

CS/SE 3GC3 Lab 4

October 21, 2019

1 Resources

1. Red Book Chapter 5 <http://www.glprogramming.com/red/chapter05.html>
2. GLUT documentation (e.g., `glutInitWindowSize`) <https://www.opengl.org/resources/libraries/glut/spec3/spec3.html>
3. Lots of materials! <http://devernay.free.fr/cours/opengl/materials.html>

2 Practice Exercises

These are ungraded exercises for the first hour of the tutorial. This is your time to get 1-on-1 help from the TA!

1. Run `make` to compile and run `tut4.cc`.
2. Use `glEnable` to enable lighting calculations (with `GL_LIGHTING`) and two lights (with `GL_LIGHTn`, replacing `n` with the light index).
 - If you compile and run with lighting enabled but without setting any lighting parameters then you should notice that the teapot is actually dimmer than the solid 50% gray it was before.
 - `glutSolidTeapot` does give materials and normals to the teapot vertices, but we need to configure our lights in the scene.
 - The only reason we can see the teapot at all is due to the default global ambient light level. This is one term in the lighting equation!
3. `display` contains a loop. Call `glLightfv` four times in the body of the loop to set the parameters of lights 0 and 1. You should set `GL_POSITION`, `GL_AMBIENT`, `GL_DIFFUSE`, and `GL_SPECULAR`. The first is done for you.
4. Compile and run. You can use the `a` and `d` keys to move the position of light 1 along the x axis.

5. Expand the `handleKeyboard` function to use the `w` and `s` key to move light 1 along the y axis.
6. Note that all three objects in the scene are rendered after a `setMaterials` call. This function will set the material properties for the next vertices. The solid sphere uses the second material. We need to set the material of the teapot and wireframe sphere to the default material explicitly because otherwise the second time `display` is called the state would still contain the new material properties.
7. Complete the `setMaterials` function body. You should follow the instructions in the comment to set the material properties.
8. Extra: Add a third set of material properties to the `materialAmbient`, `materialDiffuse`, `materialSpecular`, and `materialShiny` arrays. There is a table of material properties in the resources list.
9. Extra: Expand `handleKeyboard` to change the color of the lights through their diffuse property or the material properties. Be creative! You'll likely do something similar in your assignments.