

Final Report

Content

1. Introduction
2. Modeling Process
3. Rendering Process
4. Animation Process
5. Website
6. Conclusion

1. Introduction

Project Name: Chinese Lantern

What is Chinese Lantern

- It is an ancient traditional handicraft
- It symbolizes the meaning of reunion
- It is used to create a festive atmosphere

Why do we make Chinese Lantern

- It is very common in life
- It is one of the symbols of China
- We make lantern to carry forward traditional culture

How do we do this project

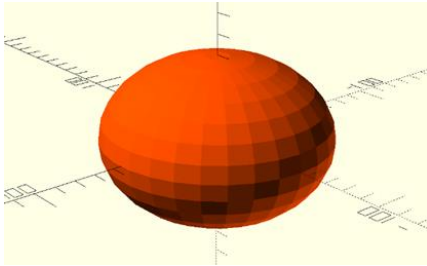
(1)Chinese Lantern part:

- use OpenScad to model
- use Three.js to render and animate

(2)Website part

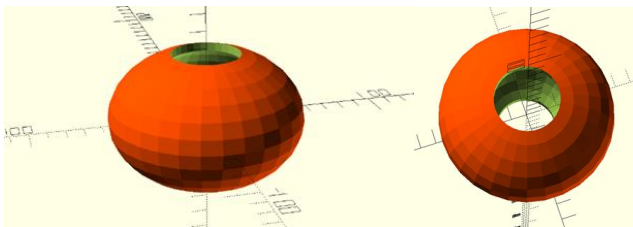
2. Modelling Process

First, the lantern starts with a scaled (on the x and y axis) sphere.



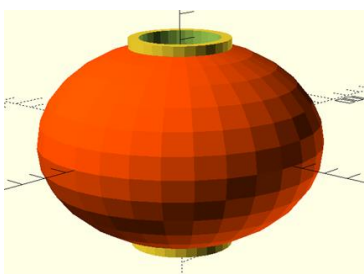
```
scale([1.4,1.4,1]) color([1,0.3,0]) sphere(r=40);
```

As a lantern could not be totally solid, a sphere with the same scale factors but a smaller radius would be rejected from the bigger outer sphere. Then, we need to cut two holes on the top and the bottom of the lantern, by using the difference function and two cylinders to realize this.



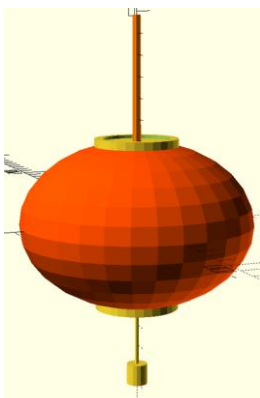
```
difference() {  
  scale([1.4,1.4,1]) color([1,0.3,0]) sphere(r=40);  
  sphere(r=38);  
  translate([0,0,5]) cylinder(h=35,r=20);  
  translate([0,0,-55]) cylinder(h=40,r=20);  
}
```

Then we need two lids to seal these holes. It could be easily done by using two cylinders, however, to make it more sophisticated and beautiful, instead of using two simple solid cylinders, I reject smaller cylinders from them too, to make them be as an outer circle of the lid which create a difference in height.



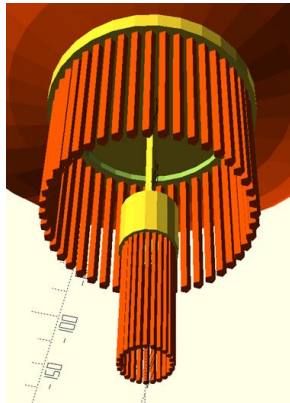
```
difference() {  
  translate([0,0,36]) cylinder(h=5,r=20);  
  translate([0,0,30]) cylinder(h=15,r=16);  
}  
  
difference() {  
  translate([0,0,-41]) cylinder(h=5,r=20);  
  translate([0,0,-50]) cylinder(h=15,r=16);  
}
```

For the poles both at the top and bottom, two cylinders are added. Also, another cylinder is added for adding tassels.



```
translate([0,0,-39.5]) cylinder(h=1,r=16);  
translate([0,0,38.5]) cylinder(h=1,r=16);  
translate([0,0,38.5]) color([1,0.5,0]) cylinder(h=60,r=2);  
translate([0,0,-69.5]) cylinder(h=30,r=1);  
  
difference() {  
  translate([0,0,-79.5]) cylinder(h=10,r=5);  
  translate([0,0,-79.6]) cylinder(h=10,r=3);  
}
```

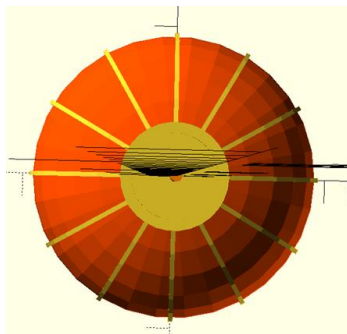
For two groups of tassels at the bottom of the lantern, adding them independently would be too time-consuming, and affects the efficiency of the codes. In the alternative, as tassels are existing around the circular lid at the bottom, the x and y coordinates could be calculated for each tassel by a function. Which is $x1=x0+r\cos(i)$ and $y1=y0+r\sin(i)$, where i represent the angle. By using the for loop and translate function, tassels will be created perfectly. Also, as for every one degree, there is a tassel would be too dense, the for loop is set to loop in a step of 8 and 10, respectively.



```
for (i = [0:8:360]){
  translate([18*cos(i),18*sin(i),-71]) color([1,0.3,0])
  cylinder(h=30,r=1);
}

for (i = [0:15:360]){
  translate([4*cos(i),4*sin(i),-104.5]) color([1,0.3,0])
  cylinder(h=25,r=0.5);
}
```

Finally, for the frame around the lantern, the way to fulfil it is to imagine these frames as thin cylinders with slightly bigger radius than the lantern itself. By using a for loop with step of 30, after each cylinder is created, rotate it in x-z dimensions.



```
for (i = [0:30:179]){
  difference(){
    scale([1.4,1.4,1]) rotate([90,0,i]) cylinder(h=1,r=41);
    translate([0,0,-100]) cylinder(h=200,r=16);
  }
}
```

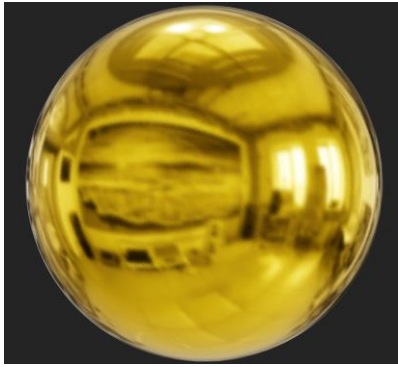
3. Rendering Process

Material:

We separated the lantern into 2 parts. One is gold and the other one is red. We apply the lantern paper texture to the red part and metal gold texture to the gold part.



lantern paper texture



metal gold texture

This metal texture helps make the lantern look more real, we could see the reflection of wood on the metal ring.



Then we added a holder for our lantern. We use a wood texture for that:



The code of setting the texture:

We make the lantern transparent so that we see the light shining through the lantern.

```
const redTexture = new THREE.CubeTextureLoader().load([
  'lantern00.png',
  'lantern00.png',
  'lantern00.png',
  'lantern00.png',
  'lantern00.png',
  'lantern00.png'
]);
redTexture.mapping = THREE.CubeReflectionMapping;

let material;

lanternBodyText = new THREE.MeshPhysicalMaterial({
  color: 0xe60000,
  envMap: redTexture,
  metalness: 0.00,
  roughness: 1.0,
  opacity: 1.0,
  transparent: true,
  transmission: 0.7,
  clearcoat: 1.0,
  clearcoatRoughness: 0.25
});
```

```
const goldBaseColor = textureLoader.load('Metal034_1K_Color.png');
const goldNormalDX = textureLoader.load('Metal034_1K_NormalDX.png');
//const goldRoughness = textureLoader.load('Metal034_1K_Roughness.png');
//const goldDisplacement = textureLoader.load('Metal034_1K_Displacement.png');
const goldMetalness = textureLoader.load('Metal034_1K_Metalness.png');
lanternFrameText = new THREE.MeshPhysicalMaterial({
  color: 0xffb900,
  map: goldBaseColor,
  normalMap: goldNormalDX,
  metalnessMap: goldMetalness,
  roughness: 0.2,
  opacity: 0.9,
  transparent: false,
  transmission: 1.0,
  clearcoat: 1.0,
  clearcoatRoughness: 0.25
});
```

```
const woodBaseColor = textureLoader.load('Wood066_1K_Color.png');
const woodNormalDX = textureLoader.load('Wood066_1K_NormalDX.png');
const woodRoughness = textureLoader.load('Wood066_1K_Roughness.png');

topWoodText = new THREE.MeshPhysicalMaterial({
  map: woodBaseColor,
  normalMap: woodNormalDX,
  roughnessMap: woodRoughness,
});
```

Lighting:

```
//lighting

//@0
const pointlight1 = new THREE.PointLight(0xffffffff,0.5,0,0);
pointlight1.position.set(70, 220, 5);
pointlight1.distance = 0.0;
pointlight1.castShadow = true;
scene.add(pointlight1);
//

const pointlight = new THREE.PointLight(0xec4e46,0.3,300,1.1);
pointlight.position.set(0, 0, 0);
//const ambientlight = new THREE.AmbientLight( 0xf0af6f, 0.4);
//scene.add(ambientlight);
scene.add(pointlight);
```

We add two pointlight sources in different position to create the shadow and the affect of our lantern. One is the natural light coming from the environment to form a shadow on the ground(We

create a planegeometry with three.js code to receive the shadow better.), and another one is from the center of the lantern to mimic the function of lantern and it is red to simulate the fire light.

Here is an example of these lighting effects:



The main shadow is created by the pointlight on the top of this scene.

The shadow of the lantern part is lighted up by the light source in the middle of lantern, so we could see the shadow is lighter and more red than the rest part of shadow.



We could also see the reflection on the wood stand, this white red light spot is from the lantern.

Some other code that enable the shadow config:

```
mesh.castShadow = true;  
mesh.receiveShadow = true;
```

```
renderer.shadowMap.enabled = true;  
renderer.shadowMap.type = THREE.PCFSoftShadowMap;
```

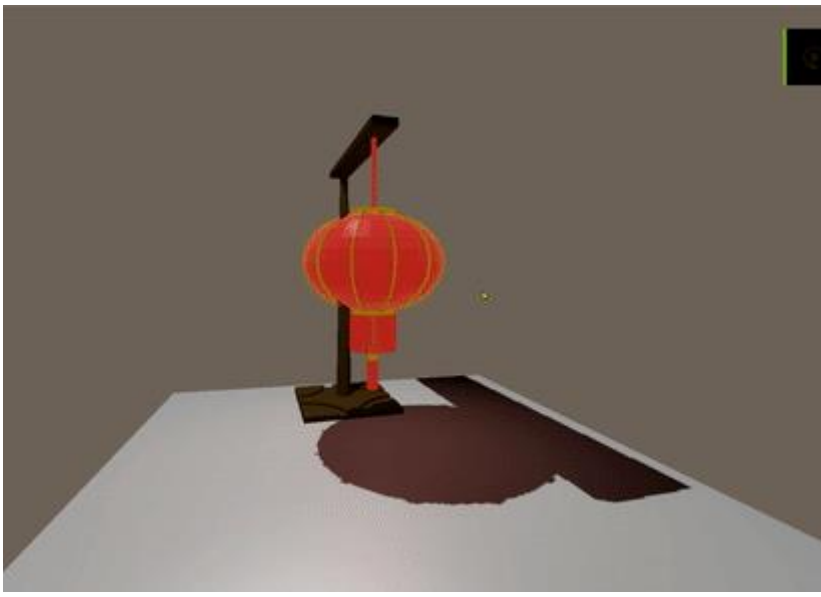
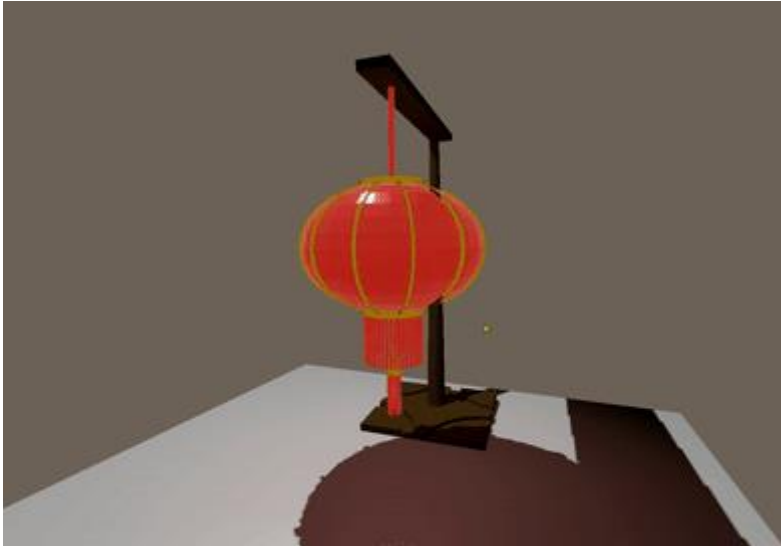
4. Animation Process

```
//camera  
const camera = new THREE.PerspectiveCamera(  
  75,  
  window.innerWidth / window.innerHeight,  
  0.1,  
  10000  
);  
//initial camera position  
camera.position.z = 150;  
camera.position.x = 150;
```

The camera is initially being placed in a distance where audiences could watch the whole lantern.

```
controls.autoRotate = true;  
controls.autoRotateSpeed = 2.1;
```


After that, the camera is going to rotate automatically if there is no input, like dragging the camera. The camera is going to rotate horizontally. If the audience wants to see the details at the top of the lantern, they can drag it and the camera will rotate according to that angle after they stop dragging.





5. Website


URL: <https://dilemmagx.github.io/PACSSR-301004/>


PACSSR-301004 Group 6


 **Description**


 This page is a presentation page of PACSSR-301004.


 **Group Members (Last name A-Z)**


 Yiming Chen


 Haojie Ding


 Chengyu Fu


 Binghao Ye


 Zian Zhag

 **Related Links**

 [Project Executing](#)

 [View Source Code](#)

 [Screengrab Video](#)

 [Presentation PDF](#)

6. Conclusion

Although our project is finished, we still have some aspects for improvement :

- Create more model for the scene
- Adding more detail to the lantern
- Add background Image