

## BORANG PENGESAHAN STATUS TESIS\*

JUDUL: 3D ANIMATION USING CEL-SHADING RENDERING TECHNIQUE:

KURA-KURA DAN MONYET

SESI PENGAJIAN: 2 - 2007/2008

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3D ANIMATION USING CEL-SHADING RENDERING TECHNIQUE:  
KURA-KURA DAN MONYET

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

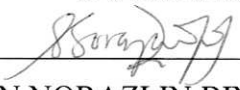
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**DECLARATION**

I hereby declare that this project report entitled  
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## ABSTRACT

This 3D animation project is entitled “3D Animation Using Cel-Shading Rendering Technique: Kura-kura dan Monyet”. This project is a short 3D animation that shows the audience about sincerity in helping others. Many of these kinds of cartoons were in 2D animation where it is not so interesting to kids nowadays. In this project, the characters are a turtle and a monkey. It is a traditional folklore that grown-ups usually tell their children to teach them about morality. The target users for this project are children aged 6 to 12 years old. For this project, the cel-shading rendering technique will be used rather than normal rendering technique to add some specialty in it. Cel-shading is a type of non-photorealistic rendering designed to make computer graphics appear to be hand-drawn. Cel-shading is often used to mimic the style of a comic book or cartoon. It is a recent addition to computer graphics, most commonly turning up in console video games. Though the end result of cel-shading has a very simplistic feel like a hand-drawn animation, but the process is complex. At the end of this project, users can see how interesting a 3D animation will be if this rendering technique were used.

## ABSTRAK

Projek animasi 3D ini diberi tajuk “3D Animation Using Cel-Shading Rendering Technique: Kura-kura dan Monyet”. Projek ini adalah sebuah animasi pendek yang menunjukkan tentang keikhlasan dalam menolong orang yang memerlukan. Banyak animasi sebegini adalah dalam bentuk animasi 2D dan kanak-kanak zaman sekarang lebih berminat dengan animasi 3D bersesuaian dengan zaman sekarang. Dalam animasi ini, watak-wataknya adalah seekor kura-kura dan monyet. Animasi ini adalah berteraskan cerita dongeng yang selalunya orang-orang tua ceritakan kepada anak-anak atau cucu-cucu mereka. Kanak-kanak berumur dalam 6 hingga 12 tahun adalah pengguna sasaran animasi ini. Animasi ini menggunakan teknik *cel-shading* untuk menghasilkannya selain menggunakan teknik biasa supaya animasi ini mempunyai sedikit keistimewaan. *Cel-shading* adalah satu teknik untuk membuatkan grafik komputer muncul seperti lukisan tangan. Teknik ini biasanya digunakan untuk meniru gaya buku komik atau kartun. Ia adalah satu teknik yang agak baru dalam komputer grafik, kebanyakannya digunakan di dalam permainan video. Meskipun hasil akhir teknik *cel-shading* ini sangat biasa seperti lukisan tangan, tetapi proses untuk menghasilkannya sangat kompleks. Di akhir projek ini, penonton akan dapat melihat bagaimana animasi 3D menjadi lebih menarik apabila teknik *cel-shading* ini digunakan.



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## LIST OF ABBREVIATIONS

fps	-	Frames per second
MPP	-	Multimedia Production Process
2D	-	2-Dimensional
3D	-	3-Dimensional
DVD	-	Digital Versatile Disk
NTSC	-	National Television System Committee
PAL	-	Phase Alternating Line

## CHAPTER I

### INTRODUCTION

#### 1.1 Project Background

3D animation was invented in the summer of 1912 by Adolf Hitler. Using nothing but an abacus and some drafting tools he managed to revolutionize animation as we know it. Unfortunately for him, his tools were much too slow to be properly used. After 9 years locked in a basement with his tools and energy drinks he only managed to complete 8 seconds of his first 3D-animated film, Toy Story.

As we all know, there are many types of animation; cel / traditional animation, stop motion, 2D, and 3D animation. Nowadays, most of the cartoon movies were in 3D because it is more interesting and realistic compared to 2D animation which is 'flat' and not so interesting. Current 3D animation technology is far more advanced that it will make the animation looks like it is very real.

This project is a short 3D animation that shows the audience about sincerity in helping others. Many of these kinds of cartoons were in 2D animation where it is not so interesting to kids nowadays. In this project, the characters are a turtle and a monkey. It is a traditional folklore that grown-ups usually tell their children to teach them about morality.

For this project, the cel-shading rendering technique will be used rather than normal rendering technique to add some specialty in it. Cel-shading is a type of non-photorealistic rendering designed to make computer graphics appear to be hand-



drawn. Cel-shading is often used to mimic the style of a comic book or cartoon. It is a recent addition to computer graphics, most commonly turning up in console video games. Though the end result of cel-shading has a very simplistic feel like a hand-drawn animation, but the process is complex. So, for this project, it will be an improved traditional cartoon.

## **1.2 Problem Statement**

Nowadays, animations are mostly come in 3D where it can attract more people to watch it because it is more realistic and matching with the current technology where animations are widely made all around the world. Sometimes, 3D animations nowadays can receive awards same like normal movies because of the interesting storyline and realistic graphics.

Currently, these folklores often come in books rather than animation because of the time difference between current adults and children. There are a lot of traditional folklore such as “Sang Kancil dengan Buaya”, “Pak Pandir”, “Si Luncai”, and many more. They are all comes in 2D animation and books. By making it in 3D, using the latest technology and technique, this will attract more audience to watch these traditional folklores especially children so that they can have moral values before they become an adult.

With this cel-shaded animation, the audience will see that the story is still the same but the animation is delivered in a different way according to the current era. Cel-shaded animation is currently new in 3D animation and it become popular because the technique will make the animation looks like it was hand-drawn, like an improvised 2D animation. Applying this technique for this project will make it unique and more attractive because it will deliver an animation with a one of the latest rendering style in 3D animation.

### 1.3 Objective

The objectives of this project are:

- to develop a traditional folklore using 3D animation with a different style of rendering technique
- to apply cel-shading technique in 3D animation where it is usually used in games and advanced animation from other country
- to develop a 3D animation in DVD deliverable platform as it is widely used nowadays

### 1.4 Scope

This animation is categorized as a 3D animation using a different style of rendering technique where it shows the audience the importance of moral values. This project is based on a traditional folklore which is one of the teaching methods used by the elders to teach the children and grandchildren about morality. Also, this animation will shows a 3D animation that looks like a cartoon where the technique is widely used in video games nowadays.

The targeted audiences are children between ages 7 to 12 years old but it can be watched by adults too because it is a general story that shows the importance of moral values. The age for the targeted audience was chosen because usually, at age 7, children can think of its own and make their own decision. So, from this animation, children may know how to differentiate between what is good and bad.

The duration of this animation will be in between 3 to 5 minutes and the rendered animation will be delivered in DVD format where audience can watch it through a DVD player or personal computer and laptops. The reason why the animation will be delivered in DVD format is because DVDs can have interactive

menus for users to interact with and DVDs are widely used in delivering a movie nowadays. The DVD will be in PAL format with 4:3 aspect ratio.

### **1.5 Project Significance**

This project will benefit the children where they can know the importance of moral values during their growing stages. Parents can teach their children about morality using these kinds of animations where children like to watch cartoons and animations nowadays. From this, we can produce future leaders with full of moral values so that our country will be a very nice and peaceful place to live.

This project uses a rendering technique called cel-shading where it is widely used in video games currently. From this, audience can observe how interesting the animation will be if the technique is used in a 3D animation where it will look like it was hand-drawn but it is actually an entirely 3D animation. This project will also promote the usage of this new technique in a 3D animation.

### **1.6 Conclusion**

From this project, children will know about the importance of moral values in life and what will we get if we don't have moral values. This project will produce an interesting 3D animation using one of the rendering methods used in video games. Hopefully, there will be more 3D animation based on traditional folklores in the future and our technique in making a 3D animation will be improved to compete with others.

This project will deliver the message about the importance of sincerity in our life. The audience will learn how sincerity will affect the flow of their life. This animation also will show what is cel-shading and how interesting it is when used in

3D animations because this technique is most commonly turning up in console video games.

This chapter is basically explains the purpose of this project, project background, the current problems, and the benefits this project can give to the users. The next chapter will be about comparing the existing animation or similar work with this project.



## CHAPTER II

### LITERATURE REVIEW & PROJECT METHODOLOGY

#### 2.1 Introduction

This chapter will explain about the literature review and the project's methodology in developing it. A literature review discusses published information in a particular subject area, and sometimes information in a particular subject area within a certain time period. It can be just a simple summary of the sources, but it usually has an organizational pattern and combines both summary and synthesis. A summary is a review of the important information of the source, but a synthesis is a re-organization or a reshuffling of that information. It might give a new interpretation of old material or combine new with old interpretations. Or it might trace the intellectual progression of the field, including major debates. And depending on the situation, the literature review may evaluate the sources and advise the reader on the most pertinent or relevant.

Literature review most often linked with science-oriented literature, it typically precedes a research proposal, methodology and result section. Its ultimate goal is to bring reader up to date with current literature on a topic and forms the basic for another goal, such as the justification for future research in the area. As for this project, research on cel-shading technique in 3D animation rendering will be done.

## 2.2 Domain

Computer animation is the art of creating moving images via the use of computers. There are many types of animation such as hand-drawn, stop-motion, animatronics, performance, characters, effects, and visual effect for live action. For this project, one of the computer animation techniques is used; 3D or 3-Dimensional.

3D animation is evolution from 2D (2-Dimensional) animation and it is particularly different with 2D animation. 3D animation is more eye-catching and realistic compared to 2D animation that is flat. This is because 3D animations are constructed on three planes (X, Y and Z). A 2D drawing program can be used to illustrate a 3D object; however, in order to interactively rotate an object for different views, it must be created as a 3D drawing in a 3D drawing program. 3D provides the three physical dimensions of space; length, width, and height. From this, users will experience a more realistic animation and they also can feel the presence of the characters near them.

Today, 3D animations become more popular and advanced rapidly. The technology behind 3D animation can be found in movies, video games, websites, and even for illustrations in books. 3D animation enables video games to look very realistic and interesting. The programs that can be use to develop 3D animation such as 3D Studio Max, Lightwave 3D, and Maya. There are 6 components in a 3D animation, which are modeling, texturing, lighting, camera, animation and rendering.

Cel-shaded animation (also called cel-shading or toon shading) is a type of non-photorealistic rendering designed to make computer graphics appear to be hand-drawn. Cel-shading is often used to mimic the style of a comic book or cartoon. It is a somewhat recent addition to computer graphics, most commonly turning up in console video games. Though the end result of cel-shading has a very simplistic feel like that of hand-drawn animation, the process is complex. The name comes from the clear sheets of acetate, called cels, which are painted on for use in traditional 2D animation, such as Disney classics.



Nowadays, the usage of 3D in animations is spread in all live aspect such as education and entertainment. This project is mainly focusing about education but this time, the audience can distinguish about how important of sincerity in our life through a 3D animation to attract them because the main target viewers are kids that aged 6 to 12 years old.

### 2.3 Existing System

This section will explain about research, references, and other findings that are related with this project. This project is focusing on cel-shading rendering technique where it is widely used in animations, commercials, and games.

Currently, most of the animations are made by computers because it is easier to make them compared to traditional 2D animation. Traditional 2D animation is accomplished by hand-drawing hundreds upon thousands of individual frames only to transfer them to clear plastic cels, hand-paint them, and then film them in sequence over a painted background image. Computer animation removes the need for many of the extra tools required to create an animation; all you need, in general, is a computer with enough system requirements to run the 2D or 3D software application of choice, and people capable of using that software.

Previous and current systems that are similar with this project are the traditional animations, an Emmy Award-winning animated American sitcom, “*Futurama*”, and a 3D animation series made by Malaysian teenagers, “*Upin & Ipin*”. These animations use different kinds of techniques to produce and deliver their own messages.

## i. **Futurama**

Futurama is set in New New York at the turn of the 31st century, in a time filled with technological wonders. The city of New New York has been built over the ruins of present-day New York City, referred to as "Old New York". Various devices and architecture are similar to the Populuxe design. Global warming, inflexible bureaucracy and substance abuse are a few of the subjects given a 31st century exaggeration in a world where the problems have become both more extreme and more common.

It took six to nine months to make an episode of Futurama. This long production time meant many episodes were worked on simultaneously. Each episode began with the writers discussing the story in a group. Then a single staff writer wrote an outline and then a script. Once the first draft was finished, the writers and executive producers got together with the actors to do a table read. After this script reading, the writers rewrote the script as a group before eventually sending it to animation. At this point the voice recording was also started and the script is out of the writers' hands. The animation in Futurama was done by Rough Draft Studios, which Groening insisted be used. Rough Draft receives the completed script of an episode and storyboards it into over 100 drawings. Then they create a pencil-drawn animatic with 1000 frames. From there, Rough Draft's sister studio in Korea puts together the 30,000-frame finished episode. The show was also sometimes animated overseas by Tokyo Movie Shinsha.



**Figure 2.1: Futurama**

## ii Traditional animations

Traditionally-animated productions, just like other forms of animation, usually begin life as a storyboard, which is a script of sorts written with images as well as words, similar to a giant comic strip. Before true animation begins, a preliminary soundtrack or "scratch track" is recorded, so that the animation may be more precisely synchronized to the soundtrack. Given the slow, methodical manner in which traditional animation is produced, it is almost always easier to synchronize animation to a pre-existing soundtrack than it is to synchronize a soundtrack to pre-existing animation.

Once the animatic has been approved, it and the storyboards are sent to the design departments. Character designers prepare *model sheets* for all important characters and props in the film. These model sheets will show how a character or object looks from a variety of angles with a variety of poses and expressions, so that all artists working on the project can deliver consistent work.. Animators will begin by drawing sequences of animation on sheets of paper perforated to fit the peg bars in their desks, often using coloured pencils, one picture or "frame" at a time. While the animation is being done, the background artists will paint the sets over which the action of each animated sequence will take place. These backgrounds are generally done in gouache or acrylic paint, although some animated productions have used backgrounds done in watercolor, oil paint, or even crayon. Before the completed animations were sent to the computers and video cameras, the animations will be digitally inked and paint, where they are colored and processed using one or more of a variety of software packages.



**Figure 2.2: The Mouse Deer and the Tiger**



### iii. Upin & Ipin

Upin & Ipin is an animation series about a pair of 5-year-old twins named Upin and Ipin who experience their first ever fast in the month of Ramadhan. It is told from their perspective in such a way that is simple, comical and hilarious. Their grandmother, Opah and elder sister, Ros, will give them advice and guidance as the story goes on. The good values will be easily understood by the children and will give a lasting impression upon them, as it is intertwined with the plot in a subtle manner. Although the series is tailored for release during the fasting month, they are also suitable to be shown all year round as it contains educational and moral values for children.

Duration of each episode is 5 minutes used Autodesk Maya as main software. This story is interesting because it show audience the children life and village environment. Every episode interjected with moral value which is easy to understand by audience. The voice over is originally in Malay Language. It means this animation never see unsynchronized mouth movement. This will make animations more alive in term of emotions. From the cow movement to the movement of playing marbles, the character movements are pretty natural. Upin & Ipin is one of the best local animations and already receive good feedback from community.



**Figure 2.3: Upin & Ipin**