3D Computer Graphics Project

# Overview

This project consists of two separate tasks, both designed to explore fundamental concepts in 3D computer graphics, specifically focusing on transformation operations like translation, rotation, scaling, and working with user input for interaction.   
The project utilizes OpenGL and GLUT libraries to render graphics and respond to user input.

# Task 1: Drawing Points and Polygons

## Objective

The goal of the first task is to create a simple graphics application that allows the user to interactively draw points and polygons on the screen using the mouse and keyboard.

## Key Features

- **Drawing Points**: Left-click the mouse to add points on the screen.  
- **Drawing Polygon**: Press the "Enter" key to connect the points and form a polygon.  
- **Color Change**: Press 'R', 'G', or 'B' to change the drawing color to red, green, or blue, respectively.  
- **Clear Screen**: Press 'C' to clear the points and start fresh.  
- **Exit**: Press the "Esc" key to exit the program.

## Code Explanation

- **Mouse Input**: The mouse function captures the left mouse button clicks and stores the (x, y) coordinates.  
- **Keyboard Input**: The keyboard function handles key presses for changing color, clearing the screen, or switching from points to polygons.  
- **Rendering**: Points are drawn using glBegin(GL\_POINTS) and polygons using glBegin(GL\_POLYGON).

# Task 2: Interactive Object Transformation

## Objective

In the second task, a 2D object (a square) can be translated, rotated, and scaled interactively using the keyboard.   
The user can modify the object's position, orientation, and size in real time.

## Key Features

- **Translation**: Press 'W', 'A', 'S', or 'D' to move the object up, left, down, or right.  
- **Rotation**: Press 'R' or 'F' to rotate the object clockwise or counterclockwise.  
- **Scaling**: Press '+' to increase the size of the object, and '-' to decrease it.

## Code Explanation

- **Translation**: The glTranslatef function is used to move the object along the X and Y axes based on the user input.  
- **Rotation**: The glRotatef function rotates the object around the Z-axis by an angle, which is updated with each key press.  
- **Scaling**: The glScalef function resizes the object proportionally in the X and Y dimensions.

# Project Team Members and Instructor | TEAM #25 | Ismailia Center

**Team Members**:  
- Khalid Elshawadfy Ahmed  
- Omar Abdelrahman Yousef  
- Mohamed Elsayed Abdel Samad  
- Shrouq Elsayed Farag  
  
Instructor:   
- Dr. Wafaa Samy