

Computer Science 411/611
Virtual Reality Systems
Fall 2002
Project 3 – Flight Simulator

Due: Tuesday, 10/15/2002

Develop a mouse-controlled system for dynamically viewing 3-D scenes from arbitrary position and orientation. Use three windows, as follows:

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

- A/E control window
 - input/output
 - should display a 2-D coordinate system with azimuth on the x axis and elevation on the y axis
 - azimuth should range from $-\pi$ to π
 - elevation should range from $-\pi/2$ to $\pi/2$
 - cursor position within this window specifies (at every instant) desired azimuth and elevation for the view
 - include sufficient labels/grid marks to clearly specify current A/E values
 - input of 'r' should reset the view
 - window size should be 512x512

- roll window
 - output only
 - should display current roll angle (i.e., a compass)
 - include sufficient labels/grid marks to clearly specify current roll value
 - window size should be 256x256

Button functions (with cursor in A/E 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;
```

Other functions can be added to enhance your simulator.

You should also create a simple virtual world to fly through. You may use the cube (wireframe or solid) shown in class, along with some rectangles for walls, ceiling, and floor. Students in 611 must also create an interesting object to replace the cube (e.g., a piece of modern art in a museum).

You may work in teams of 2-4. Teams should not communicate with each other. Higher quality work will be expected from larger teams.