TRAFFIC NAVIGATOR

By

Muhammad Muadz Bin Mohamad Razi

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the requirements for the
Bachelor of Technology (Hons)
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UniversitiTeknologi PETRONAS
Bandar Seri Iskandar,
31750 Tronoh
Perak Darul Ridzuan

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

CERTIFICATION OF APPROVAL

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Approved by,

_____

(Dr Baharum Bin Baharudin)

UNIVERSITI TEKNOLOGI PETRONAS
TRONOH, PERAK
September 2012

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 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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MUHAMMAD MUADZ BIN MOHAMAD RAZI

ABSTRACT

Traffic congestion had become a natural occurrence for the people in the 21st century. It had been accepted in modern life that the annoyance about it seems to fade as time goes by. High traffic congestion usually occurs during the peak hours on working days and the traffic can be so congested that drivers may get stuck in it for hours. The objective of this project is to develop an Android smart phone application that can assist drivers in Malaysia navigate through road traffic in its major cities. Through an Agile development method, the developer will gather information about Malaysia's major cities' road traffic and program the app using an Android Development Tool Kit and Google API's.

CHAPTER 1

INTRODUCTION

1.1 Background of Study

It is a common knowledge that the most preferred method of travel in Malaysia is through private motorized road transport. The increasing demand for vehicles are rising along Malaysia's with economic growth. This is maybe due to the culture where those who are able to afford a motorized vehicle should buy his or her own private vehicle. The other probable factor which results the rising trend of owning a motorized vehicle is poor public transportation system. Unfortunately, the increase of personal vehicle ownership also contribute to high traffic congestion in Malaysia's major cities such as Kuala Lumpur.

This project will consist of multiple parts. The first part is to analyze the cause and effects of traffic congestion particularly in Malaysia where the setting of the project will take place. The second part is to understand the flow of traffic in Malaysia utilizing the current technology used Malaysia trafficking systems. The author will then produce a solution by creating a mobile application that can assist Malaysian drivers to navigate through traffic. The application will be an improvement of the current used applications or may be specifically tailored to suit the targeted users. This solution will be of convenience to Malaysian drivers. The proposed title for the app is Traffic Navigator.

1.2 Problem Statement

Drivers specifically in the urban areas tend to suffer traffic congestion on a daily basis. This usually happens during working peak hours where they are heading to and returning from the office. Other cause of heavy traffic congestion may possibly due to road constructions, accidents or the high number of cars on the road at the same moment. Traffic congestion can give a variety of negative impacts both direct and indirect to the environment, economy and health. The following are the commonly

agreed negative impacts of traffic congestion:

1.2.1 Prolong Air Pollution and Global Warming

Having trapped in a congested traffic increases the emission of Carbon Monoxide (CO). This is mainly from the fuel combustion of the running engine of an individual car. Besides that, road dusts are easily spread by car tyres when a driver pulls a break to stop the car.

1.2.2 Noise Pollution

Noise from cumulative car honks and engines can cause disturbance in the urban areas. Too much noise can cause stress and discomfort to citizens who live near regularly congested roads. Prolong exposure to noise pollution on a daily basis can actually worsen health conditions.

1.2.3 Road Rage

Sitting through congested traffic for a long time can be too much troublesome for drivers. The prolong exposure to exhaust smoke, noise can eventually cause some drivers to lose their patience and start to squeeze through the traffic ignoring the safety of other road users. This in the end can lead to road accidents.

1.3 Significant Of The Project

This project is highly significant. The Traffic Navigator system can contribute greatly to the society. Traffic congestion occur all year and this system can assist drivers on the road both effectively and efficiently. With proper use of the system, traffic congestion on the road can be reduced substantially and drivers have better chances of reaching their destinations sooner while indirectly reduce overall carbon emission on the road.

1.4 Objectives

- To understand the flow of traffic and the current systems used in Malaysia.
- To research the cause, effects and create solutions to the traffic congestion problem.
- To develop an android application with specific algorithms that functions to help drivers in Malaysia navigate through road traffics improving driving

efficiency by decreasing the amount of time and gas usage for the drivers to reach their destination.

- To tackle on the possibility of promoting greener environment in the long run and study on the traffic information systems.

1.5 Scope Of Study

The focus of this project is to provide drivers in Malaysia a way of knowing which part of road are congested with traffic and a method in finding a suitable alternative route. The scope of Malaysia's road map will narrowed down to specific places where traffic guidance is possible and can utilized fully by suggesting alternate routes if the main route is congested with traffic. The targeted places will be the roads in major cities such as Kuala Lumpur and Johor Bahru.

1.6 Feasibility Of The Project

Once the need for the system and its functional requirements have been defined, it is time to create a more detailed case to better understand the opportunities and limitations associated with the project. Feasibility analysis guides the organization in determining whether or not to proceed with the project. Feasibility analysis also identifies the important risks associated with the project that must be addressed if the project is approved.

1.6.1 Technical And Operational Feasibility

- **Familiarity with the technology**

The population in Malaysia has a general knowledge in operating an Android smart phone and may have little difficulty in accessing the application system. A quick tutorial on how to operate the app will be installed in the system to assist the users on getting up to speed with the system. The system will be designed to be compatible with most Android smart phones.

- **Project size**

The system’s scope revolves around the complex road geography in Malaysia. The app must be properly built to focus on the major cities first particularly the prominent road sectors before moving on to lesser areas. This is to ensure that the app can be designed to assist users in urban areas efficiently.

- **Schedule feasibility**

The agile methodology provides allows the development of the project a flexible take on the time flow required to get each phase done. The project was allocated necessary time windows and small gap windows should unexpected circumstances arises. This allowed the developer to adjust the system's base functions and deliver it to the specified date.

1.6.2 Economic And Resource Feasibility

The second element of a feasibility analysis is to perform an economic feasibility analysis (also called a cost-benefit analysis) which identifies the financial risk associated with the project. Economic feasibility is determined by identifying costs and benefits associated with the system and assigning values to them.

This involves questions such as how much time is available to build the new system, when it can be built, whether it interferes with normal business operations, type and amount of resources required, dependencies,

In this part, the tangible cost and benefits for the system project is listed. How much value users will gain when they use the system and also how much money that can be reduced by the system for the cost expenses.

A part of that, estimations for development expenses were made. Furthermore, the developer can measure how much for a total development cost mixed with the operational cost which include with hardware and software.

1.6.3 Risk Assessment

The risks for the deployment of Traffic Navigator are medium at best. The objective of the system is to assist drivers navigate through traffic major road sectors. The expected results after the implementation of the system compared to the risks involved are worth it. The development of this system likely will be considerably slow because the project team members are still lack in experience to develop a PHP based system.

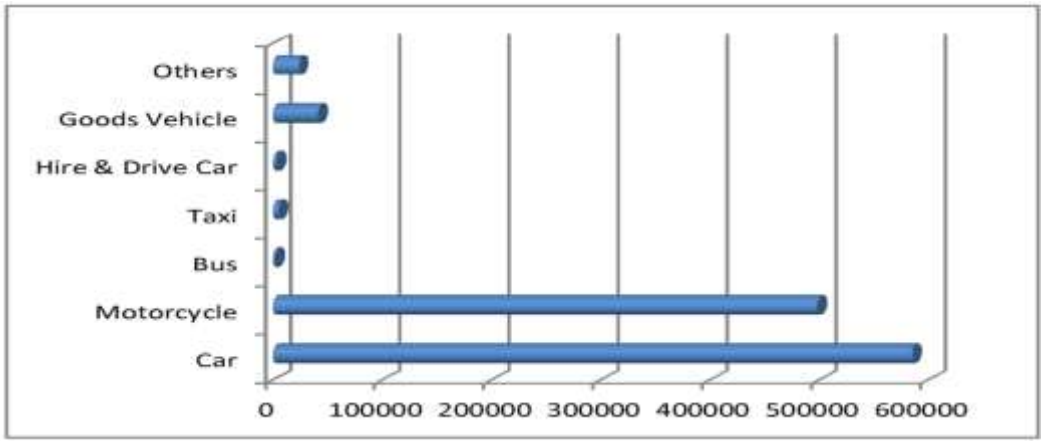
RISK ASSESSMENT 1	
Likelihood Of Risk	Medium
Potential Impact	The time taken to complete the programming phase is expected to be longer
Addressing Method	It is essential that time are allocated for the developer to thoroughly familiarize with Android Development Tool Kit SDK. Besides, it is important assign a supervisor to the project in order to supervise and guide the project accordingly.
RISK ASSESSMENT 2	
Likelihood Of Risk	High
Potential Impact	The risk will probably generate the developed system that may not be the most ideal at certain places.
Addressing Method	It is important to ensure that the agile methodology will allow the developer to quickly identify the real requirements. It is optimum to carry out the work in time to prevent any delay of the system's prototype development.

- **TABLE 1.1** : Risk Assessment

CHAPTER 2
LITERATURE REVIEW

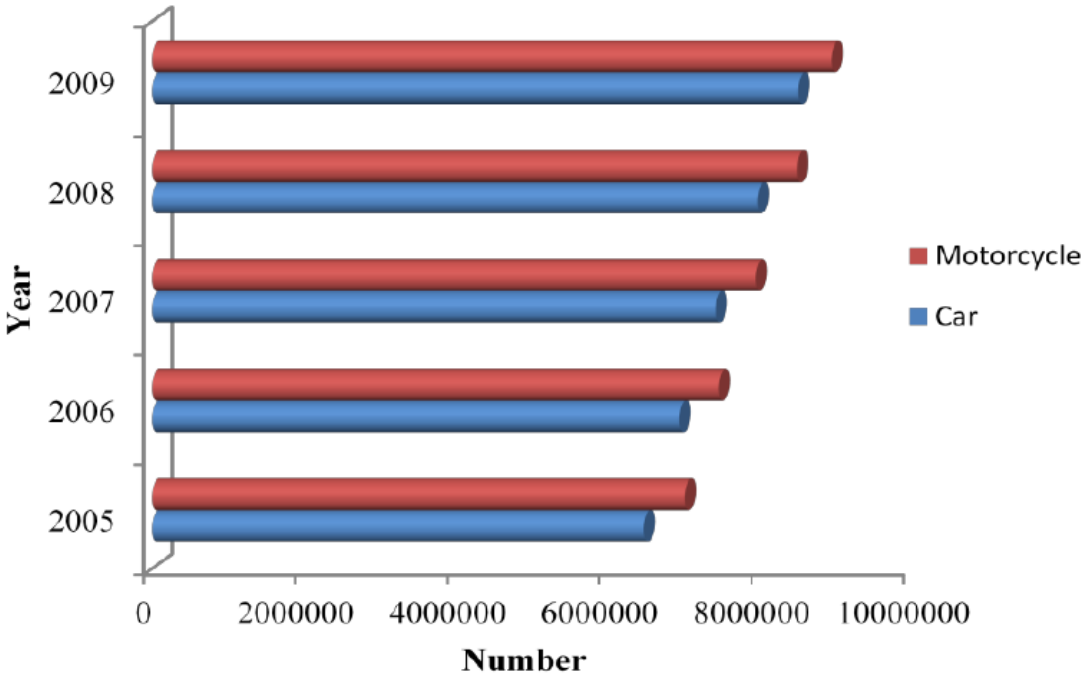
2.1 How Traffic Congestion Occur Highly In Malaysia.

Noresah (2012) stated that private vehicle ownership in Malaysia had rapidly increased for the past ten years. She later explained the drastic growth was due to various factors such as economic growth governmental policies and steady urban development. “Effects of traffic/transportation” (2005) relatively support the steady urban development factor by pointing that the increasing flexibility of choosing locations and industry changes lead to an urban sprawl which results traffic in intro-suburban areas to sky rocket. Statistically as quoted from Noresah, “Malaysia has a population of 28.3 million, 17.4 million private vehicle automobiles and 11.7 million registered drivers. This shows that more than half of the entire Malaysian population actually owns a personal motor vehicle. According to Noresah, Kuala Lumpur has the biggest amount of automobiles in the country. This was supported by “Effects of traffic/transportation” (2005) which stated that developing countries has the fastest trend of increase in number of cars from 1975 to 2000 and forecast-ed the number will continue to grow in the near future. Noresah also stated concerns on how to give more adequate space for vehicles in the near future.



- **FIGURE 2.1** : New registered motor vehicles by type, 2010

Source: Ministry of Transport Malaysia, 2011



- **FIGURE 2.2** : Current trend of growth in private vehicle (Motorcycle and car) ownership in Malaysia (Source : MIRSR, 2010)

2.2 Effects Of Traffic Congestion

Although "Effects of traffic/transportation" (2005) claimed there are bright sides of motorization such as easy to travel, the negative side may outweigh the positive when traffic congestion occurs. Knittel, Miller and Sanders (2011) claimed that engine combustion creates harmful pollutants and wheel to rad contact spreads road dust. They later added that pollutants of fuel combustion from engines indirectly create secondary pollutant ozone (03). Their research concluded that micro pollutants (PM10) "have a large and statistically significant effect on infant mortality."

2.3 Traffic Route Devices

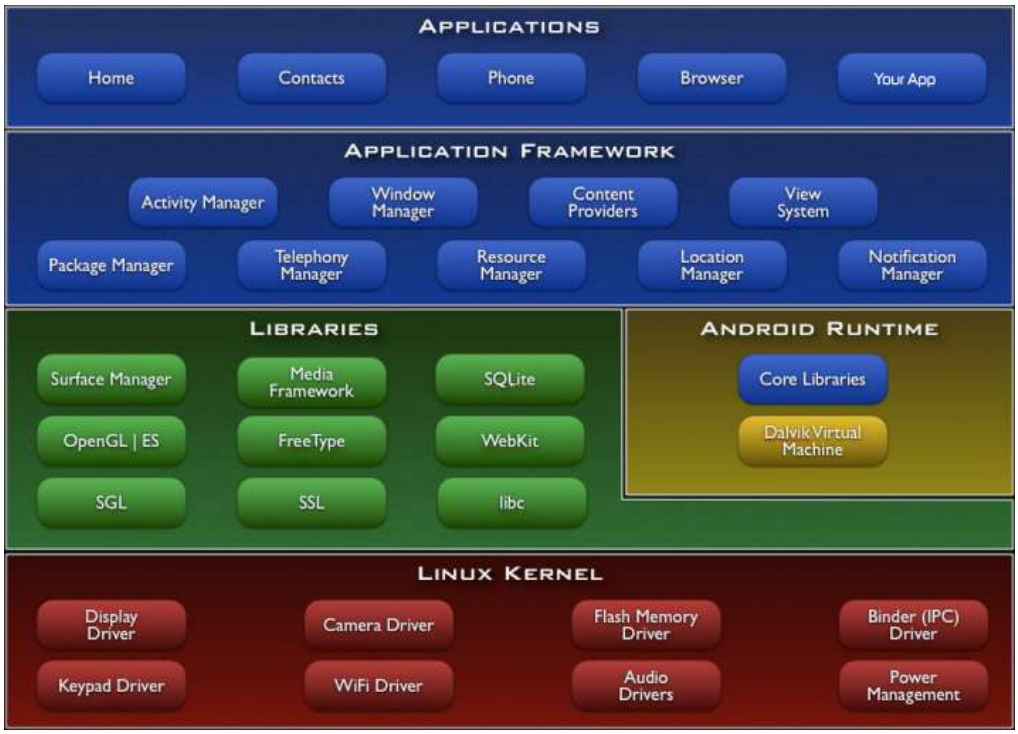
Knorr and Schreckenberg (2011) believes that Inter-Vehicle Communication provides a higher level of road safety. Through the usage of VANET system, their simulations of peak hour scenarios shows good results of vehicle communications and traffic efficiency. However, Knorr and Schreckenberg later stresses the success and road safety still depends solely on behavior of drivers.

2.4 Mobile Computing And Wireless Network

Mobile computing was made possible with the introduction fully functional laptop computers and wireless technology in the 1990's (Garlan, 2002). Mobile computing simply allows users to access information at any given time or place. Information access through mobile devices however is restricted by limited bandwith, unstable network quality and security. Software designs for mobile devices must be considered carefully due to multiple limitations such as low battery power, and display size. Regardless the usage of mobile computing has become very active and quickly becomes the standard in the current and future system designs. Wireless network encourages communication between mobile devices (Clark, 2008) and covers a wide range which allows users to establish wireless connections across long distances. Mobile computing applications reduce duplication of data inputs and real time information providing more ways to restructure business process and efficiency.

2.5 Android Devices

Android is a mobile operating system that uses a modified version of the Linux kernel (Linux, 1991 and Kroah-Hartman. 2010). Developers are able to develop Android systems using Java language (Sun Microsystems, 1990) utilizing Google-developed java libraries to control the device. (Shankland, 2007). Android offers an open development platform and provides programmers the capability to build innovative applications. The devices versatility to run background services, access location information, allows the developers to explore the usage and benefits of the devices.. The application framework is designed for simply reuse of components. Android employs a set of C/C++ libraries used by various components of the Android system. These capabilities are exposed to developers through the Android application framework.



- **FIGURE 2.3** : Android Architecture Diagram

2.6 Google Maps

It is an application which supports simple web mapping services and technology. It is an open digital map created by Google to establish information of the world. The main advantages of Google Maps are to make dynamic maps and provide an interactive interface to the user. User can drag the map to fit the user's satisfaction without waiting of a long time. Google Maps for mobile devices was first launched in 2006 (Google Inc, 2006). It enables users to view interactive map. Google Mobile Maps is an innovative mobile mapping and was widely used as a local search application. It delivers the GPS-like positioning function to mobile devices with a built-in GPS. Combining Google Mobile Maps and Google Maps API, they offer a number of utilities to manipulate digital maps.

2.7 Global Positioning System

Global Positioning System, formally known as the NAVSTAR – Navigation Satellite Timing and Ranging Global Positioning System (Dana, 1999). It is one of the most significant advanced navigation and positioning technology developed recently. The GPS consists of three main components, which are GPS Ground control stations,

GPS satellites and GPS receivers. The ground stations send control signals to the GPS satellites. As depicted in the GPS satellites transmit radio signals and the GPS receivers receive these signals and use it to calculate its position.

CHAPTER 3
METHODOLOGY

The chosen development method for the Traffic navigator project will be the Agile Development Method mainly because of its flexible concepts. The developer's task will be more easier if any important functions are to be added later in the development process of the system. This methodology emphasizes on flexible adaptive planning and enables the developer to work on the system at a suitable progress while ensuring the developer to have adequate time to make adjustments on each phase step.

The agile methodology allows the developer to develop the system through iterative approach and allows enough scope for the developer to requirement's gathering a continuous process and actually keeps the developer in line with the project's development course. There may be changes along the development process. This methodology can assist the developer to facilitate the gathering of new project requirements more smoothly while leaving no scope for guest work.

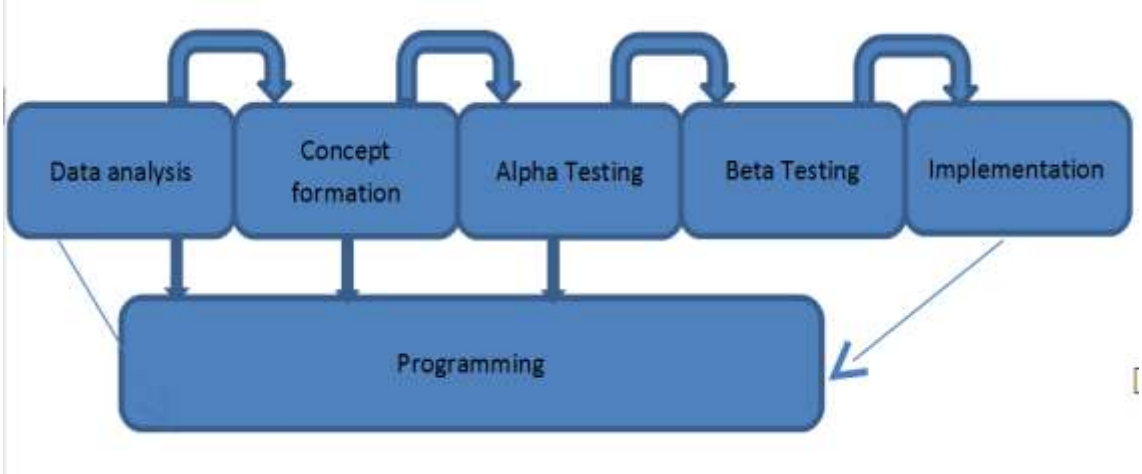
The first procedure in the system's development is to discover the key objectives and the required functions of Traffic Navigator. This will be done through detailed analysis from various references and reading materials of other related systems. Data collection will be done through interview sessions with key persons involved in the project scope. Once data collection is done, drafts and conceptual ideas about the system will be formed.

Since this project focuses on real time geography mapping and Android software for mobile phones, the developer will attempt to familiarize and be adept at Android Development Tool Kit SDK and Google Map API. These software were chosen because the Android Development Tool Kit SDK will emulate and Android software on a computer which makes the programming and debugging processes much more

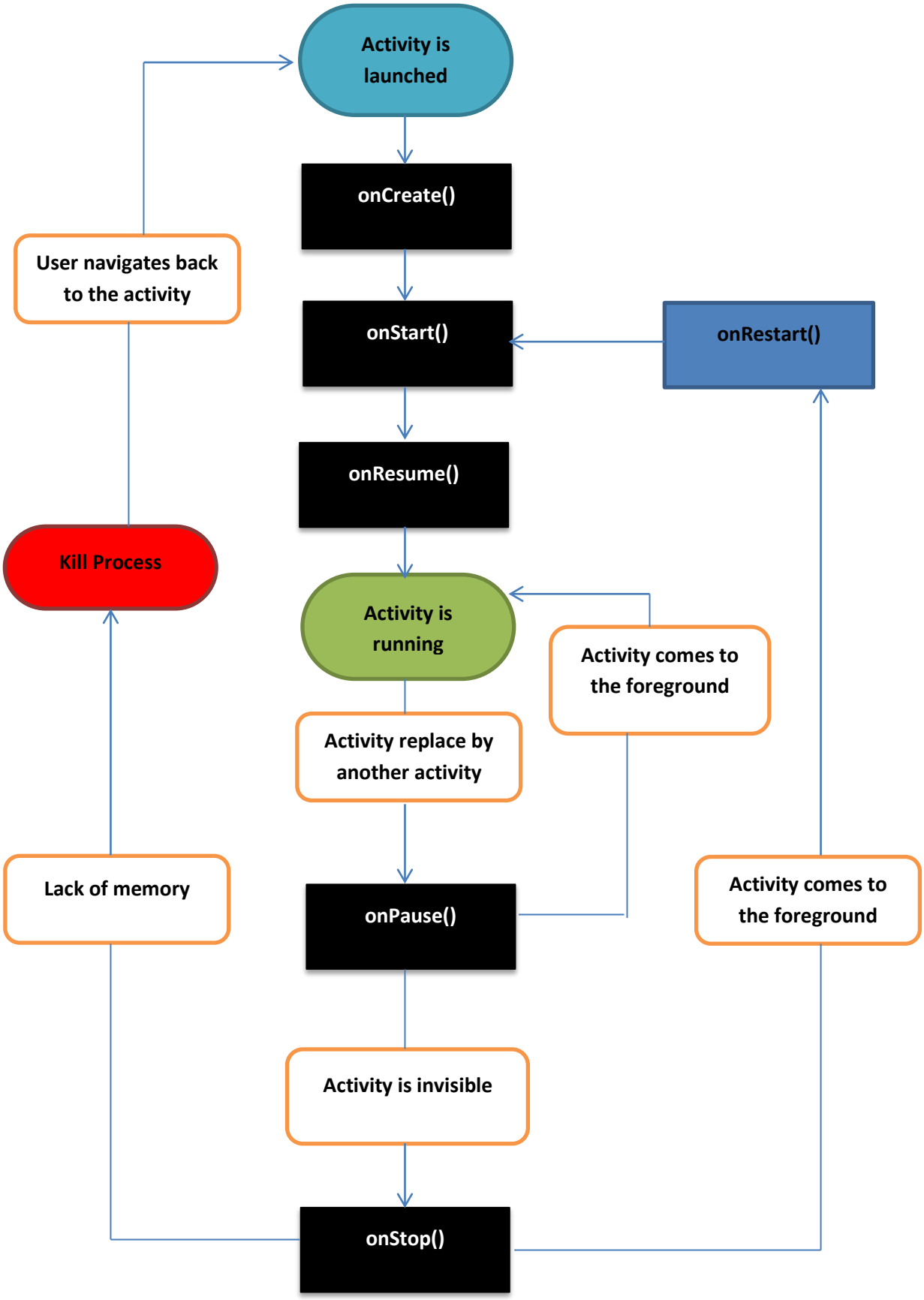
simpler for the developer. Google Map API will be helpful in giving a basic geographical layout for the developer to integrate later into the software

After the final draft is completed, the next phase of the development process begins which is the creation of the system itself. This phase will mostly be done in the second phase of the Final Year Project. Test trials will be done along the programming phase of the system. The system will first go through the Alpha Testing stage where the system's core functions will be emulated in a computer and then run in an Android smart phone. The developer will insert a series of test inputs to ensure that the system's core functions provide the desired output before proceeding to test the system in the Beta Testing Stage. The Alpha Testing phase helps by exposing any flaws in the system's primary functions and the developer can quickly ratify the problem.

The Beta Testing phase of the system will commence once the system's functions and performance has met the desired results from the Alpha tests stage. These testing stages will be heavily conducted to ensure that the Traffic Navigator will be devoid of errors and point out any minor errors or glitches that the developer had overlooked. The tests will be conducted by utilizing the assistance of volunteers who will act as the end users testing the effectiveness of the system on the road . After the Beta Testing phase is done, the system will be analyzed in terms of its performance. Any dissatisfaction experienced by them will be noted and improved upon. The Agile method provides the end result of higher quality software delivery.



- **FIGURE 3.1** : AGILE Methodology



- **FIGURE 3.2** : Traffic Navigator Activity Flow Chart

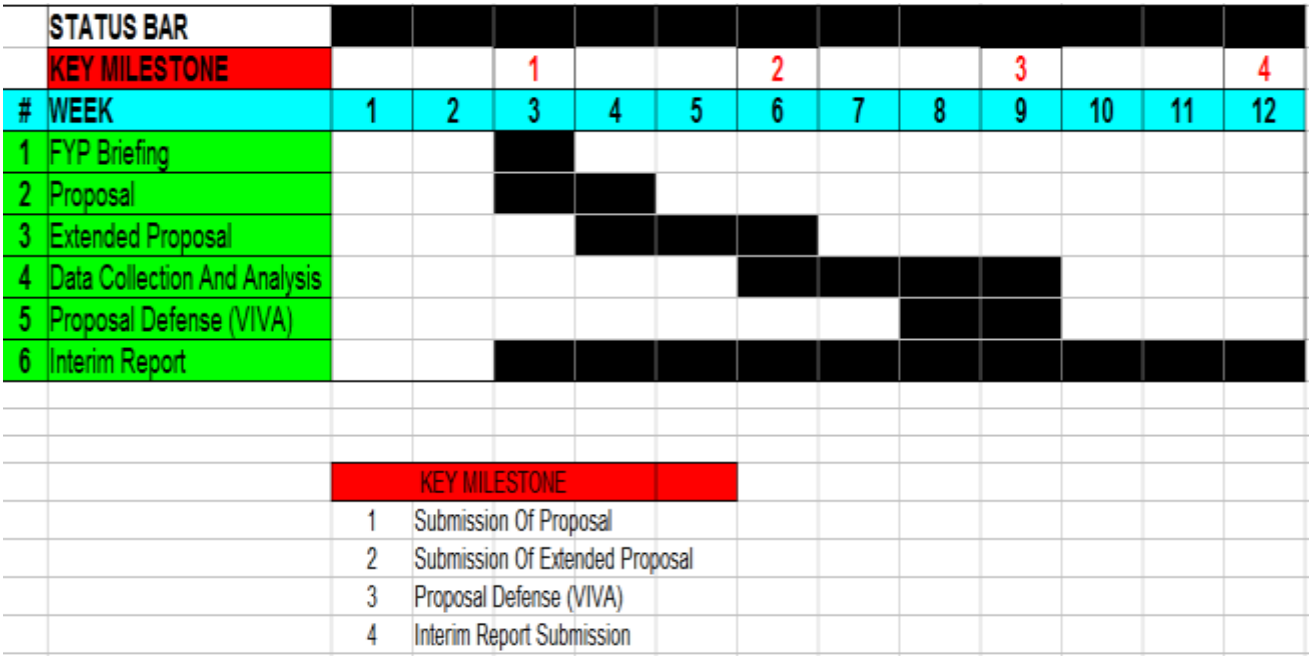
3.1 Project Activities & Key Milestones

In the systems' development phase, the activities conducted were categorized into the following. During the course of the project activities, key milestones will be recorded.

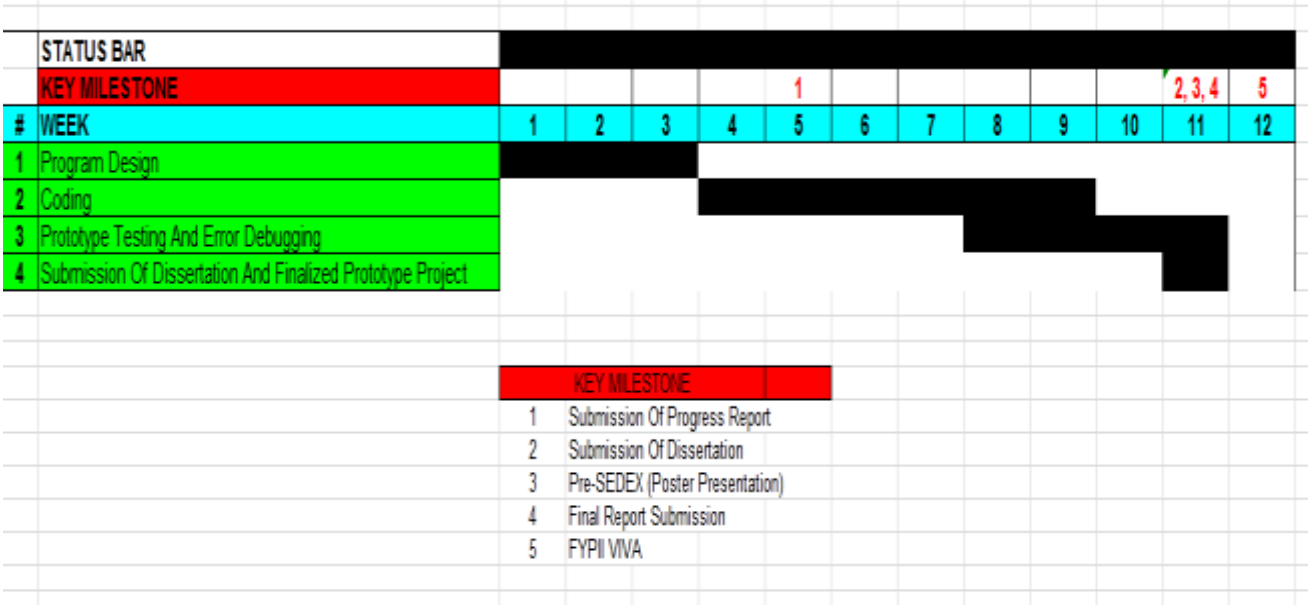
PROJECT ACTIVITIES	KEY MILESTONES	DATE(s)
• Project Initiation • Research Class(es) • Problem Identification • Research Methodology • Literature Review	• Submission and approval of project proposal • Submission of extended proposal	08/06/2012 27/06/2012
• Added Literature Review • System Discovery	• Proposal Defense (VIVA)	25/07/2012
• Extensive Research • Project Update • Refine Report Format • Addition of Issues And Challenges Raised During Proposal Defense	• Interim Report Submission	07/08/2012
• Program Interface Design • Programming	• Progress Report Submission	18/10/2012
• Additional Literature Review • Additional findings	• Project Dissertation	26/11/2012

- **TABLE 3.1** : Project Activities & Key Milestones

3.2 Gantt Chart



- **TABLE 3.2** : Gantt Chart 1



- **TABLE 3.3** : Gantt Chart 2

3.3 Tools Required

HARDWARE	**DESCRIPTION**
Brand	ASUS
Model	A53SV-SX03V
Processor	Intel(R) Core (TM) i5-2410M COU @2.30GHz
Installed Memory (RAM)	4.00 GB
Hard Drive	500 GB Western Digital
Mouse	Logitech Wireless Mouse
Printer	Canon Pixma MP 145
Android Smart phone	Sony Xperia S
SOFTWARE	**DESCRIPTION**
Operating System	Microsoft Windows 7 Home Premium 64-bit
System Application	Google Map API
	VANET
	A Trafficking Simulation
	Android Development Tool Kit
	Eclipse Juno (with Android Development Tools)
	Microsoft Office 2010

- **TABLE 3.4** : Tools Required

CHAPTER 4
RESULTS AND DISCUSSION

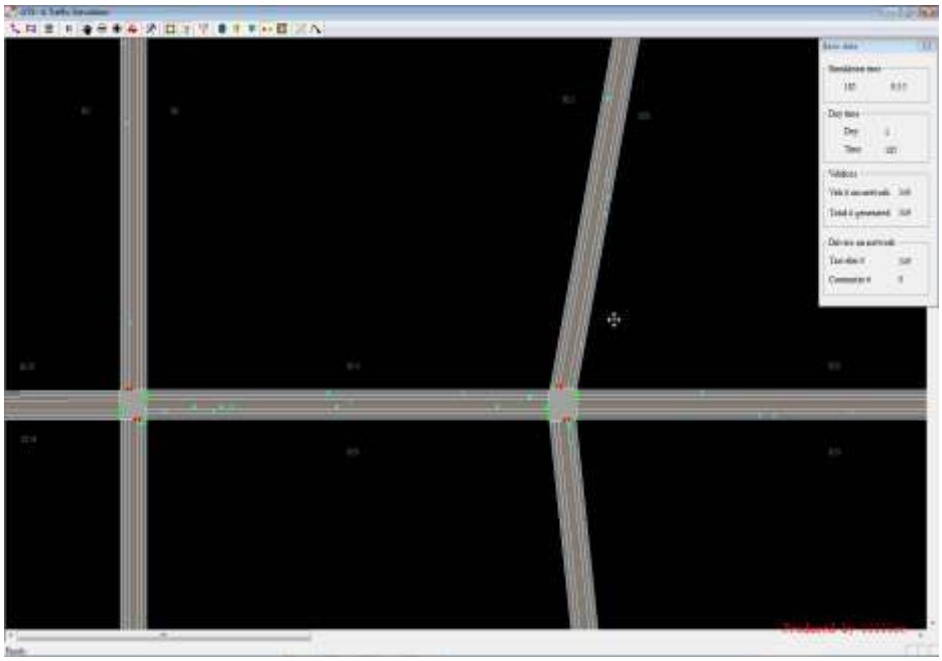
4.1 Findings And Discussion

A traffic simulation was developed to better understand traffic flow as a general. Using A Trafficking Simulation, the developer can explore basic flow and patterns of a regular road traffic activity. This simulation can provide the developer a better view on which type of road complex are traffics most active and can relate with the real life road traffic situations in Malaysia.

In the development progress of the app itself, the Eclipse software with Android Development Tools plug-ins is currently used as a medium to build the app. One other software that will be used is the Android Virtual Device (AVD). The virtual device acts as an emulator for Android devices to run tasks or programs that has been developed on the Eclipse software. This is to ensure that the apps graphical interface and background tasks works properly before it can be tested on an actual Android device.

There have been a few setbacks in the development phase. The Android SDK was proven time consuming to download due to the access limitations to the internet. The Eclipse software could not be started when it was initially installed. This was probably due to the software's version was initially not compatible with the computer's operating system. The problem was rectified by installing the correct version of the Eclipse software and the program can now launch properly. The Android Virtual Device was able to launch properly as well. As of now, the development stage has moved to build the design layout for the app. The development for the apps core functions is still in process.

On the other hand, there is a concerning issue with the app's system. The app may not prove to be reliable should there is a congestion at a tight urban area where there is only one route and there are no other alternative routes nearby.



- **FIGURE 4.1 :** A Traffic Simulation (ATS)

- **FIGURE 4.2:** Android Virtual Machine (AVD)

4.1.1 Eclipse Development Codes

a) The project codename was labelled "*mdzmaps*"

b) The maps library must be declared in the mdzmaps Manifest because it is not present in the standard Android library.

```
<uses-library android:name="com.google.android.maps" />
```

c) In order to retrieve the map tiles, access to the internet is required. The internet request permission are included in the Manifest.

d) In the activity_main.xml, a MapView library was included as the root node. The android:clickable attribute functions to enable user-interaction with the map. "True" means the can interact with the map while "false" will display the map only.

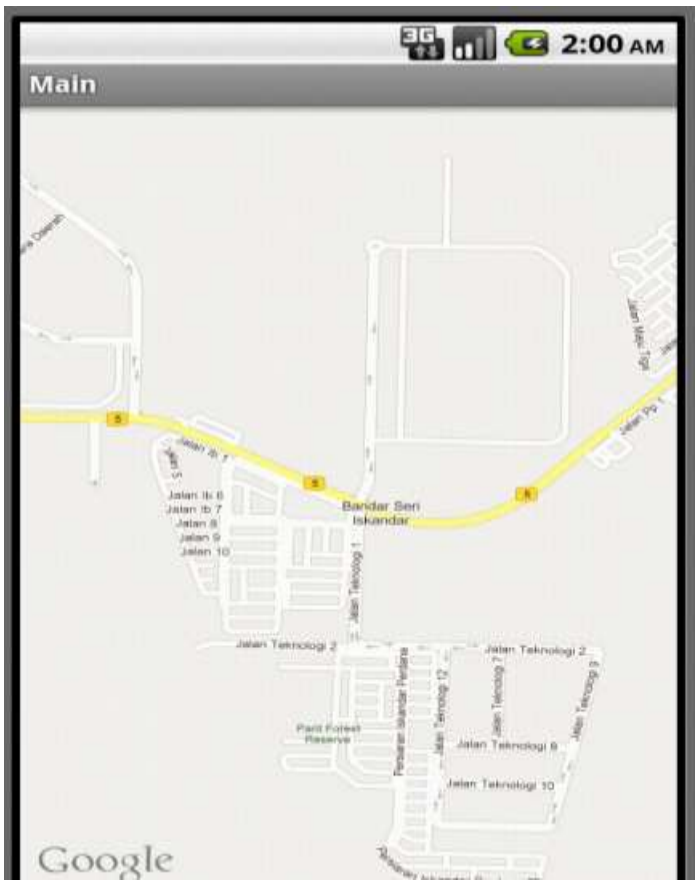
```
<uses-sdk
        android:minSdkVersion="8"
        android:targetSdkVersion="15" />
```

e) The android:apiKey contains the Maps API Key for the application. The key proves that the application is registered into the Maps service. This is crucial in order to retrieve map data during the development process. The key was obtained through a simple registration by submitting the SDK Debug Certificate's MD5 Fingerprint.

```
<com.google.android.maps.MapView
                android:id="@+id/mapView"
                android:layout_width="fill_parent"
                android:layout_height="fill_parent"
                android:enabled="true"
```

f) In the Main.java file, the isRouteDisplayed() is needed for calculations in the Masp service.

```
@Override
	protected boolean isRouteDisplayed() {
		// TODO Auto-generated method stub
```

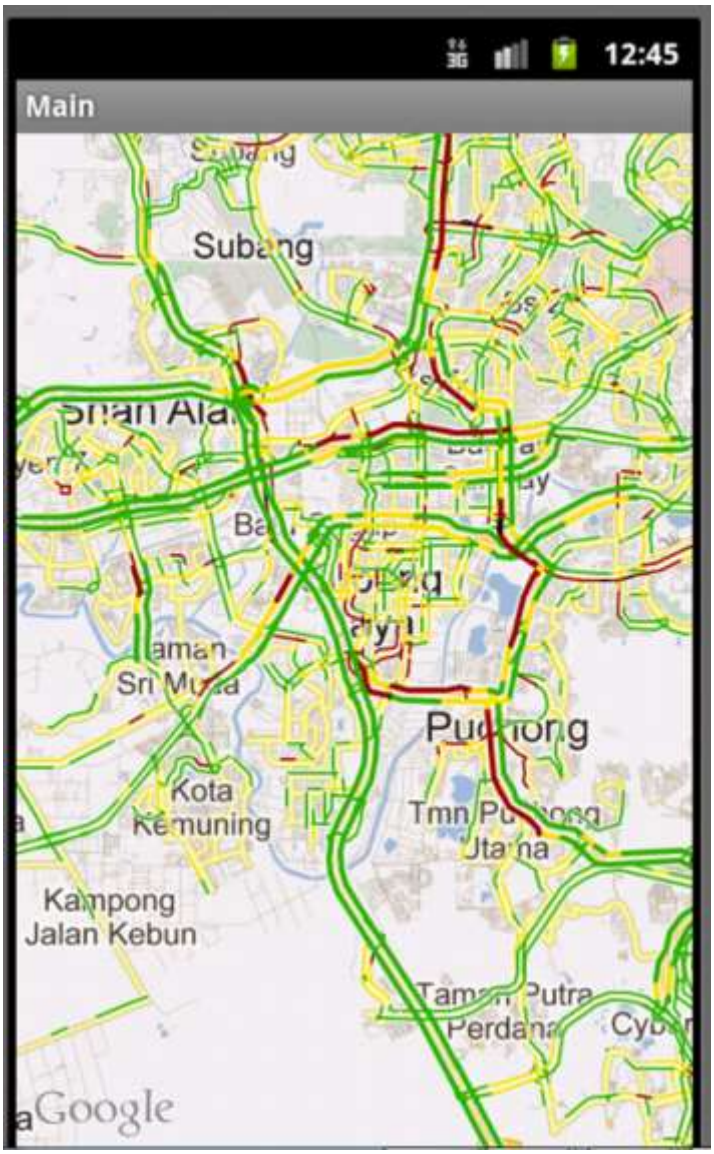


- **FIGURE 4.3 :** Traffic Navigator Map View

4.1.2 Traffic Indicators

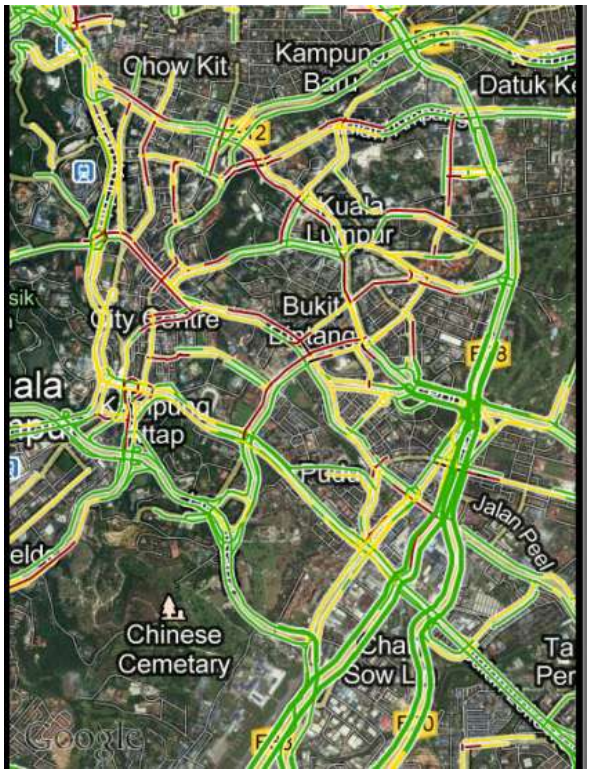
The app should display the scale of the traffic on the nearby area within the map. The traffic scale on a route should display in red color indicating the traffic conditions along that particular route is congested. Medium level of congestion will display yellow while a non-congested route will display the color green.

The app also has a satellite view function which displays a satellite layer on the map. This can give the users a sense of realism to the map display. The traffic indicators can also be layered on top of the satellite view.



- **FIGURE 4.4 :** Traffic Navigator: Traffic Indicators

- **FIGURE 4.5 :** Traffic Navigator : Satellite View



- **FIGURE 4.6 :** Traffic Navigator Satellite View with Traffic Indicators

4.2 Relevancy To The Objectives

Traffic Navigator is anticipated to give the much needed assistance for drivers in Malaysia in a way that they can be notified if their destination route is congested or not. The app is anticipated to run in the current version of Android operating system and its other dated versions so that it can be compatible with almost all versions of Android smart phones.

The app's strong point would likely to be its interface layout. The app would be designed in a way that is user friendly while still performing its core functions at an optimum level. The design should be slick and simple so that it is efficient for users to get their desired results with minimum effort in input.

CHAPTER 5
CONCLUSION AND RECOMMENDATION

5.1 Conclusion

The negative effects of traffic congestion in Malaysia can be reduced if a system or mobile application specifically tailored to Malaysian drivers is introduced. Well-informed drivers can make better decisions on choosing when and where they want to drive to avoid getting trapped in a heavy traffic jam.

5.2 Suggested Future Work For Expansion And Continuation

The suggested future work would be to inquire assistance from Lembaga Lebuhraya Malaysia since the department specialized in monitoring the traffic activities at major road sectors and highways. Their assistance could prove to be very beneficial to the project.

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APPENDIX A

(Technical Report)

Traffic Navigator

Muhammad Muadz Bin Mohamad Razi
Business Information Systems
Universiti Teknologi PETRONAS

Abstract— This report discusses the research on how traffic congestions in Malaysia can avoided through the usage of an Android application program. The objective of this project is to develop an Android smart phone application that can assist drivers in Malaysia navigate through road traffic in its major cities. The literature review component discusses about traffic congestions, mobile networking android devices in general and the possible implementations of Google Maps. The author discussed about the software development methods in the methodology section. The results and discussions section shows the prototype of the project and its development. The author mentions some possible suggestions that can be done to improve this project in the future in the recommendations section. Finally, the conclusion section will discuss about how traffic congestion can be reduced should a specific program is developed to assist drivers in Malaysia

I. INTRODUCTION

A. Background Of Study

It is a common knowledge that the most preferred method of travel in Malaysia is through private motorized road transport. The increasing demand for vehicles are rising along Malaysia's with economic growth. This is maybe due to the culture where those who are able to afford a motorized vehicle should buy his or her own private vehicle. The other probable factor which results the rising trend of owning a motorized vehicle is poor public transportation system. Unfortunately, the increase of personal vehicle ownership also contribute to high traffic congestion in Malaysia's major cities such as Kuala Lumpur.

This project will consist of multiple parts. The first part is to analyze the cause and effects of traffic congestion particularly in Malaysia where the setting of the project will take place. The second part is to understand the flow of traffic in Malaysia utilizing the current technology used Malaysia trafficking systems. The author will then produce a solution by creating a mobile application that can assist Malaysian drivers to navigate through traffic. The application will be an improvement of the current used applications or may be specifically tailored to suit the targeted users. This solution will be of convenience to Malaysian drivers.

B. Problem Statements

- Having trapped in a congested traffic increases the emission of Carbon Monoxide (CO). This is mainly from the fuel combustion of the running engine of an individual car. Besides that, road dusts are easily spread by car tyres when a driver pulls a break to stop the car.
- Noise from cumulative car honks and engines can cause disturbance in the urban areas. Too much noise can cause stress and discomfort to citizens who live near regularly congested roads. Prolong exposure to noise pollution on a daily basis can actually worsen health conditions. Sitting through congested traffic for a long time can be too much troublesome for drivers.
- The prolong exposure to exhaust smoke, noise can eventually cause some drivers to lose their patience and start to squeeze through the traffic ignoring the safety of other road users. This in the end can lead to road accidents.

C. Objectives & Scope of Study

The objectives of this project are;

- To understand the flow of traffic and the current systems used in Malaysia.
- To research the cause, effects and create solutions to the traffic congestion problem.
- To develop an android application with specific algorithms that functions to help drivers in Malaysia navigate through road traffics improving driving efficiency by decreasing the amount of time and gas usage for the drivers to reach their destination.
- To tackle on the possibility of promoting greener environment in the long run and study on the traffic information systems.

The scope of study for this project:

- The intended users are drivers particularly in Malaysia
- The scope of Malaysia's road map will narrowed down to specific places where traffic guidance is possible
- Android devices

- The targeted places will be the roads in major cities such as Kuala Lumpur and Johor Bahru.

II. LITERATURE REVIEW

A. Traffic Congestion In Malaysia

Noresah (2012) stated that private vehicle ownership in Malaysia had rapidly increased for the past ten years. She later explained the drastic growth was due to various factors such as economic growth governmental policies and steady urban development. "Effects of traffic/transportation" (2005) relatively support the steady urban development factor by pointing that the increasing flexibility of choosing locations and industry changes lead to an urban sprawl which results traffic in intro-suburban areas to sky rocket. Statistically as quoted from Noresah, "Malaysia has a population of 28.3 million, 17.4 million private vehicle automobiles and 11.7 million registered drivers. This shows that more than half of the entire Malaysian population actually owns a personal motor vehicle. According to Noresah, Kuala Lumpur has the biggest amount of automobiles in the country. This was supported by "Effects of traffic/transportation" (2005) which stated that developing countries has the fastest trend of increase in number of cars from 1975 to 2000 and forecast-ed the number will continue to grow in the near future. Noresah also stated concerns on how to give more adequate space for vehicles in the near future.

Although "Effects of traffic/transportation" (2005) claimed there are bright sides of motorization such as easy to travel, the negative side may outweigh the positive when traffic congestion occurs. Knittel, Miller and Sanders (2011) claimed that engine combustion creates harmful pollutants and wheel to rad contact spreads road dust. They later added that pollutants of fuel combustion from engines indirectly create secondary pollutant ozone (03). Their research concluded that micro pollutants (PM10) "have a large and statistically significant effect on infant mortality."

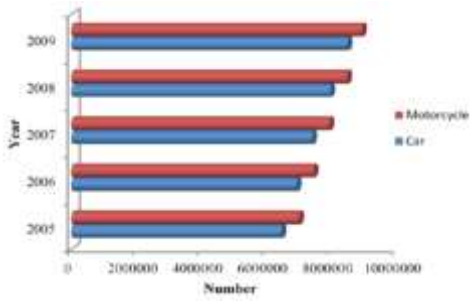

Figure 1: Current trend of growth in private vehicle ownership in Malaysia (Source : MIRSR, 2012)

Mobile computing was made possible with the introduction fully functional laptop computers and wireless technology in the 1990's (Garlan, 2002). Mobile computing simply allows users to access information at any given time or place. Information access through mobile devices however is restricted by limited bandwith, unstable network quality and security. Software designs for mobile devices must be considered carefully due to multiple limitations such as low battery power, and display size. Regardless the usage of mobile computing has become very active and quickly becomes the standard in the current and future system designs. Wireless network encourages communication between mobile devices (Clark, 2008) and covers a wide range which allows users to establish wireless connections across long distances. Mobile computing applications reduce duplication of data inputs and real time information providing more ways to restructure business process and efficiency.

Android is a mobile operating system that uses a modified version of the Linux kernel (Linux, 1991 and Kroah-Hartman. 2010). Developers are able to develop Android systems using Java language (Sun Microsystems, 1990) utilizing Google-developed java libraries to control the device. (Shankland, 2007). Android offers an open development platform and provides programmers the capability to build innovative applications. The devices versatility to run background services, access location information, allows the developers to explore the usage and benefits of the devices.. The application framework is designed for simply reuse of components. Android employs a set of C/C++ libraries used by various components of the Android system. These capabilities are exposed to developers through the Android application framework.

Figure 2: Android Architecture Diagram

B. Google Maps And Global Positioning System

It is an application which supports simple web mapping services and technology. It is an open digital map created by Google to establish information of the world. The main advantages of Google Maps are to make dynamic maps and provide an interactive interface to the user. User can drag the map to fit the user's satisfaction without waiting of a long time. Google Maps for mobile devices was first launched in 2006 (Google Inc, 2006). It enables users to view interactive map. Google Mobile Maps is an innovative mobile mapping and was widely used as a local search application. It delivers the GPS-like positioning function to mobile devices with a built-in GPS. Combining Google Mobile Maps and Google Maps API, they offer a number of utilities to manipulate digital maps.

Global Positioning System, formally known as the NAVSTAR – Navigation Satellite Timing and Ranging Global Positioning System (Dana, 1999). It is one of the most significant advanced navigation and positioning technology developed recently. The GPS consists of three main components, which are GPS Ground control stations, GPS satellites and GPS receivers. The ground stations send control signals to the GPS satellites. As depicted in the GPS satellites transmit radio signals and the GPS receivers receive these signals and use it to calculate its position.

III. METHODOLOGY

The chosen development method for the Traffic navigator project will be the Agile Development Method mainly because of its flexible concepts. The developer's task will be easier if any important functions are to be added later in the development process of the system. This methodology emphasizes on flexible adaptive planning and enables the developer to work on the system at a suitable progress while ensuring the developer to have adequate time to make adjustments on each phase step.

The agile methodology allows the developer to develop the system through iterative approach and allows enough scope for the developer to requirement's gathering a continuous process and actually keeps the developer in line with the project's development course. There may be changes along the development process. This methodology can assist the developer to facilitate the gathering of new project requirements more smoothly while leaving no scope for guest work.

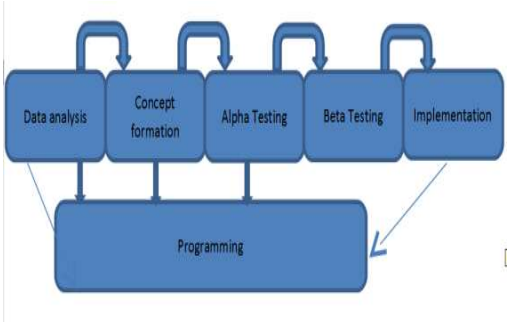

Figure 3: AGILE Methodology

The project utilizes primarily the Juno Eclipse Development software with Android Development Tools Plug-In to create the app. An Android Virtual Device was used to test and simulate the app's basic functions before it can be executed in an actual Android device.

RESULTS AND DISCUSSIONS

A traffic simulation was developed to better understand traffic flow as a general. Using A Trafficking Simulation, the developer can explore basic flow and patterns of a regular road traffic activity. This simulation can provide the developer a better view on which type of road complex are traffics most active and can relate with the real life road traffic situations in Malaysia.

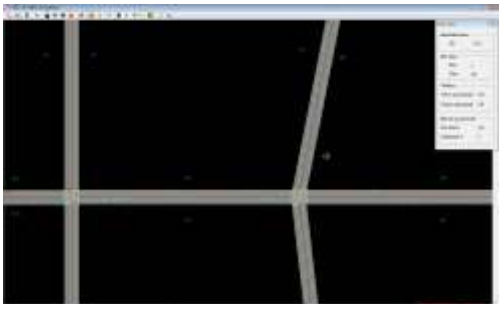

Figure 4: A Traffic Simulation (ATS)

The app should display the scale of the traffic on the nearby area within the map. The traffic scale on a route should display in red color indicating the traffic conditions along that particular route is congested. Medium level of congestion will display yellow while a non-congested route will display the color green.

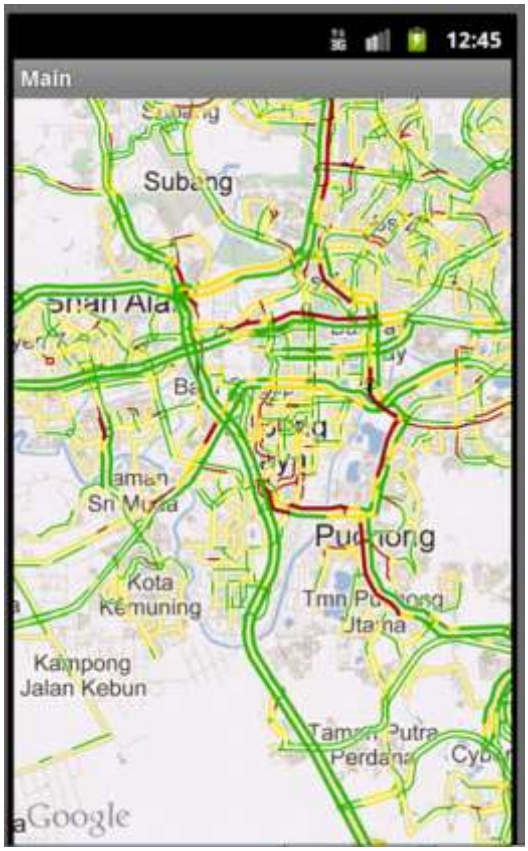

Figure 4: Traffic Indicators

IV. RECOMMENDATIONS

The suggested future work would be to inquire assistance from Lembaga Lebuhraya Malaysia since the department specialized in monitoring the traffic activities at major road sectors and highways. Their assistance could prove to be very beneficial to the project.

V. CONCLUSION

The negative effects of traffic congestion in Malaysia can be reduced if a system or mobile application specifically tailored to Malaysian drivers is introduced. Well-informed drivers can make better decisions on choosing when and where they want to drive to avoid getting trapped in a heavy traffic jam.

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APPENDIX B

(Code Samples)

Code Sample : Main.java

```
package com.example.mdzmaps;

import com.google.android.maps.GeoPoint;
import com.google.android.maps.MapActivity;
import com.google.android.maps.MapController;
import com.google.android.maps.MapView;
import com.google.android.maps.MyLocationOverlay;

import android.os.Bundle;
import android.app.Activity;
import android.view.Menu;

public class Main extends MapActivity {

       MapController mControl;
       GeoPoint GeoP;
       MapView mapV;
       MyLocationOverlay compass;

    @Override
    protected void onCreate(Bundle savedInstanceState) {
super.onCreate(savedInstanceState);
setContentView(R.layout.activity_main);
mapView = (MapView) findViewById(R.id.mapview);
mapView.setBuiltInZoomControls(true);
mapView.setClickable(true);
}
@Override
protected boolean isLocationDisplayed() {
return false;
}
@Override
protected boolean isRouteDisplayed() {
return false;
}
public void myClickHandler(View target) {
switch(target.getId()) {
case R.id.sat:
     mapView.setSatellite(true);
     break;

case R.id.traffic:
     mapView.setTraffic(true);
     break;
case R.id.normal:
     mapView.setSatellite(false);
     mapView.setStreetView(false);
     mapView.setTraffic(false);
     break;
}
}
```

Code Sample : Main.java (Continued)

```
class InterestingLocations extends ItemizedOverlay {
private List<OverlayItem> locations = new ArrayList<OverlayItem>();
private Drawable marker;
public InterestingLocations(Drawable marker)
{
  super(marker);
  this.marker=marker;
  //5.34079, 100.28241 is IICP's lat and long
  GeoPoint npark = new
GeoPoint((int)(3.1597*1000000),(int)(101.7000*1000000));
  locations.add(new OverlayItem(npark , "IICP", "IICP"));
  populate();
}
@Override
public void draw(Canvas canvas, MapView mapView, boolean shadow) {
  super.draw(canvas, mapView, shadow);
  boundCenterBottom(marker);
}
@Override
protected OverlayItem createItem(int i) {
  return locations.get(i);
}
@Override
public int size() {
  return locations.size();
}
}
}        mapV.setBuiltInZoomControls(true);
             mapV.setTraffic(true);

         double lat = 4.368040000000000000;
         double longi = 100.932745999999950000;

         GeoP = new GeoPoint ((int) (lat *1E6), (int) (longi *1E6));

         mControl = mapV.getController();
         mControl.animateTo(GeoP);
         mControl.setZoom(13);
    }

       @Override
    public boolean onCreateOptionsMenu(Menu menu) {
         getMenuInflater().inflate(R.menu.activity_main, menu);
         return true;
    }

       @Override
       protected boolean isRouteDisplayed() {
             // TODO Auto-generated method stub
             return false;
       }
}
```

Code Samples : activity_main.xml Codes

```
<LinearLayout xmlns:android="http://schemas.android.com/apk/res/android"
       android:orientation="vertical"
       android:layout_width="fill_parent"
       android:layout_height="fill_parent">

<LinearLayout xmlns:android="http://schemas.android.com/apk/res/android"
      android:orientation="horizontal" android:layout_width="fill_parent"
      android:layout_height="wrap_content">

       <Button android:id="@+id/sat"
              android:layout_width="wrap_content"
            android:layout_height="wrap_content"
              android:text="Satellite View"
            android:onClick="myClickHandler"
              android:padding="8px" />

      <Button android:id="@+id/traffic"
              android:layout_width="wrap_content"
            android:layout_height="wrap_content"
              android:text="Traffic View"
            android:onClick="myClickHandler"
              android:padding="8px" />
      <Button android:id="@+id/normal"
              android:layout_width="wrap_content"
            android:layout_height="wrap_content"
              android:text="Reset View"
            android:onClick="myClickHandler"
              android:padding="8px" />
 </LinearLayout>

 <com.google.android.maps.MapView
      android:id="@+id/mapview"
       android:layout_width="fill_parent"
      android:layout_height="wrap_content"
       android:clickable="true"
      android:apiKey="0V86ZVgqTDEBf-3F2ZoYWgUe6ou-Q4EHmUy3nUg" />
</LinearLayout>
```

Code Samples : activity_main.xml Graphical Layout Design (Continued)

Code Sample : mdzmaps Manifest

```
<manifest xmlns:android="http://schemas.android.com/apk/res/android"
    package="com.example.mdzmaps"
    android:versionCode="1"
    android:versionName="1.0" >

    <uses-sdk
        android:minSdkVersion="8"
        android:targetSdkVersion="15" />
    <uses-permission android:name="android.permission.INTERNET"/>

    <application
        android:icon="@drawable/ic_launcher"
        android:label="@string/app_name"
        android:theme="@style/AppTheme" >

        <uses-library android:name="com.google.android.maps" />
        <activity
            android:name=".Main"
            android:label="@string/title_activity_main" >
            <intent-filter>
                <action android:name="android.intent.action.MAIN" />

                <category android:name="android.intent.category.LAUNCHER" />
            </intent-filter>
        </activity>
    </application>
```