

Course:	CSCI 4110U: Advanced Computer Graphics
Lab Assignment:	9
Topic:	Texture Mapping

Overview

In this lab, you will build upon last week's lab. You are going to add texture mapping to each celestial object.

Note: If you were not able to get Lab 08 working, simply create a project (using the Draw Sphere example as a base) that draws two motionless spheres.

Instructions

First, you should download the lab assignment data (Lab09_Data) from the repository is given, below:

- https://github.com/randyfortier/CSCI4110U_Labs

For this lab, you will need a sphere with sufficient detail so that the texture coordinates. One has been provided in the data folder, along with diffuse (base colour) texture (Earth and Moon), a cloud texture (Earth-only), and a specular textures (optional; Earth-only). Use the provided sphere as a replacement within your existing solar system simulation.

Using the texture mapping demo as a template, load in the two textures for each of the celestial objects. Pass the texture ids for each texture to the shaders, and use the corresponding samplers in the shaders to compute the colour of the two bodies.

For the Moon, the process is simple. The fragment colour is merely the colour sampled from the Moon texture at the fragment's interpolated texture coordinates. For the Earth, the fragment colour will combine the diffuse texture with the cloud texture. The cloud texture has an alpha channel such that a place where there are no clouds will have a transparent colour.

Need an Extra Challenge?

If you feel like this is too easy for you (e.g. you have some background with OpenGL), you are welcome to try one of these variations (presented in order of difficulty):

1. Draw two spheres for the Earth, one with a slight scale-up where the cloud texture will be mapped, and the smaller will have the diffuse texture mapped to it. This will result in much more realistic looking clouds.
2. Loading in the specular texture, use the grayscale value of this texture to specify the shininess (specular coefficient) for the surface of the Earth. This will produce reflective oceans, but diffuse land, resulting in a far more realistic surface, especially under specific lighting conditions.
3. Add a texture for the sun, if you had added a sun object previously.
4. Add some spacecraft or space stations from <https://nasa3d.arc.nasa.gov/models> to the simulation.

Lab Report

To demonstrate to the lab instructor your completion of this laboratory assignment, merely show them the modified OpenGL program.