Assignment 5: Exploring a High-Level Graphics Library (Medium)

10 Points Possible

6/4/2025

Attempt 1

In Progress

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Unlimited Attempts Allowed

Details

Objectives:

- Review all the topics covered in this course.
  - Its a different library, so you get to make sure you understand the concepts.
- Learn to use a a high-level 3D library.
  - If you ever want to create graphics after this class, you will be wanting a high level library, not *raw* WebGL.
- Practice learning new skills directly from web resources (no textbook, no help video).
  - Hopefully 10 weeks of class has provided enough graphics background to make this easy.

Introduction:

You will re-create your first-person exploration application using Three.js: a high-level Javascript 3D library. Three.js makes it **much** *materials*, *textures*, *3D math*, all things that you'd have to implement yourself if you were to use WebGL directly. Your application will considerably easier to achieve this goal.

Guide on how to set up Three.js: link (https://ucsc-cse-160.github.io/docs/setup/threejs.html)
There is an editor (https://threejs.org/editor)

Links to an external site. (https://threejs.org/editor) provided by the three.js website, which is a GUI for creating 3D scenes without capabilities of three.js. However, 3D scenes created using the three.js editor without writing codes will not fulfill the requirements o

Your application is going to be a 3D scene (a world) that must have the following:

- At least 20 3D primary shapes such as cubes, spheres, cylinder, etc.
  - At least one of them should be textured.
  - At least one of them should be animated.
  - You used at least three different kinds.
- At least one textured 3D model **(.glb (recommended), .gltf or a .obj with an .mtl loaded)**
- At least three different light sources. Three.js has many types of light, use at least three different ones:
  - Ambient Light.
  - Directional Light
  - HemisphereLight
  - Point Light.
  - Spot Light.
  - RectArea Light
- A textured skybox.
- A camera with perspective projection.
- Controls to navigate the scene with the mouse.
- Wow Point

Please include a note on the site or as a comment on your submission with regards to what you did for this part!

Instructions

This assignment is structured as a list of tutorials that you have to follow in order to implement specific required features of the 3D

1. **Create a simple Three.js scene**

https://threejs.org/manual/#en/fundamentals (https://threejs.org/manual/#en/fundamentals) (https://threejs.org/manual/#en/funda

This first tutorial will get you started with the Three.js library. It will introduce you to the fundamentals of Three.js guiding you throu directional light source and a camera with perspective projection.

2. **Add textures**

https://threejs.org/manual/#en/textures (https://threejs.org/manual/#en/textures) (https://threejs.org/manual/#en/textures)

This next tutorial will guide you through loading and mapping textured onto a cube. It will discuss how to load the same texture ont the cube. This tutorial also discuss texture filtering: *minification*, *magnification*, *mipmapping*, *etc.*

3. **Add a custom 3D model**

https://threejs.org/manual/#en/load-obj (https://threejs.org/manual/#en/load-obj) (https://threejs.org/manual/#en/load-obj) (ht

This tutorial explains how to load a custom 3D **.obj** model and map textures onto it.

https://threejs.org/docs/#examples/en/loaders/GLTFLoader (https://threejs.org/docs/#examples/en/loaders/GLTFLoader)

Alternatively, you can utilize this **GLTF loader** to load models with the **.glb** or **.gltf** extension.

We recommend that you find free 3D models online with the **.obj** or **.glb** extension. If you're comfortable with modeling in Blender y

4. **Add controls to your camera**

https://threejs.org/manual/#en/cameras (https://threejs.org/manual/#en/cameras) (https://threejs.org/manual/#en/cameras)

This tutorial goes over different types of cameras in Three.js and it explains how to use the OrbitControl class, which implements de

You may also use any other form of controls, such as

https://threejs.org/docs/#examples/en/controls/FlyControls (https://threejs.org/docs/#examples/en/controls/FlyControls)
https://threejs.org/docs/?q=controls#examples/en/controls/FirstPersonControls (https://threejs.org/docs/?q=controls#examples/en

5. **Add extra light sources**

https://threejs.org/manual/#en/lights (https://threejs.org/manual/#en/lights) (https://threejs.org/manual/#en/lights)

This tutorial goes over different types of light sources in Three.js. Select three different light sources and add them into your scene.

6. **Add a skybox**

https://threejs.org/manual/#en/backgrounds (https://threejs.org/manual/#en/backgrounds) (https://threejs.org/manual/#en/backgr

A skybox is just a box with the sky draw on it. We place the camera inside the box and it looks like there is a sky in the background. texture that has 6 sides, the sides of a cube.

7. **Add more 3D objects to your scene**

At this point you should have a scene with a few textured cubes, one textured custom 3D object, a camera with orbit controls, a cou (meaningful) scene by adding more 3D objects into it. Make sure you have at least 20 3D primary shapes (cubes, spheres, cylinders, models.

8. **Wow (1.5 Points)**

Add an extra feature of your choosing to your project! This is left open-ended on purpose, but a few examples include making a sma features within Three.js that are of similar complexity. It should indicate that you put a degree of effort into making your scene have

Please include a note on the site or as a comment on your submission with regards to what you did for this part!

Resources

- Free 3D models:
  - Poly Pizza: https://poly.pizza/ (https://poly.pizza/)
  - (https://free3d.com/) Free 3D: https://free3d.com/ (https://free3d.com/)

What to Turn in:

(https://canvas.ucsc.edu/courses/82490/assignments/%24CANVAS_COURSE_REFERENCE%24

1. **Canvas Submission**

Zip your entire project and submit it to Canvas under the appropriate assignment. Name your zip file "[FirstName]_[LastName]_Assig

2. **Live Hosted Submission**

You will upload your submission to GitHub Pages (or any other service of your choosing). If you use GitHub Pages, click here (https://
learn how to set it up.

WHEN SUBMITTING YOUR PROJECT ON CANVAS, PLACE YOUR SITE LINK AS A COMMENT OF THE SUBMISSION.

Read the Submission Guide (https://canvas.ucsc.edu/courses/82490/pages/submission-guide?module_item_id=1575580) for further explan

View Rubric

Assignment 5 Rubric (Spring 2025)			
Criteria			
Basic scene is working - To have a scene with at least 3 different primary shapes (e.g. cube, sphere, cylinder, etc), at least one of these shapes is animated, a directional light source and a camera with perspective projection.	**Full Marks**	**2 pts**	
At least one primary shape in your scene is textured. view longer description	**Full Marks**	**1 pts**	
To have a custom textured 3D model (glb, gltf or obj file with .mtl loaded). view longer description	**Full Marks**	**1 pts**	
To be able to move the camera with controls.	**Full Marks**	**1 pts**	

To have at least 3 different light sources into your scene. view longer description	Full Marks 1 pts	
To have a skybox in your scene.	Full Marks 1 pts	
To have at least 20 primary shapes in your scene. view longer description	Full Marks 1 pts	
Extra Feature view longer description	Full Marks 1.5 pts	
Place your site link as a comment of the submission.	Full Marks 0.5 pts	

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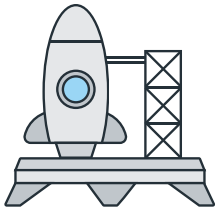

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