

Project A: Bicep workout and Rotating Dumbbell

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 various dynamic and jointed 3D shapes that were clearly different and unique from each other. As for what those shapes would be, the idea came into being that to create an action of bicep workout (named dumbbell curl) and a rotating dumbbell via using WebGL. 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 move and alter the objects on screen. There are two different objects on the canvas that the user can interact with: a whole arm and a rotating dumbbell, which are shown as Figure 1. There are several different types of controls the user can choose: mouse-click (single & double), button interaction, mouse-drag and keyboard inputs. For simplicity, we will look at the interactions based on what object they effect.

Bicep Curl: As mentioned above, the whole arm is curling, and its shape can be changing with the color meanwhile. And the user can change its curling speed by clicking button 'Increase the speed' or 'Decreasing the speed'. In addition, when the user click mouse once and dragging the mouse around the screen, it could be moved around the canvas. The other interaction available for this object is relocation. If you double click the mouse at any place on canvas, the arm could be relocated.

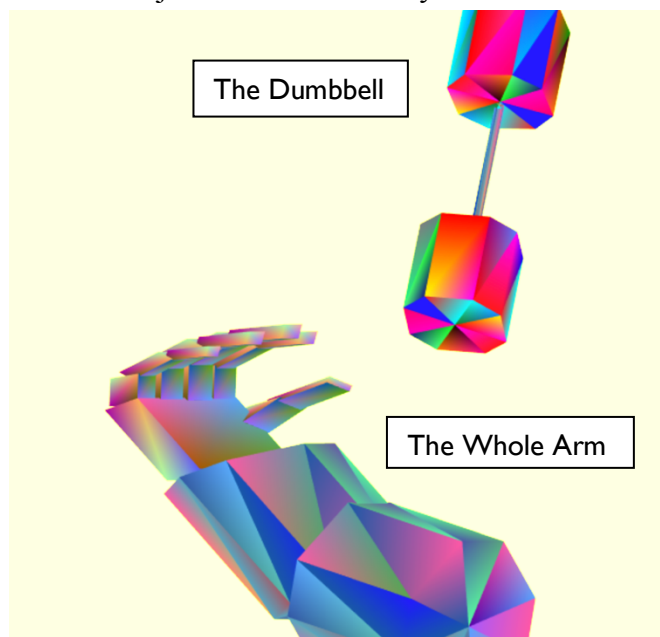


FIGURE 1 TWO OBJECTS

Rotating Dumbbell: The rotating dumbbell can be moved around the canvas by using different arrow keys, including right arrow, upper arrow, left arrow and down arrow. More interestingly, the two dumbbells could be rotating around the bar. Besides, if the user wants to stop those two moving objects, just click s key in the keyboard.

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 – 5 exhibit different states of the program. The first is the initial state. The second is after dragging the whole arm to move around the canvas. The last also shows relocation of both objects through key inputs and double mouse-clicks.

Instructions

This is an action of dumbbell biceps curl, which is shown as the moving arm.

In addition, there is a rotating dumbbell on the up-right of the canvas.

Both of these two objects are color-changed, and the arm is also shape-changed.

To increase or decrease the rotation speed of the The Arm, use the corresponding buttons.

Click on the The arm and drag the mouse to make it rotate around the canvas.

Double Click any place on canvas could relocate the arm.

Use arrow keys to move the dumbbell around the canvas, and press s to stop the rotation of the arm.

[Increase the speed](#) [Decrease the speed](#) [Help](#)

FIGURE 2 INSTRUCTIONS

Figure 6 is a scene graph diagram of the project. The nodes labeled with T mean a matrix translation. Those labeled with R mean a matrix rotation. Some have T, R which means a translation then rotation. And the index of different of T & R means different value of the T & R. The blue one represents Group Node, the red one means Transformation Node, and the green one refers to Object Node. Note: In this scene graph, the fingers and palm are cubes, the arms and dumbbell are Octahedron.

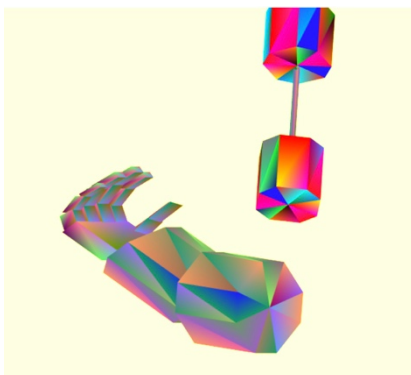


FIGURE 3 INITIAL STATE

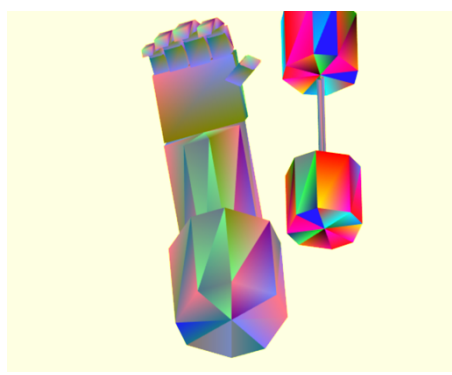


FIGURE 4 DRAG THE WHOLE ARM

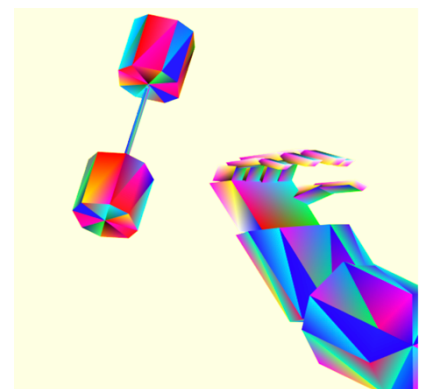


FIGURE 5 RELOCATION

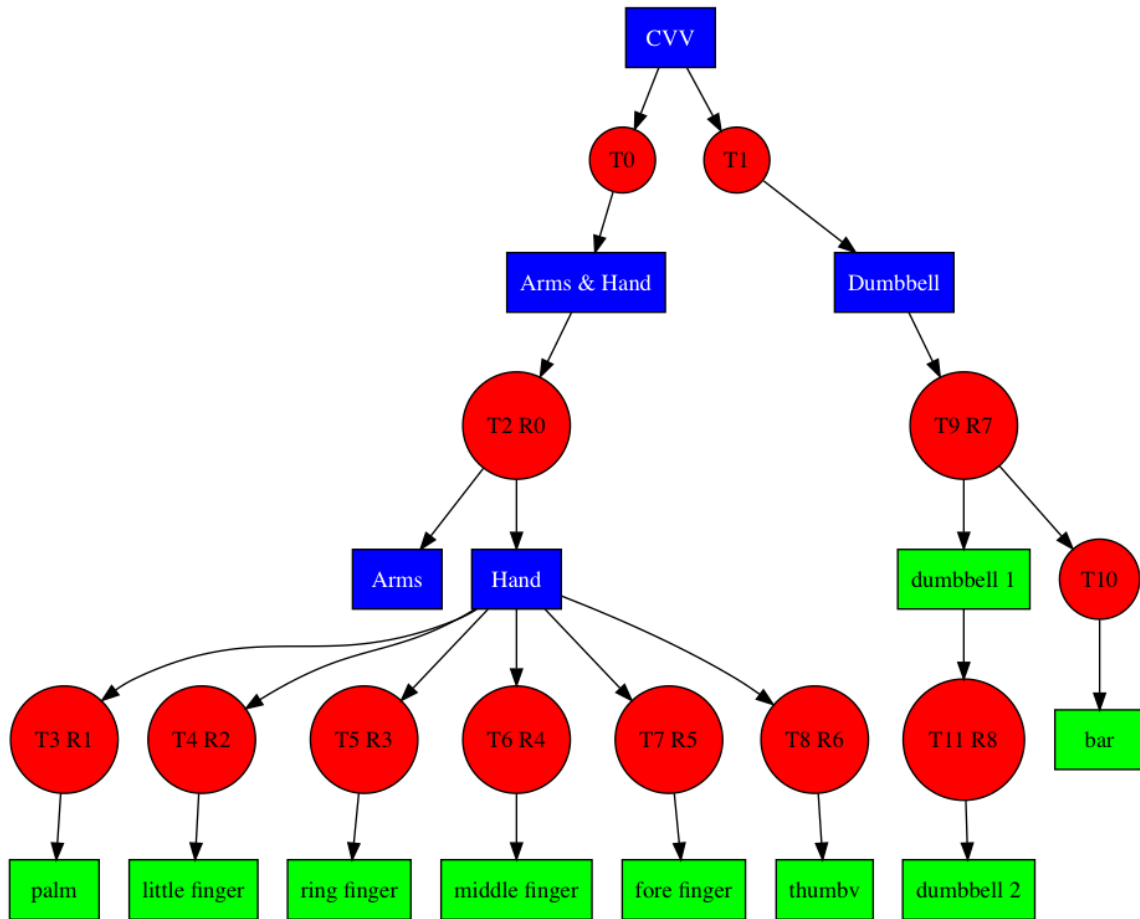


FIGURE 6 SCENE GRAPH DIAGRAM