Project B: Living in the Matrix

EECS 351: Kevin Chen, kjc004

A Brief Intro:

This project demonstrates further application of concepts covered in EECS 351: Intro to Graphics. Building on top of Project A, I use WebGL to draw and color even more shapes. This time, however, I also arrange these shapes into a large world with a floor defined by a grid in the *xy* plane, and diffuse lighting illuminating objects from the top. Observers can also fly through this world with a glass cylinder calendar from both perspective and orthogonal angles.

The world consists of five objects: an animated multi jointed bent object with a star shaped end, a still pendulum, a pyramid, a cube, and a house.

User Manual:

Instructions are displayed at the bottom of the rendered index.html webpage.

The WASD keys control how the observer sees. In particular, AS determine horizontal rotation (e.g. turning), while WD determines vertical (e.g. looking up and down). Then, J and K keys respective zoom out and in on where the observer is looking. Clicking and holding down the mouse freezes the movement of the jointed object; dragging the mouse around subsequently animates it. Releasing the click also changes the colors of every object.

Results:

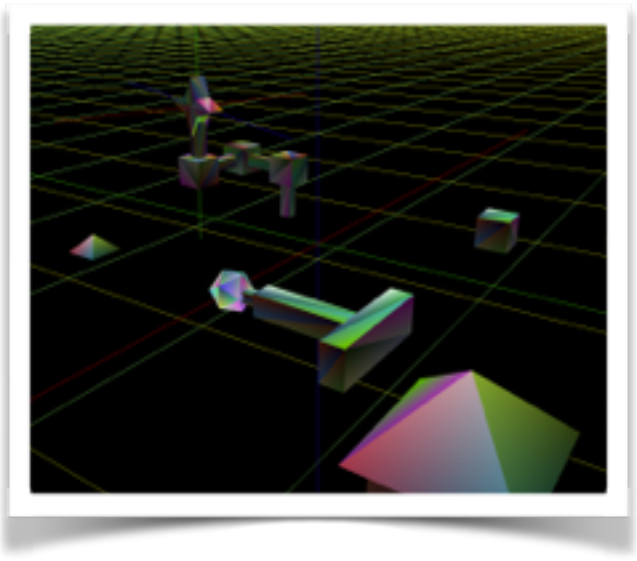

FIGURE 1. Viewing the scene perspectively.

I've included five shapes, with one animating in my scene. From the perspective viewpoint (Fig. 1), we can see all of them: there's a pyramid off to the left, a cube up and to the right, a house near the screen (more clearly depicted in Fig. 2), a still pendulum from the last project, and 4 jointed 5 segmented "bent joint" in the distance. We can also see a vast grid in the *xy* plane and *xyz* axes coming from the center of the image and from the star on top of the bent joint.

Figure 2 shows the same scene, but with an orthogonal view. The aforementioned house is show close to the front of the camera.

We can also see that diffuse lighting is implemented, originating from the positive *z* direction (Fig 3.). All of the bottoms of each object is notably darker here, and the entire bent joint changes its shading appropriate for its

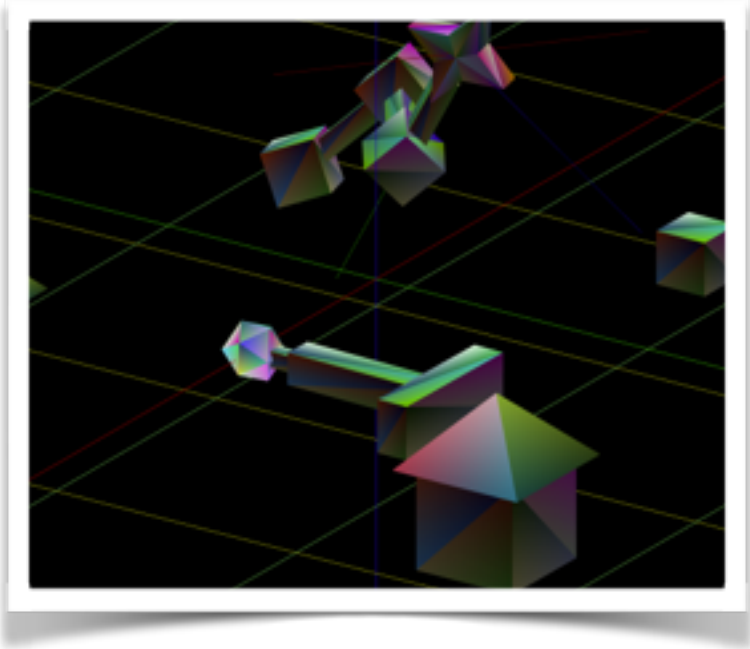

FIGURE 2. Viewing the scene orthographically.

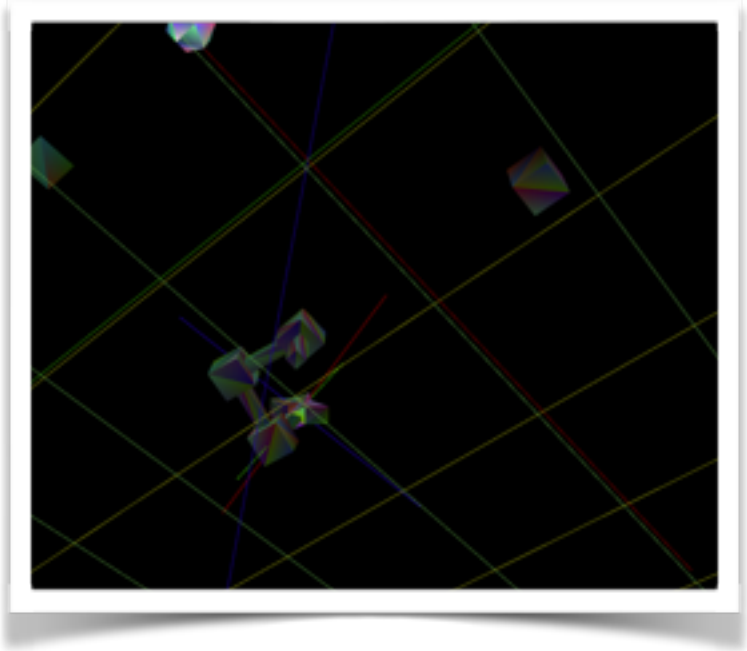

FIGURE 3. A bottom up shot.

orientation. The one exception is the icosahedron, which I did not compute all of the normals for, and thus radiates light everywhere.

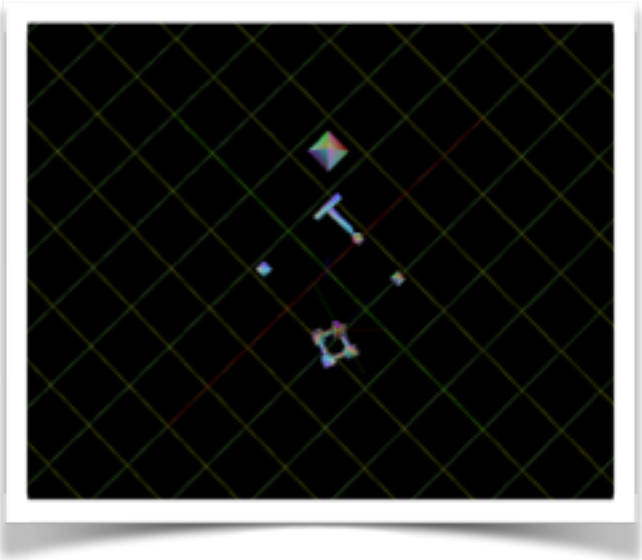

FIGURE 4. Top down shot.

Finally, Figure 4 depicts a bright, birds-eye view of this world. Please see the include PDF titled “SceneGraph” for Figure 5, the scene graph.