Assignment 7-1: Final Project Submission

Jasmine Villarreal

Professor Malcom Wabara

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My CS 330 final project was based on a 2D reference image that was transformed into an interactive 3D OpenGL scene. The was a fun class as it required integrating skills from all the previous assignments to be able to complete the final milestone successfully. This included object modeling, texture modeling, what an ideal texture looks like, lighting with different angles, and camera movement. My final scene is immersive, has accurate proportion, similar realistic textures, and 3 types of lighting to add depth to the scene. Compared to the 2D reference photo every design choice was intentional.

My final scene contains over 4 unique objects, and each modeled using basic shapes such as cone, cylinder, cube, and spheres. Some examples of using these shapes include

The table: I used a cube for the tabletop and combined the code to create 4 elongated cubes for the legs.

The cake: originally, I used only a cylinder to create the base of the cake however, when adding 2 different textures to the cake I went ahead and added a very thin cylinder shape to hold that texture. This thin layer looks like it’s a part of the original shape.

Presents: the cube was scaled to match the 2D reference, and a wrapping paper texture was added.

The balloons: This was a fun one to build for my scene it took 3 unique shapes to make it realistic and seemed like it was floating above the rest of the items on the table.

This took a lot of time to reference the 2D image to be as accurate as possible. I took the time to measure how far apart each item in my scene (the x position) are and how far back each item realistically is. (z position) it also required that I measure how high an item needed to be placed to be on top of the table without clipping of layers as well as staying accurate to the 2D reference. (y position)

As for texture for this Project I tried to be intentional on what would match the scene well. I did want to make my 2D reference more realistic for example I chose a “wrapping paper” texture that features a red base with what can be perceived as a continuous yellow ribbon; I did have to stray a bit with the present design as I couldn’t construct a bow that would have been as accurate as the 2D reference.

I implemented a Phong lighting model as it combines ambient, diffuse, and specular lighting components. The scene uses directional lighting to simulate a natural lighting that you would see in a everyday room casting illumination across ALL objects. Point light was used and positioned near the table to highlight the cake and presents more, it creates localized highlights as well as adding soft shadows. It was also important that values were adjusted properly to avoid overexposure while making sure that details shine through.

Navigation and camera support is used with a full 6-axis camera that is controlled by the keys: W, A, S, D to be able to move forward, left, down, right. The Q and E keys were assigned to the upward and downward translation. The mouse also plays a role in navigation like the mouse movement is assigned to pitch and yaw adjustments and Mouse scroll wheel functions to control movement speed. This configuration are important as it gives users the freedom to explore the scene from any perspective, while still maintaining smooth controls that respond as expected. An orthographic view is added as well using the O button. This function will toggle alternative scene inspection.

It is always important to follow and apply good coding practices and I made sure to add comments as we completed each milestone, so I knew what changes had been made what week. Using clear organization coding made my job easier as I was able to copy and paste the first 6lines of code that included: scaleXYZ, positionXYZ, XYZ Degrees, and SetTransformations. This help streamline the process of adding new shapes and build items for the scene with better accuracy.

In conclusion, the final project is a complete interactive 3D visualization that integrates object modeling, realistic textures, lighting for depth, and full navigation controls. It allows users to explore the scene while maintaining the visual accuracy and design intent of the original 2D reference image.