Final Project

In this project I was tasked with creating a 3DF scene in OpenGL that replicates a 2D image using basic shapes and textures. Working as a 3D graphics developer, this project showcases the ability to generate low-polygon 3D models and develop interactive graphics applications. The 3D scene created here is intended to be a simple yet accurate representation of my 2D image, providing a foundation for 3D printing needs.

The 3D objects in the scene were created using a combination of basic shapes: boxes, cylinders, and spheres. These shapes were chosen because they closely matched the elements presented in my 2D image. For example, the desk was represented as a plane, the keyboard as a box, and the computer screen as a combination of boxes for the screen and base. The placement of objects in the scene was done using X, Y, and Z coordinates, ensuring they align with their counterparts in the 2D image.

Texture was applied to enhance the realism of the scene. I selected royalty free images with a resolution of 1024x1024 and 512x512 pixels for textures, ensuring that they were projected accurately onto the surfaces of the 3D models. Lighting was implemented using the Phone shading model, which includes ambient, diffuse, and specular components. I incorporated two light sources: one point light and one directional light, with one of them being colored. This setup ensured that all objects in the scene were well-lit and visually appealing when the camera moved around them.

To allow users to explore the 3D scene, I implemented camera controls using the WASD keys for forward, backward, left and right movement, and the QE keys for vertical movement. The mouse controls the orientation of the camera, allowing it to look up and down and right and left. The mouse scroll wheel adjusts the speed of the movement, giving users fine control over how they navigate the scene. I also implemented functionality for switching between perspective and orthographic views using the ‘P’ and ‘O’ keys. This provides users with flexibility in viewing the scene in both 3D and 2D formats.

Throughout the project, I adhered to coding best practices, including proper formatting, commenting, and modularization. The code is structured to be easily readable, with clear indentation and spacing. Descriptive comments are used to explain the functionality of the code, ensuring it is understandable for anyone who reviews it. I also made sure to separate different functionalities into distinct functions, making the code modular and easier to maintain.

The choice of 3D shapes was based on the need to replicate the objects in the 2D images as accurately as possible while keeping the models simple and low polygon. Textures and lighting were selected to enhance the visual quality of the scene and ensure that the objects appeared realistic under carious lighting conditions. The camera controls were implemented to provide users with seamless navigation experience, allowing them to explore the scene from different angles and perspectives.

This project successfully demonstrates the ability to create 3D scenes using OpenGL, replicating a 2D imagine with basic shapes and textures. The implementation of camera controls, texturing, and lighting has resulted in a polished and interactive 3D environment that meets the requirements. Despite some challenges, such as optimizing the lighting and ensuring accurate texture projection, the outcome reflects the project goals and showcases the skills developed throughout the course.