



Bringing Mixed Reality to the Web

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About me

- Front End Engineer @AVA
- PhD student @FTN
- Former Teaching Assistant @FTN
- Lecturer at @Dafed <https://dafed.org/>
- Book reviewer @Manning specialized in JS related topics
- JS enthusiast
-  @NisamProgramer

Topics

- History or “How did we end up here”
- Short intro to WebGL and Three.js
- Visual Studio Code + plugins
- Importing 3D models to the scene
- Creating VR scene using A-Frame
- Creating AR scene using AR.js
- WebXR or “The future and where are we going”

Skills and tools

- Elementary JavaScript knowledge with HTML and CSS
- GitHub
- Visual Studio Code with plugins (other IDE are fine too - Sublime, Atom...)
- Chrome browser with Chrome developer tools
- Node.js + http-server
<https://www.npmjs.com/package/http-server>

History - WebGL

- **WebGL (Web Graphics Library)** is a JavaScript API for rendering interactive 2D and 3D graphics within any compatible web browser without the use of plug-ins
- Allowing GPU-accelerated usage of physics and image processing and effects as part of the web page canvas

- 2006. - WebGL evolved out of the Canvas 3D experiments started by [Vladimir Vukićević](#) at Mozilla
- 2009. - Khronos Group started WebGL Working Group
- 2011. - Version 1.0 WebGL specification
- 2017. - WebGL 2 (based on OpenGL ES 3.0)
- 2018. - Supported in all major browsers - both desktop and mobile

History - Three.js

- **Three.js** allows the creation of GPU-accelerated 3D animations using the JavaScript language as part of a website without relying on proprietary browser plugins
 - Three.js uses WebGL
- 2010. - First released by Ricardo Cabello to GitHub
 - 2018. - r96 stable release (over 900 contributors on GH)

Example 1

- Demonstrating basic usage of Three.js
- Creating a simple cube that rotates
- link: <https://github.com/mletic/web-mixed-reality/tree/master/example1>

Example 2

- Importing 3D model (.obj + .mtl filest) to the Three.js scene
- Using VS Code + 3D Viewer for VSCode
- Running http-server
- link: <https://github.com/mletic/web-mixed-reality/tree/master/example2>

A-Frame

- Web framework for building virtual reality (VR) experiences
- Originally from Mozilla
- Easy way to develop VR content
- Supports: Vive, Rift, Windows Mixed Reality, Daydream, GearVR, Cardboard...
- Based on Three.js -> full access to the API

A-Frame

- VR Made Simple
- Declarative HTML
- Cross-Platform VR
- Entity-Component Architecture
- Performance
- Tool Agnostic

Example 3

- Basic A-Frame scene
- Elements on a plane with a sky
- Basic manipulation
- Working with the Visual Inspector
ctrl+alt+i (mac: control+option+i)
- Run it on your phones!
- link: <https://github.com/mletic/web-mixed-reality/tree/master/example3>

Example 4

- A-Frame scene with imported assets (3D model)
- Position the camera if the element is too close
- Run it on your phones!
- link: <https://github.com/mletic/web-mixed-reality/tree/master/example4>

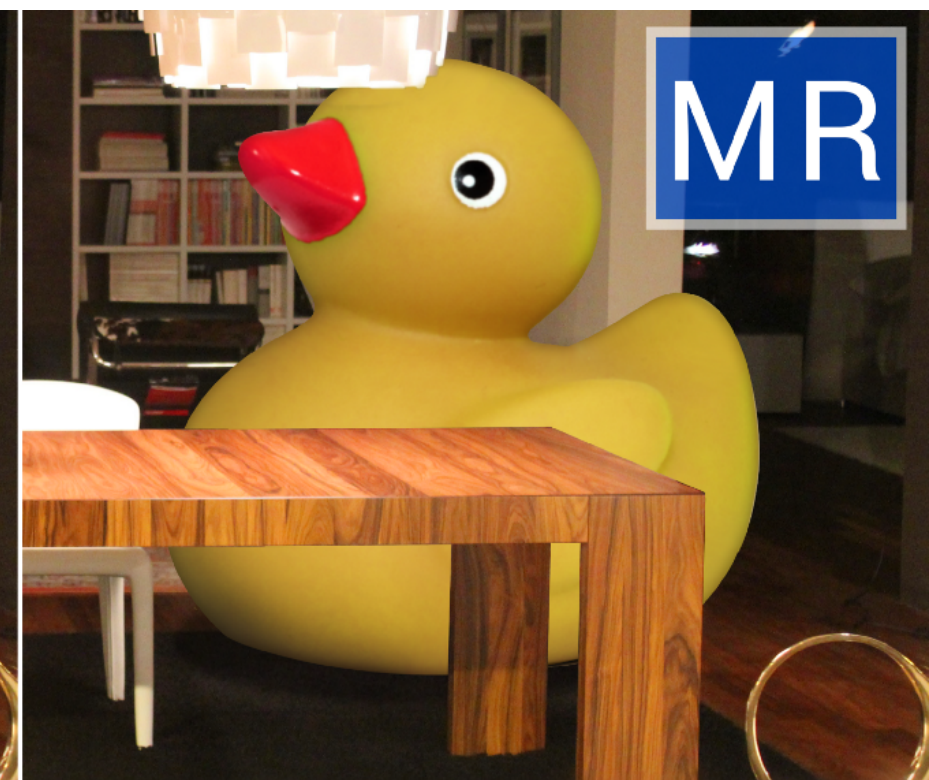
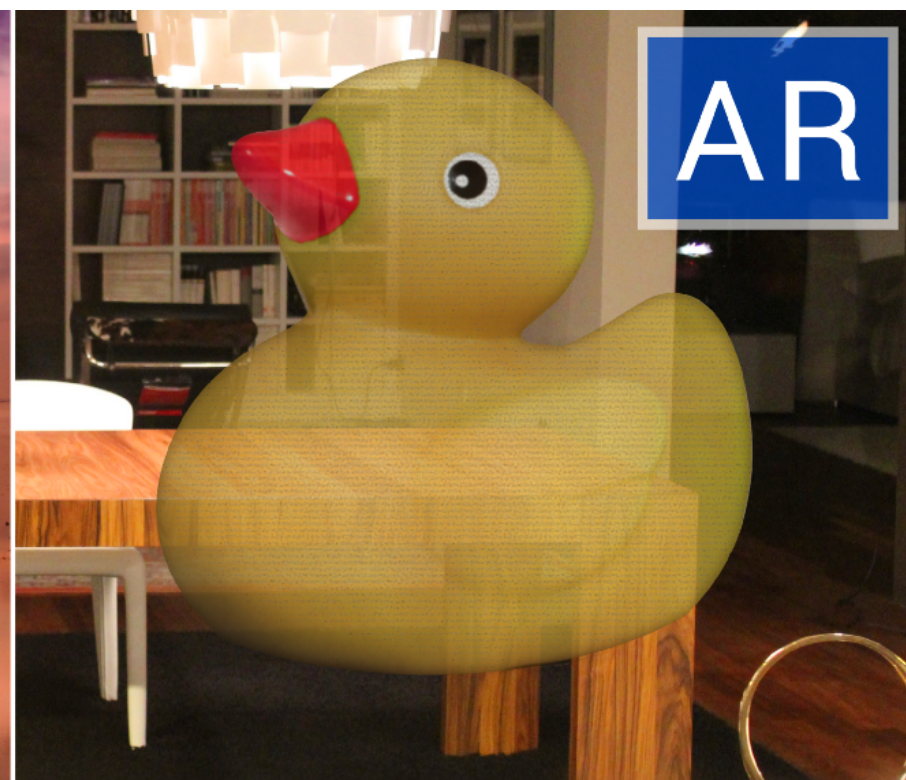
AR.js

- Augmented reality for the web
- aframe + three.js + jsartoolkit5
- Works on any phone with webgl and webrtc (minor iOS issues)
- All open source

Example 5

- AR.js scene with a texture as asset
- Casting the element on a surface template image
- Run it on your phones!
- link: <https://github.com/mletic/web-mixed-reality/tree/master/example5>

Differences between VR, AR & MR



WebXR

- API for accessing virtual reality (VR) and augmented reality (AR) devices, including sensors and head-mounted displays, on the Web
- Name change: WebVR -> WebXR
- <https://immersive-web.github.io/webxr/>
- XR refers to hardware, applications, and techniques used for Virtual Reality, Augmented Reality, and other related technologies
 - Head mounted displays, whether they are opaque, transparent, or utilize video passthrough
 - Mobile devices with positional tracking
 - Fixed displays with head tracking capabilities

2017

- Mozilla shipped the WebVR API in Firefox
- Oculus browser and Samsung Internet shipped WebVR for Gear VR
- Microsoft is shipping WebVR in Edge
- VR frameworks like A-Frame and ReactVR gained massive popularity
- VR tools expansion: Vizor, WebVR Studio, PlayCanvas...

2018

- WebVR -> WebXR
- Providing access to both augmented and virtual reality devices
- Immersive Web Community Group
- WebXR viewer for iOS
- ...

Mozilla A-Painter on WebXR



Moving and rotating a WebAR model using Google's Article 3D model viewer



More examples...



More examples...





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Q&A

