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SII411

Project B: Exploration into the Virtual World of Robots, Animals, and Objects

Goals

The main goal of this project was to delve deeper into the virtual world through the use of cameras with perspective and orthographic views, simulating moving through a 3D space, and light shading to make objects appear more realistic and dimensional. This project also brought together past and new concepts such as quaternions, resizing the canvas to fit the browser, and the use of a ground plane to make movements more visible on screen.

User's Guide and Interactions

Enter key prints instructions below the canvas.

Mouse dragging is capable of rotating Baymax through the use of quaternions.

Arrow Up/Down/Left/Right and 7 and 1 on the keypad change the eye position.

The keypad numbers 8, 4, 6, 2, 9, and 3 change the look-at position.

The keys w, a, s, and z allow camera movement diagonally.

The keys p, l, o, and k allow change in the view frustum by changing near and far.

Results

Figure 1: The initial setup of the camera view. Baymax, the robot, is the jointed, animated object. His legs simulate a walking movement by moving back and forth, his jointed arm swings back and forth, while his fingers bend with each swing.

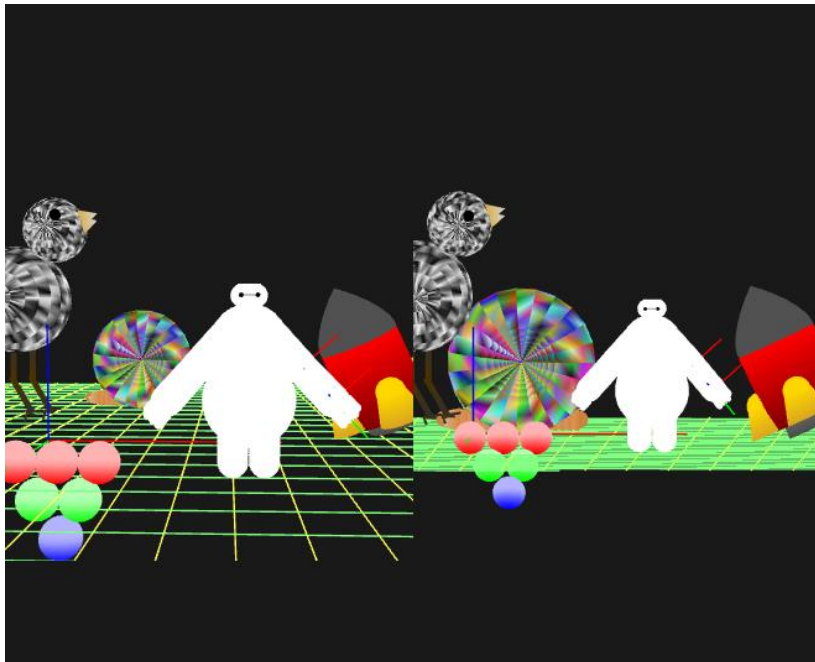


Figure 2 ,3: Different scenes from altering eye and look-at positions. Also visible in figure 3 are two alternate 3D axes in the jointed movement of the robot's arm and fingers.

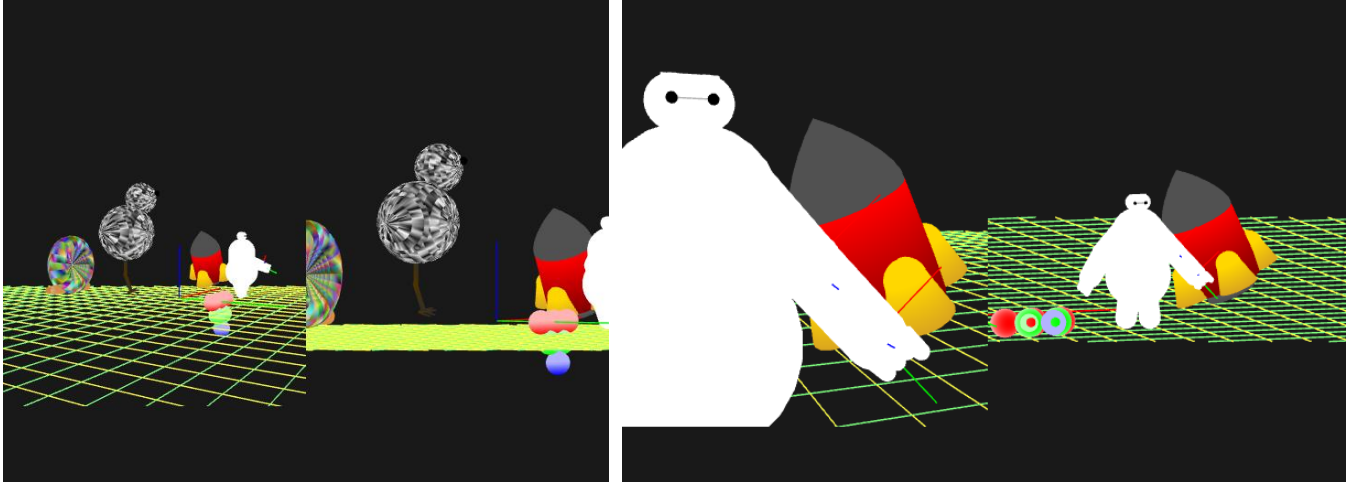


Figure 4 , 5: Simple diffuse overhead shading. As the shape rotates and the coordinate system changes, the shading ensures that the top will always maintain bright, and the bottom dim. For example, figure four has an upward z axis. This was calculated by using $\text{'color'} * (0.3 + 0.7 * \text{clamped_result})$.

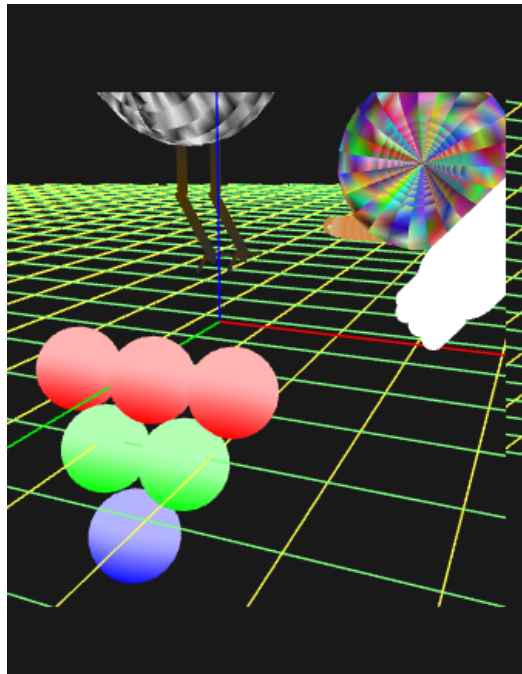
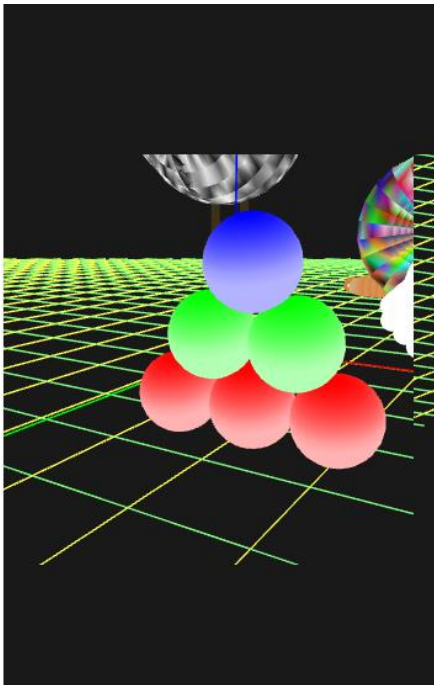


Figure 5, 7: Browser resizing, maintains viewport proportions

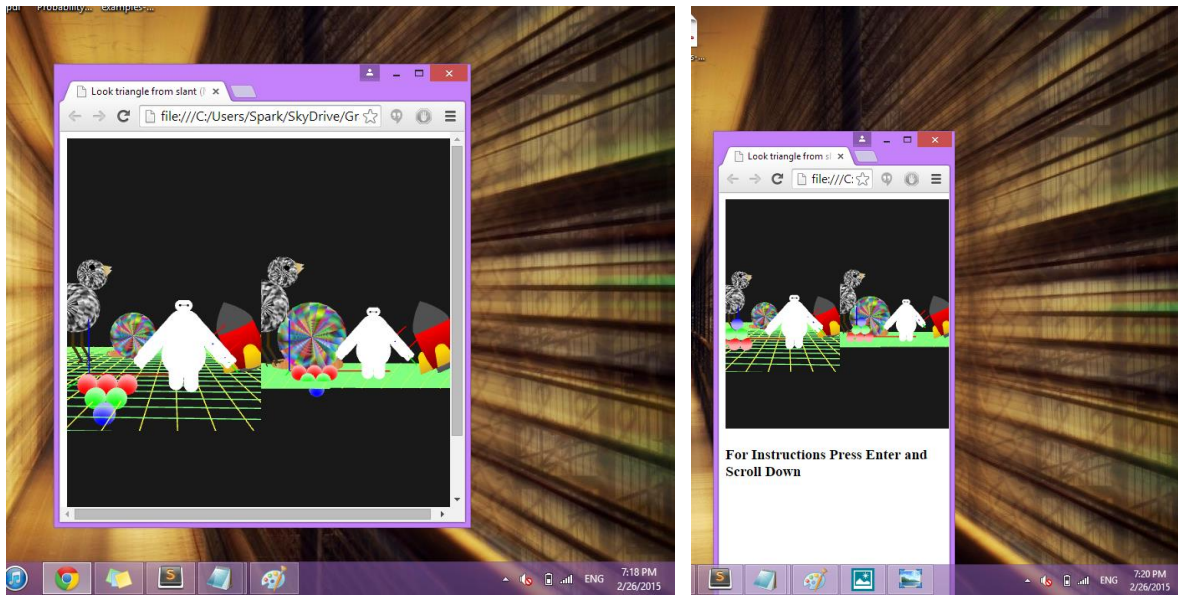
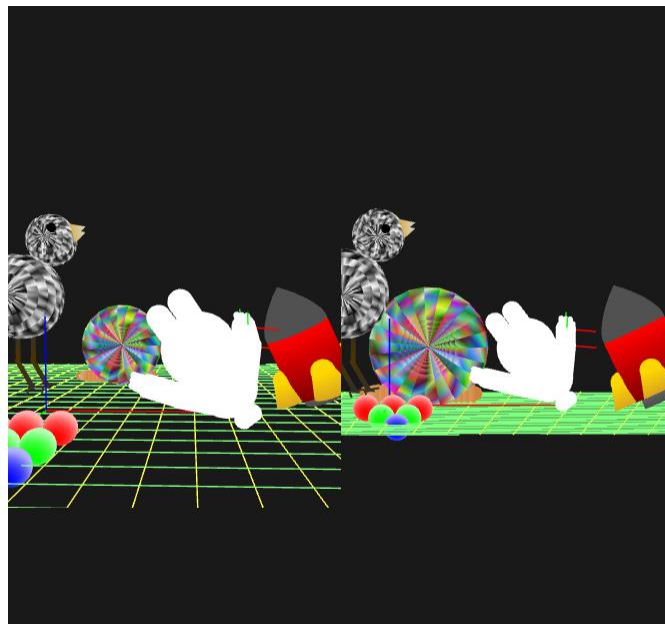


Figure 8: Mouse dragging to rotate Baymax through the use of quaternions



Scene Graph

