7-2 Final Project Review

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CS-330 Comp Graphic and Visualization

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**December 23, 2024**

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This project was a recreation of a realistic, modern workplace. It consists of various objects including a desk, keyboard, mouse, pencil holder with pencils, a coffee mug, and a stack of books. These objects gave me a chance to showcase a variety of shapes and textures while maintaining a light and cohesive theme.

The monitor was the scene’s centerpiece, and it gave me a chance to create complex structures with multiple components. Implementing the monitor was more difficult than I thought and required added planning to get the proportions right. The stand was programmed separately so that I could tweak its appearance without affecting other parts of the scene.

The keyboard and mouse complement the monitor and complete the office component set. I chose to use two layered shapes to achieve a flattened spherical appearance for the mouse. Given the assignment parameters, I chose to use a texture for the keyboard keys instead of individually coding each key as a separate box mesh.

The coffee mug would have proved to be more challenging if there weren’t already a tapered cylinder mesh. Combining it with the torus gave me the shape matchup to create an authentic-looking mug. Additionally, I was able to use the mug’s relative position to orient multiple other components in the scene.

I wanted to avoid duplicate code with the book stack and didn’t want to have each book stacked directly on top of each other. To do this, I created a for loop and offset the orientation of each book by a small amount and textured them to give them a slightly weathered appearance.

Programming for this project required a working knowledge of some OpenGL and GLFW libraries. The weekly resources and sample project proved invaluable in crafting the final project’s code. Most of the scene was structured using the SceneManager class, which encapsulated the functions and logic for rendering objects. Using this approach kept the project organized, manageable, and extensible for the last seven weeks.

The navigation of the 3D scene was done through a virtual camera system. The camera can be controlled with both keyboard and mouse inputs, which gives users a way to easily move around the scene. Keyboard inputs (W, A, S, D keys) allow for forward, backward, and side-to-side movement. I added code for up and down movement (Q, E keys), and rotate left and rotate right (Z, C keys) movement. Additionally, I added orthographic (O key) and perspective (P key) view capability for greater navigation capability.

To handle different input devices, I used callback functions for the keyboard and mouse. The keyboard callback function updates the camera position based on mapped key presses as discussed above, while the mouse callback function updates the camera’s pitch and yaw angles. These angles are then used to recalculate the camera’s front vector position.

In terms of custom functions, I developed a couple of them to make the code more modular and organized. The DrawMonitor() function encapsulates logic for rendering the monitor and its screen and stand. This function can be reused or modified if I wanted to add additional monitors to the scene. Similarly, the DrawBookStack() function reduces duplicate code and handles the creation of multiple books with varying colors and positions.

In conclusion, the development of this 3D scene involved careful planning and consideration of object functionality, camera positioning, lighting, and textures. The use of custom functions made expanding the project much less painful. This project has not only demonstrated a budding proficiency with 3D graphics programming, but has also given me a chance to grow my understanding of software design principles, creating a solid foundation for future projects and improvements.