**Class: CS-330**

**7-1 Final Project Submission**

**For my final project in CS-330, I envisioned creating a 3D desk scene that included a coffee mug, pen, notebook, and laptop. Although I had a clear idea in mind, transforming that vision into reality through code presented more challenges than I anticipated. This journey was a true test of patience and resourcefulness, and I learned so much along the way. While everything may not have unfolded exactly as planned, I managed to create a functional and organized scene that I’m proud of.**

**Building the objects was a process filled with trial and error. Taking on the coffee mug, I started with a vertical cylinder for the body, added a thin torus for the rim, and crafted three smaller cylinders for the C-shaped handle. It took several attempts to shape the handle just right. I was relieved when it began to resemble a real mug, even though its details can sometimes get lost in different lighting and angles. Meanwhile, the pen was a simple, thin horizontal cylinder, but it required careful adjustments in scale and rotation to look natural on the desk. I chose a bright red color for the pen, hoping it would offer a striking contrast against the darker tones surrounding it.**

**For the notebook, I used a flattened cube and gave it a matte, black appearance to mimic a closed notebook. I was pleased to see how well it integrated into the layout, helping to create a sense of balance. The laptop proved to be a challenge, as I formed it from two flat cubes: one for the keyboard base and another for the screen. Positioning the screen at a realistic tilt was tricky; after some deliberation, I opted for a slightly open angle to convey a casual, lived-in feel. While it may not be highly detailed, I feel it contributes to the overall essence of the workspace.**

**Lighting was one of the more difficult aspects to tackle. Initially, I experimented with a wood texture for the desk, but it ended up obscuring the visibility of the objects. Transitioning to shader-based lighting made a noticeable difference. I tweaked the ambience and diffuse settings to achieve a light maple tone for the desk, which significantly improved clarity. Even with these adjustments, some challenges remained, like the mug occasionally appearing flat, and the laptop screen lacking a bit of shine. Nevertheless, I managed to set up directional lighting that casts subtle shadows, adding depth to the scene.**

**I set up the camera to navigate along all three axes using the WASD and QE keys, and incorporated mouse control for looking around. The ability to toggle between perspective and orthographic views added an extra layer of exploration. Implementing the mouse callbacks required me to revisit earlier modules, which was sometimes daunting. While the camera movement can still feel a bit jumpy, overall, it works well and gives a sense of immersion.**

**To maintain clarity, I devoted attention to keeping the code modular, employing helper functions such as SetTransformations, SetShaderMaterial, and SetShaderColor to keep the rendering logic organized. Each major object is rendered with basic mesh calls, and I made sure to comment extensively throughout to provide context. If I had more time, I would love to encapsulate some of the repetitive logic into more reusable classes or functions.**

**Even though the final product isn't flawless, the process itself taught me invaluable lessons. From adjusting lighting and positioning to constructing geometry and managing camera controls, I learned how to break down a complex scene into manageable parts. Even when the outcomes diverged from my original vision, these experiences illuminated the intricate ways in which all components of a 3D scene come together.**

**I am genuinely proud of what I accomplished. The mug, pen, notebook, and laptop form a cohesive scene, all created from scratch using modern OpenGL. Despite the hurdles I faced, this project has shown me just how much I’ve grown since the start of the course and how much more I still must discover in this field.**