

## CSci 4611: Programming Assignment #3

*due: 8pm, Sunday, April 7*

The purpose of this assignment is for you to learn how to do illumination modeling and texture mapping using OpenGL. Illumination modeling allows you to introduce lights into a scene, to specify the reflection properties of objects in the environment, and to make pictures in which the object surfaces are properly shaded. Texture mapping makes it possible for you to put a pattern, instead of a solid color, on the surface of an object and to map environmental reflections onto an object's exterior. In this homework you will make a picture of a three dimensional shape, and you will use illumination modeling and texture mapping to modify the object's appearance properties.

As the starting point for your work on this programming assignment, you are to use your program for viewing a surface of revolution that you developed in Assignment #2. The shading and texture mapping that you must add for this assignment should work for any surface of revolution that the user defines using your existing program. You should also provide the user with the same navigation tools for changing the point of view with respect to the surface of revolution as was used in the previous assignment. You may use the working version of Assignment #2 that will be posted on the course web site by Friday, March 15 to begin development of the software for this programming assignment.

In addition to the menus for selecting **ANGLES** and **STEPS** from the previous assignment, your web page should include additional menu items for selecting the surface material. The surface material menu choices should be as follows:

**YELLOW PLASTIC** - Causes the surface of revolution to assume the appearance properties of yellow plastic.

**BRASS METAL** - Prompts the surface of revolution to take on the appearance properties of brass metal.

**TEXTURE MAP** - Maps an image texture onto the surface of the surface of revolution.

Finally, you should allow the user to change the lighting direction by holding down the Shift key and dragging the mouse (this action should **not** change the camera position).

In order to perform the lighting calculations, you will have to extend the modeling of your surface of revolution to include surface normals and texture coordinates. Don't forget that a triangle or quadrilateral has two sides and that, in certain circumstances, both sides can become visible (but not at the same time).

Surface textures that can be used to do this assignment can be made available to your program by inserting the following lines into your HTML file:

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Use the `img` tag `tile-img` or `wood-img` along with the method `document.getElementById` to access either of these two textures in your Javascript program. You are also welcome to supply your own surface texture by using a service such as <http://imgur.com> to make your texture accessible via a link as was done with the above two examples.

In addition to turning in **both** the HTML and Javascript files for a web page that can be viewed using the latest version of Google Chrome, you should also submit screenshots of your program while it is displaying the surface of revolution using each of the three requested appearances (yellow plastic, brass metal, and texture mapped).

When your assignment is graded the following rubric will be used to allocate credit:

Creating necessary vertex buffer objects	15%
Implementation of appearance properties	15%
Creating surface normals and texture coordinates	20%
Rotating light source	20%
Implementation of texture mapping	20%
Coding style and structure	10%