BBM 414 - Computer Graphics Laboratory

HACETTEPE UNIVERSITY

Department of Computer Engineering

Due Date Part 1: 23:59 pm on Thursday, November 28th, 2024
Due Date: 23:59 pm on Thursday, December 12th, 2024

WebGL2 Model Drawing and Viewing

Part 1

In this part, you will modify the given project by downloading from Angel Book Source and obtain the shape of form given in Figure 1.
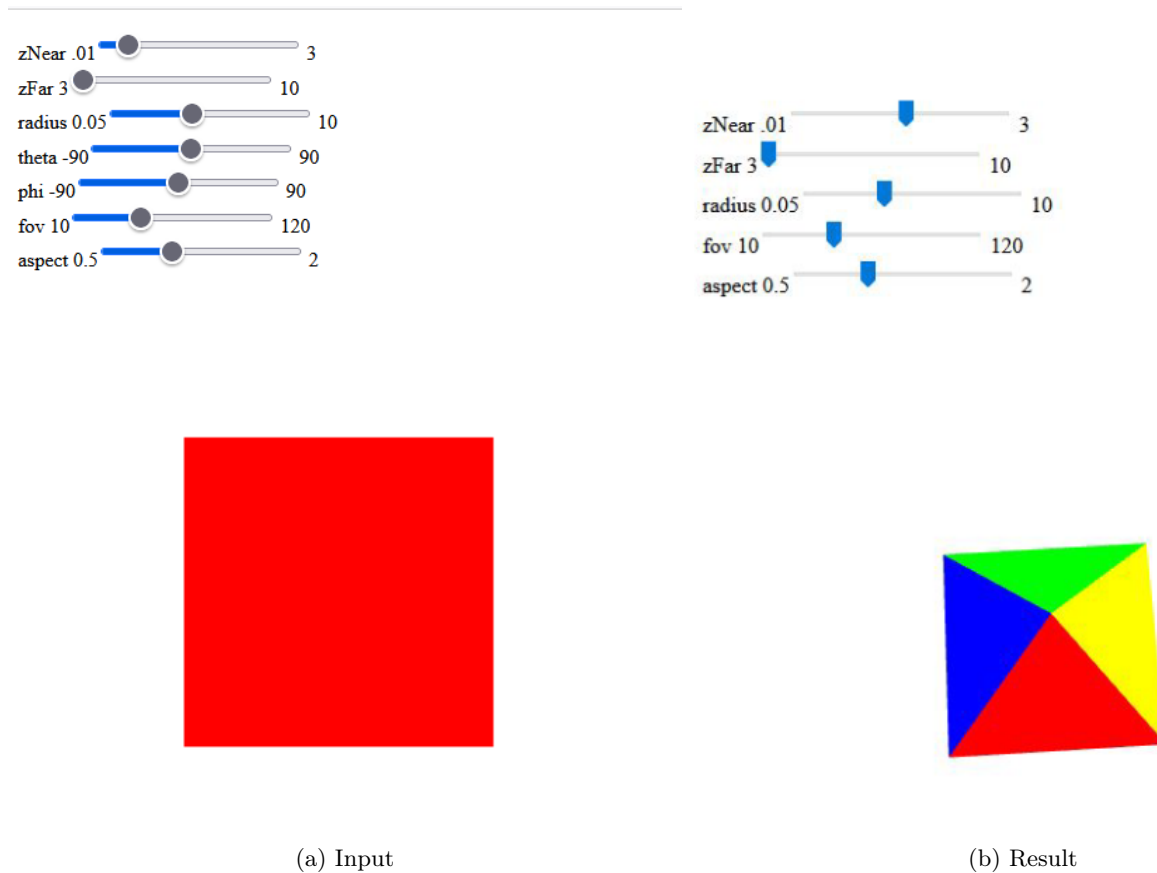

<div align="center">(a) Input   (b) Result</div>

<div align="center">Figure 1: Part 1.</div>

- Download the book source code perspective2 example from the book website: `https://www.cs.unm.edu/~angel/WebGL/7E/05/`.

- Turn the code from webgl to webgl2.

- Change the theta and phi with respect to the mouse movements (hint: pointer lock api).

- You will use 'p' to activate and deactivate the pointer lock api.

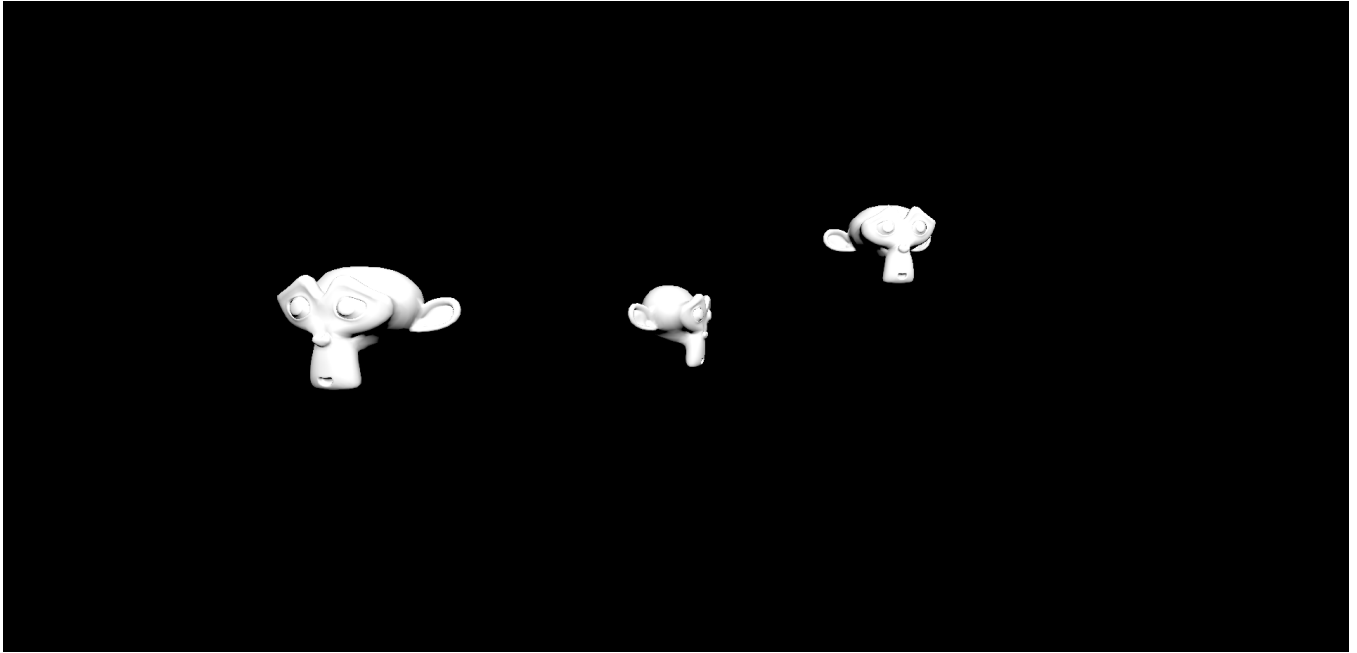- Front face will be colored to red and base face will be colored to magenta (See Figure 1).

Figure 2: Three monkeys.

Part 2

In this part, you will get familiar with 3 dimensional shapes with first person camera viewing. You will load three objects and create a controllable camera on 3d scene. The steps are explained in the following statements:

1. You will create a scene by placing three "monkeys" provided on resources of Piazza (see Figure 2).

2. Read the monkey head object file in your code and place three of them on the given figure 2.

3. You will animate the monkey heads as explained below:

   (a) Leftmost monkey will make zoom in and out.
   (b) Middle monkey will rotate around.
   (c) Rightmost monkey will go up and down.

4. You do not have to implement any lighting (so the scene does not need to look as polished as in the figure). Just make sure that the user can distinctly see the monkeys placed over the scene.

5. Place your camera in the scene so that it sees the scene with a similar angle and distance as depicted in the figure above.

6. You will create a controllable camera.

   (a) Implement the mouse inputs so that the user can navigate the camera:
      i. "Left" button: camera rotates vertically and horizontally about center.
      ii. "Middle" button: camera zooms in to and out off center.
      iii. "Right" button: moves a camera's location laterally - horizontally and vertically.
   (b) The camera should see the scene using Perspective (fovy, aspect, zNear, zFar) function
   (c) The camera should adapt to resizing of the drawing window, so if the window is made smaller, the monkey heads become smaller without getting distorted (and vice-versa).

The Implementation Details

1. Implement your homework using **WebGL2**. All programming assignments must use the shader-based functionality of **WebGL2**: at least one vertex shader and one fragment shader.

2. The assignment must be original work. Turning in someone else's work, in whole or in part, as your own will be considered as a violation of academic integrity. Please note that the former condition also holds for the material found on the web as everything on the web has been written by someone else. **Detection of such plagiarism in a submission will automatically void the submission and establish grounds to trigger an official disciplinary investigation.** General discussion of the assignment among peers is allowed, but do not share answers, algorithms or source codes. **Also using other resources (example source code, book, webpage etc.) as a code and javascript libraries (except jquery, Angel's book) are not allowed.**

3. Do not write the scripts into the html file. Reference your scripts in html.

4. You should use Netbeans or Webstorm as IDE for your projects.

   Hint: Search for pointer lock api to implement mouse input, and loading mesh in webgl.

The Report

You will write a report on latex for this assignment. You will explain the code parts and algorithm for part 1 and part 2.

What to Hand In

You should submit entire Netbeans or Webstorm project directory including javascript files and html file in a zip file extracted from IDE. Submission file structure is as given in below:

- b<studentNumber>.zip

  |–Experiment3_2023
  |——Part 1**(The whole Netbeans or Webstorm project)**
  |——Part 2**(The whole Netbeans or Webstorm project)**
  |–report.pdf

Archieve this folder as **b<studentNumber>.zip** and send via Piazza Private Post.

Grading

The assignment will be graded out of 100:

- PART 1 - CODE:0 (no implementation)
  20 (correct solution).

- PART 2 - CODE: 0 (no implementation)
  20 (monkeys loading)
  20 (monkeys movements)
  20 (mouse inputs for camera)

- REPORT: 20

Academic Integrity

All work on assignments must be done individually unless stated otherwise. You are encouraged to discuss with your classmates about the given assignments, but these discussions should be carried out in an abstract way. That is, discussions related to a particular solution to a specific problem (either in actual code or in the pseudocode) will not be tolerated. In short, turning in someone else's work, in whole or in part, as your own will be considered as a violation of academic integrity. Please note that the former condition also holds for the material found on the web as everything on the web has been written by someone else.

References

[1] https://github.com/esangel/WebGL