

WebXR & Augmented Reality



ADA ROSE CANNON

DEVELOPER ADVOCATE - SAMSUNG INTERNET

Samsung Internet on the Play Store



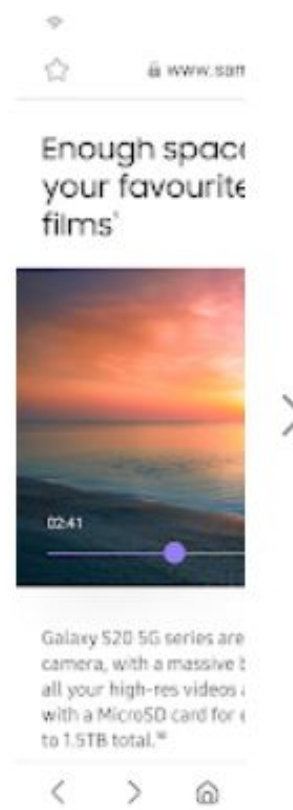
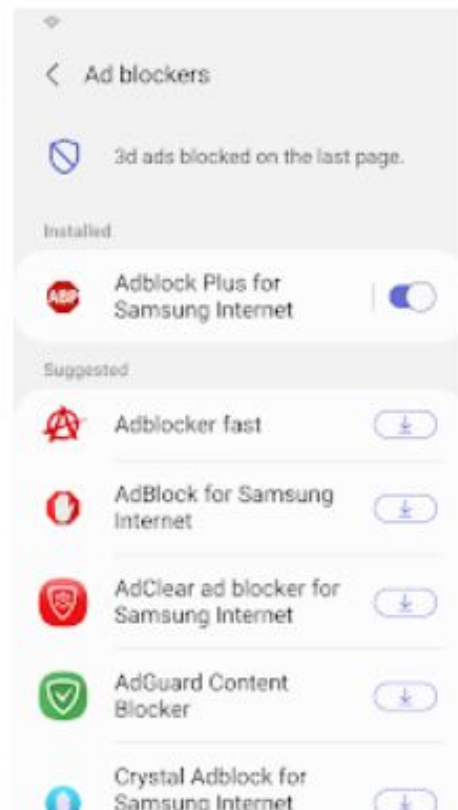
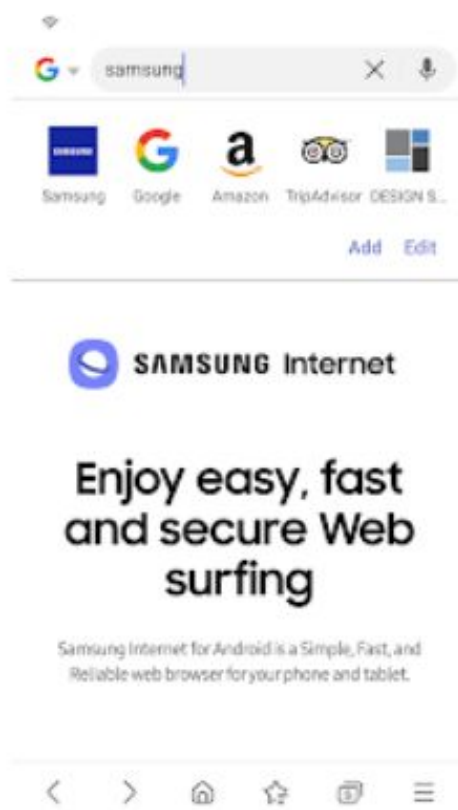
Samsung Internet Browser

Samsung Electronics Co., Ltd. Communication ★★★★★ 5,031,351

Everyone

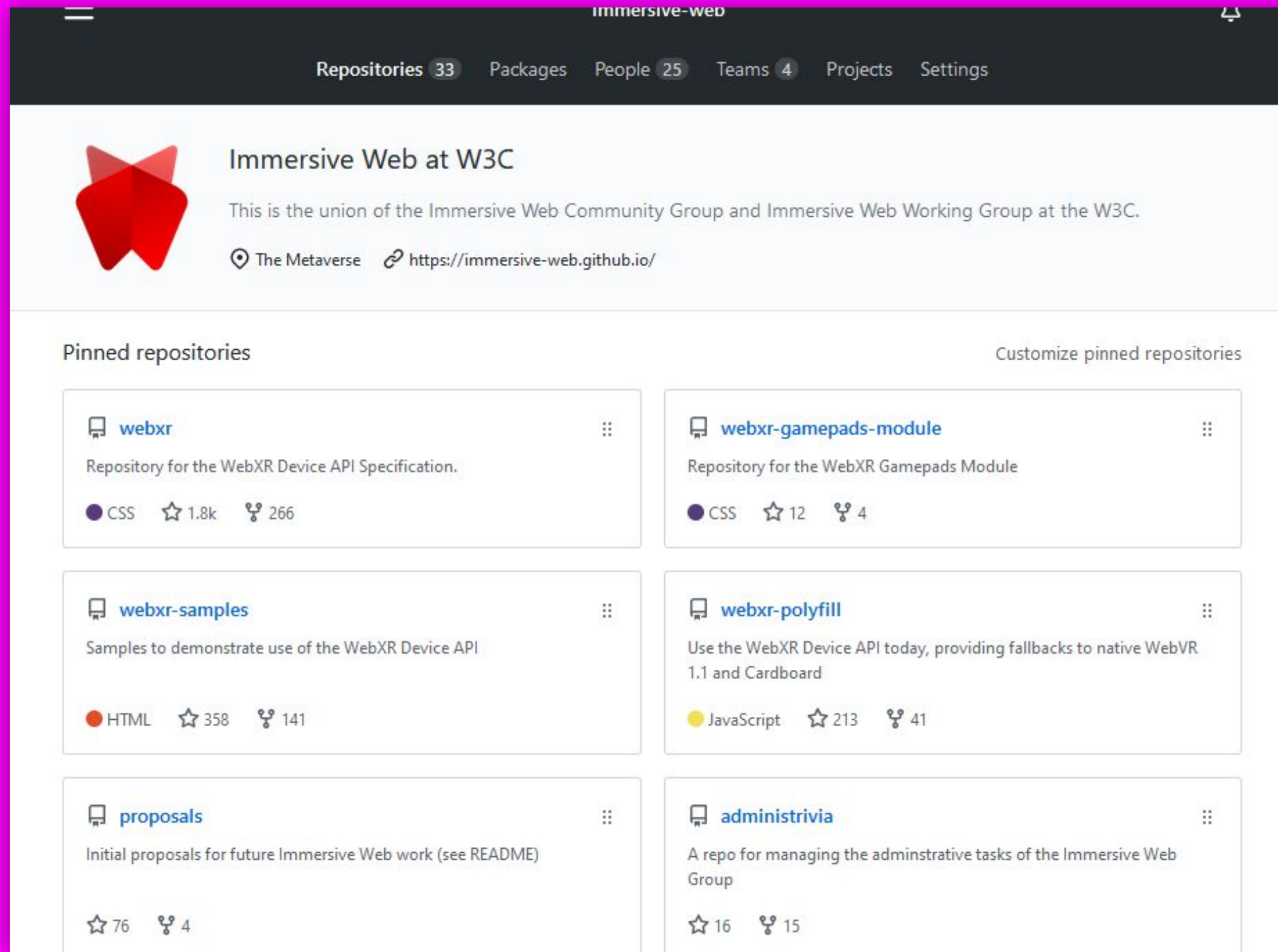
This app is available for all of your devices

Installed



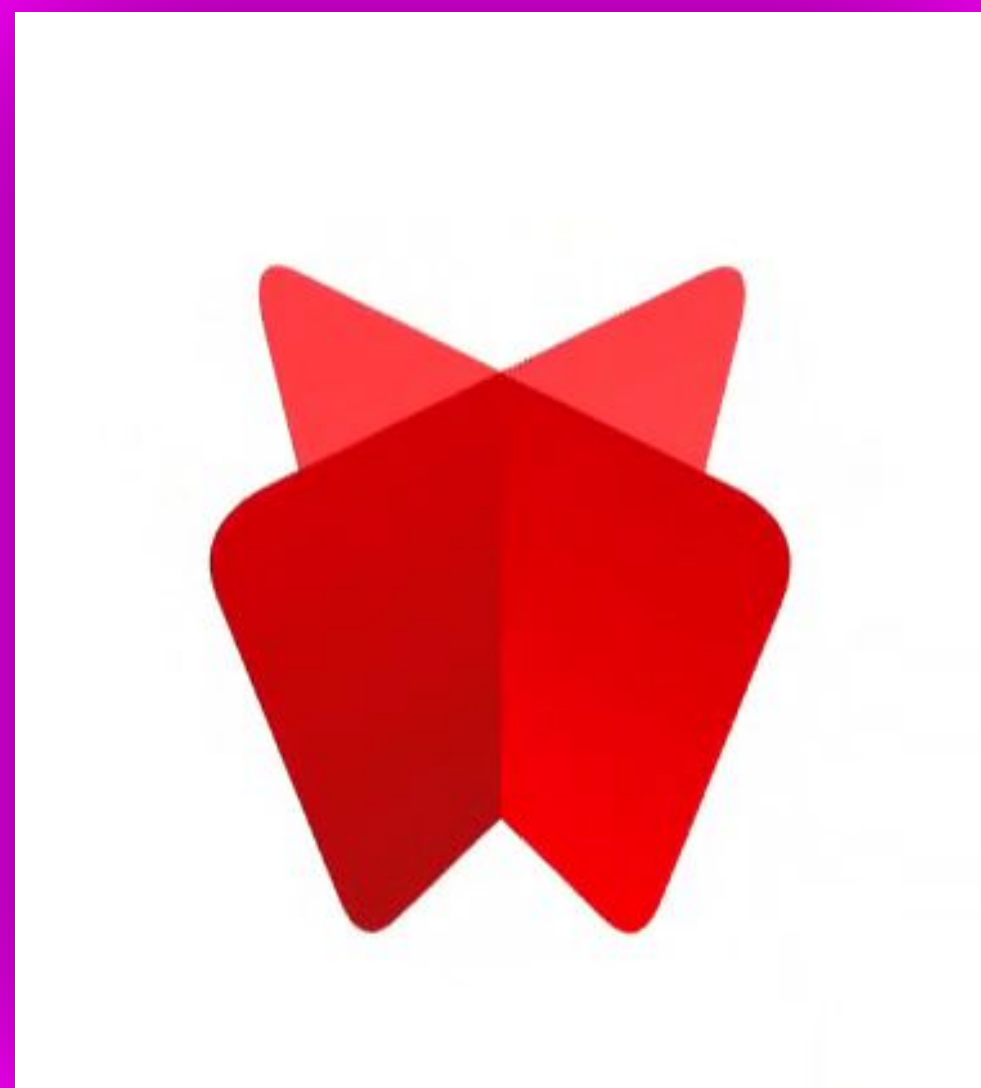
Samsung Internet provides the best web browsing experience for you with Video Assistant, Dark

W3C Immersive Web GitHub



The screenshot shows the GitHub profile for 'Immersive Web at W3C'. The page features a dark header with navigation links for 'Repositories 33', 'Packages', 'People 25', 'Teams 4', 'Projects', and 'Settings'. The profile section includes a red butterfly logo, the name 'Immersive Web at W3C', a description, and a link to 'https://immersive-web.github.io/'. Below this is a 'Pinned repositories' section with a 'Customize pinned repositories' link. Six repositories are displayed in a grid, each with a title, description, language, star count, and fork count.

Repository Name	Description	Language	Stars	Forks
webxr	Repository for the WebXR Device API Specification.	CSS	1.8k	266
webxr-gamepads-module	Repository for the WebXR Gamepads Module	CSS	12	4
webxr-samples	Samples to demonstrate use of the WebXR Device API	HTML	358	141
webxr-polyfill	Use the WebXR Device API today, providing fallbacks to native WebVR 1.1 and Cardboard	JavaScript	213	41
proposals	Initial proposals for future Immersive Web work (see README)		76	4
administrivia	A repo for managing the administrative tasks of the Immersive Web Group		16	15



WebXR

Virtual Reality Headsets



Augmented/Mixed Reality

Headsets



Phones



A-FRAME

three.js r124

WebGL

WebXR

Native API

Hardware

WebXR Modules

Modules I will talk about

- Gamepad
 - Hand Input
- Augmented Reality
 - Hit Test
 - ↳ Anchors
 - Lighting Estimation
 - DOM Overlay
- Layers

Modules I will talk about

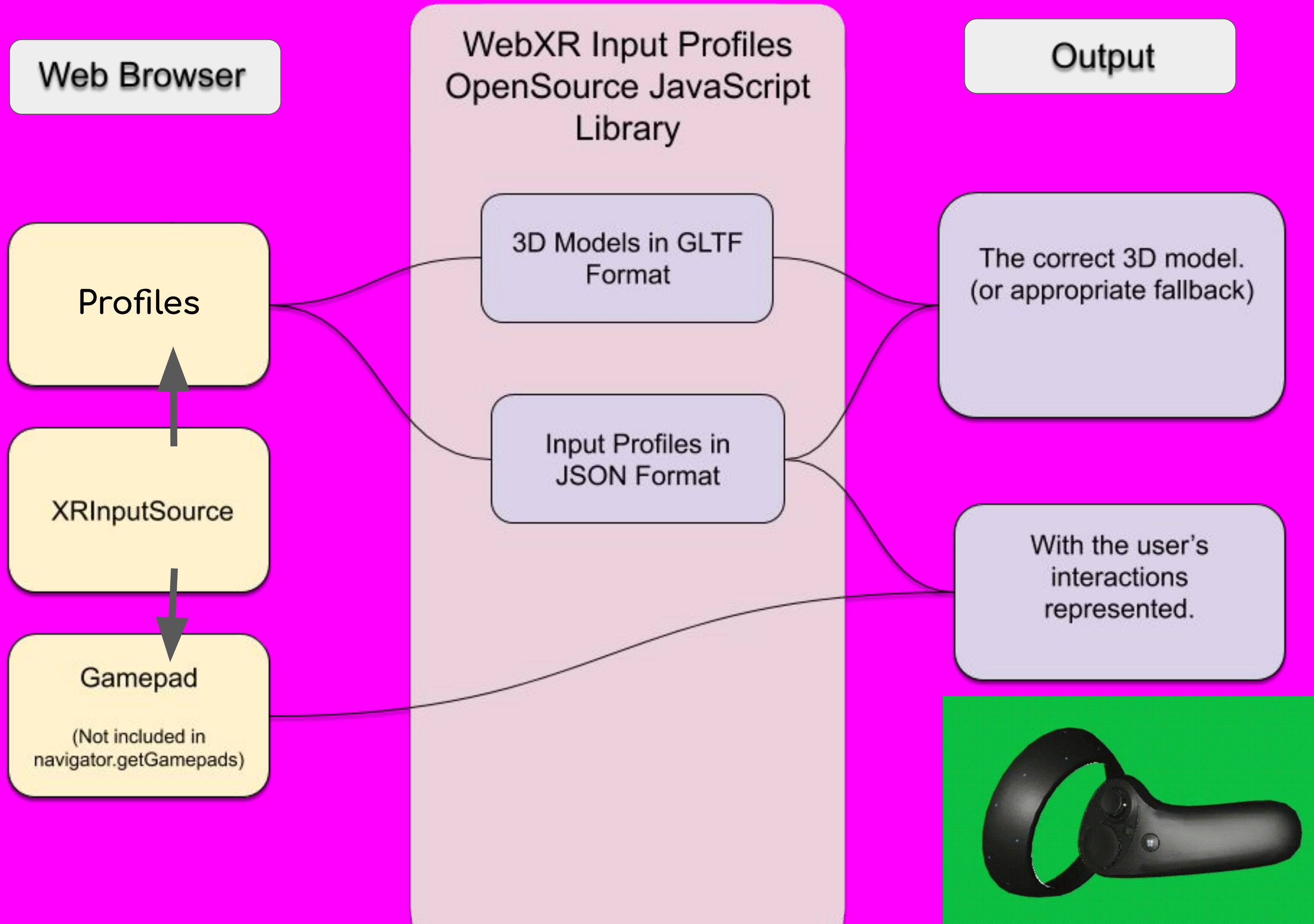
- **Gamepad**
 - Hand Input
- **Augmented Reality**
 - Hit Test
 - ↳ Anchors
 - Lighting Estimation
 - DOM Overlay
- **Layers**

Gamepad

The Web's Gamepad API reused for XR

- `XRInputSource.gamepad`
- Not exposed in `navigator.getGamepads`
- Standard mappings to help consistent behaviour

Usually in Headset AR and VR



Modules I will talk about

- Gamepad
 - **Hand Input**
- Augmented Reality
 - Hit Test
 - ↳ Anchors
 - Lighting Estimation
 - DOM Overlay
- Layers

Hand Input

Get the positions of each joint in the user's hand.

- Exposed as `xrInput.hand`
- Can access by name or all at once
- Does NOT do pose detection such as 'pinching' or 'grabbing'

Headset AR or VR

Get the position of the headset

Get the position of the eyes

Get the position of the controller

Get the position of the hand

Get the position of the foot

Get the position of the head

Get the position of the neck

Get the position of the torso

Get the position of the arm

Get the position of the leg



Headset AR or VR

Modules I will talk about

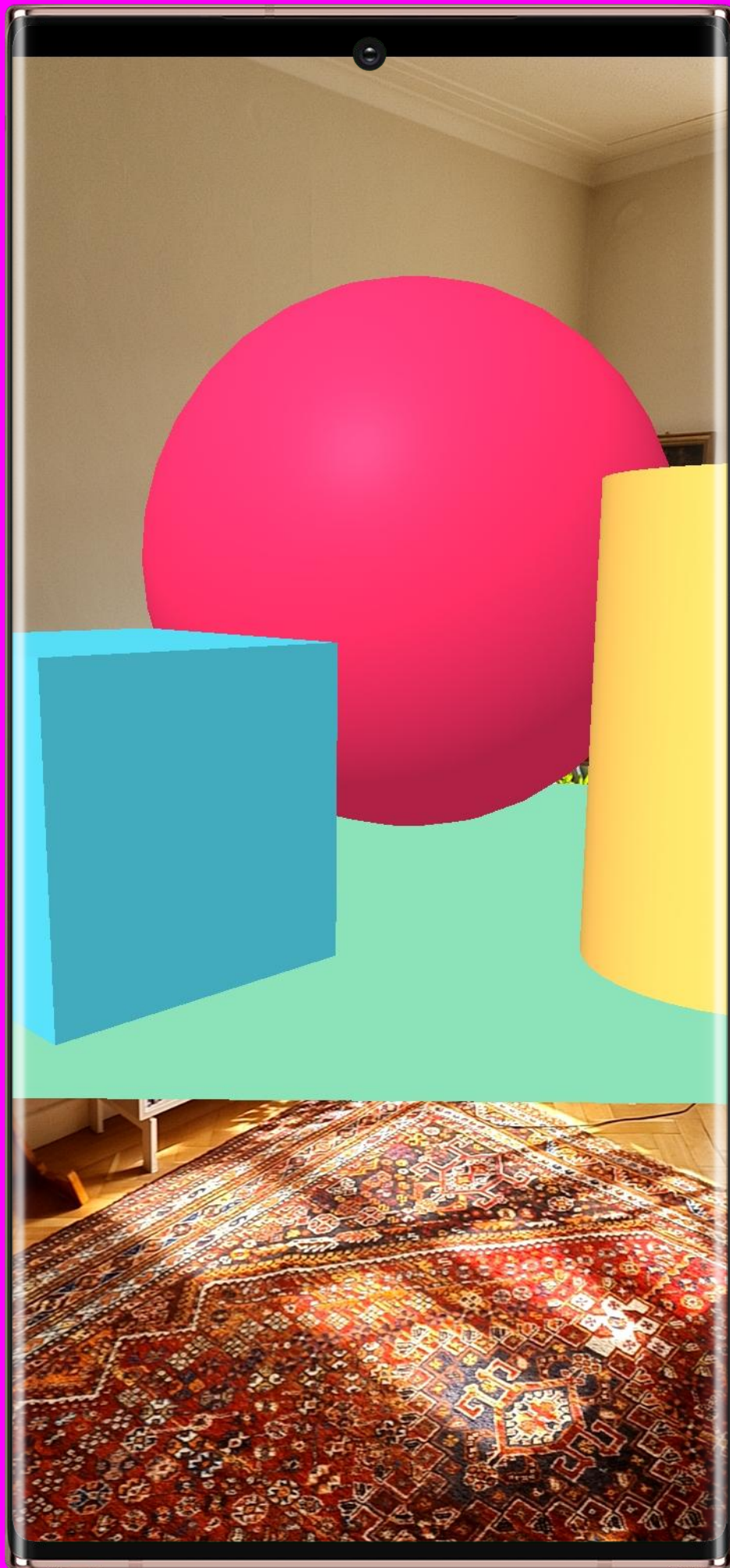
- Gamepad
 - Hand Input
- **Augmented Reality**
 - Hit Test
 - ↳ Anchors
 - Lighting Estimation
 - DOM Overlay
- Layers

Augmented Reality

Combine 3D and the real world

- Adds “immersive-ar” session type
- No other AR features.

Handheld or Headset AR



Handheld or Headset AR

Modules I will talk about

- Gamepad
 - Hand Input
- Augmented Reality
 - **Hit Test**
 - ↳ **Anchors**
 - Lighting Estimation
 - DOM Overlay
- Layers

Hit Test and Anchors

Find a point in the real world (**hit test**)
and keep track of it over time (**anchors**)

- `session.requestHitTestSource`
- `frame.getHitTestResults(this.xrHitTestSource)`
- `hitTest.createAnchor()`

Most AR



Most AR

Modules I will talk about

- Gamepad
 - Hand Input
- Augmented Reality
 - Hit Test
 - ↳ Anchors
 - **Lighting Estimation**
 - DOM Overlay
- Layers

Lighting Estimation

Make 3D models look integrated with reality, provides:

- Main light direction and colour
- Reflection Map
- Approximation of the environment lighting as a numerical format*

* They are stored as coefficients of a 3rd order spherical harmonic it's very cool

Camera and Screen based AR

AR is a 2D image on a screen

AR is a 3D image on a screen

AR is a 3D image in the real world

AR is a 3D image in the real world

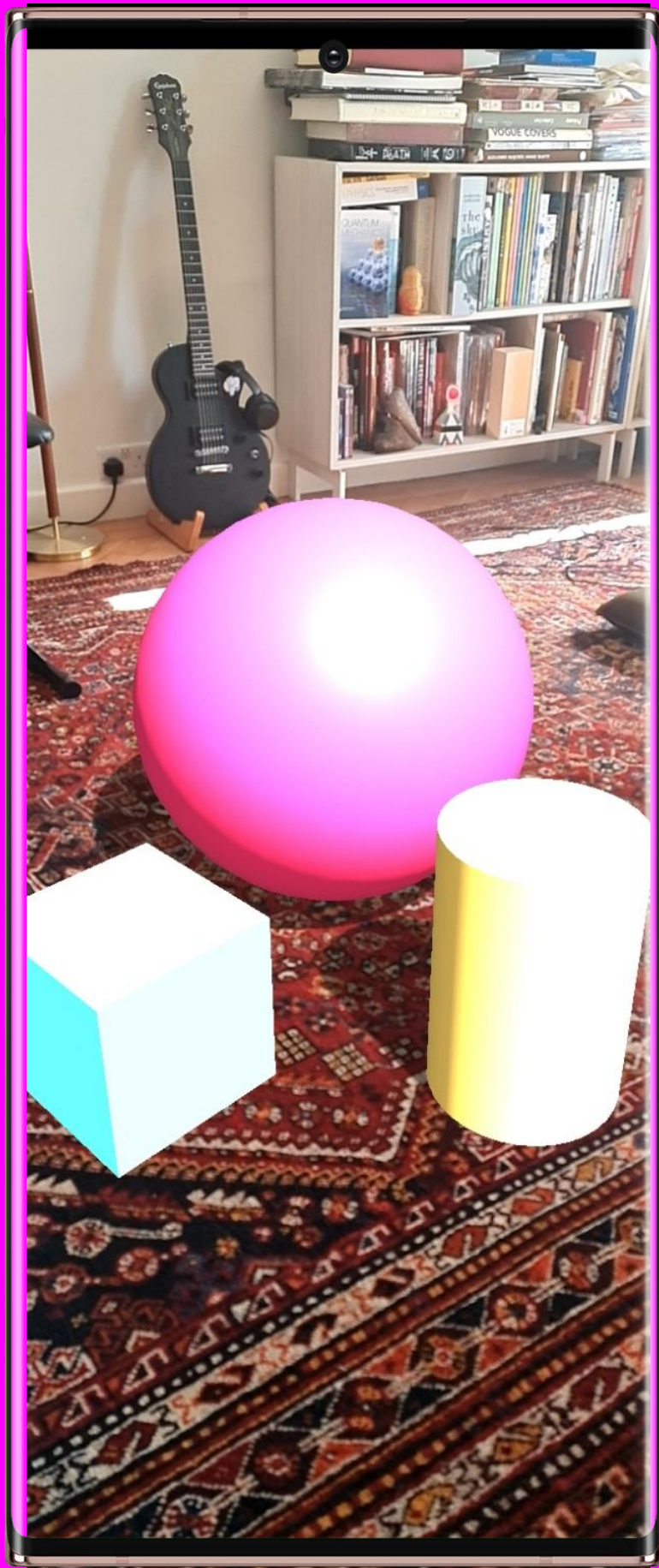
AR is a 3D image in the real world

AR is a 3D image in the real world

AR is a 3D image in the real world

AR is a 3D image in the real world

AR is a 3D image in the real world



Camera and Screen based AR

Modules I will talk about

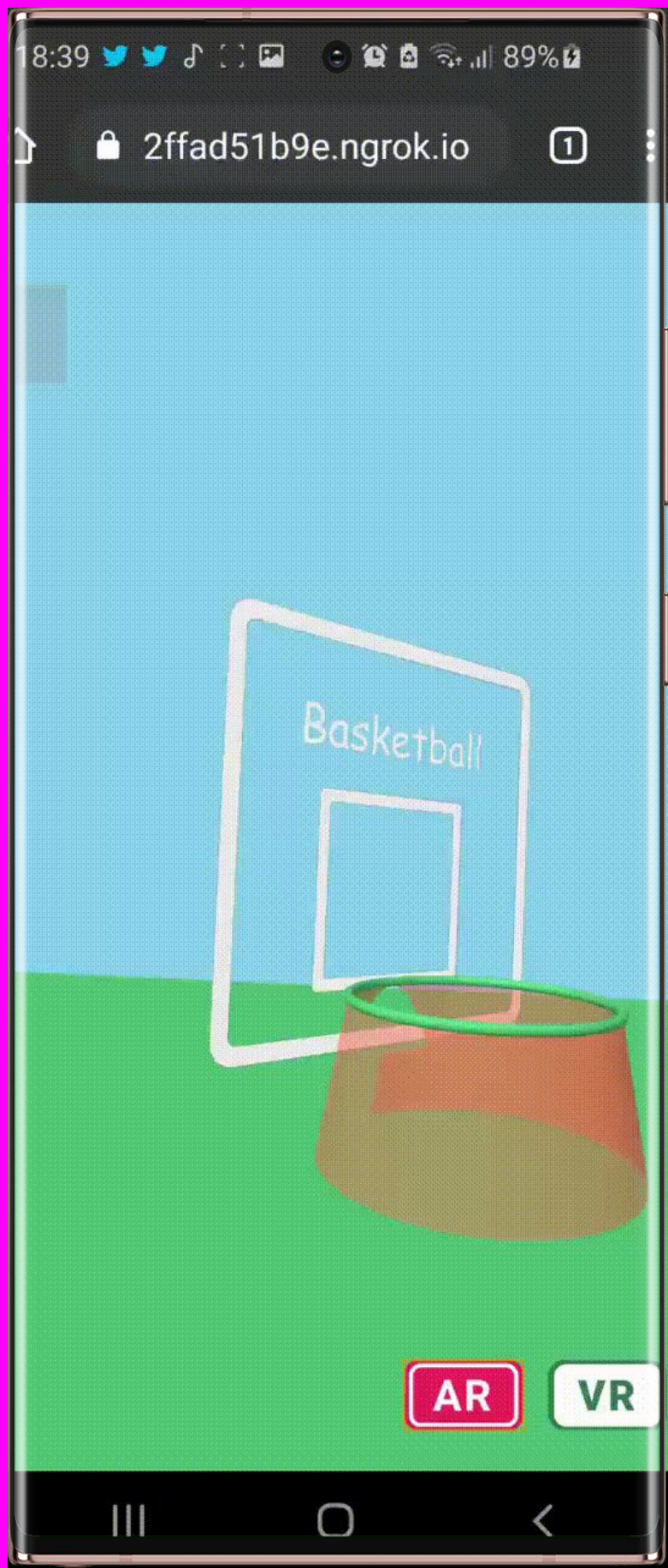
- Gamepad
 - Hand Input
- Augmented Reality
 - Hit Test
 - ↳ Anchors
 - Lighting Estimation
 - **DOM Overlay**
- Layers

Dom Overlay

Currently the only way to use HTML & CSS with WebXR

- Pick an element, it's now stretched full screen on top of the WebXR content.

Handheld AR



Handheld AR

Modules I will talk about

- Gamepad
 - Hand Input
- Augmented Reality
 - Hit Test
 - ↳ Anchors
 - Lighting Estimation
 - DOM Overlay
- **Layers**

Layers

Efficiently display images or videos on simple shapes on top or underneath the 3D content.

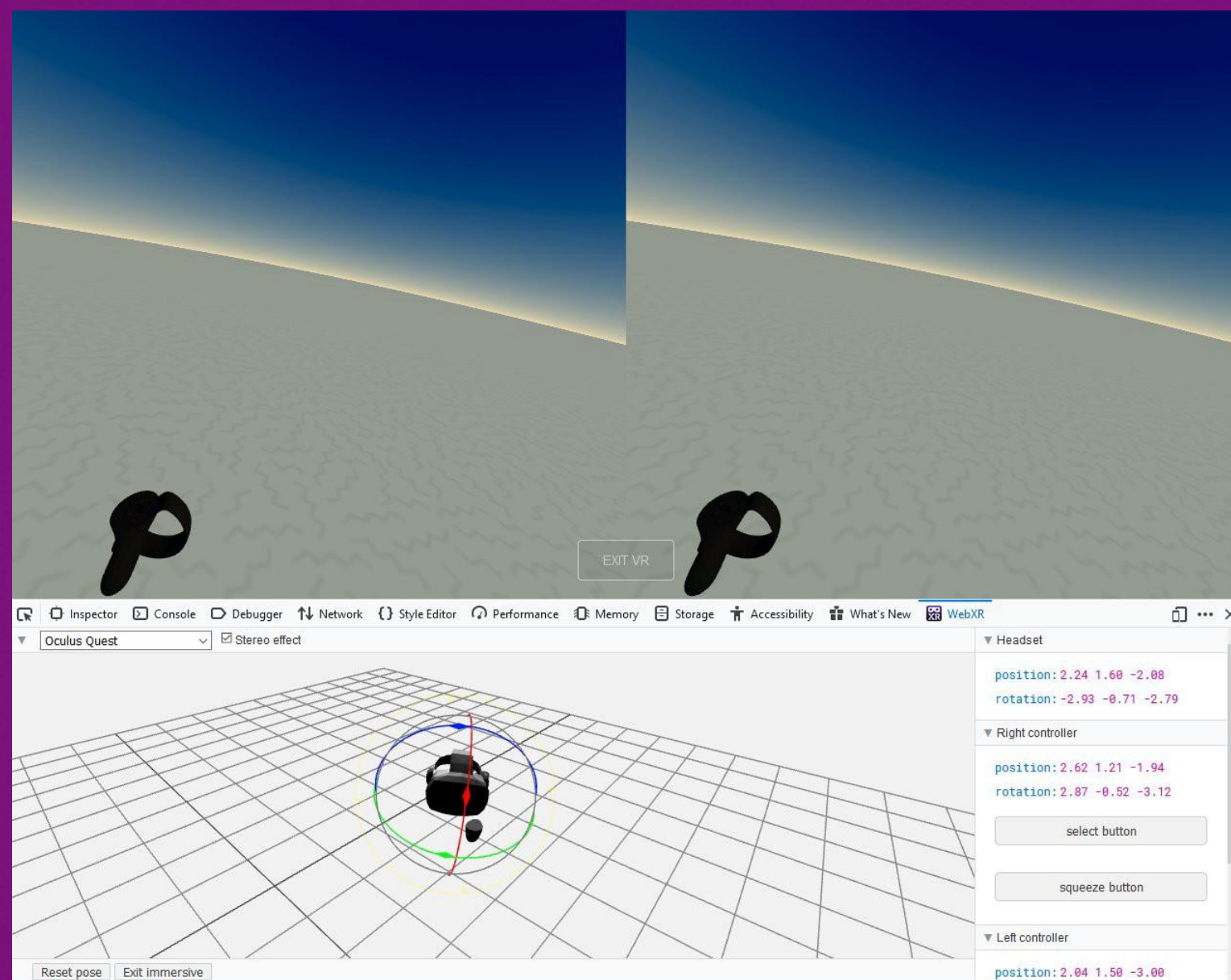
Any

Any




Useful Tools

WebXR Emulator Firefox/Chrome



<https://immersiveweb.dev/>

- Support Table
- Getting started quickly
- Examples




WebXR

The WebXR Device API provides access to input (pose information from headset and controllers) and output (hardware display) capabilities commonly associated with Virtual Reality (VR) and Augmented Reality (AR) devices. It allows you develop and host VR and AR experiences on the web.

You can read more about the goals of this standardisation effort by reading the [WebXR Explainer](#).

∞ What does this mean...




For phones:

Enable VR by providing pose information and allowing the WebGL scene to be rendered side by side to be placed in a headset like the Cardboard

Enable AR by using the platforms AR capabilities such as ARCore to render the WebGL scene onto the users environment like a magic window.

For Desktops:



Desktop computers can make use of tethered VR hardware such as the Oculus Rift or HTC Vive to display the VR scene

For standalone AR Headsets:

Enable AR by using the platforms AR capabilities to render the WebGL scene immersively onto the users environment.

For standalone VR Headsets:

Enable VR by rendering the scene using the platforms VR capabilities.

Thank you

@adarosecannon

@samsunginternet