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JUDUL: VIRTUAL REALITY OF HUMAN DIGESTION ORGANS

SESI PENGAJIAN: Semester 1(2005/2006)

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VIRTUAL REALITY OF HUMAN DIGESTION ORGANS

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

FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY
KOLEJ UNIVERSITI TEKNIKAL KEBANGSAAN MALAYSIA
2005

DECLARATION

I hereby declare that this project report entitled

VIRTUAL REALITY OF HUMAN DIGESTION ORGANS

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

STUDENT: _____ Date : 21-11-05

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SUPERVISOR: _____ Date : 21-11-05

(MISS SHARUL BADARIAH BINTI MAT SAH)

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ABSTRACT

This report develops for Sarjana Muda Project (PSM) that must be done to get Bachelor of Information Technology. The research field is about Virtual Reality. This research applies to project name "Virtual Reality for Human Digestion Organs". There have seven chapters in this report. There are Introduction, Literature Review and Methodology, Analysis, Design, Implementation, Testing and Conclusion.

Summary of this project is described about the Virtual Reality (VR). VR is a new technology to be use in Malaysia, Basically, VR apply to describe about some complex process and difficult to imagine in the real world.

The purpose of study the reality maya is for research and study the concept of reality maya itself especially in Malaysia. Besides that, learn and try something new and applied the information that has learn in the class.

This project develops using software that suitable for this application such as Eon Reality, 3Ds max, Macromedia Flash Mx and Macromedia Dreamveawer. The important factors to develop this project are creating a 3d model of human digestion organs. Then export into the Eon Reality software. This software is one of the software use for reality maya application. Using Macromedia Dreamveaver as platform for display the human digestion organs in reality maya concept. Then create the interface and interaction with Macromedia Flash. This project run using Macromedia Flash Mx as final application

After that, this project will be test based on two ways alpha and beta testing. Testing can show the result whether this project is run successful or not. For this project, *Alhamdullillah* the final result is positive for form two students (target user). They easier to understand and remember the human digestion system using this application.

ABSTRAK

Laporan ini merupakan kajian yang dilakukan bagi Projek Sarjana Muda (PSM) yang diwajibkan keatas semua pelajar sebagai syarat untuk mendapatkan ijazah. Bidang kajian yang akan dikaji ialah mengenai Realiti Maya (Virtual Reality). Tajuk bagi projek yang akan dibangunkan ialah " Organ-organ pada sistem pencernaan manusia dalam reality maya". Kajian ini mengadungi tujuh bab utama iaitu Pengenalan, *Literature Review and Methodology*, Analisis, Rekabentuk, *Implementation*, *Testing* dan Kesimpulan.

Secara ringkas, projek ini menerangkan tentang bidang kajian yang dilakukan dimana teknologi reality maya merupakan teknologi yang masih baru di negara kita Malaysia. Teknologi Reality Maya biasanya digunakan untuk menerangkan sesuatu perkara yang kompleks dan sukar untuk dibayangkan dalam dunia sebenar.

Tujuan utama mempelajari tentang Reality Maya ialah untuk mendalami dan menkaji sejauh mana konsep Reality Maya boleh diaplikasikan kepada teknologi pada masa kini terutama di Malaysia. Selain itu, ingin mencuba sesuatu yang baru dan mengaplikasikan apa yang dipelajari dalam subjek yang berkenaan.

Projek ini dibangunkan menggunakan beberapa software antaranya ialah Eon Reality, 3Ds max, Macromedia Flash Mx dan Macromedia Dreamveawer. Faktor penting untuk membangunkan projek ini ialah memodelkan organ-organ sistem pencernaan dalam bentuk 3d dan kemudiannya di import ke dalam perisian Reality Maya yang dikenali sebagai Eon Reality. Menggunakan Macromedia Dreamveaver sebagai platform untuk memaparkan organ-organ dalam bentuk reality maya. Kemudian mereka antaramuka dan interactiviti dalam Macromedia Flash dan juga menggabungkan dalam perisian yang sama.

Selepas itu, projek ini akan diuji menggunakan dua kaedah iaitu *alpha* dan *beta testing*. *Testing* akan menentukan samada projek ini berjaya atau tidak. Bagi projek ini, Alhamdullillah ia memberikan satu keputusan yang positif kepada pengguna sebenar iaitu pelajar tingkatan dua di mana mereka lebih cepat faham dan mengingat organ-organ yang terlibat dalam sistem pencernaan.

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CHAPTER I

INTRODUCTION

1.1 Introduction of Project

Human digestion system is the process of breaking down complex food to simple molecules for absorption into the blood circulatory system. This subject is taught in form 2 science subjects. Digestion takes place in two stages. The first is physical digestion that is big pieces of food are broken down into smaller pieces by teeth. The second is chemical digestion that is enzymes break up complex food molecules into smaller molecules. This project is more to chemical digestion. The organs of digestion system are mouth, salivary glands, oesophagus, liver, gall bladder, stomach, bile duct, pancreas, small and large intestine, rectum and anus.

Usually, students and teachers refer and study the system from textbooks, reference books, pictures and so on. This project tries to present a new way to study the process by picturing it using the virtual reality application.

1.2 Project Background

At present the development of Virtual Reality (VR) technology is expanding due to the importance and needs to use the 3D elements and 360° degrees panorama in expressing a clearer picture to consumers in various fields such as education, military, medicine, entertainment and so on. VR technology can manipulate

computer uses for imagined environment to exploitation of user for some purpose. However, it depends on the software and hardware used.

The project that will be developed is the VR of human digestion system. This project is targeted to the education field especially students in form two because they started learning about this system in their science subject. Human digestion system is one of the proses happened in our body. Formerly, the materials being used to describe the human digestion system to students are models, pictures and videos. It is difficult for some students to understand because they cannot imagine the real environment of the progress.

So, the new way to explain the progress is using virtual reality (VR). VR becomes a substantial and ubiquitous technology and subsequently penetrates applications for education, learning and training. In addition to multimedia, VR places the user in a three dimensional environment. By using this application it will be easier for student to understand about human digestion system. This project uses the mouse as an input device that is used to select, move and modify virtual objects.

1.3 Problem Statement

Human digestion system is one of the sub topic that secondary students learnt in their science subject during Form 2. Digestion is a process of making food absorbable by changing it and breaking it down into simpler chemical compounds. So, the human digestion system discusses about the steps to digesting the foods as soon as we swallow them.

Human digestion system includes organs such as mouth (teeth), salivary glands, esophagus, liver, gall bladder, stomach, small intestine, large intestine (colon) and anus. Currently, text books, reference books, pictures, a human model, transparency and slide presentation are some of the teaching methods being used.

Most of the student cannot answer examination questions such as fill in the blank and list down organs in digestion system and discribe the digestion process. This happens due to difficulties of imagining the whole digestion process that happen in the inner side of the human body. So, the solution is by educating them using the virtual reality (VR) technology. Schweber (1995) said that VR lets you navigate and view a world of three dimensions in real time, with six degree of freedom. In essence, virtual reality is the clone of physical reality.

Hail (1992) says 70% of human sense is for sight. By using this VR application it will be easier for students to understand about the human digestion system because it is more interesting. VR also allow better and faster understanding of even complex applications and provide means for intuitive operations and control. Besides that, a VR based system has the potential for low cost compare to other hardware such as human model and transparency machine.

1.4 Objective

The objectives of this project are as below:

1) To provide human digestion system with VR application for Form 2 students because it is one of the topics taught in their science subject. This is to make them better visualize about the system rather than the existing methods used.

2) Provide interactivity with users in some of organ in the digestion process. So, users can click or explore some part in human body to interact with the animation part.

1.5 Scope

The scope of the project is:

1) The target user for this project is form two students that learn about Human Digestion Process in their science subject and also teachers that are teaching the subject.

2) The model will be developed in order to proof the result of the research that will be done.

3) The main platform is virtual reality application but the final result after research is a combination of 3D models, virtual reality application and audio.

4) It is able to run on any PC with a mouse as an input device.

1.6 Project Significance

The main purpose for developing this project is to help students to better understand the human digestion process. This project is developed with VR technology to experience the real environment during the digestion process. So, students are able to see and know what happened during the whole process. The author selected this project because VR technology is the suitable method to explain some complex processes or applications that is difficult to imagine.

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1.7 Expected Output

The outcome of this project is a model of a human digestion system using VR application. The purpose of proposing this project in VR is to show the real environment process of digestion system. Model of human body and digestions organs will be built with the combinations of 3D models and virtual reality application software. Beside, some interface will be built with Macromedia Flash MX and Swish Max such as introduction interface and interface for explaining the system and digestion process itself. Some picture and animation will be built in 2D animation. Audio is use for develop this project such as background music and narration. This project uses the mouse as an input device that is generally used to select, move and modify virtual objects.

1.8 Conclusion

At present the development of Virtual Reality (VR) technology is expanding in Malaysia. VR can be used in the education field such as biology, chemistry and science subject because these subjects are difficult to imagine and understand. The human digestion system is one of the subtopics in the biology field. For education purposes, VR has been proposed as a technology breakthrough that holds the power to facilitate learning. So, this project is trying to apply VR into better understanding of the human digestion process among Form Two students. It is hoped that with the development of this project, learning environment is more interesting and easier for students.

CHAPTER II

LITERATURE REVIEW AND PROJECT METHODOLOGY

2.1 Introduction

The purpose of this paper is to research about virtual reality technology in education field. As a starting point research is about definition of VR itself. Then research the effectiveness of VR in education. Then, explore how this style of interaction (VR) could be use to help students develop understanding and more proper mental models of complex system and process abstract models and other intuitive material. For example process of human digestion system.

Besides that, researches about hardware and software requirement for build this project. The author also research about the process of digestion system itself. This chapter also described about methodology uses, project schedule and milestones during the project build.

2.2 Fact and Finding

For this literature review, I divided it into two portions. One is technical background and the second digestion system itself. The fact and finding both portion is as below:-

2.2.1 Technical Background

2.2.1.1) What is Virtual Reality (VR)?

There are many definition of VR. Bases on M A Gigante (1993); Keppell (1997); Schweber (1995); VR is an environment created by human to make them really immerse to the real environment. It relies on 3D, stereoscopic, head tracked displays, hand/body tracking and binaural sound. VR allow user to experience three dimensional perspectives that consists of six degree of freedoms, or else simply describes as a clone to real environment.

According to Mayer (1999), "Virtual Reality is not just a tool; it is at once technology, medium, and engine of social relations. It not only structures social relations, it is the space within which the relations occur and the tool that individuals use to enter that space. It is more than the context within which social relations occur, for it is commented on and imaginatively constructed by symbolic processes initiated and maintained by individuals and groups". Lanier (1989) likes to say that "VR a medium who's only limiting factor is the imagination of the user."

Refer to The American Heritage® Dictionary of the English Language, Fourth Edition Copyright © 2004, 2000 by Houghton Mifflin Company definition of VR with dictionary is "a computer simulation of a real or imaginary system that enables a user to perform operations on the simulated system and shows the effects in real time."

Based on encyclopaedia definition, The Columbia Electronic Encyclopedia, Sixth Edition Copyright © 2003, Columbia University Press describe "VR is computer-generated environment with and within which people can interact. A successful VR environment offers users immersion, navigation, and manipulation."

2.2.1.2) What is VRML?

According to Whatis.com and Computer Desktop Encyclopedia, VRML is Virtual Reality Modeling Language. VRML is a specification language for describing and displaying three-dimensional (3-D) images or objects on World Wide Web. VRML produces a h*yperspace* (or a *world*), a 3-dimensional space that appears on your display screen. And you can figuratively move within this space. Using VRML, you can build a sequence of visual images into Web settings with which a user can interact by viewing, moving, rotating, and otherwise interacting with an apparently 3-D scene. That is, as you press keys to turn left, right, up or down, or go forwards or backwards, the images on your screen will change to give the impression that you are moving through a real space.

2.2.1.3) What is EON Studio?

EON Studio is a complete VR development tool that allows users of all experience levels to build complete, interactive virtual reality product content quickly and easily with no programming experience required.

Mr.Paul Scholtes, President, Reality BUY says, "Using EON Studio we have been able to decrease production time spent developing configurations with complex interactivity and functionality .The benefits for our customers such as Office Depot are significantly increased using complex EON based configuration applications."

2.2.1.4) Applications of Virtual Reality

VR can be used in many fields such as medical, entertainment, training, education and more. Some application of VR is describe as below:-

a) Virtual Reality in Medical

In medicine, VR applications are for demonstrations and exercises or explorations to some complex operation to nurse or doctor. For simple operations like suturing and biopsy needle placement, VR is effective, but perhaps an overkill to train skills that can easily and cheaply be acquired in other ways.

According to research about Application of VR from Loren Lones, graduate student, San Diego State University, "Mark Billinghurst, at the Hit Lab in Washington, has developed a prototype surgical assistant for simulation of paranasal surgery. During a simulated operation the system provides vocal and visual feedback to the user, and warns the surgeon when a dangerous action is about to take place. In addition to training, the expert assistant can be used during the actual operation to provide feedback and guidance. This is very useful when the surgeon's awareness of the situation is limited due to complex anatomy."

Based on Hunter G.Hoffman (2004) says; one of the ways to lessen pain is to attract the patients interest indirectly. VR is unique and suitable to lessen a patient's pain because it could immerse the patient into the 3d world. This results in the patients feeling less pain than before. Besides that, a VR programme also help patients that are phobias of certain situations like heights, spiders and public speaking.

Refer the diagram 2.1 and 2.2 below to see the example of VR application in medical.