

CS 405 Project 3: Scene Graph + Illumination

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Task 1 – Successfully implemented draw function:

```
draw(mvp, modelView, normalMatrix, modelMatrix) {  
    /**  
     * @Task1 : Implement the draw function for the SceneNode class.  
     */  
  
    // Accumulate transformations from parent nodes  
    var transformedMvp = MatrixMult(mvp, this.trs.getTransformationMatrix());  
    var transformedModelView = MatrixMult(modelView, this.trs.getTransformationMatrix());  
    var transformedNormals = MatrixMult(normalMatrix, this.trs.getTransformationMatrix());  
    var transformedModel = MatrixMult(modelMatrix, this.trs.getTransformationMatrix());  
  
    // Draw the MeshDrawer  
    if (this.meshDrawer) {  
        this.meshDrawer.draw(transformedMvp, transformedModelView, transformedNormals, transformedModel);  
    }  
  
    // Recursively draw children  
    for (let child of this.children) {  
        child.draw(transformedMvp, transformedModelView, transformedNormals, transformedModel);  
    }  
}
```

Task 2 – Successfully implemented diffuse and specular light inside meshFS:

```
// Calculate the diffuse and specular lighting below.  
  
// Diffuse lighting  
diff = max(dot(normal, lightdir), 0.0);  
  
// Specular lighting  
vec3 viewDir = normalize(-vPosition);  
vec3 reflectDir = reflect(-lightdir, normal);  
spec = pow(max(dot(viewDir, reflectDir), 0.0), phongExp);
```

Task 3 – Successfully implemented Mars and its texture:

```
/**  
 * @task3 : add rotation to mars on z-axis.  
 the rotation should be 1.5 * zRotation
```

```
*/
```

```
marsNode.trs.setRotation(0, 0, 1.5 * zRotation);
```

```
/**
```

```
 * @Task3 : Add Mars to the solar system
```

```
 * Mars should be a child of the sun.
```

```
 * Mars should use sphere as the mesh object.
```

```
 * Mars should be translated by -6 units on the X axis with respect to the sun
```

```
 * Mars should be scaled to 0.35 for x,y and z coordinates
```

```
 * use the image on the link below as texture:
```

```
 * @link : https://i.imgur.com/Mwsa16j.jpeg
```

```
 *
```

```
*/
```

```
// Create Mars MeshDrawer
```

```
marsMeshDrawer = new MeshDrawer();
```

```
marsMeshDrawer.setMesh(sphereBuffers.positionBuffer, sphereBuffers.texCoordBuffer,  
sphereBuffers.normalBuffer);
```

```
setTextureImg(marsMeshDrawer, "https://i.imgur.com/Mwsa16j.jpeg");
```

```
// Initialize Mars TRS
```

```
marsTrs = new TRS();
```

```
marsTrs.setTranslation(-6, 0, 0);
```

```
marsTrs.setScale(0.35, 0.35, 0.35);
```

```
// Create Mars SceneNode
```

```
marsNode = new SceneNode(marsMeshDrawer, marsTrs, sunNode);
```