Alexandria University
Faculty of Engineering
Computer and Systems Engineering Department

CS 422 Computer Graphics
Assigned: Tuesday, 14/03/2023
Due: Tuesday, 21/03/2023

Lab Assignment 03

Objectives

Getting familiar with OpenGL API, drawing using parametric equations, colors and drawing modes.

Problem Statement

You are required to create an OpenGL project using the project template. You should implement an application that asks user to choose between two types of shapes (Helix and **Sphere**).

Circular helix parametric equation:

$$X(t) = X_c + R * \cos(t)$$

$$Y(t) = Y_c + R * \sin(t)$$

$$Z(t) = P * t$$

Where X_c, Y_c center of the helix, R is radius of the helix and P is the pitch of helix (the height of one complete helix turn).

You should choose X_c, Y_c such that helix appears fully within application window.

At runtime, Input handling should be as follows:

- In case of sphere:
  - When user presses Q/q, increase/decrease number of latitudinal slices.
  - When user presses P/p, increase/decrease number of longitudinal slices.
  - When user presses W/w, draw sphere in wireframe / draw filled sphere.
- In case of helix:
  - When user presses R/r, increase/decrease radius of the helix
  - When user presses H/h, increase/decrease pitch of helix.
  - When user presses N/n, increase/decrease number of vertices used to draw the helix.

Number of turns of helix that should be drawn is 5 turns. Use GL_FRONT_AND_BACK option for drawing mode. Also, For each vertex drawn you, should pick **random color** to draw vertex with. You should modify hemisphere code showed in the lab to fullfill requirements.

Delivery Policy

- You should submit a report describing your code flow, screenshots of sample run and challenges you faced (if any).
- You should submit the project source code (.cpp file(s)).
- You should cite any additional resources you used.
- Further details for the submission instructions will be posted later on MS Teams.

Good Luck