# CS405 Project

In this project, we built a solar system simulation in WebGL with 3D models and animation.

For the first task I computed the local transmissions in draw function by using MatrixMult function in the sceneNode.js.

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());

After this step it draws the MeshDrawer and for each child I used recursion to draw them.

The recursion passes to each child and these matrices are used to render the child nodes in the correct position and orientation.

this.children.forEach(child => child.draw(transformedMvp, transformedModelView, transformedNormals, transformedModel));

For the second task which was in the meshDrawer.js, I implemented the Phong Lighting Model into the fragment shader. I also implemented diffuse, specular lighting types and calculate them. They give a more realistic lightings in the project.

diff=max(dot(normal, lightdir), 0.0);

vec3 viewDir = normalize(-vPosition);

vec3 reflectDir = reflect(-lightdir, normal);

spec = pow(max(dot(viewDir, reflectDir), 0.0), phongExp);

For the third task, I implemented Mars to our solar system with creating a new mesh drawer for it. Then I used the setMesh function just like its used for moon, earth and sun( the Mars is also the child of the sun). And then I translated and scaled the mars just like the document wanted.

var marsMeshDrawer=new MeshDrawer();

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

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

var marsTrs = new TRS();

//here is translation and scaling for the mars

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

marsTrs.setScale(0.35, 0.35, 0.35);

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

Here is the video: