Hybrid Animation: Implementation of Two-Dimensional (2D) Animation

Syed Muhammad Hazry Asraf\textsuperscript{a},\textsuperscript{1} and Syed Zulkarnain Syed Idrus\textsuperscript{1, b, *1}
School of Human Development and Techno-Communication (iKOM),
Universiti Malaysia Perlis (UniMAP).

\textsuperscript{a}hazrasyed@gmail.com; \textsuperscript{b}syzul@unimap.edu.my; \textsuperscript{c,*}

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. 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 in 2D animation.

1. Introduction
The Two-Dimensional (2D) animation focuses on creating characters, storyboards, and backgrounds in 2D environments. Often thought as traditional animation, the figures can move up and down, left, and right. The 2D graphic components can be manipulated by 2D geometric transformation: transformation in position, scaling, and rotation.

The two most exhausting processes in 2D animation production are, the generation of key-frames and in between frames. The enormous amounts of still animation are produced by most cartoon studios manually, which is time-consuming and heavy. Compared to 2D animation, three dimensional animation take advantages such as, ease of camera motion, complex lighting and shading, realism and high reusability of assets from scene to scene\cite{1}.

It is used in military, entertainment, sports, medical applications, and for computer and robotics vision verification. In filmmaking and video game development, it refers to the recording of human actors, and uses that information to turn digital character models into 2D or 3D computer animations\cite{2}.

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\cite{3}.
In the 2001 Fine Animation Sdn. Bhd. cooperation with Skop Production Sdn. Bhd, Putih is a Malaysian animated film published around 2001 by Rashid Sibir’s directions. The story is based on the folklore “Bawang Putih Bawang Merah”. The story is about a beautiful girl, Putih a poor girl who was abused by his stepmother, Kundur and stepsister, Merah after the death of his father, Pak Sukam. This story tells the envy of the stepmother and the Merah who end up with the right repayment of their deeds. In order to match a 2D style, all animation is in 2D template, to achieve lively movement of texture. Figure 1 shows the cover of Putih movie [4].

Treasure Planet is a 2002 American animated science fiction adventure film produced by Walt Disney Feature Animation and released by Walt Disney Pictures. It is the 43rd Disney animated feature film. The film is a science fiction adaptation of Robert Louis Stevenson’s adventure novel Treasure Island and was the first film. It is an interesting animation and use all the characters in 3D animation, while the background uses 2D animation. Thus, when it is combined, this animation is in hybrid animation. Figure 2 shows one of the scenes in the Treasure Planet movie [5].

Comparing the films, the production studios were using the mixing approaches for different purposes. Putih’s production animated the actor based on a 2D drawing. In Treasure Planet, 2D assets were breakdown for smoother and precise animation. Table 1 shows some points and comparison features made by films when applying 2D mixed approaches.
Table 1. Comparison of the previous projects

| Index | Title               | Released (Year) | Remarkable approaches in the integration of 2D assets | Nationality     |
|-------|---------------------|----------------|------------------------------------------------------|----------------|
| [4]   | Putih               | 2001           | Applying 2D motion template.                         | Malaysia        |
| [5]   | Treasure Planet     | 2002           | Building a 3D environment made of 2D visual elements. | America         |

3. The structural design of the 2D animation

In the development of 2D, it goes through some of the processes commonly used by some animation industries as shown in Figure 3.

![Figure 3. The structural design of the 2D animation.](image)

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 4 shows the sketches and storyboards in the making of an animation. Storyboard is important as an introductory idea before doing character modeling.

![Figure 4. The storyboard in designing character and environment](image)

3.2. 2D Modeling

The 2D Modeling is the process of manually creating geometrical 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 in Figure 5 showed great efforts in blending 2D 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 2D 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, and then related to this project. The comparison of existing works refines, 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 software, the individual needs to evaluate more about software in a subject to give a deep understanding.

References
[1] Lee, H-C., Chang, C-M., Chao, J-S., and Lin, W-T. (2017) ‘Realistic Character Motion Response in Computer Fighting Game’ Multimedia 2007. ISM 2007. Ninth IEEE International Symposium on, pp. 169-175, 2007.
[2] O’Hailey, T. (2010) Hybrid animation: Integrating 2D and 3D assets. Amsterdam: Elsevier Science.
[3] 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.
[4] Putih – Official Trailer (Rashid Sibir, 2001).
[5] Treasure Planet (Ron Clements, 2002).