Hybrid Animation: Implementation of Three-Dimensional (3D) Animation

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Abstract. In the 21st century, much progress has been made following the industrial revolution 4.0. Therefore, the field of animation has also been injected into technological advances. The transmission of information is difficult to convey accurately and interactively to users. In providing users with more exposure and convenience in a more attractive and convenient way. Therefore, animation and motion capture are the best options for use today. As a result, the results of this project can have a huge impact on the animation industry in making video or animation more interesting 3D animation.

1. Introduction
Animation of Two-Dimensional (2D) and Three-Dimensional (3D) known as hybrid animation is one of the most popular techniques used by many designers or animators to make cartoons, hybrid animation short story and many more. The creation and presentation of hybrid animation is not a new thing in multimedia industry. Hybrid animation is a 2D and 3D measurement of X, Y and Z scale on a flat plane. It is also the creation of moving pictures in a 2D environment, such as through "traditional" cel animation or in computerized animation software[1]. Although nowadays, 3D animation is the new type of animation in industry, yet there are more advantages in using hybrid animation. One of the advantages is the process to create and manipulate the objects are easier.

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.). For example, applying stone walls texture to a flat polygon, making the polygon looks more apparent in depth. (Luque, 2012) explained, cel shading, or tone shading is usually used in representing inorganic, lifeless or technological objects. These techniques bring greater realism with lesser effect on the performance of the simulation to end user (Backlund, 2014).

Cell shading, also known as tone 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. It provides a rigid look, making the model look dead. Certainly, tone-lined objects are stiffer than hand drawn animation, and lifeless compared to 3D realistic shading.

2. Related works
In principle, 2D animated images are still created in much the same way as they were traditionally, although the technology has improved. One of the oldest forms of animation is cell shading, whereby each cell or frame is drawn individually and placed into a linear sequence. This was originally accomplished with pencil or ink on a ‘cell’, and would be coloured later on by a dedicated colourist and layered over other cells in the sequence.
When 2D animation is created today, it tends to utilise digital software and frame technologies such as onion-skinning. This allows for faster, more accurate and more easily editable sequences, although some purists would argue these methods lose some of the charm of analogue animation. Adam claimed that both instances rendered in two dimensions during the animation process[1].

![Figure 1](image1.png)

**Figure 1.** Geng: Pengembaraan Bermula-Upin dan Ipin (Mohd Nizam Abdul Razak, 2009)

In 2009 film Geng: Pengembaraan Bermula-Upin dan Ipin’s produced by Les' Copaque title role was produced entirely with a computer. The first Malaysian-produced film that uses 3D animations to be the pride of Malaysians. This film is also a catalyst in the animation film industry with amazing results. While 3D features are in line with the texture of the actor, computer programs are also built by the team, to make the character look like life. Figure 1 shows the cover of Geng: Pengembaraan Bermula-Upin dan Ipin movie.[2].

![Figure 2](image2.png)

**Figure 2.** SeeFood (Goh Aun Hoe, 2012)

SeeFood is a Malaysian computer-animated adventure film produced in 2012 by Silver Ant, with grants from the Ministry of Science, Technology and Innovation as well as support from the Multimedia Development Corporation (MDeC). An animated film with a very fascinating design and an advanced look can make a great success with a welcome reception abroad. This film is using fully
3D animation. Figure 2 shows the cover of SeeFood movie[3]. Comparing the films, the production studios were using the mixing approaches for different purposes. Geng: Pengembaraan Bermula-Upin dan Ipin’s production animated the actor and environment asset based on a 3D model. In SeeFood, 3D assets were breakdown for smoother and precise animation. Table 1 show some points and comparison features made by films when applying 3D asset/modeling approaches.

Table 1. Comparison of the previous projects

| Index | Title | Released (Year) | Remarkable approaches in the integration of 2D assets | Nationality |
|-------|-------|-----------------|------------------------------------------------------|-------------|
| [2]   | Geng: Pengembaraan Bermula-Upin dan Ipin | 2009 | 3D implementation in whole asset development | Malaysia |
| [3]   | SeeFood | 2012 | Using 3D material as reference. | Malaysia |

3. The structural design of the 3D animation

3.1. System planning
In animation design, the main factor is the design of the character and the environment. Character design plays an important role in the presentation of animations. It does not matter from the shape of the body to the facial expression of the character. Figure 3 shows the sketches and storyboards in the making of an animation. Storyboard is important as an introductory idea before doing character modeling.

Figure 3. The storyboard in designing character and environment

3.2. 3D Modeling
The 3D Modeling is the process of manually creating geometrical and symmetry object models which meet desired design criteria and Cinema 4D software are used. The features in the Cinema 4D software has a significant impact on the product development process, allowing improved quality, reduced cost, and aids products to get to market faster. Nowadays, The approaches from the films is studied, however not all of them will be selected to be implemented in this project. The development showed great efforts in blending 3D assets, however it is line programming approach will not be adapted into this project due to time constraints and lack of related skills. The following issues determine how one medium is chosen over the others.
4. Conclusions
After being observed in this 3D animation project. Among them, the animated shows are very short but full of the good content. This makes audiences feel satisfied when watching. In addition, the animation shown is in silent form, only motion and background sound. The boundary and the nature of terms used in the project were studied and described.

The old and current techniques and technology of current animation process were explained, then related to this project. The comparison of existing works refine, by a greater distance, what to be experimented and achieved in this project. The methodology explained the process of the project. The software and hardware requirements are briefly brought up, and will be further discussed. This animation is very interactive to the user due to the suitable color selection and lighting in this animation. Multimedia consists of orderly instructions and codes written by the programmer in any special computer language. Before using a software, the individual needs to evaluate more about a software in a subject to give a deep understanding.

References
[1] Laybourne, Kit (1998). The Animation Book: A Complete Guide to Animated Filmmaking—from Flip-books to Sound Cartoons to 3-D Animation. New York: Three Rivers Press. ISBN 0-517-88602-2.
[2] Geng: Pengembaraan Bermula-Upin dan Ipin (Mohd Nizam Abdul Razak, 2009).
[3] SeeFood (Goh Aun Hoe, 2012).