CPSC 314 Assignment 3

Term: September 2007, Instructor: Wolfgang Heidrich, heidrich@cs.ubc.ca, http://www.ugrad.cs.ubc.ca/˜cs314

Due: Monday, April 7, noon. in class

NOTE: this assignment needs to be demoed to the TA in your lab that week (April 7-11)!

Assignment 3.1: Graphics Demo (30 Points)

Implement a scene, animation, game, or tutorial of your choice in OpenGL. You may work alone or in groups of two. In the latter case, you need only hand in one demo. A list of ideas is suggested below. **Your final mark will be based in part on a short demo given to a TA in your lab session on the 28th or 29th.** You can use any of the OpenGL demo programs provided during this course as a starting point if you like, although you should document this in your README file.

If you need help regarding how to implement any particular features, do not hesitate to ask the instructor or the TAs. Be sure to develop your project in testable stages. The best demos will be glorified forever in the 314 Hall of Fame!

- **Driving Game.** Create a world with roads, or perhaps rough terrain without roads. Implement a mouse or keyboard interface for steering your virtual car around in this world. Ideas for optional features could include collision detection, night-driving mode, having the car leave tracks on the pavement or sand, providing control over the camera point-of-view (first person, third person, etc.), adding other autonomous cars in the world, etc. Be creative and add your own features.
- **Tutorial Application.** Implement a tutorial for some part of the course that you think would benefit from a demonstration or tutorial. One idea is to generate a 3D graphics visualization of the various rays that are produced during ray tracing a simple scene. Or maybe an interactive illustration of the steps in shadow algorithms such as shadow mapping or shadow volumes. One last idea is to graphically illustrate, in 3D, the various vectors involved in performing local lighting computations. As the user moves the mouse, the vectors N,R, L, V are all drawn for the given surface point.
- **Ray Tracer.** Build a simple ray tracer. Begin with simple scenes. A single reflective sphere that sits on a checkerboard terrain is a good test case. Work towards more complex scenes as time allows.
- **Fractal Terrain.** Interesting mountain-like terrains are easily generated using a recursive procedure and random numbers. Talk to the instructor or your TAs if you are interested in this.
- **Surfaces of Revolution or Swept Surfaces.** An object like a wine glass is a surface of revolution. It can be generated by rotating a curve around some axis - in the case of the wine glass this would be the vertical axis. Build an application which lets you draw a curve using the mouse, and then this curve is turned into a 3D object by rotating it around a given axis, or by sweeping some other fixed cross-sectional shape along the curve.
- **Particle System.** Use simple physics (F=ma) to animate a set of points, for example to simulate a firework.
- **Another demo of your choosing.** Create an OpenGL scene or animation that illustrates something that you have a personal interest in. Add something interesting to one of the previous assignments.
- **Research Report.** Investigate some area of interest to you in further depth. How is computer graphics used to support medical imaging? How were the special effects for a given film done? What are the social implications

of being able to easily create videos of 3D scenes that are indistinguishable from reality? Should the goal of computer graphics be to continually achieve better realism, or should it be to achieve new visual styles that would be impossible with conventional film? How has computer graphics influenced the design of objects around us, etc.? If you do write a report, you will be expected to also prepare a 5-6 minute summary powerpoint presentation for your lab.

Hand-in Instructions

You do not have to hand in any printed code. You need only do one submission for a group of two. Create a README file that includes the names and login ID of the group members of your project, and any information you would like to pass on the marker. Create a folder called `assn3` under your cs314 directory and put all the source files, your makefile, and your README file there. Also include any images that are used as texture maps. Do not use further subdirectories. The assignment should be handed in with the exact command:

```
handin cs314 assn3
```

Important: bring a filled-in and signed copy of the declaration on the next page to your lab presentation (one per person, even if you collaborate).

Collaboration Policy

This assignment **can** be a joined project with one partner.
If you have collaborated with other students on the solution to this assignment, this fact needs to be disclosed in the form below. In case of a collaboration on the programming part, you should also specify who did which parts of the project. Likewise, if external resources (other than the course web pages and text book) were used for solving the assignment, they need to be listed below. **Failure to disclose a collaboration or external resources constitutes an act of academic misconduct, and will be reported to the dean**.

Declaration

I hereby declare that I have read and understood the above statement.

Name:

Student ID:

Signature and Date:

I have used the following external resources:

I have collaborated with the following individuals (explain degree of collaboration):