

DEERWALK INSTITUTE OF TECHNOLOGY

Tribhuvan University

Faculties of Computer Science



**Bachelors of Science in Computer Science and
Information Technology (BSc. CSIT)**

Course: Computer Graphics (CSC209)

Year/Semester: II/III

**A Lab report on:
Introduction to OpenGL**

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❖ LAB 10

OBJECTIVE:

Write a program in any high-level language to use OpenGL..

THEORY:

OpenGL® is the most widely adopted 2D and 3D graphics API in the industry, bringing thousands of applications to a wide variety of computer platforms. It is window-system and operating-system independent as well as network-transparent. OpenGL enables developers of software for PC, workstation, and supercomputing hardware to create high-performance, visually compelling graphics software applications, in markets such as CAD, content creation, energy, entertainment, game development, manufacturing, medical, and virtual reality. OpenGL exposes all the features of the latest graphics hardware.

Demonstration of simple 3D objects in OpenGL:

```
#include <GLFW/glfw3.h>
#include <math.h>

// Rotation angles
float angleX = 0.0f, angleY = 0.0f;

// Function to draw a cube
void drawCube() {
    glBegin(GL_QUADS);

    // Front face
    glColor3f(1, 0, 0); // Red
    glVertex3f(-0.5, -0.5, 0.5);
    glVertex3f(0.5, -0.5, 0.5);
    glVertex3f(0.5, 0.5, 0.5);
    glVertex3f(-0.5, 0.5, 0.5);

    // Back face
    glColor3f(0, 1, 0); // Green
    glVertex3f(-0.5, -0.5, -0.5);
    glVertex3f(-0.5, 0.5, -0.5);
    glVertex3f(0.5, 0.5, -0.5);
    glVertex3f(0.5, -0.5, -0.5);

    // Left face
    glColor3f(0, 0, 1); // Blue
    glVertex3f(-0.5, -0.5, -0.5);
    glVertex3f(-0.5, -0.5, 0.5);
    glVertex3f(-0.5, 0.5, 0.5);
    glVertex3f(-0.5, 0.5, -0.5);
```

```

// Right face
glColor3f(1, 1, 0); // Yellow
glVertex3f(0.5, -0.5, -0.5);
glVertex3f(0.5, 0.5, -0.5);
glVertex3f(0.5, 0.5, 0.5);
glVertex3f(0.5, -0.5, 0.5);

// Top face
glColor3f(1, 0, 1); // Magenta
glVertex3f(-0.5, 0.5, -0.5);
glVertex3f(-0.5, 0.5, 0.5);
glVertex3f(0.5, 0.5, 0.5);
glVertex3f(0.5, 0.5, -0.5);

// Bottom face
glColor3f(0, 1, 1); // Cyan
glVertex3f(-0.5, -0.5, -0.5);
glVertex3f(0.5, -0.5, -0.5);
glVertex3f(0.5, -0.5, 0.5);
glVertex3f(-0.5, -0.5, 0.5);

glEnd();
}

int main() {
    // Initialize GLFW
    if (!glfwInit()) return -1;

    // Create a windowed mode window
    GLFWwindow* window = glfwCreateWindow(600, 600, "3D Rotating Cube", NULL,
    NULL);
    if (!window) {
        glfwTerminate();
        return -1;
    }

    glfwMakeContextCurrent(window);

    // Enable depth testing for proper 3D rendering
    glEnable(GL_DEPTH_TEST);

    // Main loop
    while (!glfwWindowShouldClose(window)) {
        glClear(GL_COLOR_BUFFER_BIT | GL_DEPTH_BUFFER_BIT);
        glLoadIdentity();

        // Apply rotation
        glRotatef(angleX, 1, 0, 0);
        glRotatef(angleY, 0, 1, 0);
    }
}

```

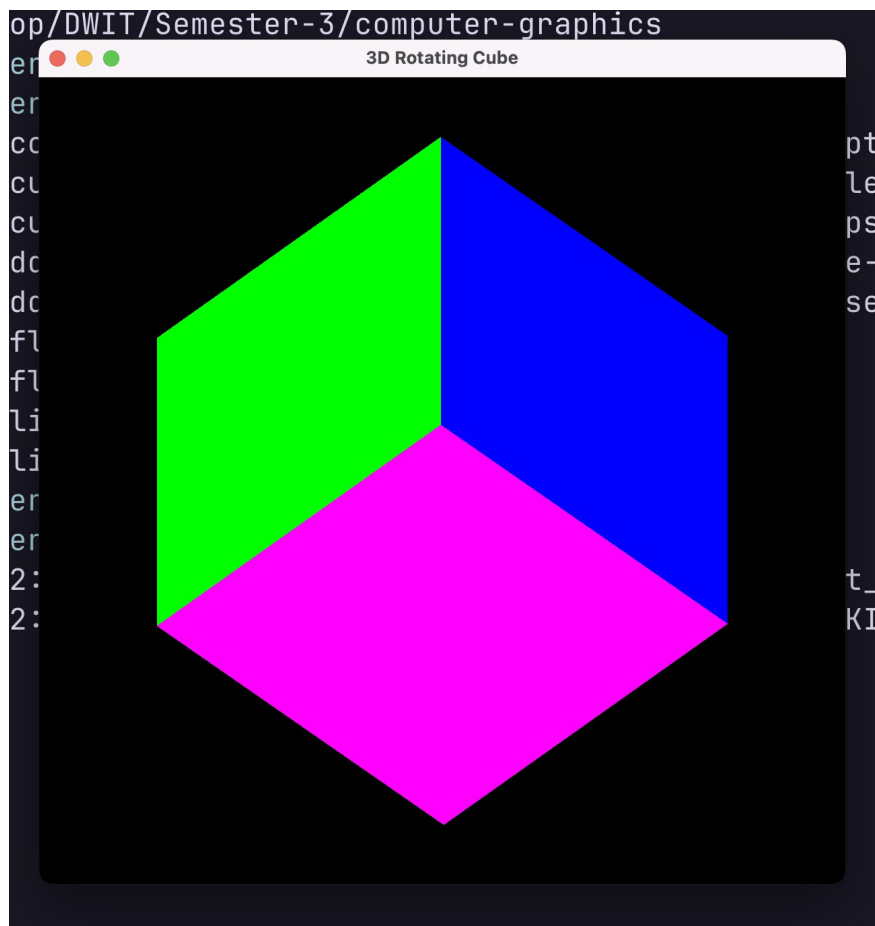
```
// Draw the cube
drawCube();

// Increment rotation angles
angleX += 0.5f;
angleY += 0.3f;

glfwSwapBuffers(window);
glfwPollEvents();
}

glfwTerminate();
return 0;
}
```

Output:



CONCLUSION:

We produced a 3D object in C programming language using OpenGL.