Assignment 4:
Lighting and Textures

Group Members:

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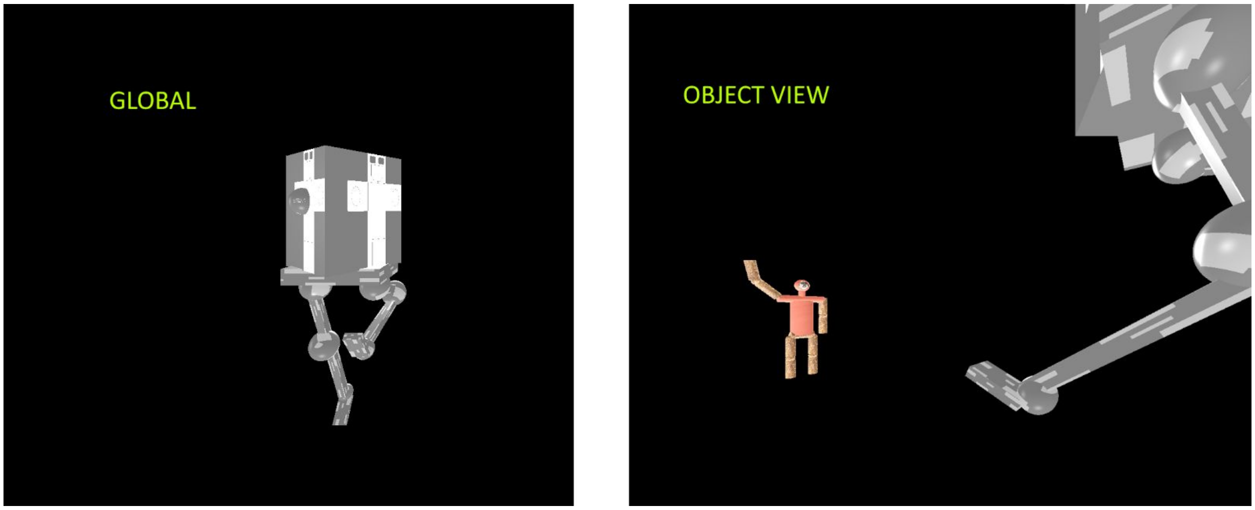
Story of Scene:

The Empire has been building their superweapon in the Death Star II on Endor, the forest moon. In this scene, the Empire has sent out a chicken walker to survey the forest moon to check for potential threats in the form of Alliance forces. The chicken walker is walking through the forest when it comes across a small creature known as an Ewok. Bending down to see the Ewok, the walker notices that the Ewok is waving to it. By looking through the moving camera, the first-person view from inside the chicken walker can be seen. Using this camera, it is clear to see that the Ewok is waving. Not knowing the allegiance of the Ewoks to the Rebel Alliance, the Imperial troops inside the chicken walker assume that this Ewok is friendly. Instead of firing at the creature, the Imperial troops wave their guns back at the Ewok, so as to say a friendly, "hello." Little do they know, the Imperial troops are about to be met with a surge of Rebel forces, including help from the Ewoks, in which the Imperial forces are defeated.

User Manual:

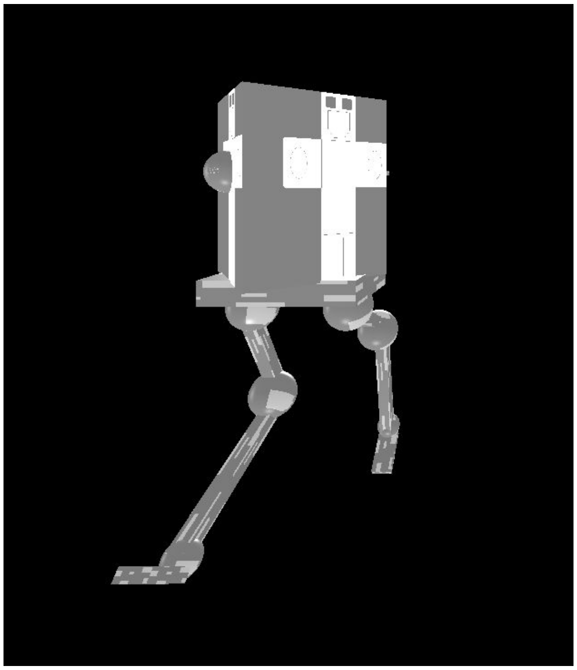
By running this program, the xml file that contains our walker and Ewok scenegraphs will be loaded. The initial scene will be looked at from the global, stationary camera. By pressing the 'O' or 'o' key, the camera will switch to a first-person view camera from inside the cabin of the chicken walker looking straight out. This camera stays in this position as the chicken walker model moves throughout the scene. To switch back to the global camera, simply press 'g' or 'G.' A comparison of these two camera views can be seen in *Figure 1*, below.



[Figure 1: Picture of initial view from global camera next to picture from walker camera]

Model Description:

Walker: The walker is made up of a combination of objects, most of which are wrapped in a grey texture to simulate the look of metal. Starting from the bottom, each foot is a box that has been scaled in a rectangular way. Each foot is then connected to an ankle joint in the shape of a sphere. Above this are the elongated boxes that make up the shin and thigh, which are connected through a knee joint also in the sphere shape. Each leg has a hip object in the shape of a sphere that connects to the pelvis box. Sitting on top of the pelvis is another box that makes up the main cabin of the walker. Coming off the either side of this cabin are two guns that consist of a spherical bearing and a barrel in the shape of an elongated box. The entire model stands tall, towering over the Ewok model.



[Picture of Walker]

Ewok: The Ewok is similar to the walker, but is much shorter and rounder. The legs are made up of two cylinders that have been scaled to be shorter and wider to signify the shin and thigh. These two objects are once again connected with a spherical knee joint and attach to spherical hip joints. These hip joints then attach to a cylindrical pelvis which is laying sideways, on which the upper body sits. The torso is also a cylinder that has been scaled in a disproportionate way so that it is a little wider than it is deep. On top of the torso is a shoulder blade which is simply a sideways cylinder. Off each side of this shoulder blade are arms that are made up very much like the legs. The upper and lower arm are cylinders attached at an elbow joint made of a sphere. Finally, the cylindrical neck sits on top of the shoulders and holds the spherical head. Because an Ewok wears an orange shall, the texture covering the torso, and shoulders is an orange color.

Other than that, an Ewok is covered in fur, so the rest of the objects have a brown furry texture. On the head, we've added a texture that symbolizes a face.

[Picture of Ewok]

Division of Work:

Task	**Partner**
Light Parser	**Nate C.**
Spotlight Implementation	**Nate C.**
Texture Creation	**Nate C. / Tyler M.**
New Model Creation	**Tyler M.**
New Model Texturing	**Tyler M.**
New Model Animation	**Tyler M.**
Texture Parsing/Mapping	**Nate C.**
Object Stationary Camera	**Nate C.**
Adding Multiple Models to Scene	**Nate C. / Tyler M.**
Documentation	**Nate C. / Tyler M.**

Difficulty/Time Estimation:

Overall, we give this project a rating of ‘Difficult’. Coming to grips with light processing, how to fit lights into the graphics pipeline, texture mapping, more complicated shaders and leveraging different models in the same scene all made this a very challenging assignement. We spent a little over 30 hours working on this project between the two of us.

Features:

Have:

- Lighting Basics
    - Can Add lights to our scene
    - Can attach lights to different parts of our models
        - Can see Light attached at global level and on the leftgun-barrel in the walker_updated.xml file
    - Lights can move as parent model parts move
    - Models have material properties that interact with the lighting
    - A shader to interpret lights
- Scene
    - Scene Contains two different models
    - Each model has material properties instead of pure color
    - Each model has 2 axes of movement
    - Each model is textured and defaults to a particular texture
        - Instead of white, we used a metallic grey as our default texture because it made texturing our Walker much easier.

Partially Have:

- Object Stationary Camera
    - Can switch between global and object stationary view using the ‘o’ and ‘g’ keys
    - Object Stationary Camera moves as model animates
    - Object Stationary Camera IS NOT placed at the correct location -- we are unsure why this is the case as we leverage the transform of the object it is attached to.
- Spotlights
    - Have the ability to parse for Spotangle and Spotdirection from XML
    - Correctly assign these parameters to our util::Light objects
    - Spotlights with no spot angle are assigned an angle of 180 degrees
    - Pass these parameters to shader
    - Attempt to computer dot(spotdirection, -Lightvec) in shader but CAN’T get correct spotlight functionality
    - Spotlights DO NOT appear correctly in rendered scene.