



**K. J. Somaiya College of Engineering, Mumbai-77**  
Somaiya Vidyavihar University

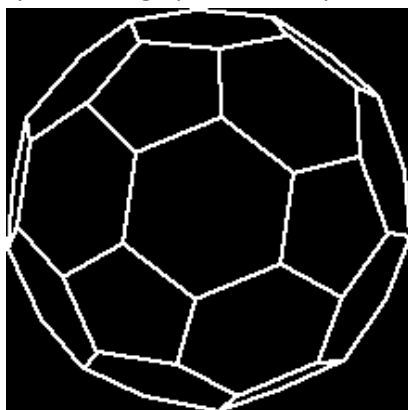
**Batch:** D-2    **Roll No.:** 16010122151

**Experiment No. 11**

**TITLE:** Write a program to draw “Buckyball” using OpenGL library.

**AIM:**

Write a program to draw “Buckyball” using OpenGL library.



---

**Expected OUTCOME of Experiment:**

---

**Books/ Journals/ Websites referred:**

<https://www.glprogramming.com/red/chapter02.html>

---



**K. J. Somaiya College of Engineering, Mumbai-77**  
Somaiya Vidyavihar University

**Algorithm/ Pseudocode for each process:**

A buckyball is generated by subdividing the edges of an isocahedron.

```
void subdivide(float *v1, float *v2, float *v3, long depth)
```

```
{
    GLfloat v12[3], v23[3], v31[3];
    GLint i;
    if (depth == 0)
    {
        drawtriangle(v1, v2, v3); return;
    }
    for (i = 0; i < 3; i++)
    {
        v12[i] = v1[i] + v2[i];
        v23[i] = v2[i] + v3[i];
        v31[i] = v3[i] + v1[i];
    }
    normalize(v12);
    normalize(v23);
    normalize(v31);
    subdivide(v1, v12, v31, depth-1);
    subdivide(v2, v23, v12, depth-1);
    subdivide(v3, v31, v23, depth-1);
    subdivide(v12, v23, v31, depth-1);
}
```

**Implementation details:**

```
#include<GL/glut.h>
#include<math.h>
    GLfloat xRotated, yRotated, zRotated;
void display(void);
void idle(void)
{
    xRotated = xRotated + 0.01;
    yRotated += 0.01;
    zRotated += 0.01;
    display();
}
void myinit()
{
    GLfloat mat_specular[] = {1.0, 1.0, 1.0, 1.0};
    GLfloat mat_shininess[] = {50.0};
    GLfloat light_position[] = {1.0, 1.0, 1.0, 0.0};
    glMaterialfv(GL_FRONT, GL_SPECULAR, mat_specular);
    glMaterialfv(GL_FRONT, GL_SHININESS, mat_shininess);
```



**K. J. Somaiya College of Engineering, Mumbai-77**  
Somaiya Vidyavihar University

```
glLightfv(GL_LIGHT0, GL_POSITION, light_position);
glEnable(GL_LIGHTING);
glEnable(GL_LIGHT0);
glEnable(GL_DEPTH_TEST);
}
void display(void)
{
    glClearColor(1, 1, 1, 1);
    glClear(GL_COLOR_BUFFER_BIT | GL_DEPTH_BUFFER_BIT);
    glMatrixMode(GL_MODELVIEW);
    glClear(GL_COLOR_BUFFER_BIT);
    glLoadIdentity();
    glTranslatef(0.0, 0.0, -5.0);
    glColor3f(0.9, 0.3, 0.2);
    glRotatef(xRotated, 1.0, 0.0, 0.0);
    glRotatef(yRotated, 0.0, 1.0, 0.0);
    glRotatef(zRotated, 0.0, 0.0, 1.0);
    glScalef(1.0, 1.0,
            1.0);
    glutSolidDodecahedron();
    glFlush();
}
void myReshape(GLsizei w, GLsizei h)
{
    glViewport(0, 0, w, h);
    glMatrixMode(GL_PROJECTION);
    glLoadIdentity();
    glOrtho(-1.5, 1.5, -1.5 * (GLfloat)480 / (GLfloat)640, 1.5 *
(GLGLfloat)480 / (GLfloat)640, -10.0, 10.0);
    glMatrixMode(GL_MODELVIEW);
    glLoadIdentity();
}
int main(int argc, char **argv)
{
    glutInit(&argc, argv);
    glutInitWindowSize(640, 480);
    glutInitWindowPosition(200, 200);
    glutInitDisplayMode(GLUT_SINGLE | GLUT_RGBA | GLUT_DEPTH);
    xRotated = yRotated = zRotated = 30.0;
    xRotated = 43;
    yRotated = 50;
    glutCreateWindow("Buckyball");
    glutDisplayFunc(display);
    glutReshapeFunc(myReshape);
    myinit();
    glutIdleFunc(idle)
    glutMainL
```



**K. J. Somaiya College of Engineering, Mumbai-77**  
Somaiya Vidyavihar University

```
op();  
}
```

**Output(s) (Screen Shot):**



**Conclusion and discussion:**

Drawing of buckyball by subdivision of icosahedron is understood and implemented

**Date:**

**Signature of faculty in-charge**

**Post Lab**



**K. J. Somaiya College of Engineering, Mumbai-77**  
Somaiya Vidyavihar University

**Draw The 5-, 11-, and 17-rosettes. using OpenGL.**

**Code:**

```
import glfw
from OpenGL.GL import *
from OpenGL.GLU import gluOrtho2D
import numpy as np

def draw_rosette(num_points, radius=0.5):
    glBegin(GL_LINE_LOOP)
    for i in range(num_points * 2):
        angle = i * np.pi / num_points
        r = radius if i % 2 == 0 else radius * 0.5
        x = r * np.cos(angle)
        y = r * np.sin(angle)
        glVertex2f(x, y)
    glEnd()

def draw_scene():
    glClear(GL_COLOR_BUFFER_BIT)
    glPushMatrix()
    glTranslatef(-0.75, 0.0, 0.0)
    draw_rosette(5)
    glPopMatrix()
    glPushMatrix()
    glTranslatef(0.0, 0.0, 0.0)
    draw_rosette(11)
    glPopMatrix()
    glPushMatrix()
    glTranslatef(0.75, 0.0, 0.0)
    draw_rosette(17)
    glPopMatrix()

def key_callback(window, key, scancode, action, mods):
    if action == glfw.PRESS and key == glfw.KEY_E:
        glfw.set_window_should_close(window, True)

def main():
    if not glfw.init():
        return
    window = glfw.create_window(800, 600, "Rosettes", None, None)
    if not window:
        glfw.terminate()
        return
    glfw.make_context_current(window)
    glClearColor(0.0, 0.0, 0.0, 1.0)
```



**K. J. Somaiya College of Engineering, Mumbai-77**  
Somaiya Vidyavihar University

```
gluOrtho2D(-1.5, 1.5, -1.5, 1.5)
glfw.set_key_callback(window, key_callback)
while not glfw.window_should_close(window):
    draw_scene()
    glfw.swap_buffers(window)
    glfw.poll_events()
glfw.terminate()

if __name__ == "__main__":
    main()
```

**Output:**

