University of Massachusetts Boston

CS460

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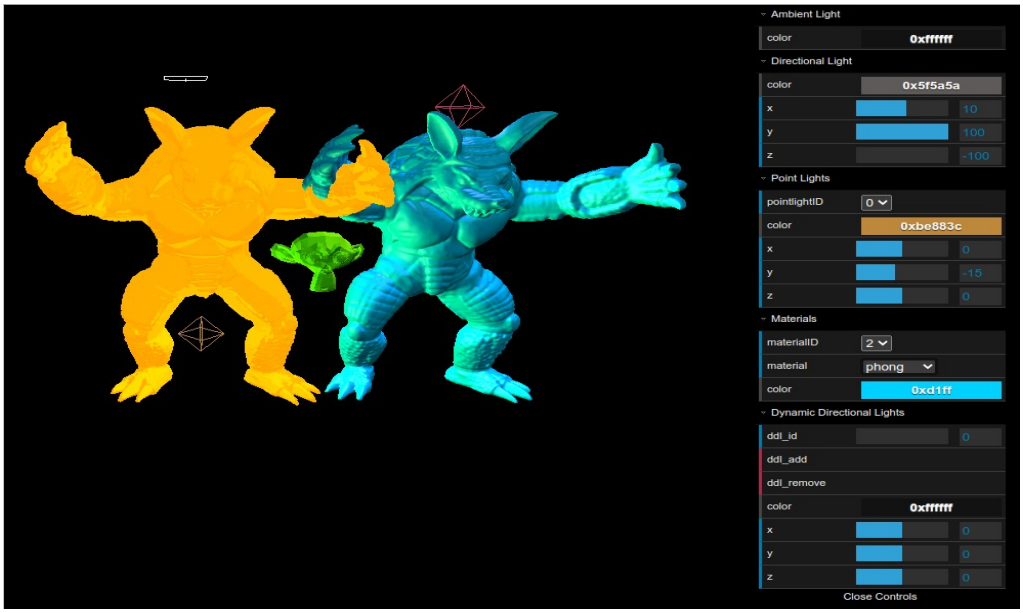
Assignment 9: Geometry, Materials, and Lighting!

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?

TOON SHADER
- A cell shaded style makes a 3d surface emulate a 2d surface
- Uses phong shading by calculating dot product of surface normal and light position
- The result is then clamped to 1 if dot product is more than 0. This give a maximium light intensity of 1 or no light intensity at 0
- This effect can be seen by how the first mesh if either fully light or not lit at all or dimly lit due to presence of ambient light
- This is how 2d surfaces react since they are flat planes where light does not fall off realistically according to surface normals which 3d objects have

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

`https://sairam-bandarupalli.github.io/cs460student/09/index.html`

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.

Shader effect for Brain Surface! (Sairam Bandarupalli and Sruthi Chirumamilla)

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
  }

});
```

Done!

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.

Done!

Collab with Sruthi Chirumamilla