CS405 PROJECT 3 REPORT – SARP KAAN ÖZDEMİR

**Task 1: Implement the draw Function for SceneNode**

**Objective:**

Implement the draw function for the SceneNode class to handle rendering of nodes in a scene graph.

Implementation Details:

-Transformation Propagation: Applied the node's transformation to the model, view, and projection matrices.

-Recursive Drawing: Implemented recursive drawing to propagate transformations to child nodes.

-Matrix Multiplication: Used matrix multiplication to combine transformations.

-Mesh Rendering: Called the mesh drawer's draw method with the transformed matrices.

**Task 2: Update the Fragment Shader for Lighting**

**Objective:**

Enhance the fragment shader to support diffuse and specular lighting in addition to ambient lighting.

**Implementation Details:**

-**Phong Lighting Model:** Implemented ambient, diffuse, and specular components.

-**Diffuse Lighting:** Calculated using the dot product of the normal and light direction.

-**Specular Lighting:** Used the halfway vector for specular highlights, controlled by a shininess factor.

-**Uniforms:** Added uniforms for light position, color, and intensity parameters.

-**Texture Application:** Combined lighting effects with texture sampling.

**Task 3: Add Mars to the Solar System**

**Objective:**

Add Mars as a child of the Sun in the scene graph, with specific transformations and texture.

**Implementation Details:**

-**Mesh Setup:** Used the sphere mesh for Mars and applied the provided texture.

-**Transformation:** Translated Mars by -6 units on the X-axis and scaled it to 0.35.

-**Hierarchy:** Added Mars as a child of the Sun node.

-**Rotation:** Implemented Mars' rotation at 1.5 times the Sun's rotation in the render loop.