

**DRIVE SAFE
MOBILE APPLICATION**

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**INFORMATION & COMMUNICATION TECHNOLOGY
UNIVERSITI TEKNOLOGI PETRONAS
SEPTEMBER 2012**

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B.TECH (HONS) INFO. & COMM. TECHNOLOGY

SEPTEMBER 2012

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by

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Dissertation submitted in partial fulfillment of

The requirement for the

Bachelor of Technology (Hons)

Information and Communication Technology

September 2012

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CERTIFICATION OF APPROVAL

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by

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A project dissertation submitted to the
Information and Communication Technology Program
Universiti Teknologi PETRONAS

In partial fulfillment of the requirement for the
BACHELOR OF TECHNOLOGY (Hons)
INFORMATION AND COMMUNICATION TECHNOLOGY

Approved by,

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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.

OOI POH VIN

ABSTRACT

Drive Safe is a mobile application that aims to educate people about road safety awareness. It is built as a platform to nurture road users especially Malaysians to be more responsible on the road. Road accident has been acknowledged as the number one killer in Malaysia beating drugs and aids far way behind. People are dying more on the roads than anywhere else. The root cause for this situation is mainly because of human negligence. Malaysians are still lacking road safety awareness; if this can be put to an end, then definitely we are looking forward for a safer ride in the future.

In this project, the main purpose is to educate people on the importance of road safety awareness. The scope of this project is broad as it attempts to address not only vehicles drivers and motorcyclist, but all road users including cyclist and pedestrians. Nevertheless, this project is targeted to audiences who live in Malaysia only. Therefore, the perceptions of all types of road users are hugely important in the development of this application. Rapid Application Development methodology is employed in this project, so that the features and functions implemented can be tested module by module.

Last but not least, this project also managed to come up with numerous interesting and yet important findings about road users in Malaysia. For example, most road users are unaware of the 12 second; which is designed to remind motorist that he or she needs room to slow down, stop or take evasive action if something happens on the road in front of them. Therefore, Drive Safe Mobile Application aims to educate people with those rules and regulations that are rarely heard by people such as 2 second rule, 4 second rule, do's and don'ts before and after drive and many more.

ACKNOWLEDGEMENTS

The author would like to express his sincere gratitude to his supervisor, Ms. Penny Goh Kim Nee, for being continuously supportive throughout this project. He also would like to thank the University for providing the best facilities to conduct the project. Besides that, he would like to give credit to his parents, lecturers and friends who have the main source of inspiration and motivation. Thanks you so much also to all android developers around the world who have supportive in delivering this application. Last but not least, thank you so much also to everyone who has been directly or indirectly involved in the development of this wonderful mobile application. Thank you very much.

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ABBREVIATIONS AND NOMENCLATURES

App	Application
DEC	Driver's Education Curriculum
AppInventor	Application Inventor
IDE	Integrated Development Environment
SDK	Software Development Kit
RAD	Rapid Application Development
MIT	Massachusetts Institute of Technology
IT	Information Technology

CHAPTER 1

INTRODUCTION

1.1 Background of Study

Study has shown that the statistics of road accidents in Malaysia is increasing at an average rate of 9.7% per annum. Another interesting research has also proven that 90% of road accidents are caused by human error or negligence. Apparently, road accidents have been the number one killer in the country beating drugs, aids and health problem far way behind. More people are dying on the roads than anywhere else. This is definitely not good news; as it affects our country's productivity and economy in many ways.

Although various methods have been implemented to curb this issue, they seem to be ineffective. This is simply because the root of all cause remain untouched which is ignorance and negligence. In Malaysia specifically, people are lacking road safety awareness. Many people still do not know what are 2 second rule, 12 second rule and etc. Especially female drivers, they are still unaware of what are the dos and don'ts before and after driving. All these information are extremely vital in order to pursue a safe journey.

Therefore, **Drive Safe** is a mobile application that aims to solve this issue. Its vision is to create a safe and conducive driving environment for all road users and its mission is to educate people about road safety awareness. The mobile application does not only applicable for car drivers or motorcyclist, but also to overall road users including cyclist and pedestrians. **Drive Safe** has a genuine objective that each and every one of us regardless of age must educate ourselves with sufficient information about road safety. That is why **Drive Safe** will benefit a range of people from kids to adults.

1.2 Problem Statement

1.2.1 Problem Identification

Innovations would be meaningless if they do not help to solve a problem. In this project, **Drive Safe** aims to overcome a number of issues as stated below:

- The number of road accidents is increasing constantly per annum.
- Malaysians are lacking road safety education.
- The main cause of road accidents is human errors.
- The only source of road safety education that we have is the Malaysian Driver's Education Curriculum handbook which is thick and boring.

As mentioned in the previous section, the number of road accidents is increasing and whether we like it or not, the root cause is human error or negligence. This is because Malaysians are lacking road safety education. Getting a driving license is pretty easy as all we need to do is to attend a few hours of lectures, 1 hour of theory test, and a few days of training and finally the practical test. The question is that are these modules sufficient enough to certify that a person is matured and qualified enough to drive on the road.

Apart from that, the only source of road safety education that we have is the Malaysian Driver's Education Curriculum handbook which we would use them as reference to score the theory test. After passing, the book will be forgotten. The objective of the book is not achieved. Hence, **Drive Safe** is needed as a substitute to provide a better, interactive and sustainable platform to educate people about road safety awareness.

1.2.2 Significance of the Project

This project is a significant advancement on the Malaysian Driver's Education Curriculum. It is an improvised and enhanced version in many ways. **Drive Safe** mobile application will be version 2.0 of Malaysian Driver's Education Curriculum with interactive learning modules and interesting games available. Here are some of the features **Drive Safe** has:

- Interesting and simple learning module.
- Minimal design and user friendly.
- Mock-up theory test.
- Interactive pop quiz.
- Simple yet addictive game.

1.3 Objective

The objectives of this project are as stated below:

- To develop a mobile application that could increase the road safety awareness among Malaysian road users.
- To develop a fun and interactive learning platform for road users to educate themselves on road safety awareness.
- To produce more matured and qualified drivers on the road for a safer and conducive drive in the future.

1.4 Scope of Study

This project requires plenty of research on the awareness level of Malaysian road users about road safety features. This can only be done through surveys, questionnaires and interviews with different type of road users such as motorcyclist, car drivers, heavy vehicle drivers, cyclist and even pedestrian. All these information are vital for the development of the mobile application so that it has a clearer and precise idea on which issues to be tackled first. For example, a car driver wouldn't know why a motorcyclist in front of him is waving his hand up and down; which means he or she is intending to slow down or stop. After obtaining all these information, the learning modules are created to educate them. Simple games are built within the application to create a fun and interactive learning platform for users. Finally, testing and debugging are required continuously to have the features to function properly.

CHAPTER 2

LITERATURE REVIEW

2.1 Road Safety Situation in Malaysia

Road safety has always been considered as one of the most important social responsibilities of the Malaysian government. Various agencies and voluntary organizations are formed within the government to help to look over this matter. Hence, a National Road Safety Plan was formulated which aims to provide road safety research programs, behavioral modification of road users, road engineering and vehicle safety, medical treatment and safety administration.

This research paper which is prepared by the Highway Planning Unit from Road Safety Section under the Ministry of Works, it has touched various aspects of current road safety situations in Malaysia such as road accident statistics, national road safety target and strategies to reduce road accidents. The author of this research paper has also expressed his concern about the statistics of road accidents in Malaysia that have been increasing at an average rate of 9.7% per annum.

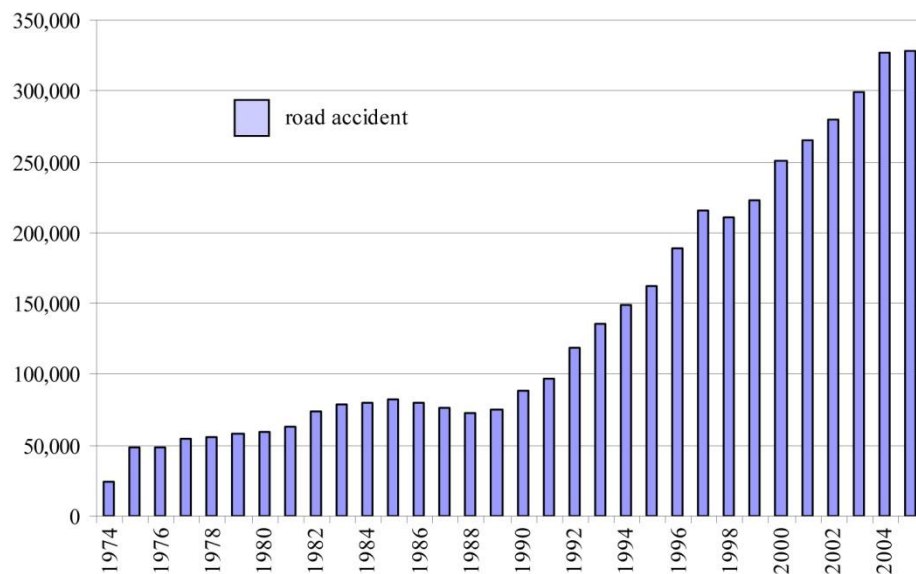


Figure 1: Statistics of Road Accidents in Malaysia (2005)

Source: Royal Malaysian Police (PDRM)

The Cabinet Committee of Road Safety which was formed in the year 1990 holds the responsibility to formulate a national road safety target in reducing this statistics. In engineering point of view, there are a few factors that highly contributes to the number of accidents in the country such as combination of traffic composition, improper intersection design, provision of street lighting, high traffic volume, provision of pedestrian crossing, signal light, vehicle speed and etc. It is clear that human error factor is the main contributor here.

However, the counter measurements that are taken to curb this issue are still concentrated on improving the external factors and not internal factors. More focus is given in improving lighting and road system. More budgets has been allocated to build observation towers and to fix cameras. Although the initiative is noble and would help to reduce the statistics, we still have not touch the root cause yet, which is human negligence. A proper road safety education needs to be implemented in producing matured and qualified drivers on road.

2.2. Human Error Accounts for Road Accidents

An interesting online journal was featured in the Alert Driving magazine entitled “Human Error Accounts for 90% of Road Accidents” which was written by Olivia Olarte. Alert Driving is web based company that concentrates on the driver’s risk management all around the world. The author stated that 90 percent of road accidents are caused by human error and we therefore have to focus on people in all road safety programs.

The mission is simple; that is to increase the ability of road users to act in accordance with the needs of the environment. Therefore, the key word here is to focus on the human element which is to stimulate good driving ethics among road users. In this context, human error is not only defined as bad driving behavior such as driving in the influence of alcohol, changing lanes without signal, over speeding and passing through red lights, but also covers various aspects like the dos and don’ts before and after driving, precautionary rules like the 2 second rule, 4 second rule and the 12 second rule. Although they seem to be not significant, they play a vital role in ensuring that a driver reaches his or her destination safe and sound.

In this journal, the author also stated that summoning a driver for breaking rules may not be the best option for a long term. He or she is still going to repeat the same mistake. This initiative is best effective for low and middle income drivers who clearly do not want to spend their not so lucrative income on paying fines. However, for those who are affordable, summon will be simply useless. If the main objective of summons is to teach drivers a lesson, then the objective is definitely a failure.

Therefore, the only way to instill good driving ethics among Malaysian road users is by emphasizing on road safety awareness. They need to be responsible on the road towards themselves and other road users as well. The significant tool is to reach the hearts and lifestyle of all road users especially the young people through the use of technology and nurture them to be a responsible road user. The technology could be social media or even mobile applications since smartphones have been growing rapidly among young people.

2.3 Driver's Education Curriculum

The Driver's Education Curriculum (DEC) was formulated to help drivers and road users to master the aspects of safety, rules and regulations that need to be practiced while on the road. The curriculum has a noble aim that is to produce road users who are knowledgeable, skillful, cautious and competent, and practice good values when they are on the road to ensure a safe and conducive environment for all road users.

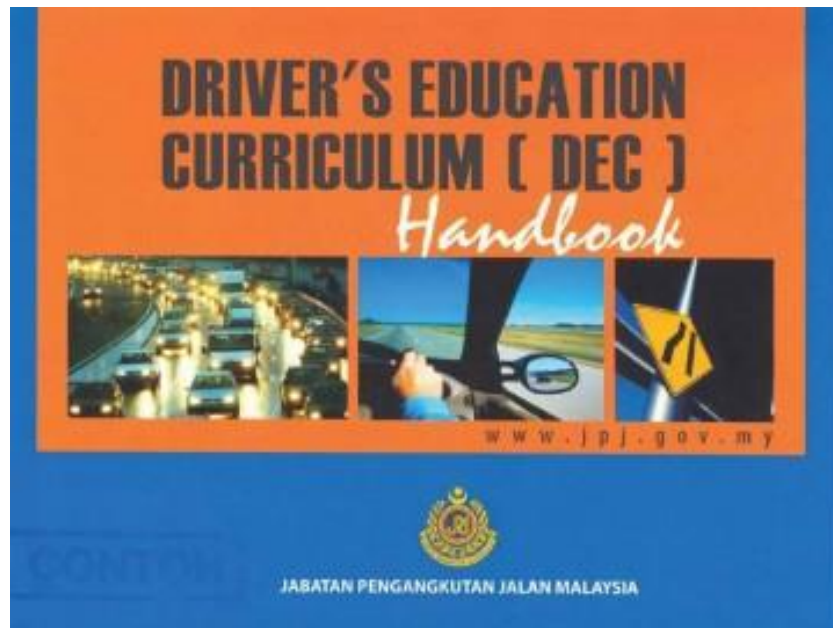


Figure 2: Driver's Education Curriculum Handbook

This handbook is normally provided for driving school student so that they could revise the content of the book which will be helpful for them to pass the driving theory test later. The handbook contains seven chapters altogether and each chapter has a few sections. The handbook basically covers various aspects of road safety such as Highway Code, traffic signs, concept of defensive driving, types of obstacles, driving in an emergency, health and safety, stress management, driving offences and penalties, maintaining distance technique and many more. In other word, this handbook can be considered as the holy book for all road users. Although it is totally impossible to remember all the content in this handbook, there are many important aspects that can be emphasized to road users such as the distance technique. Not many people are aware of this technique despite its importance in avoiding accidents from happening.

A common road user would probably absorb 30 to 40 percent of the information contained in the handbook which is actually used to pass the theory test. Unfortunately, after years, the percentage will eventually reduce. This is simply because the handbook is thick and boring. Scientist has found out that people only remember 10 percent of what they read, 20 percent of what they hear and 30 percent of what they see. Likewise, the handbook only covers the three aspects above; read, hear and see. However, this percentage can be increased further if we could add interaction between the human and the content of this particular handbook because people can remember 90% percent of what they experience.

The term is called experiential learning which is defined as making meaning from direct experience. A user needs to interact with the information provided and not just read or hear or see. He or she must be able to give inputs and receive outputs from the modules provided by the Driver's Education Curriculum. Unfortunately, human cannot interact with books but they can with smartphones. Smartphones have been a growing technology nowadays to the extent that even young kids own a smartphone. If the process of learning can be embedded into smartphones, then definitely the end results would be much more convincing. Road safety awareness can be instilled among Malaysian road users through smartphone technology which will be far more effective than handbooks.

2.4 Learning via Mobile Devices

As smartphones and tablet devices are being popular nowadays around the world, many students and educators are using this technology as an approach to help supplement their daily academic activities. “College Professors Create Mobile Apps for Students”, this is definitely interesting news featured in the United State News and World Report LP on the 26th of October, 2012 written by Ryan Lytle. While the education system is flooded with thousands and thousands of cool applications, textbook companies are losing their business model and therefore they too have venture into mobile application development business. Their business model needs to be reengineered by turning textbooks into something mobile.

It is so cool that students can actually read text books through their mobile devices and the need of having an actual printed textbook is no longer viable. Well, looking at the landscape of textbooks, who actually wants to carry these heavy books everywhere when all these can be compressed and stored into a small yet sophisticated device call smartphone? It is the sense that students have something in their hands and they have immediate access to it for a very long time that a physical textbook could never offer. One significant feature of mobile applications that textbooks can never offer is the ability to update or make changes immediately.

Students benefit the most when they are able to engage with the content of the course which textbooks can never provide. Mobile application is the next biggest thing that has the potential to revolutionize the concept of learning and educating. It is cheap, portable, small and handy, interactive and yes it is incredibly smart. The process of learning could be fun and more effective through mobile application as user can interact with the devices. There will be inputs and outputs as well. This is what experiential learning is all about; making meaning from experience! Rather than just read, hear and see, user needs to do it with their own effort. Observe the end results and learn from that lesson.

CHAPTER 3

METHODOLOGY

3.1 Research Methodology

The research methodology used in developing **Drive Safe** mobile application is the Rapid Application Development (RAD). The reason why this methodology is chosen is simply because Rapid Application Development uses minimal planning in favor of rapid prototyping. It basically involves methods like iterative development and software prototyping which would be very helpful in developing mobile application. The requirements of a mobile application are always changing and therefore a methodology such as this would be suitable whenever there is a need to redefine the specification of the mobile application.

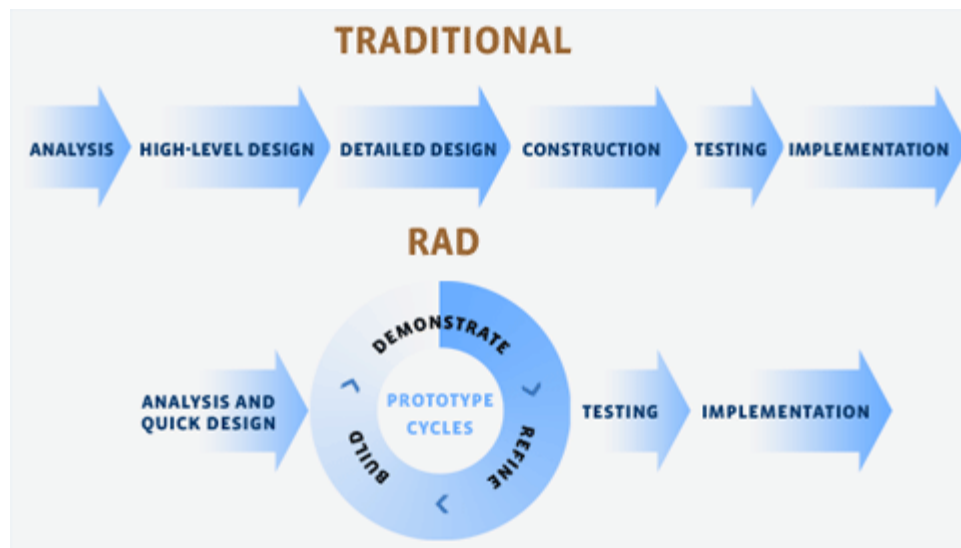


Figure 3: Rapid Application Development Software Cycle

Rapid Application Development is actually used to describe a software development process which was introduced by James Martin in 1991. His methodology involved iterative development and prototyping. This methodology may compromise in functionality and performance in the exchange of faster development phase. However, with proper planning, we could achieve great functionality in short time.

As mentioned earlier, **Drive Safe** is a mobile application that is aimed to educate people about road safety awareness. The requirements and specifications to build as such mobile application could not be permanent and they will be constantly redefined from time to time. Rapid Application Development would be the most suitable as we need fast and instant results.

The four phases involved in this methodology are requirement planning phase, user design phase, construction phase and finally cutover phase. Requirement planning phase involves the process of acquiring information such as business needs, project scope, constraints and system requirements. This phase ends when the development team agrees to the key issues and obtain green light from the authorities to continue. Next phase is the user design phase whereby users will interact with developers to come up with models or prototypes that represent all system processes and activities involved in the application. In constructive phase, tasks such as programming, coding, unit integration and system testing take place. Finally in the cutover phase, the final product will be released and ready for user training.

The main advantage of using this methodology is that it promotes strong collaborative atmosphere among the various stakeholders and dynamic gathering of requirements. Prototyping and system testing will be given high priority until the final product is released for use. However, the only drawback with this methodology is that any decision must be acknowledge by the whole team; which in this case, it would not be a problem as this is an individual project.

3.2 Project Activities

The project activities for this **Drive Safe** mobile application can be classified into seven groups.

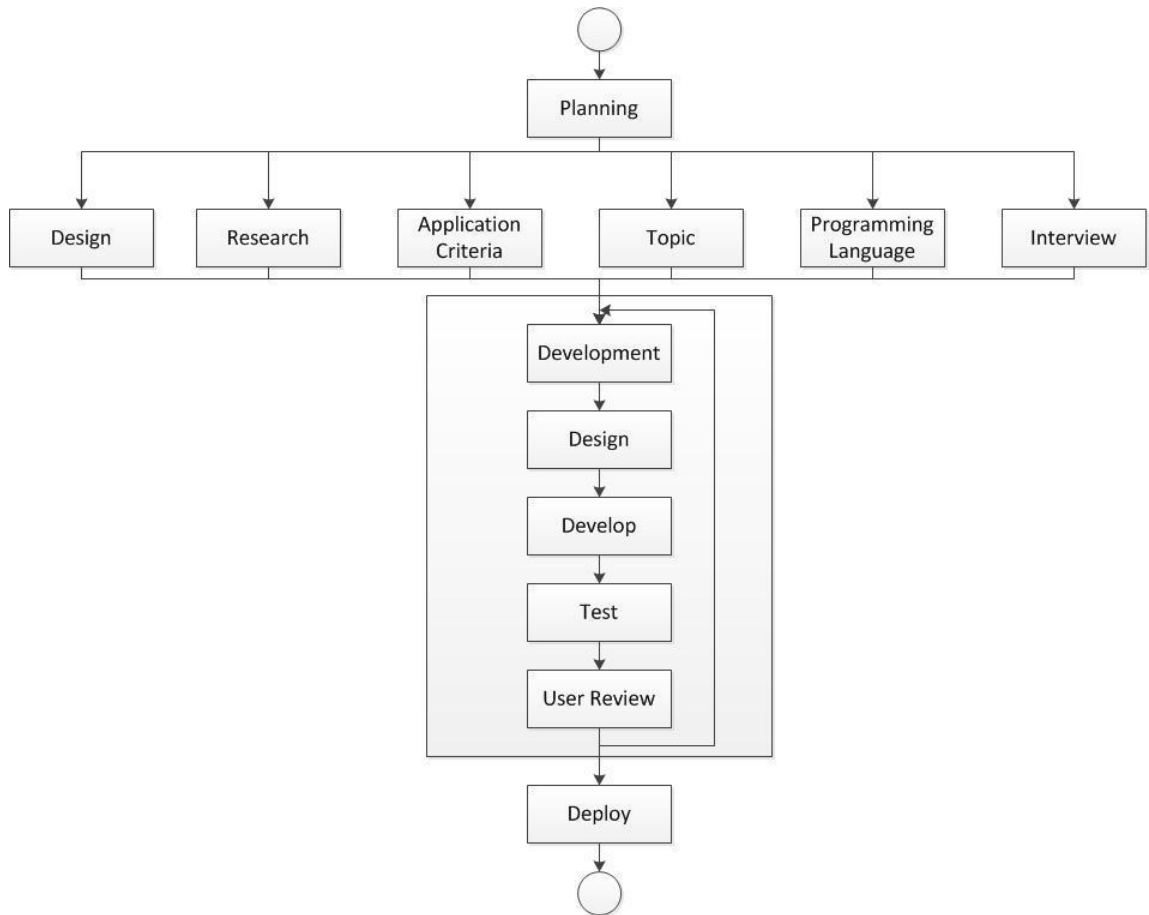


Figure 4: Activity Diagram for **Drive Safe** Mobile Application

➤ Research

Research need to be done in order to understand the requirements and wanted features and functionalities in the **Drive Safe** mobile application. The basics of android application development are to be known prior to the development phase. This includes the knowledge of java programming, the platform to build android application; whether is it going to be on eclipse or MIT AppInventor. Information about the level of understanding of road users towards road safety awareness is the most crucial one.

➤ Literature Review

Background information on the research area can be obtained by doing literature review, whereby journals, articles, news, books, conference proceedings, theses, or even a piece of writing from other resources that is related to the project is perused to have thorough explanation of work. To be precise, any articles that are closely related to mobile application that helps o to educate people and about road safety awareness or road accidents will be studied to help delivering this project. Prior studies also needed on the features of various android based smartphones according to their operating system versions such as honey comb and ice cream sandwich.

➤ User interface Design

User interface is the part of a system whereby a user could interact with the system. It performs as a mediator between the user and the backend system. This includes the on screen display that provides navigation throughout the system, the screens and the forms that capture data and the feedback that the system produces. In this **Drive Safe** mobile application, an interface is used to display information on important theories on road safety such as the rules and regulations and the dos and don'ts. The user interface also accepts user inputs for the for mockup test, the pop quiz and also the driving game so that the application can process the inputs and display instant feedback to its user.

➤ Implementation

Putting the concept and design into place is indeed a very time consuming and complicated job as we need to ensure that the changes made does not jeopardize the previous version. Programming and coding comprised the major part of this implementation phase and prototypes will be constantly produced as the development continues. At the back end, the application must be able to retrieve user inputs and generate feedback in order to create a fun and friendly interaction between the user and the system. Implementation is also need at the receiver's side to ensure that data integrity and that the information is displayed properly.

➤ Testing

Testing will be an ongoing and continuous task as the project development goes on. It is performed with the aim of detecting defects within the system and identifying the right solution to overcome the error. Debugging is thus the term used whereby after testing is done, the process of correcting the defects in the system. Test plans will be created to include the testing requirements for the product. Bug fixes also need to be verified each time after corrections has been made. However, the main testing tasks for this project would be user interface testing, module testing, integration testing, compatibility testing and lastly system testing as a whole.

➤ Documentation

Reports are submitted in partial fulfillment of the requirements for completing this project as a whole. Documentation includes the composition of proposal, preliminary reports, progress reports, interim report, poster and dissertation. Documenting the findings, data analysis, results and discussions, research and literature analysis are vital to archive the valuable information about the project as documentation is also one of the project's deliverables.

➤ Presentation

Finally, the outcomes of the **Drive Safe** mobile application will be presented verbally at the end of the semester. All the project works regarding this project will be demonstrated in the final oral presentation. The final presentation would provide an opportunity for students to exhibit their knowledge and findings about their project research for the system that they have been developing.

3.2.1 Key Milestones

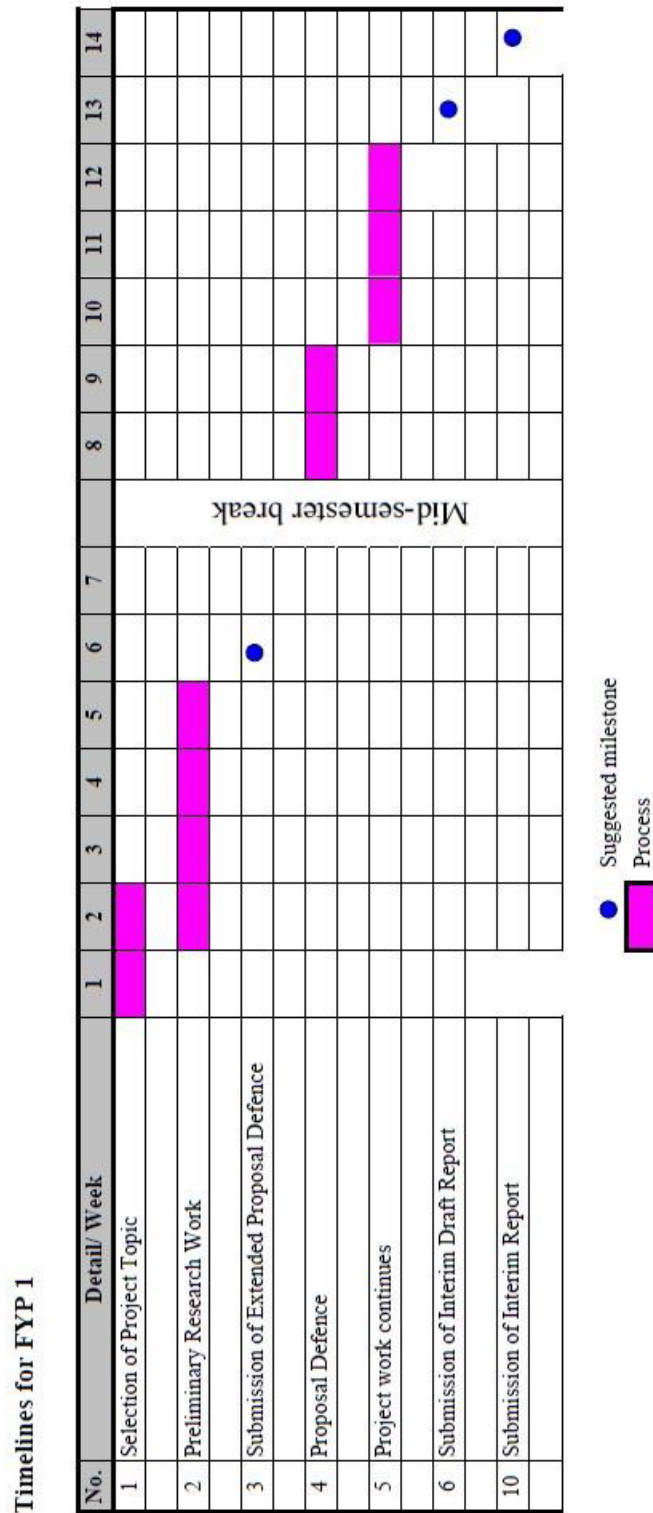
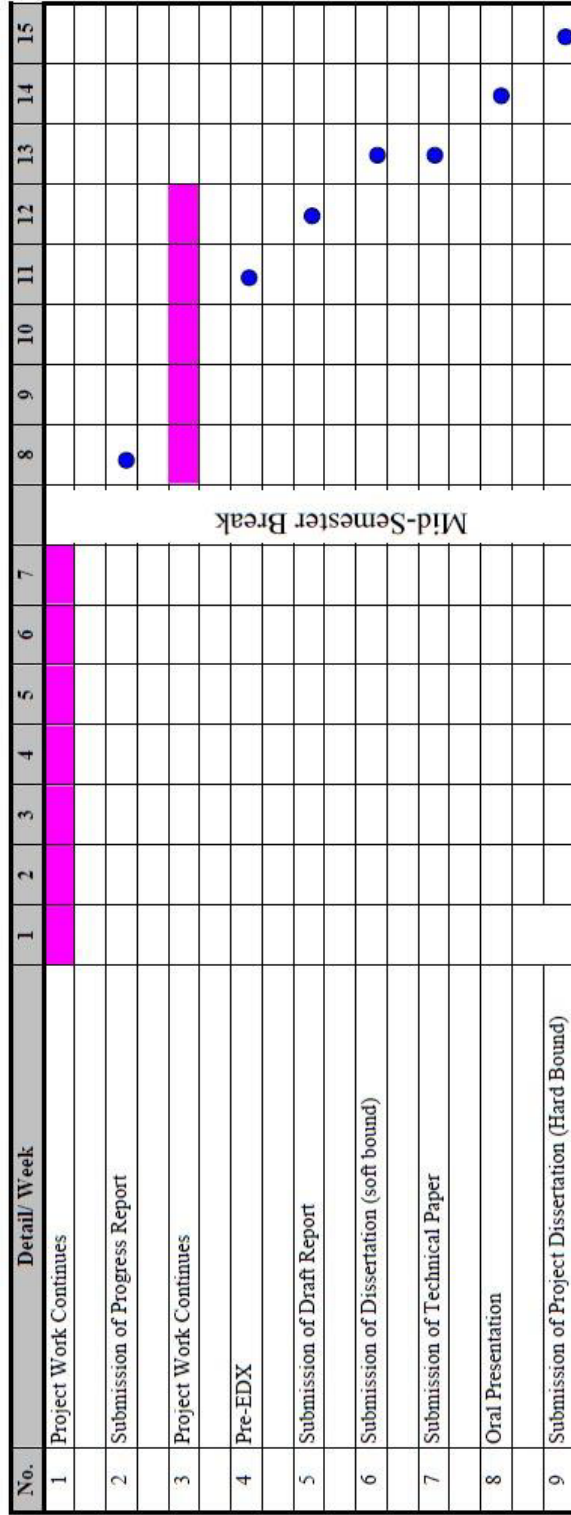


Figure 5: Key Milestones for Final Year Project I

Timelines for FYP 2



● Suggested milestone
 █ Process

Figure 6: Key Milestones for Final Year Project II

3.2.2 Gantt Chart

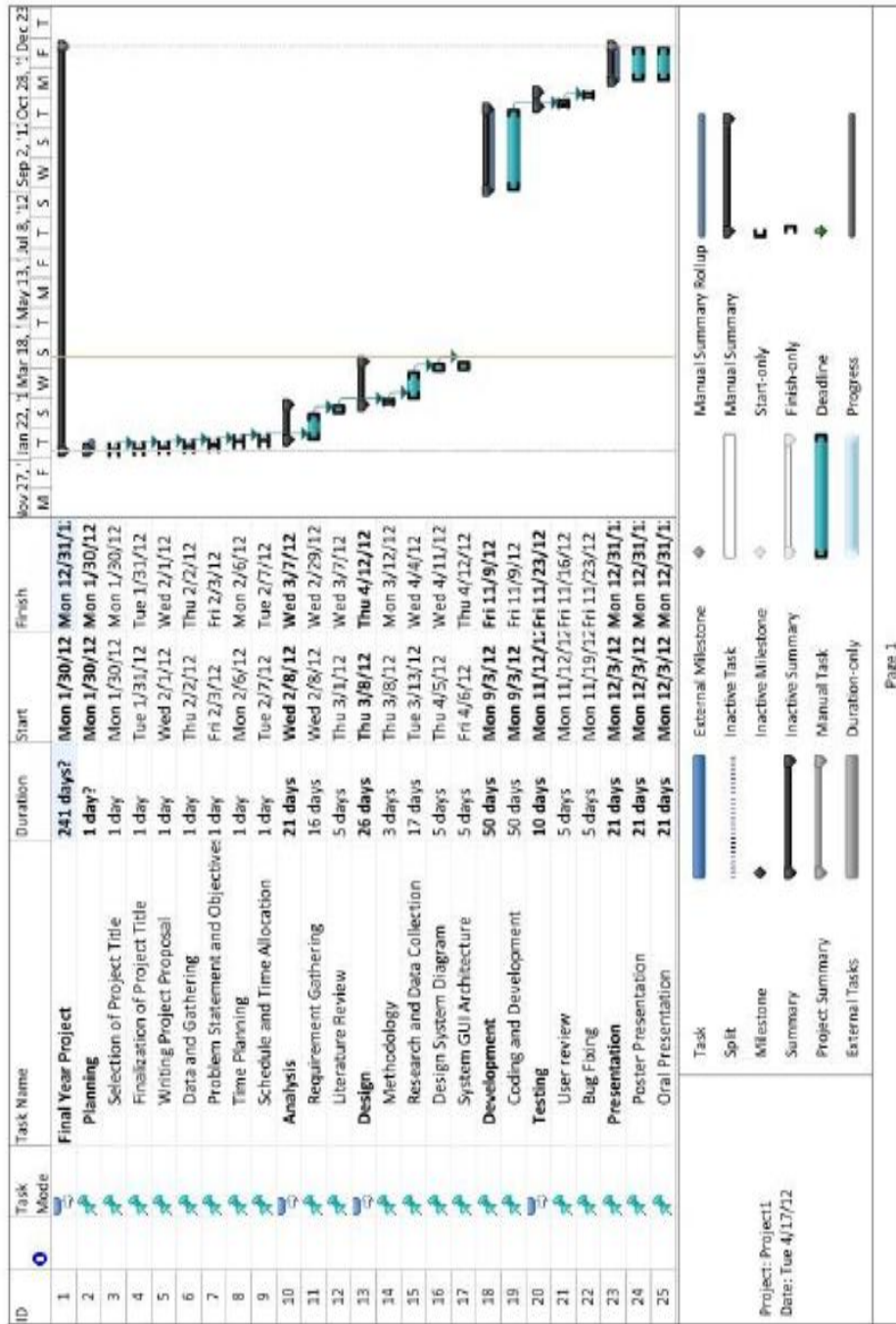


Figure 7: Gantt chart for the Entire Final Year Project

3.3 Tools Required

In order to develop this mobile application, several tools were needed along the development process; both hardware and software.

3.3.1 System Development

The major software that is used to develop this mobile application is MIT AppInventor. MIT AppInventor is web based Integrated Development Environment (IDE) to build android based mobile application. It requires minimal native programming as it involves a lot of drag and drop functionalities. After designing the interface, we need to build the blocks according to logics so that the mobile application would work as we wanted.

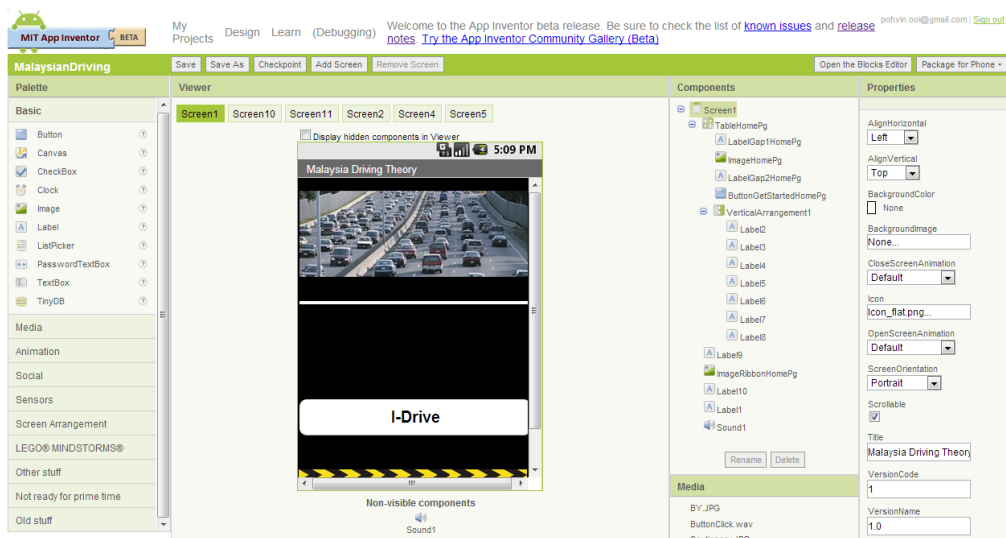


Figure 8: MIT AppInventor Interface

Along the development process, an android based smartphone is needed to perform the testing process. The smartphone used in developing this application is using Software Development Kit (SDK) version 4.0 which is also called as Ice Cream Sandwich.

3.3.2 Interface Design

The interface design is the most crucial element of any mobile application. A mobile application that has a good user interface will normally earn user's attention. It will be easier for user to interact with the application and therefore the objective of the application is achievable. In the process of designing the interface of **Drive Safe** mobile application, Adobe Photoshop CS4 has been used ultimately to produce the graphic design such as background, buttons, symbols and etc.

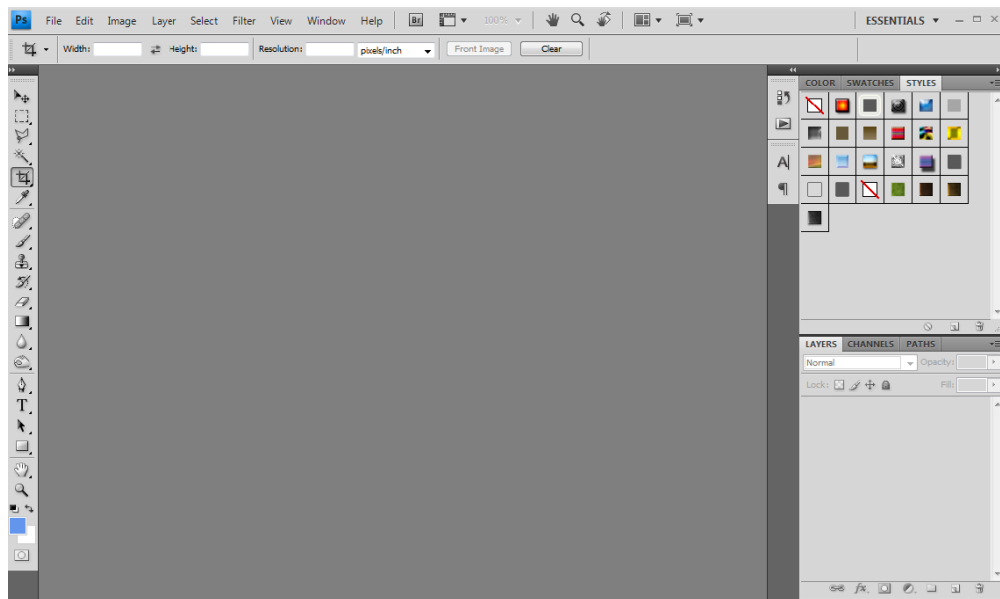


Figure 9: Adobe Photoshop CS4 Interface

CHAPTER 4

RESULTS AND DISCUSSION

4.1 Findings

4.1.1 Research on MIT AppInventor

AppInventor allows us to create android applications even if we do not have any knowledge in programming. In designing our application, all we need to do is to assemble pieces of logic blocks together on an editor. In MIT AppInventor, there are basically two main parts which are components editor and blocks editor.

Component editor is where we include most of the graphic user interface elements such as buttons, texts, images, videos, game consoles, labels, background, colors and many other properties that we can use in the AppInventor. All these elements can be dragged and dropped from the palette into the application screen. The screenshot below shows an example of block editor.

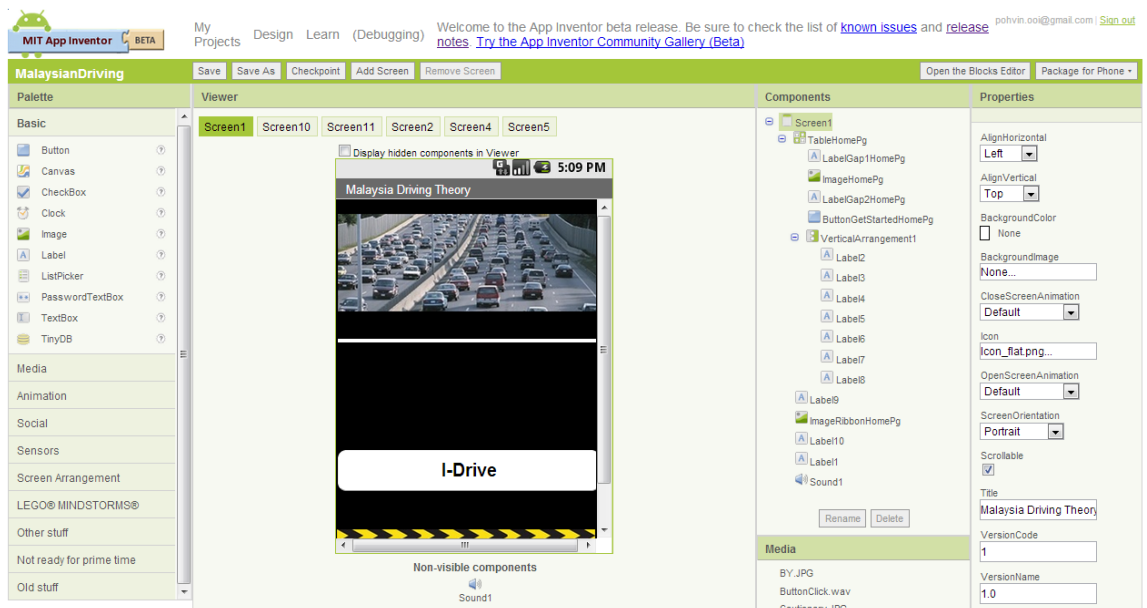


Figure 10: AppInventor Component Editor

Referring to the figure above, there are plenty of elements that we can pick from the palette and add them into the viewer to build our own application. Once all the elements are put into their respective places, it is a good habit to rename the components so that we can remember better.

Once done with the component editor, next is the block editor. In the block editor section, we need to add the interaction between the components that we have created earlier. In other words, we need to add logics to our application. For example, let say we have added a cat picture, cat's sound audio file and a button in the component editor earlier. Now, we want the audio file to play if user clicks on the button. Therefore, in the block editor, we must add logic such as; if the button is clicked, then the audio file is executed.

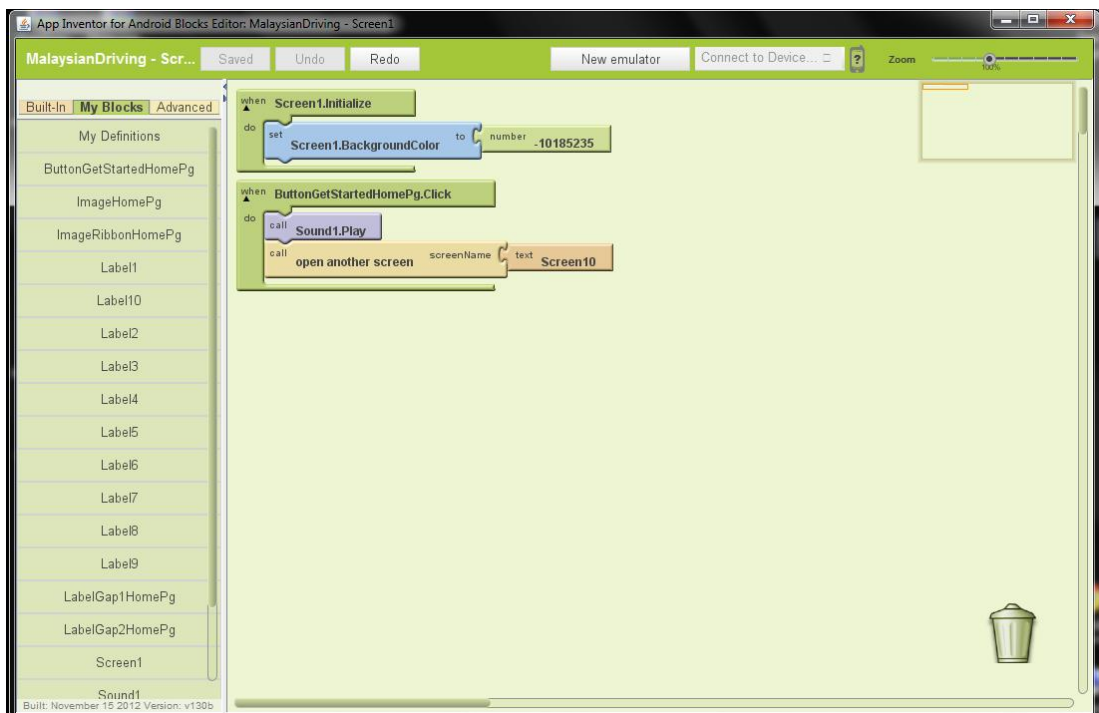


Figure 11: AppInventor Block Editor

4.1.2 Research Mobile Application

Although there are plenty of operating systems for mobile devices in the market such as Symbian, Windows, iOS, Bada OS and Android OS, the most significant ones would be Android OS which is owned by Google and iOS by Apple. These two operating systems are always head to head in the mobile world. However, there are few reasons why Android OS is chosen as the platform for this particular project.

The number one reason is mainly because it is an open source and available for free in the internet for all android application developers around the world. The software development kit (SDK) can be downloaded and integrated with the Eclipse software to build android application. Second important reason is that android applications can be installed into several brands of smartphones such as Samsung, HTC, and Sony Ericsson. Meanwhile, iOS is only available for Apple's iPhones. Hence, android has a greater number of choices of smartphones compared to iOS.

Besides that, in Malaysia especially, there is a greater number of android device users compared to iPhone users. The reason is because android devices are available at different range of prices, models and specifications. However, iPhones has a fixed price and it is definitely much more expensive compared to android devices.

Apart from the aspect of price, android operating system frequently updates their versions from time to time. Each time a newer version is released, the features and user interface is greatly enhanced and improvised. However, iOS is the other way round. Although iOS is much more stable compared to android, their interface has been the same since the beginning till today which is actually kind of boring and less attractive already to its users. Unlike android, user can actually customize the look of their device screen according to own preferences. Furthermore, the latest version of android which is Jellybean is undeniably stable and has been acknowledged as a serious competitor for iOS.

4.2 Data Gathering

The data gathering process was rapidly performed during the initial stage of the project. Various methods were used to gather as much information as possible in order to help to build this application. Some of the data gathering methods and results are as follow:

4.2.1 Formal Interviews

In the process of gathering enough information, a few formal interviews were conducted. An interview was carried out with the Head of Traffic Police, Bukit Mertajam Branch in Pulau Pinang, Inspektor S. Manoharan, he insisted that many young people are being reckless when driving on the road and their actions does not only put their life into danger but other road users as well. Apart from that, when he was asked what is the best solution to overcome the number of road accidents in Malaysia and the answer was self-realization. One must realize the importance of following the rules and regulation implemented by the government and practices them when driving on the road.

Besides, an online interview was carried out with Mr. Farooq, the Chief Executive Officer of Sabeelo Net which is an IT company based in Pakistan that is actively involved in mobile application development and also website development. He stated that people are going crazy about mobile application. Whenever there is a new cool application in the market, it would just go viral so fast that you could not even imagine. Mr. Farooq was also inquired about his opinion on the process of learning through mobile devices and he was very positive that mobile devices are going to be the biggest breakthrough in education system in the near future. Furthermore, when he was asked to give a comment on **Drive Safe** mobile application, he commented that it is definitely a very genuine attempt for a very good cause. Improvisation and enhancement can be done in terms of features so that the application is more attractive to its users.

4.2.2 Informal Interviews

Unlike formal interviews, informal interview were conducted among friends, families, lecturers and also random people from the public. The main purpose of this interview is to evaluate the level of awareness of road safety among Malaysians and also how well mobile devices are accepted by our Malaysians. Below are some examples of the questions asked during the interview:-

- What is the main reason of road accidents happening in Malaysia?
- How many attempts have you made before passing the driving test?
- Do you still keep the Driver's Education Curriculum handbook with you?
- Do you own a smartphone or tablet?
- What is your device's operating system?
- How often do you spend time on your smartphone in a day?
- Do you think that learning via mobile device is feasible?

The results of the interviews were as expected. Many mentioned that the main reason of road accidents in Malaysia is because of over speeding, cutting lanes without signal, and many other reasons which are also related to human error. Most of them passed their driving test in single attempt however the handbooks are no longer with them anymore. Most of the interviewee had a smartphone except for those who are elderly and has very little interest in technology stuffs. Besides, android is the popular choice among all the smartphone users and they averagely spend three to four hours a day using their smartphones for various reasons. For the final question, the most frequent answer given by all of them was why not. Some mentioned that if the application is attractive enough, then definitely it will be a smart way of educating road safety awareness through mobile application.

4.2.3 Survey and Questionnaires

An online survey was conducted among 50 road users from various age, gender and profession. The data gathered from the survey as compiled and displayed as below:-

Question 1: What is the main cause of road accidents in Malaysia?

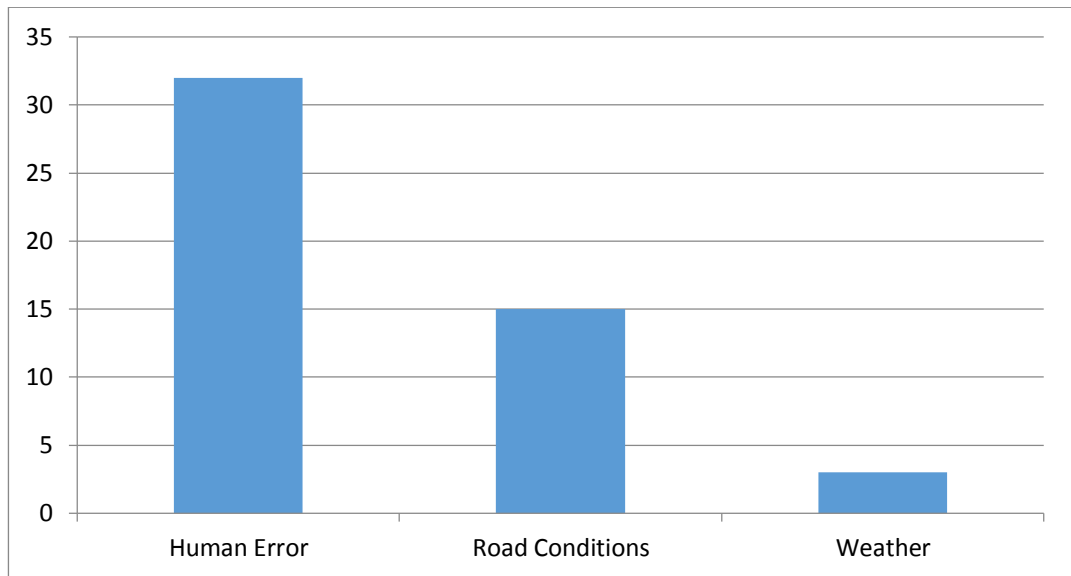


Figure 12: Graph Results for Question 1

Question 2: How many attempts have you made to pass the driving test?

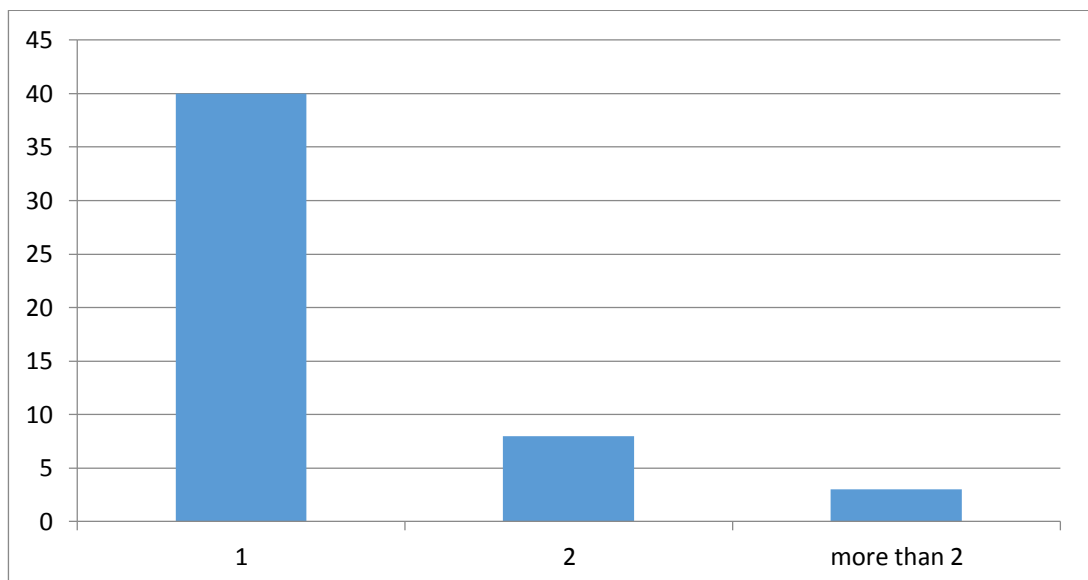


Figure 13: Graph Results for Question 2

Question 3: Do you still keep the Driver's Education Curriculum handbook?

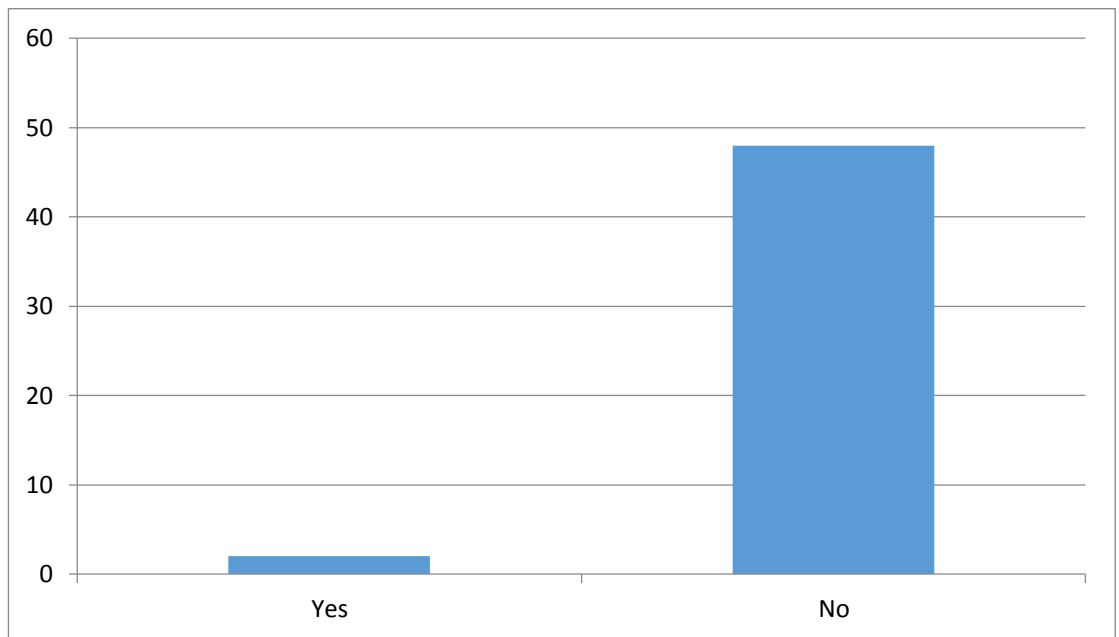


Figure 14: Graph Results for Question 3

Question 4: Do you what is twelve second rule?

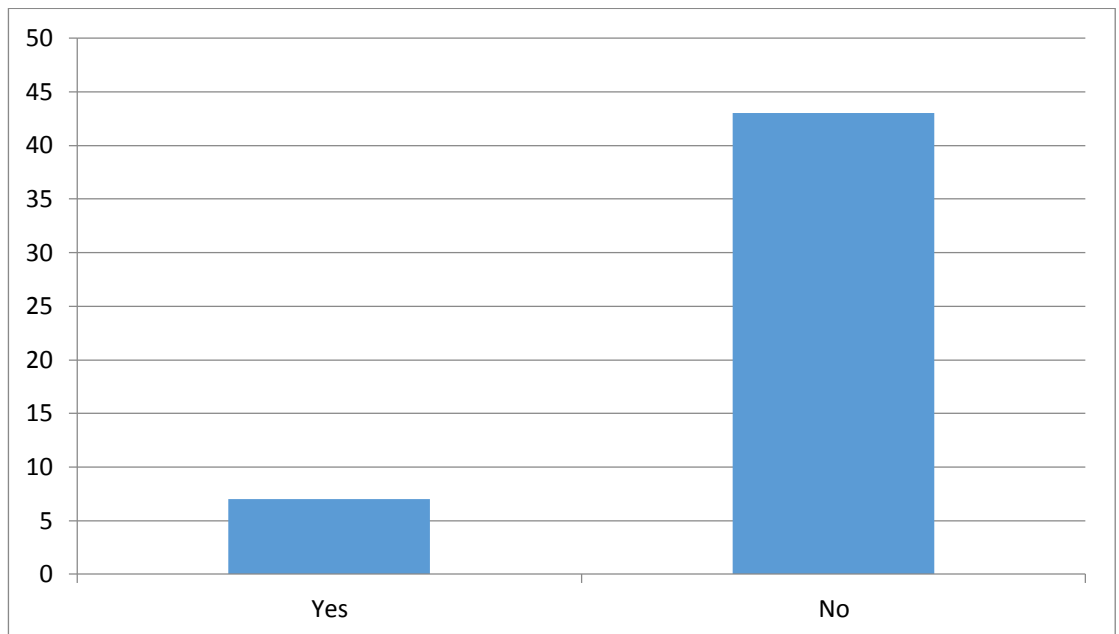


Figure 15: Graph Results for Question 4

Question 5: If a motorcyclist is waving his hand up and down, what does that mean?

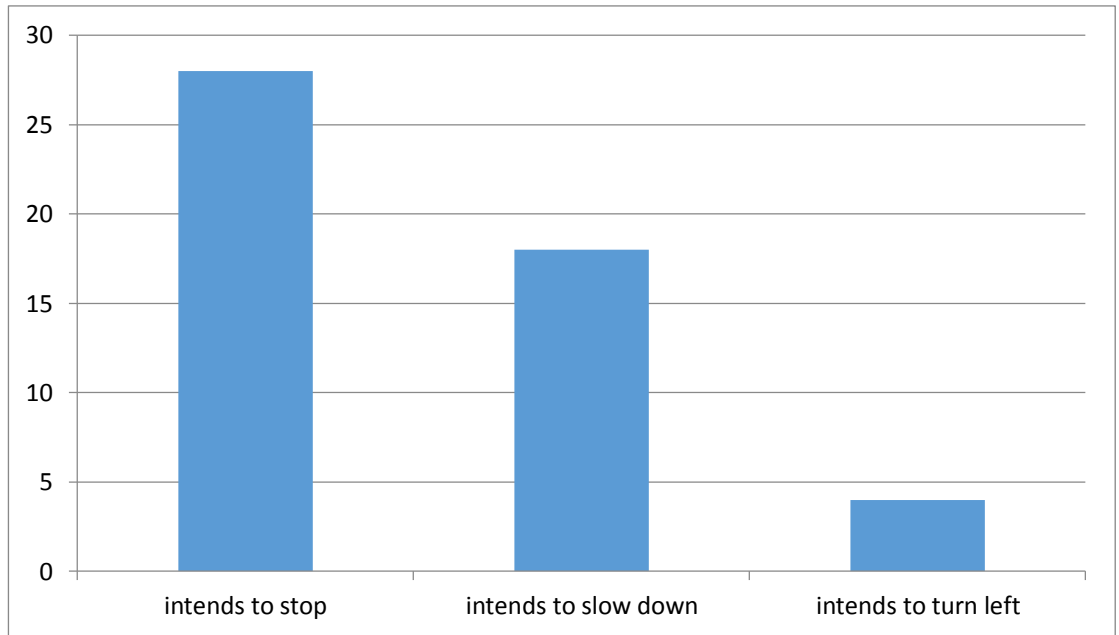


Figure 16: Graph Results for Question 5

Question 6: Do you own a smartphone or tablet?

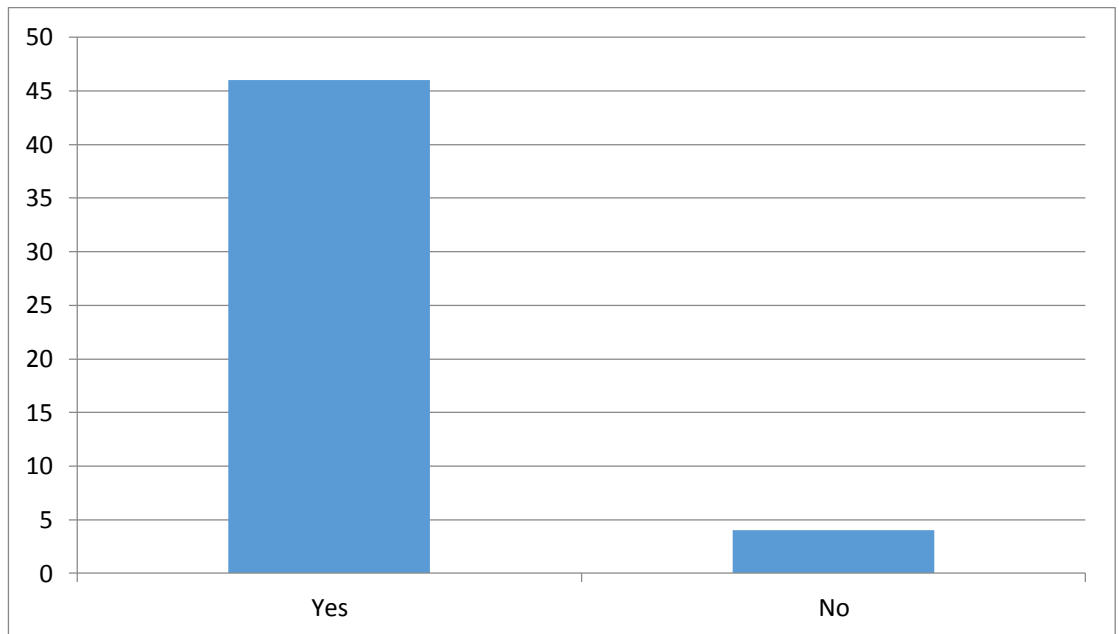


Figure 17: Graph Results for Question 6

Question 7: What is the operating system for your mobile devices?

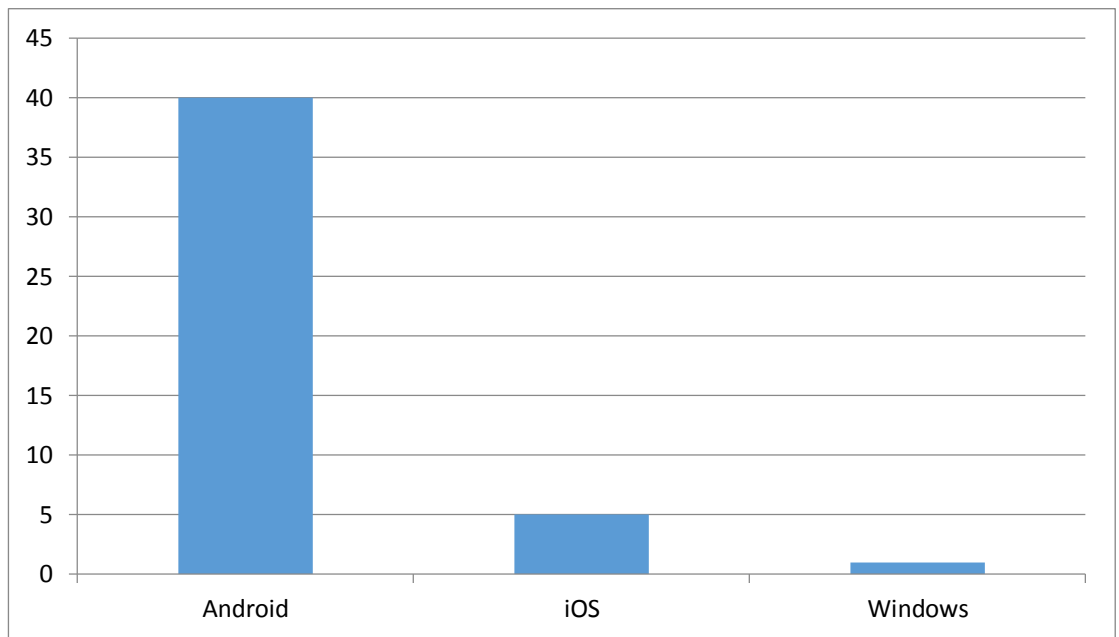


Figure 18: Graph Results for Question 7

Question 8: How much time do you spend on mobile devices in a day?

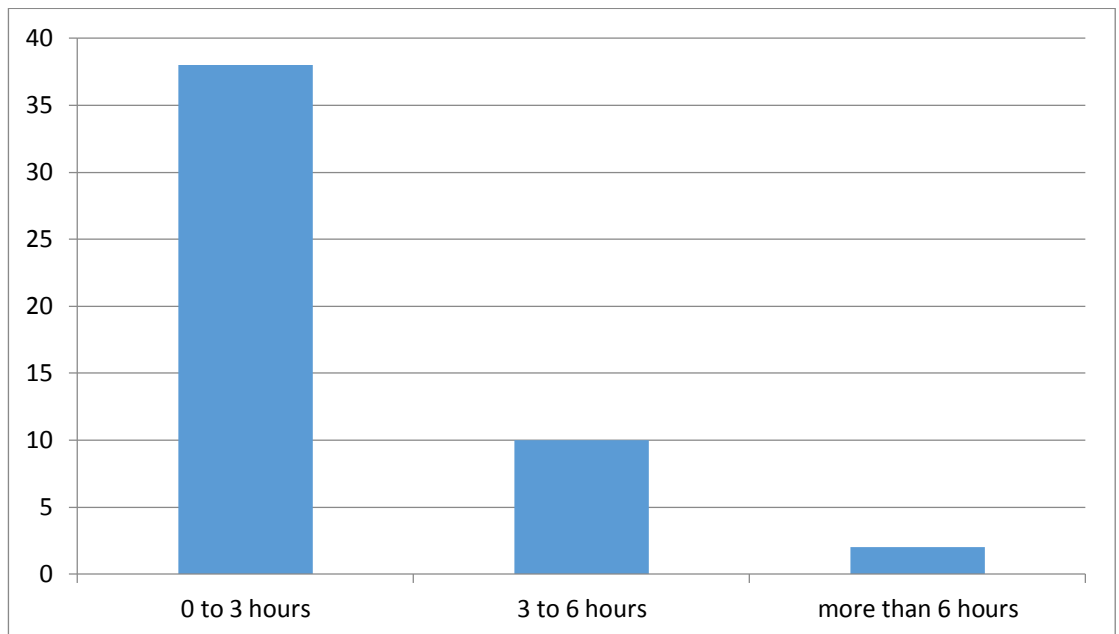


Figure 19: Graph Results for Question 8

Question 9: What is the popular category of application you normally download?

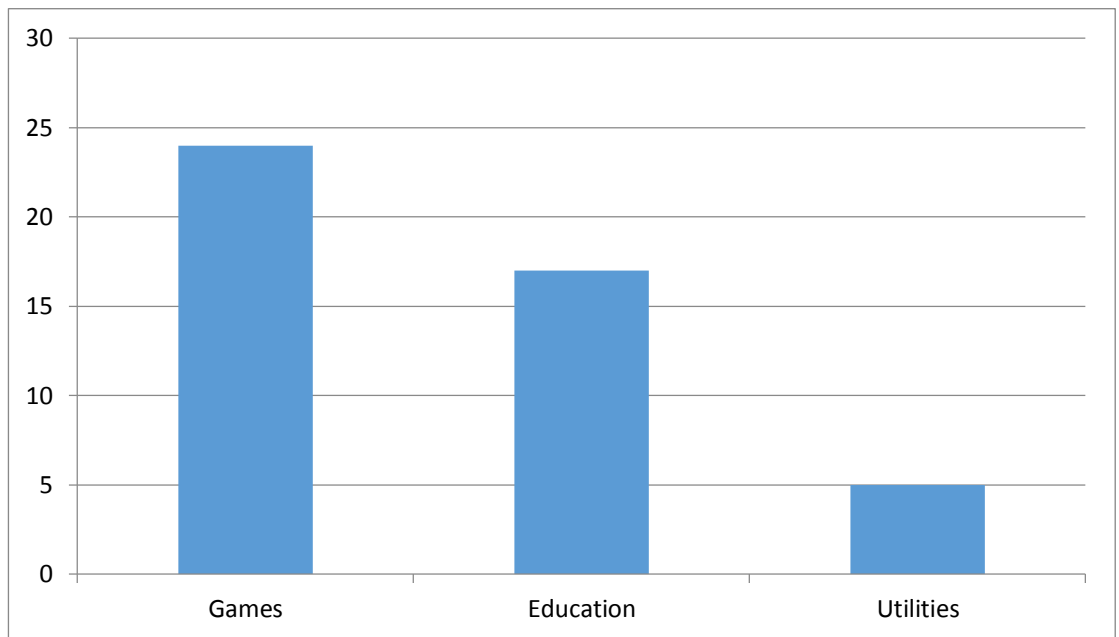


Figure 20: Graph Results for Question 9

Question 10: Do you think mobile learning is feasible?

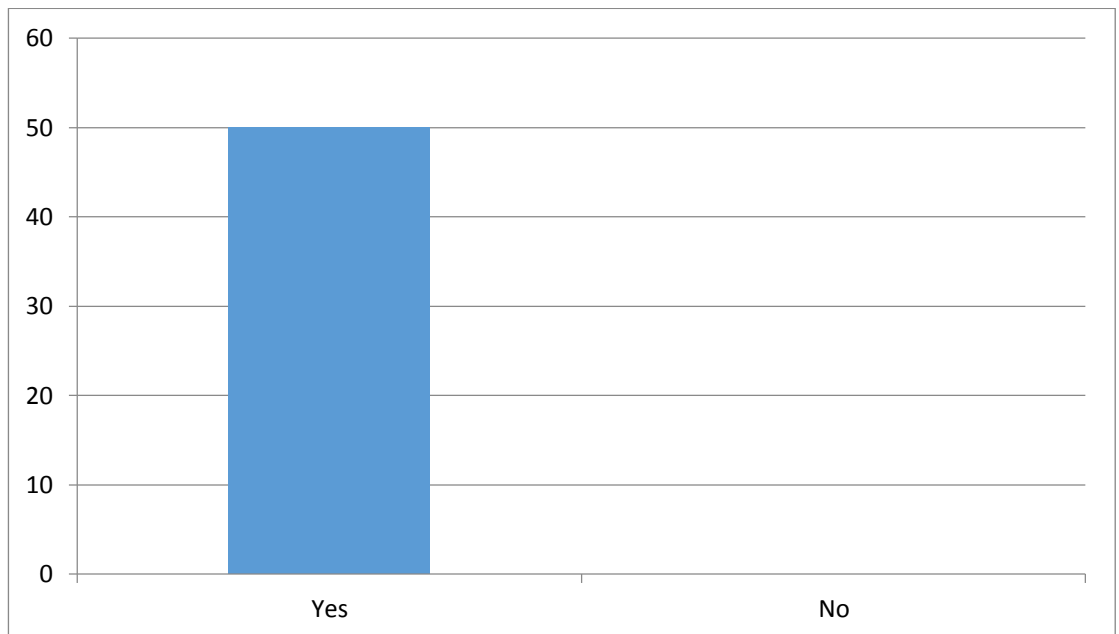


Figure 21: Graph Results for Question 10

Based on the results above, we can make the following conclusions:

- Human error is regarded as the major cause of road accidents in Malaysia.
- Most drivers managed to pass their driving test in a single attempt.
- Most road users do not own a DEC handbook anymore.
- Most road users have forgotten safety distance management.
- Not many road users know traffics hand signals.
- Most road users own a smartphones.
- Android is a popular choice of operating system among smartphone users.
- An average user uses his mobile device at an average rate of 4 to 5 hours a day.
- Most mobile users prefer android games than education based mobile application.

4.3 System Modeling

4.3.1 System Flowchart

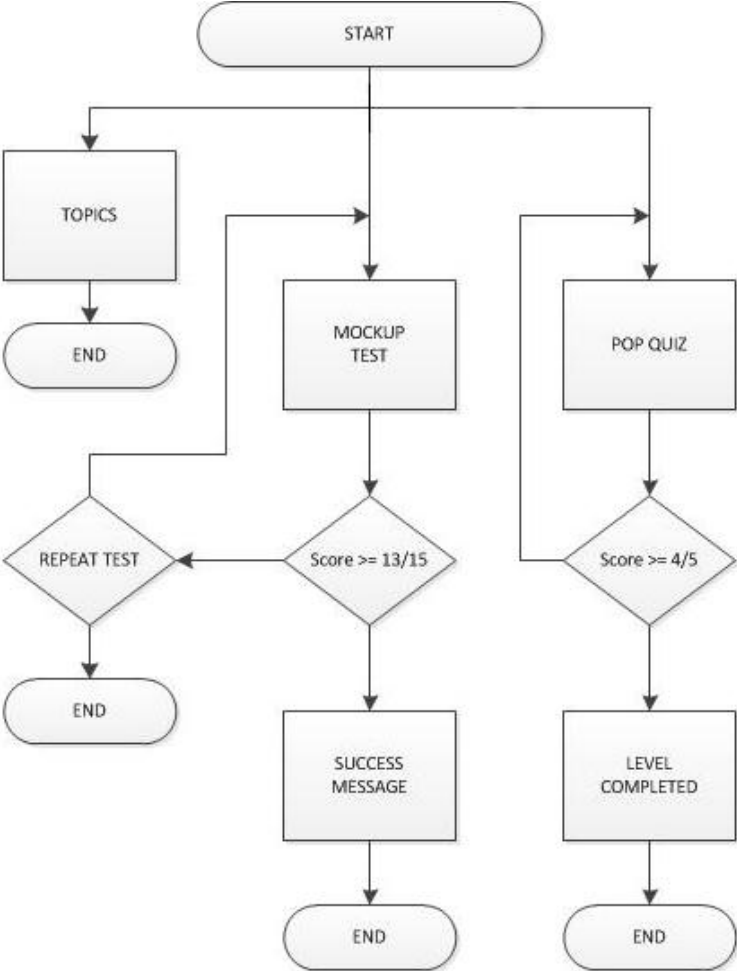


Figure 22: System Flowchart

Figure 22 depicts the system flowchart of the proposed application. When a user starts the application, he or she will be given three options to choose which comprise of theory topics, mock up test and mini game. The theory part is mainly text and images covering various chapters from the Driver's Education Curriculum. The mockup test currently has 15 questions and user needs to score at least 13 out of 15 in order to pass the test. Next, the mini game feature enables user to play a simple level based game whereby he or she must complete level 1 to unlock level 2. If the user provides a wrong answer, the phone will eventually vibrate.

4.3.2 System Use Case Diagram

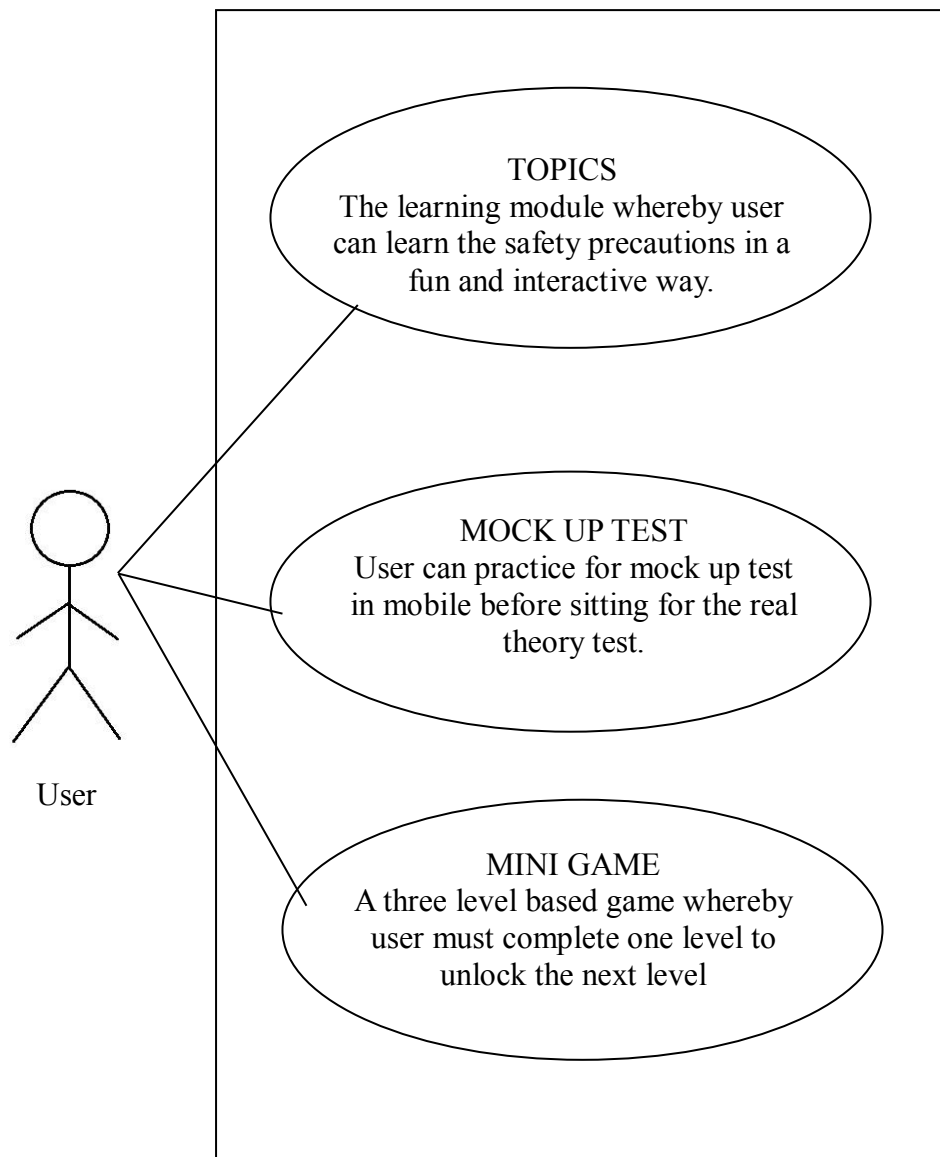


Figure 23: System Use Case Diagram

Figure 23 above show the system use case diagram for the mobile application. Use case diagram is a typical diagram that comprises a list of steps or features defining the interaction between a human and the system to achieve a goal.

4.4 Project Deliverables

The project is completed. The basic features are already available which are topics, mini game and mock up test. The following figures are some of the screenshots from the application.

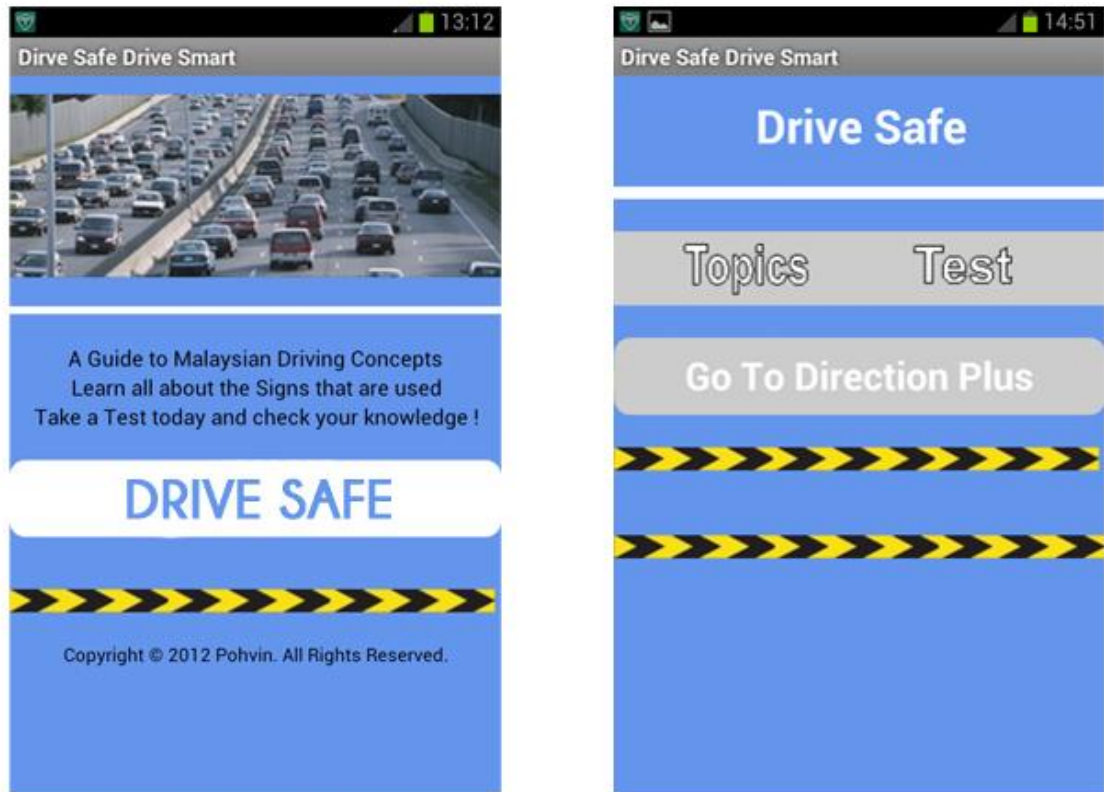


Figure 24 & 25: Home Page and Main Page

The application's graphical user interface has very minimal graphic design. Focus is given more towards functionality. Figure 24 above show the home page or the landing page when a user executes the program. The user will be navigated to main page from there. Here, he or she can choose from two options; topics or test.



Figure 26 & 27: Topic Page and Traffic Sign Page

If user chooses topics in the main page, he will be directed to topics page as shown figure 26 above. Under this page, there are currently three major topics such as traffic signs, hand signals, road markings. Figure 27 shows the traffic sign page where user can view a number frequently displayed traffic sign boards on the road.



Figure 28 & 29: Hand Signal and Road Marking Page

Figure above shows more content from the topics such as hand signals and road markings. More content is to be added in the future with animations.

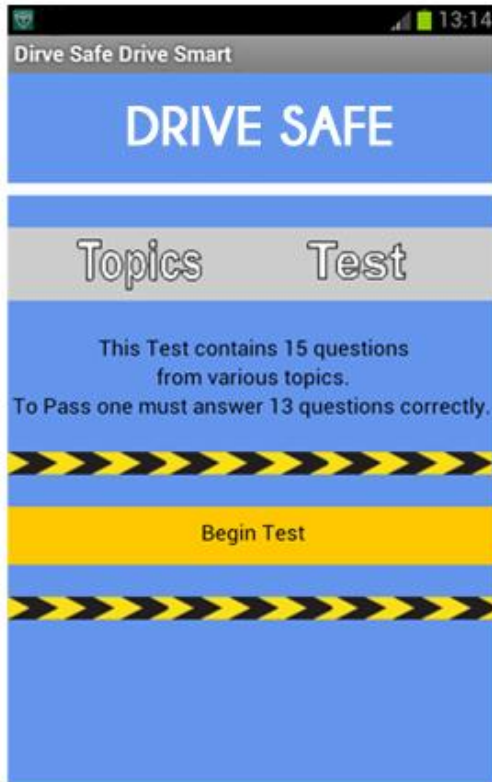


Figure 30 & 31: Mockup Test Page and Question Page

From the main page, if the user chooses on test option, then he or she will be directed to the begin test page. User will be given a short briefing and instruction on how the test will be conducted. Once test has begun, user needs to answer 13 out of 15 questions correctly in order to pass the test. There will be more questions added from time to time in the future.

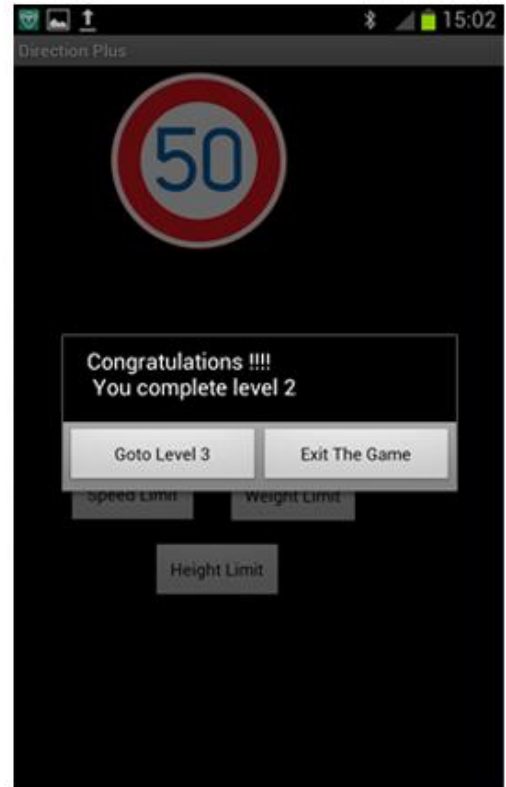
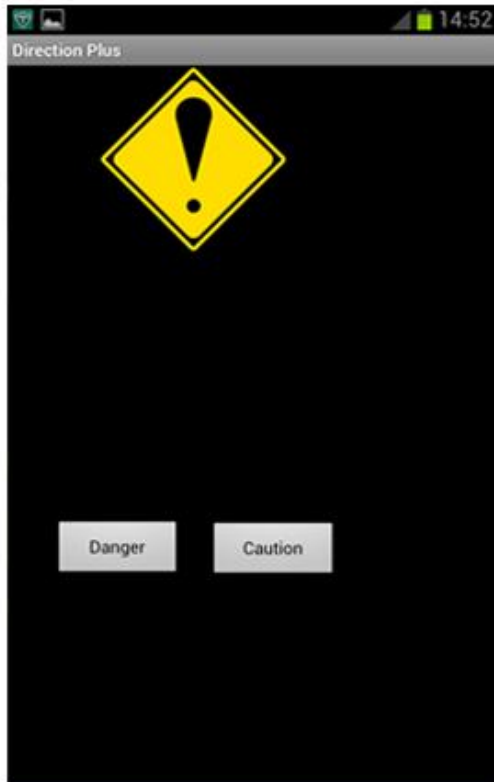


Figure 32 & 33: Mini Game Page

The two figures above shows the mini game page. The mini game is level based whereby the user must complete one level in order to pursue to the next level. Level based games are always an addiction as it causes user to perform numerous attempts in order to complete the levels. Indirectly, they are also learning experientially.

After the application is built, user testing has been performed to prove that the application could actually educate people through experiential learning. A simple test of 15 questions was distributed among 50 people from Universiti Teknologi PETRONAS and they were required to answer the test in 5 minutes. After that, the test papers are collected and each user is provided with 5 minutes to play around with the mobile application. Finally, the 50 users were required to retake the test of 15 questions. The difference of correct answer between the first test and the second test were then analyzed.

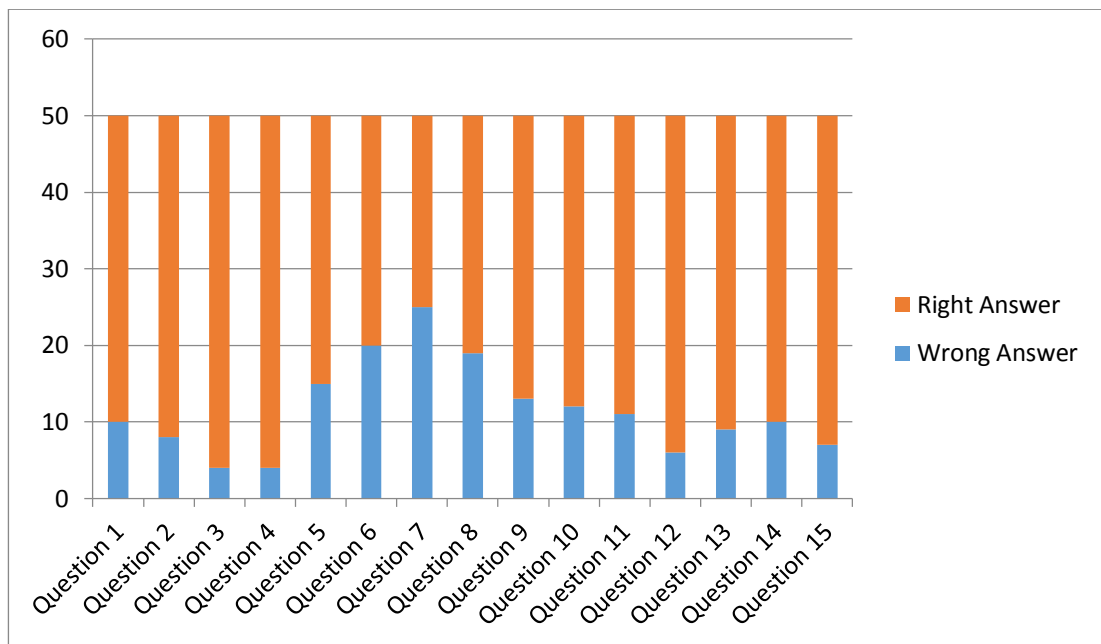


Figure 34: Test Results before Drive Safe

The graph above shows the number of right and wrong answer for each question from the test before each user is provided with a duration of time to play with the **Drive Safe** mobile application.

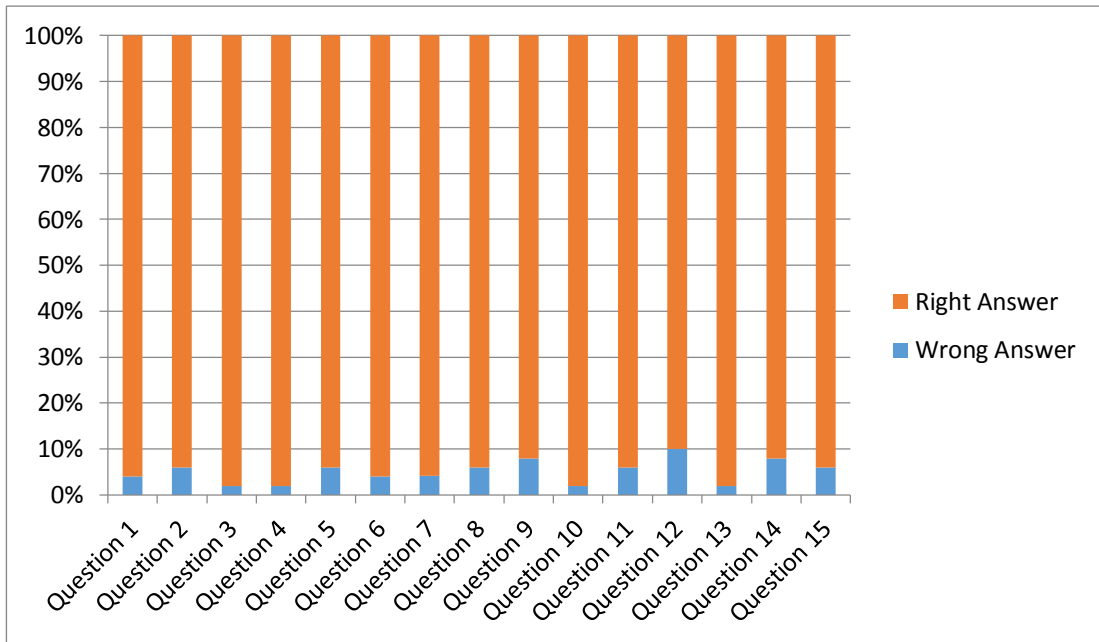


Figure 35: Test Results after Drive Safe

The graph above shows the number of right and wrong answers scored by each user after they had been provided a duration of five minutes to play around with **Drive Safe** mobile application.

By simply comparing the two graphs above, we can conclude that the 50 users managed to answer all the 15 questions better after using the **Drive Safe** mobile application. This graph proves that **Drive Safe** is an effective platform to educate people about road safety awareness. This also proves the experiential learning is a successful learning methodology for the next generation.

CHAPTER 5

CONCLUSION AND RECOMMENDATIONS

This project has highlighted the seriousness of road accidents in our country, Malaysia. It also highlighted that the major reason for road accidents are caused by human error and negligence. This project also revealed the lack of road safety awareness among Malaysians that leads to human error during road accidents. In pursuit of overcoming all these issues, this project aims to build a mobile platform that could educate people about road safety awareness. The author of this project hopes that the noble initiative of this project could be supported in order to make safer and better environment for road users.

The recommendation that the author would like to suggest are:

- The application will be uploaded to Google Play for all road users to download and install for free.
- The topic modules are revised and revamped so that there will be more animations instead of images.
- More questions added to the mock up test module.
- More levels added to the pop quiz module.

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Appendix

Drive Safe Mobile Application

A Mobile Application to Educate Road Safety Awareness

Ms. Goh Kim Nee
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Abstract

Drive Safe is a mobile application that aims to educate people about road safety awareness. It is built as a platform to nurture road users especially Malaysians to be more responsible on the road. Road accident has been acknowledged as the number one killer in Malaysia beating drugs and aids far way behind. People are dying more on the roads than anywhere else. The root cause for this situation is mainly because of human negligence. Malaysians are still lacking road safety awareness; if this can be put to an end, then definitely we are looking forward for a safer ride in the future.

In this project, the main purpose is to educate people on the importance of road safety awareness. The scope of this project is broad as it attempts to address not only vehicles drivers and motorcyclist, but all road users including cyclist and pedestrians. Nevertheless, this project is targeted to audiences who live in Malaysia only.

Therefore, the perceptions of all types of road users are hugely important in the development of this application. Rapid Application Development methodology is employed in this project, so that the features and functions implemented can be tested module by module.

Last but not least, this project also managed to come up with numerous interesting and yet important findings about road users in Malaysia. For example, most road users are unaware of the 12 second; which is designed to remind motorist that he or she needs room to slow down, stop or take evasive action if something happens on the road in front of them. Therefore, Drive Safe Mobile Application aims to educate people with those rules and regulations that are rarely heard by people such as 2 second rule, 4 second rule, do's and don'ts before and after drive and many more.

Keywords: road safety, awareness, road accidents, rapid application development

Acknowledgement

The author would like to express his sincere gratitude to his supervisor, Ms. Penny Goh Kim Nee, for being continuously supportive throughout this project. He also would like to thank the University for providing the best facilities to conduct the project. Besides that, he would like

to give credit to his parents, lecturers and friends who have the main source of inspiration and motivation. Thanks you so much also to all android developers around the world who have supportive in delivering this application. Last but not least, thank you so much also to everyone who has been directly or indirectly involved in the development of this wonderful mobile application. Thank you very much.

I. Introduction

Study has shown that the statistics of road accidents in Malaysia is increasing at an average rate of 9.7% per annum. Another interesting research has also proven that 90% of road accidents are caused by human error or negligence. Apparently, road accidents have been the number one killer in the country beating drugs, aids and health problem far way behind. More people are dying on the roads than anywhere else. This is definitely not good news; as it affects our country's productivity and economy in many ways.

Although various methods have been implemented to curb this issue, they seem to be ineffective. This is simply because the root of all cause remain untouched which is ignorance and negligence. In Malaysia specifically, people are lacking road safety awareness. Many people still do not know what are 2 second rule, 12 second rule and etc. Especially female drivers, they are still unaware of what are the dos and don'ts before and after driving. All these information are extremely vital in order to pursue a safe journey.

Therefore, **Drive Safe** is a mobile application that aims to solve this issue. Its vision is to create a safe and conducive driving environment for all road users and its mission is to educate people about road safety awareness. The mobile application does not only applicable for car drivers or motorcyclist, but also to overall road users including cyclist and pedestrians. **Drive Safe** has a genuine objective that each and every one of us regardless of age must educate ourselves with sufficient information about road safety. That is why **Drive Safe** will benefit a range of people from kids to adults.

A. Problem Statement

Innovations would be meaningless if they do not help to solve a problem. In this project, **Drive Safe** aims to overcome a number of issues as stated below:

- The number of road accidents is increasing constantly per annum.
- Malaysians are lacking road safety education.
- The main cause of road accidents is human errors.
- The only source of road safety education that we have is the Malaysian Driver's Education Curriculum handbook which is thick and boring.

As mentioned in the previous section, the number of road accidents is increasing and whether we like it or not, the root cause is human error or negligence. This is because Malaysians are lacking road safety education. Getting a driving license is pretty easy as all we need to do is to attend a few hours of lectures, 1 hour of theory test, and a few days of training and finally the practical test. The question is that are these modules sufficient enough to certify that a person is matured and qualified enough to drive on the road.

Apart from that, the only source of road safety education that we have is the Malaysian Driver's Education Curriculum handbook which we would use them as reference to score the theory test. After passing, the book will be forgotten. The objective of the book is not achieved. Hence, **Drive Safe** is needed as a substitute to provide a better, interactive and sustainable platform to educate people about road safety awareness.

B. Objective

The objectives of this project are as stated below:

- To develop a mobile application that could increase the road safety awareness among Malaysian road users.
- To develop a fun and interactive learning platform for road users to educate themselves on road safety awareness.
- To produce more matured and qualified drivers on the road for a safer and conducive drive in the future.

C. Scope of Study

This project requires plenty of research on the awareness level of Malaysian road users about road safety features. This can only be done through surveys, questionnaires and interviews with different type of road users such as motorcyclist, car drivers, heavy vehicle drivers, cyclist and even pedestrian. All these information are vital for the development of the mobile application so that it has a clearer and precise idea on which issues to be tackled first. For example, a car driver wouldn't know why a motorcyclist in front of him is waving his hand up and down; which means he or she is intending to slow down or stop. After obtaining all these information, the learning

modules are created to educate them. Simple games are built within the application to create a fun and interactive learning platform for users. Finally, testing and debugging are required continuously to have the features to function properly.

II. Literature Review

A. Road Safety Situation in Malaysia

Road safety has always been considered as one of the most important social responsibilities of the Malaysian government. Various agencies and voluntary organizations are formed within the government to help to look over this matter. Hence, a National Road Safety Plan was formulated which aims to provide road safety research programs, behavioral modification of road users, road engineering and vehicle safety, medical treatment and safety administration.

This research paper which is prepared by the Highway Planning Unit from Road Safety Section under the Ministry of Works, it has touched various aspects of current road safety situations in Malaysia such as road accident statistics, national road safety target and strategies to reduce road accidents. The author of this research paper has also expressed his concern about the statistics of road accidents in Malaysia that have been increasing at an average rate of 9.7% per annum.

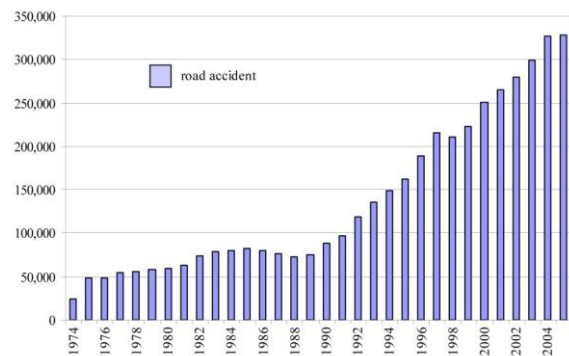


Figure 1: Statistics of Road Accidents in Malaysia (2005)

The Cabinet Committee of Road Safety which was formed in the year 1990 holds the responsibility to formulate a national road safety target in reducing this statistics. In engineering point of view, there are a few factors that highly contributes to the number of accidents in the country such as combination of traffic composition, improper intersection design, provision of street lighting, high traffic volume, provision of pedestrian crossing, signal light, vehicle speed and etc. It is clear that human error factor is the main contributor here.

However, the counter measurements that are taken to curb this issue are still concentrated on improving the external factors and not internal factors. More focus is given in improving lighting and road system. More budgets has been allocated to build observation towers and to fix cameras. Although the initiative is noble and would help to

reduce the statistics, we still have not touch the root cause yet, which is human negligence. A proper road safety education needs to be implemented in producing matured and qualified drivers on road.

B. Human Error Accounts for Road Accidents

An interesting online journal was featured in the Alert Driving magazine entitled “Human Error Accounts for 90% of Road Accidents” which was written by Olivia Olarte. Alert Driving is web based company that concentrates on the driver’s risk management all around the world. The author stated that 90 percent of road accidents are caused by human error and we therefore have to focus on people in all road safety programs.

The mission is simple; that is to increase the ability of road users to act in accordance with the needs of the environment. Therefore, the key word here is to focus on the human element which is to stimulate good driving ethics among road users. In this context, human error is not only defined as bad driving behavior such as driving in the influence of alcohol, changing lanes without signal, over speeding and passing through red lights, but also covers various aspects like the dos and don’ts before and after driving, precautionary rules like the 2 second rule, 4 second rule and the 12 second rule. Although they seem to be not significant, they play a vital role in ensuring that a driver reaches his or her destination safe and sound.

In this journal, the author also stated that summoning a driver for breaking rules may not be the best option for a long term. He or she is still going to repeat the same mistake. This initiative is best effective for low and middle income drivers who clearly do not want to spend their not so lucrative income on paying fines. However, for those who are affordable, summon will be simply useless. If the main objective of summons is to teach drivers a lesson, then the objective is definitely a failure.

Therefore, the only way to instill good driving ethics among Malaysian road users is by emphasizing on road safety awareness. They need to be responsible on the road towards themselves and other road users as well. The significant tool is to reach the hearts and lifestyle of all road users especially the young people through the use of technology and nurture them to be a responsible road user. The technology could be social media or even mobile applications since smartphones have been growing rapidly among young people.

C. Driver’s Education Curriculum

The Driver’s Education Curriculum (DEC) was formulated to help drivers and road users to master the aspects of safety, rules and regulations that need to be practiced while on the road. The curriculum has a noble aim that is to produce road users who are knowledgeable, skillful, cautious and competent, and practice good values when they are on the road to ensure a safe and conducive environment for all road users.

This handbook is normally provided for driving school student so that they could revise the content of the book

which will be helpful for them to pass the driving theory test later. The handbook contains seven chapters altogether and each chapter has a few sections. The handbook basically covers various aspects of road safety such as Highway Code, traffic signs, concept of defensive driving, types of obstacles, driving in an emergency, health and safety, stress management, driving offences and penalties, maintaining distance technique and many more. In other word, this handbook can be considered as the holy book for all road users. Although it is totally impossible to remember all the content in this handbook, there are many important aspects that can be emphasized to road users such as the distance technique. Not many people are aware of this technique despite its importance in avoiding accidents from happening.

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A common road user would probably absorb 30 to 40 percent of the information contained in the handbook which is actually used to pass the theory test. Unfortunately, after years, the percentage will eventually reduce. This is simply because the handbook is thick and boring. Scientist has found out that people only remember 10 percent of what they read, 20 percent of what they hear and 30 percent of what they see. Likewise, the handbook only covers the three aspects above; read, hear and see. However, this percentage can be increased further if we could add interaction between the human and the content of this particular handbook because people can remember 90% percent of what they experience.

The term is called experiential learning which is defined as making meaning from direct experience. A user needs to interact with the information provided and not just read or hear or see. He or she must be able to give inputs and receive outputs from the modules provided by the Driver’s Education Curriculum. Unfortunately, human cannot interact with books but they can with smartphones. Smartphones have been a growing technology nowadays to the extent that even young kids own a smartphone. If the process of learning can be embedded into smartphones, then definitely the end results would be much more convincing. Road safety awareness can be instilled among Malaysian road users through smartphone technology which will be far more effective than handbooks.

D. Learning via Mobile Devices

As smartphones and tablet devices are being popular nowadays around the world, many students and educators are using this technology as an approach to help supplement their daily academic activities. “College Professors Create Mobile Apps for Students”, this is definitely interesting news featured in the United State News and World Report LP on the 26th of October, 2012 written by Ryan Lytle. While the education system is flooded with thousands and thousands of cool applications, textbook companies are losing their business model and therefore they too have venture into mobile application development business. Their business model needs to be reengineered by turning textbooks into something mobile.

It is so cool that students can actually read text books through their mobile devices and the need of having an actual printed textbook is no longer viable. Well, looking at the landscape of textbooks, who actually wants to carry these heavy books everywhere when all these can be compressed and stored into a small yet sophisticated device call smartphone? It is the sense that students have something in their hands and they have immediate access to it for a very long time that a physical textbook could never offer. One significant feature of mobile applications that textbooks can never offer is the ability to update or make changes immediately.

Students benefit the most when they are able to engage with the content of the course which textbooks can never provide. Mobile application is the next biggest thing that has the potential to revolutionize the concept of learning and educating. It is cheap, portable, small and handy, interactive and yes it is incredibly smart. The process of learning could be fun and more effective through mobile application as user can interact with the devices. There will be inputs and outputs as well. This is what experiential learning is all about; making meaning from experience! Rather than just read, hear and see, user needs to do it with their own effort. Observe the end results and learn from that lesson.

III. Methodology

A. Software Process Model

The research methodology used in developing **Drive Safe** mobile application is the Rapid Application Development (RAD). The reason why this methodology is chosen is simply because Rapid Application Development uses minimal planning in favor of rapid prototyping. It basically involves methods like iterative development and software prototyping which would be very helpful in developing mobile application. The requirements of a mobile application are always changing and therefore a methodology such as this would be suitable whenever there is a need to redefine the specification of the mobile application.

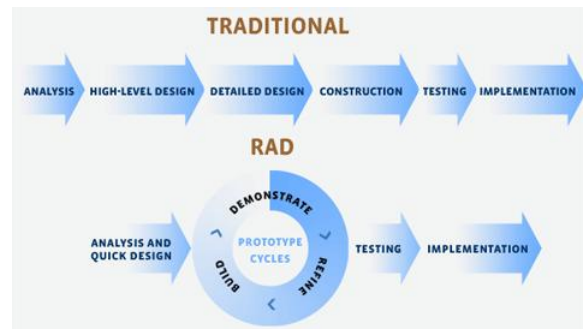


Figure 2: Rapid Application Development Software Cycle

Rapid Application Development is actually used to describe a software development process which was introduced by James Martin in 1991. His methodology involved iterative development and prototyping. This methodology may compromise in functionality and performance in the exchange of faster development phase. However, with proper planning, we could achieve great functionality in short time.

As mentioned earlier, **Drive Safe** is a mobile application that is aimed to educate people about road safety awareness. The requirements and specifications to build as such mobile application could not be permanent and they will be constantly redefined from time to time. Rapid Application Development would be the most suitable as we need fast and instant results.

The four phases involved in this methodology are requirement planning phase, user design phase, construction phase and finally cutover phase. Requirement planning phase involves the process of acquiring information such as business needs, project scope, constraints and system requirements. This phase ends when the development team agrees to the key issues and obtain green light from the authorities to continue. Next phase is the user design phase whereby users will interact with developers to come up with models or prototypes that represent all system processes and activities involved in the application. In constructive phase, tasks such as programming, coding, unit integration and system testing take place. Finally in the cutover phase, the final product will be released and ready for user training.

The main advantage of using this methodology is that it promotes strong collaborative atmosphere among the various stakeholders and dynamic gathering of requirements. Prototyping and system testing will be given high priority until the final product is released for use. However, the only drawback with this methodology is that any decision must be acknowledge by the whole team; which in this case, it would not be a problem as this is an individual project.

B. Tools Required

Tools required for the development of this application:

- Android Mobile
- Eclipse IDE
- Mobile Phone Driver
- MIT AppInventor
- Adobe Photoshop CS4

IV. Results and Discussion

The project is completed. The basic features are already available which are topics, mini game and mock up test. The following figures are some of the screenshots from the application.



Figure 3 & 4: Home Page and Main Page

The application's graphical user interface has very minimal graphic design. Focus is given more towards functionality. Figure 3 above show the home page or the landing page when a user executes the program. The user will be navigated to main page from there. Here, he or she can choose from two options; topics or test.



Figure 5 & 6: Topic Page and Traffic Sign Page

If user chooses topics in the main page, he will be directed to topics page as shown figure 5 above. Under this page, there are currently three major topics such as traffic signs, hand signals, road markings. Figure 6 shows the traffic sign page where user can view a number frequently displayed traffic sign boards on the road.



Figure 7 & 8: Hand Signal and Road Marking Page

Figure above shows more content from the topics such as hand signals and road markings. More content is to be added in the future with animations.

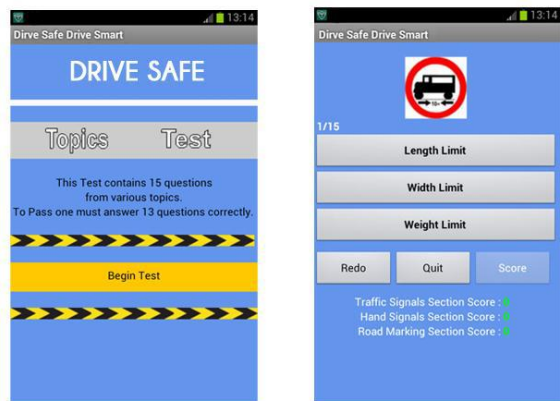


Figure 9 & 10: Mockup Test Page and Question Page

From the main page, if the user chooses on test option, then he or she will be directed to the begin test page. User will be given a short briefing and instruction on how the test will be conducted. Once test has begun, user needs to answer 13 out of 15 questions correctly in order to pass the test. There will be more questions added from time to time in the future.



Figure 11 & 12: Mini Game Page

The two figures above shows the mini game page. The mini game is level based whereby the user must complete one level in order to pursue to the next level. Level based games are always an addiction as it causes user to perform numerous attempts in order to complete the levels. Indirectly, they are also learning experientially.

After the application is built, user testing has been performed to prove that the application could actually educate people through experiential learning. A simple test of 15 questions was distributed among 50 people from Universiti Teknologi PETRONAS and they were required to answer the test in 5 minutes. After that, the test papers are collected and each user is provided with 5 minutes to play around with the mobile application. Finally, the 50 users were required to retake the test of 15 questions. The difference of correct answer between the first test and the second test were then analyzed.

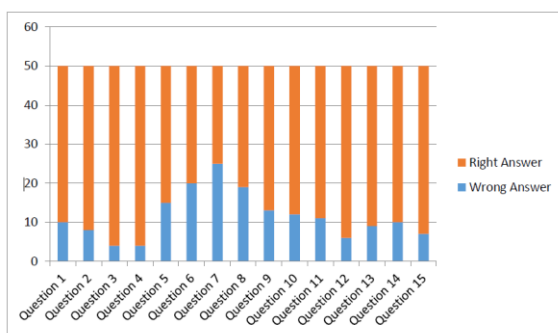


Figure 13: Test Results before Drive Safe

The graph above shows the number of right and wrong answer for each question from the test before each user is provided with a duration of time to play with the **Drive Safe** mobile application.

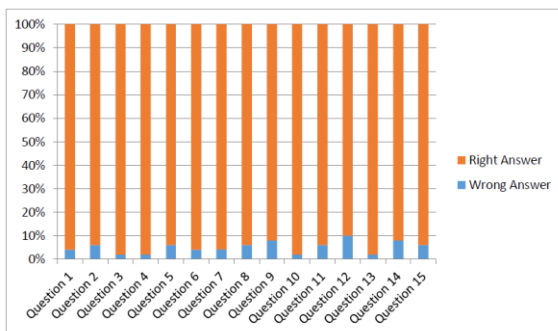


Figure 35: Test Results after Drive Safe

The graph above shows the number of right and wrong answers scored by each user after they had been provided a duration of five minutes to play around with **Drive Safe** mobile application.

By simply comparing the two graphs above, we can conclude that the 50 users managed to answer all the 15 questions better after using the **Drive Safe** mobile application. This graph proves that **Drive Safe** is an effective platform to educate people about road safety awareness. This also proves the experiential learning is a successful learning methodology for the next generation.

V. Conclusion and Recommendation

This project has highlighted the seriousness of road accidents in our country, Malaysia. It also highlighted that the major reason for road accidents are caused by human error and negligence. This project also revealed the lack of road safety awareness among Malaysians that leads to human error during road accidents. In pursuit of overcoming all these issues, this project aims to build a mobile platform that could educate people about road safety awareness. The author of this project hopes that the noble initiative of this project could be supported in order to make safer and better environment for road users.

The recommendation that the author would like to suggest are:

- 📱 The application will be uploaded to Google Play for all road users to download and install for free.
- 📱 The topic modules are revised and revamped so that there will be more animations instead of images.
- 📱 More questions added to the mock up test module.
- 📱 More levels added to the pop quiz module.

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