COMPUTER GRAPHICS

Course Project

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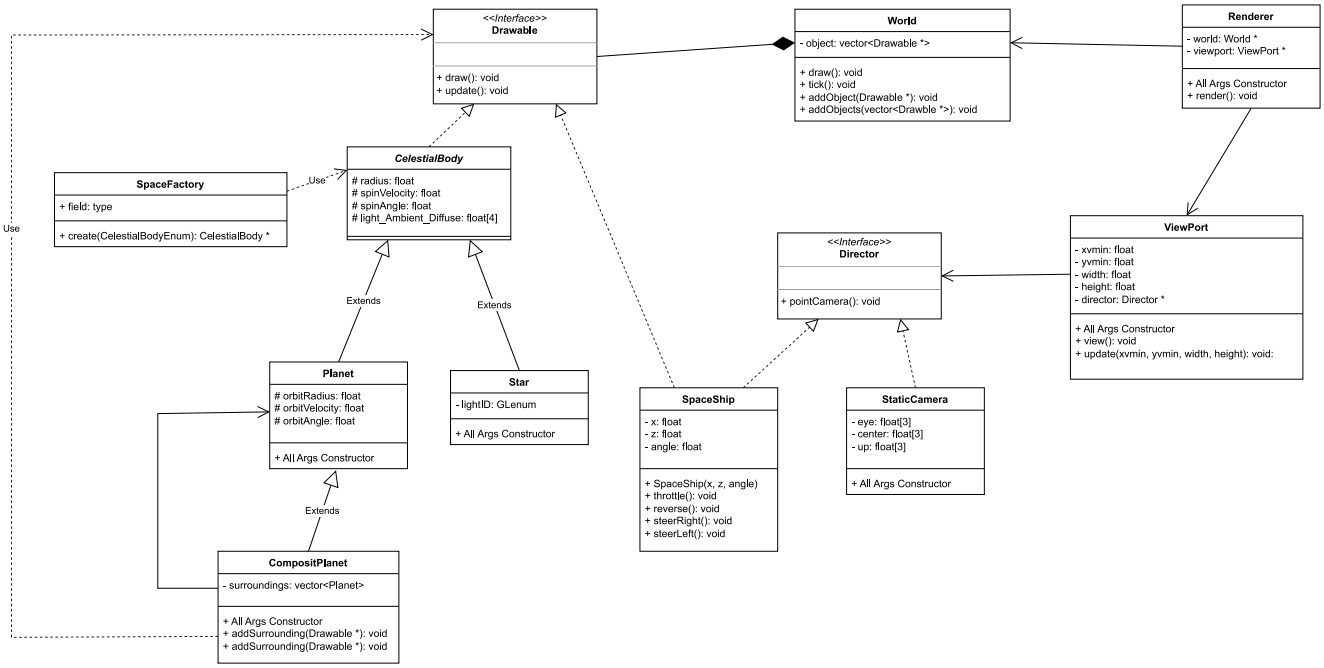
Class Diagram



Code

Drawing The Sun

```
void Star::draw()
{
    glEnable(lightID);

    glLightfv(lightID, GL_AMBIENT_AND_DIFFUSE, light_Ambient_Diffuse);
    float w[] = {0.1, 0.1, 0.1, 1};

    glLightfv(lightID, GL_SPECULAR, w);

    float lightPosition[4] = {0, 0, 0, 1};
    glLightfv(lightID, GL_POSITION, lightPosition);



    glLightf(lightID, GL_LINEAR_ATTENUATION, 0.0001f);
    glLightf(lightID, GL_QUADRATIC_ATTENUATION, 0.0001f);


    glMaterialfv(GL_FRONT, GL_EMISSION, light_Ambient_Diffuse);

    glPushMatrix();
        glRotatef(spinAngle, 0, 1, 0);
        glRotatef(90, 1, 0, 0);

        glutSolidSphere(radius, 40, 40);
    glPopMatrix();

    float reset[4] = {0};
    glMaterialfv(GL_FRONT, GL_EMISSION, reset);
}
```

Drawing Planets

```
void Planet::draw(){
    glMaterialfv(GL_FRONT, GL_AMBIENT_AND_DIFFUSE, light_Ambient_Diffuse);
    float w[] = {0.1, 0.1, 0.1, 1};
    glMaterialfv(GL_FRONT, GL_SPECULAR, w);

    glPushMatrix();
        glRotatef(orbitAngle, 0, 1, 0);
        glTranslatef(orbitRadius, 0, 0);
        glRotatef(spinAngle, 0, 1, 0);
        glRotatef(90, 1, 0, 0);
        glutSolidSphere(radius, 40, 40);
    glPopMatrix();

    float reset[4] = {0};

    glMaterialfv(GL_FRONT, GL_AMBIENT_AND_DIFFUSE, reset);

}
```

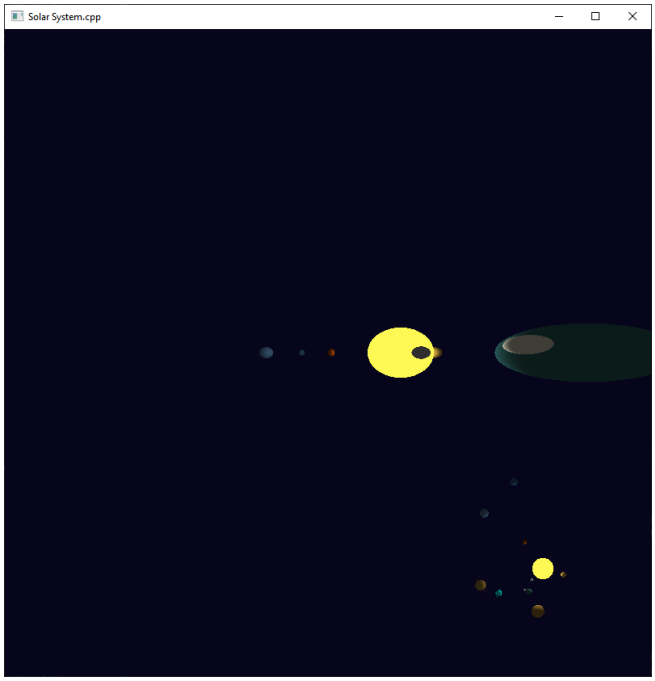
Setup Function

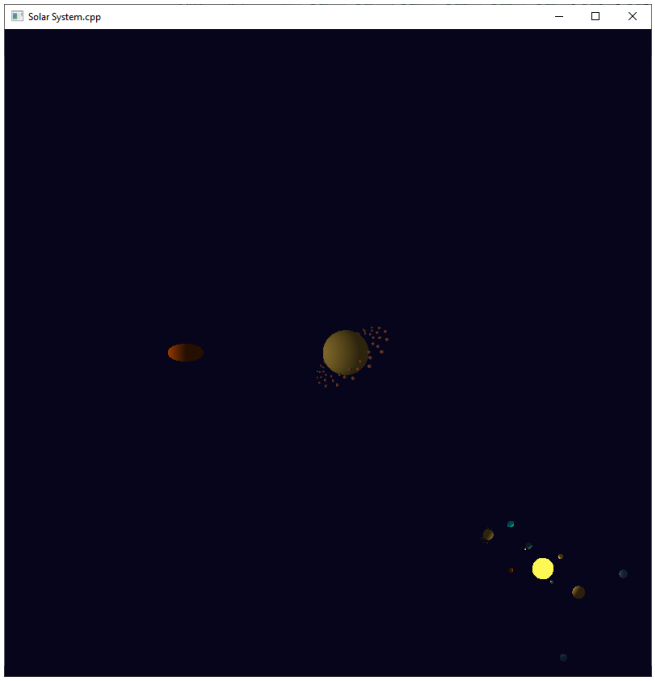
```
// Initialization routine.
void setup(void)
{
    glEnable(GL_DEPTH_TEST);

    // Create the world
    world = new World();

    world->addObject(factory.create(SUN));

    world->addObject(factory.create(MERCURY));
    world->addObject(factory.create(VENUS));
    world->addObject(factory.create(EARTH));
    world->addObject(factory.create(MARS));
    world->addObject(factory.create(JUPYTER));
    world->addObject(factory.create(SATURNE));
    world->addObject(factory.create(URANUS));
    world->addObject(factory.create(NEPTUNE));

    //backgorund
    float cosmicColor[3] = {0.09, 0.08, 0.43};
    world->addObject(new Planet(400, 0, 0, 0, 0, 0, cosmicColor));

    //add spaceship
    spaceship = new SpaceShip(-100, 100, 45);
    world->addObject(spaceship);

    // Create the spaceship viewport and renderer
    spaceshipViewPort = new ViewPort(0, 0, width, height, *spaceship);
    spaceshipRenderer = new Renderer(world, spaceshipViewPort);

    // Create the fixed viewport and renderer
    double eye[3] = {0, 100, 0}, center[3]= {0, 0, 0}, up[3] = {0, 0, -1};
    fixedCamera = new StaticCamera (eye, center, up);
    fixedViewPort = new ViewPort(width * 2 / 3, 0, width / 3, height / 3, *fixedCamera);
    fixedRenderer = new Renderer(world, fixedViewPort);


    glEnable(GL_LIGHTING);
    glLightModelfv(GL_LIGHT_MODEL_AMBIENT, globAmb);


    glEnable(GL_DEPTH_TEST);
    glClearColor(0.0, 0.0, 0.0, 0.0);

    glutTimerFunc(0, update, 0); // Initial call of update().
}
```

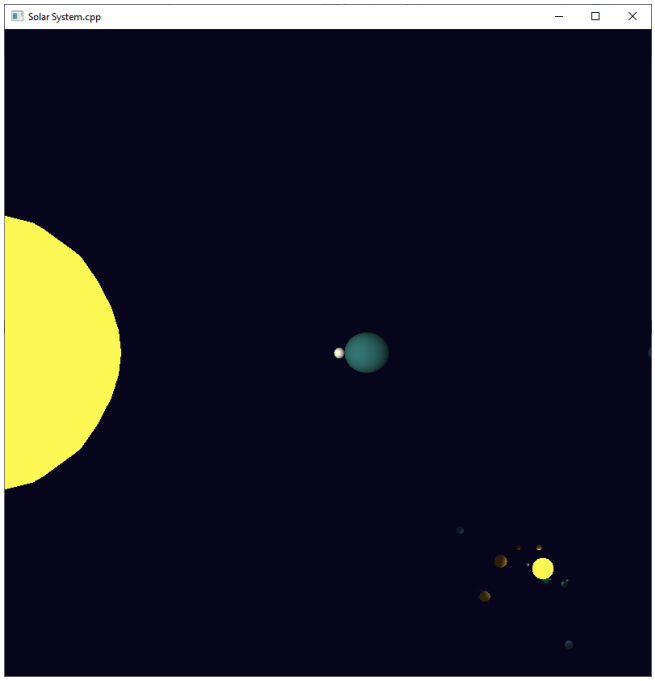
Draw Function

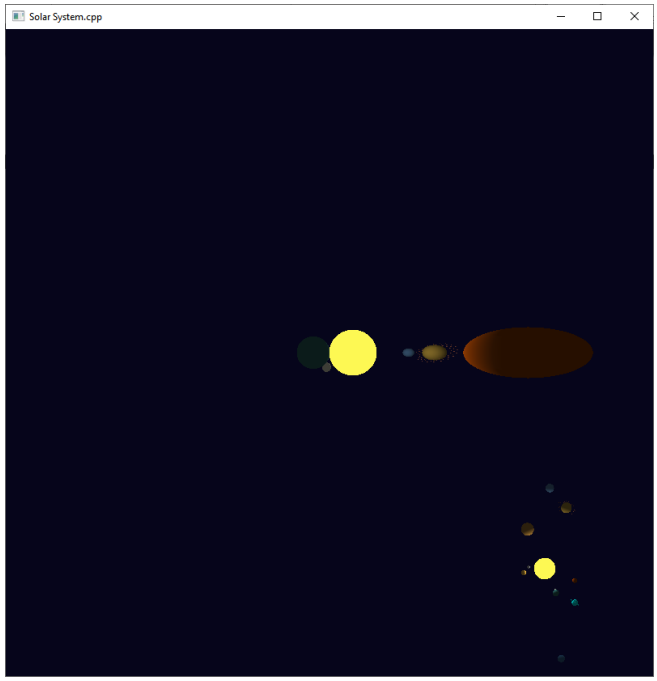
```
// Drawing routine.
void drawScene(void)
{

    glClear(GL_COLOR_BUFFER_BIT | GL_DEPTH_BUFFER_BIT);

    spaceshipRenderer->render();
    fixedRenderer->render();

    glutSwapBuffers();
}
```

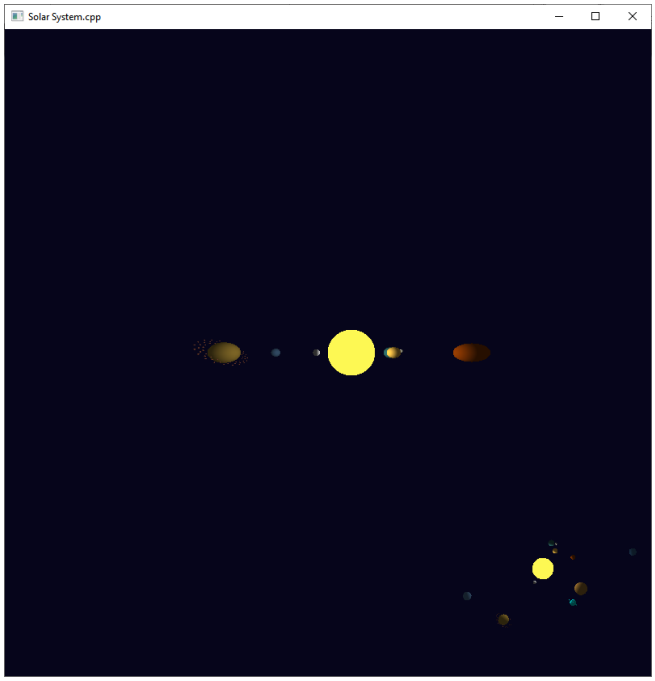
Screen Shots

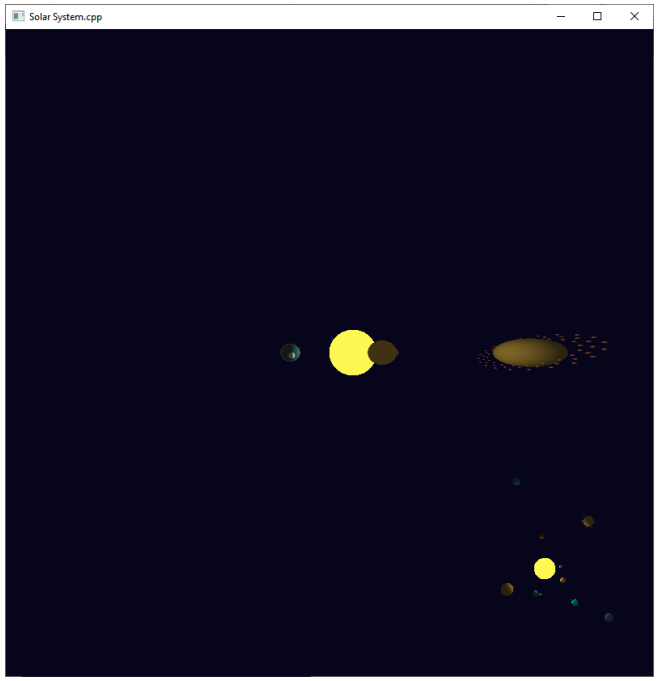





Solar System.cpp


Solar System.cpp


Solar System.cpp


Solar System.cpp

Compilation

Make sure to include all the .h and .cpp files.

Additional Resources

https://www.youtube.com/playlist?list=PLIrATfBNZ98foTJPJ_Ev03o2oq3-GGOS2

https://groups.google.com/g/comp.graphics.api.opengl/c/v1HgahK2kyY

https://just.edu.jo/~yaser/courses/cs480/Tutorials/OpenGl%20-%20Chapter%208%20%20Light%20&%20Material.htm