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|  | **Qatar University**  **College of Engineering**  **Department of Computer Science and Engineering** |

Computer Graphics Project Report

**Solar System**

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# Project Goals

The primary goal of our project is to create an interactive and visually appealing 3D representation of the solar system. We aim to incorporate at least two key areas of computer graphics, such as rendering, interaction and object transformation to enhance the user engagement.

# Project Accomplishments

## Implemented Features

* Solar System Model: We imported 3D models of the solar system, including the sun and planets, and attached a textures to each object we imported.
* Rendering Techniques: To enhance realism, we implemented shaders and texture mapping. We created a sky sphere that has a space texture attached for simulating space environment. Furthermore, to simulate a realistic solar system we implemented directional light from the sun to light the planets and the sides of the planet that are facing away from the sun would be dark.
* Transformation: We added translating motion to our planets models that enabled them to orbit around the sun in circular motion. To make the solar system look more realistic we applied rotation motion to the planets depending on their axis tilt.
* Interactivity: Users can interact with the solar system. For example, we created a small interface GUI that displays instructions to interact with the Solar system simulation. For instance, we mapped the keys from 1 to 8 to each planet respectively, when pressing any key from 1 to 8 takes the FPS camera to a close-up position to the planet that is mapped to that key. Also, when pressing the comma (,) key, it will increase camera movement speed and when pressing period (.) key, it will decrease the movement speed of the camera. Additionally, when pressing the P key, it will pause the planets from orbiting around the sun and display them in a line. Finally, users can use the WASD keys to move in around the solar system and use the mouse to control the camera.

## Relation to Computer Graphics

* Rendering our project heavily focuses on rendering to create realistic solar system. The use of various shaders like vertex and fragment shaders and texture mapping contributes to the visual fidelity of the solar system model.
* Interactivity is a key aspect of our project. User can manipulate the camera view through selecting the planets using the mapped hotkeys, providing an immersive experience.

# Technical Details

## Rendering a Sky map around the solar system

To simulate the vastness of space, we implemented rendering to a cube map texture. This technique involves projecting the scene onto a huge Sphere and having the solar system inside the sphere, providing a convincing backdrop for the solar system.

## Mouse Interaction Mapping

Mouse movements are mapped to 3D space coordinates, allowing users interact with solar system. This involved converting 2D screen coordinates to 3D space through [ ].

# Additional Instructions for Running the Code

# Resources Used

# Challenges Faced