Brandon Mullins

CS-330

Module Seven Final Project: Final Project

Southern New Hampshire University

For my final project in CS 330, I needed to create a three-dimensional scene that demonstrated textures, lighting, and interactive controls. The process required making several design decisions that influenced how the scene looked and how it functioned. Each choice, from the layout of objects to the way textures were applied, was made with the goal of balancing technical requirements with a realistic and engaging final product.

The scene design centered on a vanity with a mirror, along with supporting objects such as a toothbrush holder, sink, and faucet. I selected these objects because they allowed me to show the use of different geometric primitives while still creating a space that looked realistic. The grouping of objects gave me an opportunity to practice scaling, rotation, and translation, while at the same time presenting a layout that felt cohesive. I wanted to avoid building random shapes that did not fit together, so choosing a recognizable setting gave my project structure and clarity.

Camera movement was another important design choice. I implemented keyboard and mouse controls so that a user could freely explore the environment. The WASD keys provided forward, backward, and side to side motion, while the QE keys allowed vertical movement. The mouse controlled the orientation of the camera, and the scroll wheel adjusted speed. This gave the user full control of navigation and the ability to look at objects from multiple perspectives. This design was chosen because it made the project more interactive and helped highlight the details of the scene.

Textures were selected to add realism and contrast between objects. A brick texture was applied to the wall, while wood and metal were used for the vanity and faucet. I focused on using high resolution images that were square so they would map correctly onto surfaces. This prevented stretching and kept the textures consistent. One of the challenges I encountered was texture loading, especially with path issues. To address this, I adjusted the loading process so that it would check multiple possible directories. This made the program more reliable when run in different folders.

Lighting was one of the most significant decisions in the project. I chose a directional light source that illuminated the scene evenly while still producing shading and highlights. This choice helped emphasize the shapes and textures of objects and gave the scene more depth. To support proper lighting, I updated the vertex shader to transform normal into view space and pass them to the fragment shader. The fragment shader then calculated how the light interacted with the surfaces. Without these changes, the lighting would not have worked correctly, and the textures would not have looked natural.

Shader updates were necessary to tie everything together. The vertex shader was responsible for sending accurate position, normal, and texture coordinate data, while the fragment shader applied both lighting and textures. By structuring the shaders this way, the project became more flexible and could support future improvements such as adding specular highlights or additional light sources.

In the end, each design decision shaped the final product. The arrangement of the scene made it realistic, the camera controls made it interactive, the textures gave it variety, and the lighting added depth. These elements worked together to create a project that satisfied the technical goals of the course while also being visually engaging. The process required testing and refinement at every stage, but the outcome was a scene that demonstrated both technical knowledge and creative design.