

VR/AR Capstone

Intro Lecture

Aditya Sankar

(some slides adapted from Gordon Wetzstein, Dan Escudero)

Logistics

Lectures: Tuesday 1:30pm - 2:50pm

- GLD 322 (Gould Hall)

Lab: Thursday 1:30pm - 4:20pm

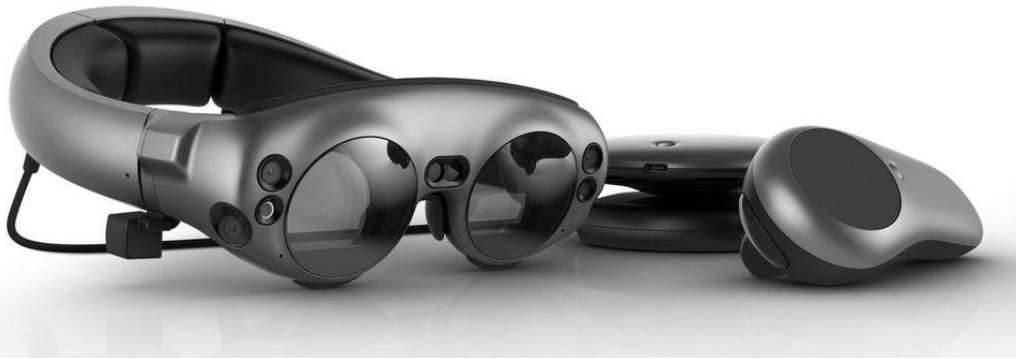
- SIG 327

TA's Edward Zhang, Xuan Luo and Ethan Gordon

Website: <http://cs.washington.edu/481v>

World's most EPIC capstone

World's most EPIC hardware!



Course Objectives

- You will invent and develop an AR/VR application in 10 weeks
- Hear and Learn from the Biggest Minds in Virtual and Augmented Reality
- Be among the first people in the world to develop apps for VR/AR platforms
- Simulate the software development process

vir·tu·al re·al·i·ty

vərCH(əw)əl rē'alədē

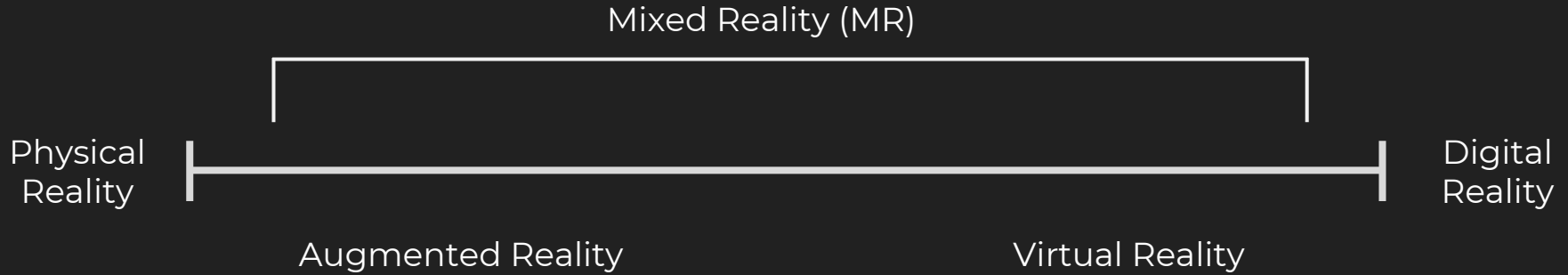
the computer-generated simulation of a three-dimensional image or environment that can be interacted with in a seemingly real or physical way by a person using special electronic equipment, such as a helmet with a screen inside or gloves fitted with sensors.

aug·men·ted re·al·i·ty

/,ôg'mentəd/ rē'alədē

Augmented Reality (AR) is an interactive experience of a real-world environment whereby the objects that reside in the real-world are "augmented" by computer-generated perceptual information, sometimes across multiple sensory modalities, including visual, auditory, haptic, somatosensory, and olfactory.

Reality-Virtuality (RV) Continuum



XR (Extended Reality): Umbrella Term

Personal
Computer
e.g. Commodore PET
1983

Laptop
e.g. Apple MacBook

Smartphone
e.g. ASUS Zenfone

AR/VR
e.g. HoloLens,
Vive, Magic Leap

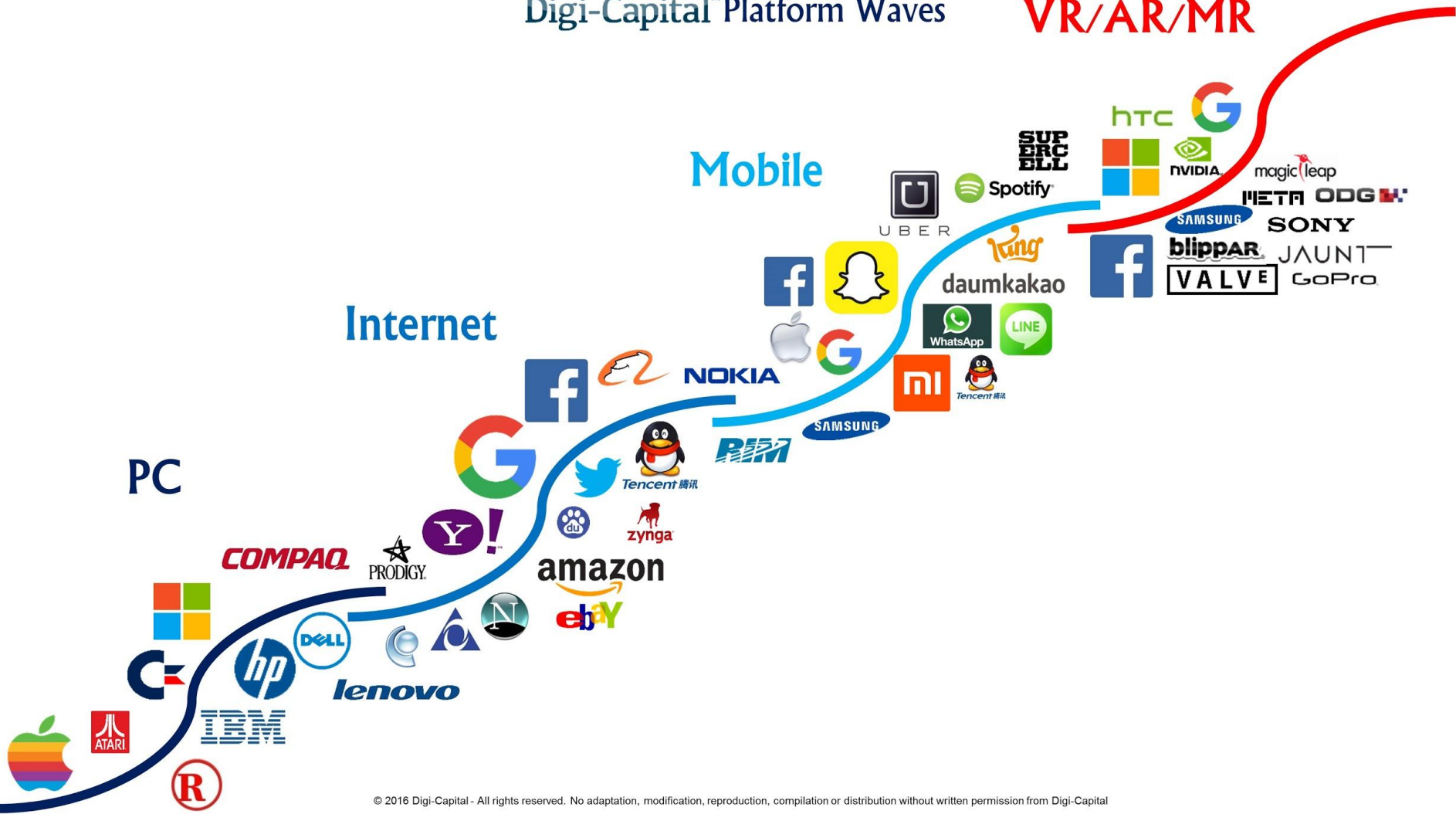


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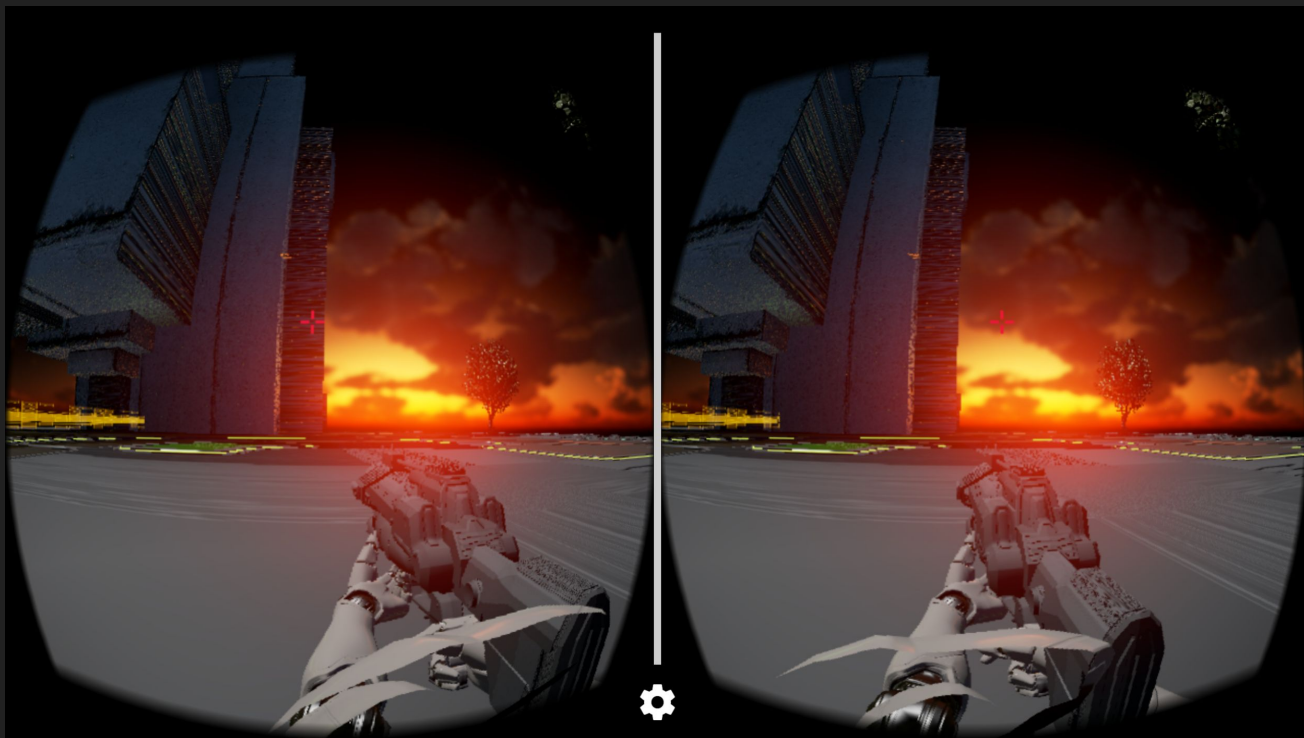
Computing Form Factor

Digi-Capital™ Platform Waves

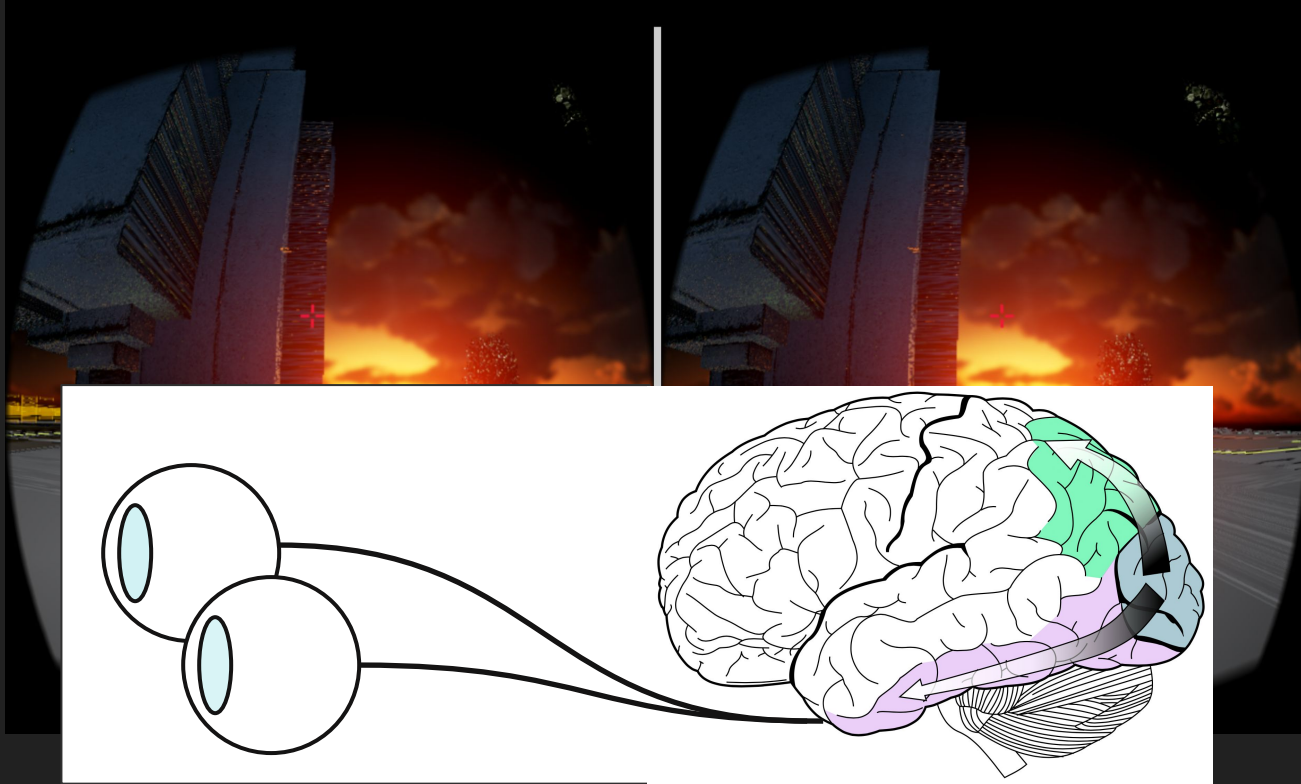
VR/AR/MR



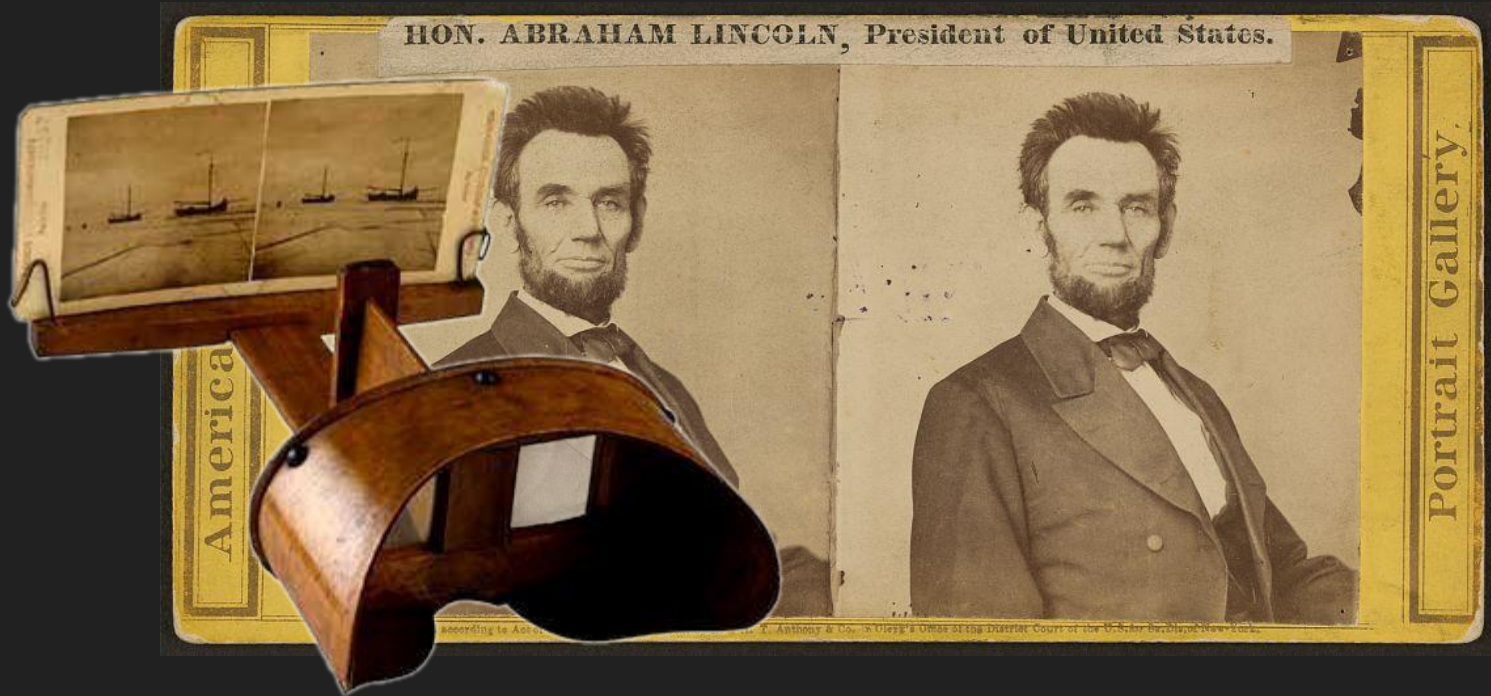
Stereoscopic Display



Stereoscopic Display



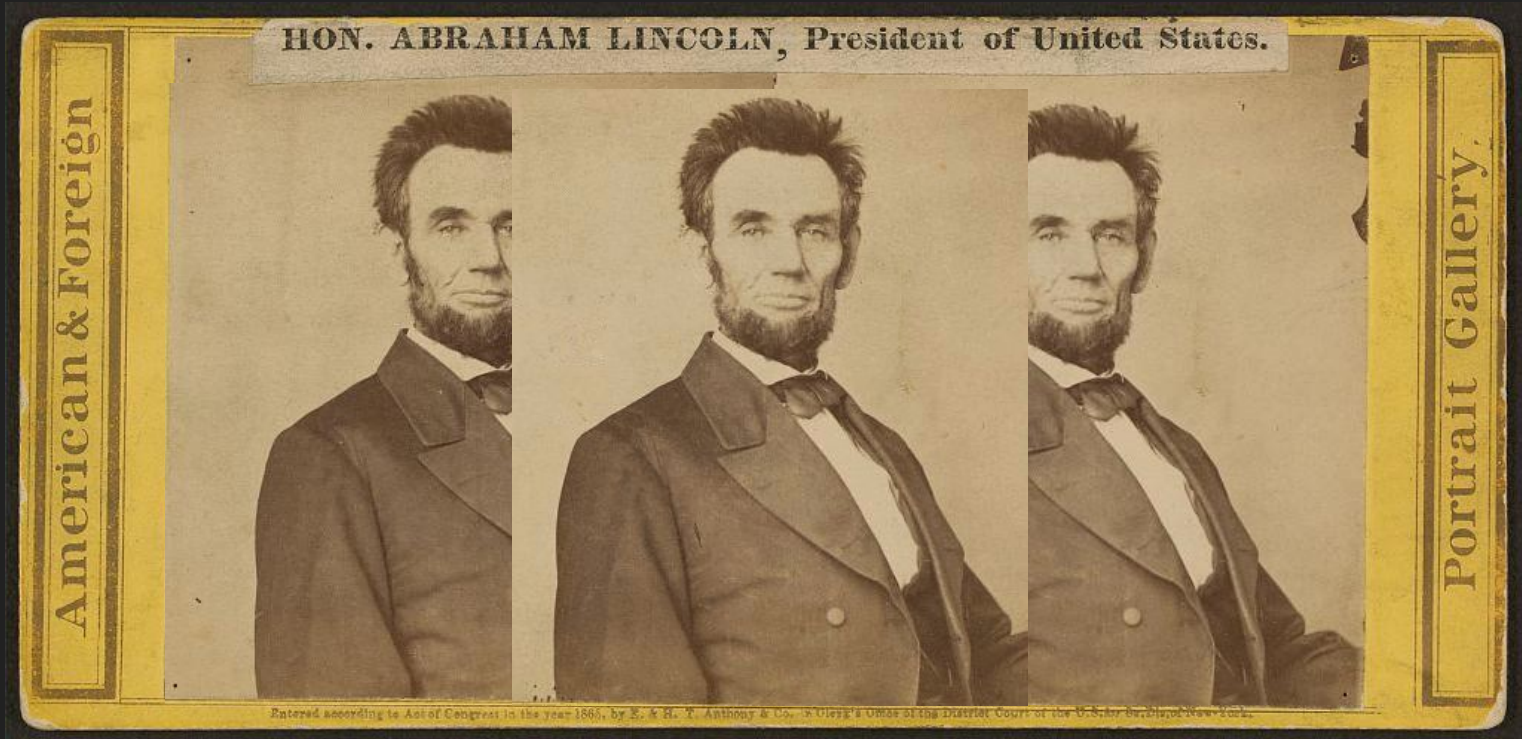
They've existed for a while ...



Charles Wheatstone., 1841. Stereoscope.

Walker, Lewis E., 1865. Hon. Abraham Lincoln, President of the United States. Library of Congress

Brain does its magic..



Brief History of VR/AR

Stereoscopes
Wheatstone, Brewster, ...

VR & AR
Ivan Sutherland

Nintendo
Virtual Boy

VR explosion
Oculus, Sony, HTC, MS, ...



1838



1968



1995



2012-2018

???



simulation & training



visualization & entertainment



remote control of vehicles, e.g. drones



gaming



robotic surgery



architecture walkthroughs



education



virtual travel



a trip down the rabbit hole


What should we build?

Coming up with an idea

- Discuss diverse ideas and platforms that interest you
- Define a substantial problem to solve. Think about:
 - Would people want to use it?
 - Would it bring them joy and delight?
 - Would it improve their lives? Would it be fun?
- Think about devices and their capabilities
 - You will get to try them today
- Fine (in fact encouraged) to propose multiple ideas/platforms
- Iterate!!!

Ideas Page

Secure | <https://courses.cs.washington.edu/courses/cse481v/18au/ideas.php>

 **AR / VR Capstone**

[Project](#) - [Schedule](#) [Speakers](#) [Resources](#) -

Here are some project ideas/suggestions to help get you started with brainstorming.

Educational VR/AR Apps

- Projecting notes on instruments to learn how to play. [Spring 16 project]
- Learning physics concepts (like forces, charges, magnetism, relativity) in VR
- Witness some defining historical moments as if you were there (space shuttle launch, moon landing, first flight, famous speeches etc.)
- Virtual classroom
- Visualize Classical Physics problems (friction, rolling, $F = ma$) with physical props and AR
- Visualize molecules and chemical reactions
- Visualize biological process, be able to zoom inside cells and observe things like DNA walkers, protein synthesis, cell duplication etc.,
- Everything the magic school bus did (human body, space, weather systems, etc.)

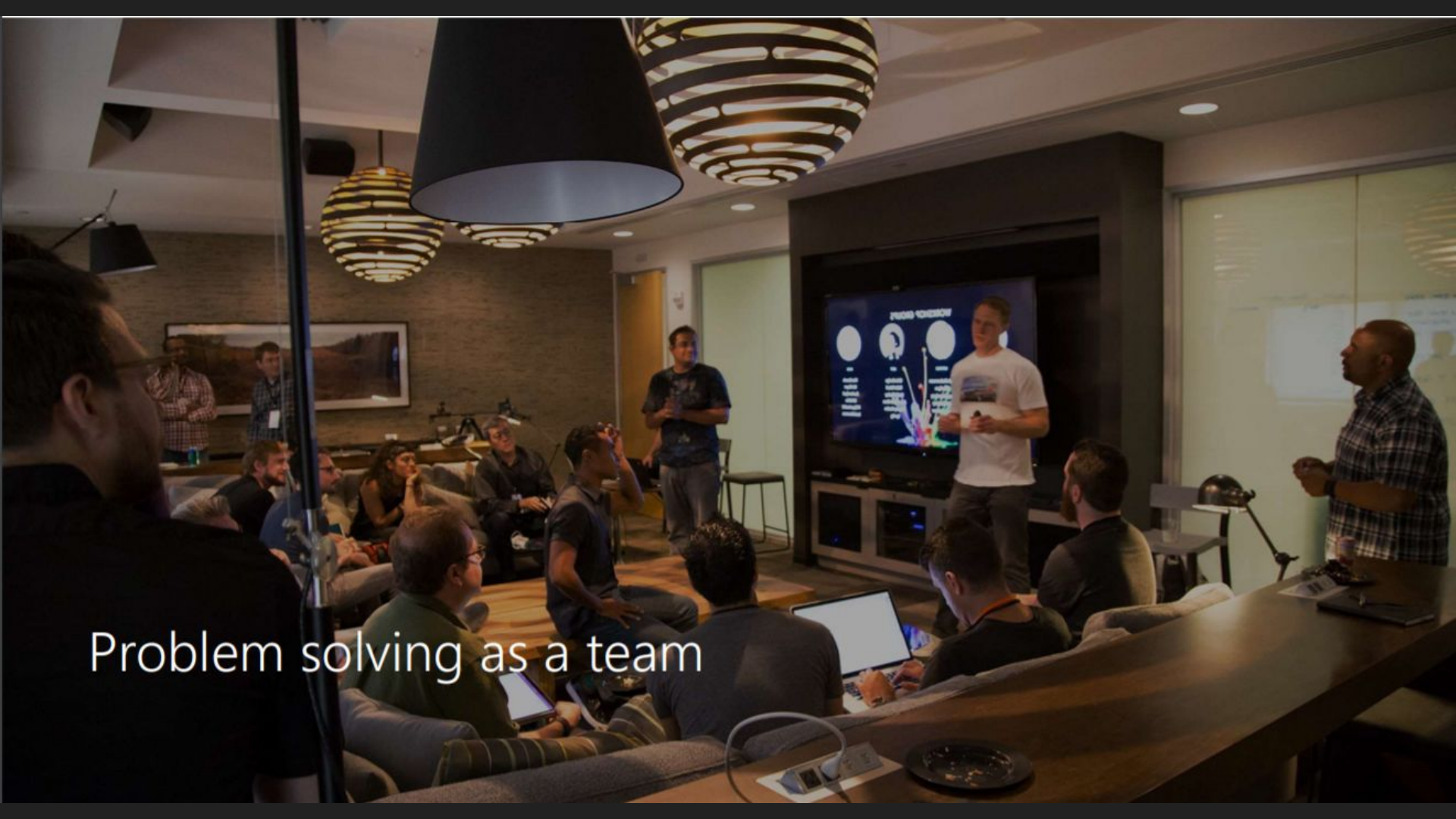
Games

- Holographic chess (like wizard's chess in Harry Potter) [Spring 16 project]
- Games with holographic monsters (think Yu-Gi-Oh, Pokemon, etc).
- AR pictonary (instead of drawing pictures in 2D draw them in 3D).
- AR paintball/laser tag (virtual paint, have virtual paint stick to real life walls, etc.)
- Pokemon Go++: include gestures (throw a pokeball), pokemon actually stay on the ground, environment-aware pokemon (electric types appear near electrical outlets?), battles with effects (maybe borrow assets from Pokemon Stadium games)
 - Occlusions (Pokemon already released a tech demo for this)
 - Analyze game and see what's missing -- what can we add
- New strategy/RPG style games
- Plenty of ideas online! Try exploring something new in this space


AR How-To's or Tutorials (for common tasks)

- Steps to change oil, car repair
- How to repair bicycle
- Many require tools to be named/connected/visualized

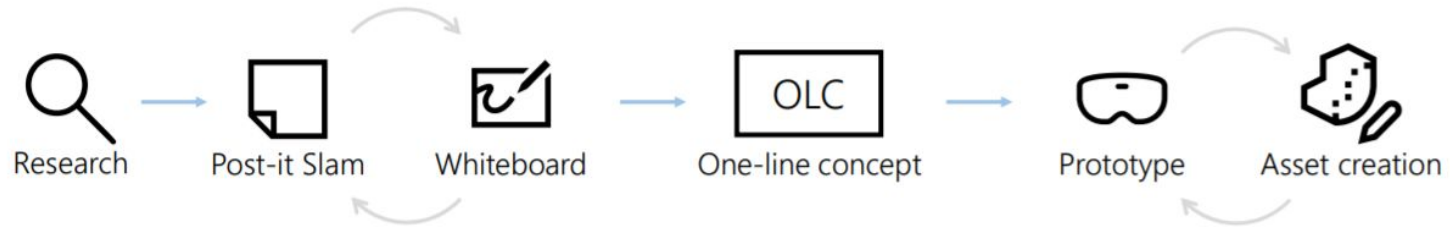
How should we build it?

A group of people are gathered in a modern office space, likely a lounge or meeting area, for a collaborative session. In the center, a large television screen displays a presentation titled "PROBLEM SOLVING" with various diagrams and charts. Two men stand near the screen, one pointing at it. A group of people are seated on a long wooden table in the foreground, some looking at the screen and others at their laptops. The room features large, modern pendant lights and a glass partition on the right side. The overall atmosphere is professional and collaborative.

Problem solving as a team

A man in a white t-shirt is pointing at a large wall covered in numerous yellow sticky notes. He is standing in a modern office lounge with other people sitting on sofas and standing in the background. The room features large windows, a wooden coffee table, and distinctive spherical pendant lights. The text 'Pens Paper Sticky notes Whiteboards...' is overlaid on the left side of the image.

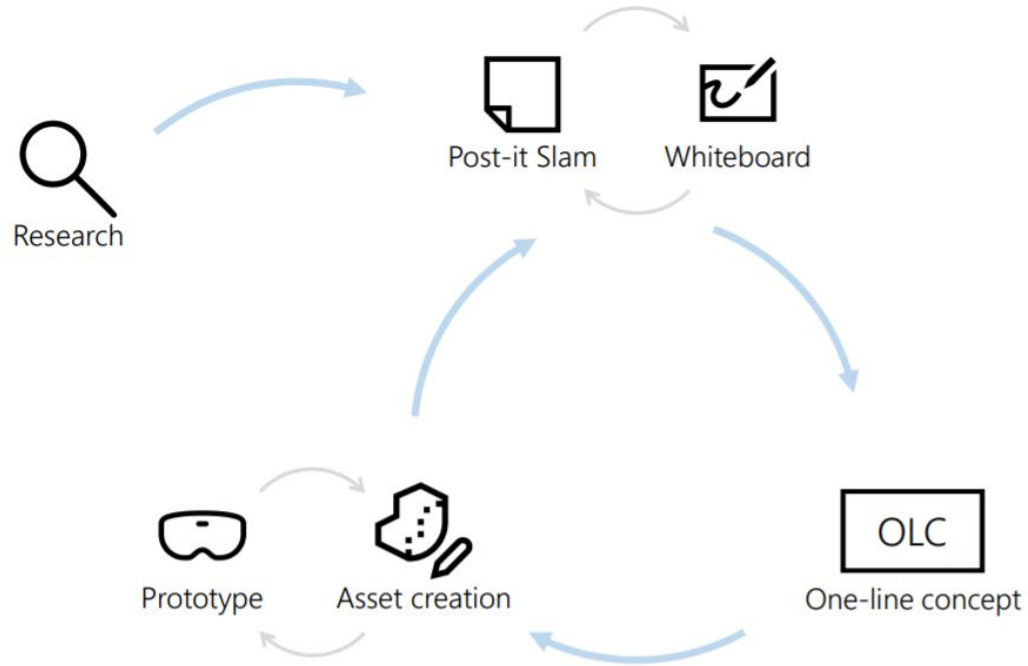
Pens
Paper
Sticky notes
Whiteboards...



Paper/3D Prototyping

Acting. Consulting

Storyboarding



Deliverables and Evaluation

- Initial Ideas Post (Due Thursday at noon)
- In-person pitch (During Thursday Lab)
- Project Requirements Document (PRD) (One week from Thursday)
- Weekly updates and Mid-term report
- Peer-reviews
- Final Demo

Speakers: Learn from Top Minds

10/09: Ben Lok, University of Florida

10/16: Doug Lanman, Facebook Reality Labs

10/23: Jeremy Bailenson, Stanford VHIL

10/30: Paul Debevec, Google

11/06: Gordon Stoll, Valve

11/20: Cassidy Curtis, Google

11/27: Shahram Izadi, PerceptivelO

12/04: Startup Founders Panel

What's next

- Try out devices and understand their capabilities
 - Try different demos, ensure everyone gets to try
 - Devices will be in the lab and you can visit anytime
- Post initial ideas to discussion board
 - One line concept and a brief description
 - Any API/Platform/Feasibility related questions
 - Due Thursday at noon (ideas can change after, if needed)
 - At the Thursday lab, give a 10-minute pitch (slides, visuals are fine)

Questions?

Go try the devices!

Have fun!