Aug 13th, 12:00 PM - 1:00 PM

Lunch Keynote Speaker — The Next Wave: Humans, Computers, and Redefining Reality
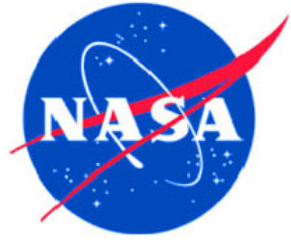
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Little, William L. M.S., "Lunch Keynote Speaker — The Next Wave: Humans, Computers, and Redefining Reality" (2018). *National Training Aircraft Symposium (NTAS)*. 47.
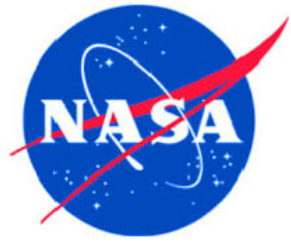https://commons.erau.edu/ntas/2018/presentations/47
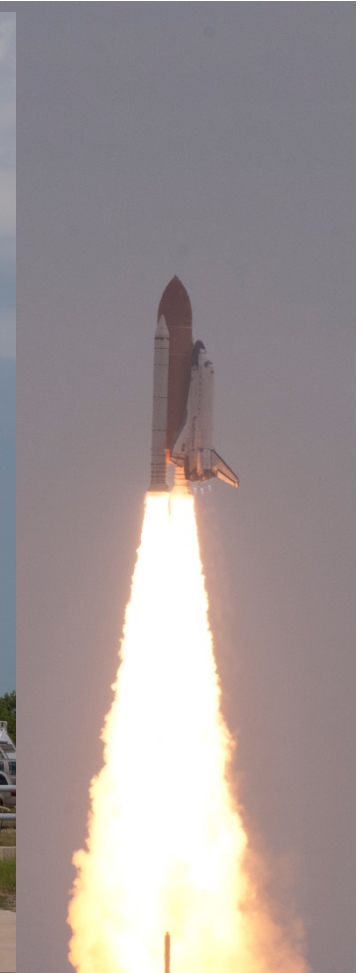
The Next Wave

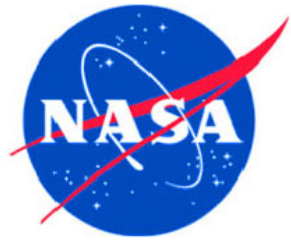## Humans, Computers, and Redefining Reality

William Little
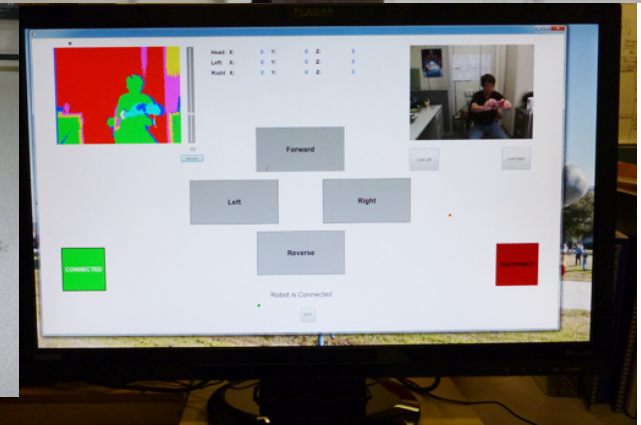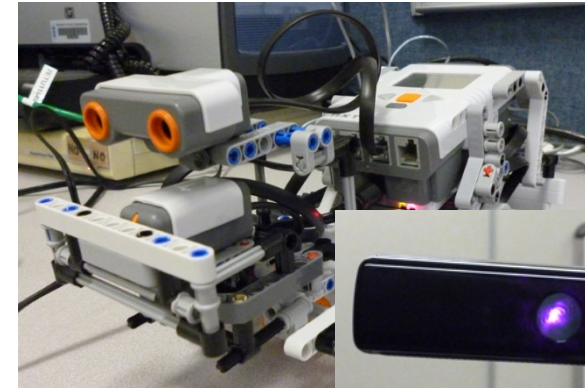
NASA Kennedy Space Center

Background

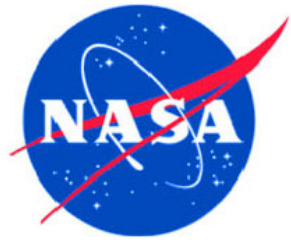# The KSC Augmented/Virtual Reality Lab (AVR Lab)

Charter:

"Dedicated to exploration into the growing computer fields of Extended Reality and the Natural User Interface, the AVR Lab is a proving ground for new technologies that can be integrated into future NASA projects and programs."
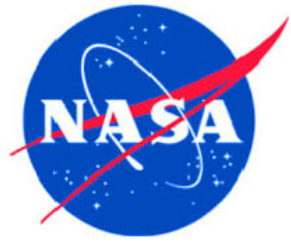
What is Extended Reality?

eXtended Reality (XR)

=

Augmented Reality (AR)

+

Virtual Reality (VR)
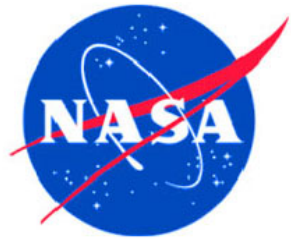
+

Mixed Reality (MR)

Augmented Reality

Wikipedia: "A live direct or indirect view of a physical, real-world environment whose elements are 'augmented' by computer-generated or extracted real-world sensory input such as sound, video, graphics, haptics, or GPS data."
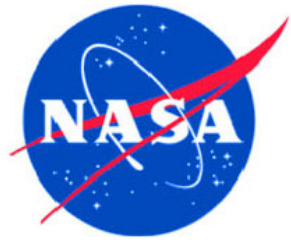
Virtual Reality

Wikipedia: "A computer technology that uses virtual reality headsets or multi-projected environments, sometimes in concert with physical environments or props, to generate realistic images, sounds and other sensations that simulate a user's physical presence in a virtual or imaginary environment."

# Mixed Reality

Wikipedia: "The merging of real and virtual worlds to produce new environments and visualizations where physical and digital objects co-exist and interact in real time. Mixed reality takes place not only in the physical world or the virtual world, but is a mix of reality and virtual reality, encompassing both augmented reality and augmented virtuality via immersive technology."
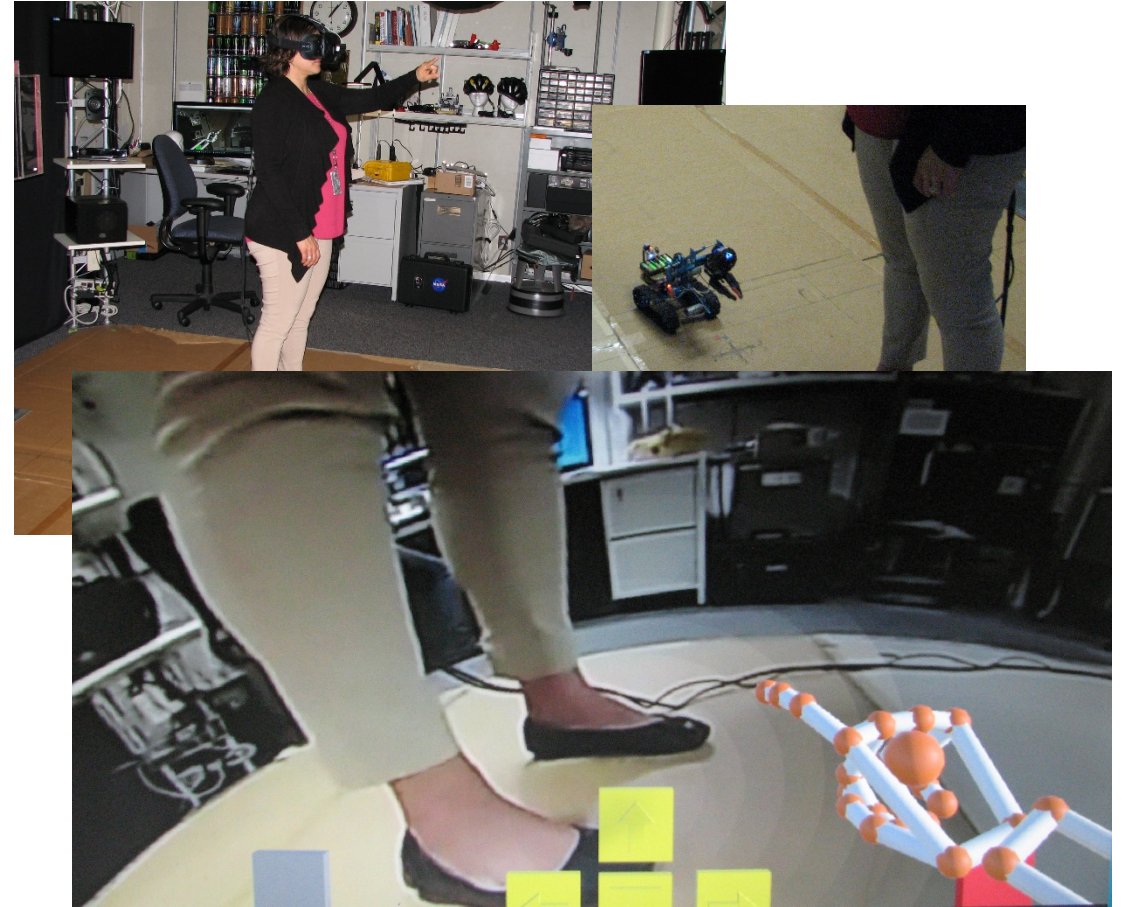
What is HCI?

HCI

Human **C**omputer **I**nterface

↓

Human **C**omputer **I**nteraction

From GUI to NUI

The Tools of the Trade

- Oculus Rift
- HTC Vive
- Hololens
- Kinect
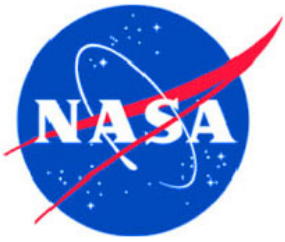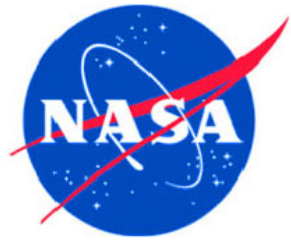- Optitrack Motion Capture
- Leap Motion
- Unity 3D
- Blender
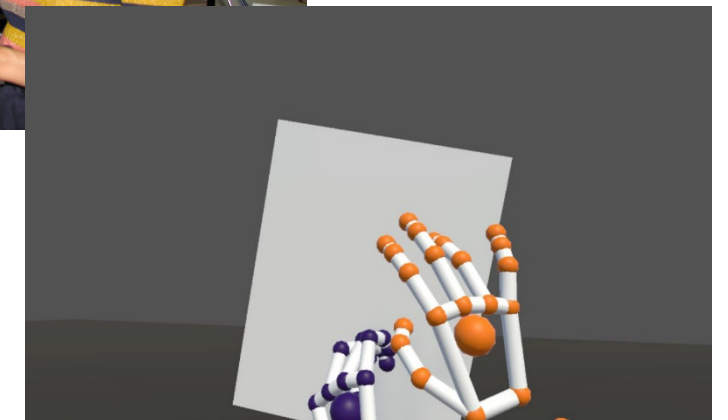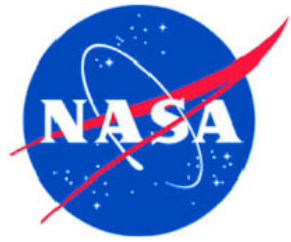- Visual Studio
- C#/C++/Python
- etc.

Virtual Control Panel

- Human interaction with virtual objects drives behaviors of objects in the physical world
- Shortcomings of XR environments are identified
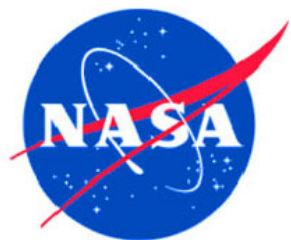- Solutions proposed, implemented, tested

Voice Recognition


```xml
<!-- turnCommand: The root command for turning the robot left or right. -->
<rule id="turnCommand">
  <one-of>
    <item>turn</item>
    <item>go</item>
  </one-of>
  <item>
    <ruleref uri="#turnDirection" />
  </item>
</rule>

<!-- turnDirection: The commands to turn the robot left or right. -->
<rule id="turnDirection">
  <one-of>
    <item>
      left <tag>out.turn="3"</tag> <!-- 3 = Left -->
    </item>
    <item>
      right <tag>out.turn="4"</tag> <!-- 4 = Right -->
    </item>
  </one-of>
</rule>

<!-- stopCommands: The commands for stopping all robot activities. -->
<rule id="stopCommand">
  <one-of>
    <item>
      stop <tag>out.stop="0"</tag> <!-- 0 = Stop -->
    </item>
    <item>
<!--      halt <tag>out.direction="0"</tag> -->
      halt <tag>out.stop="0"</tag>
    </item>
  </one-of>
```

Facial Recognition
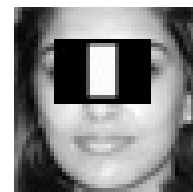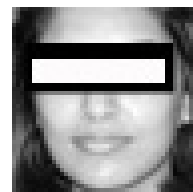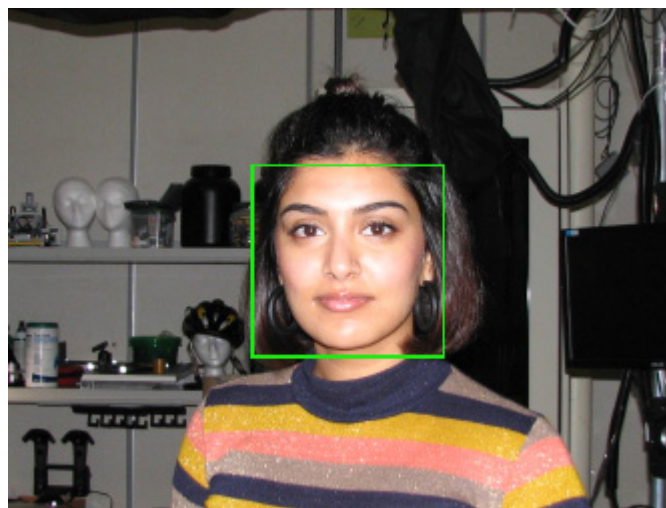
"Good morning, Tanya. What application would you like to run today?'"

Time Flies When You're Having Fun!

KINECT:
- June 2009: Project Natal announced
- November 2010: Xbox 360 V.1 Launched
- June 2011: SDK Released
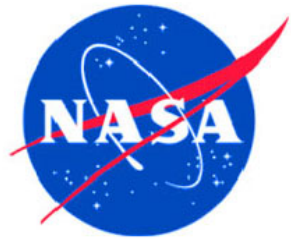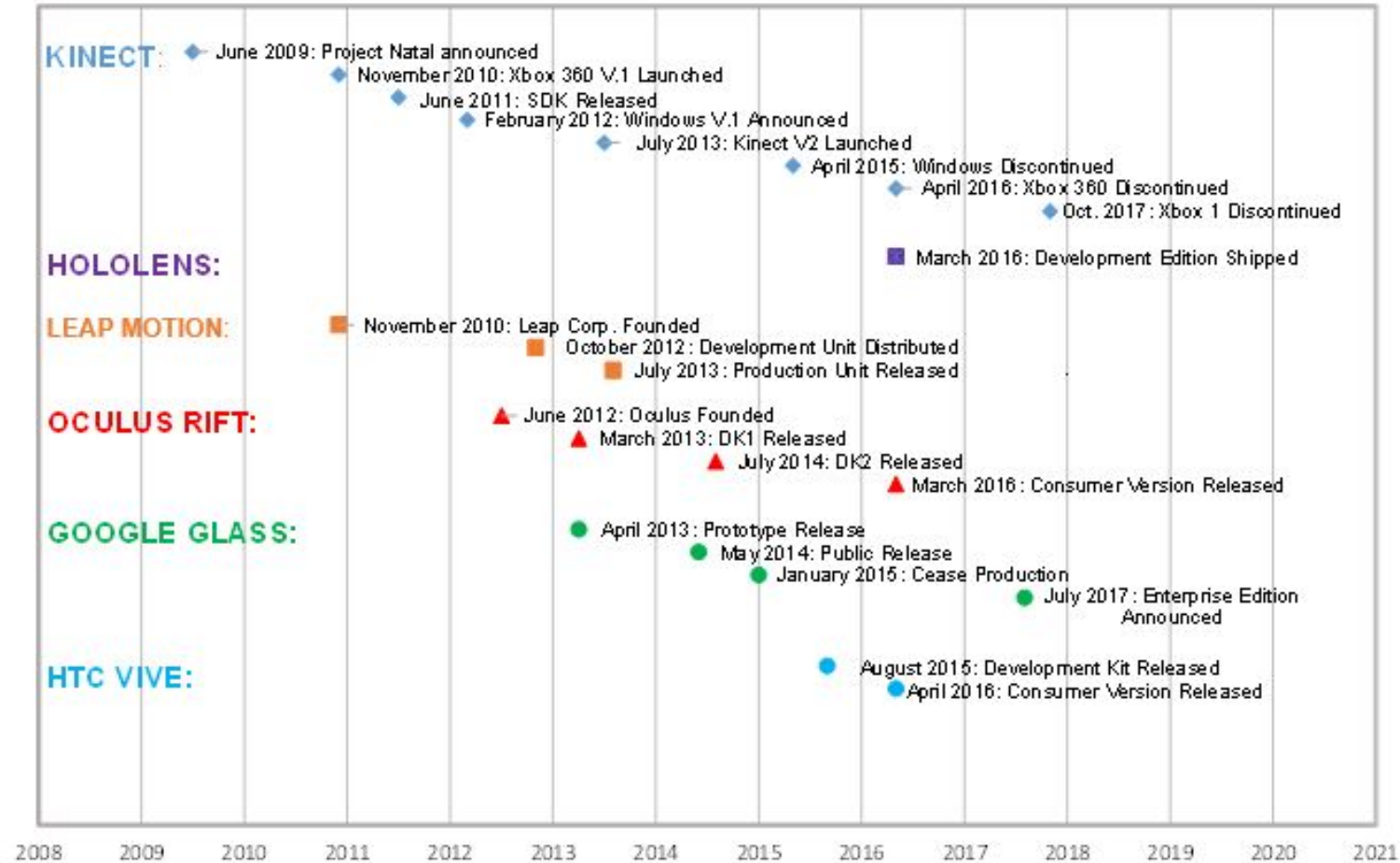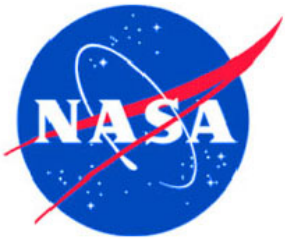- February 2012: Windows V.1 Announced
- July 2013: Kinect V2 Launched
- April 2015: Windows Discontinued
- April 2016: Xbox 360 Discontinued
- Oct. 2017: Xbox 1 Discontinued

HOLOLENS:
- March 2016: Development Edition Shipped

LEAP MOTION:
- November 2010: Leap Corp. Founded
- October 2012: Development Unit Distributed
- July 2013: Production Unit Released

OCULUS RIFT:
- June 2012: Oculus Founded
- March 2013: DK1 Released
- July 2014: DK2 Released
- March 2016: Consumer Version Released

GOOGLE GLASS:
- April 2013: Prototype Release
- May 2014: Public Release
- January 2015: Cease Production
- July 2017: Enterprise Edition Announced

HTC VIVE:
- August 2015: Development Kit Released
- April 2016: Consumer Version Released

2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021

https://www.youtube.com/watch?v=v9kTVZiJ3Uc or view on metadata page

Conclusions

- The next wave of the computer revolution isn't coming – it's already here.

- Radical changes in the way humans receive, process, and act on computer based information are changing how we learn in ways we are just beginning to understand.

- XR technology has already begun to reshape traditional notions of the classroom, textbooks, and any number of tools and methodologies used to prepare students for the future.
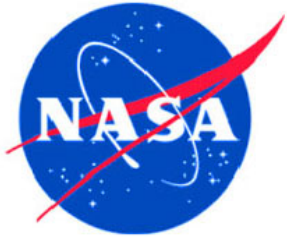
Questions?

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