CS-450 Computer Graphics Spring 2021

Homework 2
Due: Wed, Apr 21 & Fri, Apr 23 at 2:30 pm (project demos and code)

Write a graphics application that shows a building on Coe's campus in **three levels of detail (LOD)**. The building must have at least one feature that is curved, such as a wall, arched windows, columns or steeple. At the crudest LOD, used when the viewer is far from the building, the curved feature may only have a few segments and other architectural features may be left out or approximated. At the finest LOD, used when the viewer is close, the curve feature should be very smooth and all other architectural features shown in full form. The middle LOD should be about halfway between the other two. Under the viewing system described below, the LOD should **switch automatically** based on how far the viewer is from the building (e.g., when zooming in or out).

You can create your models by hand, or use a tool of your choosing. In either case, you will need to provide **surface normals** and assign them to vertices in order to correctly shade the curved feature and the other parts of the building. Assign material properties as appropriate to different parts of the building. Make sure to "ground" your building by providing the surrounding 50 – 100 feet of sidewalk and lawn (and trees if you are really ambitious).

Add global ambient light, two or more positional lights that will distinctly light the model (e.g., light primarily shown on different parts of the building), and, optionally, a directional light (e.g., the sun). Global ambient light, when turned on, should have a low intensity, but should be bright enough to see the building clearly. The lights must remain **stationary**. Note: Modeling transformations affect lights, so be careful.

User-Interaction

Add the following **user-interactions**:

- Left mouse-based menu
  - lights
    - global ambient light: on (default), off
    - positional light 1: on (default), off
    - positional light 2: on, off (default)
    - directional light: on, off (default) -- optional
- Right mouse-based menu
  - display
    - mode: wireframe, filled – flat shading (default), filled – smooth shading
- On keyboard button '+' rotate through the three levels of detail
- viewing: use polar coordinates to allow the viewer to move their viewpoint along a sphere surrounding the building. When zooming in, the LOD should switch automatically.

As before, please add a **star '*'** after the currently selected mouse-based menu option as feedback to the user.

Email your code ("*hw2.cpp*") to me (thostetl@coe.edu) prior to the due date given above.