

DEVELOPMENT OF 3D UTEM ENVIRONMENT

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Tajuk Projek : DEVELOPMENT OF 3D UTEM ENVIRONMENT

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ABSTRACT

The purpose of this project is to study the application of Virtual reality technology. Virtual reality application of architecture walkthrough will provide natural control interface by clicking the mouse or using keyboard's shortcut keys function. The functionality of this project is to provide information about utem building such as faculty of electronic engineering and computer engineering, hall, mosque, chancellery and library. This application will also guide the student or staffs go to this location by clicking the buttons on the screen. Utem campus will be introduced in form of 3d models. Software Google Sketchup 8 is used to apply 3D Utem environment. This project is defined as non-immersive which will display the 3D environment on a computer

ABSTRAK

Tujuan projek ini adalah untuk mengkaji penggunaan teknologi realiti maya. Aplikasi realiti maya seni bina akan menyediakan pengantara-muka dengan klik tetikus atau menggunakan jalan pintas kekunci fungsi keyboard ini. Fungsi projek ini adalah untuk memberikan maklumat tentang bangunan UTeM seperti fakulti kejuruteraan elektronik dan kejuruteraan komputer, dewan, masjid, dan perpustakaan. Aplikasi ini juga akan membimbing pelajar atau kakitangan pergi ke lokasi ini dengan klik butang pada skrin. Kampus UTeM akan diperkenalkan dalam bentuk model 3d. Perisian Google SketchUp 8 digunakan untuk mencipta persekitaran UTeM 3D. Projek ini akan memaparkan persekitaran 3D pada komputer

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Chapter 1

Introduction

1.1 Project Background

The domain of this project is virtual reality application for architectural walkthrough. Virtual reality is simulated a real environment by computer that can experience visually in the three dimensions. The virtual reality system of this project is defined as non-immersive which will display the 3d virtual environment on a computer monitor.

Nowadays, the technology of interaction interface between human and computer become more powerful. This “Development of 3D Utem environment” project will develop a real world environment about University technical Malaysia Melaka (Utem) main

campus located in durian tunggal. The technology of virtual reality is used to display a real environment of utem which is modelling in 3D objects. The student can view through their university environment and get information about each building.

3D computer graphic is the graphic that use a three-dimensional to represent of geometric data that stored in the computer to perform calculation and render 2d image. Google sketchup 8 will be used for modelling the main campus area of university technical Malaysia Melaka. The software such as Visual studio will be used to interact the Utem building to display the output with non-immersive.

1.2 Problem Statement

There are many applications can reused to search for any location that users want to go such as Google map and tourism website which display the locations information in the form of two dimensional. The Google map only provides top view of 2D image. Nevertheless, some of the users want to know the real appear of the environment for easily to find the location. Hence, the image of two dimensional is not achieved high level of efficiency if compared to three dimensional which apply with virtual reality technology.

1.3 Objective

The objective of this project is described briefly as following:

- **To understand the virtual reality application technology.**

Visual studio is using to interact virtually with 3d models based on virtual reality technology. The virtual reality application of architecture walkthrough will provide the natural control interface by clicking the keyboard or mouse.

- **To explore the technique in modeling a virtual reality environment:**

There are some technique and software can be used to develop a reality environment such as use Google Sketchup Pro 8 to develop 3D environment and OpenGL to develop 3D environment, Flash to develop 2D environment and so on. For this project, the Google Sketchup Pro 8 is used to model a reality environment with Unity to apply the 3D models in application.

- **To develop a virtual reality application in which provides information about UteM main campus areas:**

The UteM's student and staff will benefit from the project with the provided information by clicking on the area that follows their interest.

1.4 Scope

1. This project will help to introduce UTeM main campus areas in a form of 3D models and apply in virtual reality technology. The basic phases such as 3D modeling and 3D texturing will be used to create 3D computer graphic.
2. The target users of the project are the students and staff especially the new student of University Technical Melaka Malaysia (UTeM).
3. Users can use the mouse or shortcut key from keyboard to view the UteM main area which they want to know the location of their destination.

4. When the utem building display on computer, user will take part with non-immersive to walkthrough the virtual utem main campus.
5. User can only navigates outside of the building only but not inside the building.

1.5 Project Significance

The UTeM student and staff especially the new student will gain benefit from the project. Student can easily to figure out their location that they want to go and avoid lost feeling in the utem campus. Besides, I also can gain benefit and explore the skill or techniques in modeling and develop a reality environment, and study the application of the virtual reality technology by using OpenGL skills.

1.6 Conclusion

This project consists of virtual utem which located in durian tunggal. This will combined by a virtual reality technology. Users can use the mouse or shortcut key of keyboard to view the utem main campus which they want to know more information. When display the utem building, the user can take part with non-immersive to walkthrough the virtual utem main campus. This project is very useful and benefits for the students so they can view the campus on their computer. In the next chapter is related with literature review and project mythology.

Chapter 2

Literature Review

In this chapter, it will discuss about the literature review which contains information gathered to gain knowledge and ideas in completing the project. There are several sources that have been taken as a resource such as books, thesis, journal and website. It is included the software and method which is useful in the project.

2.1 Introduction

Whyte, j. (2003) reported her research about construction field in virtual reality of industrial application in the USA and the UK. Some case study approach used to explore strategies and business drivers for identifying the pattern of use in virtual reality. The driver business for the use of virtual reality included demonstrating technical competence, design review, simulating dynamic operation, co-coordinating detail design, scheduling construction and marketing. The reused design of extend and project

size may affect the strategy of implementing and using of virtual reality. For the research result, virtual reality is a universal interface to all construction applications.

There is an empirical study of the use of virtual reality applications in architecture and construction. According to her research, construction often perceived as a backward industry and mentions that some improvement is necessary for government reports. Whyte, j. (2003) indicated that “the ‘pioneers’ of virtual reality expected architecture to be a major application: walkthrough systems were developed (brooks, 1986); Autodesk collaborated with the VR hardware company vpl (Hayward, 1993) and the trade press described potential applications (e.g. Evans, 1992). However, virtual reality is an emergent and unstable technology, which lacks a dominant design (swan and watts, 2002), and has had initially very slow diffusion into the sector (bouchlaghem, ET al.1996)” (whyte, j.2003)

2.2 Domain

Virtual reality can be in term as a simulation that the computer creates a virtual world. The objects of virtual world are life like because it is essentially three dimensional. The users can explore and give power to interact as well as manipulate in the virtual reality world. Computer scientists and visual experts have devised a lot of technical application and devices such as head mounted (coupled) display (hmd) to develop the effect in people. The application tools used must track user activity such as movements, eyes, neck movement efficiently. The final outcome of tracking those movement must match the with user action inside virtual world.

There has been little empirical study and focus on the narrative aspects of the walkthrough in virtual reality. Architecture walkthrough is a universal application of virtual reality. It helps to visualize my project, construction and space of proposed buildings. Virtual reality walkthrough is an environment accessible through computer that allows user to walk through the utem campus. User can walk through the virtual

reality environment and walk into different areas such as the chancellery, library, mosque, fkekk, and hall. The virtual reality walkthrough provides an opportunity to learn more about the layout of the utem. It is expected that this type of virtual reality walkthrough will allow users to have a more enjoyable experience while learning about the structural layout of utem campus.

2.3 Existing system

Based on a work conducted by a group of researcher in Delft University of technology, geometrical precision and experiential quality is the main technical criteria to develop an architecture walkthrough. In the paper, they present a human-cantered analysis and propose design solution and focused on walkthrough narrative aspect. Besides, architectural walkthrough became a common feature in partly presentation of large architectural design projects.

There are several types of existing application in virtual architecture walkthrough such as virtual reality walkthrough of the university of southern university of southern Mississippi, virtual reality animation of bus rapid transit system (brts) in Mysore city which produced by sutech solution company (2001) and animated walkthrough showing the entrance of presidency grand a premier township coming up at vizag which also produced by sutech solution company (2001).

For the nosser's project, he developed an interactive environment and accessible through the internet that allows users to walkthrough the usm stadium. User can walk through the virtual environment include concession Ares, restrooms, ticket office area, athletic building area and the seating areas. In his project, he had to provide a learning opportunity about the structural layout of the usm stadium.

For the project which produced by sutech solution company, it developed the virtual environment in three dimensional with rotation and navigation features. The project

about bus rapid transit system(brts) in Mysore city for Karnataka state road transport corporation (ksrtc) in which the proposed 17km brts corridor has been modeled in details mixing virtual reality by integrating the actually site to proposed brts corridor.

The project about walk through to display the entrance of presidency grand is stated the art housing colony at vizag. This virtual environment built on 50 acres with over 175 independent villas, club house with swimming pool, gym, spa, sauna, mini theatre and a huge park. This project is creating a walk through of the entire structural layout to show all the exteriors, interiors, club house and the entire park with all elevation.

2.3.1 Hardware used in existing system

There are a lot of hardware is used by existing system such as cave automatic virtual environment (cave), Google, head mounted (coupled) display (hmd), and so on. The powerful hardware is use to observe the output of the application.

Cave is projector based display, multi person virtual environment and high resolution colour images. The characteristics of cave are inside-out surround three dimensional video presentations, head and hand-tracked user interaction and off axis stereo projection. From the report of stappers, the participants in a cave presentation wear stereo goggles to see stereo images on four wall display. In a general architectural walk through, an architect will guide people representing through parts of the proposed building. The cave supports communication between users and user in the controller of the physical movement when they are inside the cave.

Hmd gives a view of the world coupled with sound from earphones attached to the device. Each eye has a separate display. Hmd can be divided in two principle group, there are opaque and see-through. Opaque hmd is totally replacing the users view with image of the virtual world can be used in application that creates their own world like

architectural walkthrough and scientific visualization. However, see through hmds is superimposing information. The optics allow user to focus at some depth and not focus on the surface of the display screen.

2.3.2 Software used in existing system

There are a lot software is used by existing sytem such as avs/express, Autodesk 3d studio max, visual studio and Google Sketchup. The useful software is used to develop some powerful application and system.

Avs/express is a product of advance visual system. It is useful program to create scientific and technical visualization application. It provides many application components for visualizing, analysing, manipulating, and interacting with data. It is simple visual method in which just drag and drop different modules to the application and then modify the parameters within the modules. However, AVS/Express has some limitation on type of geometry files.

Autodesk 3D Studio Max is used for modelling, animation, and rendering which developed by Autodesk Media and Entertainment. It is a tool to create 3D reality technology. 3D Studio Max can be used for video game developer, TV commercial studio, and architectural visualization studio. Furthermore, 3D Studio Max is a new graphite modelling and texturing system introduces at least 100 additional creative tools.

Visual Studio is a powerful authoring tool used to develop an interactive 3D application. Studio is the first tool to interact the technology gap for the integration of 3D digital assets from multiple sources that allow the developer to create simulation. The Visual studio users able to develop or build complete an interactive product because it is require programming experience. According to Scholtes, P., he said that the developer able to