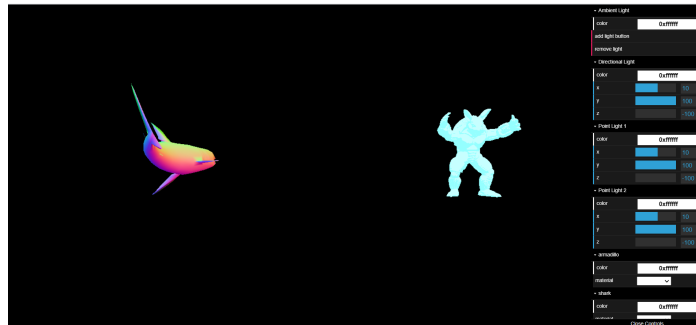


CS460 Fall 2020

Github Username: cfd123123 Due Date: 11/30/2020

## Assignment 9: Geometry, Materials, and Lighting!

We will load our favorite mesh from a file, try out different materials, and play around with light settings.



**Starter code for assignment 9.** After pulling from upstream, there is the folder 09 in your fork. If you run a webserver and access the file, you will see a sad single armadillo in the scene.

**Part 1 (14 points):** The armadillo needs a friend! Please load a second mesh from a file using a THREE.js loader. This could be any mesh you find online in any format THREE.js supports - or you could load the armadillo again. Please modify the positions so that the meshes do not overlap.

**Part 2 (15 points):** Please configure the second mesh from above with a different material of your choice (not MeshToonMaterial again!).

**Part 3 (10 points):** Please add two point light sources to the scene.

**Part 4 (15 points):** The starter code includes the following snippet to control the color and position of the directional light.

```
var directionalFolder = gui.addFolder('Directional Light');
directionalFolder.addColor(controller, 'color').onChange( function(value) {
    directionalLight.color.setHex(value);
});
directionalFolder.add(directionalLight.position, 'x', -100, 100);
directionalFolder.add(directionalLight.position, 'y', -100, 100);
directionalFolder.add(directionalLight.position, 'z', -100, 100);
directionalFolder.open();
```

Please setup dat.GUI to control position and color of the two point lights with similar code.

**Part 5 (15 points):** Please setup dat.GUI to control the color of both materials.

**Part 6 (30 points):** Please play around with the lights and try to understand why the toon material seems to work \*sometimes\*. What are your observations?



Base on my observation, the effect of toon material display is related to both color and position of lights. Take the example in the screenshot, If I change the color and position of the light, the detail of the toon material effect will disappear. This is because toon material is rendering by toon shading (cel shading). Toon shading render each pixel according to the relationship between the normal of each pixel and the direction/color of the light. So when we change the value of light parameter (color, position), the effect of rendering would be changed as well.

**Part 9 (1 points):** Please update the screenshot above with your own and then post the github pages url here:

<https://cfd123123.github.io/cs460student/09>

**Bonus (33 points):**

**Part 1 (11 points):** Please add dat.GUI elements that allow to switch the material for the two meshes. Here is an example of a combobox in dat.GUI:

```
// Choose from accepted values
gui.add(controller, 'material', [ 'toon', 'standard', 'phong' ] ).onChange( function(value) {

    if (value == 'phong') {
        // TODO
    }

});
```

**Part 2 (22 points):** Please make adding lights to the scene dynamic: Add dat.GUI buttons to add new directional lights that then also add a dat.GUI folder to the menu that allows to control (color and position), and remove the light.