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Module 7

For my 3D final project, I decided to recreate a simple kitchen countertop scene. I picked this idea because it’s something I see every day, and it gave me a realistic but manageable setup to work with. The reference image showed everyday items like a microwave, a coffee mug, salt and pepper shakers, and a cutting board with a kitchen knife. These objects are easy to recognize and made it straightforward to break them down into basic 3D shapes. For example, the mug uses a cylinder for the body and a torus for the handle, the shakers are tapered cylinders, the microwave is just a box, and the knife combines a box for the handle and a prism or pyramid for the blade. The countertop and cutting board are both flat planes. I liked that this scene gave me a solid mix of shapes to work with and let me explore OpenGL features like transformations, textures, and lighting in a way that felt realistic but not overwhelming. It also helped me focus on getting the camera and navigation controls working smoothly across all the objects.

The camera system in my scene lets users freely explore in full 3D using a combination of keyboard and mouse controls. You can move forward, backward, left, right, up, and down using the WASD and QE keys, which makes it easy to navigate around and between the objects. The mouse controls the camera’s orientation, letting you look around by adjusting the pitch and yaw—just like moving your head in a real space. Scrolling the mouse wheel changes the movement speed, which helps when you want to either speed through the scene or slow down for a closer look. I also expanded the camera’s orbit radius to make sure all of the objects stay well-lit and visible from different angles, especially when testing lighting effects. To give users flexibility, I added a toggle key that switches between orthographic and perspective views, so you can choose between a flat, diagram-like view and a more natural, immersive 3D perspective.

I wrote separate functions for each part of the scene to keep things organized and easy to work with. The mug, knife, microwave and each has its own function that handles its shape, texture, and where it sits in the scene. This made it way easier to make changes without messing up the rest of the project. I also made separate functions for setting up the shaders, lights, and camera controls so everything stayed clean and easy to manage. For lighting, I built out both a point light and a directional light, each using ambient, diffuse, and specular components from the phong model. Having everything split up like this helped a lot when I needed to test or fix things if something wasn’t working right, I could go straight to the function that handled it. It just made the whole process smoother.