

EECS 104

Fundamentals of Computer Graphics

Project 1

Project Objectives:

As part of this warm-up project you will (1) create your first working graphics program based on OpenGL, (2) implement an event-based rendering framework, using GLUT, (3) implement an intuitive graphical user interface based on GLUT, GLUI or QT, (4) learn about window management and initialization and (4) draw and manipulate simple OpenGL primitives.

Project Description:

Your first project will be the implementation of a 3D viewer that renders models provided in the Fundamentals of Computer Graphics (FCG) file format. You will use a parser to load models in the ".fcg" format, store them in a data structure and display the described scene using OpenGL. You are expected to implement the following components for this assignment.

- (a) Create and configure a drawing area that can be swithed between perspective and orthographic projection.
- (b) Modify the provided parser to satisfy the ".fcg" file format (Version 1.1).
- (c) Draw the contents of the provided ".fcg" files.
- (d) Allow the user to resize the window interactively (preserve aspect ratio and keep your image in the same relative position).
- (e) Toggle display modes (solid/wireframe/points) based on keyboard events (S/W/P)
- (f) Implement mouse events that allow the user to translate, rotate and scale the model by manipulating the image area directly with the mouse. For example, pressing the left mouse button and dragging the mouse would translate the object, pressing the right button and dragging the mouse would rotate the scene around the origin of the world coordinate system etc.
- (g) Create an intuitive user interface for your application based on GLUI or QT. Trackballs, sliders, buttons and text fields should be provided to control the position, orientation, scale of your target objects as well as other relevant visualization parameters.
- (h) Create your own model of choice in ".fcg" format.

Project Requirements:

The programming language for all projects will be C/C++ and OpenGL for all graphics aspects. We recommend the use of the Microsoft Visual C/C++ environment for developing your application. However, the use of MFC components is **not** allowed. All source code has to be carefully documented in doxygen compliant form and follow the VIS coding standards. The laboratory machines in EG3151 and ET421 are available for your project work and equipped with all the necessary tools. Project presentations will take place in EG3131.

Project Resources:

Information about how to install OpenGL, GLUT and GLUI on your personnel machine can be found under the resources section of the course homepage.

<http://vis.eng.uci.edu/courses/eecs104/resources>

Project Submission:

All projects have to be submitted electronically before the due-date. A detailed description of the submission process will be available on the course homepage. You will submit a complete version of your project including source files, header files, project files (makefiles), a one page user manual and description of features.

Project Presentation:

You will be asked to give a presentation of your program and demonstrate its functionality and correctness based on the provided `/*.fcg` examples and your own model. One additional "mystery" model will be used during the presentation to test if all features were implemented.

Bonus points:

Bonus points (10) will be available if you develop a parser or data structure that outperforms the `FcgParser` code by at least 10%. Source code snippets for the benchmarking of your code will be available. The most elaborate fcg model (part h) submitted, will also be awarded 5 bonus points.

HAVE FUN !!!