Introduction

The animation is called “Cookie Monster” and it is about a cat’s journey to enjoy a cookie.

The animation was created using Blender and Unreal Engine 5 (UE5). We chose these 2 3D softwares as modelling could be done easily in Blender, and Blender is a free and open-source software whereas other softwares like Maya and Houdini were subscription-based softwares. On the other hand, UE5 has a illumination system called Lumen which produces realistic lighting with real-time performance, hence it was a good software for us to visualise the scene in real-time and to render our animation. Finally, the rendered clips were merged and edited using iMovie.

This animation was done by Team 8 (Chen Xingjian, Clarissa Lee Zi Xin, Toh Wei Chung Andy).

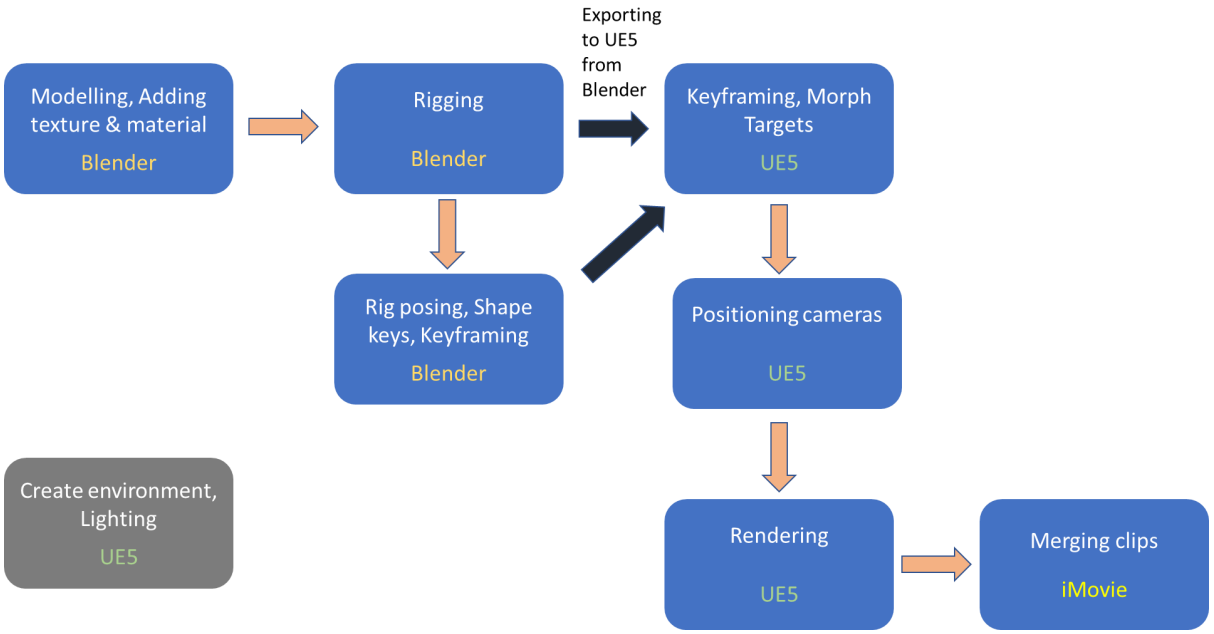
Final animation clip:
https://www.youtube.com/watch?v=cTmGBaGFGq4

Artistic aspect

We decided to tell a story of a house cat and his adventures at home alone while his owner is out for a grocery run. We settled on a more stylized look for the environment as well as the characters in the animation like the cat.

Pipeline and techniques used

Pipeline



Blender: Modelling, Adding texture & material

Some models (i.e. cookie, jar, the human) and animations were taken from websites like https://free3d.com/, https://sketchfab.com/ and https://actorcore.reallusion.com/. Other models like the cat were made in Blender with references to the art drawn in our storyboard.

For the cat, we originally thought of creating the hair of the cat with particle system in Blender. However artistically it didn't look very nice, hence we settled on a more stylised/cartoon-like look for the cat.

Blender: Rigging

For rigging, we made use of Rigify in Blender, it provides several generic rigs for humans, and even cats, which was perfect for us. For each of the bones/rigs, Blender helps us to give weights for each of the rigs and the weights are used to decide the deformation for each part of the cat. Setting automatic weights did not perform well enough (i.e. some parts were too deformed), hence we used "Weight Paint" in Blender to reduce or add weights in certain areas.

Blender: Rig posing, Shape keys, Keyframing

We were able to pose the rigs to create different actions, after keyframing the poses, Blender calculates the interpolated actions in between the key frames. Shape keys was also another method that we used when animating the cat. A shape key has a range of 0 to 1, the original mesh was set with a value of 0, we then deform the mesh (i.e. move the mesh to create closed eyes) and give a value of 1 to it. We can then interpolate the value of 0 to 1 to get interpolated actions like in the case of keyframes. For example, in this case increasing the value of the shape key from 0 to 1 and back to 0, creates an animation of the eyes closing and then reopening.

UE5: Create environment, Lighting

Our environment design is done in UE5 with the help of available assets online. We made use of transforms and scaling to position objects to build up our environment. We also made use of UE5's Lumen lighting system.

UE5: Keyframing, Morph Targets

After exporting the mesh and its skeleton/rig from Blender to UE5, we can also make use of the shape keys created in Blender in UE5. The shape keys are known as morph targets in UE5. The only difference between shape keys in Blender and UE5 is that morph targets have a range from -1 to 1 (compared to 0 - 1 in Blender). Negative values lead to a movement in the opposite direction of positive values.

Morph targets were used to deform the pillow in various ways as the cat carries it around in the animation. For example, it was used to deflate the pillow, and to extend the sides of the pillow.

Exporting from Blender to UE5

There were several issues with exporting the models and rigging from Blender to UE5. For example, some textures like glass could not be exported from Blender to UE5. We thus had

to recreate the materials again in UE5. Another issue that we had was that the rigs created by Rigify in Blender behaved differently from rigs in UE5. Exporting animation from Blender to UE5 thus resulted in issues like deformed spines and head. To resolve this, we made use of a Blender add-on (named “Expy Kit”) to convert rigs created by Rigify in Blender to rigs that were compatible with UE5.