

# Immersive Mobile Technologies: Virtual/Augmented Reality Technologies in the Classroom

Olga Scrivner, Research Scientist, CNS  
Nitocris Perez, OVPIT UITS,  
Julie Madewell, Senior Lecturer,  
Cameron Buckley

Advancing Teaching and Learning with Technology Symposium  
September 15 2017 | IUPUI



INDIANA UNIVERSITY BLOOMINGTON

Center for Innovative Teaching and Learning



**CNS**

Cyberinfrastructure for  
Network Science Center  
[cns.iu.edu](http://cns.iu.edu)

# Acknowledgment

This project is supported by **SOTL grants 2016-2017 / 2017-2018**,  
and partially funded by PHI and XDMOD grants (CNS).



INDIANA UNIVERSITY BLOOMINGTON

**Center for Innovative Teaching and Learning**



**CNS**

Cyberinfrastructure for  
Network Science Center  
[cns.iu.edu](http://cns.iu.edu)

# What is this?



# Augmented Reality

Augmented reality is a view of the real world with virtual elements overlaying it.

Pokémon Go is an example of augmented reality or AR



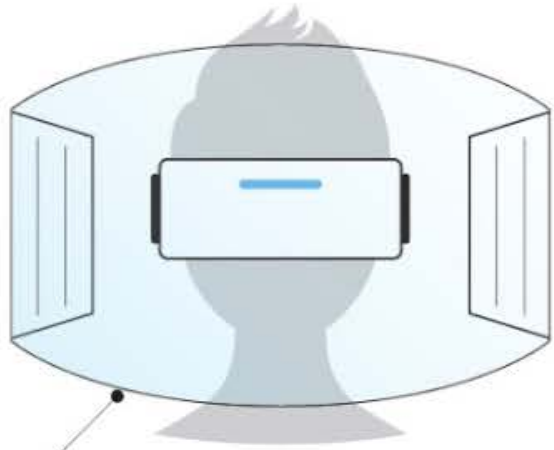
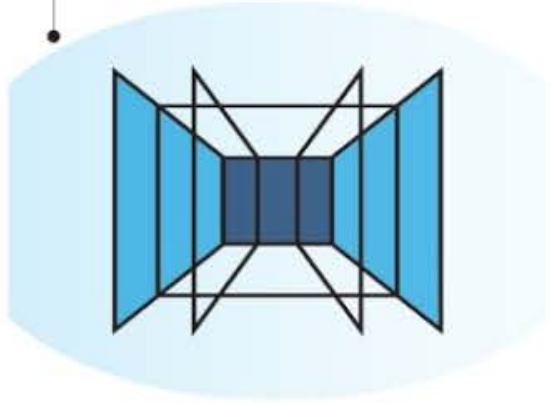
# Virtual Reality

Virtual reality is a realistic and immersive experience of a virtual world



# VIRTUAL REALITY (VR)

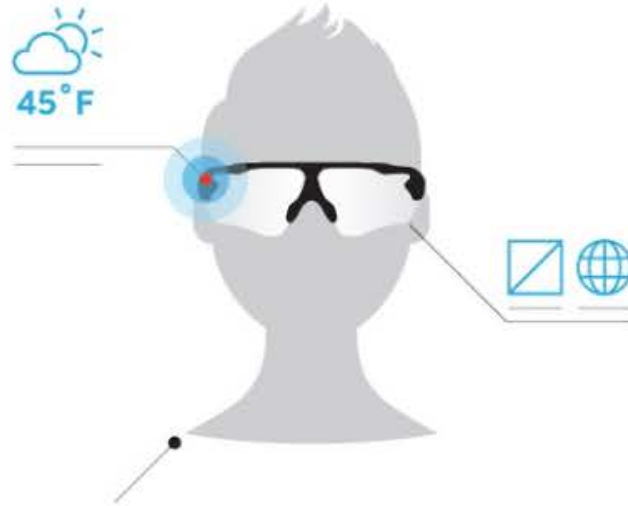
Completely digital environment



Fully enclosed, synthetic experience with no sense of the real world.

# AUGMENTED REALITY (AR)

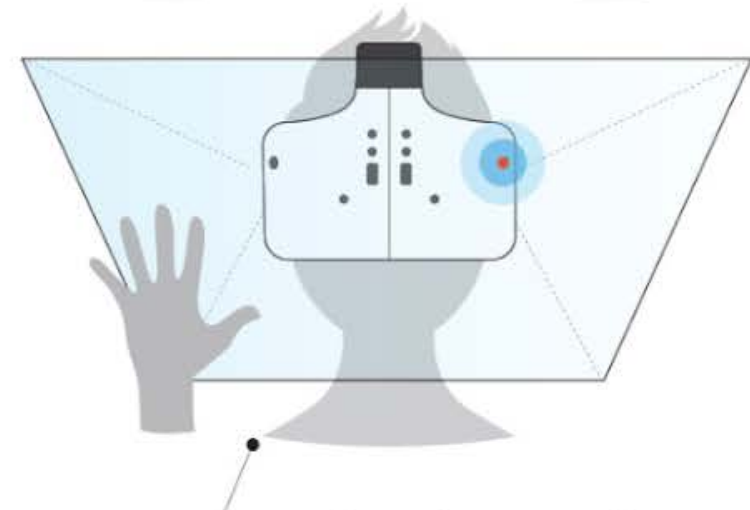
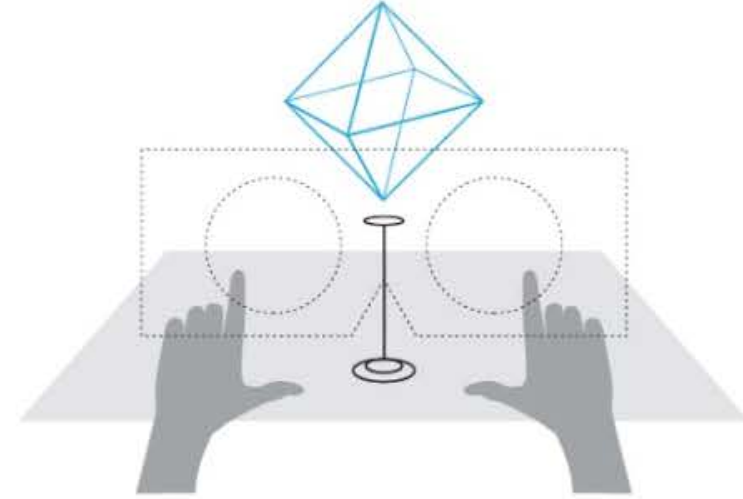
Real world with digital information overlay



Real world remains central to the experience, enhanced by virtual details.

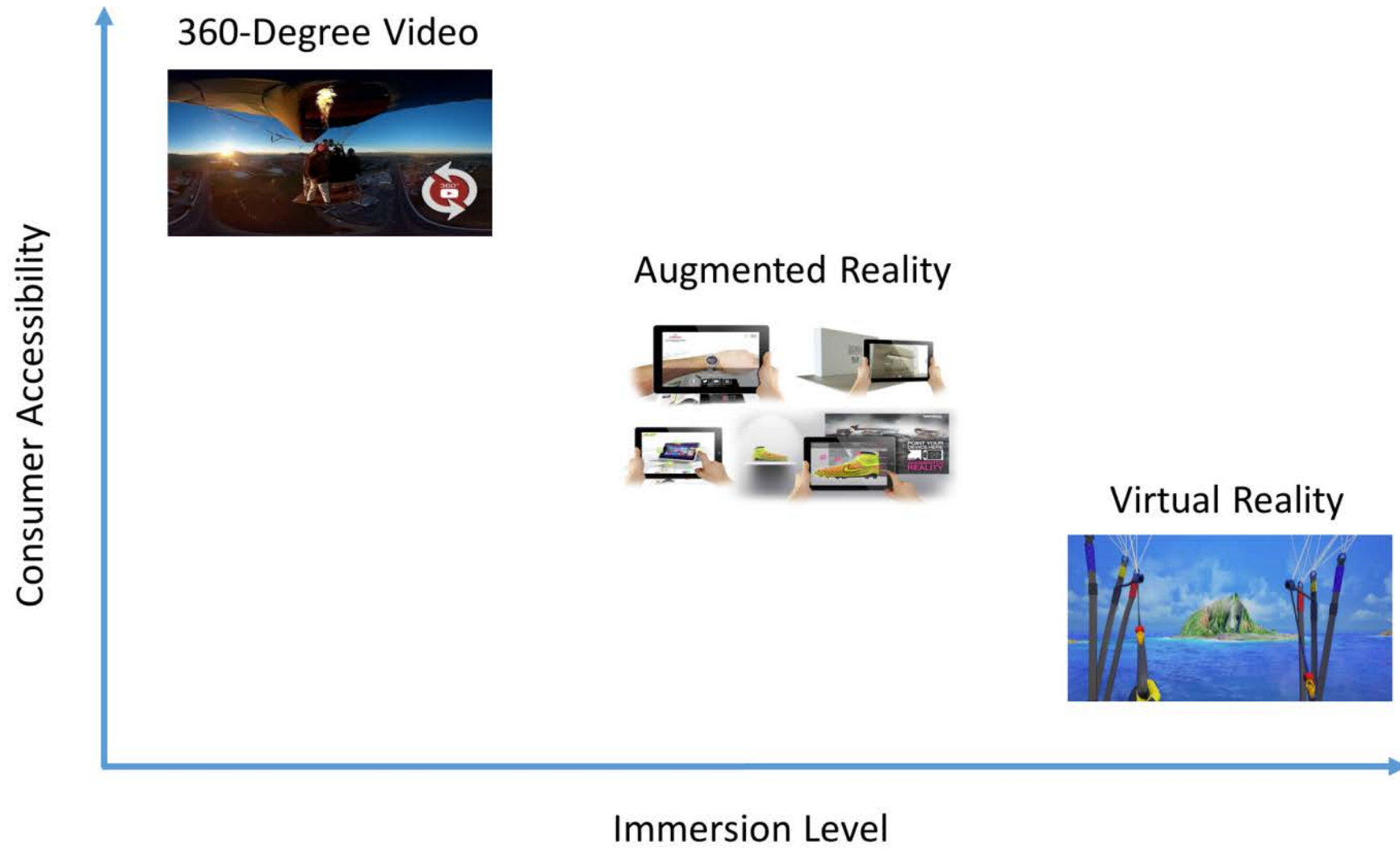
# MERGED REALITY (MR)

Real and the virtual are intertwined



Interaction with and manipulation of both the physical and virtual environment.

# Immersive Video Formats



# Augmented Reality: Definition

“a real time direct or indirect view of a physical real world environment that has been **enhanced/augmented** by adding virtual computer generated information to it”  
(Carmigniani et al. 2011)





# AR in Education

1

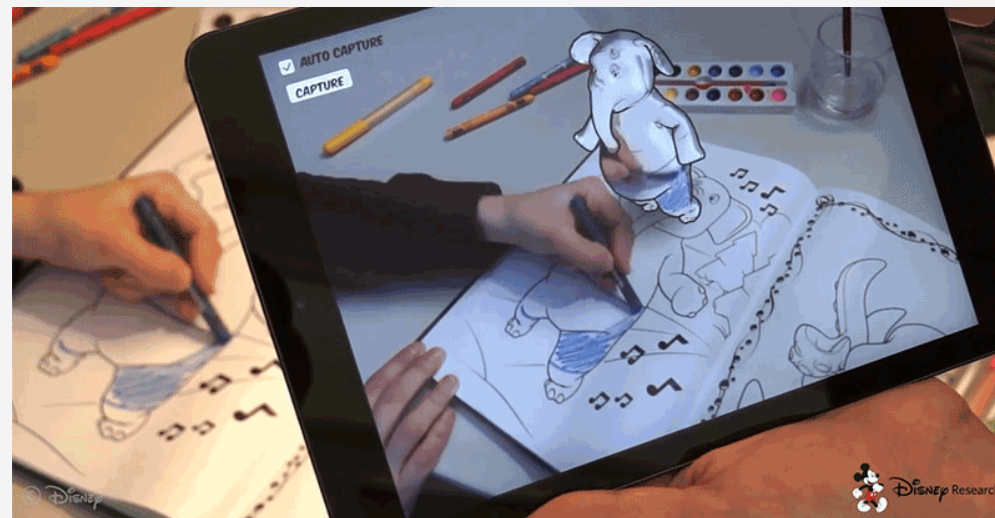
AR enhances **problem solving**, increases **motivation**, and improves **performance** (Wasko 2013, Billinghurst 2012)

2

Students have more **authentic learning experiences** (Klopfer 2008)

3

“Potentially more exciting for educators” (Bower 2013)



# Methodology

1

Select images from a textbook, prepare slides or background images



2

Record video in IU Media Lab - *Green Screen* technology

3

Use Aurasma studio to combine images and videos



# Implementation



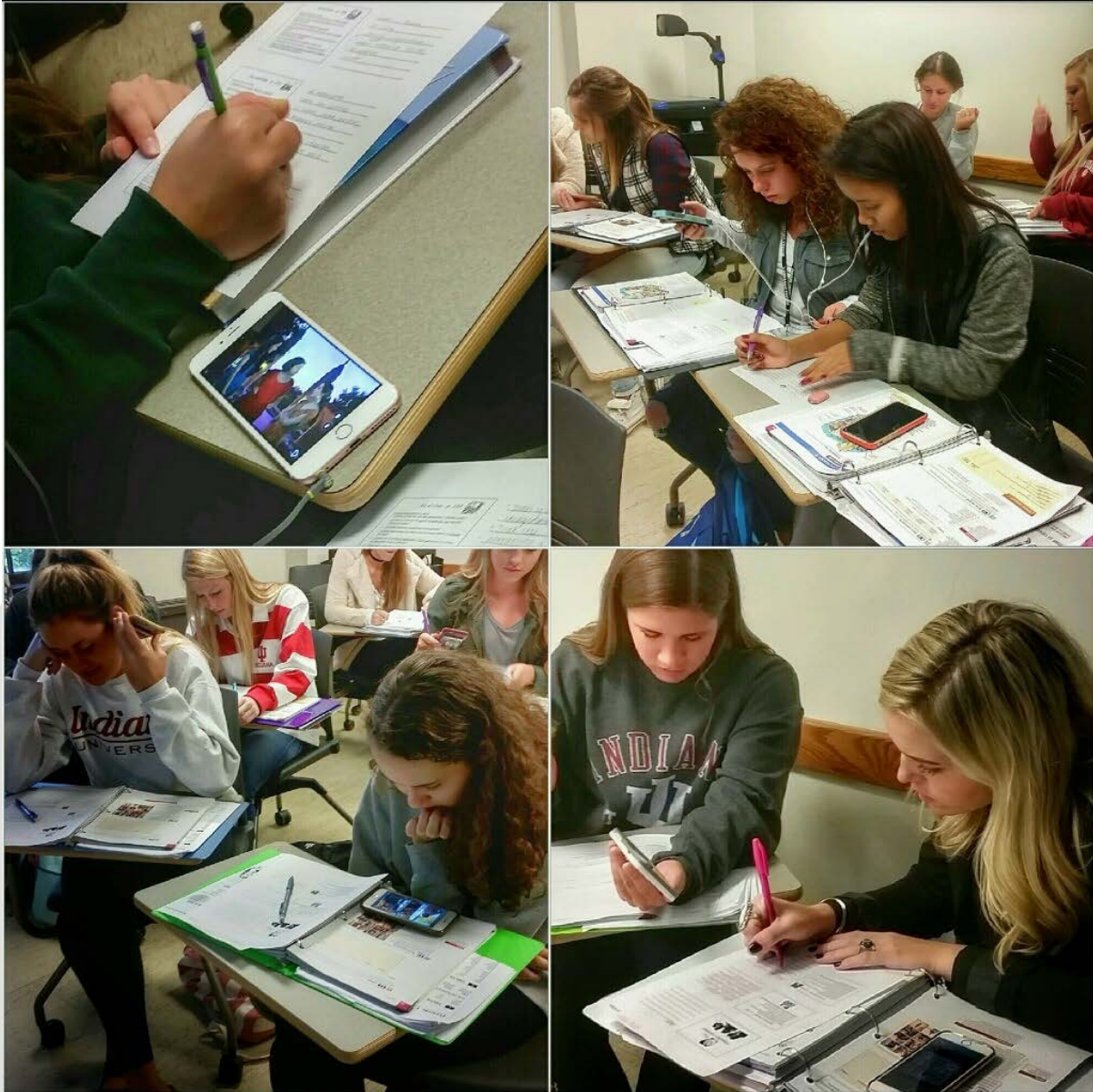
# Our Students

Vocabulary

Pronunciation

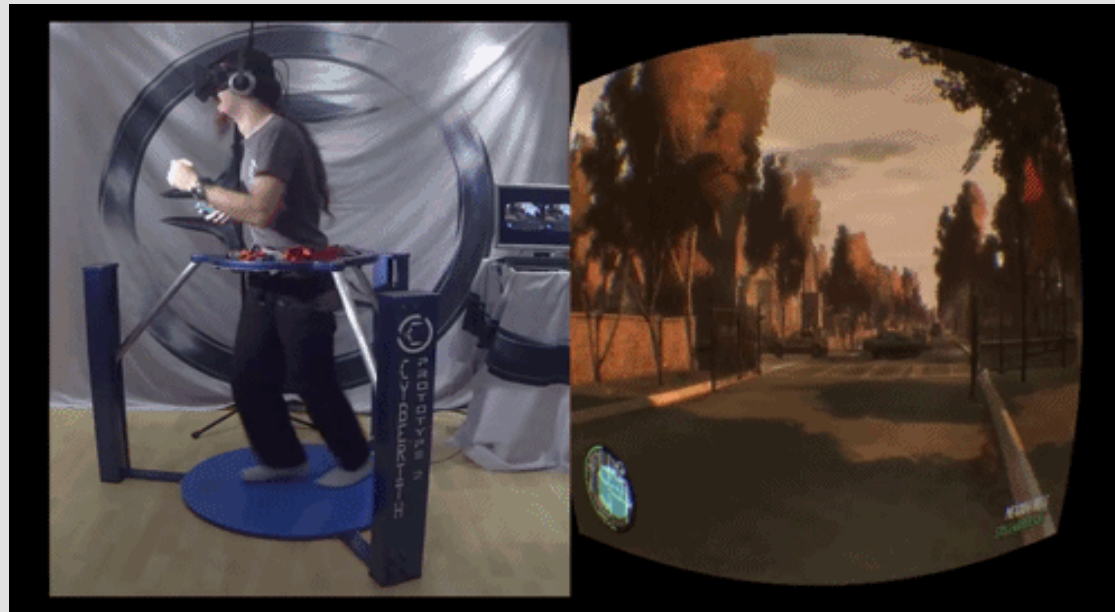
Comprehension

Grammar



# Virtual Reality: Definition

“ computer interface that permits the user to interact in real time, in a tridimensional space generated by a computer, using their feelings, through special devices”  
(Kimer. 2012)



# VR in Education

1

VR provides access to a **visual-spatial dimension** not available with 2D or abstract learning (Sorby 2009)

2

Multi-sensory VR environment helps increase **engagement** with content and **knowledge retention**.

3

VR can help “discover, explore and build knowledge about places and situations that we could never explore” (Piovesan et al. 2012)

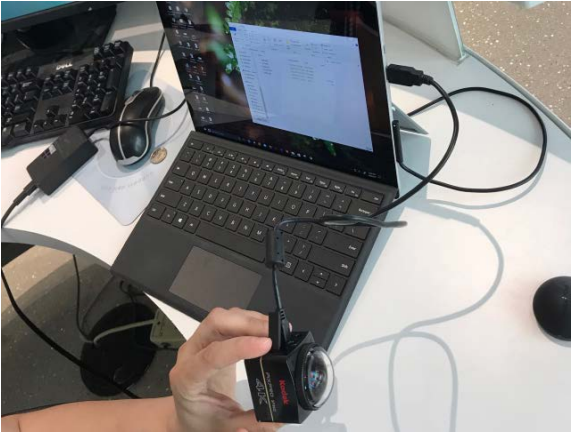


# VR Environments for Education

- 1 Computer-generated environments (games and simulation)
- 2 360-degree images
- 3 360-degree videos

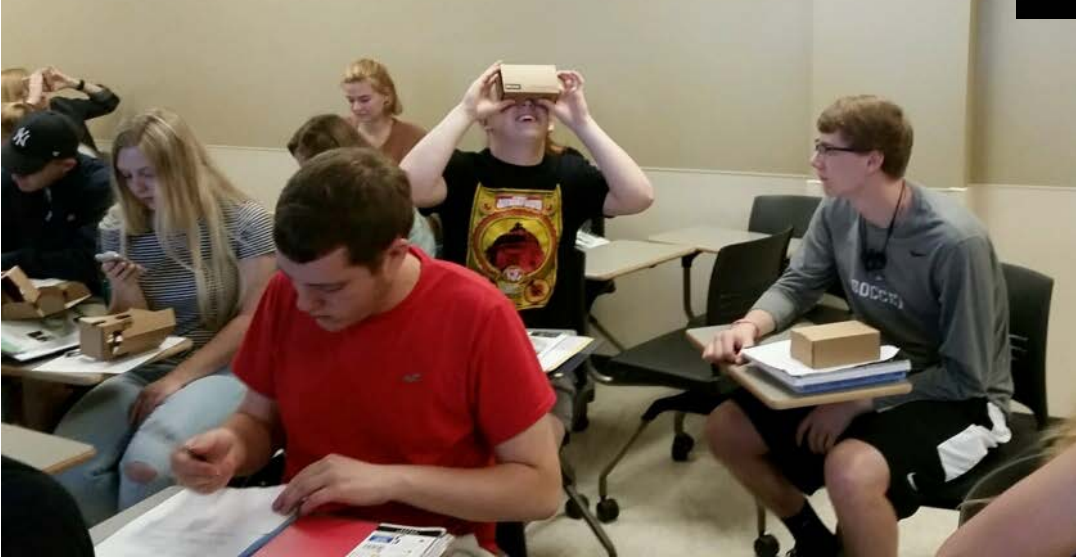


# Doing 360





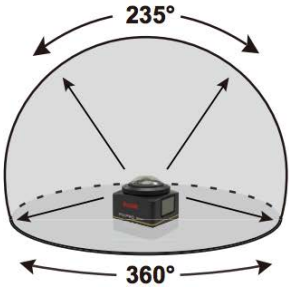
# Our Students



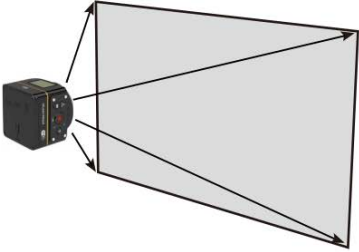
# 360 Images and Videos



• ○ Global



• □ Front



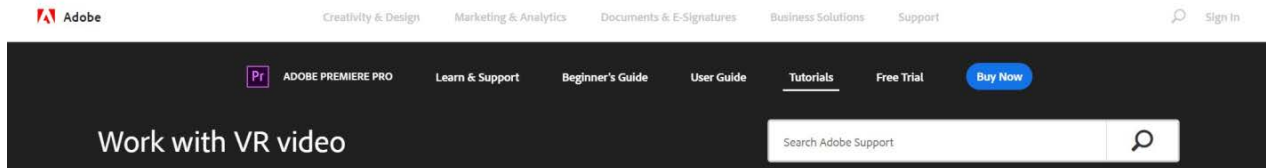
# KODAK PIXPRO

VR CAMERA



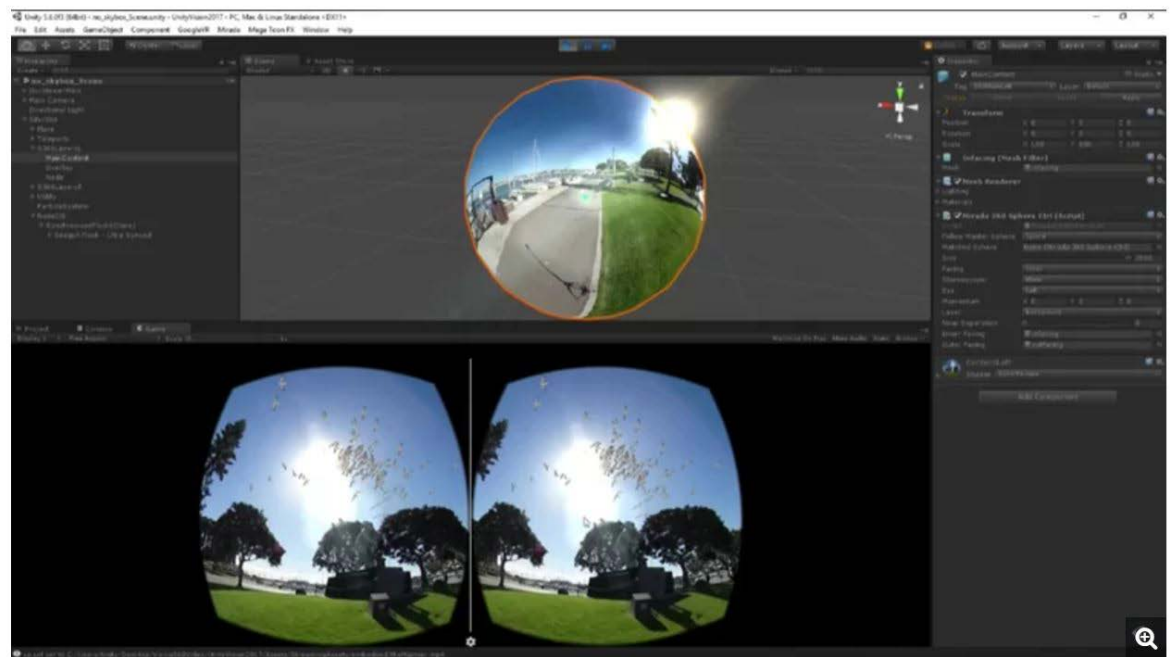
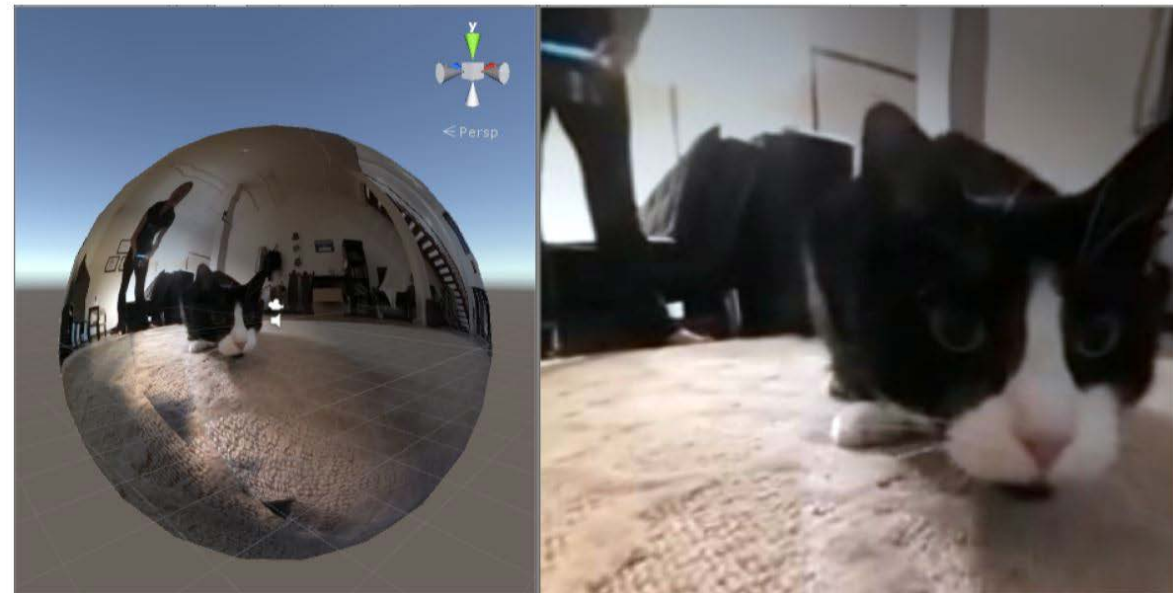
## ORBIT360 4K

The KODAK PIXPRO Orbit360 4K VR Camera adopts a minimalist approach to an all-in-one 360° VR camera, with two fixed focus lenses housed by a futuristic camera body. Each curved lens is designed to work in tandem, to capture full 360° 4K Video\* and easily upload 360° videos and photos to social media platforms like Facebook™ and YouTube™ via the camera's Smart Device App while on the go. KODAK PIXPRO Digital Cameras - Tell your story.



Learn how to work with VR media directly in Adobe Premiere Pro, including stereo media, so you can edit sequences, apply special effects, and output 360-degree projects tagged properly for media players.

If you want to follow along with this tutorial, use the VR Video assets. Click Save to Creative Cloud to copy the assets to your account.





NEW

SM-R324NZAAXAR

**Gear VR with Controller**

★★★★☆ 4.4 OUT OF 5 STARS (56)

Transform virtual reality with a new handheld controller.  
Explore thousands of exciting 360° experiences.

© \$129.99

WHERE TO BUY?

ADD TO COMPARE  ADD TO WISHLIST

## Google Cardboard

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



# Current VR Implementations



 PlayStation.VR

# VR and mixed reality headsets

Viewing 1-6 of 6 results



**Microsoft HoloLens Development Edition**

★★★★★

\$3,000.00



**Oculus Rift + Touch**

★★★★★

\$499.00



**HP Windows Mixed Reality Headset Developer Edition**

★★★★☆

\$329.00

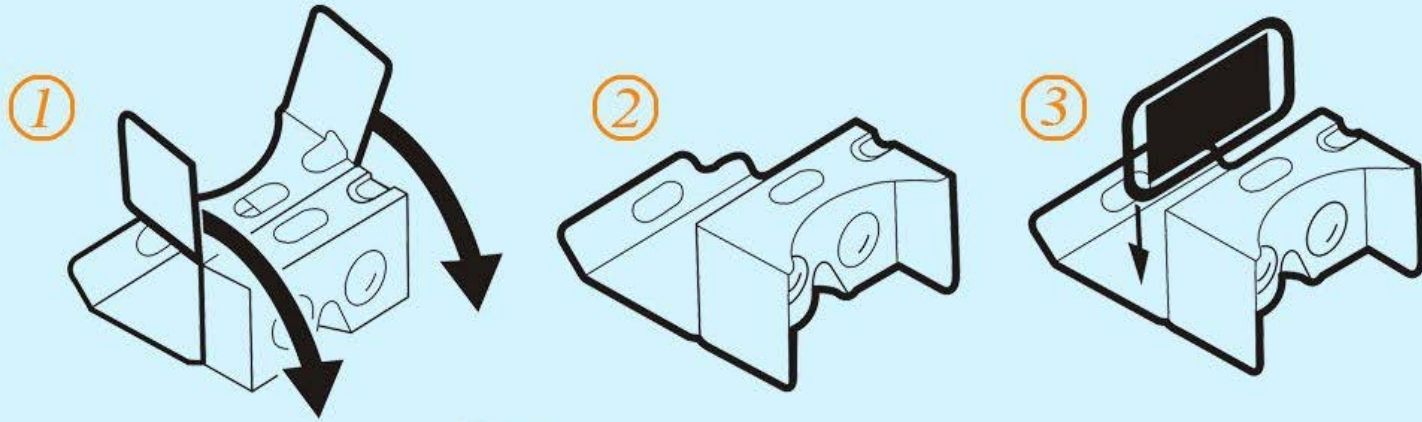


**HTC VIVE Virtual Reality System**

★★★★★

\$599.00

**Installation is very simple**

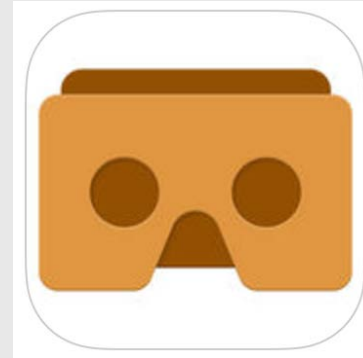


**Assemble  
Cardboard  
Viewer**

# Hands-on Session

- 1 Smart Phone
- 2 Cardboard Viewer App
- 3 Google Street App
- 4 YouTube App

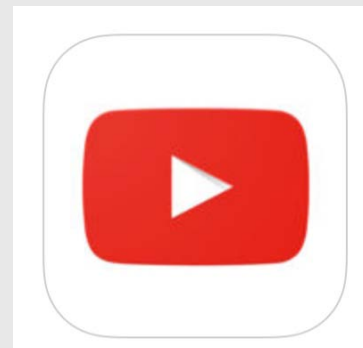
**Google Cardboard**  
By Google, Inc.



**LIFE VR**  
By Time Inc.



**YouTube - Watch, Upload**  
By Google, Inc.

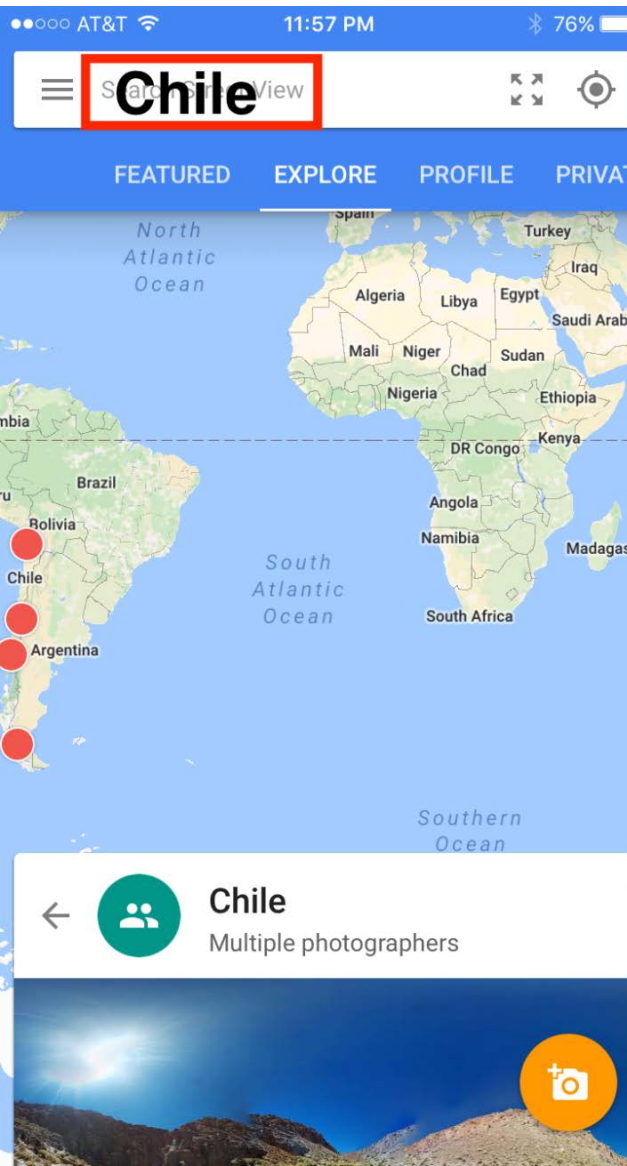


**Google Street View**  
Google Inc. Travel & Local





# Google Street



Can walk using Arrows



Only 360 panoramic view



Place your phone into your Cardboard v2 viewer.

Using a different viewer?

SWITCH

**You**  **Tube**



# 360 Videos on YouTube



1

BBC - Snow leopards in 360

2

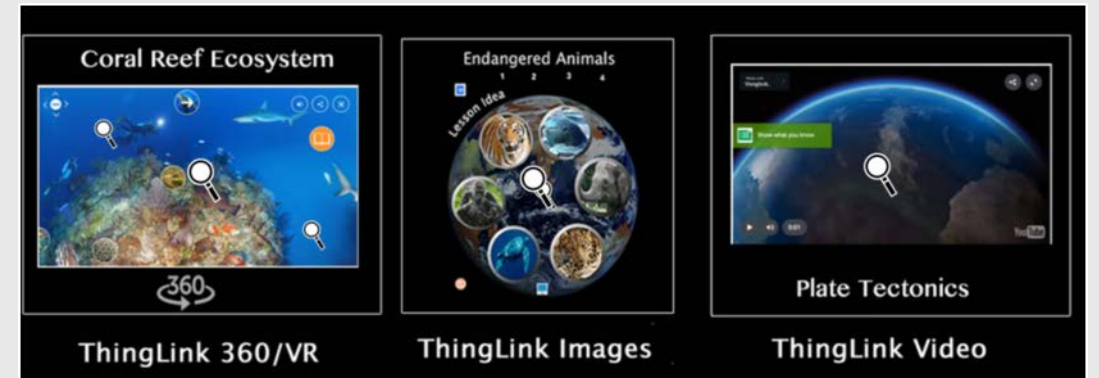
National Geographic – 360 Volcano Eruption

3

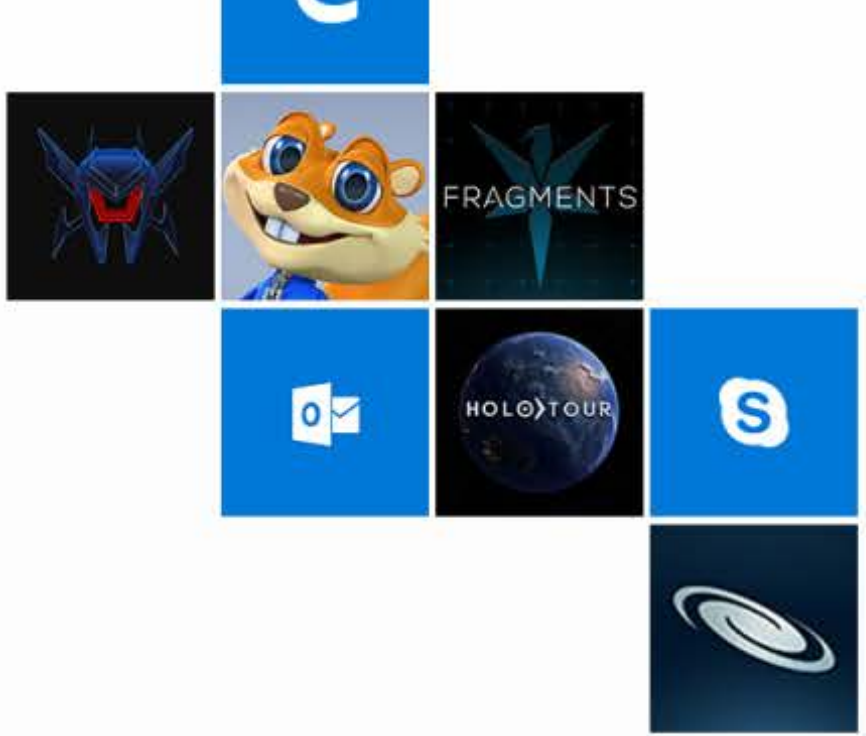
Time – Rogue One behind the scene (LifeVR)

# VR + AR - ThingLink

- 1 Import 360 image
- 2 Augment with Video, Quiz, Reading
- 3 Accessible on smart phones or web
- 4 Shareable lesson collections



<https://www.thinglink.com/video/888135368845557761>



# Mixed Reality with the Microsoft HoloLens

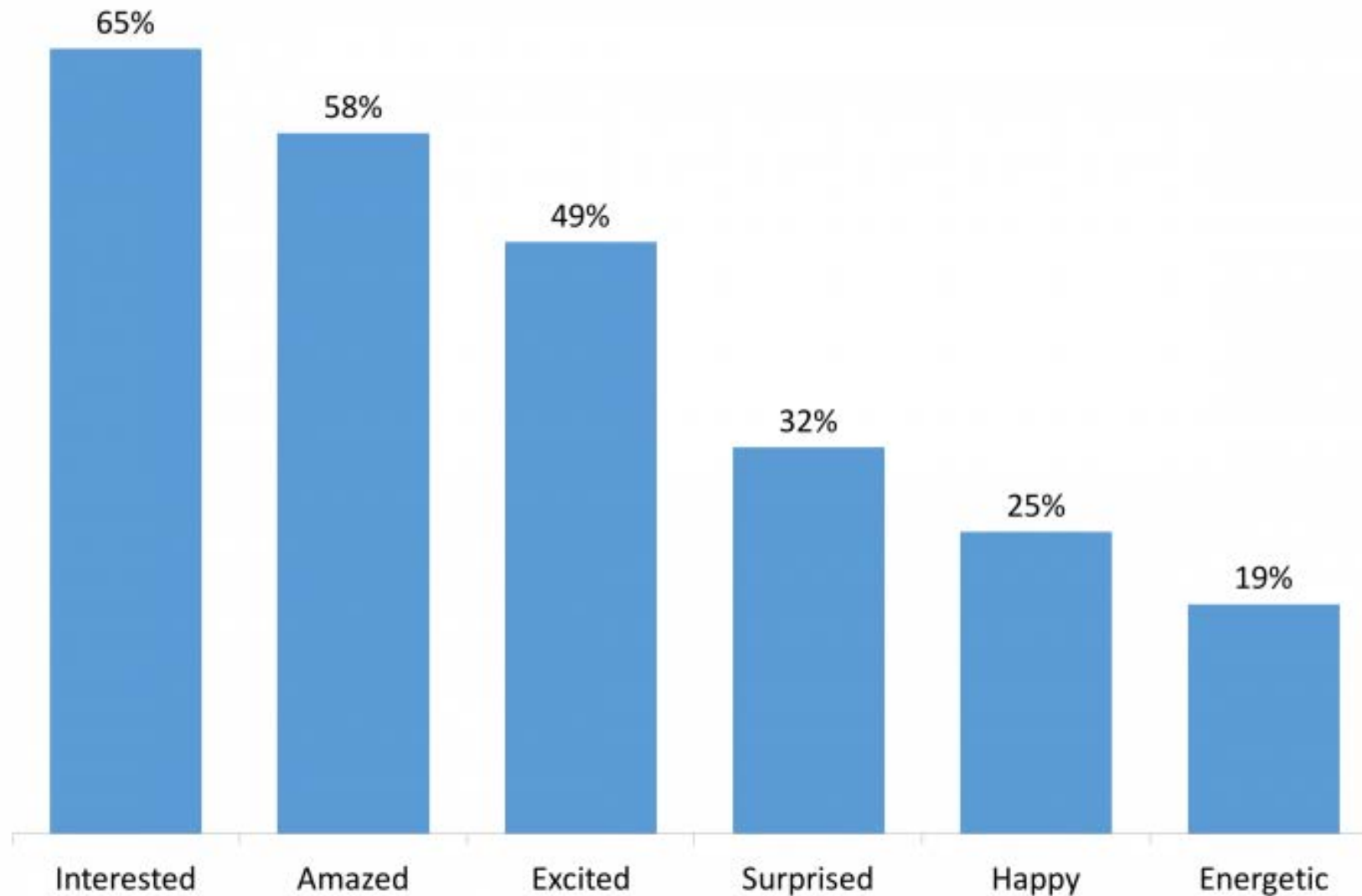
# Mixed Reality

What Microsoft calls Mixed Reality, Intel calls Merged Reality and similar terms are blended reality or hybrid reality.

These terms are a little squishier than VR and AR in that blended reality implementations are essentially advanced AR systems.

The real distinction is MR is considered a simultaneous blend of both virtual and real worlds to create experiences where both exist and interact with one another.

## How Consumers Feel When Watching Content in VR (US)



N = 1,300

Source: Greenlight VR, Cubicle Ninjas, 2016

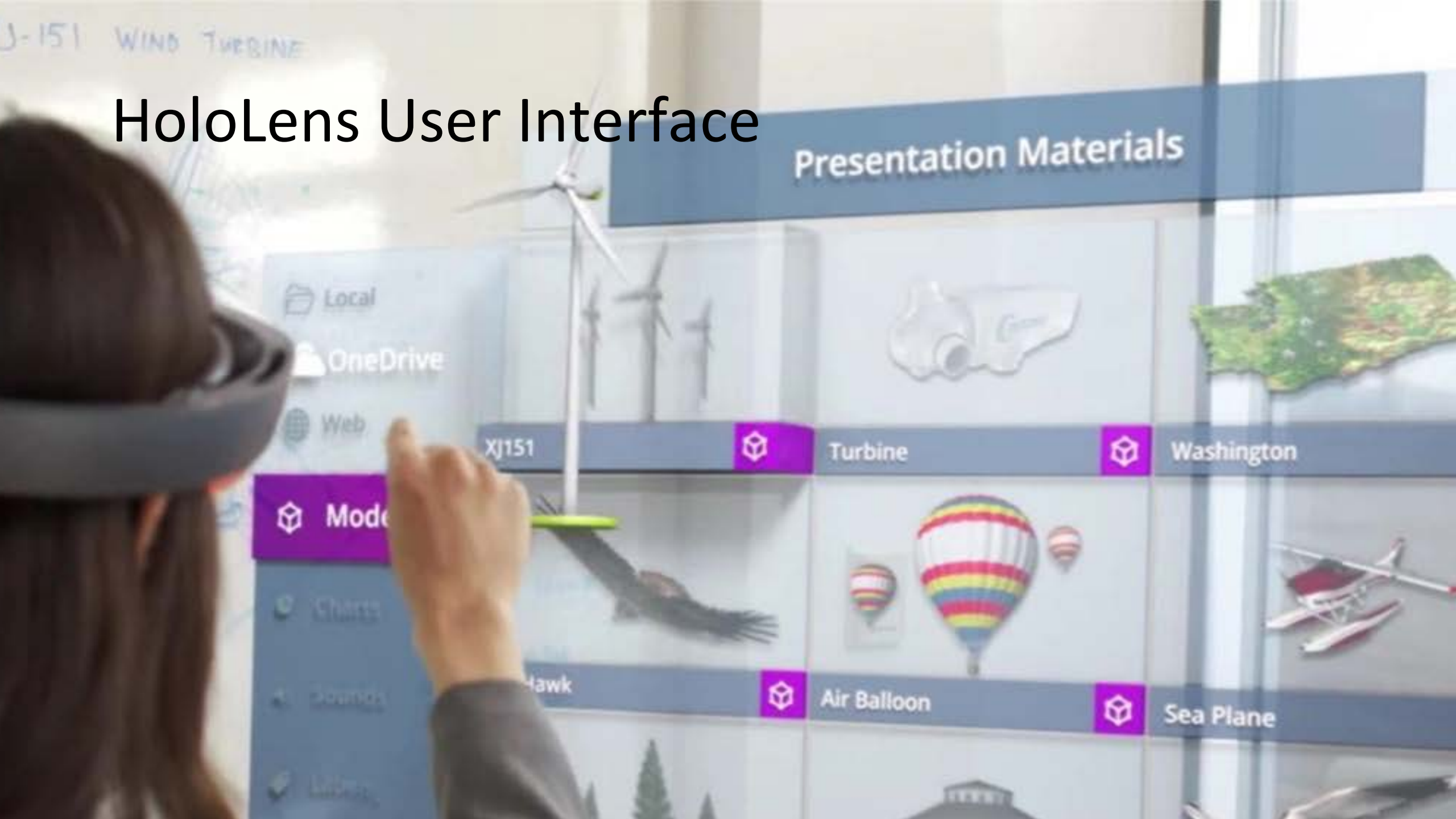
BI INTELLIGENCE

# Use Cases and Content

- 360 degree educational video
- Architectural design
- Augmented reality anatomy
- Automotive dealer: virtual test drive
- Logistics and package delivery management
- Real estate virtual property tours
- Remote surgery
- Retail store: virtual fitting rooms
- Virtual reality grid control



# HoloLens User Interface



XJ151 Wind Turbine

Local  
OneDrive  
Web

Models

Contoso

Contoso Logo

Energy AEP



XJ151

Output Report

XJ151 Logo

Music



Energy Chart

Energy Out

Seagull

## GESTURE

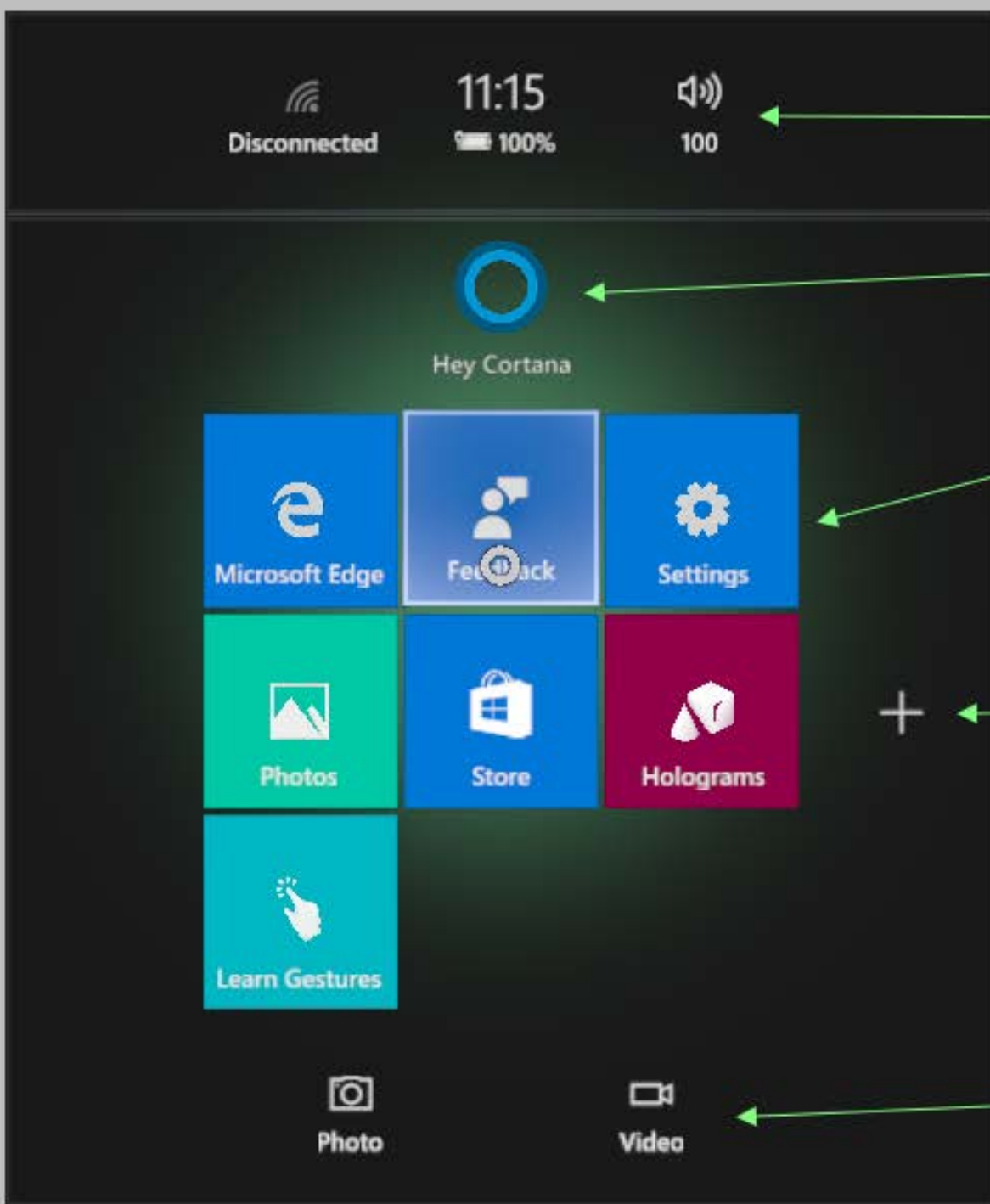
Tap is similar to a mouse click

# The air-tap gesture

- To air-tap, make a fist in front of you, with the back of your hand facing you. Your elbow should be bent at your side in a comfortable position.
- Now, raise your index finger to the sky and then tap, by flexing your index finger down (the press) and then back up (the release).
- An air-tap results in a select operation. Other ways to select are using a clicker or the voice command "select." The same air-tap gesture can be used within any holographic app.

# The bloom gesture

- Bloom is a gesture used to go back to the Start Menu. It is similar to pressing the Windows key on a keyboard or the Xbox button on an Xbox controller
- To do the bloom gesture, hold out your hand, palm up, with your fingertips together. Then open your hand.
- In Windows Holographic, the bloom gesture can be performed with your hand. You can also return to Start by saying "Hey Cortana, Go Home"



System Information

Cortana

Pinned Application launchers

All Apps

Mixed Reality Capture

Store



Apps & games



Search



piano

Jewel Star

An explosive match-3 game



[App categories](#)

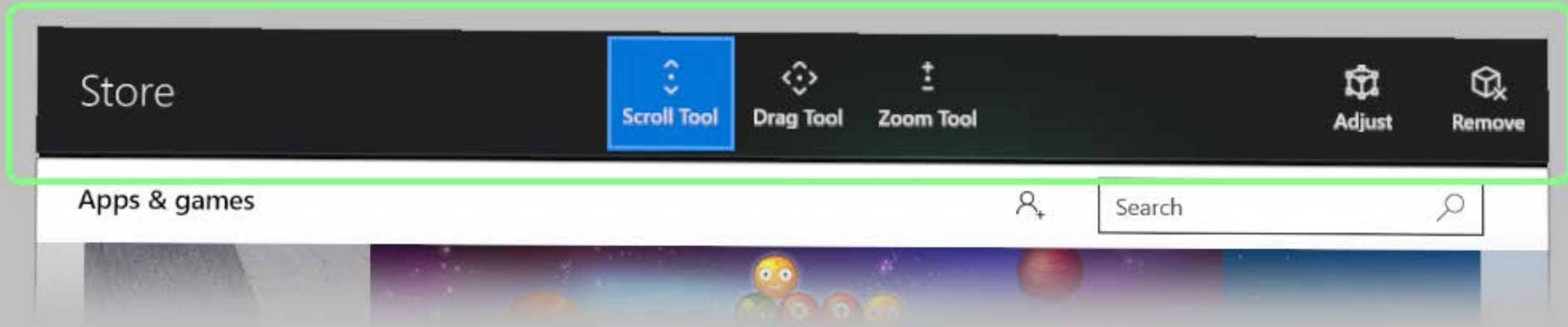
[Game categories](#)

[Featured](#)

Getting started



# Holobar



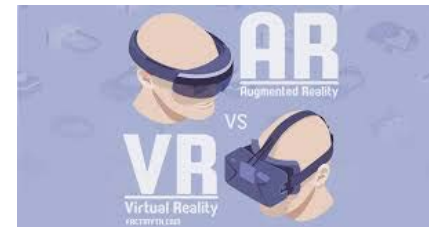
# HoloLens Hands On





# Round Table Discussion

- 1 What will be the advantages and disadvantages of VR/AR use in education?
- 2 How will you measure students' knowledge retention?
- 3 How do you facilitate learning abstract content?
- 4 Which tools will you use to create VR learning experiences?



# Credits - Images

<https://upload.wikimedia.org/wikipedia/commons/thumb/d/dc/Sensorama-morton-heilig-virtual-reality-headset.jpg/220px-Sensorama-morton-heilig-virtual-reality-headset.jpg>

[https://aotw-pd.s3.amazonaws.com/Audi\\_AR\\_Kalender\\_h264-big.jpg](https://aotw-pd.s3.amazonaws.com/Audi_AR_Kalender_h264-big.jpg)