

3-D OpenGL

CS 420

Objectives:

- Understand the purpose of the z-buffer (depth-buffer).
- Understand the distinction between orthographic projection and perspective projection.
- Observe how a curved surface (a hemisphere) is constructed from triangles.
- Start to think about transformations such as translation and rotation.

Experiments

- Experiment 2.21 and Exercise 2.23 (3 pts.)
 1. Swap the drawing order of each of the two discs for each of the two upper annuluses. For each annulus, explain any differences you observe between original drawing order and the reverse drawing order.
- Experiments 2.22 and 2.23 and Exercise 2.28 (3 pts.)
 1. Explain the differences between orthographic and perspective projection.
 2. Consider two identical objects that are at different distances from the synthetic camera. With orthographic projection, will the two objects appear to be the same size? If not, which object will be smaller? Repeat for perspective projection.
 3. In perspective projection, where is the center of projection located?
- Experiment 2.24. (3 pts.)
 1. Modify the code so that pressing the **z** key moves the sphere away from you and pressing the **Z** key moves the sphere towards you. Explain all changes that you had to make to the code to accomplish this.
- Experiments 2.26 and 2.27 (3 pts.)
 1. Experiment with various combinations of the rotations. Start the program, then have it rotate the hemisphere about the X-axis. Then, terminate the program. Repeat this “start, rotate, terminate” sequence with the Y- and Z-axes, observing the rotations.
 2. Start the program and perform a 90 degree rotation about the Z-axis by pressing the **z** key 18 times. Now, press the **x** key several times, which should rotate the hemisphere about the X-axis. Which axis is the hemisphere actually rotated about? Explain this.