Mawlana Bhashani Science and Technology University

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Department of Computer Science and Engineering

Course Title: Computer Graphics and Animation

Lab Report Tittle: Draw an object (car) in OpenGL and Animate

Course Code: CSE 3206

LAB REPORT

Submitted By:	**Submitted To:**
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Problem Statement: Draw an object (car) in OpenGL and Animate the car both in forward and backward direction.

1. For backward, rotate the car for real visualization.

Code:

```
#include <GL/gl.h>
#include <stdio.h>
#include <math.h>
#include <GL/glut.h>

void circle(GLfloat rx, GLfloat ry, GLfloat cx, GLfloat cy)
{
    glBegin(GL_POLYGON);
    glVertex2f(cx, cy);
    for (int i = 0; i <= 360; i++)
    {
        float angle = i * 3.1416 / 180;
        float x = rx * cos(angle);
        float y = ry * sin(angle);
        glVertex2f((x + cx), (y + cy));
    }
    glEnd();
}

void sun(GLfloat rx, GLfloat ry, GLfloat cx, GLfloat cy)
{
    glBegin(GL_POLYGON);
    glVertex2f(cx, cy);
    for (int i = 0; i <= 360; i++)
    {
        float angle = i * 3.1416 / 180;
        float x = rx * cos(angle);
        float y = ry * sin(angle);
        glVertex2f((x + cx), (y + cy));
    }
    glEnd();
}

void init(void)
{
    glClearColor(0.0, 0.0, 0.9, 0.0);
    glMatrixMode(GL_PROJECTION);
    gluOrtho2D(0.0, 500, 0.0, 500); // window size
}
```

```
float bx = 10;
bool isMovingForward = true;

void hills()
{
    // Hills 1
    glColor3ub(184, 134, 11);
    glBegin(GL_POLYGON);
    glVertex2d(-40, 300);
    glVertex2d(200, 300);
    glVertex2d(100, 450);
    glEnd();

    // Hills 2
    glColor3ub(218, 165, 32);
    glBegin(GL_POLYGON);
    glVertex2d(150, 300);
    glVertex2d(350, 300);
    glVertex2d(250, 450);
    glEnd();

    // Hills 3
    glColor3ub(184, 134, 11);
    glBegin(GL_POLYGON);
    glVertex2d(300, 300);
    glVertex2d(520, 300);
    glVertex2d(400, 450);
    glEnd();
}

void display(void)
{
    glClear(GL_COLOR_BUFFER_BIT);

    // Ground Color
    glColor3ub(0, 255, 0);
    glBegin(GL_POLYGON);
    glVertex2d(0, 0);
    glVertex2d(500, 0);
    glVertex2d(500, 150);
    glVertex2d(0, 150);
    glEnd();

    // Road
```

```
    glColor3ub(255, 255, 255);
    glBegin(GL_POLYGON);
    glVertex2d(0, 55);
    glVertex2d(500, 55);
    glVertex2d(500, 115);
    glVertex2d(0, 115);
    glEnd();

    glColor3ub(0, 0, 0);
    glBegin(GL_POLYGON);
    glVertex2d(0, 60);
    glVertex2d(500, 60);
    glVertex2d(500, 110);
    glVertex2d(0, 110);
    glEnd();

    // Hills
    hills();

    // Sun design
    glColor3ub(255, 215, 0);
    sun(20, 20, 175, 450);

    glPushMatrix();
    glTranslatef(bx, 0, 0);

    glColor3ub(255, 0, 0);
    glBegin(GL_POLYGON);
    glVertex2d(410, 100);
    glVertex2d(490, 100);
    glVertex2d(485, 130);
    glVertex2d(410, 130);
    glEnd();

    glColor3ub(255, 0, 0);
    glBegin(GL_POLYGON);
    glVertex2d(420, 130);
    glVertex2d(475, 130);
    glVertex2d(465, 160);
    glVertex2d(430, 160);
    glEnd();

    // Car window
    glColor3ub(220, 220, 220);
    glBegin(GL_POLYGON);
```

```
    glVertex2d(425, 130);
    glVertex2d(445, 130);
    glVertex2d(445, 150);
    glVertex2d(430, 150);
    glEnd();

    // Car window
    glColor3ub(220, 220, 220);
    glBegin(GL_POLYGON);
    glVertex2d(450, 130);
    glVertex2d(470, 130);
    glVertex2d(465, 150);
    glVertex2d(450, 150);
    glEnd();

    // Car wheels
    glColor3ub(0, 0, 0);
    circle(10, 14, 435, 100);
    circle(10, 14, 465, 100);

    glColor3ub(245, 245, 245);
    circle(6, 10, 435, 100);
    circle(6, 10, 465, 100);

    glPopMatrix();

    if (isMovingForward)
    {
        bx += 0.05;
        if (bx > 500)
            isMovingForward = false;
    }
    else
    {
        bx -= 0.05;
        if (bx < -500)
            isMovingForward = true;
    }

    glutPostRedisplay();
    glFlush();
    glutSwapBuffers();
}

int main(int argc, char** argv)
```

```
{
    glutInit(&argc, argv);
    glutInitDisplayMode(GLUT_DOUBLE | GLUT_RGBA | GLUT_DEPTH);
    glutInitWindowSize(1000, 600);
    glutInitWindowPosition(300, 50);
    glutCreateWindow("A Moving Car Scenario");
    init();
    glutDisplayFunc(display);
    glutMainLoop();
    return 0;
}
```

Screen Shot of Output:

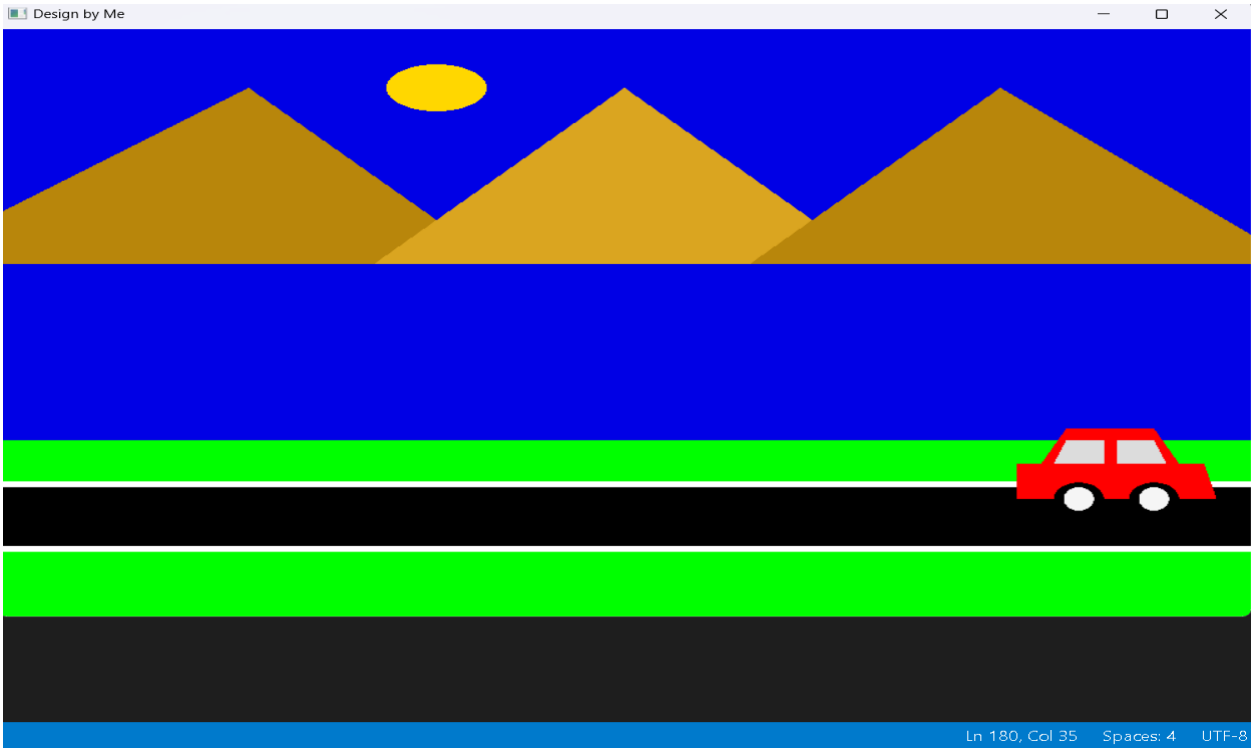

Fig: Move on forward

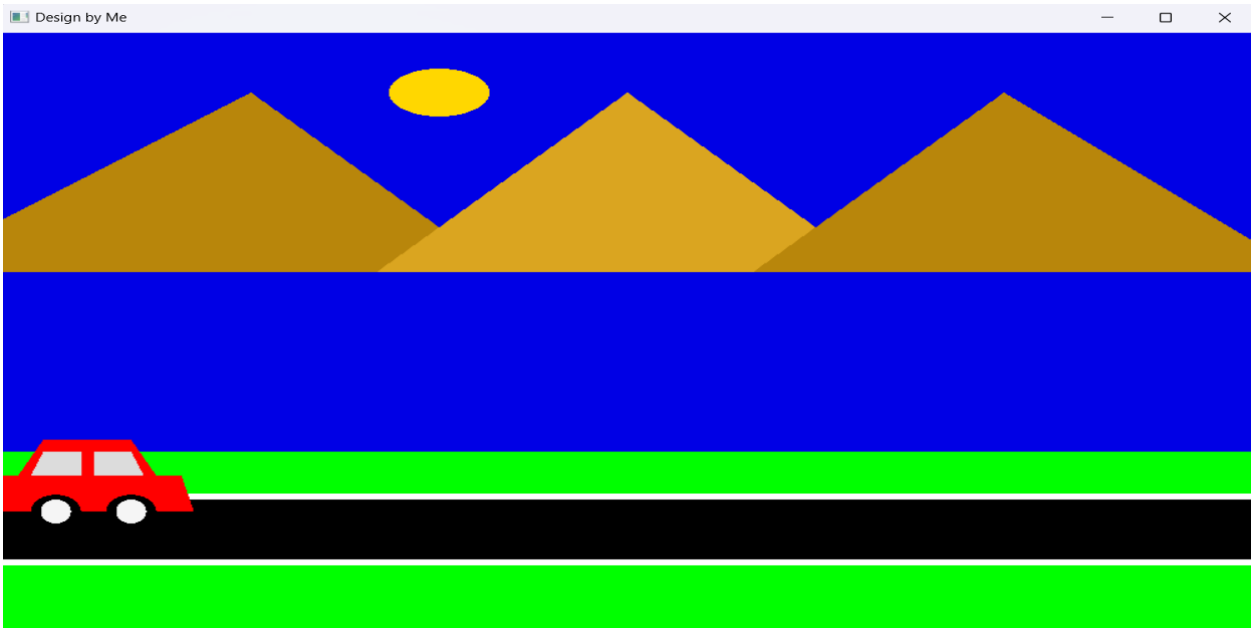

Fig: Move on Backward