**PROJECT CODE:**

#include <stdio.h>

#include <math.h>

#include <windows.h>

#include <GL/glut.h>

using namespace std;

float curColor[3] = { 1, 1, 0 };

float weatherColor[3] = { 0, 1, 0 };

float perc = 1;

int leafCount = 7;

float leafy[100] = { 0, -100, 100, 200, 124, -212, -300 };

float leafx[100] = { 0, 20, 154, -200, 358, -52, 350 };

float leafsize[100] = { 1, 0.50, 0.55, 0.6, 0.7, 0.75, 0.8};

float leafangle[100] = { 0, 25, 50, 90, 251, 158, 0 };

float leafrotatespeed[100] = { 0.15, -0.2, 0.15, 0.1, -0.05, -0.07, 0.15 };

void spring() {

perc = 0;

weatherColor[0] = 0.1;

weatherColor[1] = 0.8;

weatherColor[2] = 0;

}

void summer() {

perc = 0;

weatherColor[0] = 1.0;

weatherColor[1] = 0.8;

weatherColor[2] = 0;

}

void winter(){

perc = 0;

weatherColor[0] = 0.6;

weatherColor[1] = 0.4;

weatherColor[2] = 0.12;

}

void fall() {

perc = 0;

weatherColor[0] = 0.9;

weatherColor[1] = 0.2;

weatherColor[2] = 0;

}

void leaf(int x, int y, float size, float angle) {

glLoadIdentity();

glTranslatef(x, y, 0);

glRotatef(angle, 0, 0, 1);

glScalef(size, size, size);

//leaf1-----------------------------------------------------

// Stem

glColor3f(curColor[0]\*0.6, curColor[1]\*0.6, curColor[2]\*0.6);

glBegin(GL\_POLYGON);

glVertex2f(- 4, - 0);

glVertex2f(- 4, -50);

glVertex2f(+ 4, -50);

glVertex2f(+ 4, - 0);

glEnd();

// Leaf

glColor3f(curColor[0]\*(100-(rand()%20))/100.0,

curColor[1]\*(100-(rand()%20))/100.0,

curColor[2]\*(100-(rand()%20))/100.0);

glBegin(GL\_POLYGON);

glVertex2f(- 0, + 0);

glVertex2f(- 65, - 10);

glVertex2f(- 45, + 15);

glVertex2f(-140, + 48);

glVertex2f(-120, + 60);

glVertex2f(-155, + 95);

glVertex2f(-107, + 88);

glVertex2f(-115, +120);

glVertex2f(- 30, + 77);

glVertex2f(- 45, +167);

glVertex2f(- 20, +150);

glVertex2f(+ 0, +203);

glVertex2f(+ 20, +150);

glVertex2f(+ 45, +167);

glVertex2f(+ 30, + 77);

glVertex2f(+115, +120);

glVertex2f(+107, + 88);

glVertex2f(+155, + 95);

glVertex2f(+120, + 60);

glVertex2f(+140, + 48);

glVertex2f(+ 45, + 15);

glVertex2f(+ 65, - 10);

glVertex2f(+ 0, + 0);

glEnd();

//Veins

glColor3f(curColor[0]\*0.2, curColor[1]\*0.2, curColor[2]\*0.2);

glBegin(GL\_LINE\_STRIP);

glVertex2f(+0, + 0);

glVertex2f(+3, + 50);

glVertex2f(-2, +100);

glVertex2f(+0, +200);

glEnd();

glBegin(GL\_LINE\_STRIP);

glVertex2f(+ 3, + 50);

glVertex2f(+ 20, + 30);

glVertex2f(+120, + 75);

glEnd();

glBegin(GL\_LINE\_STRIP);

glVertex2f(+2.5, +30);

glVertex2f(-20, +20);

glVertex2f(-120, +75);

glEnd();

glBegin(GL\_LINE\_STRIP);

glVertex2f(-2, +100);

glVertex2f(+20, +120);

glEnd();

glBegin(GL\_LINE\_STRIP);

glVertex2f(-2, +100);

glVertex2f(-20, +115);

glEnd();

glBegin(GL\_LINE\_STRIP);

glVertex2f(-1.5, + 80);

glVertex2f(-15, +90);

glEnd();

glBegin(GL\_LINE\_STRIP);

glVertex2f( 0, + 65);

glVertex2f(+22,+ 75);

glEnd();

//LEAF2------------------------------------------------------------

//stem

glTranslatef(x+100.0,y+100.0,0.0);

glScalef(1,1,0);

glColor3f(curColor[0]\*0.6, curColor[1]\*0.6, curColor[2]\*0.6);

glBegin(GL\_POLYGON);

glVertex2f(- 4, - 0);

glVertex2f(- 4, -50);

glVertex2f(+ 4, -50);

glVertex2f(+ 4, - 0);

glEnd();

//leaf

glColor3f(curColor[0]\*(100-(rand()%20))/100.0,

curColor[1]\*(100-(rand()%20))/100.0,

curColor[2]\*(100-(rand()%20))/100.0);

glBegin(GL\_POLYGON);

glVertex2f(- 0, + 0);

glVertex2f(- 25, + 70);

glVertex2f(- 20, +150);

glVertex2f(+ 0, +203);

glVertex2f(+ 20, +150);

glVertex2f(+ 30, + 77);

glVertex2f(+ 0, + 0);

glEnd();

//Veins

glColor3f(curColor[0]\*0.2, curColor[1]\*0.2, curColor[2]\*0.2);

glBegin(GL\_LINE\_STRIP);

glVertex2f(+0, + 0);

glVertex2f(+3, + 50);

glVertex2f(-2, +100);

glVertex2f(+0, +200);

glEnd();

glBegin(GL\_LINE\_STRIP);

glVertex2f(-2, +100);

glVertex2f(+20, +120);

glEnd();

glBegin(GL\_LINE\_STRIP);

glVertex2f(-2, +100);

glVertex2f(-20, +115);

glEnd();

glBegin(GL\_LINE\_STRIP);

glVertex2f(-1.5, + 80);

glVertex2f(-20, +90);

glEnd();

glBegin(GL\_LINE\_STRIP);

glVertex2f( 0, + 65);

glVertex2f(+22,+ 75);

glEnd();

//leaf3--------------------------------------------------------

glTranslatef(x+200,y+200,0);

glScalef(1,1,0);

// Stem

glColor3f(curColor[0]\*0.6, curColor[1]\*0.6, curColor[2]\*0.6);

glBegin(GL\_POLYGON);

glVertex2f(- 4, - 0);

glVertex2f(- 4, -50);

glVertex2f(+ 4, -50);

glVertex2f(+ 4, - 0);

glEnd();

// Leaf

glColor3f(curColor[0]\*(100-(rand()%20))/100.0,

curColor[1]\*(100-(rand()%20))/100.0,

curColor[2]\*(100-(rand()%20))/100.0);

glBegin(GL\_POLYGON);

glVertex2f(- 0, + 0);

glVertex2f(- 45, + 15);

glVertex2f(- 30, + 77);

glVertex2f(+ 0, +203);

glVertex2f(+ 30, + 77);

glVertex2f(+ 45, + 15);

glVertex2f(+ 0, + 0);

glEnd();

//Veins

glColor3f(curColor[0]\*0.2, curColor[1]\*0.2, curColor[2]\*0.2);

glBegin(GL\_LINE\_STRIP);

glVertex2f(+0, + 0);

glVertex2f(+3, + 50);

glVertex2f(-2, +100);

glVertex2f(+0, +200);

glEnd();

glBegin(GL\_LINE\_STRIP);

glVertex2f(-2, +100);

glVertex2f(+20, +120);

glEnd();

glBegin(GL\_LINE\_STRIP);

glVertex2f(-2, +100);

glVertex2f(-20, +115);

glEnd();

glBegin(GL\_LINE\_STRIP);

glVertex2f(-1.5, + 80);

glVertex2f(-15, +90);

glEnd();

glBegin(GL\_LINE\_STRIP);

glVertex2f( 0, + 65);

glVertex2f(+22,+ 75);

glEnd();

glBegin(GL\_LINE\_STRIP);

glVertex2f(+4, +45);

glVertex2f(+20, +50);

glEnd();

glBegin(GL\_LINE\_STRIP);

glVertex2f(-0.01, +45);

glVertex2f(-30, +60);

glEnd();

//leaf 4---------------------------------------------------------

glTranslatef(x+400,y+400,0);

glScalef(2.0,2.0,0);

// Stem

glColor3f(curColor[0]\*0.6, curColor[1]\*0.6, curColor[2]\*0.6);

glBegin(GL\_POLYGON);

glVertex2f(- 4, - 0);

glVertex2f(- 4, -50);

glVertex2f(+ 4, -50);

glVertex2f(+ 4, - 0);

glEnd();

//leaf

glColor3f(curColor[0]\*(100-(rand()%20))/100.0,

curColor[1]\*(100-(rand()%20))/100.0,

curColor[2]\*(100-(rand()%20))/100.0);

glBegin(GL\_POLYGON);

glVertex2f(0,0);

glVertex2f(-6,-10);

glVertex2f(-10,-10);

glVertex2f(-15,-16);

glVertex2f(-20,-19);

glVertex2f(-24,-17);

glVertex2f(-30,-13);

glVertex2f(-34,-10);

glVertex2f(-38,-5);

glVertex2f(-40,0);

glVertex2f(-40,5);

glVertex2f(-39,10);

glVertex2f(-38,15);

glVertex2f(-35,20);

glVertex2f(-30,28);

glVertex2f(-20,37);

glVertex2f(-18,40);

glVertex2f(-10,48);

glVertex2f(-3,58);

glVertex2f(-2,61);

glVertex2f(-1,64);

glVertex2f(0,65);

glVertex2f(0,0);

glVertex2f(6,-10);

glVertex2f(10,-10);

glVertex2f(15,-16);

glVertex2f(20,-19);

glVertex2f(24,-17);

glVertex2f(30,-13);

glVertex2f(34,-10);

glVertex2f(38,-5);

glVertex2f(40,0);

glVertex2f(40,5);

glVertex2f(39,10);

glVertex2f(38,15);

glVertex2f(35,20);

glVertex2f(30,28);

glVertex2f(20,37);

glVertex2f(18,40);

glVertex2f(10,48);

glVertex2f(3,58);

glVertex2f(2,61);

glVertex2f(1,64);

glVertex2f(0,65);

glVertex2f(0,0);

glEnd();

//Veins

glColor3f(curColor[0]\*0.2, curColor[1]\*0.2, curColor[2]\*0.2);

glBegin(GL\_LINE\_STRIP);

glVertex2f(+0, + 0);

glVertex2f(0,65);

glEnd();

glBegin(GL\_LINE\_STRIP);

glVertex2f(0,0);

glVertex2f(-25,10);

glEnd();

glBegin(GL\_LINE\_STRIP);

glVertex2f(0,0);

glVertex2f(25,10);

glEnd();

glBegin(GL\_LINE\_STRIP);

glVertex2f(0, +10);

glVertex2f(-20,20);

glEnd();

glBegin(GL\_LINE\_STRIP);

glVertex2f(0, +10);

glVertex2f(20,20);

glEnd();

glBegin(GL\_LINE\_STRIP);

glVertex2f(0, +20);

glVertex2f(-15,30);

glEnd();

glBegin(GL\_LINE\_STRIP);

glVertex2f(0, +20);

glVertex2f(15,30);

glEnd();

glBegin(GL\_LINE\_STRIP);

glVertex2f(0, +30);

glVertex2f(-12,40);

glEnd();

glBegin(GL\_LINE\_STRIP);

glVertex2f(0, +30);

glVertex2f(12,40);

glEnd();

glBegin(GL\_LINE\_STRIP);

glVertex2f(0, +40);

glVertex2f(-5,46);

glEnd();

glBegin(GL\_LINE\_STRIP);

glVertex2f(0, +40);

glVertex2f(5,46);

glEnd();

}

void display(){

glClear(GL\_COLOR\_BUFFER\_BIT);

glClearColor(0, 0, 0, 0);

glLoadIdentity();

glColor3f(0, 1, 0);

for (int i = 0; i<leafCount; i++)

{

leaf(leafx[i], leafy[i], leafsize[i], leafangle[i]);

leafy[i] -= 1\*leafsize[i];

leafangle[i] += leafrotatespeed[i];

if (leafy[i] < -300-200\*leafsize[i])

{

leafy[i] = 400;

leafx[i] = rand()%701 - 350;

}

}

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

curColor[i] = perc\*weatherColor[i] + (1-perc)\*curColor[i];

if(perc < 1)

perc += 0.00001;

glFlush();

Sleep(1);

glutPostRedisplay();

}

void menu(int op)

{

switch (op)

{

case 1:

spring();

glutPostRedisplay();

break;

case 2:

summer();

glutPostRedisplay();

break;

case 3:

winter();

glutPostRedisplay();

break;

case 4:

fall();

glutPostRedisplay();

break;

case 5:

exit(0);

}

}

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

{

glutInit(&argc, argv);

glutInitDisplayMode(GLUT\_SINGLE|GLUT\_RGB);

glutInitWindowSize(800, 600);

glutCreateWindow("SEASONS");

glMatrixMode(GL\_PROJECTION);

glLoadIdentity();

gluOrtho2D(-400, 400, -300, 300);

glMatrixMode(GL\_MODELVIEW);

glutCreateMenu(menu);

glutAddMenuEntry("spring", 1);

glutAddMenuEntry("summer", 2);

glutAddMenuEntry("winter", 3);

glutAddMenuEntry("fall", 4);

glutAddMenuEntry("Quit", 5);

glutAttachMenu(GLUT\_RIGHT\_BUTTON);

glutDisplayFunc(display);

glutMainLoop();

}