Project B: 3D World

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To illustrate a 3D world, I assume that the view is acquired from a flying camera, which fulfill the Canonical View Volume of the WebGL.

First of all, my program depicts the 3D scene twice, in two side-by-side viewports that together fill all the width of your browser window, without gaps and without any distortion of the images within, even after window re-sizing makes the webpage taller or wider. It always fills entire window width and at least 0.75 of the window height. Among them, the left viewport will show a 3D perspective image with 40-degree vertical field-of-view, the right will show an orthographic image, each from the same camera location and viewing direction.

Secondly, in the depicted 3D world, there are several kinds of objects. The rooster is flying in this imagine world which is colored by green and yellow. These roosters are automatically moving and rotating. Besides, each rooster is animated, adjustable, 3-jointed and 4-segment 3D shape. The sun is moving in the sky which is colored by red and orange. The fish is moving and rotating in the water which is colored by white, light blue and purple. The Tree is separated in the 3D world, which is colored by green and brown. There is also a 'Ground Plane' grid in the 3D world which shows the ground and river.

Thirdly, there is a 3D world-space coordinate. Besides, the sun and all the roosters have it own 3D coordinate. The red axe represents the x axe, the green axe represents y axe, and the blue axe represents the z axe.

In addition, the 3D world is simple diffuse overhead shading. It shows orientation-dependent on screen vertex colors, smoothly interpolated between vertices. The program computed each vertex color from the dot-product of surface normal and the world-space +z vector.

There are some adjustable 3D view controls in this project.

If you press the key of H, you can open a new webpage of user instruction to get some information of this project.

If you press the key of up arrow, you can spin upward the camera to see a different view.

If you press the key of down arrow, you can spin downward the camera to see a different view.

If you press the key of left arrow, you can spin leftward the camera to see a different view.

If you press the key of right arrow, you can spin rightward the camera to see a different view.

If you press the key of <, you can move forward the camera.

If you press the key of >, you can move backward the camera.

If you press the key of W, you can move up the camera.

If you press the key of S, you can move down the camera.

If you press the key of A, you can move left the camera.

If you press the key of D, you can move right the camera.

If you press the key of /, you can accelerate the speed of movement.

If you press the key of [, you can spin counter-clockwise the camera.

If you press the key of], you can spin clockwise the camera.

If you press the key of T, you can move upward the roosters.

If you press the key of G, you can move downward the roosters.

If you press the key of F, you can move leftward the roosters.

If you press the key of H, you can move rightward the roosters.

If you press the key of R, you can move forward the roosters.

If you press the key of Y, you can move backward the roosters.

If you press the key of U, you can spin counter-clockwise the roosters.

If you press the key of J, you can spin clockwise the roosters.

If you press the key of -, you can narrow the proportion of the width and height of the camera.

If you press the key of +, you can magnify the proportion of the width and height of the camera.

If you press the key of space, you can change the camera to the airplane view, so that the camera is automatically moving.

If you press the key of (, you can accelerate the speed of the airplane.

If you press the key of), you can decelerate the speed of the airplane.

In addition, if you drag the mouse, you can rotate the one of the rooster to some extent.

The following pictures are the results I cut out from the screen.

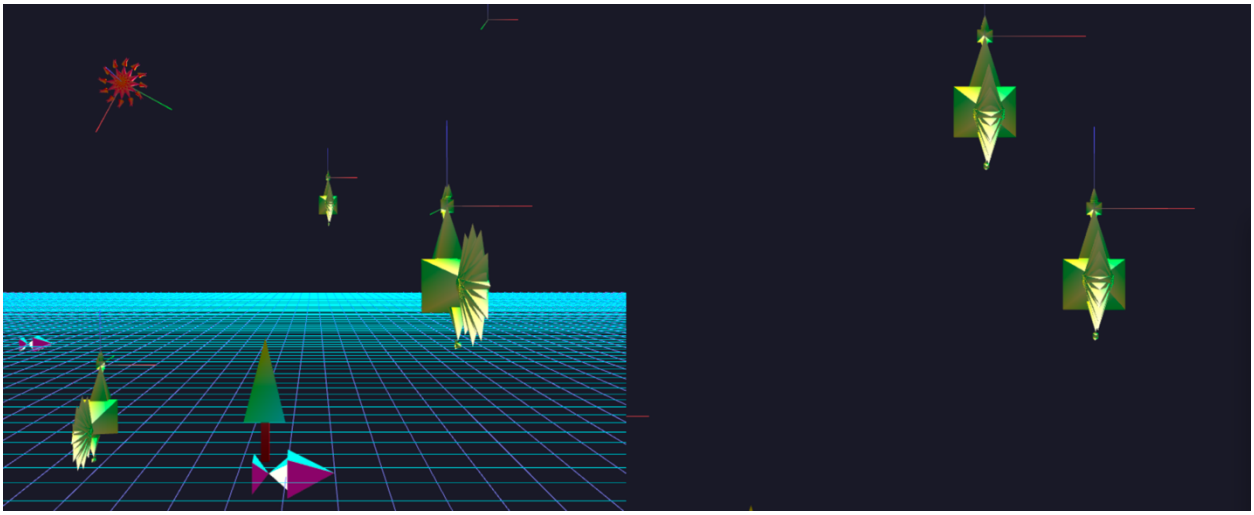

figure1

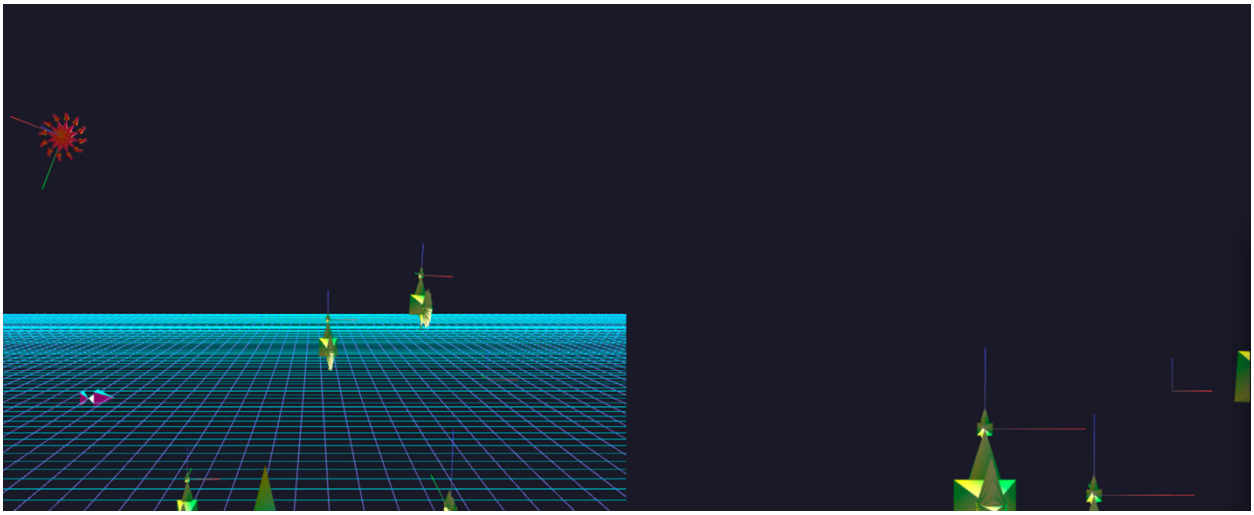

figure2

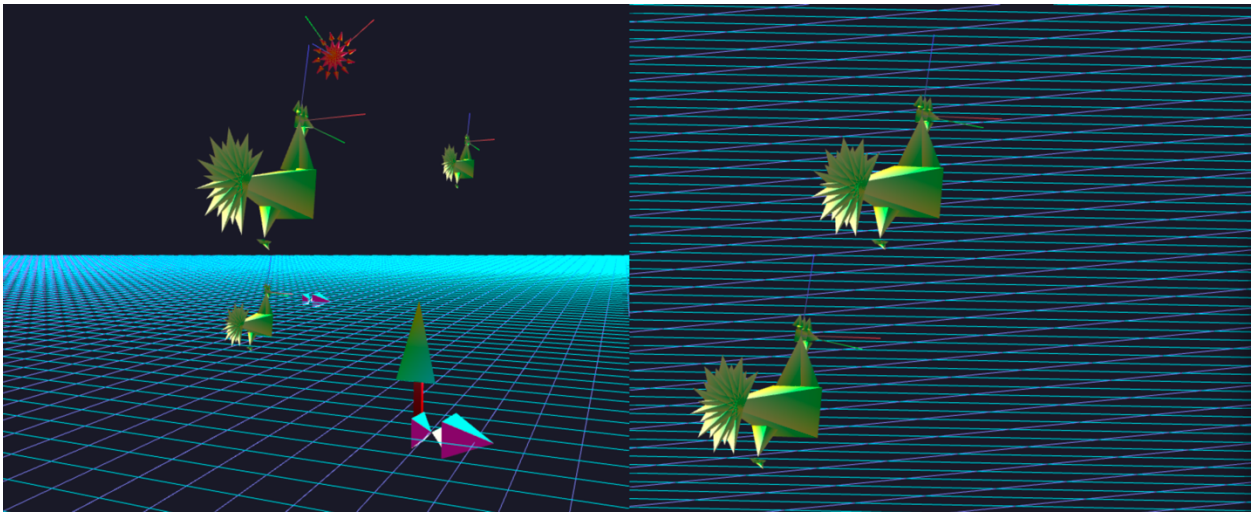

figure3

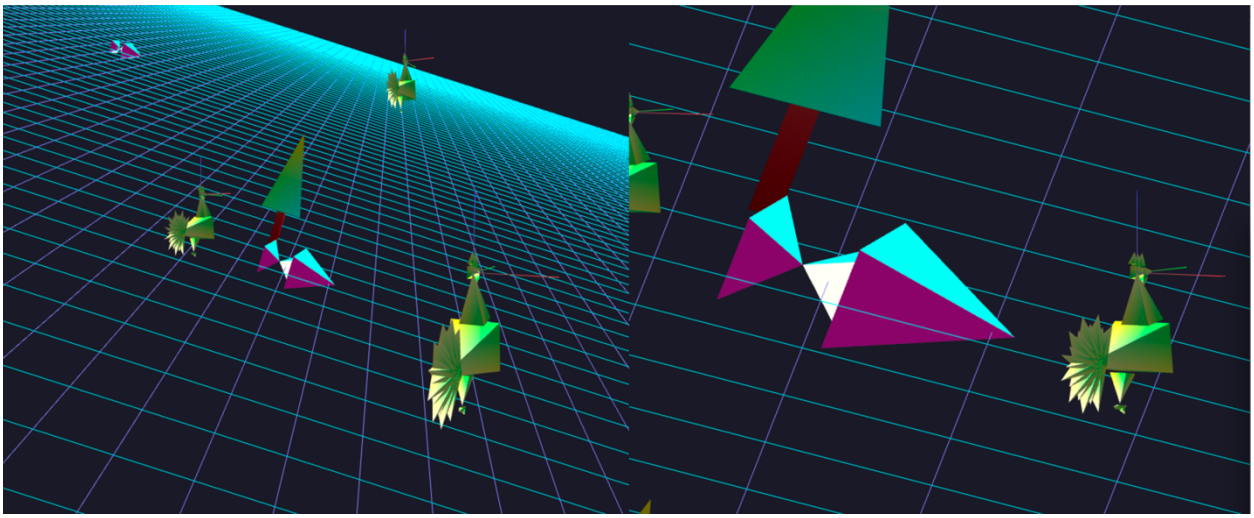

figure4

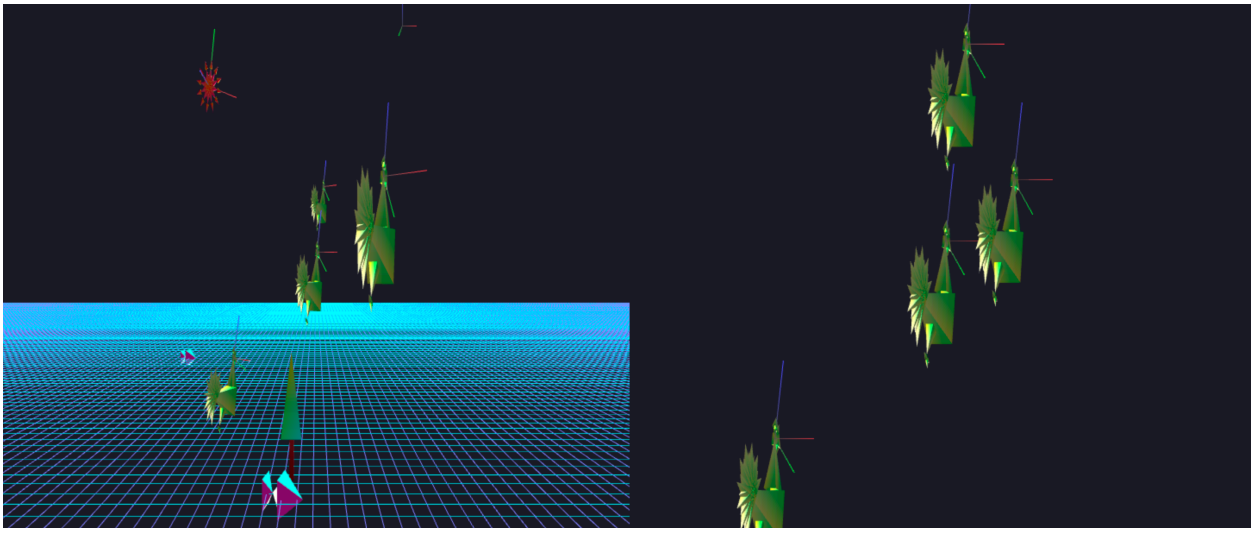

figure5

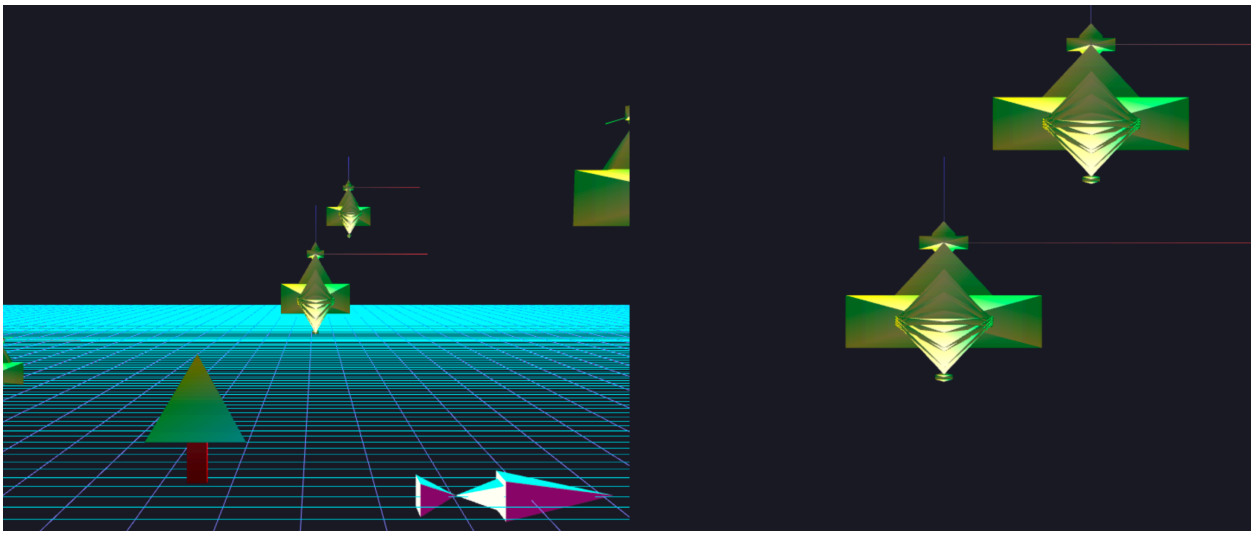

figure6

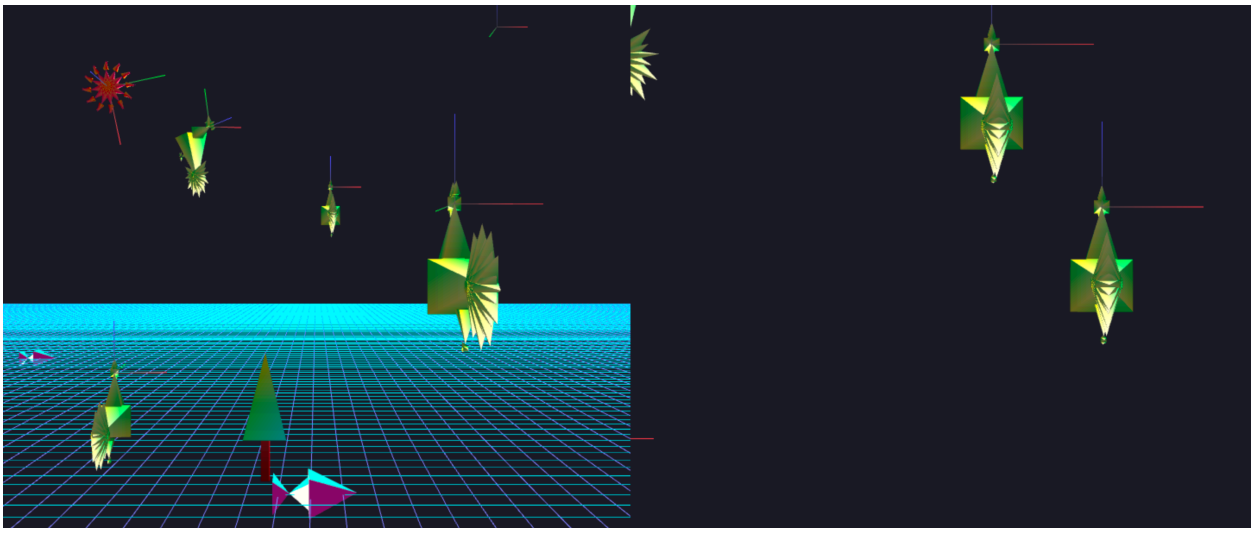

figure7

Following is the program's scene graphic.