

# Department of Computer Science and Engineering

SHRI MADHWA VADIRAJA INSTITUTE OF TECHNOLOGY AND MANAGEMENT

A Unit of Shri Sode Vadiraja Mutt Education Trust® Udupi  
(Affiliated to Visvesvaraya Technological University, Belagavi)  
Vishwothama Nagar, Bantakal – 574 115, Udupi District, Karnataka, INDIA



//Program 8: Develop a menu driven program to animate a flag using Bezier Curve algorithm

```
#include<GL/glut.h>
#include<stdio.h>
#include<math.h>
#define PI 3.1416
static float theta = 0.0;
GLint nCtrlPts = 4, nBezCurvePts = 20;

typedef struct wcPt3D
{
    GLfloat x, y, z;
};
void bino(GLint n, GLint *C)
{
    GLint k, j;
    for(k=0; k<=n; k++)
    {
        C[k]=1;
        for(j=n; j>=k+1; j--)
            C[k]*=j;
        for(j=n-k; j>=2; j--)
            C[k]/=j;
    }
}
void computeBezPt(GLfloat u, wcPt3D *bezPt, GLint nCtrlPts, wcPt3D *ctrlPts,
    GLint *C)
{
    GLint k, n=nCtrlPts-1;
    GLfloat bezBlendFcn;
    bezPt->x=bezPt->y=bezPt->z=0.0;
    for(k=0; k< nCtrlPts; k++)
    {
        bezBlendFcn = C[k] * pow(u, k) * pow(1-u, n-k);
        bezPt->x += ctrlPts[k].x * bezBlendFcn;
        bezPt->y += ctrlPts[k].y * bezBlendFcn;
        bezPt->z += ctrlPts[k].z * bezBlendFcn;
    }
}
void bezier(wcPt3D *ctrlPts, GLint nCtrlPts, GLint nBezCurvePts)
{
    wcPt3D bezCurvePt;
    GLfloat u;
    GLint *C, k;
```

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```
C= new GLint[nCtrlPts];
bino(nCtrlPts-1, C);
glBegin(GL_LINE_STRIP);
for(k=0; k<=nBezCurvePts; k++)
{
    u=GLfloat(k)/GLfloat(nBezCurvePts);
    computeBezPt(u, &bezCurvePt, nCtrlPts, ctrlPts, C);
    glVertex2f(bezCurvePt.x, bezCurvePt.y);
}
glEnd();
delete[]C;
}
void draw_and_animate()
{
    wcPt3D ctrlPts[4] = {
        {20, 100, 0},
        {30, 110, 0},
        {50, 90, 0},
        {60, 100, 0}};

    ctrlPts[1].x +=10*sin(theta * PI/180.0);
    ctrlPts[1].y +=5*sin(theta * PI/180.0);
    ctrlPts[2].x -= 10*sin((theta+30) * PI/180.0);
    ctrlPts[2].y -= 10*sin((theta+30) * PI/180.0);
    ctrlPts[3].x-= 4*sin((theta) * PI/180.0);
    ctrlPts[3].y += sin((theta-30) * PI/180.0);
    theta+=0.1;
    glPointSize(5);
    glPushMatrix();
    glLineWidth(5);
    glColor3f(255/255, 153/255.0, 51/255.0); //Indian flag: Orange color code
    for(int i=0;i<8;i++)
    {
        glTranslatef(0, -0.8, 0);
        bezier(ctrlPts, nCtrlPts, nBezCurvePts);
    }
    glColor3f(1, 1, 1); //Indian flag: white color code
    for(int i=0;i<8;i++)
    {
        glTranslatef(0, -0.8, 0);
        bezier(ctrlPts, nCtrlPts, nBezCurvePts);
    }
    glColor3f(19/255.0, 136/255.0, 8/255.0); //Indian flag: green color code
```

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```
for(int i=0;i<8;i++)
{
    glTranslatef(0, -0.8, 0);
    bezier(ctrlPts, nCtrlPts, nBezCurvePts);
}
glPopMatrix();
glColor3f(0.7,0.5,0.3); //flag pole
glLineWidth(5);
glBegin(GL_LINES);
glVertex2f(20,100);
glVertex2f(20,40);
glEnd();
glFlush();
glutPostRedisplay();
glutSwapBuffers();
}
// Menu
void menu(int id)
{
    switch (id)
    {
        case 1:glutIdleFunc(draw_and_animate);
                break;
        case 2:glutIdleFunc(NULL);
    }
    glutPostRedisplay();
}
void display()
{
    glClear(GL_COLOR_BUFFER_BIT);
}
//window reshape
void reshape(GLint w, GLint h)
{
    glViewport(0, 0, w, h);
    glMatrixMode(GL_PROJECTION);
    glLoadIdentity();
    gluOrtho2D(0, 150, 0, 150);
    glClear(GL_COLOR_BUFFER_BIT);
}
void main(int argc, char **argv)
{
    glutInit(&argc, argv);
```

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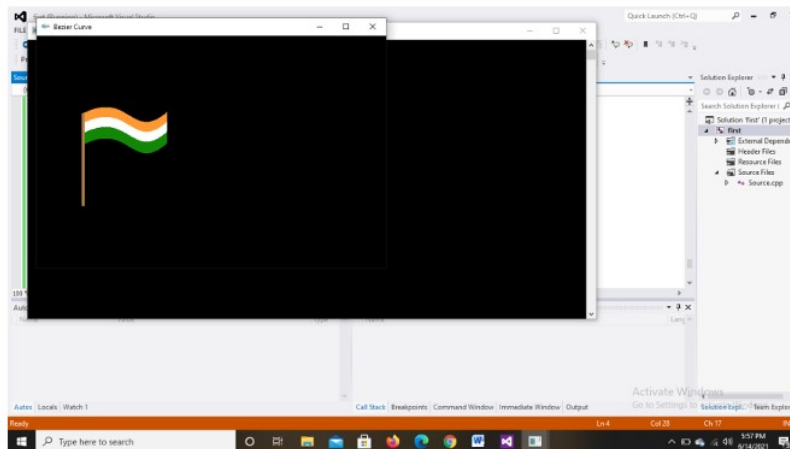
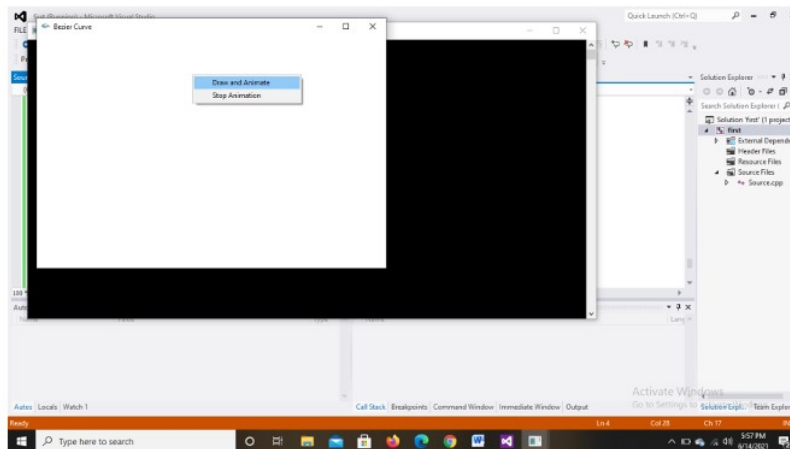
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```
glutInitDisplayMode(GLUT_DOUBLE | GLUT_RGB);  
glutInitWindowPosition(50, 50);  
glutInitWindowSize(600, 400);  
glutCreateWindow("Bezier Curve");  
glutDisplayFunc(display);  
glutReshapeFunc(reshape);  
glutCreateMenu(menu);  
glutAddMenuEntry("Draw and Animate", 1);  
glutAddMenuEntry("Stop Animation", 2);  
glutAttachMenu(GLUT_RIGHT_BUTTON);  
glutMainLoop();  
}
```

## OUTPUT



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