

# Enhancing Machinima for Low Budget Animation

Mitra Istiar Wardhana, Ima Kusumawati Hidayat, Denik Ristya Rini

Art and Design Department  
Universitas Negeri Malang  
Malang, Indonesia  
mitra.istiar.fs@um.ac.id

**Abstract**—Machinima is still dominated by game-based and virtual environments products. No one has utilized the advantages of machinima in the production of three-dimensional animation. For this reason, machinima needs to be enhanced so that it can be used in the production of animation, especially low-cost animation. Enhancing machinima is done by combining the process of making machinima and traditional 3-dimensional animation. The involvement of animation studios is also done to ensure that the production process can run properly. The implementation of the combined production process accelerates the animation production process because there are steps that are eliminated and the use of real-time rendering features. However, obstacles are still found in the process of migrating assets from animation software to game engine software.

**Keywords**—*machinima; 3D animation production; low budget animation*

## I. INTRODUCTION

Machinima, which comes from a combination of machine and cinema, is a technique for making animation in real time using computer software [1]. The software used must support real time rendering. The use of software that supports real time rendering is more widely used in game making, especially to create animated scenes in the game. Machinima is rarely used in animation because it has several weaknesses, such as not being able to produce image quality as well as animation with traditional techniques due to the rendering process is done directly so that the use of visual effects cannot be maximized to keep the frame number ideal. From the search results on the YouTube video sharing site, machinima-based animation is dominated by works that utilize game software as the media for the maker. This method is prone to licensing problems and the content is limited and less varied due to all objects and characters that are used are not self-made but come from the game's software. These weaknesses can actually be covered by the rapid production process and low costs [2].

The concept of machinima develops over time. Although still rare, some research on machinima has been done. The research focuses on machinima technology and applications. Examining the use of dynamic cameras in machinima [3, 4], and examining the effectiveness of machinima use in learning in schools are some examples of machinima research [5, 6]. From several research that have been conducted, there are no researchers discussing how to use machinima to produce traditional-like 3D animation. According to researchers, using machinima in traditional 3D animation will be able to cut the

duration of the production. This production method also minimizing the risk of license violations because this method uses self-made asset.

This article focuses on identifying how to enhancing machinima for used in traditional 3D animation production. This method can be used as a reference by animators to make low budgeted animation and risk-free license violations.

## II. METHODS

To Enhancing machinima for low budgeted animation is done by combining the production process between machinima and traditional 3D animation. The new production model will bring their respective advantages. To ensure that the new production model can be applied to animation production, one local animation studio is involved as a partner.

The local animation studio production model will be used as a reference in developing a new model so that the new model does not change drastically the production model that has been used. New production models focus on production speed and cost efficiency.

The selection of software considers several things, including costs and compatibility between software. To reduce costs, open source software is used, Blender 3D version 2.79 which is used to create assets and animation. Whereas to apply the machinima technique, the personal version of Unity 3D 2018 game engine software is used which is free of charge.

The advantage of machinima techniques compared to conventional rendering techniques is that no computer specifications are needed specifically for machinima to be run. The machinima technique can be run with intermediate-level computer specifications, namely the 1.8 GHz processor, 4 GB memory and 2 GB VGA.

## III. RESULTS AND DISCUSSION

The application of machinima to traditional 3D animation refers to the traditional 3D animation production process. The process of making animation with machinima techniques has a workflow that is almost the same as making animation with traditional techniques. But making animations with machinima techniques has a difference, especially in a simpler and faster process.

A. Traditional 3D Animation Production

The traditional 3D animation production process consists of several stages that form a 3d animation production workflow. This workflow consists of a group of people, hardware and software that are put together to work in a certain work order to produce 3D animation products. Basically, traditional 3d animation production has a high complexity so that it has a long enough flow in the process. But there are three stages in 3D animation production that are commonly used by studios that produce animation. There are three stages in the production of 3-dimensional animation [7]:

- Pre-production stage,
- Production stage,
- Post production stage.

Each stage is further divided into several phases as can be seen in Figure 1:

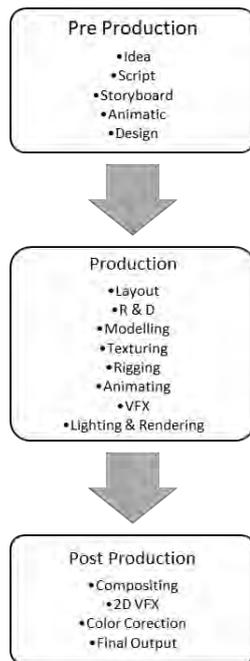


Fig. 1. Traditional 3d animation production pipeline.

B. Machinima Production

The machinima production process uses almost the same stages as filmmaking [8, 10]. Here are four methods used in making machinima [11] including:

- Rely on the artificial intelligence of the game to control most actions / actions (this method is simple to produce, but the results obtained are unpredictable and may affect the script because of unpredictable results).
- The machinima maker acts as a virtual actor and each member of the crew controls the character in real-time as is commonly found in multiplayer games .
- The first file format that is generated is still not in the form of a video file but the game file used. After that

the machinima makers can manipulate the results by adding camera, timing and lighting settings.

- The scripting process is carried out by giving commands directly to the game engine, but scripting capabilities may be limited or not available.

Other reference said that machinima is made using three methods

- Using the demo or replay feature on game software that is processed in such a way that it can be displayed in video form.
- Using screen capture software, to capture the appearance of the game and turn it into a video form.
- Using asset composition technique which is done by composing game assets with other audio-visual components such as animations, dialogs and sound effects [12].

Based on the three opinions above, it can be concluded that the process of making machinima has a procedure that is almost the same as the process of making video / animated films. Because machinima is made in a game-based virtual world, all actors involved are virtual actors by utilizing artificial intelligence in the game as supporting scenes created.

Unlike conventional three-dimensional animation, there is no specific reference for making machinima because machinima develops following the development of game technology. The presence of new features in the game also changes the machinima production process because new features usually offer better results. Some machinima features that do not change over time are the use of game assets and the rendering process in real time. Figure 2 describes the general methods used in machinima production.

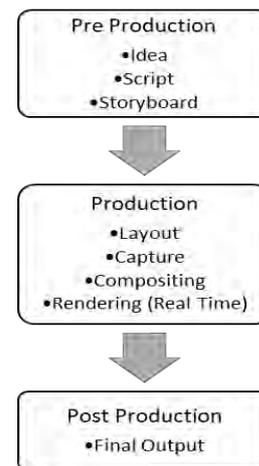


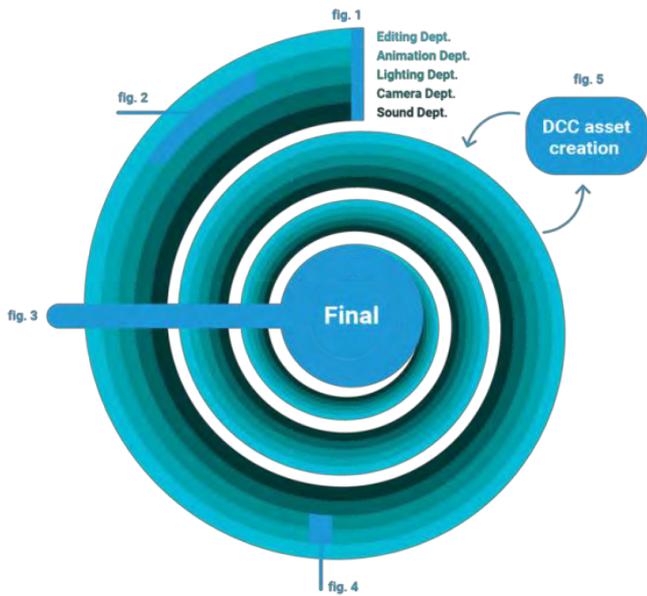
Fig. 2. Machinima production pipeline.

C. Enhancing Machinima for 3D Animation Production

Based on the nature of machinima which has advantages in the real time rendering process, enhancing machinima for 3D animation production means changing its production pipeline. By adding traditional 3D animation process to machinima, the

rendering process that was previously done by frame by frame will become real time. Real time means the time needed to render is the same as the time duration of the rendered animation. Adding traditional 3D animation process to machinima requires software that can handle the rendering process in real time.

The most appropriate software in handling render in real time is game engine software. Some game software is used to make short animations, one of the most intense campaigns for the use of game engines in making animation is Unity 3D. Since the emergence of Unity's real time rendering short film entitled ADAM in 2016, Unity continues to improve the capabilities of its software so that it can produce interesting visuals in real time. Recently Unity also offers a parallel 3D animation production pipeline where each part works at the same time leaving a linear production pattern used in conventional animation production.



<sup>a</sup> Source: <https://unity.com/solutions/film/real-time-filmmaking-explained>

Fig. 3. Parallel production in Unity 3D.

Unity claims that applying parallel production will speed up production time twice, but for animation studios that are used to producing animation linearly, it will take time to adapt to parallel production patterns. Another challenge that must be faced in the production of animation in real time is the compatibility of the software used. The two-software used are animation software and game engine software.

The problem sometimes occurs when migrating assets from animation software to game engine software. Therefore, the linear production pattern is maintained with several adjustments so that production can focus more on software compatibility. When compatibility has been achieved then the process of migrating assets can be faster which will increase the speed of overall animation production. Figure 4 show the enhanced machinima production process.

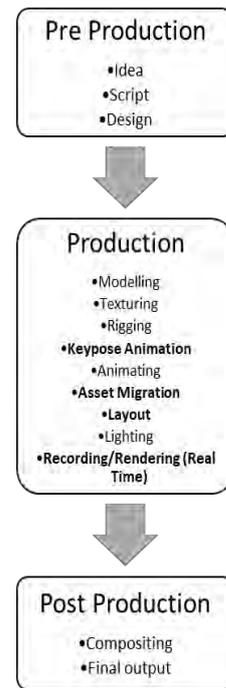


Fig. 4. Enhanced machinima production.

Figure 4 show that the animation production process with machinima in general is almost the same as the conventional animation production process. This production pipeline has differences with CAMELOT Project who uses a virtual environment for making animation [6]. Using a virtual environment means that all the assets needed in the animation have been provided before. Whereas this production pipeline uses assets that are self-made according to the theme of the animated story.

Differences lie at each stage of production. In the pre-production stage the difference is in the storyboard and animatic phases that are eliminated. The purpose of this change is to speed up the production process where the storyboard that previously contained the image panels will turn into a character pose. At the production stage there are quite a number of changes, including the presence of a keypose animation phase that serves as a substitute for storyboarding. The form of keypose animation is in the form of key poses from characters which will later describe the whole form of animation.

After making the key poses, the characters will be animated based on the key poses that have been made. After the animation is complete, asset migration will be carried out to the game engine software. This phase is a very crucial phase because there is a change in the use of software from animation software to game engine software. Problems that are likely to occur are assets that have been made before can experience changes and even damage.

Assets that have been migrated and checked will be arranged according to the scene in the Keypose Animation phase. The last phase that changes is in the rendering phase. The changes that occur are the speed of the rendering. If in conventional animation the rendering process is carried out by frame by frame, in machinima animation the rendering process

is done in real time. In the post-production stage, the color correction phase is eliminated because this phase has been carried out in the production stage when adjusting the lighting. In the post-production phase only leaves the compositing phase and final output only.

After implementing this model to an animation scene here are several advantages and disadvantages of using enhanced machinima as follows

1) *Advantage*

- Revisions can be done easily and quickly
- Faster production process
- Less Budgeted

2) *Disadvantage*

- Lack compatibility between animation and rendering software
- Asset migration process takes a long time
- Animation visual quality decreases

#### IV. CONCLUSION

Machinima can be enhanced to produce low budgeted three-dimensional animations, but there are still software compatibility issues that must be solved. The use of game engine software combined with animation software can cause problems when migrating assets. The problem that might occur is a change in assets after the migration process. The application of machinima also decreases the visual quality of animation. If the animator can overcome these problems, the overall production process will run faster. Reduced production time will have an impact on the reduced costs needed in the production of 3d animated films.

#### ACKNOWLEDGMENT

We are thanking to Universitas Negeri Malang for the PNPB funding and support to our research. We also thank to our colleagues from Art and Design Department, Faculty of Letters, Universitas Negeri Malang who provided insight and expertise that greatly assisted the research.

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