WAP BASED VEHICLE REGISTRATION

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WAP BASED VEHICLE REGISTRATION

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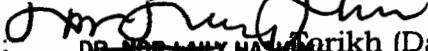
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ABSTRACT

In these days at UUM, vehicles number is increasingly as many of UUM students and staffs own their personal vehicle. However, there is much discussion regarding the effectiveness when it comes to WBVR. The aim of this project was to help UUM students and staff to accomplish their vehicle registration with no much effort. In this respect, the goal of this study was to design and develop a prototype of WAP-based vehicle registration for UUM, and measure to what extent users are willing to accept this prototype on their mobile phone. Overall, the prototype was evaluated in term of its usability aspects. And the results confirm that it is useful for users and it is capable to help them to make their vehicle registration.

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بِسْمِ اللهِ الرَّحْمٰنِ الرَّحِيْمِ

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TABLE OF CONTENTS

LIST OF TABLE

LIST OF FIGURS

CHAPTER ONE

INTRODUCTION

Mobile technologies are rapidly growth; it has facilitated our daily life's activities. Moreover, it has played an important role in the management of relations between people, whether social or economic relations, or the everyday life (Goh and Kim et al. (2006); Muller and Lenhart et al. (2004). Moreover, the evolution and relevance of this technology gave a new face of communication between people and opening up great prospects for continuing them. Indeed, the wide spread usage of mobile technologies for the past decade revolutionize the way people think and communicate.

The emergence of the Wireless Application Protocol (WAP) technology has brought a lot of changes to the way through which people conduct their operations anywhere and anytime. Nowadays, mobile services are considered as a new technology age that provides user interfaces for basic telephony and messaging services, as well as for more advanced and entertaining experiences.

Therefore, Mobile-based Application for vehicle registration can improve people's life, make it simpler and allows peoples faster and efficient dealing with their vehicle registering.

1.1   Background of the Study

Universiti Utara Malaysia (Northern University Malaysia, UUM), is a public university located in Kedah, Sintok. Utara means "north". It is formally registered as a

1

16 department with 84 special operations during the opening of the University. The University was established with the specific mission of providing a leadership role for management education in the country. Thus, the university is also known as a management university. UUM academic institutions which include College of Business (COB), College of Law Government and International Studies (COLGIS) and College of Arts and Sciences (the CAS) are the present structure of the university. (www.uum.edu.my).

Universiti Utara Malaysia provides accommodation for almost 22 000 students in 15 campuses, including special rooms for married students. Many of these student residences are named after multinational companies such as MAS, Tenaga Nasional, Tradewinds, Proton, Petronas, EON, Sime Darby, MISC, TM Perwaja, Maybank, Bank Muamalat, Yayasan Al-Bukhary, Bank Rakyat and SME Bank. (www.uum.edu.my).

For many students, residence, lecturers and visitors there are huge number of vehicles entering the university. All the vehicles need to be registered under UUM which increases the administrative work.

Like the researcher said before, Mobile applications increasingly affect the diffusion of information as well as business activity. They gain broad acceptance due to the increased need in supporting the mobile workforce and the rapid improvement in the devices and wireless technologies for communication. Many mobile applications provide personal services such as sending and viewing email, browsing the World

2

Wide Web, viewing traffic and weather reports, watching movies and chatting with others (El-Alfy, 2005).

In this respect, the use of mobile in registration sector has been coined to denote the ways in which mobile communication technologies can be applied to address the registration issues especially as it is related to users that need to access a varied range of applications and services through wireless access devices.

1.2   Problem Statements

Every year, thousands of new students register to University North Malaysia (UUM). Many students own personal vehicle. All vehicles must be registered according to UUM rules and regulation. Currently, student must fill up the application form from their residential colleges. After students go through the whole process for collecting registration stickers', they need to get approval from UUM's Security Department which is known as vehicle registration data labels or sticker. It is time-consuming and a cumbersome procedures for registration of vehicles to collect stickers. After this long procedure, students will obtain their vehicle registration sticker issued by the security department.

Nowadays, mobile telephone services are used by all the majority of student in UUM, which makes it easy to access internet through mobile phone using the WAP protocol. So a WAP based vehicle registration system (VRS) is proposed for UUM that is able to resolve the current difficulties, eliminate paper work and to keep details of vehicle registration.

1.3 Research Objective

The main objectives of this research are:

1. To design a WAP-base vehicle registration system for UUM.

2. To provide a prototype of the WAP-base vehicle registration for UUM.

3. To investigate users satisfaction of the WAP-based VRS.

1.4 Research Question

The main research questions of this research are:

1. How to design a WAP-base vehicle registration system for UUM?

2. What are the requirements of the WAP-base vehicle registration for UUM?

3. How to investigate users' satisfaction of the WAP-based VRS?

1.5 Research Scope

Applications of this research studies the WAP system for issuing vehicle registration certificates are, WAP based vehicle registration system;

1. To provide vehicle registration details.

2. Provide update and current vehicle registration information.

3. Enable user to access online system to register their vehicle at any time, from anywhere.

1.6 Significance of Research

The purpose of the designed WAP based vehicle registration system is to have an interactive WAP-based vehicle registration for UUM that can satisfy UUM students and staffs. In addition, to apply registration through their mobile telephone which will save cost, fewer employees, reduce administration work and less time.

1.7   Limitation of the Study

The study is limited to prototype design because enable WAP architecture in mobile phone is costly and it will be difficult to have real implementation in real devices.

1.8   Organization of the Study

In conclusion, this chapter provided a discussion on the problems statement, research objectives, questions significant and limitation. The proposed solution is a WAP-based vehicle registration system. Thus, after introducing the problem above, this study plan the organization of this research as follows: in the next coming chapters. Chapter two provides a literature reviews and the related previous studies.   The literature focuses on several outlines such as, WAP and Mobile applications concepts in general and implementations issue. Chapter three focuses on the methodology used in implementing this project in order to achieve the study objectives. Chapter four deals and discusses the findings of this study based on the results of implementing the proposed system using the methodology described in the previous chapter.   Chapter five elaborates the results for this study. Finally, chapter six emphasizes on the project limitations, future recommendations and concludes the findings of this project.

CHAPTER TWO

LITERATURE REVIEW

2.1   Introduction

The background of this research and brief description of the study settings were introduced in the previous chapter. This chapter will continue on the discussion and ideas in previous work and knowledge related to mobile technology and its aspects.

2.2   Mobile Technology

Mobile technologies potentially create a wide variety of uses and limitations that differ significantly from desktop and laptop technologies. Figure 2.1 shows the infrastructure for mobile computing Turban and Leidner et al, (2007). However, today most people are equipped with mobile devices and most of them already have good knowledge and experiences in using mobile devices to access internet applications, Schaffelhofer, & Wright, (2002).

The number of subscribers of mobile phones has also increased in the same period in Norway. Even though, the number of subscribers was already substantial, it grew approximately 30 percent. In 2001, 3,201,554 people were mobile phone subscribers. That is 71% of the population, with comparison, only approximately 30% of the population in the USA has mobile subscription (Schei & Fritzner, 2002). Moreover, China has 206 million subscribers in 2002, which is 16.19% of China's population (Chen & Kinshuk, 2005). One reason for this growth can be the expansion of mobile

devices like smart phones, personal digital assistants (PDAs) and mobile phones in the market.

2.2.1 Mobile Applications

However, it can be noted that, Mobile applications increasingly affect the diffusion of information as well as business activity. They gain broad acceptance due to the increased need in supporting the mobile workforce and the rapid improvement in the devices and wireless technologies for communication. Many mobile applications provide personal services such as sending and viewing email, browsing the world wide web (WWW), viewing different things like weather reports , watching movies and chatting with others (El-Alfy, 2005).

Furthermore, Mobile services appear to be an obvious choice for any chose we are as human going to take which is the first criterion for mobile services to be relevant. Nevertheless, based on a study conducted by (Carlsson, & Walden, 2005) in 2003; few users have expressed their desire to use their mobile phone whenever possible. So by reading the fact, several industries have been undergoing many dramatic changes during the last decade, due to the possibilities offered by Internet technology.

In this respect, and based on a study by (Kalkbrenner & Nebojsa, 2001) which focused on the improvement of organizational infrastructure for campus and student needs, it indicated that there are still many weaknesses in the current version of Wireless Application Protocol (WAP) that require in-depth investigation, since every new technology arriving on the market has to be investigated of its benefit for daily use.

At present, mobile phones have been popular worldwide. Mainly it is ubiquitous and customers can make calls anywhere for transaction. Mobile phone market shares have grown up dramatically. Mobile commerce (m-commerce) attracts various relative companies such as mobile handset manufacturers to develop technologies to generate added values for their mobile sphere (Amor, 2002).

2.2.2 WAP Concept and Definition

Wireless Application Protocol (WAP) is a collection of wireless application protocol and specification standard that allows mobiles devices to communicate with the web server using the WAP browser and display the contents back on the mobile devices screen, basically, it is the protocol that allow mobile devices to access the internet (WAP Forum, 2002a). International Engineering Consortium (IEC) has introduced another definition: Wireless application protocol (WAP) is an application environment and set of communication protocols for wireless devices designed to enable manufacturer, vendor, and technology independent access to the Internet and advanced telephony services (International Engineering Consortium, 2007).

In the early day of wireless web, several companies produced their own proprietary application protocol, this made the wireless web developed that followed one company communication protocol standard can only be viewed by mobile phone that use that standard (Nylander, 2004). Lacks of standardization hinder the growth of wireless web, users were confused, and developers were screaming for standardization.

8

One of the most important aspects of wireless communications is standardization. WAP is intended primarily for Internet enabled digital phones, pagers and other handheld devices. It is designed to standardize development across different wireless technologies worldwide. In 1997, the Wireless Application Protocol (WAP) was developed by Nokia, Ericsson, Motorola and others to foster the emergence of the wireless Internet. It is designed to standardize development across different wireless technologies worldwide (Computing, 2000). Moreover, in June 2002, 350 member companies involved WAP forum companies joined together and formed the Open Mobile Alliance (OMA). They represent the world's leading mobile operators, device and network suppliers, information technology companies, application developers and content providers (Open Mobile Alliance (OMA), 2004).

According to analysts at Lehman Brothers Inc (Kustin, 2002), the number of wireless Internet access devices being utilized worldwide is expected to double annually from approximately 50 million units in the year 2000 to approximately 600 million units in the year 2004. Based on this data, recognizing the upcoming need to have pricing information and purchasing opportunities available for users of handled Internet access devices is essential for companies looking to become the most preferred suppliers of consumer goods on the Web. Moreover, IEC (International Engineering Consortium, 2007) believed that the future for WAP will be bright; based on 75 percent of the world company's stand behind the mobile telephone market and the huge development potential of WAP.

2.2.3 WAP architecture

WAP has a client and server approach that compounds wireless network and internet technology. In fact the motivation for developing WAP was to extend Internet technologies to wireless networks, bearers and devices (Wapforum, 2002b).

The First specification of WAP (WAP 1.0) released in 1998 by WAP Forum. Followed by WAP 2.0 which is a next-generation set of specifications that utilized and supported enhancements in the capabilities of the latest wireless devices and Internet content technologies, also WAP 2.0 provides managed backwards compatibility to existing WAP content, applications and services that comply with previous WAP versions.

It was designed to work on any mobile network standard whether Wireless LAN (IEEE 802.11 protocol), Bluetooth, Infrared (IR) or cellular networks such as Global System for Mobile Communications (GSM), General Packet Radio Service (GPRS) (Antovski, 2003; Cervera, 2002; Kalliola, 2005). WAP has a layering concept like the internet; each of the layers of the architecture is accessible by the layers above, as well as by other services and applications. However, Open Systems Interconnection (OSI) model is a reference model developed by ISO (International Organization for Standardization) in 1984, as a conceptual framework of standards for communication in the network across different equipment and applications by different vendors. Figure 2.1 shows the WAP layer stack (centre) and internet OSI (International Standard Organization). WAP stack consist of Wireless Application Environment (WAE), Wireless Session Protocol (WSP), Wireless Transaction Protocol (WTP), Wireless Transport Layer Security (WTLS) and Wireless Datagram Protocol (WDP).

Figure 2.1: *WAP Protocol Stack (WAP Forum, 2002a)*

1. Wireless Application Environment (WAE)

- The WAE layer is where the protocol for the user interface resides, WAE interact with Wireless Markup Language (WML), and WML is equivalent to the HTTP in the internet, WML Script and Wireless Telephony Application (WTA) to display content on the screen.

2. Wireless Session Protocol (WSP): Compose of two protocols:

- Work with WTP to make connection oriented session.
- Allow server to make connectionless oriented session (PUSH technology).

3. Wireless Transaction Protocol (WTP)

- WTP layer responsible to manage a transaction,
- WTP employed the User Datagram Protocol (UDP) on the internet model; WTP offers three classes of transaction service: unreliable one way request, reliable one way request and reliable two way request respond.

4. **Wireless Transport Layer Security (WTLS)**

- WTLS layer deal with security,

- Data integrity and authentication protocol.

5. **Wireless Datagram Protocol (WDP)**

- WDP is data transport protocol that manages the transmission; WDP allows WAP protocol to adapt any data communication protocol from network standard, thus allowing WAP to communicate with any network standards.

2.2.4 The WAP Service Model

In today's Internet model, the client performs a copy on the web browser, which uses the underlying Internet protocols to access useful content residing on a server on the network. These interactions occur through the use of HTTP request and response messages. WAP based Internet technology that is optimized to address the limitations of wireless connections and wireless devices. A service created from HTML usually does not fit well with small portable wireless devices, due to limitations in their appearance. In addition, these devices have limited storage capacity and computing, and that means excessive or redundant data that are not welcome, therefore using WML instead of HTML. WML pages can also be encoded in binary format in order to reduce the amount of data transmitted over the wireless interfaces shown in figure 2.2. (Margaret van Steenderen, 2002).

Figure 2.2: *WAP Architecture*

2.3 Registration

There is no much to say about registration, but the researcher believes that, the term Registration affects several aspects of our life (including Registration for stalls, delivery vehicles and other moving objects) is prescribed by law. Registration will allow local authorities to make an updated list of all the places in their area so they can visit when you need it. The frequency of visits will depend on the type of business.

However, according to the problem above, vehicle registration is a very common one. Wherever it is, in the city, state or universities there is always offices burdening applicants by requiring them to personally deliver the certified copy of resident's registration and other documents.

2.3.1 Vehicle registration

Vehicle Registration used involves manual recording of vehicle's information which ranges from cars to buses and later to trucks and heavy duty equipment on ledgers and tracking other related information such as registration, road worthiness test certificates, and change of ownership, engine and chassis numbers; and expiration of road license. This process has been extremely inefficient and the recovery of the information was not possible once ledgers were damaged or lost as it frequently occurs.

2.4   Information Communication Technology (ICT) and Registration

Mobile applications are increasingly affecting the dissemination of information and registration system. It won widespread acceptance, due to an increased need to support mobile workforce and rapid improvement of devices and wireless technologies for communication. Many mobile applications provide personal services such as sending and viewing e-mail, browsing the World Wide Web (WWW), which saw traffic and weather reports, watching movies and talking with others (El-Alfy, 2005).

In addition to that, a mobile service seems to be the obvious choice for travel and tourism information for travellers on the go, the first criterion for mobile services is relevant. However, according to a study conducted by (Carlsson and Walden, 2005) in 2003, several users who have expressed a desire to use their mobile phone whenever possible. Travel and tourism has been through many dramatic changes over the past decade because of the potential offered by Internet technology.

According to Chen (2007) service registration management is a brand-new process and attempt for any kind of service using information technology and products. It has the long-term characteristic, the complexity, timeliness and polytrophic. Because of this, vehicle registration system cannot be short, simple, seal, static system, but is one open, the request is more prompt, precise, in the application depth and the breadth, the change and develop nimbly along with the time.

In another study by, Ramsay (2001) it is ready to go mobile. Much has been said about the technology that will make this possible, but very little about what potential users expect from WAP and mobile Internet. He used the experience of 20 test users who participated in the evaluation of usability. Users have the option of WAP phones will be used for one week. The study concluded that WAP is not user-friendly services. Connection times are too long, even when the user is able to connect to a WAP site their connection is often the time, even before any data from the Internet. During the test users were asked if they think they will be able to WAP phone within one year, 70 percent said no. However, when asked if they would like after three years of negative responses dropped to 20 percent. So there is hope for the service. Moreover, research shows that there is a market for data services provided over the mobile Internet and gives a strong indication of what users would like this service.

Moreover, Kamal (2002) tried to measure the attitudes of students from registering and advice in various academic institutions to ensure quality services that complement the academic. Bearing in mind that many universities developed in the Middle East and other countries have not yet been exploited fully automated service for students, this study provides recommendations for the invasion route for the development of

15

audio and web-banner automatically recording a positive evaluation of service quality.

2.5 Summary

In conclusion, mobile services is found to be the obvious choice for us as human to keep the wheel of life running as they are one of the largest and most rapidly expanding industry in the world and one of the significant users of ICT. In addition to that, after introducing the WAP Concept and Definition, WAP architectures well as The WAP Service Model and based on the reviewing of the literature benefits or the advantages of the WAP is too way to write about them it just like the sky is the limit to explain how much is important the existence of WAP in our daily life. Overall, the main objective of this chapter was to give a brief a background about some researches that have carried out about mobile web applications that is of a successful example in mobile Vehicle registration services. That has identified the approaches to be used for developing a Mobile WAP interface to help user to do his or her Vehicle registration everywhere and every time rather than anywhere and anytime. Finally, this project is proposed as a solution to arrange the operation of Vehicle registration, overcome the difficulties faced and to make it easier for UUM and its community when registering their vehicles. .

CHAPTER THREE

RESEARCH METHODOLOGY

3.1   Introduction

The methodology can be a description of the process or can be expanded to include a comprehensive collection of philosophical theories, concepts or ideas related to the particular discipline or research. In short, methodology is a plan that depicts how to make the system. Without a proper methodology system development can be halt. Therefore, to fulfil research objectives and answer research questions a methodology proposed by Hoffer 2004 is adopted.

3.2   Research Methodology

A cooperative was used between data gathering, prototype development, system implement, and usability testing and data analysis in order to achieve the three main objectives and to give proper answers for the research questions as well (see Figure 3.1).
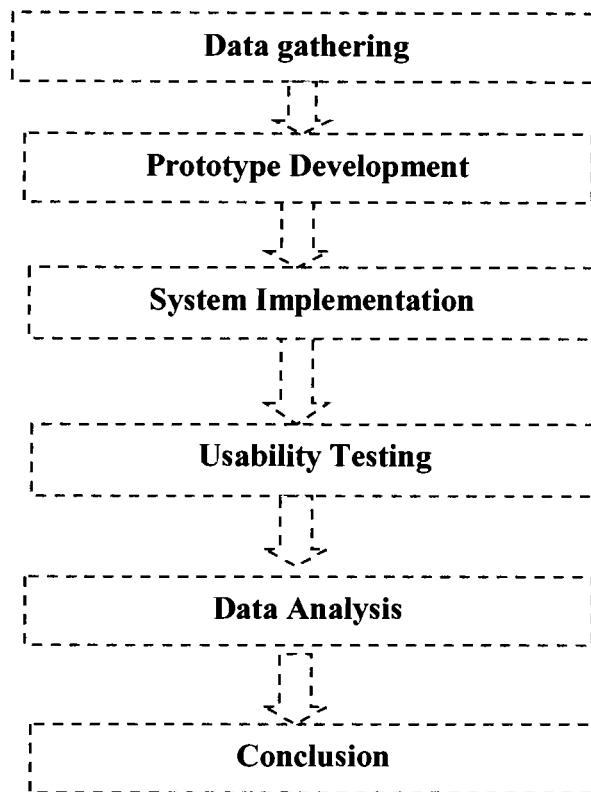
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│           Data gathering             │
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│            Data Analysis             │
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│             Conclusion               │
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Figure 3.1: *WAP based vehicle registration (adopted methodology from Hoffer, 2004)*

3.2.1 Data gathering

Data collection was the most important step where a comprehensive study was done in order to get a clear idea of what has been achieved at the end of the project. Articles, journals, magazines, newspapers, books, literature were reviewed to get an idea of problem-solving techniques, and problems. Lehtonen (1997) presented a methodology called controllability analysis in logistics. He focused on the data gathering and analysis for simulation project to reveal the potential improvement areas, and define and analyze the data so that they are ready for the simulation process.

3.2.2 Prototype Development

Azhari (2009) found the goal of rapid mechanical prototyping is to be able to quickly fabricate complex-shaped, 3D parts directly from computer-aided design models while doing his research on the evolution of rapid prototyping in dentistry. Prototype step has begun when all necessary data gathering has been fulfilled in the project. It was then translated into a more understanding format for the purpose of well implementation. In other words, the possible interactions among the system components and functions has been identified and visualized.

The system and the details of the functional requirements and non-functional requirements and other related diagram for prototype are all presented in details in chapter four.

3.2.3 System Implementation

This is the most critical step of the study. The success in this step was the backbone of the project. Necessary programs has been coded and debugged. JSP and SQL and mobile browser has been used. Liu (2009) addressed the issue in system implementation for ERM system. He tries to outline his ERM because during this stage, the system is physically created.

3.2.4 Usability Testing

Usability testing can play an important role in improving the effectiveness of online information literacy instruction, although it is a key element in the larger project evaluation. Usability is a product development approach that includes direct information about users during the development cycle to reduce costs and create

19

products and tools that meet users' needs. At this stage, user feedbacks were taken, after distributing and gathering the questionnaire from users to know their reactions.

3.2.5 Data Analysis

To be effective and successful, strategic and tactical integrated collection and strategic analysis is integrated into all aspects of direct analytical data. This is illustrated by the analysis of data through anecdotal evidence that industry sources, real-life/real-time examples and a framework that can be used by companies of all sizes. To analysis the data there was a simple calculation such as mean method, max, median operation. Without the analysis of required data and acquired data the system may be vulnerable. Sometimes some outlier can be detected so we need to analyze the data to make a proper prototype.

3.3 Summary

This chapter introduced the five stages of the project research methodology adopted from Hoffer (2004). The stages involved; (data gathering, Prototype Development, System Implementation, Usability Testing, and data analysis). The methodology has been applied very carefully to insure that the research objective are meet and also improve the aspects of the prototype simulation software, to meet the expectations of the users and to resolve the potential issues arising from the usage.

CHAPTER FOUR

ANALYSIS AND PROTOTYPE DESIGN

4.1   Introduction

In the previous chapter, the methodology of the research that been applied for this project was explained considerably. The General Methodology proposed by Hoffer (2004) was adopted in the project. This project consists five phases which are data gathering prototype development, system implementation, usability testing, data analysis and a conclusion .This chapter will be discussed in details about the design and implementation of WAP based vehicle registration for UUM System. It describes how the researcher worked to achieve the project's objectives by applying the phases of the Design Research Methodology. The chapter begins with the system requirements (functional requirements) collected from the end users of the system. Also it carries out the system architecture and the design of the graphical user interface of the prototype system.

4.2   System Requirements

The subsequent are the requirements of UUM vehicle registration system based on the objectives and the definition of the Use Cases. The requirements of this system are structured according to various characteristic of the system which is system performance and functionalities.

4.2.1   Functional Requirements

Based on the objectives and the definition of the Use Cases, the following are the requirements for the system; system performance and its functionality. These system

21

requirements are organized according to different aspects. The complete list of the system requirements (the functional requirements) are shown in the next coming table.

Table 4.1: *WBVR Functional Requirements*

Requirement ID	Requirement Description	Priority
WBVR_01	**Log-in to system**	
WBVR_01_01	**The system allows administrator& participant log-in into the system.** **The administrator participant should have password and username**	Mandatory
WBVR_01_02	**The system shall detect the validation of the "user name " and "password"**	Desirable
WBVR_01_03	**The system will guide if log in password is forgotten**	Optional
WBVR_02	**Manage Vehicle**	
WBVR_02_01	**Admin can register for new vehicle**	Mandatory
WBVR_02_02	**Admin and Staff/ student can register vehicle through mobile**	Mandatory
WBVR_02_03	**Admin and Staff/ student can edit the registration details**	Optional
WBVR_02_04	**Admin and Staff/ student can view their vehicle registration details**	Optional
WBVR_03	**Log Out**	
WBVR_03_01	**The Administrator/ staff, trainer can log-out from the system**	Mandatory
WBVR_03_02	**The system will display a confirmation message about log out**	Mandatory

4.2.2 Non-Functional Requirement

Describe user-visible aspects of the system that are not directly related with the functional behaviour of the system, as well as non-functional requirement, include quantitative constraints, such as response time (i.e. how fast the system reacts to user commands.) or accuracy (.e. how precise are the systems numerical answers). however, Listed below are the non-functional requirements of the system.

Table 4.2: *Non-Functional Requirements*

Requirement ID	Requirement Description	Priority
WBVR_04	**Reliability Issues**	
WBVR_04_01	The system should receive updated information every 15 minute.	Mandatory
WBVR_04_02	If the system crash, it should behave perfectly normal when reloaded again	Mandatory
WBVR_04_03	For a single user, the system should crash not more than once per 5 hours.	Mandatory
WBVR_05	**Usability Issues**	
WBVR_05_01	The system must be easy to use it so must design best interface for user	Mandatory
WBVR_06	**Response Time / Speed**	
WBVR_06_01	The system should be able the process any transaction at the highest speed and avoid unnecessary. As a low response time , the user may feel frustrated and decided not use this system	Mandatory
WBVR_07	**Security**	
WBVR_07_01	Security of data stored in the system only can be access by certain authorize staff or admin in WBVR	Mandatory

4.3   Use Case Diagram

According to Rumbaugh (2002), Use case diagrams describe what the system from
the perspective of outside observers. The emphasis is on what makes the system rather
than how. Use Case diagrams are closely connected to scenarios. One scenario is an
example of what happens when someone interacts with the system. Use Case is a
summary of scenarios for a single task or goal. An actor is who or what initiated the
events that are involved in the project. Actors are simply playing the role of persons
or objects.

4.3.1 Use case diagrams are useful in three areas.

- Defining characteristics (specifications). New cases are often used to create new applications, such as system analysis and design takes shape.

- Communication with clients. Notational simplicity of use case diagrams a good way for developers to communicate with customers.

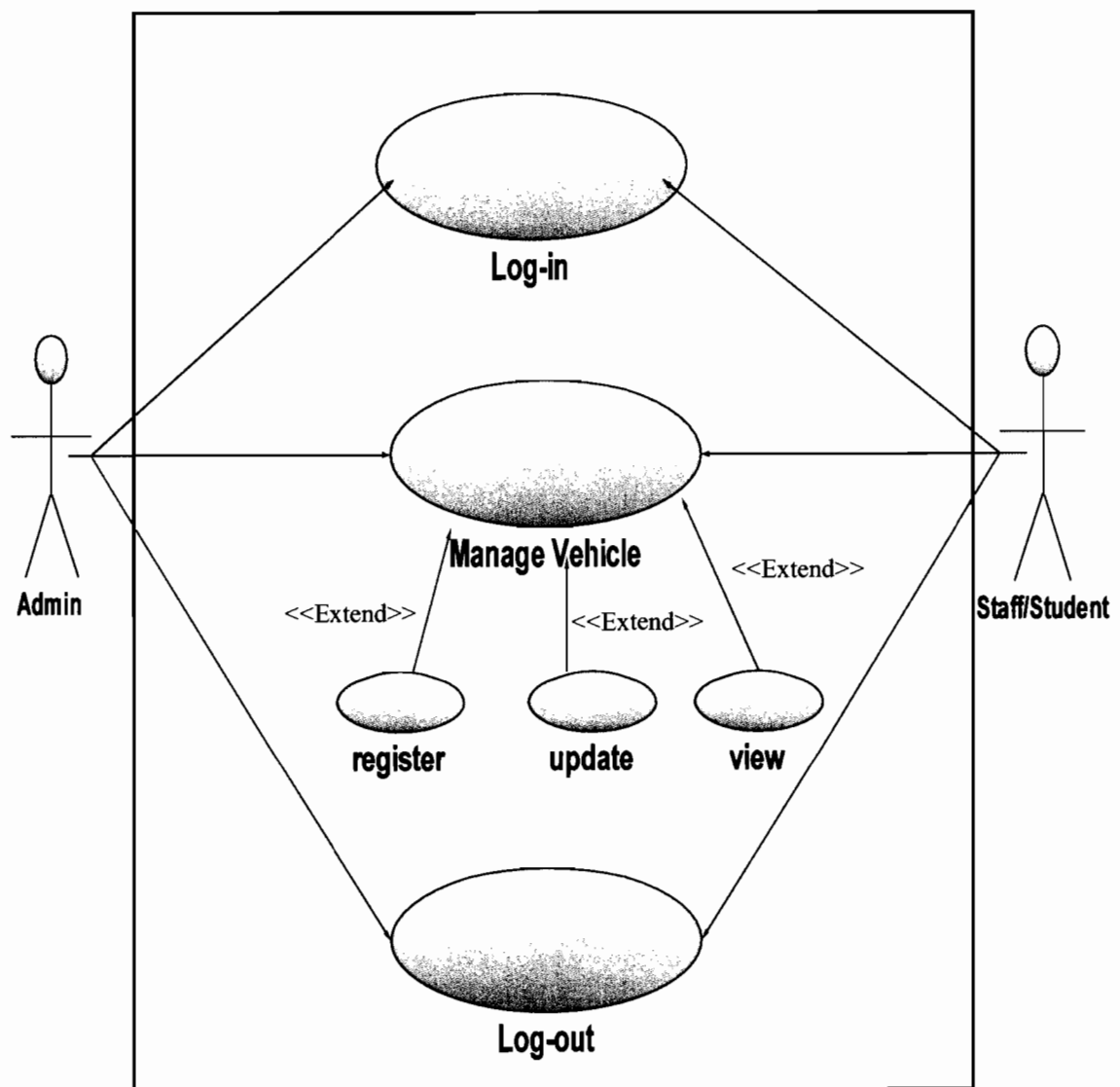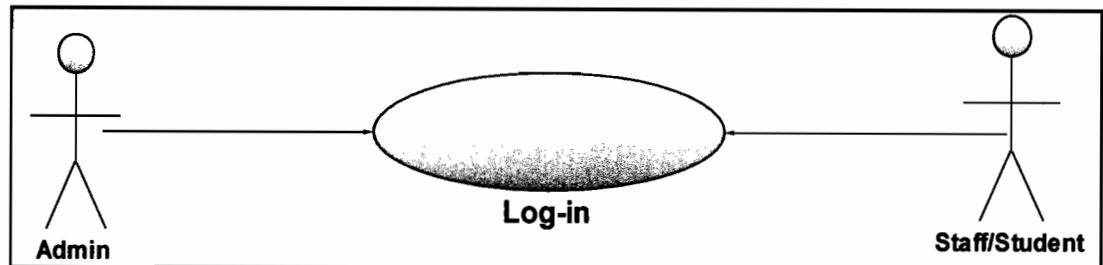- Production of test cases. Collections of use case scenarios suggest a number of test scenarios.

Figure 4.1: **WBVR** use case diagram.

4.4   Use Case Specifications

4.4.1   Use Case: Login

4.4.1.1 Brief Description

This use case is initiated by the user (administrator, Staff and Student). This use case will enable the user to login into the system.

4.4.1.2 Pre-Conditions

The user must have account, and have user name and password.

4.4.1.3 Characteristic of Activation

Event Driven (on user demand).

4.4.1.4 Flow of Event

4.4.1.4.1 Basic Flow (WBVR _01_01)

This use case begins when the user press the <<login>> button at main page.

- The user can input his/her ID and password.

- After that, the user will press "LOGIN" button to login into system, the system verifies the ID and password. [E-1: Invalid password/username].

- The system will display home page for user and determine which functions are available for him/her.

4.4.1.4.2 Alternative Flow

Not applicable.

4.4.1.4.3 Exceptional Flow

E-1: Invalid Password/Username

The system will display error message and the user have to re-enter the username and password (WBVR _01_02)

4.4.1.5 Post-Conditions

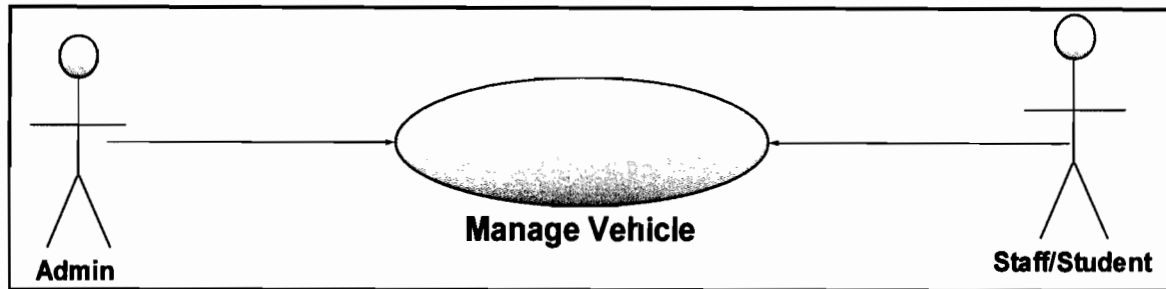User will be able to proceed to other activities.

4.4.1.6 Rule(S)

Not applicable.

4.4.1.7 Constraint(S)

The user must enter the correct user name and password.

4.4.2 Use Case: Mange Vehicle

Manage Vehicle

Admin — Staff/Student

4.4.2.1 Brief Description

This use case is initiated by the (admin, Staff and Student). This use case will enable the Administrator, staff, student to add, edit the registration form and view their vehicle registration details.

4.4.2.2 Pre-Conditions

The user must have account, and have user name and password.

4.4.2.3 Characteristic of Activation

Event Driven (on user demand).

4.4.2.4 Flow of Event

4.4.2.4.1 Basic Flow (WBVR _02)

This use case begins when the user (admin, Staff and Student) access to web site and click on manage Vehicle, the system will appear new page with three options [A-1: Register Vehicle], [A-2: update your Vehicle],[A-3: View your Vehicle] .

4.4.2.4.2 Alternative Flow

A-1: Register Vehicle

- If the user (admin, Staff and Student) click on Register Vehicle button, the new page will appear and the user can fill the information about the vehicle like (owner name owner No....etc), then user will click on Submit button.[E-1: confirm message], [E-2: some fields are empty].

A-2: update your Vehicle

- If the user (admin, Staff and Student) click on update your Vehicle button, the new page will appear and the user can enter Vehicle NO and Click on search Button, the system will display the information about the vehicle and the user can update the details vehicle   then click on submit button.[E-3: confirm message], [E-4: some fields are empty].

A-3: View your Vehicle

- If the user (admin, Staff and Student) click on view your Vehicle button, the system will display the information about the vehicle.

4.4.2.4.3 Exceptional Flow

E-1: Confirm message

- Massage box will appear to confirm user that trainee information is already saved in the database.

E-2: Some fields are empty

- Massage box will appear to confirm user that some fields are empty and the user can re- enter it again.

E-3: Confirm message

- Massage box will appear to confirm user that trainee information is already saved in the database.

E-4: Some fields are empty

- Massage box will appear to confirm user that some fields are empty and the user can re- enter it again.

4.4.2.5 Post-Conditions

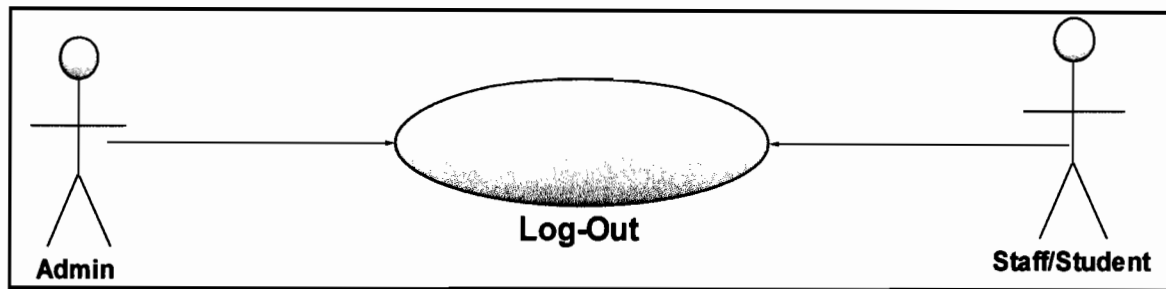- This use case will enable the user to (add, edit and view vehicle).

4.4.2.6 Rule(S)

Not applicable.

4.4.2.7 Constraint(S)

Not applicable.

4.4.3 USE CASE: Log out

Log-Out

Admin — Staff/Student

4.4.3.1 Brief Description

This use case is initiated by the user (administrator, Monitor, trainer and trainee). This use case will enable the user to logout from the system.

4.4.3.2 Pre-Conditions

The user is already logged in.

4.4.3.3 Characteristic of Activation

Event Driven (on user demand)

4.4.3.4 Flow of Events

4.4.3.4.1 Basic Flow (WBVR_06)

- This use case begins when the user presses the logout button.
- The system will display the main page.

4.4.3.4.2 Alternative Flow

Not applicable.

4.4.3.4.3 Exceptional Flow

Not applicable.

4.4.3.5 Post-Conditions

The system will display the main page.

4.4.3.6 Rule(S)

Not applicable.

4.4.3.7 Constraint(S)

Not applicable.

4.5   Sequence Diagram

According to (Johan, 2004) Class and object diagrams are static model views. Interaction diagrams are dynamic. They describe how objects collaborate. A sequence diagram is an interaction diagram that specifies how operations are carried out, what messages are sent and when. Sequence diagrams are organized according to time. The time progresses as you go down the page. The objects involved in the operation are listed from left to right according to when they take part in the message sequence.
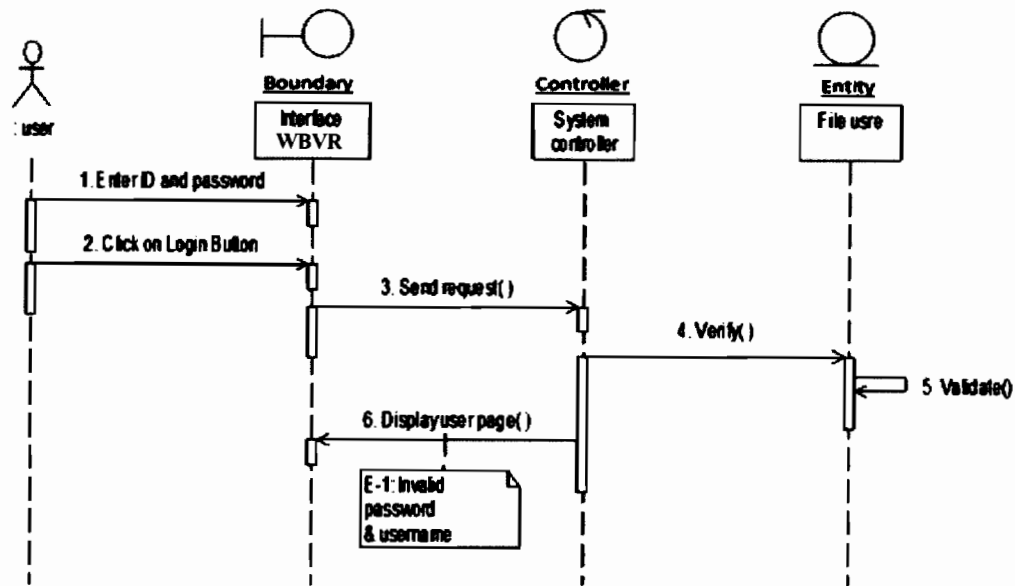
4.5.1 Log in Sequence Diagram

Figure 4.2: Log-in Sequence Diagram

4.5.2 Manage Vehicle Sequence Diagram

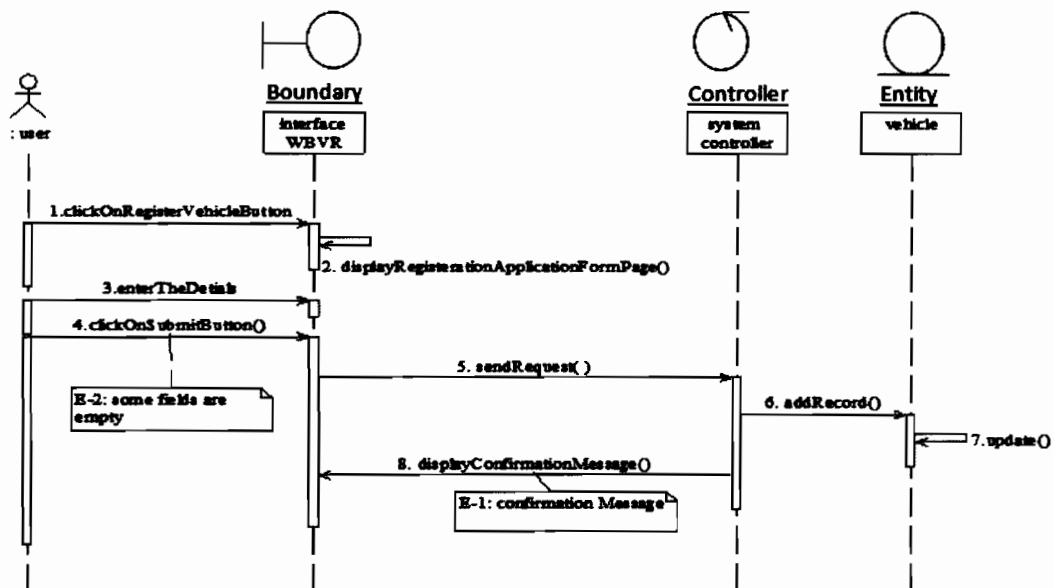### 4.5.2.1 Register Vehicle Sequence Diagram

Figure 4.3: Register Vehicle Sequence Diagram
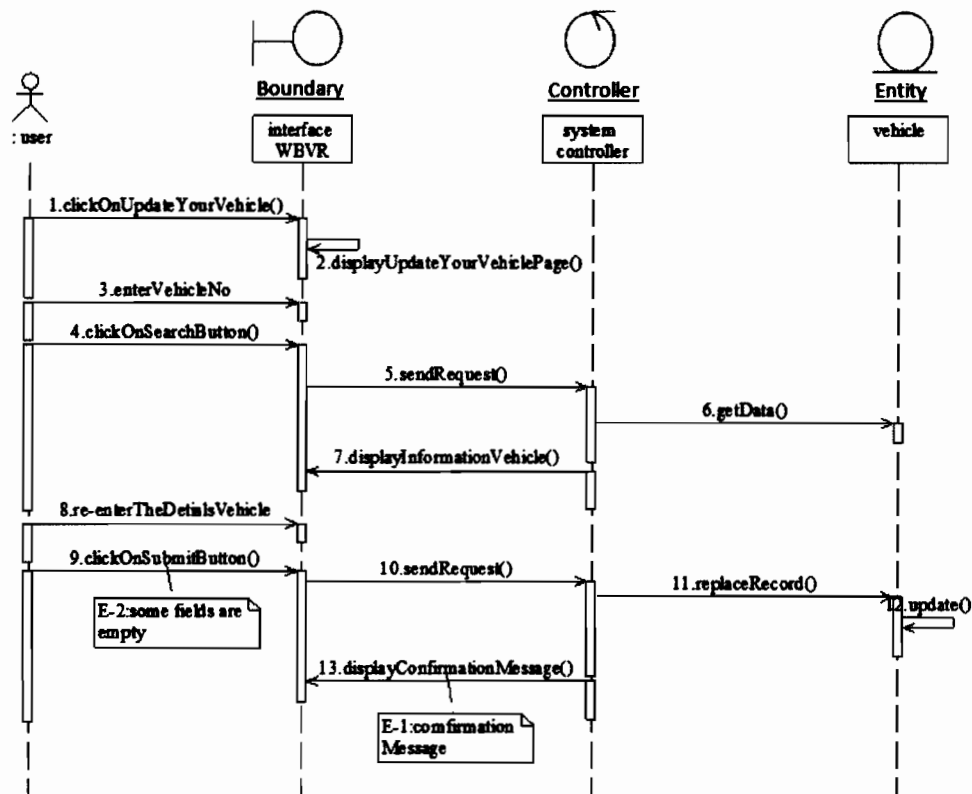
4.5.2.2 Update your Vehicle Sequence Diagram

Figure 4.4: Update your Vehicle Sequence Diagram
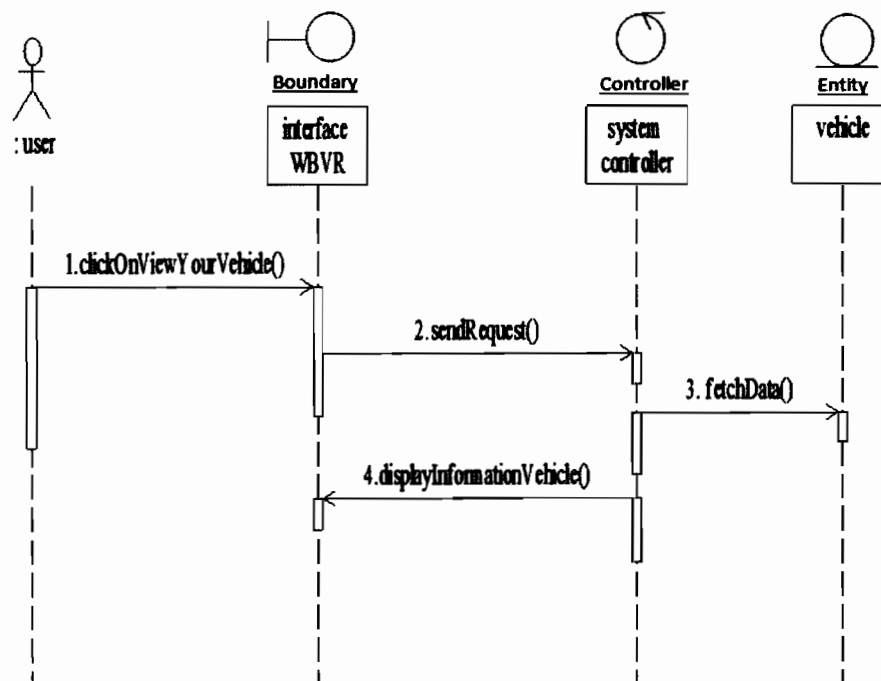
4.5.2.3 View your Vehicle Sequence Diagram

Figure 4.5: View your Vehicle Sequence Diagram
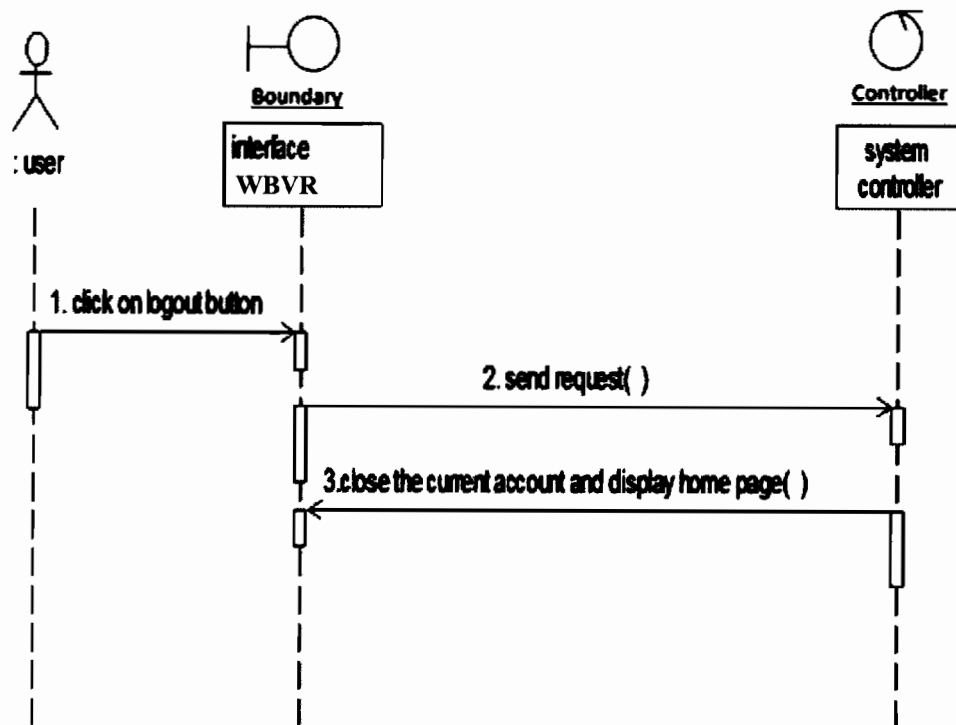
4.5.3 Log-out Sequence Diagram

Figure 4.6: Log out Sequence Diagram

4.6 Class Diagram

Referring to (Barclay et al, 2004), Class diagrams are widely used to describe the types of objects in a system and their relationships. Class diagrams model class structure and contents using design elements such as classes, packages and objects. Class diagrams describe three different perspectives when designing a system, conceptual, specification, and implementation. These perspectives become evident as the diagram is created and help solidify the design.

Class diagrams also display relationships such as containment, inheritance, associations and others. The association relationship is the most common relationship in a class diagram. The association shows the relationship between instances of classes. Another common relationship in class diagrams is a generalization. A generalization is used when two classes are similar, but have some differences.

Class diagrams are used in nearly all Object Oriented software designs. Use them to describe the Classes of the system and their relationships to each other.
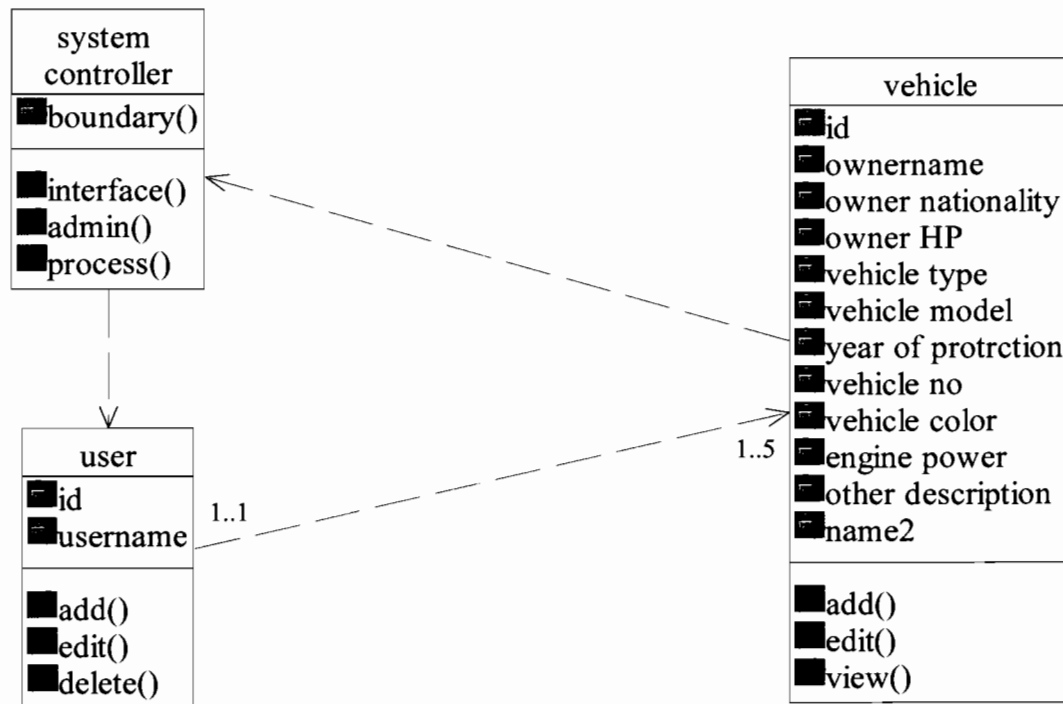

Figure 4.7: WBVR Class Diagram

4.7   System Interface

The prototype of the WAP Based Vehicle Registration system has been successfully completed within this phase and all the functional requirements of the system that were defined   have been fully achieved. The design was translated into program code.

The JSP used for the programming of the WAP Based Vehicle Registration system, JSP are built on top of Sun's Servlet technology. JSP are essential an HTML page with special JSP tags embedded. These JSP tags can contain Java code. The JSP file extension is JSP rather than .htm or .html. The JSP engine parses the .JSP and creates a Java Servlet source file. It then compiles the source file and creates a class file; this is done the first time and this why the JSP is probably slower the first time it is executed. Any time after this the special compiled Servlet is executed and is therefore returns faster. Microsoft MYSQL was used as the Database to store and retrieve all information.

The following figure represents the system screen shots
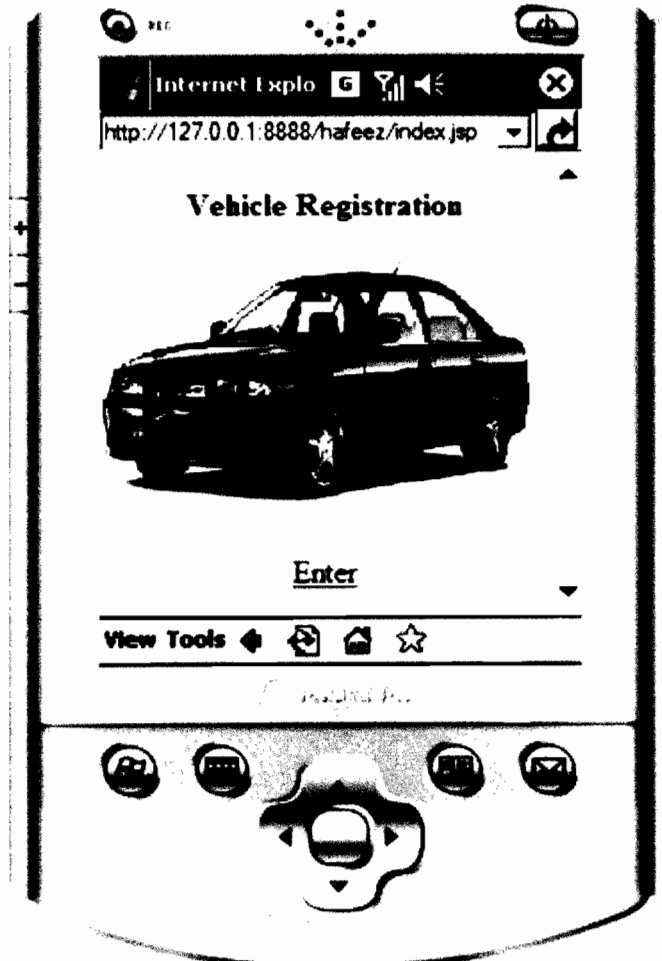
SCREEN SHOTS

MAIN PAGE

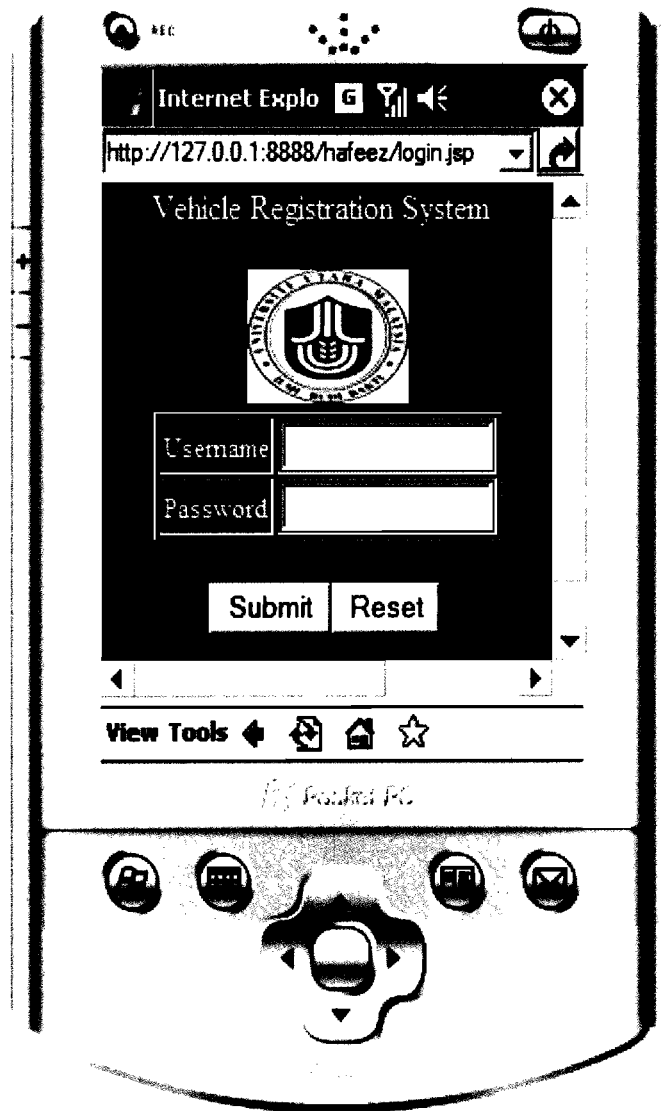**Figure 4.8**: Main Page of the WAP Based Vehicle Registration system.

Log-In PAGE

Figure 4.9: Log-In Page.
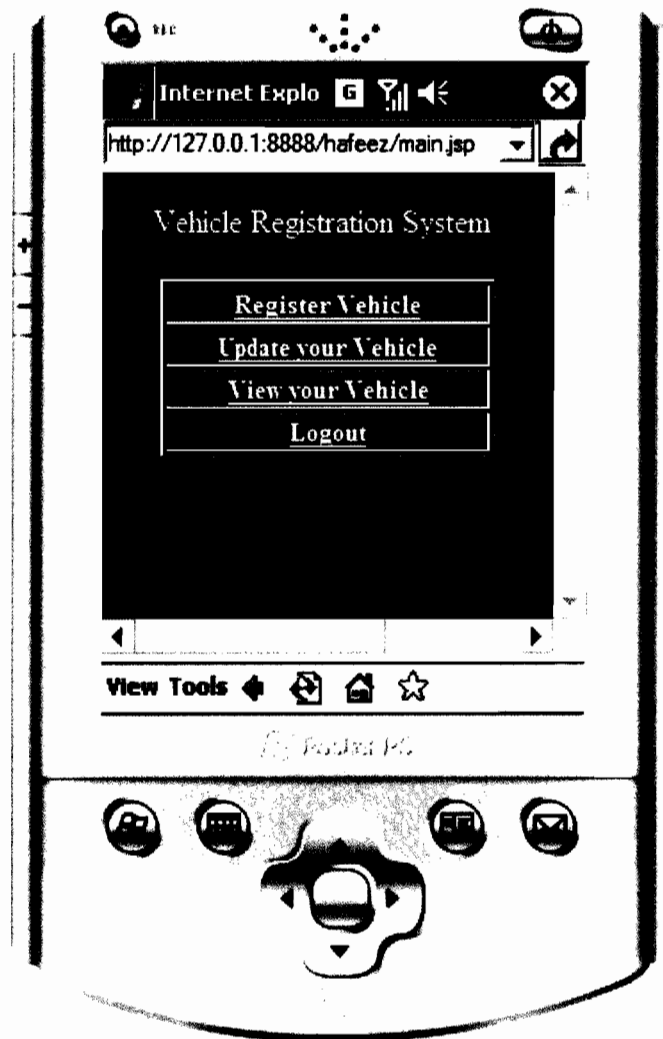
Main Page after Logged into the system

Figure 4.10: Main Page after Logged into the system.

Register Vehicle Page

Figure 4.11: Register Vehicle Page.

Update Your Vehicle Page

If the user clicks on Update Your Vehicle Button, the system will display all the

Vehicle Model and the user can choose the model the needs to change it information

by click on the type of Vehicle model.
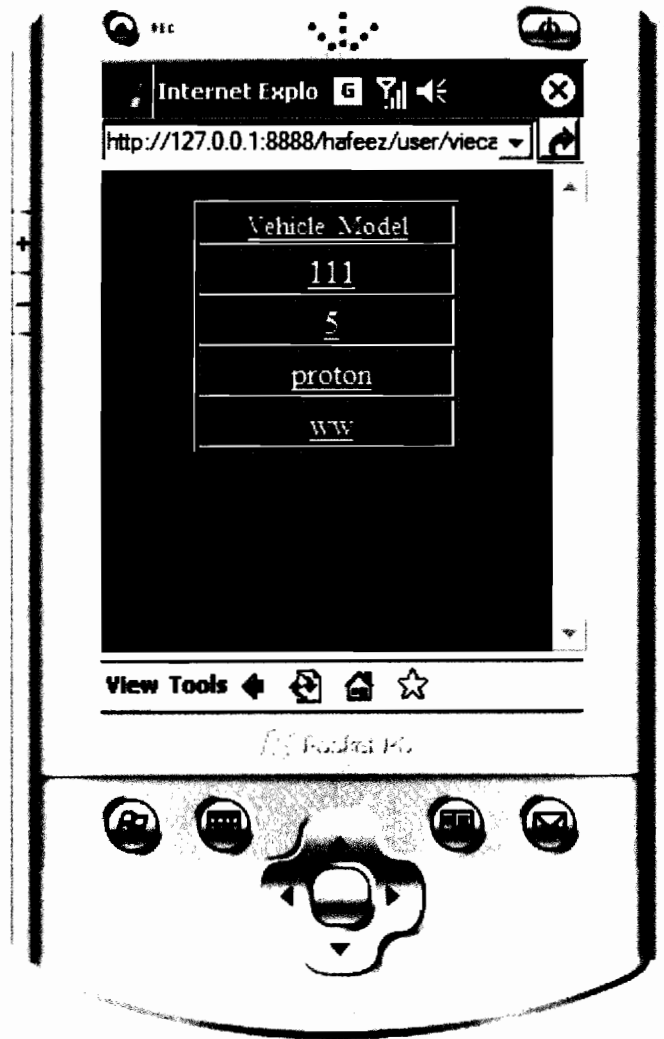

Figure 4.12: Update Your Vehicle Page.

After that the system will appear this page to update the details of vehicle.

Figure 4.13: Update Your Vehicle Page.

View Your Vehicle Page

Figure 4.14: View Your Vehicle Page.

4.8 Summary

In this chapter, the implementation of the sequence of the several steps for building the system is discussed and tested. The real system for Design of WAP based vehicle registration for UUM was developed. The main goal of the chapter was to highlight the architecture of the system. The result of running the system shows that the objective of the study is done successfully. The results and findings will be discussed in the next chapter.

CHAPTER FIVE

DATA ANALYSIS

This chapter represents the result of the study after the evaluation. A usability test was applicable in the evaluation. As such, this test required users to use the product. The moderator of the test gives predetermined test tasks one at a time, whereby test users were to perform with the user interface (Nielson, 1993). A total of 33 participants obtained the distributed questionnaires.

5.1   System Evaluation

The key goal of this section is to discuss the evaluation of the system. In the same manner, users are asked to use the product for evaluation. The moderator of the test gives prearranged test tasks one at a time to the test user, who in turn carries out the tasks with the user interface (Nielson, 1993).

5.2   Usability technique

A quantitative survey was accomplished. In this phase of methodology, the research covers mainly on the user's evaluation. It was conducted to determine users' perception on the usability aspect of the system. The instrument was developed based on previous studies. However, Davis (1989) concluded that the Perceived Usefulness and Ease of Use (PUEU) is a strong correlate of user acceptance and should not be ignored by those attempting to design or implement a successful system. All the results conducted will be shown on the following chapter.

45

The questionnaire of this study is divided into two (2) sections (Section A, B). Section A addressing the respondent's general information; Section B measuring the Perceive of Usefulness of WBVR.

5.3 Demographic data

Table 5.1: *Profile of Respondents*

	Percent	Frequency N=50
Gender		
Female	40%	20
Male	60%	30
Age		
20-25 years	04%	02
26-35 years	54%	27
36-45 years	22%	11
Above 46	20%	10
Education		
Diploma	12%	06
Degree	04%	02
Master	50%	25
Phd	14%	07
Other	20%	10

The table 5.1 shows the demographic information of the survey. Based on the above table, it shows that most of the respondents are male garnering 60%, while females got the percentage of 40%. Concerning the respondents' age remarks, the majority of the respondents were ages "between" 26-35 with 54%. Finally, the participant who qualified the highest percentage is the master's degree which has an equivalent of 50%.
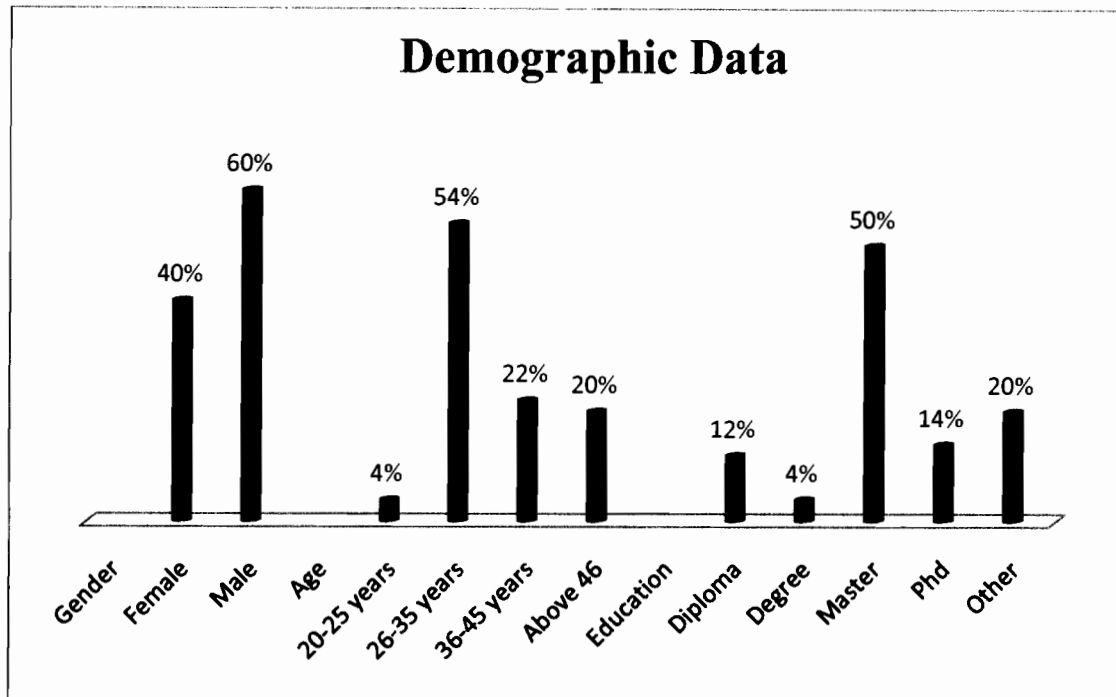
Figure 5.1: *Demographic Data*

5.4 Factor analysis

1	2	3	4	5
Strongly Disagree (Sangat Tidak Sseuju)	**Disagree** (Tidak Setuju)	**Neutral**	**Agree** (Setuju)	**Strongly Agree** (Sangat Setuju)

		1	2	3	4	5	Means
	Ease of Use						
1	Overall, I am satisfied with how easy is to use the (WBVR) Keseluruhan , saya berpuas hati dengan bertapa mudahnya menggunakan (WBVR)	00%	00%	00%	51.5%	48.5%	**4.4848**
2	It was simple to use the(WBVR) Ianya mudah untuk digunakan (WBVR)	00%	00%	18.2%	60.6%	21.2%	**4.0303**
3	The (WBVR) can motivate Participants to use the internet continuously.	00%	00%	09.1%	33.6%	57.3%	**4.4848**

47

	WBVR dapat meningkatkan motivasi pengguna untuk menggunakan internet secara berterusan						
4	Through (WBVR) Participants can get what I want more easily. Melalui penggunaan (WBVR) , pengguna boleh mendapat info secara mudah	00%	00%	03%	51.5%	45.5%	**4.4242**
5	With (WBVR) Participants can be more efficient. Dengan (WBVR) , pengguna dapat mengatasi pendaftaran kenderaan	00%	00%	00%	51.5%	48.5%	**4.4242**
6	I think it will be more convenient for Participants to use (WBVR) Saya berpendapat , pengguna akan berasa selesa dengan penggunaan (WBVR)	00%	00%	3.0%	48.5%	48.5%	**4.4848**
7	It was easy to learn to use (WBVR) Ianya mudah untuk belajar menggunakan (WBVR)	00%	00%	3.0%	57.6%	39.4%	**4.4545**
Usefulness							
8	(WBVR) is useful for the Participants. (WBVR) adalah sangat berguna kepada peserta	00%	00%	6.1%	39.4%	54.5%	**4.3636**
9	With (WPVR) Participants can get info quickly. Dengan (WBVR) peserta dapat mengumpul informasi dengan cepat	00%	00%	12.1%	63.6%	24.2%	**4.4848**
10	The information provided with (WBVR) is clear. Informasi yang diberikan oleh (WBVR) adalah jelas	00%	00%	00%	27.3%	72.7%	**4.1212**
11	With (WBVR), it is easier to find the information I needed. Dengan (WBVR) ianya mudah bagi saya untuk mencari informasi yang diperlukan	00%	00%	3.0%	54.5%	42.4%	**4.7273**
12	The information provided for (WBVR) is easy to understand. Informasi yang diberikan oleh (WBVR) adalah mudah untuk difahami	00%	00%	6.1%	48.5%	45.5%	**4.3939**

13	The information in (WBVR) is effective in helping Participants to vehicle registering. Informasi di dalam WBVR adalah efektif di dalam membantu peserta untuk mendaftar kenderaan	00%	00%	00%	51.5%	48.5%	**4.3939**
14	The organization of information on the (WBVR) screens is clear. Penyusunan maklumat di dalam skrin WBVR adalah jelas	00%	00%	00%	48.5%	51.5%	**4.4848**
15	(WBVR) interface is user-friendly. Hubungkait (WBVR) adalah menyenangkan	00%	00%	6.1%	63.6%	30.3%	**4.5152**
16	(WBVR) is flexible to interact with Participants. Saya suka akan hubungkait di dalam WBVR	00%	00%	00%	36.4%	63.6%	**4.2424**
17	Overall, I am satisfied with (WBVR) Secara keseluruhan saya berpuas hati dengan WBVR	00%	00%	9.1%	57.6%	33.3%	**4.6364**

Table 5.2: Factor Analysis

From the above table, the Means Value is approximately equal to 4. Therefore, most participants agreed that WBVR system in the usefulness analysis is a user-friendly interface.

5.5   Summary

Based on the part of the evaluation and after using a quantitative survey, it can be noted that, most of the respondents show a very positive opinions when dealing with the system. Of course still need more work in order to adjust the system where it will be giving further explanation in the implantation section. Finally and, with no more ado the next chapter will address the final discussion and the ending conclusion of this work.

CHAPTER SIX

CONCLUSION

6.1   Introduction

This chapter will conclude the project by summarizing and reviewing the findings found within project and presenting project contribution, problems and limitations, and the direction of the future works.

6.2   System advantages

The prototype of WAP vehicle registration system for UUM was successfully developed based on the design principles and user requirements. The system was developed using JSP language and MYSQL was used as the database. Like the research said before, this system was developed in order to assist UUM to solve the problems faced during the operation of vehicle registration. Therefore, now it is the perfect time to introduce the advantages offers by this system:

1. The system was user-friendly and easy to use based on the findings in the evaluation testing phase. This showed that users are happy with this system. The system also had been designed as simple as it could with not too many graphical items in the page.

2. The systems could save times when it comes to the matter of vehicle registration. Because the process of vehicle registration will be done by the Mobile.

3. A WAP vehicle registration system offers more convenient system which is possible to be implemented at UUM as well as the students & staff will not have problems to register through mobile devices.

4. The results of the system usability and Usefulness were reliable and trusted. Based on the respondents reaction.

6.3 The findings of this project

As was explained though chapter one, the objectives of this study are to develop the prototype and do usability testing. In addition, the project has provided a prototype of the WAP-based vehicle registration for UUM in order to help users (students and staff) to do their vehicles registration more easily anywhere at any time using their mobile phone.

In the first objective, the design phase was discussed details in chapter four. All related diagrams were also visualised, as well as the second objective was provided a prototype of the WAP-based vehicle registration for UUM in order to help users (student& staff) to do their vehicles registration more easily anywhere at any time using their mobile phone, furthermore the last objective was investigated user satisfaction that were done in order to achieve this project .The methods and the results were discussed details in chapter five.

6.4 Problem and Limitation

This study focused on designing and developing a WAP system in order to be used by UUM as a more effective way to arrange the operation of vehicle registration and thus making sure that the operation of vehicle registration is delivered to all staff and

students owning vehicles in UUM. However, some problems and limitations emerged throughout the development of the project as follow:

1. Although this is a WAP based system, it has yet to be published for the final testing and real time usage by the university administration due to time constraints and publishing complications since real time usage may face some network specific or performance problems.

2. This system was develop as a prototype only and needs more features and enhancement to make it robust.

3. This system did not capture overall design and requirements; certain parts cannot be function well due to time constraints.

4. This study was limited to making a prototype rather than developing a real system. Due to funding and resource the WAP based system has been tested through mobile.

6.5   Contribution of Work

The prototype was developed using JSP language to create a Wireless Application Protocol for the students and staff. MYSQL Database is to stores all information to users (students and staff). The prototype has been evaluated and the objectives of this project have been achieved. However, in doing this project, there were three contributions that want to achieve. The contributions were:

1. WBVR hopefully could provide a user, comfortable and reliable methods the representative of WBVR not only at UUM but also to be implemented in other universities in Malaysia.

2. Besides that, WBVR also intended to expose the students & staff to the current ICT technology that been used nowadays.

52

6.6   Recommendation

During the development of this system a number of issues concerning design and development surfaced. Future design and development of related projects could be done based on these considerations:

- Integrating this system with other similar related databases could be a possible solution to solve the problem mentioned before.

- In order to make others benefit from these experiences this system productivity and efficiency should be enhanced. Questions should be asked about problems that exist in the system and seek solutions or recommendations in order to enhance the system interactivity to develop the operation of vehicle registration.

6.7   Summary

WAP based vehicle registering (WBVR) prototype was developed to help UUM vehicle owners to speed up their recording of their vehicle's information via mobile devices. The prototype was evaluated and the results confirm that it is useful for users and it is capable to help them to make their registration easier. Advances in internet technology such as WAP have enabled fast data transmission. However, without effective management of these resources, congestion of networks as well as waste of resources is inevitable. Therefore, it is necessary to supervise, report, and even control, if necessary, the network resource status so that the communication network can be effectively operated without service interruption by monitoring traffic among the hosts. Web-based network management systems have been developed and applied for remote management without using specific applications. However, such web-

53

based network management systems have limited manager mobility and poor performance.

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QUESTIONNAIRE

WAP BASED VEHICLE REGISTERING

Prototype Evaluation

This questionnaire is divided into two (2) sections (Section A, B). Section A addressing respondent general information; Section B measuring the Perceive of Usefulness of WBVR and measuring the Perceive of Ease of Use of WBVR. Respondent are required to answer all the questions in order to complete the session.

In Bahasa Melayw

Borang kaji selidik ini dibahagikan kepada dua (2) seksyen (Seksyen A, B) .Section A mengenalpasti butir-butir latarbelakang responden mengukur pandangan berkenaan dengan kegunaan WBVR dan juga mengukur pandangan berkenaan dengan kebaikan penggunaan WBVR.

Responden dikehendaki menjawab kesemua soalan yang diberikan untuk menyempurnakan sesi soal jawab .

Abdulhafid Bughari Abdulkarim
College of Arts and Sciences (CAS)
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(Section A)
Respondent General Information.

This segment is about your background information. Please fill up the blanks and mark [√] where appropriate.

Gender: [ ] Male   [ ] Female.
Jentina: [ ] Lelaki   [ ] Perempuan
Age: 20-25 [ ], 26-35 [ ], 36-46 [ ], above 46 [ ].
Umur : 20-25 [ ], 26-35 [ ], 36-46 [ ], atas   46[ ].

Education background:
Latar belakang pendidikan :
[ ] Diploma   [ ] Degree   [ ] Master   [ ] Ph.D.
[ ] Diploma   [ ] Sarjana muda   [ ] Sarjana   [ ] Ph.D.

(SECTION B)

Perceived usefulness and ease of use

For the next segments, please check or shade the answer to the following questions using the scale below.

		1 Strongly Disagree Sangat Tidak Sseuju	**2** Disagree Tidak Setuju	**3** Neutral	**4** Agree Setuju	**5** Strongly Agree Sangat Setuju
Ease of Use						
1	Overall, I am satisfied with how easy is to use the (WBVR) *Keseluruhan, saya berpuas hati dengan bertapa mudahnya menggunakan (WBVR)*	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
2	It was simple to use the(WBVR) *Ianya mudah untuk digunakan (WBVR)*	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
3	The (WBVR) can motivate Participants to use the internet continuously. *(WBVR) dapat meningkatkan motivasi pengguna untuk menggunakan internet secara berterusan*	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
4	Through (WBVR) Participants can get what I want more easily. *Melalui penggunaan (WBVR), pengguna boleh mendapat info secara mudah*	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
5	With (WBVR) Participants can be more efficient. *Dengan (WBVR), pengguna dapat mengatasi pendaftaran kenderaan*	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
6	I think it will be more convenient for Participants to use (WBVR) *Saya berpendapat, pengguna akan berasa selesa dengan penggunaan (WBVR)*	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
7	It was easy to learn to use (WBVR) *Ianya mudah untuk belajar menggunakan (WBVR)*	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
Usefulness						
8	(WBVR) is useful for the Participants. *(WBVR) adalah sangat berguna kepada peserta*	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐

60

9	With (WPVR) Participants can get info quickly. *Dengan (WBVR) peserta dapat mengumpul informasi dengan cepat*	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
10	The information provided with (WBVR) is clear. *Informasi yang diberikan oleh (WBVR) adalah jelas*	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
11	With (WBVR), it is easier to find the information I needed. *Dengan (WBVR) ianya mudah bagi saya untuk mencari informasi yang diperlukan*	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
12	The information provided for (WBVR) is easy to understand. *Informasi yang diberikan oleh (WBVR) adalah mudah untuk difahami*	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
13	The information in (WBVR) is effective in helping Participants to vehicle registering. *Informasi di dalam (WBVR) adalah efektif di dalam membantu peserta untuk mendaftar kenderaan*	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
14	The organization of information on the (WBVR) screens is clear. *Penyusunan maklumat di dalam skrin (WBVR) adalah jelas*	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
15	(WBVR) interface is user-friendly. *Hubungkait (WBVR) adalah menyenangkan*	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
16	(WBVR) is flexible to interact with Participants. *Saya suka akan hubungkait di dalam (WBVR)*	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
17	Overall, I am satisfied with (WBVR) *Secara keseluruhan saya berpuas hati dengan (WBVR)*	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐

Thank you for participation