COSC422 Assignment 1 Skeletal and Character animation
By: Okoko Anainga 96871851

Introduction

This assignment was to use Assimp to import then animate models, characters and skeletons. My scene is a representation of a outdoor dancing scene modelling an animated form of outdoor shows I went to see in Hamilton when I was younger. I have imported a skeletal animation Dance.BVH and a dancing character modelled as a banana. Following this there is an imported model of a stage and the animations are positioned on this. The skeletons are replaced with glutCubes and Spheres for the joints so that they appear at all times to be one model and more human like. There is a light blue Skydome and a procedural generation for a checkered floor. The other features include basic shadows on the skeletons and importing multiple skeletons and a Character into the same scene. As well as this the scene can be navigated using keyboard controls and the animation is on an infinite loop. This report will further discuss the features above and their implementation.

Discussion

The code for this assignment can be broken down to a few key functions. These functions load models, textures and process the animation. There is three renderers used. The first one is for a model, the second is for character animation and the final one for loading a skeletal animation. The skeletal one also is specific for the Dance.BVH as it replaces the joints for primitive cubes and speres to make the skeletons more real. The floor is procedurally drawn using two for loops that each calculate where a tile (GL_QUAD) should be and render them one of two colours creating the checkered pattern. A capture of the scene can be seen in Figure 1.

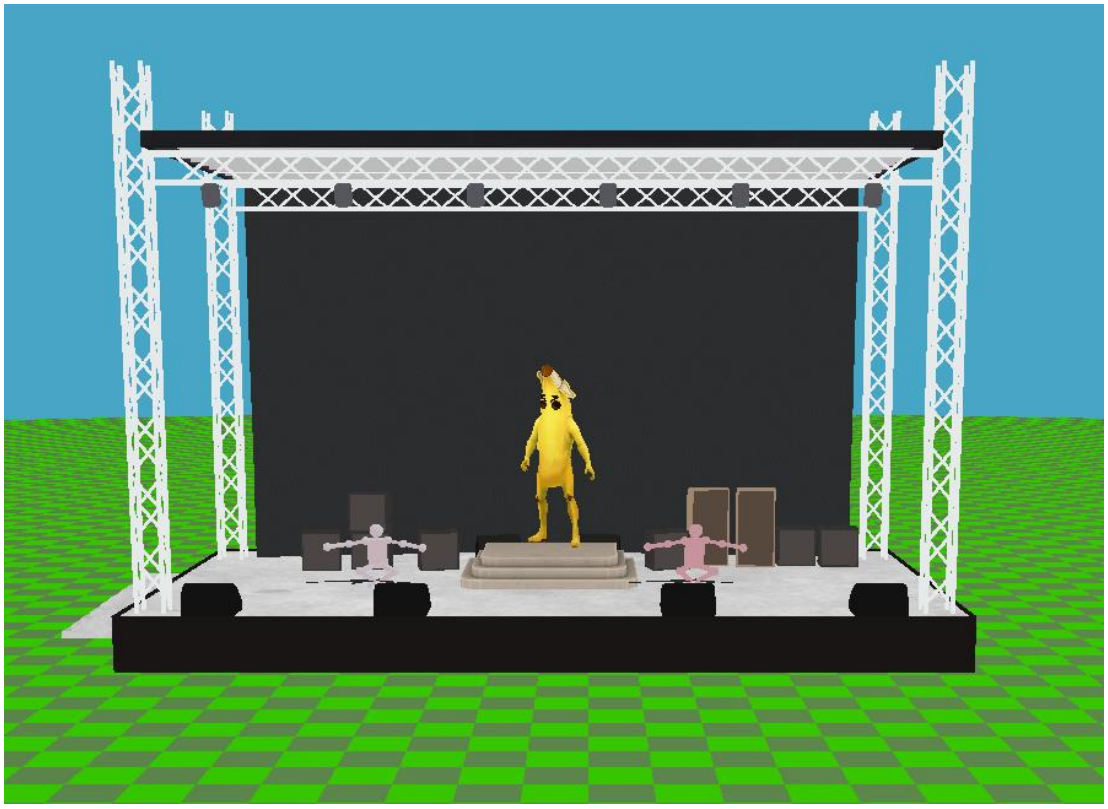


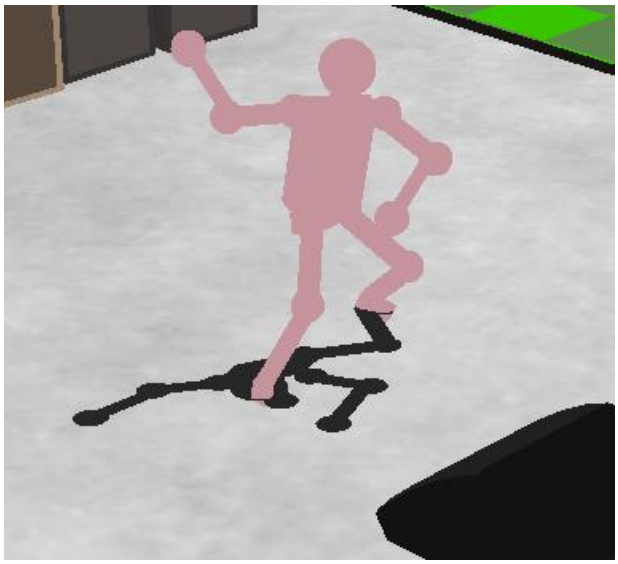
Figure 1: Screen Capture of the entire scene

Extra Features

The first of the extra features is rendering more than one Skelton this is achieved by creating a translation on the first skeleton and calling the render function a second time. This is also done with the Character animation that is loaded in as a separate AI scene object then is rendered with a transform and rotation. This can be seen in Figure 1.

Two timers are used for this one for the character animation and one for the skeletal this ensures that they are animated as intended and don't run off each other's timers. In this step when the tick is greater than the tDuration the tick for each update function is set to 0 this ensures that both independently loop at there own animation speeds.

The next feature implemented is planar shadows. This is done only on the skeletal animations as shown in Figure 2. This is achieved by rendering the shape in black at a new location that way it has the same movement as the original creating a real shadow effect



The final extra feature is achieving joint rotations without gaps between mesh surfaces. This is done in the skeletal renderer function where each part of the skeleton is rendered according to its bone structure. In this function translation and scaling are also done to make sure that the body looks fluid and connected. To make it look more human like primitive quads are used for the bones and spheres are used for the joint. These spheres are what achieve the seamless integration between bones.

Figure 2: Demonstration of Planar Shadows

Special Controls

There are 6 special controls for this scene in total these are:

- Keyboard arrow up – zoom in with a slight arc
- Keyboard arrow down – zoom out with a slight arc
- Keyboard arrow left – pan to the left around the stage
- Keyboard arrow right – pan to the right around the stage
- Up page – pan up around the stage
- Down page – pan down around the stage

All of these buttons move the camera around the stage as explained above. It does this in increments of 5 in the world coordinates. There are also checks implemented to stop the camera from going

outside of the Skydome. As shown below there are two significantly different views of the stage Figure 3.

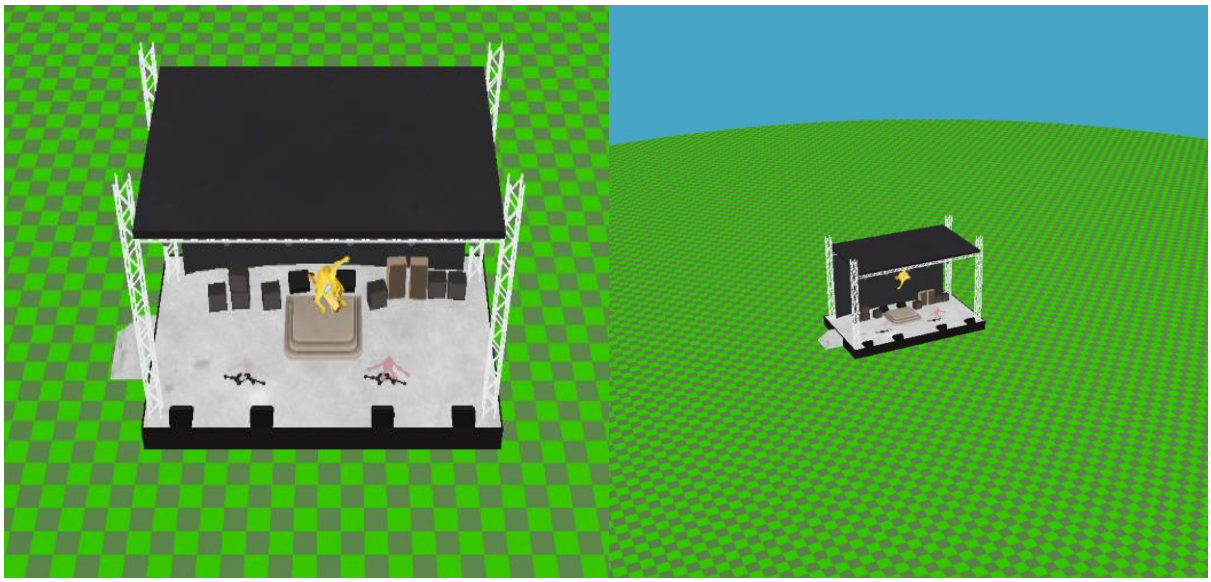


Figure 3: Different perspectives of the scene

Conclusion

In conclusion, undertaking this assignment has not only been an educational experience but also one that has significantly peeked my interests. The journey from conceptualization to the final result, a captivating animation featuring three figures engaged in dance, has been both rewarding and illuminating. The intricate process of bringing these characters to life through animation has deepened my appreciation for the art form and the technical nuances involved with it.

Reflecting on the completed project, it's clear that while the animation itself stands as a testament to my creative and technical abilities, there's always room for growth and refinement. One aspect that particularly stands out for potential enhancement is the introduction of textures to the sky dome. This subtle addition has the potential to elevate the entire scene, imbuing it with a heightened sense of realism and immersion.

Bibliography

Dorado, J. (2023, 08 24). *Banana Dancing*. Retrieved from SketchFab: https://sketchfab.com/3d-models/banana-dancing-fortnite-c1db1b10f9b14717ba731d7f49d25443

mertbbicak. (24, 08 2023). *Simple Concert Stage*. Retrieved from Sketchfab: https://sketchfab.com/3d-models/simple-concert-stage-d5c7733d06d24947bf60b3a0fe203f69

Banana model - (Dorado, 2023)

Stage model - (mertbbicak, 24)