

Project B: Bicep workout and Camera Control

This report outlines the goals, usage and outcomes of my project and includes images and scene graphs of the created objects.

Section 1: Goal and User's Guide

The goal of this project was to create a three-dimensional world with interesting shapes that the viewer can explore. The world would have a ground plane that shapes would rest on, and the viewer could look at this world from two different viewports. At least one moving object would have diffuse shading. The world itself is based off the playground and features the bicep workout, rotating dumbbell, moving basketball and other objects. The motivation for such idea is due to personal affection upon fitness. The next section will explain how to manipulate these objects and use the program.

Upon opening the html file in the Google browser, there will be a set of basic instructions on top about how to alter objects on the screen and move the camera around the world space. There are two different scenes on the canvas that the user can interact with: a perspective one and an orthogonal one, which are shown as Figure 1. There are several different types of controls and interactions the user can choose: mouse-click (single & double), button interaction, mouse-drag and keyboard inputs.

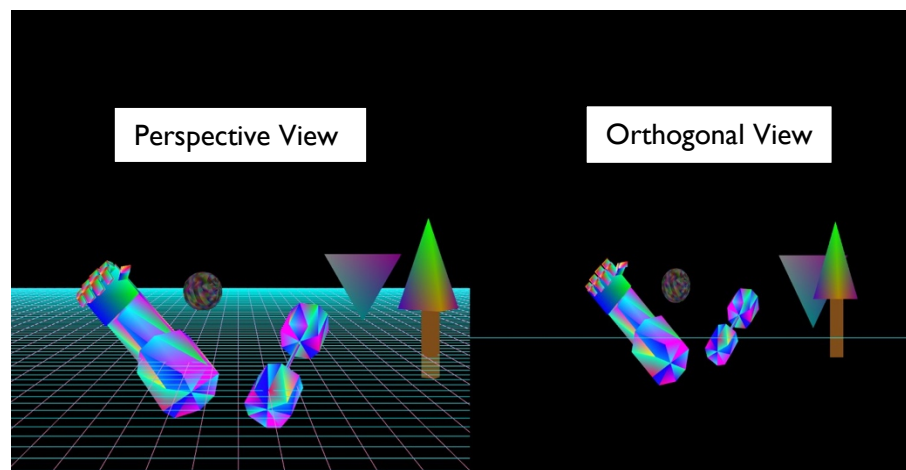


FIGURE 1 TWO DIFFERENT SCENES

Here are the features of this project. Press H/F1 on the keyboard or click the Help button blow the canvas will go to the help message. The whole arm will do curl workout with the changing shape and color over time. And users can use mouse drag to rotate the hand to any angle. In addition, there is a rotating dumbbell on it. Both of these two parts could be moved around the canvas by using the ASWD keys on the keyboard. You can the Faster and Slower buttons blow canvas to

accelerate or slow down the speed of movement. The current rotating speed shows a little above these buttons, the larger value is the faster the objects moves. There are bouncing basketball, rotating pyramid and tree on the scene. And the diffuse overhead shading only occurs on the basketball and the pyramid.

More interestingly, I added some other new features. Press Arrows buttons and B(raise) and N(lower) to move the view to any place in the 3D space. Press Z(up), X(down), C(left), V(right) to turn the camera up down left and right. Just like raise lower or turn left and right the head. Mouse drag for Rotating the Hand with Quaternion. Now the hand's rotate is using the Quaternion which is more smoothly and authentic. Click Flying-airplane button to enter airplane navigation control. In this method, use J(left), L(right), I(up), K(down) to drive even roll pitch or yaw the camera just like flying an airplane. Click the Follow button to switch the perspective camera to the little finger of the hand. Click Perspective/Frustum button to switch the perspective view between perspective and frustum. In frustum, you can use the 12 buttons blow to freely adjust the camera.

Section 2: Results

The below pictures illustrate the program. Figure 2 is a screenshot of the Instructions available when opening the html file. Figure 3 – 6 exhibit different states of the program. The first is 3D view control, where we could use Arrow buttons and ZXCVCBN to easily move the view to any place in 3d space. The second is adjustable asymmetric camera and users could use Arrow buttons and ZXCVCBN can easily move the view to any place in 3d space. The third is the flying airplane model, which could be activated by clicking Flying Airplane Button. And users could change the flying direction via JKLI keys. The last one is Following model, which could be activated by clicking Follow button. In this case, the moving speed will be set to 5(a slow speed) and the camera is located on the little finger of the hand. In addition, the hand and dumbbell could be moved by ASDW keys and the whole arm can also be dragged to move around.

ΩΩ

Instructions

Press HELP Button or "F1" or "H" for help!

The Diffuse OverHead Shading currently only Appears on the Sphere and the pyramid!!

CurrentSpeed= 45

Faster Slower HELP

Follow

Flying-airplane

User Control for the frustum camera! Perspective/Frustum

Current camera is

Perspective

←+ →+ ↑+ ↓+ far+ near+

←- →- ↑- ↓- far- near-

This Page Says

Press H or F1 for help!
 Press Arrows keys to move the view
 Press Z(up), X(down), C(left), V(right) to turn the camera up down left and right.
 Press B to raise the camera higher, N for lower.
 Mouse drag for Rotating the Hand with Quaternion.
 Press ASDW to move the Hand and dumbbell.
 Click Flying-airplane button to enter airplane navigation control.
 In this method, use J(left), L(right), I(up), K(down) to drive even roll pitch or yaw the camera.
 Click the Follow button to switch the perspective camera to the little finger of the hand.
 Click Perspective/Frustum button to switch the perspective view between perspective and frustum.
 In frustum, you can use the 12 buttons blow to freely adjust the camera.

OK

FIGURE 2 INSTRUCTIONS

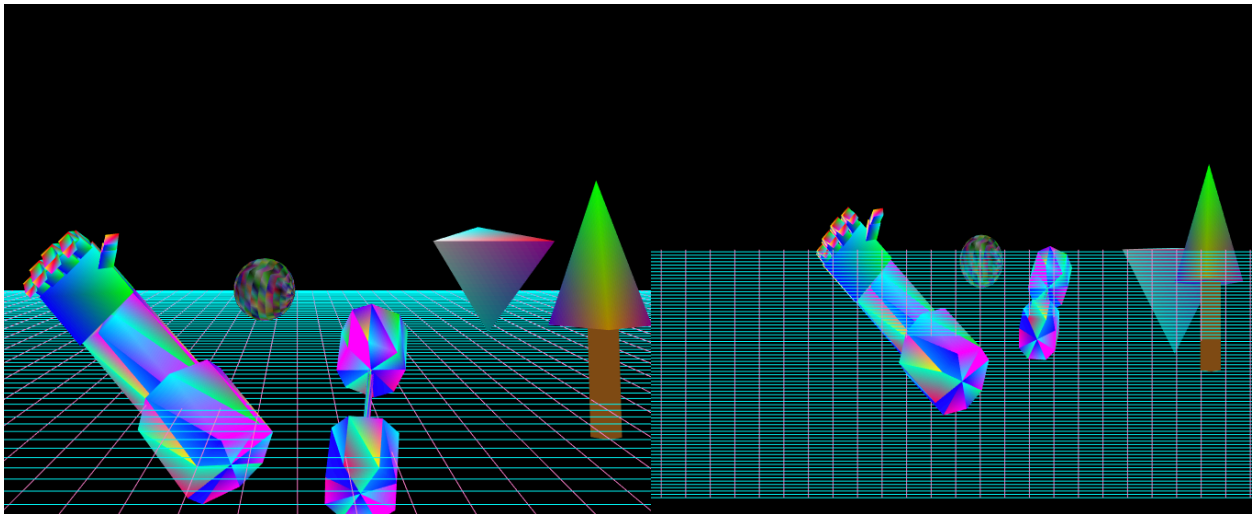


FIGURE 3 3D VIEW CONTROL

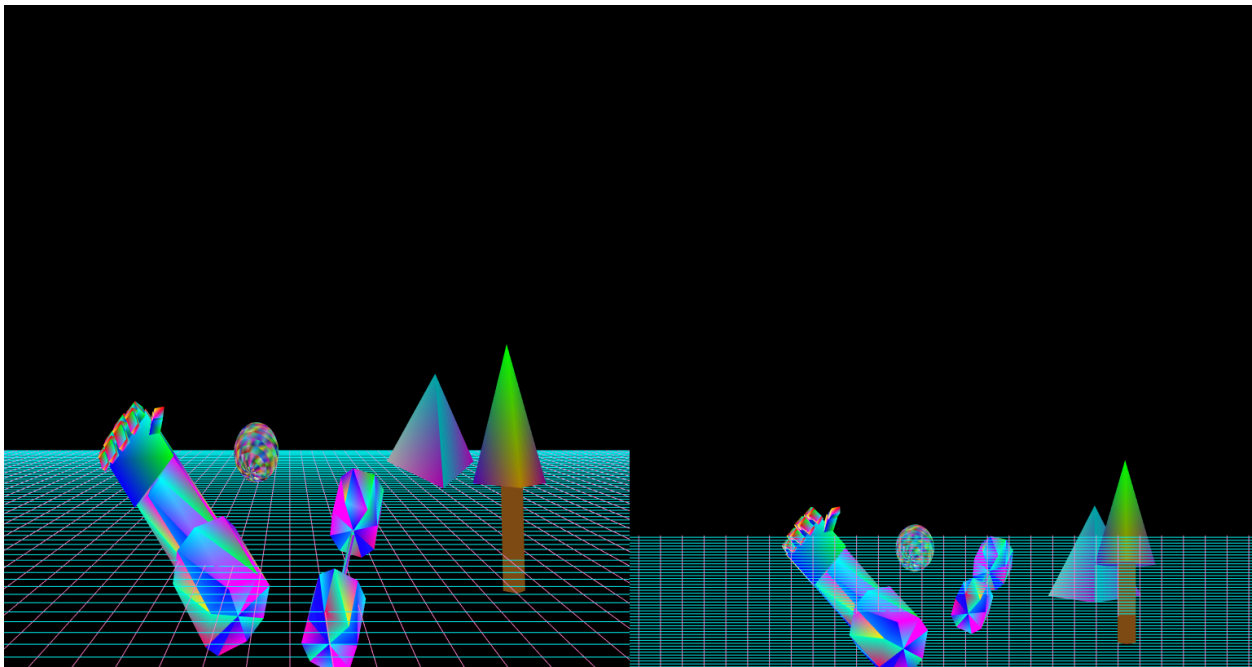


FIGURE 4 ADJUSTABLE ASYMMETRIC CAMERA

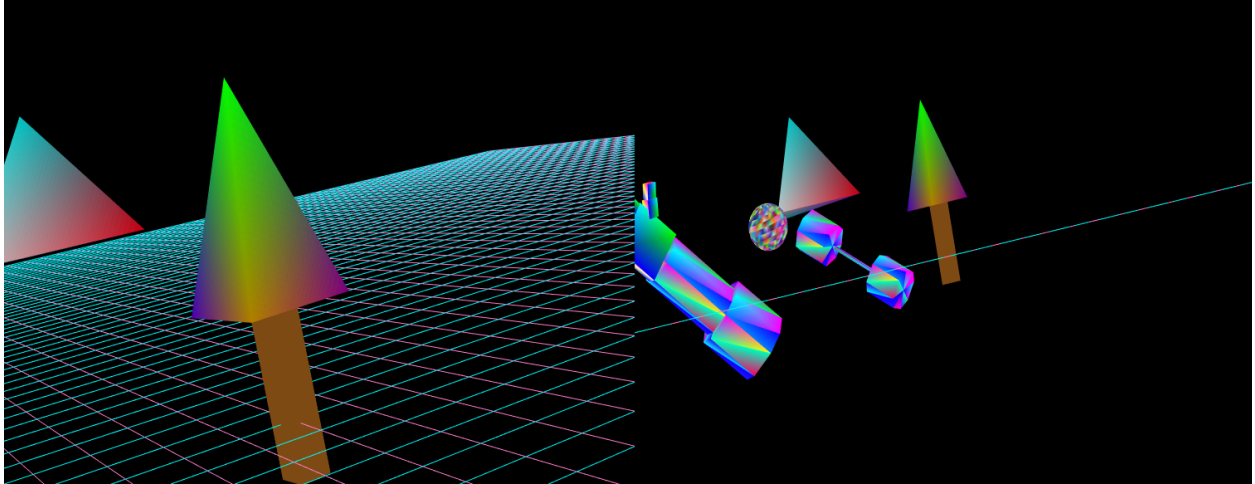
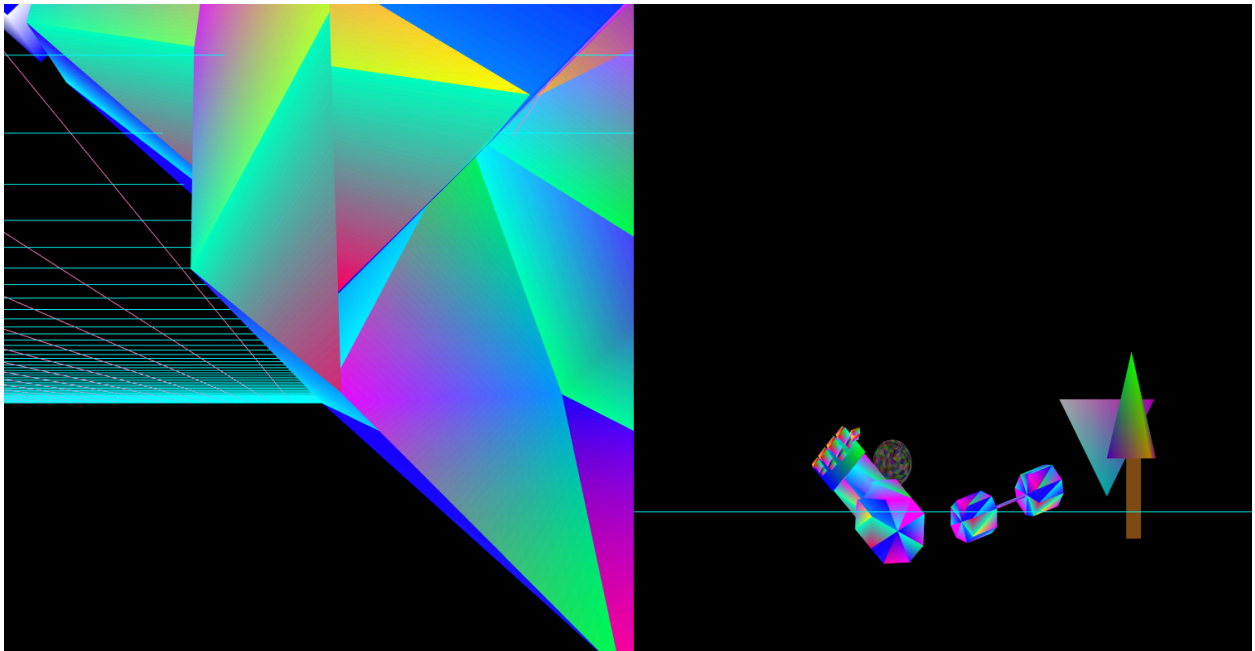
**FIGURE 5 FLYING AIRPLANE****FIGURE 6 FOLLOWING MODEL**

Figure 7 is a scene graph diagram of the project.

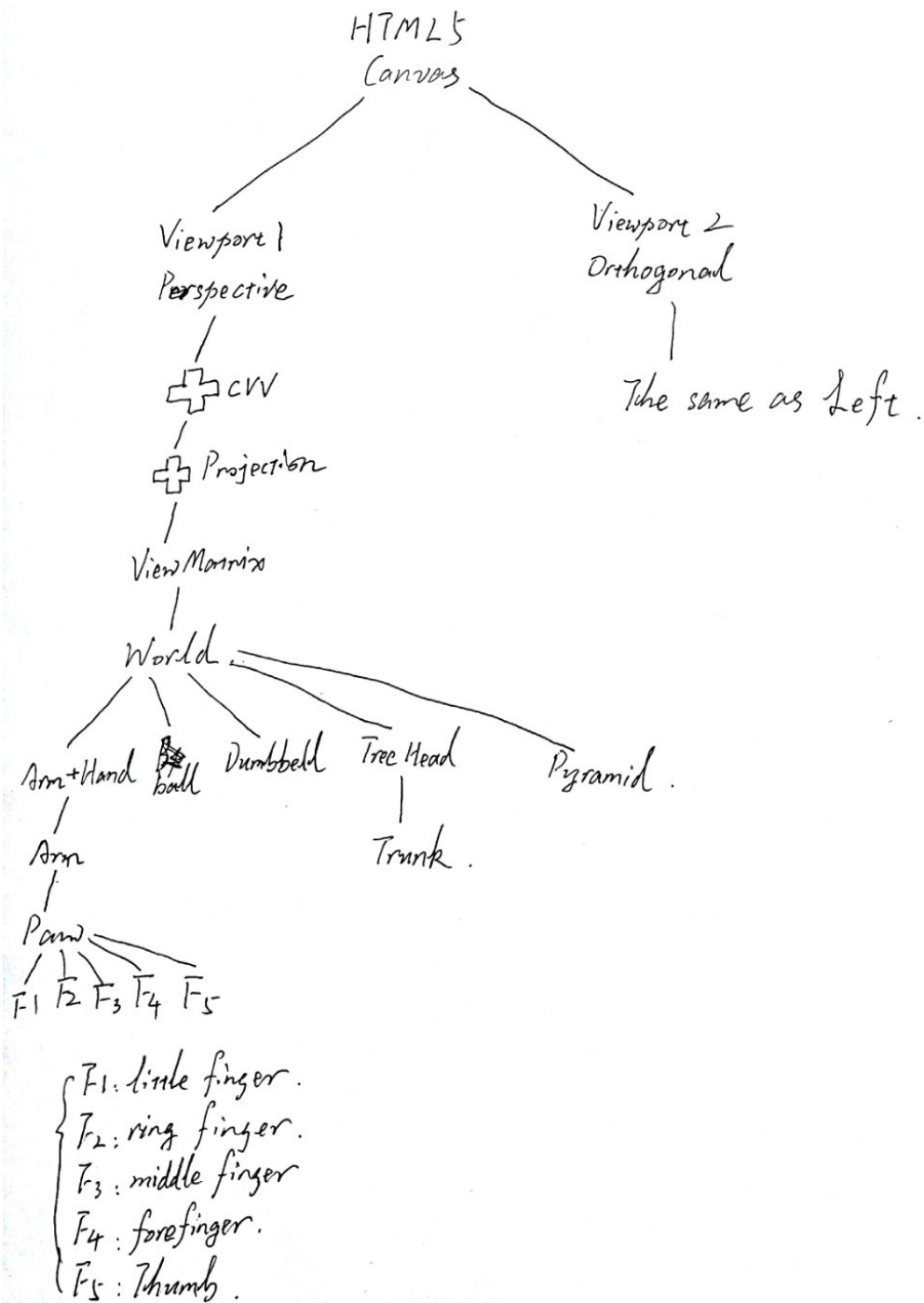


FIGURE 7 SCENE GRAPH