Virtual Tour for IT and IS Building

by

Adi Yusran Abd Ghani

Dissertation submitted in partial fulfillment of
the requirements of the
Bachelor of Technology (Hons)
(Information System)

JUNE 2004

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CERTIFICATION OF APPROVAL

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Approved by,

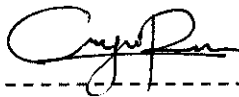_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
(Hasiah Mohamed @ Omar)

UNIVERSITI TEKNOLOGI PETRONAS

TRONOH, PERAK

June 2004

ii

CERTIFICATION OF ORIGINALITY

This is to certify that I am responsible for the work submitted in this project, that the original work is my own except as specified in the references and acknowledgements, and that the original work contained herein have not been undertaken or done by unspecified sources or persons.

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ADI YUSRAN ABD GHANI

ABSTRACT

Virtual campus tours enable users to experience the sights and panorama of a university campus without going through the real environment. Virtual tours are simply electronic presentations developed by colleges to promote their institutions. There are three types of tours, namely Classic Virtual Tour, Virtual Reality Tour and the New Breed of Virtual Tour. There are a few problems that are currently faced by users. Due to unavailability of virtual tour, user needs to visit the building in order to know the location of each of the labs available there. This will be time consuming and uses a lot of energy because not everybody is capable of touring the building on their feet. In addition, users might get confused with the building layout and they need a guide which to refer to help them to search for the right room. To overcome the problems, Virtual Tour for IT and IS building was developed in order to enable the students, staffs and the public to view the building as through they are walking through the real world. Thus the main objective of this project is to develop a virtual tour of IT and IS Building that could be used by the campus community to navigate themselves through the buildings. In conclusion, the Virtual Tour for IT and IS Building could assist the user to understand more about the building and to search for particular labs.

ACKNOWLEDGEMENT

TABLE OF CONTENTS

LIST OF FIGURES

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND OF STUDY

Virtual campus tours permit visitors to experience the sights and sounds of a college campus without going to the real campus. Virtual tours should never be construed as a substitute for actual college tours. That said, the virtual tour has its' benefits for students who are just boning up on colleges, those that are about to take actual tours, students who are returning from college tour trips and even alumni who are interested in seeing the changes that time has brought to their institution.

Virtual tours are simply electronic presentations developed by colleges to promote their institutions. However, as virtual tours have become ubiquitous, the quality of these online excursions has improved dramatically. Today colleges are focusing on delivering valuable university information within the context of the virtual tour. The sections below will explore the different types and varieties of the campus virtual tours.

The classic virtual tour utilizes campus photographs and text descriptions to convey information about the institution. Although this method is not as glitzy and interactive as some of the tours, colleges have developed very substantial tours using just pictures and text. It's important to provide more than simply building pictures and descriptions in the virtual tour though. Students are interested in class sizes, availability of courses, the college's social scene, athletic programs, intramurals, local area attractions and even how the institution will prepare them for a life after college.

Classic virtual tours are usually building-centric presentations that focus almost exclusively on the physical attributes of the college campus. Though exhaustive in their coverage of campus structures, these traditional virtual tours suffer from their similarity to one-another; it's just difficult for prospective students to glean much substantial information from this type of tour. Today students are drawn to tours that showcase the unique strengths of the institution and build a distinct case for why a prospective student ought to consider the school.

The next type of tour that will explore is called the virtual reality tour, or panoramic image tour. Panoramic tours give the visitor the illusion that he or she is standing in a particular area of campus, with the ability to turn completely around and see what is behind, or to the sides of their position. Virtual reality tours use several photographs that are "stitched" together to create the illusion of a 360-degree panoramic image. When viewing one of these tours, the visitor needs only click and drag their mouse around within the panoramic image to scroll the view in a complete 360-degree circle.

The new breed of virtual college tours focuses on delivering an experience that is as close to a real campus tour. Instead of relying on a singular tour technique or technology, the new breed of virtual tours incorporates a variety of multimedia elements into a presentation that moves in a linear fashion like a real tour. These new tours focus on delivering the institution's message within the context of the tour, and call upon different technologies at different stages of the tour to highlight particular aspects of the college.

1.2 PROBLEM STATEMENT

Based on the observation, a few problems had been identified. Below are the problems that are faced by the users.

- Touring the campus by walking could take up a lot of time. Hence, by using the virtual tour it could save up time especially for visiting outsiders and school students.
- The virtual tour created could enhance the image of Universiti Teknologi PETRONAS (UTP) where future students could view the tour while they were considering which college to apply to further their studies.
- There is also a possibility where not everybody in capable to tour the campus by walking. So, this virtual tour could be used as a method of viewing the Academic Complex by the campus community, outsiders or the new students.
- Previously, there are only pictures that could be viewed by the public. Thus the virtual tour could enhance the understanding about the location and the building which will be presented in the tour.
- Currently, there is no virtual tour of UTP. Therefore, there is a need in developing the tour.

1.3 SCOPE OF STUDY

The development of the virtual tour will be focusing on the
- IT and IS building (Building 1 and 2)
  Mainly, both buildings are catering the needs of IT and IS students by providing facilities and equipments which will enable them to gain knowledge and on hand experience while undergo their studies in UTP. Each facility in both buildings has its own objectives and functions which will assist students in their learning.

- Type of computer laboratories which are available in both buildings and their functions.

3

The computer laboratories that are available in both building are

a) Programming Labs

b) Advanced Programming Labs

c) Discussion Rooms

d) Flexible Learning Labs

e) Final Year Project Lab

f) Application Lab (Teaching and Learning)

g) Multimedia Labs

h) Data Communication Lab

i) Virtual Reality Labs

j) Usability Labs

- Lecturers' pavilions

The pavilions which are positioned at the top of the academic blocks are where most of the academic staff will be located. The uniqueness of the pavilion is where it provides a panoramic view of the campus surrounding.

1.4 OBJECTIVES

The main objective of this project is to develop the virtual tour of IT and IS Building that could be used by the campus community to navigate themselves through the buildings.

Below are other objectives that are expected to be achieved from this project

- To create a virtual tour that will portray UTP to the outsiders.
- To be able to create a 3-D modeling of the buildings.
- To be able to incorporate multimedia elements in the tour.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

This project mainly is on the matter of developing a virtual tour for the IT and IS building. In doing this study, the main areas that need to be emphasized are:

a) Simulation

b) 3D graphic

It is important to know some of the main software that is normally used for developing the virtual tour. Knowing the software will help in determining which software is applicable for the development of the virtual tour. Having some knowledge of the usage of the software will enhanced the understanding.

Virtual tour could be defined as a walkthrough. Walkthrough would bring meaning as a through demonstration or explanation that details each steps of a process. In relation with the project, the architectural walkthrough will describe about the computer model of the building which will dynamically display lighting and textures in the complex environment as the user walks through the simulation setting. (The American Heritage Dictionary of the English Language, 2000)

To further understand of the definition of virtual tour, the word virtual and tour will be defined separately in order to obtain the actual meaning of each word.

The word virtual when it was first introduced in the computational sense, it applied to things that are simulated by the computer. Though, overtime, the meaning had also been applied to things that really exist and are created or carried on by means of

the computer. The adjectives virtual are all used in various ways to denote things, activities, and organizations that are realized or carried out chiefly in an electronic medium. The word virtual are also tend to be used in reference to things that mimic their "real" equivalents. For example, virtual communities, virtual conversation and virtual tour. (The American Heritage Dictionary of the English Language, 2000)

The word tour could be defined as a trip with visits to various places of interest for business, pleasure, or instruction. In addition, it also brings the meaning of a brief trip to or through a place for the purpose of seeing it. Other definitions of tour would mean that to travel from place to place, especially for pleasure and to travel among various places while fulfilling engagements. Therefore, virtual tour could bring the meaning of things that are simulated by the computer which focus on a brief trip to or through a place for the purpose of seeing it. In other words, the user could travel from place to place using computer simulations. (Oxford Dictionary of Current English, 1998).

To further define the title, next will be the IT and IS building. The IT and IS building is the first and second building which are situated in the Universiti Teknologi PETRONAS Academic Complex. The facilities in the Academic Complex of UTP will be the largest and most comprehensive in the region for the study of technology and engineering programs.

Both buildings are comprised of computer laboratories, seminar rooms, discussion rooms and lecturers' pavilion. The pavilions at the top of the academic blocks are where most of the academic staff will be located. They provide a panoramic view of the campus surrounding.

2.2 SIMULATION

Computer simulation is the discipline of designing a model of an actual or theoretical physical system, executing the model on a digital computer, and analyzing the execution output. Simulation embodies the principle of "learning by doing" which is to learn about the system, a model should be build first and then the model could be operated.

Many people relate computer simulation with science fiction, high-tech industries and computer games. However, some people also relate it to education. Although they have mainly been used in applied fields such as aviation and medical imaging, these technologies had begun to be applied as a tool to develop commercial multimedia products. Further in this section, the term computer simulation will be defined.

According to S. Nicole and H. Tracey (2003), they had defined computer simulation as computer-generated versions of real-world objects (for example, a sky scraper or chemical molecules) or processes (for example, population growth or biological decay). They may be presented in 2-dimensional, text-driven formats, or, increasingly, 3-dimensional, multimedia formats. Computer simulations can take many different forms, ranging from computer renderings of 3-dimensional geometric shapes to highly interactive, computerized laboratory experiments.

In contrary, as stated by R. Roxanne and O. Kathy (2003), their definition of computer simulations are activities that can be conducted on a computer. Using computer-based simulation software, user will have the authority to create and manage their computer simulation.

2.2.1 Importance of Simulation

According to F. Paul (1995), simulation is important to be used in order to study dynamic systems. There are many methods of modeling systems which do not involve simulation but which involve the solution of a closed-form system (such as a system of linear equations). Simulation is often essential in the following cases:

7

- the model is very complex with many variables and interacting components
- the underlying variables relationships are nonlinear
- the model contains random varieties
- the model output is to be visual as in a 3D computer animation

The power of simulation is a uniform model execution technique can be used to solve a large variety of systems where one must choose special-purpose and sometimes arcane solution methods to avoid simulation. Another important aspect of the simulation technique is that the building of a simulation model to replicate the actual system. When user uses the closed-form approach, the model is sometimes twisted to suit the closed-form nature of the solution method rather than to accurately represent the physical system. A harmonious compromise is to tackle system modeling with a hybrid approach using both closed-form methods and simulation. For example, we might begin to model a system with closed-form analysis and then proceed later with a simulation. This evolutionary procedure is often very effective.

2.2.2 Simulation Discipline

F. Paul (1995) had outlined that, in order to characterize simulation, it is useful to compare it with other fields such as computer graphics / animation and virtual reality (VR), since these fields have much in common with simulation. Computer graphics is the computational study of light and its effect on geometric objects where the focus on graphics is to produce meaningful rendered images of real world or hypothetical objects. Animation is the use of computer graphics to generate a sequence of frames which, when passed before your eyes very quickly, produce the illusion of continuous motion. VR is primarily focused on *immersive* human-computer interaction as found in devices such as head-mounted displays (HMDs), position sensors and data gloves. Think of simulation as the ``engine'' which drives the graphics and VR technologies. That is, by doing simulation (creating a model, executing the model, and analyzing the output), you build the infrastructure necessary for other fields.

8

The ultimate test of a computer animation is that "it looks good" to the viewer. Most computer simulationists, however, regard this as only one component of validation. As long as the user are not doing engineering or science, creating a geometric model that looks good, as it undergoes motion, is satisfactory. However, if the user are trying to validate a mathematical model with real world data (often of a non-visual nature), they must be concerned with more than mere looks. Most VR researchers are concerned with the human-machine interaction and not with the mathematical models which actually create the artificial reality. For such models, it is required to have computer graphics for representing the geometry and computer simulation which will represent the dynamics.

2.2.3 Issue Relating to Simulation

As stated by F. Paul (1995), animation techniques could be used by simulationist to create simulation. Computer graphics is moving in the direction of using more system oriented models including keyframes. At first, this may seem contrary to the aim of simulation. However, keyframe models are valid. They are system models defined at a high level of abstraction. Looked at from this perspective, spline-based keyframing techniques can be used within multimodel simulations in those instances where speed is more important than visual or statistical accuracy. Validation and accuracy need not be system wide as the analyst may be focusing on only a small part of the multimodel.

F. Paul (1995) had also mentioned about icons or rendered scenes. Most of the simulations will use iconic displays instead of fully rendered 3D scenes. There are two reasons for this:

- 3D rendered scenes are computationally expensive
- Icons may express the necessary information content that is not contained in the scenery

The ideal situation is one where the computer doing the simulation is powerful enough to fully render a 3D geometric model of the system, while also having the

capability to display other sorts of information (numeric, iconic) within the 3D context.

2.2.4 Relevancy to the Project

With regards to this project, simulation is important to portray animation of still images and 3D animation. Simulation is used to make the project to be more attractive and interactive which would enhance user understanding in using the product. Therefore, simulation will be the main element used to develop the project.

Basically, simulation is an example of multimedia product. The combination of multimedia elements could create an interesting multimedia simulation. Elements like text, graphic art, sound, animation and video will increased the effectiveness and attractiveness of creating a simulation. When the sensual elements of multimedia like dazzling pictures and animations, engaging sound, compelling video clips, and raw textual information are weaved together, the thought and action centers of people's mind will be electrified. Furthermore, when the user could control the process, they will be enchanted.

2.3 3D GRAPHIC

3D animation is most widely used for featured films, video games, and commercials. In addition, the other uses of 3D includes broadcast design, corporate presentations and training programs, educational media, CD-ROMs, architectural renderings and walkthroughs, scientific visualization, virtual reality, and the web.

According to S. Nathan (2002), the term 3D Graphics has several different meanings and so it can sometimes be ambiguous and confusing when applied to computer graphics. Usually, the image that was shown on the computer screen is a two-dimensional image. The image spans from left to right and up to down but usually not in and out of the computer screen. However, still those certain types of computer graphic applications are referred to as "3D".

The difference between 2D graphics and 3D graphics is actually not how the images appear but rather how they are defined. 3D graphics actually refers to a process used to create (2D) images from 3D data rather than the actual images, themselves.

A 2D image definition contains only information about how a scene appears from a particular point. For example 2D image of a car from the front, there is no way to manipulate that image to see what the back of the car looks like. The 2D image contains only information from a single vantage point.

A 3D image, however, contains information about the scene in three dimensions. This 3D data can not be viewed directly, however. In order for it to be viewed, the 3D data must first be converted into a 2D image by the computer in a process known as rendering.

2.3.1 3D Animation Production Process

The 3D animation production process is similar to 2D production process. According to W. Bruce (2002), the easiest way to visualize the 3D animation is by comparing to a television studio environment. In the live action, there are actors, lights, and cameras. In the 3D environment, the actors are mathematically created objects and

characters, and there are digitally simulated lights and a digitally simulated camera. The process of the production is portrayed in below flowchart.
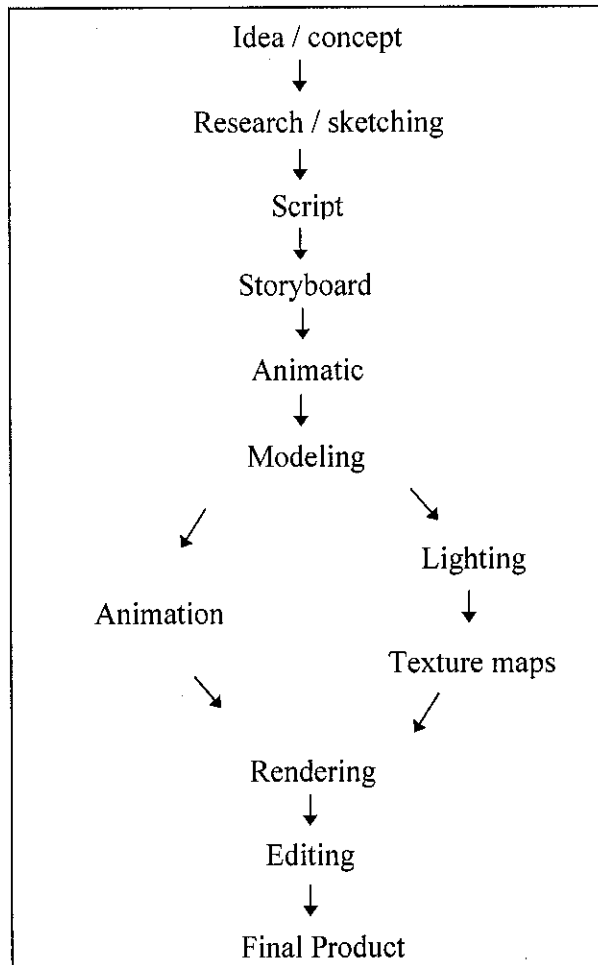
Idea / concept
↓
Research / sketching
↓
Script
↓
Storyboard
↓
Animatic
↓
Modeling
↙ ↘
Animation

Lighting
↓
Texture maps
↘ ↙
Rendering
↓
Editing
↓
Final Product

Figure 2.1: The 3D animation process

2.3.2 Modeling

Modeling is the creation of a 3D mathematical database that, when rendered or drawn by the computer, resembles the desired object. Building a model can complicate or simple depending on the underlying geometry of an object. To build a model means to create a mathematical database composed of points, lines, curves, and surfaces. The fundamental building blocks of the objects are called primitives. Primitives are simple mathematical shapes that can be modified into looking like real of fantastic objects.

Another way to model is to use rotation. Rotation works like lathe. A shape is revolved around an axis to crate an object that has rotational symmetry. On the other hand, polygons too could be used for modeling. Polygons offer speed when rendering, and for simple models complex surfaces are not really needed.

2.3.3 Relevancy to the Project

With regards to the project, the usage of 3D could give the user the ability to view the scene from any vantage point inside or outside of the scene. In addition, because the 2D images are generated on-demand by the computer, the user has the ability to move the objects around in the scene around and then re-render the image to view the changes. This is what makes interactive animation possible. This kind of flexibility is unique to the 3D graphics process and the major reason for its use.

To be working with 3D graphics, 3D computer modeling software is a need. This is because 3D artwork deals with 3D space, which is a simulation of the real space. Three- dimensional space has three axes; X (width), Y (height), Z (depth). While conceptualizing three dimensions may not be difficult, controlling views of objects and cameras, or rotating objects with a mouse and keyboard can prove to be an arduous task.

For the project, 3D computer modeling software that is going to be used will be 3D Studio Max and AutoCAD 2000. The usage of the software is depending on the type of 3D imaging that is going to be produced. If the image if regarding structural floor

13

plan, AutoCAD 2000 is more appropriate. On the hand, if it deals with modeling, 3D Studio Max will be used.

2.4 REVIEWS ON VIRTUAL TOURS

In this section, four virtual tours had been studied in order to obtain the concepts and ideas of an effective, interactive and attractive virtual tour that could leave an impact to the user. Each of the tour was observed and the findings are stated below.

2.4.1 Virtual Tour of Olympic Museum

The virtual tour of the Olympic Museum is one of the virtual tours that have been observed. This virtual tour could be viewed through the official website of Olympics Games. The Olympic Museum is located in Lausanne, Switzerland. The mission of the Olympic Museum is to make visitors aware of the breadth and the importance of the Olympic Movement; to show them by means of images and symbols that Olympism is not merely a matter of sports competition but rather a philosophy of life whose roots are deeply embedded in our history.

This tour was developed using Flash. Therefore, Flash player is required to view the tour. The tour is divided into two parts, where the first part is the building animation while the second part is images representation. In the first part, the building is presented by the animated structural layout of the entire levels of the building. Users could see all the rooms which are located on each level in the building. By clicking on each of the level, user could choose which level to go first.

The second part which is below the structural layout, are the text description and related still images that portray the rooms of the building. The text description provides the brief explanation of the room shown in the pictures. For example, the above picture is showing the image of the Library and the description on its right. Below the picture are thumbnails which allow the user to view other pictures of the Library. Once the thumbnails are clicked, the picture will change which will also change the description of the picture.

Besides, still images, this tour also provides video clips and 360° panorama views. But the 360° view is only available to certain areas of the museum.
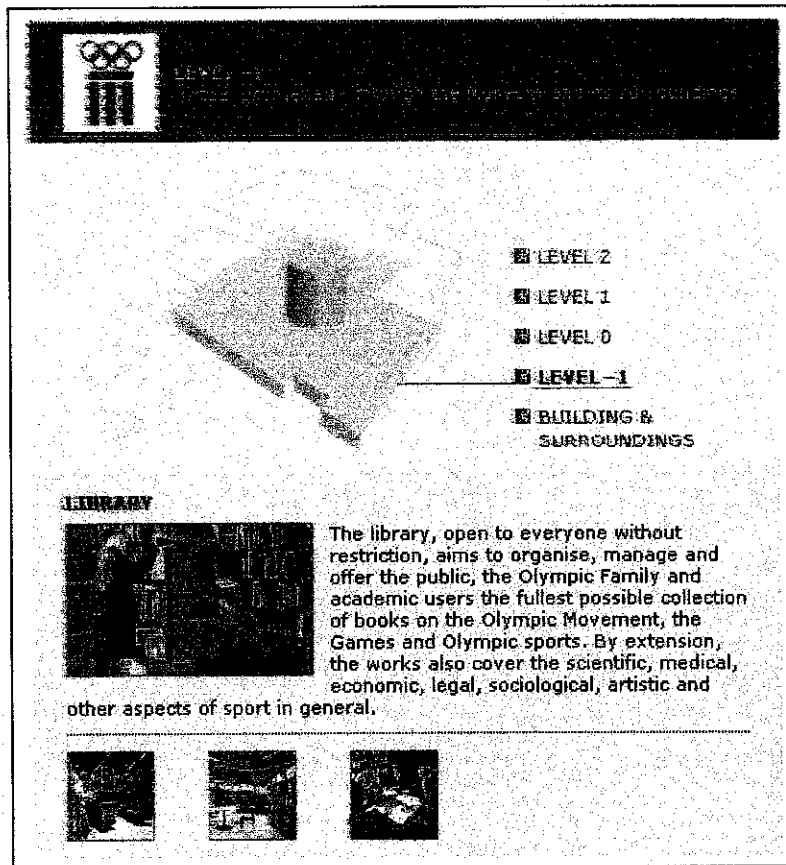
15

Figure 2.2: Illustration of Olympic Museum Virtual Tour

From the Olympic Museum Virtual Tour, few of its elements could be considered to be included inside this project. The representation of the structural layout did make the tour to be more interactive.

2.4.2 Virtual Tour of University of Pittsburgh

Next, is the virtual tour of the University of Pittsburgh. This tour could be accessed through the university official website. The University of Pittsburgh system consists of its 132-acre Pittsburgh campus, located in the Oakland section of the city, and regional campuses in Bradford, Greensburg, Johnstown and Titusville. The University's 9,600 employees, including 3,800 faculty members, serve more than 32,000 students through the programs of 18 undergraduate, graduate and professional schools.

Thorough the findings, it is found that this tour was developed not using certain software. It is developed using the web language scripting as the tour are meant to be put in the website.

Mainly, the tour comprise of three different parts which cater three different objectives. The first part consists of a picture, brief description and a small map. The second part is where the user could view the image in a bigger size. In this part is the tour just focuses on the image without any description. In the third part, the user could view the map of the entire campus. In the big map, user could just point and click on the building which they wish to view. Every part is related in order to ease the user while they navigate through the tour.

From the tour of University of Pittsburgh, elements like large map could be considered to be included in the project. However, the project will focus on the map of the building instead of the entire campus. The map shown has given the idea of how to present the structural layout in an attractive way. Usage of different colours, could give different effect and meaning to users.
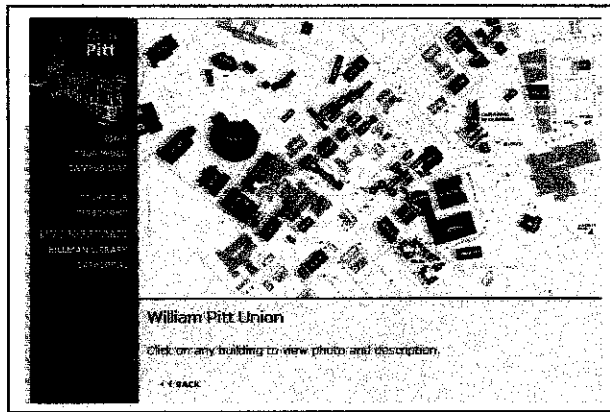
Figure 2.3 Illustration of Virtual Tour of University of Pittsburgh
where it focuses on the large map

Figure 2.4: Illustration of Virtual Tour of University of Pittsburgh
where it focuses on the description of the building
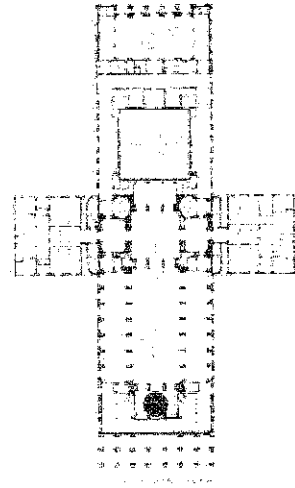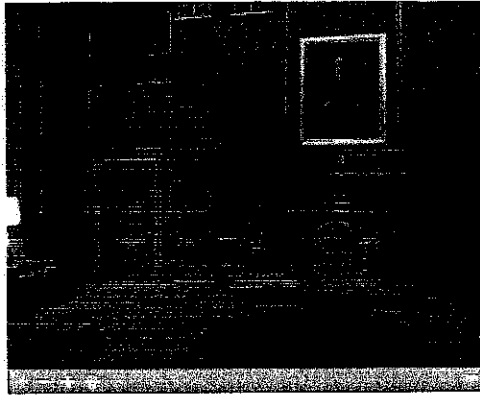
2.4.3   Virtual Tour of U.S Supreme Court

The virtual tour of the U.S Supreme Court is available over the internet in the Oyez website. The Oyez project began when they feel that there is a need in creating a multimedia-based Supreme Court. This is where the idea first took place. There are various versions of this product before the web based version has been introduced. Besides virtual tours, the Oyez also provides cases and discussions of the real court.

This tour was developed using web language scripting and there is no specific software used. On most of these pages, what looks like an image is actually a 360-degree panorama. The user can look to the right, left, up and down by clicking-and-holding the mouse button and then dragging the mouse in the appropriate direction. The user may also observe that within some sections of the tour, the cursor may change to a button/hand when the user passes over certain "hot spots." This is a signal to click the mouse which will transport the user to another section or to a detailed still image.

This virtual tour also provides floor layout of the building and images which enable the user to view the interior part of the Supreme Court. Basically, this tour covered all the rooms that could be found in the building. The images that are shown in this virtual tour provide a 360° tour of the building. User could view the rooms in the court as if they are inside the building.

From this virtual tour, elements such as the image of the floor plan could be adapted into the project. The floor layout is very important in order to enable user to understand about the layout of the building. So, users could navigate themselves through the actual building.

West Conference Room

Back to Library Anteroom

Figure 2.5: Illustration of Virtual Tour U.S Supreme Court
where it portrays the interior of the rooms

20

2.4.4   Virtual Tour of School of Management, Boston University

School of Management of Boston University is accessible through the official website Boston University. University of Boston is now internationally recognized as a top institution of learning and research. Our faculty includes Nobel Laureates, a MacArthur Fellow, leading scientists, prize-winning authors, and many more valued scholars. Throughout its history, Boston University has stayed true to its founding mission of providing an excellent education and helping students become valuable members of society.

This virtual tour was developed using Flash and Flash player is required to play it. This tour provides the information regarding the building of School of Management. The first page of the tour provides the 360° of the campus panorama. There are two buttons on this page which enables user to view either the structural layout or the description of the still image selected.

The button on left hand side will link the user to the structural layout animation where user could select which level inside the building they which to take the tour. Once the level is selected, user could further select which room they choose to view. In viewing the rooms, the images that are shown are 360° panorama. Therefore, user could view it as if they are inside the rooms. If the user needs to view the description of the rooms, they could click the button which is on the right hand side. Once they are clicked, a pop out window will display the information for the desired rooms.

From the tour, the interesting elements are the animated structural floor plans which are presented in 3D graphics. The way the animation is being presented is attractive and interactive.
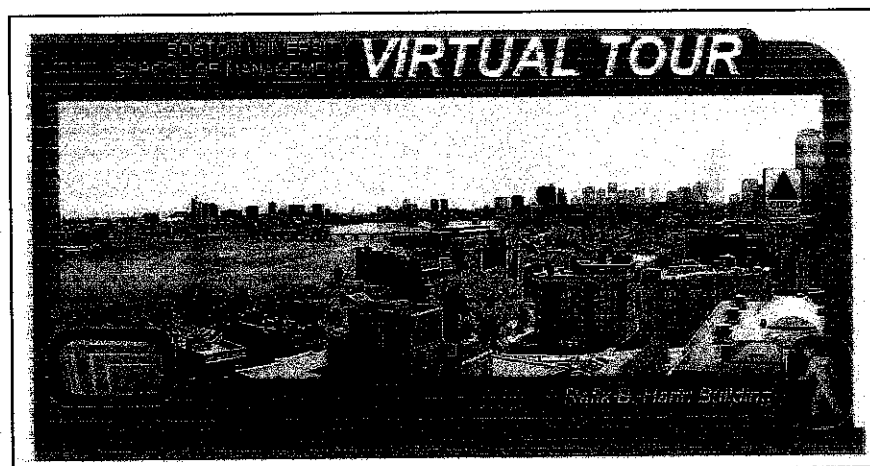

Figure 2.6: Illustration of Virtual Tour of School of Management, Boston University which displayed the 360° panorama view of the university
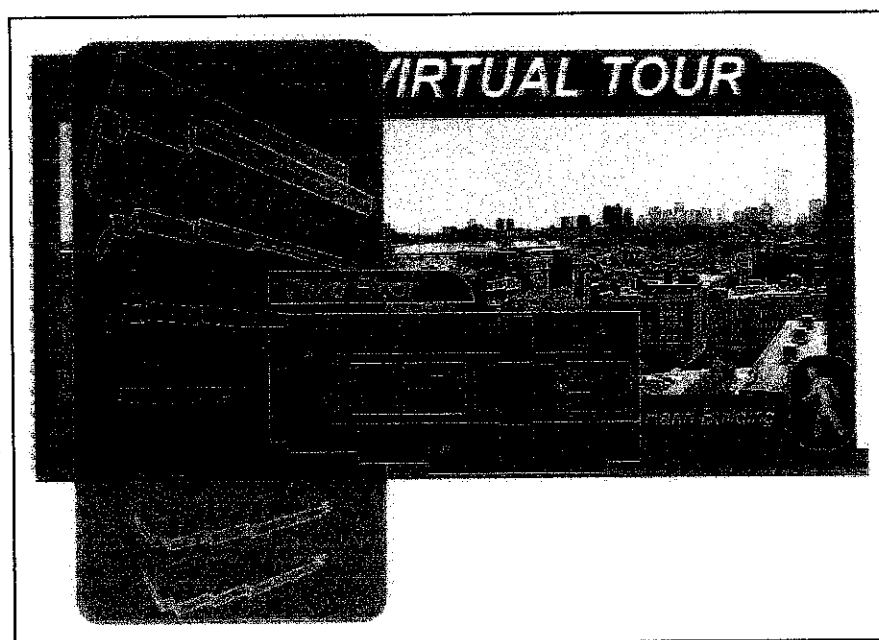

Figure 2.7: Illustration of Virtual Tour of School of Management, Boston University which focuses on the displaying of the structural layout
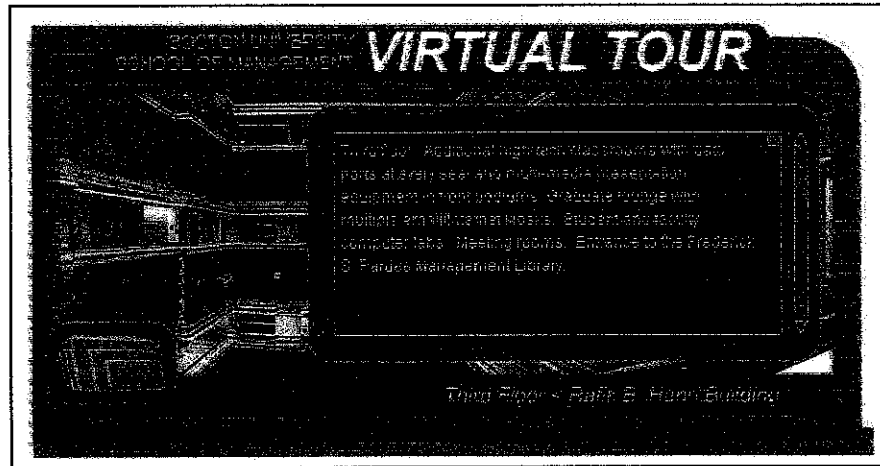
Figure 2.8: Illustration of Virtual Tour of School of Management, Boston University which focus on the description of the building

CHAPTER 3

METHODOLOGY / PROJECT WORK

3.1 SIMULATION STUDY MODEL

Simulation study model is a model which takes the fundamental process activities of specification, development, validation and evolution and represents them as a separate process phases. Each of the steps that are included inside this model will be explained further in relation to the task performed. The simulation study model could be illustrated in a flowchart in next page.

In order to develop the project, each phase is must be followed to ensure the smoothness of the development process. Once each of the phases is completed, development will move further to the next phase. All the phases that were completed will be hold and no more major changes will be made to that phase. This is to ensure that the phase is followed accordingly and no redundancy of work will be performed throughout the development process.
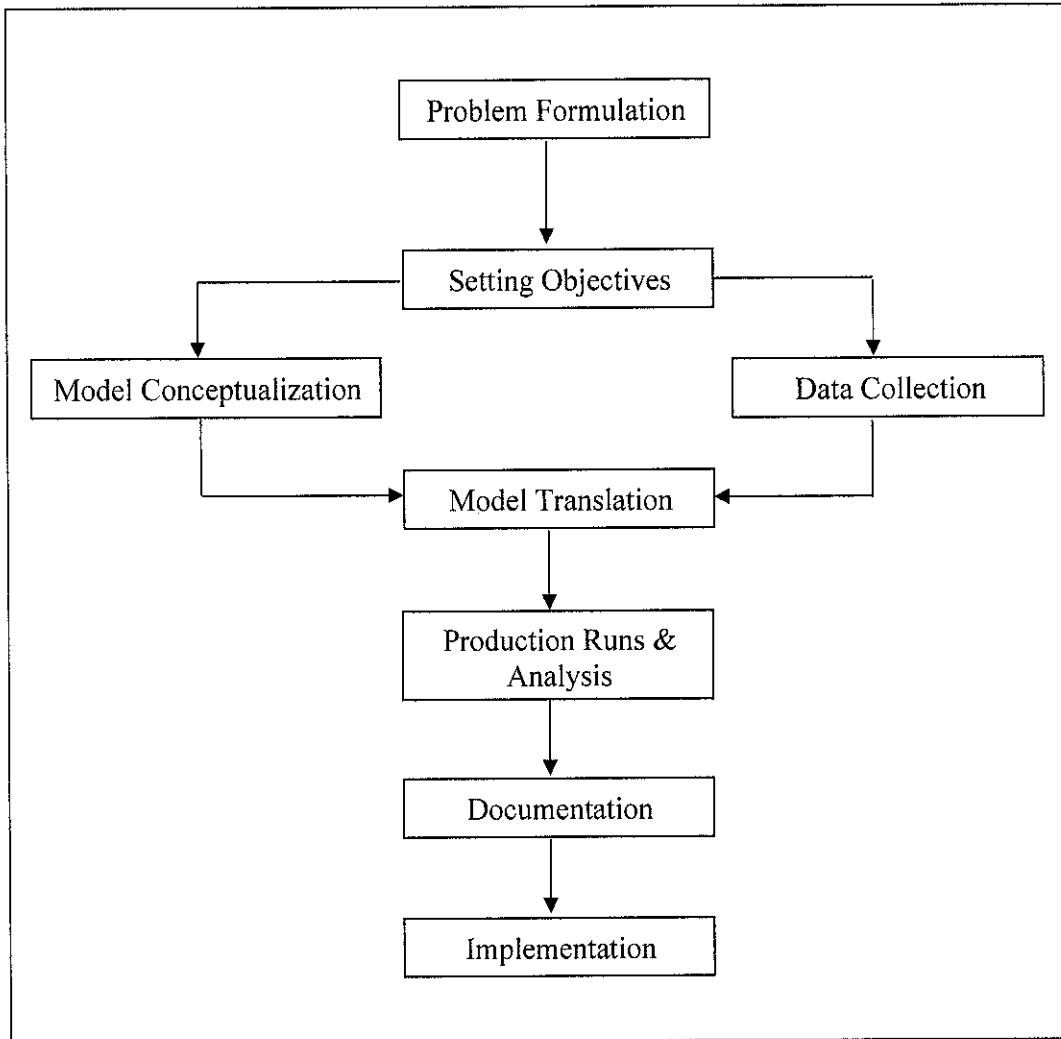
Figure 3.1: Simulation Study Model

3.1.1 Problem Formulation

Problem formulation is one way to analyze problems that are faced by users which leads to the development of the project. In order to identify the problems for this project, problem statements had to be formulated first. Problem statements need to focus on the situation of the problem. In advance, background of studies need to be conducted in order to gain knowledge regarding the virtual tours.

In identifying all the problems that are currently faced by the user, a few methods were used. The methods that were used are listed below:

- Observation: this method was used to obtain information regarding the current situation that is faced by the campus community. Based on observations, it could be determined that currently there is no virtual tour available for the usage of the campus community. At present, only pictures that are used to portray UTP to public and it is difficult to locate rooms in the building since there is no layout of the buildings provided.

- Research: this method was used to obtain information regarding the problem faced and the solution to overcome it. Based on research, virtual tour could be the substitution of the real walking tour through the buildings due to the reason that not everybody are capable to tour it by walking. In addition, the image of UTP could be enhanced once the public could view it.

The problem statements for this project are written in the Introduction chapter in the report. After the problem statement had been outlined, the solution needs to be work out. To summarize, the proposed solution to overcome the problems is by developing virtual tour which could facilitate the campus community in touring the buildings.

3.1.2   Setting of Objectives

The objectives indicate the questions that are to be answered by the simulation study. The project should include a statement of various scenarios that will be investigated.

Objectives setting are very crucial in order to ensure the project is developed based on the scope and objectives and to avoid misinterpretation of the title. Objectives could be formulated based on the outlined problem statements. In this phase, objectives and scope of studies are separated and stated clearly to ensure the topic is well understood.

In order to ensure the scope of studies to be inline with the project, the scope should not be too broad and are able to be completed with in the time frame. Therefore, for this project three main areas were identified to be included for the development. After the consideration of factor of time and resources, the three main areas are Building IT and IS, type of laboratories and the lecturers' pavilion.

Once scope had been identified, the objectives for the project were set up. The main and sub objectives were set as the goal of developing the project. Based on the problem statements, the main objective is to develop the virtual tour of IT and IS Building that could be used by the campus community to navigate themselves through the buildings.

3.1.3   Model Conceptualization

The real-world system under investigation is abstracted by a conceptual model, a series of mathematical and logical relationships concerning the component and the structure of the system. It is recommended that modeling begin as a simple model and then the model will grow until a model of appropriate complexity has been developed.

Model conceptualization is the study of previous working system which is similar to literature review. Literature Review is the analytical, critical and objectives review

of written materials on the chosen topic. It provides the information on the research question and to identify what others have said about the question.

In the literature review, four types of virtual tour had been selected to be further studied. The four types of tours consist of virtual tour for colleges and university's schools, museum, and courts. Each of the virtual tour that was selected has its own special elements.

Additionally, the literature review had also highlighted the concepts of simulation and 3D graphics in relation to the project. Both topics had been studied in order to acquire the background information to ease with the development.

In writing the literature review, research was used as a method in gaining information. The method that was used is listed below:

- Observation: this method was used to obtain information regarding the real world virtual tours. Based on observations, all the virtual tours are studied and observed based on certain elements that are being portrayed by each of the tours. Each tour is being commented and their special elements are written down.

- Research: this method was used to obtain information regarding the topics that are related to this project which could enhance the author's understanding. Based on research, two relevant topics had been selected which are simulation and 3D graphics. The concept of each topic need to be review to gain knowledge on the subject matter.

Additionally, storyboard for the product was developed. The storyboard for the project was created to ease the development process which false under the model translation phase. Storyboard is the rough ideas that were put on papers. By making the storyboard, the ideas were clearly presented on papers and it is much easier to be referred to. Moreover, the creation of storyboard makes the ideas to be well arranged and avoid repetitiveness.

3.1.4   Data Collection

The data should be submitted to the simulation analyst once the client had all kinds of needed data. Data collection and model conceptualization are shown as contemporaneous in the flow chart (figure 3.1). This is to indicate that the simulation analyst can readily construct the model while the data collection is in progressing.

Data collections are the important phase where all the appropriate data needed to be collected to ease the development of the project. With out important data, the development it is unworkable and is unable to be completed.

In developing the tour, the structural layouts of both buildings are vital where it shows the location of each room and where are the rooms located. Based on the layout too, building will be simulated with the touch of 3D imaging. The architectural drawings were obtained from KLCCB.

Some editing need to be made to the architectural drawings obtained. The reason is because of the original drawings contained unrelated information (figure 3.2). Since the drawings are in AutoCAD format, AutoCAD was used in the editing process. Unnecessary information was deleted living only the layout of the building with the fixture layout (figure 3.3). After the editing process, the drawings are no more complicated and easy to be understood.
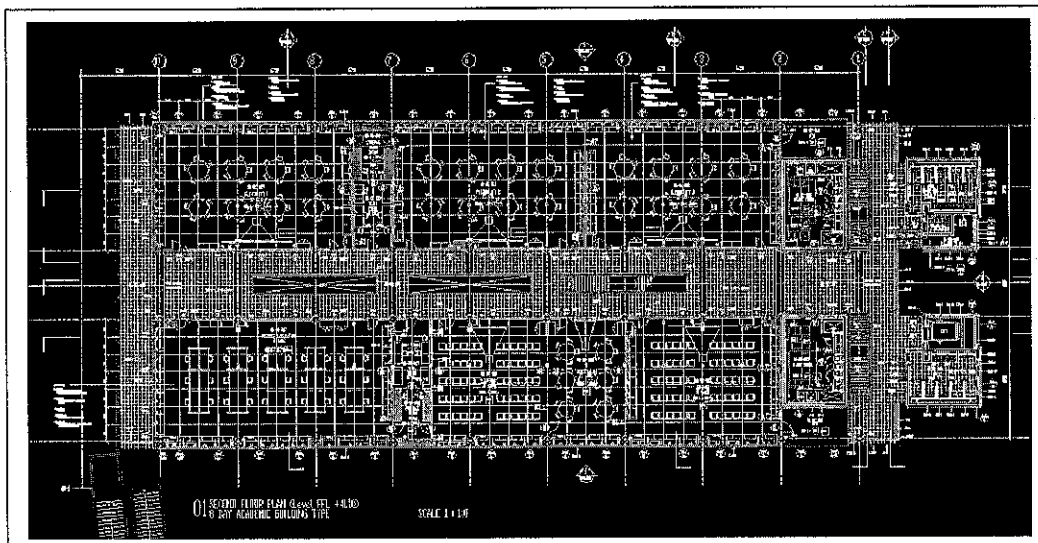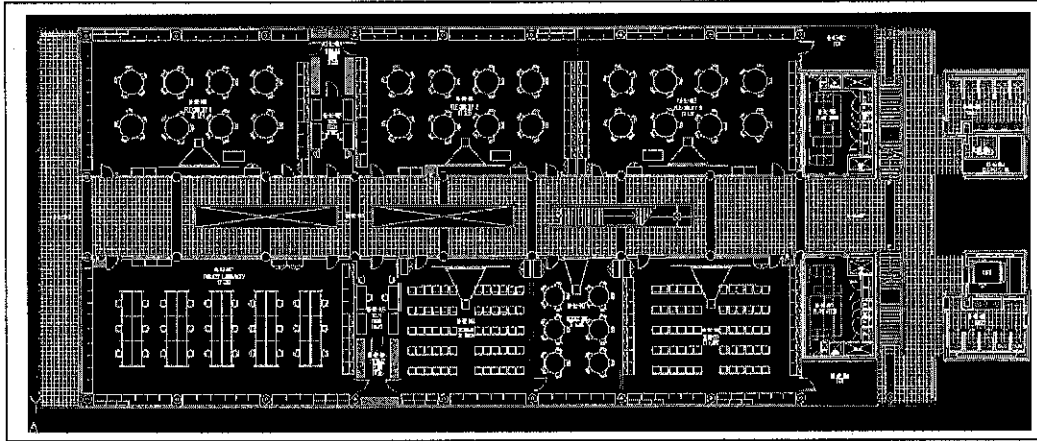

Figure 3.2: Non-edited architectural drawing

Figure 3.3: Edited architectural drawing

Other method of data gathering includes observation. The method will further explained below:

- Observation: this method was used to obtain information regarding the building IT and IS of the Academic Complex. Based on observations, information regarding the types of laboratories, their functions and their distinctive names had been identified.

3.1.5   Model Translation

The conceptual model constructed will be coded into a computer recognizable form known as the operational model.

After the editing process had taken place, the drawings were imported into a 3D modeling software known as 3D studio max. In 3D studio max, the drawings imported are in 2D image. In order to create 3D image, the 2D image must be extruded to give the 3D effect to the drawings (figure 3.4). Each of the level was translated separately.
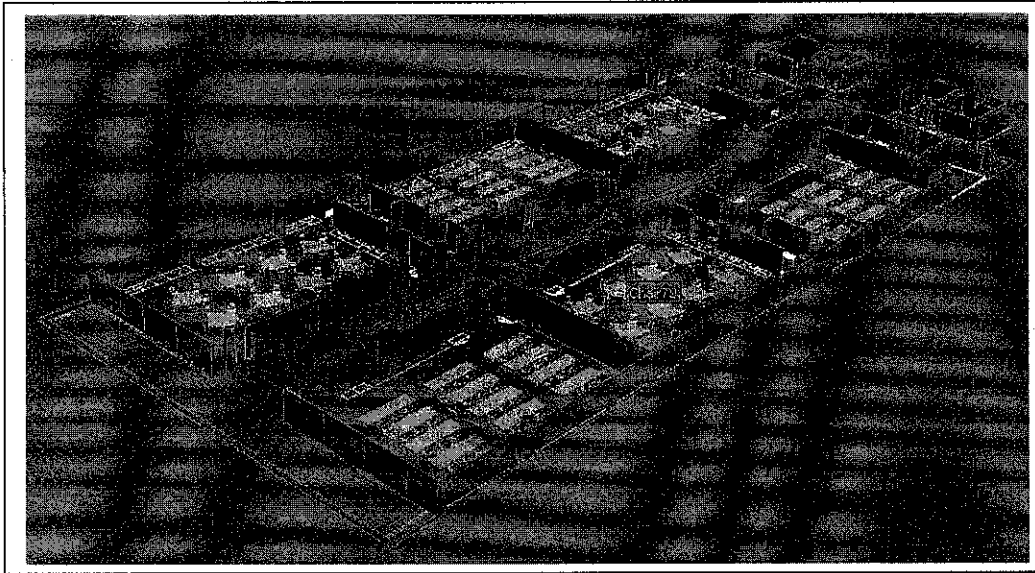
Figure 3.4: 3D modeling of one level of the building

After each level had been extruded into 3D modeling, the animation was set for all the level. In order to set the animation, two important elements need to be set correctly and appropriately to obtain the best animation. The two elements are camera and lighting. Before doing the animation, placement of camera is crucial to get the correct view and angle. The camera needs to be placed as if the user is taking the tour in the real world. Later, lighting is placed inside the animation to give light to it. If no lighting was set, the animation that will be rendered will be dark and difficult to be seen.

When the 3D modeling process finished, animation will be rendered into avi format. The rendering process will take some time depending on the length of animation. Later the avi format file will be imported into Flash in order to compile it into one application. Flash was chosen because it could integrate all multimedia elements such as text, sound, animation and graphics.

3.1.6   Production Runs and Analysis

Production runs, and their subsequent analysis, are used to estimate measures of performance for the scenarios that are being simulated.

During this phase is where usability testing will be conducted to see whether the product developed does meet the requirements. The requirements for this project will be based on the problem statements and objectives that were set earlier in the report.

Questionnaires need to be prepared in advance before the testing process began. The purpose of providing the questionnaires is to assist the user to response to the simulation product during testing. The questions were basically set to get user's feedback on how they perceive the product. From their feedback, it could be determined whether the project's requirement had been met.

Five users were selected randomly to participate in the testing process. During testing, user will be given a set of questionnaires to be answered. The user needs to view the simulation first, and then fill up the questionnaires regarding the simulation. Based on the questionnaires, result will be generated and later discussed in the discussion section.

3.1.7   Documentation and Reporting

Documentation is necessary for numerous reasons. If the simulation model is going to be used again by the same or different analysts, it may be necessary to understand how the simulation model operates. If the model is to be modified, this can be greatly by adequate documentation.

Since the need for documentation is crucial, proper documenting needs to be done for this project. A full report has to be produced for this project. The report will consist of five sections. Each of the section will be further describe below.

- Introduction

  Introduction must include the background of the project, the problem statement, the objectives and scope of study. Problem statement needs to be focused on the situation of the problem and research question which lead to the objectives of the study. The boundary of the project work is required to be clarified within the given time period

- Literature Review

  Literature review is the analytical, critical and objective review of written materials on this topic. It provides the background information on the research question and what others have to say about the question. It contains all the relevant theories, hypothesis, facts and data which are relevant to the objectives and findings of the project

- Methodology

  Methodology refers to the methods used to achieve the objectives of the project. The methods used must be relevant to the project that is being developed.

- Result and Discussion

  This section will present the finding of the project work. All the gathered data from the project work will be presented in form of tables and figures such as graph and pie charts. The data need to be analyzed and the results need to be discussed.

- Conclusion

  Conclusion will highlight the most significant findings in relation to the objectives of the project. This section also should include recommendation for future project work.

3.1.8   Implementation

The last phase in the simulation study model is implementation. During this phase, the product will be implemented and ready to be used by the campus community. This product will help the campus community to navigate themselves through building IT and IS.

CHAPTER 4

RESULT AND DISCUSSION

4.1 RESULT

Questionnaires were given to five randomly selected users to perform testing for this product. Based on the questionnaires, all the findings were summarized and will be written below.

Based on the findings, it had been identified that most of the user have been to building IT and IS. Therefore, it could be concluded that they are aware of the layout for both building but they sometimes faced with the problem of finding the correct computer lab. This shows that students are unaware of the location of each lab. So, most of the user feels that there is the necessity of developing a virtual tour which could help them to locate these rooms including computer labs and lecturers' room.

The 3D simulation that was developed does portray the real world. Most of the user which test the product agreed on this matter. User feels that the virtual tour developed was easy to be understood and easy to be used. The simulations of 3D images are presented in a simple and clearly way as to cater for the campus community and the external public.

From the findings, it could be determined that almost all user agreed that the virtual tour developed will save time in term of going through the tour virtually compared to walking in the real world. By going through the virtual tour, user will be able to see how labs are arranged including the equipment inside it. In addition, the user had responded averagely on the question of how easy the tour eases users in searching for wanted labs.
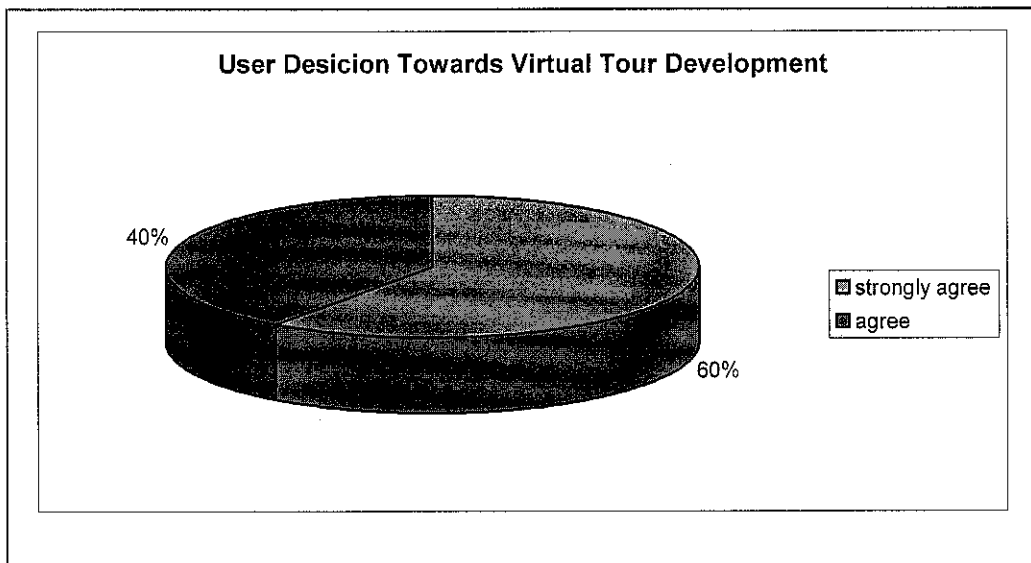
User Desicion Towards Virtual Tour Development

40%

60%

- strongly agree
- agree

Figure 4.1: User Decision towards Virtual Tour Development

Virtual Tour Portrays Real Environment

20%

20%

60%

- Agree
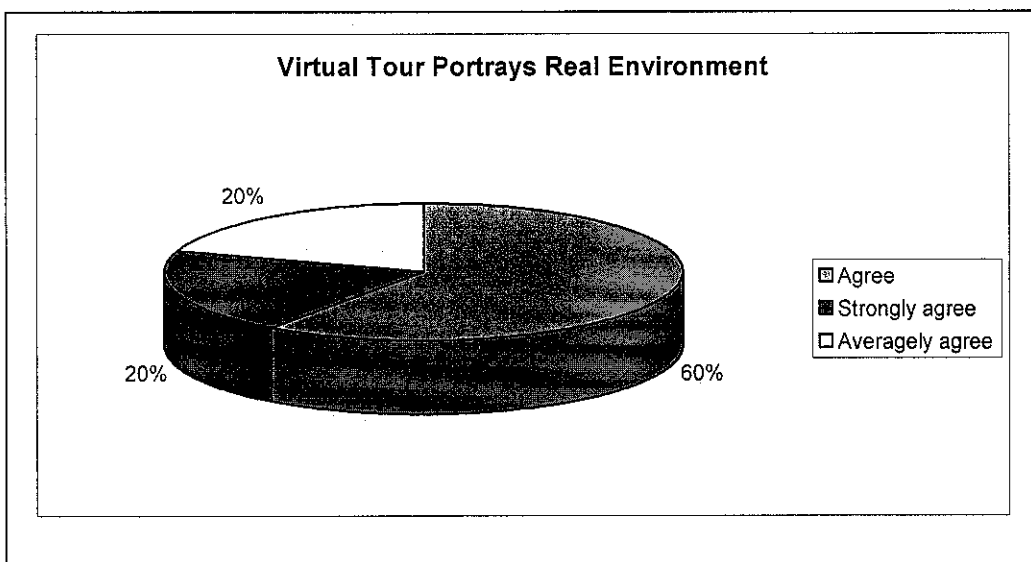- Strongly agree
- Averagely agree

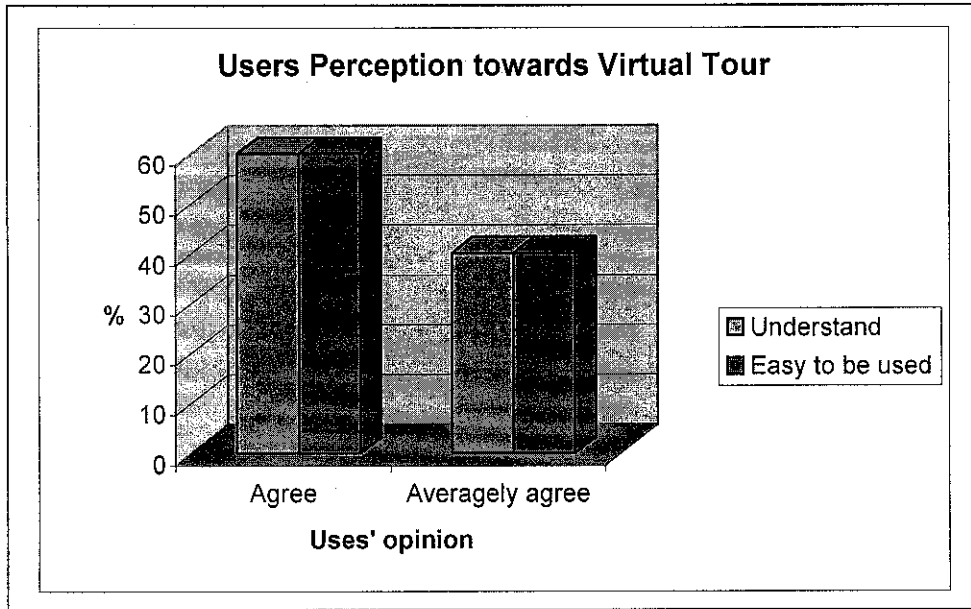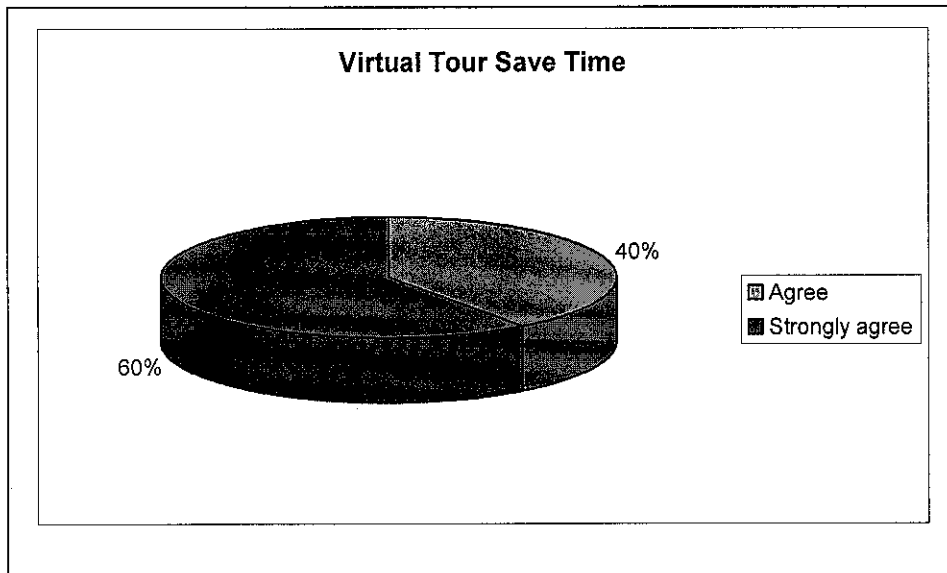Figure 4.2: Virtual Tour Portrays the Real Environment

36

Figure 4.3: User Perception towards Virtual Tour

Figure 4.4: Virtual Tour Save Time