

## CS 405 – Project 3 Report

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Github Repository: <https://github.com/xxRevo/cs405-project-3>

### TASK I

For the first task of implementing draw function for the SceneNode class, I've used the code from week13's implementation of a multi-node structure.

I've modified the following lines to apply transformations for the node:

```
var transformedMvp = MatrixMult(mvp, this.trs.getTransformationMatrix());  
    var transformedModelView =  
MatrixMult(modelView, this.trs.getTransformationMatrix())
```

And in addition have used the following function to apply the draw function to the children nodes:

```
for (var i = 0; i < this.children.length; i++) {  
    this.children[i].draw(transformedMvp, transformedModelView,  
transformedNormals, transformedModel);  
}
```

This made sure each children node is also drawn with the transformations applied.

### TASK II

Same as the previous step, to implement the diffuse and specular light I've went through the recitation material and the previous project's code to apply the following light computation:

```
diff = max(dot(normal, lightdir), 0.0);  
vec3 viewDir = normalize(-fragPos);  
vec3 reflectDir = reflect(-lightdir, normal);  
spec = pow(max(dot(viewDir, reflectDir), 0.0), phongExp);
```

max() functions are applied to ensure the minimum possible values for the specular and diffuse lights are 0 to avoid any errors.

### TASK III

To implement the new mars node to the solar system simulation I've used the example code from the sunNode, earthNode and moonNode implementations, the result was the following:

```
marsMeshDrawer = new MeshDrawer();
    marsMeshDrawer.setMesh(sphereBuffers.positionBuffer,
sphereBuffers.texCoordBuffer, sphereBuffers.normalBuffer);
    setTextureImg(marsMeshDrawer,
"https://i.imgur.com/Mwsa16j.jpeg");
    marsTrs = new TRS();
    marsTrs.setTranslation(-6,0,0);
    marsTrs.setScale(0.35,0.35,0.35);
    marsNode = new SceneNode(marsMeshDrawer, marsTrs, sunNode);
```

And for the implementation of the inner rotation of mars;

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

The result of completion of all the steps is the following graphical representation:

