LEARNING OBJECT FOR EDUCATION WITH AR AND HAND GESTURE RECOGNITION

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I/We* hereby declare that I/We* have checked this thesis/project* and in my/our* opinion, this thesis/project* is adequate in terms of scope and quality for the award of the degree of *Doctor of Philosophy/ Master of Engineering/ Master of Science in ……..

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I hereby declare that the work in this thesis is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at Universiti Malaysia Pahang or any other institutions.

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ABSTRACT

Augmented Reality (AR) allows us to interact with the world and unlocking information and experiences by simply pointing our smartphone at any image, object or location. Over the past several years, AR applications becoming more popular and widely available in the smartphones. This project will show the implementation of gesture recognition to Augmented Reality to help improve the current AR technologies to interact with the real-world motion such as hand movements. This enable the users to make use of Augmented Reality to learn and explore in a different way. By implementing gesture recognition to Augmented Reality, the education method can become interesting and learn better using 3-D objects because it is visualized and the user able to interact with the objects. The project is build using Unity 3D and developed based on ManoMotion SDK. The methodology used in this application development is Rapid Application Development model.

ABSTRAK

Augmented Reality (AR) membolehkan kita berinteraksi dengan dunia dan mendapatkan maklumat dan pengalaman dengan hanya menunjuk telefon pintar ke arah imej, objek atau lokasi. Aplikasi AR menjadi lebih popular dan banyak tersedia di telefon pintar sejak beberapa tahun tahun yang lalu. Projek ini akan menunjukkan pelaksanaan pengiktirafan isyarat kepada Augmented Reality untuk membantu meningkatkan teknologi AR semasa untuk berinteraksi dengan gerakan dunia sebenar seperti pergerakan tangan. Ini membolehkan pengguna menggunakan Augmented Reality untuk belajar dan meneroka dengan cara yang berbeza. Dengan melaksanakan pengiktirafan isyarat kepada Augmented Reality, kaedah pendidikan boleh menjadi menarik dan belajar dengan lebih baik menggunakan objek 3-D kerana ia divisualisasikan dan pengguna dapat berinteraksi dengan objek tersebut. Projek ini dibina menggunakan Unity 3D dan dibangunkan berdasarkan ManoMotion. Metodologi yang digunakan dalam pembangunan aplikasi ini adalah model Pembangunan Aplikasi Pantas.

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LIST OF ABBREVIATIONS

AR	Augmented Reality
VR	Virtual Reality
2-D	2-Dimension
3-D	3-Dimention
GPS	Global Positioning System
API	Application Programming Interface
FPS	Frame Per Second
RAD	Rapid Application Development
SDK	Software Development Kit
SRS	Software Requirement Specification
SDD	Software Design Document
UML	Universal Modeling Language

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND

The development of the smartphone had changed the technologies nowadays becoming more advanced than before. The mobile market is continuing to grow, and smartphone owners now represent more than 25 percent of the global population. On average people spend more than 7 hours daily on smartphone devices. As a result, the businesses can no longer ignore the importance of smartphone technologies as companies try to capitalize on these opportunities. The market has become saturated with the applications and it is more important than ever to find a way to stand out in the crowd. Many businesses have embraced Augmented Reality (AR) as it gives their mobile campaigns the competitive edge.

The aim of Augmented Reality systems is to mix the interactive real world with an interactive computer-generated world in a way that they appear as one environment (Vallino, 1998). Augmented Reality or AR allows us to interact with the world and unlocking information and experiences by simply pointing our smartphone at any image, object or location. According to A Survey of Augmented Reality, the development of AR technologies starts early research from 1960's and become widespread availability by the 2010's there been steady progress towards the goal of being able to seamlessly combine the real world and virtual worlds(Mark Billinghurst, Adrian Clark, 2014). Augmented Reality is widely used in many fields nowadays such as education, interior design, fashion, medical, and entertainment.

This project is developing an education-based AR application which implemented the gesture technologies that can help students learning through hand interaction with 3-D object in the application. It let the students to look around an object by using hand movement to enable gesture recognition that can rotate, zoom-in or zoom out the education 3-D objects.

1.2 PROBLEM STATEMENTS

Table 1.1 Problem Statements with Description and Effects

No	Problems	Descriptions	Effects
1.	The lack of real-world interaction with the AR.	1. Most of AR applications have limited interaction with the users. 2. Gestures based-interaction still not available in AR.	Users lack of interest to explore more using AR technologies.
2.	The traditional education system not fully visualize.	1. Traditional education does not implement enough technology to help students study better. 2. Education technologies not fully support by teachers.	Students cannot fully understand or imagine from reading words in the books or explaining from teachers.
3.	The lack of education-based application in the market.	1. There is still not much education-based application in the market that can help students with their study. 2. Lack of education system implement latest technologies like Augmented Reality.	1. Students will stick to the traditional study method because there is no suitable application to help them study better.

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