Virtuality

Workshop 1

2022

VinMaker

VR Lab

OUTLINE

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VR Experience!!!

What is VR?

- “A **simulated** experience in which **computer graphics** is used to create a **realistic-looking** world” [1]
- “The use of **computer technology** to create the effect of an **interactive 3D world** in which the objects have a sense of **spatial presence**” [2]

“With appropriate programming, such a display could literally be the Wonderland into which Alice walked.”

Sutherland, 1965 - “Father” of VR

A scene from the famous movie Ready Player One

How to understand VR?
What are its key characteristics?

There are many different answers,
and we will look into one of them - **the 3Is framework**

The 3Is of Virtual Reality[3]

Immersion

Within immersion, a person may **feel inclusive** into the virtual environment and **connected between perception and the virtual interface**.

Interaction

A VR system can **detect user's gestures** via multiple sensors and provide **real-time response** to the new activity instantaneously.

Imagination

VR virtual environment supports the user to **elaborate on thoughts with virtual, imaginary objects**.

State-of-the-art VR technologies

Towards an immersive virtual environment

- Eye-tracking
- Hand-tracking
- Haptic feedback
- Tasting

And more...

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Eye tracking

Tracking the eyes' retinas for analyzing

- Enhance **interaction**, comfort[5]
- Customize experience
- Further app developments

Hand-tracking

Interact with virtual environment by hands without controllers

- More range of **interaction** + more **realistic**
- Inside-out cameras + computer vision algorithms
- Meta Quest 2: point, pinch & scroll

Haptic feedback

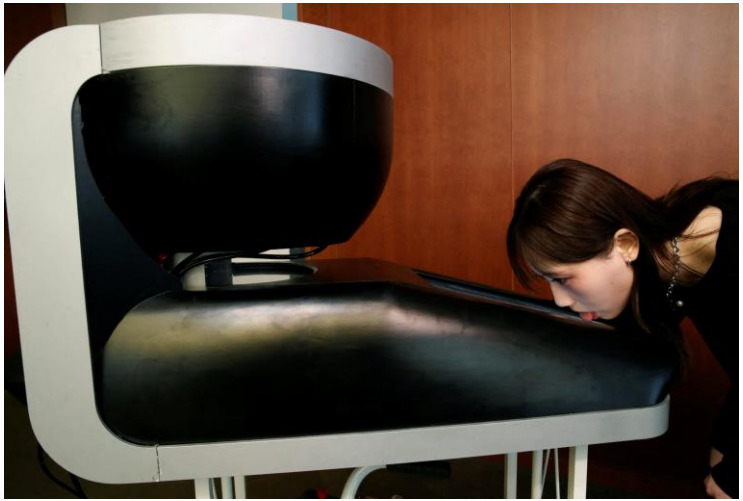
Haptic feedback aims for users' touch sense: kinesthetic + tactile

- Not only hands but full body → Gym or run indoor (~$20,000)
- Increase immersion and imagination

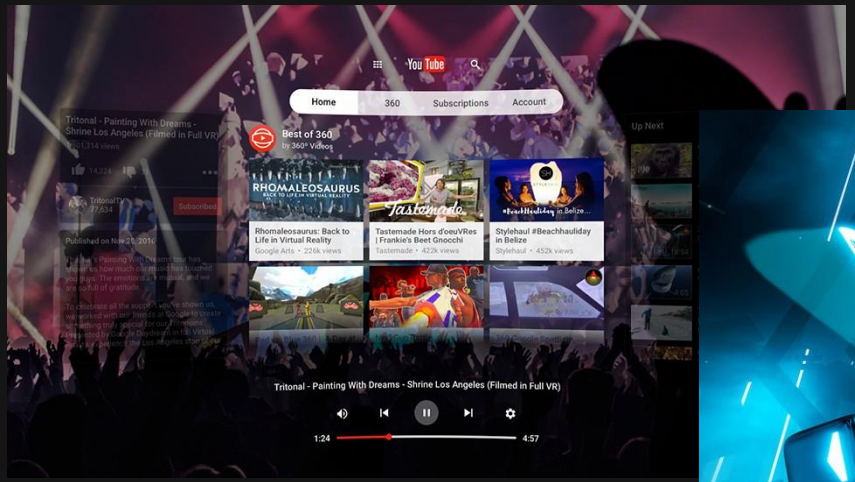
Tasting

A prototype for the taste concept created by researching team of Professor Homei Miyashita, Meiji University

Potential for VR



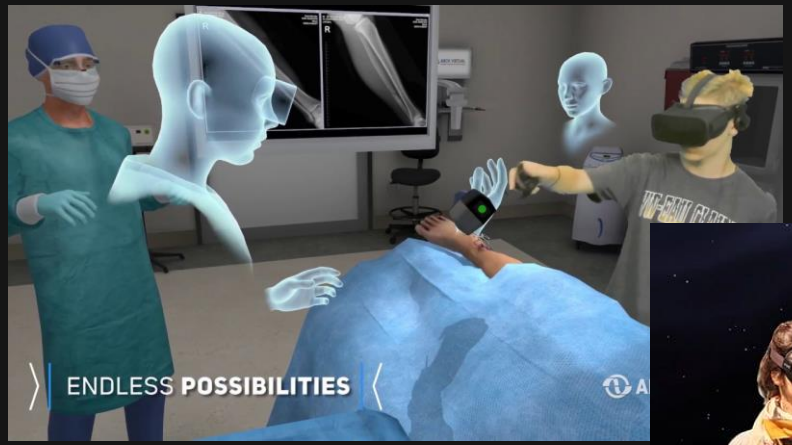
Entertainment & Tourism

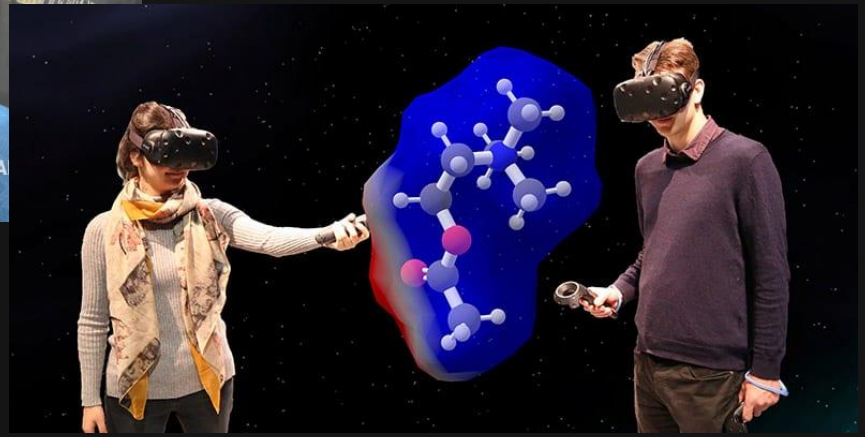


Art & Media

Science and Engineering

Healthcare, Biology & Chemistry

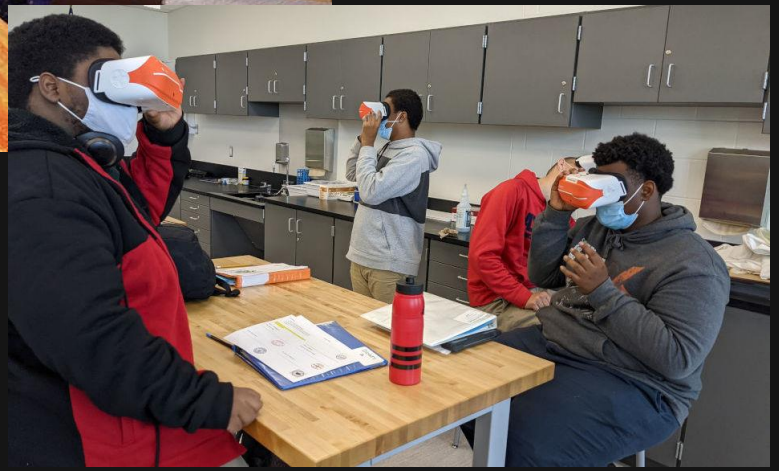




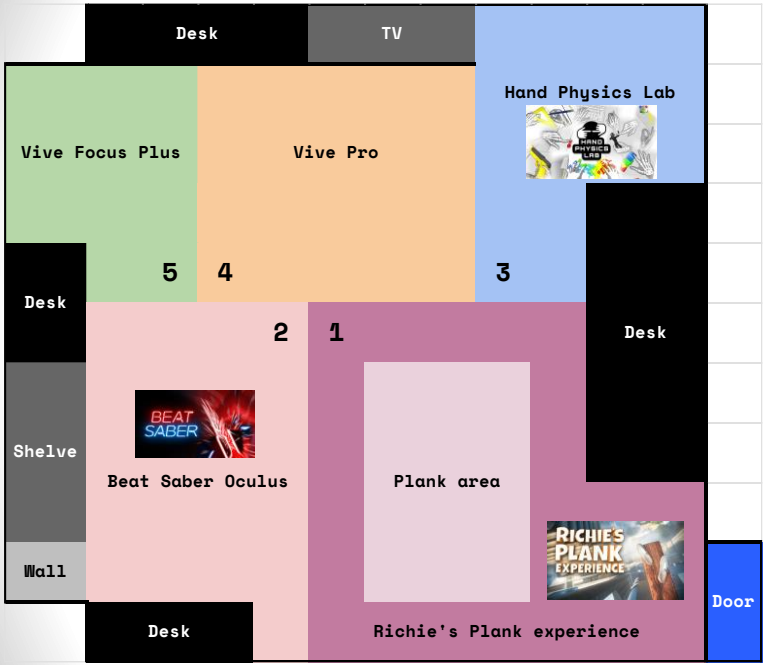
Education and Office

Virtual Speech

ClassVR



Room Layout



Form groups of 2

- One experienced the headset
- One ensures the safety
- Take turn to experience

Switch area every 15 minutes

- Pair A, B: 1 → 2 → 3
- Pair C, D: 2 → 3 → 1
- Pair E, F: 3 → 1 → 2

Free area: 4 and 5 – you can play here whenever you want!

Usage guidelines

Turning on the headset

- Press and hold the Power button for a few seconds

Turning on the controller

- Quest 2: automatic
- VIVE: press and hold the VIVE button

Note: controllers automatically turn off on idle

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Usage guidelines

Turning off the headset

- Hold the power button while wearing the headsets for ~3 seconds
- Select Power off on the menu

Note: controller automatically turn off on idle

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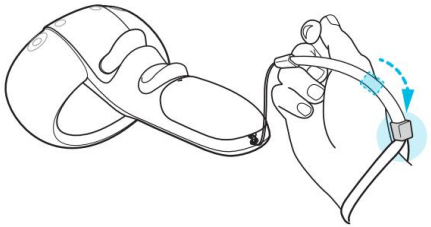
Usage guidelines

Putting on the controller

- Place the lanyard on your wrist and tighten it comfortably



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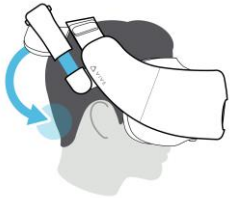
Usage guidelines

Putting on the headset

- Loosen the straps on top and at the back
- Put the headset on and tighten the straps until your preferred fit



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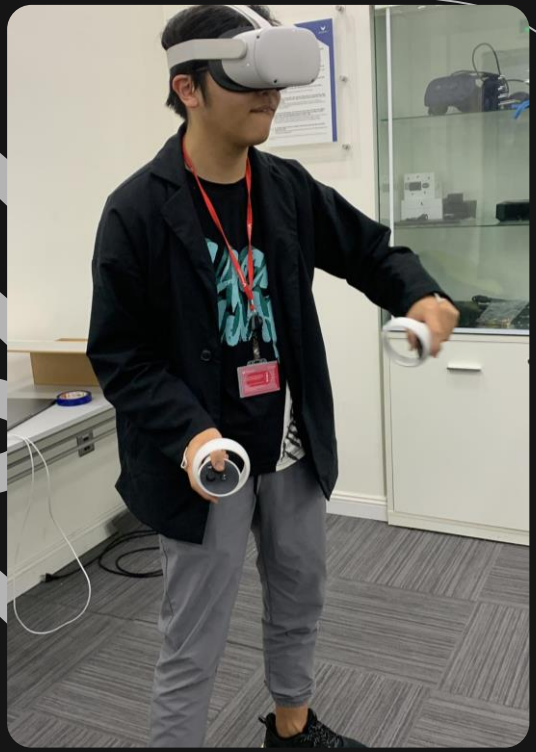

Safety requirements

Play area

- Choose safe surroundings and clear playing area
- Only use the headsets indoors
- Be aware of obstacle and cable for tripping hazards
- **Quest 2**: Set up the Guardian boundary
- **VIVE**: Seat or stand still, limit dislocation

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Safety requirements

Devices

- Make sure the controllers are secured to your wrist
- Don’t use high volume sound
- Choose appropriate content
- If you experience motion sickness, remove the headset and rest.
- Take a break every 30 minutes

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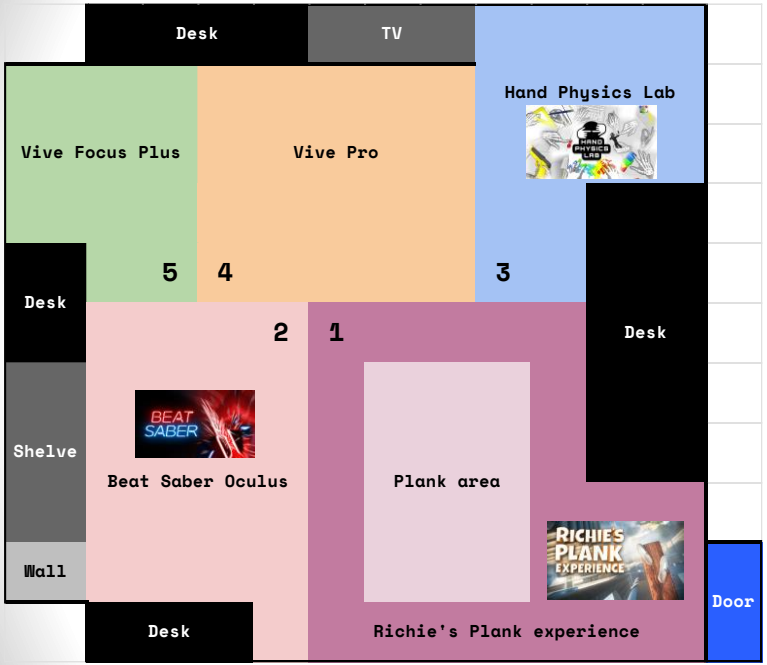
Experience!!!



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Thanks!

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References

[1] G. C. Burdea and P. Coiffet, “Virtual Reality Technology, 2nd Edition | Wiley,” *Wiley.com*. https://www.wiley.com/en-us/Virtual+Reality+Technology%2C+2nd+Edition-p-9780471360896

[2] NASA Advanced Supercomputing Division, “Virtual Reality: Definition and Requirements.” https://www.nas.nasa.gov/Software/VWT/vr.html

[3] M. Mulders, J. Buchner, and M. Kerres, “A Framework for the Use of Immersive Virtual Reality in Learning Environments,” *International Journal of Emerging Technologies in Learning (iJET)*, vol. 15, pp. 208–224, Dec. 2020, doi: 10.3991/ijet.v15i24.16615.

[4] Clay, Viviane & König, Peter & Koenig, Sabine. (2019). Eye Tracking in Virtual Reality. Journal of Eye Movement Research. 12. 10.16910/jemr.12.1.3.

References

- [5] Rogers, S. (n.d.). Seven Reasons Why Eye-tracking Will Fundamentally Change VR. Forbes. Retrieved March 29, 2022, from https://www.forbes.com/sites/solrogers/2019/02/05/seven-reasons-why-eye-tracking-will-fundamentally-change-vr/?sh=5ad4f4bf3459

- [6] *Getting started with Hand Tracking on Meta Quest 2 and Meta Quest*. (n.d.). Support.oculus.com. Retrieved March 29, 2022, from https://support.oculus.com/articles/headsets-and-accessories/controllers-and-hand-tracking/hand-tracking-quest-2/

- [7] Richard, G., Pietrzak, T., Argelaguet, F., Lécuyer, A., & Casiez, G. (2021). Studying the role of haptic feedback on virtual embodiment in a drawing task. *Frontiers in Virtual Reality*, *1*, 28.