IMPLEMENTATION OF INTERACTIVE VIRTUAL REALITY IN SOLAR SYSTEM APPLICATION

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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 COMMUNICATION TECHNOLOGY
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2011

DECLARATION

I hereby declare that this project report entitled

IMPLEMENTATION OF INTERACTIVE VIRTUAL REALITY IN SOLAR SYSTEM APPLICATION

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

STUDENT : _____ Date: 02/07/11

(VOON PEI HUA)

SUPERVISOR : _____ Date: 4/7/2011

(MADAM SYARIFFANOR BT HISHAM)

DEDICATION

To my beloved parents, thank you for their support, encouragement and support.

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Firstly, I would like to thank Madam Syariffanor bt Hisham for giving and providing me with a lot of useful advice and supervise. She has shown her patients in giving advices, comments and suggestions to me.

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ABSTRACT

Virtual Reality (VR) is a simulation of a real or imagined environment that can be experienced visually in 3-dimensions. It may additionally supply an interactive visually in full real-time motion with feedback. There are several researches have proved that VR is a famous preference for improving the classic learning approach. It is because VR provides a dynamic and interactive way to convey the knowledge to the users or learners. In this case, they can easily remember the subjects or materials that they have learned. Therefore, this project is using the VR to improve way to deliver Solar System in virtual reality environment. The simulation of this project consists of the Sun, planets and other materials or objects that appear in the Solar System. After all the multimedia components are created, EON Studio 7.0 is used to integrate all of these components. In order to run the simulation, the EON Viewer is needed to be installed in the computer. The result from the evaluation of the testing shows that most of the users such as Standard Five students and teachers satisfy this system. Thus, this system is successful achieve its objectives and it can be used as an educational tool in the primary school.

ABSTRAK

Virtual Reality (VR) merupakan suatu simulasi visual asli mahupun maya yang boleh ditontoni dalam bentuk 3-dimensi. Ia juga menyalurkan paparan visual interaktif dalam keadaan masa sebenar. Terdapat beberapa kajian yang telah membuktikan bahawa *VR* merupakan rujukan terbaik dalam meningkatkan pendekatan pembelajaran klasik. Ini kerana, *VR* menyediakan saluran secara interaktif dan dinamik untuk menyampaikan ilmu pengetahuan kepada pengguna dan pelajar. Melalui pendekatan ini mereka dengan mudah dapat mengingati perkara dan subjek yang telah dipelajari. Dengan itu, projek ini menggunakan *VR* untuk mempertingkatkan cara untuk menyalurkan Sistem Suria di dalam persekitaran realiti maya. Simulasi projek ini merangkumi matahari, planet dan bahan-bahan lain termasuk objek-objek yang terkandung dalam Sistem Suria. Selepas semua unsur multimedia siap disediakan, EON Studio 7.0 digunakan untuk menggabungkan kesemua unsur multimedia ini. Bagi menjalankan simulasi ini, EON Viewer perlu dipasangkan dalam komputer. Daripada keputusan penilaian yang dapat dalam pengujian, terdapat banyak pengguna, iaitu pelajar-pelajar Tahun Lima dan guru-guru berpuas hati terhadap sistem ini. Oleh itu, sistem ini mencapaikan tujuan-tujuannya dengan berjaya dan sistem ini boleh digunakan sebagai cara pengajaran di sekolah rendah.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

2D	–	2-dimensions
3D	–	3-dimensions
CD	–	Compact Disc
DVD	–	Digital Video Disk
VR	–	Virtual Reality

CHAPTER I

INTRODUCTION

1.1 Project Background

This project is to develop a virtual reality educational tool or application. The virtual reality environment of the space of universe or Solar System will be developed by using the Autodesk Maya for 3D modeling and EON Reality for interaction development.

With rapid development of technology, computer applications have been developed at the same time to improve our quality of lives dramatically. This include the learning process which many applications have been created and developed in order to make use of interactive learning process.

As the technology is progressing and the needs to keep advance of technology, education becomes the most significant way to convey and deliver the knowledge from generation to generation. Therefore, several learning methods have been produced with the intention of giving better understanding and comprehension of the knowledge. The current teaching techniques and systems include textbook, CD (Compact Disc), DVD (Digital Video Disk), and so forth.

By using the current methods, the problem that might be arising is that people will not remember or understand deeply the knowledge that has been taught.

1.2 Problem Statement(s)

Although there is a lot of learning and teaching methods have been developed, there is still having few inefficient and insufficient delivery of the knowledge. This incident happens because of the learning techniques that might not attract their attention as well as interest and somehow they feel bored on the books. They cannot concentrate or pay full attention when the learning process is static which means that there is no interaction between them and the learning process.

Consequently, they will forget what they have learned and cannot make use of the knowledge that they have gained. Thus, virtual solar system is an improvement of learning process that can help the students to pay full attention in the class and increase their memory.

1.3 Objective

The objectives of this project are:

- To create and provide an interactive way to deliver the knowledge about the space or Solar System. Be involved in the virtual reality environment of Solar

System, people can interact with the environment to feel the planets and other materials in the Solar System.

- To study the materials of the space of Solar System. The components of the planets and other materials in the Solar System.
- To design the future world using the virtual reality while stimulate or facilitate the imagination of people. The buildings will be constructed to facilitate the imagination of people with regard to the future world.

1.4 Scope

This project will be covered the nine planets, sun, and asteroids in the Solar System. Besides that, the building will be generated or created between the planets. The components of the planets and other materials that will be covered in this project also will be included. In this case, people will memorize and obtain the benefits from the knowledge that has been delivered by using the virtual reality environment in the space of universe or solar system.

This project is developed for the people who interesting in the field of astronomy or students who want to study the materials of the universe. The platform to be delivered for this project is standalone.

The limitation of this project is that it can only be viewed through EON Viewer. However, EON Viewer is free software that can be easily downloaded from any websites or internet.

1.5 Project Significance

When the project is successfully developed, the learning and teaching techniques will have an additional, effective and efficient delivery. The contribution of this project will help the teachers to convey the knowledge and information in relation to objects in the space of universe effectively. While for the students, they can acquire the knowledge that has been taught by their teachers and make use of the knowledge.

1.6 Summary

This project studies the problems of the current learning and teaching method. In order to solve the problems, virtual reality is used to create an interactive educational tool. Furthermore, it also used to facilitate imagination of people. At the end of this project, it is expected to help the users easy to remember and learn more about the Solar System. The next chapter will discuss about the methodology used in the project which besides that, the next chapter will also discuss about the existing system and the requirement of the hardware as well as software used in order to develop this project.

CHAPTER II

LITERATURE REVIEW & PROJECT METHODOLOGY

2.1 Introduction

A literature review is an overview of the relevant literature in a specific issue or area. The literature review is usually supported by the resources like books, theses and dissertations, journal articles, historical records, etc. In addition, a literature review is also a versatile or helpful guide which contains critical point of current information on a particular topic. A critical literature review is a decisive and vital evaluation of the relevant journalism or literature. The trustworthiness of the writers in their field is emphasized by the breadth and profundity of the literature review.

For most of the research papers, broad knowledge of the literature of the relevant area or field is crucial. It is because it provides a hard background for an investigation of a research paper. However, there is no one exact scheme to write a literature review.

Besides that, project methodology plays a significant role in succeed the project development. Therefore, the methodology that will be used in this project has been decided with awareness. The methodology that will be used in this project is Star Lifecycle Model which is suggested by Hartson and Hix in 1989. It is a methodology that derived from empirical studies of interface designers.

2.2 Domain

The domain that applies to this project is Virtual Reality (VR) that belongs to education. This domain is chosen as Mak P. (2000) revealed that "the use of Virtual Reality in education has been depicted as an interesting and promising area where constructivist learning theory can be put into practice". This type of information delivery technique or learning process will be more attention-grabbing and eye-catching with the users or learner to be involved within the virtual reality environment.

2.2.1 Virtual Reality

According to Sean M. (1998), "Virtual Reality (VR) is a term referring to a combination of high-speed computers, advanced programming techniques and interactive devices that allow users to interact with computer simulated environment." In other words, a simulation of imagined or real environment that is generated by computer with users can experience visually in three dimensions in real-time as well as can interact with it, is called virtual reality.

For decades, the idea of VR has been around. However, people actually only became aware of it in the 1990's and Tate S. (1996) indicated that "virtual reality is a formidable topic of conversation during that time". He also revealed that a few of the major areas relating to VR include simulation, modeling, entertaining, and education.

The virtual reality started when Morton Heilig (a cinematographer) wanted to create an ultimate full-view experience for spectator. Since he was unable to gain any financial support, his dream could not really achieve and he had created a unit, called Sensorama Simulator. In 1965, Ivan Sutherland (father of computer graphics) continued Heilig's work and proposed the ultimate solution of virtual reality. He was the person who created first virtual reality system realized in hardware, named head-mounted display (HMD). Consequently, a lot of relevant events had been created and produced. For instance, Cave Automatic Virtual Environment (CAVE) had been developed by the

researchers and students of the University of Illinois in 1992. A CAVE is a cubicle room where projectors are directed to at least three or more of the walls.

The characteristics of VR are immersion, interaction and imagination. According to Powell R. R. (2007) who indicated that "immersion is the ability for the users' sense to be isolated from the real world and for the computer generated environment to appear naturally enough for the user to be "transported" to another place". With the distinct degree of immersion, VR system or application will not only be affected by the types of used interfaces, moreover, it will also be the results of number and types of senses of being surrounded. While "interactivity is the ability for the users to change the computer generated environment in real time" (Powell R. R., 2007). In order to achieve the interactivity, the VR system must be able to extend to which users can modify the content of environment. For example, when the users act or input something, the computer must be able to respond or give feedback to the users. Lastly, the word "imagination" in VR system represents the ideas, applications or the virtual worlds.

2.2.2 Type of Virtual Reality

Recently, virtual reality applications have been used in various areas such as architectural walkthroughs, education and training, entertainment, games, medicine, scientific visualization, and simulations. Types of VR system in this project is non-immersive system as the types of VR system can be defined as three degrees of immersion that are fully immersive, semi-immersive and non-immersive. Below is the comparison between the various VR implementations which is provided by Kalawsky (1996). He also stated that "it is possible to turn a desktop system into a semi-immersive system by simply adding shutter glasses and the appropriate software, or a fully immersive system by connecting an HMD".