For my project, I recreated a simple scene of objects found at my desk and arranged them on top of a notebook. The first object was a Yeti coffee cup that was created using a combination of three cylinders and a torus. The three cylinders were necessary in order to recreate the 2 different textures and materials of the cup. The top and bottom are stainless steel which are more reflective compared to the center of the cup which is painted. I programmed the 2 distinct surfaces to have different materials, and this is shown by how the lighting interacts with each surface. The torus was made using an ExtraTorusMesh1, This allowed me to adjust the thickness of the torus. The next complex shape is a black plastic cap to a bottle and is made up of a cylinder and a cone. The texture I used is supposed to mimic the ridges of the cap and the material is slightly reflective because plastic has some shine to it. The next 2 objects were simple shapes, a sticky note that was made using a plane and a toothpaste box made using a box. The material used for the note and box was paper because they are less reflective than the other objects.

For the lighting of the scene, I chose to use 4 different sources. First is a directional light that is used to illuminate the whole scene and assure all objects are visible. The next 2 sources are point lights located to the right and left of the scene. The point lights help to show the different textures and materials of the objects by adding ambient, diffuse and specular lighting. The final light source was a spotlight that resembled a flashlight being pointed at the scene. The lighting choices added realism to the 3D scene and helped to illuminate the objects. The placement of each object and their size was chosen to best recreate the original image. The first complex object, the Yeti, was placed at (0, 0, 0) and all of the other objects and the plane were positioned based off the Yeti.

Navigating the 3D scene is done using the keyboard and mouse and the functionality is coded in the ViewManager.cpp class. The movement of the mouse is meant to mimic the motion of a camera by changing its orientation in the x and y direction. Moving left and right makes the camera turn left or right and moving up and down also moves the camera up or down. The mouse scroll wheel is used to adjust the speed of camera movement. Scrolling down reduces the speed and scrolling up increases it. The final input device for the 3D scene is the keyboard. Using the keys A, D, Q, and E, the user can pan the camera left, right, up, or down, respectively. The keys W and S are used to zoom in and out. The last inputs that a user can do is changing the view between orthographic and perspective by using the O and P keys.

There are a few custom functions in my SceneManager.cpp class that are used to keep the code more organized. Each object in the scene has its own function to render the object and is called in the RenderScene() method. This allowed me to work on each object individually and helped keep track of which variables belong to which object. Other custom methods include DefineObjectMaterials(), which is used to dictate how an object reacts to lighting, and SetUpSceneLights(), that creates the different light sources for the scene. Both of these are called in the PrepareScene() method. Having these 2 as separate methods allows me to add new materials and lighting without altering the existing code if needed.