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Introduction To Augmented Reality

William El Kaim
Oct. 2016 - V 2.0



This Presentation is part of the Enterprise Architecture Digital Codex



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INTRODUCTION

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For all Architects, working in startups or big companies, willing to understand and to benefit from the digital tsunami.

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Plan

Augmented Reality Definition

- Augmented Reality Market
- Augmented Reality vs. Virtual Reality
- Augmented Reality Devices
- Augmented Reality Technologies and Platforms
- Feeling and Sensing
- Augmented Reality Applications Examples





What is Augmented Reality?

- Augmented reality (AR) is a field of computer research which deals with the combination of real-world and computer-generated data.

2009 Smart phone 2010 Eyewear 2015? Contact lenses

Hercules
Rises: 6:03 a.m. Sets: 9:25 p.m.
A large constellation representing the mythological hero

Sanphan restaurant
★ ★ ★ ★ ★ 41 reviews
Thai \$ \$

Gas station
550 feet
Unleaded \$3.19

Car locator

U.S. Capitol complex
0.7 miles
... Construction of the Capitol began in 1793. When built, it was ...

Robbery
270 feet west
18 days ago

622-624 North Carolina Ave. SE
900 feet
List price: \$2,995,000
Bed: 7 Bath: 8
On market: 420 days

Peregrine Espresso
195 feet
Free Wi-Fi

flickr: Eastern Market Fire
510 feet
Taken: 2007-04-30 09:35:35 a.m.

Bus stop
70 feet
Nearest for
32 34 36
A11 C40
CIRC

Subway stop
140 feet
Nearest for
Orange Line
Blue Line

Twitter users in the area
perfect day to head to @EasternMarketDC
anyone want to meet up? #spring #dc #market
Posted by @ARpro 10 minutes ago

UP AND AWAY Point your phone at the sky and find stars hidden by daylight. Aim at a tourist spot and see its history plus info for visitors. For an augmented-reality check, tap into crime stats.

REAL DEALS Various apps can steer you to the cheapest gas around, mass-transit options, good food, and Wi-Fi spots. You can also learn the price of that town house that's up for sale.

STREET PALS The Tweepers Around app tells if tweeters are near. Flickr displays area photos by members (Eastern Market, above). In the works: an app to match faces to social-network profiles.

In March one of our staff designers enhanced the reality of his Washington, D.C., neighborhood. Smart phone applications (apps) added layers of information to what he saw—called out in this composite of five photos, each taken with his phone.



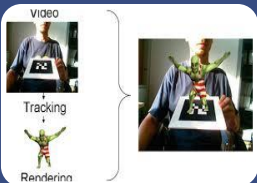
AR systems have the following three characteristics



Combines real and virtual objects in a real environment



Is interactive in real-time



Registers (aligns) real and virtual objects with each other.



All About Augmentation

- Augmented reality (AR) is a live direct or indirect view of a physical, real-world environment whose elements are augmented (or supplemented) by computer-generated sensory input such as sound, video, graphics or GPS data.
 - As a result, the technology functions by enhancing one's current perception of reality.
- Augmentation is **conventionally in real-time** and **in semantic context with environmental elements**
 - Ex: sports scores on TV during a match.



Plan

- *Augmented Reality Definition*

Augmented Reality Market

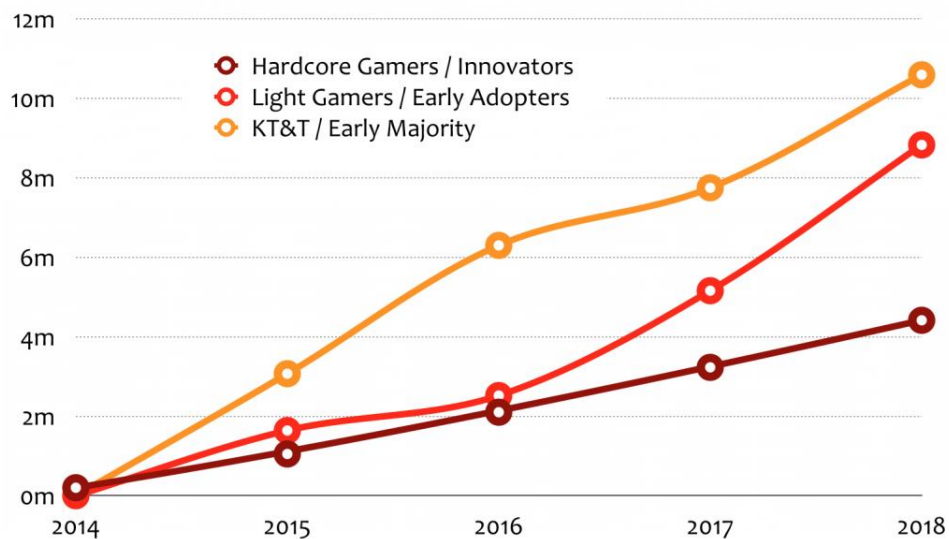
- Augmented Reality vs. Virtual Reality
- Augmented Reality Devices
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- Augmented Reality Applications Examples





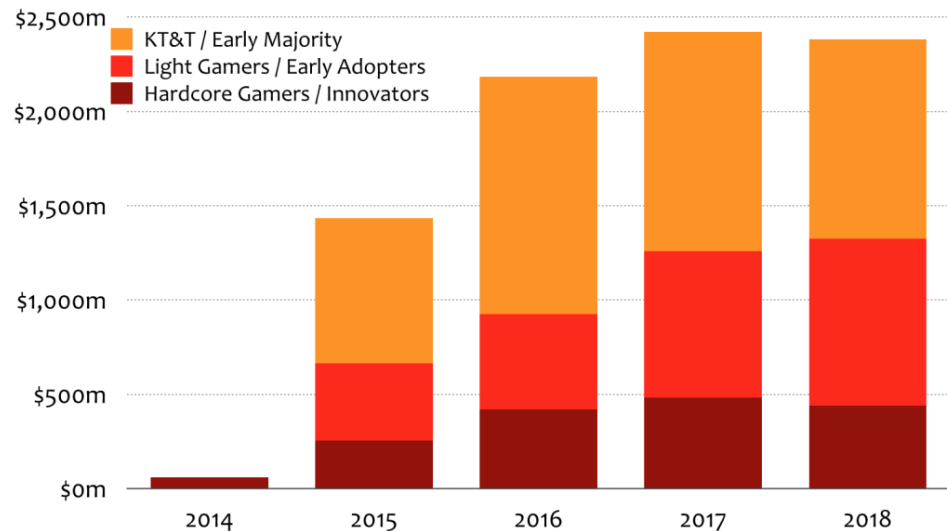
A Growing Market

Annual Unit Sales for Consumer Virtual Reality Devices



KZERO
WORLDWIDE

Annual Revenues for Consumer Virtual Reality Devices



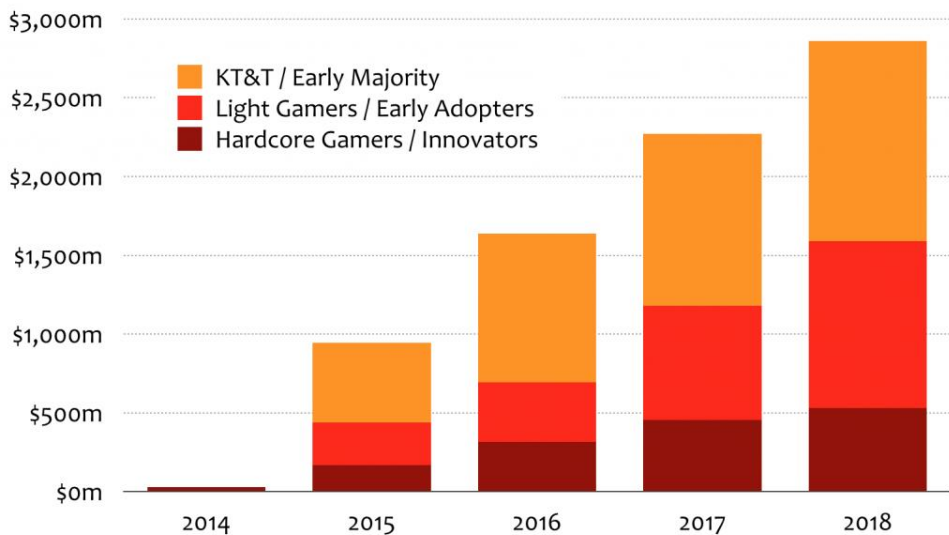
KZERO
WORLDWIDE

Total 2018 annual software revenue is forecasted at \$2.8bn from 47.6m active users. Cumulative software revenue from 2014 to 2018 is estimated at \$7.7bn.

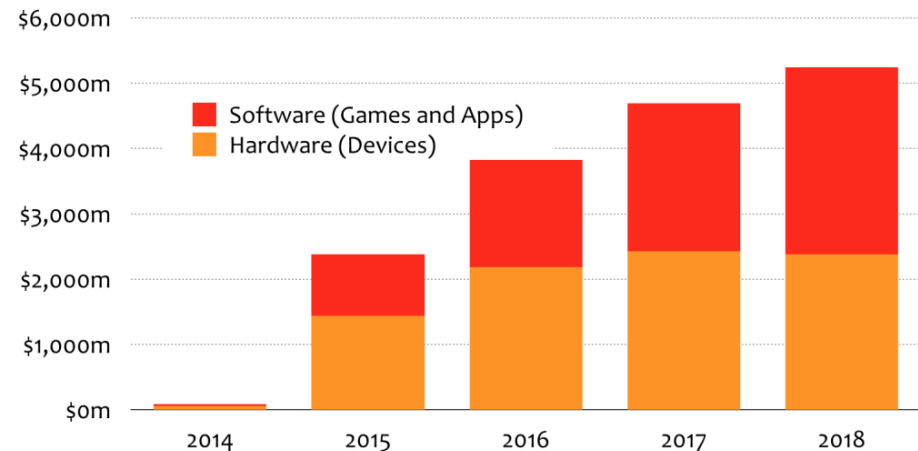


A Growing Market

Annual Game/App Revenues by Type



Hardware and Software Total Revenue for Consumer VR





Plan

- *Augmented Reality Definition*
- *Augmented Reality Market*

Augmented Reality vs. Virtual Reality

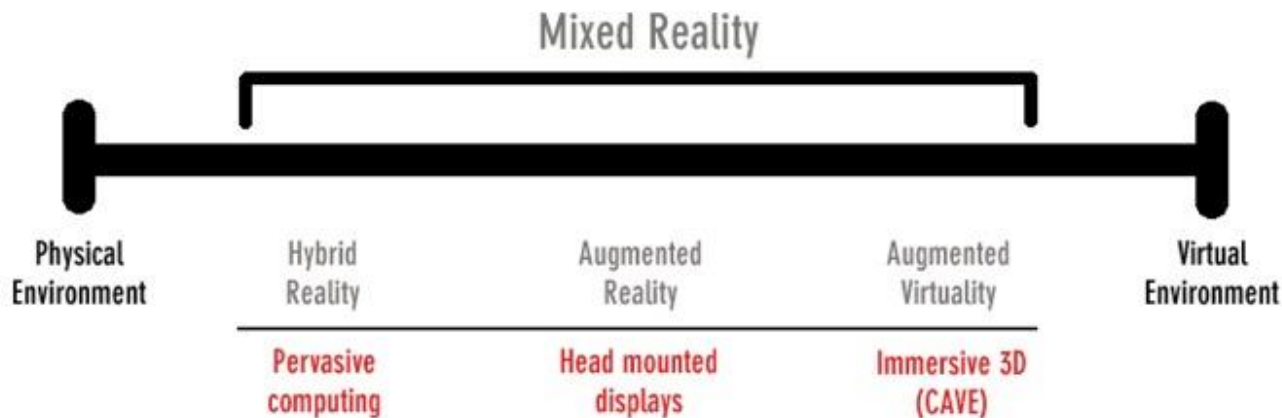
- Augmented Reality Devices
- Augmented Reality Technologies and Platforms
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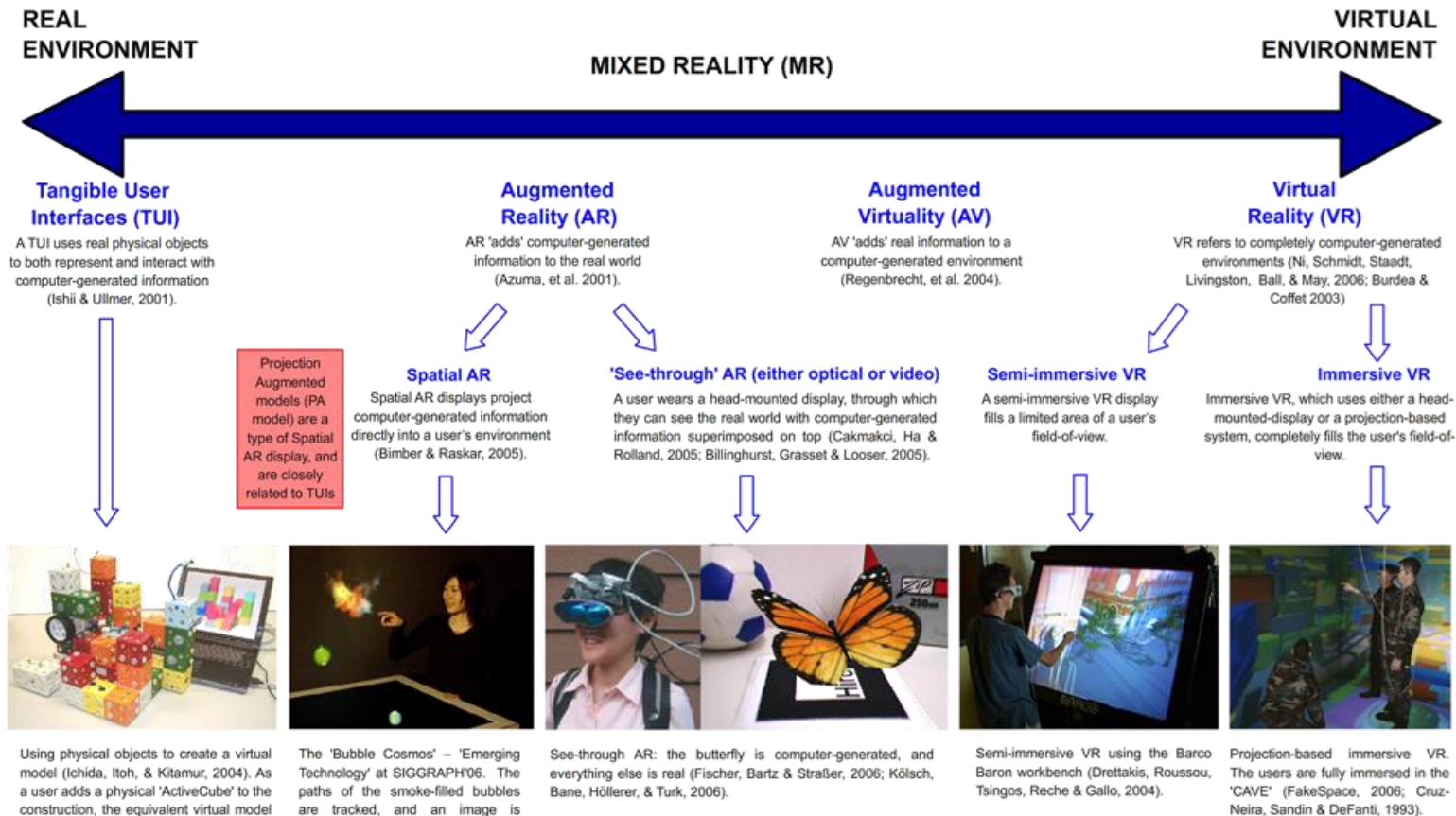
Milgram's reality-virtuality continuum

- In 1994 Paul Milgram and Fumio Kishino defined a mixed reality as "*anywhere between the extrema of the virtuality continuum*", where the **Virtuality Continuum** extends from the completely real through to the completely virtual environment with augmented reality and augmented virtuality ranging between.





Milgram's reality-virtuality continuum



Reality

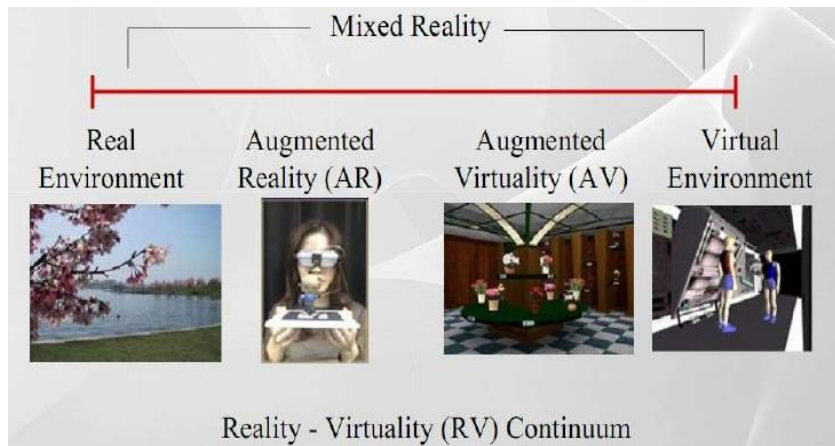


Virtual Reality





Milgram's reality-virtuality continuum



Augmented Reality is the art of superimposing computer generated content over a live view of the world.



Augmented reality is the integration of digital information with live video or the user's environment in real time.



Augmented Reality v.s. Virtual Reality



VR technologies completely immerse a user inside a synthetic environment. While immersed, the user cannot see the real world around him.



In contrast, AR allows the user to see the real world, with virtual objects superimposed upon or composited with the real world.



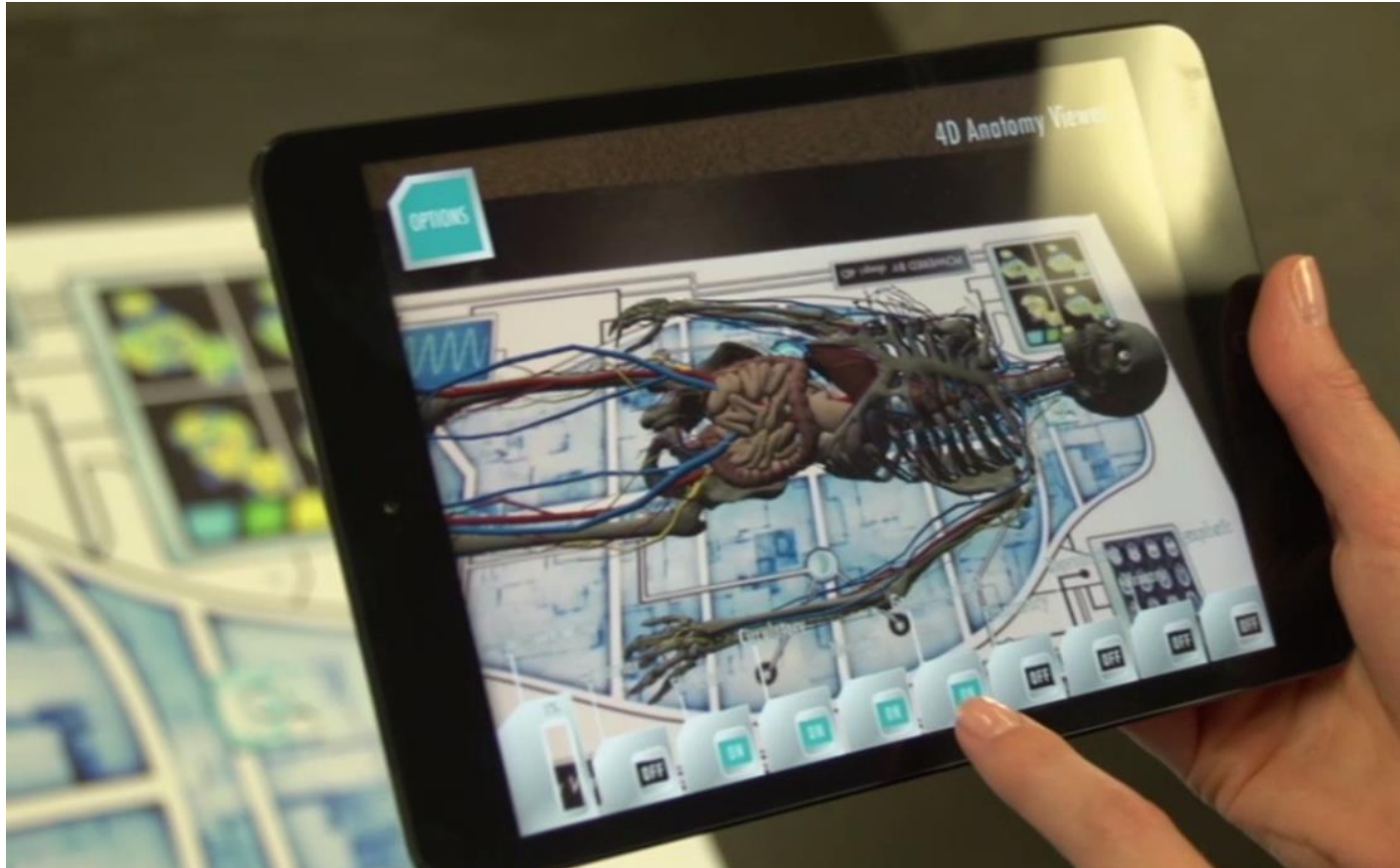


Augmented Reality Example





Virtual Reality Example





Plan

- *Augmented Reality Definition*
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Augmented Reality Interactions

- With the help of advanced AR technology (e.g. adding computer vision and object recognition) the information about the surrounding real world of the user becomes interactive and digitally manipulable.
- Artificial information about the environment and its objects can be overlaid on the real world
- In order to benefit from it you need a dedicated device
 - Laptop or computer
 - Handheld like Smartphone or Tablets
 - Head-Mounted Device (HMDs) often employ sensors for six degrees of freedom monitoring that allow the system to align virtual information to the physical world and adjust accordingly with the user's head movements
 - Smart Glasses
 - Gesture based solution (Kinect, Leapmotion)



Head-Mounted Display (HMDs)

- A head-mounted display or helmet mounted display, both abbreviated HMD, is a display device, worn on the head or as part of a helmet, that has a small display optic in front of one (monocular HMD) or each eye (binocular HMD).
- Basic one
 - [Google CardBoard](#) and [VRase](#) use your smartphone
- HMD available today
 - [Carl Zeiss VR One Plus](#)
 - [HTC Vive](#)
 - [Microsoft HoloLens](#)
 - [OculusVR](#) bought by facebook
 - [Samsung GearVR](#)
 - [Sensics](#) invented the [Smart Goggles](#)
 - [Sony PlayStation VR](#)
 - [Sulon Technologies](#)



Handheld: Google CardBoard



[DAYDREAM](#) [CARDBOARD](#) [JUMP](#) [DEVELOPERS](#) [GOOGLE VR](#)





Head-Mounted Device (HMDs)

vrAse



FEATURES

EXPERIENCE

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FORUMS

FAQ



turn your smartphone into a huge 3D screen !



Head-Mounted Device (HMDs)

META.01


Video






Head-Mounted Device (HMDs)

Oculus



RIFT GEAR VR EXPÉRIENCES DÉVELOPPEURS BLOG


Blog / Dernières publications



VR Action Brawler—Feral Rites from Insomniac Games—Now Available on Oculus Rift

13 septembre 2016


Avenge your father's death in this adventure-brawler. Choose your character, learn new abilities along the way, and master the power to transform into a monstrous...



Oculus Film Short "Henry" Wins an Emmy!

8 septembre 2016


We're thrilled to announce that Henry, the charming VR film from Oculus Story Studio, has won an Emmy® for Outstanding Original Interactive Program!...



Damaged Core is a New Kind of Shooter for VR—Available Now on Rift


30 août 2016

Damaged Core launches today from High Voltage. Damaged Core is a new kind of shooter...



Gear VR

En savoir plus



Rift

En savoir plus



HMD: OSVR HDK

- The OSVR HDK presents a more modular approach than any other headset currently known about.
- While its resolution is just about identical to Oculus' DK2 devkit, its open-source nature means it's 3D-printable and allows for nearly unfettered modification and addons.

The screenshot shows the OSVR website with a dark theme. At the top is a navigation bar with the Razer logo, links for PRODUCTS, STORE, SUPPORT, and COMMUNITY, and a search bar. Below the navigation bar is a breadcrumb trail: RAZER / OSVR. The main content area features the OSVR logo (an orange square with 'OS' and 'VR' stacked, followed by 'OSVR' in orange text). To the right is a large image of the OSVR HDK headset, which is black with orange accents and the OSVR logo. Below the logo, a paragraph states: 'Razer is part of the Open-Source Virtual Reality (OSVR) ecosystem, a new standard in VR gaming to push the VR gaming experience forward and supporting the venture with the **OSVR Hacker Dev Kit**, a virtual reality device and open-source software that enables programming for any variety of VR technology.' Below this is a section titled 'WHAT IS OSVR?' with a paragraph explaining that OSVR™ stands for Open Source Virtual Reality and is an ecosystem designed to set an open standard for VR input devices, games, and output. At the bottom, there are two green buttons: 'MORE ABOUT OSVR >' on the left and 'OSVR HACKER DEV KIT >' on the right. Above the latter button is the text 'Want to develop for OSVR? Find our how to get your own kit.'




HMDs Compared



Model	Oculus Rift	HTC Vive	PS VR
In the box	Headset, motion sensor, wireless Xbox One controller, remote, 2x games, and cables	Headset, 2x motion tracking cubes, 2x wireless controllers, link box, earbuds, and cables	Headset, processor unit, camera, earbuds, 2x PS Move controllers, 1x game, and cables
Headset price	~\$599	~\$799	\$460
PC/VR bundle cost	~\$1,500	~\$1,800	\$800+
Release date	3/28/2016	4/5/2016	10/1/2016
Display	AMOLED	OLED	OLED
Resolution	1200 X 1080 (per eye)	2160 X 1200	1920 X 1080
Field of view	110	110	100
Headset weight	~1.03 lbs.	1.21 lbs.	1.34 lbs.
Platform	Oculus, Steam VR	Steam VR	PlayStation
Operating system	Windows 7 or newer	Windows 7 or newer	PlayStation 4
Refresh rate (higher is better)	90Hz	90Hz	120Hz, 90Hz
Controllers	Xbox One wireless controller	Wireless controllers	PS4 wireless controllers
Number of games on launch	30	30+	50 by EOY
Pass-through camera	No	Yes	No
Connections needed	HDMI, 3x USB 3.0, 1x USB 2.0	HDMI, 3x USB 3.0, 1x USB 2.0	HDMI, USB, separate processor unit
Recommended PC requirements	Nvidia GTX 970/AMD R9 290, Intel i5-4590, 8GB RAM, HDMI 1.3	Nvidia GTX 970/AMD R9 290, Intel i5-4590/AMD FX 8350, 4GB RAM, HDMI 1.4	PlayStation 4

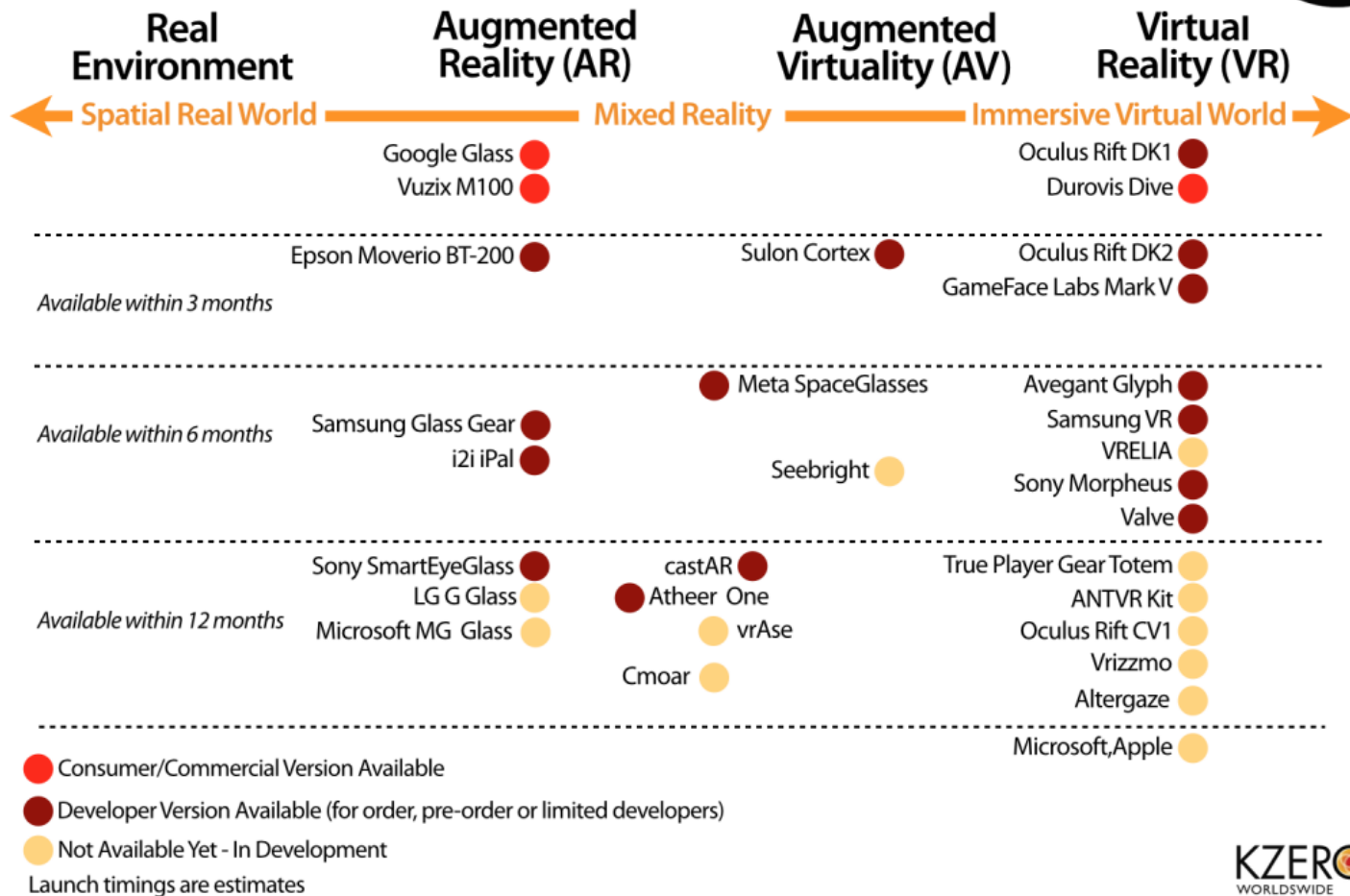


HMDs Compared

 www.connectedlab.com	HTC Vive (Expected: Q4 2015)	Sony Playstation VR (Expected: Q1 2016)	Oculus Rift CV1 (Expected: Q1 2016)	Oculus Rift DK2 (Discontinued)	Starbreeze Studios StarVR (Expected: Q4 2017)	Samsung GearVR Consumer Version (Expected: Q4 2015)
Field of View	>110 degrees	90 degrees	>110 degrees	100 degrees	210 degrees	96 degrees
Resolution	2160x1200 (1080x1200 per eye)	1920x1080 (960x1080 per eye)	2160x1200 (1080x1200 per eye)	1920x1080 (960x1080 per eye)	5120x1440 (2560x1440 per eye)	2560x1440 (1280x1440 per eye)
Refresh Rate	90Hz	90Hz	90Hz	75Hz	60Hz	60Hz with low persistence
Panel Type	OLED	OLED	OLED	AMOLED	TFT	AMOLED
Tracking	Lighthouse Roomscale Positional Tracking	'PlayStation Eye' Positional Tracking	'Constellation' Positional Tracking	Camera based Positional Tracking	Maker based Positional Tracking	Rotational Tracking only



Augmented & Virtual Reality Device Spectrum





Smart Glasses

- Wearable computing device in the form of computerized eyeglasses.
- Also called optical head-mounted display (OHMD), which is a wearable display that has the capability of reflecting projected images as well as allowing the user to see through it.
 - Early smart glasses had limited functionality and typically were simply miniature video monitors that were plugged into a video source.
 - Modern devices typically possess enhanced data processing functionality similar to a smartphone or tablet, are able to run mobile apps and include specialty features such as augmented reality overlays and GPS and mapping capability.



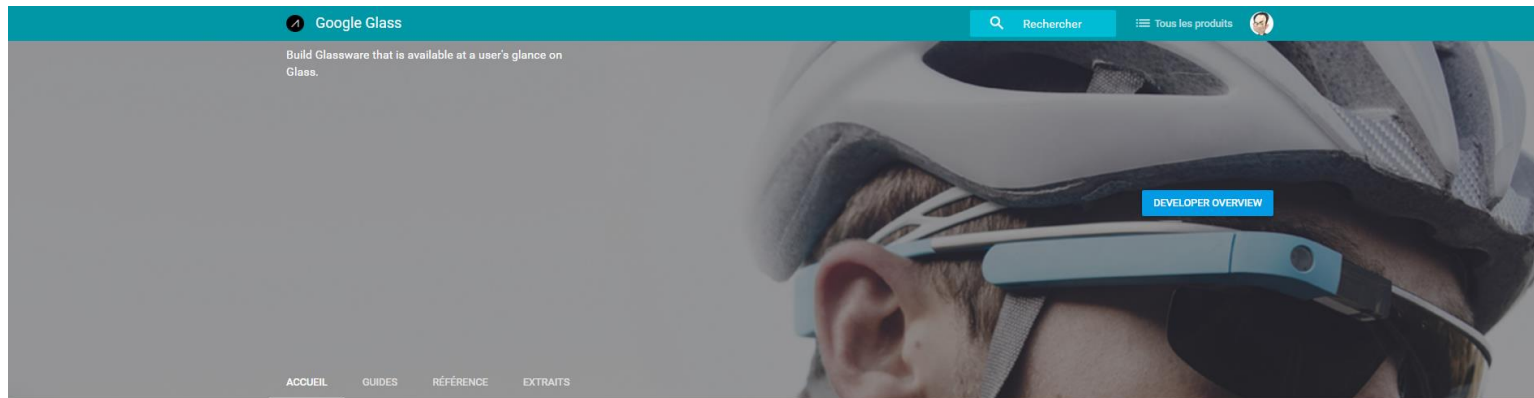
Smart Glasses

- [APX labs](#)
- [Arglass by Optinvent](#)
- [Epson Moverio BT-200](#)
- [EyeBorg Eyecam 3.0](#)
- [Google Glass](#)
- [Laster Wave](#)
- [Lumus](#)
- [Meta AR Eyeglass Hologram Computer](#)
- [Sony HMZ-T1 Personal 3D Viewer](#)
- [Penny Interactive Glasses](#)
- [Vuzix](#) comes the M100 smart glasses





Smart Glasses: Google Glass



Design before you develop

Understand our design principles and patterns before you write a line of code. When you start coding, follow Glass patterns and style, when appropriate, to give users a consistent user experience.



Learn the design principles

These principles describe the core of a great Glass experience, so apply them when designing and building.



Choose a design pattern

We've come up with a few patterns that work well on Glass. Use them to create consistent experiences.



Use Glass style and templates

Use the provided UI guidelines and templates to help you design and build Glassware correctly.



Use the Glassware Flow Designer

Collaboratively design in our web-based tool to visualize your Glassware flow and get early design feedback from the review team.



Smart Glasses: APX Lab

APX

HOME SKYLIGHT CUSTOMERS PARTNERS NEWS & BLOG COMPANY

APX AND RECON

New solutions for high-intensity environments

LEARN MORE

∨
○ ●

The world's leading enterprise smart glasses software platform

<http://www.apx-labs.com/skylight/>



Smart Glasses: Optinvent

The screenshot shows the Optinvent website with a dark theme. At the top is the Optinvent logo in green and white. To its right is a white button labeled "ORDER NOW". Below the logo is a navigation bar with links: "HOME" (highlighted in green), "ORA", "R&D", "COMPANY", and "CONTACT". The main banner features a large image of the ORA head-mounted display (HMD) glasses, which are black with blue accents. To the right of the image, the text "SEE-THROUGH EYEWEAR" is displayed in large, bold, white letters. Below this, a smaller line of text reads: "ORA head-mounted display allows hands-free simultaneous vision of a virtual image and the real world." Below the banner are three columns of content. The first column shows a woman wearing red-rimmed glasses, with the text "LIGHT AND SMART" and "See-through eyewear with 'Flip-Vu' Introducing ORA". The second column shows a man wearing sunglasses, with the text "IMAGINE ..." and "... All you can do with a wearable display". The third column shows a pair of glasses, with the text "PRE-ORDER" and "Optinvent is about to release a best-in-class see-through display software development kit". Each column has a "MORE" or "BUY" button at the bottom.

Optinvent ORDER NOW

HOME ORA R&D COMPANY CONTACT

SEE-THROUGH EYEWEAR

ORA head-mounted display allows hands-free simultaneous vision of a virtual image and the real world.

LIGHT AND SMART

See-through eyewear with "Flip-Vu" Introducing ORA

IMAGINE ...

... All you can do with a wearable display

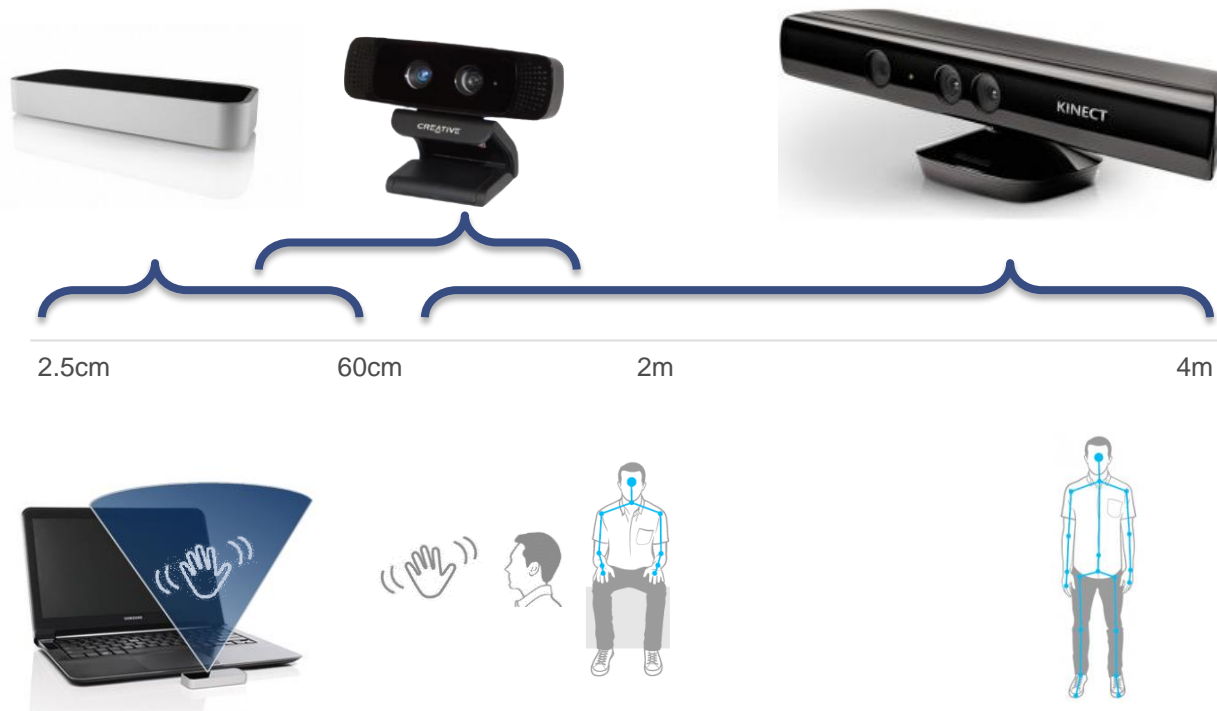
PRE-ORDER

Optinvent is about to release a best-in-class see-through display software development kit

MORE MORE BUY



Gesture Based Solution





Gesture Based Solution

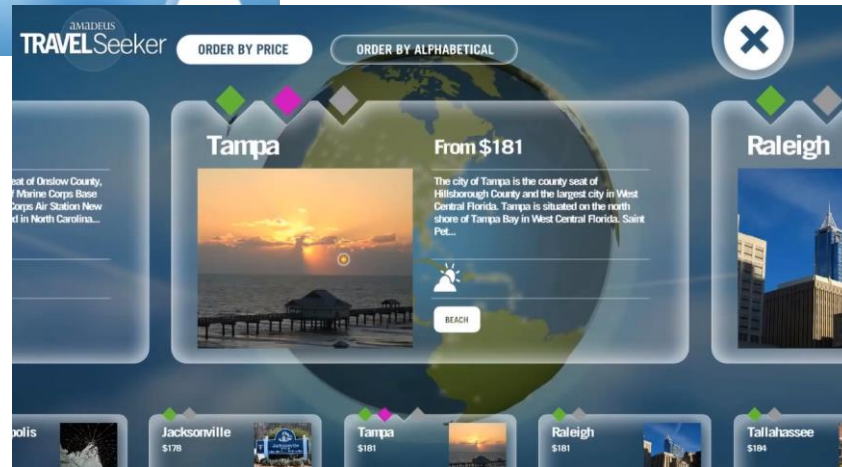




Gesture Based Solution



Amadeus Travel Seeker





Mash Up VR and Hand-Tracking

- Leap Motion and the OSVR open-source ecosystem announced a partnership that would allow Razer's [OSVR HDK](#) (hacker development kit) to ship later this year with a Leap Motion sensor embedded in its faceplate.
- Leap Motion shipped a \$20 mount that could attach its sensor to the front of an Oculus Rift devkit.





Plan

- *Augmented Reality Definition*
- *Augmented Reality Market*
- *Augmented Reality vs. Virtual Reality*
- *Augmented Reality Devices*

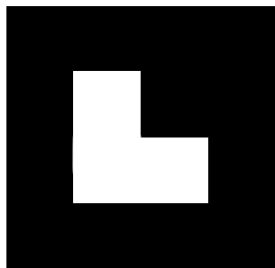
Augmented Reality Technologies and Platforms

- Augmented Reality Applications Examples

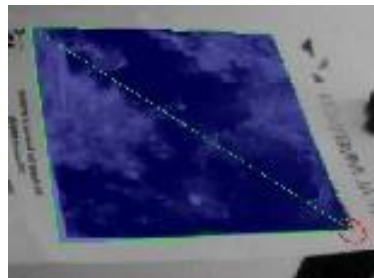




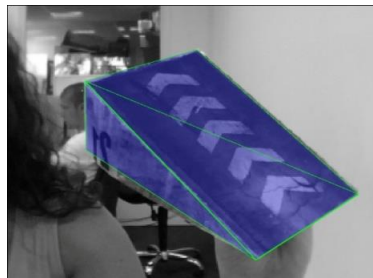
Key Tracking Technologies



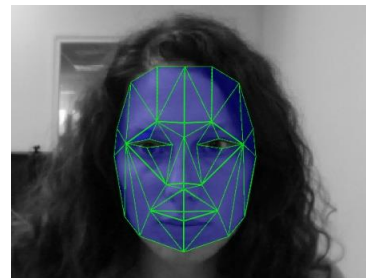
Marker Tracking



Marker Less
Tracking



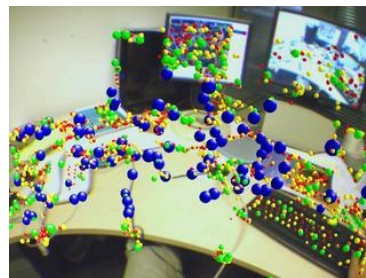
3D Object Tracking



Face Tracking



Motion detection &
Tracking



Environment
Tracking



Marker Based (“Black Square”)

- One method for an AR system to recognize elements of the physical world is through the use of so-called ‘markers’ that, when processed through the camera, alert the system that relevant information for overlay can be downloaded from the Internet.
- A marker, generally a black square is used by the app on the mobile as a placeholder for “augmented information” to be displayed.
- As is the case with many encoded markers or tags, QR (Quick Response) codes were originally conceived for use in the industrial sector to rapidly scan and track products along the supply chain.
- With the advent of the Internet-enabled smartphone and accompanying camera, apps have been developed to allow the wider public to scan these codes and access further information.



Marker Based (“Black Square”)

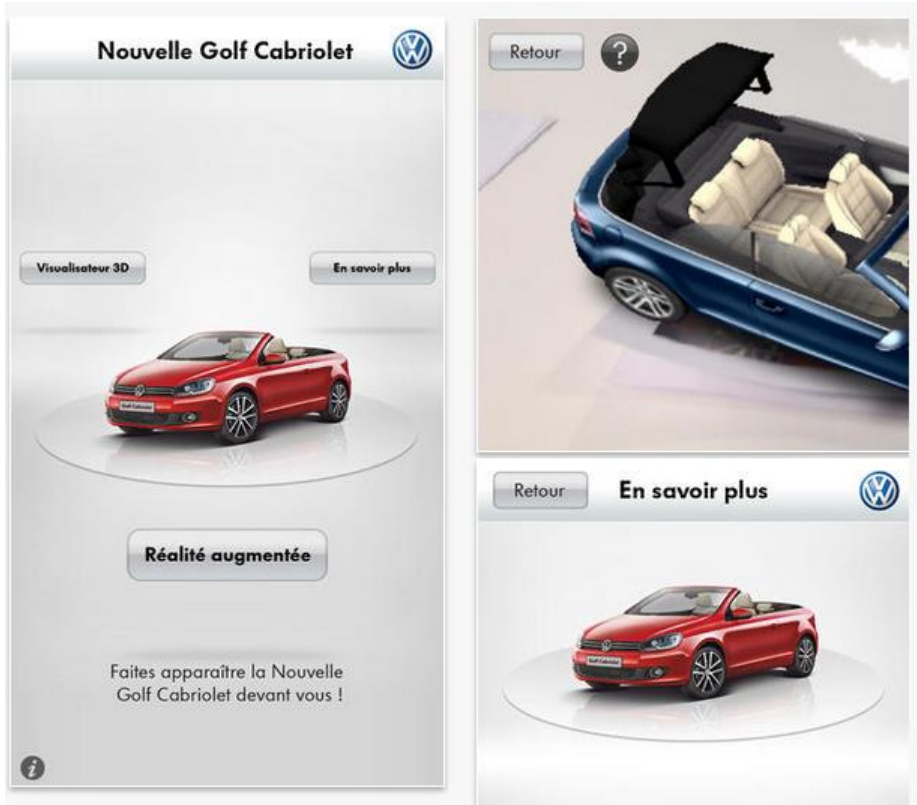
- Marker-based AR uses a camera and a visual marker to determine the center, orientation, and range of its spherical coordinate system.
- Most of the time, the applications using markers are based on open source technology.
- QR codes have found common use in AR as markers, particularly due to the fact that they are well suited for use where mobile devices are concerned.





Marker Based (“Black Square”)

Marker





Marker Based (“Black Square”)





Ex: Augmented Reality With Markers



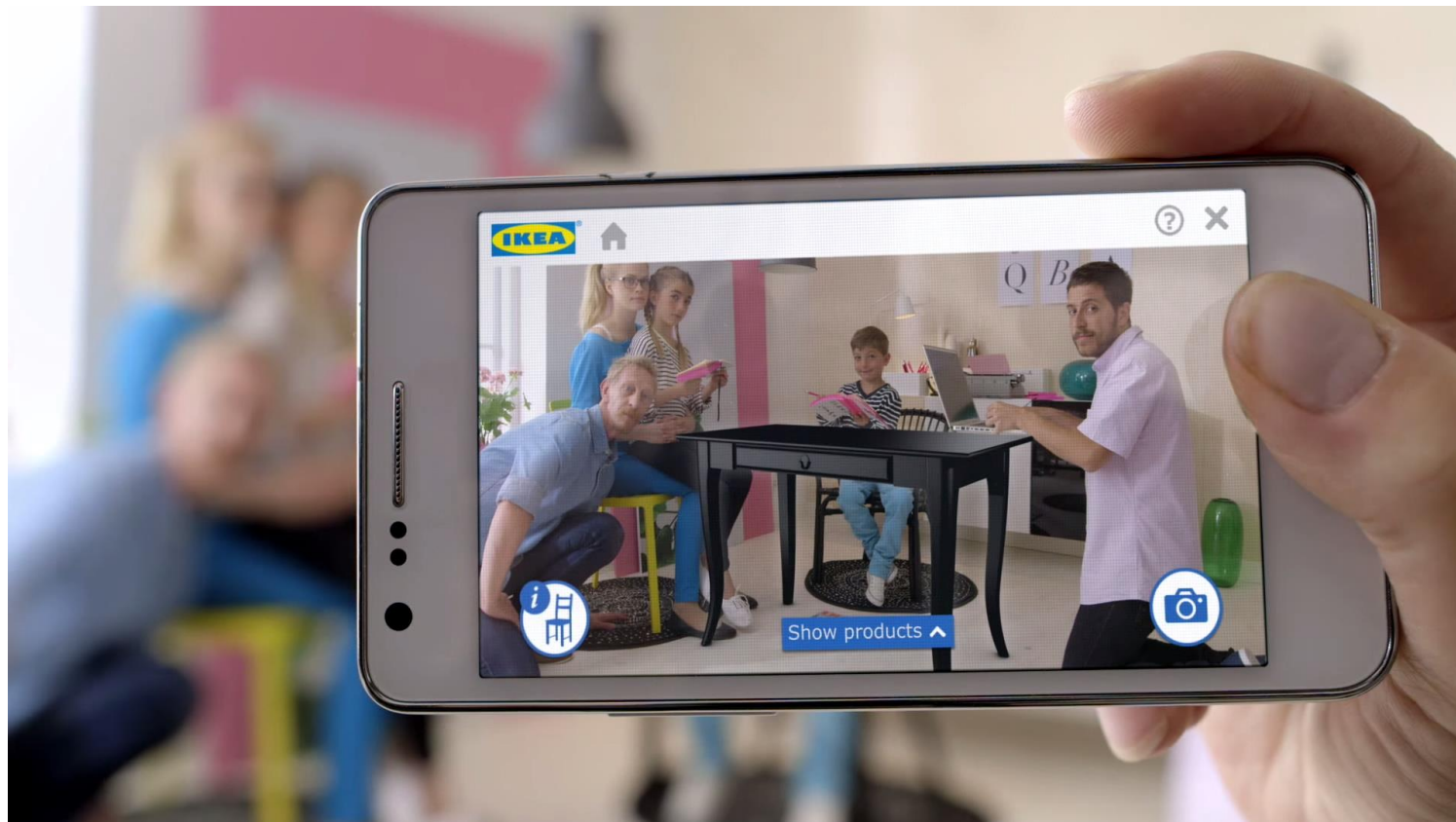


Ex: Augmented Reality With Markers





Ex: Augmented Reality With Markers





Markerless Tracking (Images)

- Where the intention to present AR is in a particularly dynamic environment, such as while on the move, outside and so on, it is infeasible that markers will be positioned on the majority of surrounding objects.
- Consequently, in the majority of envisioned use cases, where markers are unavailable, an image recognition system is required.
- Owing to the fact that real-world entities, such as humans, vehicles and buildings present far greater complexity to the system than a simple 2D marker, image recognition software requires high processing power.
 - Passive: the user simply views AR through a suitable display, where the camera is orientated away from the user (view-only mode, where the user does not interact directly with the AR presentation).
 - Active: the user is tracked by a camera and analyses of these movements are translated to the image display.



Markerless Tracking (Images)

- Active tracking and recognition of real environment on any type of support without using special placed markers.
- Example of recognition of Lego box.





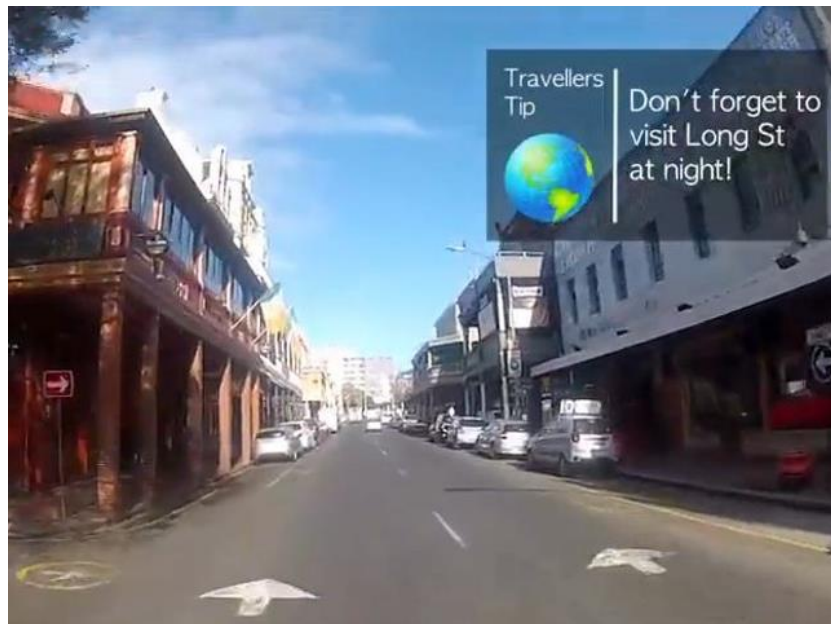
Location Based Tracking

- Refers to tracking based on geo-location information obtained from the device's location sensors (longitude, latitude, altitude, compass bearing, accelerometer readings for pitch and roll).
 - This term is used to make a distinction between systems that rely on location sensors alone in contrast to systems that can track objects using optical (image recognition) techniques.
 - Location based tracking is generally less accurate than optical methods and only works in outdoor environments.





Google Glass Travel Guide

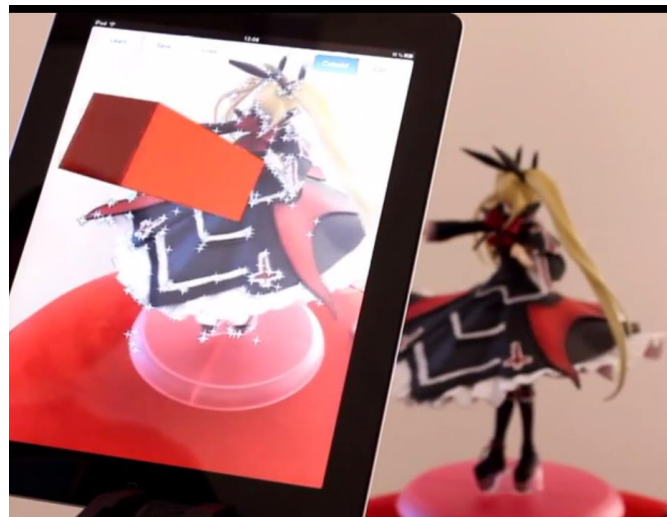


Source: [PSFK](#)




Simultaneous localization and mapping (SLAM)

- Technique used by robots and autonomous vehicles to build up a map within an unknown environment (without a priori knowledge), or to update a map within a known environment (with a priori knowledge from a given map), while at the same time keeping track of their current location.
- Enable a 360 degrees augmented view (see [video](#))





SLAM

 **PointCloud**

Register [Log in](#)

PointCloud SDKForum

OverviewDocumentationApplication keysDownloadGenerate Image TargetsTerms of useBranding guidelines

PointCloud SDK for iOS

Introduction

PointCloud SDK is a free library that lets you build iOS applications that have advanced computer vision capabilities like Simultaneous Localization and Mapping (SLAM) and image detection and tracking.

Features

- Simultaneous Localization and Mapping (SLAM)
- Save and load 3d SLAM maps
- Fast and robust image detection and tracking
- Free, even for commercial applications!

Documentation

The PointCloud SDK documentation is [available here](#).

Application keys

To use the PointCloud SDK, you need to request an application key. [You can request the key here](#).

Download

PointCloud SDK is [available for download for free](#). Don't forget to [request an application key](#), and make sure to checkout the




AR to Learn and Train

[Home](#) [Animation](#) [Training & Simulation](#) [Life Sciences](#) [Education](#) [Company](#)


Human Intelligence and Interrogation Training

LIVE can be scaled for use in non-combat scenarios like interrogations, organizational crisis management, and leadership training. The most effective way to teach or enhance these skills is through scenario-based training, where the trainer uses role-play to help trainees navigate complex, context-dependent situations. A trainer or subject matter expert can convincingly become any avatar, and project that avatar to interact with a trainee in any location, either locally or remotely. Facial expressions, eye movement, body language, and voice are all captured and broadcast through LIVE's avatars.



Real-time training with LIVE Digital Characters

The role-player steps into a capture portal and is projected as a high definition LIVE digital character into a live training scenario in real-time. No need to pre-record branching video or animated scenes. The digitally animated character's movement, speech and gestures exactly mimic the role-player and facilitate an interactive two-way dialogue in a natural and intuitive manner. This is not a recorded character but an actual live person interacting with trainees who view that person as any intended digital character. LIVE uses the latest voice modulation software, projection and targeting technology to create a completely immersive training capability.

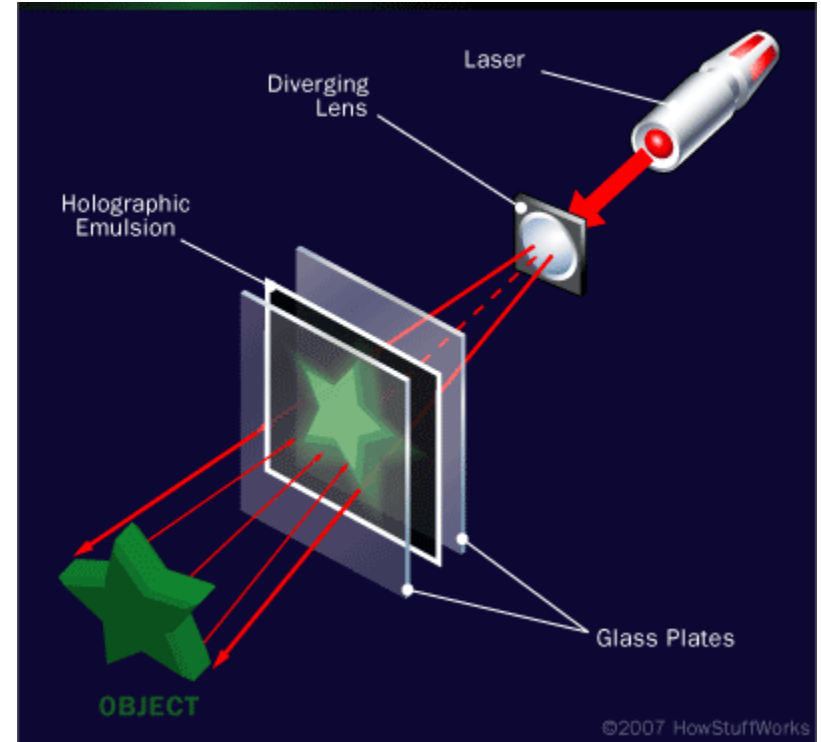


Source: [Organic Motion](#)



Holography

- Holography is a technique that enables a light field, which is generally the product of a light source scattered off objects, to be recorded and later reconstructed when the original light field is no longer present, due to the absence of the original objects.





Holography vs. Photography

- A hologram represents a recording of information regarding the light that came from the original scene as scattered in a range of directions rather than from only one direction, as in a photograph.
 - This allows the scene to be viewed from a range of different angles, as if it were still present.
- A photograph can be recorded using normal light sources (sunlight or electric lighting) whereas a laser is required to record a hologram.
- A lens is required in photography to record the image, whereas in holography, the light from the object is scattered directly onto the recording medium.
- A holographic recording requires a second light beam (the reference beam) to be directed onto the recording medium.
- A photograph can be viewed in a wide range of lighting conditions, whereas holograms can only be viewed with very specific forms of illumination.



Holography vs. Photography

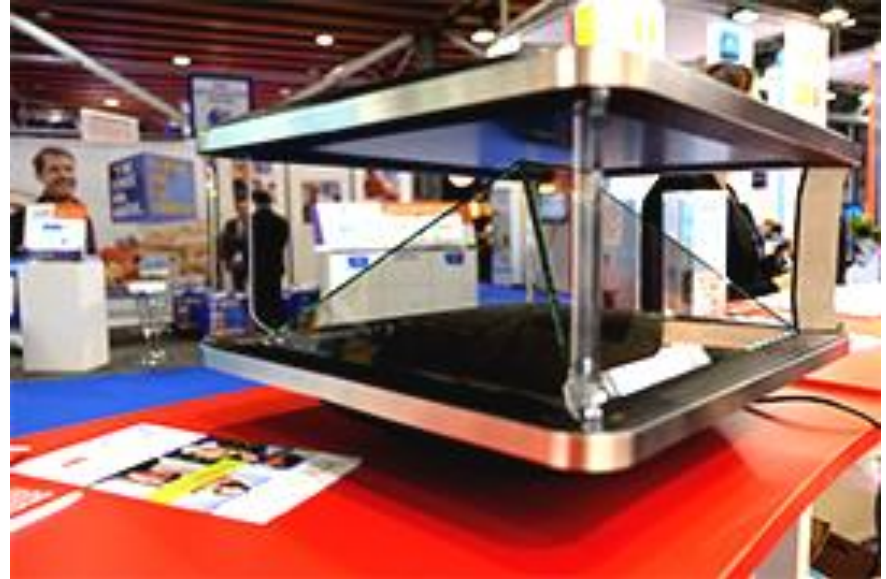
- A photograph is a two-dimensional representation that can only reproduce a rudimentary three-dimensional effect, whereas the reproduced viewing range of a hologram adds many more depth perception cues that were present in the original scene. These cues are recognized by the human brain and translated into the same perception of a three-dimensional image as when the original scene might have been viewed.
- A photograph clearly maps out the light field of the original scene. The developed hologram's surface consists of a very fine, seemingly random pattern, which appears to bear no relationship to the scene it recorded.



Hologram



<https://youtu.be/GtbBpjPPR7Y>



<http://www.holusion.com/>



Mini Augmented Reality



Mini Augmented Vision



Sony ...





Google Cardboard



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Google Cardboard

Experience virtual reality in a simple, fun, and inexpensive way.



<https://www.google.com/get/cardboard/>



Location Based Tracking

- Refers to tracking based on geo-location information obtained from the device's location sensors (longitude, latitude, altitude, compass bearing, accelerometer readings for pitch and roll).
 - This term is used to make a distinction between systems that rely on location sensors alone in contrast to systems that can track objects using optical (image recognition) techniques.
 - Location based tracking is generally less accurate than optical methods and only works in o





Simultaneous Localization And Mapping

- Simultaneous localization and mapping (SLAM)
 - Technique used by robots and autonomous vehicles to build up a map within an unknown environment (without a priori knowledge), or to update a map within a known environment (with a priori knowledge from a given map), while at the same time keeping track of their current location.
 - Enable a 360 degrees augmented view (see [video](#))





Augmented Reality Browsers

- The use of the term “AR browser” suggests these products are comparable to generic web browsers such as Internet Explorer.
- But while both are technically HTTP user agents and consume content from the web, the comparison ends there.
- Generic web browsers all adhere more or less strictly to a set of standards for mark-up and therefore different browsers can consume and render the same web content in a consistent manner.
- In contrast standards for augmented reality applications are still in their infancy and there is no interoperability between AR “browsers”.
 - This means that content cannot be shared between different AR browsers



Augmented Reality Browsers

Augmented Reality Markup Language (ARML)

- Augmented Reality Markup Language (ARML) is a data standard to describe and interact with augmented reality (AR) scenes.
 - It is developed within the Open Geospatial Consortium (OGC) by a dedicated ARML 2.0 Standards Working Group.
- ARML consists of both an XML grammar to describe the location and appearance of virtual objects in the scene, as well as ECMAScript bindings to allow dynamic access to the properties of the virtual objects, as well as event handling



Augmented Reality Browsers

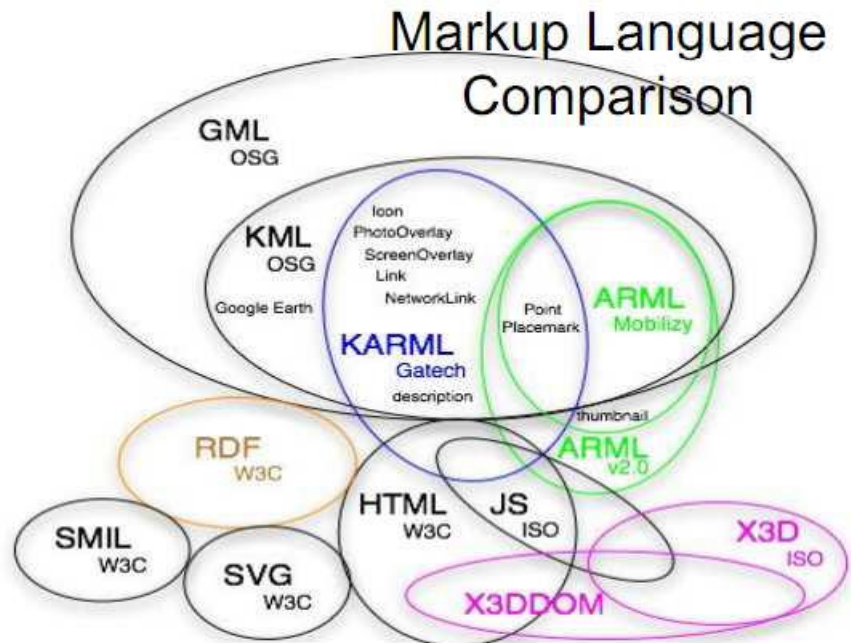
X3D Standard

- X3D is a royalty-free open standards file format and run-time architecture to represent and communicate 3D scenes and objects using XML.
- It is an ISO ratified standard that provides a system for the storage, retrieval and playback of real time graphics content embedded in applications, all within an open architecture to support a wide array of domains and user scenarios.
- The development of real-time communication of 3D data across all applications and network applications has evolved from its beginnings as the Virtual Reality Modeling Language (VRML) to the considerably more mature and refined X3D standard.



Augmented Reality Browsers

Markup Language Comparison





Augmented Reality Browsers

- [Argon](#), [Arlab](#), [Aurasma](#), [Layar](#), [Mixare](#) (open source), [Wikitude](#)
- Two majors ones are:
 - [Wikitude](#) uses location-based content from social media and groups data based on certain business niches and verticals. Wikitude allows for scanning print journals, magazines, brochures, ads and labels for 3D entries.
 - Wikitude SDK is compatible with most of development platforms and frameworks including iOS, Android, tablet, smart glasses, PhoneGap, Cordova, Tamarin, Titanium, Unity 3D and others.
 - [Layar](#), unlike Wikitude, aims to revive and augment static content pages (e.g., journals, magazines, booklets).
 - Besides offering the Layar browser app and building bespoke AR solutions for clients, Layar offers its own SDK and value-added services to application developers. Using them, developers can create AR layers and integrate them in their app with PhoneGap framework plugin. Layar SDK isn't free of charge and publishing through it requires purchasing additional page credits.



Augmented Reality Platforms

- Augment
- Eon Reality
- Hoppala: world's largest content platform for geo based AR
- Jaunt
- OnVert
- OpenHybrid
- String
- Total Immersion
- Vuforia



Layar

CUSTOM SOLUTIONS



LAYAR APP SERVICE

With Layar App Service, we build you your own iOS or Android applications so that you can provide a custom-branded experience to your users.



LAYAR SDK

With the Layar SDK, you can embed Layar's technology into your own app, creating a unique experience for readers while maintaining brand identity.



LAYAR CONNECT API

Plug directly into our image recognition and interactive print creation servers to allow your own backend systems to build and publish content in bulk.

layar

AUGMENTED REALITY

PRODUCTS

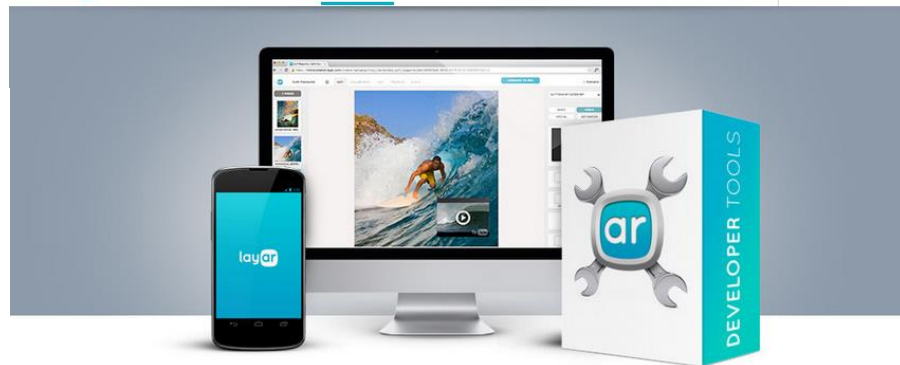
PRICING

NEWS

ABOUT

SUPPORT

LOGIN

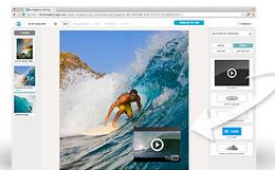


THE BEST PRODUCTS AND SERVICES IN ONE FAMILY.

LAYAR APP

With over 38 million downloads for iOS and Android, Layar is the #1 app in the market for viewing and engaging with interactive print.

LEARN MORE



LAYAR CREATOR

Your tool for enhancing print with digital content. The easy-to-use Layar Creator is everything you need to build and manage engaging interactive print campaigns.

LEARN MORE



Wikitude

Wikitude is more than just an app and augmented reality SDK. Over the past five years, Wikitude has grown to become the leading augmented reality platform.

[Learn more now!](#)

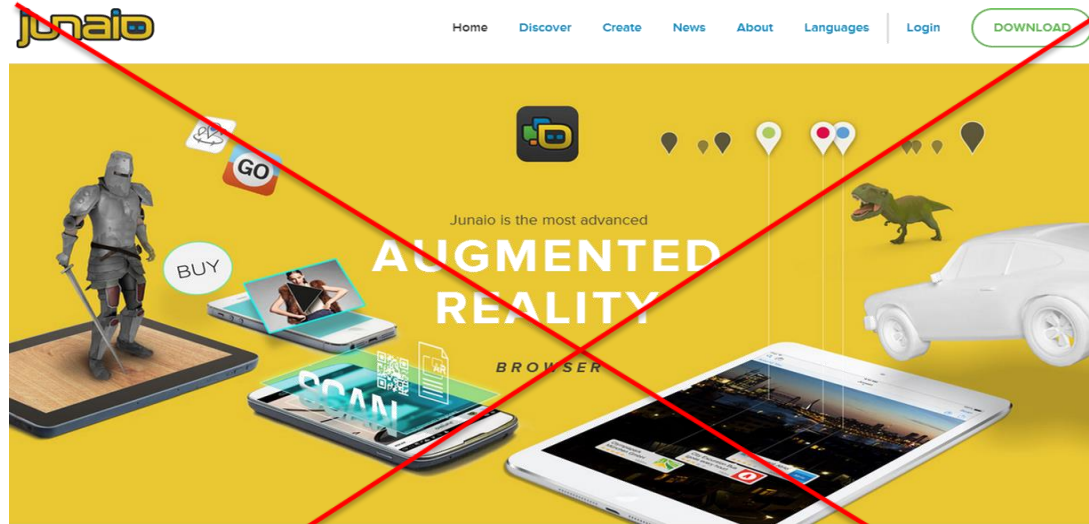


- Wikitude world Browser is widely regarded as the king of all augmented reality browsers
 - While using your smartphone's camera in a given area, the virtual browser (along with more than 3,500 associated content providers) offers you just about any geographically-relevant information you may find valuable in your travels.
- Moreover, the app allows users to find hotels and similar accommodations through Yelp, TripAdvisor, and the like, while offering mobile deals and coupons for local stores in the vicinity.



Junaio

Bought by Apple



The Junaio AR Browser App

Journey into an augmented world. Browse through thousands of channels offering digital information and content connected to real products, locations, newspapers and billboards all around the world!

[Discover >](#) [Create >](#)



Augmented Reality JS API

- [awe.js](#)
- [Three.js](#)



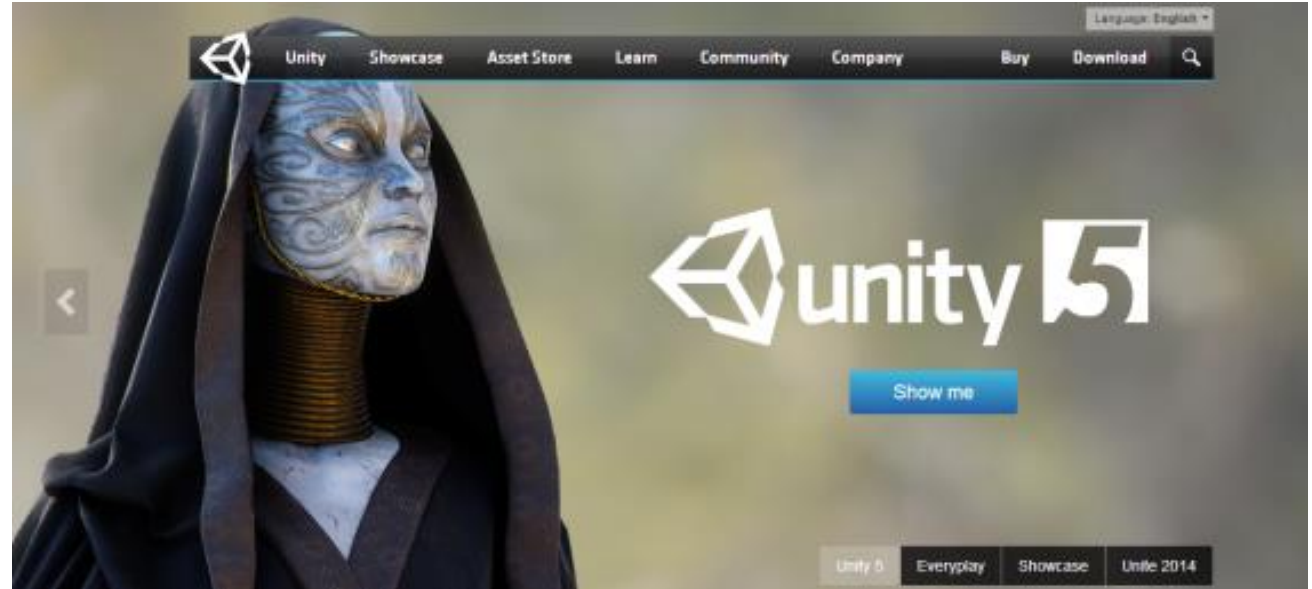
Augmented Reality Providers

- ARToolworks: camera-based augmented reality, first showing its core product - ARToolKit
- Atheer Labs: Gesture-based 3D Augmented Interactive RealityPlatform for the enterprise
- Blippar: AR marker based platform
- Catchoom: Image Recognition and Augmented Reality tools.
- Daqri: Editor of Daqri 4D studio
- InGlobe Technologies: development of Augmented Reality solutions and Perceptual Computing systems.
- Innovega: eyewear-based platforms based on the patented iOptik™ display system



Technologies: Virtual Reality Engine

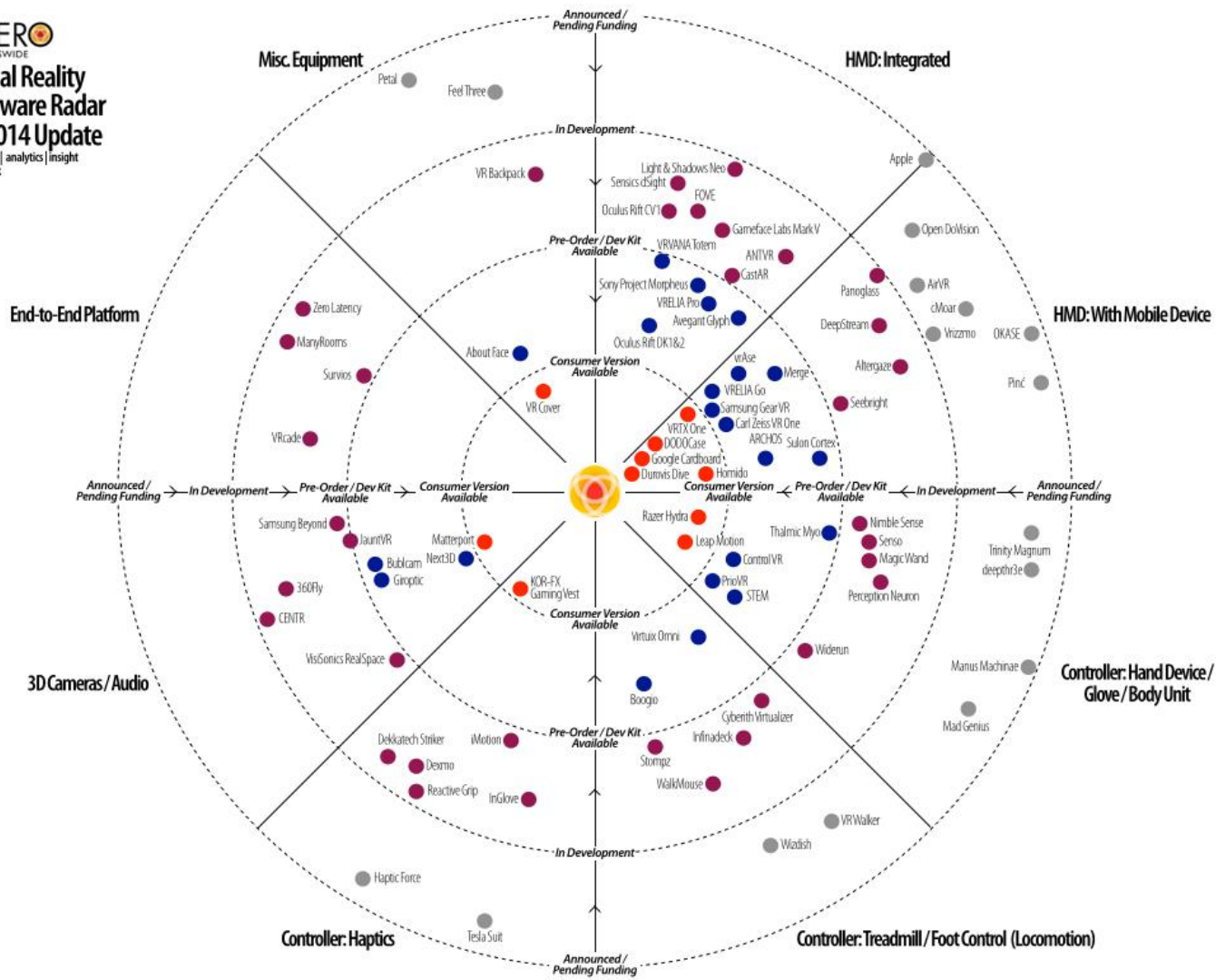
- Virtual Universe
 - [ExitReality](#)
 - [LindenLab](#)
 - [VrSIM](#)
 - [unity3D](#)





Virtual Reality Hardware Radar Q4 2014 Update

consulting | analytics | insight
kzero.co.uk





Development Companies

- Glorar
 - Specialized in 3D app on mobile, works with AR23D design company if needed
- Immersion
 - Company in France specialised in AR
- Total Immersion
 - AR for Brands
- Kudan
 - Augmented reality provider
- Marxent Labs
 - Mainly developing on Vuforia
- Merchlar
 - Design Agency (AR)



Plan

- *Augmented Reality Definition*
- *Augmented Reality Market*
- *Augmented Reality vs. Virtual Reality*
- *Augmented Reality Devices*
- *Augmented Reality Technologies and Platforms*

Feeling and Sensing

- **Augmented Reality Applications Examples**





Virtual Reality You Can Feel



AxonSkin interior lining

- Thermal and tactile feedback

Two-piece suit with gloves and boots

- Full-body coverage


Quick "snap" connectors

- Pair AxonSuit with AxonStation



VIRTUAL REALITY YOU CAN FEEL



A person wearing a VR headset and a full-body motion capture suit is captured in mid-air, jumping over a dark, curved ledge. The person's arms are outstretched, and their legs are bent in a jumping motion. The background is a vibrant pink with a geometric pattern of overlapping triangles.


POWERED BY AXONVR

We bring lifelike touch to digital experiences.

We won't stop until you can't tell what's real from what's virtual.





Virtual Reality You Can Feel

 PrioVR™

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Update: Check out the new Cyberith and PrioVR video below. [Watch Video](#)

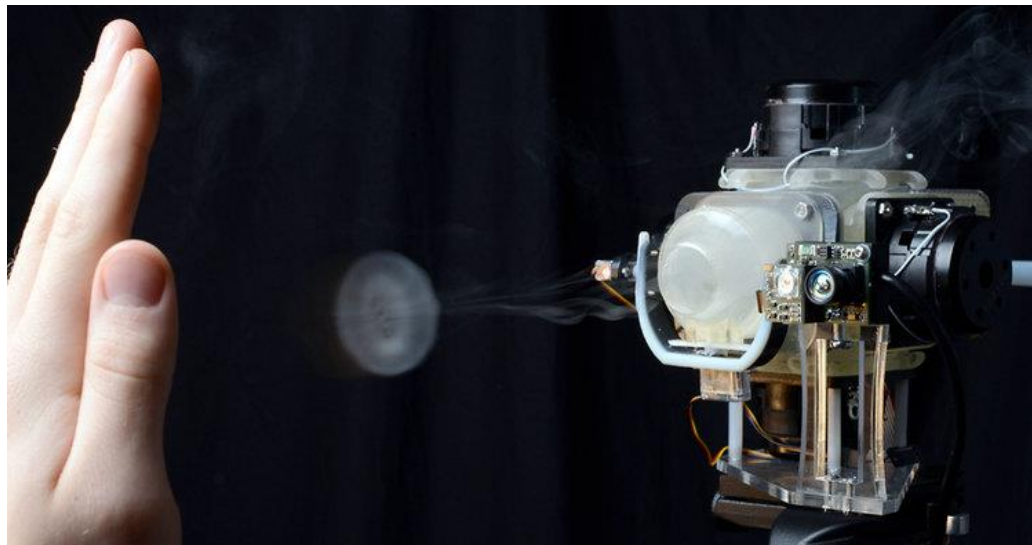


 PrioVR



Disney's Crazy Invention Lets You Feel Phantom Objects Floating In Air

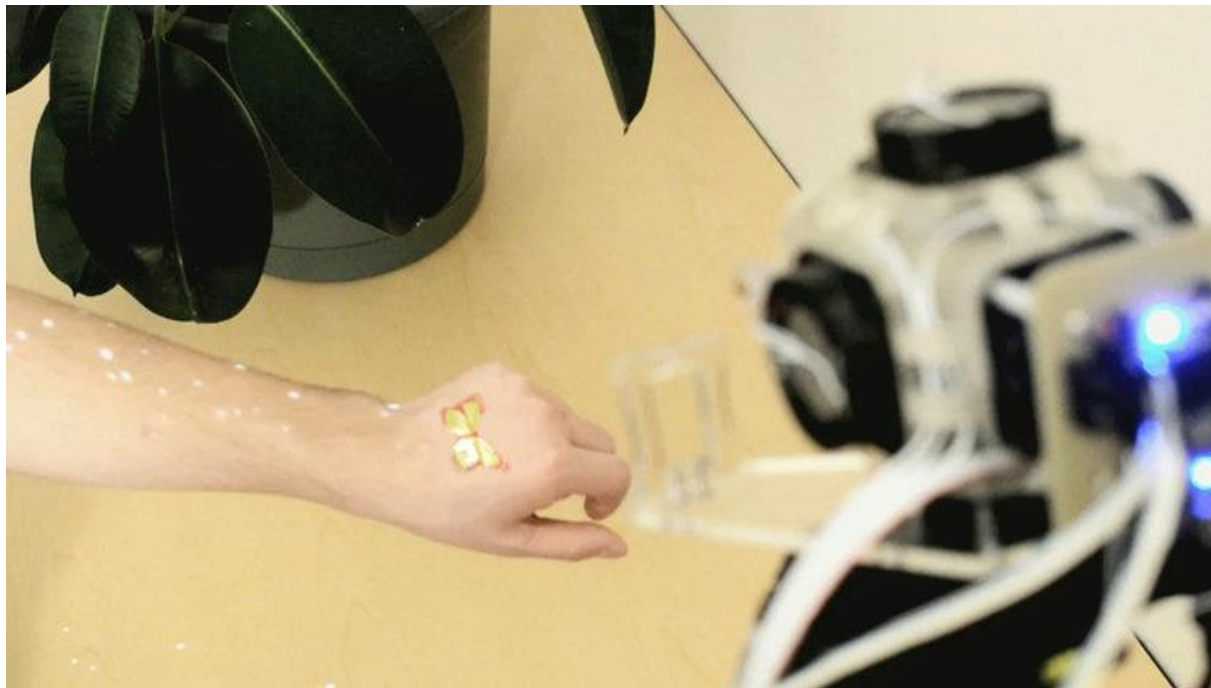
- Aireal is the result of research by University of Illinois PhD student Rajinder Sodhi and Disney Research's Ivan Poupyrev.
 - When set by your television or connected to an iPad, this diminutive machine will puff air rings that allow you to actually feel objects and textures in midair
 - no special controllers or gloves required.
- Video [here](#)





Disney's Crazy Invention Lets You Feel Phantom Objects Floating In Air

- Feel a butterfly projected on your hand.





Disney's Crazy Invention Lets You Feel Phantom Objects Floating In Air

- ...a flock of birds flying all around you





Smelling, odors piloted by your phone



Oscar Mayer



Plan

- *Augmented Reality Definition*
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- *Augmented Reality Devices*
- *Augmented Reality Technologies and Platforms*
- *Feeling and Sensing*

Augmented Reality Applications Examples





Pokemon GO





Ink Hunter

CHOOSE

art from our gallery
or upload your own



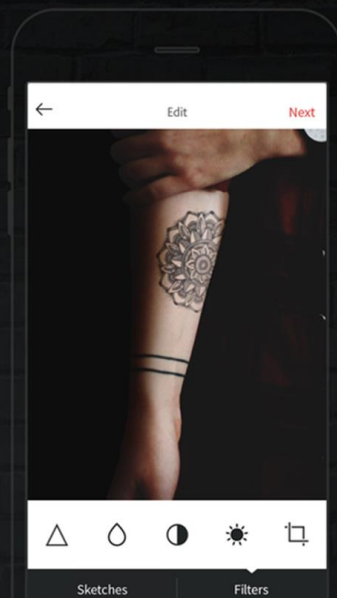
TRY

designs in augmented reality



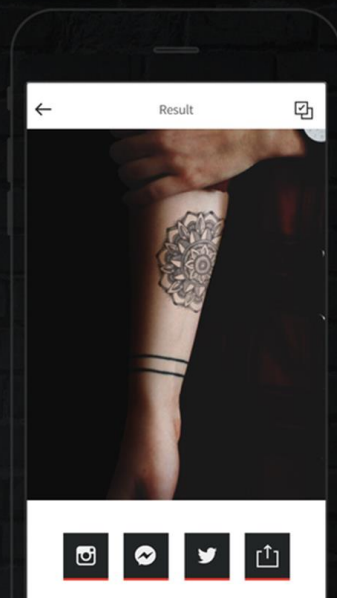
EDIT

your tatt until happy



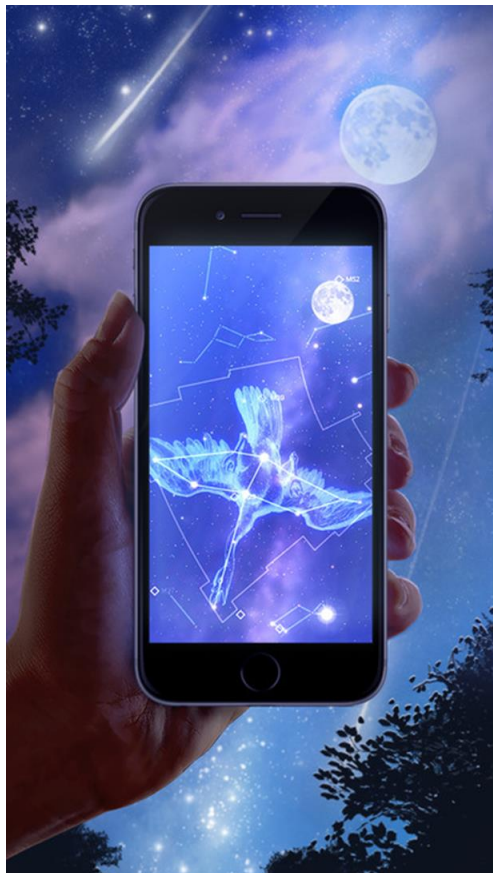
SHARE

that dope design
with your friends





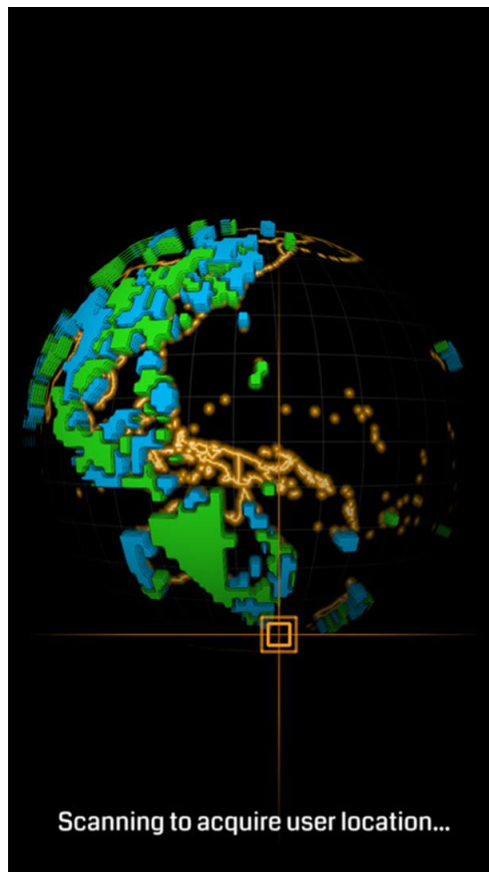
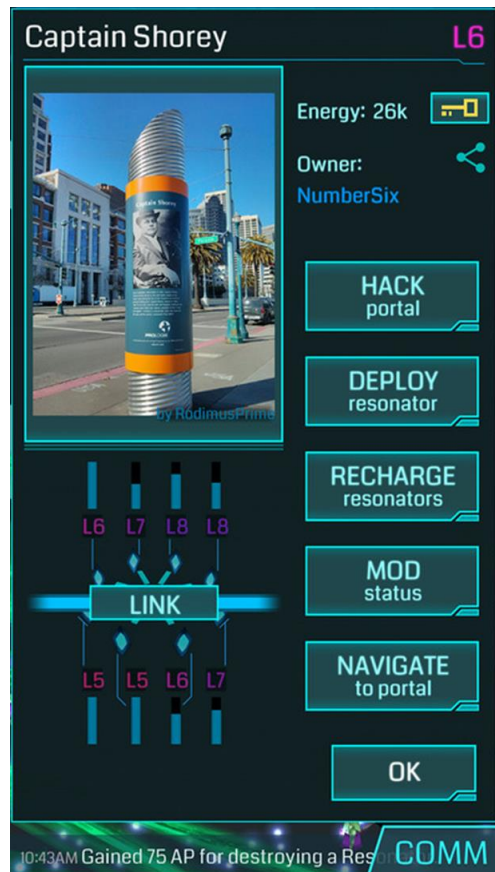
Star Chart



[IOS](#) and [Android](#)



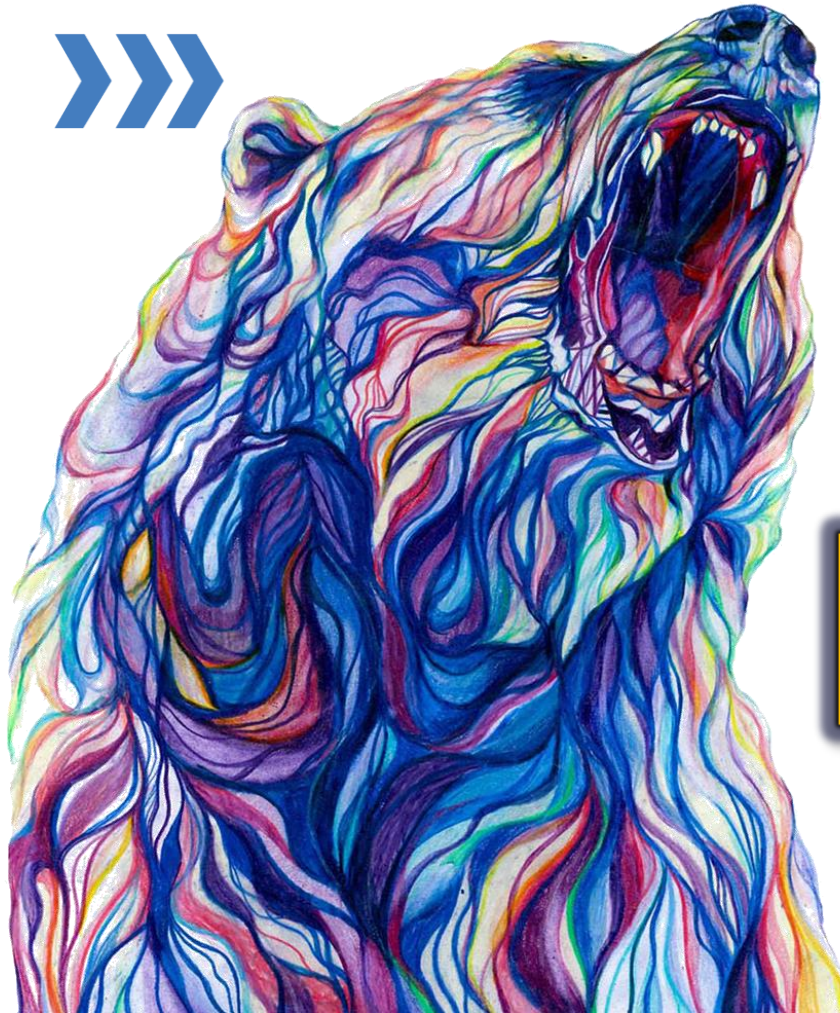
Ingres





IKEA Catalogue





Thank You



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Claudine O'Sullivan