BLOOD SEEKER MOBILE APPLICATION

by

Muhammad Fitri Bin Mohamed Salleh
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Universiti Teknologi PETRONAS
Bandar Seri Iskandar
31750 Tronoh
Perak Darul Ridzuan

CERTIFICATION OF APPROVAL

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A project dissertation submitted to the
Information & Communication Technology Programme
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Approved by,

_____

(Dr. Helmi Md Rais)
Department of Computer Information Science
Universiti Teknologi PETRONAS

UNIVERSITI TEKNOLOGI PETRONAS
TRONOH, PERAK
MAY 2014

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 FITRI BIN MOHAMED SALLEH

ABSTRACT

This report discusses the research done on the chosen topic, which is Blood Seeker**.** This project shows that Blood Seeker is one of the technology methods for patients in Malaysia. The objectives of this project are to provide a platform for individual to search for blood request and also to save lives through a simple and quick blood donors search application. The problem statements of this project are difficult to locate blood donors with a certain blood types in a designated area and there is a huge gap between blood donors to interact between themselves in emergency situation The scope of study for this project is searching donors in immediate need of blood with the target users; android users. The literature review component talks about using mobile technology as method to improve healthcare sector are further discussed in detail. In the methodology section, it is discussed about the software development methodology applied in developing this project which is Rapid Application Development combine with Waterfall Model. The project phases are also being discussed in detail. The preliminary findings consist of the findings from literature review research and the storyboard of the Blood Seeker. In the recommendations section, all the related recommendations and some improvements that can be done for the future of this project are listed and elaborated. The conclusion section concludes the overall project.

ACKNOWLEDGEMENTS

"Praise to Allah, the most Gracious and the most Merciful''

Alhamdulillah praises to Allah for the strengths and guidance that He gave to me to overcome all the challenges and problems in completing my industrial internship program. My deepest gratitude also to Him because with His blessings I can complete my dissertation.

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Regards,
Muhammad Fitri Mohamed Salleh

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et al. And others

etc. Et cetera

CHAPTER 1

INTRODUCTION

1.1 Background of Study

An increasing demand for more blood has raised the concerned of the society especially those in healthcare setting to beg for more blood donors. In fact, most of the developed countries are unable to meet the demand of blood every day experienced a critical level of blood shortage. For instance, Argentina needs approximately 5,000 donors every day to save about 15,000 lives per day. Since it only be able to have 2,600 donors daily, the target has a long way to be met. Based on the statistics from World Health Organization (WHO), blood collection per year for most of the developing countries only capable to collect for about 45% of blood product annually. Even though there are aggressive efforts being done to boost the participation of the society to involve in blood donation, the amount of blood still has not achieve the required level. This scenario involves a life-threatening issue especially among those who need the blood such as those incurred in injury as well as cancer patients. If this "big" issue is not addressed properly, it may affect not only a country but the whole world population.

As in Malaysia, almost all states facing the difficulty to beg for blood donors, recognized by the Malaysian National Blood Centre. The problem is getting worse especially during the festive season. Since there is a serious blood shortage in the blood bank, accident victims who are in need of blood are not be able to be saved. A minimal participation from Malaysian citizens is recorded, even though blood donation activities are organized everywhere. This is really true in rural areas such as Perlis, the smallest state in Malaysia. This issue has created the need to understand the population and associate factors that can increase their motivation and willingness to be a blood donor, instead of waiting for volunteers. Thus, in light of the above discussion, this study is critical in order to identify and analyse the possible contributing factors to the intention to donate blood with an endeavour to seek for better blood donation program and promotion.

1.2 Problem Statements

The problem statements of this project are:

- It is difficult to locate blood donors with a certain blood types in a designated area.

- There is a huge gap between blood donors to interact between themselves in emergency situation

Thus, as a solution to counter these problems, Blood Seeker will be developed. As it is difficult in recruiting and retaining the next generation of blood donors, Blood Seeker is designed in attracting both new and repeat donors. In this case, smartphone application is the most suitable approach to be used as a platform for an emergency blood supply. Blood Seeker is an innovative mobile application that enables the user to find the blood donors with a specific blood type within certain miles of radius. It acts as the intermediate between the blood seeker and blood donors. Apart from that, donors can provide details of any blood donation events including location, organizer as well as date and time to notify the public. This can boost the participants in the campaign and increase the awareness of Malaysian citizens towards blood donation.

1.3 Objectives and Scope of Study

The objectives of this project are:

- To develop a mobile application which provides a platform for searching and locating blood donors within a certain mile

- To develop a mobile application that able to inform people the news of events and campaigns on blood donation around Malaysia

- To develop a mobile application that able to save lives through emergency blood request function

The scope of project is a boundary for the system. Blood Seeker Mobile Application is essential for anyone who wishes to tackle an emergency situation in which a blood donor is needed. It helps the user to search and locate the nearest donors in immediate need of blood by downloading the mobile application, signing up to it and use the Locate Donor function to find all the existing users around him. Once the registered users being shown, the user can send email to them, asking them to donate their blood at the venue that been agreed by both parties; searcher and donor. Hence, it also may provide accurate and reliable information about the timing and locations of blood donation events and campaigns

To optimize and make use of this latest invention as a platform to help others in saving lives, the targeted users for this mobile application are android user's aged between 18 years old to 60 years old.

1.4 Project Feasibility

The introduction of Blood Seeker into the community will bring the perception of blood donors into another whole new dimension. This mobile application is a key approach to utilize user access and making it more convenient for people to donate blood. Addressing the problems that donors perceive to be important will go long way to building donor loyalty and encouraging more regular donation.

-Technical and technological feasibility

Blood Seeker is built on android platform. Equipped with fusion table as cloud storage system, it can store data in larger size from any other android application using common server. Android phone or tablet is available in market and affordable. Android application is known for its user friendly features. To develop this mobile application, Eclipse ADT (Android Development Tools) being used and the programming code can be referred through open sources.

- Time

Blood Seeker Mobile Application is estimated to be completed within the timeframe since the time allocated for project development is 28 weeks, combination of Rapid Application Development (RAD) and Waterfall model was chosen as development

methodology consist of several stages; Analysis, Development, Integrating, Testing, Implementation and Documentation. RAD is a concept where the product can be developed faster and of higher quality due to the time constraint.

- Cost

Development of Blood Seeker by using RAD methodology will be able to reduce the cost. Eclipse ADT (Android Development Tools) will be used to develop the system. Referring to open source code, the developer can reduce the cost by eliminating consultancy services. To implement and debug this mobile application, author is required to use android smartphone to run the system which is affordable.

CHAPTER 2

LITERATURE REVIEW

2.1 Understanding Technology in Healthcare

2.1.1 Mobile Technology

Changes of devices from electronic address books to powerful tools with wireless network connectivity has demonstrate the advancement in mobile technology. Kundu (2000) found out that mobile technology has the capacity of accessing Internet, sending and receiving email/text messages and functioning as information repository and this was related to healthcare industry. In a simpler term, current technology provides access to a wealth of medical information.

Portability, easy to access to data, user friendly, ease of data entry and sharing are the main strengths in handheld technology area of implementation, whether medical or otherwise. Lopez, I.M (2011), found that mobile application is crucial in a healthy way as it delivers actions to users anytime and anywhere. Mobile applications are able to offer that constant feature as users carry their smart phone everywhere which gives mobile application a positive effect on user trying to keep a healthy lifestyle.

Mobile application allows user to know what they need to achieve and will also track and record the user's performance so that users are to know current progress. Feedback is a positive reinforcement one that can be given by a mobile application.

2.1.2 Impact of Mobile Technology

The technology has been applied even in other fields apart from medical sector. Zanzueta (2005) pointed out trends in application of advanced mobile technology and the use of mobile technology in agricultural records and programmes.

A better software development tools and broad based with wireless networks mainly contribute to the convergence of mobile technology nowadays.

Mobile devices are a revolution as it has become an object or a tool used in our daily life use for communication purposes and to access information. Data and information can be received “anywhere”, “anytime”, and by “anyone” because of the combination of mobile devices, third generation wireless services with multimedia capabilities, and Internet and portal technology. The needs to retrieve data increases proportionally with the ability to retrieve data. Hence, it will result in application being built just to cater to those needs thus having positive effect on the community as a whole.

A lot of successful projects in health sector where mobile technology was used as the main tool to collect, process and manage medical information in a professional manner. In Tanzania, mobile application being introduced to manage medical information in a collecting drug usage, track adverse reactions, track stock balances and other pharmaceutical data. Meanwhile, handheld technology has been used successfully to collect data related to programme management at reproductive health in Bangladesh.

	Percentage of hand phone users		
	2010	2011	2012
Smartphone	14.0	12.0	26.0
Feature phone	86.0	87.3	74.0
Don’t Know	-	0.7	-

Figure 1: Percentage of Hand Phone users in Malaysia

Without exception, Malaysia is one of the countries riding the wave of telecommunication evolution. With the sheer size of smartphone market, it influences the economic growth in a country and provides job opportunities in the economic chain. Times have changed and today's clinicians now can do everything with a smartphone, from chatting with colleagues to pulling up medical records to locating needed supplies.

2.1.3 Android as Leading Mobile Operating System

Android is open source and Google releases the code under the Apache License. This open-source code and permissive licensing allows the software to be freely modified and distributed by device manufacturers, wireless bearer and buff developers. Moreover, Android has a large community of applications developers that extend the usage of devices, written primarily in a customized version of the Java programming language. In October 2012, there were huge a number of apps available for Android, and the approximation number of applications downloaded from Google Play, Android's primary app store, was 25 billion. A developer survey conducted in April–May 2013 found that Android is the most popular platform for developers, used by 71% of the mobile developer population.

Android is software for mobile devices that has operating system, middleware and key applications. The architecture of the Android is like a stack with Application being the top layer and Linux Kernel being the bottom layer of the Android. Core applications of Android include email client, SMS program, calendar, maps, browsers and contacts which are mostly text input based.

Smart phone market will record a growth rate four times faster than the overall mobile phone market, based on the International Data Corporation (IDC) Worldwide Quarterly Mobile Phone Tracker. The growth of smart phone market is catalysed by the acceptance of consumers and enterprise users in turning their feature phones for smart phones with more advanced features. Below table shows that Android will have the biggest market share by 2015, which indicates that the needs for Android applications and games will increase.

Top Smartphone Operating Systems, Shipments, and Market Share, 2013 Q3 (Units in Millions)

Operating System	2Q13 Unit Shipments	2Q13 Market Share	2Q12 Unit Shipments	2Q12 Market Share	Year-over-Year Change
Android	187.4	79.3%	108	69.1%	73.5%
iOS	31.2	13.2%	26	16.6%	20.0%
Windows Phone	8.7	3.7%	4.9	3.1%	77.6%
BlackBerry OS	6.8	2.9%	7.7	4.9%	-11.7%
Linux	1.8	0.8%	2.8	1.8%	-35.7%
Symbian	0.5	0.2%	6.5	4.2%	-92.3%
Others	N/A	0.0%	0.3	0.2%	-100.0%
Total	**236.4**	**100.0%**	**156.2**	**100.0%**	**51.3%**

Source: IDC Worldwide Mobile Phone Tracker, August 7, 2013

Figure 2: Global Smartphone Operating System in Market Share

From the figure, we can see that the number of Android platform Smartphone will be more other OS in few years' time. Hence, there is a need of applications for and highly relevant to do project for Android OS Smartphone.

2.2 Blood Transfusion in Healthcare

Most of medical advancement nowadays have greater the medication of serious disease and injuries have risen the need for blood transfusion for patients endurance, to support them through recovery or to preserve their health. Surgery, trauma and cancers, for all of which there is a high probability of the need for blood transfusion, are replacing contagious disease as leading causes of decease.

Blood donation is a platform which imposes a cost to the individual but benefits others. Most blood is donated to be used in other individuals. Basically most donors simply want to help their fellow human beings and to have safety of supply. This basic motivation you cannot change, but other factors you can influence. In fact, Zainie (2012) stated that gender plays significant role in predicting the intention to donate blood in the population. An

individual who ever donated their blood previously have higher intention to donate blood again in the future compared to the individual that never donated their blood.

Although blood banks are account with preparing sufficient blood supplies, they have to content with a permanent shortage of blood. Even though many efforts in blood transfusion must be maintained, there is now also a need to develop plans to ensure that the blood supply is adequate to provide for ageing populations.

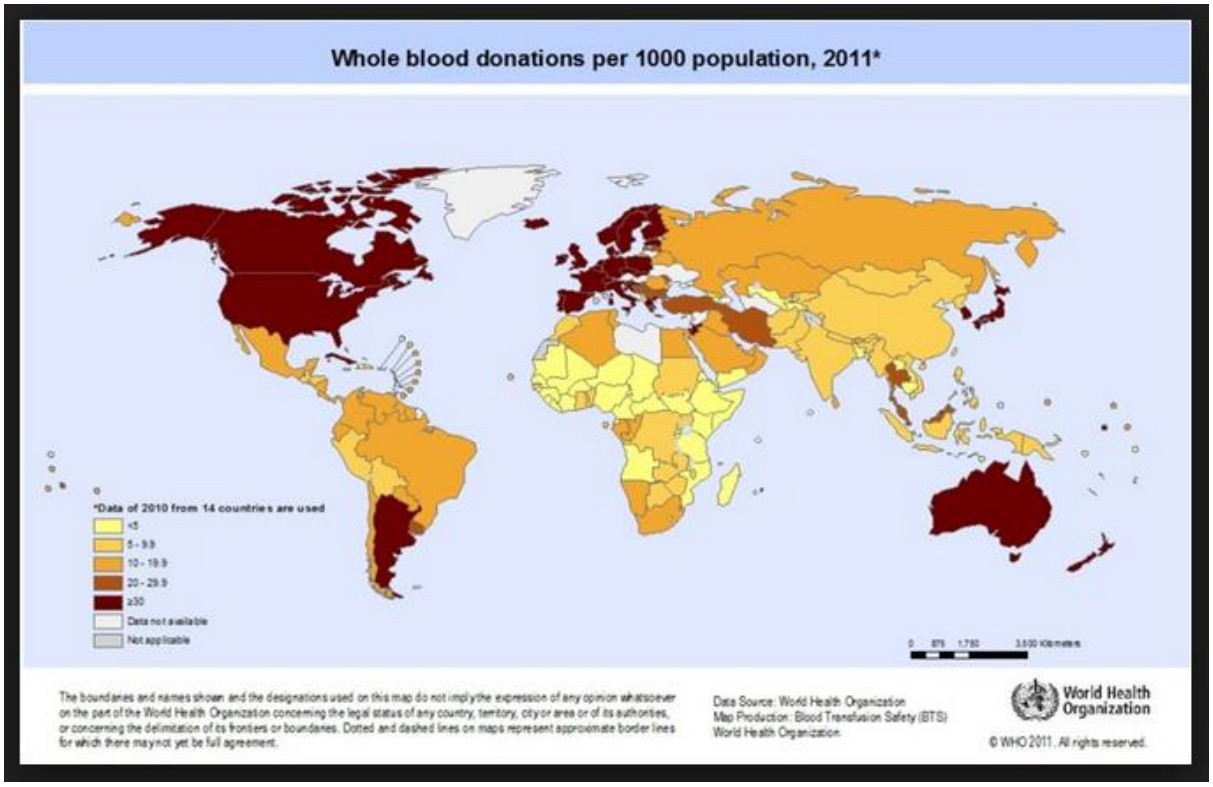


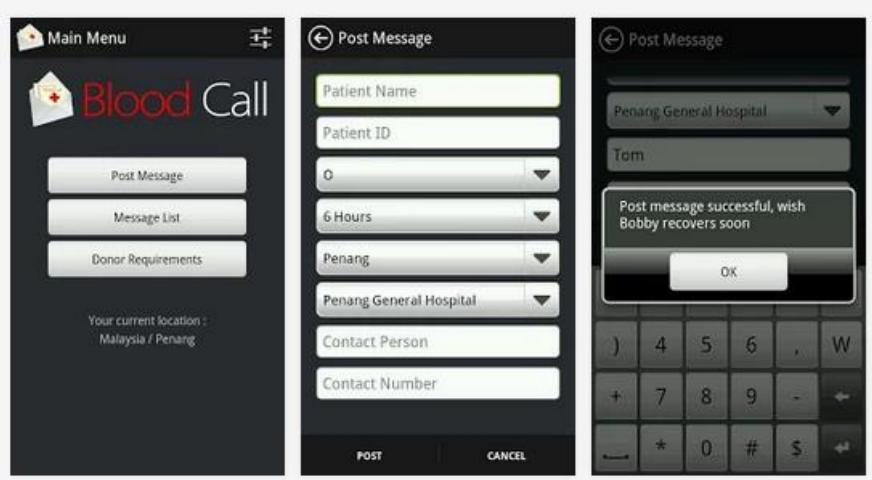
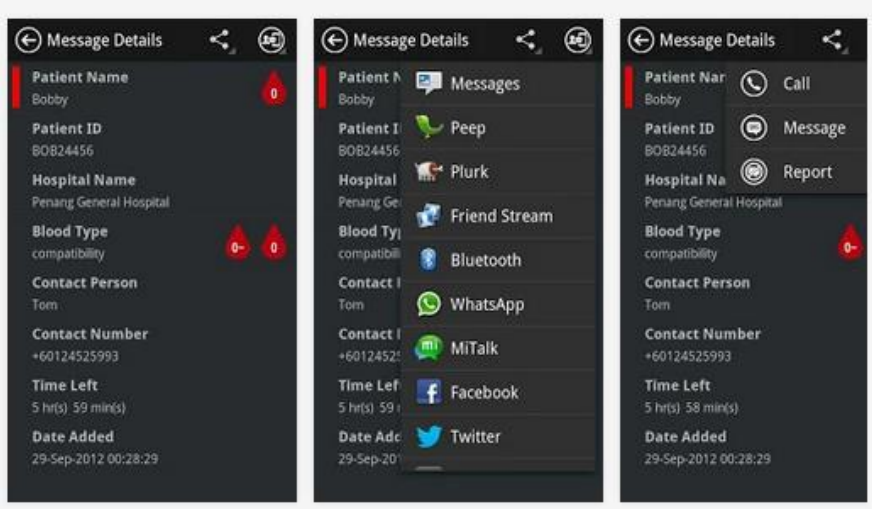
Figure 3: Whole Blood Donations per 1000 Population

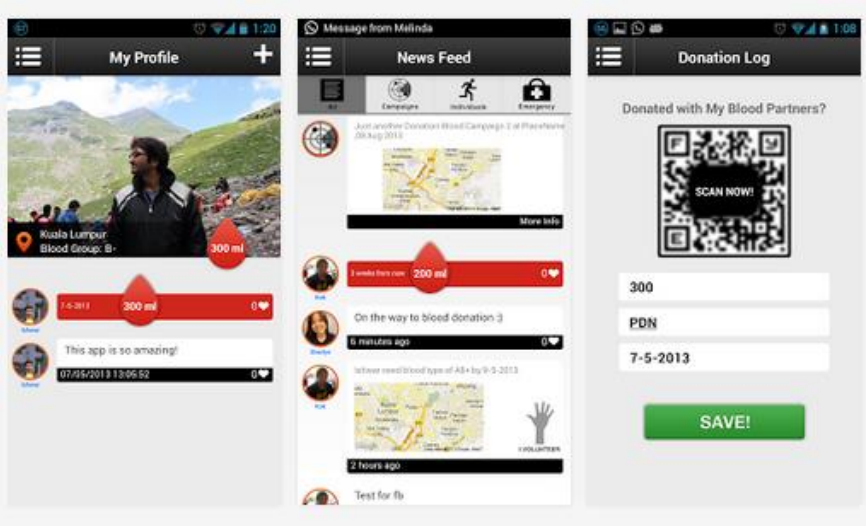
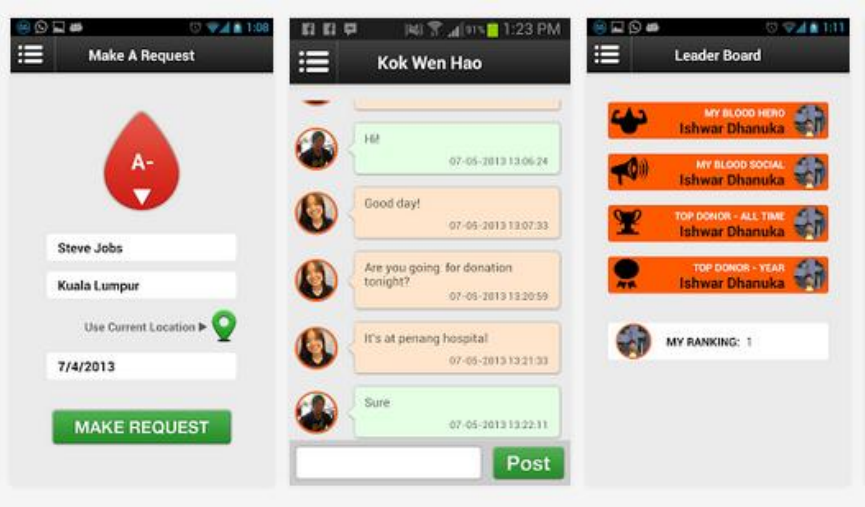
2.3 Existing Mobile or Web Application Related to Blood Donation

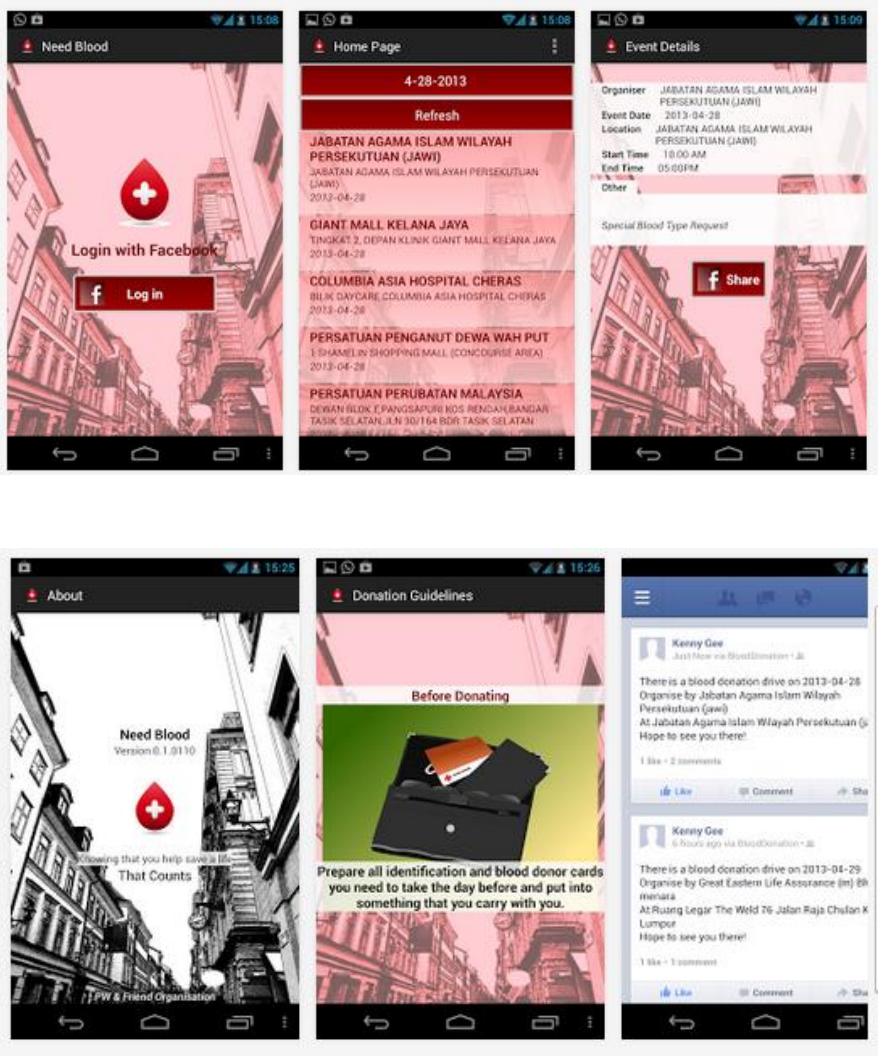
Hammound (2001) note that Information systems/Information Technology have played a central role in enabling organizations across segments to address many business challenges and achieve a lot of sustainable comparative advantage. Blood Seeker is a fast and simple tool for anyone who already is a blood donor or wants to become one. In case there is need of a blood donation, this is the easiest and fastest way to find a donor. Blood Seeker helps the user to find the blood donors who are all nearer to the user location. By using geographical position, user can locate blood donors. Surely, Blood Seeker has offered similar benefits to the blood donor.

Recipient can only communicate with registered donors and request them to make a donation using email as a platform communication. Furthermore, it is recipient responsibilities to provide donor the location of blood donation, patient ID, message, etc. However, providing recipients phone number is an optional and it is under their own risks.

Blood Seeker bridges the gap between an organizations and donors to facilitate innovation through mobile application development. This mobile application notifies users the schedules and location of every blood donation drives as published by National Blood Bank of Malaysia. Details such as location, organizing party, date and time are utmost imperative to notify the users on every available blood donation drives as the problem nowadays is the public is not well notified and informed of available blood donation drives.

Interface	Features of Application
 	**Blood Call** • Main Features; Post Message, Message List and Donor Requirements. • Strength; 1) Provide information in the shortest possible time to locate the patient's blood requirement. 2) Contact suitable blood donors as well as expanding the assistance network. • Weakness; 1) Only available in Malaysia. 2) Not available in Apple Store. Official Website: http://www.bloodcall.com.my/ Facebook: https://www.facebook.com/bloodcallapp

Interface	Features of Application
 	**MyBlood** • 7 Main Features; My Profile, News Feed, Donation Log, Make A Request, Instant Messaging, Leader Board and Donation Checklist • Strength; 1) Keeps you updated with latest campaigns by PDN, lets you request blood from fellow Malaysians. 2) Navigate yourself with your preferred GPS app or even Google Maps to the nearest camp. 3) Reminds you once you are eligible to donate blood after the time period has elapsed after a donation. • Weakness; 1) User needs to pay USD 0.99 to download this mobile application. 2) Only available in Malaysia Source: https://play.google.com/store/apps/details?id=com.droidconcept.myBlood

Interface	Features of Application
	**NeedBlood** • 4 Main Features; Eligibility Reminders, Social Media Sharing, Blood Drive Locator and Blood Bank News & Updates • Strength; 1) Users are able to track time between previous visits to the next one. 2) Users will be notified based on donation type. 3) Blood Drive Locator function shows nearest upcoming blood events. 4) Users can spread and share the words through Facebook and twitter easily. 5) Donors will be kept in the lube by receiving news updates through post and announcements. • Weakness; 1) This mobile application only available in Canada. Source: http://www.blooddonormobile.com/about/

CHAPTER 3

METHODOLOGY

3.1 Introduction

In developing Blood Seeker, the type of methodology to be used is a combination of Rapid Application Development (RAD) and Waterfall model. Since this project need to be completed within 7 months or 28 weeks, RAD is the most suitable method to develop the application. RAD is a concept where the product can be developed faster and of higher quality.

In this project, system testing is a crucial part in order to develop a working application. Hence, it is predicted to face a lot of difficulties, bugs and error during the development process. The developer will be able to find the issues, root causes of error and then fix the problem during the testing phase even though by using RAD as the type of methodology,

RAD could help in reducing the development cost of this project as it provides flexibility to completely develop the system within small budget allocation. To satisfy the needs of user in the future or improve the application's features, the developer needs to modify and enhance the application. Therefore, by applying RAD the developer can reduce the complexity of the system at the same time do the changes faster and more efficient.

By applying RAD in the development process, there are six main phases:

i. Analysis

ii. Development I & Development II

iii. Integrating

iv. Testing

v. Implementation

vi. Documentation

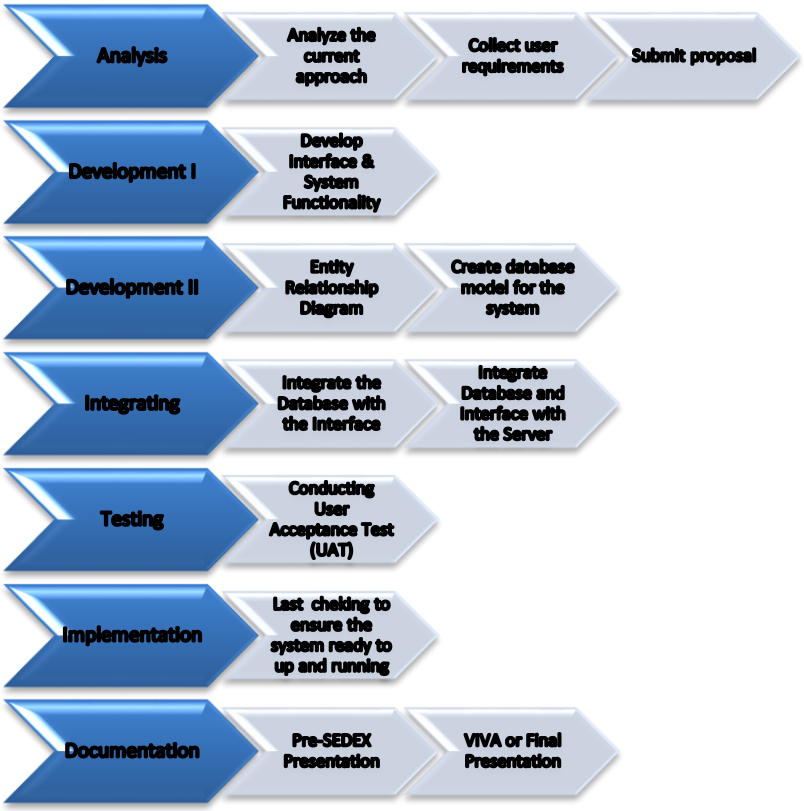


Figure 4: Combination of RAD and Waterfall Model in the Development of Blood Seeker Mobile Application

Some companies offer products that provide some or all of the tools for RAD software development. These products include requirements gathering tools, prototyping tools, computer-aided software engineering tools, language development environments such as those for the Java platform, groupware for communication among development members, and testing tools. RAD usually embraces object-oriented programming methodology, which inherently fosters software reuse. So RAD is very suitable for faster and higher development of application.

3.2 Project Phases

Phase 1: Requirement Analysis

The developer will analyse and discover the important features to be developed in the application. Process flow of the system will be discovered and draw. Before system designing phase take place, analysis is the crucial part. Thus, developer will be able to build the guide base for the next phase by knowing the important features required.

During this phase, the developer who created the design now generates code using the MIT App Inventor. End users also participate, validating screens and other aspects of the design as the application system is being built. Construction can be combined with user design into one phase when developing smaller systems.

- Outcome
    i. A definition of the system's scope
    ii. Several mobile application technologies being found
    iii. Functions in the Blood Seeker being finalised, which are Locate Donor, Nearby Campaign, Next Schedule, More info, Urgent Message and Setting.
    iv. Proposal being submitted to the Supervisor, Dr Helmi bin M Rais

Phase 2: Development I & II

There are 2 main difference between Development I and II. Development I focuses on interface such as designing and overall system functionalities. While Development II focuses on Database.

There are a lots of database software available in the market. However, the issue is to choose the base program to suit user's need. After considering request from users, the database program chose are MySQL and PHP. Besides, CSS and JavaScript are the programming languages used in developing the interface. This is an important step in program development. Designing the interface for user is very important in order to create a

user-friendly interface. A simple interface will enable the user to understand the program easily. In fact, they can easily know the correct information to be put into the database.

Another vital decision is to design the tables and columns for the database structure. Based on the observation and several references, the Entity Relationship Diagram for the database model is completed. So, the database model being presented to the several stakeholders resulting in major amendments being made to the system.

- Outcome
  i. Diagrams defining the interactions between process and data
  ii. Preliminary layout of screen
  iii. Prototypes of critical procedures
  iv. Entity Relationship Diagram
  v. The system builds using the MIT App Inventor

Phase 3: Integrating

Integration between the database model and the user interface is another important step in this program. During this time, the programming language chosen should integrate the user interface and the database model very well. Hence, the decision to use MySQL, PHP, HTML, JavaScript and CSS are perfect combination.

- Outcome
  i. Database and Interface integration planning

Phase 4: System Testing

The testing phase in Blood Seeker will be conducted by comparing the application with the current smart phone mobile application system. As per research conducted on the current system, there are some pros and cons. However, all blood donors' mobile application have some of similarities and also provide the same service. After designing and integrating

the interface and writing the programming language to prove that the system successful, the next step is to make sure that the program is working as per expected. Therefore, User Acceptance Test (UAT) will be held to test the functionalities of the system.

- Outcome
  i. Design has been finalized
  ii. The system builds using the MIT App Inventor
  iii. User Acceptance Test will be held

Phase 5: Implementation

The mobile application will be available in Google Play. Monitoring and maintaining the database system need to be done regularly. Monitoring will be focus on the performance of the system. If the system need improvement, so the developer would apply some possible improvement to the system so that it meets the required specifications.

- Outcome
  i. The new system been implemented

Phase 6: Documentation

Another step included in this phase is to prepare Interim Report, Dissertation, and Presentation. Thus, several presentation packs must be created to be examined by judges during presentation.

3.3 Gantt Chart\Project Timeline

A Gantt chart was created in the beginning, but after experiencing a number of unpredictable roadblocks, more rapid development model has been adapted in this project.

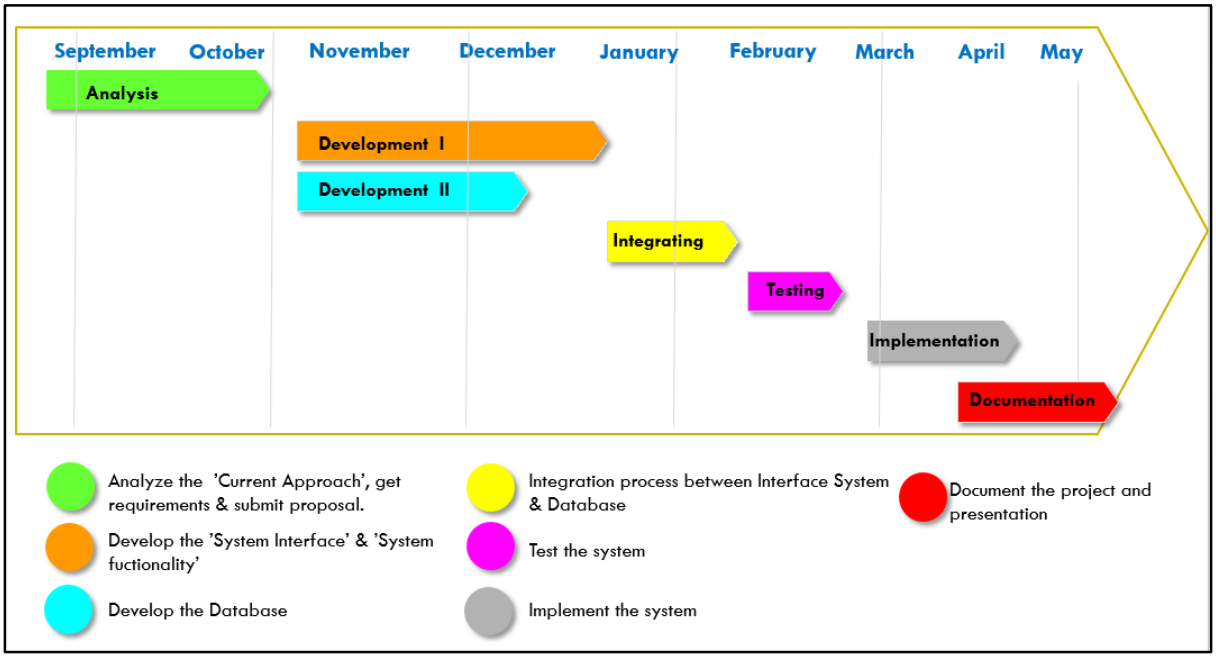


Figure 5: Gantt Chart/Project Timeline

3.4 Tools Required

To develop this project, there are several tools and requirements needs to be filling to run the system. The most fundamental one is personal computers with Windows platform, 1 GB RAM (minimum), 80 GB hard-disk space, including 115 MB of available space on the hard disk that contains the operating system. Other minimum requirement and tools required also being stated as follows:

Function	Tools
Research for suitable database program	• Google Chrome and books
Presentation of the implementation plan and ideas / presentation	• Microsoft Power Point 2010
Gantts Chart for project planning	• Microsoft Power Point 2010
Database Development and Interface Design	• MySQL, WampServer and JavaScript, Adobe Photoshop CS4, MIT App Inventor
Programming Language	• PHP, JavaScript, HTML and CSS
Documentation and report writing	• Microsoft Word 2010

Table 1: Software and Programming Language Used

CHAPTER 4

RESULT AND DISCUSSION

4.1 Data Collection and Research

4.1.1 Literature Review Findings

From literature review research, the findings are:

- The world is running out of blood supply where the demand of it still high.
- Cancer patients need blood from eight people every week.
- By using technology, there must be a way to get donors in an emergency case.
- In order to help patients search for blood donors, Blood Seeker Mobile Application will be a good solution.

4.1 Interview Findings from Medical Personal

Interview findings from En Khairul Anuar Mohd Nor, officer in charge for Hospital Besar Ipoh Blood Bank are as follows:

- Thousands of lives can be saved by enhancing healthcare sector, so that blood supply in the blood bank can be preserved, after blood donation campaign being held.
- The rarest and most needed type of blood coming from AB-. Even other types of blood is common, there is still a requirement.
- On average, Pusat Darah Negara (PDN) supplies about 400-500 pints of blood a day, equal to 3000 pints a week, which is the amount they need to have in reserve.
- Researchers have made some progress in making artificial blood, but it is still a long way to go.
- Blood has a lifespan and it is short between 20 to 30 days only.
- Blood Seeker Mobile Application would be useful especially for blood bank to search patient blood type easier and contact the donor immediately.

4.1.3 Online Survey Findings

Below are the findings based on online survey conducted earlier:

- 70% of the respondents are male and 30% are female.
- 63% of the respondents are aged between 18 – 25 years old.
- 79% of the respondents are students.
- 95% of the respondents using smartphone as their primary phone.
- 54% of the respondents using android as their operating system.
- 28% of the respondents never had experienced on blood donation while 72% of the respondents have given their blood.
- About 89% respondents choose does not have time to donate blood and do not know where to donate blood as their main obstacles.
- Approximately 81% of the respondents says that the reason behind why they donate blood is because to help people.
- 36% of the respondents aware on healthcare mobile application.
- 92% of the respondents agreed that Blood Seeker Mobile Application would bring healthcare industry to another dimension.
- 87% of the respondents willing to use Blood Seeker Mobile Application in the future.

4.2 Prototype

A prototype is an early sample or model built to test a concept or process or to act as a thing to be replicated or learned from. It is a term used in a variety of contexts including semantics, design, electronics, and software programming. Moreover, a prototype is designed to test and trial a new design to enhance precision by the system analysts and the users. Prototyping serves to provide specifications for a real, working system rather than a theoretical one [22]. Hence, the prototype for Blood Seeker Mobile Application and its' descriptions are provided below. Figures below show that when user enters the system.

Features:

4.2.1 Registration Page

A new user need to fill up the **registration page**, involving name, email, password, age, blood type, address, city, state, postal code and country. After the personal information being filled, a new user can enter the application and Menu Page will follow through. It access through the few details of the user for first time. Only users aged 18 and above can able to register as blood donor in the application

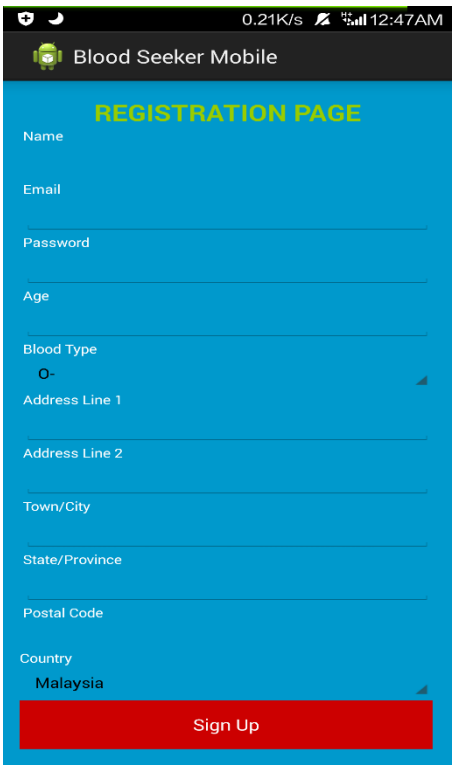


Figure 6: Blood Seeker Mobile Application on Registration Page

4.2.2 Menu Page

Menu page consisting of 4 buttons that will guide user to next page. Different type of activities will be displayed by each button in menu page. The buttons that available are ***Locate Donor***, ***Events/Campaigns***, ***Next Schedule*** and ***More Information***. By clicking on the "***Locate Donor***" button, the system will proceed to searching for donor page. While "***Events/Campaigns***" button consist of details on blood donation events and campaigns throughout Malaysia. "***Next Schedule***" function showing the next date a donor eligible to donate his blood based on his previous donation date and as for "***More Info***" button will display terms and regulation on blood donation and incentives they will gain from blood donation which hopefully can boost donor rates without compromising the safety of the blood supply.

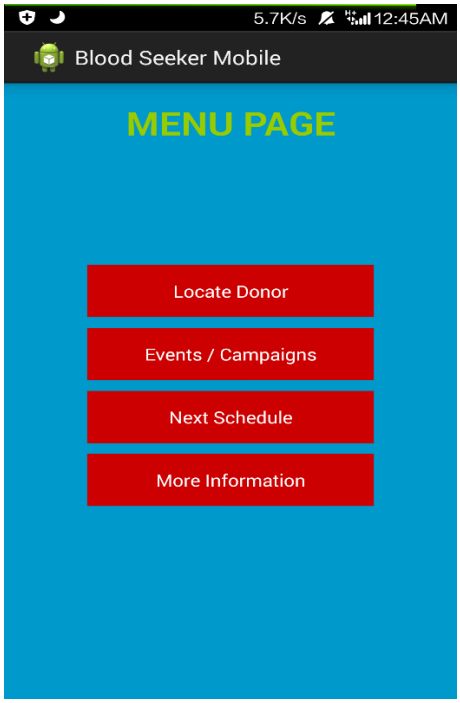


Figure 7: Blood Seeker Mobile Application on Menu Page

4.2.3 Locate Donor

If a user clicks on the ***Locate Donor***, the system will show the blood donors around him. The number of blood donor varies with the search radius being set in the function. The further the radius, the more no of blood donors being shown. Maximum radius of distance will be 100 kilometres. Besides, the user can insert the age of the donors around him, range between 18 to 60 years old. The type of blood group of A, B, AB and O also can be displayed by the function.

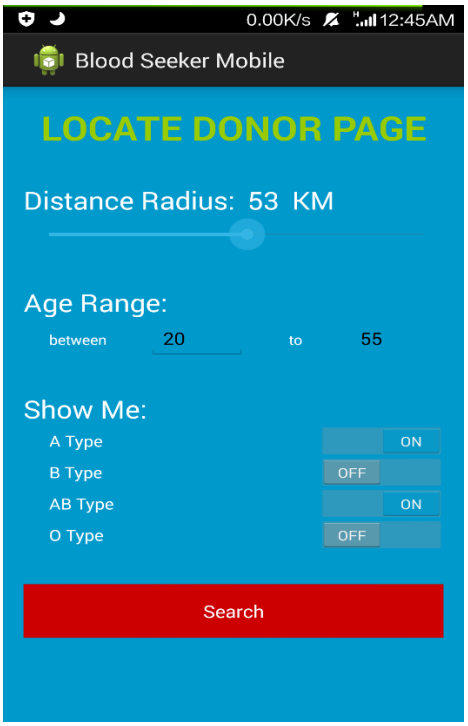


Figure 8: Blood Seeker Mobile Application on Searching for Donors

Figure 9: Blood Seeker Mobile Application on Locate Donors

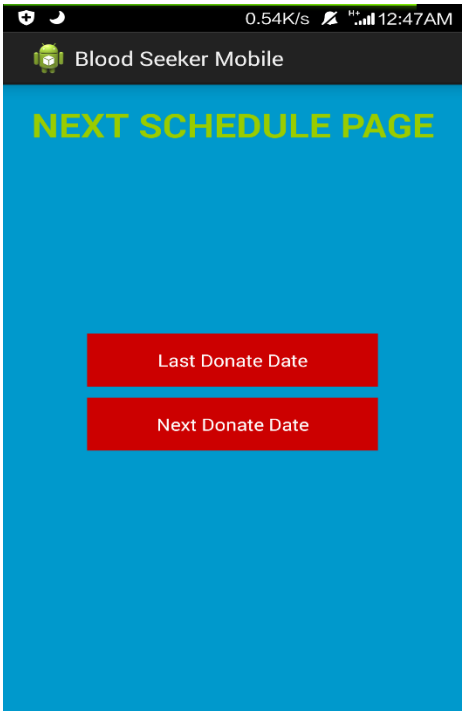
4.2.4 Events/Campaigns

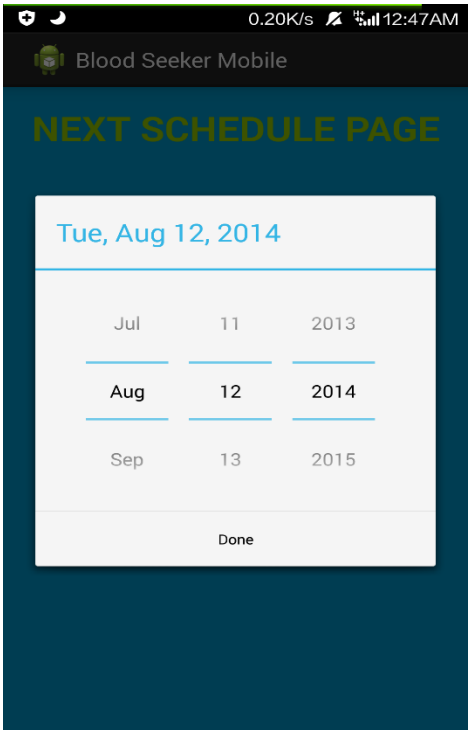
This feature will show the blood donation events/campaign for the user to attend. This function allows any users to search the information regarding blood donation events that available and need attentions. This precious information can be obtained on http://www.malaysiablooddonors.org and the function will synchronize with the latest schedule published by Malaysia National Blood Bank on the link above.

Figure 10: Blood Seeker on Blood Donation Events and Campaigns

4.2.5 Next Schedule

After a user donated his blood, he can predict when he will be eligible to donate his blood again, based on the date he insert to this function. Then the system will display the date he can donate his blood again, exactly 4 months from his previous donation date.


0.54K/s
12:47AM
Blood Seeker Mobile
NEXT SCHEDULE PAGE
Last Donate Date
Next Donate Date


0.20K/s
12:47AM
Blood Seeker Mobile
NEXT SCHEDULE PAGE
Tue, Aug 12, 2014
Jul 11 2013
Aug 12 2014
Sep 13 2015
Done

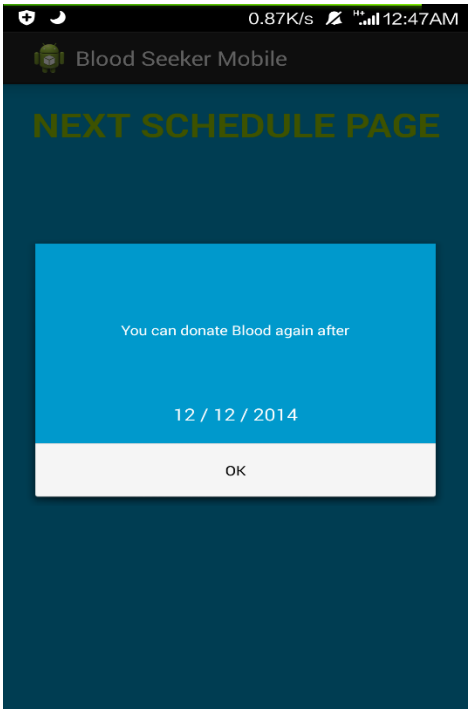
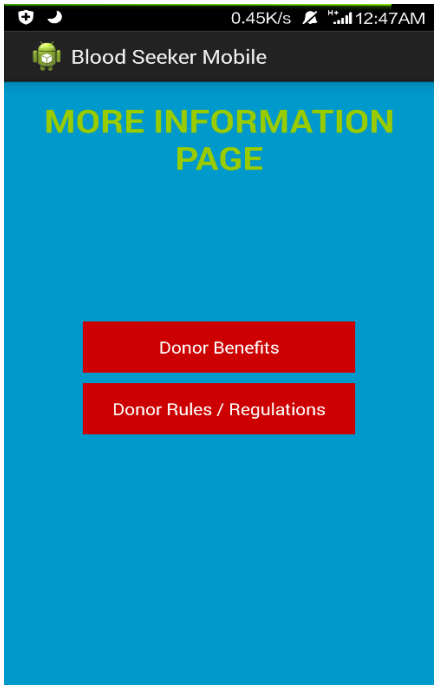
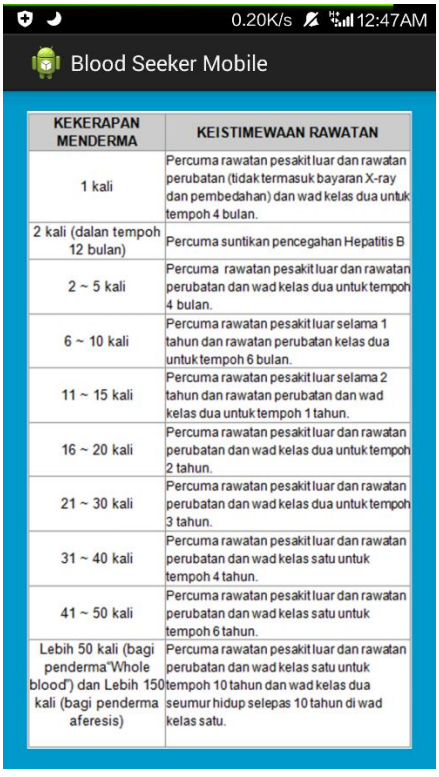


Figure 11: Blood Seeker Mobile Application on Next Schedule

4.2.6 More Info

More Info function will display 2 buttons, ***Donor Benefits*** as well as ***Donor Rules/Regulations.*** Donor Benefits are the incentives user can gain from the Ministry of Health which hopefully can boost donor rates without compromising the safety of the blood supply. In the meanwhile, Donor Rules/Regulations are the Do's and Don'ts to be a blood donor.





KEKERAPAN MENDERMA	KEISTIMEWAAN RAWATAN
1 kali	Percuma rawatan pesakit luar dan rawatan perubatan (tidak termasuk bayaran X-ray dan pembedahan) dan wad kelas dua untuk tempoh 4 bulan.
2 kali (dalan tempoh 12 bulan)	Percuma suntikan pencegahan Hepatitis B
2 ~ 5 kali	Percuma rawatan pesakit luar dan rawatan perubatan dan wad kelas dua untuk tempoh 4 bulan.
6 ~ 10 kali	Percuma rawatan pesakit luar selama 1 tahun dan rawatan perubatan kelas dua untuk tempoh 6 bulan.
11 ~ 15 kali	Percuma rawatan pesakit luar selama 2 tahun dan rawatan perubatan dan wad kelas dua untuk tempoh 1 tahun.
16 ~ 20 kali	Percuma rawatan pesakit luar dan rawatan perubatan dan wad kelas dua untuk tempoh 2 tahun.
21 ~ 30 kali	Percuma rawatan pesakit luar dan rawatan perubatan dan wad kelas dua untuk tempoh 3 tahun.
31 ~ 40 kali	Percuma rawatan pesakit luar dan rawatan perubatan dan wad kelas satu untuk tempoh 4 tahun.
41 ~ 50 kali	Percuma rawatan pesakit luar dan rawatan perubatan dan wad kelas satu untuk tempoh 6 tahun.
Lebih 50 kali (bagi penderma"Whole blood") dan Lebih 150 kali (bagi penderma aferesis)	Percuma rawatan pesakit luar dan rawatan perubatan dan wad kelas satu untuk tempoh 10 tahun dan wad kelas dua seumur hidup selepas 10 tahun di wad kelas satu.

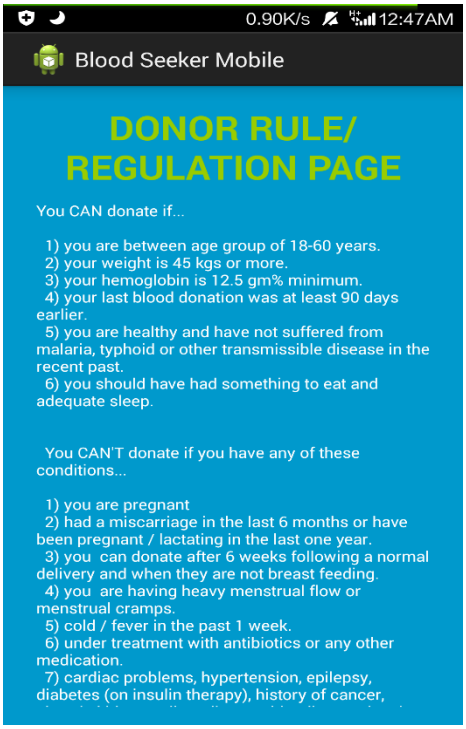


Figure 12: Blood Seeker Mobile Application on More Info

4.2.7 Urgent Message

If there are any families, relatives and friends having an accident while the nearest hospitals facing blood shortage issue, user can call upon any blood donors around him immediately. This function can help user to find blood donors whether A, B, AB and O type.

4.3 Testing

Testing and debugging are totally 2 different things. Developer should not be confused with both because testing involves a process of finding "unknown" errors while debugging is a process of removing "known" errors. The primary objective of testing is to find errors in an application, whether it satisfies the requirements and or performing other than expected. This might involve initial and actual output a developer might expect. In contrast, the objective of debugging is to identify the type and location of the "found" errors

and subsequently remove it by a re-definition, re-design or re-code, depending on the level of testing through which the errors were found.

For Blood Seeker Mobile Application, Unit Test, Integration Test, and Acceptance Test had been conducted by the developer. Unit Test is a process of testing the individual components in an application. It is done only by the programmers without involving testers, in order to ensure that the unit does not contradict with the system or application's internal specifications. Different units being tested in isolation simultaneously and it is performed during the development phase. By reviewing the code, database, requirements and design, the debugging tasks much easier as it only involves a single unit and when an error is found, the error should be located within that particular unit.

Besides, the incompatibility of the interfaces between the application's components can be tested via Integration Test. Testers and programmers worked together during this phase. This test involves design and architecture of the application to ensure the interfaces and linkages between different functions of the application work properly. Luckily, the interfaces of this Blood Seeker Mobile Application have passed its Unit Test.

Acceptance Test is done primarily by the end users to demonstrate the application is totally complete, meets the users' requirements and ready to be released. Therefore, developer had selected 41 testers whom have donated blood before. In order to have a complete Acceptance Test procedures, developer carried out three different phases.

Firstly, the general overview of the application being briefed by the developer to the testers. Then, the application being given to them so that it can be tested. After they were done conducting the testing, the developer will take note or jot down their suggestions or attitudes towards the tested application. Based on the result of the testing, the developer was be able to identify the usability of the application to them. Lastly, survey form as attached in the Appendix 2 being given by the developer to the testers which required them to fill in as a feedback about the application. For the betterment and improvement of Blood Seeker Mobile Application, all of the results being used and analysed. Below are the results of the testing.

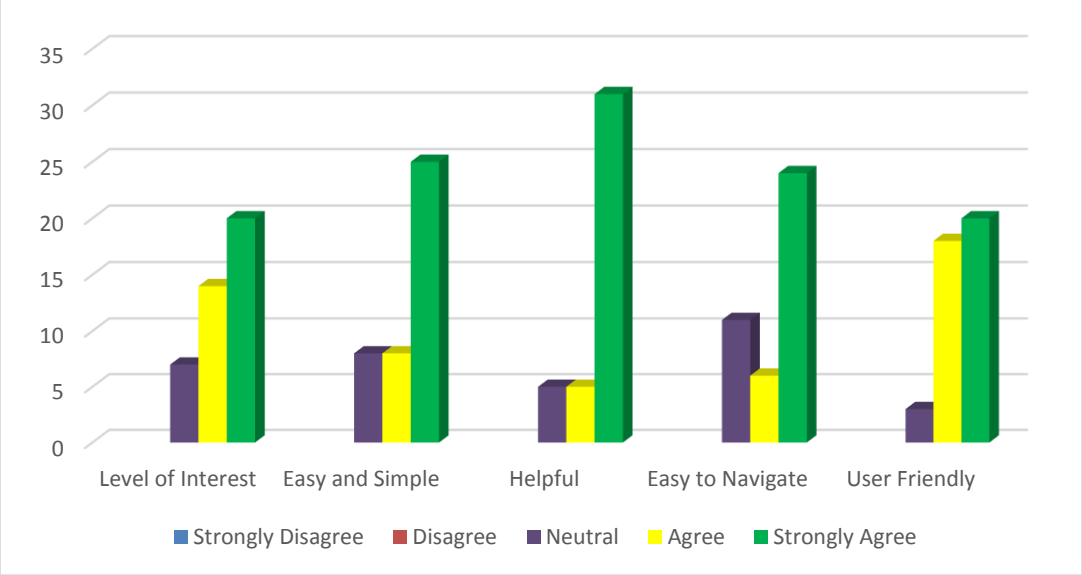


Figure 13: Users Application Feedback on Blood Seeker Mobile Application

Figure above shows 41 respondents taking part to test Blood Seeker Mobile Application. It can be concluded that they can use and accept the application very well, based on the user's participation in the activity. In fact, none of them withdraw from the activity and they follow the simple instruction given by the instructor. Moreover, the result also shows that all the users agreed that Blood Seeker Mobile Application is very helpful in order to find blood donor. More functions should be included in this application to attract more users, they added.

CHAPTER 5

RECOMMENDATION AND CONCLUSION

Based on author perspective, improvements can be made regarding this project via several recommendations. However, some factors must be put into considerations before proceeding with the development of the software so that the improvements in certain aspects can be done, instead of changing this project as a whole.

One of the recommendations is that a collaboration with any hospitals should be done, whether it is private hospital or even government. It is because by only giving out questionnaires and interviewing the end user make the data gathering process for this project is very limited. The main reason why because the data of blood donors are very confidential. So, by having collaboration, this obstacle can be overcame smoothly.

Besides that, the amount of time given should be extended because this system can truly contribute to money-making mobile application. To gauge how perfect the system can be within the time frame is very difficult because the requirements are so challenging. In fact, the development I and II phases being done quite behind the schedule even though this project being completed at least to the minimum requirements.

When this mobile application getting high demand from the users, author recommends that Blood Seeker to be developed in BlackBerry and iOS application version for future plan. Hopefully, the existing donors will able to update their personal details, make or change appointment, check when they are next due to donate or view their donation history.

As conclusion, an emergency needs of blood shortage in future demand can be catered by this project and Blood Seeker will be a good example in order to improve the usage of technology in healthcare sector in Malaysia.

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APPENDIX

Question	Respondent 1	Respondent 2	Respondent 3	Respondent 4
User-Friendliness Strongly Disagree 1 2 3 4 5 Strongly Agree				
1. The application has user-friendly Graphical User Interface (GUI).				
2. It is easy to navigate from one screen to another screen through the application.				
Informativeness Strongly Disagree 1 2 3 4 5 Strongly Agree				
1. The application will help blood requester in terms of finding the blood donor.				
2. The information provided is simple and easy to understand.				
User Feedbacks Strongly Disagree 1 2 3 4 5 Strongly Agree				
1. You are interested to use this application.				
2. Do you know any web-based systems or mobile applications exist for blood donor?				
3. Please leave your comments about Mobile Blood Donor for the betterment and improvement of this application.				