IMPLEMENTATION OF TEXTURE MAPPING FOR PRESERVING ART DETAILS IN HYBRID ANIMATION

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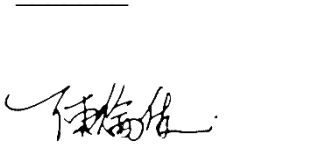

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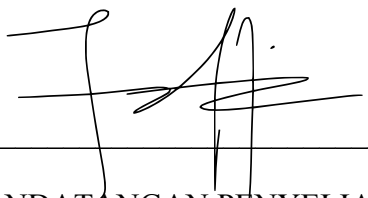

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IMPLEMENTATION OF TEXTURE MAPPING FOR PRESERVING ART DETAILS IN HYBRID ANIMATION

TAN LUN CHOK

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

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

DECLARATION

I hereby declare that this project report entitled

IMPLEMENTATION OF TEXTURE MAPPING
FOR PRESERVING ART DETAILS
IN HYBRID ANIMATION

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

STUDENT : _____ Date: 23rd August 2017

(TAN LUN CHOK)

I hereby declare that I have read this project report and found this report is sufficient in term of the scope and quality for the award of Bachelor of Computer Science (Media Interactive) With Honours

SUPERVISOR : _____ Date: _____

(SYARIFFANOR BINTI HISHAM)

DEDICATION

This work is dedicated to all the passionate animation learners, stay inspired.

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I would like to thank Ms. Syariffanor Binti Hisham for sharing her wise thoughts and guidance.

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Last but not least, an expression of gratefulness to all involved individuals, thank you.

Cheers.

ABSTRACT

"Every Piece Matters" is a two minutes animated short for children aged from 6 to 13 years old. The theme of the animated short is litter and waste. The objectives of the project are, to produce an animated short integrated of two dimensional (2D) and three dimensional (3D) assets, to adapt texture mapping techniques in the animation, and to evaluate the viability of the techniques in preserving the aesthetical details of an animation. The project is an attempt to solve the exhausting 2D animation pipeline, using 3D approaches, with minima loss of aesthetical details in the translation. The development of the project is divided into four phases: pre-production, production, post-production and testing. Reference, studies and design of the project is planned in pre-production. The production covers the preparation of assets, animating the assets, and compositing of the animated footages. A hybrid animation integrated of 2D and 3D approaches was produced. Texture mapping techniques were adopted into the modelling process. In the test phase, the technical aspects and viability of the texture mapping techniques, in preserving animation's aesthetical details were evaluated. 15 experts were involved in the expert review sessions. The analysis from the testing shows the produced animation is at average quality, the texture mapping technique is suitable for similar projects. The choice of whether to implement the 2D/3D mixed techniques shall be ponder, based on the balance between 2D graphics workload, and 3D workload: 2D provides direct control on visual style; 3D cuts down the need of 2D graphics workloads, and propels reusability of assets.

ABSTRAK

"Every Piece Matters" merupakan satu animasi selama 2 minit untuk kanak-kanak berusia 6 ke 13. Tema animasi tersebut adalah sampah dan sisa. Objecktif projek ini adalah, untuk menghasilkan sebuah animasi yang mengintegrasikan asset dua dimensi (2D) dan tiga dimensi (3D), menyesuaikan penggunaan teknik Texture Mapping ke dalam penghasilan animasi tersebut, dan menilai daya teknik tersebut dalam mengekalkan butir-butir seni animasi tersebut. Projek ini adalah satu cubaan untuk mencari jalan bagi kerja animasi yang amat meletihkan, dengan kehilangan butir-butir estetik yang minimum dalam jemahan tersebut. Pembangunan projeck ini dibahagikan ke dalam 4 fasa: pra-produksi, produksi dan produksi akhir. Rujukan, kajian dan reka-bentuk projek ini adalah dalam fasa pra-produksi. Produksi projek ini melibatkan pengyediaan asset, animasi asset, dan pengarangan rakaman-rakaman. Suatu animasi gabungan pendekatan 2D and 3D telah dihasilkan. Teknik Texture Mapping telah digunakan dalam proses modelling. Dalam fasa ujian, aspek teknikal, dan daya maju teknik Texture Mapping dalam mengekalkan butir-butir seni animasi, telah dikaji. Ujian tersebut melibatkan 15 orang pakar. Analisis dari ujian tersebut menunjukkan animasi mempunyai kualiti yang sederhana, teknik Texture Mapping sesuai dilaksanakan untuk projek yang serupa. Dalam pertimbangan sama patut perlaksanaan teknik campuran 2D/3D ke tidak, adalah bergantung pada keseimbangan kerja grafik 2D and 3D: 2D membolehkan kawalan visual secara langsung; 3D mengurangkan kerja 2D, dan menggalakkan penggunaan semula asset-aset.

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CHAPTER I

INTRODUCTION

1.1. Introduction

Computer animation is the generation process of animated images. Technology are meant to increase our efficiency. With the arising of high computing units, as well as become more popular with respect to time, computer animation is often seen as the solution to the exhausting traditional animating process.

The two most exhausting processes in two dimensional (2D) animation production are, the generation of key-frames and in between frames. The enormous amounts of animation still are produced by most cartoon studios manually, which is time-consuming and heavy. Compare with 2D animation, three dimensional (3D) animation take advantages such as, ease of camera motion, complex lighting and shading, realism and high reusability of assets from scene to scene.

For artwork and design based on 2D graphics, the strong art style from original work are hardly to be preserve, as it went through the translation, becoming a 3D work. Hybrid animation is a kind of special approach, mixing 2D and 3D assets. The blending should be consistent throughout the film when combinating the two types of elements.

In year 2007, the Japan Academy Prize for Animation of the Year went to Tekkonkinkreet, a 111 minutes animation directed by Michael Arias. The visual element in the film has very high level of detail. Texture mapping is the one important technique which helped in improving the portrayal of the setting, providing wider choice of cinematography for the film, while preserving the art details from the artists.

Texture mapping was not actally a new thing at that time. It was frequent used, even in game industry, to reduce polygon counts in 3D model, thus improve the rendering time of the 3D assets. The use of texture mapping in 3D animation worked as well, in reducing polygon counts and rendering time. However, a creative approach was taken by Studio 4 ˚C, they used this technique to preserve the orginal art touches from the Shojiro Nishimi. By the way, the integration of 2D and 3D elements enable camera movement such as subject changes or point of view to be made at ease. The CGI director Takuma Sakamoto emphasized on the integration of the elements, he explained, they may use more 3D elements if they want, but the strong 3D element might distract the viewers from immersing themselves into the story. In a 2006 Autodesk customer showcase, Michael Aris mentioned that he wanted to make seamless blending between computer graphics and hand-drawn animation.

1.2. Problem Statement

The traditional workings of 2D animation is exhausting. 3D approaches may be the solution in aiding the animating process, however if the aesthetic quality and concept are based on 2D graphics, the recreation using 3D approaches often yields weird and inconsistent result.

Artist's strong art style and the aesthetical details are hard to be preserve in the translation from 2D to 3D or mixed.The full 3D approaches featured animation are not

always effective than 2D animated films, in rendering feelings and aesthetical presentation, typically in an exaggerated and self-indulgent way.

The visual presentation of both approaches are generally distinct, hence a smooth and living blending 2D and 3D elements in an animated film, is a detailed and challenging task.

1.3. Objective

The following are the objectives of the project:

- To produce a hybrid animation, integrated of 2D and 3D approaches.
- To adopt the texture mapping techniques into the modelling process.
- To evaluate the viability of the texture mapping techniques in preserving aesthetical details of the animation.

1.4. Scope

The main audience of the animation is targeted on children. The animated short is expected to be understandable by children, or older viewers. The scope 'Children' covers grade schoolers aged from 6 to 13. The animated short is also appropriate for older viewers. Somehow, the message for older viewers is different, which is, to avoid making bad examples, especially when they are being watched by younger generation.

1.5. Project Significance

The output of this project is a hybrid animation of 2D and 3D assets, along with the documentation of the production. This study shall bring an insight into the potential of, using texture mapping in preserving artist's styles and aesthetical details. The viability of mixing 2D and 3D assets in animation. The identified and potential problems in blending the two types of elements will be identified and discussed in testing phase. The solutions for the problems will be discussed and suggested, as notes for future production.

1.6. Conclusion

In conclusion, a visually attractive animated short, and the documentation of the production is expected from this project. The animated short shall be created efficiently by integrating 2D and 3D animation assets. The storyline will be rather straight forward and linear with respect to its timeline. The focus is the implementation of techniques in the short. The introduction to this project, problem statements, objectives, scope, and project significance are brought up. In the next chapter, the literature review and project methodology will be introduced, providing a bigger picture of this project.

CHAPTER II

LITERATURE REVIEW AND PROJECT METHODOLOGY

2.1. Introduction

In the last chapter, the introduction to the project was proposed. The problems of current scenario were stated. The scope and significance of the project was identified.In this chapter, literature review, project methodology and requirements will be brought up. The litarature review assess the terms related to the project in detail, as to provide clearer extent of the concepts. The existed works will be evaluate and compared, as a premilinary analysis for the next chapter. The software and hardware requirements will be listed. The list of requirements will be specified in chapter 3.

2.2. Domain

This project covers a few specified spheres of knowledge. Which are: animation, hybrid animation, techniques in animating 2D graphics, and techniques in hybrid animation.

2.2.1 Animation

Animation is the procedure of create the illusion of motions and changes, by rapid display of a images in sequence, which the pictures are minamally different. Animation formation methods include the traditional animation creation method and those involving stop motion animation of two or three-dimensional objects (Pan, 2011). 3D computer animation use a three-dimensional representation of geometric data in performing calculations, then rendering 2D images. In contrast, 2D animation has faster real-time renderings. As in Fiore's (2011) findings, users often have more direct control to images than in 3D computer graphics.

2.2.2 Hybrid Animation

According to Hailey (2014)，hybrid animation is the product of combining two-dimensional (2D) and three-dimensional animation media(3D). The use of 2D and 3D mixed media can be seen in a test short '*Where the Wild Things Are* ' from 1983, by John Lasseter. Disney's The Black Cauldron was one of the first combination of 3D elements and 2D animation.

2.2.3 Techniques in Animating 2D graphics

The 2D graphic components can me manipulated by two dimensional geometric transformation: transformation in position, scaling, and rotation. Multiple layers of the graphic

2.2.3.1 Parallaxing

Parallax is the effect of difference in object apparent position, when viewed from different position. John(1998) explained that parallaxing refers to when a collection of 2D sprites or layers of sprites are made to move independently of each other and/or the background to create a sense of added depth. The technique grew out of the multiplane camera technique used in traditional animation since the 1940s. The manipulation of 2D layers at different rates perceive, giving the viewer an experience of distance betweeen objects and depth.

2.2.4 Techniques in Hybrid Animation

There are few techniques in hybrid animation, for different circumstances and purpose. The techniques are described in section 2.2.4.1 to 2.2.4.2.

2.2.4.1 Texture Mapping

Bump mapping, normal mapping and parallax mapping are techniques applied to textures in 3D rendering applications, to simulate bumps and wrinkles on the surface of an object without using more polygons(Ander, n.d.). These techniques bring greater realism with lesser effect on the performance of the simulation to end user (Backlund, 2014). For example, applying stone walls texture to a flat polygon, making the polygon looks more apparent in depth. Luque (2012) explained, cel shading, or toon shading is usually used in representing inorganic, lifeless or technological objects.

2.2.4.2 Cel Shading

Cel shading, also known as toon shading, is a technique of non-photorealistic rendering, to produce a flat appearance for 3D computer graphics. Less shading colors were used, instead of shade gradients in the rendering. Optionally, thick outlines may be added to make the graphics appear to be more cartoonish. That provides a rigid look, making the model look dead. Certainly, toon-lined objects are stiffer than hand drawn animation, and lifeless compared to 3D realistic shading.

2.3. Existing System

There are animated films integrating 2D and 3D assets. According to Hailey's (2014) findings, production teams use 3D animation approaches to improve their processes and works. The following few are selected for study, on the purpose of their choice on the approaches: Aladdin, Iron Giant, Brother Bear, Howl's Moving Castle, and Tekkonkinkreet.