

CENG 477

Introduction to Computer Graphics

Homework 2 – Modeling Transformations

Instructor: Prof. Dr. Yusuf Sahillioğlu

Duration: Two and a Half Weeks

You will implement an OpenGL program that performs Modeling Transformations.

You can use GLFW, GLUT, or FreeGLUT as an OpenGL Windowing API.

You can take your input from keyboard, e.g., scanf, but you'll get +20 bonus if you use GUI, e.g., NanoGUI, within your OpenGL program.

You will implement the program on both CPU (50 pts) and GPU (50 pts). For the former, use OpenGL functions, e.g., glVertex3f(), but not transformations functions such as glRotatef(). Once loaded to the screen, you will update the model coordinates by applying composite transformation matrices to the homogenous coordinates.

For the latter, use GLSL (OpenGL Shading Language). Use OpenGL transformation matrices, e.g., glRotatef(), to set your final matrix to be used by the vertex shader. Rasterizer will then send the pixels to fragment shader in which you will perform Toon Shading. You'll get +10 bonus for Gooch Shading and +10 for Phong Shading.

You have to support 3D transformations listed below:

- Translation
- Rotation around an axis parallel to x-axis, y-axis, and z-axis
- Rotation around an arbitrary axis
- Scaling w.r.t. a fixed point
- Reflection over an arbitrary plane
- Shearing in x-direction, y-direction, and z-direction.

Support resetting, i.e., I should be able to roll back to the original coordinates, without closing the program, in order to test another transformation.

Submission

Use models available at segeval.cs.princeton.edu. Do the homework individually. Submit your solution through ODTUClass. Specifically, you must send source files, executables, and a report listing the screenshots of your executions for each task above. Report should also include encountered problems & interesting observations.