BBM 414 - Computer Graphics Laboratory

HACETTEPE UNIVERSITY
Department of Computer Engineering

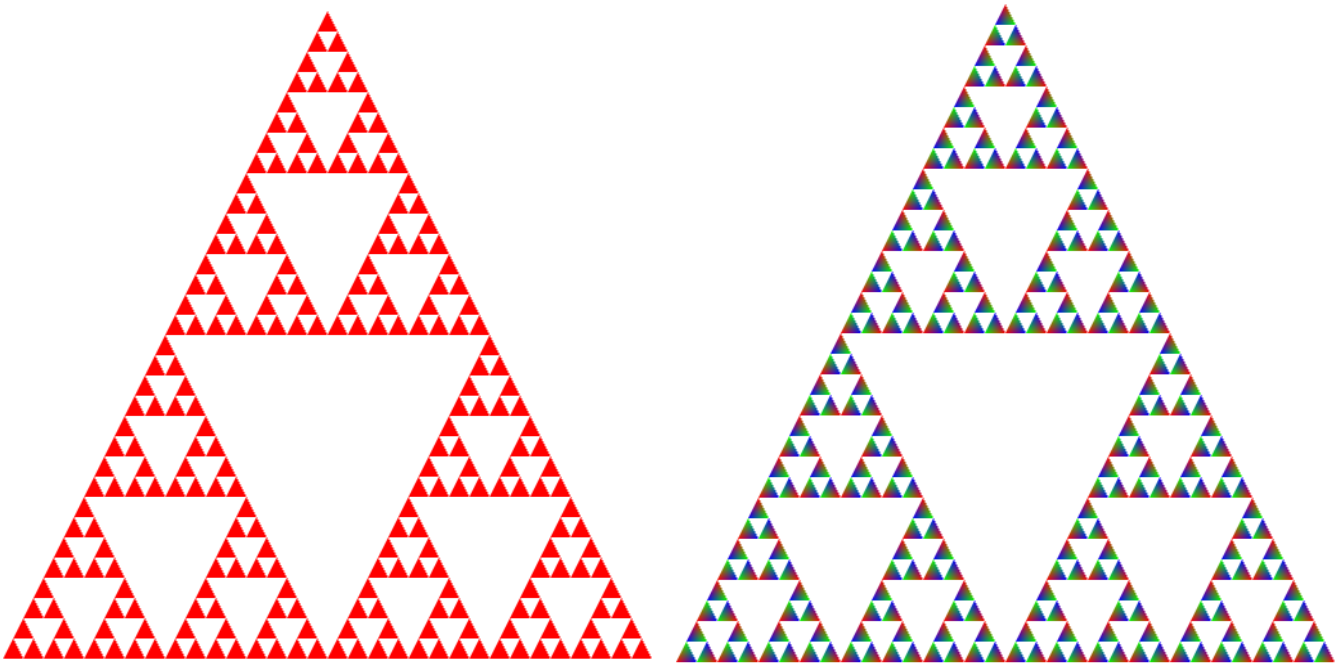
Programming Assignment 2
Fall 2024-2025
Assoc. Prof. Dr. Ufuk Çelikcan

Due Date Part 1: 23:59 pm on Thursday, December 24th, 2024
Due Date: 23:59 pm on Thursday, November 7th, 2024

WebGL2 Shape Drawing and Basic Shading

Part 1

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



(a) Input (b) Result

Figure 1: Part 1.

- Download the source code "Experiment2_Part1_Template.zip" example from Piazza.
- Update the color of the triangles so that they look like the scene.

Part 2

In this part, you will get familiar with simple translation and rotation using shader language. You will get keyboard keys and mouse movements from user and make an animation using the defined functions with respect to the given keys and mouse curser position. The steps are explained in the following statements

1. You will draw the shape from the previous assignment, umbrella (see Figure 2).
2. (Step 1) Your shape will be at the default position given in Figure 2. Use 'r' key to switch to Step 1 figure 2.
3. (Step 2) You will change the vertex shader code to create rotation animation. You will get the horizontal mouse movement inside the canvas to create rotation angle (see Figure 3). Use 'm' key to switch to Step 2.
4. (Step 3) You will change the fragment shader code to change the color of the head randomly while moving with respect to the horizontal mouse movement inside the canvas (see Figure 6). Use 'c' key to switch to Step 3.

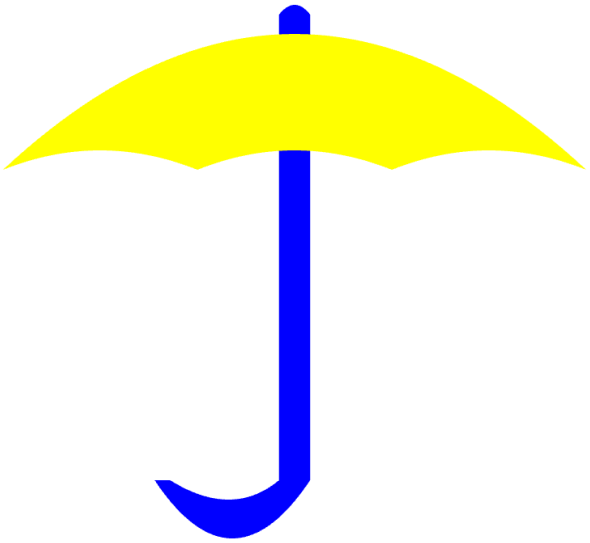


Figure 2: Umbrella centered in canvas.

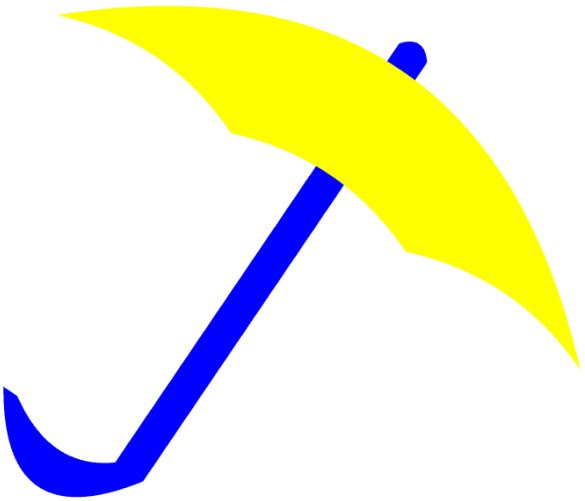


Figure 3: Rotation around its center.

Figure 4: Rotation around its center.

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

  |–Experiment2_2024
  |——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)
  10 (reset)
  25 (change color)
  25 (move)
- 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`