

The Study of Using Game Engine to Create Short Film Animation

Nurul Hadi Musleh, B. Mohd Suhaimi and Dahlan Abdul Ghani
Malaysian Institute of Information Technology, University Kuala Lumpur,
1016 Jalan Sultan Ismail, 50200 Kuala Lumpur, Malaysia

Abstract: In any animated films, regardless if it short film or a featured film, there are a lot of procedures that are going to be taken to create a single shot. The purpose of this research is to find out how a game engine can be used to render the animation. In addition, this study will also find out whether this method is more efficient than the standard method of rendering in any 3D Software application. Furthermore, this research will also study the pros and cons of this method. For this study, the game engine that will be taken as examples are from unity and unreal engine. These two companies had created stunning short animated film using their respective engines. In this research, an upcoming short story entitled 'Gelendangan' will be the short-animated film used.

Key words: Animated short films, game engine, render, unity, unreal engine, Gelendangan

INTRODUCTION

In any animation production, there is always a pipeline. The pipeline is divided into three section which are pre-production, production and post production. As games and animated films have a lot of common when it comes to concept and development pipeline. However, there are several differences between the pipeline in making animated film and games. An example of difference between the creation games and animated film are easily seen in the way the characters are animated.

In a movie, animators are only responsible for animating whatever is in the view of the shot camera. So, to put in other words, animators in movies would only have to worry about one shot at a time. Because of when the play button is hit in a movie, audience are not able to rotate the camera angle. Therefore, audience is stuck with that one camera angle.

In games, animators need to consider the movement of the character in every viewing angle as possible. Since, games are meant to be interactive, user will have the full control of the character. For an example, if the game is third person, the player will able to control to the camera around, making them see the character moves from completely different angle. Thus, animator in games development need to consider a lot in their animation. This is to ensure their animation holds up whatever the player do to the character.

Background of the study: The study was conducted to find out whether a game engine could really be a significant in reducing the production time of creating a

short film. The main aim of this study is to focus on reducing the production time in rendering the shots. In addition, this study will also study if a game engine could be used to create short film.

In this study, a student is required to create a short 3D animated film. Therefore, the student decided to find an alternative method to reduce the time taken in the post production process. Thus, making him able to complete the project within the timeline.

Game engine has been recently encouraged by developers to be used by filmmakers to make their films. Therefore, the student decided to take advantage on the current technology on game engine to be used on his project.

There are many things to be considered when producing or creating a short animation film. It does not have a specific step or stages but it does have its processes and workflow that will help research as a guide in creating or producing the short animation film with good quality standard.

There are always some limitations when it comes to the producing or creating a short animation film. It will often be about time management on how to finish the project on time because of the time constraints, so, there will be sacrifices made in the quality of the short animation film upon trying to prioritize only the parts that makes the animation special and one of a kind.

The usage of a game engine, may or may not be helpful factor in the production pipeline. But with this study, the outcome could really be beneficial for future references or guide.



Fig. 1: Developers of game engine

A game engine is a software network used to create and develop video games. The developers have been using them to create games for console, mobile devices and personal computers. The main functionality that is provided by a game engine includes a rendering engine for 2D or 3D graphics, a physics engine or a collision detection, sound, scripting, animation, artificial intelligence, networking, streaming, memory management, threading, localization support, scene graph and could also include video support for cinematics. Figure 1 shows the example of the current game engine (Anonymous, 2014, 2016a-c).

In 2014, Unreal Engine 4 (UE4) has announced to release their game engine for free for artist. This is to encouraged developers to create more indie game. At the same time, UE4 has released a demo, A boy and his kite, a short-animated film which is rendered using real-time at 30 frame per second in 100 square miles of diverse terrain (Papadopoulos, 2015).

In 2016, unity had also release their demo, Adam which also rendered completely in real time, the demo runs at 1440 p on a GeForce GTX980. The short-animated film has greatly shows how the game engine has reach unimaginable achievements in the entertainment industry (Papadopoulos, 2015).

Unity 'Adam': One of the most interesting projects done by unity is 'Adam'. The short-animated film has greatly shows an amazing quality of work, brilliant design and of course the powerful capabilities of unity 5.

This project surprisingly only consists of 8 people with each one specialized in a certain area. The demo was written and directed by Veselin Efremov. With the help of Georgi Simeonov as the production designer and Torbjorn Laedre as the tech lead. These people have successfully pull off one of the greatest achievement in unity.

'Adam' is also an experimental project done by unity to find out how far can they push their engines to the limit. In Fig. 2, its clearly shown how far game engines nowadays has progressed. In addition, this project also provides feedback and shape the tool in a very close collaboration with the engineering team that are currently developing the engine (Phillips, 2016).

The primary features that unity wanted to showcase with 'Adam' film is that they wanted to put a test on the upcoming SSRR and temporal anti-aliasing effects. Unity also constantly improving its features when it comes to lighting and rendering.

In a recent interview, Veselin Efremov talked about how the whole production is organized. He stated that the process is a hybrid between game development and filmmaking. Although, it's a different world but the team takes the best from both. For example in film, the starting point will always be in creating the script, storyboard, look development and focus a lot of into direction. When Veselin directed the piece, he wanted to have all the liberties a film director does like setting up lighting per shot, shot dressing, individual control of each camera. But at the same time, being able to research in real-time engine allows Veselin to have more freedom and transgress some of the limitation of the film (Muller, 2017).

One of things that Veselin notices is that they can research on all areas in parallel. This allows them to mutually inform each other as they advance through production. For examples, changes in concept art can be informed and adjusted based on decisions about animation, the camera can be changed based on some good looking visual effects that happened in the background. He could also experiment a lot with the lighting and mood, since, the result occurs immediately, the cost in trying various idea is can be considered to none (Muller, 2017).

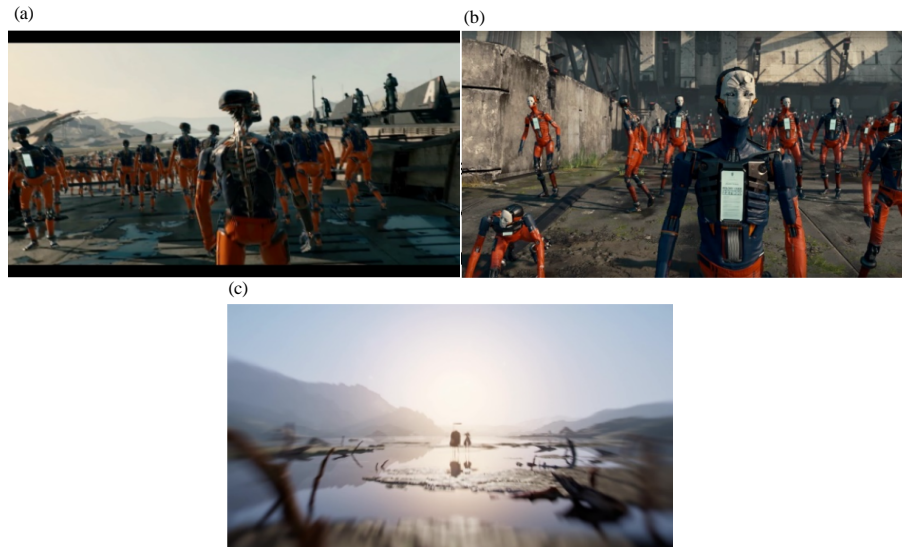


Fig. 2a-c: Unity short animated film ‘Adam’



Fig. 3a-d: ‘A boy and his kite’

However, the whole point of this experiment has been greatly influenced unity in future development. Considering the project is done by the team of eight surely surprised the industry. With this experiment, it has shown that what used to require a lot of extra research and features from different resources is now achievable with its current software (Muller, 2017) (Fig. 3a-d).

Unreal engine 4 ‘a boy and his kite’: ‘A boy and his kite’ is another short-animated film or a demo released by

Anonymous (2016a-c). This project has been released to public for free for them to test the new engineered game engine that was released.

The four-minute-long demo was intended to showcase to the public how their game engine can run a large amount of terrain with elevated level of details and surprisingly be able to run in real-time. However, it does require a beef specs of hardware to run the demo on its full capacity. But recent test has been done on lower specification hardware and it is still playable at around 30 frame per second.

The interesting part on this project is how they manage to capture that important level of details to be imported as assets into the game engine. Each of the assets has been created using photographs of real world objects. Assets such as rocks, ground tiles, cliff faces and tree trunks are reconstructed directly from photographs using a process called photogrammetry. For the assets to be suitable for any lighting situations. They were put through a process called 'de-lighting' process.

This demo has clearly shown the potential of unreal engine 4 in rendering open world environments with prominent details. Thus, could possibly be an opportunity for the filmmakers to reconsidered in using a game engine into their pipeline. Figure 3a-d shows the example of the scene in the demo.

MATERIALS AND METHODS

Introduction: The gaming industry and film industries shares almost the same procedure in carrying out their projects. The process is divided into three phases which are the pre-production, production and post-production. However, the difference between these two fields lies during the production and post-production phase. In the chapter, each of the process will be covered and explained thoroughly.

Pre-production phase: The pre-production for this project is like any project done under the film category. It begins with the process of thinking of an idea of the story for the animated short film. The idea for this story is the story of the daily life a homeless man with his kid. The idea is then proceeded to the final year project coordinator to be approved.

After the story is approved, the student need to visualize the idea into a thumbnail. This will help in getting the right cinematography as well as how the story will flow from one shot to another. However, the thumb nail is only a rough or a draft version of the story before it can be finalized. A lot of consideration need to be considered in visualizing the story. It involves on how the story is conveyed to the audience and the mood of the story.

Once the thumb nail is finalized and turn into its final version which is the storyboard, the process continues to the creation of several designs for the main character of the story. The two main characters in this story is the father and the son. These two characters is then finalized in the form of character turnaround for the used in the production phase later.

The location for the story is then planned as it is based on real life locations. To obtain a detailed picture for references purposes, the buildings and props are photographed as much as possible to ease the process in the production line.

The other important thing during the pre-production phase will be to organize a proper timeline. A Gantt chart is normally used to distribute the research accordingly within the timeline given. By having the time organize properly the work will be running smoothly and able to complete before the dateline.

To ensure all process throughout will be running smoothly, a system is created for the files to be saved and a naming convention is made for each file that will be created.

RESULTS AND DISCUSSION

Production phase: In this phase, all the resources collected during the production will be used entirely to develop the short film. However, this process may be different as this project integrated a game engine. In this project, the game engine used will be unity. Therefore, to fit the game engine into the production, several processes is added. Such as the creation of assets for them to be imported into the engine.

To start with the production process, the character for this animated short is modelled in using the software 3Ds max. The character is modelled and textured accordingly based on the design the were created prior to the production phase. Once the character model is finished, they will undergo a process called rigging. This process will help in adding a joint and controller for the character. This will help for the character to be animated later. The background and layout are modelled and texture as well accordingly.

After the modelling process is finish, these files will be arranged properly in a managed folder system to ease the process during animation. Once all the files are in proper order, the animation process begins straight away after all the files are completed and checked.

The animation would be easier to be animated directly in the game engine. Unfortunately due to the limitation of the game engine used. The animation will be done using 3Ds max which is then baked. The challenge in this process starts during the animation itself.

Normally, animation could be cheated based on the camera shots. However, due to the nature of the game engine itself, camera cannot be exported from other 3rd party's software. Thus, the camera must be created within

the game engine itself. This impose a problem as the animation must be perfect and cheating cannot be done to improve time consumption. Therefore, the time consume in the animation process has increased.

The layout has been already imported to the game engine and arranged accordingly based on the map and layout that has already planned. After the animation is imported, the camera is then set in the game engine. A script is written out to allow the camera to be change according to the shot in the storyboard without any interaction needed.

Since, game engine runs in real time rendering, the time cost for rendering are reduced greatly. Unfortunately, another problem arise as unity does not have the option to export the game as a video or a movie file. Therefore, another software, AVCapture is used to capture the whole movie itself.

Post production: The finished animated film is still not in its final form. In this process, visual effects are added into the film to create much more stunning looks for the overall outcome of the film.

Unlike the standard way of adding the effects when using a game engine, the effects are also done directly in the game engine as well. This however, gives an advantage as any changes that is made can be seen in real time creating a room for experimental effects to be done. After the effects has been done the lighting for the animation is added. Just like the effects, the lighting also done in real time giving the flexibility in adjusting the light to get the right mood.

Once everything is set and in motion, the game is run again and captured using the AVCapture Software. The capture video is then imported into Adobe Premier for online editing. In this process, the audio and background music is added. With this the animated film is finished. Ready to be rendered as a high-quality video.

CONCLUSION

The conclusion drawn during this entire process is that when using or interpreting a game engine

to create an animated short film can add several challenges. However, every obstacle has its way around it.

The answer to the question whether a game engine could reduce the time cost of the entire process could be seen during the rendering process. Since, rendering is completely done in real time by right it should have been helpful. Unfortunately, the time that is saved for the rendering has been fully used during the animation process. Therefore, the entire concept of having a game engine to reduce time cost has been redundant.

REFERENCES

- Anonymous, 2014. Bringing the hero to life for indie game development pipeline. Pluralsight Company, Farmington, Utah, USA. <https://www.pluralsight.com/blog/film-games/bringing-hero-life-indie-game-development-pipeline>
- Anonymous, 2016a. Adam: Building CGI-quality short with a team of eight. Unity Technologies, San Francisco, California, USA. <https://80.lv/articles/adam-unity-production-interview/>
- Anonymous, 2016b. Game engine. Wikipedia Organization, USA.
- Anonymous, 2016c. Rendering (computer graphics). Wikimedia Foundation, San Francisco, California, USA.
- Muller, M., 2017. Adam-step by step. Unity Technologies, San Francisco, California, USA. https://blogs.unity3d.com/2017/01/11/adam-step-by-step/?_ga=1.118504073.1894747710.1491441417
- Papadopoulos, J., 2015. Unreal engine 4 a boy and his kite tech demo now available for download. DSOGaming, Patreon Company, San Francisco, California, USA. <https://www.dsogaming.com/news/unreal-engine-4-a-boy-and-his-kite-tech-demo-now-available/>
- Phillips, T., 2016. Impressive unity short film shows off game engine's power. The Eurogamer, Gamer Network Ltd., Brighton, UK. <https://www.eurogamer.net/articles/2016-03-16-unity-short-film-impresses>