Computer Science 411/611
Virtual Reality Systems
Fall 2007
Homework 2 (Midterm) – Free Fly

Due: Thursday, 9/27/2007

Overview

In this project, you will develop a program that allows the user to navigate a simple environment using the mouse. You can use this project as a base program to build upon for the next assignment, in which you will use the VR helmet as the input device.

Description

Given the code available on the class website, develop a mouse-controlled system for dynamically viewing 3-D scenes from arbitrary position and orientation. Use two windows, as follows:

- view window
  - output only
  - window size should be 640x480
  - should display the current scene from the current view at every instant

- A/E/R/Color control window
  - input only
  - window size should be 512x512
  - cursor position within this window specifies (at every instant) desired azimuth and elevation for the view
  - azimuth is specified along the x direction and ranges from $-\pi$ to π
  - elevation is specified along the y direction and ranges from $-\pi/2$ to $\pi/2$

  - (optional) display a 2-D coordinate system with sufficient labels/grid marks to clearly specify current A/E values
  - (optional) create a third window 256x256 to show roll angle (i.e., a compass) with grid marks

Button functions (with cursor in A/E/R/Color control window):

- left button down: continuous zoom forward along current view direction, i.e.,

  viewdir = (viewpt – eyept);
  eyept += increment * viewdir;
  viewpt = eyept + viewdir;
  (or viewpt += increment * viewdir;)

- right button down: continuous zoom backward along current view direction, i.e.,

  viewdir = (viewpt – eyept);
  eyept -= increment * viewdir;
  viewpt = eyept + viewdir;
  (or viewpt -= increment * viewdir;)

- middle button down: continuous roll, i.e.,

  roll += increment;

Key functions (with cursor in A/E control window):

- 's' – return to start view
- 'd' – toggle roll direction
- 'r'/'R' – decrease/increase diffuse red component
- 'g'/'G' – decrease/increase diffuse green component
- 'b'/'B' – decrease/increase diffuse blue component
- 'q'/'Q' – quit

Other functions can be added to enhance your viewer.

For the viewing object, change the solid cube shown in class to a solid pyramid, or any another interesting object. You may want to write code to import obj files, which can be generated by a variety of modeling applications, such as Maya.

Students in 611 must also add rectangles for surrounding walls, ceiling, and floor, and shade them in an interesting way.

Submission Requirements

You should submit the following:

- a hardcopy of your program (with your name, date, and compile line in a comment section at the beginning of your code)
- a sheet describing any special features of your project
- an electronic copy of your program (tar'ed and gzip'ed) sent to me at tadavis@cs.clemson.edu