Ready Player One

Video Games
Introduction to Virtual Reality
CS 415: Game Development
(Virtual Reality Module)

Professor Luciano Soares

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What is Virtual Reality?

Virtual Reality refers to an interface to computer-generated 3D environments involving real-time simulations across multiple sensory channels.

Sorli, Suzanne & Casas, Dan & Verschoor, Mickeal & Tajadura-Jiménez, Ana & Otaduy, Miguel, "Fine Virtual Manipulation with Hands of Different Sizes" ISMAR 2022

Thu Nguyen-Phuoc and Feng Liu and Lei Xiao. SNeRF: Stylized Neural Implicit Representations for 3D Scenes, SIGGRAPH 2022

S. Zou, X. Hu, Y. Ban and S. Warisawa, "Simulating Olfactory Cocktail Party Effect in VR: A Multi-odor Display Approach Based on Attention" *IEEE VR 2022*

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Head-Mounted Displays - HMDs

Virtual & Augmented Reality – VR Headsets

HTC VIVE XR Elite

Microsoft HoloLens

Head-Mounted Displays – HMDs (Origin)

Virtual reality headsets were the first virtual reality (or augmented reality) devices to gain popularity.

Ivan Sutherland,
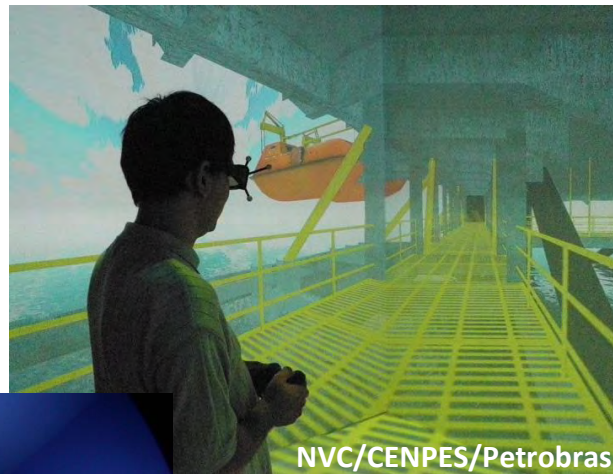The Ultimate Display,
1967

CAVEs (cave automatic virtual environment)

Immersive environments based on projection screens around the user.
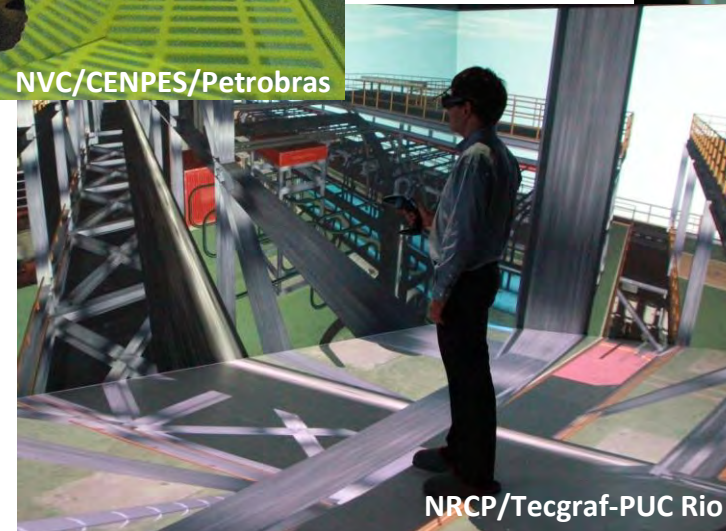

1st CAVE at UIC

NVC/CENPES/Petrobras

Caverna Digital/USP

Beckman Cube at UIUC

NRCP/Tecgraf-PUC Rio

HMDs / VR Headset

Types:
- Tethered
- Standalone
- Mobile

Pimax

HMDs tethered to a computer / console

HTC Vive

HTC Valve Index

Playstation VR 2

HMDs Standalone

Vive Focus 3

Meta Quest 2 (Oculus Quest 2)

Apple Vision Pro

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Orzly VR headset

Daydream

Google Cardboard VR

Samsung Gear VR

Site to compare headsets
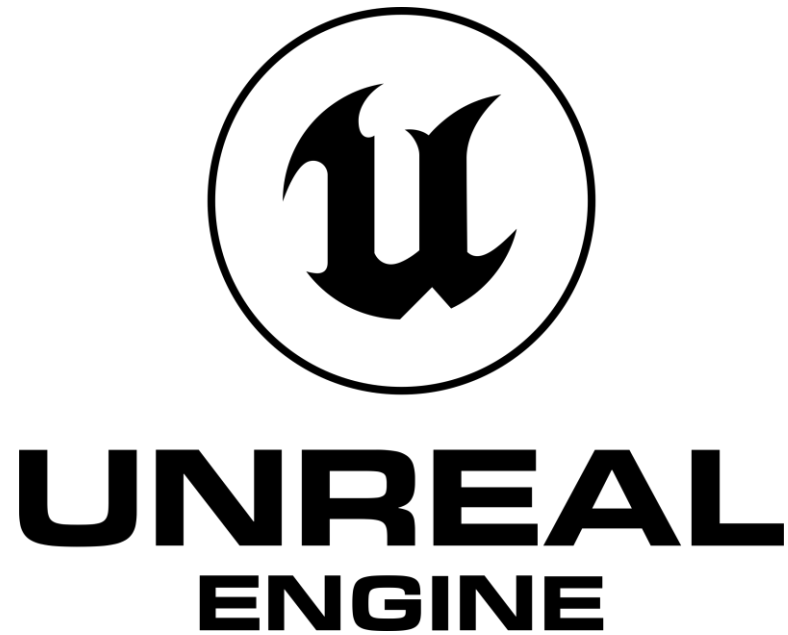

https://vr-compare.com/
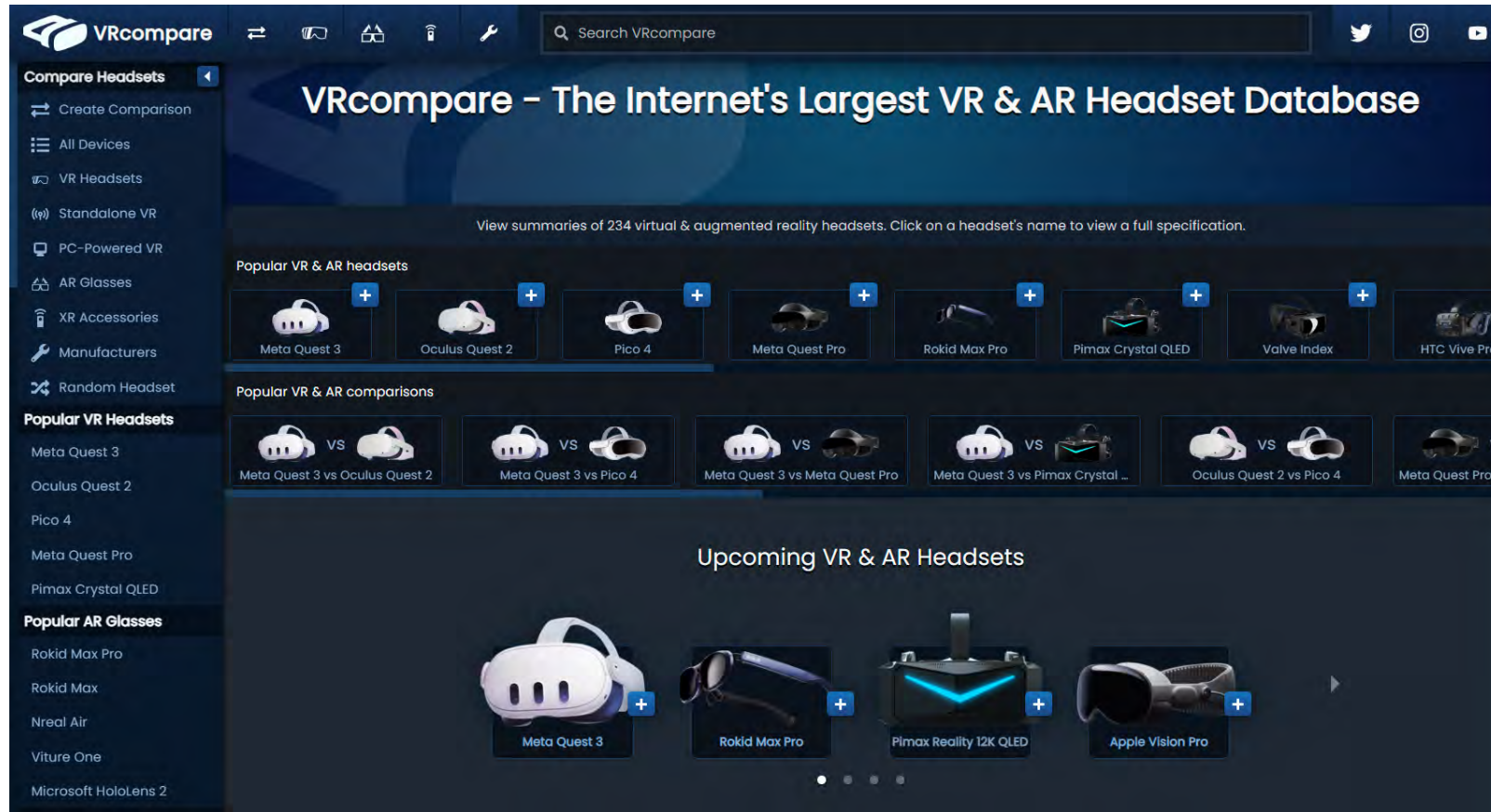
Development Tools

"Graphic Engines" are currently used to produce most of the Virtual Reality applications.
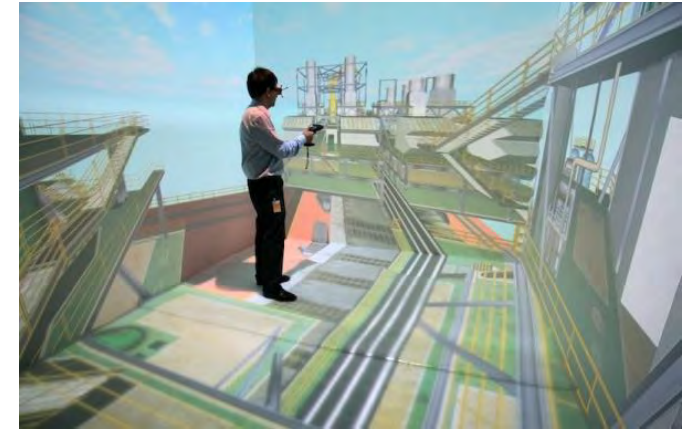
Virtual Reality Applications

Some areas of Virtual Reality applications:

- Flight/Driving simulators
- Engineering in general
- Medicine / Healthcare
- Education / Social interaction
- Understanding and Appreciation of cultural heritage
- Architectural walkthroughs / virtual travel
- Entertainment (games)

Planning of an Offshore Platform

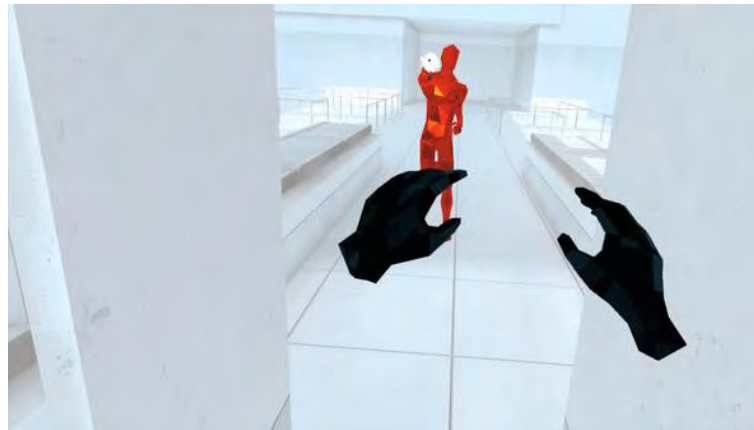**Surgery Training (lapvision)**

Flight Simulator (DoD)

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Virtual Reality Games

Beat Saber (Beat Games)

Half-Life: Alyx (Valve)

Superhot (Superhot Team)

Virtual Reality Movies

Vader Immortal: A Star Wars VR Series

Space Explorers: The ISS Experience

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VR Fails

https://www.youtube.com/watch?v=c-dT0Q3CLko

Virtual Reality Market

statista

Virtual reality (VR) is a simulated experience similar to or completely different from the real world. VR aims to create a sensory experience for the user, sometimes including sight, touch, hearing, smell, or even taste. The industry is growing at a fast pace, with the global VR market size projected to increase from less than 12 billion U.S. dollars in 2022 to more than 22 billion U.S. dollars by 2025. Both the enterprise and consumer segments, including the increased development of the VR gaming industry, are expected to profit from the forecast growth.

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KEY INSIGHTS

VR market size 2023	**15.8bn USD**
VR hardware market size 2023	**9.4bn USD**
VR gaming market size 2023	**2.7bn USD**

https://www.statista.com/topics/2532/virtual-reality-vr

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