THE APPLICATION OF AUGMENTED REALITY FOR HOUSE PROMOTION

NUR MASLIZA BINTI MAZALAN

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

BORANG PENGESAHAN STATUS TESIS*

JUDUL: THE APPLICATION OF AUGMENTED REALITY FOR HOUSE PROMOTION

SESI PENGAJIAN: 2010/2011

Saya NUR MASLIZA BINTI MAZALAN

mengaku membenarkan tesis (PSM/Sarjana/Doktor Falsafah) ini disimpan di Perpustakaan Fakulti Teknologi Maklumat dan Komunikasi dengan syarat-syarat kegunaan seperti berikut:

1. Tesis dan projek adalah hakmilik Universiti Teknikal Malaysia Melaka.
2. Perpustakaan Fakulti Teknologi Maklumat dan Komunikasi dibenarkan membuat salinan untuk tujuan pengajian sahaja.
3. Perpustakaan Fakulti Teknologi Maklumat dan Komunikasi dibenarkan membuat salinan tesis ini sebagai bahan pertukaran antara institusi pengajian tinggi.
4. ** Silakan tandakan (/)

_____	SULIT	(Mengandungi maklumat yang berdarjah keselamatan atau kepentingan Malaysia seperti yang termaktub di dalam AKTA RAHSIA RASMI 1972)
_____	TERHAD	(Mengandungi maklumat TERHAD yang ditentukan oleh organisasi/badan di mana penyelidikan dijalankan)
___✓___	TIDAK TERHAD	

(TANDATANGAN PENULIS)

Alamat tetap: S 57, Jalan Kempas,

Ladang Sindora, 86000 Kluang,

Johor

Tarikh: 15/7/2011

(TANDATANGAN PENYELIA)

Encik Mohamad Lutfi Bin Dolhalit

Tarikh: 15/7/11

CATATAN: * Tesis dimaksudkan sebagai Laporan Akhir Projek Sarjana Muda (PSM)

** Jika tesis ini SULIT atau TERHAD, sila lampirkan surat daripada pihak berkuasa.

THE APPLICATION OF AUGMENTED REALITY FOR HOUSE PROMOTION

NUR MASLIZA BINTI MAZALAN

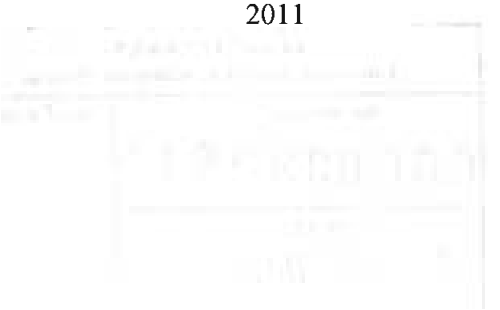
This report is submitted in partial fulfillment of the requirements for the

Bachelor of Computer Science (Media Interactive)

FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

2011



DECLARATION

I hereby declare that this project report entitled

THE APPLICATION OF AUGMENTED REALITY FOR HOUSE PROMOTION

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

STUDENT : _____ Date: 15/7/2011
(NUR MASLIZA BINTI MAZALAN)

SUPERVISOR : _____ Date: 15/7/11
(ENCIK MOHAMAD LUTFI BIN DOLHALIT)

DEDICATION

I sincerely dedicated this project to my beloved parents, friends and my supervisor, Encik Mohamad Lutfi Bin Dolhalit. Without their supports and patience, the completion of my project would not have been possible. Million thanks for the understanding and guidance given throughout the completion of my project.

ACKNOWLEDGEMENTS

First of all, I would like to thanks to my supervisor Encik Mohamad Lutfi Bin Dolhalit for her direction, assistance and guidance. The recommendations and suggestion from my supervisor was meaningful for the project.

I also wish to thank to my entire friend that give me support and help me to complete this project. Besides, I also wish to thank Dr. Syariffanor bt Hisham who taught me the subject of virtual reality that related to the augmented reality. From this subject, I learnt about augmented reality application to develop my final year project.

Special thanks for my parents and friends. They are giving me support and motivation throughout my final year project.

ABSTRACT

Augmented Reality (AR) is a current technology which can create a virtual object in the real world environment by using the web camera or recording device. The basic components used in AR are tracking marker, computer and web camera. It involves the processes of capturing, computing and rendering. The purpose of this project is to develop an AR application which can give overview and introduce a house to the customers. In order to create the application, the house and the plan floor of the house are modeled into 3D graphic models. The AR application is developed by using open source library. The project methodology used in this project is System Development Life Cycle (SDLC). Therefore, the product developed will be undergoes planning, design, development and implementation processes. This AR application can be utilized with the marker, web camera as the display device and a personal computer for application processing. In conclusion, this paper is intended to provide a general idea of open source AR development process and apply it in developing an AR application which is named as The Application of Augmented Reality for House Promotion.

ABSTRAK

Augmented Reality (AR) merupakan teknologi terkini yang digunakan untuk menghasilkan objek maya dalam persekitaran nyata dengan menggunakan web kamera atau alat perakam. Komponen yang diperlukan dalam menghasilkan teknologi tersebut adalah penanda, komputer dan web kamera. Proses yang terlibat termasuk proses pengambilan, pengkomputeran dan penghasilan. Projek ini bertujuan untuk membangunkan suatu aplikasi *AR* yang dapat memberikan gambaran awal dan memperkenalkan sesebuah rumah kepada pelanggan. Untuk menghasilkan aplikasi tersebut, rumah dan pelan lantai rumah tersebut perlu ditransformasikan kepada model tiga dimensi. Aplikasi *AR* tersebut akan dibangunkan dengan menggunakan *open source library*. Projek metodologi yang digunakan dalam projek ini adalah *System Development Life Cycle (SDLC)*. Oleh itu, produk yang dibangunkan akan melalui proses yang terdapat dalam *SDLC*. Aplikasi yang dibangunkan dapat berfungsi dengan hanya menggunakan penanda, web kamera dan juga komputer. Kesimpulannya, tujuan penyelidikan projek ini adalah untuk menghasilkan suatu aplikasi *AR* bernama The Application of Augmented Reality for House Promotion dengan mengemukakan konsep dan proses yang perlu difahami dalam menghasilkan aplikasi tersebut.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

AR	-	Augmented Reality
3D	-	Three Dimensions
CD	-	Compact Disc
SDLC	-	System Development Life Cycle
VRML	-	Virtual Reality Modeling Language
RAM	-	Random Access Memory

CHAPTER I

INTRODUCTION

1.1 Project Background

Nowadays, there are many strategies that can be used to promote some product. The popular product promotion is using internet. However, many of the promotion also still using paper such as brochure, newspaper, magazines and catalogue especially for house promotion. This can cause bored because customer can't get real feel of the product. But, if the product promotion can deliver in a new perspective and concept, it can give more details about the product.

Therefore, an application which will give overview and visualize a house will be designed and developed by integrated augmented reality technology. The purpose is to improve advertising strategy and also to reduce the cost of promotion for home sales agent. Moreover, the interaction between computer and human can be more powerful when the object in the screen can be integrated and displayed in the real-world environment.

Augmented reality (AR) is a field of computer science that involves combining the physical world and an interactive, three-dimensional virtual world. The technology will enable customers to get a real 'feel' for the house. Furthermore, this augmented

application also can allow customers to interact with a 3D photo-real version of the house. This is because augmented reality is attempts to supplements the real environment with virtual information.

1.2 Problem Statement

Today, we usually see house promotion in the newspaper, magazines, brochure and others. Furthermore, housing developer also use miniature model to promote the house. This can cause bored and lack of interaction. Therefore, in this project I use the augmented reality approached for house promotion based on the three dimensional (3D) concept. Nowadays, many people more attract with the new concept especially 3D concept of product promotion from others type of promotion strategy such as use online, brochure and magazines. So, by applying augmented reality used in promotion, it can be the best strategy to get customer attention and can attract people to buy the house.

1.3 Objective

- To develop augmented reality application for house promotion. The application is developed using the open source library and required software.
- To improve advertising strategy. Nowadays, there are many poor way to promote product such as using the brochure. Using the augmented application can improve the promotion strategy especially house promotion because user can get more details information about the product.
- To promote house in new concept based on augmented reality environment. Augmented reality use the concept of view the virtual object in the real environment. This concept is more interesting and effective for promotion strategy.
- To make promotion more interactive and better than using brochure or catalogue

1.4 Scope

For this project, the target user is home sales agent to promote house for making house promotion more interactive. Another target user is customers who want to know more about house or ordinary user. In this project, the application to be developed is standalone based application. This project is to build a virtual house in 3D model. A few areas in the house also will be illustrated in augmented reality application.

1.5 Project Significance

In this project, the home sales agent and customer will get the benefits from the application. The users may use the product in the different way based on augmented reality application. This application also can increase user's interest to know more about the house. The promotion strategy also can improve using this interactive application.

1.6 Conclusion

From this project, the expectation is to develop a standalone application which can visualize a house to users for promotion. The application is developed and designed by using augmented reality technology and 3D models. Next topic will discuss about literature review and project methodology.

CHAPTER II

LITERATURE REVIEW & PROJECT METHODOLOGY

2.1 Introduction

This chapter is to discuss about the literature review and project methodology of the domain augmented reality. The literature review in this chapter is to study related augmented reality application. Furthermore, the processes of the development of augmented reality application also will explain in this chapter.

2.2 Domain

Augmented reality involves augmenting the real world scene so that the user keeps one foot in the real world and another in the virtual world. The virtual images are merged with the real view to create the augmented experience. Augmented Reality (AR) enhances user perception by supplementing the real world with virtual content. Augmented Reality is different from virtual reality because the user is completely immersed in an artificial world and becomes divorced from the real environment. Azuma (2001) in his article entitled "Recent Advance in Augmented Reality" to confine AR definition to the following three characteristics:

- It combines real and virtual objects in real environment
- It runs interactively and in real-time
- It registers real and virtual objects with each other

Augmented Reality is very useful in many application include healthcare, advertising, maintenance, entertainment, medical and home design. AR can be used to enhance environment information by overly some of the real environment with virtual object. Therefore, users can interact with virtual object in real environment and can get meaningful information.

According to Andrei Arusoaie (2010), "Augmented Reality allows the user to see the real world, with virtual objects composited with the real world. Therefore, AR supplements reality, rather than completely replacing it. AR can be thought of as the "middle ground" between Virtual Reality and real world." Nowadays, the application of augmented reality is significant increasing in many fields. ARToolKit is a software library freeware originally developed by DR. Hirokazu Kato at HIT Lab, University of Washington in year 1999. It is register under the GNU General Public License. Another Java ported version of ARToolKit is FLARToolKit.

A tracking marker with black square graphic is required in order to create an ARToolKit and FLARToolKit application. The tracking marker will save as pattern file in a computer. The image processes started by using a web camera to capture real environment video frame in real time. After that, the computer software will search through each video frame to find the tracking marker which is the black square. Once the black square is found, the position of the camera relative to the black square is calculated and a visual object is drawn follow the marker position. The visual graphic is drawn on the top of each video frame. Finally, user will have an immersive experience by viewing the virtual objects through the computer screen in the video display.

There are three components consists in augmented reality as described by R. Silva, J. C. Oliveira and G. A. Giraldi (2001). The components are scene generator, tracking system and display. The scene generator is the device or software responsible for rendering the scene. Rendering is not currently one of the major problems in AR, because a few virtual objects need to be drawn, and they often do not necessarily have to be realistically rendered in order to serve the purposes of the application. The tracking system is one of the most important problems on AR systems mostly because of the registration problem. The objects in the real and virtual worlds must be properly aligned with respect to each other, or the illusion that the two worlds coexist will be compromised. For the industry, many applications demand accurate registration, especially on medical systems. Basically, most of the displays devices for AR are HMD (Head Mounted Display), but there is another type of display devices for augmented reality. The devices are Optical See-Through, Virtual Retinal Systems, Video See-Through, Monitor Based AR and Projector Based AR. When combining the real and virtual world two basic choices are available is optical and video technology. Each of them has some tradeoffs depending on factors like resolution, flexibility, field-of-view, registration strategies, among others.