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JUDUL: VISIT SOLAR SYSTEM USING VIRTUAL REALITY
SESI PENGAJIAN: 2006/2007

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VIS ITY

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This report is submitted in partial fulfillment of the requirements for the Bachelor of Computer Science (Interactive Media)

FACULTY OF INFORMATION AND COMMUNICATIONS TECHNOLOGY
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2006

DECLARATION

I hereby declare that this project report entitled

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is written by me and is my own effort and that no part has been plagiarized without citations.

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DEDICATION

To my beloved parents, siblings and friends...

ACKNOWLEDGEMENTS

All praise and thanks are due to Allah, and peace and blessings be upon His Messenger. With only His blessing, this project can be done.

I would like to thank Mrs. Rusnida bt Romli for her assistance in completing this project successfully. Without her guide and patience, I will never manage to complete this task. I am so thankful to you.

Also thanks to Fakulti Teknologi Maklumat dan Komunikasi (FTMK) lecturers, for teaching me all this time while I was in Kolej Universiti Teknikal Kebangsaan Malaysia (KUTKM).

A thousand thanks to my family especially for my parent for giving me a lot of support and helps during my studying in KUTKM. Not to forget all my colleagues for their helps and ideas in completing this project.

May Allah bless you all. Thank you.

ABSTRACT

This project focuses on developing a Virtual Reality system to visit the solar system. The purpose of this project is to enhance people understanding about the solar system rather than read about it through encyclopedia, text books or media electronics. The target user for this application will cover all levels of society. The user will use the desktop (non-immersive system) and also VR goggles (semi immersive system) to explore the virtual space along with the VR tracking devices. The user will have the power to view and navigate themselves through the environment of this virtual reality from the view of 360°. The methods that will be used for this project is ADDIE model methods. This method is divided with its function and method usage. The ADDIE model method suitable to use for the application project such as virtual reality, courseware, software, and others related product. This application contains interactive ability where he/ she can view the information about the planet they being view by clicking the planet. EON Studio was chosen in developing the VR system with the support from other such as 3d Studio Max for building the 3ds object and Adobe Photoshop for image editing. VR can be used in conjunction with many class subject s and appeal to different learning styles. Subjects that rely on visualization, such as science and social studies, could benefit the use of VR. Traditional method of text based instruction could be augmented by the experiential method of VR. Hopefully, the producing of this application can be a good contribution towards society understanding about the solar system.

ABSTRAK

Projek ini membincangkan tentang pembangunan sebuah sistem Realiti Maya untuk melawat sistem solar. Tujuan projek ini dibangunkan adalah untuk memberikan lebih kefahaman kepada orang ramai selain membaca mengenainya melalui ensiklopedia, buku teks dan media elektronik. Pengguna yang disasarkan untuk menggunakan aplikasi ini meliputi semua lapisan masyarakat. Pengguna akan menggunakan komputer meja (sistem tidak-imersif) ataupun alat bantuan kepala Realiti Maya (sistem semi-imersif) untuk menjelajah ke ruang angkasa maya dengan sokongan alat pengesan Realiti Maya. Pengguna berkuasa untuk melihat dan mengemudi diri mereka di alam Realiti Maya dengan pandangan seluas 360°. Kaedah yang akan digunakan untuk membangunkan aplikasi ini adalah berdasarkan kaedah ADDIE model. Kaedah ini dibahagikan mengikut fungsi dan penggunaan. ADDIE model sesuai digunakan untuk pembangunan projek applikasi seperti Realiti Maya, perisian kursus, dan produk-produk lain yang berkaitan. Aplikasi ini mengandungi keupayaan interaktif di mana pengguna dapat melihat informasi tentang sesebuah planet yang dilihat hanya dengan interaksi terhadap planet tersebut. Perisian EON Studio dipilih untuk membangunkan sistem Realiti Maya ini dengan sokongan daripada perisian seperti 3D Studio Max untuk membina objek-objek 3D dan Adobe Photoshop untuk mereka dan menyunting gambar. Realiti Maya boleh digunakan bersama-sama dengan subjek-subjek di dalam darjah serta dapat menjadi satu kaedah pembelajaran yang berbeza. Subjek-subjek yang bergantung kepada penggunaan visual seperti sains dan pengajian social boleh dimanfaatkan dengan penglibatan Realiti Maya. Diharapkan, dengan penghasilan aplikasi ini akan dapat memberikan manfaat dan kefahaman kepada orang ramai tentang sistem solar.

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LIST OF ABREVATION

3D	3 Dimension
FTMK	Fakulti Teknologi Maklumat dan Komunikasi
HMD	Head Mounted Display
KUTKM	Kolej Universiti Teknikal Kebangsaan Malaysia
MB	Megabytes
VR	Virtual Reality

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CHAPTER I

INTRODUCTION

1.1 Project Background

The solar system comprises the Earth's Sun and the retinue of celestial objects gravitationally bound to it. There are planets, asteroids, moons, stars and many other things in space. The solar system consists of the Sun; the nine planets, more than 130 satellites of the planets, a large number of small bodies such as the comets and asteroids, and the interplanetary medium. The planets are; Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune and Pluto. Those things have their own identity with a lot of interesting elements to tell about. The first thing to notice is that the solar system is mostly empty space. The planets are very small compared to the space between them.

Virtual Reality (VR) is an environment that is simulated by a computer. Displayed either on a computer screen or through special stereoscopic displays, most VR environments are primarily visual experiences, but some simulations include additional sensory information, such as sound. Interaction with a virtual environment can be done either through the use of standard input devices such as a keyboard and mouse, or through multimodal devices. VR environment can be similar to the real world, for example, simulations for pilot or combat training, or it can differ significantly from reality, as in VR games.

Apparently, people will read the encyclopedia or educational books to read about solar system. A visit to the solar system through virtual reality can be a good way to learn more about our earth and its surrounding. This VR will have an interface from the view of the outer space. User will explore the solar system using the virtual reality goggle. They can move around through the entire solar system. They can click the planets and some other thing in the solar system to view information about the selected object. User can move around the planet to view the whole of it. This program certainly will be focus on our beloved earth. There will be more information for it. With the produce of this program, hopefully user can learn and knows more about our space through a VR technology.

1.2 Problem Statement

Outer space is a place where not people can go easily. Not many people can afford lots of expenses just to see the view from out of earth. For example, N'SYNC spends lots of million dollars just to go to space to record their video clip for only a few days. Not just a lot of money, they also need to be well trained, and also fully equipped. It is almost impossible for someone to cross over the solar system in a short of time with the current technology.

A virtual reality can be a good way for people to get a glimpse of experience in exploring the outer space. With the technology of today, developers can create a synthetic world using VR. Refer to Burdea and Coiffet (2003) it is a simulation in which computer graphics is used to create a realistic-looking world. Moreover, the synthetic world is not static, but responds to the user's input. As a result, VR would be a great option for interested people to overcome the boundary of going to the real space.

Normally, people will interpret encyclopedia as a book that contains pictures or images of the subject with text about it. The solar system can actually be view through

pictures, video or telescope. This kind of method deliverable might be boring or dull for some readers or users. Videos about our solar system were also produced in order to enhance the user comprehension about the space. But the problem for this situation is video is just a one way communication.

VR has the elements of multimedia that can be a good way to stimulate user attention. The elements involved such as sounds, text, graphics, animations and others that would facilitate the process of explaining about the solar system become a lot better. According to Byrnes (2001), VR presents information in a 3-dimensional form with the participant viewing the world from the inside world (an immersive viewpoint with the ability to interact with the information or world). VR provides interaction between the user and the program that will result an effective communication.

1.3 Objective

The objectives of this project are as follows:

- **Build a solar system encyclopedia using virtual reality**
  The main objective of this project is to build a virtual reality encyclopedia about solar system. The environment will be built using 3D software where user can see the planets and others from 360° viewpoint.

- **Help user understand more about solar system**
  From the interaction between the user and the program, information can be delivered efficiently. The user can understand more about the characteristic of a planet from a VR system application better than just viewing the picture from an encyclopedia.

1.4 Scope

This application will covers all levels of society. The user will use the desktop (non-immersive) and also VR goggles (semi-immersive system) to explore the outer space. People who cannot wear the goggle are prohibited to use this program for health precautious reason. Man, woman, kids and adult can use this program as long as they knew how to conduct a computer and the VR tracking devices. Alternatively, even without the goggle a user can still use this application by using a desktop monitor (non-immersive system).

The platform that will be use to produce this application is using EON Studio. This software will help the developer in producing VR application for the function of interaction and ability. To create the 3Ds model, software named 3D Studio Max will be used. Its capability and easy to use will be an advantage to create models and mapping materials in a short time. Adobe Photoshop will be use to create and edit images for the textures.

The user will have the power to view and navigate themselves through the environment of this virtual reality from the view of 360°. This application contains interactive ability where he/ she can view the information about the planet they being view by clicking the planet then a dialog box contains information about the planet will appear.

1.5 Project Significance

There are a lot of benefits that would arise when this project completed successfully. As a mention before, the main objective of this project is to build a solar system encyclopedia using VR. As we know, VR can be one of the methods that can facilitate the process of learning. VR can stimulate a user attention because to handle a

VR program, a user needs to adapt the synthetic environment by using their eyes, ear and others senses.

This project would provide a good education method for kids. As children, they only have a brief idea about the outer space. From the produced of this program, they can gain a new level of knowledge and imagination about the real space. Besides, they can gain a new of knowledge about the real space and also be introduced to the technology of VR, a new method of learning for them which they might be using in the future.

School will find this application to be useful for them. This could be addition knowledge for the student besides the text and reference book. VR can facilitate learning process in many subjects and for as this project, it can help the students to develop understanding about our solar system in science subject.

Traveling in space is still rather impossible for many people. Only few people can go to the real space but it requisite a lot of qualification. For normal people, traveling to space is impossible since the fare involved for it is millions dollar. Take NASA for example. They have the technology and a lot of staff but compared to that, only a few of them can fly the space shuttle to the space. The produced of this application can be a representation for someone who eager to go in space but do not have the chances. They would gain more comprehension about our solar system. They can enjoy the dreamt of traveling in space.

1.6 Expected Output

This application is expected to produce an interface with a panel where it contains a picture of the entire solar system. This panel will function as a short cut

button for the user to go from one place to another. The user can click the object such as the planets to read the information that will appear concerning to the object clicked.

1.7 Conclusion

Virtual reality has incredible potential in the education field. This technology allows people to visualize abstract concepts, to take part in an interactive event that for reasons of distance, time, scale, money, safety or money would not conceivable. A VR can be a good way for people to get a glimpse of experience in exploring the outer space. This project will be act just like the encyclopedia about our solar system but instead of using traditional way to deliver the information, VR were used. Through this application, hopefully user will gain a new level of knowledge and imagination about the real space further more they will more comprehend about the characteristic of a planet from the VR better than just viewing the picture from the encyclopedia.

CHAPTER II

LITERATURE REVIEW AND PROJECT METHODOLOGY

2.1 Introduction

This chapter contains a details description of each part of the subtopic that are; fact and finding, project methodology, project requirement, and project schedule and milestone.

Fact and finding mentioned about research that has been done or the project. Research were held including analyze related data through all references such as books, person or internet as well. Findings about a virtual reality, solar system and others will be mention properly.

Project methodology is useful as a guideline during development process. The methods that will be used for this project is ADDIE model methods. This method is divided with its function and method usage. The ADDIE model method suitable to use for the application project such as virtual reality, courseware, software, and others related product.

Hardware and software that were used to develop the project will be stated in the subtopic of Project Requirement. The entire software and hardware involved that will be used along the development process will be mentioned briefly.