**7-1 Final Project**

Winnie Kwong

Southern New Hampshire University

CS-330 Comp Graphic and Visualization

Professor Battersby

December 10th, 2023

**Justify Development**

When developing the 3D scene, I used realism and simplicity with the fundamentals of OpenGL to create an accurate model of the 2D images. Applying proper textures and lighting creates extra layers of depth to the scene's meaning, enhancing the viewer's emotion and engulfing the view in an illusion of a life-like world. The textures applied to the objects were carefully chosen to ensure the objects were not pixelated and risked the chance to ruin the scene's atmosphere. Using different light colors also affects the scene by setting the environment's mood. The scene is manipulative by adjusting the lighting to darker tones of blue and purple. It can be assumed to be during the night, triggering the mind to feel more cautious when roaming in the dark. One of the critical elements of navigating through the scene is combining the camera with the flashlight to set the tone and emphasize the object's different dimensions. Connecting a flashlight spotlight with the camera contributes to the visual effects by compensating for the scene's lack of brightness and creating an illusion for the viewers to feel as if they are walking around in the middle of the night. Using the mouse function to move the camera in multiple directions makes the viewers think they are actually in the scene, making it more realistic and interactive I have also kept in mind the reflection of each object and how it will react to the flashlight (spotlight) that was put in place. Objects such as the metal on the pendant, the clasp of the ornament, and the gloss texture of the Rubik's cube play a role that naturally reflects light compared to the dullness of the nanoblock donut. Realism and simplicity are important factors when creating art because they allow the viewers to see more honest and ideal imagery that captures the beauty of everyday objects.

**Navigating a 3D Scene**

Using the mouse function to move the camera in multiple directions makes the viewers think they are actually in the scene, making it more realistic and interactive. Creating a function for the camera is determined by the direction of the viewer's input. With a directional pad, users can easily navigate the scene. Also, with the help of including the mouse cursor, the code enables the viewer to be aware of their surroundings. The camera can mimic the viewer's actions by including a mouse cursor as if they are looking around and turning their neck. Using the camera controls also increases the perception of the object's depth and the mathematical calculations involved with each object. For example, the scale of the nanoblock donut is much smaller than the Rubik's cube. Still, the donut required more render functions to call to create the various cylinders, cubes, and textures whereas the rubik’s cube required one cube and six textures. When combining lighting with the camera, the code's functions can also determine the intensity of the reflection of each object. In the scene, as viewers move towards an object, the shininess's reflection is higher than when the viewer is further away from the object. Including a directional pad, mouse, and lighting effects in the code helped to make the scene experience convincing.

**Custom Functions**

The custom functions in the program help make it more modular and organized because it is broken down into smaller portions for manageability and readability. Having a managed program with smaller code blocks can save time. For example, on the nanoblock donut, there are over 20 sprinkles with five different colors: yellow, red, pink, green, and blue. With organization, it would be easier to modify a single sprinkle that needed change instead of utilizing trial and error to locate the sprinkle. Also, having separate functions follows standard industry practices, making the code much easier to read. For example, if the developer wanted to adjust the camera or mouse functions, copying and reusing them in another program would be simple. Suppose the functions were placed only in the main function. In that case, it can result in the developer having syntax errors when reusing the code. Having separate functions to perform specific tasks makes the program more accessible to identify and resolve any possible issues.