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Project Reflection

Coming into this project, I knew I wanted to model items that I interact with frequently. A perfect place to find items like these is my desk. I tried to pick Items that varied in shape, texture, and overall complexity.

The desk acts as the background of the scene, all of the objects are sitting on the desk surface. The plane is the easiest shape to manipulate because there are only 2 triangles and no curves. I took a high-quality picture of the desk surface which was used for the texture. In my opinion, the desk texture does most of the work in bringing this scene to life.

The center of the image is the pack of baby blue sticky notes. This is a very simple cube shape with a plain blue texture. After having the experience of working with cubes, the sticky notes object came together in only a few minutes.

The next object is the ball. The ball is a sphere. The development of the sphere was straightforward. The texture on the other hand was a challenge. Since the ball is not one static color across the entire surface, it needed to be textured to look like the ball in the picture. On top of that, texturing spheres is a bit more intensive than texturing something like a cube. It took a couple of tries to get the texture right and I am pleased with the result.

The third object in this scene is the Chapstick. I had a few ideas for how I might replicate this object. I ended up viewing this object as 3 cylinders stacked on top of each other. You have the thin white twistable part at the bottom. Then, you have the majority of the tube where the logo sits. Finally, you have the white cap at the top. I found that the plastic used for the Chapstick is almost identical to the plastic used for the adapter.

The final object in this scene is the power adapter. I anticipated the adapter being the most complex object in this scene. It turned out to be a nice-looking object. I made the base as one cube and then added 2 cubes on top of it to represent the prongs. I used an image of white, semi-glossy plastic for the base and stainless steel for the prongs. The adherence to texture in this complex object makes it look very realistic. I wanted to add some of the finer details like the filleted edges on the base or the holes in the prongs, but that was beyond the scope of this course.

I used 2 different lights in this scene. The first is a point light. This is the light that you can actually see as an object in the scene. This light represents my desk lamp that was used to produce the original project images. At the time of taking those pictures, I didn’t know that lighting was going to factor in, so I moved the light around between images. I decided to put the light at the intersection of the top and the front view of the scene. If you look closely, you can see that the objects have a bit of yellow-ness to them. This is by design. The lamp that I have has a bulb that produces slightly yellow light. I tried to replicate this by adding some yellowness to the point light. It may not be obvious from the scene but the room that I took the photos in has a window behind the desk. This lets in a lot of natural light to the scene. To replicate this, I added a directional light to the scene that points towards the front and bottom views of the scene. You can see from the images that the scene is just in general brightly lit. You can also see that the side of the objects that face away from the lamp are sill lit. This is achieved in the scene by using the directional light.

Navigation in this scene is very similar to most keyboard-and-mouse computer games. The main navigation tools are the W, A, S, and D keys – along with the mouse. The user would point the mouse in a certain direction and the WASD keys move the camera in that direction relative to the direction the user is pointing to with the mouse. Forward, back, left, right. Difficult to explain, but very intuitive. The user can press Q and E keys to move in up and down directions. The scroll wheel affects the speed of movement in all directions. If for some reason the user gets lost in the scene, they can press the 1, 2, 3, and 4, keys. Each will snap to a certain preset view of the scene. Lastly, the P key is the alternation between orthographic and normal perspective of the scene. These controls allow the user to navigate around the scene and view the scene from any angle imaginable.

One of the main concepts in this course was modeling complex objects by breaking them down into simple, primitive shapes. In my scene I needed a plane, a sphere, several cubes, as well as several cylinders. <https://learnopengl.com/> provides great tutorials and examples, but they put the vertex array for the shape they’re using in the main method. If the user wants to use multiple shapes, they end up putting many vertex arrays in the main method. As we can see with some of the more complex shape primitives like sphere and cylinder, the vertex array can become quite lengthy. Thus, the main method becomes cluttered, and the code quickly becomes very difficult to understand.

In my code, I used custom functions to abstract object creation away from the main method. The result is replacing hundreds of lines with less than 10 to render that same object in the main method. This is a much more usable and readable solution that makes developing these scenes easy and fun. That leads to the second benefit of abstraction. Since there is a function for a specific shape, we can call that function any time we want to add another one of those shapes to our scene. All we have to do now is position and scale our object on the scene, then texture and light it. The difficult details of the vertices are no longer the user's concern. The code in the main method becomes much more condensed and organized. This reusable solution decreases the amount of time it would take to build a 3D scene again.