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For my final project, I chose to re-create an image from a musical artist that I enjoy: PilotRedSun’s album *Achievement.* This album cover provides a surreal and liminal-Esque scene of the interior of a home, with a cake and candle on top of a wooden table, with a refrigerator in the background. The refrigerator has two pieces of paper attached and is flanked by an outdoor exterior scene. Additionally, an ant is on the tabletop observing the scene. I chose this image due to the simple yet nuanced structure of the items, the lighting within the scene, and the overall mood the image portrays. The creation of this scene challenged me in ways I have not previously been challenged in before such as texturing 3D objects, lighting the scene, and managing large blocks of code with clean, readable comments.

All the objects created within my scene were created using different kinds of methods. The cake was created by using different kinds of stacked cylinder objects, with the candle being a singular thin cylinder with a small sphere at the top to represent the flame. The table was created using a large flat cylinder with the wood texture applied, and the refrigerator was created from a rectangular box. I also was sure to add details to the scene such as the trim around the baseboards of the room, and the papers on the fridge like the reference image contains. These small choices were a great teaching point about the basics of 3D modeling and debugging to ensure my scene looked as close to the reference image as possible.

The biggest challenge I faced during the development of my scene was getting the chair to be correct. It seemed like such a simple object in theory, however I had a massive amount of difficulty getting the seat legs, chair backrest, and seat aligned properly to make the scene look realistic. The legs were not properly connecting to the ground and looking flush no matter the method I attempted. Despite adjusting the chair many times, I ultimately decided to exclude the inclusion of the chair since it did not turn out the way I intended. This was a humbling experience and reminded me of the amount of patience that is needed for proper 3D rendering.

Another aspect that gave me trouble, but I ultimately felt turned out quite well was texturing. Originally, I had a massive amount of issues getting textures to not only apply, but to look good within my scene. For example, CAKE.JPG and FROSTING.JPG gave the cake realistic details but took a large amount of time to make look correct and realistic. I also applied textures to the table to match the original photo and included a slightly bumpy texture for the fridge to mimic how a real fridge would look. The walls and floors required proper texture selection to avoid looking overblown and match the proper style of my reference image. Some images were also loading too shiny or not loading at all, which I was able to finally fix utilizing proper texture calling methods.

Lighting was a focus of mine during the creation of my 3D environment to make the scene feel realistic. I managed to apply two different textures together, the SKY.JPG and GRASS.JPG textures while creating a light source through the window that mimicked a realistic sun. Additionally, I implemented two main light sources, which was an ambient light for the overall room, and a yellow light for the sun to represent natural sunlight within the room. I had to adjust my shininess and specular values multiple times to prevent the cake and other objects from looking too overly glossy. Ultimately, my lighting turned out excellent in my opinion, bringing warmth to the scene against the harsh shadows and objects. Another challenge was properly positioning for my objects, and I had to very carefully adjust the X, Y, and Z values to ensure the scene was as accurate as possible. The fridge required a good amount of trial and error, but I am very happy with the results.

For the camera and movement navigation, I used the standard WASD layout for movement with the Q and E keys allowing for vertical movement of the camera. The scrolling wheel for the mouse allows for the speeds of navigation, as well as viewing from a first-person perspective. The camera movements I implemented were vital for control within my 3D scene to allow me to properly adjust objects and verify my source image.

To ensure a clean and easy to use coding interface, I created some functions that helped me to ensure that once I had a solid foundation of logic, the issues I faced, such as texturing, became much easier to debug. BindGLTextures() was a prime example of an easy to repeat way of ensuring textures were properly applied. Lighting was easy to adjust the values of my scene’s ambient lighting and the window’s sun glare by implementing OOP (object-oriented programming) that allowed me to re-use code to easily edit my scene.

This project is easily the most difficult one I have faced since I began my degree and cemented the importance of patience and trial/error within the coding process. I did not use OpenGL previously until this course, and it was an excellent way to challenge myself to properly utilize resources such as YouTube to educate myself on coding logic. I am disappointed I did not include the chair, but I am happy with my results and feel as though it is a thoughtful re-creation of the scene.