the number of accidents in upcoming years. With the features which gives alert about the dangerous corners ahead , these system can prevent the accident from occur in Federal Roads and State Roads that have many sharp corners. Some of the warning signboards like “SLOW DOWN” and Sharp Corner Signboard are not put beside the roads in safe-sight distance before taking the corners, if there any, the signboards are already rusting or dull in colour or even unable to see it due to bad weather like driving in heavy rain. With this system, drivers can know that they need to drive the car carefully just after they heard the audible ‘beep sounds’ inside the car, even in the bad weather condition as the system is using inside the car.

2.1.3 Dangerous Corner

Road Type	Fatal	Serious	Total	%age
Straight	3,690	4,148	7,838	63.10
Bend	894	829	1,723	13.87
Roundabout	23	28	51	0.41
Cross Junction	215	457	672	5.41
T/Y Junction	576	1,424	2,000	16.10
Staggered Junction	36	78	114	0.92
Interchanges	12	11	23	0.19
Total	5,446	6,975	12,421	100

Table 1: Road Accident by Road Type (2003)

Source: Statistical Report Road Accident, Royal Malaysian Police. 2003

From the table above, total accidents in Bend (Corner road type) are the third highest percentage that contribute about 13.87% of accidents in 2003. Drivers tend to overtake corners exceeding the appropriate speed which resulted serious accidents. Besides, some of the dangerous corners do not have adequate safe sight distance to see the signboard before taking the corners especially while drivers over speeding. Hence, with the implementation of the Android Based Car Alert System in Alerting Incoming Sharp Corner via GPS Assistance will reduce the accidents percentage that happens in bend road as it give audible sound in car to alert the driver to slow the car speed and ready to take the corner. Besides, this system also helps the drivers if they unable to see the signboard or emergency sign "SELEKOH MERBAHAYA" because of the signboard already dull in colour and hard to see by the driver in distance. This system is believed can help in reducing the car accidents as it gives alert whether the drivers exceed the specified speed limit before taking the corner.

2.2 Global Positioning System (GPS)

GPS stands for "Global Positioning System". GPS is a satellite navigation system used to determine ground position and velocity (location, speed, and direction). Though it was created and originally used by the U.S. military, GPS is now available to the general public all over the world. GPS navigation systems are currently installed in a number of luxury cars, complete with an LCD map that shows the driver exactly where in the world he is. Advanced car GPS units can actually speak the directions to a certain destination and tell the driver when to turn.

2.2.1 GPS Elements

According to Wells, D. E. et al. (1987) The GPS system consists of three segments.

- The Space Segment : comprising the satellites and the transmitted signals.
- The Control Segment: the ground facilities carrying out the task of satellite tracking, orbit computations, telemetry and supervision necessary for the daily control of the space segment.
- The User Segment : the entire spectrum of applications equipment and computational techniques that are available to the users.

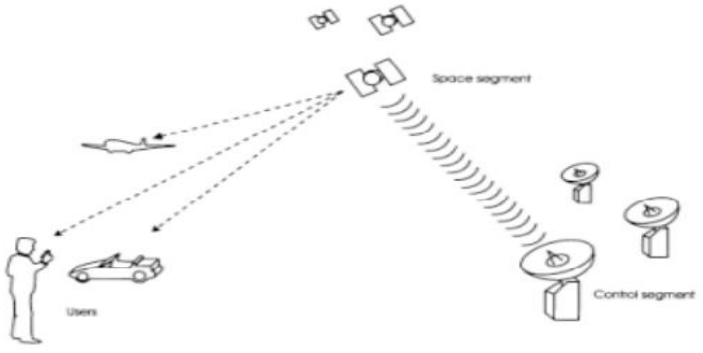


Figure 2: Figure of GPS System Elements.

According to Jean-MarieZogg (2002) in his book, GPS Basics Introduction to the system Application overview, a GPS receiver determines just four variables: longitude, latitude, height and time. Information like (e.g. speed, direction etc.) can

be derived from these four components. An appreciation of the way in which the GPS system functions is necessary, in order to develop new, fascinating applications.

2.2.2 GPS Measurement Mechanism

The signal format for GPS is designed to satisfy a set of desired attributes which were outlined at the conception of the system (Spilker, 1978). Among these requirements were the needs for accurate time of arrival (TOA) measurements of the incoming signals, as well as accurate Doppler measurements. An ionospheric group delay correction was desired. Rapid acquisition capability was a fundamental driver in the design of the signal structure.

An efficient data channel providing the navigation message to multiple users was needed while minimizing the amount of transmitted data, allowing for small, low gain antennas to be used [Hurn, 1989]. Another key issue was susceptibility to interference (intentional or otherwise) and multipath errors. To satisfy these requirements, spread spectrum or code division multiple access (CDMA) technology is used. In CDMA, all satellites transmit signals at the same frequency. Each satellite has its own code by which it modulates a bit stream, and this is used by a receiver to choose the satellite of interest out of background noise and other satellites transmitting in the same band.

2.2.3 Why GPS is Convenient to Use for Navigating Driver?

Berg, R. E. (1996) once stated that GPS has replaced the conventional method in many applications, He found that GPS Positioning is cost effective process, in which at least 50% cost reduction can be obtained whenever it is possible to use the real-time kinematic (RTK) GPS as compared to conventional techniques. According to Kleusberg, A. (1995), GPS could provide more than 75% timesaving whenever it is possible to use the RTK GPS method. GPS also does not require intervisibility between stations has also made it more attractive to surveyors over the conventional methods. For those situations in which the GPS signal is obstructed, such as in urban canyons, GPS has been successfully integrated with other conventional equipment.

2.2.4 Why Drivers Need this System?

According to Ahmad, E. (2002), Vehicle tracking and navigation are rapidly growing applications and now GPS has numerous applications in land, marine and air navigation. It is expected that the majority of GPS users will be in vehicle navigation. It is shows that Ahmad able to know that the majority of the GPS users are coming from the drivers and we can clearly these GPS applications are well-developed recent years for driver such as Waze, Papago and Google Map.

This system objective is to give audible alert to drivers in overtaking the sharp corner. With the help of the early alert, this system is expected to give drivers warning to slow down the car before taking corners to avoid accidents like skidding and crash with the opposing cars. Young drivers often drive at high speed, which more often leads to their losing control over the vehicle and driving off the road. The higher the speed, in combination with the fact that young driver often have more passengers in car, also results in more several injuries (Evans, 1991). In the UK cohort Study, (Forsythe et al. , 1995) speeding was found to be by far the most common offence among both male and young drivers.

According to Maakip. I. (2003), Intelligent Transport System is the application of technologies solution rather than basic road building and expected to improve safety and reduce the environmental damage caused by motor vehicle usage. Besides, he shows key human factor themes that were investigated in developing driver information system (p. 234).

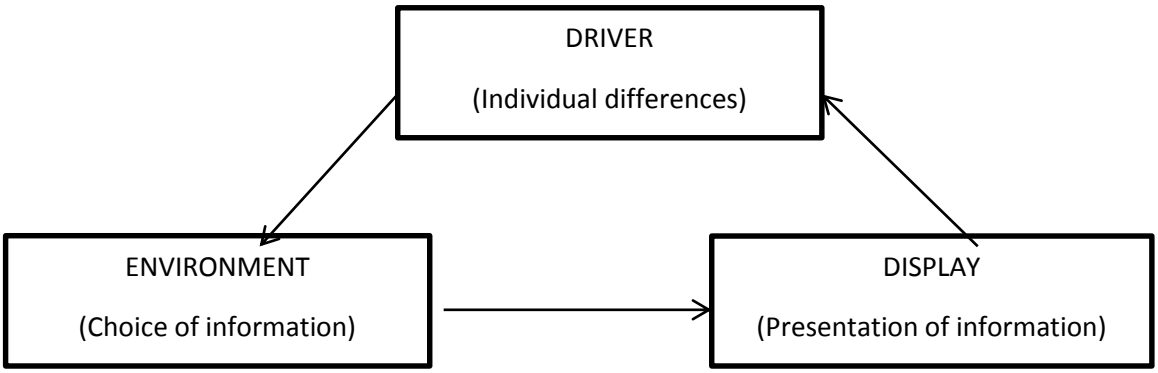


Figure 3: Key Human Factor research team for driver information system

According to Maakip, I. (2003), there are three main issues that need to be explained further in key human factor research themes for driver information system. The information has to be presented to the drivers via a display, for example visual or auditory modality and what time the information should be presented for aiding drivers in several situations (p. 235). The Android Based Car Alert System in Alerting Incoming Sharp Corner via GPS Assistance has features informing the driver visually via maps which is sharp corner ahead and alerting driver by producing audible sound. This system features is expected to fulfil all the Key Human Factor for driver information.

Another system objective is to simplify the usage of the application for the drivers in emergency use This System also has features where the driver can search the emergency places by only refresh the list instead of typing the full emergency places name. According to Davis (1993), a complex system that is designed without end users in mind usually gain little usage and support from the public (p. 236). In order

to make sure drivers use this system efficiently while driving, we have made the system simple to use by reducing the number of clicks to specific function and provide short and precise information for adequate understanding.

According to Gustafsson, S. (2003) , There are 70 per cent who drive always have their mobile phone activated while driving and mobile phones provide a great deal of security for the driver and those closest to them (p. 305). Android Based Car Alert System in Alerting Incoming Sharp Corner via GPS Assistance is the system that use Android platform that can be implemented in drivers' mobile phones and the driver mostly activated the mobile phones and can use the application. Besides, this system provide great deal of security for the driver in searching the emergency places if any threats happens to them e.g. being followed by suspicious people.

2.3 Comparative Study

Based on the research that had been done, there are two GPS System Applications that could be the same with the 'Google Maps API GPS System Application'. However, all the applications are the web-based application and yet not be applied by using the mobile application medium. The applications are 'Waze' and 'PapaGo'. Even though these applications might have some similarities with 'Google Maps API' System Application', the 'Google Maps API GPS System Application' has its own distinctive features that made it different from the other applications.

Elements/ Application	Waze	PapaGo	Google Maps API
User Interface	Good but has so many functions that hard for people to understand.	Just nice but not has clear system flow.	Good. The interface easier to be understood and used.
Ease of Use	Ease to use.	Hard to use	Very easy to use.
Human Computer Interaction	User need to key in the data in order to find the emergency places	User need to key in the data in order to find the emergency places	User only need to push refresh button to get the lists of emergency place in nearest sequence
Information Content	Good. Provide more accurate and reliable information.	Good. Provide more information.	Very Good. Provide dangerous corner alert. Provide precise and reliable information about emergency places.
Main Feature/ Functionality	Provide directory to interest place with speed limit alert	Provide directory to interest place with speed limit alert	Provide directory to interest place, dangerous corner alert and updating nearby emergency location
Working Offline / Online	Offline or Online	Offline only	Offline or Online
Target User	Driver with Online or Offline Mobile network coverage	Driver with Online mobile network coverage	Driver with Online or Offline mobile network coverage

Table 2: Comparison of other Google Maps API application available with the Other GPS System Application.

2.4 Mobile Computing

Mobile devices are a revolution as it has become an object tool used in our daily life use for communication purposes and to access information. The combination of mobile devices, third generation wireless services with multimedia capabilities, internet and portable technology, this allow data and information to be received “anywhere”, “anytime”, and by anyone. Hence, this features entertain others as it can produce the new attractive technologies that interactive features towards every stage of ages whether kids , adults and also old folks.

The process of obtaining or discovering new information is a form of learning. Without realizing it we go thru the process of learning in our daily life. Nature of receiving and obtaining information is changing due to the influence of mobile connectivity. Mobile connectivity increases learning opportunity thru project collaboration and media sharing.

2.5 Android

Android's default user interface is based on direct manipulation, using touch inputs, that loosely correspond to real-world actions, like swiping, tapping, pinching, and reverse pinching to manipulate on-screen objects, and a virtual keyboard. These features are built to maximise the satisfaction of the android user. Time by time, there are always initiative to enhance the effectiveness of the android device which to maximise the use of all the function that it had. As there are many developers whether in a company of freelance developer, there are many benefits application that have been built by them for betterment of our daily live.

As the developing the application software are available in internet with use of no money, it attracts the online developers to innovate application that helps other peoples. Only with the knowledge of programming, sometimes they can only study the code by online that require no costs, hence develop the application that beyond

imagination that give benefits to millions of people around the world. The response to user input is designed to be immediate and provides a fluid touch interface, often using the vibration capabilities of the device to provide haptic feedback to the user. Internal hardware such as accelerometers, gyroscopes and proximity sensors are used by some applications to respond to additional user actions, for example adjusting the screen from portrait to landscape depending on how the device is oriented, or allowing the user to steer a vehicle in a racing game by rotating the device, simulating control of a steering wheel. .

CHAPTER 3

METHODOLOGY

3.1 System Architecture

There are 24 global satellites orbit the Earth to send signals to a GPS-enabled receiver. The receiver can communicate with three or four satellites at any single point in time. For this to work, however, there has to be a line of sight between the receiver and the satellites. Once the receiver obtains the positioning measurements, it can calculate the location coordinates directly on the device. Over the past several years, the size, power consumption, and cost of GPS chipsets have fallen, leading to widespread use of this technology in the mobile environment.

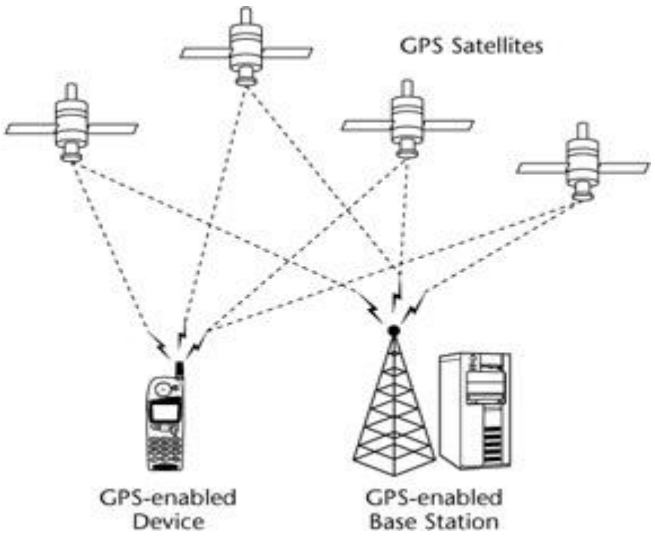


Figure 4 : System Architecture.

Android Based Car Alert System in Alerting Incoming Sharp Corner via GPS Assistance works similar to other triangulation-based positioning technologies. The satellites constantly broadcast signals that can be read by GPS-enabled devices (mobile phone). It is unimportant to the satellite how many devices are receiving the signal because the communication goes in only one direction. The device measures the amount of time it takes for the satellite signals to reach it. This measurement is taken from three distinct satellites to provide precise location information.

Mathematically, four measurements are required, but three usually provide sufficient information to give an accurate result. The speed of the signal is known, enabling the GPS to determine the distance from the satellite. It is very important that these time measurements be incredibly precise. A time calculation that is off by one-thousandth of a second can result is a location variation of over 300 kilometres (200 miles).

For this reason, the GPS receivers use atomic clocks on each satellite to ensure the time is correct. Once the distances have been determined, triangulation calculations are executed to determine the absolute location coordinates. GPS produces very accurate results, typically to within 5 to 40 meters of the actual location.

In order to get a reading, the GPS receiver has to have a line of sight to the satellites. This is a significant limitation for the mobile workforce. As Based Car Alert System in Alerting Incoming Sharp Corner via GPS Assistance requires use inside of vehicles, making it difficult for GPS to provide the required service. The system need to incorporating a second positioning technology, typically network-based, along with GPS. For instance, a mobile phone identity solution could be used as a backup where a line of sight is not available. A second limitation is the time required to obtain the location information. With standard GPS configurations, this time ranges between 20 to 40 seconds, a delay that could have a negative impact of the usability of the application.

One solution to both the line-of-sight and time delay issues is network-assisted GPS or A-GPS. A-GPS uses modified handsets that receive the GPS signals and then send those readings to a network server. The server uses network-based GPS receivers to help the handset measure the GPS data. The network GPS receivers are placed around the network several hundred kilometres apart.The handset regularly collects GPS satellite data and provides this data to the handsets, enabling them to make timing measurements without having to decode the actual satellite messages. This makes a substantial difference in the time it takes to get the location information. Using A-GPS, the time is typically between one and eight seconds.

3.2 Research Methodology

The methodology used in this project development is Waterfall methodology. The waterfall model is a methodology that always been used by software developer. The progress of the project development is flowing steadily downwards (like a waterfall) from the phases of Requirement, Design, Implementation, Verification and Maintenance.

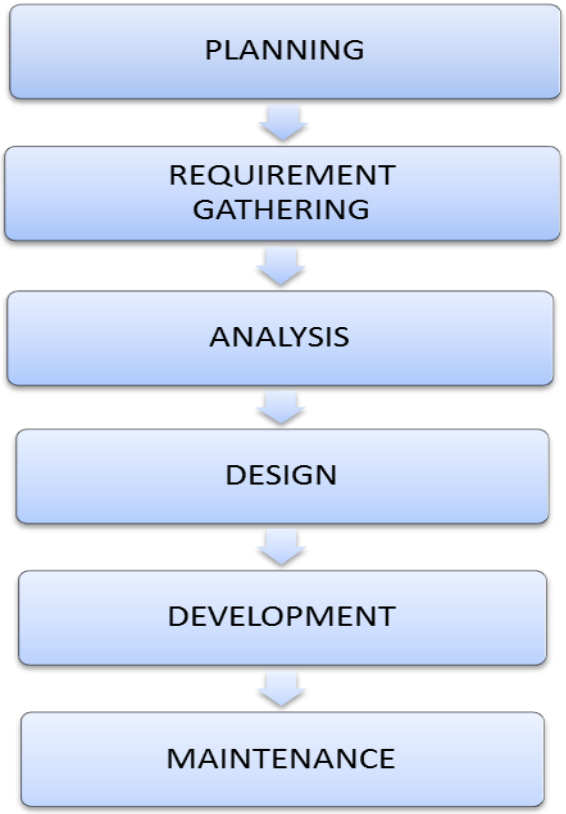


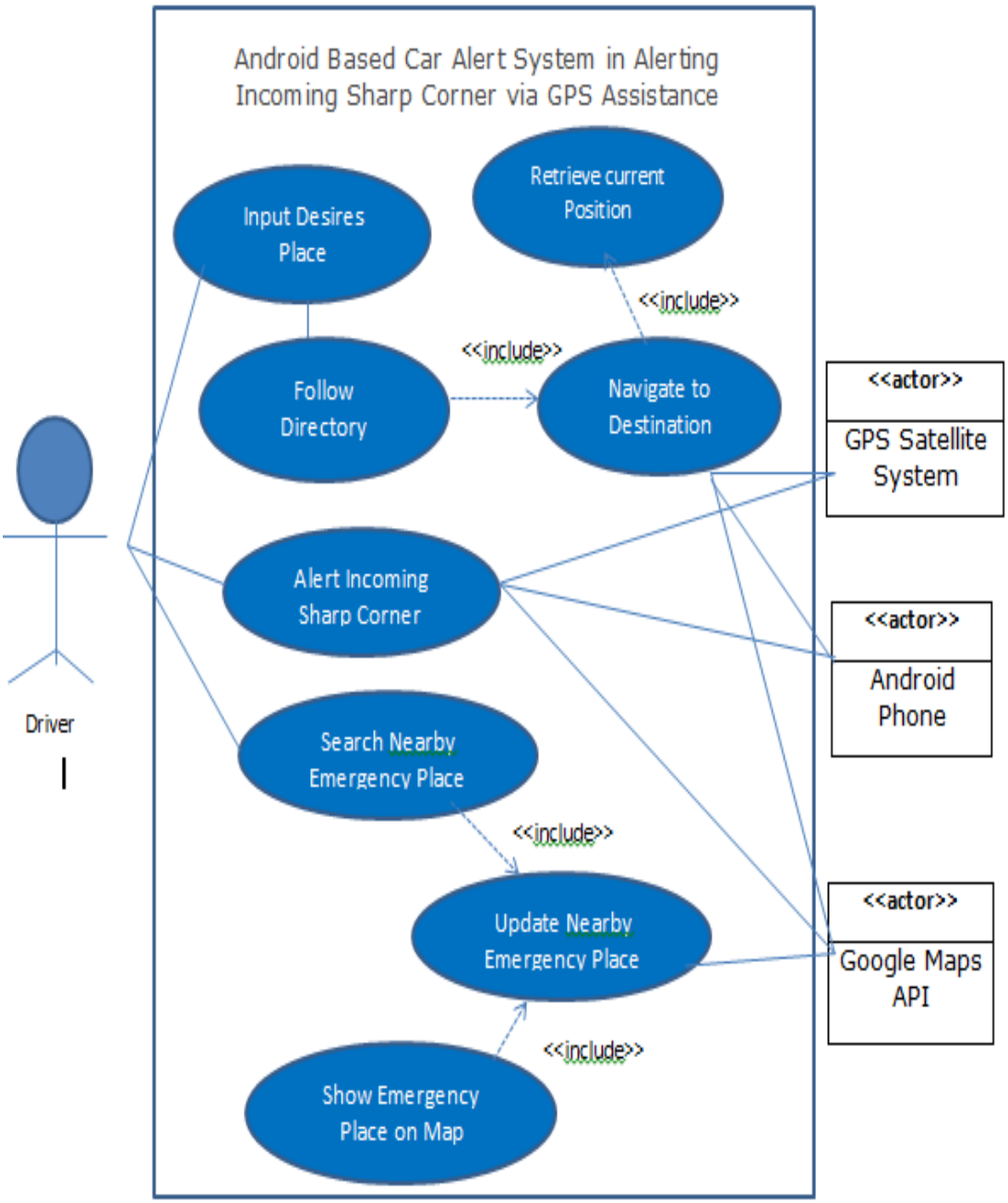
Figure 5: Waterfall model used for this project development

The diagram above shows clearly of the steps taken during the development. Besides that, the advantage of using this methodology is that help to reduce time consumption as the phases of the project development are done step by step. Therefore, the developer will know exactly what is going on in each of the phases. The next section will elaborate more on each of the phases encountered during the development.

3.3 Project Phases

3.3.1 Requirement Gathering

Use Case for Android Based Car Alert System in Alerting Incoming Sharp Corner and Updating Emergency Places via GPS Assistance



Use Case Specification for Android Based Car Alert System in Alerting Incoming Sharp Corner and Updating Emergency Places via GPS Assistance

Section	Content
Designation	UC1
Name	Alerting Incoming Sharp Corner
Author	Abu Zarin
Description	The driver of the vehicle will be notified whether there are incoming sharp corners via buzzer sound
Trigger event	The driver click "Start detecting sharp corner"
Actors	Driver, GPS Satellite System , Android Phone , Google Maps API
Pre-Condition	The navigation system is activate , GPS in On
Result	Alert the dangerous corners with alarm sound before 300metres from the sharp corners
Main Scenario	1. The system shows current position and shows 2. The driver click "Start detecting sharp corner" button 3. The system will update the location every 2 second interval 3.1 If there are incoming dangerous corner, alert sound will be projected via android device. 4. Else, the system will keep updating the dangerous sharp corner area.
Post Condition	The driver click "Stop detecting Dangerous Corner" button

Use Case Specification for Android Based Car Alert System in Alerting Incoming Sharp Corner and Updating Emergency Places via GPS Assistance

Section	Content
Designation	UC2
Name	Search Nearby Emergency Places
Author	Abu Zarin
Description	The driver search emergency place.
Trigger event	The driver wished to navigate to nearby emergency places
Actors	Driver, GPS Satellite System , Android Phone , Google Maps API
Pre-Condition	The navigation system is activate , GPS is On
Result	Nearby Emergency Places will be listed by only few clicks with no keyboard input.
Main Scenario	1. The driver clicks Nearby Emergencies button. 2. The system show the emergency place < 90 km 3. The User then clicks " Show Emergency Places on Map" button 4. The system then automatically pin point the nearby emergency places on the map. 5. When the user clicks the emergency place, the system shall navigate the driver to the desired place. 6. When the last chosen emergency placed is reached, the navigation system shows "reached destination"
Post Condition	The driver reached the Chosen Emergency place

Flow Chart Diagram for Android Based Car Alert System in Alerting Incoming Sharp Corner and Updating Emergency Places via GPS Assistance for alerting incoming sharp corner.

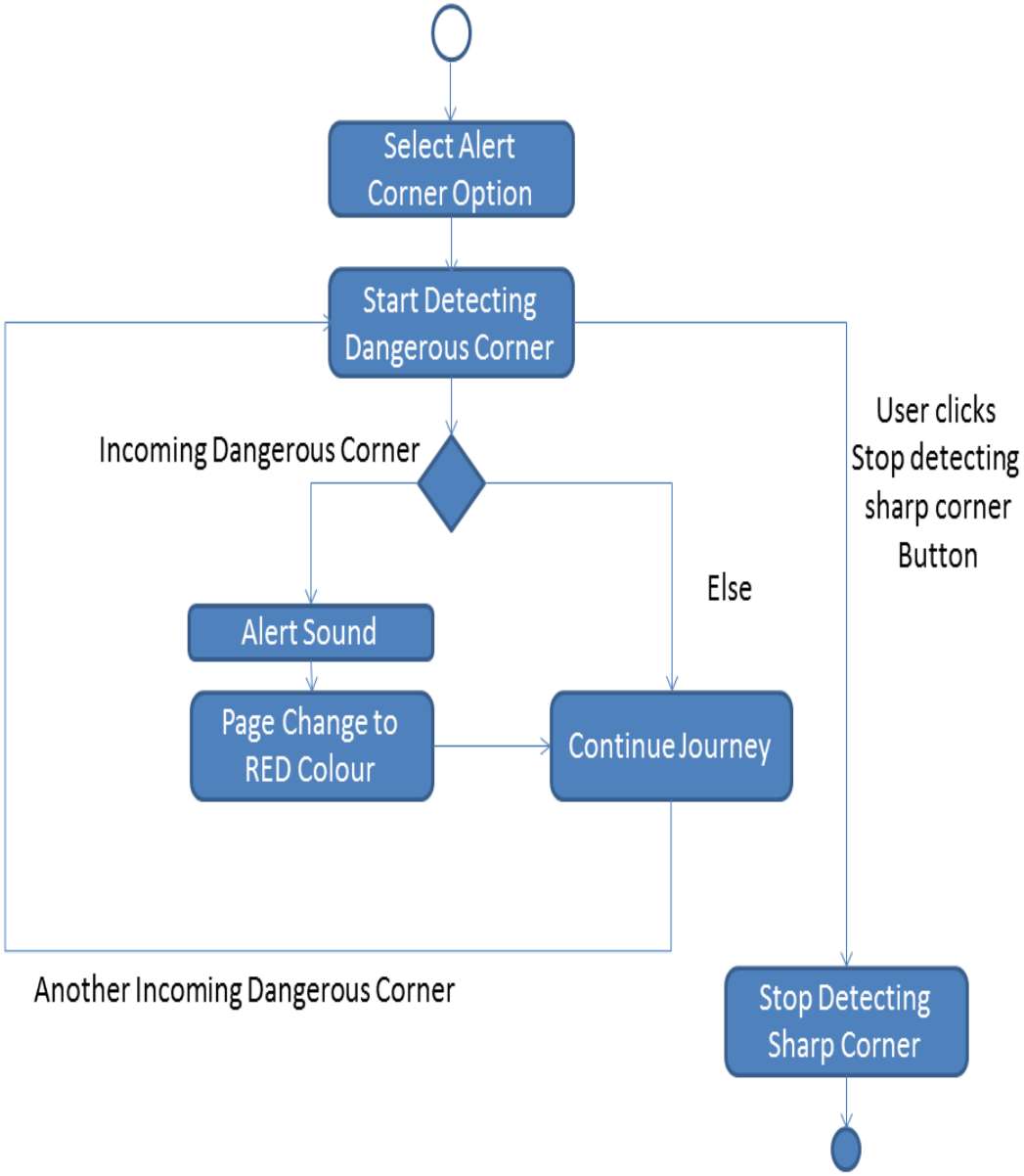


Figure 6: Flow Chart Diagram for Android Based Car Alert System in Alerting Incoming Sharp Corner and Updating Nearby Emergency Location via GPS Assistance for alerting incoming sharp corner.

Flow Chart Diagram for Android Based Car Alert System in Alerting Incoming Sharp Corner and Updating Nearest Emergency Places via GPS Assistance for searching and navigate to Emergency Place.

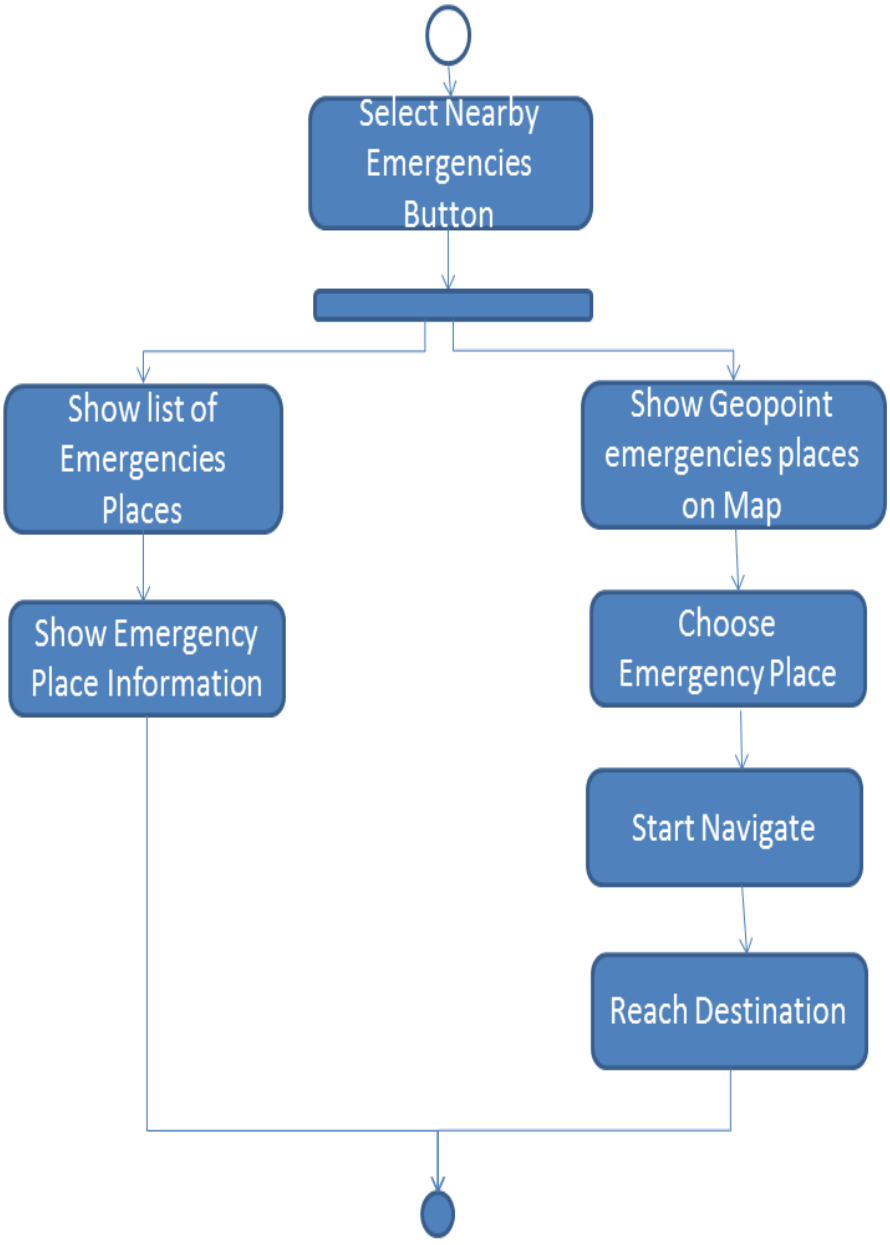


Figure 7: Flow Chart Diagram for Android Based Car Alert System in Alerting Incoming Sharp Corner and Updating Nearby Emergency Location via GPS Assistance for searching and navigate to Emergency Place.

3.3.2 Hardware and Software Installation

As the project is based on Android Platform, there are several softwares need to be installed in the Personal Computer to produce the programming-platform environment. In this project, the Android device that has been selected is Oppo Smartphone x9006. At the programming site, the Personal Computer used is ASUS A45V.Below is the details of the hardware:-

Android Device	Oppo Smartphone (Mobile Phone)
Android Device Specification	Model Number : X9006 Android Version : 4.3 Processor Quad Core 2.3GHz RAM : 2GB ROM : 2.61GB
Personal Computer	ASUS A45V
Operating System	Windows 8 64bit
Processor	Intel Core i5-3570k
Memory	4G RAM
Peripherals	Speaker, Mouse, Keyboard,

Table 3: Hardware used for the development.

The Software used to support the Android programming are:-

1) **Eclipse** and**,**
2) **Android SDK**

It is a software development kit for developer to create application using the Android platform. It is suitable to use as it includes sample project that comes up with source code and emulator so we can see the interface and how the activities run. And it is written using Java programming language and the libraries is needed to build the application.

To run Eclipse for this project, the requirement Java version is 1.7 . The **Java SE DEVELOPMENT KIT 7u75** need to be installed.

Java SE Development Kit 7u75

You must accept the Oracle Binary Code License Agreement for Java SE to download this software.

Thank you for accepting the Oracle Binary Code License Agreement for Java SE; you may now download this software.

Product / File Description	File Size	Download
Linux x86	119.43 MB	jdk-7u75-linux-i586.rpm
Linux x86	136.77 MB	jdk-7u75-linux-i586.tar.gz
Linux x64	120.83 MB	jdk-7u75-linux-x64.rpm
Linux x64	135.66 MB	jdk-7u75-linux-x64.tar.gz
Mac OS X x64	185.86 MB	jdk-7u75-macosx-x64.dmg
Solaris x86 (SVR4 package)	139.55 MB	jdk-7u75-solaris-i586.tar.Z
Solaris x86	95.87 MB	jdk-7u75-solaris-i586.tar.gz
Solaris x64 (SVR4 package)	24.66 MB	jdk-7u75-solaris-x64.tar.Z
Solaris x64	16.38 MB	jdk-7u75-solaris-x64.tar.gz
Solaris SPARC (SVR4 package)	138.66 MB	jdk-7u75-solaris-sparc.tar.Z
Solaris SPARC	98.56 MB	jdk-7u75-solaris-sparc.tar.gz
Solaris SPARC 64-bit (SVR4 package)	23.94 MB	jdk-7u75-solaris-sparcv9.tar.Z
Solaris SPARC 64-bit	18.37 MB	jdk-7u75-solaris-sparcv9.tar.gz
Windows x86	127.8 MB	jdk-7u75-windows-i586.exe
Windows x64	129.52 MB	jdk-7u75-windows-x64.exe

Java SE DEVELOPMENT KIT 7u75 is available in the Oracle website. It is used for building applications, applets, and components using the Java programming language.

3.3.3 Creating the Source Code

The source code for the developer is available in the Google Maps API. The online source code that is available and suitable for this project is being downloaded and edited to meet the project objectives.

Google Maps API is open source and actively being used by the developer to build their own apps . Everyone can contribute to the application by coding new feature, makes new algorithm, filter information, or tracking and fixing the bugs. The project is in a lively state of continuous improvement by all these forms of developer and user interaction.

The Google Maps API is selected because the maps can work both online and offline (no internet needed). Map data can be stored on your device's memory card for offline use once you save the place to navigate later on. Hence, during the implementation and testing the system, no internet data is needed as Map data can be stored on our device for offline use. Moreover, these source codes are supporting Malaysia maps environment compared to other source code. Hence, needed information can be manipulated for this project.

As the maps in the application collaborate with google maps, the coding complexity is higher to manipulate the raw data to turns into the valuable data .For instance, the data of the places in the google maps needs to classify by groups like Restaurants, Entertainment and Emergency place. In this project, this system is trying to get the

data of the Emergency places like Police Station, Hospital and fire station to be grouped in one category, which is 'EMERGENCY' option. Further development phase will be further explained.

3.3.4 Alert Corner Activities

Google API is used in developing this functionality. The idea is driver will be notified by warning buzzer alert about 300 metres before them reaching the dangerous sharp corner.

Hence, the activity of alerting the corner is consists of three class activities which are:-

1. GPS Tracker,
2. Area of Triangle Algorithm,
3. Warning Alert sound and Text

The system will track the driver position by detecting the current location of the mobile phone when GPS is on. The system will keep tracking the driver position for every 2 seconds of interval and check it whether the driver is in the range of dangerous corner area. The area for the system to give warning sound is set by using "Area of Triangle" Algorithm. The algorithm is used to plot the sharp corner and to give the suitable area and time for the system to pop up the warning sound. It is means whenever the driver is within the 300 metres from the sharp corner, the system then will alert the driver via buzzer sound so the driver is more alert in taking the sharp corner ahead.

Figure 8: Understanding Area of Triangle Algorithm

Figure above show the system plot the dangerous corner (yellow colour) and the algorithm will be executed to make the area of triangle, so when the driver touch or get into the triangle area, the system will pop up the warning sound to get driver attention.

Here is the Area of Triangle algorithm:-

```
//rectangle
//change your coordinates here...
double a1 = 4.380680, a2 = 100.969483;
double b1 = 4.380993, b2 = 100.969927;
double c1 = 4.387776, c2 = 100.968815;
double d1 = 4.388092, d2 = 100.968573;

double l = Math.sqrt((Math.pow(b1 - a1, 2)) + (Math.pow(b2 - a2, 2)));
double w = Math.sqrt((Math.pow(c1 - a1, 2)) + (Math.pow(c2 - a2, 2)));
double area = l * w;
```

```
private double triangleArea(double ax, double ay, double bx, double by, double cx, double cy){
    double area = (ax * (by - cy) + bx * (cy-ay) + cx * (ay - by)) / 2.0;
    return (Math.abs(area));
}
```

The update location code structure for every 2 seconds interval:-

```
// Location updates intervals in sec
private static int UPDATE_INTERVAL = 2000; // 2 sec
private static int FATEST_INTERVAL = 2000; // 2 sec
private static int DISPLACEMENT = 0; // 0 meters
```

The Warning Sound and Warning Text Code Structure:-

```
if(totalArea < area){
    bgLayout.setBackgroundColor(Color.parseColor("#b20e0f"));
    Toast.makeText(getApplication(), "Incoming sharp corner! Slow Down! Be careful!", Toast.LENGTH_LONG);
    txtMessage.setText("Incoming sharp corner! Slow Down! Be careful!");
    Music.play(getApplicationContext(), R.raw.alarm);
}else{
    bgLayout.setBackgroundColor(Color.parseColor("#FFFFFF"));
    txtMessage.setText("");
    Music.stop(getApplicationContext());
}
```

3.3.5 Interpret and Automatically Filtering Nearby Emergency Place.

Navigate to the Emergency place needs to use Google Maps API. Each system needs an unique key id to get collaborate with Dynamic Google Maps. Google Maps API is chosen because it gives live instruction to driver when navigating, it also can set the fastest routes to emergency place, and filtering the information that we want only. It is also have almost no bugs during navigation, and it is also easy to integrate with the external interface of apps.

The activities to create for this functionality works are:-

1. Unique Product Key for Google Maps API
2. Interaction with Google Maps for Navigation Purpose
3. Filter activity module to find the emergency place nearby
4. Geo point activity to automatically show the nearest emergency place.
5. Show information for emergency place (name, address, location, and phone number)

In order to create this functionality, there are several modules to be created and integrate between them. The first one is to get interact with the Google Maps API, which is we need to get connected with by using Unique Key id , that created by google itself. And then we need to declare activity class for maps. By default, the Java file that defines the maps activity is named MapsActivity.java. It should contain the following code after activity package name:

```
import android.os.Bundle;
import android.support.v4.app.FragmentActivity;
import com.google.android.gms.maps.CameraUpdateFactory;
import com.google.android.gms.maps.GoogleMap;
import com.google.android.gms.maps.OnMapReadyCallback;
import com.google.android.gms.maps.SupportMapFragment;
import com.google.android.gms.maps.model.LatLng;
import com.google.android.gms.maps.model.MarkerOptions;

public class MapsActivity extends FragmentActivity implements OnMapReadyCallback {
    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_maps);
        SupportMapFragment mapFragment = (SupportMapFragment) getSupportFragmentManager()
                .findFragmentById(R.id.map);
        mapFragment.getMapAsync(this);
    }
```

The unique product key will be projected by Google for the system to operate and get connected with Maps for navigation purpose. The connection with google maps will be as code of lines below:-

```
public class GooglePlaces {

    /** Global instance of the HTTP transport. */
    private static final HttpTransport HTTP_TRANSPORT = new NetHttpTransport();

    // Google API Key
    private static final String API_KEY = "AIzaSyCRLa4LQZWNQBcjCYcIVYA45i9i8zfClqc"; // place your API key here

    // Google Places serach url's
    private static final String PLACES_SEARCH_URL = "https://maps.googleapis.com/maps/api/place/search/json?";
    private static final String PLACES_TEXT_SEARCH_URL = "https://maps.googleapis.com/maps/api/place/search/json?";
    private static final String PLACES_DETAILS_URL = "https://maps.googleapis.com/maps/api/place/details/json?";

    private double _latitude;
    private double _longitude;
    private double _radius;
```

Below is source code for automatically filtering emergency place . The system filter the emergency location with the name of Hospital , Police, Klinik. The radius from the current driver location is set to 9000 metres.

```
// Separeate your place types by PIPE symbol "|"
// If you want all types places make it as null
// Check list of types supported by google
//
String types = "hospital|police|klinik"; // Listing emergency place

// Radius in meters - increase this value if you don't find any places
double radius = 90000; // 1000 meters

// get nearest places
nearPlaces = googlePlaces.search(gps.getLatitude(),
        gps.getLongitude(), radius, types);
```

3.3.6 Current Location

Current Location is the minor functionality to know where the driver is. From this functionalities, it also able to navigate the driver to other places by key in the desire places.

3.3.7 Integrating Layout with the Alert Sharp Corner & Emergency Place Activities.

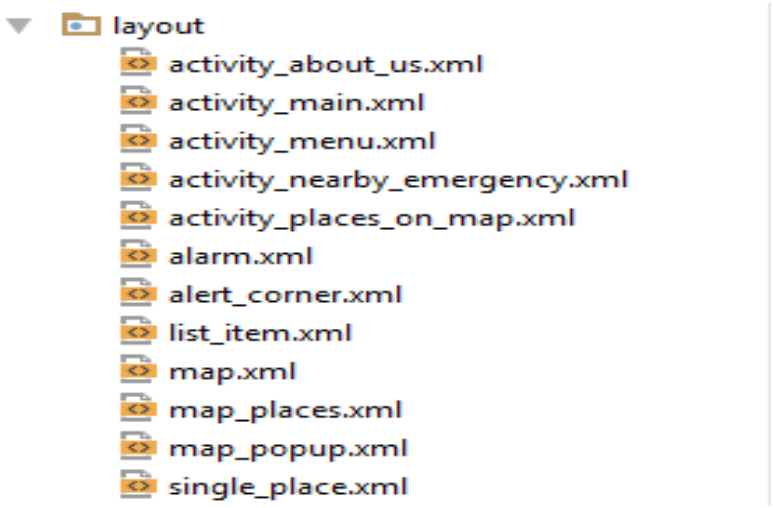


Figure 9: Layouts of the functionality of the system

The layout of the system is design using android studio tools. It consists of layouts and widgets for every interface. The layout is mainly include text, images and connected to the Google Maps API when there are .onclick activities.

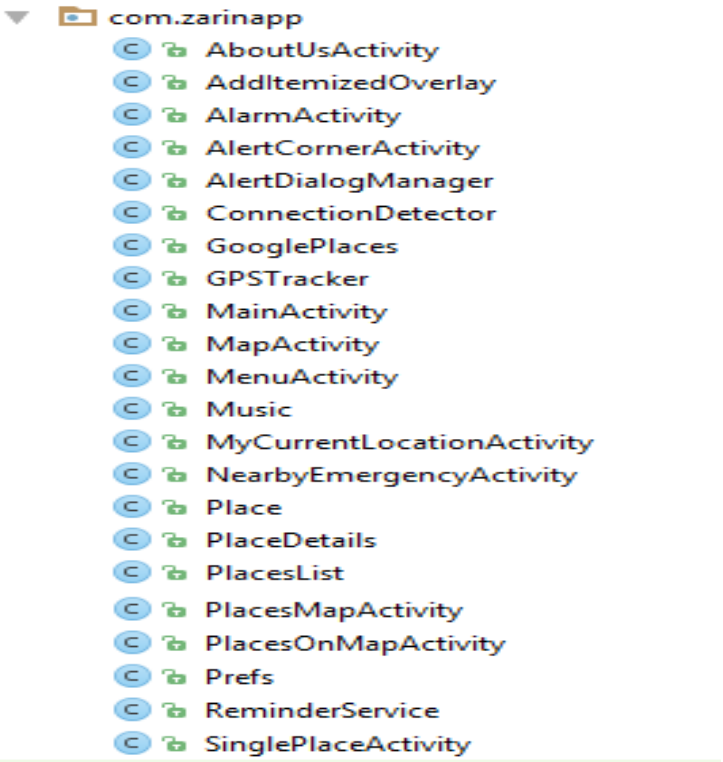


Figure 10: Activities module / Functionality of the system

The functionality is creates module by module easier for code modification and modules integration. There are two main functionalities which are alert sharp corner and updating emergency. Besides, the minor functions which are the main page, menu, about us is also being developed to make the system is complete in every aspect like other apps.

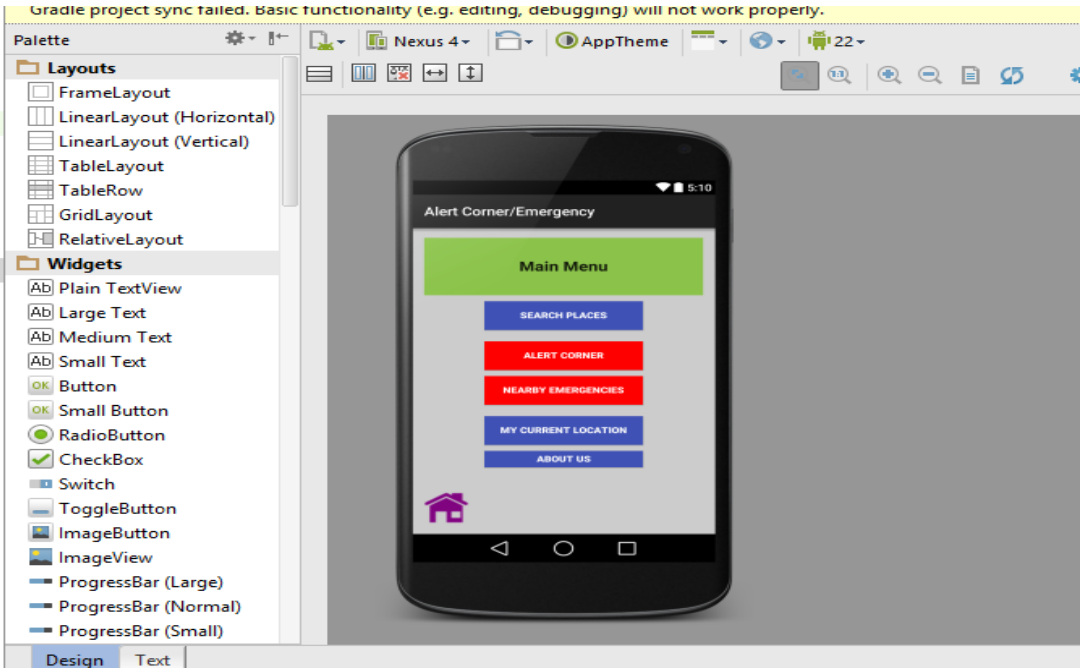


Figure11: Layout for activity_menu.xml

Example of the interface for menu_activity.xml layout when it is integrated with MenuActivity activity class. The function of the each activity will be called whenever the button is clicked.

3.3.8 Interview and Observation

The interview has been carried out with the residents in Seri Iskandar. The interviewees were adults in the range of 20 -50 years old. The question is about the accidents happens in the area of Perak .Besides, the questions about the important places to go in case of emergency also has been asked to them. The list of questionnaires is attached on the appendices.

After the data from the interview has been collected, field observation has been carried out to observe the dangerous corners that accidents always happen in Perak. Observation is needed for the testing phase in some location which the maps will be narrowed into the specific location to run the testing in real environment. The results will be further discussed in the next chapter.

3.4 GANTT Chart

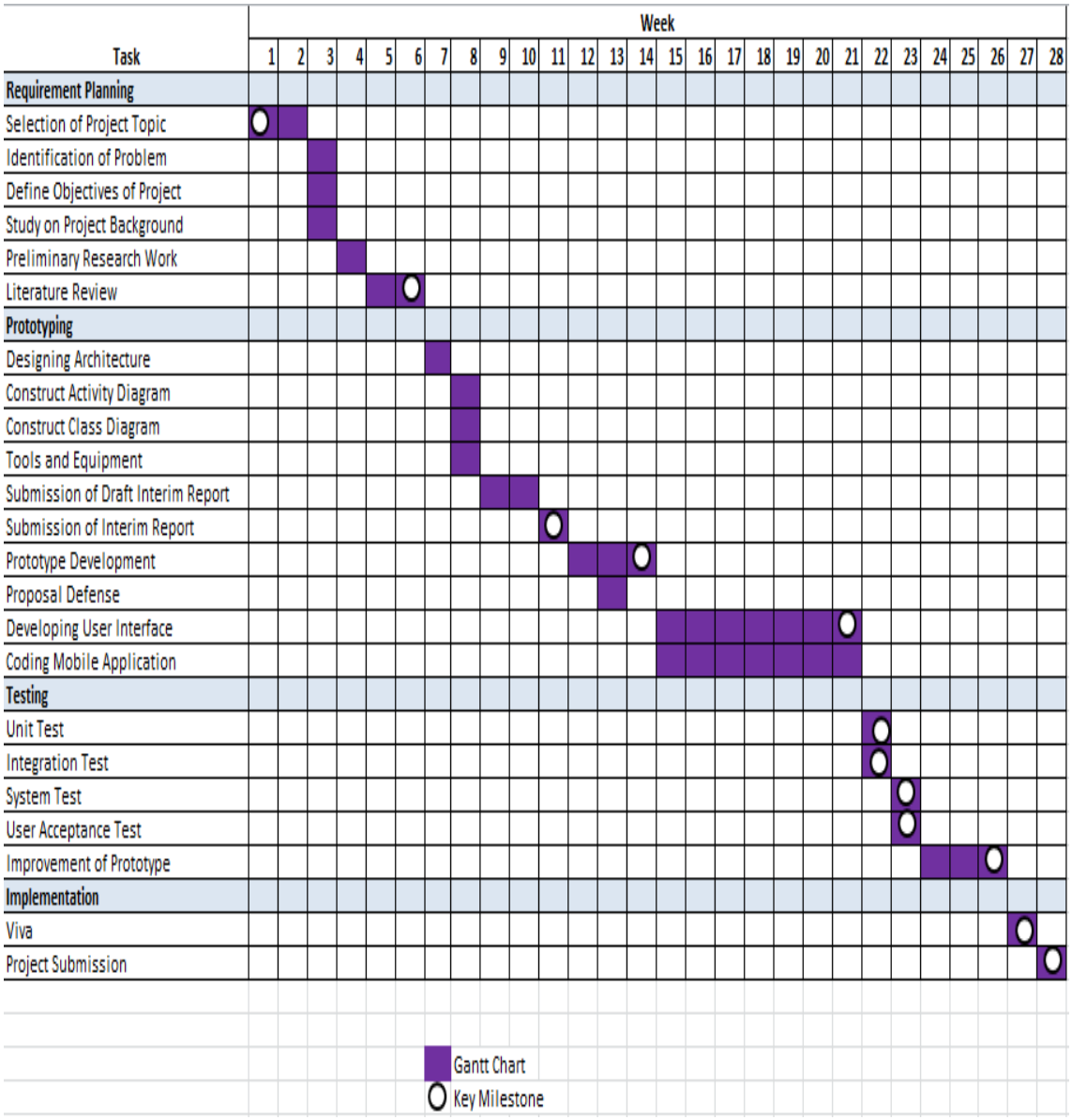


Table 4: Android Based Car Alert System in Alerting Incoming Sharp Corner via GPS Assistance Project Gantt Chart.

3.5 Key Milestone

No.	Tasks / Activities	Milestones
1.	**Data Gathering and Requirement**	Week : 1 – 4 (FYP1)
	Research on previous related materials	Week : 1 – 4 (Literature Review Draft)
	Draft out System Requirement	Week : 1 – 4
2.	**Analyzing**	Week : 7 – 11
	Finalize Scope	Week : 7
	Develop Flow of each Module (Draft)	Week: 8
	Draft the interface requirement	Week: 9 – 11
3.	**Designing**	Week: 12 - 14
	Interface of System	Week: 12 - 14
4.	**Implementation & Testing**	Week: 1 – 7 (FYP 2)
	Debugging	Week: 7-8
	Validation	Week: 9
	Verification	Week: 9
5.	**Evaluation**	Week : 10
6.	**Deployment**	Week : 10

Table 5: Android Based Car Alert System in Alerting Incoming Sharp Corner via GPS Assistance Project Key Milestone

CHAPTER 4

RESULT AND DISCUSSION

4.1 Introduction

In Chapter 3, there are explanations about the methodology involved in the Android Based Car Alert System in Alerting Incoming Sharp Corner via GPS Assistance development. In this Chapter 4, the result of the system development is discussed in details

4.2 The Interview and Observation Analysis

From the interview session, all interviewee agrees that the sharp corners are one of the most dangerous road structures in Malaysia. The sharp corners are always constructed at the rural/village area and it brings dangerous to the drivers. The situation become worsen are when the signboard about the dangerous corner ahead is not installed at the road side and the 'Turn' signboards are not installed alongside the corner adequate enough.

The interviewees also stated that sometimes the road become dangerous when the road maintenance does not change the 'Direction' signboards that have been crashed by previous driver during and the upcoming the drivers who use the road will not aware of the signboard that has been broken and that increase the percentage of the accidents on that place again and again. With this system, the interviewees said it might be useful for the drivers in detecting the sharp corners ahead and can avoid from accidents happen.

The other results are, the interviewee also state that the inadequate lamps in the road sight at the corners reduce the eyes visibility and awareness to take the corners during the night. At the end of the interview session, they stated the place where the road that are always having accidents in the nearby area. All of them agreed to have the Android Based Car Alert System in Alerting Incoming Sharp Corner via GPS

Assistance if the system can alert them before taking the dangerous corners as they believe adequate time is needed for the drivers to know the dangerous corner ahead and adequate time needed to slow down the car. They also state the warning sound also will attract their attention to be more aware to handle the car carefully. The interviewees also agree that this system helps driver a lot as it has a features which to list all the emergency place nearby by only clicks of button without need to type the address as it make it easier to drivers to use it.

They also give the example of emergency place for the system need to provide that which are police station, clinic, and hospital. The system is capable to automatically pin point the emergency location in the maps , hence it will show it on the maps and the user can easily know where is the nearest places and the name of the location that they choose to go to.

With all these interview analysis, the system is trying to cope with all the requirements from them that are possible to implement in the system. The Field observation is also carried out to see the road corners that are reportedly to have many accidents which is at Malim Nawar road.

Figure 12: The signboard direction at the sharp at Malim Nawar Road.

The direction signboard that crashed by car does not being changed with the new one and the absence of the road side lamps bring the difficulty to see the road direction thus it can be the reason of the accidents at this place. This situation brings dangerous to the road users who are the first time using this road as they have no experiences in handling the car in this road.

Figure 13: View of road at the sharp corners at Malim Nawar Road during the night.

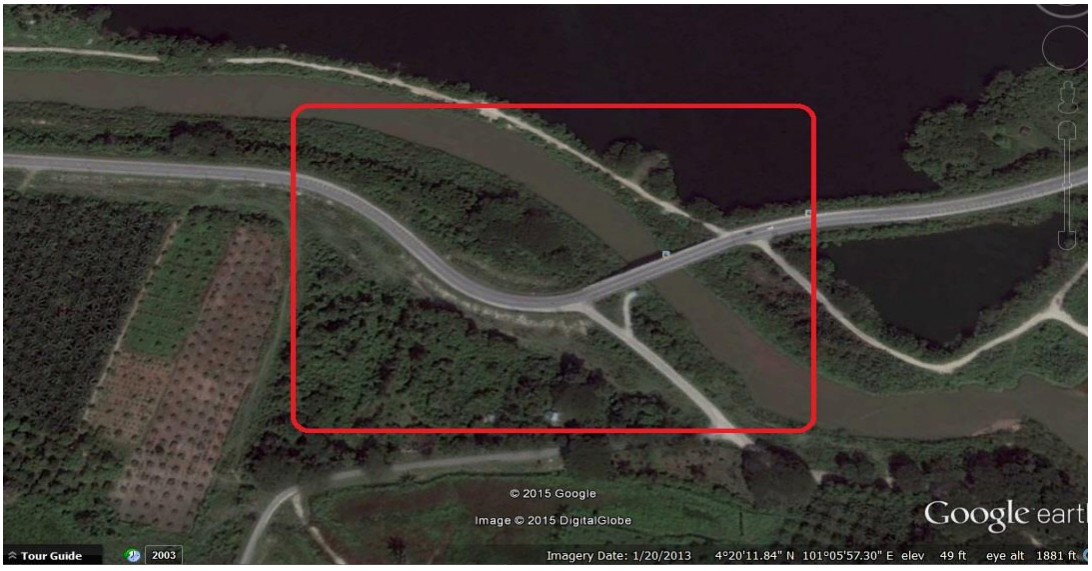


Figure 14: View of road at the sharp corners at Malim Nawar Road in Google Earth Map.

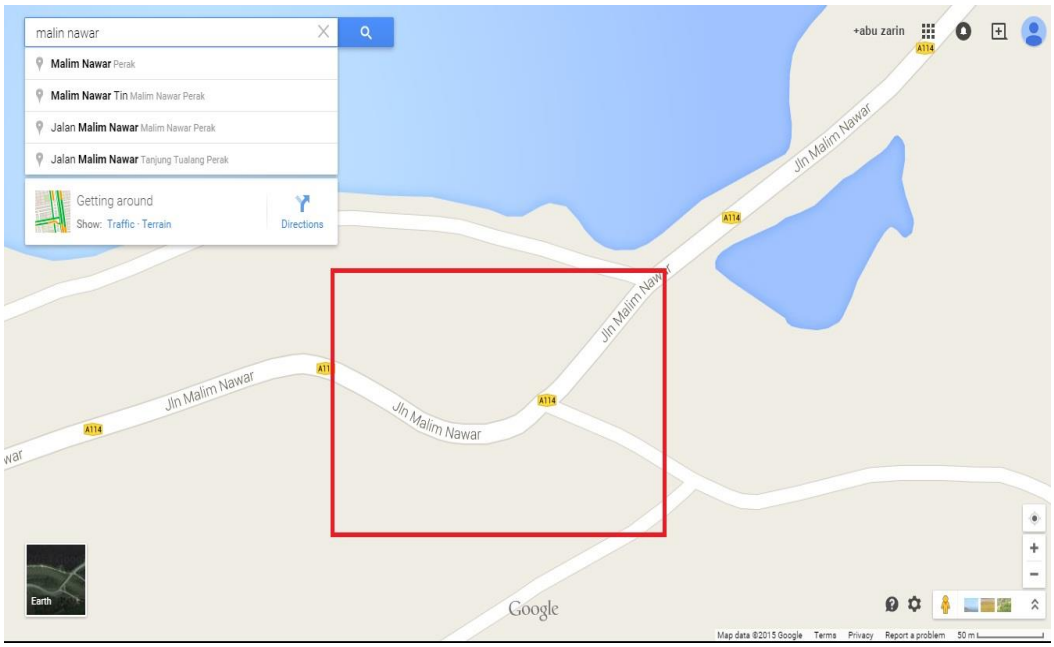


Figure 15: View of road at the sharp corners at Malim Nawar Road in Google Streets Maps

From the observation at Malim Nawar road, it is clearly shown that the situation of the road is dangerous for the driver to take the corner without proper alert. Even though the signboard of the direction is big and clear enough is implemented , but it is no maintenance to change the signboard to the new one , it will bring risk to the driver to overtake the corner , especially if the driver who drive fast at this place. This could be death accident if there are no adequate alert to driver who driving on this corners.

This dangerous corner also can be viewed in Google Earth maps and Google Streets maps. The degree of sharpness of the corner can be clearly seen. We can conclude that this corner is dangerous as the corner is at a sudden after a long straight road. The driver might speeding before reaching the corner and if in case he does not aware about the alert signboard at the road side, he might unable to control the car well and lead to accident.

4.3 System Prototype

4.3.1 Softwares Use for Prototype

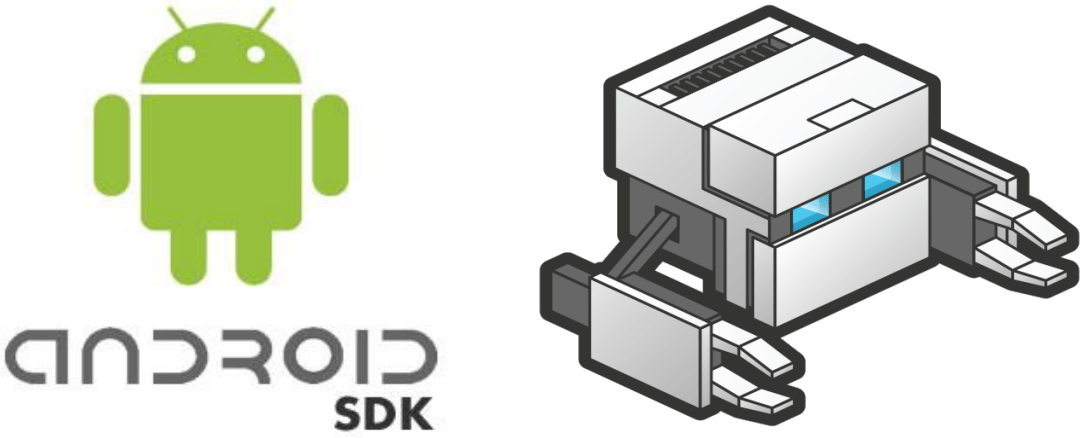


Figure 16: Android SDK and PhoneGAP.

The Prototype of the system is implemented based on the progress of the system development. Some of the functionalities are already working successfully and the rest are under development. The best application to show the expected running application is PHONEGAP which it using html and Javascript language and easy to implemented in mobile phone. The system demonstration will use PHONEGAP to show how the system works during presentation. Android SDK is use to develop system prototype which the system can be integrated and connected with the numbers of interfaces and the buttons are working properly. Besides, it also standard software use to develop apps and it is very dynamic and can run functionalities so it is interactive for user. The resolution of the interfaces also suits the Oppo smartphones which is 1080p that fits the snapshots.

4.3.2 Apps Icon

Figure 17: Icon Alert corner/Emergency apps

This will be the Apps icon that will appear on the phone home screen. The car image is chosen as drivers easy to find whenever they want to use for navigation and alert corner as it related to transportation image. The title also is Alert corner/Emergency is use for easy understanding for the user what is the purpose of this apps.

4.3.3 Homepage and Menu

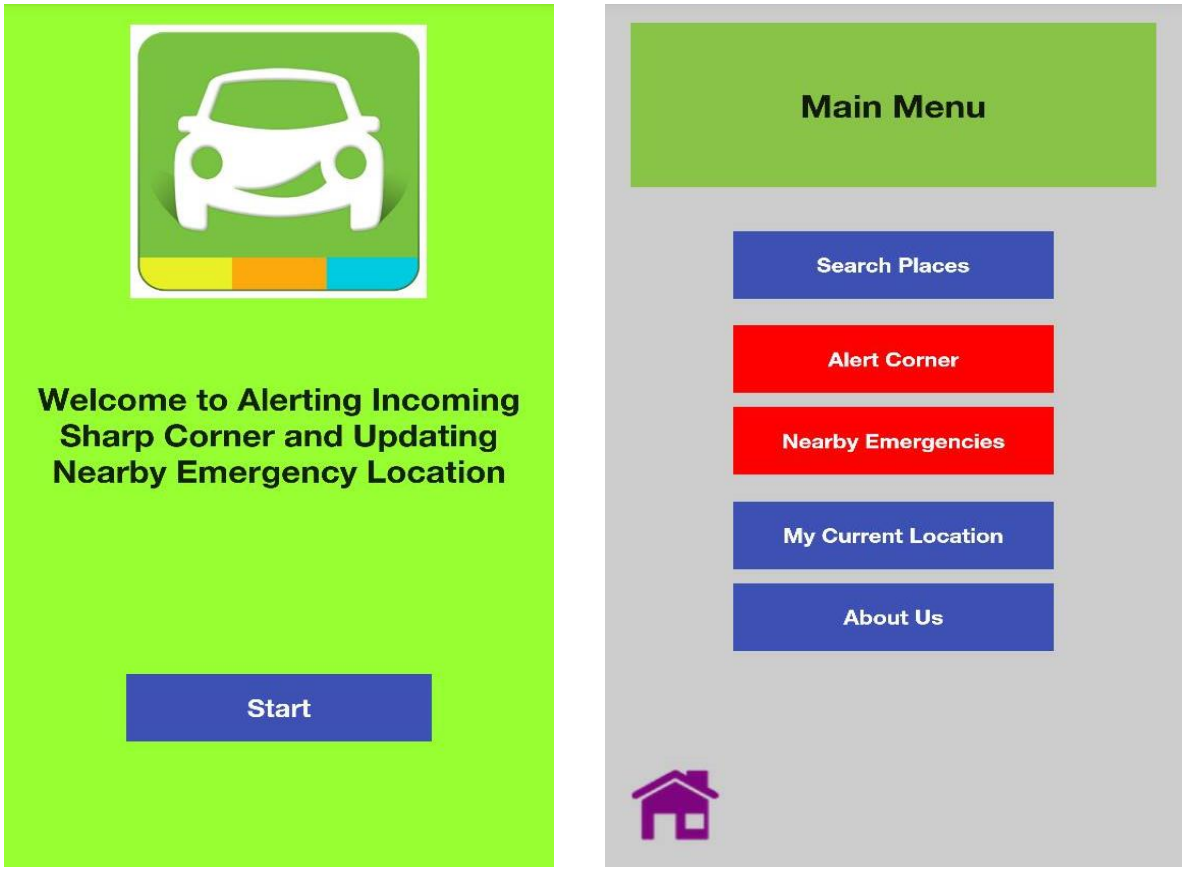


Figure 18: Home Page and Main Menu Page

After the user click on the Apps icon, the home page will appear. It will show welcome message and then the user need to clicks “Start” button and then it will proceed to Main Menu Page.

From the Main Page, user can select the four options. The four options are:-

Search Places	The Search Places option is to go to the Map for navigating the drivers to the place that they input.
Alert Corner	Search the Place that the driver wants to navigate to, this is where the system is enhance which is to provide

	Emergency Place option to driver
Nearby Emergencies	automatically list out the nearest emergency place and will show the information about the emergency place and navigate user to the desired emergency places.
My current location	Shows the current location of the driver
About Us	Shows information about developer

4.3.4 Incoming Sharp Corner Alert

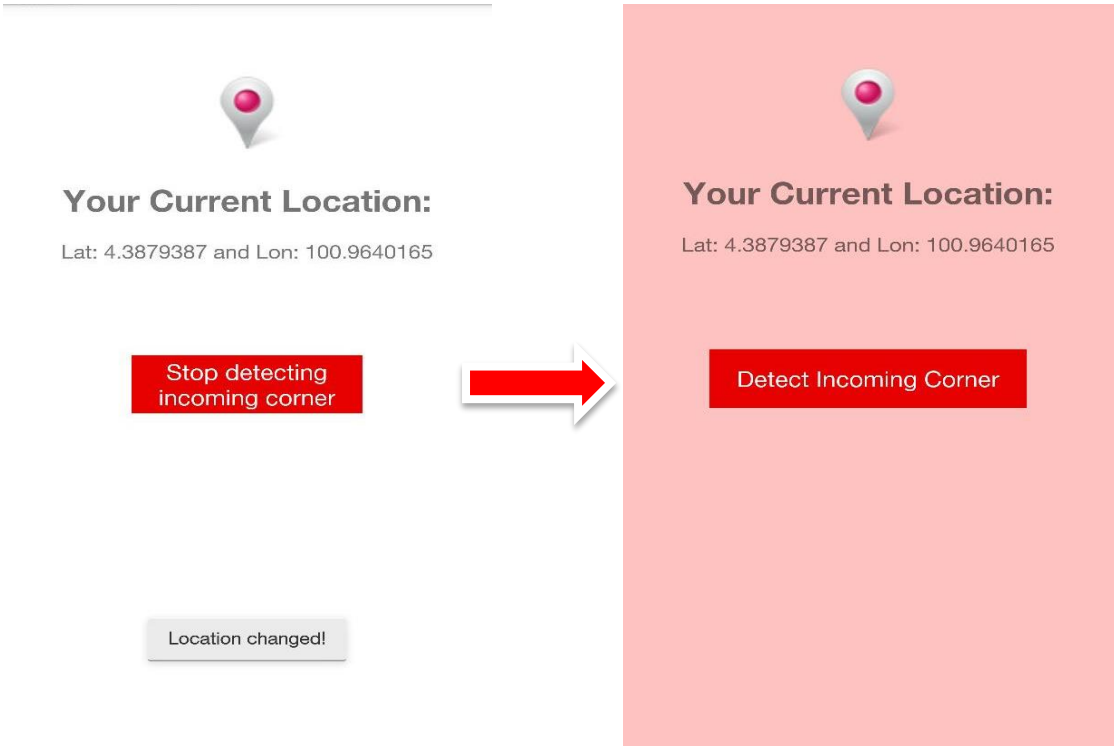


Figure 19: Incoming Sharp Corner Alert interface

When the driver clicks the ‘Alert Corner’ button the system will direct the driver to the detecting corner page. By default, the initial page will ask the driver to start detecting sharp corner. Once the driver click ‘Start detecting corner’ , The system will automatically update the location of the driver for every 2 seconds. The “bleep” sound will be projected via the speaker if the driver are within 300 metres from the

dangerous corner to alert the driver. The driver can choose to stop detect dangerous corner if they want, especially when the driver are used to use that road.

4.3.5 Search Emergency Place

Figure 20: Search Emergency Place

Once the user clicks the nearby emergency button, the driver will redirect into the list of the nearby emergency places. The system will range out the nearby places up to 90 kilometres. When driver clicks the list of emergency place, details information about emergency place will be appeared such as address and phone number. The system then automatically pin point the nearby emergency location on the maps if the user click the 'show nearby emergency places' button. Driver can choose which emergency place that they want to go and navigate to that place. The system will automatically give the fastest route to the desired place and redirects the drivers to the map navigation.

4.3.6 Navigate to Emergency Place

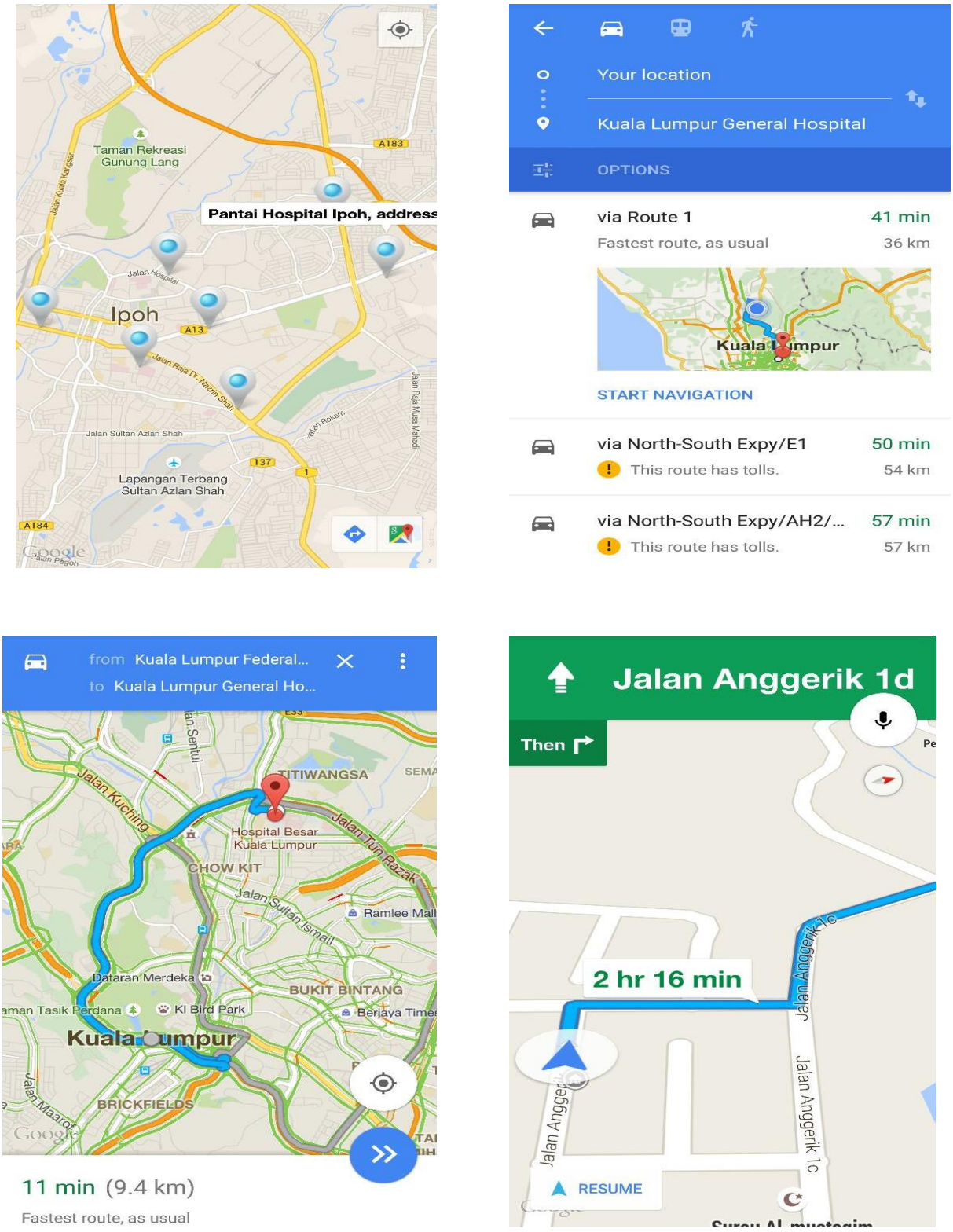


Figure 21: Navigate to the emergency place

After the driver already find the emergency place that he desired, he needs to click the place name and the ‘Directions To’ button will appear. Then the system will calculate the shortest distance to the place. The system interacts with Google Maps API while navigating and the user can change the settings like change from driver to pedestrian mode in case the user is walking. It also shows multiple choices of routes to be used. The driver then needs to click the ‘Next’ button for him to be able to be navigated by the system to the chosen emergency place.

4.3.7 Current Location

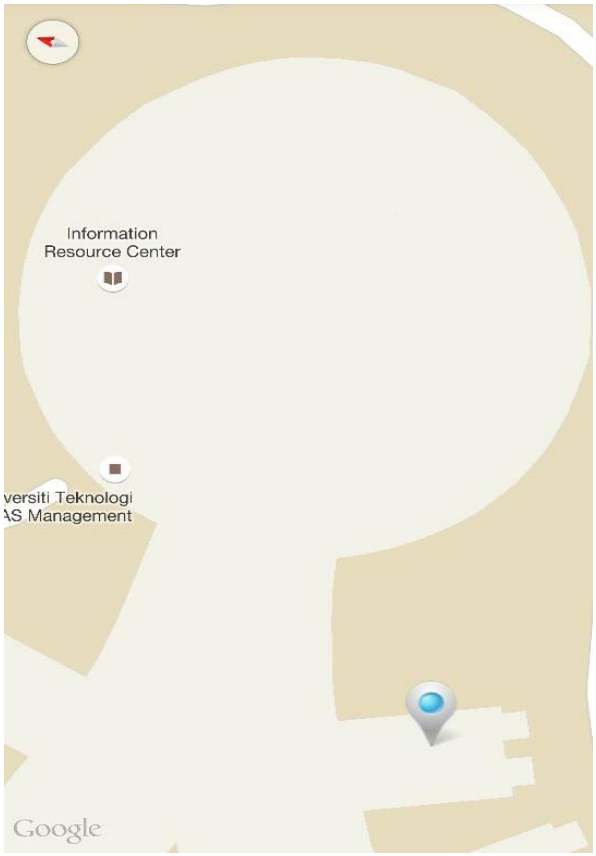


Figure 22: Current location

Once the driver click the Current Location button, the system will show the current place of the driver. The user also can start to navigate to other place by click on the geo-point current location, and then click the navigation button to enter the desires place to go to.

4.4 System Testing

System testing needs to be done to meet quality benchmark to make sure the system is ready to be used by drivers when this apps is available to install into their mobile phones or android gadget. This is to ensure the satisfactions of user whenever they use the system and to measure the efficiency and effectiveness of this apps functionalities.

Below is the table for system functional testing for this system.

Component	**Expected function**	**Testing frequency**	**Testing Results**		**Remarks**
			Success	**Failure**	
"Apps Icon"	System goes to Home Page of the System	20	19	1	Failure because of last activity is not end at Home Page
"Home" Button	Navigate to Home Page	20	20	0	-
"Start" Button	Navigate to Menu Page	20	20	0	-
"Start Navigate" button	Navigate to the desired place	20	18	2	Failure because of GPS is disabled and Mobile data is not on during search emergency places
"Pedestrian and Driver" Option	The system will then calculate the time taken and distance to the desired place according to the option chosen	20	18	2	Failure because of GPS is disabled and Mobile data is not on during search emergency places

"Search Places" Button	System will go to the map and navigation activity start	20	18	1	1) GPS is not On , navigation cannot start. 2) Over Query Limit
"Detect Sharp Corner" Button	System will check whether there is incoming dangerous corner	50	44	6	1)The system sometimes is unable to give alert sound when driver drive to fast (= >150 km/h) 2)Fail when GPS is disabled
"Stop Detect Sharp Corner' Button	System will stop detecting sharp Corner	40	40	0	-
"Nearby Emergencies " Button	System will list emergency places	40	39	1	Failure because of GPS is disabled
"Show Emergency Place on the Map" Button	It will pin point the nearby emergency places on the map	40	39	1	Failure because of GPS is disabled
"Navigation to Emergency Place" button	It will navigate the driver to the desires location	40	38	2	Failure because of GPS is disabled and Mobile data is not on during search emergency places
"Current location"	Show the current	20	16	4	1) Failure because the location is not

Button	location of the driver				very accurate , absence of Wifi and bad weather 2) Failure because of GPS is disabled
"About Us" Button	Will show the information about developer	20	20	0	-

Table 6: System Functional Testing

4.5 User Testing

The user testing is carried out with about 15 students are giving the chances to use this android application. Universiti Teknologi PETRONAS students are age of 22 years old that taking information technology courses is gathered to make system testing. At the end of the testing session , 4 questions are being asks and rates are given by them. The questions are:-

- How is the performance of this apps functionalities?
- Do you satisfy with the Interface of this apps?
- Does it save your time to find the Emergency location?
- Does the system give enough information about the emergency place?

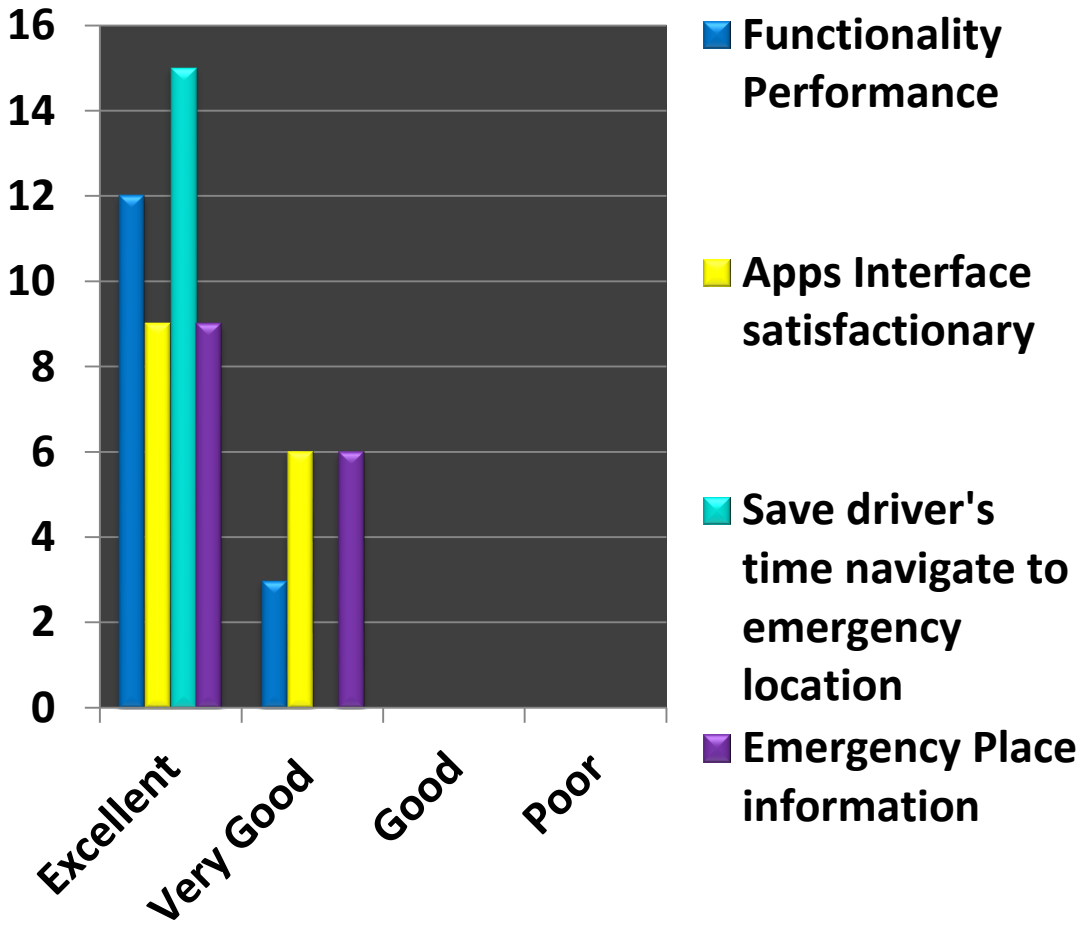


Figure 23: User Testing Graph

The user testing was held in the village 5A, Universiti Teknologi PETRONAS . To make the testing is easy to run, the location of the dangerous corner was pointed on Village 5A , in order to show how alert sound works. This testing is unable to cover the efficiency of the system to detect area of dangerous corner in real environment as it is about students safety factor during the testing. Hence, the test covers only for alert sound performance, and updating emergency place and the interface as well.

For functionality performance, 12 out of 15 respondents vote "excellent" whereas another three respondents vote " very good". Majority of respondents satisfy with the functionalities of the system to give warning sound to user and automatically update the emergency places as it is perfectly working.

For Interface satisfaction's, 9 out of 15 respondents vote "excellent" whereas another six respondents vote "very good". The respondents satisfy with the colour chosen for main functionalities like Alert Corner and Nearby Emergencies which is Red , that show that are the main functionalities and show that the system has good human computer interaction.

For issue of saving driver time to find emergency location, all respondents vote "excellent". All the respondents agree that this functionality save a lot of time for user to find emergency place especially during an emergency situation. They also believe that the system will help them a lot while in foreign country to search emergency place like Hospital and Police Station.

For functionality performance, 9 out of 15 respondents vote "excellent" whereas another six respondents vote "very good". Majority of the respondents satisfy with the information given but there is recommendation to put a "direct call" button to the emergency place so that the user can call the emergency place without need to key in phone number outside of the information of emergency place's page.

CHAPTER 5

CONCLUSION AND RECOMMENDATION

5.1 Conclusion

This Android Based System Alerting Incoming Sharp Corner via GPS Assistance would bring the positive impact in reducing the car accidents if it is successfully implemented. The system need to fulfil all the requirements and works effectively in real environment. Therefore, all planning, requirement gatherings, development and testing phase need to be seriously handled to prevent any unwanted problems onwards.

The system need to have very accurate data to be processed and gathered to determine where the dangerous corners are and what is the appropriate time to alert the driver before taking the incoming corners. The calculation method is the highest priorities to be tested during the development phase.

The system is unable to automatically detect the sharp corner as it is using Google Maps API which having restriction in getting through the navigation module to trace the corner. Furthermore, Google does not have the features and data about the sharp corner compares to Openstreet Maps which has file that updated by developer from the internet open source. Hence, there is no other way for the system to track and get information about the sharp corner location in the maps and synchronize it with the Google Maps. There is also restriction in developing the system using the google Maps as we need to purchase the license for further development and other functionalities and it gives limited query quota in using the system everyday.

The ability of the system which alert the incoming sharp corners to drivers give the drivers many benefits which are can avoid them from having accidents that might take their lives and also can prevent from drivers' cars broken because of accidents.

During the emergency situation, if any of the passengers was injured, there is a need for the drivers drive to the nearby emergency place. This system might help a lot to find the emergency place if the driver does not familiar with the place, might be if the drivers first experience to be in that place.

Besides that, the system might help the nervous driver who hardly to type in the emergency place name during emergency situation for example strangers are following him. The driver can choose to go to police station nearby by only few clicks of button to get protection.

As for conclusion, this system is planning to be developed in Android platform as many peoples around the world own android mobiles phone right now. Moreover, this project will be a good project for the entire expected user; the Malaysia drivers when they wanted to use a mobile application to navigate them to their desired place safely.

5.2 Recommendation

Android Based System Alerting Incoming Sharp Corner via GPS Assistance is recommended to be implemented on every car dashboard for the safeties of the drivers. As the modern car radio are mostly android based and comes with the GPS system, the current GPS system need to implement the added features like the system had. The system will be connected to the car sound system and it will alert the driver in adequate volume.

The further research on the precision of data calculation might produce good results about the system performance and the touch of the expert programmer can produce more quality features of this system in terms of the user friendliness and others. Other than that, the system in the feature can be developed in IOS platform to enable I-phone users to experience the system.

For improvement, alert corner might be integrated with Google maps API for navigation. It means that during the navigation, the system will be able to give the alert incoming dangerous corner and the user can see visually the road corners condition in terms of its angle and direction, hence the users can predict and readily overtaking the corner as they have more information about the sharp corners ahead.

For next phase of improvement, it is recommended for the developer to update all the sharp corners point in Malaysia in one folder and extract it to the system to update. Hence, any new sharp corners or any modification can be edit in one folder and it is easy to maintain.

The system also can be improved by showing the distance of the driver to the nearest emergency places, hence it will helps to improve the drivers in making decision.

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APPENDICIES

Interview Questionnaire

1. Do you realize some roads in Malaysia are dangerous? Why?
2. Do you think that some corners are very dangerous if it not been warned by 'Selekoh Merbahaya' sign board?
3. Some of the sign board at the corners is not under maintenance because some of they are dull in colour and broken because had been crashed by drivers and this lead to accidents because drivers not aware of the signs. Do you agree?
4. If there is existence of the new system that notifies you there is dangerous corner ahead, will you use it?
5. If stranger follows you while driving, what are possible places will you go to get protection?
6. Are you using the GPS to navigate at unfamiliar location?
7. What are the possible causes of accidents by human?
8. Can you give the three names of emergency places?
9. Do you know where dangerous corners nearby are?

Pre SEDEX Poster Presentation