Virtual Reality
PSY/CS 484/684

Paul MacNeilage & Eelke Folmer

Final Exam

- Worth 25% of grade
- In-class review on April 29th
- Exam on May 1st in lecture hall
- The exam will be cumulative
- Same format as the mid-term
  - 17 true/false – 2pts each
  - 15 multiple choice – 2pts each
  - 6 short answer – 6 pts each

Alpha Version Assignment

The Alpha version of your VR game is an early build that should include working interaction system, the core gameplay features, and/or a functioning virtual environment. While the game/app is not expected to be feature-complete or fully polished, it should demonstrate the primary gameplay loop and VR interaction that define your project.

Think of it as the "first draft" of your game that may be good enough to play and evaluate, but still open to refinement, bug fixing, and additional content.

Specifically, please submit one of the following:

a) A video showing alpha version of your project.

b) A pdf report describing the work progress of your project. Include graphics showing the alpha version of your project, description of work completed and TODO list.

c) An .apk build file of your project. Make sure the project is correctly built and works on the headset.

Final Project Assignment

- 350 points total, worth 25% of grade

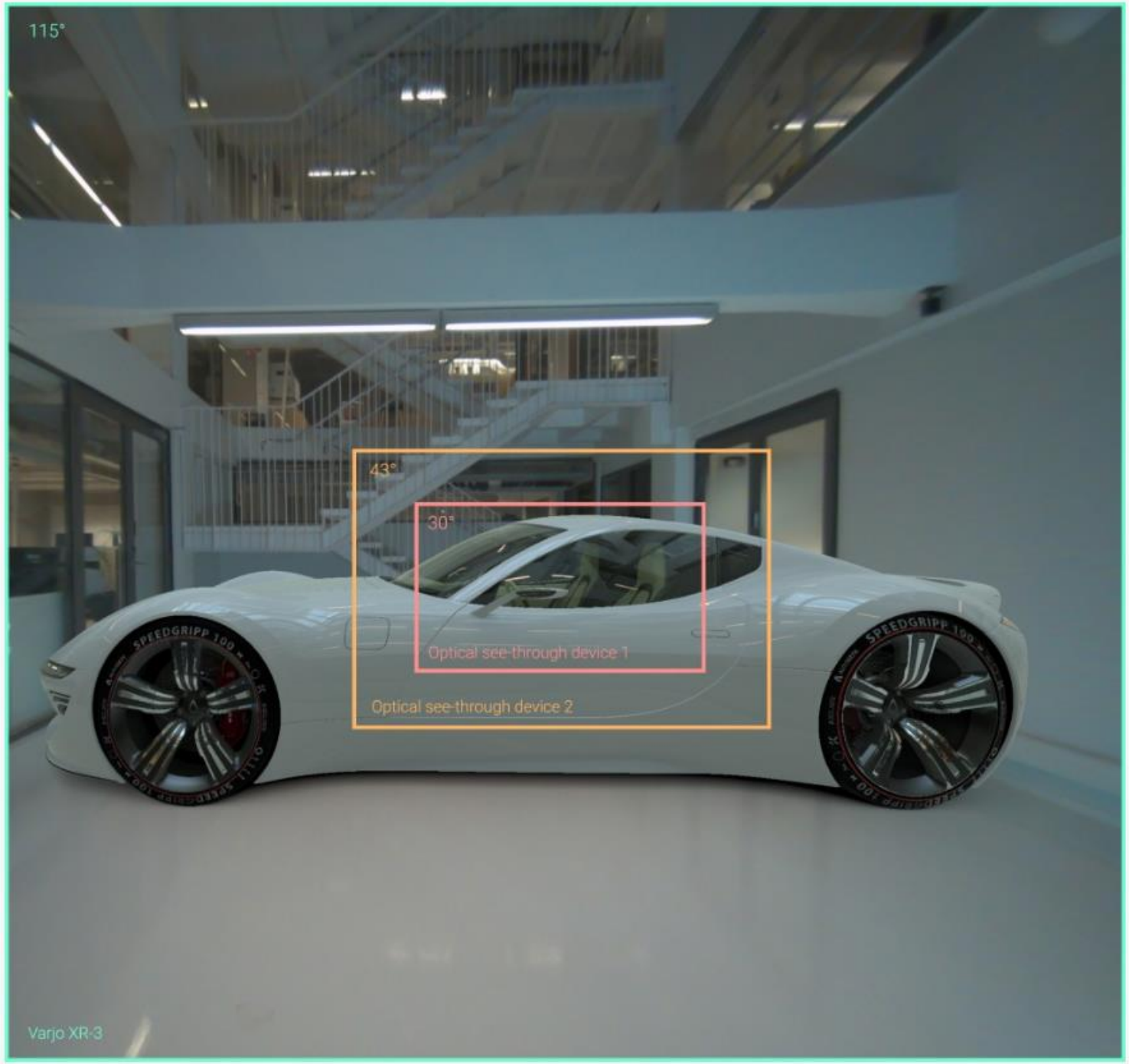
- April 29th – Alpha version due - 25 points
- May 8th : Final Project – 100 points, see rubric for grading
  - Folder with source code
  - Folder with executable
  - Readme to explain things

- May 8th: Video presentation of final project – 50 points
  - Approximately 3 slides
  - Approximately 3 minutes total
  - All group members presenting
  - Use zoom; record to the cloud

- May 8th: Evaluation of classmates projects in lecture hall during scheduled exam time 10:15-12:15am

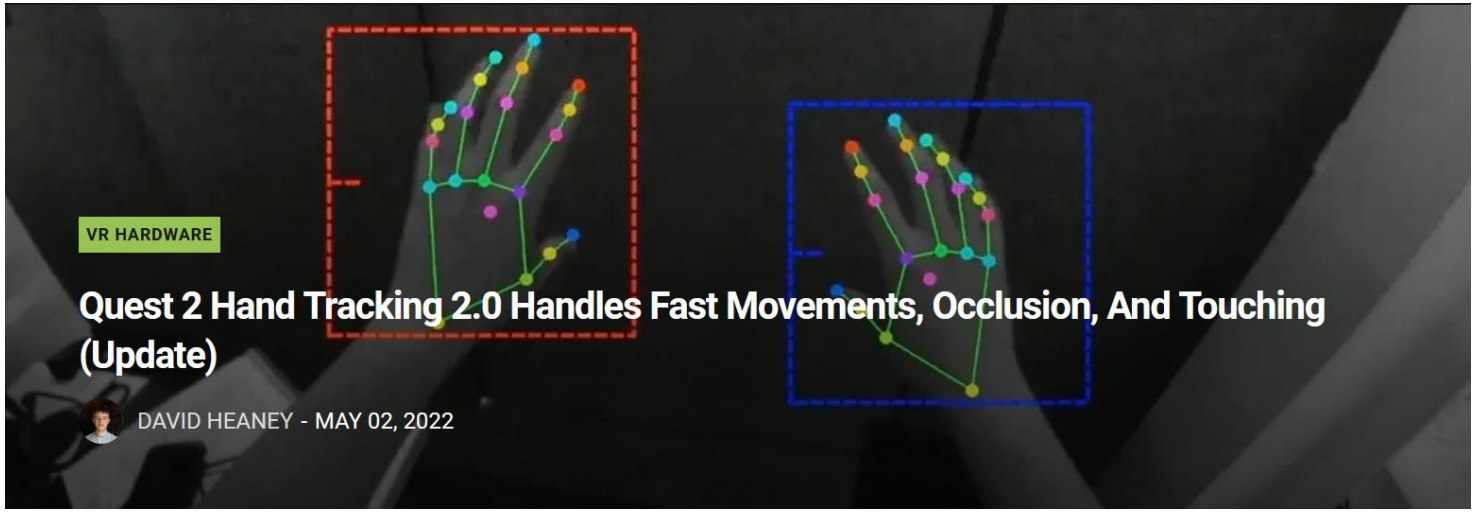
Increased Field of View, etc.

- Varjo XR-3



Hand Tracking

- Hand tracking demo



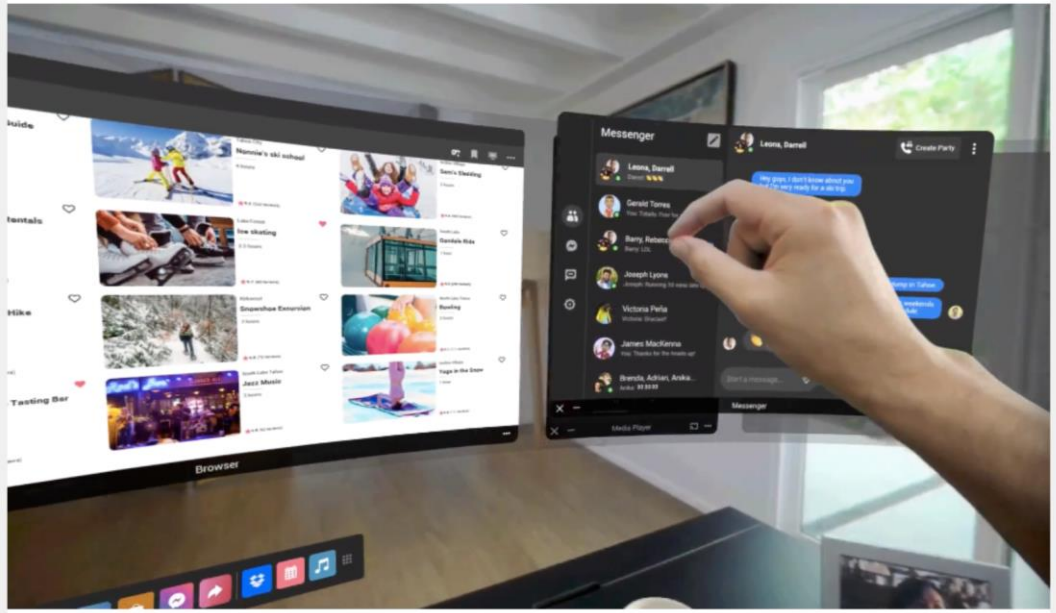
Commercial VR, MR, XR cutting edge

VRSCOUT

News

Meta's Next VR/AR Headset Will 'Replace Your Laptop'

April 28, 2022 • by Kyle Melnick



- From VR to MR
- Quest vs Vision Pro

Passthrough VR – How it works

- Video camera capture head-centered video (or two of them)
- Video is instantaneously “modified”
  - Stitching feeds together
  - Filling in blank spots
  - Correct distortions

https://www.xrtoday.com/virtual-reality/what-is-vr-passthrough-and-how-is-it-shaping-the-future-of-xr/

Passthrough VR - Applications

- Safety
  - Awareness of the real environment – don’t bump into things
  - Not “cutoff” from the real world
  - Allows social interaction/collaboration

- Augmented reality type experiences
  - Overlay virtual content on the real world

Augmented Reality

- Overlay virtual content on the visible real world
- More challenging to get right than passthrough
  - Alignment of virtual content with visible real world
  - Dynamic range of light levels in real world
  - Etc.

Microsoft Hololens

Magic Leap Glasses

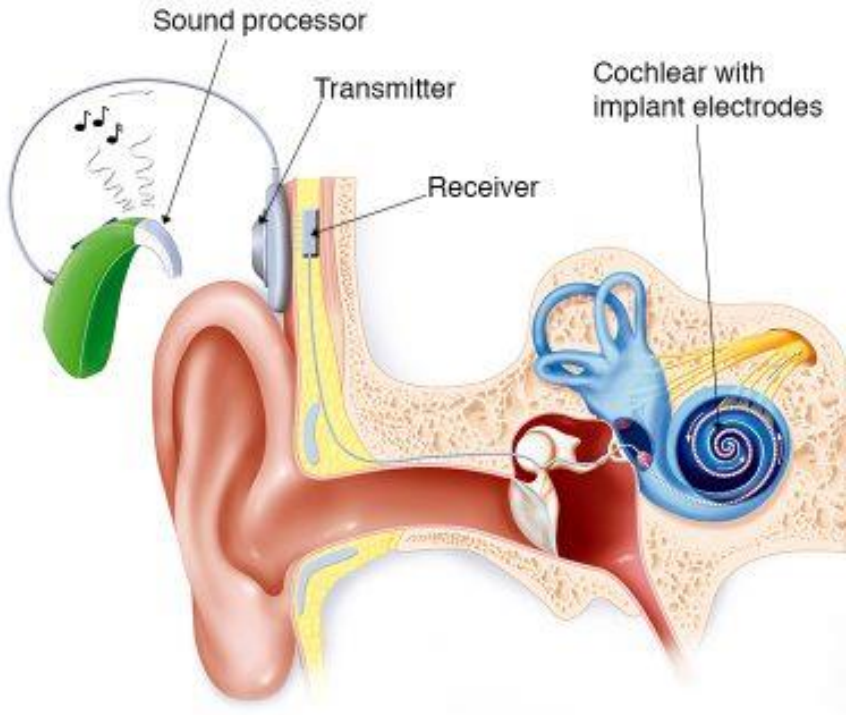
Applications

- “Smartglasses” – next gen “platform” after smartphones, smartwatches, etc.
- Current versions do not necessarily incorporate visual displays
- Example functionality:
  - “What is the name of the plant I’m looking at?”

- Functionality with visual display
  - All the things you can do on your smartphone!
  - Navigation
  - Texting
  - Web search
  - Etc.

Sensory Implants

- Direct electrical sensory stimulation that mimics real-world stimulation
- Cochlear implants – very common
- Retinal implant – in development
- Vestibular implants – in development



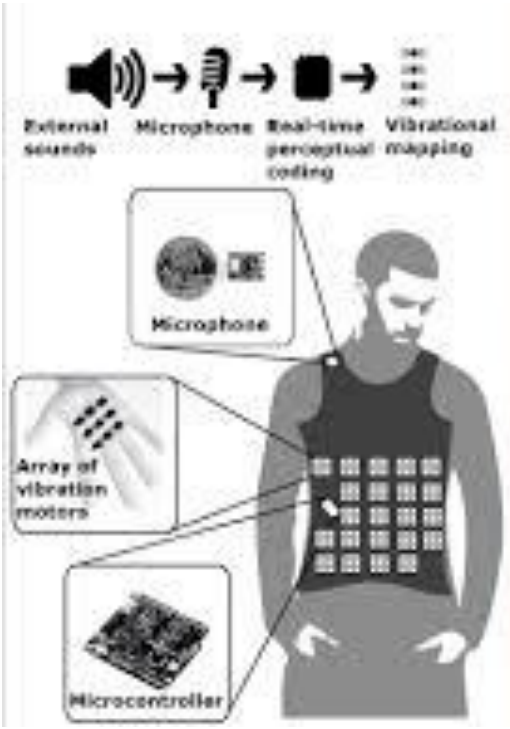
Plasticity – sight restoration

- Molyneux's problem – would a blind person whose sight has been restored be able to instantly recognize object they know only based on touch?
  - Question about universal versus modality-dependent cognitive representations

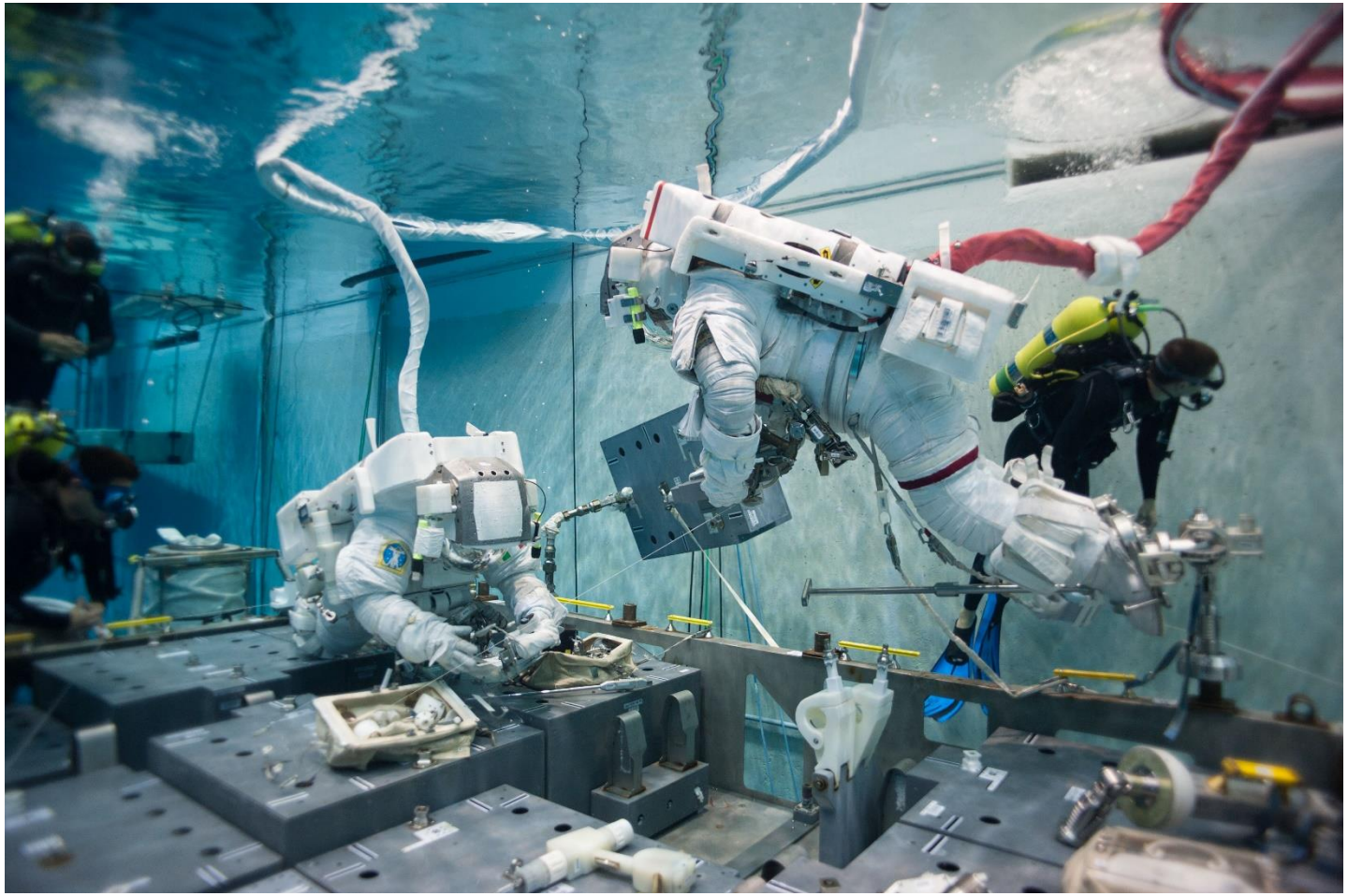
- Surgery for congenital cataracts – Ethiopia, India
  - Patients must “learn to see”
  - Allows researchers to investigate some of these questions
  - Depends on plasticity, but limited because of natural developmental mechanisms

Plasticity – sensory substitution

- Render stimuli from one sense to another
- Camera or microphones -> somatosensory stimulation



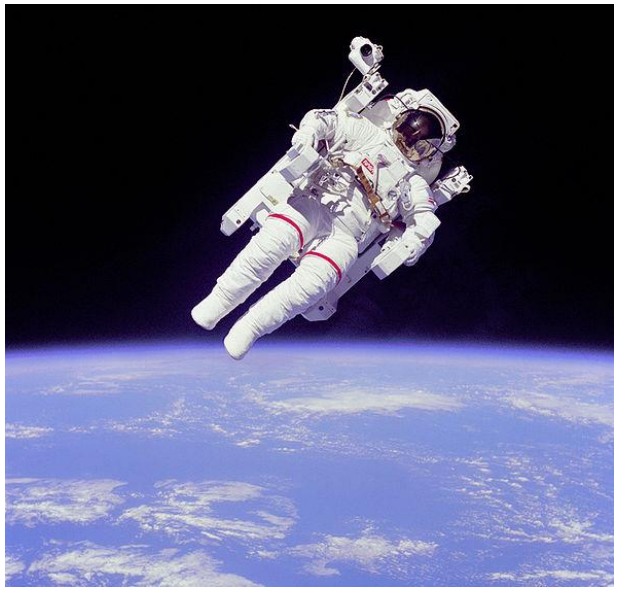
Astronaut Training Underwater



Underwater VR for Astronaut Training

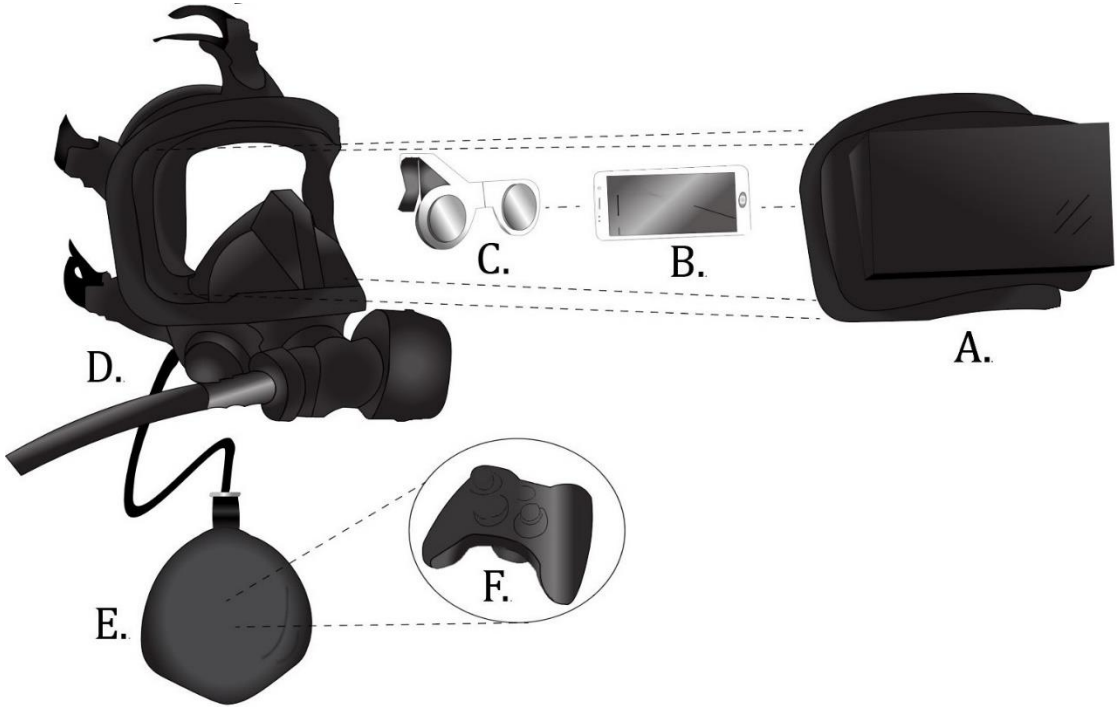
- NBL training of astronauts is expensive
- Can we accomplish the same thing using VR?

1) Make dive mask into HMD



2) Simulate a spacewalk

Underwater VR for Astronaut Training



scientific reports

OPEN

The effect of water immersion on vection in virtual reality

Géraldine Fauville[1]✉, Anna C. M. Queiroz[1], Erika S. Woolsey[2], Jonathan W. Kelly[3] & Jeremy N. Bailenson[1]

Research about vection (illusory self-motion) has investigated a wide range of sensory cues and employed various methods and equipment, including use of virtual reality (VR). However, there is currently no research in the field of vection on the impact of floating in water while experiencing VR. Aquatic immersion presents a new and interesting method to potentially enhance vection by reducing conflicting sensory information that is usually experienced when standing or sitting on a stable surface. This study compares vection, visually induced motion sickness, and presence among participants experiencing VR while standing on the ground or floating in water. Results show that vection was significantly enhanced for the participants in the Water condition, whose judgments of self-displacement were larger than those of participants in the Ground condition. No differences in visually induced motion sickness or presence were found between conditions. We discuss the implication of this new type of VR experience for the fields of VR and vection while also discussing future research questions that emerge from our findings.

Commercial Underwater VR

- Ballast VR

Body Swap Video

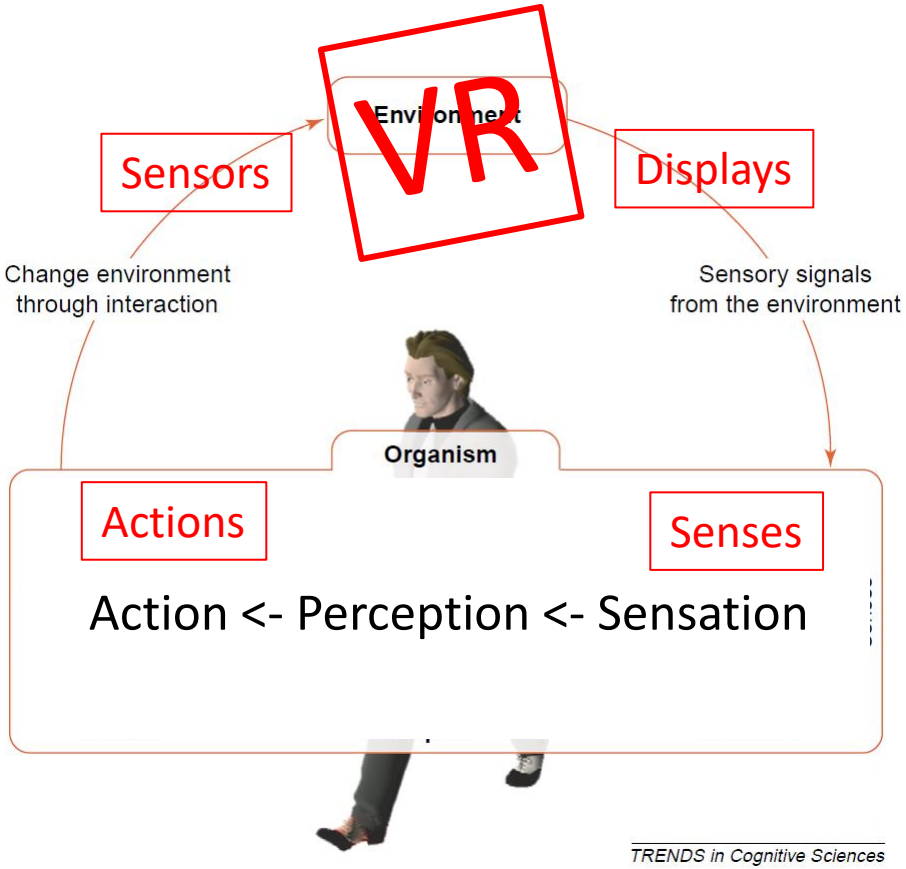
- Click here

What have we covered?

Contents

At the core of VR

- For psychologists:
  - a computer in the loop problem
- For computer scientists:
  - a human in the loop problem
- Requires an interdisciplinary approach.



Please evaluate our course…

- Psychology students: we hope you learned something about computer science!
- Computer science students: we hope you learned something about psychology!
- Please let us know what you thought of the course:
  - https://www.unr.edu/assessment/course-evaluations