CSE4204| Computer Graphics Lab | Assignment – 3

Part A [5 marks]:

Create a 3D hexagonal prism using index buffer. **The color of each side of the hexagonal prism should be different.** You have the freedom to choose any color you want.

- For pressing A and S keys, the hexagonal prism will rotate (-ve) and (+ve) along the Y-axis.
- For pressing W and Z keys, the hexagonal prism will rotate (-ve) and (+ve) along theX-axis.
- Also, the hexagonal prism will scale up and down for pressing the + and - buttons.

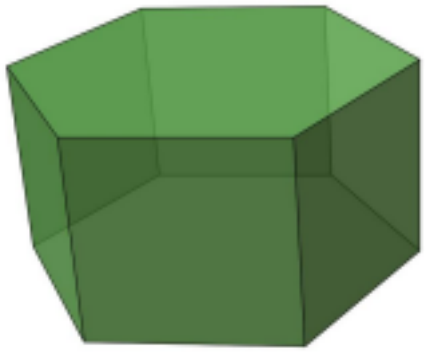


Figure: A Hexagonal Prism

Hints:

- You must carefully define the order of the vertices. For front-facing triangles, the order of the vertices should be counterclockwise and vice-versa

Part B [5 marks]:

Create a crate (box) with a lid. Both the crate and lid have the same coordinates; only lid is the scaled (skewed) version of the crate. You have the freedom to choose colors. Attach two separate shader programs for the crate and the lid. Apply perspective projection on them. For each left and right arrow key pressing, the crate along with the lid (crate + lid) will rotate positive and negative degree along Y axis respectively. For each up and down arrow key pressing, only the lid will open and close respectively.

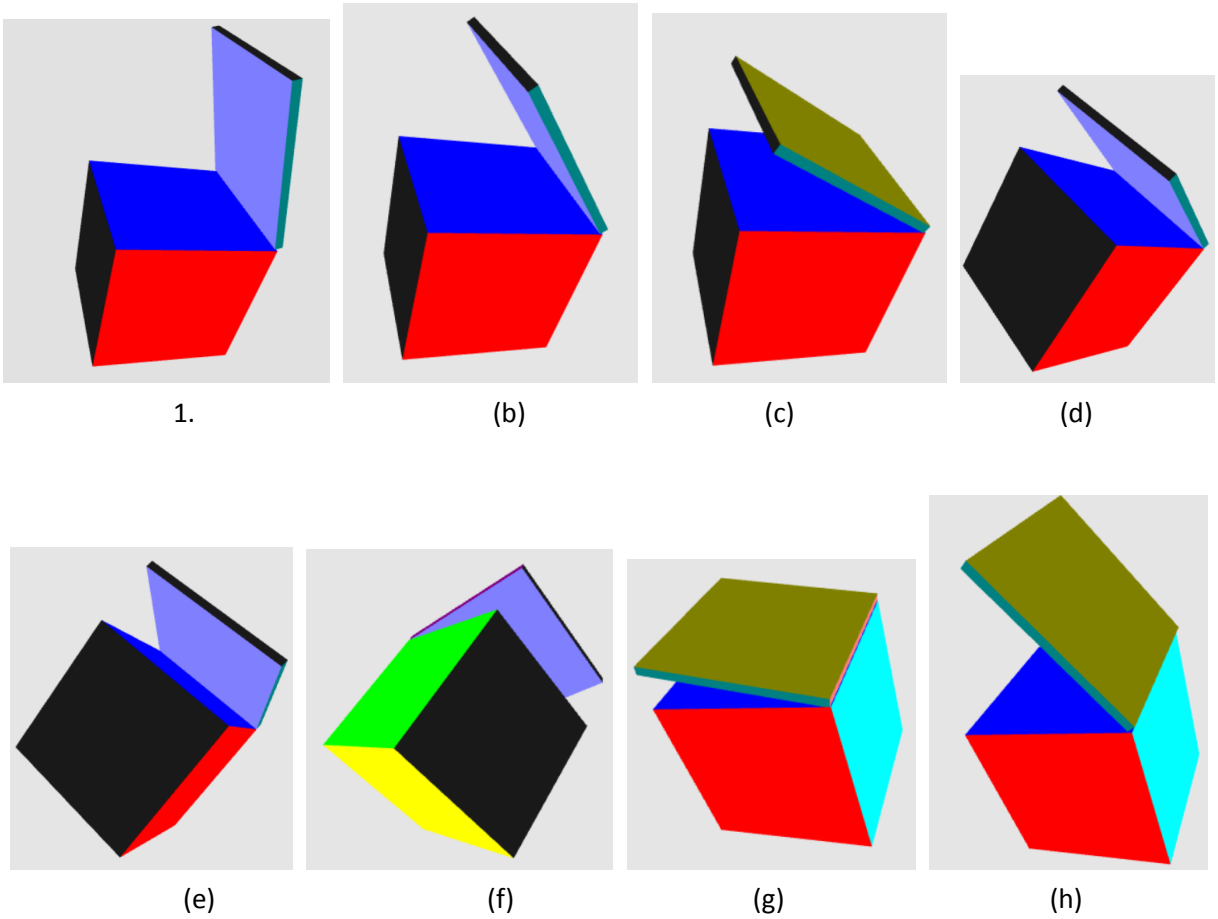


Figure: Different states of the crate and the lid. (a) – (c): Pressing down arrow key several times. (d) – (f): Pressing right arrow key several times. (g): Pressing left arrow key several times. (h) : Pressing up arrow key several times. Video demo is available **here**.

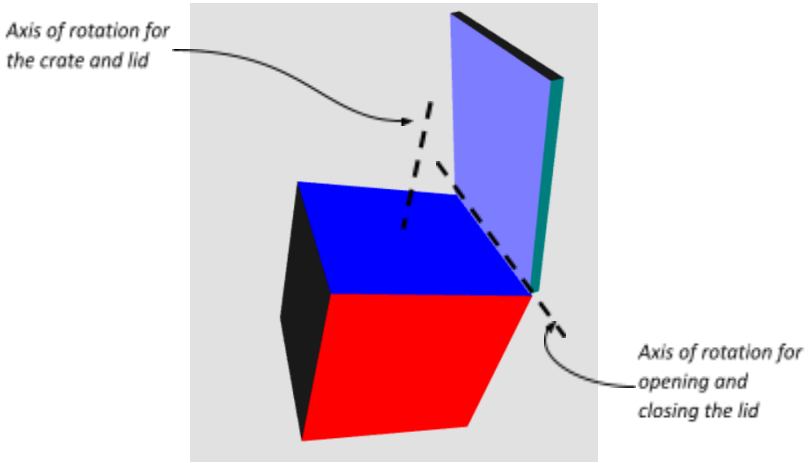
Requirement:

1. Initially the (crate + lid) will create 30-degree w.r.t X and Y axis respectively.
2. Your program must be modularized into several functions. There must be two initiGL functions – which are `initGL_1()` and `initGL_2()`; and two draw functions which are `draw_crate()` and `draw_lid()` respectively.

Note:

1. Start working with the perspective first.
2. Carefully plan for the **composite transformation**. It is very crucial for this assignment.
3. Be careful on the axis of rotation for crate and lid. Note that, for rotating (crate + lid), the axis of rotation is actually the Y axis which goes through the center of the crate. However, for the opening and closing the lid, the axis of rotation is on of its edges. In that case, you might need to translate that edge to any of the principal axis (Z axis would be better), apply the rotation and undo the translation.

4. `gl.useProgram(prog)` is very important for switching from working between (crate + lid) and only lid.



Evaluation: Coding + Viva