Project 1 Rendering Engine (Pure C++ version)

In this project, you will implement most of the rendering techniques mentioned in our lectures.

Following are the detailed specifications for this project.

1. This project **should be implemented in pure C++**, similar as our assignments 2 and 3. You can make use of any routines provided in the VS environment; however, graphics libraries, such as OpenGL, or DirectX, can not be resorted to.

2. The system can switch between two projection modes, perspective projection and orthographic projection. (6 points)

3. The user can interactively change the parameters for the camera coordinate system. Such parameters may include the camera’s position, the position of the reference point, and the up-vector. (8 points)

4. The user can insert new instances of 3D models to the scene. 3D models include cube, cylinder, sphere, and cone. The system needs to provide an interface for the user to specify the object’s parameters for instantiation. Both of the geometric attributes and their material properties can be specified by the user. Material properties may include their ambient reflection coefficients, their diffuse reflection coefficients, their specular reflection coefficients, their specular exponent, and their textures. You can use the parametric equations, or meshes, to represent each 3D object. (10 points)

5. The system can provide a basic wire-frame view for the user to observe the scene. (8 points)

6. For the shading models, please use the Phong shading model. The user can add new point lights to the scene. Of course, the system needs to provide an interface for the user to specify and modify the properties of lights. (10 points)

7. Please use the Phong surface rendering scheme (normal vector interpolation rendering scheme) to render the polygon. (8 points)