

Teapots Can Fly

3D Graphics for Web Programmers

Presented by

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So,

how does

3D animation

work?





3D Animation is like Claymation

We're building

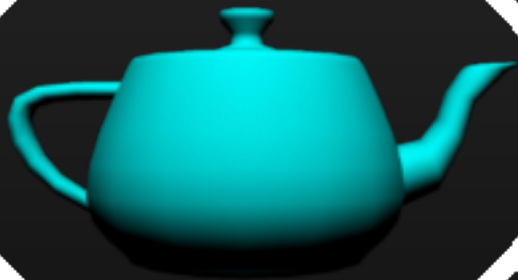


Our own little world

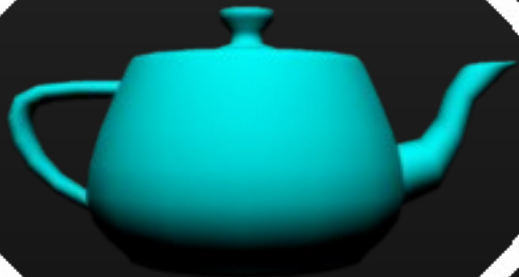
Where?

What?

How?



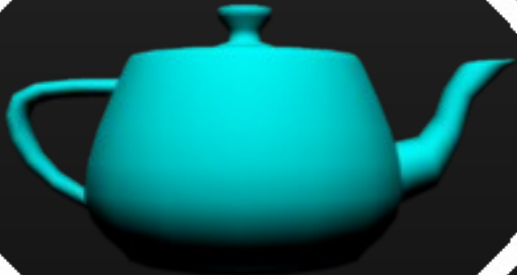
Where?



THREE.Scene

THREE.PerspectiveCamera

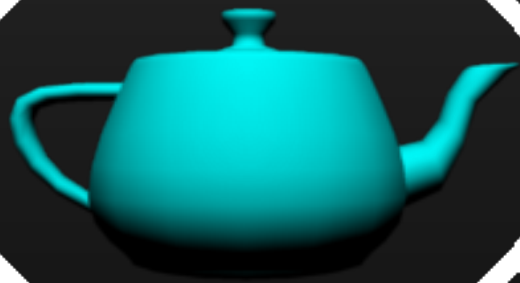
THREE.Mesh



What?

THREE.PointLight

Affine transformations:
translate, rotate, scale



requestAnimationFrame()

How?

What do we need?

- three.js
- teapot.js
- An html5 page



To get it all:

[https://github.com/shegeek/
teapots_can_fly](https://github.com/shegeek/teapots_can_fly)

clone or download zip



The basic setup:

```
<head>  
  <title>Teapots can fly!</title>  
  <style>canvas { width: 100%;  
    Height: 100% }  
  </style>  
</head>
```



The basic setup:

```
<body>  
  <script src="three.min.js">  
  </script>  
  <script>  
    ** Our Stuff Goes Here! **  
  </script>  
</body>
```



The last setup step:

```
<script>
```

```
var renderer = new THREE.WebGLRenderer();
```

```
renderer.setSize(window.innerWidth,  
                window.innerHeight);
```

```
document.body.appendChild  
    (renderer.domElement);
```

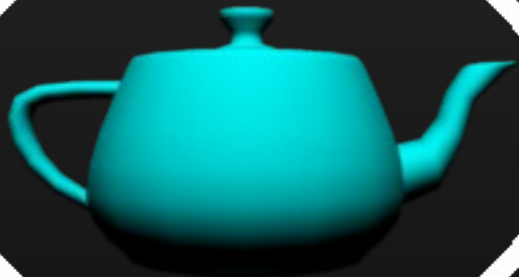
```
</script>
```



And now, the
3D code!



Where?



THREE.Scene

THREE.PerspectiveCamera

The Diorama

```
var scene = new THREE.Scene();
```



The Camera

```
var camera = new THREE.PerspectiveCamera(  
35,  
window.innerWidth/window.innerHeight,  
0.1, 1000);
```

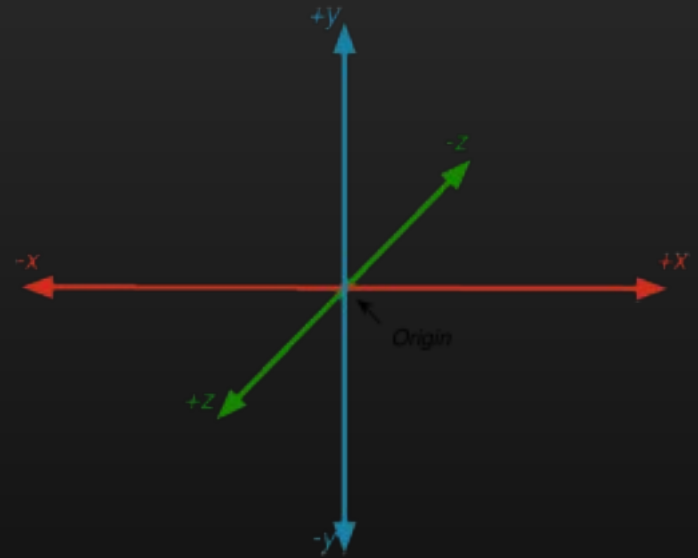
```
camera.position.z = 50;
```



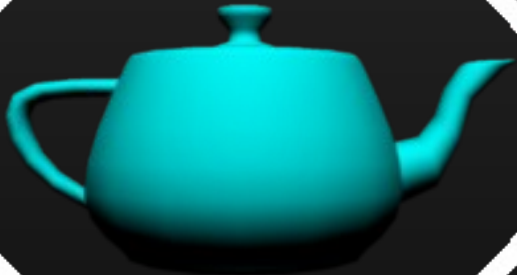
Right-handed coordinates

Positive X to the right

Positive Z coming out
of the screen



THREE.Mesh



What?

THREE.PointLight

The Teapot

```
var teapot;  
var jsonLoader = new THREE.JSONLoader();  
jsonLoader.load( "teapot.js", createTeapot);
```



The Teapot's Callback

```
function createTeapot(tGeometry){  
    var tMaterial = new  
        THREE.MeshPhongMaterial({color: 0x00ffff});  
    var tMesh = new THREE.Mesh( tGeometry, tMaterial );  
    scene.add(tMesh);  
    teapot = tMesh;  
}
```

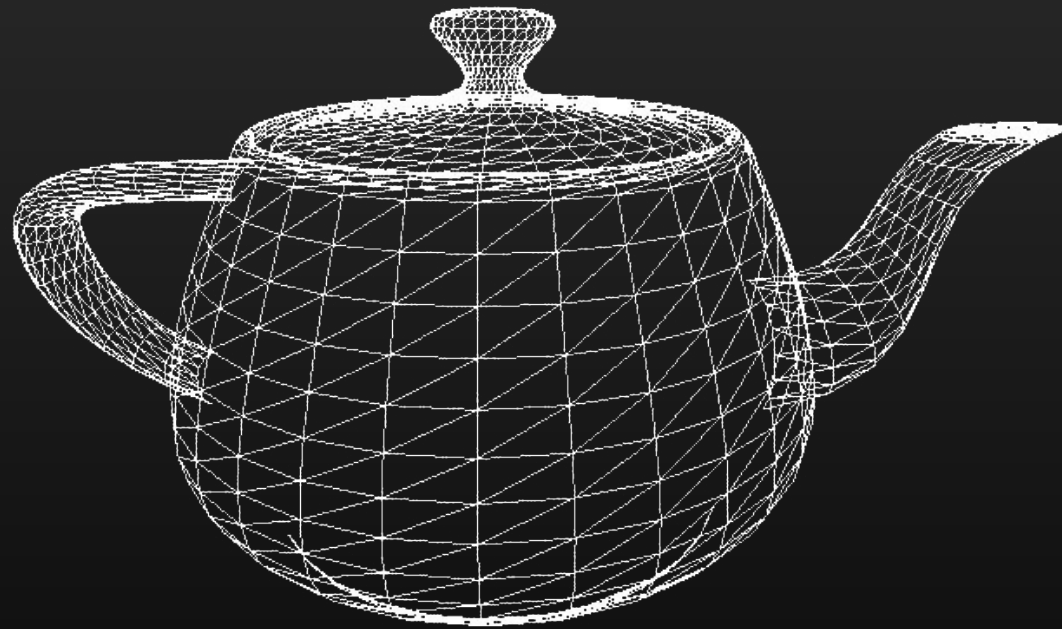


A closer look...

```
new THREE.Mesh( tGeometry, tMaterial );
```

A mesh has two parts





A Geometry

Is like

Bones...



...A Material

Is like

Skin.



The Teapot's Callback

```
function createTeapot(tGeometry){  
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  scene.add(tMesh);  
  teapot = tMesh;  
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```

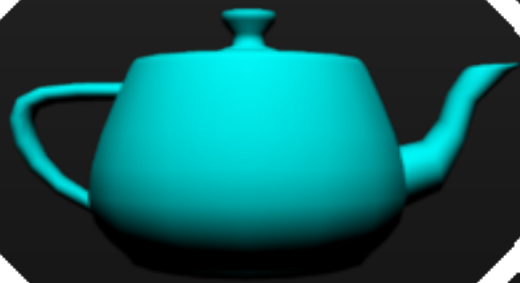


Let there be light!

```
var light = new THREE.PointLight(0xffffffff);  
light.position.set(0,150,150);  
scene.add(light);
```



Affine transformations:
translate, rotate, scale



`requestAnimationFrame()`

How?

Making the Teapot Move

```
teapot.position.x += 0.1;  
if (teapot.position.x > halfScreenWidth)  
    teapot.position.x = -halfScreenWidth;
```



Rendering the Frame

```
renderer.render(scene, camera);
```



Setting Up the Next Frame

```
requestAnimationFrame(render);
```



The Complete Render Loop

```
var halfScreenWidth = 80;  
var render = function () {  
  if (teapot) {  
    teapot.position.x += 0.1;  
    if (teapot.position.x > halfScreenWidth)  
      teapot.position.x = -halfScreenWidth;  
    renderer.render(scene, camera);  
  }  
  requestAnimationFrame(render);  
};  
render();
```



...And one again, the repo:

[https://github.com/shegeek/
teapots_can_fly](https://github.com/shegeek/teapots_can_fly)

Enjoy! Make cool stuff!

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Resources and links

three.js repo: <https://github.com/mrdoob/three.js>

three.js home page: <http://threejs.org/>

Stemkoski's examples:

<http://stemkoski.github.io/Three.js/index.html>

WebGL Up and Running (by Tony Parisi):

<http://shop.oreilly.com/product/0636920024729.do>

Learning Three.js blog: <http://learningthreejs.com/>



Resources and links

three.js boilerplate builder:

<http://jeromeetienne.github.io/threejsboilerplatebuilder/>

An Introduction to Web GL:

<http://dev.opera.com/articles/view/an-introduction-to-webgl/>

Tutorials on the LearningWebGL blog:

http://learningwebgl.com/blog/?page_id=1217

WebGL 1.0 spec: <http://www.khronos.org/webgl/>



Felix image courtesy of Wikihow
wikihow.com/Draw-Felix-the-Cat

Gumby image courtesy of
Art Clokey's Gumbyworld
gumbyworld.com

Earth image courtesy of NASA
visibleearth.nasa.gov

Coordinate axes image courtesy of
<http://www.cocos2d-x.org/>

Teapot wireframe image courtesy of
caig.cs.nctu.edu.tw/

Saran Wrap man image courtesy of
funnyordie.com

