CS460 Fall 2022
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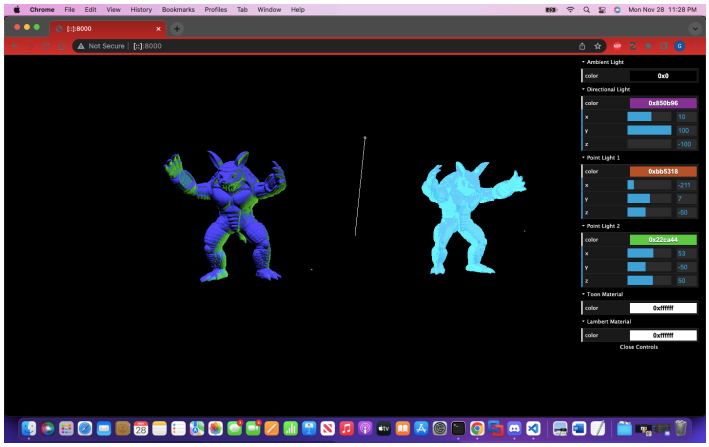
Assignment 9: Geometry, Materials, and Lighting!

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

Based on what I see from how the toon material responds to the lights, it seems that part of the problem is that the toon material tends to get more ”blown out” towards a white appearance more easily than the other kinds of basic Three.js materials. This means that the toon material more easily gets to a blindingly white appearance that is less receptive to being changed by other lights compared to the other materials I tried out.

The second thing I noticed is that the toon material is disproportionately affected by the directional light compared to the extent that it is affected by the other kinds of light sources. This means that, depending on the angle at which the directional light is placed, the mesh with the toon material can seem to be unaffected by the other lights, when this is not really the case.

The net result of these qualities is that minute lighting changes can be very difficult to perceive on a mesh with a toon material, compared to meshes with different standard materials, where minute lighting changes can often be easily percieved on the mesh.

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

`https://gab-viva02.github.io/cs460student/09/`

Part 10 (10 points): Choose a final project—either an existing one from `https://cs460.org/assignments/final/` or a new one. Please list the project here and in the link. If working as a team, assemble your team and list the team members below and in the link.

`YOUR_FINAL_PROJECT_CHOICE`: Carnival Shooting Gallery!

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
  }
```

```
});
```

Not attempted.

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.

Not attempted.

Sources used:

The idea and code for adding the DirectionalLightHelper comes from looking at the .html file for this link through the developer tools: `https://threejsfundamentals.org/threejs/threejs-lights-directional-w-helper.html`

The idea and code for adding the PointLightHelpers comes from looking at the .html file for this link through the developer tools: `https://threejsfundamentals.org/threejs/threejs-lights-point.html`