**Justify development choices for your 3D scene**.

My scene has four object that I chose for their simple shapes. I chose to use the alcohol bottle and the eyewash solution bottle as object that I could add complexity to since they were made up of three different shapes. I consider the small white tin can to be the most simple object and I found the hair tie to be the most challenging. The hair tie in my photograph is a torus, however, I had challenges incorporating a torus in my digital scene. My best attempt was to create a sphere with an image as the texture. I found that using the cylinder program as a objects made programing easier than creating several triangles to make a rectangular box. For example, the base of the alcohol bottle is actually a cylinder with only four sides. By creating the object this way, it made applying texture easier. The upper portion of the alcoloh bottle is where I made use of the drawTriangles function and set it on top of the four sided cylinder base. The base of the eye wash solution bottle is a cylinder this many side to give it the appearance of a rounded object. The very top of the eye wash bottle is a cone shape. I created this by modifying the code for the cylinder header and .cpp files to be able to accept a different radius for the top and bottom of the cylinder.

**Explain how a user can navigate your 3D scene**. As you compose your thoughts, discuss how you set up to control the virtual camera for your 3D scene using different input devices.

There are six keyboard input that can be used to navigate this scene.

* A key - moves the camera to the left
* D key - moves the camera to the right
* S key - moves the camera away from the objects
* W key - moves the camera towards the objects
* Q key - moves the camera down
* E key - moves the camera up
* P key - toggles between perspective and orthographic projection views

The mouse is also used as an input device. By using the scroll wheel on the mouse a user can move closer or further away from the scene just as they would use the S and W keys. A user can also move completely around the scene by moving the mouse.

**Explain the custom functions in your program that you are using to make your code more modular and organized**.

I found that having specific shapes in their own class makes creating more objects using that class very easy. The cylinder, cone and sphere classes can all be reused to make additional objects in this scene. If another object was to be created, calling a given class and creating a new object is simple. For example, to create a new cone, a user would need to call the cone class, provide the required inputs to identify the radius of both top and bottom surfaces, number of surfaces on the round edge, and height of the cone. Finally, rename the cone and call the render method. All of the textures are grouped together and are distinguished by incrementing numbers (texture1, texture2 and data1, data2…). Adding new textures to existing objects or new objects would only require duplicating that block of code and incrementing the name of the texture and data number.

Alnaji, L. (2015). *SNHU*. YouTube. https://www.youtube.com/@loayalnaji7903

Vries , J. de. (2014, June). *Welcome to OpenGL*. Learn OpenGL, extensive tutorial resource for learning Modern OpenGL. https://learnopengl.com/

A picture containing plastic bottle, water bottle, solvent, plastic

Description automatically generatedA picture containing text, plastic bottle, household supply, plastic

Description automatically generated

A picture containing plastic bottle, water bottle, bottle, indoor

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