Bringing Mixed Reality to the Web Marko Letić

November 24-25, 2018



About me

- Front End Engineer @AVA
- PhD student @FTN
- Lecturer at @Dafed <u>https://dafed.org/</u>
- JS enthusiast



Book reviewer @Manning specialized in JS related topics

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

- GitHub
- Sublime, Atom...)
- Chrome browser with Chrome developer tools
- Node.js + http-server https://www.npmjs.com/package/http-server

Elementary JavaScript knowledge with HTML and CSS

Visual Studio Code with plugins (other IDE are fine too -

- as part of the web page canvas
- 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 - 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

• 2006. - WebGL evolved out of the Canvas 3D experiments started by Vladimir

- **Three.js** allows the creation of GPU-accelerated 3D
- Three.js uses WebGL
- 2010. First released by Ricardo Cabello to GitHub

History - Three.js

animations using the JavaScript language as part of a website without relying on proprietary browser plugins

• 2018. - r96 stable release (over 900 contributors on GH)



- Demonstrating basic usage of Three.js
- Creating a simple cube that rotates
- master/example1

link: https://github.com/mletic/web-mixed-reality/tree/

- Using VS Code + 3D Viewer for VSCode
- Running http-server
- master/example2

Importing 3D model (.obj + .mtl filest) to the Three.js scene

link: https://github.com/mletic/web-mixed-reality/tree/

A-Frame

- Originally from Mozilla
- Easy way to develop VR content
- GearVR, Cardboard...
- Based on Three.js -> full access to the API

• Web framework for building virtual reality (VR) experiences

Supports: Vive, Rift, Windows Mixed Reality, Daydream,

A-Frame

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

- 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!
- example3

link: https://github.com/mletic/web-mixed-reality/tree/master/

- A-Frame scene with imported assets (3D model)
- Position the camera if the element is too close
- Run it on your phones!
- master/example4

link: https://github.com/mletic/web-mixed-reality/tree/

- Augmented reality for the web
- aframe + three.js + jsartoolkit5
- issues)
- All open source

AR.js

Works on any phone with webgl and webrtc (minor iOS)

- 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

- sensors and head-mounted displays, on the Web
- Name change: WebVR -> WebXR
- <u>https://immersive-web.github.io/webxr/</u>
- Augmented Reality, and other related technologies
 - passthrough
 - Mobile devices with positional tracking
 - Fixed displays with head tracking capabilities

• API for accessing virtual reality (VR) and augmented reality (AR) devices, including

• XR refers to hardware, applications, and techniques used for Virtual Reality,

Head mounted displays, whether they are opaque, transparent, or utilize video

- 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...

2017

- WebVR -> WebXR
- devices
- Immersive Web Community Group
- WebXR viewer for iOS

. . .

2018

Providing access to both augmented and virtual reality

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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Thank you!

