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CS-330

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CS330 - Project Reflection

This project was a very helpful experience. It took utilizing all resources and learning to pace the process efficiently. OpenGL documentation was extremely beneficial for the span of the project, and learning the parameters of each function was what helped write the main functions of the code.

I believe the picture I started with provided some obstacles, with the various shapes I was going to be using. Some of the shapes were straight forward, with the Nintendo 3DS being simply two flattened cubes and the lip balm being a simple cylinder. The fidget cube was more complicated with its buttons built into the side and the service bell was more of a challenge because of the curves on the object. Overall, though, I believe the approach I took worked out for the best outcome.

The design decision I took for the service bell was to use a half-sphere and torus for the base. The half-sphere was hard to source a function for, but that led to walking through an existing function (Ahn, *OpenGL Sphere Creation*) and finding how it could be cut in half. Once it was loaded, I needed to create a torus. The torus was easier to source and worked well as the base for the bell. I decided to leave the torus as a basic black color, matching the picture, and using a texture on the bell itself to represent the yellow metal and smiley. I chose to use a silver cylinder for the button on top of the bell, as it simplifies the representation well.

The design I chose for the fidget cube was a simple cube with four cylinders for each button. The challenge was rendering each cylinder for the buttons, but once executing the code, it became simpler. I decided to use separate models and render each one. This allowed me to be very specific about where each button was, allowing troubleshooting to be easier later.

The Nintendo 3DS was easier to render. The Nintendo 3DS was represented using two flattened cubes. I used one model and mesh, and just reset the model matrix in between renders. I gave it a dark red texture to represent the red plastic. From the photograph, the 3DS is shinier plastic, so I increased the intensity of specular lighting on this object by changing the uniforms in my shader for this object only.

The lip balm was the easiest, with a simple cylinder. I wanted to show the color from the picture, without the branding. I found a texture and drew over it to make it generic and applied it to a single cylinder. From there I wanted to represent the cap and bottom different, with separate colors and sizes. For that I created new meshes and rendered them with colors. The outcome looked very similar to the photo.

Lighting is important for representing object material and texture. I wanted to represent the same lighting in the photo, which consists of a window nearby and two lights overhead. For that purpose, I used the Phong lighting shader (*OpenGL Basic lighting*) and created multiple light objects. I used a directional light to represent the sun coming in from the window and gave it a warmer white light. The two lights overhead were normal point lights, with bright white colors. I changed the intensity of them to match the scene in the photo. The sun was low intensity, but the point lights I left at about half intensity to show consistent shadows.

Overall, I believe the scene was represented well, with simple objects pieced together to make each object. Each object took multiple meshes to represent, and the outcome looked similar to the picture.

References

Ahn, S. H. (n.d.). *OpenGL Sphere Creation*. OpenGL sphere. <http://www.songho.ca/opengl/gl_sphere.html>

*Basic lighting*. LearnOpenGL. (n.d.). https://learnopengl.com/Lighting/Basic-Lighting