Skeletal and Character Animation Report

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Build Commands

Skeletal Animation

1. cd SkeletalAnimation
2. g++ -o SkeletalAnimation SkeletalAnimation.cpp -lGL -lGLU -lglut -lassimp && ./SkeletalAnimation

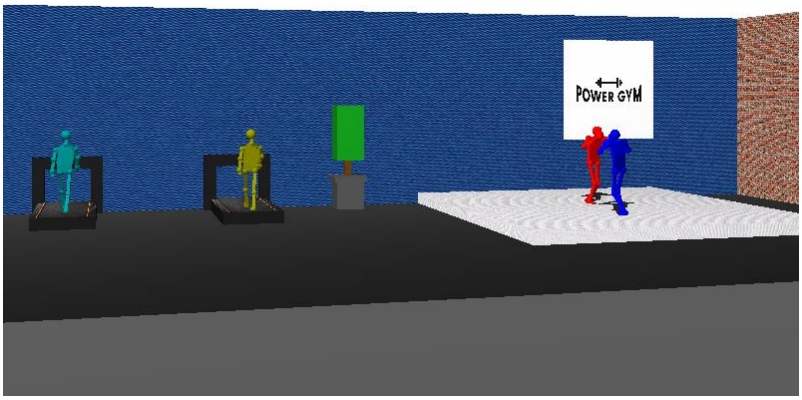
Character Animation

1. cd CharAnimation
2. g++ CharAnimation.cpp -o CharAnimation -lGL -lGLU -lglut -lassimp -lIL -lILU -lILUT && ./CharAnimation

Scene Description

Skeletal Animation

The scene contains a total of four models, two boxers and two treadmill users, using the Boxing.bvh and Walk.bvh files, respectively. The scene was designed to resemble a gym setting for the models, which is a well-suited environment considering the nature of the animations. The boxer skeletons were given a platform to perform their boxing fight/animation, and the treadmill skeletons were given a treadmill each to provide context on their animations. The entire scene is shown below.



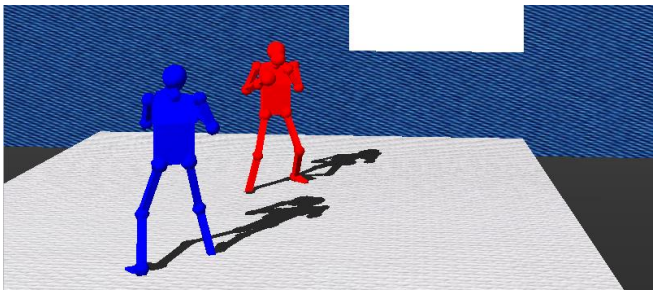
Character Animation

The character animation program contains the dwarf.x character with a green tiled floor plane with lighting enabled. The dwarf is performing the mixture of crouching then looking around and then repeating. This was achieved following the methods outlined in exercise 8. The character animation scene is shown below.

Extra Features

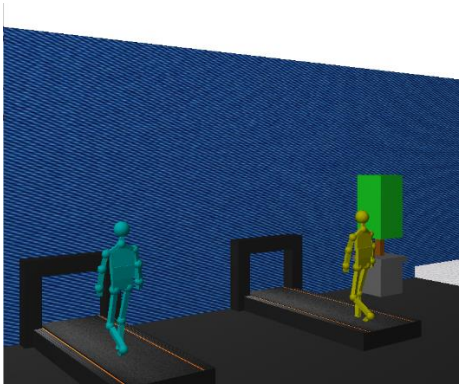
Planar Shadows

Planar shadows are implemented on the two boxer models, as shown below. This was achieved using basic shadow generation methods from COSC363.



Animation Looping

As previously mentioned, the treadmill users are animated using the Walk.bvh file. In the render function for these models, the root nodes transformation matrix is set to zero, keeping the model stationary despite its animation. This prevents the models from moving and gives the effect of using a treadmill. The tDuration is set to 155 and during the update function, when the current tick surpasses this value, it is set to the value of 45. These values correspond with keyframes that are the same as each other and create a smooth transition between the starting and resetting of the animation.



More Than One Animated Skeletal Model and Synchronized Animations Involving Multiple Skeletal Models

There are two instances of synchronized animation models. The boxers being synchronized gives the impression of an actual fight as both are throwing punches. The two treadmill users are also a pair of synchronized animations.

Joint Rotations Without Visible Gaps Between Mesh Surfaces

All models in the scene have the gaps between their joints connected using sphere objects added during the rendering of appropriate nodes such as arms and legs.

Problems/Challenges

The most difficult challenge I faced was introducing the treadmill user models into the scene as this required the loading of another .bvh file. I initially attempted to rework the render, updateNodeMatrices and update functions to work with both animations, however, I ran into many issues that I was unable to solve at the time. I decided to have separate methods for each animation to make the implementation less complex. This in a good programming sense is not ideal, however, it served as a workaround for my purposes.

Keyboard Controls

Key	**Action**
Up Arrow (Skeletal Animation only)	Camera Zoom In
Down Arrow (Skeletal Animation only)	Camera Zoom Out
Left Arrow	Rotate Camera Left
Right Arrow	Rotate Camera Right

References

Resource	Reference
wall.tga	https://www.freepik.com/free-photos-vectors/seamless-blue-fabric-texture
treadmill.tga	https://www.shutterstock.com/image-photo/texture-fabric-treadmill-top-view-635367656
ring.tga	https://www.freepik.com/premium-photo/white-canvas-texture-seamless-square-texture-tile-ready_32150184.htm
gym.tga	https://www.rawpixel.com/search/gym%20logo?page=1&path=_topics&sort=curated
gym_floor.tga	https://www.tvs-gymflooring.com/gym-flooring/
brick.tga	https://creativemarket.com/ultrapro