University of Massachusetts Boston

CS460

CS460 Fall 2022
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Due Date: 11/28/2022

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?

The Toon Material gets its effect from its shaders. In order for these shaders to work they need lighting or else the material appears flat instead of toonish. Toon Shaders work by diluting the shading color used to create a cartoonish effect instead of a smooth gradient effect. If the shaders don't have enough light to render with then the cartoonish effect is no longer feasible leaving a matte flat finish on the armadillos.

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

`https://talkingeagle.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.

For the Final Project I plan to build the original Snake Game with a twist, it's 3D instead of 2D. That means instead of playing on a flat surface we can play inside of a 3D cube. To complete this project, I have reached out to Ryan Zeng, since he was planning on a Three js game as well.

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.