



# An AR|VR Rap Session

- Shivank Shekhar, Global Co-Chair, VRAR Association

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# Who am I ?

- Global Co- Chair for (WebXR) Industry Committee at VRAR Association
- Corporate Consultant for Silicon Valley VR/AR Consortium
- Contributor and Developer for WebXR API and WebVR 2.0 at W3C.





A global industry association for  
**virtual reality, augmented reality, and mixed reality**  
connecting leading solution providers with brands and customers.

Our programs and initiatives are  
designed to accelerate anyone's  
**growth, knowledge, and connections.**

[www.thevrara.com](http://www.thevrara.com)

3900+  
Companies



50+  
Chapters



20+  
Committees



15K  
Professionals



Community



Training  
Online & On-site



Equipment



Research  
& Events



# Committees are creating best practices, guidelines, and standards

## Existing Committees:

1. Advertising
2. AEC
3. Aerospace
4. Arcade
5. Automotive
6. Criminal Justice
7. Enterprise
8. Entertainment
9. Education
10. Healthcare
11. Marketing
12. Public Safety/Emergency Response
13. Content Licensing
14. Retail & eCommerce
15. Storytelling
16. More at [www.thevrara.com](http://www.thevrara.com)



# Overview

VR/AR Spectrum

Aframe

XR Spectrum

Case Studies

Types of VR/AR

Web Frameworks

WebXR API

WebVR

Networked Aframe

Standalone VR

# What I am excited about in 2018 ?

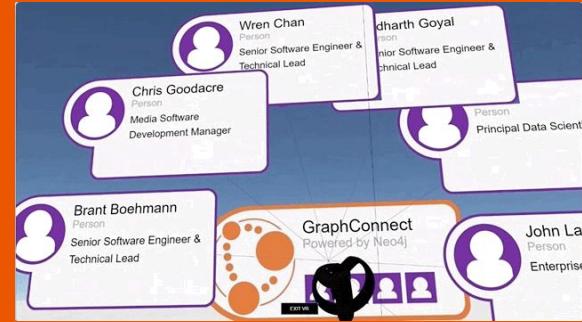


XR Projects

Artificial Intelligence in VR



Data Visualisation

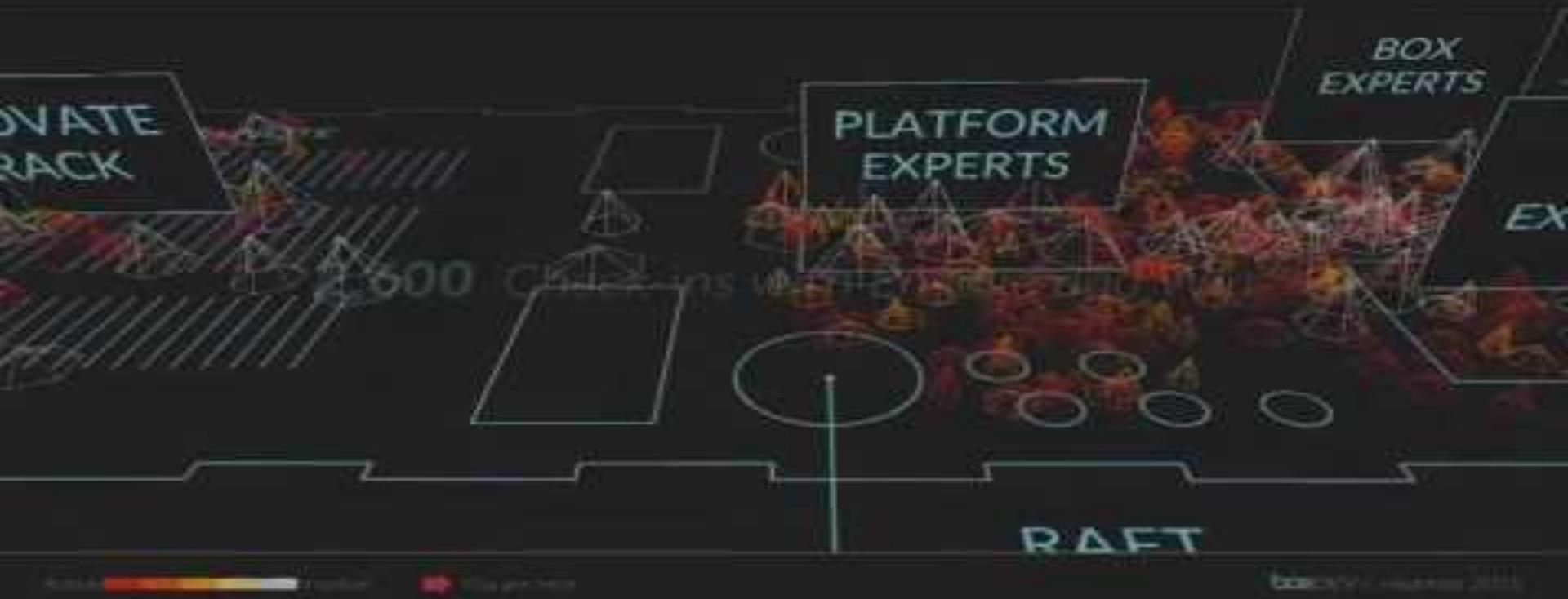


Augmented Reality



1:30pm Execute - Designing for Enterprise

2:50pm





# Understanding VR/AR



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## Realities, like literally!



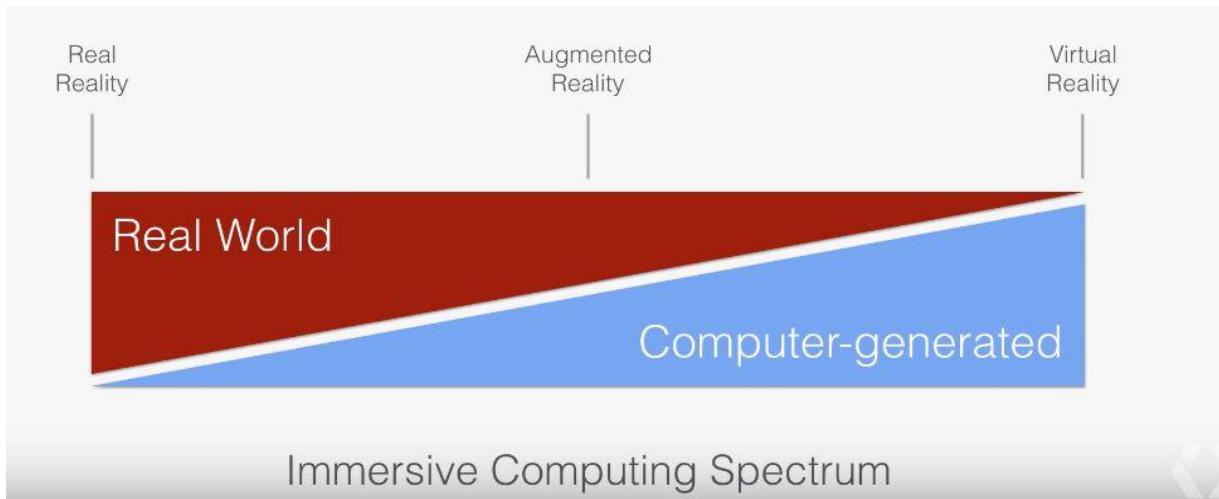
The state of things as they "actually exist" through our human senses without any technology.



Artificially created sensory experiences of people, environments and objects, which can include sight, touch, hearing, and smell.

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# The VR/AR Spectrum



## Virtual Reality:

- Immersion into another world
- Usually uses a headset and mobile device
- Does not interact with the real world
- Experiential Information

## Augmented Reality:

- Overlay of objects in world around you
- Use of a phone or viewing device
- Usually uses target image

# VR/AR applications at scale

## Classical Applications

- Gaming Industry
- Data Visualisation
- Mixed Reality Applications
- Tourism
- Information Industry
- Training Industry

## Artificial Intelligence/ Machine Learning Based Applications

- Digital Assistants
- Image recognition
- Social VR
- Business Analytics Platforms
- AR Cloud



# VR, AR, MR popular applications



## 13 PLACES WHERE VR IS GETTING REAL

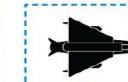
A handful of companies are integrating it into work, while a growing number use it to sell.



Ford designers and engineers use VR to test elements of new cars, saving some \$8 million in one year. Audi is outfitting dealers with VR kits that will enable customers to configure and customize vehicles.



Surgeons at UCLA are using Surgical Theater's medical VR technology and Oculus Rift headsets to test-run highly technical and sensitive surgeries before they operate.



Airbus uses it to demo planes for customers; it patented a helmet that passengers may one day use for entertainment. BAE Systems' VR enables engineers and sailors to "walk through" warships during design.



Carnival developed a promotion to give shoppers at some AT&T stores the chance to use Samsung VR equipment to virtually explore its cruise ships and vacation destinations.



The North Face took users to a virtual Yosemite National Park and Moab at its stores. In South Korea, the company's promotion placed customers in dog sleds for extra verisimilitude.



Global architecture firm IA Interior Architects is working with InsiteVR to build design models in virtual reality. It's also experimenting with the technology to give clients a "tour" before a project is built.



Sotheby's International Realty is using VR to host open houses to sell luxury homes. Other realty companies, such as Halstead and Douglas Elliman, are reportedly planning to use similar technology.

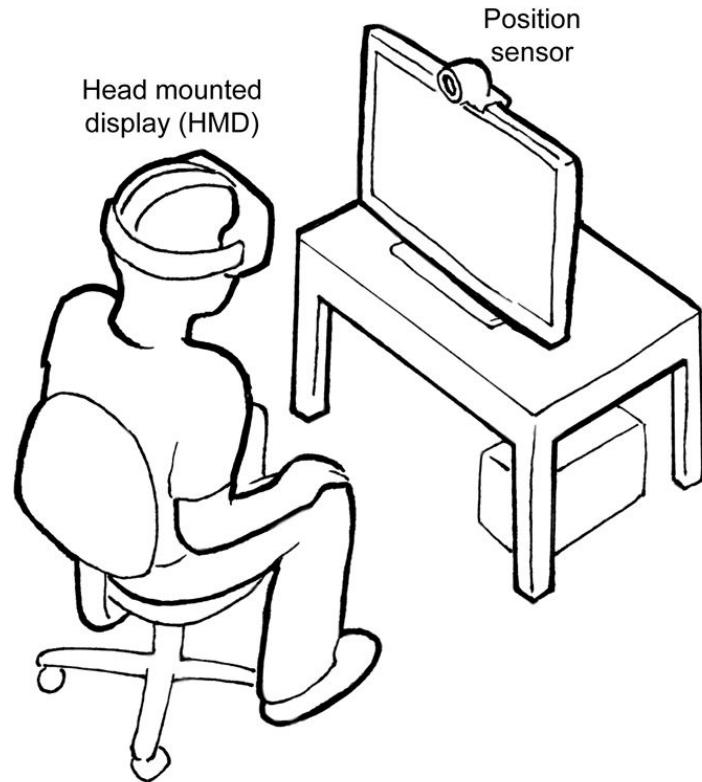


Luxury retailer the Line is using VR to create a virtual pop-up shop that enables consumers to tour the Apartment, the company's New York City store in SoHo.

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# How does this work?

1. [`Navigator.getVRDisplays\(\)`](#) is used to get a reference to your VR display.
2. [`VRDisplay.requestPresent\(\)`](#) is used to start presenting to the VR display.
3. WebVR's dedicated [`VRDisplay.requestAnimationFrame\(\)`](#) method is used to run the app's rendering loop at the correct refresh rate for the display.
4. Inside the rendering loop, you grab the data required to display the current frame ([`VRDisplay.getFrameData\(\)`](#)), draw the displayed scene twice — once for the view in each eye, then submit the rendered view to the display to show to the user ([`VRDisplay.submitFrame\(\)`](#)).



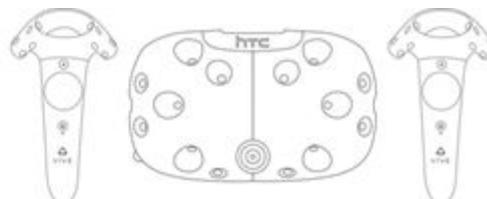
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# WebVR

WebVR



**WebVR** is a *JavaScript API* for creating immersive 3D, *Virtual Reality* experiences in your *browser*. It provides access to VR devices.



# WebVR Infrastructure



# Why WebVR?

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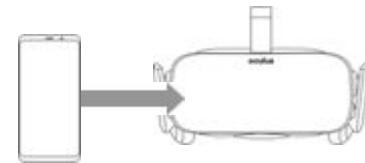
Google VR SDK  
(iOS/Android/Unity)



Oculus Mobile SDK



Viveport SDK  
(Android/Windows)



WebVR

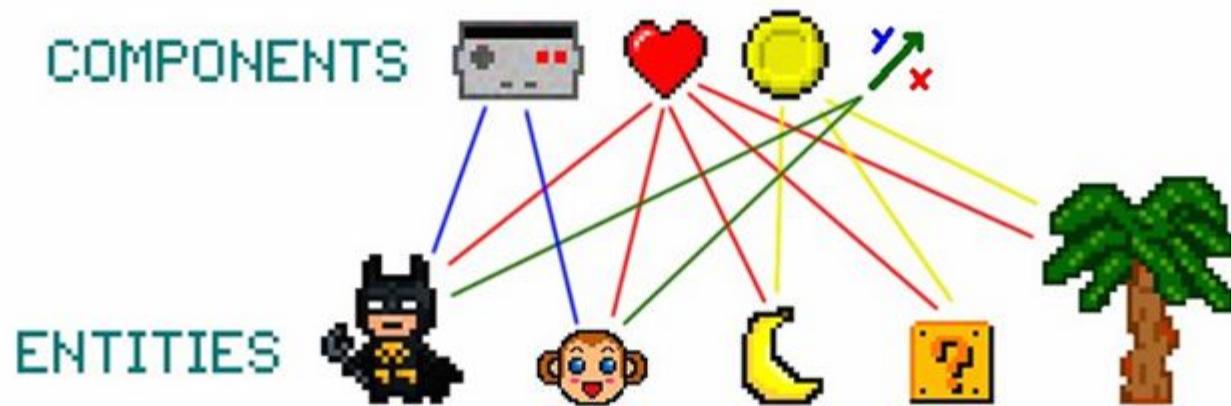
Widest **delivery** network in existence: the **Web**



Cost of entry for simple experiences for consumers translates to access to a browser in a device.

# Aframe : The Top-Dog of WebVR





# Entity-Component System



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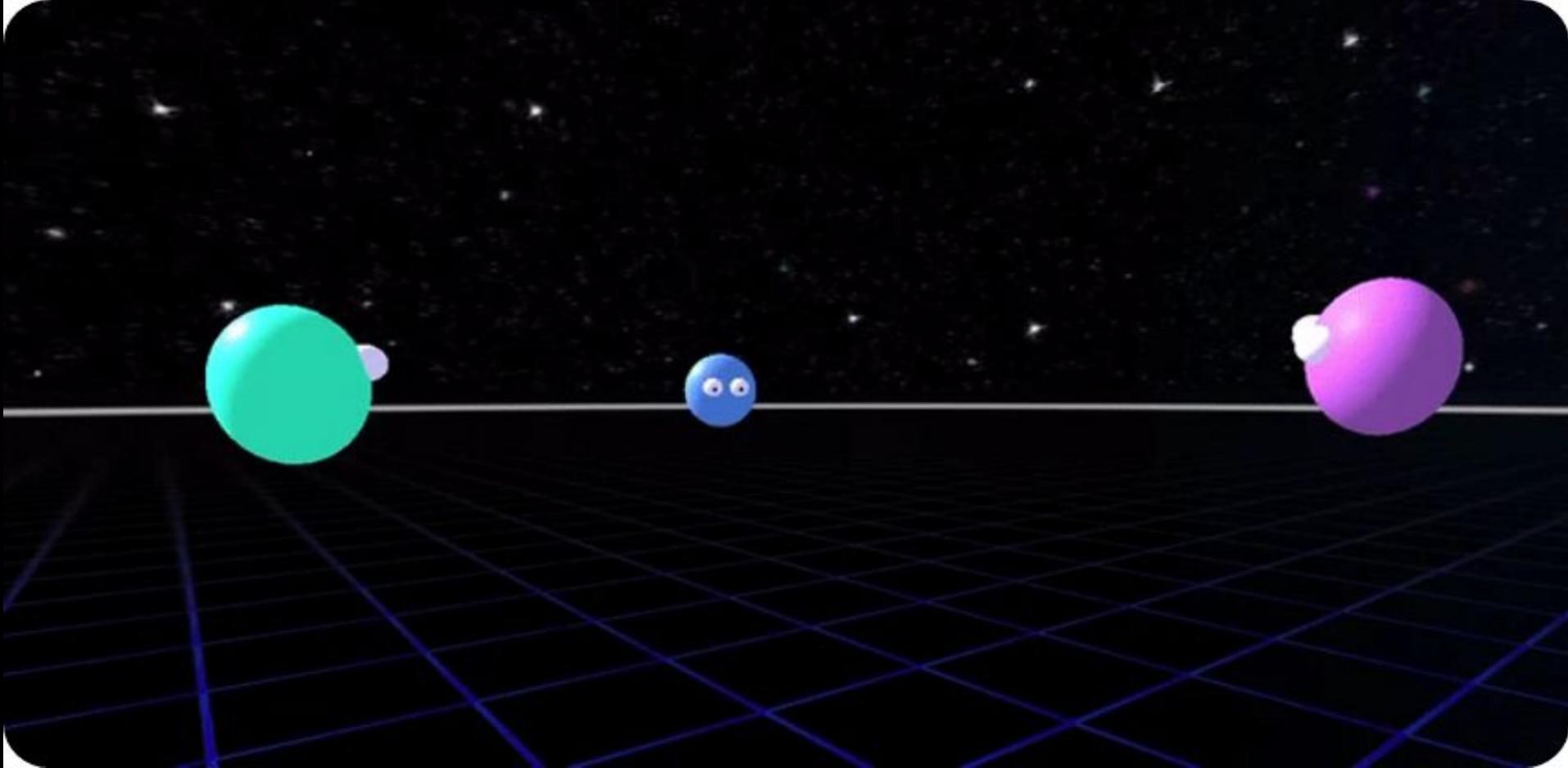
Other Players in Market?



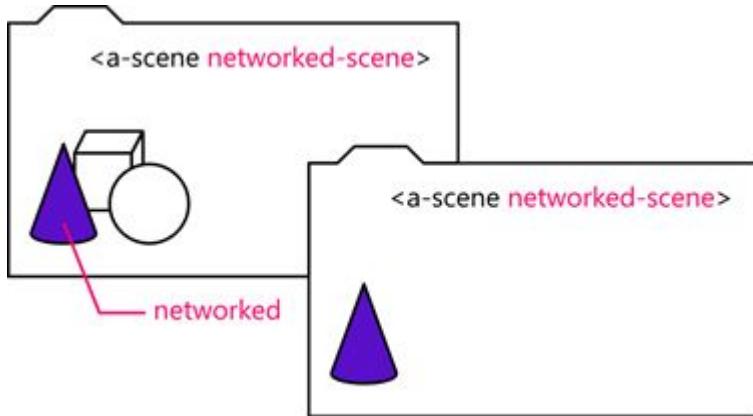


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# Social VR : Networked Aframe



# How does it work?



Uses a 'networked-scene' system for the scene identifying sessions by 'app' and 'room'.

Uses a 'networked' component on entities to sync them.

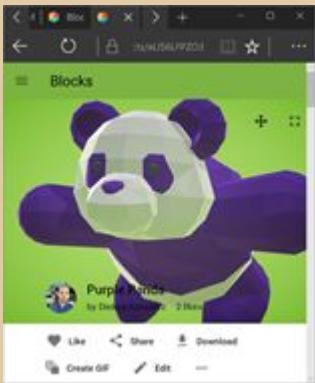
Utilizes templates to represent the networked entity.

It can broadcast messages to connected peers.

Based in WebRTC / WebSockets and PEER.js

PEERJS





# Google Blocks



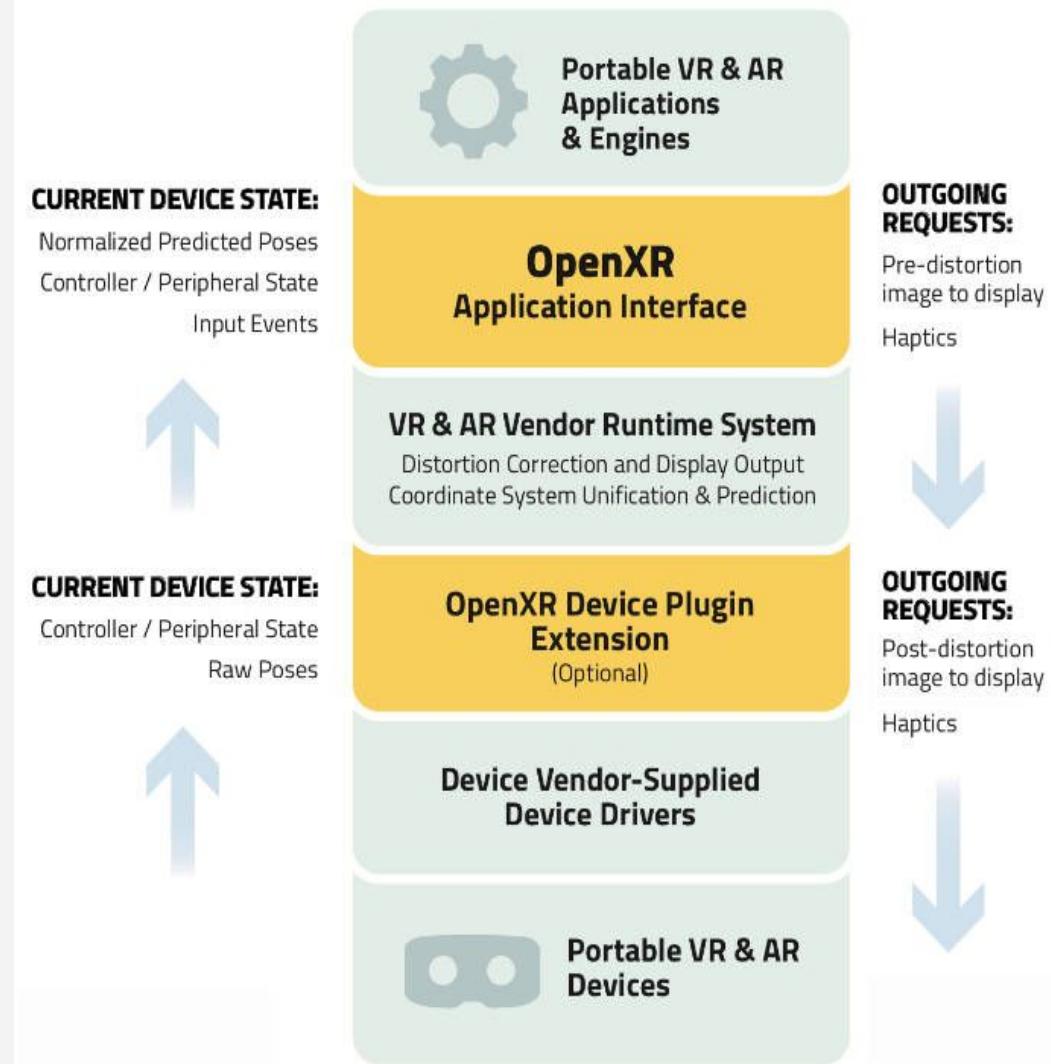
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# Why you should not care about WebVR anymore?



# The XR Spectrum

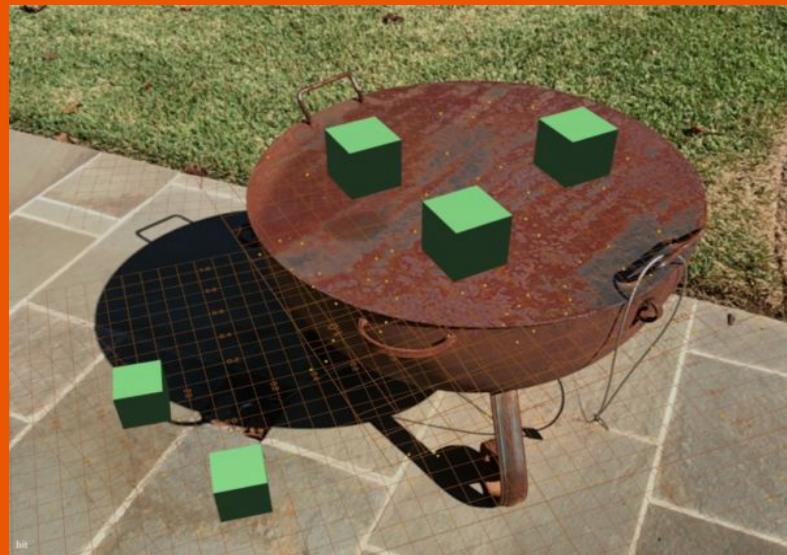
# OpenXR Architecture



# and who is supporting us?



# WebXR: A combined framework



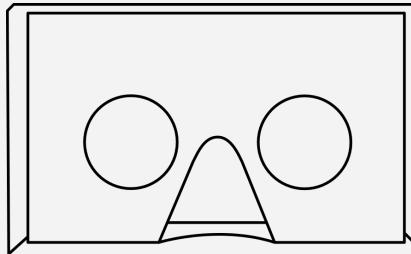
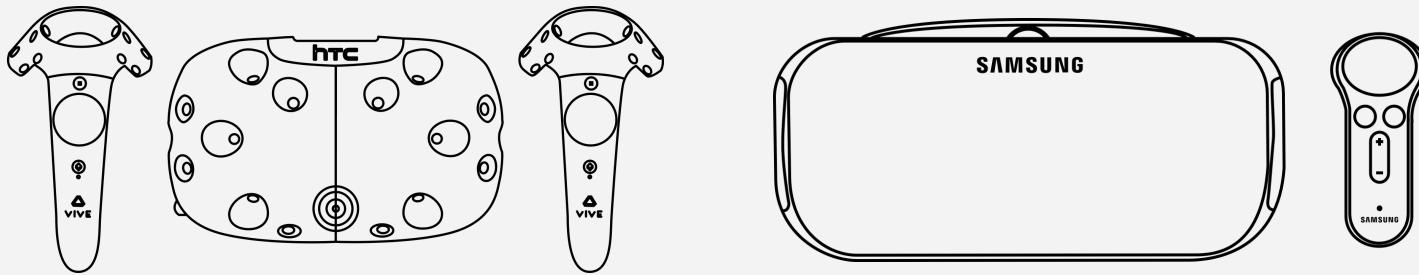
Mozilla Brings WebXR - An Awesome  
Augmented Reality App

## Proposing a WebXR API

We have created a [draft WebXR API proposal](#) for providing access to both augmented and virtual reality devices.

The WebXR API formalizes the different ways these technologies expose views of reality around the user, and it exposes concepts common in AR platforms such as the Anchors found in Hololens, ARKit, and ARCore.

# Cross Device Support for VR/AR/MR





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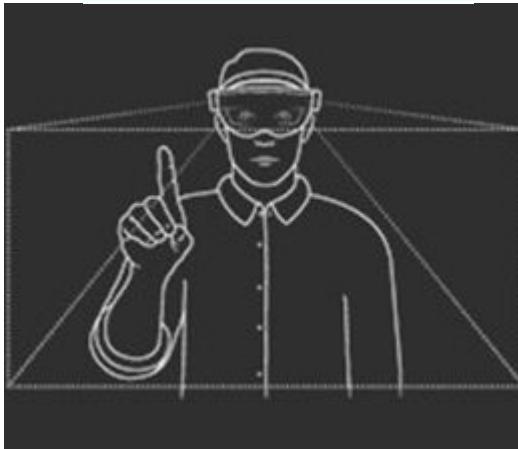
# How do VR devices work?



**Gaze**



**Gesture**



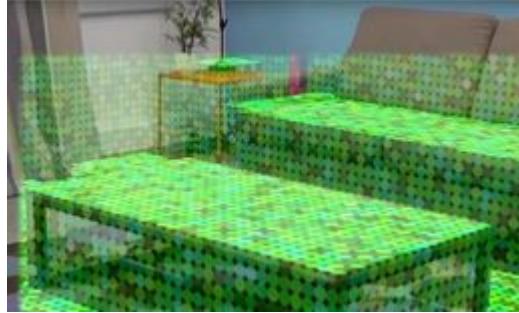
**Voice commands**



**Spatial sound**



**Spatial mapping**



**World coordinates**

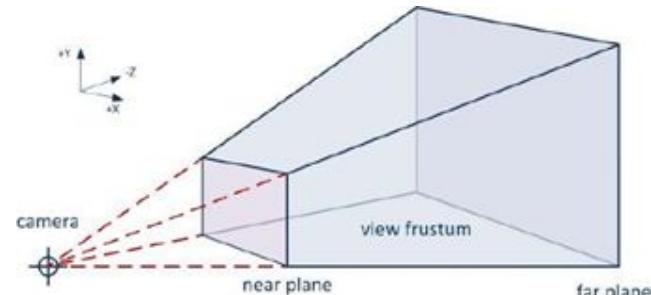


# Standalone VR : Unity vs Unreal



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# Why a Game Engine?



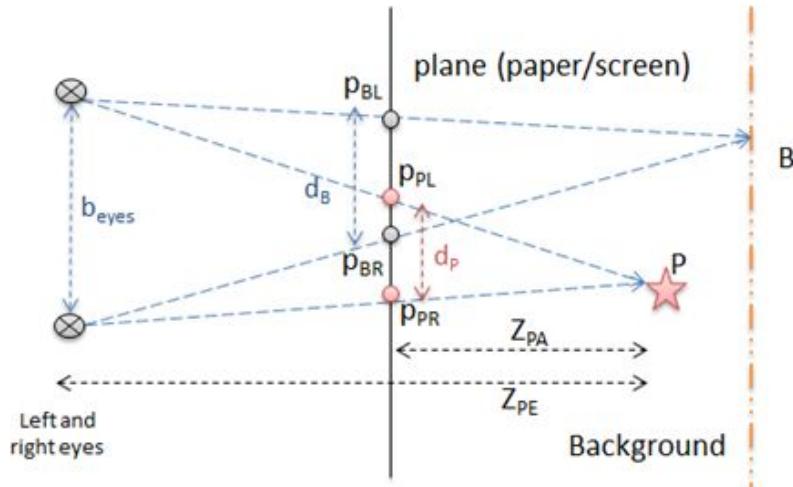
Viewing Frustum of Camera



# Points to ponder!



Principle of perceiving 3D in VR



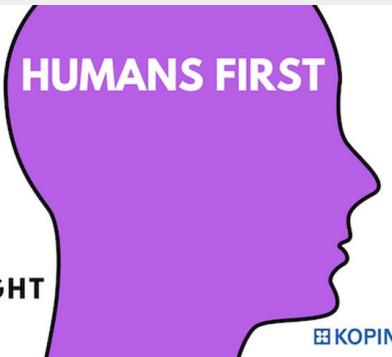
# Unity vs Unreal

Unity 5	Unreal Engine 4
Development feature	
Mainly based on C# & JavaScript	Mainly based on C++ & UnrealScript
Requires knowledge of programming (atleast C# or JavaScript) for project development	Include Blueprint feature, which allows developing a project with minimum knowledge of Coding
Provides wider tweak & settings for the environment and object	Environment & object settings in Blueprint are limited. Requires custom-made model & platform for more settings
Graphic is good enough for mobile users, but limited compared with Unreal Engine	Graphic is generally better, including better shadow, physic, terrain
Better performance for mobile use	Better performance for PC & Console
Supports a wide range of platforms, including mobile & web	Supports mainly PC and Console
Development fee	
<ul style="list-style-type: none"><li>Free for personal use or commercial use with annual revenue less than \$100k.</li><li>The Free edition lacks of Profiler feature, which is used for performance benchmark for the project</li></ul>	<ul style="list-style-type: none"><li>Free for personal use. Includes all features, it is no difference between Free edition &amp; Premium edition.</li><li>Requires 5% profit for commercial use</li></ul>
Community	
Huge user base	Moderate user base
Extensive asset library, including objects, scripts, animation, tools required for a complete game with low fee	Small asset library. High fee of use
Huge database of the tutorial, including videos, demo & scripts. Requires less time for training	Limited database of tutorial
Community & Tutorials suitable for all types of developers, including beginners and hobbyist	Tutorials largely are designed for designers rather than programmers



# Five Rules of Doing AR|VR Right

#1



FAN'S FIVE RULES  
FOR DOING AR RIGHT

KOPIN

#3 MAINTAIN SITUATIONAL AWARENESS



FAN'S FIVE RULES  
FOR DOING AR RIGHT



#2



KOPIN

VOICE IS THE NEW TOU



FAN'S FIVE RULES

FOR DOING AR RIGHT

KOPIN

#4

BALANCE DESIGN WITH BENEFITS



FAN'S FIVE RULES

FOR DOING AR RIGHT

KOPIN

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# Augmented Reality



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# WebAR



# Some Popular AR trendsetters



Vs.

ARCore



Immersive

Ambient

Digi-Capital™ Reality Matrix

Virtual	Augmented
<i>Immersive VR</i>	<i>Mixed Reality</i>
htc VIVE oculus <b>SONY</b> FOVE	magic leap Microsoft HoloLens <b>ODG</b>
<i>Virtual Reality</i>	<i>Augmented Reality</i>
Samsung Gear VR   	      

© Digi-Capital 2015

Virtual

Augmented



# Data in VR





# Data Trends

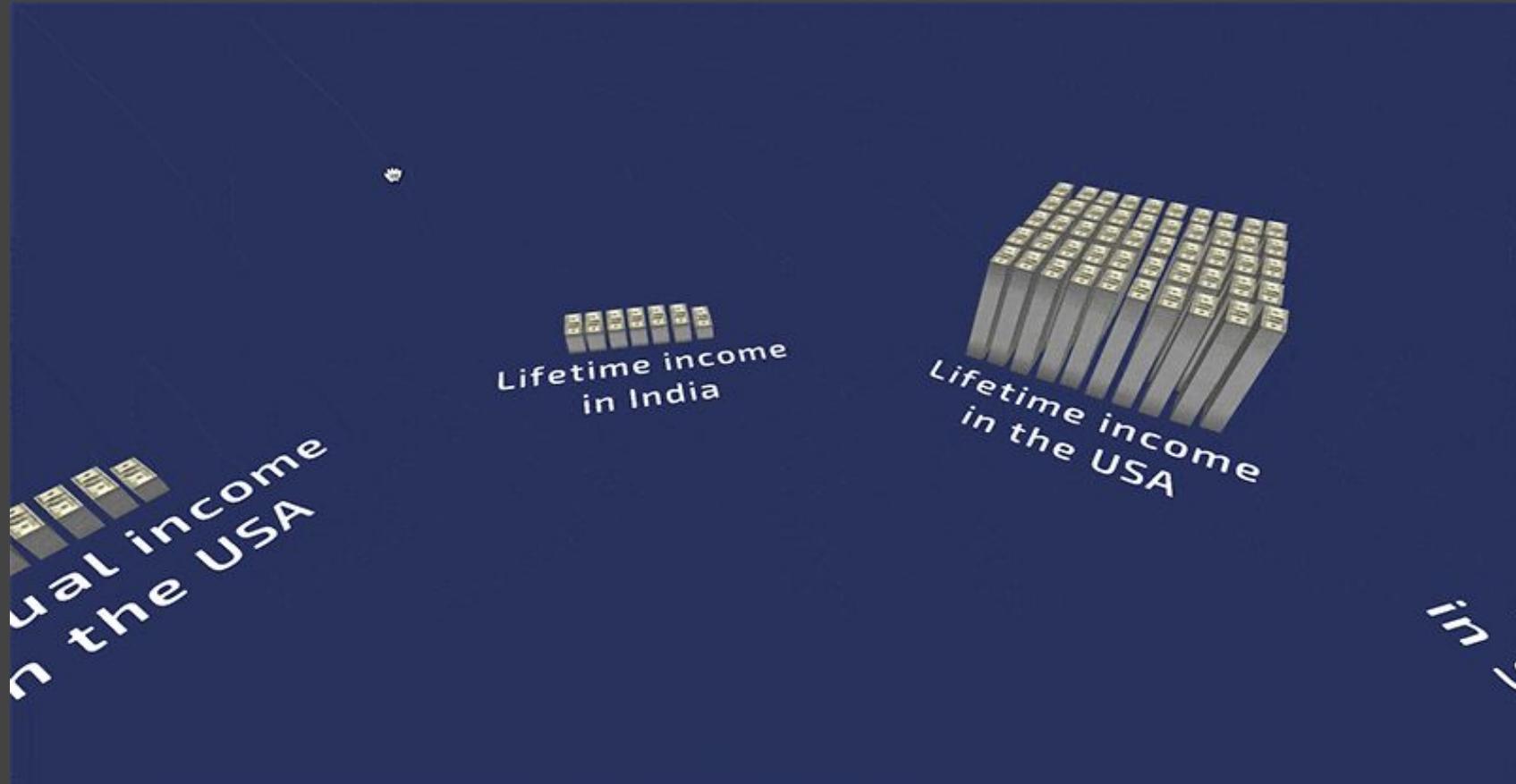
## Random Numbers



## Did you know?



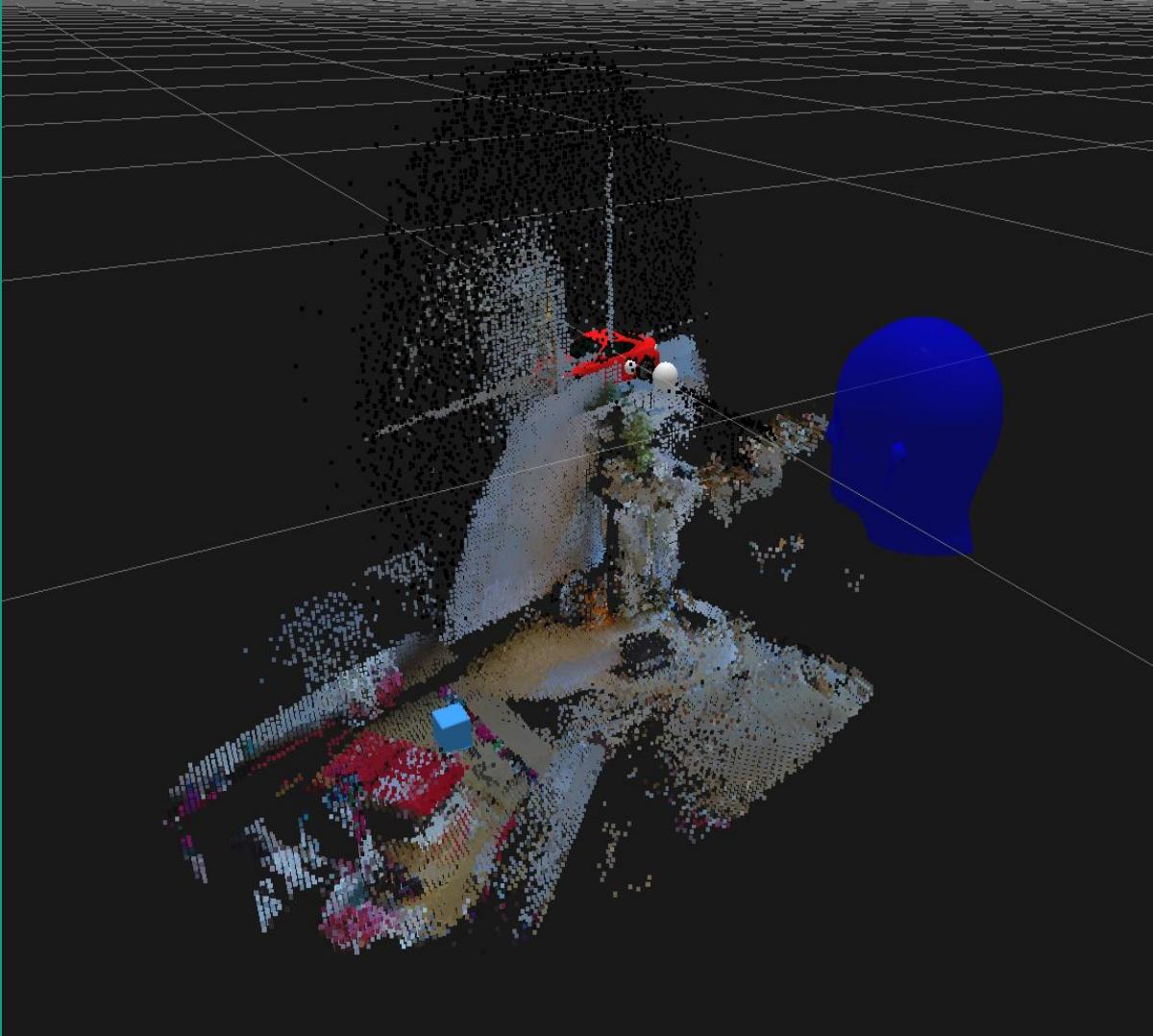
# Turns to something like this .....





## Case Study: Meta2 AR Headset

Using onboard IR sensors over the Meta2 AR device capturing, saving and replying the spatial data IRL.





# Case 2: IBM Watson

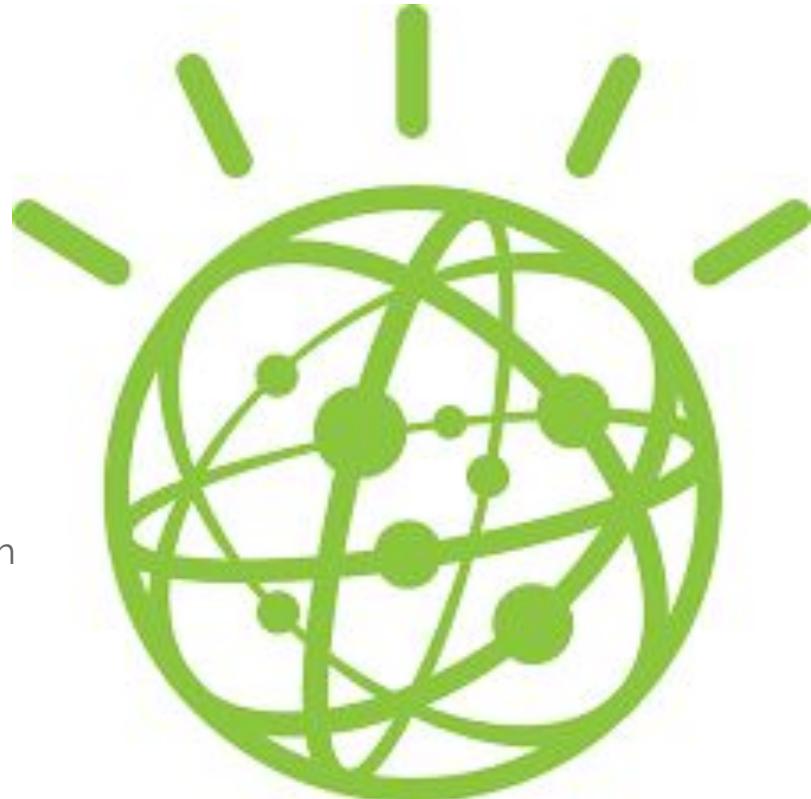
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# AI in VR Analytics

Enabling a world of "6DOF" Analytics

The combination of VR and AI is only now becoming possible due to:

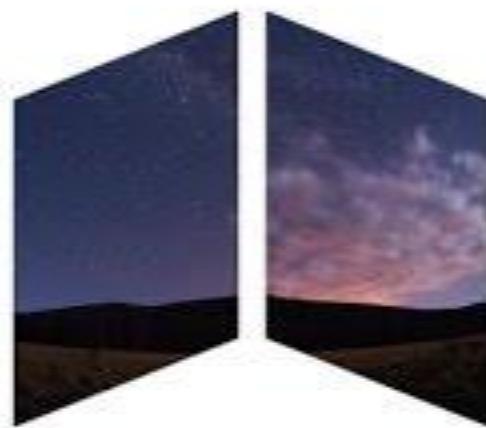
- Recent developments in AI, particularly deep learning, that foster real-time image and speech recognition
- Increased availability and reduced cost of local processing and storage
- Expanding network bandwidth, allowing richer data streams
- Availability of AI and VR/AR services in the cloud





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# How is IBM Visualising High Dimensional Data using Augmented Reality?



**IBM Immersive Insights**



# Ai in VR (NVIDIA and OpenAI Research )





# Deep-learning Autonomous Simulation

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# Deep Learning Based Simulation Engine

State-of-the-art deep learning simulation engine leverages reality-grade city mesh combined with DNN (deep neural network) and AI capabilities.

Cognata's virtual reality simulator and engine enable autonomous car manufacturers to run thousands of different scenarios based on various geographic locations and driver behaviors, and sharing the road with other users.



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# Star Trek VR Voice Assistants

The coolest part? I don't need to memorize hyper-specific phrases -- because Ubisoft teamed up with IBM Watson, the closest thing we have to a real-life Star Trek computer, to process my voice in near real-time.





# OpenAI



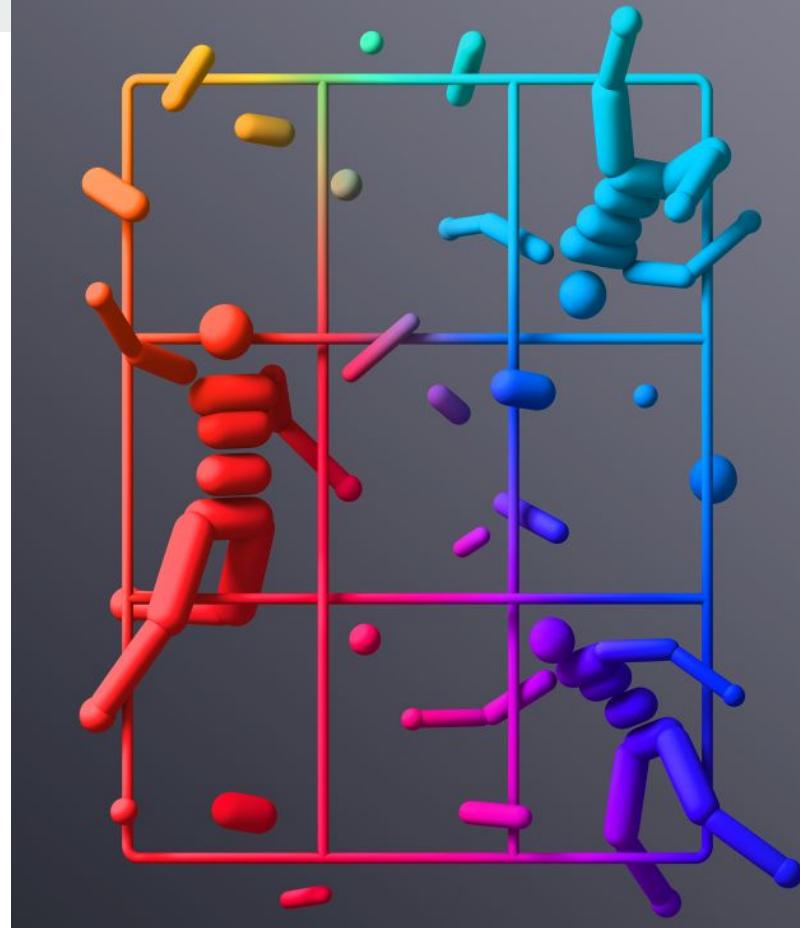
## OpenAI : Dota2 BotPlayer

\*\*Window of opportunity

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## Competitive Self Play : OpenAI

It was found that self-play allows simulated AI's to discover physical skills like tackling, ducking, faking, kicking, catching, and diving for the ball, without explicitly designing an environment with these skills in mind





# Real Time VR/AR Delivery Systems



# The AR Cloud

# HOW TO MAKE AN AR CLOUD

- 1. A SCALABLE SHAREABLE POINT CLOUD**
- 2. AN INSTANT UBIQUITOUS LOCALIZER**
- 3. REAL-TIME MULTI-USER INTERACTION**

# Questions?

Connect with me:

[www.geekyshiva.xyz](http://www.geekyshiva.xyz)

Twitter: @shivank1995

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# Ciao!!

# Exercises

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Easy-To-do:

1. Test Aframe and create a simple WebVR website.
2. Test Aframe-AR or AR.js and design a simple marker based Augmented Reality Scene.
3. Create a Hello! World VR Scene with ReactVR.

Moderate:

1. Test Networked Aframe with the person sitting next to you and tweak the code on glitch.
2. Test a project with Babylon.js 3D VR scene in babylon playground. (# You will be provided the starter code if you fail to even start the tasks)

Advanced:

1. Develop a basic FPS VR game with 3rd party sprites and layers using Unity or Unreal engine.