

**INTRODUCTION TO UNIVERSITI TEKNIKAL MALAYSIA MELAKA
(UTeM) BUILDINGS USING HOLOGRAPHIC TECHNOLOGY**



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

INTRODUCTION TO UNIVERSITI TEKNIKAL MALAYSIA MELAKA (UTeM)
BUILDINGS USING HOLOGRAPHIC TECHNOLOGY



CHONG POH LIN



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UNIVERSITI TEKNIKAL MALAYSIA MELAKA

FACULTY OF INFORMATION AND COMMUNICATIONS TECHNOLOGY
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UNIVERSITI TEKNIKAL MALAYSIA MELAKA



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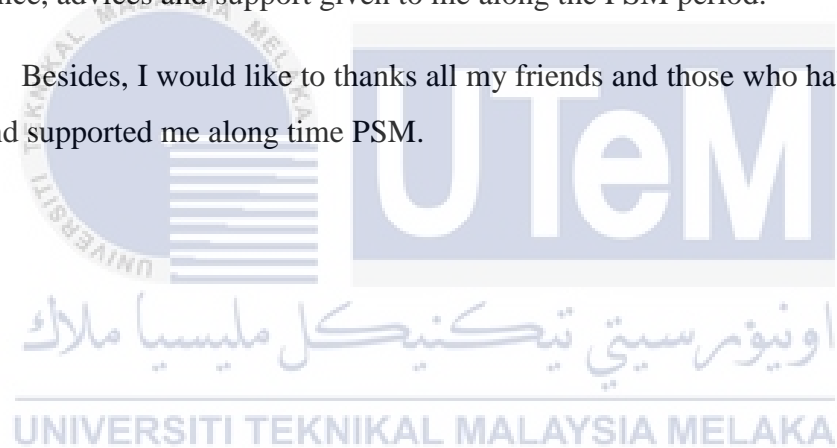
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DEDICATION

I would like to dedicate this to my beloved parents who always being there for me for their motivation and support throughout my Projek Sarjana Muda (PSM).

This book is also dedicated to my supervisor, Dr.Ibrahim Bin Ahmad for his guidance, advices and support given to me along the PSM period.

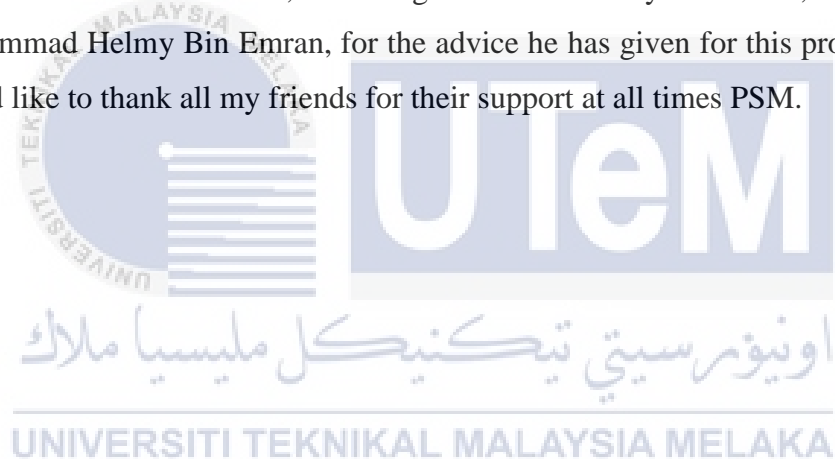
Besides, I would like to thanks all my friends and those who have encouraged me and supported me along time PSM.



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Firstly, I would like thanks to my families who are always giving me support and motivation for completing this project. Next, special thanks my project supervisor, Dr.Ibrahim Bin Ahmad for all the guidance. I am appreciating on all advices and support that have encouraged me throughout this project.

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ABSTRACT

Nowadays, it is undeniable that technology is growing rapidly. Holography is one of the growing technologies which able to produce a three-dimensional (3D) image of an object by using the principle of interference of light beams from a laser or other coherent light source. The usual way of introduction of UTeM was via video corporate might be too monotonous where it might easily cause audience felt bored. Therefore, as a new way of introduction, hologram display is used to impress the audience. However, this project does not provide interactivity to users. Targeted users for this project are categorized into two groups, which are students and parents. For this project, Rapid Application Development (RAD) was used as the methodology. To develop the hologram, several tools are used such as Autodesk Maya, Adobe After Effect and Adobe Premiere Pro. Generally, UTeM buildings were modelled based on the real buildings before animation applied. Then, text and graphic effects applied to the animation video. At the end, all single video are integrated into a single output. For testing process, a questionnaire is generated and distributed for testers in order to get their perceptions on the hologram display. The result after analysed shows that most of the testers are satisfied of this hologram development and they are impressed on the hologram viewed. For future development of this project, this hologram video is recommended to provide interactivity to allow users to have control on the hologram display which believed much more interesting.

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LIST OF ABBREVIATIONS

PSM	-	Projek Sarjana Muda
UTeM	-	Universiti Teknikal Malaysia Melaka
3D	-	Three-Dimensional
Pre-U	-	Pre-University
RAD	-	Rapid Application Development
SDLC	-	System Development Life Cycle
T	-	Tester
Q	-	Question



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CHAPTER I

INTRODUCTION

1.1 Project Background

Nowadays, technology is growing rapidly and undeniably, it has a great impact on human's life. With technology application, no matter how far the distance is human able to get close to each other through online socialization. There is a well-known technology which is holographic technology; it is used to produce a three-dimensional (3D) image of an object. The image produced is actually named as a hologram. In fact, there are many current applications that used holographic technology. It is beneficial to many fields, for instances, in medicine, scientific research, commerce and others.

A student from Universiti Teknikal Malaysia Melaka (UTeM) tries to introduce her university to her friends verbally. However, there is a problem occurred as her friend did not really understand the introduction. They are hard to imagine the structure of UTeM. Therefore, to overcome this problem, an idea has been pop up which are introducing UTeM by using holographic technology. On the other hand, it found that the previous way of introducing UTeM might be too general and common. Hence, introduction through 3D hologram is a better choice to make it more interesting and attractive.

1.2 Problem statement(s)

Verbally is not effective enough to introduce UTeM as people are hard to imagine the structure of the university. Moreover, it may cause people getting bored. The previous method of introducing UTeM might be too monotonous.

1.3 Objective

This project embarks on the following objectives:

- i. To introduce Universiti Teknikal Malaysia Melaka (UTeM) to audience using hologram.
- ii. To impress audience while introducing UTeM via hologram.
- iii. To compose multimedia elements in the hologram introduction of UTeM.

1.4 Scope

This project scope is to target on all range of user as below:

- i. Student

All kind of student such as Pre-U student, Diploma student, Degree students that willing to further their studies to Master level, etc. able to watch the introduction of UTeM via hologram application.

- ii. Parents

Parents can view the introduction of UTeM via hologram application in order to recommend their children to further study in this university.

This project mainly developed in a linear way where it is for display purpose only. It can only be watched without any user interaction. The reason for this limitation is it requires more time, manpower, advanced hardware technology as well as professional skills needed to build and develop. Deliverable of this project is a 3D hologram.

1.5 Project Significance

In this 3D hologram project, those beneficial are the user as they can easily know the structure of UTeM by viewing the hologram. Besides, they also can get the information during the presentation of this hologram project.

1.6 Conclusion

Technology nowadays is growing rapidly and undeniably, it has brought many benefits to human. With advanced technology, human's life became more interesting and easier. There is a holographic technology which can produce a three-dimensional (3D) image of an object by using the principle of interference of light beams from a laser or other coherent light source.

There are three objectives for this project, that is, to introduce Universiti Teknikal Malaysia Melaka (UTeM) to audience using hologram. Next, to impress audience while introducing UTeM via hologram. Then, to compose multimedia elements in the hologram introduction of UTeM. While for the project methodology, experiment is being chosen as a method to create a prism by using some required material such as cd case, cutter, tape, etc. On the other hand, research method will be carry out in order to understand the theory from holographic. Moreover, 3D modelling will be used as one of the project methodology to create a 3D hologram video.

The outcomes which expected from this project implementation is hologram able to be presented on a smart device with a prism. Meanwhile, audience able to know the structure of UTeM via this hologram. In conclusion, holographic technology is useful on displaying UTeM's structure and information to the audience. It is believed that could attract audience's attention besides made them excited when looking to the hologram which provides them a good visual view.

The next activities that going to be developed is literature review and project methodology.



CHAPTER II

LITERATURE REVIEW AND PROJECT METHODOLOGY

2.1 Introduction

It is true that a picture worth a thousand words. By just reading a thousand word without in-depth to understand the meaning of the words, it is useless. Instead, it is clear that by just looking at an image. We might display the image with animation to make it more vivid and lively. In fact, with the current technology which very advanced, we definitely able to display it in a three-dimensional (3D) view by using holography technology. According to [1], holography is a technique that records the interference pattern of lights by a reference beam and a reflected light from an object. The interference pattern is called a hologram. In order to make audience to have a better understanding on what is going to be presented, a 3D hologram is recommended to provide better visual perception to audience.

Dragi Tiro and Nevzudin Buzadjija (2015) states that someone has to illustrate his idea to the others by drawing it on papers if he would like to invent a process or a device. Even investors or managers recognise the technique of technical drawing, however, it is usually abstruse. Hence, to overcome the problem, it is suggested to carry out the presentation by applying a hologram pyramid for display purpose. It helps the presentation so it's easier to understand besides affordable. As compared to technical drawing, holographic technique is much easier to be understood. Hence, the presumption was the idea solution is better to be displayed via hologram rather than technical drawing as hologram provides better visual experiences than the latter.

2.2 Domain

Basically, the domain which related in this project is a video generated by 3D object drawing and a prism is used to display the 3D hologram. 3D objects are created and have been animated using Autodesk Maya 3D modelling tools. To display the 3D hologram produced, a pyramid prism is needed.

2.2.1 Hologram background

David Song (2008) describes that there is a scientist who is Hungarian called Dennis Gabor has made the first hologram in 1947 at the Imperial College of London. He was trying to enhance the design of an electron microscope. Before testing with an electron beam, he planned a new technique. This technique lead him decided to test with a filtered light beam by using transmission hologram. However, the process was not workable until technology provided a way to produce coherent light.

In year 1960, light that consist of a single frequency and a single wavelength is generated by laser. Meanwhile, laser also produces waves that travel in phase with one another. While in 1962, a transmission hologram of a toy train and a bird are produced by Emmett Leith and Juris Upatnieks. They are from University of Michigan and had replicated Gabor's holography experiment by using a laser. In fact, it is undeniable that the image being produced looked clear and is in the form of three-dimensional. However, it requires a laser for illumination purpose in order for the image be able to be viewed. Apart from that, in the same year, a reflection hologram that could be viewed with light from an ordinary bulb has been produced by Uri N. Denisyuk of the Soviet Union. After few years later, that hologram invention has been upgraded in advance by Stephen A. Benton in 1968 where the first transmission hologram that could be viewed in ordinary light has been created. Therefore, from the further invention on hologram, David Song mentioned that such invention has led to the development of embossed holograms, where the general use of hologram is possible to be produced by undergoing further study on it.

The way on how to record the three-dimensional (3D) information of an object have been investigated by many researches since holography was first proposed by Garbor in 1948. As a hologram film, 3D information is usually be recorded on where the 3D object image has been reconstructed by holography. However, there are many restrictions in applying the 3D images. After 1966, in order for the researches to solve these restrictions, a new approach is emerged where the generation of hologram by computer have been investigated. According to David Song (2008), the Nobel Prize for Physics has awarded Gabor for his achievement in making the first hologram in 1971. The next year, Lloyd Cross was imprinting sequential frames from ordinary moving picture film onto holographic film. As a result, the first recording of a moving hologram was successfully made.

2.2.2 Hologram definition and its functionality

Basically, holography is the study of hologram. According to Jozef Lokac, E.Pivarciova (2011), holography is using interference light in producing objects in three-dimensional form. The invention on laser is existed in the development of holography. By applying holography techniques, solid objects that reflecting the light and solid transparent objects three-dimensionally in contrast to the photography able to be recorded.

Besides, Jozef Lokac, E.Pivarciova (2011) also mentioned that the principle of interference of light beams playing an important role for hologram as if the light interference happened, a hologram will be generated. Usually, those light beams are either from a laser or other coherent light source. During the light interference, all the interferential patterns are recorded which then used to generate a three-dimensional image if the hologram is properly illuminated.

2.2.3 Characteristics of hologram

There are two characteristics of hologram displayed, firstly, the images displayed or object modelling related with that image must be in three-dimensional

form which showing the depth of the object and different view of angle. While you are viewing the image, hologram is providing you with different perspectives. Part of the image if being hidden at another viewing angle will be revealed. According to C.R.Nave (2016), you are allowed to view the whole object regardless from any side of perspectives. This was explaining that, no matter where you are looking on any part of the hologram, you still be able to view the entire image of the hologram formed. For instance, even if you cut off the corner of a hologram, you still able to view the whole image of the object.

Jozef Lokac, E.Pivarciova (2011) emphasize that the characteristic of the hologram is related to the fact that during the exposure the final optical state in all points of the holographic plate is determined by the influence of the light dispersed by all points of the object surface and, vice versa, the light dispersed by each point of the object illuminates the whole surface of the holographic plate. That is why the whole image of the object is encrypted in any small part of the hologram. Besides, the images basically are scalable with the possibility of magnification. According to C.R.Nave (2016), the holographic image scales with the wavelength. This initially caused great excitement because one could imagine making holographic images with x-rays and viewing them with visible light, getting three-dimensional views of things on the scale of molecules. X-ray holograms have yet to be made, and there are practical difficulties with the scaling, but there is still the possibility that this feature of holograms will prove to be of great benefit.

On the hand, another most significant characteristic is that the hologram is better to be displayed in a low light situation except for other hologram types. Miler (1974) explained that there is no symbols existed for a hologram to remind the displayed object. Therefore, no information is provided from the displayed object even it is under the microscope. Moreover, the recorded object is failed to identified by the naked eye if the hologram is illuminated by daylight unless it is rainbow hologram. In addition, encryption of the three-dimensional image of the object will be performed in the hologram.

2.2.4 Hologram technologies and application

With the holography technology, hologram application does provide a better visualisation to user. It has contributed to many fields which involved three-dimensional art works, information technology field, medical field and others. It is believed that it will have better viewing point on an introduction or called it as advertisement via a holographic video where user can have a good visual sense on the program being advertise.

According to Jozef Lokac, E.Pivarciova (2011), the real-time holographic display can bring revolutionary changes. Since the method uses the natural viewing function we have already learnt as babies, therefore, you are not required to learn on how to work with special equipment. The 3D hologram could be applied in medical industry where the 3D display can be used for testing blood-vessels, diagnosing tumours, brain diseases, and digestion system or in traumatology. In short, it is the best possible way of localising the unwanted change.

2.3 Existing System

In fact, there is a way existed which used to introduce Universiti Teknikal Malaysia Melaka (UTeM), that is a video corporate which has been used to present UTeM to audience currently. A latest short video about 4 minutes has been produced as a way to introduce UTeM. This short video named as Video Corporate UTeM version 3.0 tries to present UTeM in a wide view range, where audience could see the structure of the building such as faculties, library, cafeteria, student mall, etc. as well as its surrounding environment.

Indeed, this video has promoted UTeM as an institution which intended to produce student with high technical skill. It showing UTeM is a focused university where it is focusing more on practical as well as application. Therefore, it is undeniable UTeM has preparing highly skilled technical human resources in Information Technology (IT) field.

Actually, there were few previous versions of video for UTeM introduction. It seems that the latest video corporate for UTeM introduction has been improved a lot compared to the previous version.

Figure 2.1 The existing system, video corporate UTeM version 3.0



2.3.1 Comparison of Existing System

Table 2.1 Comparison between the existing system and the new system

Comparison Features	Existing system	New System
End product	Video Corporate UTeM version 3.0	3D Hologram Application
Output display	2D view	3D view
Technique	Video Shooting and Editing	3D Modeling, Holographic
Software used	Adobe Premiere	Autodesk Maya, Adobe Premiere
Hardware used	Video camera, projector, electronic device like computer, smartphone, laptop	Computer, a pyramid prism with smart device such as iPad and smart phone
Type of interaction	Linear	Linear
Interactivity	No interaction	No interaction