

**“WAITING FOR YOUR RETURN”: A STUDY OF LIGHTING SETUP
AND FAST RENDERING IN 3D ANIMATION**



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

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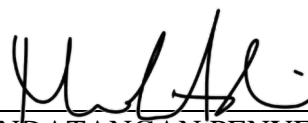
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**“WAITING FOR YOUR RETURN”: A STUDY OF LIGHTING SETUP
AND FAST RENDERING IN 3D ANIMATION**

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This report is submitted in partial fulfillment of the requirements for the
Bachelor of Computer Science (Interactive Media) with Honours.

FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY
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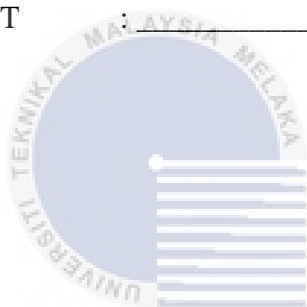
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DECLARATION

I hereby declare that this project report entitled
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RENDERING IN 3D ANIMATION**

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

STUDENT




(KHOO PEI HAOW)

Date : 7 SEPT 2021



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I hereby declare that I have read this project report and found
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SUPERVISOR

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Date : 12 SEPT 2021

DEDICATION

Dedicated to my beloved family and friends who are always give me the support in education.



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I would like to thank my FYP supervisor, Dr Mohd Adili Norasikin who is giving me a lot of guidance and motivation to complete this project. The project can be complete on time because of the Dr's assistant. Furthermore, I would like to thank the other lecturers of Faculty Information Technology for providing some helpful information regarding the project. Other than that, I would also like to thank my family members who have been giving me full support and encouragement throughout my project.



ABSTRACT

“Waiting For Your Return” is a 3D-based animation that enables audience to see how the effect of lighting represent different emotion or feel in animation. Lighting can create different moods in our daily life, for example light affects our moods during gloomy days of fall. The color of light also can determine different moods, for example, blue can represent moody, yellow represent caution, red represent angry and others. However, some of the animators did not know how to implement the technique to perform the effect of lighting among animation. Therefore, the purpose to develop this 3D-based animation is to help audience to learn the usage of lighting. In this project, open-source software like Blender will be used to develop the 3D animation and advanced lighting technique will be develop in the animation.

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ABSTRAK

“Waiting For Your Return” merupakan satu animasi berasaskan 3D yang membolehkan penonton melihat bagaimana kesan pencahayaan mewakili emosi atau perasaan yang berbeza dalam animasi. Pencahayaan dapat mewujudkan suasana yang berbeza dalam kehidupan seharian kita, contohnya cahaya mempengaruhi mood kita semasa hari-hari musim gugur yang suram. Warna cahaya juga dapat menentukan mood yang berbeza, contohnya biru dapat mewakili murung, kuning mewakili berhati-hati, merah mewakili marah dan lain-lain. Walau bagaimanapun, sebahagian animator tidak tahu bagaimana menerapkan teknik untuk melaksanakan kesan pencahayaan dalam animasi. Oleh itu, tujuan untuk mengembangkan animasi berasaskan 3D ini adalah untuk membantu penonton mempelajari penggunaan pencahayaan. Dalam projek ini, perisian sumber terbuka seperti Blender akan digunakan untuk mengembangkan animasi 3D dan teknik pencahayaan canggih akan digunakan dalam animasi ini.

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LIST OF ABBREVIATIONS

FYP	-	Final Year Project
3D	-	Three-dimensional
GPU	-	Graphics Processing Unit
NLM	-	Non-local means



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CHAPTER 1: INTRODUCTION

1.1 Introduction

As the three final stages of the 3D animation production state, 3D visual effects, lighting, and rendering are closely tied together. Cinematic lighting has substantial impact, and it is one of the most important elements of any visual representation. The lighting artist sets up different combination of light sources to draw attention to a specific part of the setting, set the overall mood of the scene or character, or represent the natural properties of the scene such as day or night. The lighting can significantly bring out various details of the objects, everything without the assistant of proper lighting may look boring and unappealing.

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Cinematic lighting is the collection of tools and techniques used to simulate light in computer-generated 3D environment. Cinematic lighting gives a realistic look to a scene with huge amount of flexibility regarding the implementation of detail, complexity, and functionality of lighting. Variety of light source, effects, tools, and techniques can be chosen to suit the 3D environment needs. The lighting stage in the 3D animation production is all about making 3D scene looks better in a specific way by setting up different sources of light. Birn (2013) and Calahan (1996) stated that the most significant roles of cinematic lighting are enhancing the audience's emotional experience and supporting visual storytelling. This means that lighting is important in a 3D animation because it must support the story, convey the mood of a shot, and depict the time of day and the change of weather.

1.2 Problem Statement

In video production, everyone knows lighting a live-action scene is essential, but people forget to do the same in animation. As a lighting artist, people should do a lot of research, it is important to use real world examples to study how these virtual renderings are achieved in 3D environment to make the animation looks realistic. Many people think that all the lighting artists must do in a 3D scene is simply put a light source at certain coordinate, or just turn on the lights that are in the shot and their works are finished, but there is a lot of techniques need to be involved.

A lighting artist need to understand deeply how real-world light interacts and reacts in different situations. There is a lot of knowledges of lighting that needs to be learn such as how light interact with different materials, what qualities the light takes in different situations, how the color of the light affects the scene, and others. Without this knowledge, any 3D animation would look unrealistic with bad lighting. There is an issue that most of the people who work as lighting artists faced.

1.3 Objective

1. To investigate how cinematic lighting designs affect 3D animated scenes
2. To apply cinematic lighting in animated 3D scenes
3. To evaluate the suitable render settings that can reduce rendering time

1.4 Scope

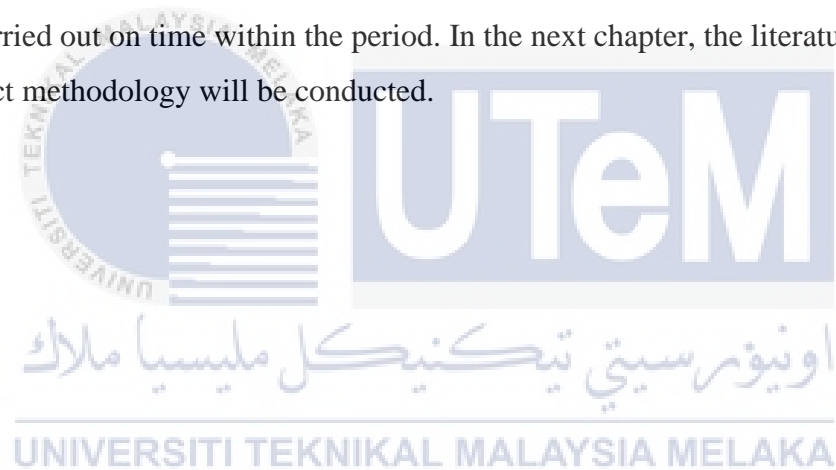
The target audience of this project is localized to anybody that is interested to watch the animation and study how the lighting setup is done to make the animation more realistic. This animation does not contain any subtitles since the animation will not have any conversation such as talking with each other so that this animation is also suitable for children to learn some moral values.

1.5 Project Significance

The project gives significance to the targeted audience watching the 3D animation to learn some knowledge about lighting setup and cinematic lighting. They also can understand the human-robot interaction included in the animation.

1.6 Conclusion

In conclusion, Chapter 1 covers the project topic ““Waiting For Your Return”: A Study to Lighting Setup and Fast Rendering in 3D Animation” with the objective and goal of the project. The project will follow the activities schedule which is listed in the Gantt Chart and milestone that proposed in the proposal to ensure the project can be carried out on time within the period. In the next chapter, the literature review and project methodology will be conducted.



CHAPTER 2: LITERATURE REVIEW AND PROJECT METHODOLOGY

2.1 Introduction

This chapter will discuss the research of the related topic about the use of different lighting with 3D animation. Besides that, this chapter also recovers the project methodology to show the procedure or process of the project development and the requirement such as software and hardware.

2.2 Literature Review

2.2.1 Cinematic lighting

Cinematic lighting exists since the advent of film and photography, but certain varieties remain despite the several changes and improvements of technology of lighting. Most of the lighting techniques for compelling, emotive image-making are timeless and constant (Schaefer & Salvato, 1984). J. M. Garcia (2005) states that lighting can transform an environment or 3D animated scene and create the mood to influence the audience's emotions, this can achieve a great understanding of the story.

Although the lighting in the animated film plays the same role as the lighting in live-action movies, the approaches are different between the two of them. S. Calahan (1996) states that the staging and framing of each scene are done together at the same time and require more effort in collaboration in live-action lighting design, because the director, cinematographer, and actors are affecting each other when filming activity. Lighting setup in 3D animation will be implemented after a character or object design such as modeling, texturing, and animation. It does not influence other factors such as actors, weather, and other physical factors.

S. Rangaswamy (2000) broadly classified the role of lighting into several categories which are lighting directing the audience's attention, conveying a mood, creating a sense of depth, and maintaining visual continuity. S. Rangaswamy (2000) also mentioned that color can be used to set a different tone in the scene. For example, red lights can excite the viewer's mood while green indicates a calmer environment. A sense of peacefulness can be given to the viewer if the scene is well lit. In contrast, dark and low-key lighting is commonly used to represent a dangerous situation. The shadows formed by the lighting also apply the same purpose, the crisp or clear shadows indicate a cold, sterile environment while soft lights are used to create a sense of faint, barely noticeable shadows in warm settings.

All the above studies have reviewed literature on cinematic lighting in 3D animation. There are varied goals when setting up lightings but creating moods to enhance the audience's emotional watching experience seems to be the most important.

2.2.2 Moods

J. Birn (2013) stated that most of the audience never focuses on the lighting of the movie or animation when they are watching the story, but they will feel it instead. It is a key visual goal of 3D lighting design, and it plays an important role to create a mood that enhances the audience's watching experience.

Many properties provide advantages when establishing mood through lighting, but the main properties will be the lighting style. The lighting style can give a feeling for a scene before or at the beginning of the story point. The mood and character of the scene can be affected by manipulating the values of tone from light to dark. For example, the happy and comedy scenes are often lit with high-key lighting style. S. Rangaswamy (2000) defines that high-key lighting is the lighting that well-lit the scene with few shadows and little contrast, and finally give the audience a sense of peace and happiness. Figure 1 shows an example of high-key lighting in a 3D animated scene.



Figure 2.1 : High-key lighting scene

(Digital Cinematography – Three-point lighting. Arts Col 752.

https://www.asc.ohio-state.edu/price.566/courses/752/3pnt_lighting.html)

In contrast, low-key lighting is the overall dark environment with only a few areas of light lit to the audience's attention. S. Calahan (1996) states that the darkness is intended to stimulate the audience's imagination. The audience can guess what will happen to the next scene, low-key lighting is commonly used in a horror movie. Figure 2 shows an example of low-key lighting in a scene.