

CS460 Fall 2021

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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**).

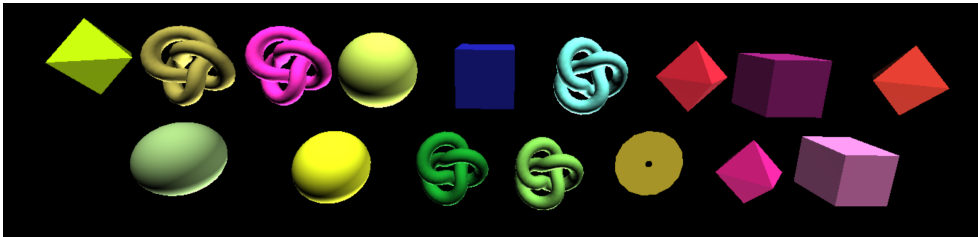
| Constructor | Parameters |
|---|---|
| <code>THREE.BoxBufferGeometry</code> | (width, height, depth) |
| <code>THREE.TorusKnotBufferGeometry</code> | (radius, tube, tubularSegments, radialSegments) |
| <code>THREE.SphereBufferGeometry</code> | (radius, widthSegments, heightSegments) |
| <code>THREE.OctahedronBufferGeometry</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:



Below is the result of my code after multiple clicks.



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://aniuta78.github.io/cs460student/03>

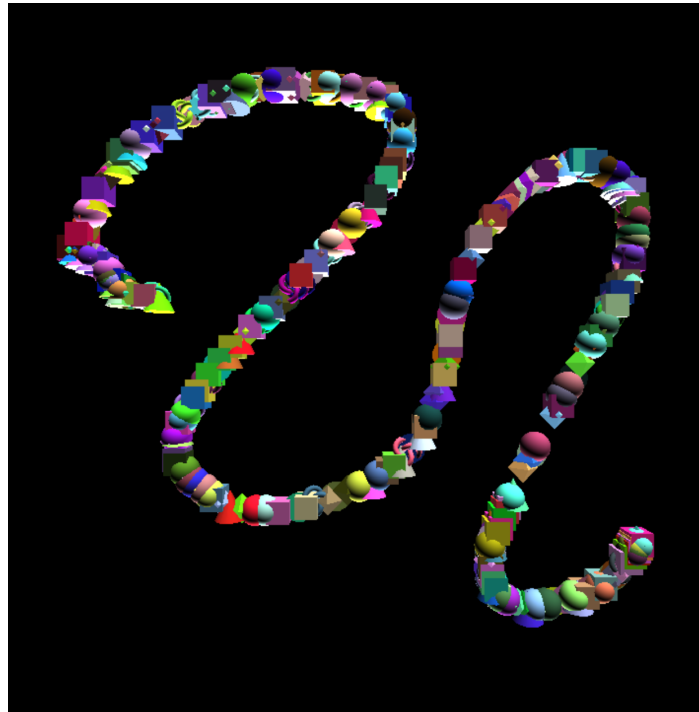
Bonus (33 points):

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

YOUR ANSWER

Yes. I observe Z-Fighting when I click to place a new shape on the same place with an existent shape.

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**.



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

When I reached the number of 3500, if I moved the mouse over the same objects again and again, I see some kind of rendering slowdown. I mean, I see just some of the new shapes created because they are created on the same place where multiple other shapes were created already.

What happens if the console is not open during drawing?

YOUR ANSWER

When the console is closed during drawing, I can't see the number of shapes created. I just see some of the shapes

created because they are created over the mess of other shapes

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

YOUR ANSWER

I can not estimate the number of triangles because all the new shapes that are created over the mess of other shapes overlap each other. It is impossible to clearly see what kind of shape just being created.