Assignment 4

11:59 PM, March 6th, 2024

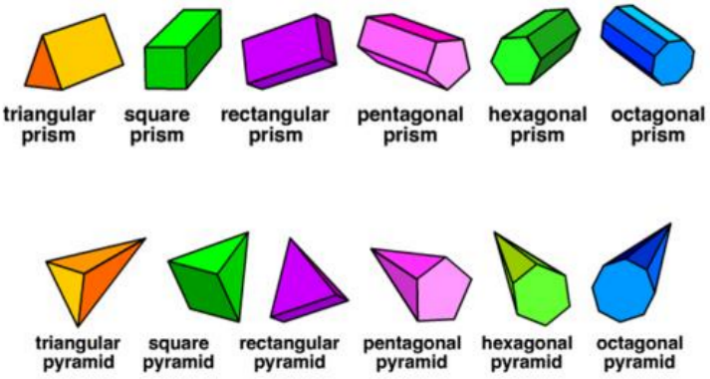
Part A: Procedural Generation of the Prism [40 points]

You will be generating and rendering a prism of given parameters. The number of sides of the polygon in the prism should be passed as a command line argument. As this argument increases, the prism will tend to become cylindrical in nature.

1. Code up the prism generation pipeline which should create the vertices and the faces of the prism for any general n sides. [20 Points]

Hint: Generate one polygon's vertices on a plane and then translate these to get the other polygon's vertices and use these to build all the necessary faces.

2. You will now have the vertices and the faces. Next, color each of the faces of the prism with any color you like (each face should have a unique color - you can also assign a unique color to each vertex of a face). [20 Points]



Part B: Bringing the scene to life with motion [40 Points]

1. Flying Camera: The fly camera is a popular camera locomotion technique used in Blender to navigate the scene. You will be implementing it by binding six keys - W and S for forward and backward, A and D for left and right and Q and E for up and down for the respective camera movement. Ensure the camera always faces the prism's (center).[15 Points]

2. Object Translation: Another six keys of your choice should be assigned for 6D (up, down, left, right, towards, away w.r.t to the camera) movement of the prism. The camera need not follow the prism. [15 Points]

3. Prism let's go for a spin: On press of the key R, the prism should rotate about any single axis (X, Y, Z) of your choice. [10 Points]

Part C: Change the shape [10 Points]

1. Egyptian pyramids: You come up with a way by which a prism can be converted into a pyramid. Use Key press T to toggle between prism and pyramid.

Note: Additionally, if you are interested you can learn how to place textures on the surfaces. Render the shapes that you made with some good-looking textures. Please ensure that the different faces of the final shape should be distinctly visible. We would love to see how creative you all are.

Other Instruction:

1. This assignment is optional, you can use this assignment to replace your grade in one of the previous assignments or with the quiz.

2. You may use either OpenGL 2 or OpenGL 3/4. We will consider both solutions to be valid.

3. If you use OpenGL 3/4, you can start from the following boilerplate code. It is not compulsory to use the boilerplate code, you may start your implementation from scratch.

4. Ensure that your code is modular and clean. Do not create different animation functions for different prisms.

5. Debug your code and ensure it works well and is complete before your submission.

6. You can have multiple files and library codes. But make sure you submit only your code files, as Moodle has a size restriction, and we will not accept submission via any other means. There could be exceptions if you manage to write that much code.

7. Late submissions will not be accepted under any circumstances, so ensure you are on time.

8. Plagiarism is treated very strictly. You may discuss with others, but just don't copy code and make it hard for us.

References

- OpenGL 2 - https://www.swiftless.com/opengltuts.html
- OpenGL 3/4 - https://learnopengl.com/Getting-started/OpenGL