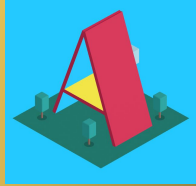


Creating and Sharing XR Experiences

<https://github.com/georgemck/xreality>



“DIY Creating and Sharing XR”
with George McKinney

XReality Meetup Group
Sat. June 27th from 10am-12pm PDT



Raspberry Pi 4
Model B 2GB



<https://www.meetup.com/XReality-AR-VR-MR-and-Beyond/events/270672383/>

George McKinney



George McKinney grew up playing Atari and programming the Commodore 64 in Silicon Valley. He graduated from Stanford University and received his MBA from the University of Southern California. George began working in the software industry with WebConference.com, an early pioneer in online communications. For the past 15 years, he has worked as a software developer creating marketing experiences and enterprise software for companies including Disney, Kraft, Acura, Honda, and LG. He has built augmented/virtual/mixed/voice/IoT applications working with Amazon, Samsung, Microsoft, Qualcomm, BlackBerry and Oculus hardware.

Outline

- Introduction and About You (3 minutes /)
- Technology Review (15 minutes)
- Content acquisition (15 minutes)
 - Capture - 360 camera
 - 3D generation - Software
- Website building
 - Build VR Website with Wordpress (20 minutes)
 - VR Demo with HTML5 Canvas using Three.js (20 minutes)
- Q & A / Other Topics(60 minutes)
 - App and Game Development
 - Content Distribution

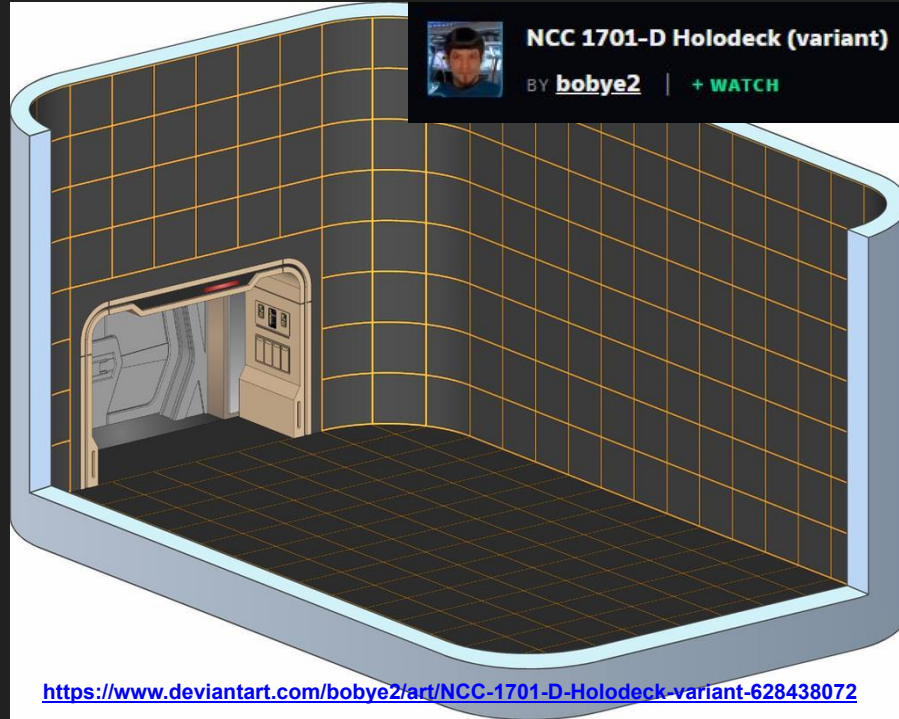
For the best experience view this on Google Drive at
<https://3dvu.co/xreality>

XR EXAMPLES

Star Trek Enterprise Holodeck

Rendering by
Boby2

What year was the first
Holodeck in Star Trek?



(X) Reality:

- **Augmented Reality (AR)** : requires a camera and watched through a screen. You see the real world through a screen while computer generated content is placed in front of you.
- **Virtual Reality (VR)**: usually with a headset; can use a camera. Mostly computer generated content but real-world elements can be brought in.
- **Mixed Reality (MR)**: an enhancement of AR where real world elements are used to ground computer generated content.
- **Spatial Audio**: Audio that allows you to orient yourself in the space you are in.
- **Extended Reality (XR)**: in general any of the experiences above. X, like in math, is a variable that can hold any value (**A**, **V**, **M**).

Virtual Reality

Wonderland Video Player Testing in Java

“Experimenting with some random movies and the Video Player in Open Wonderland -- most of the stuttering (avatar jumping around) is caused by the screen-capturing software (recording at 1680x1050), performance within Wonderland is actually very smooth. Only the video with loud music (MPEG-4, stereo AAC at 48 KHz) stutters a bit.”

-- Nathan Labhart (November 2010)

<https://www.oracle.com/technetwork/systems/ts-6125-158848.pdf>



Programmed in Java

Virtual Reality

Good Dog, Bad Dog.

"A game that puts the player in the paws of a dog and allows them to be as good or as bad a dog as they want to be... Good Dog, Bad Dog is a game about having the same experience as your pet dog does, from running after tennis balls to soiling the best rug in the house.... Currently only on PlayStation®4 and PlayStation®VR"

-- Brad Nelson (June 2020)



Programmed in C# with Unity 3D

Cinematic Virtual Reality

An immersive
Cinematic
VR Storytelling
Experience!



Veronica Flint
Creator. Writer.
Creative Director.



This is Magic! Programmed in C# with Unity 3D

Social VR

Oculus Quest.

“Introducing ‘Facebook Horizon,’ a New Social VR World, Coming to Oculus Quest and the Rift Platform in 2020”

<https://www.oculus.com/blog/introducing-facebook-horizon-a-new-social-vr-world-coming-to-oculus-quest-and-the-rift-platform-in-2020>

(September 2019)



 / creators

Facebook

Augmented Reality

Kraft Lunchables

"Total Immersion was a leader in augmented reality. They created their D'Fusion platform in Lua programming language which was popular in game development at the time. After porting their engine to Adobe Flash Player and mobile devices, consumer brands began adopting AR broadly including this game I worked on for Kraft Lunchables."

-- George McKinney (Aug. 2010)



Programmed in Actionscript. Total Immersion and Adobe Flash.

Augmented Reality

Pokémon GO

“...promotes physical activity, which benefits cognition by helping children develop skills like spatial awareness and understanding cause-effect relationships, enabling kids to perform better at school -- getting exercise improves working memory, for example.”

-- JV Chamary (Feb. 2018)



Programmed in C# made with Unity 3D

Mixed Reality

HoloKit.

“HoloKit: affordable open source mixed reality experience... HoloKit merges the real and the virtual in a smart way. While you see through the real world, virtual objects are blended into it. Powered by the accurate gyro and camera on smart phones, HoloKit solidly places virtual objects onto your table or floor, as if they were physically there without physical makers.”

-- <https://www.holokit.io> (June 2017)



Made with Unity 3D

Mixed Reality

HoloLens.

“HoloLens 2... an untethered mixed reality device with apps and solutions that enhance collaboration. Help your whole company be more productive and innovate with more purpose..”

-- <https://microsoft.com/en-us/hololens>
(June 2020)



Mixed Reality

Windows Mixed Reality Headset.

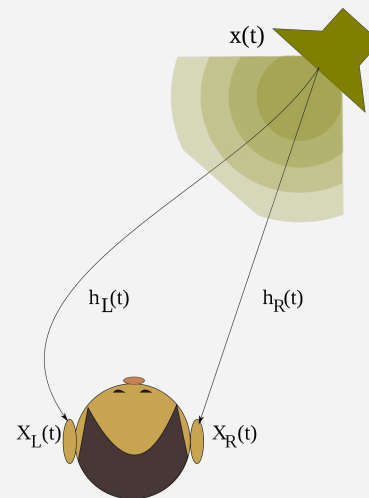
“With personalized virtual surfaces chosen from travel, sports, culture, live concerts, time travel, games like Minecraft and 20,000+ universal Windows apps you can escape the everyday to enter your unique world..”

<https://acer.com/ac/en/US/content/series-design/wmr>
(June 2020)



Spatial Audio

What is Audio 360, or spatial audio? “You can think of Audio 360 or spatial audio as an immersive sphere of audio that is delivered over headphones, just like humans hear sound in real life. In essence, it is possible to tell where a particular sound is coming from a point in space over a standard pair of headphones, without needing any external hardware or specialised piece of equipment. With 360 video and Virtual Reality, Audio 360 also changes instantly in real-time, as the user looks around either wearing a VR headset or rotates a smartphone where they are viewing the 360 content.” -- Facebook 360 <https://facebook360.fb.com/spatial-workstation/>



<https://creator.oculus.com/learn/spatial-audio/>

For the best experience view this on Google Drive at
<https://3dvu.co/xreality>

OPPORTUNITIES

- Architecture
- Industrial
- Real Estate
- Data Viz

Enterprise AR

Daqri.

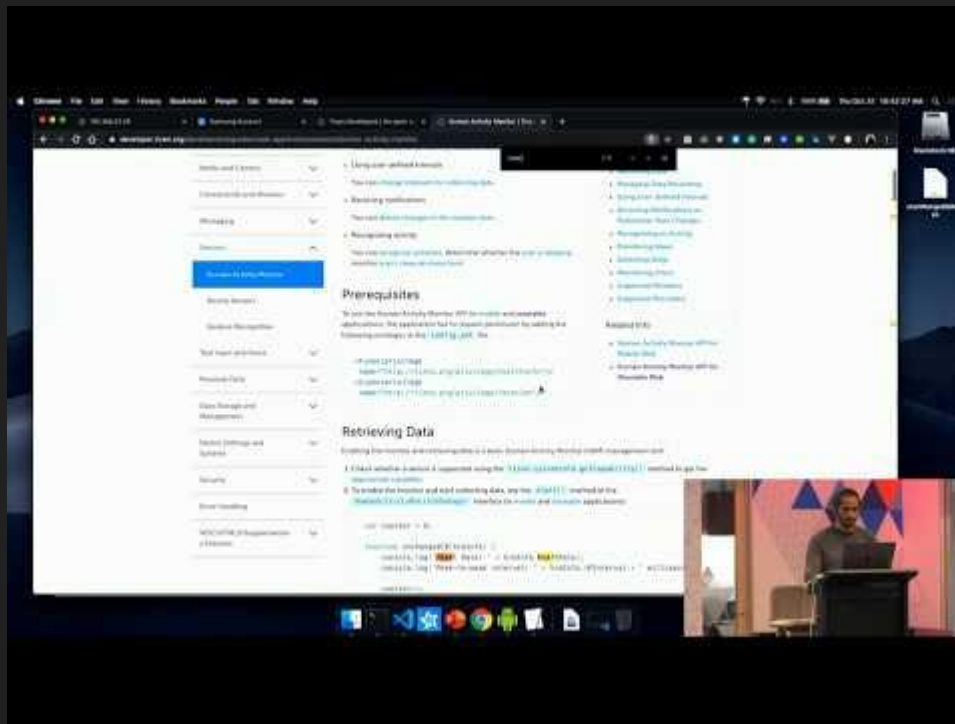
"WEARABLE SERVICE LINE BRING YOUR WORKFORCE, CUSTOMERS AND MACHINES TOGETHER WITH WEARABLE CAPABILITIES.."

-- <https://daqri.com> (June 2020)



Wearables & WebXR.

-- Josue Bustos (June 2020)
Full Stack Serverless,
Technical Consultant
<https://www.linkedin.com/in/josuebustos/>



Engineering

Wearables in the workplace.

“Augmented reality in construction and architecture projects involves placing a 3D model of a proposed design onto an existing space using mobile devices and 3D models.”

<https://www.autodesk.com/redshift/what-is-augmented-reality/>



Engineering

Wearables in the workplace.

"Ford Tests Buzzing Wristbands to Keep Workers at Safe Distances"
By Keith Naughton
April 15, 2020

<https://www.bloomberg.com/news/articles/2020-04-15/ford-tests-buzzing-distancing-wristbands-to-keep-workers-apart>

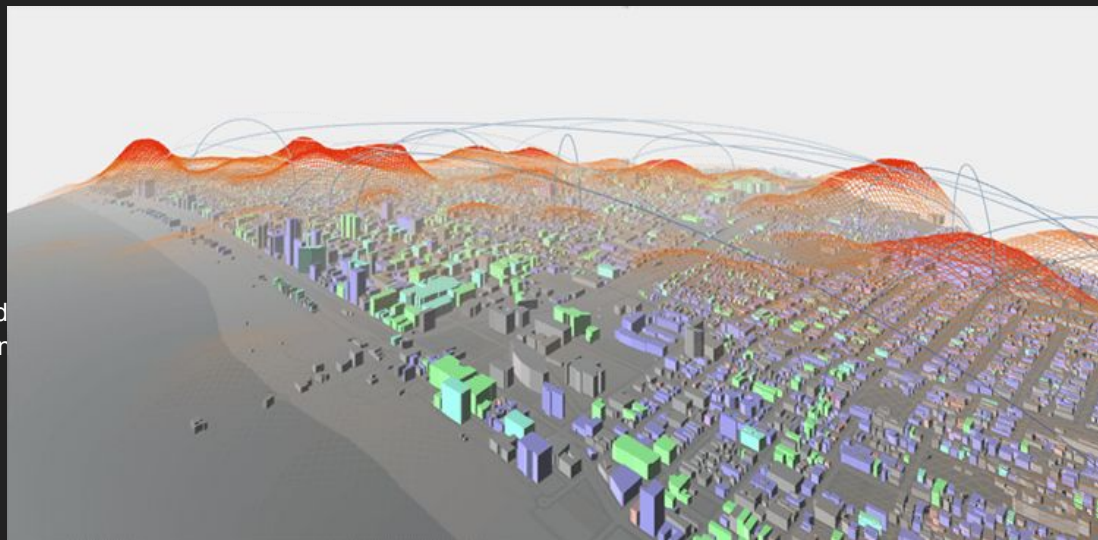
SAMSUNG



Big Data

Telecom. Smart Cities.
Marketing.

"We're
people
with
-- BadVR.com (June 2020)



<http://datavizcatalogue.com/blog/whos-offering-data-visualization-vr/>



360 Video

Virtual Open House.

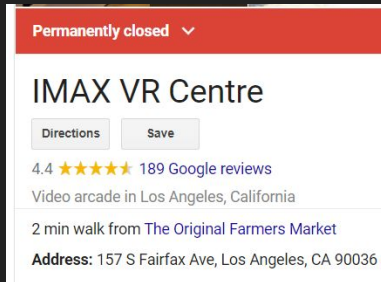
"Aleksey Volchek is a Zillow Certified Photographer serving Palm Coast, FL and beyond.."

-- <http://VirtualOpen.House> (June 2020)

https://www.youtube.com/channel/UCmY_NJGs7SWmgAep218s3Sg



XR GRAVEYARD: In Memory of failed approaches...



For the best experience view this on Google Drive at
<https://3dvu.co/xreality>

TECHNOLOGY

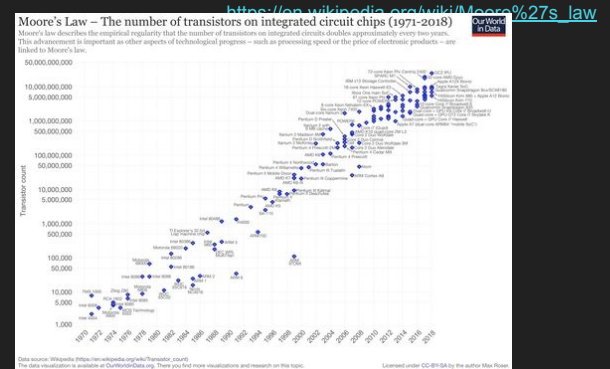
What is Moore's Law

Moore's law is the observation that the number of transistors in a dense integrated circuit (IC) doubles about every two years. Moore's law is an observation and projection of a historical trend. Rather than a law of physics, it is an empirical relationship linked to gains from experience in production.

--

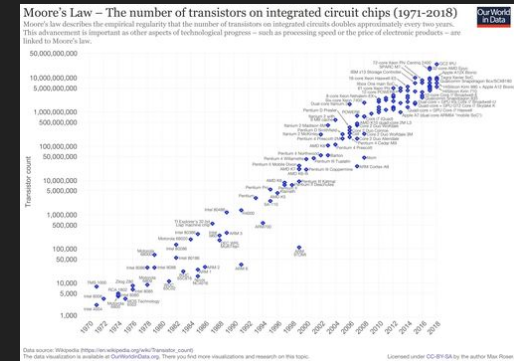
Wikipedia

Gordon Moore, Co-Founder of Intel



XR has benefited from Moore's Law

- Denser Transistors (ARM, x86)
- Miniaturization (smart phones)
- Distribution (cloud computing)
- Faster networks (Fiber Optics, 5G, Cable)



From server, to desktop, mobile, cloud and IoT...

Technology Licensing

- Standards-based ([OpenCL](#), [OpenGL ES aka WebGL](#))
 - Khronos Group sets 3D standards
 - Everyone refers to the standard
- Open Source ([Three.js](#), [A-Frame](#), [Babylon.js](#))
 - Understand what you are using
 - Free to use, Free to Innovate, Free to Contribute
- Closed Source ([Unity 3D](#), [Unreal](#), [Autodesk](#), [Adobe](#))
 - Restricted use
 - Costs money

STANDARDS

WebGL

Khronos Group



Closed Source

Unity.com Game engine



- Mobile Apps (iPhone and Android)
- Game Consoles (Sony Play Station, Xbox, Sega)
- Computers (Mac, VR only works on Windows)
- Automotive, Transportation
- Architecture, Engineering
- Film, Television

Closed Source

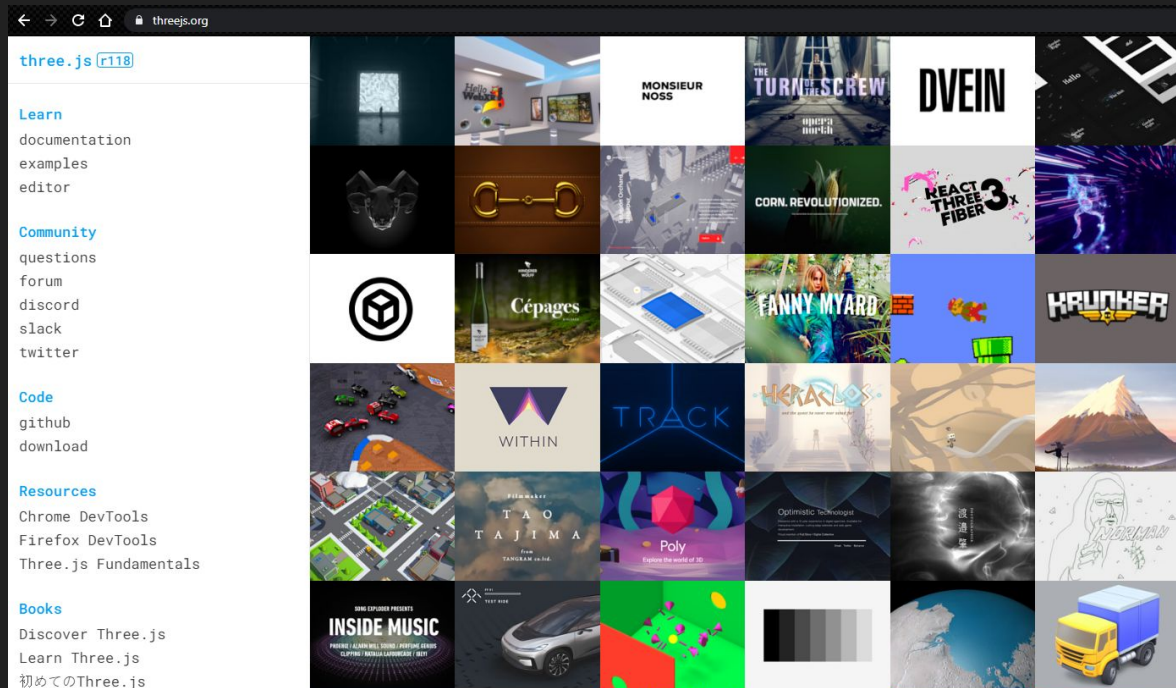
UnrealEngine.com
Game engine



Open Source

Check out Three.js

<https://threejs.org/>



David Lyon's 121 slides



Intro to WebGL

with Three.js

<https://davidlyons.dev/threejs-intro/#slide-0>

For the best experience view this on Google Drive at
<https://3dvu.co/xreality>

DIGITAL ASSETS

Capture, Draw, Copy or Code?

The *first* hurdle to overcome in working in XR is acquire content to explore!

360 Cameras for Capture

So many choices



Consider stitching software,
Live-streaming, try out the
mobile app

The Best 360 Cameras for 2020

Tiny video cameras with multiple ultra-wide lenses capture the entire world around you—all 360 degrees of it. Here's how the most popular models stack up in our testing.



By [Jim Fisher](#) Updated April 8, 2020



<https://www.pcmag.com/picks/the-best-360-cameras>

The best 360 cameras in 2020: shoot panoramas, 360 video and more

By [Rod Lawton, Jamie Carter](#) May 27, 2020

The best 360 cameras are now easy to use and easy to buy. We list the best low-cost high-value 360 cameras around right now

<https://www.digitalcameraworld.com/buying-guides/best-360-cameras>

3D Drawing Software



Create your own content
Using one of these software
You will also need basic image
Program like Gimp/Photoshop/Paint



3D Asset Stores for Content

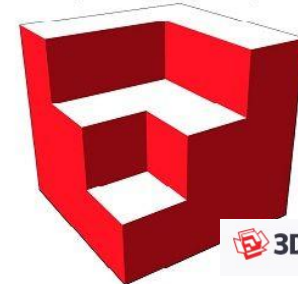


Bēhance

DEVIANART

St Adobe Stock

SketchUp Sample Components



3D Warehouse

3D Overview

Blender Foundation



lost scene from Big Buck Bunny

3D Overview

- Scene
- Camera
- Renderers

Lights

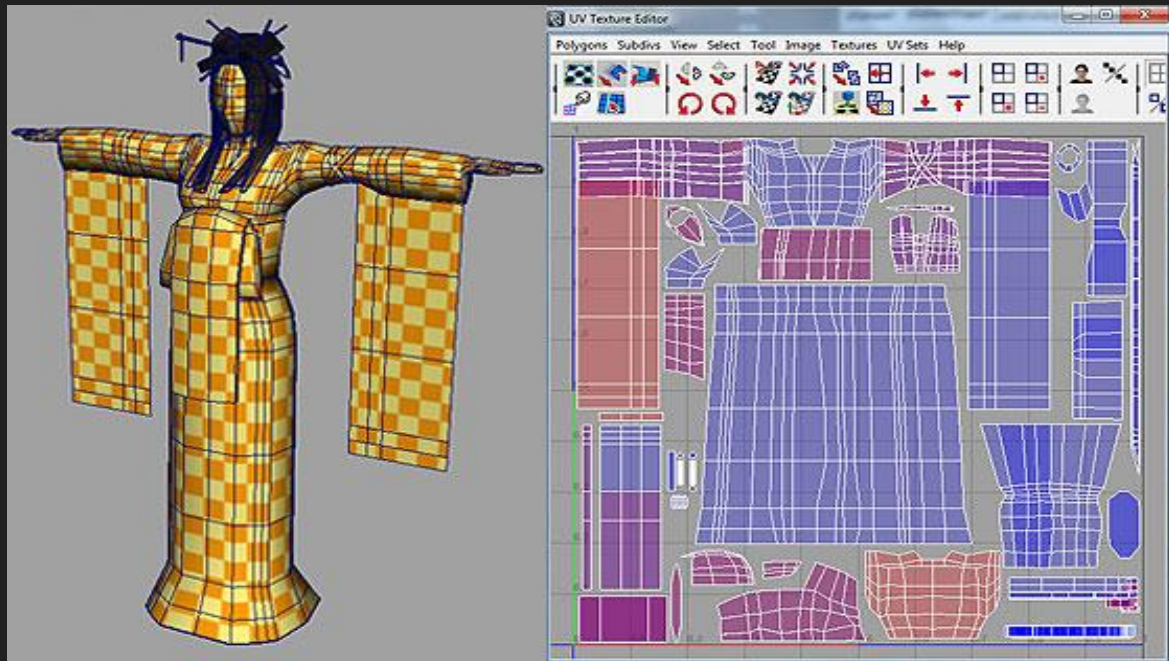
- Ambient
- Directional
- Point
- Spot

Textures and Materials

- UV Maps
- Solid
- 2D
- Video

UV Texture Map

Geisha 3D Model by Keiko Kamata



Geometries

- Cubes
- Cylinders
- Lines
- Particles
- Planes
- Polyhedrons
- Spheres
- Text in 3D

Collada DAE

Standards-based asset sharing

```
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      <copyright>Unknown</copyright>
    </contributor>
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    </library_cameras>
  </collada>
```

Check out WordPress VR Plugins

WP-VR-view How to add Photo Sphere and 360 Video

<https://www.youtube.com/watch?v=DWkLce9M-h0>

<https://wordpress.org/plugins/wp-vr-view/>

(this app needs an update but still works, June 2020)



WP VR

<https://wordpress.org/plugins/wpvr/>

Freemium



MY WORK

- Kraft Lunchables Augmented Reality
<https://www.georgemckinney.com/game-song-and-movie/>
- Mobile Augmented Reality using Javascript (JS-Aruco)
<https://www.georgemckinney.com/mobile-augmented-reality-app>
- Mobile AR Presentation at HTML5 Developer Conference 2013
<https://www.georgemckinney.com/armobile/>
- 360 Video: Triforium Fridays Nov. 2018
<https://www.youtube.com/watch?v=2tfdSGFCWVE>
- 360 Web VR Scene
<https://midivrcard.com/wintergreeting.html>

Kraft Lunchables

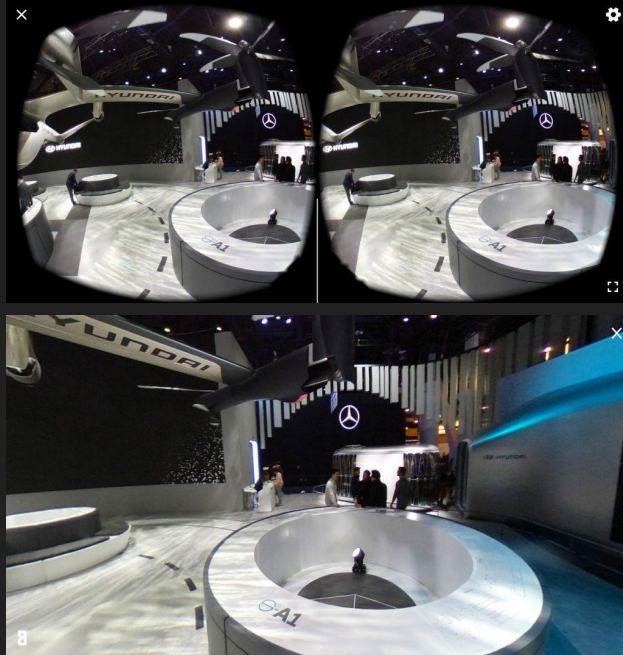
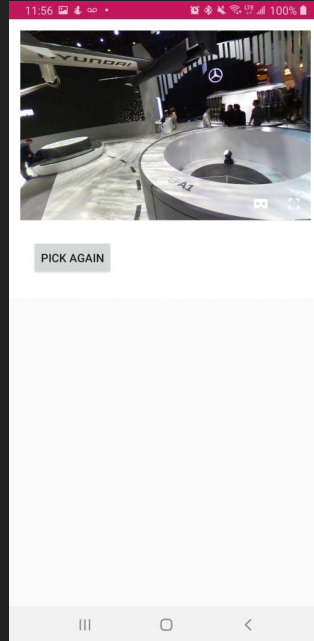


Augmented Reality using Adobe Flash and Total Immersion D'Fusion

<https://www.georgemckinney.com/game-song-and-movie/>

Android App 360 Image Viewer (in Beta)

<https://developers.google.com/cardboard>



Mobile Augmented Reality



Using Javascript, BlackBerry WebWorks, (JS-Aruco)

<https://www.georgemckinney.com/mobile-augmented-reality-app>

360 Web VR Scene



360 Photo Sphere Gallery with Gaze Navigation

<https://midivrcard.com/wintergreeting.html>

Mobile AR Preso, SF HTML5 DevConf 2013

Augmented Reality Mobile Apps in JavaScript... for YOU!

HTML version

<http://www.georgemckinney.com/augmented-reality-mobile-apps-in-javascript>

Augmented Reality using Adobe Flash and Total Immersion D'Fusion

<https://www.georgemckinney.com/armobile/>

360 Video: LA Triforium Nov. 2018



Musical performance captured with Samsung Gear 360, shared on YouTube.

<https://www.youtube.com/watch?v=2tfdSGFCWVE>

CLOSING

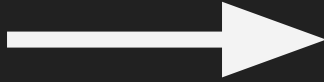
The Future is Voice

OK, Google

Siri

Cortana

Alexa



Powerful Human to Computer
Interaction Technologies and will
get better with time

Machine Learning

Databases

People I Follow

Tony Parisi <https://medium.com/@tonyparisi>

Mr. Doob <https://github.com/mrdoob>

Dominique Wu <https://www.linkedin.com/in/dominiquewu/>

Veronica Flint <https://www.linkedin.com/in/corveniaflint/>

Brad Nelson <https://www.linkedin.com/in/playem/>

Rob Bateman <https://github.com/rob-bateman>

Yosun Chang <https://twitter.com/yosun>

My Blogs

<https://3dvu.co/blog>

<https://www.georgemckinney.com/>

Reach Out on Social Media

Github <https://github.com/georgemck>

Twitter <https://twitter.com/georgemck>

LinkedIn <https://www.linkedin.com/in/georgemckinney/>

YouTube <https://www.youtube.com/jamatatechnologies>

Meetup <https://www.meetup.com/laphonegap/>

Industry Events



<https://www.siggraph.org/>



<https://gdconf.com/>



<https://www.awexr.com/>

360 VR Workflow with Adobe Premiere

A beginner's guide to spatial audio in 360-degree video NICK MICHAEL • DECEMBER 18, 2017.
<https://training.npr.org/2017/12/18/a-beginners-guide-to-spatial-audio-in-360-degree-video/#tips>

1. Ingest. Move files from cards to hard drives. Organize your media so you can easily locate multiple video angles and audio files from the same scene. Renaming files with custom pre-fixes is one way to keep file groups together.
2. Stitch. Stitch your angles. Depending on the timeline and complexity of your shoot, you might only do a rough stitch for review here. Then, after you've picture-locked, you can carefully re-stitch only your final shots.
3. Set project and sequence settings. Adobe has more specifics here.
4. Sync audio and video. Lay out a sequence in which to sync all your audio and video clips. Draw your edit selections from here.
5. Edit. Shots need to sit on screen long enough for people to look around. A good minimum seems to be 15-20 seconds.
6. Graphics and titling. Design your graphics presentation. We've placed titles in every quadrant, but your project may require something different. Prevent graphics bubbling with a plugin like SkyBox (included in Adobe Premiere 2018 CC).
7. Final stitch + audio mix + color correction. Finesse it all!
8. Export. Consult Adobe for the latest specifics.



Interesting Experiences

Let Yayoi Kusama Take You to Infinity | The Daily 360 | The New York Times

<https://www.youtube.com/watch?v=d26td0RDTIY>

RICOH THETA S Live Streaming over USB - Alpha driver

<https://www.youtube.com/watch?v=A8AI7U2ZeF0>

[Drone Racing League | Episode 2: Semi-Finals \(Level 1: Miami Lights\) | DRL](#)

<https://www.youtube.com/watch?v=0gYkZGOTdM0>

More Cool

Rockchip Smart Glass

<https://www.youtube.com/watch?v=sYul3ROK-fk&t=66s>

Coachella VR 360

<https://www.youtube.com/watch?v=1mZQEfECluE&t=18s>

Augmented Reality: Epson Moverio HackATHon - Intro

<https://www.youtube.com/watch?v=UMdM0ciVWco>

Hands on with the Epson Moverio BT-200 augmented reality smart glasses at CES 2014

<https://www.youtube.com/watch?v=U59gMEXW0Yc>

Resources

Virtual Reality and 360-degree Live Streaming with Wowza

https://www.youtube.com/watch?v=uhKso8ySa_E

Random Notes

Challenges of Mobile AR

Sensors (more sensors, higher cost)

SDKs

Manufacturers

Hardware

Behavior

Content

PWA - A solution?

General case - HCI

Voice input

IoT

Input Devices

Foot pedals

https://www.amazon.com/s?k=transcription+foot+pedal&crid=3KHFGXE9X0HNF&srefix=shower+%2Caps%2C260&ref=nb_sb_ss_or_ganic-diversity_1_7