



**SOCIAL INTERACTION IN VIRTUAL ENVIRONMENT
(VIRTUAL ENVIRONMENT/ 3D ANIMATION)**

ZATIL ALYANI BINTI HANIFAH

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Saya ZATIL ALYANI BT. HANIFAH

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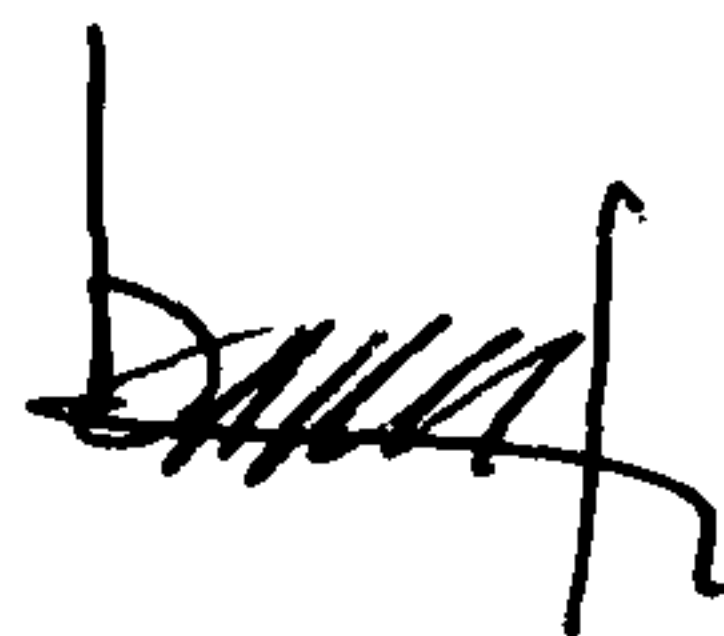
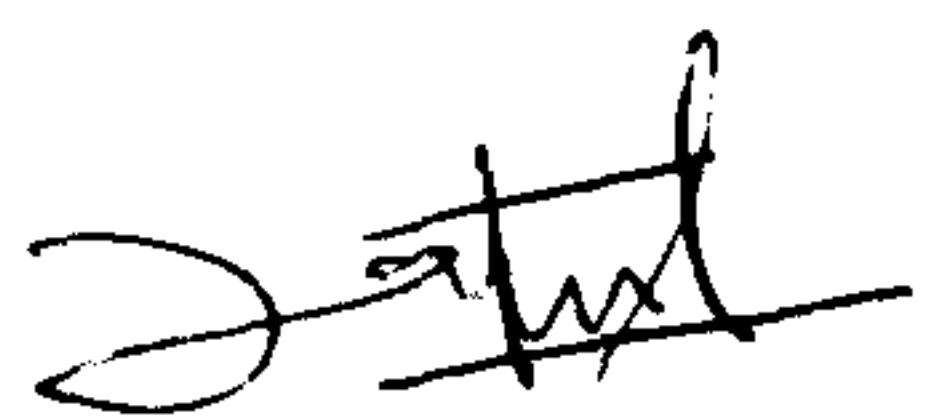
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Received for examination by:

.....

Mr. Mohd Kamal Othman

Date:

.....

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ABSTRACT

SOCIAL INTERACTION IN VIRTUAL ENVIRONMENT (VIRTUAL ENVIRONMENT/ 3D ANIMATION)

Zatil Alyani binti Hanifah

This project aims to study and designs a rich Virtual Environment (VE), which allows social interaction between object in the environment. The specific objectives of this project are to (1) study about social interaction in Virtual Environment, (2) develop a VE and add some animations to the objects especially human embodiments (3) model a realistic, detailed and convincing body animation and (4) apply the social interaction in VE as an entertainment. This includes development of human embodiment with some animation added. A PC-based software package from Discreet: 3D Studio Max 7.0 is used for completing this project. The process of developing is broken down into four phases; the preproduction phase, first production phase which is building and texturing, second production phase or called animating and the postproduction phase. The result is animations consist of 3-5 minutes interaction. The analysis of end result shows the implication of the project and description of the strength and its weaknesses. This project also has given several recommendations on how to improve the future project.

ABSTRAK

INTERAKSI SOSIAL DI DALAM PERSEKITARAN MAYA (PERSEKITARAN MAYA/ ANIMASI 3D)

Zatil Alyani binti Hanifah

Kajian ini bertujuan untuk mempelajari dan membina suatu persekitaran maya yang kaya dan mewujudkan interaksi sosial di antara objek-objek di dalam persekitaran tersebut. Objektif kajian ini adalah untuk (1) mempelajari tentang interaksi sosial yang berlaku dalam persekitaran maya, (2) membina suatu persekitaran maya dan menghasilkan animasi bagi objek-objek yang terkandung di dalam persekitaran tersebut terutamanya manusia maya, (3) membentuk manusia maya yang mempunyai ciri-ciri seakan realiti, lengkap dan animasi badan yang meyakinkan dan (4) mengaplikasikan interaksi sosial dalam persekitaran maya kepada lapangan hiburan. Program komputer yang digunakan bagi melengkapkan projek ini ialah pakej dari Discreet: 3D Studio Max 7.0. Proses pembangunan dibahagikan kepada empat fasa; fasa pra-permodelan, fasa permodelan pertama, fasa permodelan kedua dan fasa permodelan lanjutan. Keputusan bagi projek ini ialah animasi selama 3 minit yang mengandungi interaksi sosial. Analisis akhir bagi keputusan projek menunjukkan implikasi yang wujud dan penerangan tentang kelebihan serta kekurangan yang ada. Selain itu, kajian ini juga menyarankan beberapa cadangan yang dapat dijadikan rujukan untuk penyelidikan pada masa hadapan.

CHAPTER 1

INTRODUCTION

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1.0 Introduction

Nowadays, Virtual Environment (VE) simulations are becoming more popular. A VE is a simulated environment generated by computer that very similar to the real world. Recently, many systems are available to animate VE and virtual human. Such applications encompass several domains, i.e. virtual autonomous agents living and working in VE, human factors analysis, training, education, entertainment, virtual prototyping, and simulation-based design. Virtual Reality

(VR) technology becomes widely used in entertainment field i.e. in the process of making animation film, computer games, and 3D animation.

This research aims to study and designs a rich Virtual Environment (VE), which allows social interaction between objects and human embodiments in the environment. These include development of an environment with some animation added to the objects especially human embodiment. 3D character animation, especially human animation or virtual human becomes popular for simulation, multimedia applications, and games. There is a famous computer game named DOOM that applied the rich VE by using the video mapping technique.

The human embodiments that allow interaction between them in the VE will increase the level of presence. Some Hollywood's most dazzling special effects are computer-generated such as the battle scenes in the big budget, box-office movie *The Lord of the Ring*. Earlier such movies are *Star Wars*, *Terminator*, *Jurassic Park* and *Alien vs. Predator*. The latest movie that now plays in the cinema is DOOM, which the ideas come from previous computer games- DOOM. Many scenes in this film have using the computer-generated image such a 3D image. This technology also guides the 3D animators in bringing to "life" cartoon-like or toy-like characters as recently demonstrated with the movie *Chicken Little*.

According to Nadia (1991), scenes involving virtual humans imply many complex problems that have been solving for several years. The necessity to model interactions between an object and a virtual human appeared in most applications of computer animation and simulation.

The aim of this project is to apply the social interaction into virtual environment as an entertainment. Social interaction can be defined as a dynamic, changing sequence of social actions between individuals (or groups), which modify their actions and reactions due to the actions by their interaction partner (Wikipedia Encyclopedia, 2005).

Communication, as one of the basic needs of human existence, can be defined as transfer or exchange of information between entities. Communication and interaction always occurs in real life. Many generations of ancient tribes communicate to each other using animal-like guttural sounds, gestures, as a way to fulfill their requirements before they latched on to language. In the Franco-Cantabrian region (Southwestern France and Northern Spain), a quite fascinating cave drawing about 20,000 years ago have been discovered and show how they communicate to each other. Picture drawings were used by the ancient Cretans and Hittites for communications (Khan, 2001).

There are many forms (direction) of communication exist such as; one to one, one to many, and many to one. In our everyday life, we frequently use a combination of words, gestures and facial expression to express our full meaning. Most of us spend about 75 percent of our waking hours communicating our knowledge, thoughts, and ideas to others. Communication can be categorized into two basic forms: verbal and non-verbal communication. Verbal communication includes mainly speech and sound, and our body language reckons as non-verbal communication (Otto & Roberts, 2003). Sense of deprivation experiments has proved beyond doubt that a person out off form communication of any sort begins to go mad fast (Khan, 2001).

The communication or social interaction between human in real life not much different compared to Virtual Environment (VE). VE are generally composed of static and dynamic virtual entities and may include 3D sound. Social interaction occurs in every environment, which consists of humans and objects. For example, the interactions between two fighters in 3D fight game where they attack and defend themselves. The human embodiments are used to apply the sense of interaction between the virtual human in VE. A photorealistic and accurate representation of human embodiments could potentially provoke the interpretation of various social interactions.

The communication had also applied in Virtual Reality field. Virtual reality (VR) is not a new concept even the oxymoron "artificial reality" was recently introduced by Krueger (1983). Sutherland (1965) introduced the key concepts of immersion in a simulated world, and of complete sensory input and output, which are the basis of current VR research (Balaguer, F., & Mangili, A., 2000).

Overall, this research consists of five main phases. Phase one focuses on the research itself including problem statement, objectives, the research significance and its contribution. The second phase studies the different aspects of relevant background or also known as literature review. This phase is carried out in order to find the previous researches that related to this project. The third phase is focus on project design and implementation. The fourth phase will discussed the data gathered from the research and the analysis of the result from the research. The final phase is conclusion of the research that is by reviewing what has been achieved and what has not been achieved. This report also suggests what may need to be improved in the future. The expected outcome of this research is a rich VE with animation between human embodiment and objects.

1.1 Problem Statement

The interaction model found in typical desktop VE designed for social interaction needs to be improved in order to provide an adequate sense of embodiment and appropriate sense of presence. This research aims to map the social interaction in real world into VE. A detail of complex virtual human embodiment increases the natural interaction within the environment. The users' more natural perception of each other (and of autonomous actors) increases their sense of being together, and thus the overall sense of shared presence in the environment (Thalmann, 1997).

The shape of objects and the interaction remain ambiguous without true three-dimension (3D) representation. As evidenced by the perspective projection onto a flat surface can be highly ambiguous. VR removes this, and as a result VR represents a fundamental objective in design processes. Of particular importance is the sense of scale that can only be conveyed by immersing the designer in the "design" (Wong, 1996).

1.2 Objectives

The objectives of this project are divided into two, which are general objective and specific objectives. Both objectives describe the goal and purpose of this project.

1.2.1 General Objectives

Objective of this project is to study and design a rich environment, which allows social interaction between objects in the environment.

1.2.2 Specific objectives:

The specific objectives for this project are as follows:

1. To study about social interaction in Virtual Environment.
2. To develop a VE and add some animations to the objects especially human embodiments.
3. To model a realistic, detailed and convincing body animation.
4. To apply the social interaction in VE as an entertainment.

1.3 Project Design

This project consists of a rich VE and the objects within the environment. Social interaction occurs in everyday life and this will be mapped into VE. This project based on how to create the human embodiments in VE and the animation added. The full animation will consist of 3-5 minutes interaction.

1.3.1 Steps of Production

Table 1.1 below summarizes the production step as described by Fox (2004).

PREPRODUCTION	PRODUCTION	POSTPRODUCTION
Story idea	Character modeling	Motion graphics
Scriptwriting	Character texturing	Editing
Concept art	Character shader creation	
Storyboarding	Body and head rigging	
Animatics	Environment modeling	
Casting and recording	Environment texturing	
Sounds effect and music	Props modeling and texturing	
	Effects modeling	
	Scene layout	
	Body animation	
	Rendering	

Table 1.1: Production Phase (Fox, 2004)

1.4 Research Significance

The ultimate reason for developing realistic-looking virtual humans is to be able to use them virtually in any scene that re-creates the real world. However, though there is a VE it may be is not complete without human embodiment with social interaction (Thalmann, 1997). The only realistic embodiment makes non-verbal communication possible.

1.5 Research Contribution

With the new developments of digital and interactive television and multimedia products, there is also a need for systems that provide designers with the capability for embedding real time simulated humans in games, multimedia titles and film animations (Thalmann, 1997).

In fact, there are many current and potential applications of human activities that may be part of a VR system involving human embodiments:

- 3D animation/ film animation
- Simulation based learning and training (transportation, civil engineering etc.)
- Simulation of ergonomic work environments
- Virtual patient for surgery, plastic surgery

- Orthopedic and prostheses and rehabilitation
- Virtual psychotherapies
- Architectural simulation with people, buildings, landscapes and lights
- Computer games involving people and “Virtual Worlds”
- Game and sport simulation

1.6 Research Limitation

The limitation is to develop a very realistic looking human embodiments and the interaction between objects. It is not easy to create a humanlike character, which has all human characteristics. The main problem is to design a realistic body and face construction and deformations.

1.7 Definition of Terms

Virtual Environment (VE)

Literal Definition

Wikipedia encyclopedia (2005) defines VE as an environment that is simulated by a computer. The simulated environment can be similar to the real world – for example, in simulations for pilot or combat training or it can differ significantly from reality, as in VR games.

Operational Definition

A rich virtual environment consists of 3D objects and the interaction between objects.

Human Embodiment

Literal definition

Human embodiment is a simple graphical representation with more advanced functionalities such as facial and gesture communication (Capin et al., 1999).

Operational definition

Map the real world human into 3D human in virtual environment.

Social Interaction

Literal definition

Social interaction is a dynamic, changing sequence of social actions between individuals (or groups) that modify their actions and reactions due to the actions by their interaction partner (Wikipedia Encyclopedia, 2005).

Operational definition

Social interaction is a communication process as a way to convey information or doing certain task between group of people or objects.

Communication

Literal definition

Wikipedia Encyclopedia states that communication is the process of exchanging information usually via a common system of symbols.

Operational definition

Social skill used to interact among each other with certain purposes, for example, express emotion or changing information through communication.

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CHAPTER 2

LITERATURE REVIEW

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2.0 Introduction

This chapter is about the review of the previous research related to this project. Previous research shows that there is many systems that have been develop by applying virtual human embodiment in VE. For example, the Virtual Human Project done by Ward R.C., Kruse K.L., Allgood G.O., et al. (2000). In this project, the researchers developed a Virtual Human Respiratory System (VHRS) that can be used to predict pulmonary diseases or injuries from lung sound. Disney Imagineering has developed a high-fidelity virtual reality (VR) as a medium to tell stories such as the animated film “Aladdin”.