

ICS 280 F02: Computer Graphics
Programming Assignment 4
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Assigned: Oct 22, 2002

Due Date: Nov 5, 2002 11:59pm.

PROJECT GOAL: Lighting and Texture mapping.

- I. Draw at least two different models with different ambient, specular and diffused material coefficients. Have two lights with different light parameters. With a key stroke, smoothly increase and decrease the ambient light. With another key input rotate one light around the model. This is in addition to the rotate/zoom/translate operations of the object you have already implemented. Over this minimum requirement, you can add any other functionality that would improve your understanding of the lighting operations.
- II. Use different shading parameters like flat shading and smooth shading.
- III. Choose a large square plane and place the viewpoint and a light source in such a way they are at the same distance from the plane, and the viewpoint sees the specular highlight exactly at the center of the plane. (The vectors from the center of the plane to the viewpoint and the light make equal angle with the normal and the normal lies on the same plane described by these two vectors). Further, make sure that the specular exponent is very high so that there are no specular highlight on the corners of the plane. Under this placement of the objects in the scene, render the scene. Now subdivide the square with an additional vertex at the center of the square. Under this new scenario, render the scene. Make sure you have “smooth shading” of OpenGL enabled. Document the differences. Comment on the “smooth shading” of the OpenGL.
- IV. Choose any non-offensive image and texture map it on the object. Use “texture wrap around” and “texture clamping” operations to understand these functions. To simplify texture coordinate assignment, you can choose a simple rectangular plane as your object. Let the size of the rectangle be (1.5,1.5). Let the texture coordinate of any point on the plane be (x,y). Notice the effects of ‘wrap around’ and ‘clamping’.
- V. This question is to understand the difference between the texture space and the object space. Use a square image for a texture. Use a regular grid of 4x4 on the XY plane as the object space. The texture coordinates are also equally spaced. Without reassigning the texture coordinates, randomly move the grid point coordinates within $(x \pm 0.5, y \pm 0.5)$.

Take snapshots of the images you generate for each of the above question. Document your results, and comment on each of them. Use `my_gl` for all the geometric transformation. Further, note under certain conditions, the light position also has to be transformed using the model-view transformation.

Note: This assignment is just to get you started on lighting and texture mapping, and can no way be assumed to give you a complete training on these features. Try out different options of OpenGL from the red/blue book to learn more.