

Nouveaux Moyens d'Interaction

#FishEye #VR

Luc MARONGIU - 2017

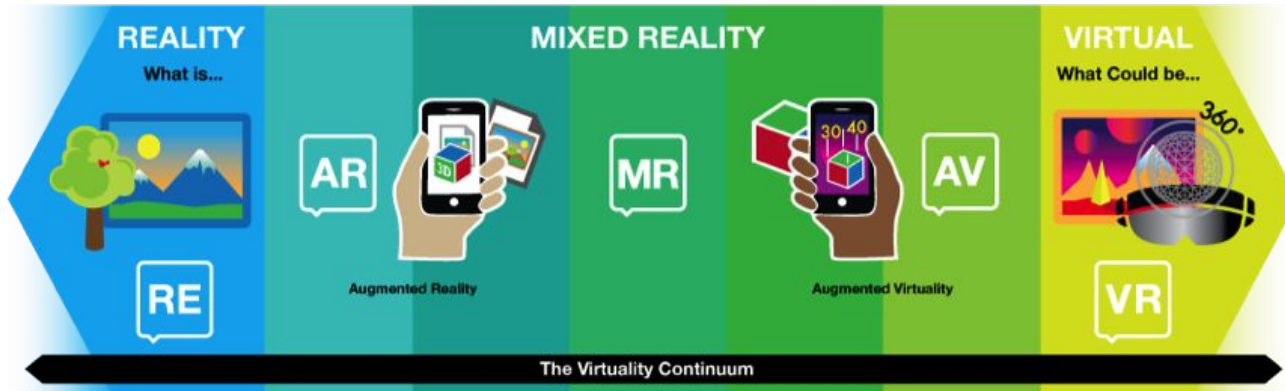
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TD : (Partie 3) VR / AR

VR, AR, quelles différences ?



A composite image showing a large view of Earth on the left and a smaller view of Mars on the right, set against a starry space background. A semi-transparent white box is overlaid on the Earth image.

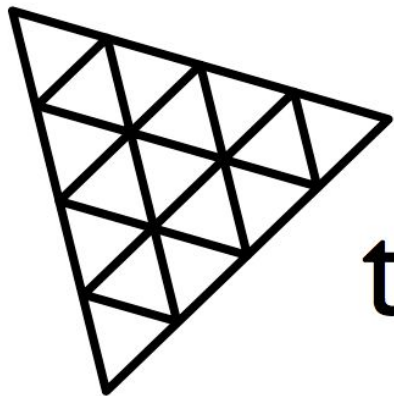
Exo 1 : VR



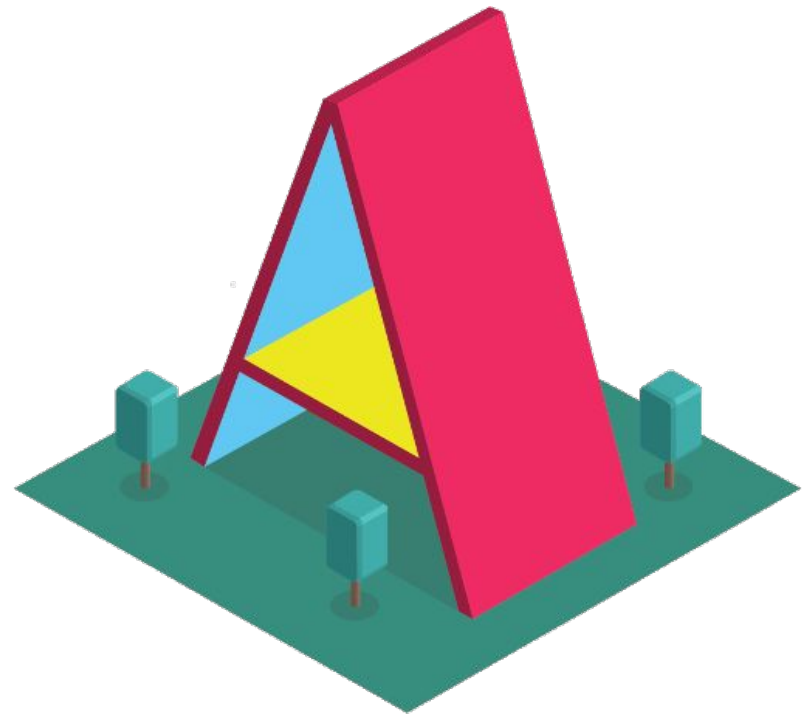


Quels *frameworks, librairies* utilisés ?

Quels *frameworks, librairies* utilisés ?



three.js



A web framework for building virtual reality experiences. <https://aframe.io/>



vr webvr virtualreality threejs html framework ar vive oculus rift cardboard game-engine virtual-reality-e
aframe virtual-reality daydream

📄 3,667 commits

🌿 7 branches

📦 13 releases

👤 192 contributors

🔗 MIT

Branch: master ▾

New pull request

Find file

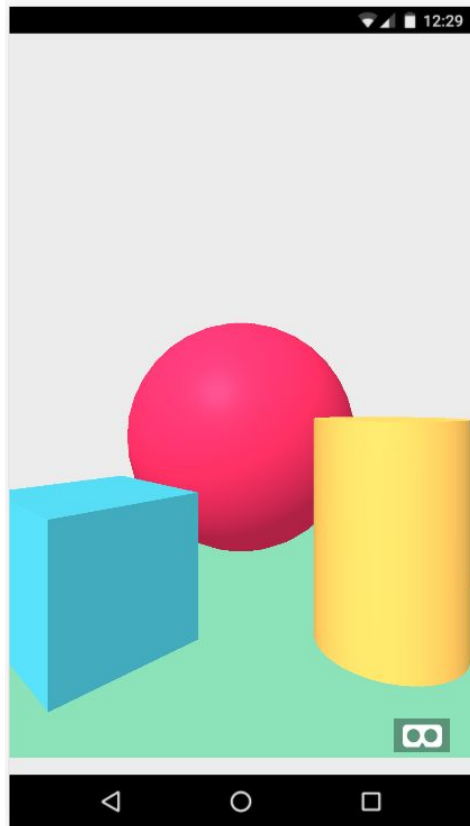
Clone or download ▾

 dmarcos Change log for 0.7.0

Latest commit 2b0d64e a day ago

📁 .github	move stackoverflow nudge in issue template to the bottom	8 months ago
📁 dist	Update master CDN URL. (https://rawgit.com/aframevr/aframe/0cceca4/di...)	4 days ago
📁 docs	Clarify that WebVR is released with Firefox 55+ for Windows now (#3037)	16 hours ago
📁 examples	hand-controls bugfixes (#3025)	7 days ago
📁 scripts	Replace 'replace' dependency. (#2854)	2 months ago
📁 src	Bump aframe-master dist/ builds. (916491c...4e98415)	4 days ago
📁 tests	Handle vrdisplayconnect/vrdisplaydisconnect events in VREffect and VR...	4 days ago
📁 vendor	Handle vrdisplayconnect/vrdisplaydisconnect events in VREffect and VR...	4 days ago

A-frame example



```
<html>
  <head>
    <script src="https://aframe.io/releases/0.7.0/aframe.min.js"></script>
  </head>
  <body>

    <a-scene>

      <a-box position="-1 0.5 -3" rotation="0 45 0" color="#4CC3D9"></a-box>

      <a-sphere position="0 1.25 -5" radius="1.25" color="#EF2D5E"></a-sphere>

      <a-cylinder position="1 0.75 -3" radius="0.5" height="1.5" color="#FFC65D"></a-cylinder>

      <a-plane position="0 0 -4" rotation="-90 0 0" width="4" height="4" color="#7BC8A4"></a-plane>

      <a-sky color="#ECECEC"></a-sky>

    </a-scene>

  </body>
</html>
```

Charger une texture 1/2

```
<script src="https://aframe.io/releases/0.7.0/aframe.min.js "></script>

<a-scene>
  <a-sphere id="earth" position="0 1.25 -150" radius="4"
src="./img/earth3.jpg" >
  </a-sphere>
</a-scene>
```

→ 'src' : chargement de texture au Runtime

→ Simple mais....

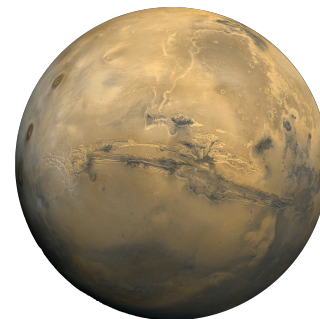
→ Peut avoir un **impact négatif** sur les performances runtime



Charger une texture 2/2

→ **A-assets** : Preload les textures

→ N'affiche pas la **scène** si textures non chargées



```
<a-scene>  
  <a-assets>  
      
  </a-assets>  
  <a-sphere id="earth" position="0 1.25 -150" radius="4"  
src="#earthTexture" >  
  </a-sphere>  
</a-scene>
```

Charger un background 360°

→ A-sky

→ Assets ou src

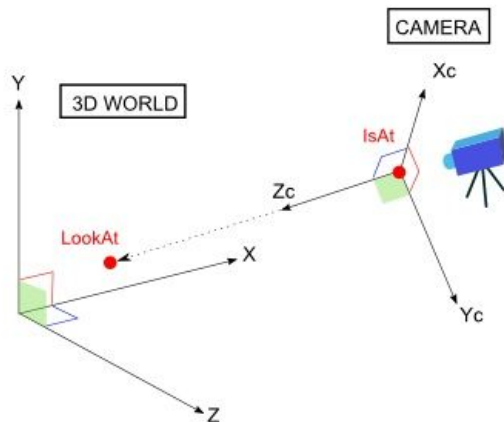


```
<a-scene>  
  <a-assets>  
      
      
  </a-assets>  
  <a-sky id="stars" src="#starsTexture" ></a-sky>  
</a-scene>
```

Gestion camera

→ a-entity

→ cursor: "fuse:true; fuseTimeout:300"



```
<a-entity id="camera" position="-10 30 100" camera="userHeight: 1.6" look-controls>  
  <a-entity cursor="fuse: true; fuseTimeout: 300"  
    position="0 0 -1"  
    geometry="primitive: ring; radiusInner: 0.02; radiusOuter: 0.03"  
    material="color: white; shader: flat">  
    <a-animation begin="click" easing="ease-in" attribute="scale"  
      fill="backwards" from="0.1 0.1 0.1" to="1 1 1"></a-animation>  
    <a-animation begin="cursor-fusing" easing="ease-in" attribute="scale"  
      fill="backwards" from="1 1 1" to="0.1 0.1 0.1"></a-animation>  
  </a-entity>  
</a-entity>
```

*Nous avons créé ciel et planètes...
Il ne nous reste plus qu'à les animer !*



*“Mon jeu actuellement en
développement”*

“Comment *animer* ? Comment gérer les *collisions* ? Développer un *moteur physique* ? un *moteur graphique* ? ...”



La boucle à l'origine de tout

How to Use setInterval() Function

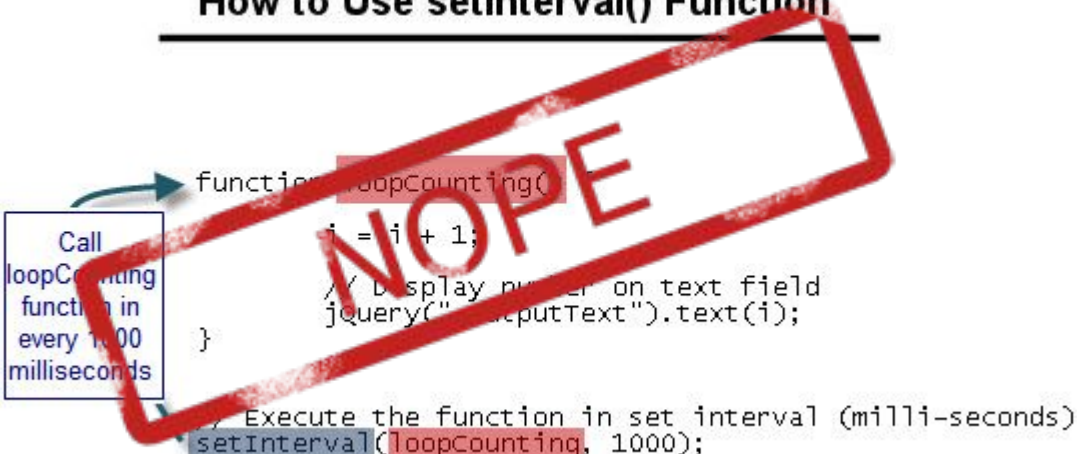
```
function loopCounting() {  
    i = i + 1;  
    // Display number on text field  
    jQuery(".outputText").text(i);  
}  
  
// Execute the function in set interval (milli-seconds)  
setInterval(loopCounting, 1000);
```

Call
loopCounting
function in
every 1000
milliseconds

La boucle à l'origine de tout

How to Use setInterval() Function

```
function loopCounting()  
    i = i + 1;  
    // Display number on text field  
    jquery("#inputText").text(i);  
}  
  
// Execute the function in set interval (milli-seconds)  
setInterval(loopCounting, 1000);
```



→ **Facile** à utiliser mais...

→ **Framerate non garanti !**

→ **Vitesse des animations en fonction des FPS et non du temps !**

La boucle à l'origine de tout v2 !

```
1. // Animation loop
2. let now = 0;
3. let lastFrame = 0;
4. function loop (now) {
5.     const deltaT = now - lastFrame;
6.
7.     // Updating planets position
8.     ...
9.
10.    lastFrame = now;
11.    window.requestAnimationFrame(loop);
12. }
13.
14. loop(0);
```

→ Dépend du **temps**

→ Existe pour ne pas bloquer
l'UI

→ **Performant**



Attributs :

Name, Revolution, Rotation

Update :

→ **DeltaT** = Temps passés
entre 2 boucles d'animation

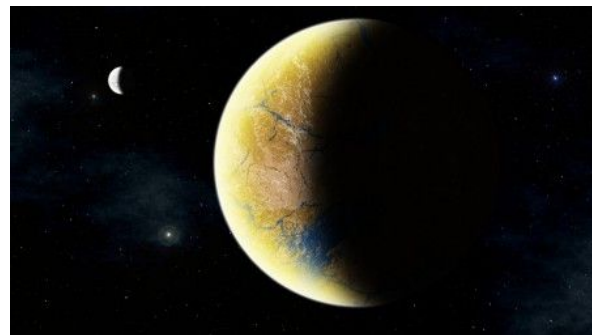
→ Calcul new position, angle
& rotation

```
1. class Planet {
2.     /* * @param {String} name
3.     * @param {Number} revolution
4.     * @param {Number} rotation
5.     */
6.     constructor(name, revolution, rotation) {
7.         this.name = name;
8.         this.revolution = revolution;
9.         this.rotation = rotation || 100;
10.        this.element = document.getElementById(name);
11.        this.element.addEventListener("click", () => {...},{passive:false});
12.    }
13.    /**
14.     * @param {Number} deltaT
15.     */
16.    update (deltaT) {
17.        // update position using time and revolution period
18.        const angle = -deltaT/6000 * 365/this.revolution;
19.        let position = this.element.getAttribute("position");
20.        const x = position.x;
21.        const z = position.z;
22.        position.x = x * Math.cos(angle) - z * Math.sin(angle);
23.        position.z = x * Math.sin(angle) + z * Math.cos(angle);
24.        this.element.setAttribute("position",position);
25.        // update rotation
26.        let rotation = this.element.getAttribute("rotation");
27.        rotation.y += deltaT/this.rotation;
28.        this.element.setAttribute("rotation",rotation);
29.    }
30.    static distance (v1, v2) {...}
31. }
```

Gestion ombres et lumières

→ Propriété `'light'` ajouté à la `a-scene` et à un objet

→ `material="shader:flat"` pour que l'objet en question soit aussi illuminé



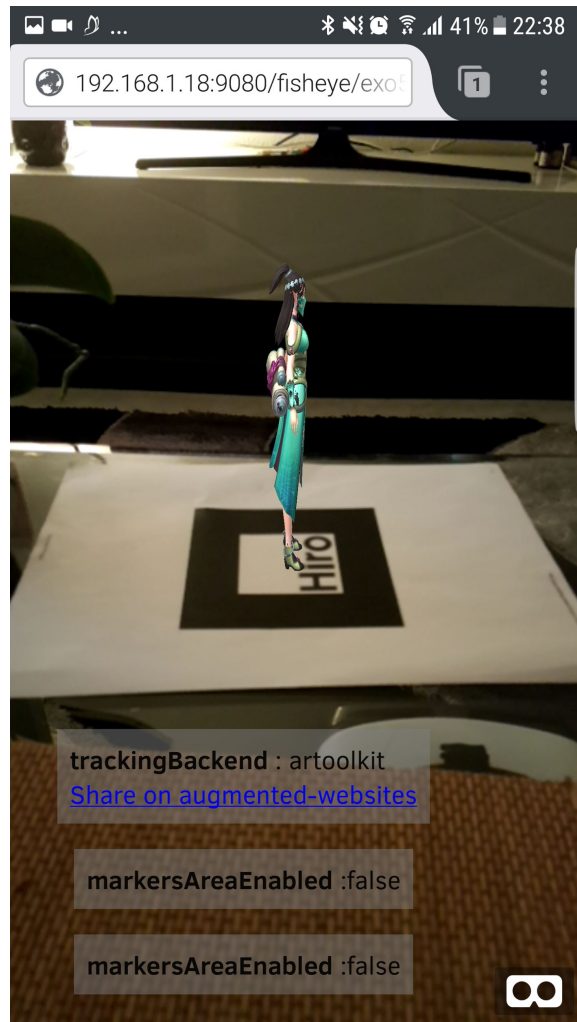
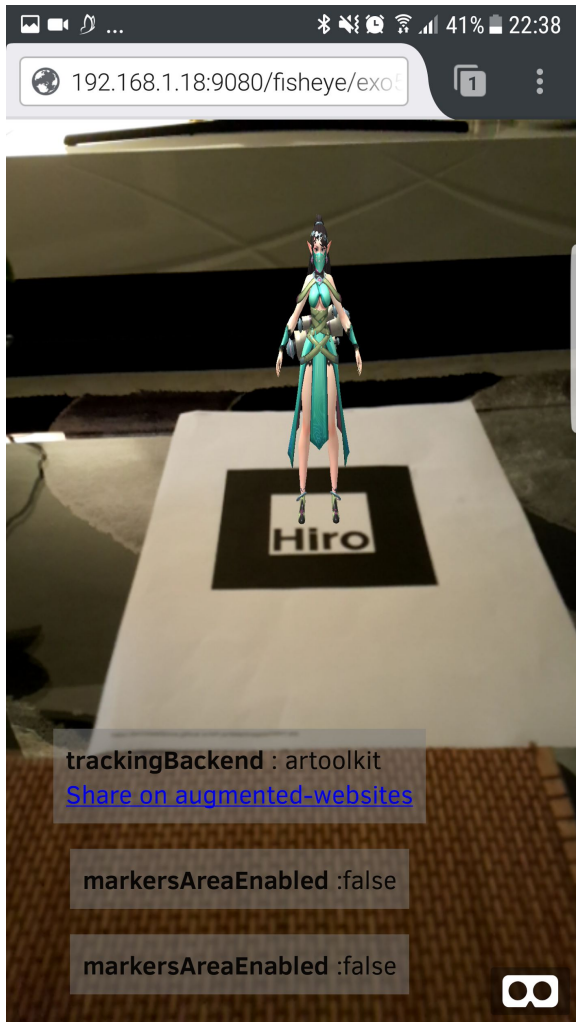
```
<a-scene light="defaultLightsEnabled: true" >
```

```
<a-sphere light="type: point; intensity: 1" id="soleil" position="0 0 0"  
rotation="0 0 0" radius="25" src="../../img/soleil2.jpg" material="shader:  
flat"></a-sphere>
```

```
</a-scene>
```

Exo 2 : AR
















Aframe.js + AR.js → non mature mais OK

875 commits 5 branches 6 releases 10 contributors MIT

Branch: master ▾ New pull request Find file Clone or download ▾

 **jeromeetienne** Merge branch 'dev' ... Latest commit 3e61c92 on 15 Aug

 aframe	Merge branch 'dev'	2 months ago
 babylon.js	new build	2 months ago
 data	integrating augmented-webpage in README.md	4 months ago
 test	reenenable test	3 months ago
 three.js	new build	2 months ago
 webvr-polyfill	new build	2 months ago
 .gitignore	adds .gitignore	5 months ago
 CHANGELOG.md	more docs	2 months ago
 LICENSE.txt	adding licenses	8 months ago
 Makefile	add a global watch to build	2 months ago

Avant de commencer....

→ **Device** : PC avec **webcam** ou **Smartphone**

→ **Sur chrome** : nécessite **https://** ou **http://127.0.0.1** pour fonctionner

→ **Pas de contrainte** sur **Firefox** (y compris mobile)

→ **Ma config** :

- Web server for **chrome** (extension) ou **WAMP** sur PC
- Smartphone avec **Firefox mobile**



Web Server for Chrome
proposé par chromebeat.com

A Web Server for Chrome, serves web pages from a local folder over the network, using HTTP. Runs offline.

★★★★★ (891)

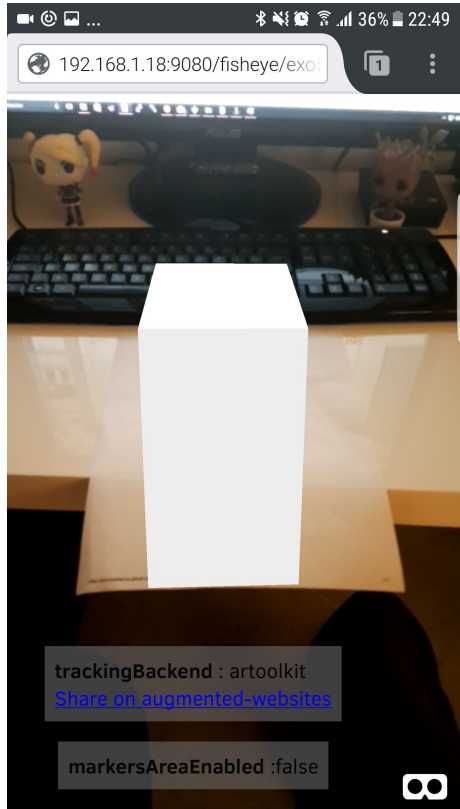
ÉVALUER

Outils de développement

2.00 OK!

Web Server for Chrome

AR Exemple



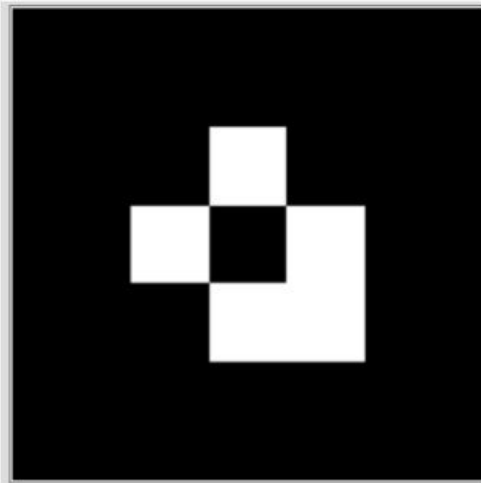
```
1. <script src="https://aframe.io/releases/0.7.0/aframe.min.js"></script>
2. <script
   src="https://jeromeetienne.github.io/AR.js/aframe/build/aframe-ar.js"></
   script>
3. <body style='margin : 0px; overflow: hidden;'>
4.   <a-scene embedded arjs>
5.     <a-marker preset=hiro>
6.       <a-box></a-box>
7.     </a-marker>
8.   <a-entity camera></a-entity>
9. </a-scene>
10.</body>
```

Marker



1. `// Preset "hiro" ou "kanji"`
2. `<a-marker preset="hiro">`
3. `<a-box></a-box>`
4. `</a-marker>`

```
<a-marker type='barcode' value='20' >  
    <!-- here put your content -->  
</a-marker>
```



Récupérer un modèle 3D .gltf

Sketchfab EXPLORE COMMUNITY BLOG Search

Search v2.0 1/20 1/2 1/4

Simple View UPLOAD

Model Name	Creator	Views	Comments	Reactions	Stars
Fruit on Table		43	0	4	4
Mika		58	0	4	4
Stall [001] [Medieval Assets]		29	0	4	4
Assia		87	0	4	4
Buste de Raoul Mortier		19	0	4	4
Orcish Sword		33	0	4	4
Stone		16	0	4	4
Fallout 4: Bloatfly (Fanart) (WIP)		42	0	4	4
Torch Ignition		39	0	4	4
Adolphe Sax		33	0	4	4
Dick Dastardly Airplane		72	0	4	4
Cyber Grenade		46	0	4	4

Afficher le modèle 3D

```
1. <a-assets>
2.   <a-asset-item id="ying" src="./ch_ying_default/scene.gltf"></a-asset-item>
3. </a-assets>
4.
5. <a-entity gltf-model="#itty" scale="0.5 0.5 0.5"></a-entity>
```

→ Pour aller plus loin : <https://aframe.io/blog/arjs/>

Web Code vs Native Code

→ Native code **faster** to run

→ Javascript is **easier** and **faster to write**

→ web code => single version **run everywhere**

Up to you to choose according to your own needs