

Goal: to port to AssemblyScript all the parts of Three.js that are needed to render the same thing as the following equivalent JavaScript example: <https://codepen.io/trusktr/pen/EzBKYM>

The example uses **Three.js r105**, and we're porting/forked from that version of Three.js. We'll bring in major changes from future versions Three.js later.

Example code, for reference:

```
var renderer = new THREE.WebGLRenderer({
  canvas: document.getElementById('canvas'),
  antialias: true
});

// canvas-related stuff (color, width, height, pixel ratio)
renderer.setClearColor(0x348EDD);
renderer.setPixelRatio(window.devicePixelRatio);
renderer.setSize(window.innerWidth, window.innerHeight);

var camera = new THREE.PerspectiveCamera(35, window.innerWidth /
window.innerHeight, 0.1, 3000);
var scene = new THREE.Scene();

var light2 = new THREE.PointLight(0x348EDD, 0.8);
scene.add(light2);

// new box (cube) geometry
var material = new THREE.MeshPhongMaterial();
var mesh = new THREE.Mesh(geometry, material); -- S, J (Object3D)
mesh.position.set(0, 0, -1000);
scene.add(mesh);

requestAnimationFrame(render);

mesh.rotation.y = 0.785;
mesh.rotation.x = 1;

function render() {
  mesh.rotation.x += 0.005;
  mesh.rotation.y += 0.007;
  mesh.rotation.z += 0.05;
  renderer.render(scene, camera);
  requestAnimationFrame(render);
}

window.addEventListener('resize', onWindowResize, false);

function onWindowResize() {
  camera.aspect = window.innerWidth / window.innerHeight;
```

```
camera.updateProjectionMatrix();
renderer.setSize(window.innerWidth, window.innerHeight);
}
```

Below is a list of all the classes and their methods that were called at any point during rendering of the above example. We instrumented the code using [this script](#) in the [inspecting-three](#) branch.

The classes and methods are color-coded to show progress as follows:

Red = WIP (both source and tests)

Green = converted to AS, tested, working. This doesn't mean all parts are ported/tested, but rather only the parts needed for the above demo.

Gray - means we skipped it for the initial demo

To claim a class, pick one that isn't complete yet, then if it is not listed as an issue in the GitHub repo make an issue for it, and finally mention you will work on it in the issue.

Used Classes and Methods

Total classes touched: 79

Total methods touched: 302

Used classes:

[
"Window" - Anything listed under Window just means a plain function not part of a class.
"Quaternion",
"Vector3",
"Box3",
"Matrix3",
"Sphere",
"Matrix4",
"Color",
"Vector2",
"Object3D",
"Euler",
"Layers",
"Ray",
"Texture",
"DataTexture2DArray",
"DataTexture3D",
"CubeTexture",
"LoadingManager",
"CubicPoly",
"TextureLoader",
"MaterialLoader",
]

"Clock",
"Camera",
"WebGLRenderer",
"Vector4",
"Frustum",
"Plane",
"WebGLClipping",
"WebGLExtensions",
"WebGLCapabilities",
"WebGLUtils",
"WebGLState",
"ColorBuffer",
"DepthBuffer",
"StencilBuffer",
"WebGLInfo",
"WebGLProperties",
"WebGLTextures",
"WebGLAttributes",
"WebGLGeometries",
"WebGLObjects",
"WebGLMorphTargets",
"WebGLPrograms",
"WebGLRenderLists",
"WebGLRenderStates",
"WebGLBackground",
"WebGLBufferRenderer",
"WebGLIndexedBufferRenderer",
"WebVRManager",
"PerspectiveCamera",
"ArrayCamera",
"WebGLAnimation",
"WebGLShadowMap",
"MeshDepthMaterial", - no shadows in initial demo
"MeshDistanceMaterial", - no shadows in initial demo
"Scene",
"PointLight",
"LightShadow",
"Geometry",
"BoxGeometry",
"BufferGeometry",
"BoxBufferGeometry",
"Uint16BufferAttribute",
"Float32BufferAttribute",
"Face3",
"MeshPhongMaterial",
"Mesh",
"WebGLRenderState",
"WebGLLights",

```
"UniformsCache",
"WebGLRenderList",
"BufferGeometry",
"DirectGeometry", - skipped, using BoxBufferGeometry instead of BoxGeometry
"BufferAttribute",
"WebGLProgram",
"WebGLUniforms",
"SingleUniform",
"StructuredUniform",
"PureArrayUniform",
]
```

Used methods per class:

```
[
 [
  "Window",
  [
    "",
    "mergeUniforms",
    "cloneUniforms",
    "initGLContext",
    "getMaxPrecision",
    "createTexture",
    "enable",
    "setFlipSided",
    "setCullFace",
    "setBlending",
    "setClear",
    "buildPlane",
    "arrayMax",
    "addFace",
    "projectPlanes",
    "projectObject",
    "createBuffer",
    "getNextRenderItem",
    "renderObjects",
    "renderObject",
    "setPolygonOffset",
    "disable",
    "setProgram",
    "initMaterial",
    "getTextureEncodingFromMap",
    "generateExtensions",
    "filterEmptyLine",
  ]
 ]
]
```

```
"generateDefines",
"getToneMappingFunction",
"getTexelDecodingFunction",
"getEncodingComponents",
"getTexelEncodingFunction",
"parseIncludes",
"replace",
"replaceLightNums",
"replaceClippingPlaneNums",
"unrollLoops",
"WebGLShader",
"fetchAttributeLocations",
"parseUniform",
"getSingularSetter",
"addUniform",
"getPureArraySetter",
"arraysEqual",
"copyArray",
"markUniformsLightsNeedsUpdate",
"refreshUniformsCommon",
"refreshUniformsPhong",
"flatten",
"setupVertexAttributes",
"enableAttributeAndDivisor"
]
],
[
```

"Quaternion",

```
[
  "Quaternion",
  "onChange",
  "setFromEuler"
]
],
[
```

"Vector3",

```
[
  "Vector3",
  "clone",
  "fromArray",
  "subVectors",
  "cross",
  "crossVectors",
  "normalize",
```

```
"length",
"divideScalar",
"multiplyScalar",
"copy",
"set",
"min",
"max",
"addVectors",
"distanceToSquared",
"applyMatrix4",
"dot",
"setFromMatrixPosition",
"toArray"
]
],
[
```

```
"Box3",
[
  "Box3",
  "setFromPoints",
  "makeEmpty",
  "expandByPoint",
  "getCenter",
  "isEmpty"
]
],
[
```

```
"Matrix3",
[
  "Matrix3",
  "clone",
  "fromArray",
  "getNormalMatrix",
  "setFromMatrix4",
  "set",
  "getInverse",
  "transpose"
]
],
[
```

```
"Sphere", - JP
[
  "Sphere",
```

```
"setFromPoints",  
"copy",  
"applyMatrix4"  
]  
],  
[
```

"Matrix4", - JP

```
[  
"Matrix4",  
"makePerspective",  
"getInverse",  
"compose",  
"copy",  
"multiplyMatrices",  
"getMaxScaleOnAxis",  
"determinant"  
]  
],  
[
```

"Color", - JP

```
[  
"Color",  
"set",  
"setHex",  
"clone",  
"setRGB",  
"copy",  
"multiplyScalar"  
]  
],  
[
```

"Vector2", - JP

```
[  
"Vector2",  
"clone",  
"fromArray"  
]  
],  
[
```

"Object3D", - JP

```
[
```

```
"Object3D",
"add",
"remove",
"traverse",
]
],
[

  "Object",
  [
    "generateUUID",
    "get",
    "setClear",
    "setFunc",
    "scissor",
    "viewport",
    "setAnimationLoop",
    "setContext",
    "setClearColor",
    "init",
    "pushLight",
    "update",
    "push",
    "sort",
    "setupLights",
    "setup",
    "reset",
    "render",
    "setMaterial",
    "setTest",
    "setMask",
    "useProgram",
    "initAttributes",
    "enableAttribute",
    "disableUnusedAttributes",
    "setPolygonOffset"
  ]
],
[
```

"Euler",

```
[
  "Euler",
  "onChange",
  "set",
  "onRotationChange",
]
```

```
    "get"  
  ],  
  [  
    "
```

```
    "Layers", - JP
```

```
  [  
    "Layers",  
    "enable",  
    "test"  
  ],  
],  
[
```

```
  "Ray",  
  [  
    "Ray"  
  ],  
],  
[
```

```
  "Texture",  
  [  
    "Texture"  
  ],  
],  
[
```

```
  "DataTexture2DArray",  
  [  
    "DataTexture2DArray",  
    "Texture"  
  ],  
],  
[
```

```
  "DataTexture3D",  
  [  
    "DataTexture3D",  
    "Texture"  
  ],  
],  
[
```

```
"CubeTexture",
[
  "CubeTexture",
  "Texture"
]
],
[
```

```
"LoadingManager",
[
  "LoadingManager"
],
[
```

```
"CubicPoly",
[
  "CubicPoly"
],
[
```

```
"TextureLoader",
[
  "TextureLoader"
],
[
```

```
"MaterialLoader",
[
    "MaterialLoader"
],
[
```

```
"Clock",  
[  
  "Clock"  
],  
[
```

"Camera", - JP

```
[  
  "Camera",  
  "Object3D"  
],  
[
```

"WebGLRenderer", - JP

```
[  
  "render",  
  "clear",  
  "renderBufferDirect",  
  "WebGLRenderer",  
  "setClearColor",  
  "setPixelRatio",  
  "setSize",  
  "setViewport",  
  "getRenderTarget"  
],  
[
```

"Vector4",

```
[  
  "Vector4",  
  "set",  
  "equals",  
  "copy",  
  "multiplyScalar"  
],  
[
```

"Frustum",

```
[  
  "Frustum",  
  "setFromMatrix",  
  "intersectsObject",  
  "intersectsSphere"  
],  
[
```

"Plane", - JP

```
[
  "Plane",
  "setComponents",
  "normalize",
  "distanceToPoint"
],
[

  "WebGLClipping",
  [
    "WebGLClipping",
    ""
  ]
],
[

  "WebGLExtensions",
  [
    "WebGLExtensions"
  ]
],
[

  "WebGLCapabilities",
  [
    "WebGLCapabilities"
  ]
],
[

  "WebGLUtils",
  [
    "WebGLUtils"
  ]
],
[

  "WebGLState",
  [
    "WebGLState"
  ]
]
```

```
],
[

    "ColorBuffer",
    [
        "ColorBuffer"
    ]
],
[

    "DepthBuffer",
    [
        "DepthBuffer"
    ]
],
[

    "StencilBuffer",
    [
        "StencilBuffer"
    ]
],
[

    "WebGLInfo",
    [
        "WebGLInfo"
    ]
],
[

    "WebGLProperties",
    [
        "WebGLProperties"
    ]
],
[

    "WebGLTextures",
    [
        "WebGLTextures",
        "resetTextureUnits"
    ]
],
```

```
[  
  
  "WebGLAttributes",  
  [  
    "WebGLAttributes"  
  ],  
  [  
  
    "WebGLGeometries",  
    [  
      "WebGLGeometries"  
    ],  
  ],  
  [  
  
    "WebGLObjects",  
    [  
      "WebGLObjects"  
    ],  
  ],  
  [  
  
    "WebGLMorphtargets",  
    [  
      "WebGLMorphtargets"  
    ],  
  ],  
  [  
  
    "WebGLPrograms",  
    [  
      "WebGLPrograms",  
      ""  
    ],  
  ],  
  [  
  
    "WebGLRenderLists",  
    [  
      "WebGLRenderLists"  
    ],  
  ],  
  [  

```

```
    "WebGLRenderStates",
  [
    "WebGLRenderStates"
  ],
  [

    "WebGLBackground",
  [
    "WebGLBackground"
  ],
  [

    "WebGLBufferRenderer",
  [
    "WebGLBufferRenderer",
    "setMode",
    "render"
  ],
  [

    "WebGLIndexedBufferRenderer",
  [
    "WebGLIndexedBufferRenderer"
  ],
  [

    "WebVRManager",
  [
    "WebVRManager",
    "isPresenting"
  ],
  [

    "PerspectiveCamera",
  [
    "PerspectiveCamera",
    "Camera",
    "Object3D",
```

```
"updateProjectionMatrix",  
"updateMatrixWorld",  
"updateMatrix"  
]  
],  
[
```

```
"ArrayCamera",  
[  
"ArrayCamera",  
"PerspectiveCamera",  
"Camera",  
"Object3D",  
"updateProjectionMatrix"  
]  
],  
[
```

```
"WebGLAnimation",  
[  
"WebGLAnimation"  
]  
],  
[
```

```
"WebGLShadowMap",  
[  
"WebGLShadowMap",  
""  
]  
],  
[
```

```
"MeshDepthMaterial", - no shadow in initial demo  
[  
"MeshDepthMaterial",  
"Material",  
"setValues"  
]  
],  
[
```

```
"MeshDistanceMaterial", - no shadow in initial demo  
[  
"MeshDistanceMaterial",
```

```
"Material",
"setValues"
]
],
[
```

```
  "Scene",
  [
    "Scene",
    "Object3D",
    "add",
    "updateMatrixWorld",
    "updateMatrix",
    "addEventListener",
    "onBeforeRender",
    "onAfterRender"
  ]
],
[
```

```
  "PointLight",
  [
    "PointLight",
    "Light",
    "Object3D",
    "dispatchEvent",
    "updateMatrixWorld",
    "updateMatrix"
  ]
],
[
```

```
  "LightShadow",
  [
    "LightShadow"
  ]
],
[
```

```
  "BoxGeometry",
  [
    "BoxGeometry",
    "Geometry",
    "fromBufferGeometry", - inherit from Geometry
    "computeFaceNormals", - inherit from Geometry
  ]
],
[
```

```
"mergeVertices", - inherit from Geometry
"computeBoundingSphere", - inherit from Geometry
"addEventListener" - inherit from Geometry -> EventListener
```

```
]
],
[
```

```
"BoxBufferGeometry",
```

```
[
  "BoxBufferGeometry",
  "BufferGeometry",
  "addGroup", - inherit from BufferGeometry
  "setIndex", - inherit from BufferGeometry
  "addAttribute" - inherit from BufferGeometry
]
],
[
```

```
"Uint16BufferAttribute",
```

```
[
  "Uint16BufferAttribute",
  "BufferAttribute"
]
],
[
```

```
"Float32BufferAttribute",
```

```
[
  "Float32BufferAttribute",
  "BufferAttribute"
]
],
[
```

```
"Face3",
```

```
[
  "Face3"
]
],
[
```

```
"MeshPhongMaterial",
```

```
[
  "MeshPhongMaterial",
  "Material",
```

```
"setValues",
"addEventListener",
"onBeforeCompile"
],
[

  "Mesh",
  [
    "Mesh",
    "Object3D",
    "updateMorphTargets",
    "dispatchEvent", - from EventDispatcher
    "updateMatrixWorld", - from Object3D
    "updateMatrix", - from Object3D
    "onBeforeRender", - from Object3D
    "onAfterRender" - from Object3D
  ],
  [

    "WebGLRenderState",
    [
      "WebGLRenderState"
    ],
    [

      "WebGLLights",
      [
        "WebGLLights"
      ],
      [

        "UniformsCache",
        [
          "UniformsCache"
        ],
        [

          "WebGLRenderList",
          [
            "WebGLRenderList"
```

```
]
],
[

  "BufferGeometry",
  [
    "BufferGeometry",
    "setFromObject", - skipped, needed only if we use BoxGeometry instead of BoxBufferGeometry
    "fromGeometry", - skipped, same reason
    "fromDirectGeometry", - skipped, same reason
    "addAttribute",
    "updateFromObject" - skipped, same reason
  ]
],
[
```

```
  "DirectGeometry",
  [
    "DirectGeometry",
    "fromGeometry",
    "computeGroups"
  ]
],
[
```

```
  "BufferAttribute",
  [
    "BufferAttribute",
    "copyVector3sArray",
    "copyColorsArray",
    "copyVector2sArray",
    "onUploadCallback"
  ]
],
[
```

```
  "WebGLProgram",
  [
    "WebGLProgram",
    ""
  ]
],
[
```

```
    "WebGLUniforms",
    [
        "WebGLUniforms",
        ""
    ]
],
[

    "SingleUniform",
    [
        "SingleUniform",
        "setValueM4",
        "setValueV1f",
        "setValueV3f",
        "setValueV1i",
        "setValueV2f",
        "setValueM3"
    ]
],
[

    "StructuredUniform",
    [
        "StructuredUniform",
        ""
    ]
],
[

    "PureArrayUniform",
    [
        "PureArrayUniform",
        "setValueV3fArray"
    ]
],
]
```