

CS460 Fall 2021

Name: Yi Luo

Github Username: yi0110

Due Date: 09/27/2021

## Assignment 3: Three.js Cubes ... and other geometries

We will use Three.js to create multiple different geometries in an interactive fashion.

In class, we learned how to create a `THREE.Mesh` by combining the `THREE.BoxBufferGeometry` and the `THREE.MeshStandardMaterial`. We also learned how to *unproject* a mouse click from 2D (viewport / screen space) to a 3D position. This way, we were able use the `window.onclick` callback to move a cube to a new position in the 3D scene. Now, we will extend our code.

The goal of this assignment is to create multiple different geometries by clicking in the viewport. This means, rather than moving an existing mesh, we will create new ones in the `window.onclick` callback. On each click, our code will randomly choose a different geometry and a random color to place the object at the current mouse position.

**We will be using six different geometries. Before we start coding, we want to understand their parameters. Please complete the table below.** You can find this information in the Three.js documentation at <https://threejs.org/docs/> (scroll down to Geometries). In most cases, we only care about the first few parameters (**please replace the Xs**).

Constructor	Parameters
<code>THREE.BoxBufferGeometry</code>	( width, height, depth )
<code>THREE.TorusKnotBufferGeometry</code>	( radius, tube, tubularSegments, radialSegments )
<code>THREE.SphereBufferGeometry</code>	( radius, widthSegments, heightSegments )
<code>THREE.OctahedronBufferGeometry</code>	( radius )
<code>THREE.ConeBufferGeometry</code>	( radius, height )
<code>THREE.RingBufferGeometry</code>	( innerRadius, outerRadius, thetaSegments )

**Please write code to create one of these six geometries with a random color on each click at the current mouse position.** We will use the `SHIFT`-key to distinguish between geometry placement and regular camera movement. Copy the starter code from <https://cs460.org/shortcuts/08/> and save it as **03/index.html** in your github fork. This code includes the `window.onclick` callback, the `SHIFT`-key condition, and the `unproject` functionality.

After six clicks, if you are lucky and you don't have duplicate shapes, this could be your result:



**Please make sure that your code is accessible through Github Pages. Also, please commit this PDF and your final code to your Github fork, and submit a pull request.**

Link to your assignment: <https://github.com/yi0110/cs460student/blob/main/03/index.html>

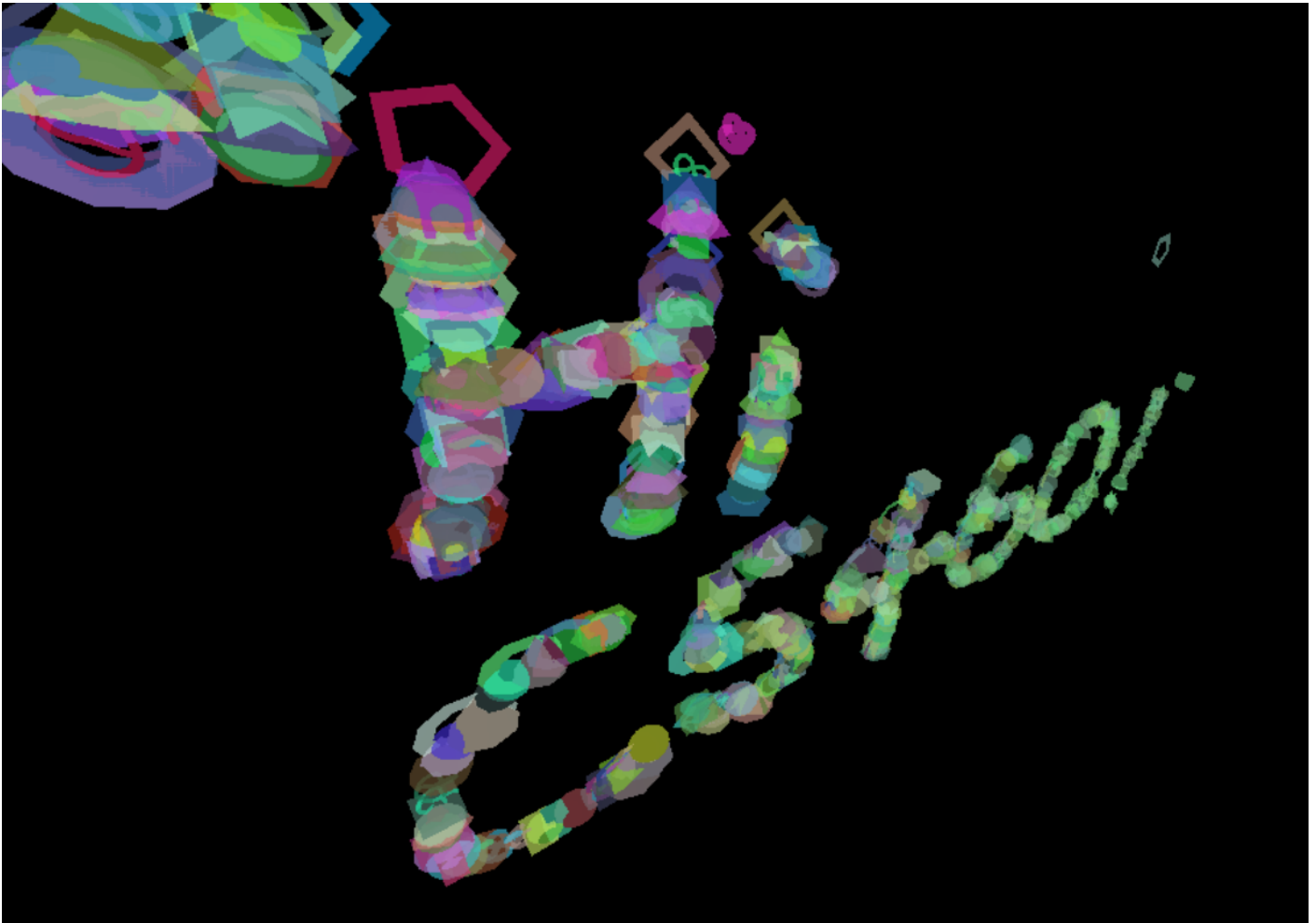
## Bonus (33 points):

Part 1 (5 points): Do you observe Z-Fighting? If yes, when?

YOUR ANSWER ☐

Yes, the Z-Fighting can be easily observed when camera zoom in/zoom out that the computer needs to recalculate all the vertex. When the movement is finish, it could still be observed when there are many objects.

Part 2 (10 points): Please change `window.onclick` to `window.onmousemove`. Now, holding **SHIFT** and moving the mouse draws a ton of shapes. Submit your changed code as part of your `03/index.html` file and **please replace the screenshot below with your drawing**.



\*I use a fog method here, so the further object looks similar a color, while they are still randomly different color as the closed objects shows.

Part 3 (18 points): Please keep track of the number of placed objects and print the count in the JavaScript console. Now, with the change to `window.onmousemove`, after how many objects do you see a slower rendering performance?

YOUR ANSWER:

After the count reaches about 1000-1200.

What happens if the console is not open during drawing?

YOUR ANSWER

Not thing surprising happened, except I do not know how many objects there are without the console.

Can you estimate the total number of triangles drawn as soon as slow-down occurs?

YOUR ANSWER

I am not sure what the triangles is referred here. If it the triangles shapes object, I do not think my code would create any triangle object, so it would be zero. If we want to add the triangle into object types that would be created, we can changed the creating method. What I do in the code is use method addRandomObject(x, y, z) and have another method randomGeometry() in it. Each time, the addRandomObject would use a geometry returned by randomGeometry(). We can change the method so randomGeomerty return both the geometry and its type in a json or other form. Then we create a counter for recognize the type as triangle each time. If it is for how many faces of triangles, I am not sure how to do that.