**Program to create a house like figure and rotate about a given fixed point using openGL functions.**

**Objective:** In this program the students will learn to draw a house and use transformation functions of OpenGL to rotate it about a fixed point.

**Program:**

#include <stdlib.h>

#include <stdio.h>

#include <math.h>

#include <GL/glut.h>

GLfloat house[3][9]={ {100.0,100.0,175.0,250.0,250.0,150.0,150.0,200.0,200.0},

{100.0,300.0,400.0,300.0,100.0,100.0,150.0,150.0,100.0},

{1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0 } };

GLfloat rot\_mat[3][3]={{0},{0},{0}};

GLfloat result[3][9]={{0},{0},{0}};

GLfloat h=100.0;

GLfloat k=100.0,theta;

void multiply()

{

int i,j,l;

for(i=0;i<3;i++)

for(j=0;j<9;j++)

{

result[i][j]=0;

for(l=0;l<3;l++)

result[i][j]=result[i][j]+rot\_mat[i][l]\*house[l][j];

}

}

void rotate()

{

GLfloat m,n;

m=-h\*(cos(theta)-1)+k\*(sin(theta));

n=-k\*(cos(theta)-1)-h\*(sin(theta));

rot\_mat[0][0]=cos(theta);

rot\_mat[0][1]=-sin(theta);

rot\_mat[0][2]=m;

rot\_mat[1][0]=sin(theta);

rot\_mat[1][1]=cos(theta);

rot\_mat[1][2]=n;

rot\_mat[2][0]=0;

rot\_mat[2][1]=0;

rot\_mat[2][2]=1;

multiply();

}

void draw\_house()

{

glColor3f(0.0,0.0,1.0);

glBegin(GL\_LINE\_LOOP);

glVertex2f(house[0][0],house[1][0]);

glVertex2f(house[0][1],house[1][1]);

glVertex2f(house[0][3],house[1][3]);

glVertex2f(house[0][4],house[1][4]);

glEnd();

glColor3f(1.0,0.0,0.0);

glBegin(GL\_LINE\_LOOP);

glVertex2f(house[0][5],house[1][5]);

glVertex2f(house[0][6],house[1][6]);

glVertex2f(house[0][7],house[1][7]);

glVertex2f(house[0][8],house[1][8]);

glEnd();

glColor3f(0.0,0.0,1.0);

glBegin(GL\_LINE\_LOOP);

glVertex2f(house[0][1],house[1][1]);

glVertex2f(house[0][2],house[1][2]);

glVertex2f(house[0][3],house[1][3]);

glEnd();

}

void drawrotatedhouse()

{

glColor3f(0.0,0.0,1.0);

glBegin(GL\_LINE\_LOOP);

glVertex2f(result[0][0],result[1][0]);

glVertex2f(result[0][1],result[1][1]);

glVertex2f(result[0][3],result[1][3]);

glVertex2f(result[0][4],result[1][4]);

glEnd();

glColor3f(1.0,0.0,0.0);

glBegin(GL\_LINE\_LOOP);

glVertex2f(result[0][5],result[1][5]);

glVertex2f(result[0][6],result[1][6]);

glVertex2f(result[0][7],result[1][7]);

glVertex2f(result[0][8],result[1][8]);

glEnd();

glColor3f(0.0,0.0,1.0);

glBegin(GL\_LINE\_LOOP);

glVertex2f(result[0][1],result[1][1]);

glVertex2f(result[0][2],result[1][2]);

glVertex2f(result[0][3],result[1][3]);

glEnd();

}

void display()

{

glClear(GL\_COLOR\_BUFFER\_BIT);

draw\_house();

rotate();

drawrotatedhouse();

glFlush();

}

void myinit()

{

glClearColor(1.0,1.0,1.0,1.0);

glColor3f(1.0,0.0,0.0);

glPointSize(1.0);

glMatrixMode(GL\_PROJECTION);

glLoadIdentity();

gluOrtho2D(0.0,500.0,0.0,500.0);

glMatrixMode(GL\_MODELVIEW);

}

int main(int argc,char \*argv[])

{

printf("enter the rotation angle\n");

scanf("%f",&theta);

glutInit(&argc,argv);

glutInitDisplayMode(GLUT\_SINGLE|GLUT\_RGB);

glutInitWindowSize(500,500);

glutInitWindowPosition(0,0);

glutCreateWindow("house rotation");

glutDisplayFunc(display);

myinit();

glutMainLoop();

}

**Output:**

