Homework 3 Report

D11315807

Ardiawan Bagus Harisa

Department of CSIE

In this traffic light homework, I draw a traffic light including its pole and façade. The light color will change after every two seconds. Instead of blocking the color as the animation mechanism, I draw the red, green, and yellow color based on a global variable.

OpenGL App 1.cpp

OpenGL App 1 (Global Scope)

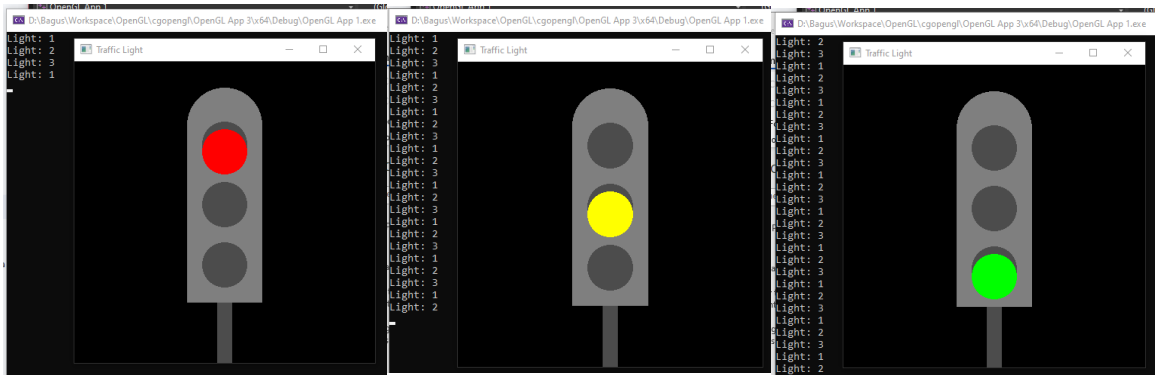
```cpp
int createWindow(const char* title, int width, int height, int posX, int posY, void (*displayFunc)()) { ... }

void displayTraffic() {
    glClear(GL_COLOR_BUFFER_BIT);

    drawRect(0.0f, -0.75f, 0.1f, 0.5f, { 0.3f, 0.3f, 0.3f });   // Pole
    drawRect(0.0f, 0.0f, 0.5f, 1.2f, { 0.5f, 0.5f, 0.5f });     // Panel
    drawCircle(0.0f, 0.575f, 0.25f, 100, { 0.5f, 0.5f, 0.5f }); // Facades
    drawCircle(0.0f, 0.45f, 0.15f, 100, { 0.3f, 0.3f, 0.3f });
    drawCircle(0.0f, 0.05f, 0.15f, 100, { 0.3f, 0.3f, 0.3f });
    drawCircle(0.0f, -0.35f, 0.15f, 100, { 0.3f, 0.3f, 0.3f });

    if (light == 1) {
        drawCircle(0.0f, 0.4f, 0.15f, 100, { 1.0f, 0.0f, 0.0f });   // Red
    }
    else if (light == 2) {
        drawCircle(0.0f, 0.0f, 0.15f, 100, { 1.0f, 1.0f, 0.0f });   // Yellow
    }
    else if (light == 3) {
        drawCircle(0.0f, -0.4f, 0.15f, 100, { 0.0f, 1.0f, 0.0f });  // Green
    }

    glFlush();
}

void updateTraffic(int value) {
    //glutSetWindow(window1);
    // make the traffic light change colors every 3 seconds
    light = light < 3 ? ++light : 1;
    printf("Light: %d\n", light);
    glutPostRedisplay();
    glutTimerFunc(2000, updateTraffic, 0);
}

int main(int argc, char** argv) {
    glutInit(&argc, argv);
    glutInitDisplayMode(GLUT_SINGLE | GLUT_RGB);

    window1 = createWindow("Traffic Light", 400, 400, 50, 50, displayTraffic);
    updateTraffic(0);

    glutMainLoop();
    return 0;
}
```

As you can see, I create a window that will call the displayTraffic() function to draw the traffic light animation, in which will be updated using updateTraffic() function.

First, I draw the pole and panel using drawRect() function that I have created on the previous homework. The parameters I use on the functions are: center of *x, center of y, width, height, and color*. I also draw the main façade for the main panel and three façades for each light with center of *x, center of y, radius, number of segments, and color* as the parameters.

Second, according to the value of global variable: *light*, I draw the correct color accordingly.

Finally, I update the value in light simply by add 1 value for every 2000ms or 2 seconds.



Notes:

- I push my code here: https://github.com/ardiawanbagusharisa/cgopengl

The complete code:

```
#include <GL/glew.h>
#include <GL/freeglut.h>
#include <cmath>
#include <stdio.h>
#include "OpenGL App 1.h"

const float PI = 3.14159265359f;
struct Color {
     float r, g, b;
};

int window1, window2;
int light = 0;

void drawRect(float cx, float cy, float sizeX, float sizeY, Color
color) {
     glColor3f(color.r, color.g, color.b);
     glBegin(GL_QUADS);                 // Start drawing a square

     glVertex2f(cx - sizeX / 2, cy - sizeY / 2);       //  Change
the method to be more parametric
     glVertex2f(cx + sizeX / 2, cy - sizeY / 2);
     glVertex2f(cx + sizeX / 2, cy + sizeY / 2);
     glVertex2f(cx - sizeX / 2, cy + sizeY / 2);

     glEnd();
}

void drawCircle(float cx, float cy, float r, int segments, Color
color) {
     glColor3f(color.r, color.g, color.b);
     glBegin(GL_TRIANGLE_FAN);
     //glVertex2f(0.0f, 0.0f);
     for (int i = 0; i <= segments; i++) {
          float theta = 2.0f * PI * float(i) / float(segments);
     // Compute the radian angle
          float x = r * cosf(theta);         //  Set  coordinates
of points on the perimeter of the circle using polar to cartesian
          float y = r * sinf(theta);
          glVertex2f(x + cx, y + cy);
     }
     glEnd();
}

int createWindow(const char* title, int width, int height, int
posX, int posY, void (*displayFunc)()) {
```

```
     glutInitWindowSize(width, height);
     glutInitWindowPosition(posX, posY);
     int windowID = glutCreateWindow(title);
     glewInit();
     glClearColor(0.0f, 0.0f, 0.0f, 1.0f);        //        Black
background
     glutDisplayFunc(displayFunc);                // Register the
display function
     return windowID;
}

void displayTraffic() {
     glClear(GL_COLOR_BUFFER_BIT);

     drawRect(0.0f, -0.75f, 0.1f, 0.5f, { 0.3f, 0.3f, 0.3f });
     // Pole
     drawRect(0.0f, 0.0f, 0.5f, 1.2f, { 0.5f, 0.5f, 0.5f });
     // Panel
     drawCircle(0.0f, 0.575f, 0.25f, 100, { 0.5f, 0.5f, 0.5f });
     // Facades
     drawCircle(0.0f, 0.45f, 0.15f, 100, { 0.3f, 0.3f, 0.3f });
     drawCircle(0.0f, 0.05f, 0.15f, 100, { 0.3f, 0.3f, 0.3f });
     drawCircle(0.0f, -0.35f, 0.15f, 100, { 0.3f, 0.3f, 0.3f });

     if (light == 1) {
         drawCircle(0.0f, 0.4f, 0.15f, 100, { 1.0f, 0.0f, 0.0f });
     // Red
     }
     else if (light == 2) {
         drawCircle(0.0f, 0.0f, 0.15f, 100, { 1.0f, 1.0f, 0.0f });
     // Yellow
     }
     else if (light == 3) {
          drawCircle(0.0f,  -0.4f,  0.15f,  100,  {  0.0f,  1.0f,
0.0f });  // Green
     }

     glFlush();
}

void updateTraffic(int value) {
     //glutSetWindow(window1);
     // make the traffic light change colors every 3 seconds
     light = light < 3 ? ++light : 1;
     printf("Light: %d\n", light);
     glutPostRedisplay();
     glutTimerFunc(2000, updateTraffic, 0);
```

```
}

int main(int argc, char** argv) {
     glutInit(&argc, argv);
     glutInitDisplayMode(GLUT_SINGLE | GLUT_RGB);

     window1 = createWindow("Traffic Light", 400, 400, 50, 50,
displayTraffic);
     updateTraffic(0);

     glutMainLoop();
     return 0;
}
```