Ifeoluwa Adewoyin  
CS 330  
**3D Scene Development Progress**

For this project, I wanted the challenge of creating a 3D autumn-themed still life scene using OpenGL and C++. At the beginning I started by selecting an image of a warm autumn arrangement featuring dried flowers in a vase, a pumpkin, and candles on a wooden table surface. For me I wanted an image with diverse shapes, textures, and materials to work with while trying to learn 3D modeling techniques.

The initial phase involved setting up the foundational elements of the scene. I used a wooden table surface using a plane mesh with texture mapping and added complexity by overlaying a secondary texture with transparency to create a more nuanced surface appearance. I wanted to show my understanding of texture blending and UV scaling techniques.

Next, I constructed the centerpiece vase using a combination of primitive shapes. I used a tapered cylinder for the bottom, a cylinder for the middle section, and another tapered cylinder for the top opening. Each section was given different textures and material properties to create more visual interest.

For the flower arrangement which I struggled with : I tried a procedurally generated system that creates multiple stems and buds. Each stem was positioned using mathematical calculations to achieve a natural, non-uniform appearance, with varied lengths, angles, and positions. The stems were created using cylinders, while the flower buds were represented by spheres. The positions of the flower buds were precisely calculated to connect seamlessly with their stems.

The pumpkin was constructed by combining a sphere for the main body with box meshes arranged in a circular pattern to create the characteristic ridges. A tilted cylinder represents the stem, completing a recognizable pumpkin shape using only basic 3D primitives.

I enhanced the scene by adding amber glass candle holders, each constructed from cylinders for the main body and torus shapes for the decorative rims. The candles inside were created with cylinders for the wax and cones for the flames. A book using box meshes and a prism for the binding adds further complexity to the scene.

For lighting, I implemented multiple light sources: a warm overhead light simulating a ceiling lamp, a cooler directional light representing window illumination, and a warm point light representing candlelight. These lights use the Phong shading model with ambient, diffuse, and specular components to create a realistic lighting environment.

Navigation controls allow users to explore the scene from any angle. The WASD keys control horizontal movement, QE keys handle vertical movement, and the mouse controls camera orientation. The mouse scroll wheel adjusts movement speed, and users can toggle between perspective and orthographic projections using the P and O keys.

Throughout this project, I've applied important principles of 3D graphics programming, including proper texture mapping, material properties management, lighting calculations, and user interaction handling. The modular structure of my code with custom functions has improved code organization and reusability.