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Case Study of Animation Production using 'MetaHuman'

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Abstract

Recently, the use of Unreal Engine for animation production is increasing. In this situation, Unreal Engine's 'MetaHuman Creator' helps make it easier to apply realistic characters to animation. In this regard, we tried to produce animations using 'MetaHuman' and verify the effectiveness and differences from the animation production process using only Maya software. To increase the efficiency of the production process, the animation process was made with Maya software. We tried to import animation data from Unreal Engine and go through the process of making animations, and try to find out if there are any problems. And we tried to compare animations made with realistic 'MetaHuman' characters and animation works using cartoon-type characters. The use of the same camera lens in realistic character animations and cartoon character animations produced based on the same scenario was judged to be the cause of the lack of realistic animation screen composition. The analysis revealed that a different approach from the existing animation camera lens selection is required for the selection of the camera lens in the production of realistic animation.

Keywords: *Animation Production, Unreal Engine, MetaHuman, Studio Library, Maya*

1. Introduction

Recently, advertisements featuring virtual actors can be easily found in the media. Cases of overcoming the uncanny valley that reduce the favorability of virtual actors are gradually appearing in advertisements, showing how virtual characters are active in various fields such as actors, singers, and influencers advertising products. As the commercial activities of virtual actors increase, software that can create and apply virtual actors is also rapidly developing. Recently, Epic Games has provided an environment where users can create virtual characters according to the needs of users through a site called 'MetaHuman Creator(MH Creator)', and transfer the characters to 'Maya' and 'Unreal Engine(UE)' software to create various contents[1]. Nevertheless, various production processes are being attempted because it is not easy to produce content by applying it to animation or movies as a 'MetaHuman(MH)' character. It can be said that the virtual actors currently shown in the media are being produced in two directions. The first is to use a MH character as a digital actor, and the second is to combine the face of a CG character with the real actor's movements by

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applying the face swap technology and using deep learning AI[2]. The second method is currently widely used because it can be easily accessed and manufactured in terms of cost and development. In the past, game engines such as UE were not used in the animation production process. However, realistic MH characters provided by Epic Games and realistic props provided by the Asset Store are more focused on applying and using the provided assets rather than producing the necessary assets. This advantage has a different production paradigm from the existing animation production process. Recently, the animation production process is changing rapidly. Figure 1 shows the short animation production process to create animations using MH. It can be seen that the animation production process using MH is highly dependent on UE. Maya software is used for animating, and is responsible for modeling basic spatial structures for animating, as well as producing character and Lip Sync animations. The use of MH is expected to play a role in accelerating the ever-increasing dependence on the UE in the animation production process.

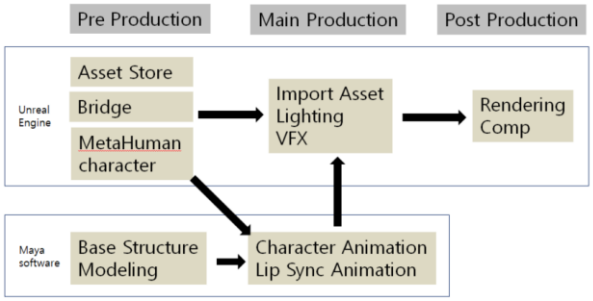


Figure 1. Animation process using MH

2. Experiments

In this paper, we tried to make a short animation using Epic Games' MH and find out about the similarities and differences between making an animation using only Maya software. The short animation is about that three college students in a dormitory trying to meet the deadline for their final assignments. The length of the screening of the work is 3 minutes. The images on the left in Table 4 are animations of the same story using only Maya software. In the animation, cartoon characters appeared, and it was made with limited animating and static camera composition and movement. The images on the right in Table 4 are animations using MH. When an animation was created using the same storyboard, we tried to find out what kind of difference there would be between an animation featuring a MH and an animation featuring cartoon characters. In addition, we tried to find out about the problems that can occur in the work process that requires the use of UE and Maya software together.

3. Result

3.1. Modeling Process

The character modeling and rigging process were made using MH Creator. MH can transfer character data to Maya software and UE. However, the shape of the MH imported into Maya software is the right image in Table 1, and it can be seen that there is a difference from the left image. Three characters were created with MH Creator, but the characters imported into Maya all have the same naming structure and face shape. Having the same naming may simplify the manufacturing process working in Maya software. As shown in Table 3, the stored expressions can be applied to all three characters with a common naming structure without additional setting. Character animation data can also be compatible without additional settings. The

disadvantage is that the face shape shown in Maya and the face shape of the character shown in UE are slightly different. Therefore, facial expressions and lip sync animations created in Maya require further modification after importing the data into the UE.

Table 1. Character comparison

Character A	Character B	Character C	Default character
			
Characters created with MH Creator			Characters imported into Maya

Basic spatial modeling is the most important step before character animating. It can be said that the setting of the default space is very important in order to accurately match the animation data in Maya software and UE. The image of Figure 2(a) shows the spatial structure of moving characters in Maya software, and the image of Figure 2(b) shows the results of work in UE. Additional modeling assets are placed in the UE's space and the MH is placed and moved to the same location as the Maya software. Asset modeling data can be produced, or modeling and shader data can be imported using the 'Asset Store' and 'Bridge' software. These data are applied to the scene through the process of modifying them back into desired assets through shader node transformations in UE.

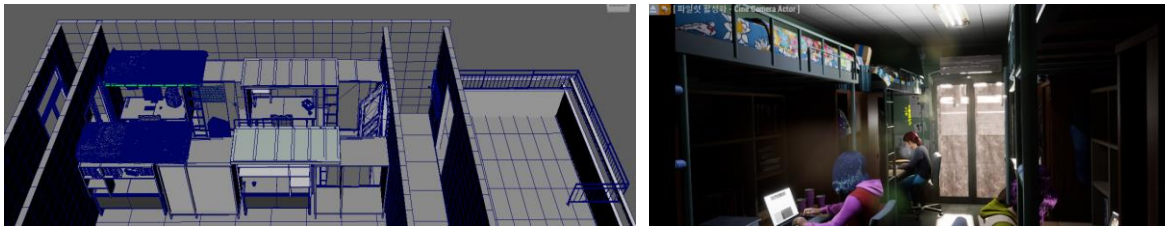


Figure 2. Space layout in Maya software(a), Space layout in UE(b)

3.2. Animation Process

3.2.1 Character Animation

In order to move the MH in Maya, it must be used by custom rigging or connected to 'Human IK' provided by Maya. In this paper, 'Human IK' is connected to MH's skeleton so that the character can move. The reason for using 'Human IK' rigging is that both keyframe animation and motion capture data can be easily used. The produced animation consists of a total of 39 scenes. 37 cuts were produced with keyframe animation, and 2 cuts were used to create data using motion capture. For motion capture equipment and software, 'Vive tracker' and 'Brekel Open VR Recorder' were used[3]. At the beginning of the production, it was judged that the realistic MH would not go well with the character's movements produced by keyframe animation. However, as a result of the test, although the movement looked simple, there was no incongruity with the character. When a character moves, it often moves while interacting with other objects rather than moving independently. Most of these objects are moved by being constrained to the character. In order to open the animation data of the object in UE, the movement of the object must be a bake key simulation. Various functions such as 'group, parent, constrain' can be used when setting the constraint relationship

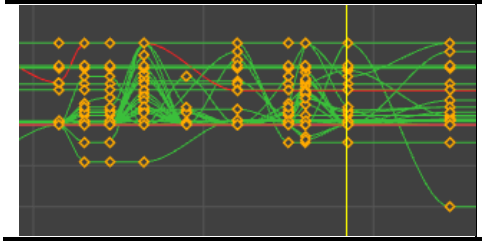
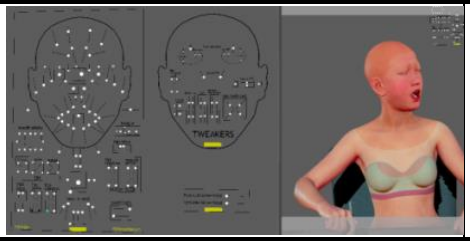
between character and object. In Maya software, when these functions are used, the same movement result of the object can be obtained, but when the group and parent functions are applied in bake key simulation, the animation curve appears as '0' as shown in Figure 3(a). '0' means no movement. In this case, when you open the file in UE, there will be no movement of the object[4].

Figure 3. Curve of parented cup(a), Curve of constrained cup(b)[3]

3.2.2 Lip Sync Animation

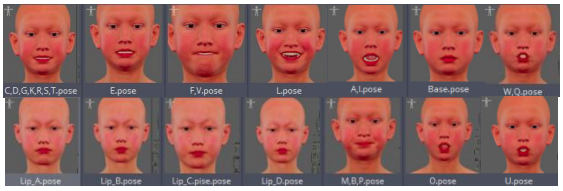
The method of creating the MH's facial expression can be made by keyframe animation using facial expression controllers in Maya software as shown in Table 2 and the method of facial capture in UE using mobile. As a result of testing the facial capture method using mobile, it was expected that additional work would take a lot of time to create an accurate and exaggerated mouth shape. In order to increase the efficiency of expression animation production with keyframes, the necessary data were prepared in advance using the expression library as shown in Table 3 to shorten the production period. Table 2 is a MH monologue used in one scene, and the dialogue is 'How much work do you have left?'. The left image in Table 2 shows the frame and graph in which the shape of the mouth is designated as a keyframe according to the dialogue. The dialogue shows that we can create the necessary mouth shape and expression using only about 7 key poses, excluding the moving hold. It was made by referring to the recorded videos of the actors for the expression production. When we look at the recorded video, the mouth shape and expression required for realistic character are smaller than expected and appear repeatedly. For that reason, it is expected that production efficiency does not decrease even if facial expressions are created with keyframes without using facial capture.

Table 2. Facial expression works from Maya to UE

Animation curve	Facial controller in Maya	Output
		

We tried to build the necessary data to produce mouth shapes and facial expressions. Table 3 shows the data accumulated using the Maya plugin 'Studio Library'. As a basic expression, a mouth shape for metabolic processing was produced. And for the additional facial expressions, the mouth shape that appears differently for each actor and the facial expressions necessary for the scenario was produced. There are only 14 mouth shapes made with basic expressions. This means that even real person don't show too many shapes of mouth in conversation[5,6].

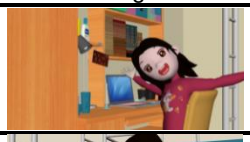
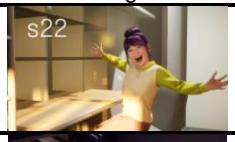
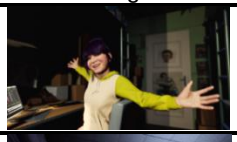
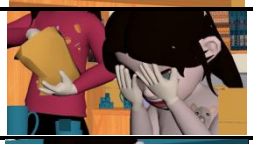
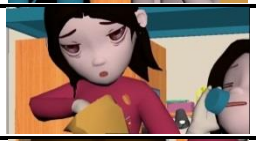
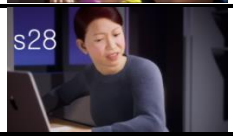
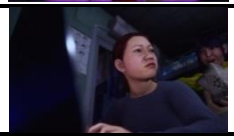
Table 3. Lip sync data required for animation production

Lip sync shape	Additional facial expression pose
	

3.2.3 Camera Animation

The focal length of the camera lens, which is commonly used when making animations for children, is 35-50mm. The images on the left in Table 4 are animation scenes using cartoon characters. The focal length of the camera lens required for animation production was made using 35mm and 50mm. And the middle and right images in Table 4 are animations made using MH. The middle images were made using a lens with a focal length of 35-50mm. Although the left image and the middle image use the same focal length lens, the middle image has a weaker depth and looks boring compared to the left image. The right image in Table 4 tried two different approaches to overcome the disadvantages of the middle image. First, the distortion rate of the image was increased by using an exaggerated focal length. The sense of depth of the objects and people visible in the image increased, and the faces of the characters close to the screen appeared more three-dimensional, creating a feeling of tension on the screen. Second, we tried to give it realism by applying a camera shake as a 'Blueprint' in UE to keep the camera moving. The continuously moving screen, like a handheld camera, reduces the static feeling of the video, enhancing the MH's sense of reality[7,8].

Table 4. Camera focal length comparison

	Cartoon character	MH Character			
Lens	Before lens correction			After lens correction	
Focal length	Image	Focal length	Image	Focal length	Image
50mm		35mm		20mm	
50mm		35mm		20mm	
50mm		50mm		10.5mm	
50mm		50mm		20mm	
50mm		50mm		15mm	

50mm		35mm		20mm	

3.3. Post Process

Figure 4(a) is the final rendered image in UE. In order to increase the reality of MH, a simple post editing effect was applied to express the character more realistically and three-dimensionally. By adjusting the contrast in the original image, the character looks more three-dimensional and the character's texture is clearly visible. The animation was completed by setting the color map according to space and time and adding film grain. Looking at the right image in Figure 4(c), it looks a bit rougher than the original image, but it shows a more realistic feeling in which we can feel the emotions of the character.

Figure 4. Rendering (a), Adjusting contrast (b), Adjusting tone & film grain (c)

3.4 Process Evaluation

Prior to the production of animations using MH, cartoon animations were pre-produced as shown in Table 4. So, it was easy to compare the efficiency of animation using MH. Cartoon style animation was produced using only Maya software, and MH animation was produced using Maya software and UE at the same time. In both works, the same storyline and the same character poses and timing were applied. The analysis of the production process and results of the two works can be organized as shown in Table 5.

Table 5. Analysis of animation production process using MH

	advantage	disadvantage
MH Creator	- Realistic visuals and ease of use	- There is a limit to the implementation of the form that can be produced
Mdl / Shader management	- Easy to create and apply using Asset Store and bridge tools	- Shaders made in Maya need to be modified in UE
Character Animation in Maya	- Compatible with custom rigging and MH skeletons	- Character body shape mismatch in Maya and UE
Lip Sync Animation in Maya	- Facial capture possible using mobile	- Character face shape mismatch as seen in Maya and UE
Lighting in UE	-Lighting installation, effects, control and validation implemented in real time	- Scenes within a level are applied with the same lighting settings
Rendering in UE	- Very fast rendering possible	

The very realistic form of MH characters confuses the definition of animation. Whether animations made with UE and MH, which pursue realistic rendering, should be placed in the category of animation or short

films will continue to be debated in the future. The biggest difference between the animation production process using MH and the existing animation production process using cartoon characters is that the camera settings need to be approached differently. As shown in Table 4, the use of static and simple camera composition and focal length proves that many improvements are needed in realistic animation.

4. Conclusion

We think the biggest reason why the number of cases of applying UE to animation production is increasing is that it is pursuing an applicable modular production process rather than creating new necessary data[9,10]. Recent Maya software emphasizes the compatibility of using 'Live Link' to run UE and camera, lighting and character animations simultaneously. As a result of applying the animation production process using Live Link to the production of the work, it was difficult to judge that it was a necessary process in the main production. It may be effective in a studio that mainly does post-production. It's still true that the UE suddenly crashes more often than other software. In this case, the generated data may be lost or the project file itself may become unusable. Therefore, we decided that it would be possible to build a more stable production process by keeping the system light and storing the Maya software and UE work files separately at all times. Animation production with MH used the engine to quickly create highly realistic characters, handle heavy data lightly, and output high-quality images. In order to produce contents using realistic characters such as MH, it is judged that more natural images can be produced by applying the camera technique used in movies rather than the existing camera technique for screen composition or animation production. In the next study, we try to create mixed content with live-action characters or digital actors through face swap technology and analyze the production process.

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