

# **Motricity in the Immersive Web**

## **Inclusive & Accessible Locomotion and**

## **Interaction in XR on the Web**

November 5, 2019

@rolanddubois

# **Overview**

- 1. The trend towards controller-free input**
- 2. Why is XR hardware failing?**
- 3. What can we learn from AT?**
- 4. Experiments, Tools and Projects**
- 5. Discussion**

# What Is Accessibility? #ally

When something is accessible, a person with a disability can (to the greatest extent possible):

- acquire the **same information**,
- engage in the **same interactions**,
- and enjoy the **same services** as a person without a disability,
- with substantially **equivalent ease of use**.

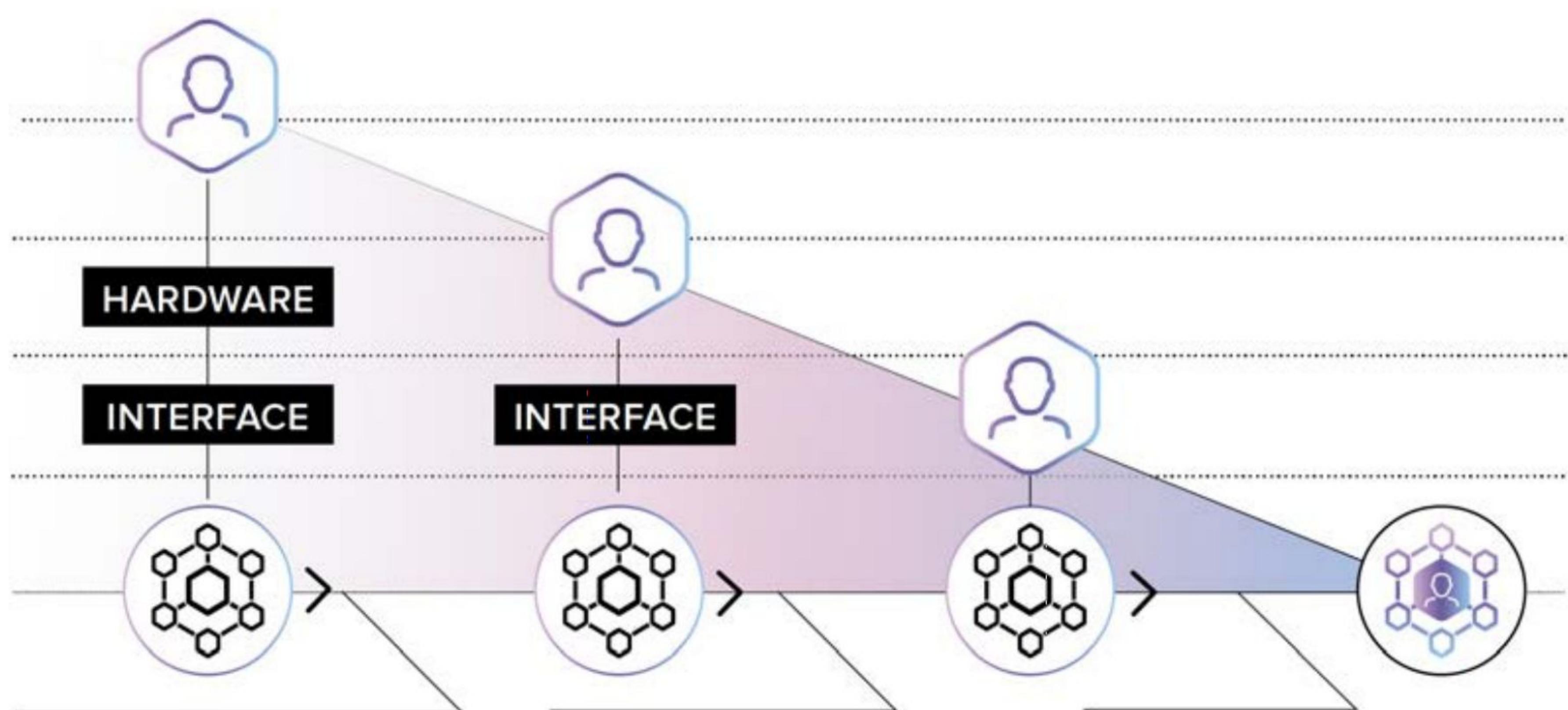
## In Other Words:

**Accessibility = Designing  
things to provide equal access  
to people with disabilities**

**2D Web — making content  
accessible**

**Immersive Web — making  
experience accessible**

**The trend towards  
controller-free input  
allows no space for  
graceful degradation**



## Devices

Intermediate devices allow us to interact with machines

## Smart Screens

Smartphones drive a shift towards physical or spoken interaction.

## Intuitive Interaction

AR and VR take us a step further with natural modes of interaction shifting attention from the mobile screen to the world around us



POINT



CLICK



TYPE



TOUCH



SWIPE



TALK



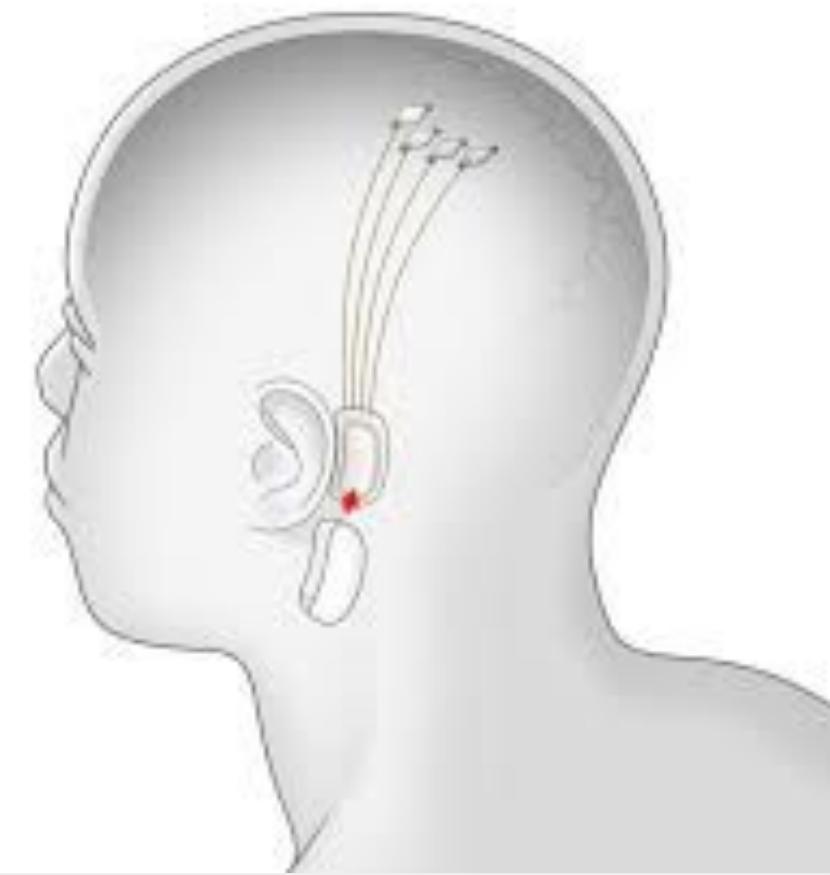
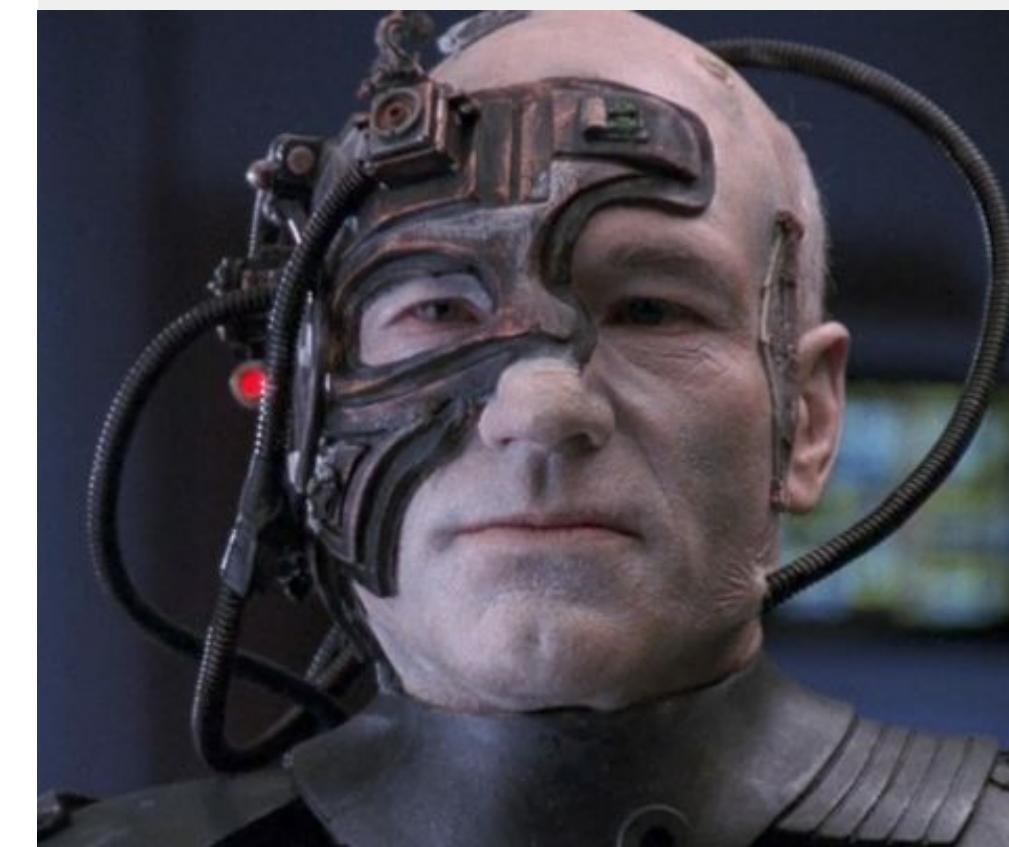
GESTURE



MOOD



GAZE



# Low-cost brain computer interfaces (BCI)



Emotiv



Neurable

## Disruptions: Brain Computer Interfaces Inch Closer to Mainstream

BY NICK BILTON APRIL 28, 2013 11:00 AM 38



Muse, a lightweight, wireless headband, can engage with computers, iPads and smartphones. Cadeau Creative



NeuroSky

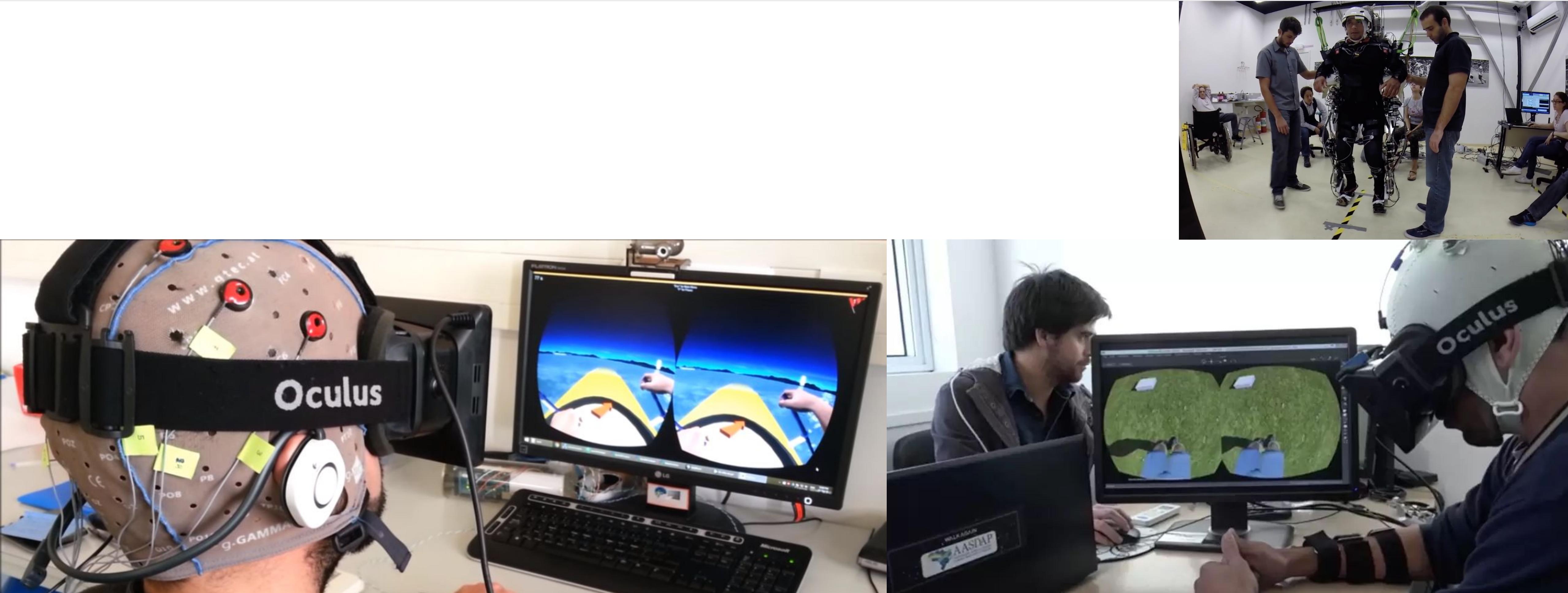


Muse



Nia

# BCI & VR in Research



# Spatial gesture / hand motion control



Kinemic



Leap Motion



Gest



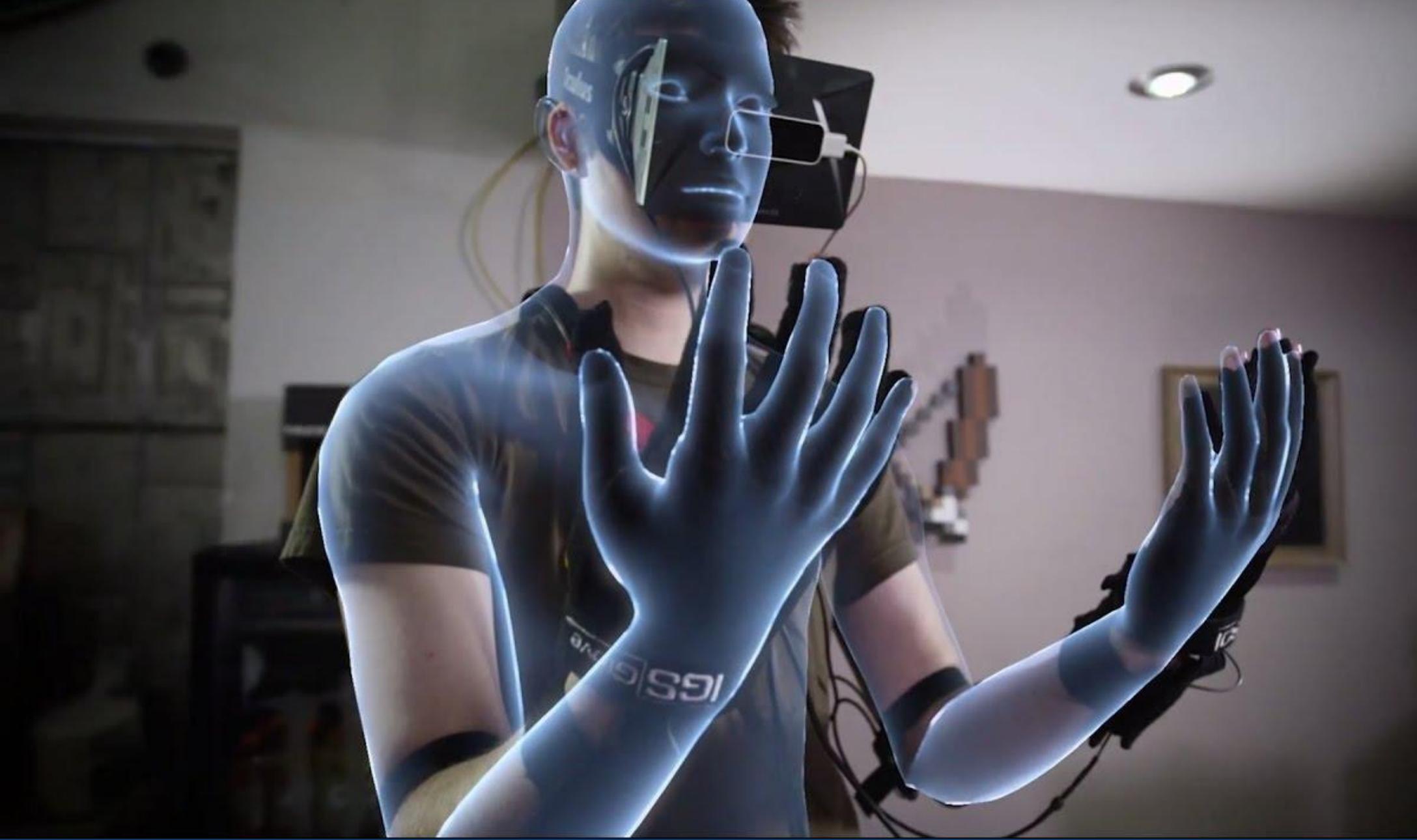
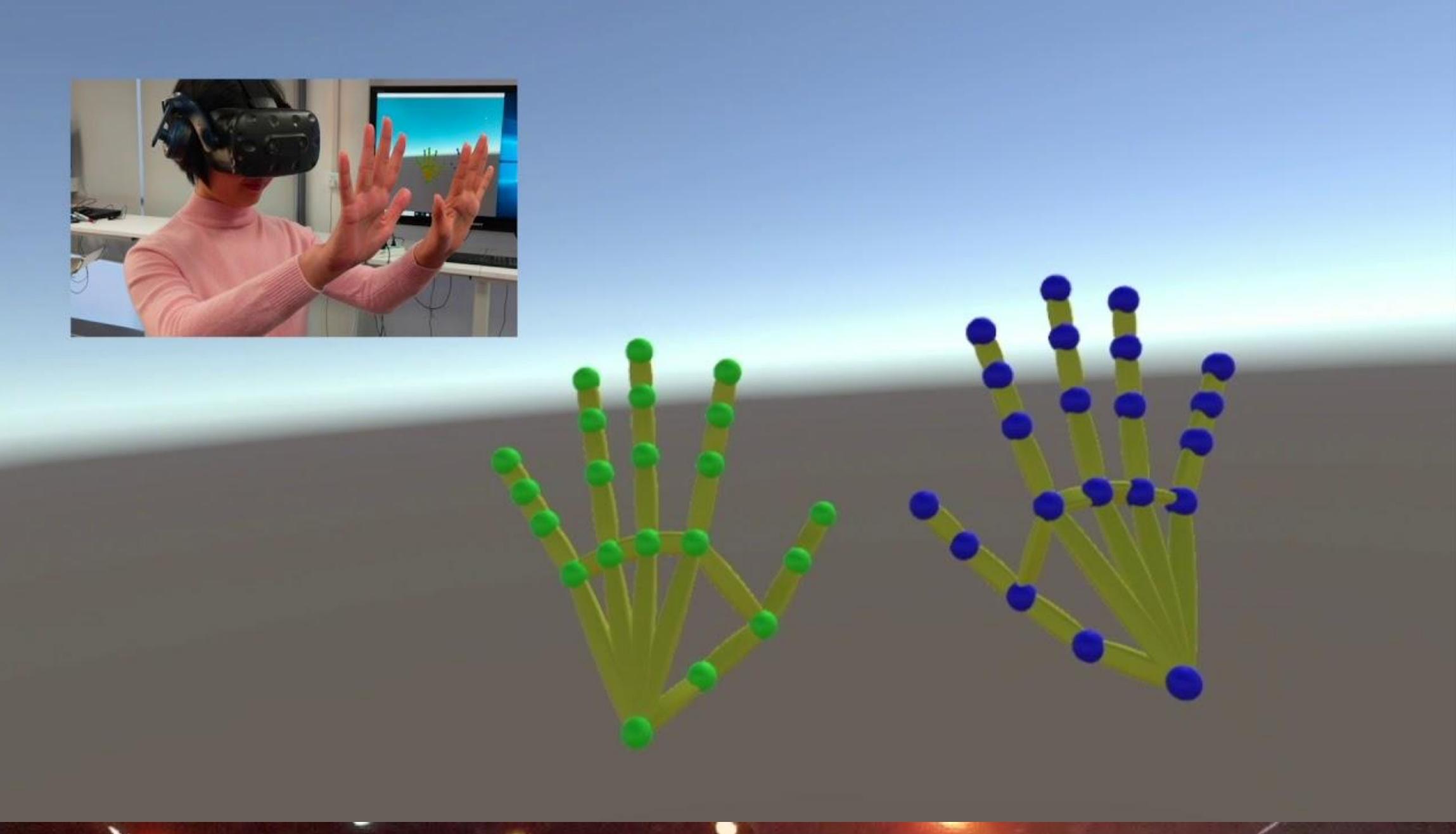
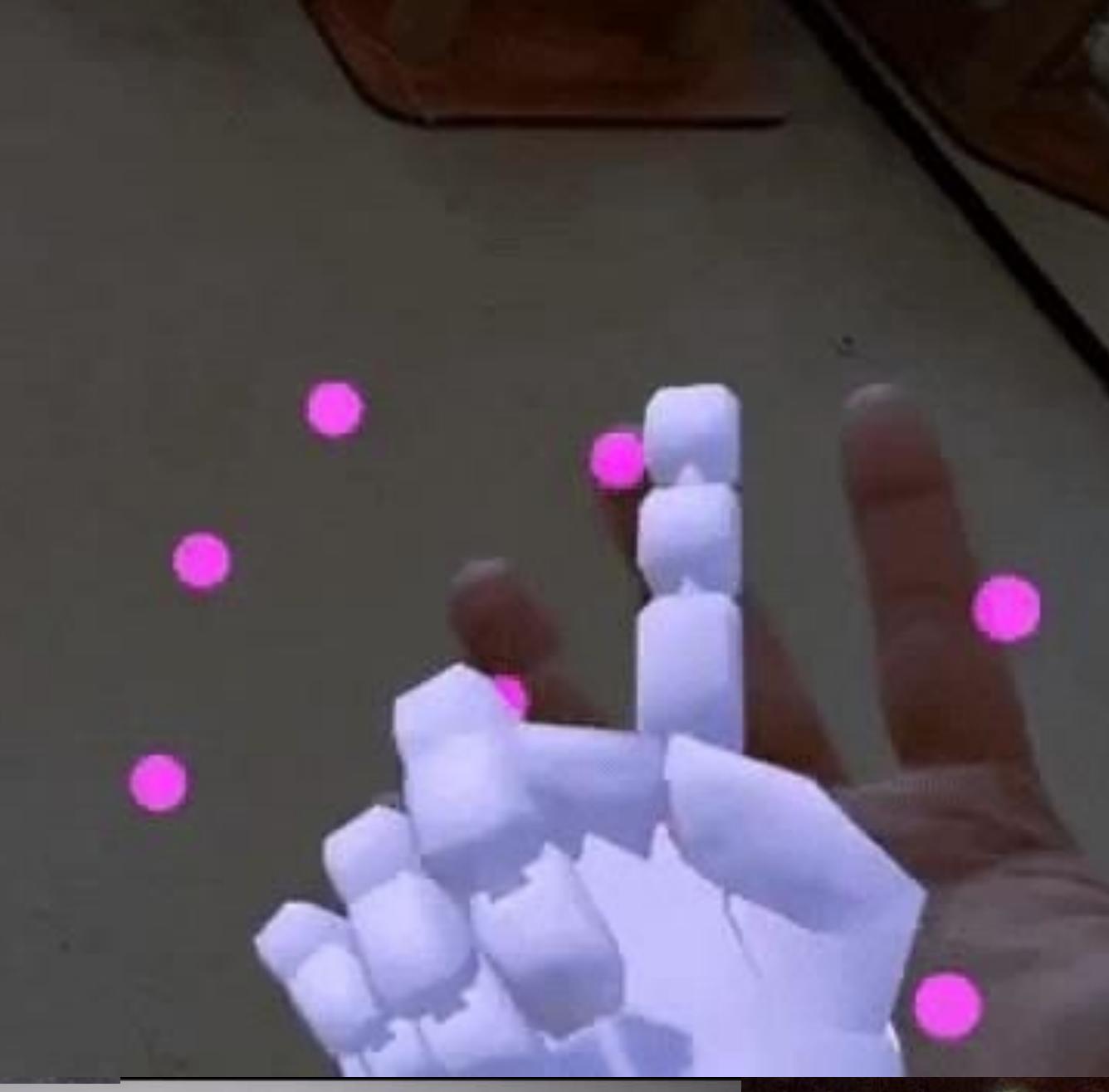
Bixi



MYO

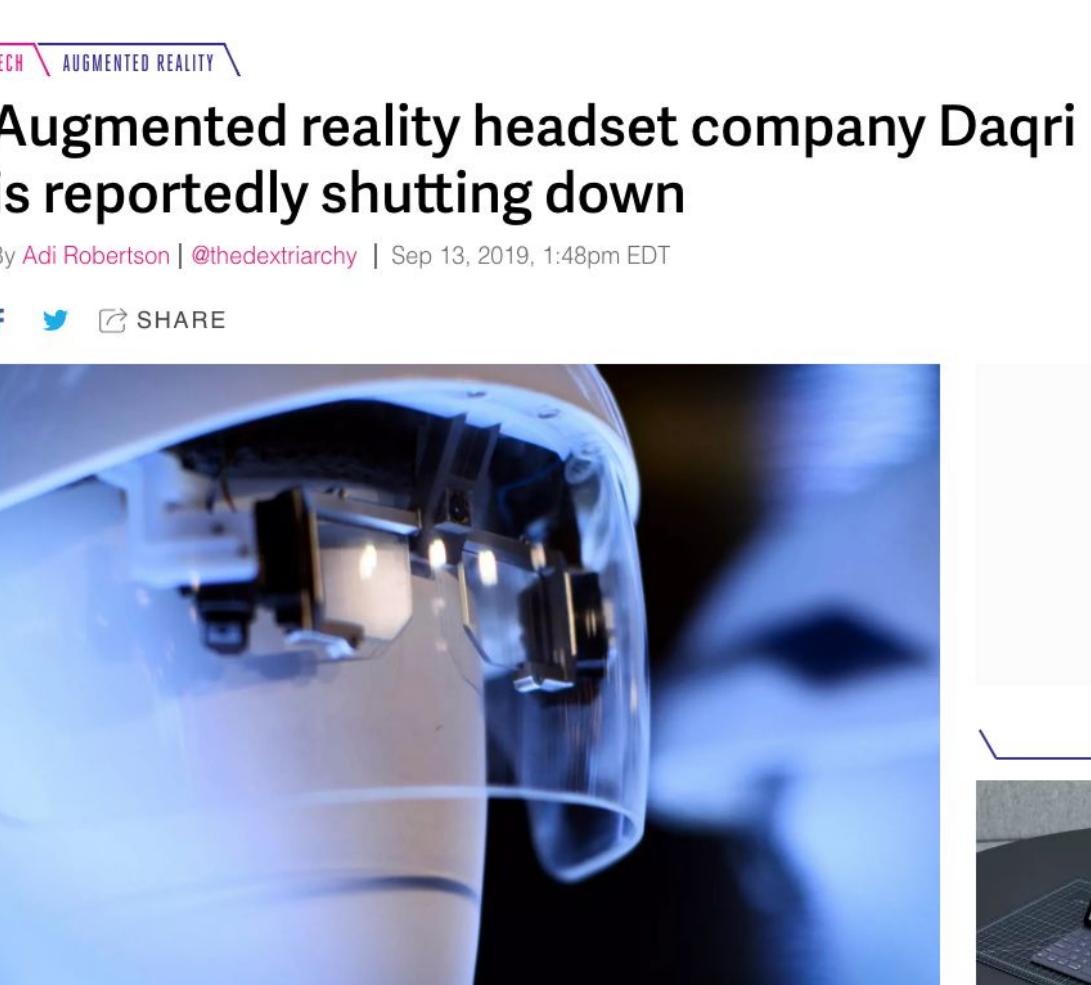
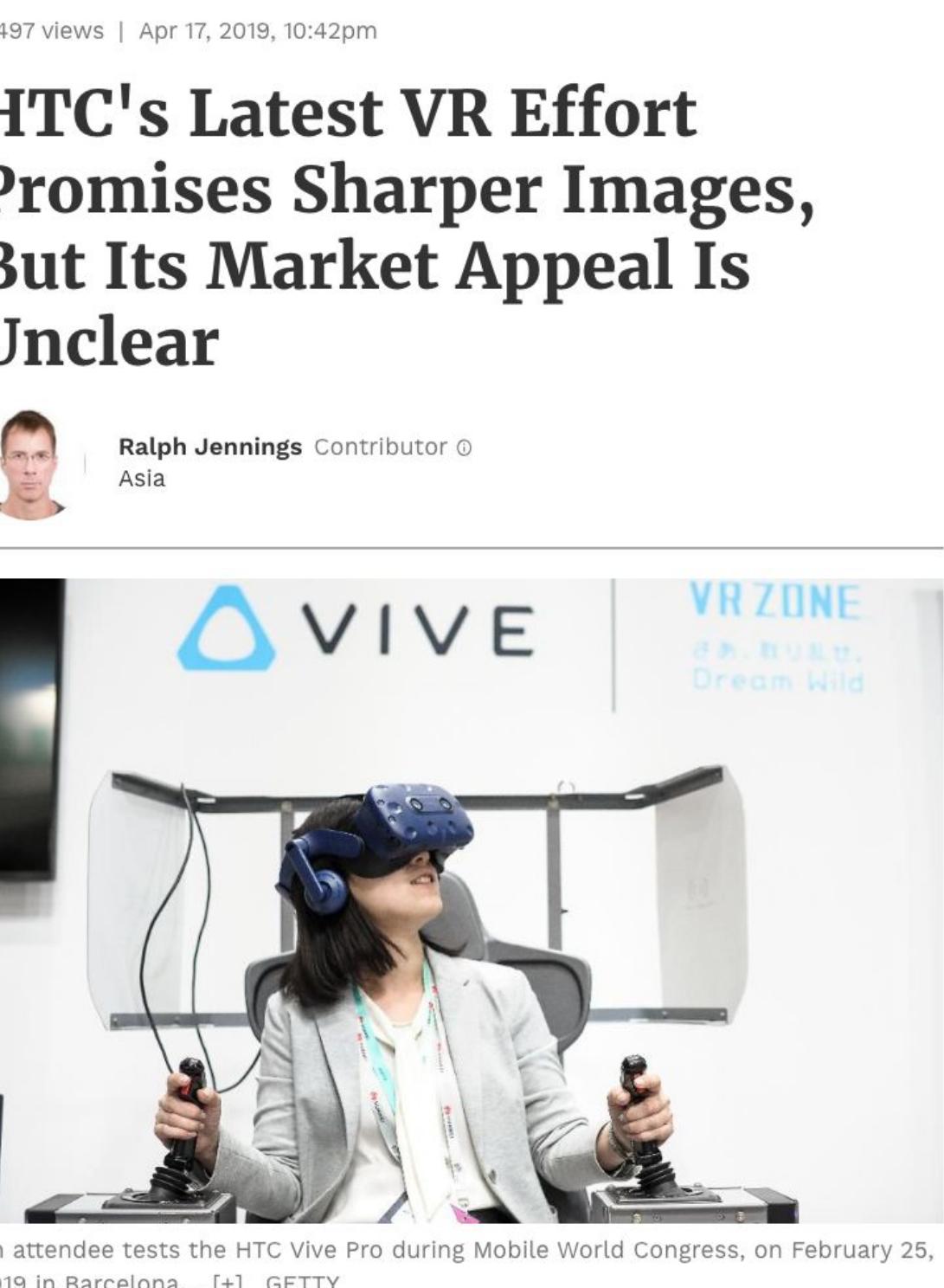
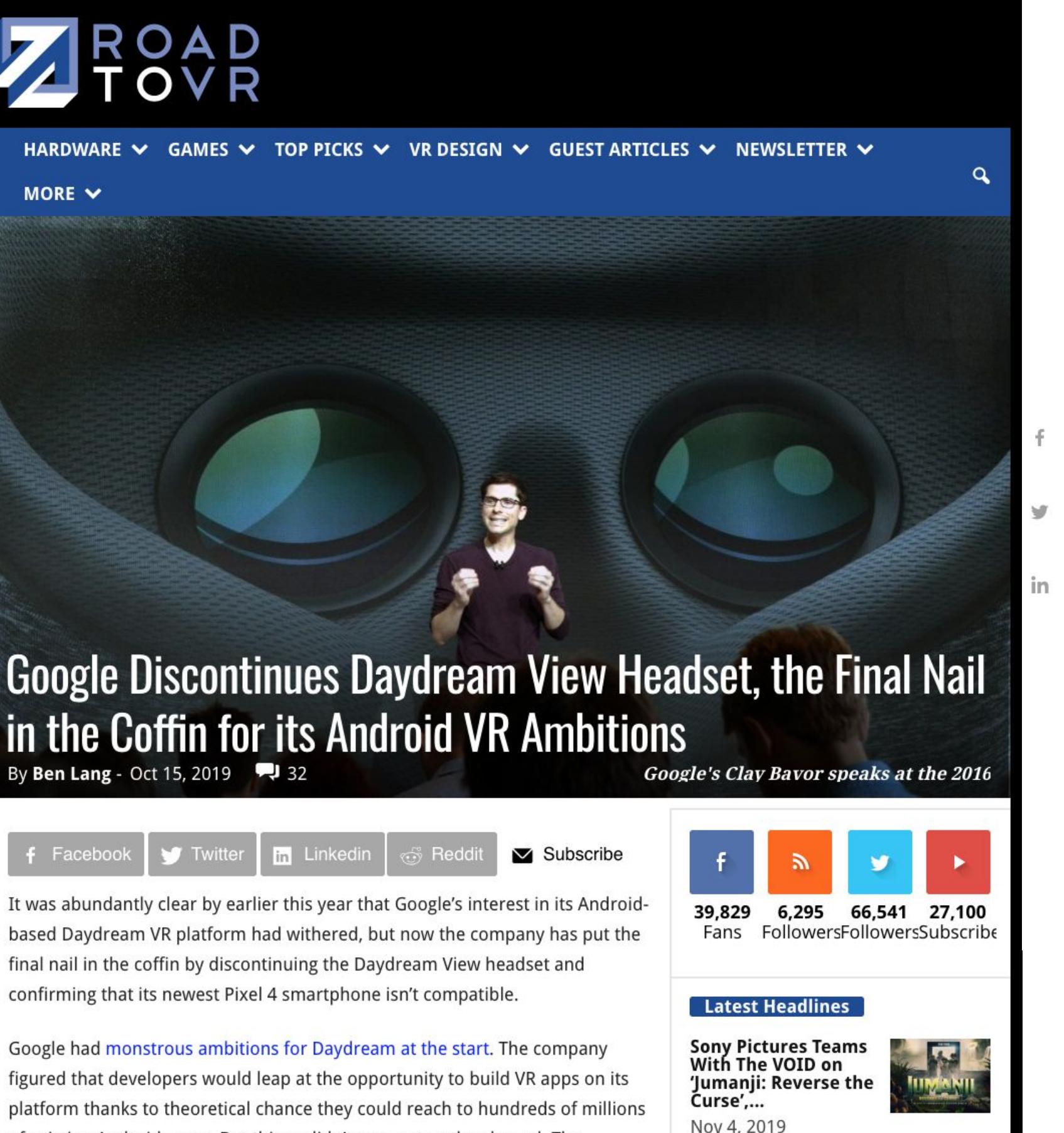


Nod



Hololens 2, Magic Leap, VIVE Hand Tracking SDK, Oculus 2107 - Oculus Hand Tracking OC6

**Why is XR hardware  
failing?**



# Magic Leap is partnering with Star Wars' Lucasfilm to make 'experiential story moments'

By Russell Brandom | Jun 16, 2016, 10:57am EDT

Source [Wired](#)

f t SHARE



## For Magic Leap to be truly magical, it needs content, content, content

After shipping its headset this summer, the mixed reality startup will use its LEAP conference this week to woo developers.



Ian Sherr October 8, 2018 5:00 AM PDT



1



# Magic Leap teams with Brainlab, SyncThink, and XRHealth for medical AR

JEREMY HORWITZ @HORWITZ SEPTEMBER 4, 2019 6:00 AM



Above: Magic Leap's Mika.

Image Credit: Jeremy Horwitz/VentureBeat

Most Read

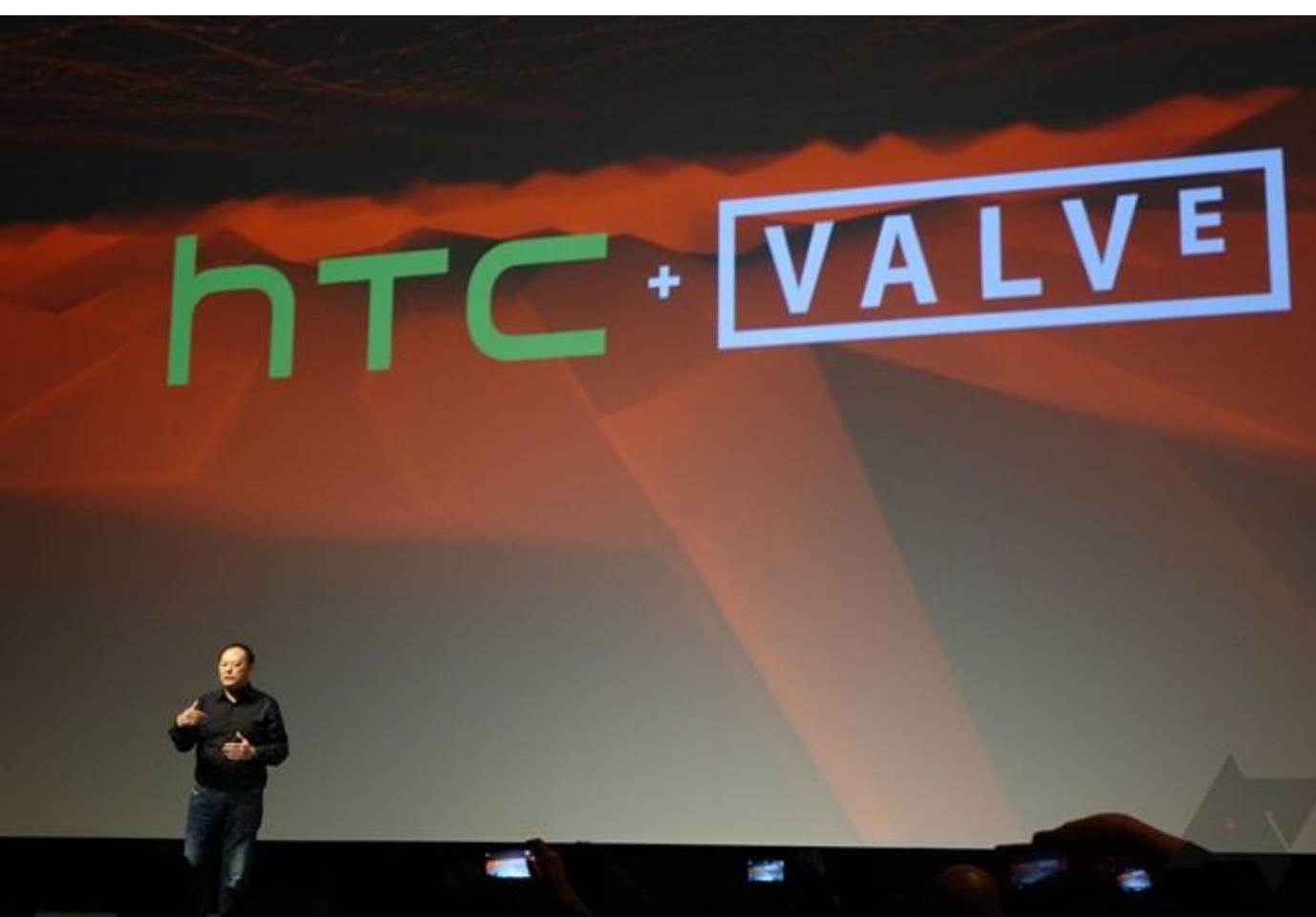


AMD CEO Lisa Su interview -- 2020 will be a bigger product year for us

UPCOMING EVENTS

[GamesBeat Summit 2020](#)

Apr. 28-29



## HTC Vive Cosmos unveiled at Rs 89,990 with free, one-year 'VIVEPORT Infinity' membership

The premium VR headset will be available at Amazon.

IANS | Oct 25, 2019, 01.04 PM IST



0 Comments

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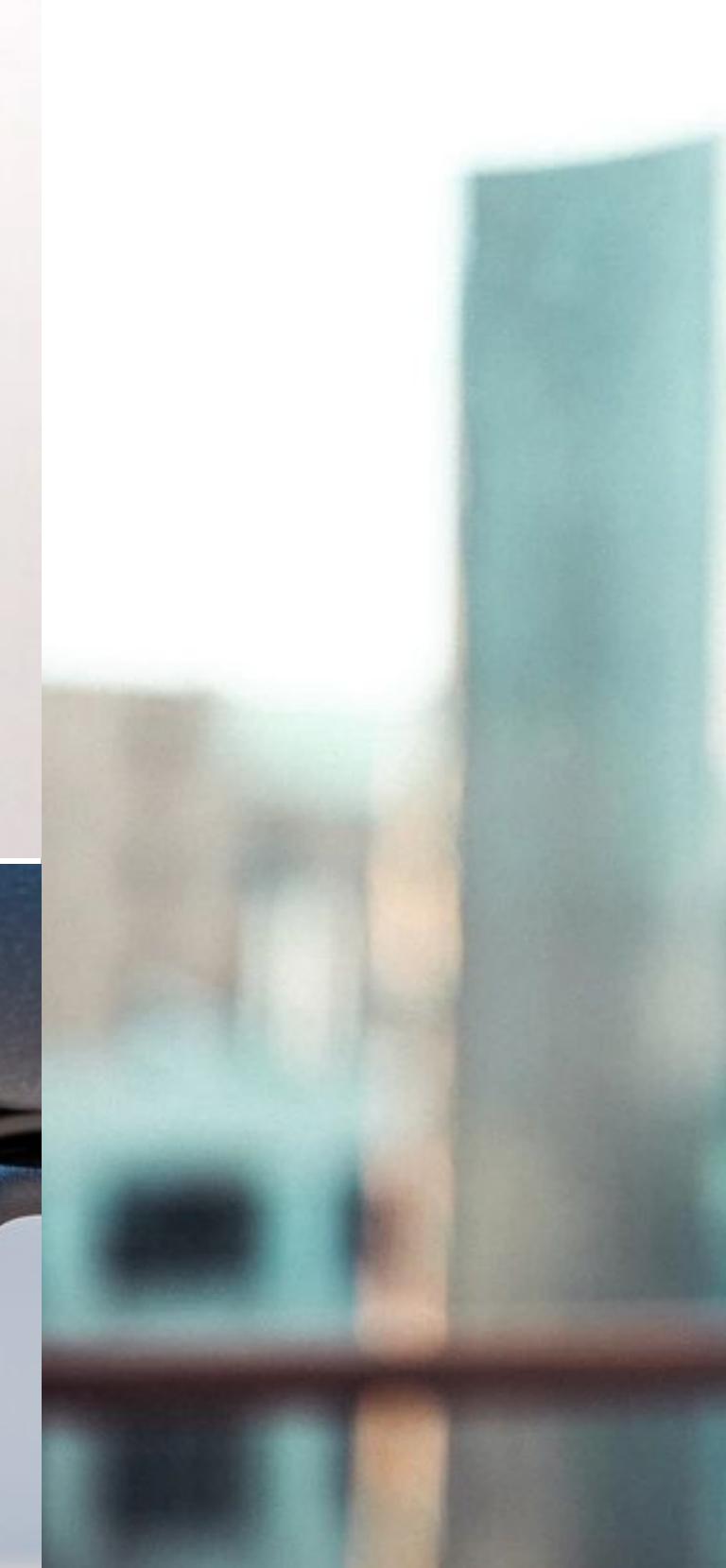
Agencies



## HTC to Focus on VR Development Instead of Hardware in Future

INDUSTRY AJ Cortese October 8, 2019





Protective eyewear in medical and blue collar work environments, My name is Yanick/Unsplash

**What can we learn from  
Assistive Technologies  
(AT)?**

# **What people think when they hear VR**

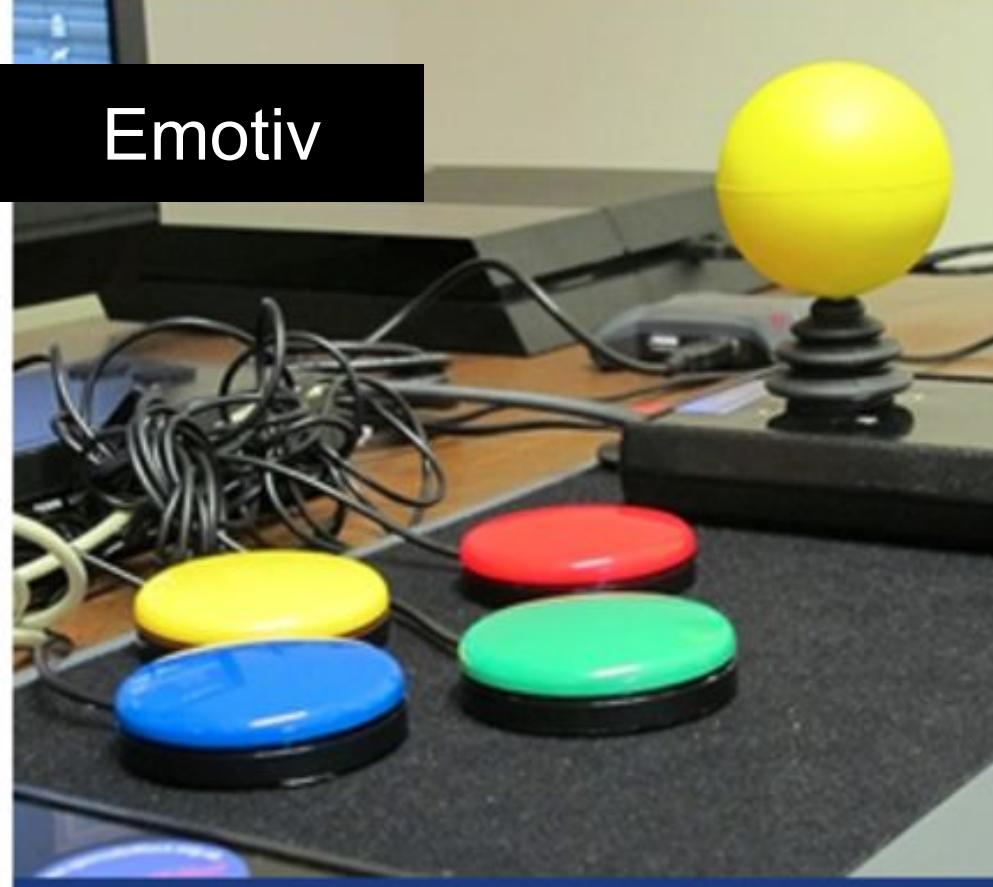
<https://www.flickr.com/photos/yelp/28474934237/>



# Who do people interact and **play** in VR



# Accessible Controllers



The Controller Project

Custom Modifications for People with Physical Disabilities

Home Shop Build a Controller Post a Request

Buy a DIY Mod Kit or Supplies

Purchase the parts to modify a controller of your own

Click to open the shop >

Request a Custom Controller

Contact me to see if I can help you out by designing a custom controller

Read More >

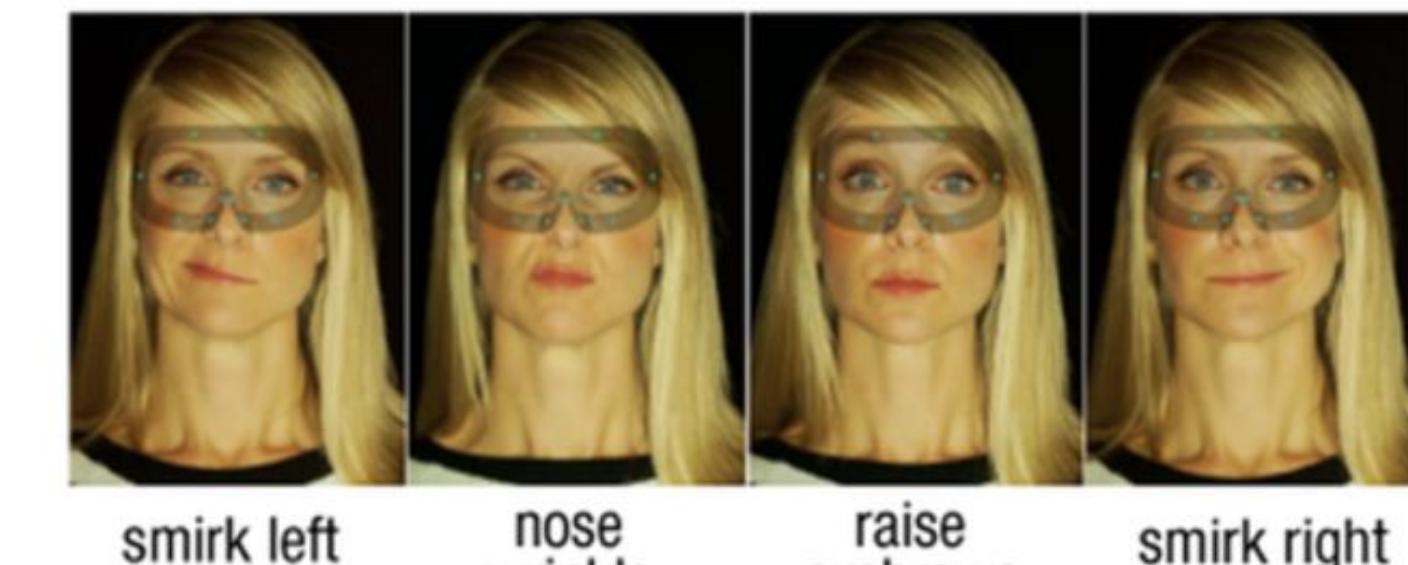
Donate

Like what I'm doing? Donate!

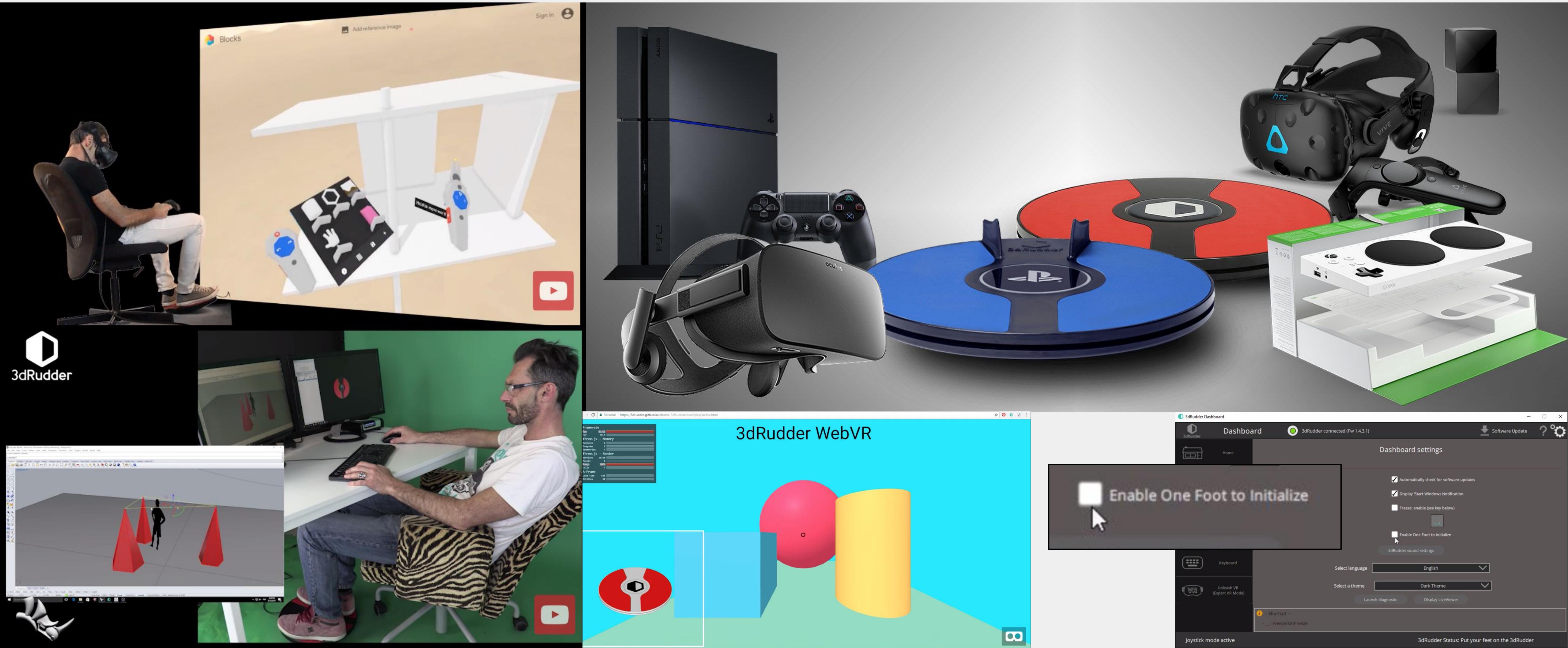
Click to Donate >



swipe left      select      back      swipe right



# Accessible Controllers - 3dRudder



# In-Vehicle Assistive Technology (IVAT)



# Driving Game Controllers



Proudly powered by **D-BOX**



# **Experiments, Tools and Projects**

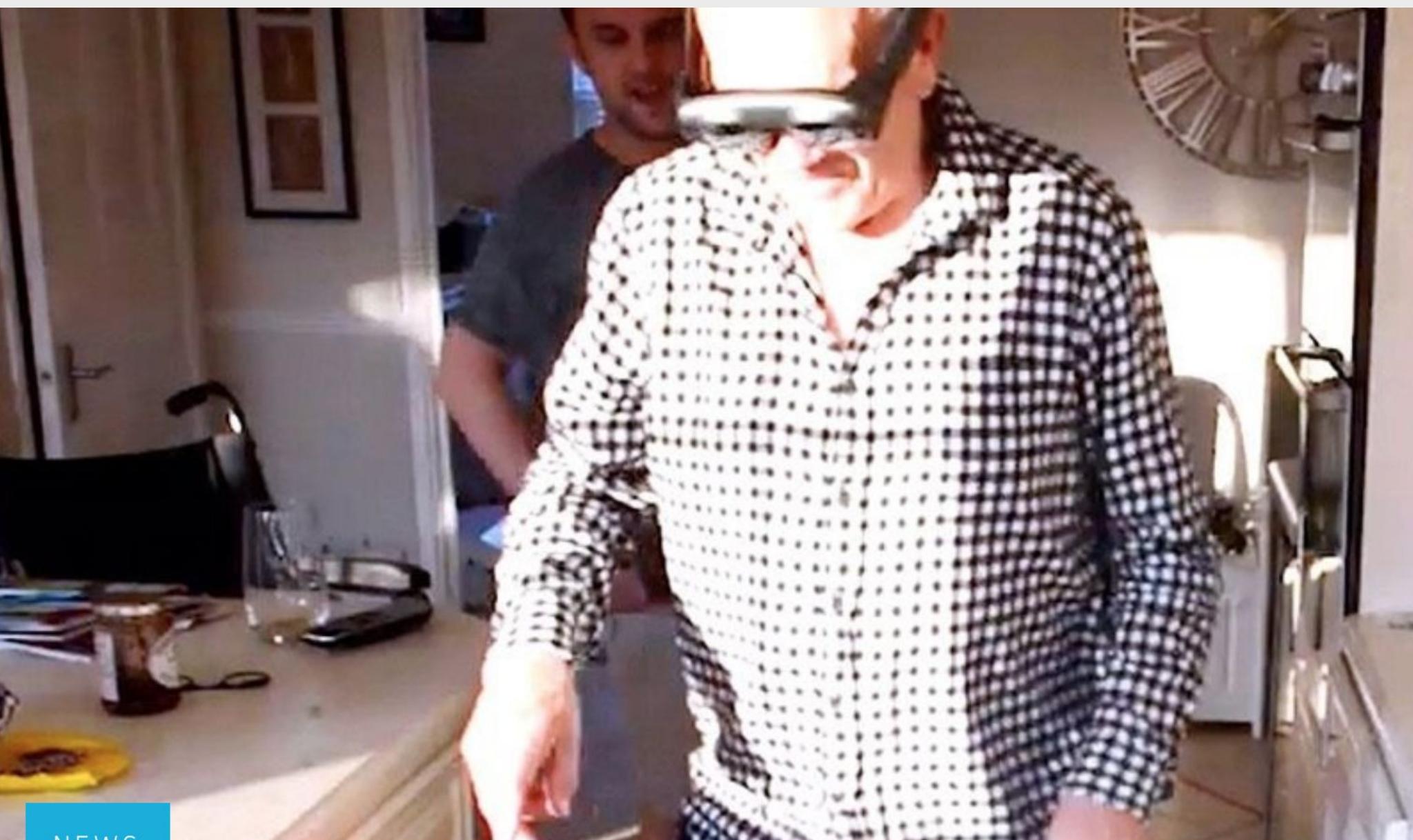
# SeeingVR: Low Vision Tools For VR



The color of this tool is adjustable to account for:

# Virtual reality offers benefits for Parkinson's disease patients

by Experimental Biology



NEWS

## Magic Lines Works to Restore Mobility to Parkinson's and Dementia Patients Through AR on Magic Leap & HoloLens

BY JIM MANNING | 08/26/2019 3:03 PM

A screenshot of a virtual reality application. In the foreground, there is a black cylindrical object, likely a haptic feedback device. A white overlay box contains the text "Do you have Parkinson's disease?". Below this, there are two buttons: "Yes" on the left and "No" on the right. At the bottom of the overlay, it says "Hover Over + Click". The background shows a virtual kitchen environment with white cabinets and a blue floor.



Cave Automatic Virtual Environment (CAVE) VR system ...  
s are reporting early success with a new tool to help

# WalkinVR: Steam Driver For VR



# WalkinVR: Steam Driver For VR



 Alice Wong 

@SFdirewolf



I would LOVE to force-choke someone as Darth Vader in a #VR experience. A girl can dream. [#a11y](#) [#VRaccess](#)

A photograph of a person dressed as Darth Vader, wearing a black helmet and a red zip-up hoodie with a black dog silhouette on the chest. They are holding a glowing white lightsaber. The person is seated at a desk in a room with framed pictures on the wall. A desk lamp is visible on the desk.

16 7:28 AM - Dec 27, 2016

i

 See Alice Wong's other Tweets >



# Deadline to participate in this online survey:

January 31, 2017

# Online Survey

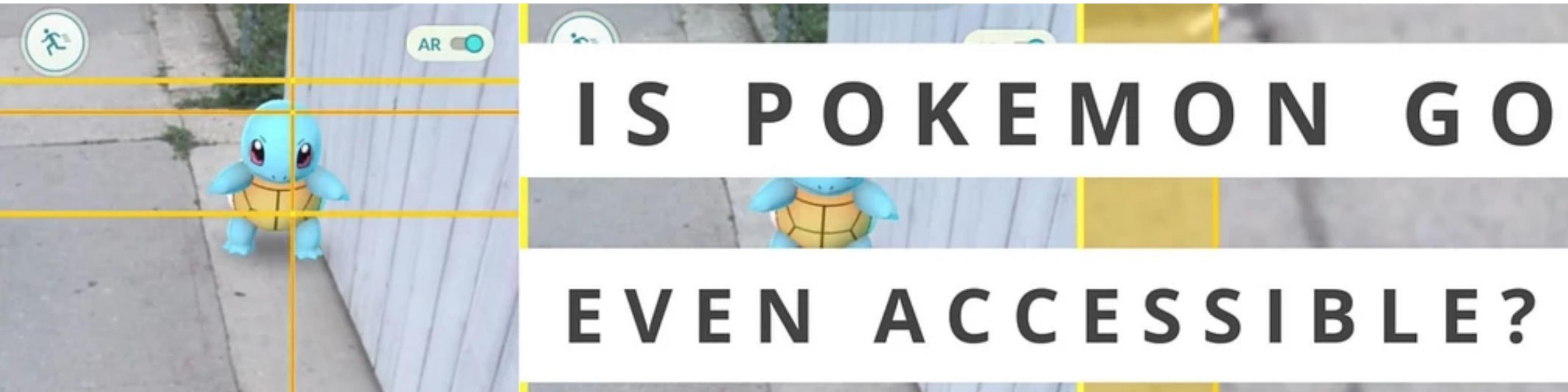
[https://docs.google.com/forms/d/e/1FAIpQLScKkpxMwB5dHiE6k\\_73xpQCNL1hxCUR0xxnpTiD](https://docs.google.com/forms/d/e/1FAIpQLScKkpxMwB5dHiE6k_73xpQCNL1hxCUR0xxnpTiD)

# Share Your Photos!

If you want to share photos of you using VR, please send them to: [DisabilityVisibilityProject@gmail.com](mailto:DisabilityVisibilityProject@gmail.com)

Or tweet @DisVisibility with the hashtag #VRaccess

# Does Pokemon GO pass our accessibility tests?

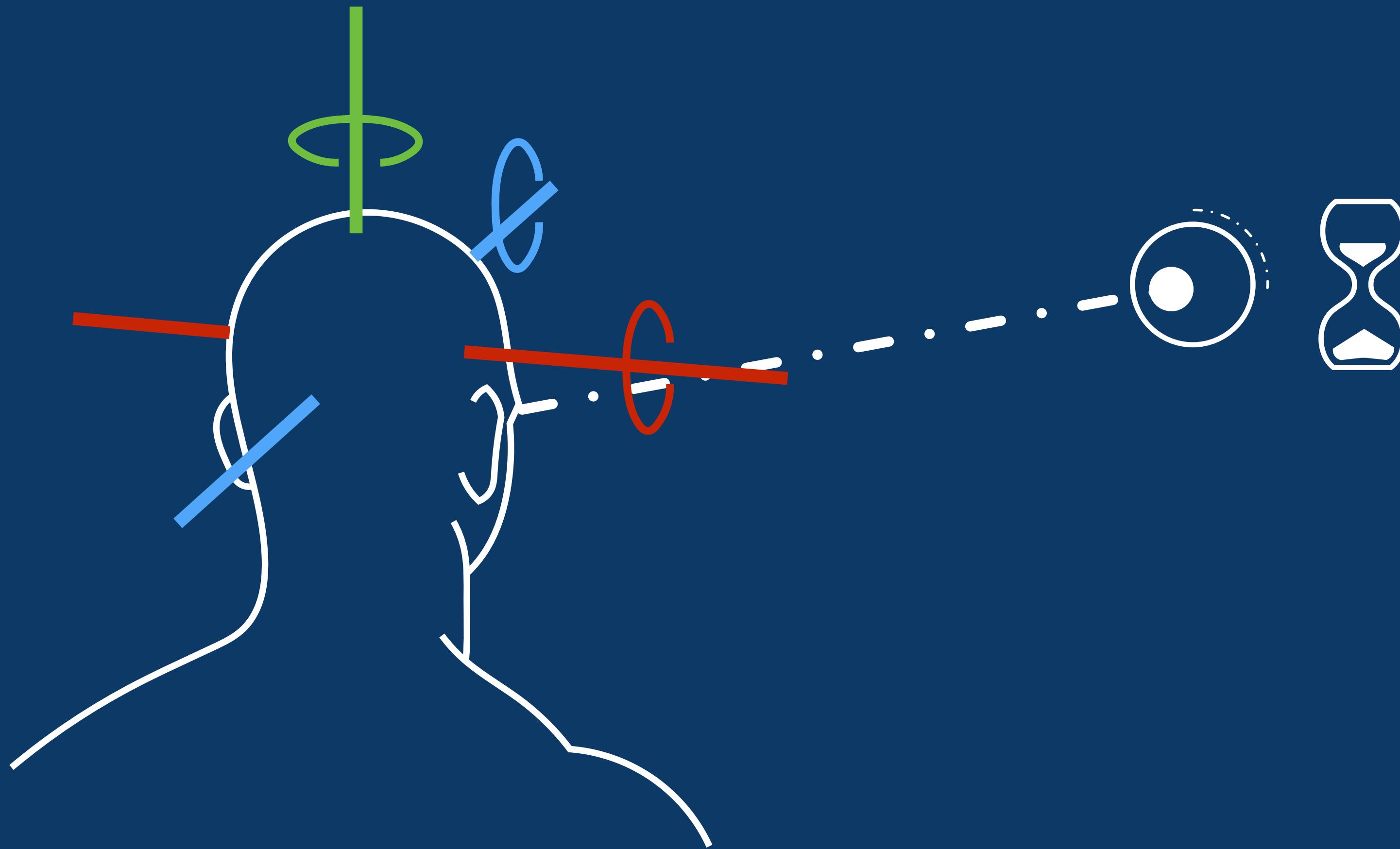


# From Sip-and-Puff To Binary



# Single switch controllers, name 'em all!





Is the fallback input for mobile VR  
inclusive enough for everyone?



# Navigating VR for Physically Disabled Users

with Binary Input Controls



**433** Hackers

**110** Team submissions

Best Application For Accessibility

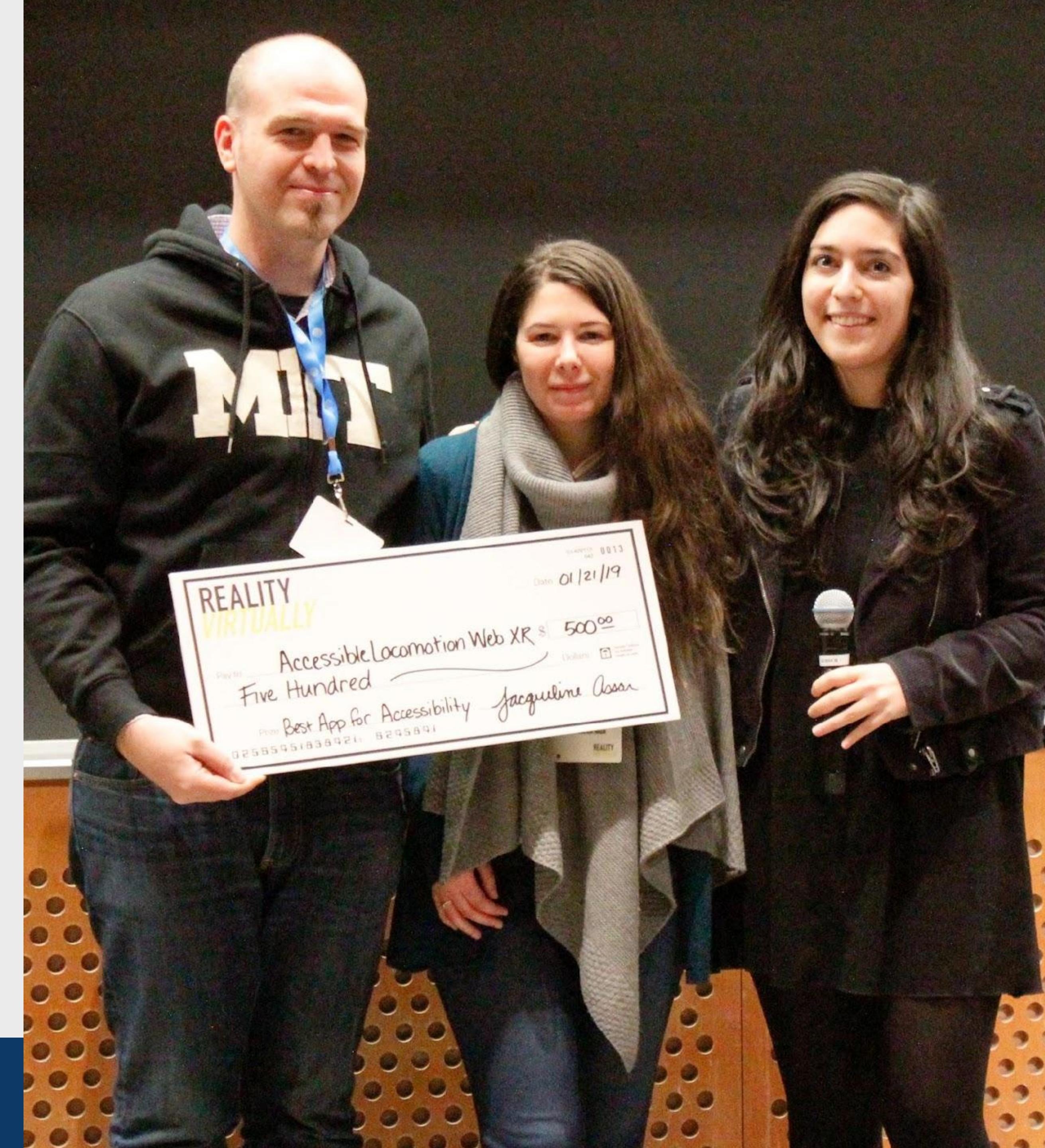
Wayfair Way-more

Best Use of an HTC Vive Focus

3x winner at the **world's largest, most diverse XR Hackathon.**

January 17-21st, 2019

@ the MIT Media Lab, Boston



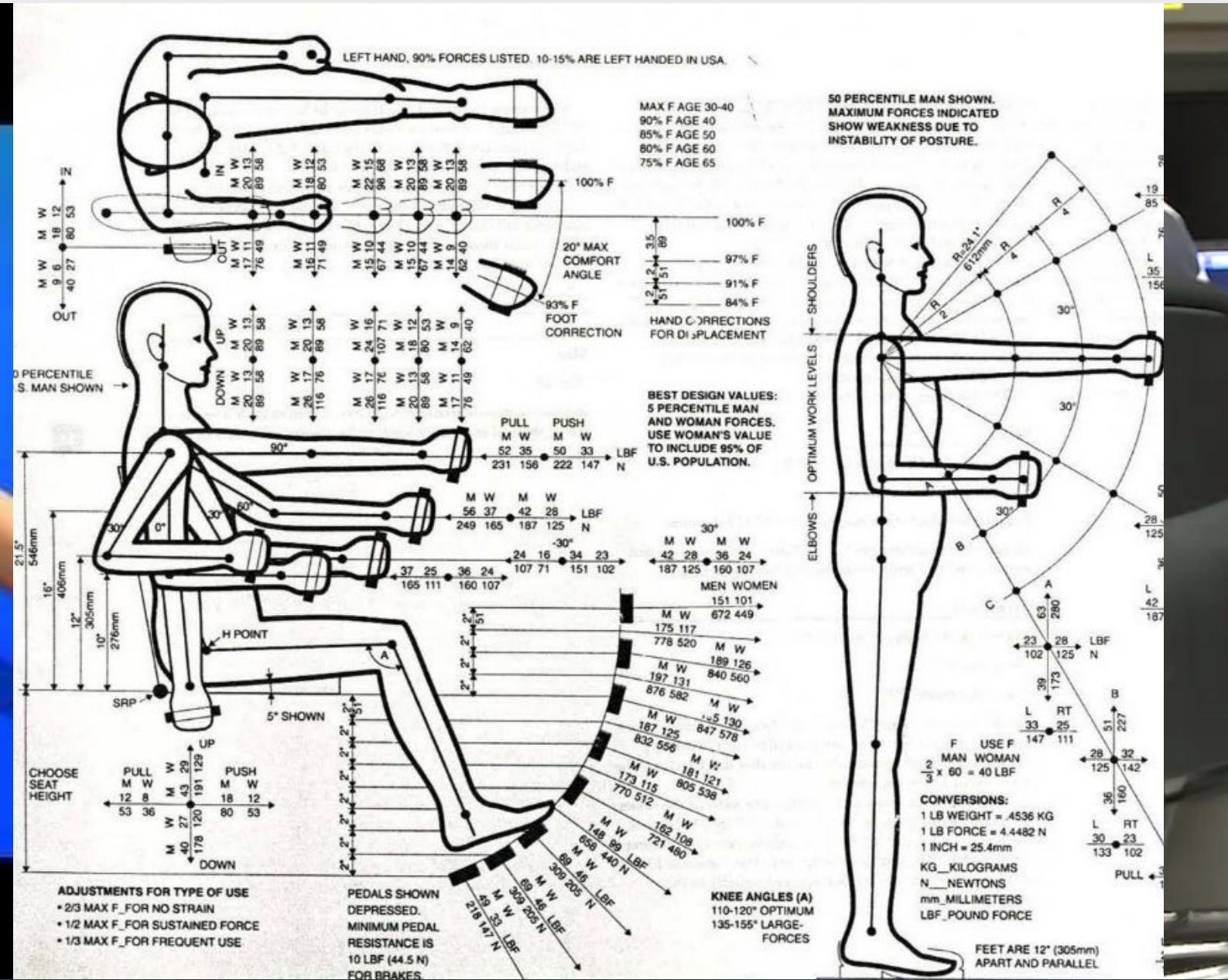
# Binary Input

- single button control
- binary input frequencies: on/off - short/long/continuous
- mapped with the W3C standard Gamepad API to enable assistive technology (AT) devices

# Discussion

# Discussion

- How can we progressively enhance the XR **experience**?
- What do **HMI & Ergonomics** teach us better than flat GUIs?
- Can Assistive Technologies **guide us** to interaction standards?



# Engage and Interact

## Meetups

[A11yNYC - Accessibility New York City](#)

[CUNY Tech Meetup](#)

## Events

[Access + Ability Build-a-Thon](#)

## Links & Resources

[5 VR Games with A11y Features](#)

[Why VR/AR Developers Should Prioritize A11y in UX/UI Design](#)

[XRAccess](#)

[Ablegamers.org](#)

[The Geeky Gimp](#)



# Thank You!

Roland Dubois

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@rolanddubois

#aframe\_nyc

# Hello, I am Roland Dubois

- Product UX Lead at Virtual Facility
- XR Accessibility Lead and co-founder at Virtuleap
- Mozilla Tech Speaker
- Creator of GRAVR — a globally recognized avatar for WebVR
- Member of the W3C Immersive Web CG
- Member of the XR Access Initiative
- Host of WebXR (A-Frame NYC) workshops & events
- Creating immersive experiments that make the current VR/AR industry accessible for everyone.

