IDENTIFICATION SYSTEM FOR SECURITY DEPARTMENT

by

Mohd Shahril B Mohd Shahid

Dissertation submitted in partial fulfillment of

the requirements for the

Bachelor of Technology (Hons)

(Information System)

December 2004

Universiti Teknologi PETRONAS

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Perak Darul Ridzuan

CERTIFICATION OF APPROVAL

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Approved by

_____

(Mrs. Aliza Sarlan)

UNIVERSITI TEKNOLOGI PETRONAS

TRONOH, PERAK

DECEMBER 2004

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.

MOHD SHAHRIL MOHD SHAHID

ABSTRACT

Delivering real-time surveillance services to handheld devices over the Internet is an interesting application in the mobile environment. Developing such system needs tackle considerable design challenges including device downsides, platform heterogeneity and bandwidth limitation. In University Technology Petronas (UTP), the wireless technology is currently not very popular. Therefore, the purpose of this project is to introduce the wireless technology to the security department of UTP by strengthening the security summon, sticker, key booking and matrices card manual procedure and system from any violation and modification of information that can be detected easily and corrective action can be taken faster. As UTP become evolve and grow, security department rule are become huge. Therefore they need to prepare them with efficient computerized solution to perform data update and to access data from diverse location.

The objective of this paper is to research on wireless technology that is suitable for security department system and suitable for UTP environment. To elaborate this, we can see that this system is integrated with Personal Digital Assistant (PDA) that equip with Bluetooth technology. With the capabilities of 10 meters radius sphere, this system can be accessed via the PDA in that range and data transfer rates are comparatively slow at 1-2 megabits per second. But there is another that can be used which is WIFI with the range of 30 meters and data transfer rated at 2-11 megabits per second. For the purpose of this project Bluetooth technology have been chosen to show the system functionality and performance. The methodology use for the project is Rapid Application Development that has four phases; requirement planning, user design, construction and cutover. The suggested solution will lead to build a prototype of new computerized system that can be accessed using the PDA for Security Department of University Technology Petronas..

ACKNOWLEDGEMENT

Bismillah ar-Rahmani Ar-Raheem

In the Name of Allah, The Most Compassionate, the Most Merciful

First and foremost I would like to recite my greatest gratitude to the Most Merciful Allah for giving me the opportunity in completing this manuscript on time and without much hassle or problem. Without His observance in giving me the chance in finishing the report, there might be major problem which can resulted in delay of turning in the report in the time constrain.

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3. **Parents and families** (for giving the full moral support in completing the report in addition to the consultation they have given during my troubled times)

4. **Friends** (as they have been there for me during the good and bad times as we stay together under the same varsity)

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ABBREVIATION AND NOMENCLATURES

PDA	Personal Digital Assistant
RAD	Rapid Application Development
ASP	Active Server Page
PHP	Personal Home Page
PCs	Personal Computer
I/O	Input/Output
UTP	University Technology Petronas
SMS	Short Message Service
IBIS	Identification-based information system
IIS	Internet Information Services
RAM	Random Access Memory
IrDA	Infrared Data Association
HTTP	Hypertext Transfer Protocol
VB6	Visual Basic 6.0
WAP	Wireless Application Protocol
GPRS	General Packet Radio Services
3G	3-Generation
LAN	Local Area Network
WIFI	Wireless Communication (802.11b)

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CHAPTER 1

INTRODUCTION

At a decade of 90's the use of Personal Computer (PC), became common in several different application areas due to fall of its price. The spread of PC's all over the world and its connection through networks, intranet or Local Area Network (LANs), made this equipment a mean of communication between people from different parts of the world. The achievement enabled a faster and even more effective communications (e.g. chat, e-mail, net-meetings, etc) between people. This interconnection stimulates the mobility and data exchange between people of remote locations. The necessity of mobility implicates a new kind of technology. Based on this new reality, new devices started to emerge with processing capabilities similar to some PCs but requiring no static power sources, i.e. devices that allows the development of automation tasks but with onus of mobility. Personal Digital Assistant (PDA) devices are more and more sophisticated in memory, I/O devices capability, wireless connectivity, internet accessibility, etc. Nowadays a new horizon as come up, the development of software to portable wireless devices which communicate with other devices through Bluetooth or other communication technologies such as Infrared Data Association (IrDA). The software initially simple to mobile phone and personal agendas is now become more complex because devices like PDA have more and more application target fields. Nowadays one question remains. Why not use these small devices in application that require small processing requirements? Why not used them in some monitoring, alarm and domotic applications? In this paper it describes an application that is being developed to help the security department of University Technology Petronas (UTP) in monitoring the status of the student's information using the PDA with wireless technology to strengthen the security quality services issue in UTP.

1.1   Background of Study

The purpose of this project is to perform a research about the transformation of working environment from the manual to more computerized system. The new computerized system will reduce the widely use of paperwork and will replace it with simplified automated requests and procedure that ensure fast and efficient workflow of the business process. Currently, security department have their own system in handling the issue of summon, sticker, matrices card and key booking. But the system that they use seems not efficient anymore. So with this project, authors try to develop a prototype system which is more suitable and compatible with the current technology and reducing the risk of manual system. In current manual system, students have to spend their time visiting the security department to apply for sticker, matrices card and key booking. Students have to wait for a week before the application process completed. Sometimes student do not aware of their application status whether it is completed or not. So with this issue, students can not been blamed because of the lagging manual system. Since there are many types of tool that can be used to improve the current situation, this project will focus on the PDA as mobile devices. This system will respond to the real time environment transaction that will update the information once the executable instruction is click. With the use of PDA as a tool, this system will put on some value added functionality and retain some of the same basic functionality of the current security department system. This identification system now offers greater capabilities for customizing searches with limits and manipulating results which ultimately mean getting the information faster and accurate in remote place.

1.2   Problem Statements

Currently in UTP, the security department is trying to improve their working style in managing the issue of summon, matrices card, stickers and key booking. But the situation is currently unchanged because of the inefficiency of data storage due to manual keeping of data. This happen because the data is not updated and as the UTP students become more and more, it require more data storage and require more space. The summon ticket keeping process is also not efficient. The security personal need to keep track all the student record by key in all the data twice. Sometimes, the data is redundant and sometimes the information given by student is not matching and inaccurate. Therefore, the security personal can not trace who are the real owners of the ID number. In other situation, we can see that car sticker issuing also become a major problem to security department. Student is not aware of their sticker status. Sometimes, with their own creativity, they erase the number that been written by the security personal to use it to another vehicle. So they do not have to apply for another sticker and wait for sticker process which probably time consume and limit their movement to come and out from UTP.

1.2.1 Problem Identification

Some problems faced by the existing system are as follows:

- Time Consuming

  Manual system of summon and vehicle sticker that currently use is time consuming and requires a lot of work in transferring data from one sheet to another sheet.

- Data Redundancy

  Redundancy of data encounters when different security personal inserts the same student misconduct using the same student id which will lead to revert of student false and database error.

- Wrong Data

  Different record with the different student name or id on the manual system receipt and sometimes the information does not exist.

- Change of Detail

  False information by the student which can lead to difficulties in tracing them when security department wants to issue summons. This happen because every semester student keep on migrating from college to another college, therefore the student college address also keep on changing every semester.

- Dispersed Location of Database Accessibility

  Dispersed location required information to be accessed at once.

1.2.2 Significant of the Project

The significant of this project to the problems is the enhancement of security department into new environment which is a computerized system of UTP vehicle and summon system. The product and guideline of this project will give ideas and alternative design especially on the system framework and structure which will lead to the system functionality. Currently, security department always had been blamed on the student misconduct. This happened because students are not aware of the rules and regulations that have been stated by the university. Therefore when the security wants to issue a summon tickets, student always asked them back of the rules and regulations. Therefore, with this system student can get latest information and current situation in UTP on any events that involve student participation such as parking issues.

This system will increase in sharing information between each department (security and finance) that will create intelligent partnership to increase the efficiency in work. Furthermore, student information can be easily updated, retrieved and modified. This system can retrieve student information by key-in their Matrices number using PDA. It will provide the number of summon ticket receive by the student during their studies at UTP. This system will emphasize on wireless communication technology to help the Security Department (or other organization) and student for retrieving information at a remote place more easily and effectively. On the other hand, the workload of the call centre can be reduced.

Besides, student also can easily view information on new restricted area and misconduct that they have committed. Then summon will be issued to the student via e-mail to notify that the action have been taken by the security department. Apart from that, this project also will encourage the usage of new technology to be adopted in UTP security department.

1.3   Objective and Scope of Study

1.3.1   The Relevancy of the Project

The rational behind the project is to highlight some improvement in security department in managing their working environment. Besides, the aim of this project also to introduce wireless technology in security system by using PDA tool. PDA which equipped with window platform environment will make it easier to be adopted by any security personal, thus simultaneously a good result can be achieved in a split second without hesitate.

1.3.2   Objective

- To identify on wireless technology that is suitable for security department system and suitable for UTP environment.
- To develop prototype system for security department.
- To analyze on the wireless performance and their respond time in dispersed location at UTP.
- To describe on the compatibility of the interface design of the system in Personal Digital Assistant.
- To analyze the current business process of security department.
- To study on hardware and software compatibility for the wireless technology.
- To make it easy for the students to check whether they have any summons.
- To simplify the process of vehicle registration for students and staffs.

1.3.3   Scope of Study

Currently, the students always complain about the inefficiency of the vehicle registration process and procedure. They have to go to the security department to fill in the vehicle registration form, and then go to the finance department to pay for the registration fee then, go back to the security department to get their car/motorcycle sticker. This tedious procedure could be eliminated if the registration form can be filled online. With the new system, students are requested to register their vehicle by filling their relevant particulars in the form provided online. Once the Security Department receives the applications, they will produce a list of student's name who applies for the vehicle registration and submit it to the Finance Department. Meanwhile, the students can already settle the payment for the registration process to the Finance Department whilst waiting for the Security Department to process their application. When the registration process is completed, the student will receive a notification via e-mail and they just need to bring photocopies of his/her driving license and the grant of the vehicle.

Therefore this system suggested to:

- understand the concept of database accessibility through PDA (Personal Digital Assistance).
- develop summon system prototype which enable data to be viewed, retrieved and insert using PDA.
- develop summon system with PDA user interface display.

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CHAPTER 2

LITERATURE REVIEW

System Development is a challenging undertaking that is often critical to the safety of humans and welfare of business (Zahran, 1998). Problem caused by low quality, unreliable software application include widespread inconvenience and loss of life. Digital identification technology may be providing a simple, cost-effective solution to all. This system enables to issue durable, tamper-evident IDs to students, faculty and staff for a minimal capital outlay. Brilliant, true-to-life photos can help campus protect them by giving their staff the ability to identify, at a glance, which should and should not be in and around the campus at all times. This system will help given advantage to the security to identify their student at any given place and time. In addition to the visual elements on ID card themselves, this digital identity system allows you to build powerful database of images and information for multiple uses around your university (Datacard Group, 2004).

In developing this system, the plan is to provide wireless system with PDA's and have distributed database. This database consists of two or more data file located at different sites on a computer network. Because the database is distributed, different users can access it without interfering with one another. However, the DBMS must periodically synchronize the scattered databases to make sure that they all have consistent data.

It needs a good research in the hardware and software analysis, if the system needs to produce a good result as it expected. This research important to improve

software quality result from this effort will increase the product reliability and enhance customer satisfaction (Grady, 1997).

Over the past few years, wireless industry analyst has speculated as to the uptake of wireless in the enterprise. While there are still many divergent views, the interest in wireless messaging and notification applications has been consistently gaining momentum. The most recent wireless metrics point to global mobile device proliferation and popularity of Short Messaging Service (SMS) technology as evidence of the impact wireless messaging is having in the enterprise. According to Strategies Group (2002), the U.S. mobile data market will increase from 5 million subscribers last year [2001] to 172 million in 2007. In-State they expects the number of business wireless data users to grow from 6.6 million at the end of 2001, to more than 39 million in 2006. According to IDC (1999), by the end of 2006, roughly two-thirds of U.S. workers will be mobile workers.

PDA (Personal Digital Assistant) is a new technology that builds with a compact specification as similar to Personal Computer (Pc's) that give a relief to a person whom always travel from one place to another. How the PDA's can help the security to trace the student identification? According to Kelly J. Harris Director (2001), Justice IT Service for SEARCH, "While PDAs have yet to gain widespread acceptance among law enforcement agencies, wireless handhelds have generated a lot of interest and there's a lot of product testing going on. This show that PDA's is not only for store document and downloaded document only but it can help in law enforcement. Some trend from a big company giving out the PDA's to their CEOs and employees more and more often show that this device is important part in working environment. In other opinion, Harris said that "PDAs won't replace laptops, but they can fill a large gap for officer on foot, on motorcycle and bicycle patrol. They are most useful in conducting instant check and for writing citation".

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Based on observation in our campus, security department is still using conservative method on tracing their student. It is more complicated when at the main entrance where security needs to check every car that come into our campus, this really time consume and insufficient. Furthermore, when the security want to issue a fine, their need to ask the student their ID number and this give opportunity to the student to give false information by giving a wrong ID number. This happens because security doesn't recognize the student faces and ID. So if this thing happens other student might be caught as other student false.

According to bicycle officer Lisa Flores "It is easy for us to look up records, check the status of criminal incident or even run background checks on individuals while continuing to patrol the city". Another example that we can see is at the Thirty Bellevue Police Department officers who patrol on motorcycle or bicycles have been given Palm VIIx wireless handhelds to connect with the state police database. This access lets them confirm validity of driver license, license plate and other information stored in the archive. Officer also can access current and pending calls from dispatchers using software provided with the PDAs. This show that Identification with mobile device can support and reduce the number of transaction that department need to handle with updated information every time and anytime basis.

"The student really like it because it's state-of-the-art technology and it lets them work as groups anywhere in the room without wires" Nils Freeholm (1993).

This shows that wireless network are acceptable by many people. Based on the opinion by Nils Freeholm wireless technologies really give a greater impact in business. Wireless technology is not something which is unfamiliar this day. It enables mobile device to communicate with each other and making this world small in sharing and finding information. With this technology and effort by the expert, wireless is become so helpful and successful. According to police in California, a new wireless

identification system has passed its trial run with flying colors. A major advantage of IBIS (Identification-based information system) over similar technology, Visionic spokespersons Frances according to Zelazny (2001) "wireless NewsFactor is that it captures face recognition data as well as fingerprint data. In addition, crime scene photos can be taken with this equipment, she said".

The system enables multiple data input while responding to each input separately and waiting for separate responses. "The successful deployment of IBIS by the Ontario Police Department is a testament to the ways this technology can be used to improve efficiency and streamline operations by police, especially as many departments face budget constraints," Zelazny said. "Officers don't have to take subjects to the station house. It's a very easy way to ID someone." With this kind of accommodation, the number of criminal can be reduced and more respect can be earned by the department who use this system because it shown the efficiency and effectiveness of work. Eventhough the aim of this paper only for small scope rather then police department and other law enforcement agency that control large community of people but this will give some evident of successes that wireless technology can help in reducing criminal.

According to Dr. Joseph Atick (2001), "The immediate feedback that we have received from the Ontario Police Department is encouraging as it illustrates the potential that IBIS has to revolutionize the way policing is conducted worldwide". The system will give a greater impact on student if this system can be implemented successfully. It will handle large amount of data. So securities do not need to memorize the entire student or to check file for student information or equip themselves with large book of rule and regulation and student faces or ID's. This because police patrol themselves isn't equipping with large amount of information. "It comes as no surprise that the use of wireless data by public-safety agencies is widespread. It is becoming rare that a patrol vehicle isn't equipped with a mounted mobile-data terminal," said David Rosi, vice president and general manager of Aether's mobile government division.

CHAPTER 3

METHODOLOGY / PROJECT WORK

3.1 Procedure Identification

The methodology being used in this project to develop a wireless identification system is the Rapid Application Development (RAD). This methodology is chosen because it is the most suitable methodology in development to decrease time needed to design and implement information system radically. This technique emphasizes extensive user involvement in a rapid and evolutionary construction of working process of a system to accelerate the system development process. This methodology needs more participation from user and administrator involvement which contributed to compatible system and satisfy user's need. Thus the flexibility of this methodology will allow and give opportunity to developer in refining each phase more precisely and at the same time assist in using the system without hesitate.

For this project, the RAD technique has four phases; requirement planning, user design, construction and cutover. The requirement planning phases is where the research works for this project. Since the project outcomes are the product and prototype of the system, this phase will identify the requirement and will set the functionality of the system which leads to the major contribution on the information needed for the whole project works.

And each phase will define the following scope:

i. requirement planning

In this first phase, author will identify objectives and requirement specification for the application or system and to determine functions (high-level process decomposition).

ii. user Design

Second phase of the methodology, author will design and refine the development phase. This refine and design process is based on the review outcomes from Requirements Planning which is include of scope, objectives, data models, reports. Then, I'll make the initial design (using prototyping) by developing the prototype.

iii. construction

In the construction phase, author will design tests and make some adjustments of the prototyping. Then the system will be tested by the user which is the security staff to validate and review modules as they are built. The outcome from the test will lead to modification in design, and code then optimized.

iv. cutover

The last phases of this methodology will require conversion data and system to develop. Author will fully test the system (unit, system, volume etc). When this conversation and modification is completed, author will prepare a final documentation for the product.

3.2   Required Tools

3.2.1   Software Requirement

The project is reliable and requires a middle cost budget. It is a web-based project, so in order to develop the system, author uses Macromedia Dreamweaver and Microsoft Visual Basic 6.0 as a platform to build the web site. Besides that, the Adobe Photoshop 7.0 is used to create graphic and modify images to give better illustration in attract user attention. For the server side part, it needs some consideration in choosing between the Internet Information Services (IIS) or Apache. When the web server has been set up, the author will browse through web browser whenever the website has been published. Actually, in developing the system, author spends more time on searching for open sources software so the cost expense can be maintained in affordable cost. Therefore, author had chosen Apache as the web server and as for the programming language, author determine to use Personal Home Page (PHP). The selection of this programming language because it is open sources and also there are many source available from the reference books, websites and forum.

Another critical part in developing this system is to connect the website with the existing security department database and set up a connection from the PDA to the website in Personal Computer (PCs) which will allow the data accessibility by the security. Furthermore some changes need to be done on the PDA user interface to provide synchronization of function between the PDA, website and database. Nowadays, the evolution of PDA which has the similar capability of the Personal Computer (PCs) allow the platform of the pocketPC operating system to be modified as similar with what we create for a new system or program in normal PCs. Therefore this issue can be reduced but in other situation author still need to learn a language which is

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compatible to the window CE platform in order to the user interface function as expected. These are the listed authoring tools required for developing this system:

Software	Description
▪ Personal Home Page (PHP) / Active Server Pages (ASP)	The programming language use for scripting
▪ Macromedia Dreamweaver	To develop the website
▪ SQL / Oracle/ MySQL	A Database Management System (DBMS) to create the database application
▪ Microsoft Visual Basic 6.0	A software platform for modify the User Interface
▪ Adobe Photoshop 7.0	The software used to design graphic and images
▪ Apache or Internet Information Service (IIS)	Software used to configure server setup
▪ Microsoft Internet Explorer	The web browser used for testing the web design

Table 1 Authoring Tools for Developing This System

3.2.2 Hardware Requirement

The hardware requirements (not the minimal requirement) to develop and run the system are:

- Operating System-Windows Xp
- Computer-Multimedia Personal Computer
- Monitor- 17 inch (1024 x resolution)
- RAM – 256MB
- Hard Disk Space-40 GB
- Processor – Intel Pentium IV
- PDA - Hp iPAQ 1940 with Bluetooth capability
- Bluetooth Dongle – establish connection between PDA and PCs in wireless environment

The hardware requirement is important and critical as to make sure the project run smoothly and fast. Appropriate RAM in term of speed and swapping is required to ensure the hardware able to execute task and transaction occur simultaneously. Disk space for storage also important element in ensures the system capabilities and smoothness. Larger disk space will allow large storage of data and at the same time the capability of traffic during transaction of data will not crash and cause the database error.

CHAPTER 4

RESULT AND DISCUSSION

4.1 Results and Findings

Result and finding is the critical and most important part in the project. All the research and product presented in this section. In this report, the result and discussion shown is for the final stages. But some modification and changes will occur if the compatibility of the hardware and software are hesitated. Therefore the research is still in progress. This report is based on the every stage of the methodology which is the requirement resource planning and a part of user design process. The sources of research are collected from the informal interview, the internet, the reference books, newspaper articles, journals and research paper. These are the activities done about project together with the findings explained.

4.2 Data Gathering and Analysis

4.2.1 Website Prototype Design

A prototype system is built to provide a platform for the evaluation of an interface based on a PDA. The prototype main purpose was to provide enough functionality to allow heuristic evaluation of the potential of a handheld device to function as an extension of a mainstream security system in order to provide true mobility to user of the system. The prototype should be able to demonstrate area strengthen and weakness in user interaction of an interface used such as device.

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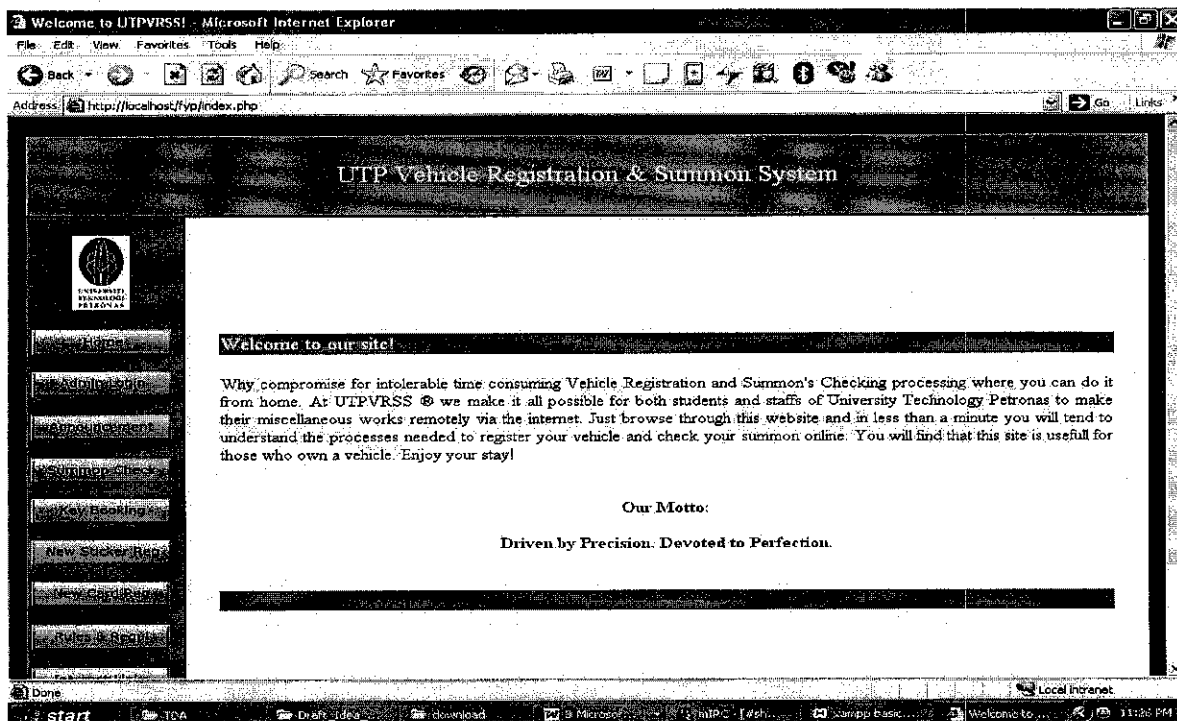
Figure 1: Index Page for The System
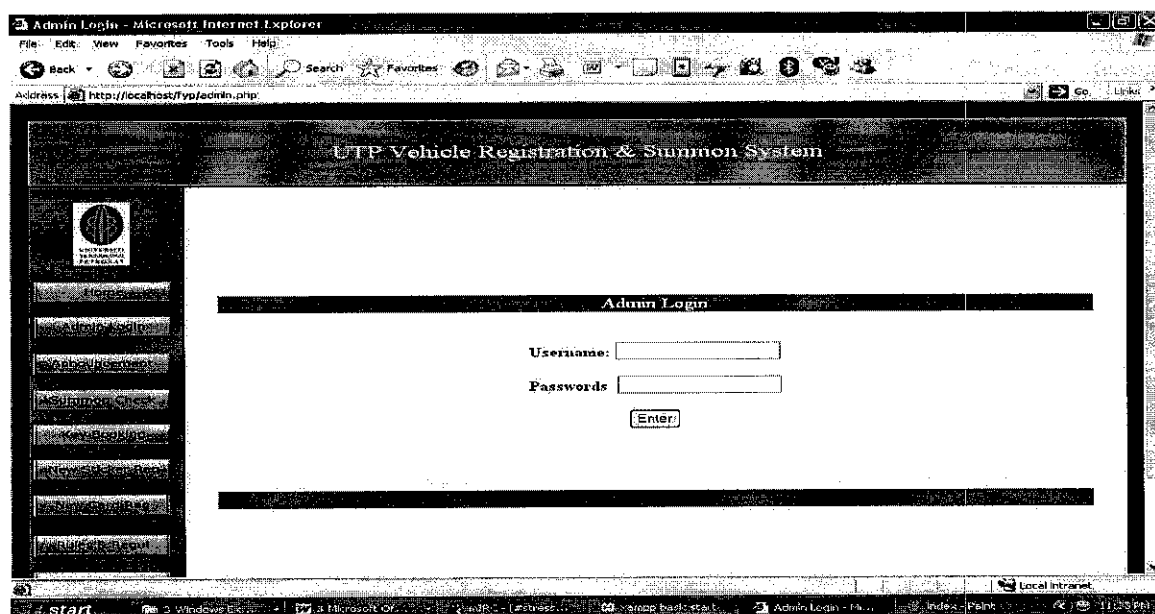
Figure 2: Admin Login Page
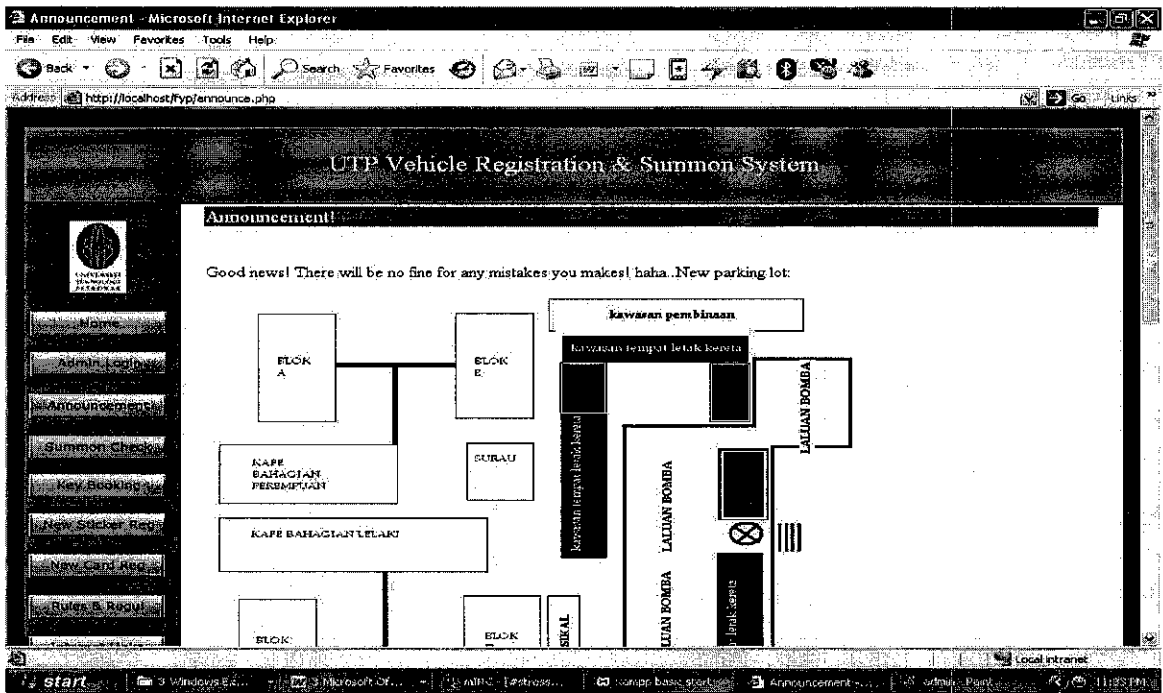
Figure 3: Announcement Page

Figure 4: Summon Search Page

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Figure 5: Key Booking Page

Figure 6: New Card ID Application Page

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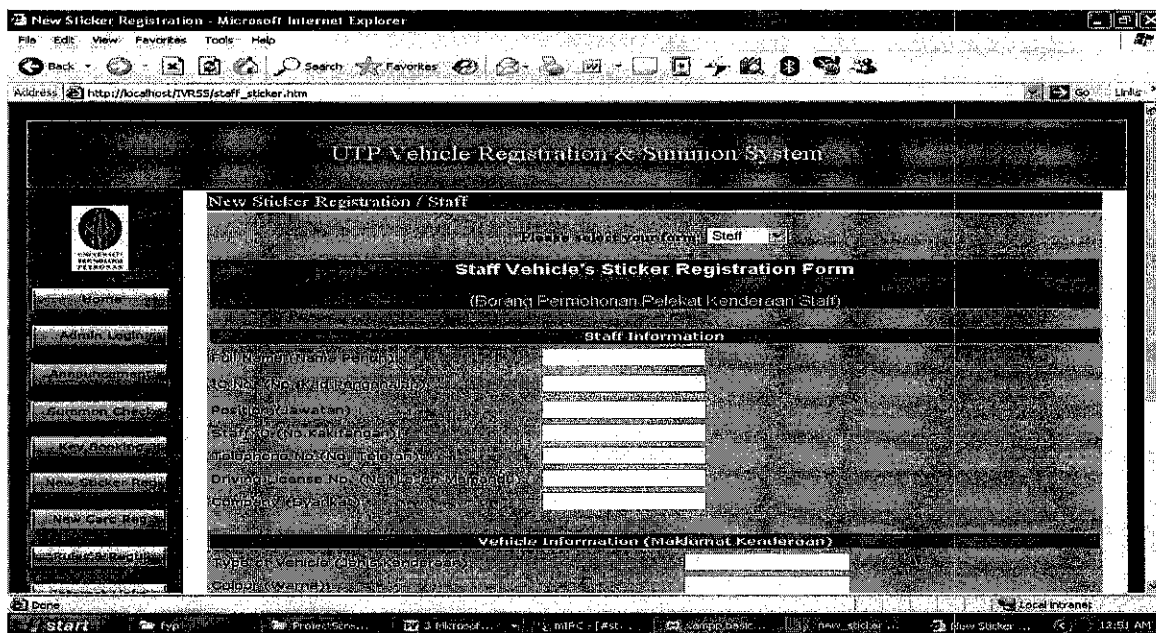
Figure 7: Vehicle Sticker Registration Page
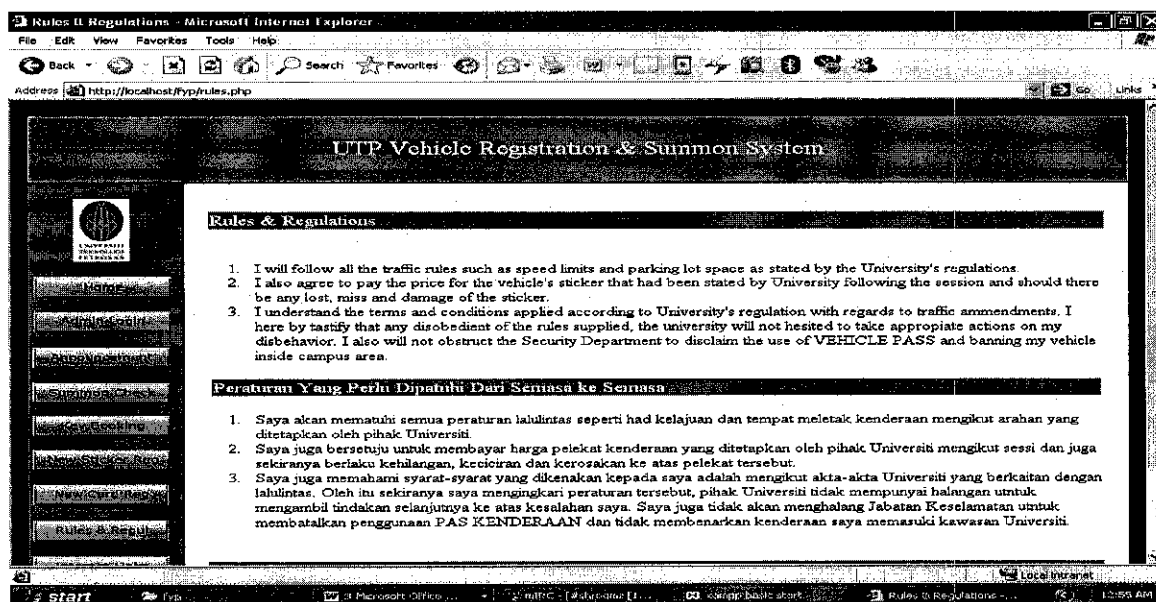
Figure 8: Rules and Regulations Page

Figure 9: Key Booking Results Page

Figure 10: Student Card Application Results Page

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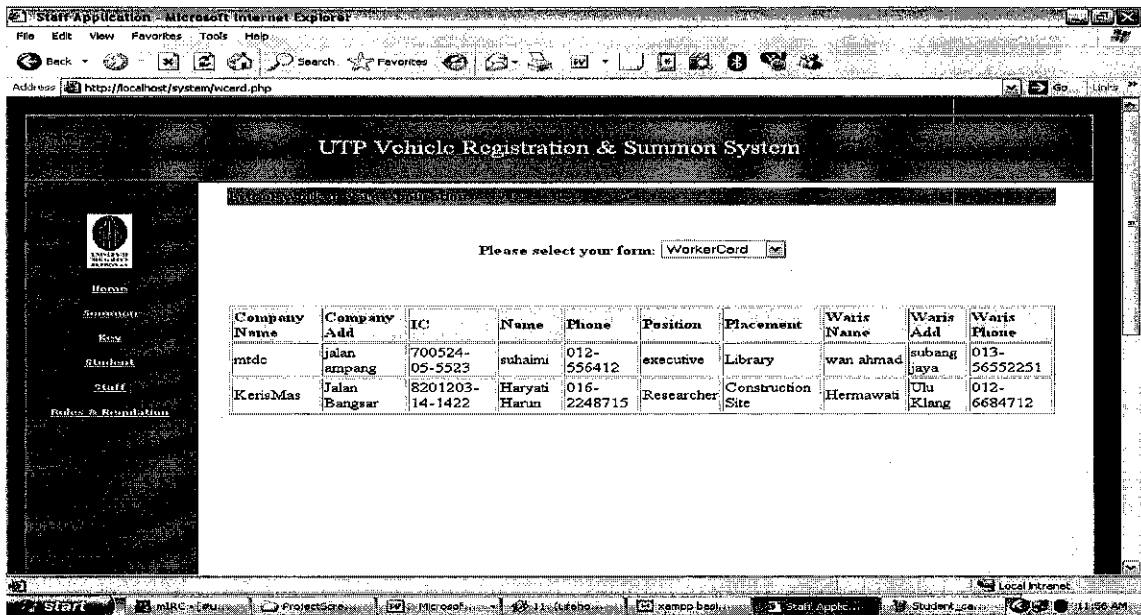
Figure 11: Worker Card Application Results Page
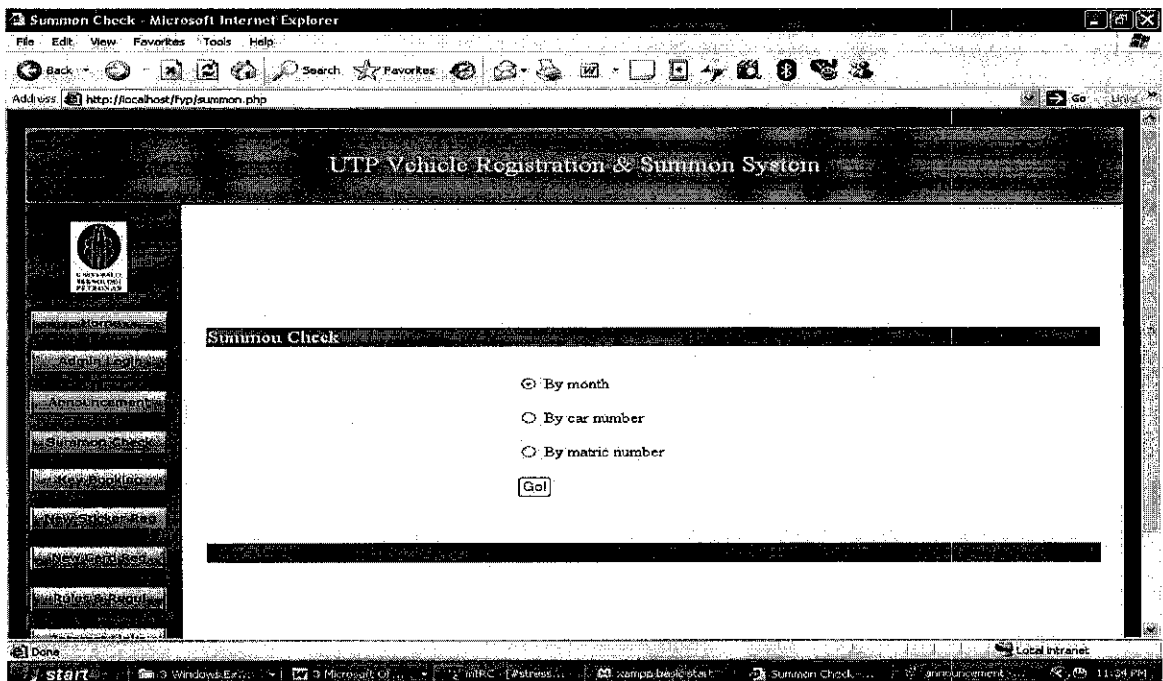
UTP Vehicle Registration & Summon System

Please select your form: WorkerCard

Company Name	Company Add	IC	Name	Phone	Position	Placement	Waris Name	Waris Add	Waris Phone
mtdc	jalan ampang	700524-05-5523	suhaimi	012-556412	executive	Library	wan ahmad	subang jaya	013-56552251
KerisMas	Jalan Bangsar	8201203-14-1422	Haryati Harun	016-2248715	Researcher	Construction Site	Hermawati	Ulu Klang	012-6684712

Figure 12: Vendor Card Application Results Page

UTP Vehicle Registration & Summon System

Please select your form: VendorSticker

Name	IC	Position	Vendor ID	Phone	Company	Type	Register No	Model
Sabariah Othman	730124-04-5524	kerani	22514	012-5551122	MTDC	Car	KBJ 4004	Wira
Fakhtul Amin	771101-05-2247	Vendor	11425	012-954124	MSC	Car	ADN 22	Pajero
Zulkefly Baharom	701223-01-5555	Manager	45781	019-6471203	Formis Net	Car	ACN 181	Mercedes

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Figure 13: Summon Results Page

4.2.2 Wireless Technology Evaluation

In this project, there are several standard for wireless communication that could be considered:

4.2.2.1   Bluetooth
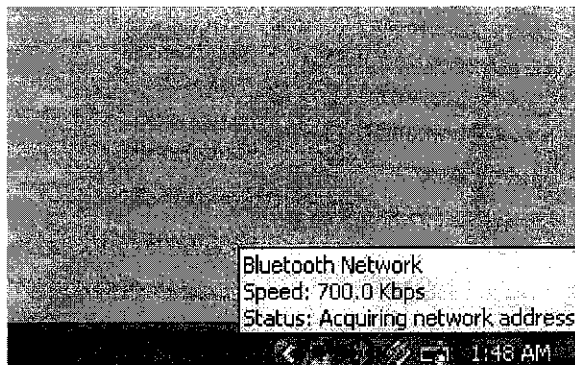
Figure 14: Bluetooth Network Connection

Bluetooth is an RF specification for short-range point to point and point to multipoint voice and data transfer supporting 128 bit encryption. It provides a 10 meters radius sphere of influence for RF devices and allows for up to eight devices to be connected. Bluetooth uses the 2.4GHz Industrial, Scientific and Medical (ISM) frequency band, which is available worldwide and does not require line of sight for communication. It is generally used for the wireless connection of peripherals (keyboard, mouse, printer) thought it is also used to provide networking where it is difficult or impossible to use a wired network, for example in a shop or a listed building. Data transfer rates are comparatively slow at 1-2 megabits per second.

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4.2.2.2   802.11b

It allows wireless roaming communication between up to 128 devices in over network segment over a local area. It supports direct sequence, frequency hopping and diffuse infrared technologies and the standard defines protocols for both an-hoc and client/server networks. Like Bluetooth, 802.11b devices use the 2.4GHz range as this requires no transmission license. Unlike Bluetooth however, 802.11b is rated at 2-11 megabits per second and has the range of 30 meters. This is currently the most popular standard for wireless network.

4.2.2.3   Infrared Data Association (IrDA)

IrDA can achieve transfer rated of up to 4 megabits per second, but limited to line of sight operation. Laptop computers, handheld devices and some mobiles phones have IrDA capability built-in. IrDA does not cause interference with other wireless communication and its short range of 3 meters make eavesdropping difficult.

4.2.3   Development Constraints

In this project, author had chosen to use Hp iPAQ as the selected PDAs. This hardware use Microsoft Pocket PC2003 or window pocket mobile as the operating system. This iPAQ include with Pocket Internet Explorer Browser. The intention was to use Active Server Pages (ASP) technology to produce the interface. However, a problem with the web server software left the server unable to render the ASP code. Instead, the software was coded with TCP/IP sockets and a direct connection between the PCs and the PDA was made (as opposed to an HTTP connection). A server component to handle

communication requests and to interpret responses from the server component was built.

This solution is not ideal as it involves deploying software component to the client, whereas a web-based solution would have removed this requirement and thus reduces the system complexity.

The development environments available were limited by the ability of the iPAQ and its software. The client and server application were both written in the appropriate versions of Visual Basic (i.e. VB6 for the server and Embedded VB for client). However, this led to some compatibility issues. Embedded VB does not support the same range of objects, methods and properties as VBV6. Furthermore, the syntax for common methods and properties is different.

These differences caused frustration and cost time. Experienced developers rely on their memory allow them to achieve high throughput. They know the structure for all of the more common function and only fall back on help systems when the immediate programming problem calls for a solution outside the norm. When using a familiar programming language, changes in the language's syntax slow the development down which turn in turn exacerbates frustration levels.

On the other unforeseen problem with developing embedded systems is the available error handling. Embedded VB has only limited error handling facilities. Unlike VB6 a program written in Embedded VB cannot catch and process errors; it can either carry on the processing with invalid data or stop altogether.

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4.2.4   Design Consideration

4.2.4.1   Application Mapping

Although handheld devices can access and manipulate data like a conventional computer, existing server/desktop application are not well suited to run on these devices. According to Rist (1999) for using mobile devices in accessing virtual meeting places, we need to use a middle tier component to provide mapping functionality so that the interface components of an application could be used on any devices, with the aim of reducing the complexity of the interface to suit the mobile devices such as PDAs. Vanderdonckt (2001) proposed model-based design allowing different devices to be supported by one application. Again, these techniques involved mapping the functionality and interface components of an application across a range of mobile devices. This is essentially the idea behind the Wireless Application Protocol (WAP) which allows a web-based application designed and written for an 800 x 600 resolution screen to be stripped and rendered on a 240 x 320 display.

4.2.4.2   Context Mapping

A context-sensitive application can help users to feel in control of the task. For example, a system that reacts to the current location of the user could show those items closest to them or even directing them to the next item. Another benefit of context sensitive applications is that other information not necessarily related to the current tasks could be required. For example, if a store person using a context sensitive devices were a great distance from office and someone in the office needed urgent information about a product that was close to the devices location, the store person could check in the stock and report back using the devices. This may interrupt the task in hand, but could provide more urgent information much faster then previously possible. Likewise

the device can be used to provide information to the user about the current task, such as new delivery of stock that has arrived that can allow the current picking list to be completed. Lacucci (2001) assert that new mobile communication services are likely to be increasingly bonded to the context of the user activities. It is the same with the purpose of this project which intend to build an effective and efficient system to security department.

4.2.5   Implementing Issues

4.2.5.1 Range

The 802.11b range of 30 meters, although longer then Bluetooth's 10 meters still seems too short given that warehouses can be enormous, indeed it is in very large warehouse that mobile computing could have the greatest benefit. In practice, the system worked up to 100 meters when the server was in a building and the PDA in a car park. However, the reception disappeared at a range of 30 meters when house were in the signal path.

4.2.5.2 Disconnection

Careful consideration needs to be made for wireless based application where disconnections and automated re-connection without data loss would certainly be a requirement for a real picking application. There would be no reason to stop picking an order just because the connection with the main network had been lost. In fact, there may be areas of the warehouse where dead spots occur or range too great for the devices.

One model of client server design that would provide distinct advantage is the 'fat client' approach. This places the business logic and presentation components on the client device, ensuring the application can still be used for data capture while a connection to the server is unavailable. Data can be stored locally on the client device and updates carried out to the server database when connection re-established. A client server application design based on a distributed presentation layer, where the business logic and data reside on the server and only the presentation components are available on the client, would not suit this application due to the high risk of constant disconnection.

4.3 Discussion

Based on the research and informal interview, author found that there are many things that need to be considered in developing the system. From front end development till the back end development, author found that it really need more research to be done in order to support and make the system is reliable, usable and compatible. The range of wireless network technologies remains problematic and it may be worth exploring the potential of the global packet radio service (GPRS) and 3-Generation (3G) mobile telephony standards for this type of application.

The Personal Digital Assistant (PDA) with touch screen interface presents the opportunity to provide functionality at the point best suited to its use. Applications such as picking lists or the restaurant table waiting systems would seem to be ideal for this type of mobile device, potentially saving hours of unnecessary staff movements. Further, the interface can be designed in such a way as to expand the functionality of relatively simple tasks to provide real benefits to new employees or the disabled, supplementing their knowledge or physiology to allow them to complete a larger number of tasks with minimal training.

As a conclusion, this project is still in the process of developing the prototype which author hope that the prototype can clearly depict the actual system. Therefore the feedback from the prototype can be used as lesson learned for the next stage of the project development.

CHAPTER 5

CONCLUSION AND RECOMMENDATION

5.1   Relevancy to the Objectives

There are several objectives of the project mentioned earlier in this report. The first objective is to analyze on wireless technology that is suitable for security department system and suitable for UTP environment. Author had done some research on the current business process of security department of UTP and manages to identify their main business process and activity. In chapter 4, author had mentioned 3 type of wireless technology that suitable. The first type of wireless technology is Bluetooth. It has 10 meters radius sphere of influence for RF devices and allows for up to eight devices to be connected. Bluetooth uses the 2.4GHz Industrial, Scientific and Medical (ISM) frequency band and data transfer rates are comparatively slow at 1-2 megabits per second. The second wireless technology is WIFI or 802.11b which rated at 2-11 megabits per second and has the range of 30 meters. This is currently the most popular standard for wireless network and last wireless technology evaluation perform is IrDA (Infrared Data Association). IrDA has the transfer rated of up to 4 megabits per second, but limited to line of sight operation The good thing in IrDA is it does not cause interference with other wireless communication and its short range of 3 meters make eavesdropping difficult. Because the purpose of this system is to provide security department with a mobility and ease access of data in remote places, so author decided to use Bluetooth technology which provides a longer range then IrDA but lower range then WIFI or 802.11b.

The second objective is to develop a prototype of the system. The purpose of this prototype is to give a big picture of the system functionality as a whole and get the feedback from the user. So with the lesson learned collected from the feedback, author hope that this system can improve to the stage where it can be build into a more comprehensive version of the system that make good and consistent use of the features that can received the most positive feedback.

In third objectives, the purpose is to analyze on the wireless performance and their respond time in dispersed location at UTP. In UTP, the use of wireless technology is currently limited and not very popular. Therefore the use of Bluetooth as a testing prototype is worth for the system prototype. The use of this system among security personal is to help them in retrieval and insertion of data rapidly in dispersed location. With the use of PDA as the alternative, the information can be inserted at once in the database where it will provide ease to security to collect information from anywhere and anytime basis. But the problem is when data need to be uploaded during the access time and connection failed. In wireless technology, there are many factors that influence the connection. One of the problems is the capability of the database in handling simultaneous transaction process and traffic. Therefore more research needs to be studied in order to provide a better solution for security department.

The last objective of this system prototype is to analyze on the compatibility of the interface design of the system in Personal Digital Assistant. This is the major problem in developing the system. Author not very familiar with the PDA environment event though it is window based. Therefore the development of the user interface in the server side needs to be compatible with the supported alignment in PDA. For the process of development of this interface author has tested three different web sites, but it did not give a positive feedback. Therefore the visibility of the system prototype in the PDA is not good as in the PCs. This happen because the differences of resolution between the

PCs that support more then 1024 x 768 and PDA that support only 320 x 240. In developing the system, author had to reduce the use of interactive element to make the system prototype can reduce the upload time and space in PDA.

5.2   Recommendations

The author hopes that this system will improve the security department system in handling the issue of summon, key booking, sticker and matrices card. Even though this system is not really perform as expected but later with the greater technological change, this prototype can be changed into more reliable with the help of technology enhancement.

For this project, the author focused on the current issue in security department. With this system prototype, the author tries to give a clear view on the expected system that is need by the security department. This will help in assist security department in developing a real system in the future. Furthermore, student also has the privilege to understand the rules and regulation and get latest information from the security department. Any latest announcement can be accessed faster and retrieve immediately. This system also can be enhanced with the development of bulletin board as a discussion room and feedback from the security and student or staff.

The use of wireless technology is currently a good movement toward the establishment of UTP as the higher education learning. The ability to equip a latest technology will improve the work and put knowledge as a main priority where knowledge can be accessed anytime and anywhere basis. Therefore the development of this prototype will increase the use of wireless technology usage.

Some further expansion can be done with this prototype system. It is regarding on the compatibility of the application that used. This prototype system is using PHP as a main coding language. Actually in developing a web site, author can use any kind of programming language but author need to know what kind of environment or platform that can support this language. Mostly any PCs can support any type of programming language but in this project, author needs to consider the PDA platform. Actually PDA does not fully have the capability to support what PCs can support. Therefore, in this recommendation author suggests that in the future JavaScript can be used as the main coding language.

The author hopes that this system prototype can be implemented for the security department of UTP but some further research need to be done so it will be compatible and suitable with the current situation. The exposure and experience gained throughout the project will be a very good base for working environment. Hopefully, the knowledge and benefit gained must not be kept in mind but to be implies in daily life.

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APPENDICES

ID		Task Name	Duration	Start	Finish
3		Form 01 and 02 Submission (To FY	1 day?	Tue 4/27/04	Tue 4/27/04
4		Approval of Topic	2 days?	Wed 5/26/04	Thu 5/27/04
5		Preliminary Investigation	30 days?	Tue 6/1/04	Mon 7/12/04
6		Site Survey	3 days?	Tue 7/13/04	Thu 7/15/04
7		Information Gathering	9 days?	Tue 7/13/04	Fri 7/23/04
8		Determine Project Scope	7 days?	Tue 7/20/04	Wed 7/28/04
9		Submission of Preliminary Report	3 days?	Wed 7/28/04	Fri 7/30/04
10		System Analysis	14 days?	Mon 8/2/04	Thu 8/19/04
11		Work Schedule	2 days	Mon 8/2/04	Tue 8/3/04
12		Feasibility Study	3 days?	Wed 8/4/04	Fri 8/6/04
13		Problem Analysis	3 days	Mon 8/9/04	Wed 8/11/04
14		Requirement analysis &specification	3 days?	Thu 8/12/04	Mon 8/16/04
15		Tool & Equipment	3 days?	Tue 8/17/04	Thu 8/19/04
16		Submission of Progress Report	1 day?	Fri 8/20/04	Fri 8/20/04
17		System Design	7 days?	Mon 8/23/04	Tue 8/31/04
18		Identify System Specification	3 days?	Mon 8/23/04	Wed 8/25/04
19		Application Structure	3 days	Wed 8/25/04	Fri 8/27/04
20		Database Schema	2 days	Mon 8/30/04	Tue 8/31/04
21		System Development and Testing	16 days	Wed 9/1/04	Wed 9/22/04
22		Interface Design	3 days	Wed 9/1/04	Fri 9/3/04
23		Database Development	5 days	Mon 9/6/04	Fri 9/10/04
24		Scripting	5 days	Mon 9/13/04	Fri 9/17/04
25		System Integration & Testing	3 days	Mon 9/20/04	Wed 9/22/04
26		User Approval And Acceptance	3 days	Thu 9/23/04	Mon 9/27/04
27		User Documentation	15 days?	Mon 9/27/04	Fri 10/15/04
28		Submission of Supervisor's Final Draft	5 days?	Mon 9/27/04	Fri 10/1/04
29		Submission of Final Draft	1 day	Fri 10/15/04	Fri 10/15/04
30		FYP Presentation	3 days?	Mon 11/1/04	Wed 11/3/04
31		Submission of Project Dissertation	1 day	Fri 12/10/04	Fri 12/10/04

Project: Identification System Gantt Cha
Date: Monday 8/9/04

Legend: Task | Split | Progress | Milestone | Summary | Project Summary | External Tasks | External Milestone | Deadline
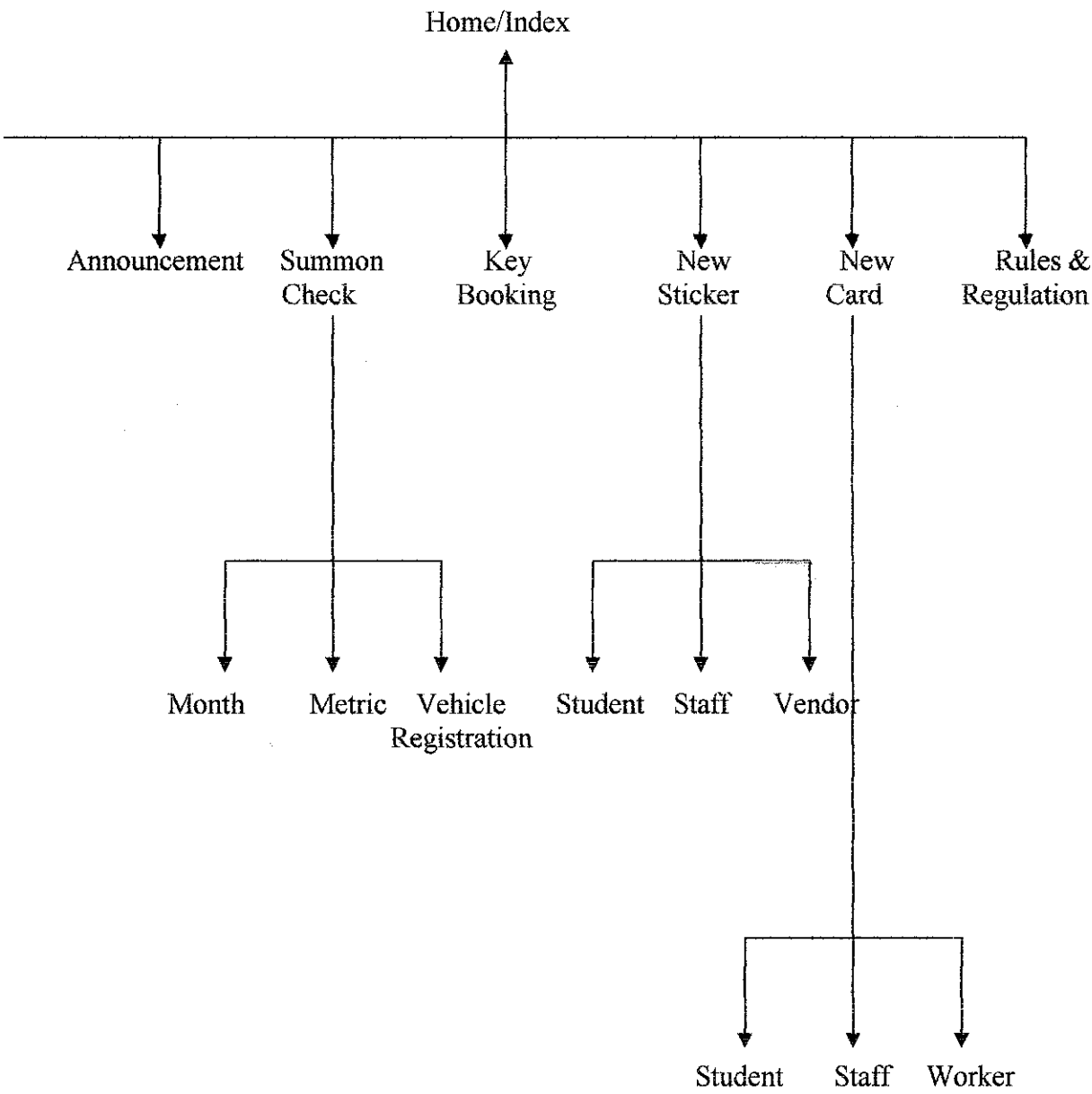
APPENDIX A
THE PROJECT TIMELINE

Home/Index

Announcement   Summon Check   Key Booking   New Sticker   New Card   Rules & Regulation

Month   Metric   Vehicle Registration   Student   Staff   Vendor

Student   Staff   Worker

First page (Home/index)

A – Banner
B- UTP logo
C- introContent
K1- announcement
K2-new sticker registration
K3-new card application
K4-summon check
K5-Key Booking
K6 –rules and regulation
K7 – admin login
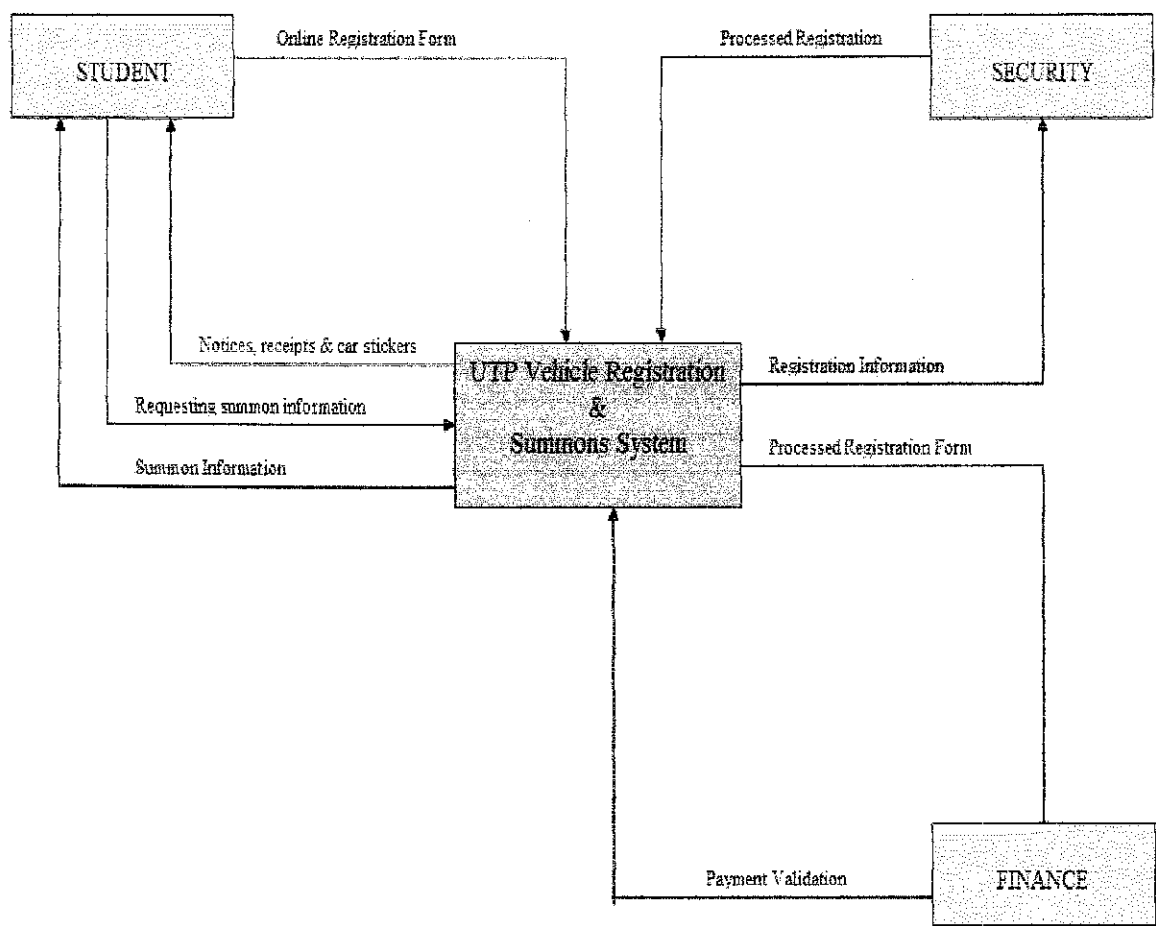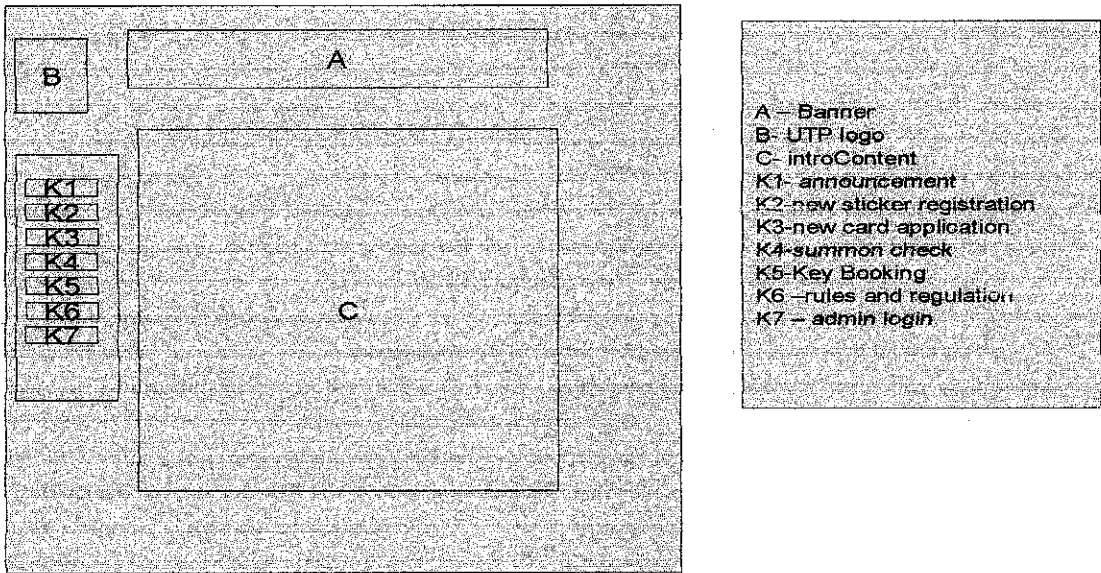
Second page: (k1)
Announcement

A – Banner
B- UTP logo
C- introContent
K1 – announcement
K2-new sticker registration
K3-new card application
K4-summon check
K5-Key Booking
K6 –rules and regulation
K7 – admin login
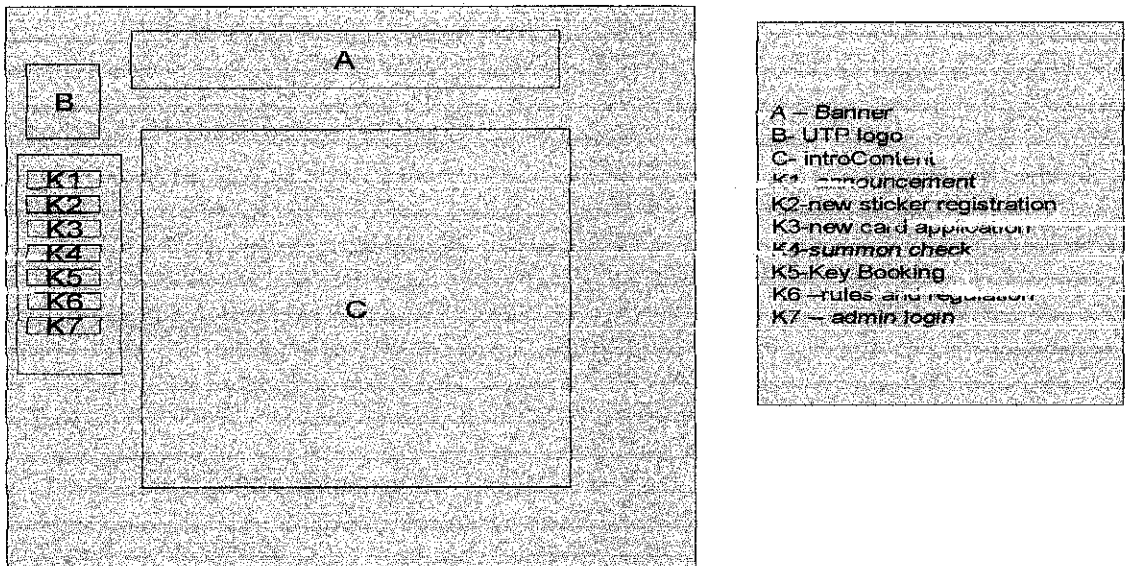
Third page: (k2)New Sticker
Registration
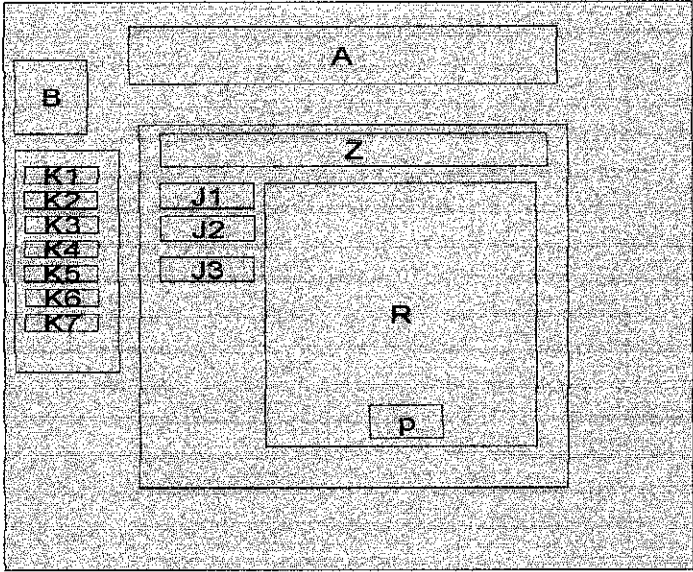
A – Banner
B- UTP logo
C- introContent
J1 – Student button
J2- Staff Button
J3- Vendor button
Z – instruction statement
R- form of application
from x button
P- button submit

Third page: (k3)New ID card
application
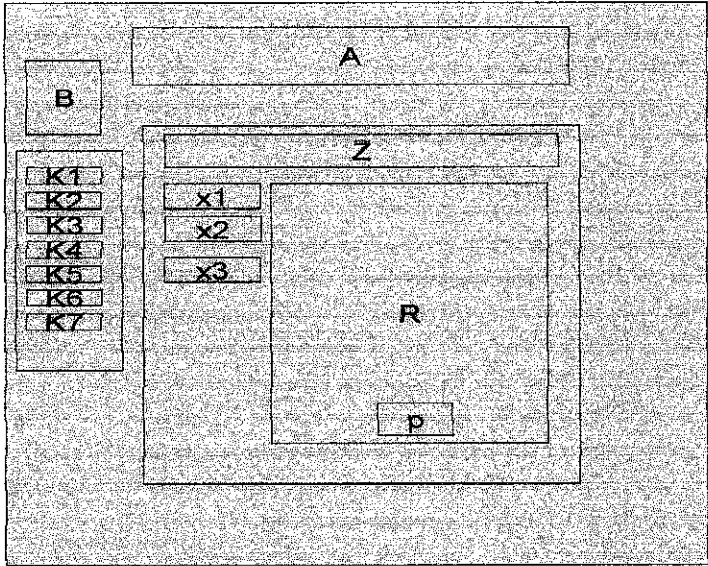
A – Banner
B- UTP logo
C- introContent
x1 – Student button
x2- Staff Button
x3- Maintenance button
Z – instruction statement
R- form of application from
x button
P- button submit

Forth page: (k4)Summon
Check


```
┌─────────────────────────────────┐
│  ┌──────────────────────────┐   │
│  │            A             │   │
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│ ┌───┐                           │
│ │ B │                           │
│ └───┘ ┌────────────────────┐    │
│ ┌───┐ │                    │    │
│ │K1 │ │  ┌──────────────┐  │    │
│ │K2 │ │  │      s1      │  │    │
│ │K3 │ │  └──────────────┘  │    │
│ │K4 │ │  ┌──────────────┐  │    │
│ │K5 │ │  │      s2      │  │    │
│ │K6 │ │  └──────────────┘  │    │
│ │K7 │ │  ┌──────────────┐  │    │
│ └───┘ │  │      s3      │  │    │
│       │  └──────────────┘  │    │
│       │  ┌────┐            │    │
│       │  │k12 │            │    │
│       │  └────┘            │    │
│       └────────────────────┘    │
└─────────────────────────────────┘
```
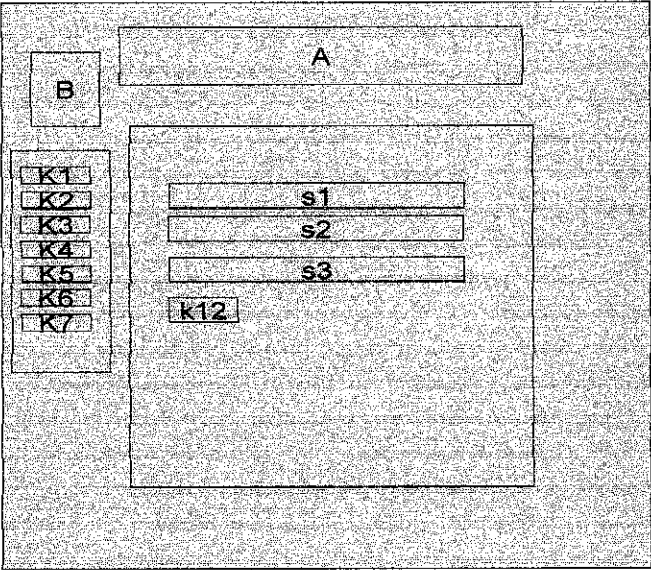
A – Banner
B- UTP logo
S1-radio button (By month)
S2-radio button (car number)
S3-radio button matrix number
K12 – Go button

Second page: (k5) Key
Booking
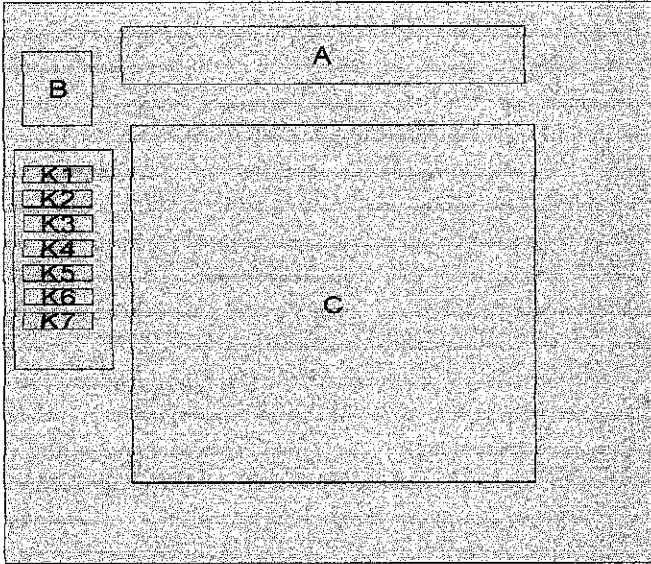

```
┌─────────────────────────────────┐
│  ┌──────────────────────────┐   │
│  │            A             │   │
│ ┌───┐└──────────────────────┘   │
│ │ B │                           │
│ └───┘                           │
│ ┌───┐ ┌────────────────────┐    │
│ │K1 │ │                    │    │
│ │K2 │ │                    │    │
│ │K3 │ │                    │    │
│ │K4 │ │                    │    │
│ │K5 │ │         C          │    │
│ │K6 │ │                    │    │
│ │K7 │ │                    │    │
│ └───┘ │                    │    │
│       └────────────────────┘    │
└─────────────────────────────────┘
```

A – Banner
B- UTP logo
C- introContent
K1- announcement
K2-new sticker registration
K3-new card application
K4-summon check
K5-Key Booking
K6 –rules and regulation
K7– admin login

**Fifth page: (k6) Rules &
Regulation**
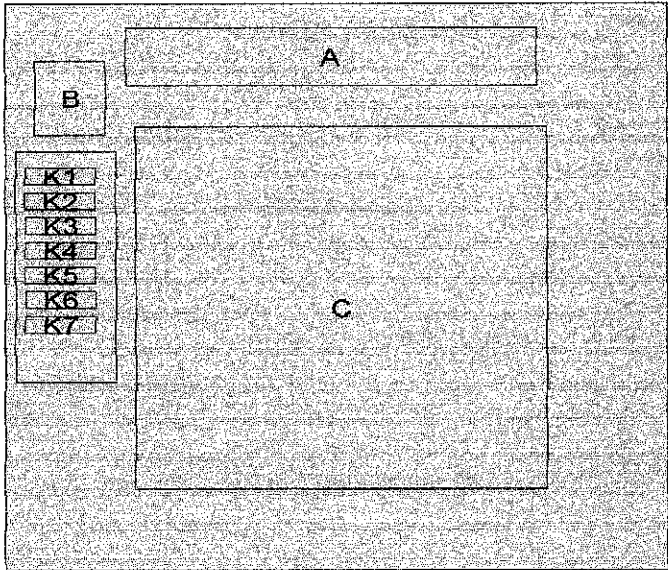
A

B

K1
K2
K3
K4
K5
K6
K7

C

A – Banner
B- UTP logo
C- introContent
K1- announcement
K2-new sticker registration
K3-new card application
K4-summon check
K5-Key Booking
K6 – rules and regulation
K7 – admin login

Fifth page: (k8)Admin login

B

A

1   3

2   4

5

A – Banner
B- UTP logo
1 – username
2- password
3- textbox for username
4-textbox for password
5 – button enter

```
┌─────────────────┐
│   Requirement   │
│    Planning     │
│    Analysis     │
└────────┬────────┘
         │
         ▼
┌─────────────────┐
│  User Design    │
│   Interface     │
│                 │
└────────┬────────┘
         │
         ▼
┌─────────────────┐
│  Construction   │
│                 │
│                 │
└────────┬────────┘
         │
         ▼
┌─────────────────┐
│    Cutover      │
│                 │
│                 │
└─────────────────┘
```

APPENDIX G:The Coding for Website

Index.php Pages

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.01 Transitional//EN">
<html>
<head>
<title>Welcome to UTPVRSS!</title>
<meta http-equiv="Content-Type" content="text/html; charset=iso-8859-1">
<script language="JavaScript" type="text/JavaScript">
<!--



function MM_reloadPage(init) {  //reloads the window if Nav4 resized
  if (init==true) with (navigator) {if ((appName=="Netscape")&&(parseInt(appVersion)==4)) {
    document.MM_pgw=innerWidth; document.MM_pgH=innerHeight; onresize=MM_reloadPage; }}
  else if (innerWidth!=document.MM_pgw || innerHeight!=document.MM_pgH) location.reload();
}
MM_reloadPage(true);

function MM_preloadImages() { //v3.0
  var d=document; if(d.images){ if(!d.MM_p) d.MM_p=new Array();
    var i,j=d.MM_p.length,a=MM_preloadImages.arguments; for(i=0; i<a.length; i++)
    if (a[i].indexOf("#")!=0){ d.MM_p[j]=new Image; d.MM_p[j++].src=a[i];}}
}
//-->
</script>
</head>


<body bgcolor="#000000" link="#FFFFFF" vlink="#FFFFFF" alink="#FFFFFF">
<table width="100%" border="0">
  <tr>
    <td>
<table width="100%" border="0">
      <tr>
        <td height="84" colspan="2" bgcolor="#FF9900"><div align="center"><font color="#FFFFFF" size="+2">U

          Vehicle Registration &amp; Summon System</font></div></td>
      </tr>
      <tr>
        <td width="14%" height="547" valign="top" bgcolor="#666699">
          <div align="center">
            <p> </p>
            <p><img src="Images/utp.gif" width="41" height="68"> </p>
            <p><font color="#FFFF00" size="2" face="Verdana, Arial, Helvetica, sans-serif"><strong><a
href="index.php"><font size="1">Home</font></a></strong></font></p>
            <p align="center"><font color="#FFFFFF" size="1" face="Verdana, Arial, Helvetica,
sans-serif"><strong><a href="admin.php">Admin
              Login</a></strong></font></p>
            <p align="center"><font color="#FFFFFF" size="1" face="Verdana, Arial, Helvetica,
sans-serif"><strong><a href="announce.php">Announcement</a>
              </strong></font></p>
            <p align="center"><font color="#FFFFFF" size="1" face="Verdana, Arial, Helvetica,
sans-serif"><strong><a href="summon.php">Summon
              Check</a></strong></font></p>
            <p align="center"><font color="#FFFFFF" size="1" face="Verdana, Arial, Helvetica,
sans-serif"><strong><a href="key_book.php">Key
              Booking</a></strong></font></p>
            <p align="center"><font color="#FFFFFF" size="1" face="Verdana, Arial, Helvetica,
sans-serif"><strong><a href="new_sticker.php">New
              Sticker</a></strong></font></p>
            <p align="center"><font color="#FFFFFF" size="1" face="Verdana, Arial, Helvetica,
sans-serif"><strong><a href="new_card.php">New
              Card</a></strong></font></p>
            <p align="center"><font color="#FFFFFF" size="1" face="Verdana, Arial, Helvetica,
sans-serif"><strong><a href="rules.php">Rules
              &amp; Regulation</a></strong></font></p>
            <p> </p>
          </div>
          <div align="center">
<p> </p>
            <p>  </p>
            <p> </p>
          </div></td>
        <td width="86%"
background="../../../../Documents%20and%20Settings/Windows%20User/Desktop/Mlleneum_Log2.jpg" bgcolor="#FFFFFF
<table width="100%" border="0">
          <tr>
            <td width="3%" height="269" rowspan="3"> </td>
            <td colspan="2" bgcolor="#666699"> <p><font color="#FFFFFF" size="4" face="Times New Roman,
Times, serif">Welcome
              to our site!</font></p></td>
            <td width="3%" rowspan="3" bgcolor="#FFFFFF"> </td>
          </tr>
          <tr>
            <td height="217" colspan="2"><p align="justify"><br>
              Why compromise for intolerable time consuming Vehicle Registration
              and Summon's Checking processing where you can do it from
```
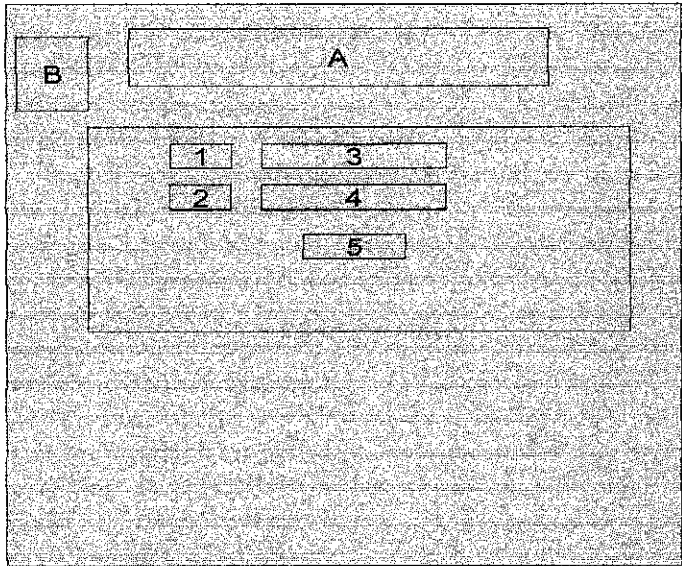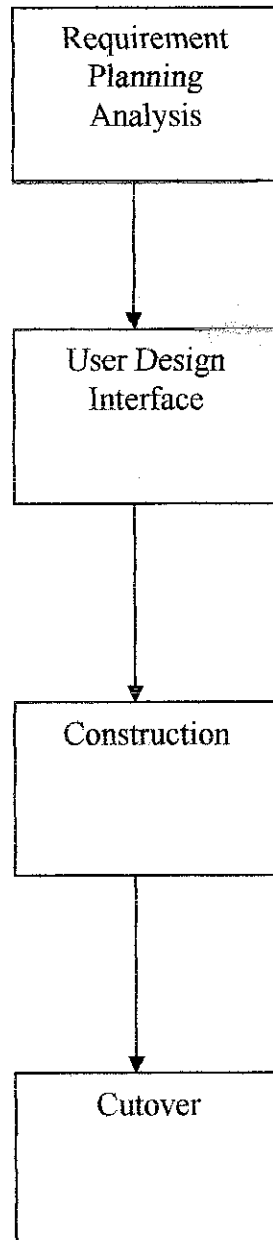
```html
          home. At UTPVRSS &reg; we make it all possible for both students
          and staffs of University Technology Petronas to make their
          miscellaneous works remotely via the internet. Just browse
          through this website and in less than a minute you will tend
          to understand the processes needed to register your vehicle
          and check your summon online. You will find that this site
          is usefull for those who own a vehicle. Enjoy your stay!</p>
          <p align="center"><strong><br>
          Our Motto: </strong></p>
          <p align="center"><strong>Driven by Precision. Devoted to Perfection.</strong></p>
          <p> </p></td>
        </tr>
        <tr>
          <td height="21" colspan="2" bgcolor="#666699"> </td>
        </tr>
      </table></td>
    </tr>
    <tr>
      <td colspan="2" bgcolor="#FF9900"> </td>
    </tr>
  </table>
  <p align="center"><font color="#FF9900" size="2">Content and materials on
    this website are Copyright &copy; 2004 UTPVRSS Team</font></p></td>
  </tr>
</table>
</body>
</html>
```

Announce.php

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.01 Transitional//EN">
<html>
<head>
<title>Announcement</title>
<meta http-equiv="Content-Type" content="text/html; charset=iso-8859-1">
<script language="JavaScript" type="text/JavaScript">
<!--


function MM_reloadPage(init) {  //reloads the window if Nav4 resized
  if (init==true) with (navigator) {if ((appName=="Netscape")&&(parseInt(appVersion)==4)) {
    document.MM_pgW=innerWidth; document.MM_pgH=innerHeight; onresize=MM_reloadPage; }}
  else if (innerWidth!=document.MM_pgW || innerHeight!=document.MM_pgH) location.reload();
}
MM_reloadPage(true);

function MM_preloadImages() { //v3.0
  var d=document; if(d.images){ if(!d.MM_p) d.MM_p=new Array();
    var i,j=d.MM_p.length,a=MM_preloadImages.arguments; for(i=0; i<a.length; i++)
    if (a[i].indexOf("#")!=0){ d.MM_p[j]=new Image; d.MM_p[j++].src=a[i];}}
}
//-->
</script>
</head>

<body bgcolor="#000000" link="#FFFFFF" vlink="#FFFFFF" alink="#FFFFFF">
<table width="100%" border="0">
  <tr>
    <td>
<table width="100%" border="0">
      <tr>
        <td height="84" colspan="2" bgcolor="#FF9900"><div align="center"><font color="#FFFFFF" size="+2">U

          Vehicle Registration &amp; Summon System</font></div></td>
      </tr>
      <tr>
        <td width="14%" height="547" valign="top" bgcolor="#666699">
<div align="center">
            <div align="center">
              <p> </p>
              <p><img src="Images/utp.gif" width="41" height="68"> </p>
              <p><font color="#FFFF00" size="2" face="Verdana, Arial, Helvetica, sans-serif"><strong><a
href="index.php"><font size="1">Home</font></a></strong></font></p>
              <p align="center"><font color="#FFFFFF" size="1" face="Verdana, Arial, Helvetica,
sans-serif"><strong><a href="admin.php">Admin
                Login</a></strong></font></p>
              <p align="center"><font color="#FFFFFF" size="1" face="Verdana, Arial, Helvetica,
sans-serif"><strong><a href="announce.php">Announcement</a>
                </strong></font></p>
              <p align="center"><font color="#FFFFFF" size="1" face="Verdana, Arial, Helvetica,
sans-serif"><strong><a href="summon.php">Summon
                Check</a></strong></font></p>
              <p align="center"><font color="#FFFFFF" size="1" face="Verdana, Arial, Helvetica,
sans-serif"><strong><a href="key_book.php">Key
                Booking</a></strong></font></p>
              <p align="center"><font color="#FFFFFF" size="1" face="Verdana, Arial, Helvetica,
sans-serif"><strong><a href="new_sticker.php">New
                Sticker</a></strong></font></p>
              <p align="center"><font color="#FFFFFF" size="1" face="Verdana, Arial, Helvetica,
sans-serif"><strong><a href="new_card.php">New
                Card</a></strong></font></p>
              <p align="center"><font color="#FFFFFF" size="1" face="Verdana, Arial, Helvetica,
sans-serif"><strong><a href="rules.php">Rules
                &amp; Regulation</a></strong></font></p>
            </div>
            <div align="center">
              <p> </p>
            </div>
            <p>  </p>
            <p>  </p>
            <p><img src="Images/Untitled-1.jpg" width="124" height="317"></p>
            </div>
            <div align="center">
<p> </p>
            <p>  </p>
            <p> </p>
          </div></td>
        <td width="86%"
background="../../../../Documents%20and%20Settings/Windows%20User/Desktop/Mlleneum_Log2.jpg" bgcolor="#FFFFFF

          <table width="100%" border="0">
            <tr>
              <td width="2%" height="269" rowspan="3"> </td>
              <td colspan="2" bgcolor="#666699"> <p><font color="#FFFFFF"
size="4">Announcement!</font></p></td>
              <td width="2%" rowspan="3"> </td>
```

```
        </tr>
        <tr>
          <td height="217" colspan="2" bgcolor="#FFFFFF"> <p> </p>
            <p>New parking lot:</p>
            <p><img src="Images/parkingfinal2.jpg" width="584" height="622"></p>
            <hr> <p><img src="Images/parkingfinal3.jpg" width="262" height="486"><br>
            </p>
            <p> </p></td>
        </tr>
        <tr>
          <td height="21" colspan="2" bgcolor="#666699"> </td>
        </tr>
      </table> </td>
  </tr>
  <tr>
    <td colspan="2" bgcolor="#FF9900"> </td>
  </tr>
</table>
<p align="center"><font color="#FF9900" size="2">Content and materials on
  this website are Copyright &copy; 2004 UTPVRSS Team</font></p></td>
  </tr>
</table>
</body>
</html>
```

adminLogin.php

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.01 Transitional//EN">
<html>
<head>
<title>Admin Login</title>
<meta http-equiv="Content-Type" content="text/html; charset=iso-8859-1">
<script language="JavaScript" type="text/JavaScript">
<!--


function MM_reloadPage(init) {  //reloads the window if Nav4 resized
  if (init==true) with (navigator) {if ((appName=="Netscape")&&(parseInt(appVersion)==4)) {
    document.MM_pgW=innerWidth; document.MM_pgH=innerHeight; onresize=MM_reloadPage; }}
  else if (innerWidth!=document.MM_pgW || innerHeight!=document.MM_pgH) location.reload();
}
MM_reloadPage(true);

function MM_preloadImages() { //v3.0
  var d=document; if(d.images){ if(!d.MM_p) d.MM_p=new Array();
    var i,j=d.MM_p.length,a=MM_preloadImages.arguments; for(i=0; i<a.length; i++)
    if (a[i].indexOf("#")!=0){ d.MM_p[j]=new Image; d.MM_p[j++].src=a[i];}}
}
//-->
</script>
</head>

<body bgcolor="#000000" link="#FFFFFF" vlink="#FFFFFF" alink="#FFFFFF">
<table width="100%" border="0">
  <tr>
    <td>
<table width="100%" border="0">
      <tr>
        <td height="84" colspan="2" bgcolor="#FF9900"><div align="center"><font color="#FFFFFF" size="+2">U

        Vehicle Registration &amp; Summon System</font></div></td>
      </tr>
      <tr>
        <td width="14%" height="547" valign="top" bgcolor="#666699">
          <div align="center">
            <p> </p>
            <p><img src="Images/utp.gif" width="41" height="68"> </p>
            <p><font color="#FFFF00" size="2" face="Verdana, Arial, Helvetica, sans-serif"><strong><a
href="index.php"><font size="1">Home</font></a></strong></font></p>
            <p align="center"><font color="#FFFFFF" size="1" face="Verdana, Arial, Helvetica,
sans-serif"><strong><a href="admin.php">Admin
                Login</a></strong></font></p>
            <p align="center"><font color="#FFFFFF" size="1" face="Verdana, Arial, Helvetica,
sans-serif"><strong><a href="announce.php">Announcement</a>
                </strong></font></p>
            <p align="center"><font color="#FFFFFF" size="1" face="Verdana, Arial, Helvetica,
sans-serif"><strong><a href="sumresult.php">Summon
                Check</a></strong></font></p>
            <p align="center"><font color="#FFFFFF" size="1" face="Verdana, Arial, Helvetica,
sans-serif"><strong><a href="key_book.php">Key
                Booking</a></strong></font></p>
            <p align="center"><font color="#FFFFFF" size="1" face="Verdana, Arial, Helvetica,
sans-serif"><strong><a href="new_sticker.php">New
                Sticker</a></strong></font></p>
            <p align="center"><font color="#FFFFFF" size="1" face="Verdana, Arial, Helvetica,
sans-serif"><strong><a href="new_card.php">New
                Card</a></strong></font></p>
            <p align="center"><font color="#FFFFFF" size="1" face="Verdana, Arial, Helvetica,
sans-serif"><strong><a href="rules.php">Rules
                &amp; Regulation</a></strong></font></p>
          </div>
          <div align="center">
<p> </p>
            <p>  </p>
            <p> </p>
          </div></td>
        <td width="86%"
background="../../../../Documents%20and%20Settings/Windows%20User/Desktop/Mlleneum_Log2.jpg"
bgcolor="#FFFFFF"><table width="100%" border="0">

              <tr>
        <td width="3%" height="269" rowspan="3"> </td>
        <td colspan="2" bgcolor="#666699"> <p align="center"><font color="#FFFFFF" size="4" face="Tim
New Roman, Times, serif">Admin
                Login </font></p></td>
        <td width="3%" rowspan="3"> </td>
      </tr>
      <tr>
        <td height="217" colspan="2">
                <?php

                session_start();
```

```
                    if ($username && $password)
                        {

                            $db=mysql_connect ("localhost","root");
                            mysql_select_db ("fyp",$db);
                            $sql="SELECT count(*) FROM  users WHERE username = '$username' AND
password='$password'";
                            $result=mysql_query($sql)or die("Could not execute query");
                //include 'key_result.php';

                                        //echo "\n Thank you $fname, you information has entered and ready fo
process.\n";
                        if (mysql_num_rows($result) > 0)
                            {
                        // if they are in the database register the user id
                        $valid_user = $password;
                        session_register("valid_user");
                            }


                        }

                        else
                        {
                        ?>

                        <form name="form1" method="post" action="key_result.php">
                    <div align="center">
                        <p><strong>Username:</strong>
                            <input name="username" type="text" id="username">
                        </p>
                        <p><strong>Passwords<font color="#000000">:</font></strong>
                            <input name="password" type="password" id="password">
                        </p>
                        <p>
                            <input type="submit" name="Submit" value="Enter">
                        </p>
                    </div>
                    </form>
                                    <?php
                                }
                        ?>
                    <p align="left"><br>
                        </p></td>
                    </tr>
                    <tr>
                      <td height="21" colspan="2" bgcolor="#666699"> </td>
                    </tr>
                  </table>

                        </td>
            </tr>
            <tr>
              <td colspan="2" bgcolor="#FF9900"> </td>
            </tr>
          </table>
          <p align="center"><font color="#FF9900" size="2">Content and materials on
            this website are Copyright &copy; 2004 UTPVRSS Team</font></p></td>
      </tr>
    </table>
    </body>
    </html>
```

key_book.php

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.01 Transitional//EN">
<html>
<head>
<title>Key Booking</title>
<meta http-equiv="Content-Type" content="text/html; charset=iso-8859-1">
<script language="JavaScript" type="text/JavaScript">
<!--


function MM_reloadPage(init) {  //reloads the window if Nav4 resized
  if (init==true) with (navigator) {if ((appName=="Netscape")&&(parseInt(appVersion)==4)) {
    document.MM_pgW=innerWidth; document.MM_pgH=innerHeight; onresize=MM_reloadPage; }}
  else if (innerWidth!=document.MM_pgW || innerHeight!=document.MM_pgH) location.reload();
}
MM_reloadPage(true);

function MM_preloadImages() { //v3.0
  var d=document; if(d.images){ if(!d.MM_p) d.MM_p=new Array();
    var i,j=d.MM_p.length,a=MM_preloadImages.arguments; for(i=0; i<a.length; i++)
    if (a[i].indexOf("#")!=0){ d.MM_p[j]=new Image; d.MM_p[j++].src=a[i];}}
}
//-->
</script>
</head>

<body bgcolor="#000000" link="#FFFFFF" vlink="#FFFFFF" alink="#FFFFFF">
<table width="100%" border="0">
  <tr>
    <td>
<table width="100%" border="0">
      <tr>
        <td height="84" colspan="2" bgcolor="#FF9900"><div align="center"><font color="#FFFFFF" size="+2">U

          Vehicle Registration &amp; Summon System</font></div></td>
      </tr>
      <tr>
        <td width="14%" height="547" valign="top" bgcolor="#666699"> <p> </p><div align="center">
          <p><img src="Images/utp.gif" width="41" height="68"></p>
          <p><font color="#FFFF00" size="2" face="Verdana, Arial, Helvetica, sans-serif"><strong><a
href="index.php"><font size="1">Home</font></a></strong></font></p>
          <p align="center"><font color="#FFFFFF" size="1" face="Verdana, Arial, Helvetica,
sans-serif"><strong><a href="admin.php">Admin
          Login</a></strong></font></p>
          <p align="center"><font color="#FFFFFF" size="1" face="Verdana, Arial, Helvetica,
sans-serif"><strong><a href="announce.php">Announcement</a>
          </strong></font></p>
          <p align="center"><font color="#FFFFFF" size="1" face="Verdana, Arial, Helvetica,
sans-serif"><strong><a href="sumresult.php">Summon
          Check</a></strong></font></p>
          <p align="center"><font color="#FFFFFF" size="1" face="Verdana, Arial, Helvetica,
sans-serif"><strong><a href="key_book.php">Key
          Booking</a></strong></font></p>
          <p align="center"><font color="#FFFFFF" size="1" face="Verdana, Arial, Helvetica,
sans-serif"><strong><a href="new_sticker.php">New
          Sticker</a></strong></font></p>
          <p align="center"><font color="#FFFFFF" size="1" face="Verdana, Arial, Helvetica,
sans-serif"><strong><a href="new_card.php">New
          Card</a></strong></font></p>
          <p align="center"><font color="#FFFFFF" size="1" face="Verdana, Arial, Helvetica,
sans-serif"><strong><a href="rules.php">Rules
          &amp; Regulation</a></strong></font></p>
        </div>
        <div align="center">
          <p> </p>
          <p>  </p>
          <p>  </p>
        </div></td>
        <td width="86%"
background="../../../../Documents%20and%20Settings/Windows%20User/Desktop/Mlleneum_Log2.jpg" bgcolor="#FFFFFF">

          <?php
          if ($Submit)
                        {
                            $db=mysql_connect ("localhost","root");
                            mysql_select_db ("fyp",$db);
                            $sql="Insert into  keybook (fname,course,id,email,date,RoomNo) VALUES
('$fname','$course','$id','$email','$date','$RoomNo')";
                            $result=mysql_query($sql);
          echo "\n Thank you $fname, you information has entered and ready for process.\n";

                        } else
                        {
                        ?>
          <form action="<?php echo $PHP_SELF?>" method= "post">
            <table width="100%" border="0">
              <tr>
```

```
        <td width="2%"> </td>
        <td colspan="2" bgcolor="#666699"> <font color="#FFFFFF" size="4">Key
          Booking - Request Procedure</font><font face="Verdana, Arial, Helvetica, sans-serif"
size="2"> 
          </font></td>
        <td width="2%"> </td>
      </tr>
      <tr>
        <td> </td>
        <td width="31%"> </td>
        <td width="65%"><div align="left"><font face="Verdana, Arial, Helvetica, sans-serif"
size="2">
          </font></div></td>
        <td> </td>
      </tr>
      <tr>
        <td><div align="left"><font face="Verdana, Arial, Helvetica, sans-serif" size="2">
          </font></div></td>
        <td><font face="Verdana, Arial, Helvetica, sans-serif" size="2">Full
          Name (Nama Penuh):</font></td>
        <td><font face="Verdana, Arial, Helvetica, sans-serif" size="2">
          <input name="fname" type="text" id="fname">
          </font></td>
        <td> </td>
      </tr>
      <tr>
        <td><font face="Verdana, Arial, Helvetica, sans-serif" size="2"> 
          </font></td>
        <td><font face="Verdana, Arial, Helvetica, sans-serif" size="2">Course
          Taken (Kursus) : </font></td>
        <td><font face="Verdana, Arial, Helvetica, sans-serif" size="2">
          <input name="course" type="text" id="course">
          </font></td>
        <td> </td>
      </tr>
      <tr>
        <td height="26"> </td>
        <td><font face="Verdana, Arial, Helvetica, sans-serif" size="2">ID
          (Student/Staff):</font></td>
        <td><font face="Verdana, Arial, Helvetica, sans-serif" size="2">
          <input name="id" type="text" id="id">
          </font></td>
        <td> </td>
      </tr>
      <tr>
        <td> </td>
        <td><font face="Verdana, Arial, Helvetica, sans-serif" size="2">E-mail:
          </font></td>
        <td><input name="email" type="text" id="email"></td>
        <td> </td>
      </tr>
      <tr>
        <td> </td>
        <td><font size="2" face="Verdana, Arial, Helvetica, sans-serif">Date
          (Tarikh):</font></td>
        <td><input type="text" name="date">
          (yyyy-mm-dd) </td>
        <td> </td>
      </tr>
      <tr>
        <td> </td>
        <td><font size="2" face="Arial, Helvetica, sans-serif">Room Number</font>:</td>
        <td><input type="text" name="RoomNo"></td>
        <td> </td>
      </tr>
      <tr>
        <td> </td>
        <td colspan="2"><p><font face="Verdana, Arial, Helvetica, sans-serif" size="2">Please
          read the Rules &amp; Regulation before you submit this registration.
          Thank you.</font></p>
          <p align="center">
          <input type="submit" name="Submit" value="Submit">
          <input type="reset" name="Reset" value="Reset">
          </p></td>
        <td> </td>
      </tr>
      <tr>
        <td> </td>
        <td colspan="2" bgcolor="#666699"> </td>
        <td> </td>
      </tr>
    </table>

  </form>
    <?php
          }
          ?>
    </td>
  </tr>
  <tr>
```

```
          <td colspan="2" bgcolor="#FF9900"> </td>
        </tr>
      </table>
      <p align="center"><font color="#FF9900" size="2">Content and materials on
        this website are Copyright &copy; 2004 UTPVRSS Team</font></p></td>
  </tr>
</table>
</body>
</html>
```

sumresult.php

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.01 Transitional//EN">
<html>
<head>
<title>summon result</title>
<meta http-equiv="Content-Type" content="text/html; charset=iso-8859-1">
<script language="JavaScript" type="text/JavaScript">
<!--

function MM_reloadPage(init) {  //reloads the window if Nav4 resized
  if (init==true) with (navigator) {if ((appName=="Netscape")&&(parseInt(appVersion)==4)) {
    document.MM_pgW=innerWidth; document.MM_pgH=innerHeight; onresize=MM_reloadPage; }}
  else if (innerWidth!=document.MM_pgW || innerHeight!=document.MM_pgH) location.reload();
}
MM_reloadPage(true);

function MM_preloadImages() { //v3.0
  var d=document; if(d.images){ if(!d.MM_p) d.MM_p=new Array();
    var i,j=d.MM_p.length,a=MM_preloadImages.arguments; for(i=0; i<a.length; i++)
    if (a[i].indexOf("#")!=0){ d.MM_p[j]=new Image; d.MM_p[j++].src=a[i];}}
}
//-->
</script>
</head>

<body bgcolor="#000000" link="#FFFFFF" vlink="#FFFFFF" alink="#FFFFFF">
<table width="99%" border="0">
  <tr>
    <td height="1164"> <table width="100%" border="0">
      <tr>
        <td height="84" colspan="2" bgcolor="#FF9900"><div align="center"><font color="#FFFFFF" size="+2">U

          Vehicle Registration &amp; Summon System</font></div></td>
      </tr>
      <tr>
        <td width="16%" height="1013" valign="top" bgcolor="#666699"> <p> </p>
          <div align="center">
            <p><img src="Images/utp.gif" width="41" height="68"></p>
            <p><font color="#FFFF00" size="2" face="Verdana, Arial, Helvetica, sans-serif"><strong><a
href="index.php"><font size="1">Home</font></a></strong></font></p>
            <p align="center"><font color="#FFFFFF" size="1" face="Verdana, Arial, Helvetica,
sans-serif"><strong><a href="admin.php">Admin
              Login</a></strong></font></p>
            <p align="center"><font color="#FFFFFF" size="1" face="Verdana, Arial, Helvetica,
sans-serif"><strong><a href="announce.php">Announcement</a>
              </strong></font></p>
            <p align="center"><font color="#FFFFFF" size="1" face="Verdana, Arial, Helvetica,
sans-serif"><strong><a href="sumresult.php">Summon
              Check</a></strong></font></p>
            <p align="center"><font color="#FFFFFF" size="1" face="Verdana, Arial, Helvetica,
sans-serif"><strong><a href="key_book.php">Key
              Booking</a></strong></font></p>
            <p align="center"><font color="#FFFFFF" size="1" face="Verdana, Arial, Helvetica,
sans-serif"><strong><a href="new_sticker.php">New
              Sticker</a></strong></font></p>
            <p align="center"><font color="#FFFFFF" size="1" face="Verdana, Arial, Helvetica,
sans-serif"><strong><a href="new_card.php">New
              Card</a></strong></font></p>
            <p align="center"><font color="#FFFFFF" size="1" face="Verdana, Arial, Helvetica,
sans-serif"><strong><a href="rules.php">Rules
              &amp; Regulation</a></strong></font></p>
          </div>
          <div align="center">
            <p> </p>
            <p>  </p>
            <p> </p>
          </div></td>
        <td width="84%" valign="top"
background="../../../../Documents%20and%20Settings/Windows%20User/Desktop/Mlleneum_Log2.jpg"
bgcolor="#FFFFFF"><table width="99%" height="973" border="0">
          <tr>
            <td height="967" valign="top"> <table width="95%" height="835" border="0" align="center">
              <tr>
                <td height="22" bgcolor="#FF9900"><font color="#0000FF"><strong>List
                  of Student summon</strong></font></td>
              </tr>
              <tr>
                <td height="780" valign="top"> <p> </p>
                  <form name="form1" method="post" action="">
                    <?php
                    $db = mysql_connect("localhost", "root");
                    mysql_select_db("fyp",$db);
                    $result = mysql_query("SELECT * FROM summon",$db);
                    if ($myrow = mysql_fetch_array($result)) {
                    echo "<table border=1 align=center>\n";
                    echo "<tr><td bgcolor=#FFFFCC><b>No</td><td bgcolor=#FFFFCC><b>Date</td><td
bgcolor=#FFFFCC><b>Vehicle No.</td><td bgcolor=#FFFFCC><b>Name</td><td bgcolor=#FFFFCC><b>ID</td><td
bgcolor=#FFFFCC><b>Payment Due Date</td><td bgcolor=#FFFFCC><b>Summon No.</td><td
```

```
bgcolor=#FFFFCC><b>Total</td></tr>\n";
                      do {

printf("<tr><td>%s</td><td>%s</td><td>%s</td><td>%s</td><td>%s</td><td>%s</td><td>%s</td><td>RM %s</tr>\n",
                              $myrow["No"], $myrow["date"],$myrow["vno"], $myrow["name"], $myrow["ID"]
$myrow["ldate"], $myrow["summonno"], $myrow["total"]);
                    } while ($myrow = mysql_fetch_array($result));
                      echo "</table>\n";
                    } else
                                            {
                              echo "Sorry, no records were found!";
                    }
                ?>
              </form>
                <p> </p></td>
          </tr>
          <tr>
            <td bgcolor="#FF9900"> </td>
          </tr>
        </table>
        <p> </p>
        <p> </p>
        <p> </p></td>
      </tr>
    </table>
    <p> </p></td>
  </tr>
  <tr>
    <td height="21" colspan="2" bgcolor="#FF9900"> </td>
  </tr>
</table>
<p align="center"><font color="#FF9900" size="2">Content and materials on
  this website are Copyright &copy; 2004 UTPVRSS Team</font></p></td>
  </tr>
</table>
</body>
</html>
```

key_result.php

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.01 Transitional//EN">
<html>
<head>
<title>Key Application</title>
<meta http-equiv="Content-Type" content="text/html; charset=iso-8859-1">
<script language="JavaScript" type="text/JavaScript">
<!--

function MM_reloadPage(init) {  //reloads the window if Nav4 resized
  if (init==true) with (navigator) {if ((appName=="Netscape")&&(parseInt(appVersion)==4)) {
    document.MM_pgW=innerWidth; document.MM_pgH=innerHeight; onresize=MM_reloadPage; }}
  else if (innerWidth!=document.MM_pgW || innerHeight!=document.MM_pgH) location.reload();
}
MM_reloadPage(true);

function MM_preloadImages() { //v3.0
  var d=document; if(d.images){ if(!d.MM_p) d.MM_p=new Array();
    var i,j=d.MM_p.length,a=MM_preloadImages.arguments; for(i=0; i<a.length; i++)
    if (a[i].indexOf("#")!=0){ d.MM_p[j]=new Image; d.MM_p[j++].src=a[i];}}
}
//-->
</script>
</head>

<body bgcolor="#000000" link="#FFFFFF" vlink="#FFFFFF" alink="#FFFFFF">
<table width="99%" border="0">
    <tr>
    <td height="1164"> <table width="100%" border="0">
        <tr>
        <td height="84" colspan="2" bgcolor="#FF9900"><div align="center"><font color="#FFFFFF" size="+2">U

            Vehicle Registration &amp; Summon System</font></div></td>
        </tr>
        <tr>
        <td width="16%" height="1013" valign="top" bgcolor="#666699"> <p> </p>
            <div align="center">
            <p><img src="Images/utp.gif" width="41" height="68"></p>
            <p><font color="#FFFF00" size="2" face="Verdana, Arial, Helvetica, sans-serif"><strong><a
href="index.php"><font size="1">Home</font></a></strong></font></p>
            <p><strong><font color="#FFFFFF" size="1" face="Verdana, Arial, Helvetica, sans-serif"><a
href="summonissues.php">Summon</a></font></strong></p>
            <p align="center"><font color="#FFFFFF" size="1" face="Verdana, Arial, Helvetica,
sans-serif"><strong><a href="key_result.php">Key</a></strong></font></p>
            <p align="center"><font color="#FFFFFF" size="1" face="Verdana, Arial, Helvetica,
sans-serif"><strong><a href="student_result.php">Student</a></strong></font></p>
            <p align="center"><font color="#FFFFFF" size="1" face="Verdana, Arial, Helvetica,
sans-serif"><strong><a href="staff_result.php">Staff</a></strong></font></p>
            <p align="center"><font color="#FFFFFF" size="1" face="Verdana, Arial, Helvetica,
sans-serif"><strong><a href="rules.php">Rules
            &amp; Regulation</a></strong></font></p>
            </div>
            <div align="center">
            <p> </p>
            <p>  </p>
            <p> </p>
            </div></td>
        <td width="84%" valign="top"
background="../../../../Documents%20and%20Settings/Windows%20User/Desktop/Mlleneum_Log2.jpg"
bgcolor="#FFFFFF"><table width="99%" height="973" border="0">
            <tr>
            <td height="967" valign="top"> <table width="95%" height="835" border="0" align="center">
                <tr>
                <td height="22" bgcolor="#FF9900"><font color="#0000FF"><strong>List
                of Key Application</strong></font></td>
                </tr>
                <tr>
                <td height="780" valign="top"> <p> </p>
                    <form name="form1" method="post" action="">
                    <?php
                    $db = mysql_connect("localhost", "root");
                    mysql_select_db("fyp",$db);
                    $result = mysql_query("SELECT * FROM keybook",$db);
                    if ($myrow = mysql_fetch_array($result)) {
                    echo "<table border=1 align=center>\n";
                    echo "<tr><td bgcolor=#FFFFCC><b>Name</td><td bgcolor=#FFFFCC><b>Course</td><td
bgcolor=#FFFFCC><b>ID</td><td bgcolor=#FFFFCC><b>E-mail</td><td bgcolor=#FFFFCC><b>Date</td><td
bgcolor=#FFFFCC><b>Room No.</td></tr>\n";
                        do {

printf("<tr><td>%s</td><td>%s</td><td>%s</td><td>%s</td><td>%s</td><td>%s</td></tr>\n",
                                $myrow["fname"], $myrow["course"],$myrow["id"], $myrow["email"],
$myrow["date"], $myrow["RoomNo"]);
                        } while ($myrow = mysql_fetch_array($result));
                        echo "</table>\n";
                    } else
                                            {
                        echo "Sorry, no records were found!";
```

```
                        }
                ?>
            </form>
            <p> </p></td>
          </tr>
          <tr>
            <td bgcolor="#FF9900"> </td>
          </tr>
        </table>
        <p> </p>
        <p> </p>
        <p> </p></td>
      </tr>
    </table>
    <p> </p></td>
  </tr>
  <tr>
    <td height="21" colspan="2" bgcolor="#FF9900"> </td>
  </tr>
</table>
<p align="center"><font color="#FF9900" size="2">Content and materials on
    this website are Copyright &copy; 2004 UTPVRSS Team</font></p></td>
  </tr>
</table>
</body>
</html>
```

1. Do not use image maps without 'ALT' description.

2. Do provide ALT="..." text for all your images.

3. Do not use [red | green | brown | gray | purple] [next to |on top of |changing to] [red| green |gray| purple].

4. Do have a strong, bright contrast between foregrounds and background colors, not only for the page text but also in the images.

5. Do not use colors in images to denote special areas, such as bar charts, maps and navigation bars. Consider using textures or line shading instead. Alternatively, provide additional written labels.

6. Do use blue, yellow, white and black if you really must use colors to distinguish items.

7. Use shape to show categorical distinctions

8. Use less color as possible

9. Use colors from the web safe color palettes.

10. Do not use shades of red and green together