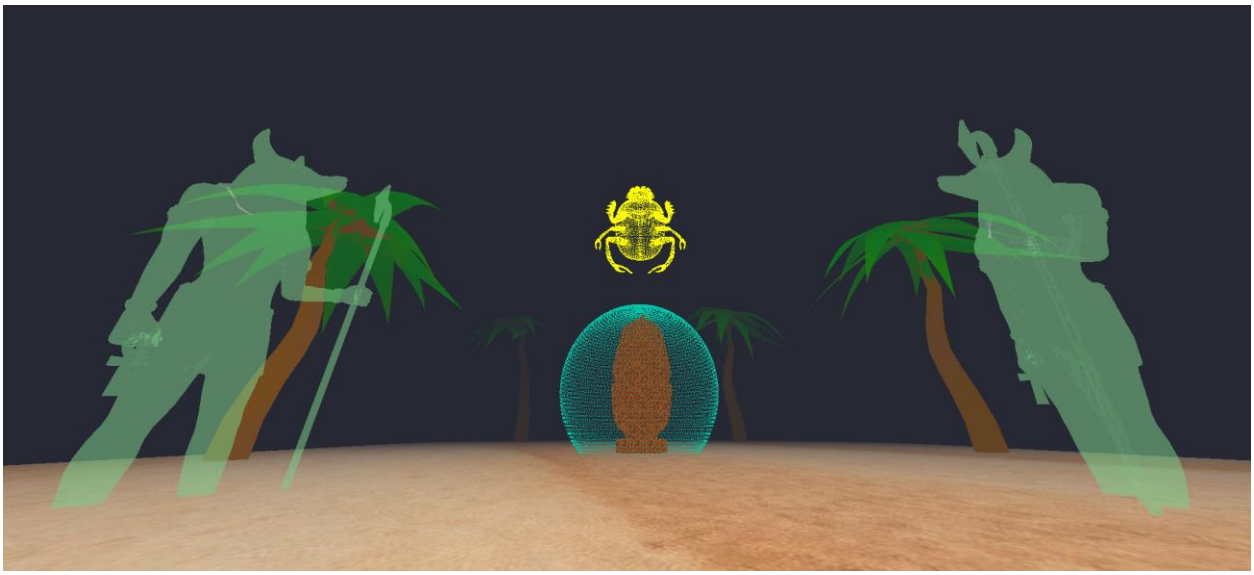
Assignment 4: “The Pharaoh’s Statue”



Lore (Description)*:

Somewhere isolated in the Egyptian desert sits a bronze statue of an unknown pharaoh. Only some have been able to drive across the dunes and come across the small, almost mirage-like area where the statue sits. Those who leave after admiring the lone statue surrounded by trees later discover that they cannot relocate the area. Amidst the trees, one may find some scarab beetles living in the area.

When nightfall hits, the scene changes, and the spirits awaken. Two selected scarab beetles shift into tall spirits with jackal heads. Harnessing the power of the desert, the Jackal Guards defend the pharaoh’s statue with a Shield of the Scarab, protecting it from any lost souls that find the land during the nighttime. Those who dare to attempt vandalization of the statue would soon find themselves facing Anubis himself.

Five Implemented Features:

- **Geometry Shader:** Used primitive modification to shift a sphere model into the “Shield of the Scarab” surrounding the Pharaoh statue. Also used the same primitive modification (with different coloring) on the Scarab anomaly that floats above the shield.
- **Perlin Noise:** Used to create a bronze-like statue effect on the Pharaoh model. All calculations were done in a separate Noise.java class.
- **Fog/Transparency:** Fog is used during the night scene (without the positional light active), and Transparency is used on the Jackal Guards to simulate the spiritual effect.
- **Bump Mapping:** Used on the scarab beetles during the day to simulate the bumpy, insect-like texture that beetles may have.
- **Environment Mapping:** Used on the Jeep Renegade to simulate the shiny metal of the vehicle. Also modified to include lights and shadow-mapping with the cube map texture.

*I made this up myself. This story is entirely fictional.

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Features I Was Not Able to Get Completely Working

I believe that I was able to get all 5 of my chosen requirements working in their full effects, some of them even working with more code than the example programs, such as with added lighting/shadows. As for the other 3 options:

- I attempted Tessellation, first with Bezier and then with height mapping. After trying to make lighting and shadows work, I gave up on it.
- I decided against stereoscopy. I do not have virtual reality or 3D glasses ☹
- While water looks amazing, I figured it would not make too much sense in my desert scene.

Features That Went Beyond the Requirements

This time around, I did not go above the requirements. Although I did make sure that all 5 of my implemented requirements were far from a simple copy/paste of the book's example code

Sources:

(Note: The following links all have licenses that allow for Personal/Free Use)

- Jeep Renegade 2016 Model (https://www.cgtrader.com/free-3d-models/car/suv/jeep-renegade-a-5-doors-compact-suv-from-2016)
- Palm Tree Model (https://www.turbosquid.com/3d-models/free-palm-trees-3d-model/951851)
- Anubis Model (https://free3d.com/3d-model/anubis-v1--392870.html)
- Pharaoh Statue Model (https://free3d.com/3d-model/noveltybust-egyptianpharaoh-v1--347256.html)
- Scarab Beetle Model (https://free3d.com/3d-model/scarab-beetle-v1--704557.html)
- Sand Texture (https://www.pexels.com/photo/wavy-patterns-on-the-desert-sand-1527934/)
- The remaining models were created by me in Blender (the sphere and cube).
- The remaining textures are either vec4 colors or created by me in Blender (palm tree and Anubis/Scarab beetle).
- The cube map is "Storm Clouds", from Gordon, V., developed for use with the textbook.

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Instructions:

- W – Moves the camera forward
- A – Moves the camera left
- S – Moves the camera backward
- D – Moves the camera right
- Q – Moves the camera up
- E – Moves the camera down
- R – Resets the camera to its default location
- Left Arrow Key – Pans camera left
- Right Arrow Key – Pans camera right
- Up Arrow Key – Pitches camera up
- Down Arrow Key - Pitches camera down
- Spacebar – Toggles the axes
- Dragging in Any Direction – Moves the positional light in that dragged direction
- L – Toggles the positional light, and the sphere that represents it (shifts scene from day mode to night mode, or vice versa)

Lab Testing:

I was able to get my project working on ECS-METALSLUG.