

# CGM PROJECT

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**Project Name:** Solar System

## **Problem Statement :**

To write a program in OpenGL that will accurately animate the Solar System which can't be captured by an actual camera precisely.

## **Abstract:**

Computer graphics is the process of making the design, 2D, 3D, and animation of an object. The solar system is a set of celestial bodies bound by gravitational forces. The movement of celestial bodies like the sun, stars, planets, and the others will be more easily understood if taught through visualization movement through computer animation. This visualization shows the solar system's planetary motion which moves around the sun and remains in each orbit. We use OpenGL to represent the solar system as a visual. OpenGL supports this modeling capability as OpenGL has additional features to better produce something more realistic.

## **Introduction :**

This project illustrates a simple solar system in a 3D space where the planets will have retrograde motion towards the sun. This report outlines the methods used to visualize the artificial solar system and also the discussion of the end results from the project.

## **Methodology used:**

In this project, there are 2 types of models that will be used to illustrate the planet. The first model is a simple sphere that represents the 3D shape for most of the planets. The second model is a sphere with a circular ring surrounding the object. The model is used on planets such as Neptune, Saturn, and Uranus.

### *Stages of making solar system visualization:*

- Declare all the attributes that are needed for the translation and rotation functions.
- Set the speed of rotation of each planet, because the speed of each planet to make one revolution is different
- We had created two separate paths for planets and asteroids.
- Create the sun with a solid sphere, set the size, and position it in the center point (0,0,0) so that the sun becomes the center of planets that will be surrounding them.
- Create the planets Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune with a solid sphere, set the size of each planet, and the planet's position in accordance with the ratio of the actual distance.
- Set the revolution of each planet.
- To generate the final directional light effect, it will require the ambient, diffuse and specular reflection summation.
- Create the orbit of each planet, with torus (ring), set torus in the center, so the planets will move around the sun, and still remain in orbit.
- Adjust the lighting to give a 3D effect.

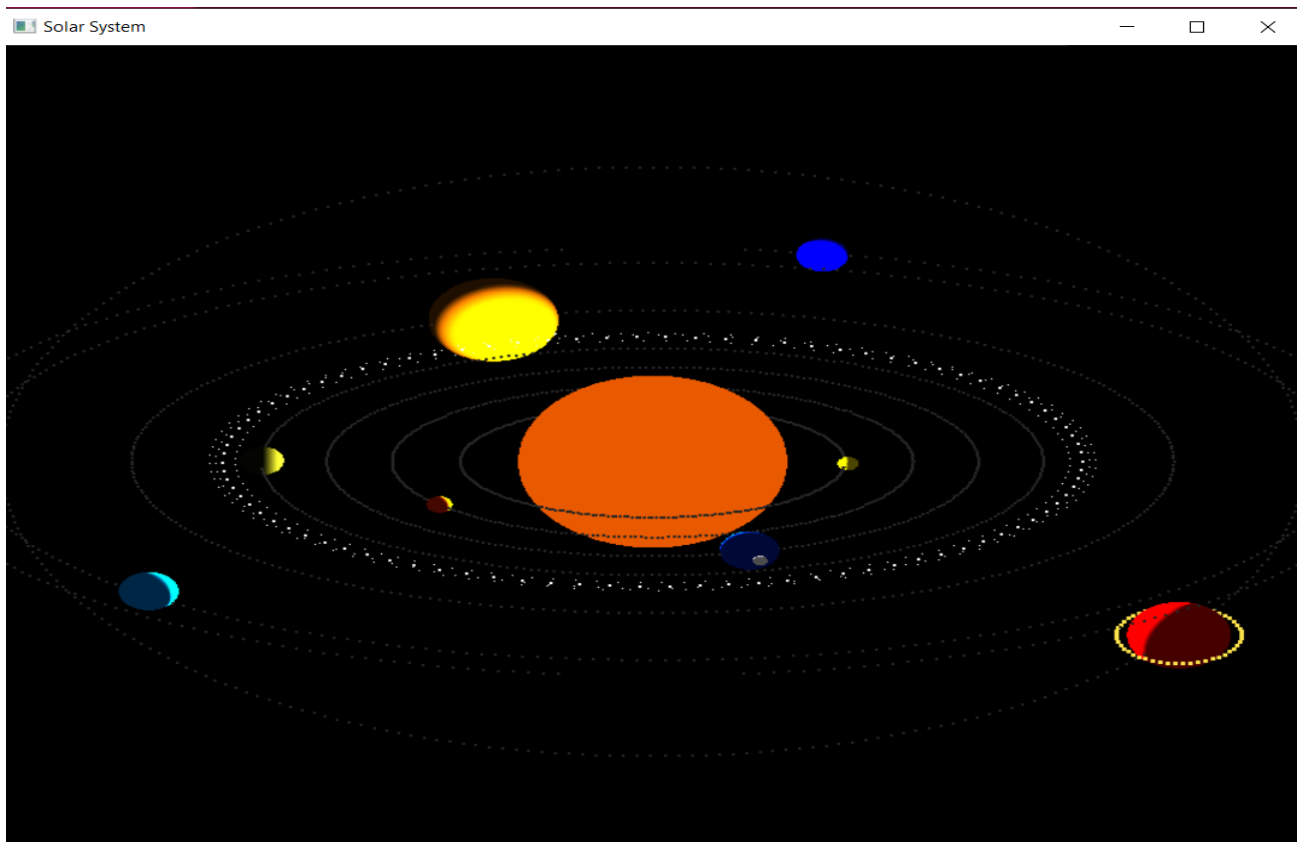
## Experimental Results:

The first appearance is an animation of planet movement and some asteroids, they move around the sun automatically, and it also gives general information about the solar system.

Planets	revolution(year)	
	real	opengl
Sun	0	0
Mercury	0.24	41.666666667
Venus	0.62	16.12903226
Earth	1	10
Mars	1.88	5.319148936
Jupiter	11.86	0.84317032
Saturn	29.45	0.339558574
Uranus	84.02	0.119019281
Neptune	164.79	0.060683294

Table 1. Size of Planets

Planets	diameter	
	real	opengl
Sun	1391684	278336.8
Mercury	4879	975.8
Venus	12104	2420.8
Earth	12742	2548.4
Mars	6779	1355.8
Jupiter	139822	27964.4
Saturn	116464	23292.8
Uranus	50724	10144.8
Neptune	49244	9848.8



## Conclusion:

- ❖ This project shows how computer graphics could simulate some pictures that can't be captured easily with the actual camera. By having objects and using some computer graphic techniques, the final result portrays the solar system generally.
- ❖ The 3d objects and the 3d space helps to project and capture the frame from any angle in the solar system. The textures help the frames to look more realistic and closer to the actual image of planets. The point light that is set in this solar system project has depicted how the sun as the light source of the solar system works routinely.
- ❖ The camera helps the user to pick the frame and observe the planet's animation from anywhere in the solar system. All the planets are set to some specified color and time frame to rotate around the sun which looks realistic. Here we set some asteroids to make them realistic.
- ❖ Subsequently, all the computer graphic methods have made the final frame rendered to be more alive and looked realistic. Animation circulation of planets around the sun interface design is the design of the visual and interpretive models designed.