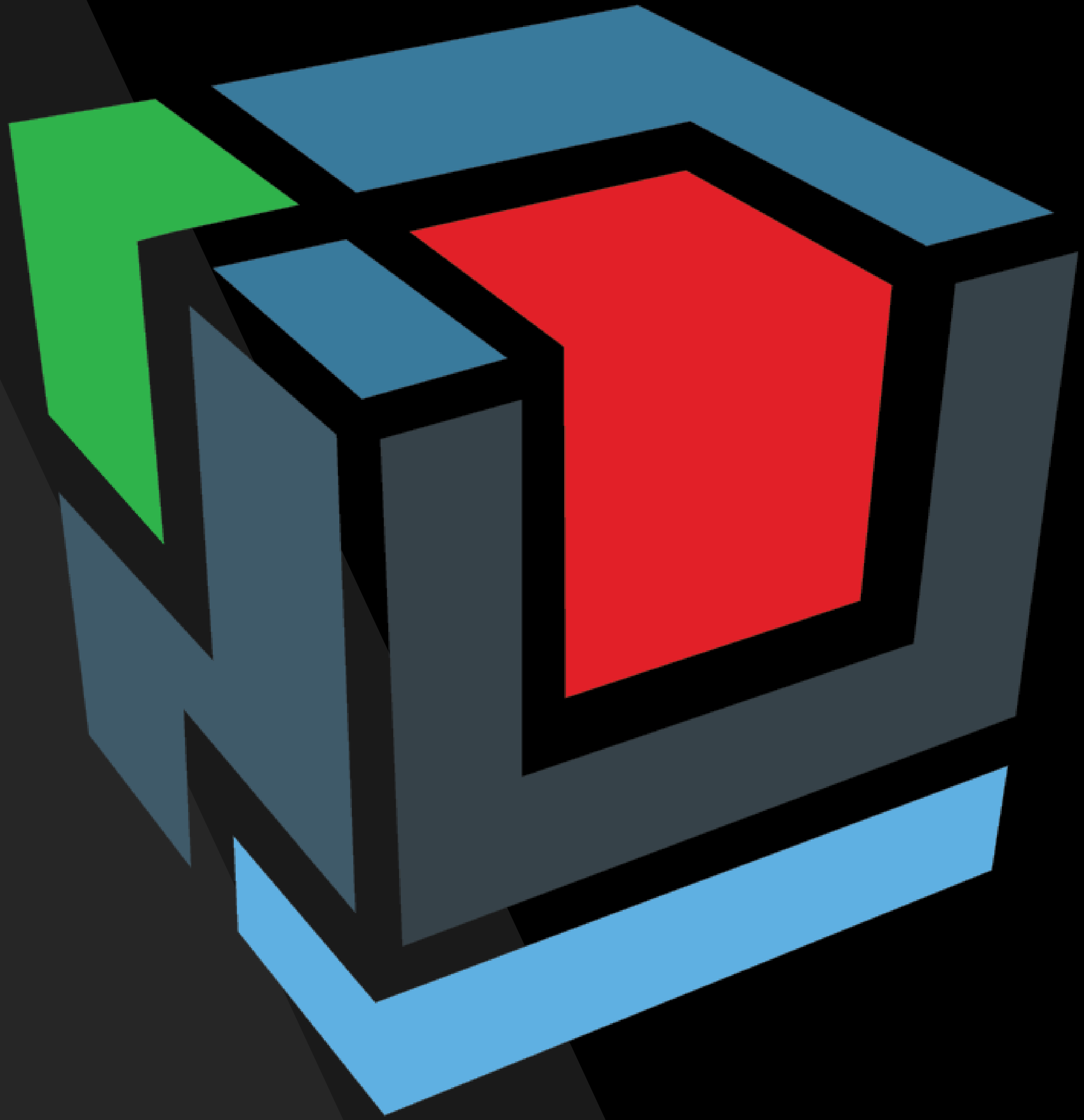
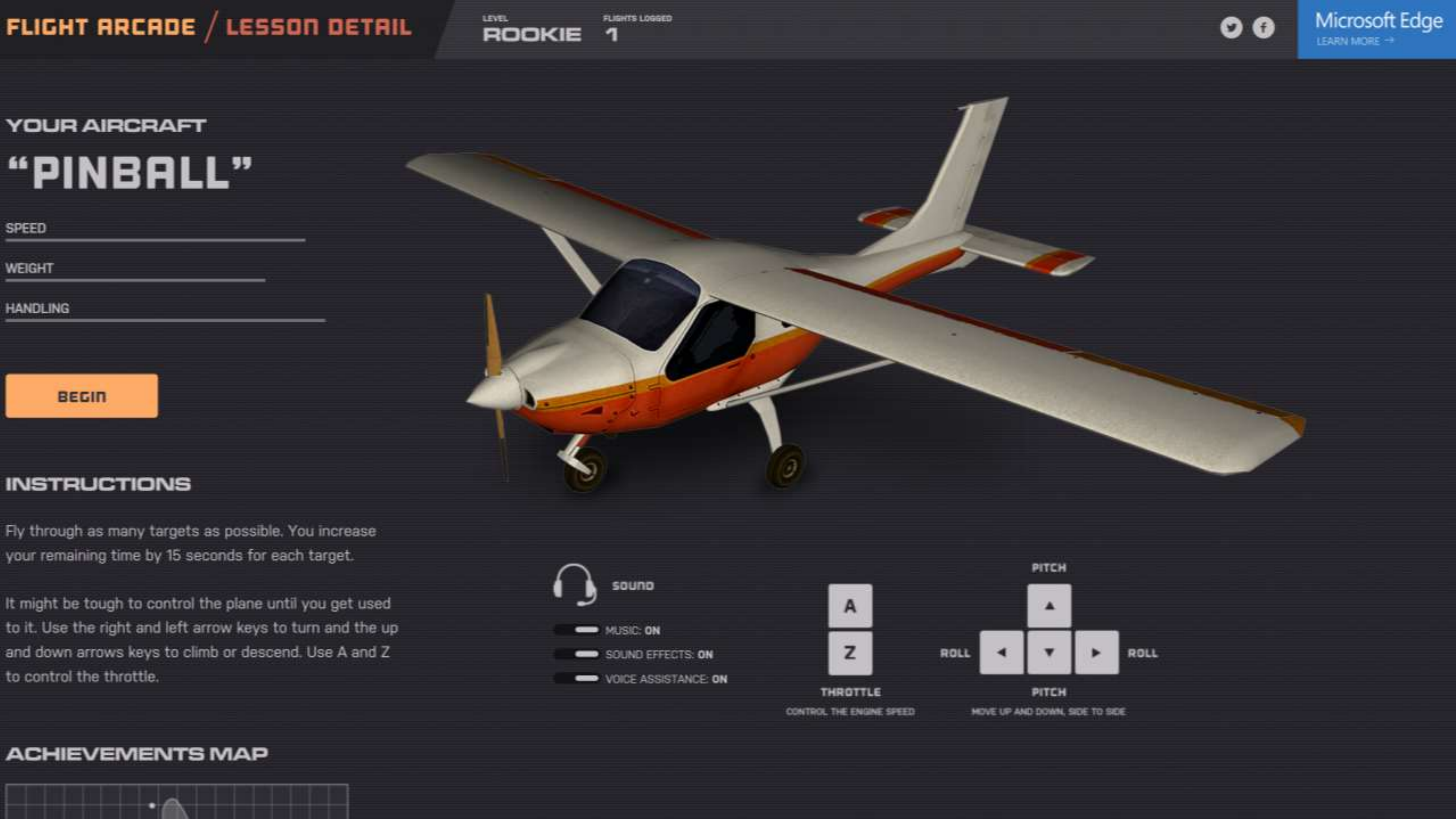
An introduction

Babylon.js



Nick Trogh
Software Engineer, Microsoft
@nicktrog



YOUR AIRCRAFT

"PINBALL"

SPEED

WEIGHT

HANDLING

INSTRUCTIONS

Fly through as many targets as possible. You increase your remaining time by 15 seconds for each target.

It might be tough to control the plane until you get used to it. Use the right and left arrow keys to turn and the up and down arrows keys to climb or descend. Use A and Z to control the throttle.

SOUND

MUSIC: ON

SOUND EFFECTS: ON

VOICE ASSISTANCE: ON

THROTTLE

CONTROL THE ENGINE SPEED

PITCH

MOVE UP AND DOWN, SIDE TO SIDE

ACHIEVEMENTS MAP

RB211 Jet Engine

Three-shaft architecture

The three-shaft architecture, first introduced on the RB211-22B, allows an engine to have fewer stages giving a shorter, stiffer structure. This technology allows the rotors to run to their optimum speeds thereby reducing the need for compressor variable guide vanes.

Best performance retention

In the RB211-524G/H-T the HP turbine system is designed to operate at Trent 700 temperatures that are significantly higher than the RB211-524G/H-T. As a result of this, the engine is able to better retain its performance characteristics throughout its service life.

Innovative technology

Through the Rolls-Royce concept of family designs, the RB211-524G/H was upgraded with 04 module HP (high pressure) technology developed on the Trent 700 engine family in 1997.

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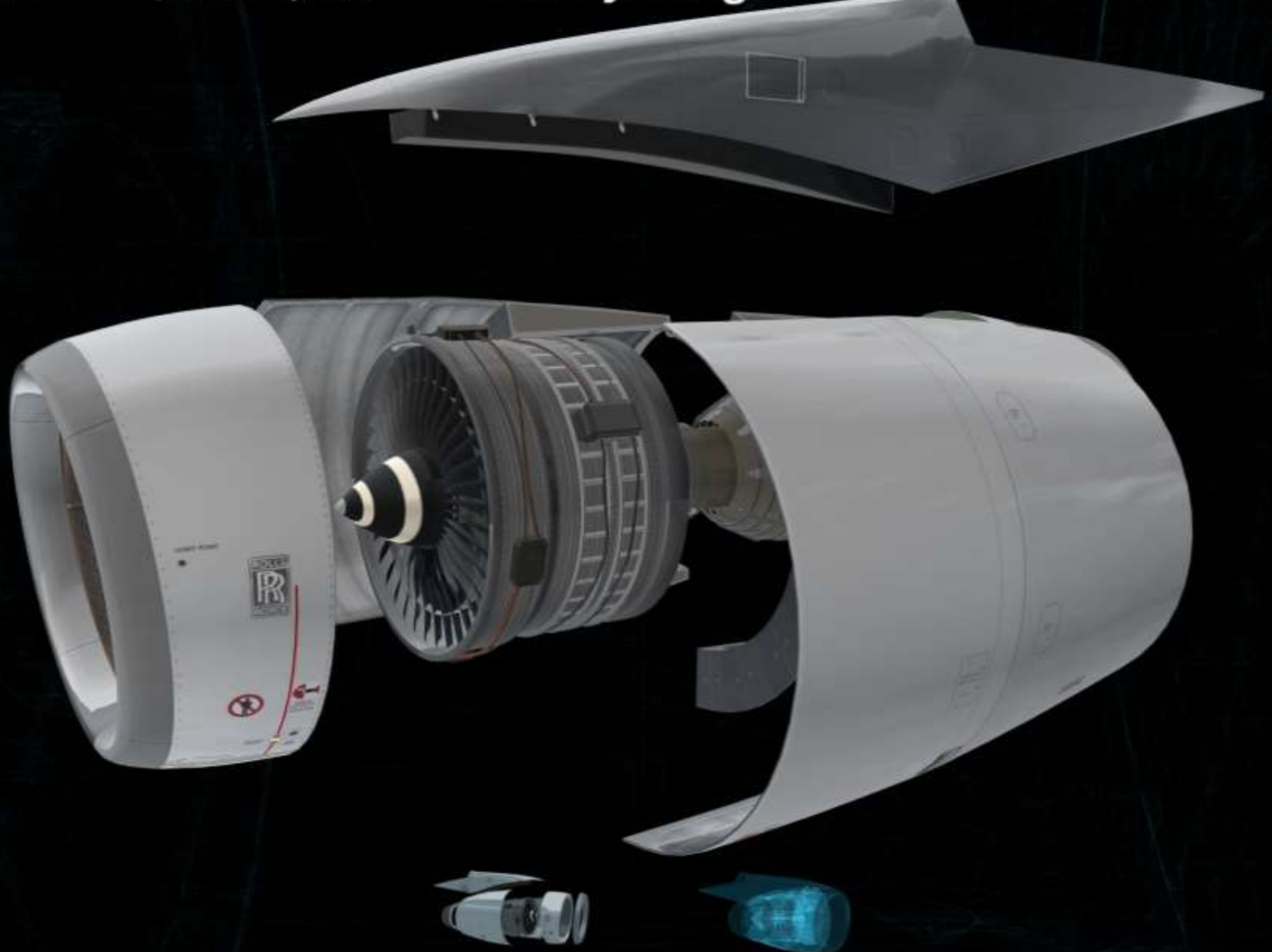
Through the Rolls-Royce concept of family designs, the RB211-524G/H was upgraded with 04 module HP (high pressure) technology developed on the Trent 700 engine family in 1997.

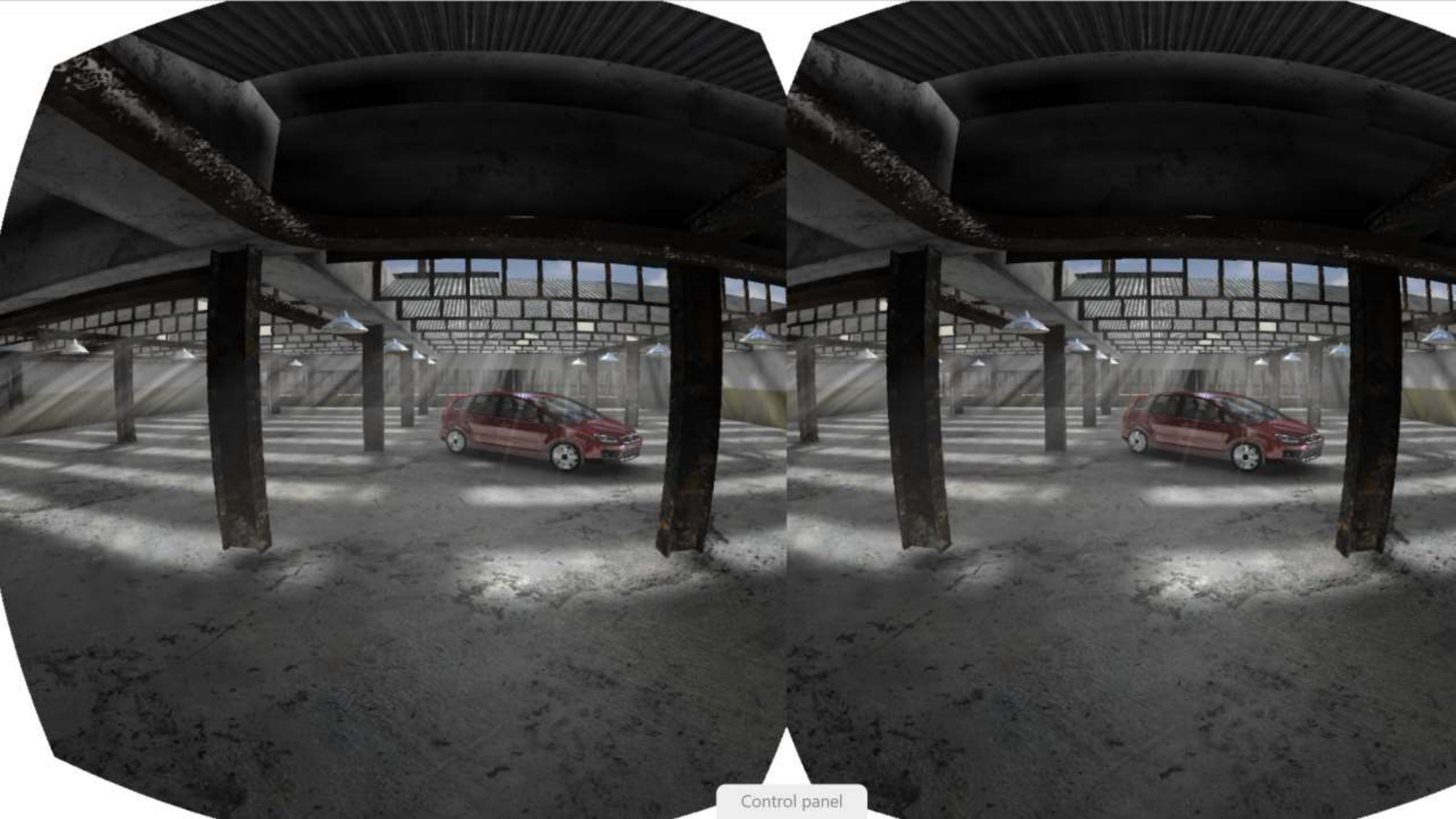
Date
1973

Weight
3267 kg (7,203 lb)

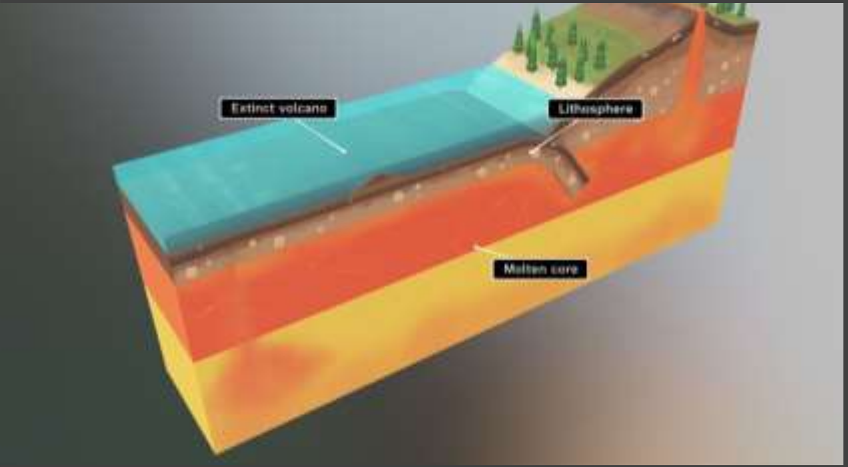
Length
303.3 cm (119.4 in.)

Diameter
217.2 cm (85.5 in.)





Control panel



Babylon.js at a glance

- 3D engine built on top of WebGL (1 **and** 2)
- **Open** source (Apache 2 license)
- **Community** driven
- Written in **TypeScript**
- Used by a lot of **1st and 3rd** party apps
  - Remix3D, Xbox avatars, Bing, Visio, Dynamics CRM, PowerPoint, …
  - Adobe, Sony Electronics, US Army, Ubi Soft,…

Why Babylon.js ?

- JavaScript!
- Our philosophy: *Developers should only type the **minimum** amount of code for every single feature*
- **High** performance
- Backward **compatibility** and truly cross platform
- Not only an engine but also exporters, sandbox, playground, editor, **big and reactive community**

PBR

WebRTC

WebVR

Automatic decimations

Realtime refraction

Postprocesses

WebAudio

Particles

Collisions

LOD

GamePad

Realtime reflection

Physics

Lens flares

Touch

Bones

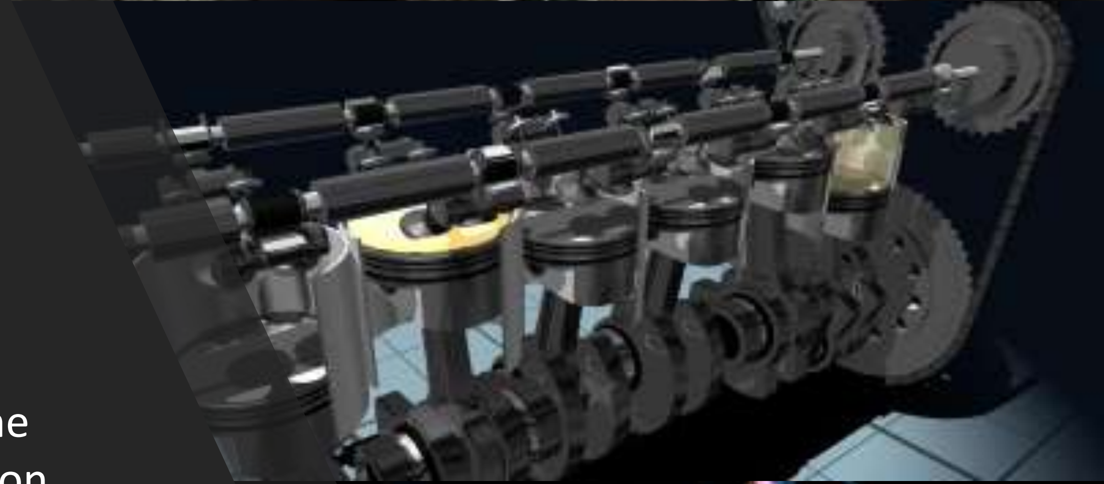
Animations

Morphing

PBR

Smart shaders

Shadows



Babylon.js

Built on Standards!

WebGL

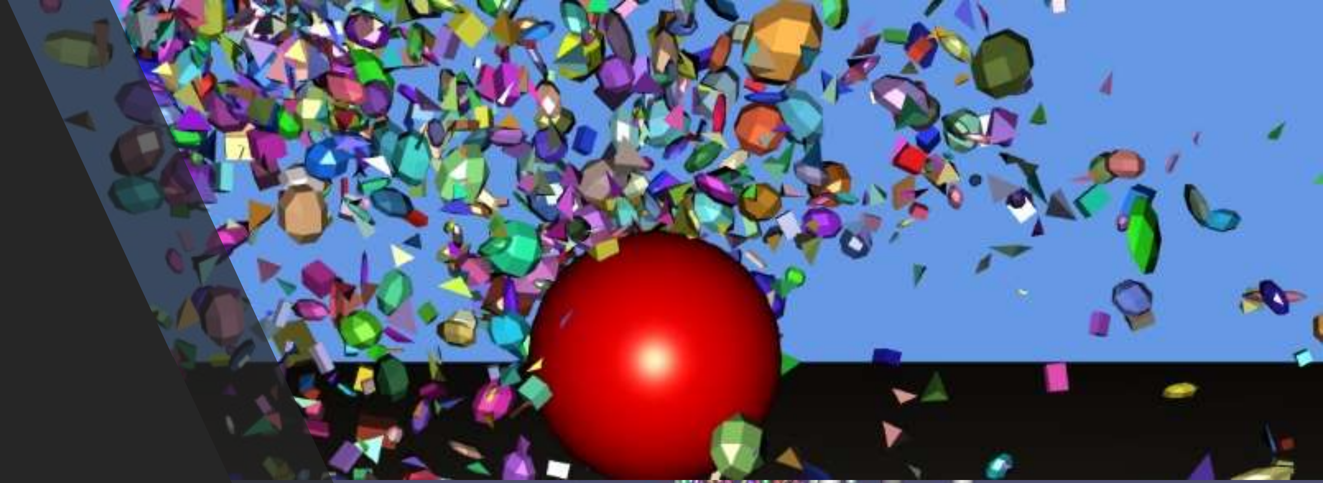
glTF

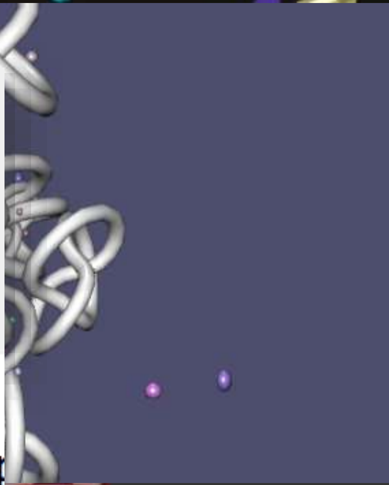
WebVR

Babylon.js

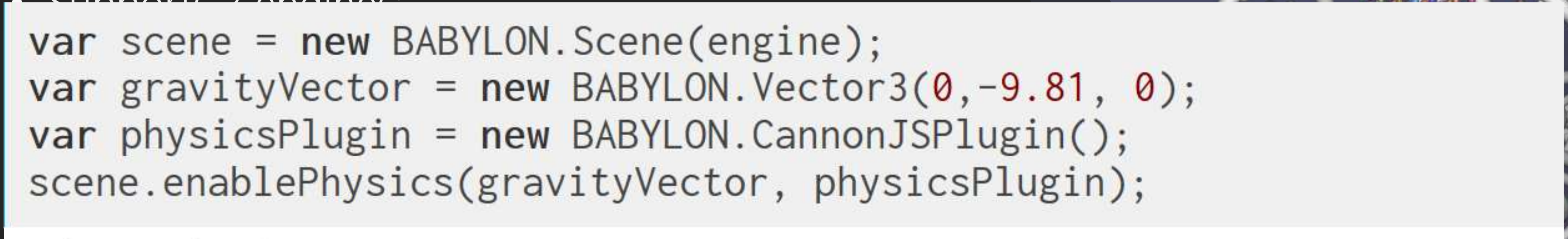
Demos!

Physics

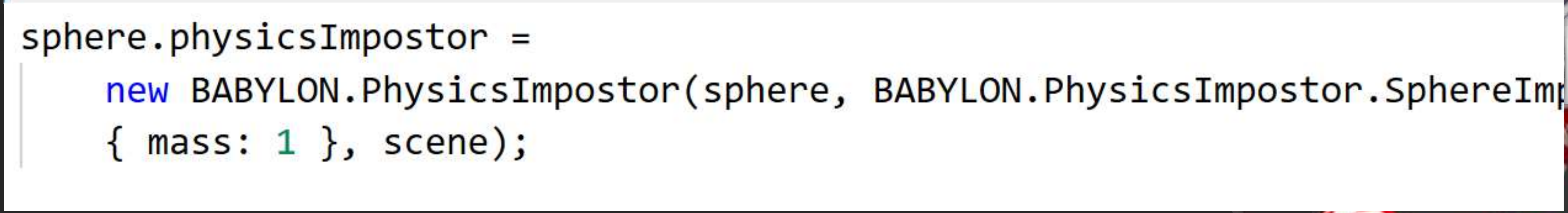




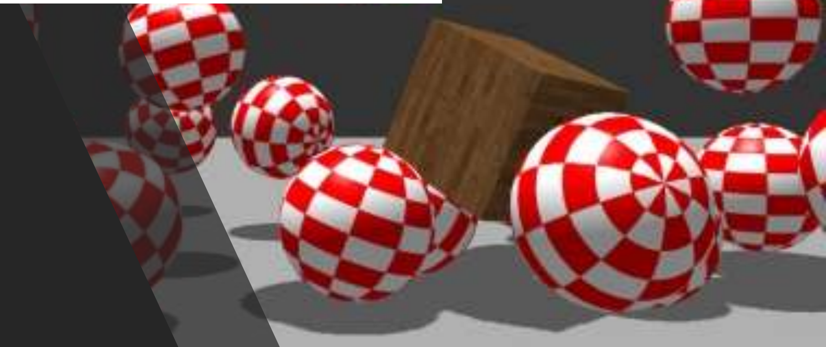
- **Component** based mechanism
- Supports 2 engines:



```
var scene = new BABYLON.Scene(engine);
var gravityVector = new BABYLON.Vector3(0,-9.81, 0);
var physicsPlugin = new BABYLON.CannonJSPlugin();
scene.enablePhysics(gravityVector, physicsPlugin);
```

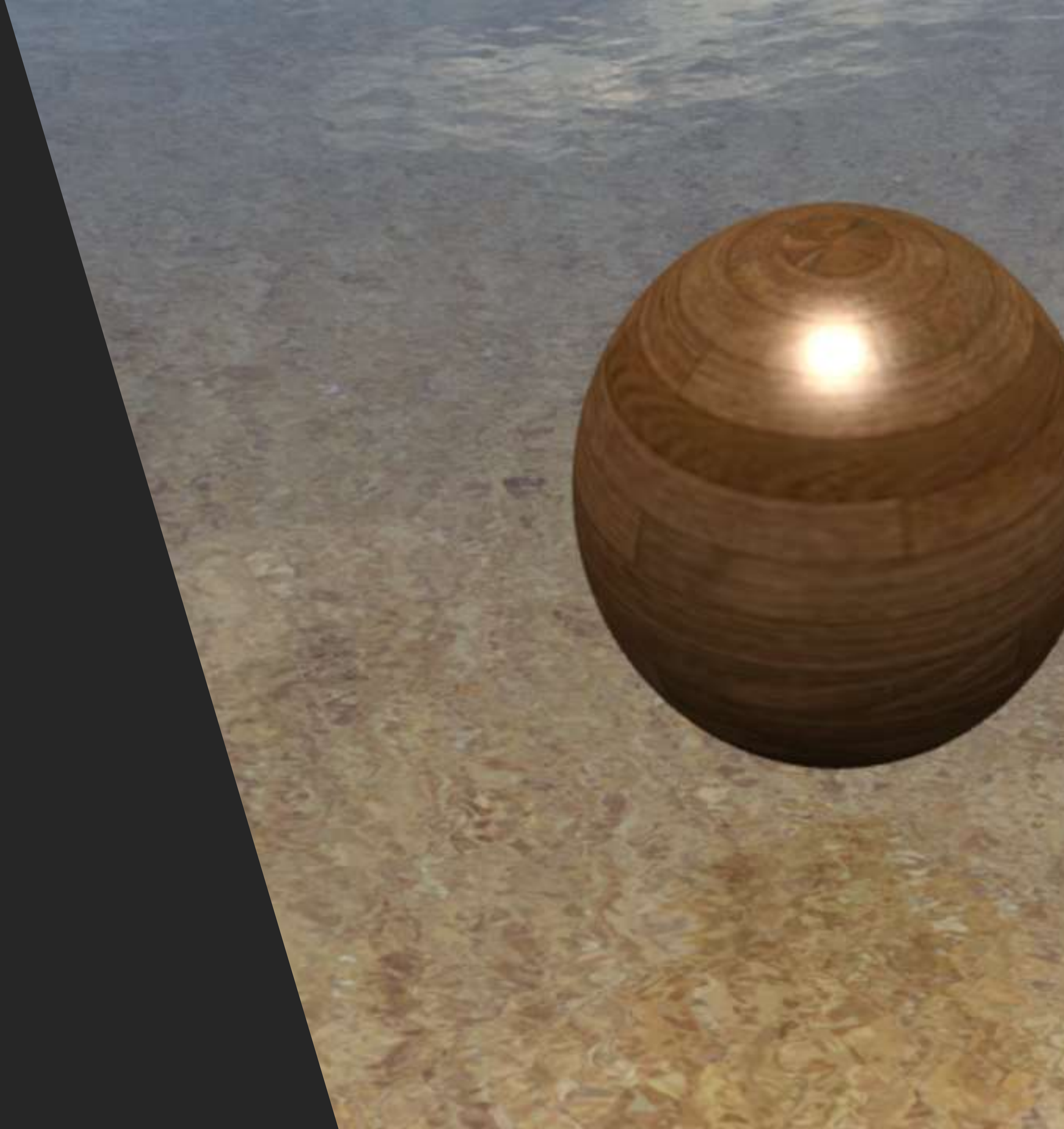


```
sphere.physicsImpostor =
    new BABYLON.PhysicsImpostor(sphere, BABYLON.PhysicsImpostor.SphereImp
    { mass: 1 }, scene);
```

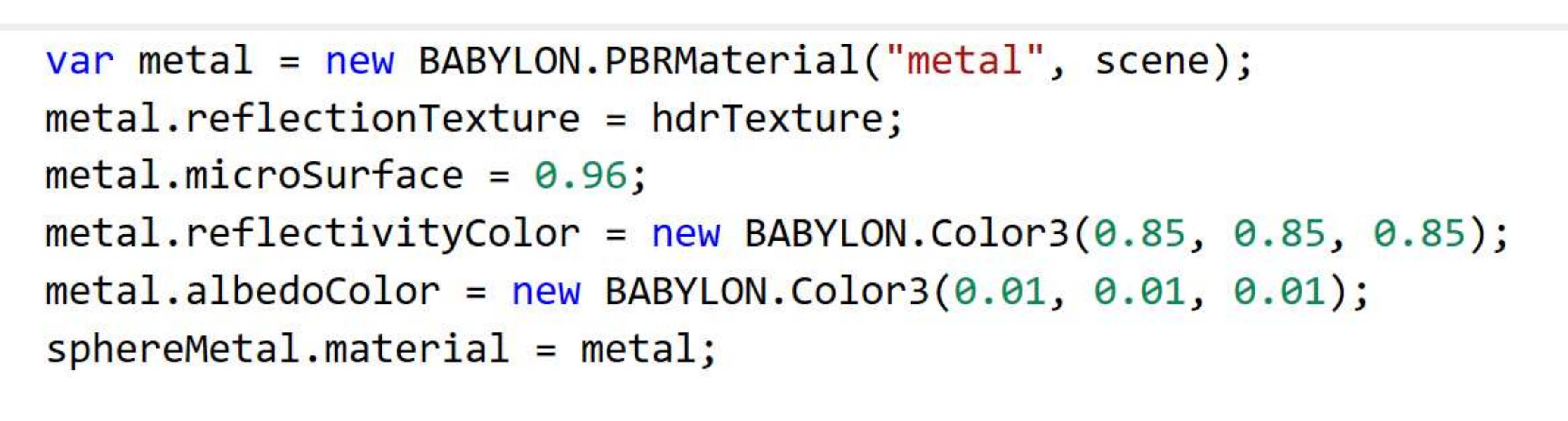


More materials…

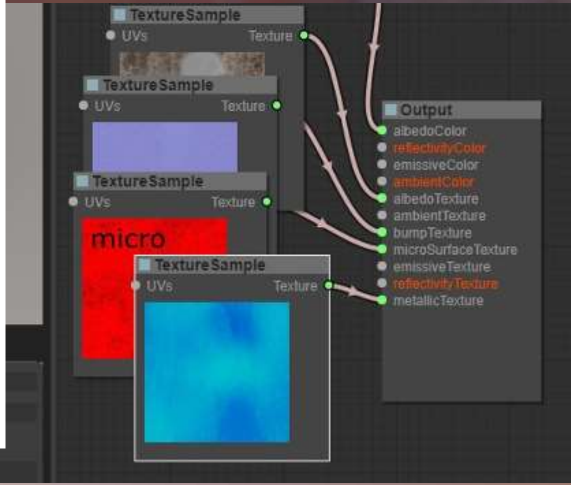
- Extensions
  - Water
  - Fur
  - Fire
- Procedural materials
  - Marble
  - Brick
  - Cloud
  - Grass



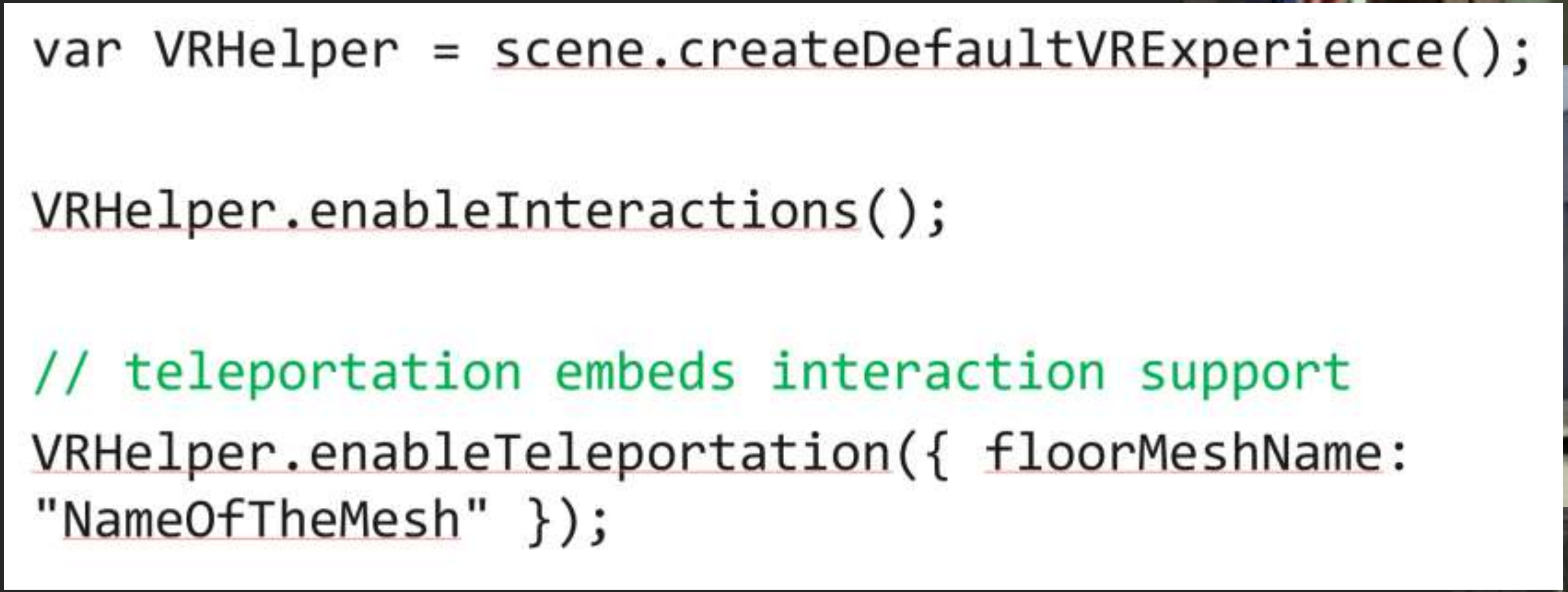
PBR



```
var metal = new BABYLON.PBRMaterial("metal", scene);
metal.reflectionTexture = hdrTexture;
metal.microSurface = 0.96;
metal.reflectivityColor = new BABYLON.Color3(0.85, 0.85, 0.85);
metal.albedoColor = new BABYLON.Color3(0.01, 0.01, 0.01);
sphereMetal.material = metal;
```



WebVR

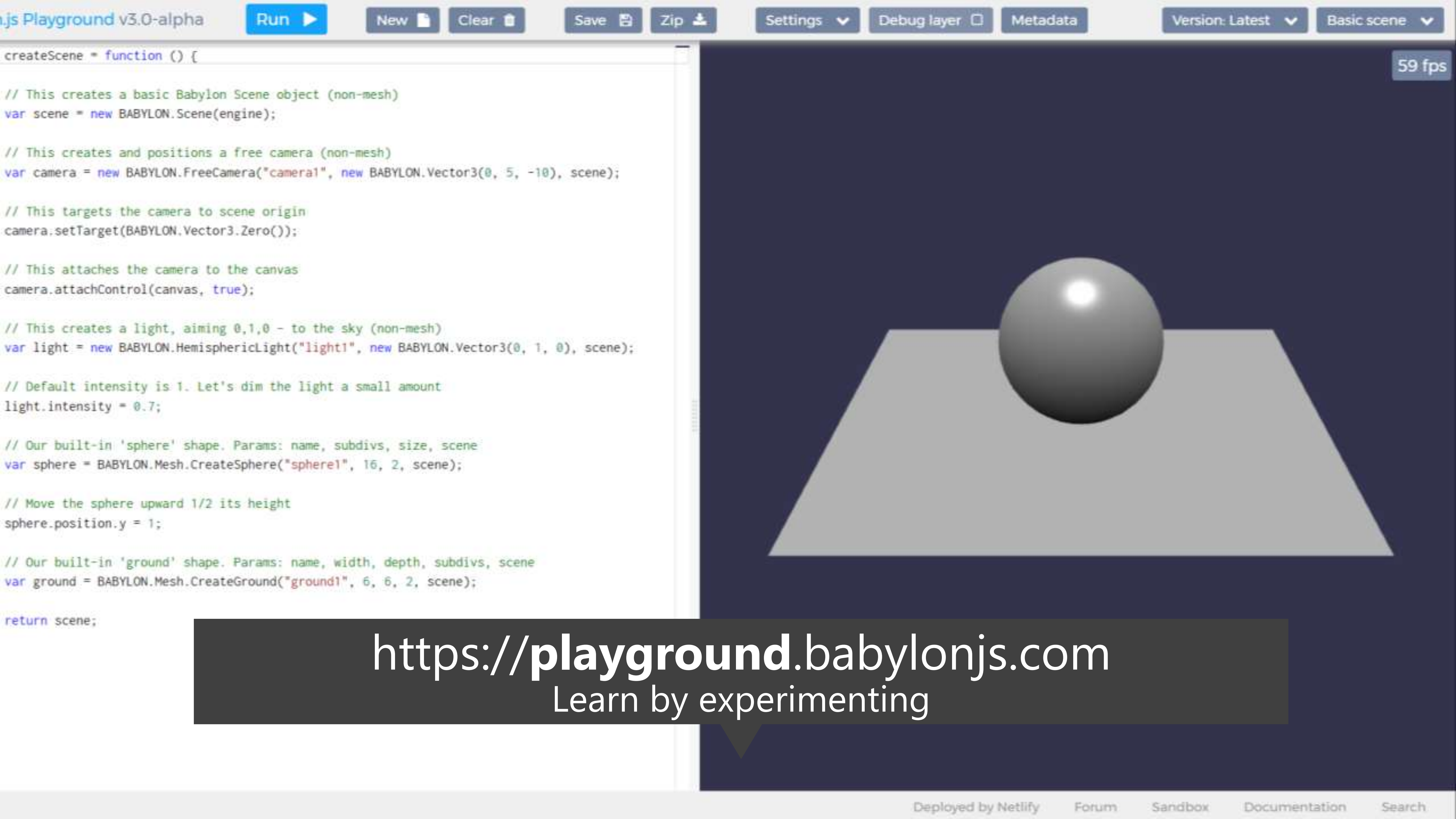


```
var VRHelper = scene.createDefaultVRExperience();

VRHelper.enableInteractions();

// teleportation embeds interaction support
VRHelper.enableTeleportation({ floorMeshName:
"NameOfTheMesh" });
```

- Support Gamepads and controllers (including MR controllers)

Babylon.js

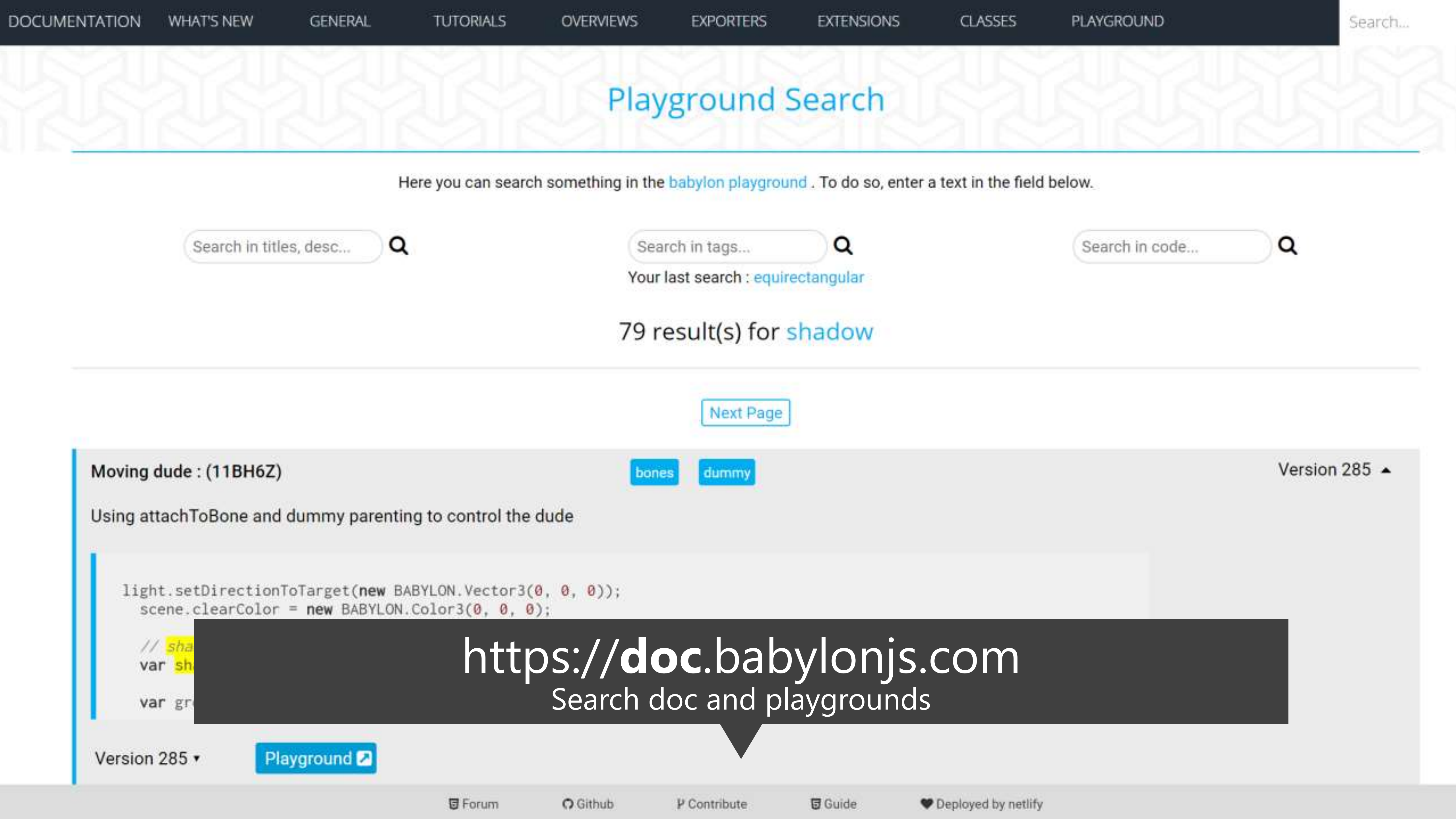
More than a 3D engine



```
createScene = function () {

// This creates a basic Babylon Scene object (non-mesh)
var scene = new BABYLON.Scene(engine);

// This creates and positions a free camera (non-mesh)
var camera = new BABYLON.FreeCamera("camera1", new BABYLON.Vector3(0, 5, -10), scene);

// This targets the camera to scene origin
camera.setTarget(BABYLON.Vector3.Zero());

// This attaches the camera to the canvas
camera.attachControl(canvas, true);

// This creates a light, aiming 0,1,0 - to the sky (non-mesh)
var light = new BABYLON.HemisphericLight("light1", new BABYLON.Vector3(0, 1, 0), scene);

// Default intensity is 1. Let's dim the light a small amount
light.intensity = 0.7;

// Our built-in 'sphere' shape. Params: name, subdivs, size, scene
var sphere = BABYLON.Mesh.CreateSphere("sphere1", 16, 2, scene);

// Move the sphere upward 1/2 its height
sphere.position.y = 1;

// Our built-in 'ground' shape. Params: name, width, depth, subdivs, scene
var ground = BABYLON.Mesh.CreateGround("ground1", 6, 6, 2, scene);

return scene;
```

https://**playground**.babylonjs.com

Learn by experimenting



Playground Search

Here you can search something in the babylon playground . To do so, enter a text in the field below.

Your last search : equirectangular

79 result(s) for shadow

Moving dude : (11BH6Z)

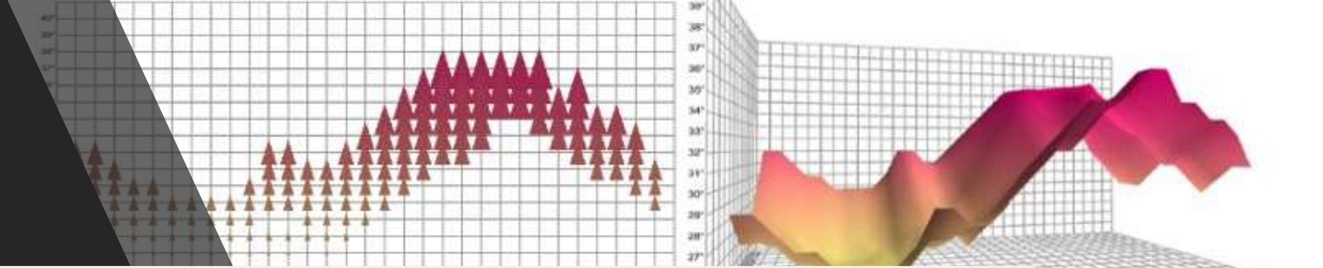
Using attachToBone and dummy parenting to control the dude

```
light.setDirectionToTarget(new BABYLON.Vector3(0, 0, 0));
  scene.clearColor = new BABYLON.Color3(0, 0, 0);

  // sha
  var sh

  var gr
```

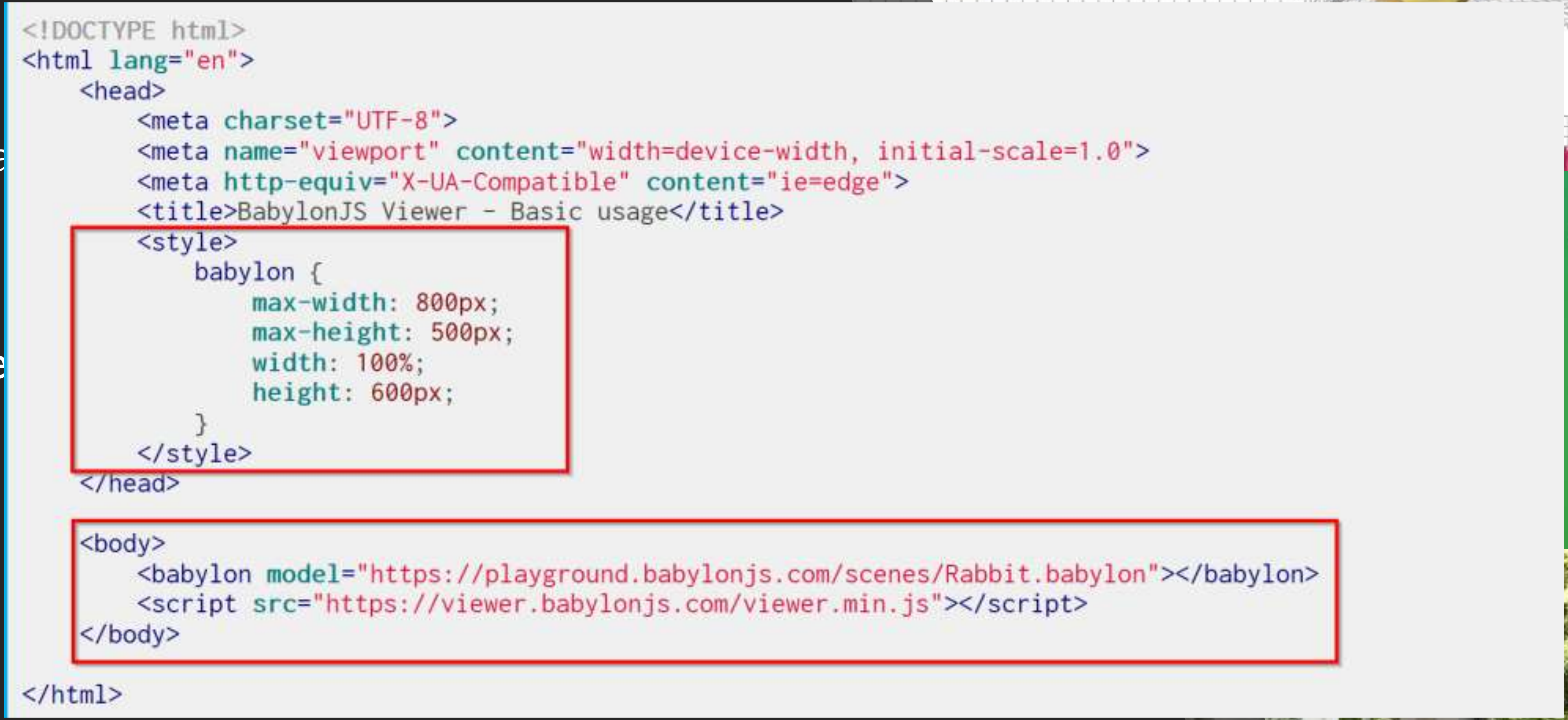
https://**doc**.babylonjs.com

Search doc and playgrounds

Viewer



- Ea
- Te

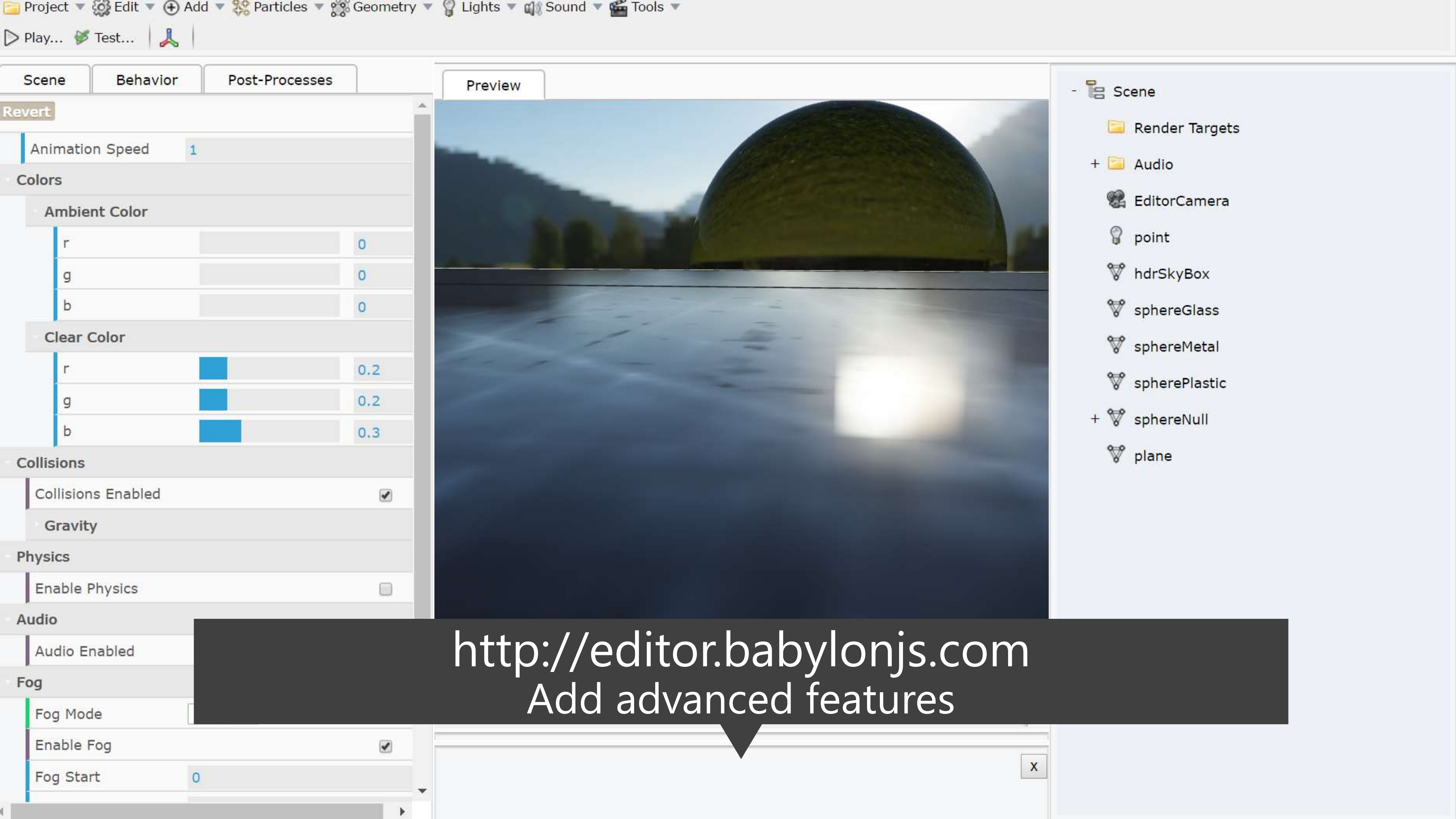


```
<!DOCTYPE html>
<html lang="en">
    <head>
        <meta charset="UTF-8">
        <meta name="viewport" content="width=device-width, initial-scale=1.0">
        <meta http-equiv="X-UA-Compatible" content="ie=edge">
        <title>BabylonJS Viewer - Basic usage</title>
        <style>
            babylon {
                max-width: 800px;
                max-height: 500px;
                width: 100%;
                height: 600px;
            }
        </style>
    </head>

    <body>
        <babylon model="https://playground.babylonjs.com/scenes/Rabbit.babylon"></babylon>
        <script src="https://viewer.babylonjs.com/viewer.min.js"></script>
    </body>

</html>
```

Babylon.js

Advanced Tooling

https://github.com/babylonjs/exporters
Integration with DCC tools



Animation Speed 1

Colors

Ambient Color

r 0

g 0

b 0

Clear Color

r 0.2

g 0.2

b 0.3

Collisions

Collisions Enabled ☑

Gravity

Physics

Enable Physics ☐

Audio

Audio Enabled

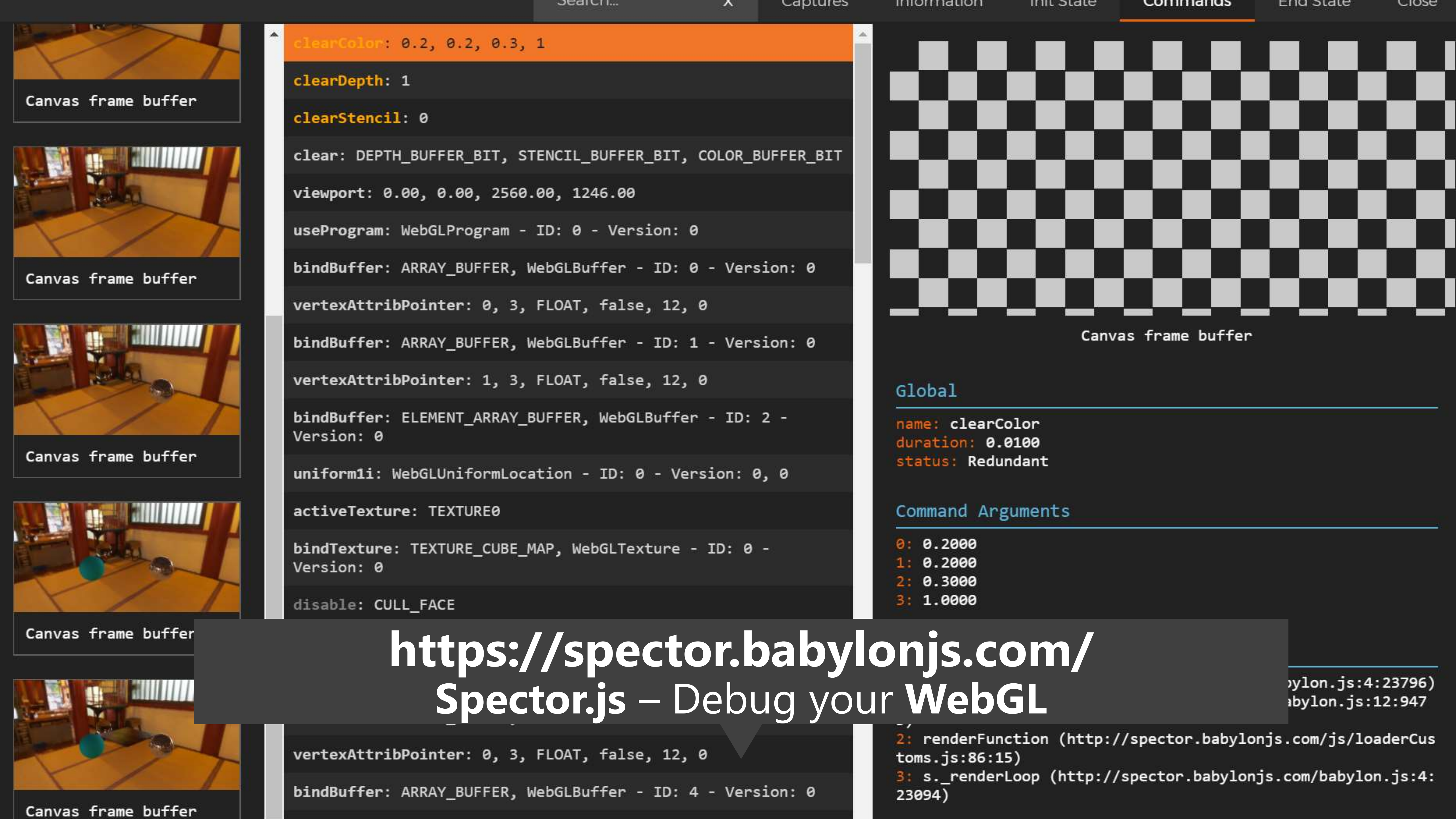
Fog

Fog Mode

Enable Fog ☑

Fog Start 0

http://editor.babylonjs.com
Add advanced features



```
clearColor: 0.2, 0.2, 0.3, 1
clearDepth: 1
clearStencil: 0
clear: DEPTH_BUFFER_BIT, STENCIL_BUFFER_BIT, COLOR_BUFFER_BIT
viewport: 0.00, 0.00, 2560.00, 1246.00
useProgram: WebGLProgram - ID: 0 - Version: 0
bindBuffer: ARRAY_BUFFER, WebGLBuffer - ID: 0 - Version: 0
vertexAttribPointer: 0, 3, FLOAT, false, 12, 0
bindBuffer: ARRAY_BUFFER, WebGLBuffer - ID: 1 - Version: 0
vertexAttribPointer: 1, 3, FLOAT, false, 12, 0
bindBuffer: ELEMENT_ARRAY_BUFFER, WebGLBuffer - ID: 2 -
Version: 0
uniform1i: WebGLUniformLocation - ID: 0 - Version: 0, 0
activeTexture: TEXTURE0
bindTexture: TEXTURE_CUBE_MAP, WebGLTexture - ID: 0 -
Version: 0
disable: CULL_FACE
vertexAttribPointer: 0, 3, FLOAT, false, 12, 0
bindBuffer: ARRAY_BUFFER, WebGLBuffer - ID: 4 - Version: 0
```

Global

```
name: clearColor
duration: 0.0100
status: Redundant
```

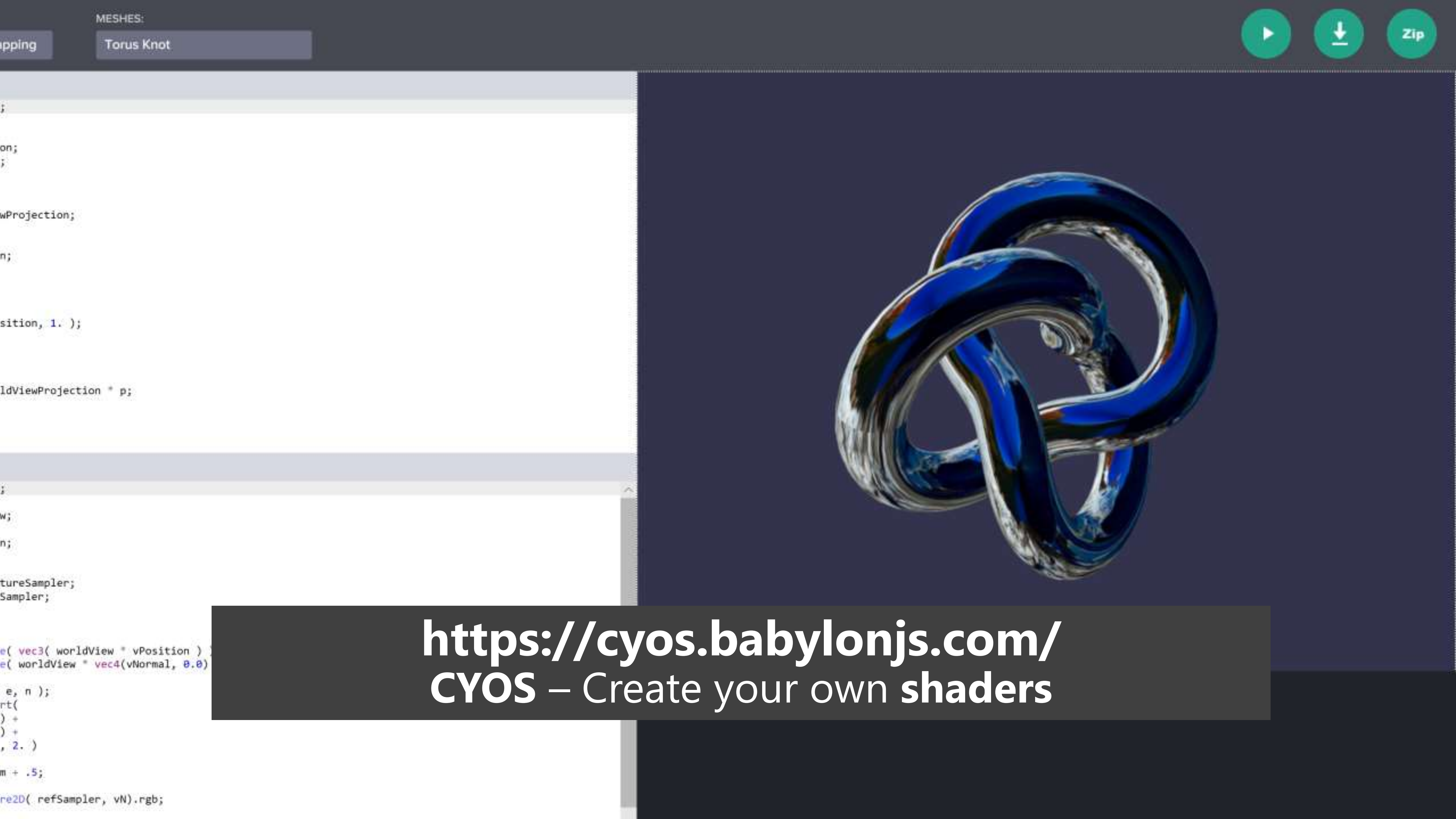
Command Arguments

```
0: 0.2000
1: 0.2000
2: 0.3000
3: 1.0000
```

```
ylon.js:4:23796)
abylon.js:12:947
2: renderFunction (http://spector.babylonjs.com/js/loaderCus
toms.js:86:15)
3: s._renderLoop (http://spector.babylonjs.com/babylon.js:4:
23094)
```

https://spector.babylonjs.com/

Spector.js – Debug your **WebGL**



```
;


on;
;



wProjection;


n;




sition, 1. );




ldViewProjection * p;
```

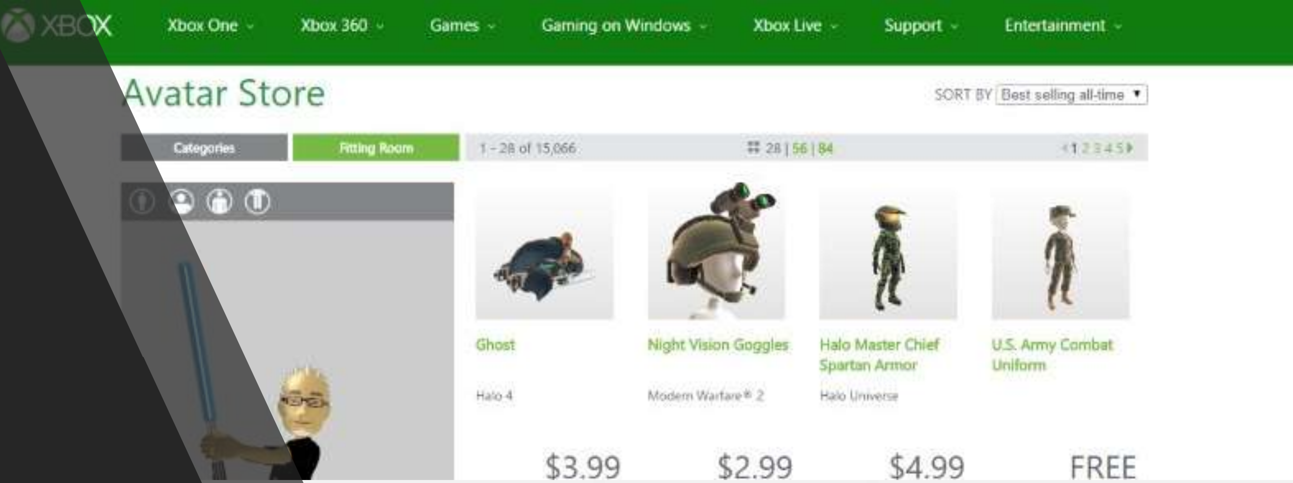
```
;

w;

n;


tureSampler;
Sampler;



e( vec3( worldView * vPosition ) )
e( worldView * vec4(vNormal, 0.0)

 e, n );
rt(
) +
) +
, 2. )

m + .5;

re2D( refSampler, vN).rgb;
```

https://cyos.babylonjs.com/

CYOS – Create your own **shaders**

Some numbers

- 173+ external contributors
- Most popular 3d game engine (according to Javascripting.com)
- 10000+ commits which means 1 commit every hour
- 6000+ stars on GitHub
- 1 preview release per day
- 7000+ downloads per month on NPM
- 1370 forks
- ~120 forum messages a day
- ~100 PR per month

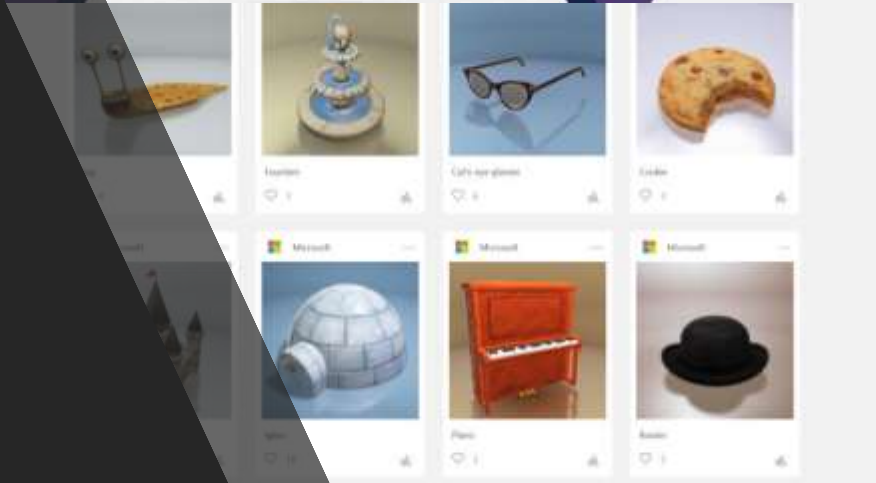


Avatar Store

SORT BY Best selling all-time

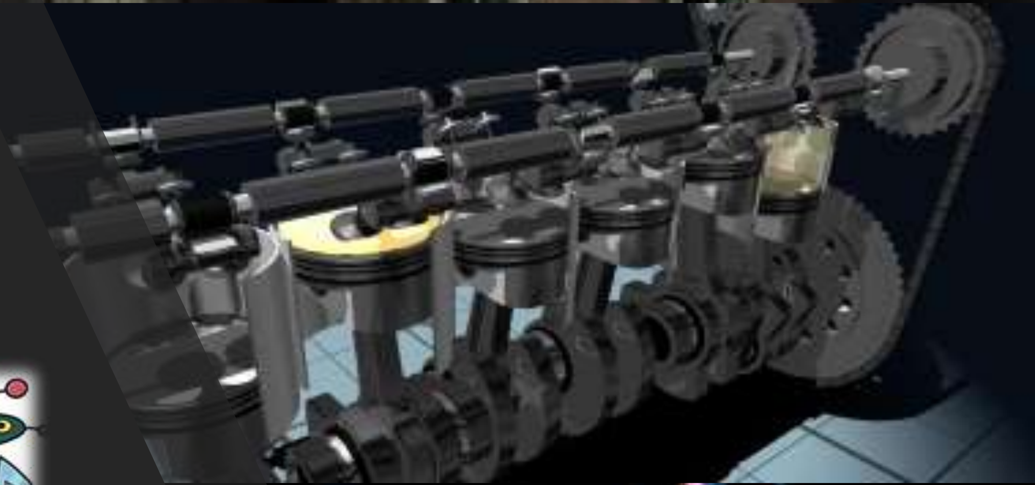
1 - 28 of 15,066 | 28 | 56 | 84 | 1 2 3 4 5

Ghost	Night Vision Goggles	Halo Master Chief Spartan Armor	U.S. Army Combat Uniform
Halo 4	Modern Warfare® 2	Halo Universe	
$3.99	$2.99	$4.99	FREE



Other options?

- Game engines: Unity, Unreal, …
- JavaScript based: Three.js, PlayCanvas, Phaser, Pixi.js, …
- Pure WebGL



Summary / call to action

Try Babylon.js in the Playground: http://playground.babylonjs.com

Read the documentation: http://doc.babylonjs.com

Dev forum: http://www.html5gamedevs.com/forum/16-babylonjs/

Microsoft