Milestone 3: Algorithms and Data Structures

Chris Charlebois

Cup.CPP

*Briefly describe the artifact. What is it? When was it created?*

This is a 3-D model of a random object I had on hand, in this case, a plastic water cup, rendered in OpenGL. I chose this shape because of the difficulties in building a conical cylinder using polygon and the interesting effects different kinds of lighting have on this shape. I originally created this in a class on OpenGL graphics programming in 2019. This program is written in C++ and utilizes the OpenGL Extension Wrangler, the OpenGL Mathematics library, the freeglut OpenGL Utility Toolkit, and SOIL2 (Simple OpenGL Image Loader). The cup was model manually with 212 points and 130 polygons.

*Justify the inclusion of the artifact in your ePortfolio. Why did you select this item? What specific components of the artifact showcase your skills and abilities in software development? How was the artifact improved?*

I found writing code to generate graphics to be a fascinating process of algorithms and data structures. There are many tools that aid in computer graphics, but working with the low-level elements provided great insight in how these graphics are generated. I was not completely satisfied with the camera view controls in the original program. They were counter intuitive and simple, but they were the specific requirements called for. Given the opportunity to enhance this program, I expanded the degrees of control and allowed for easier camera movement around the object. Also, I added the ability to move the cup itself in relation to the lighting, rather than simply moving the point of view around the cup.

*Did you meet the course objectives you planned to meet with this enhancement in Module One? Do you have any updates to your outcome-coverage plans?*

This project required understanding and manipulation of algorithms to perform the complex calculations on all polygons as the camera and model were rotated in three dimensions and the data structures used to pass data between the program and library modules.

*Reflect on the process of enhancing and/or modifying the artifact. What did you learn as you were creating it and improving it? What challenges did you face?*

The most difficult part of enhancing the program was the mathematics involved with rotating the camera and model in three dimensions. This required the mental gymnastics to apply the proper trigonometric functions to calculate the transformations. One method I particularly liked was how I used temporary variables to account for the mouse input while the mouse button was pressed, using the permanent and temporary variables together to generate the live view, and then add or subtract the temporary value to the permanent value only when the mouse button is released.  
I also ran into a big problem creating a executable that would run outside of the development environment. The application would run, but would only produce a black window. It took far too long to realize that the issue was that I had not included the texture file into the same folder as the executable.