

**SSN COLLEGE OF ENGINEERING**  
**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**  
**UCS1712 – GRAPHICS AND MULTIMEDIA LAB**  
**EX NO: 9-3D Projections**

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### AIM

To write a C++ program using OPENGL to perform 3D Projections – Orthographic and Perspective.

### ALGORITHM

1. Using glutWireTorus() draw a Torus.
2. Draw axes for reference.
3. Space key is used to toggle between orthographic and perspective projections.
4. When in perspective projection mode:
  - a. 'UP' key pressed: X-rotate by +1
  - b. 'DOWN' key pressed: X-rotate by -1
  - c. 'LEFT' key pressed: Y-rotate by +1
  - d. 'RIGHT' key pressed: Y-rotate by -1

### CODE

```
#include<gl/glut.h>
#include<iostream>

using namespace std;

int alpha = 0, theta = 0;
bool flag = false;

void init()
{
    glClearColor(1.0, 1.0, 1.0, 1.0);
    glEnable(GL_DEPTH_TEST);
}

void keyPress(int key, int x, int y)
{
    switch (key)
    {
        case GLUT_KEY_RIGHT:
            alpha++;
    }
}
```

```

        break;
    case GLUT_KEY_LEFT:
        alpha--;
        break;
    case GLUT_KEY_UP:
        theta++;
        break;
    case GLUT_KEY_DOWN:
        theta--;
        break;
    case GLUT_KEY_HOME:
        flag = !flag;
        break;
    }
    glutPostRedisplay();
}

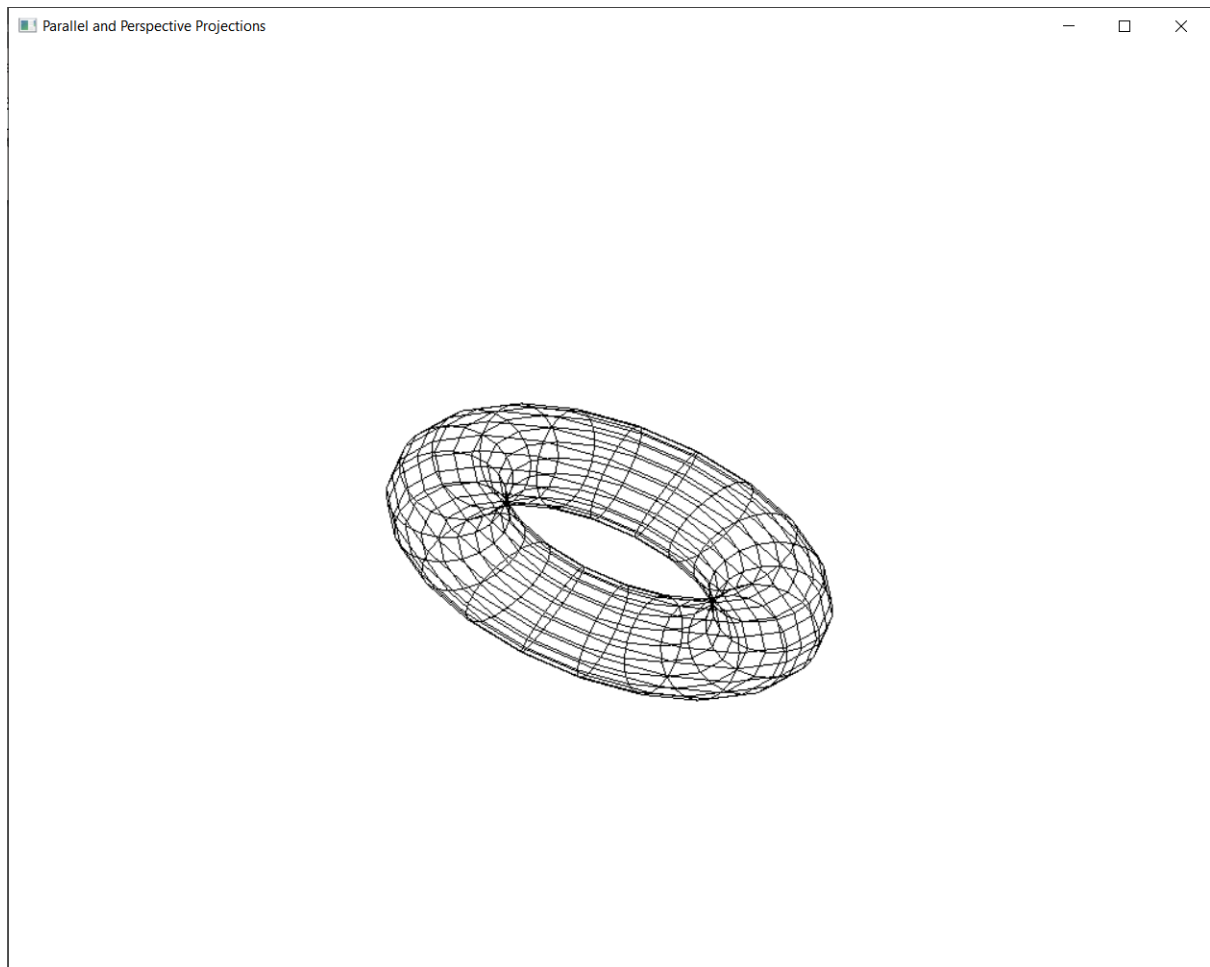
void display()
{
    glClear(GL_COLOR_BUFFER_BIT | GL_DEPTH_BUFFER_BIT);
    glMatrixMode(GL_PROJECTION);
    glLoadIdentity();
    if (flag) glOrtho(-500, 500, -500, 500, -500, 500);
    else gluPerspective(100, 1, 0.1, 1000);
    glMatrixMode(GL_MODELVIEW);
    glLoadIdentity();
    gluLookAt(0, 0, 300, 0, 0, 0, 0, 1, 0);
    glRotatef(alpha, 0, 1, 0);
    glRotatef(theta, 1, 0, 0);
    glColor3f(0.0, 0.0, 0.0);
    glutWireTorus(50, 150, 20, 20);
    glFlush();
}

int main(int argc, char* argv[])
{
    glutInit(&argc, argv);
    glutInitDisplayMode(GLUT_SINGLE | GLUT_RGB | GLUT_DEPTH);
    glutInitWindowSize(1000, 1000);
    glutCreateWindow("Parallel and Perspective Projections");
    init();
    glutDisplayFunc(display);
    glutSpecialFunc(keyPress);
    glutMainLoop();
    return 0;
}

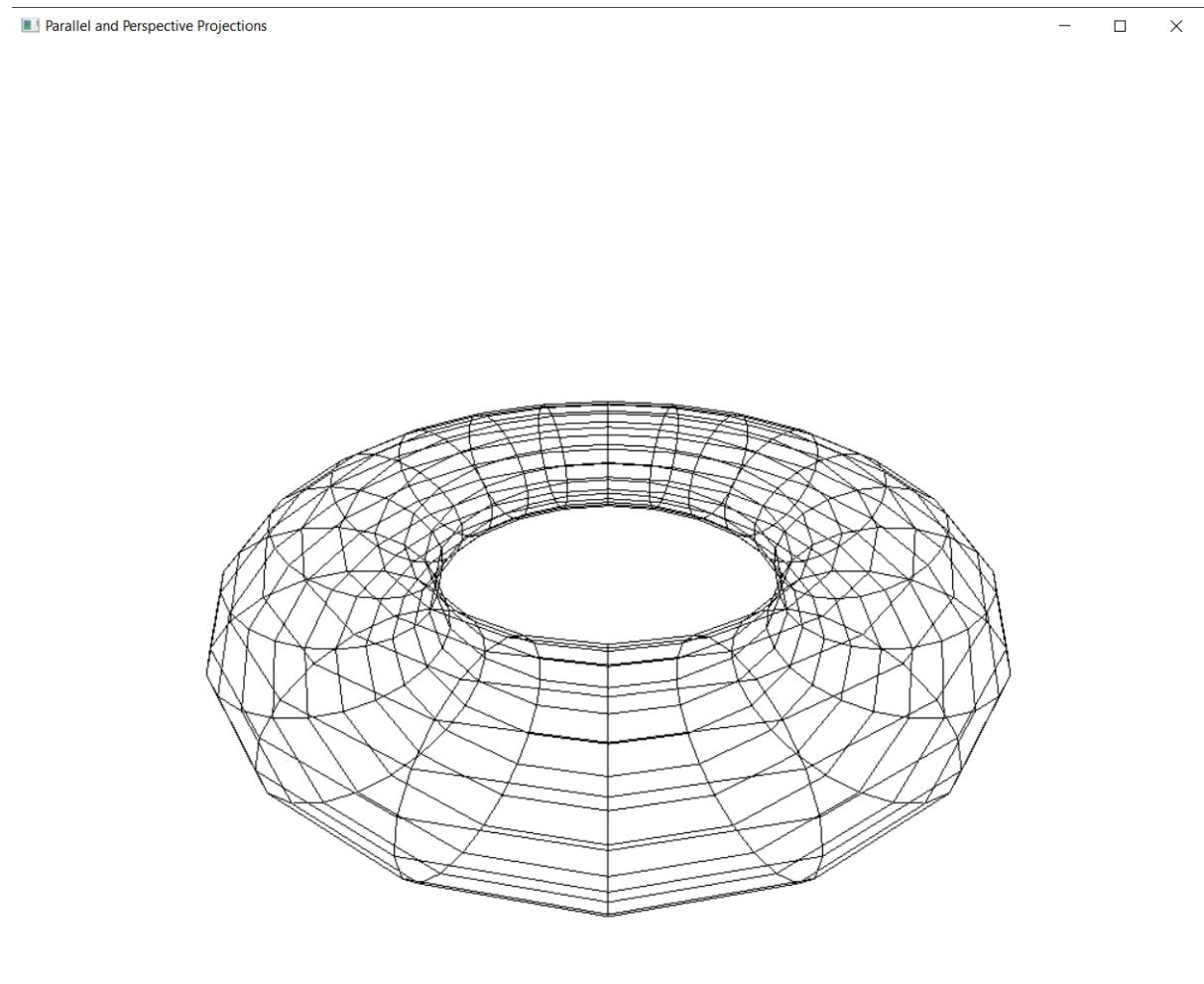
```

## OUTPUT

### ORTHOGRAPHIC



## PERSPECTIVE



## RESULT

OPENGL programs to perform 3D projections was designed and implemented successfully.