Assignment 1 – CS360

2D scene rendering using basic shapes and adding simple animation

Due date: Sept 1, 2024, 11:59pm

Grade: 150 points (15% of the course grade)

In this assignment, you will create a 2D animated scene using only three basic shapes: square, triangle, and circle. You will apply affine transformations to translate, rotate, and scale the shapes as needed to form various objects in your scene. You will use the glMatrix-0.9.5.min.js JavaScript matrix-vector library to perform transformations using the APIs provided by it. Example usage of this library is discussed in class, and sample codes are provided as references. You are not required to understand everything provided in this library. Other than the glMatrix-0.9.5.min.js library, no other additional library is allowed to use to complete your assignment.

Here is the scene that you will create (for all animations effects, see the attached video):

Pointers for your assignment that you should follow:

1. First create initCircleBuffer() and drawCircle() methods to add circle drawing capability. The Square and Triangle drawing code is already provided.
2. The vertex and fragment shader codes will remain the same as provided in the example codes. We will do shader programming in upcoming assignments.
3. You are only allowed to use squares, circles, and triangles to form the entire scene.
4. You must create the same objects as shown in the scene and try to reproduce them. Minor size and shape changes in your scene are fine. Overall, the scene should look the same.
5. The animations of the windmill blades, the boat, and the moon should be the same as shown in the accompanying video. The windmill blades and the sun rotate along its own center, and the boats have a back-and-forth motion on the river. See the video for reference.
6. The order of all the objects should be followed as shown here. For example, the windmill is in front of the boat. So, you must draw objects accordingly to maintain the order as shown in the scene.
7. Your code also should add three buttons to toggle among
    a. gl.POINTS to show only point rendering
    b. gl.LINE_LOOP to show the wireframe mode
    c. gl.TRIANGLES to show the solid surface mode

See the video for reference.

I suggest that you follow the divide-and-conquer strategy for this assignment. There are several pieces that can be put together to form the scene. Build them separately by writing functions for them. For example, write a function for drawing a house, and inside it, draw multiple squares and triangles together with transformations to form the shape. Then in the main drawScene() function, call this drawHouse() function. This will keep your code clean and modularized and will be easy to debug and put together the scene. Check the accompanying video carefully for all animated components.

How to submit?

The **HelloIITK** portal will be set up for submission. There will be a time limit set. Please start early and finish it by the deadline. Your submission should contain three files, one main JavaScript, one HTML file, and the glMatrix.js file. Zip everything into a single compressed file and upload it. Your code should just run out-of-the-box on TA's computer without needing to do any modification. You can test it in both Chrome and Firefox before submitting it. Name your compressed file as "**Lastname_rollnumber_Assignment1.zip**", and replace lastname, rollnumber with your last name and roll number.

Grading:

We will grade your submitted version only. So DO NOT MISS THE DEADLINE, do not email me your code, else you may get 0.

Start early and have fun!