Augmented & Virtual Reality

Mr. Mohammad Furqan Ali
Research Engineer & Graduate Teaching Assistant
(Computer Sci. & Wireless Communication Engineering)
School of Computer Science & Robotics
National Research Tomsk Polytechnic University Russia

01 Virtual Reality (VR)

02 Augmented Reality (AG)

03 Mixed Reality (MR)

Introduction to AR/VR

Image courtesy of Forbes

Image courtesy of Chronicle of Higher Education

Image courtesy of RoboDK

What is Virtual Reality

VR is a mediated environment which creates the sensation in a user of being present in a physical surrounding

Coates (1992)

Virtual Reality is electronic simulations of environments experienced via head mounted eye goggles and wired clothing enabling the end user to interact n realistic three-dimensional situations.

Greeenbaum (1992)

Virtual Reality is alternate world filled with computer-generated images that respond to human movements. These simulated environments are usually visited with the aid of an expensive data suit which features stereophonic video goggles and fiber-optic gloves.

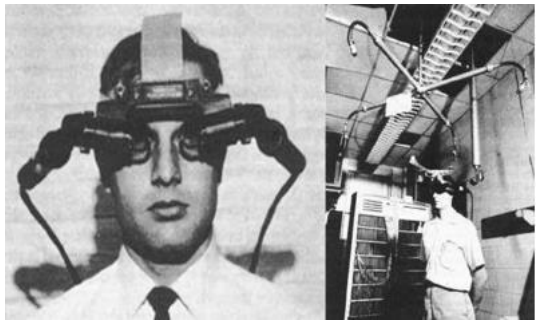
Krueger (1991)

The term (virtual worlds) typically refers to three-dimensional realities implemented with stereo viewing goggles and reality gloves.

Looking back in History of AR/VR

Advanced Visualization
building design, a map, or anything else in 3D visualization.

2023



Philco Corporation
Proposed a headsight for visual simulation and tracking system. Pilots could train under headsight to simulate flying in complete darkness

1961

1985 & 1995

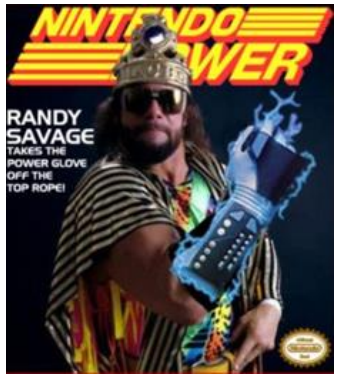
Morton Heilig
Attempted to stimulate the different senses during 1950s. Used a machine called Sensorama to provide a visual treat Included moving chairs and odor meters

1950

1965

Ultimate Display by Ivan Sutherland
Mimicked the physical world with the use of Ultimate display. It would look like the world the person lived in

VPL Research & Nintendo Virtual Boy
VPL invented the EyePhone and data suite tracking full body as well as hand gloves. Nitendo Virual Boy proposed stereoscopic 3D graphics on wide screen

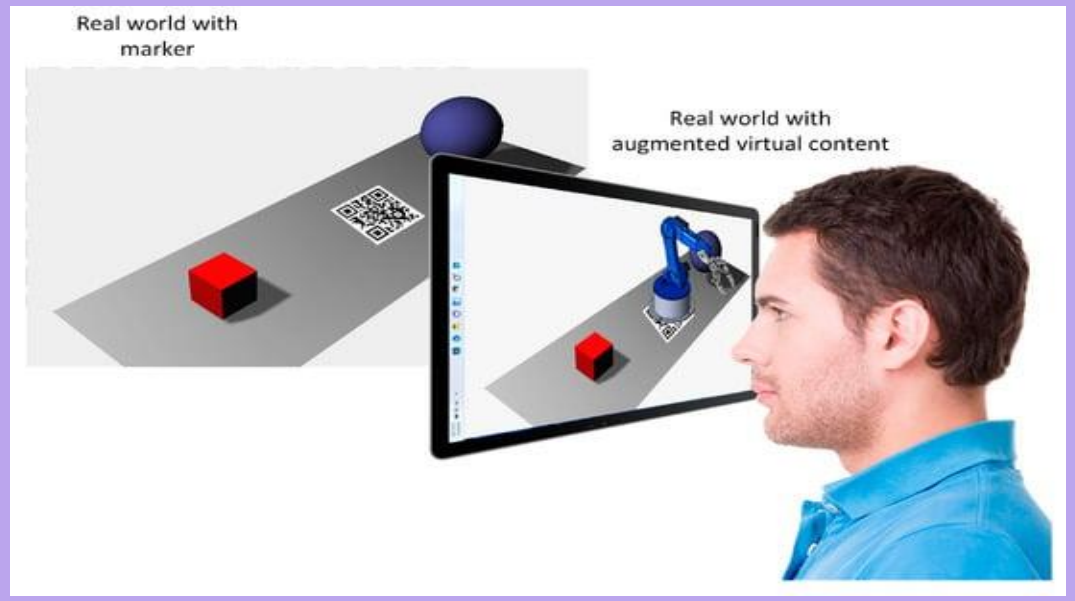


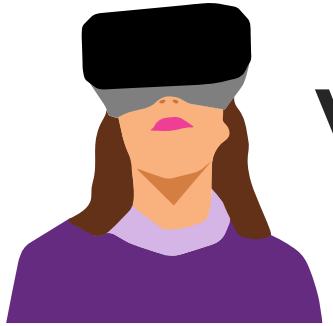
VR vs AR

VR:- It is based on to immerse the user in a virtual environment
AR:- It introduces virtual elements onto the real world

- A VR system typically uses a headset in combination with a verity of sensors to track the users movement and relay the appropriate images/feedback creating the sensation of interacting with the virtual world.

- An AR system will typically utilize clear lenses or a pass-through camera allowing the user to see the world around them in real time while virtual elements are projects on the lenses or rendered on the camera output.





Virtual Reality (VR)

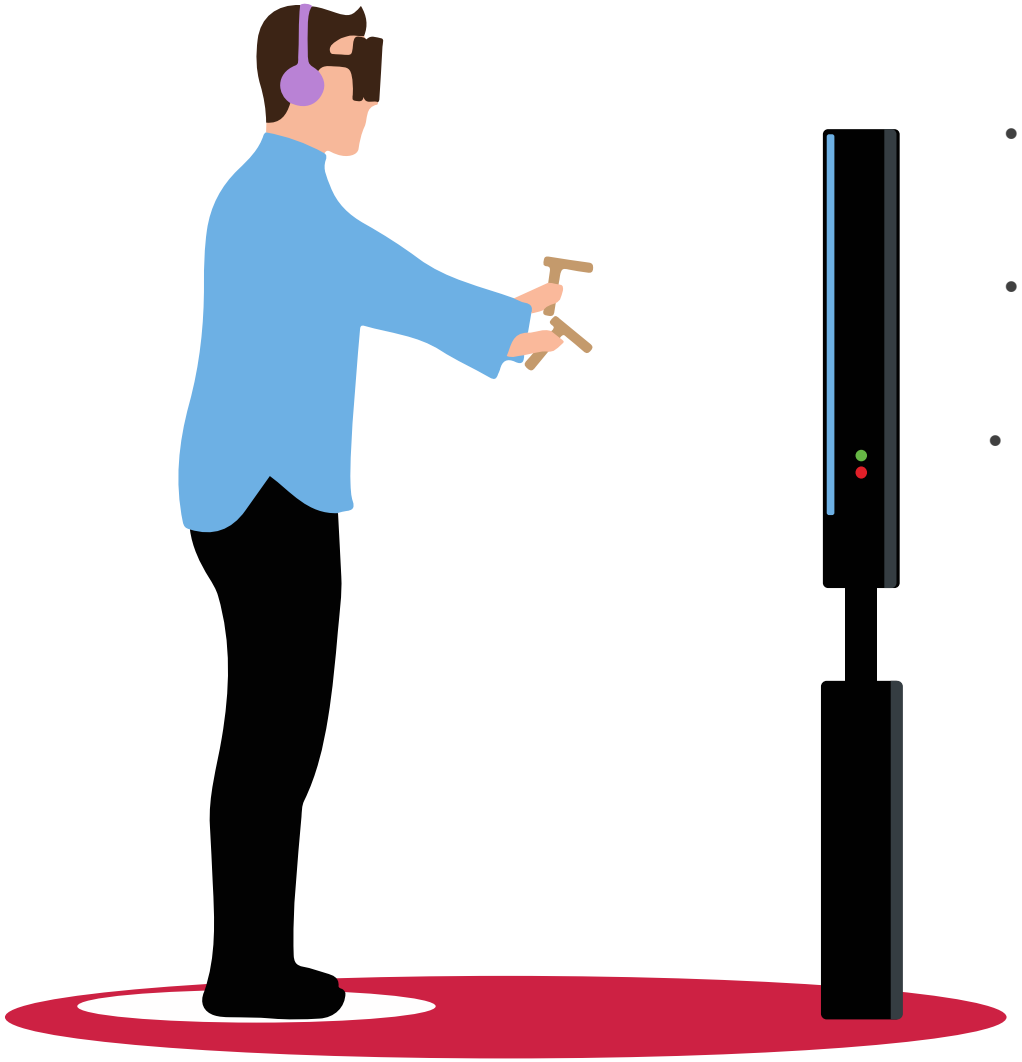
Fully Immersed
You do not see the real world around you

Virtual Simulations
Completely simulated environment where you are taken to a different place, perhaps a different time.

Control
You can control what you are looking at and where you are going.

VR & AR Applications

VR and AR platforms are ideally suited for a wide verity educational applications.



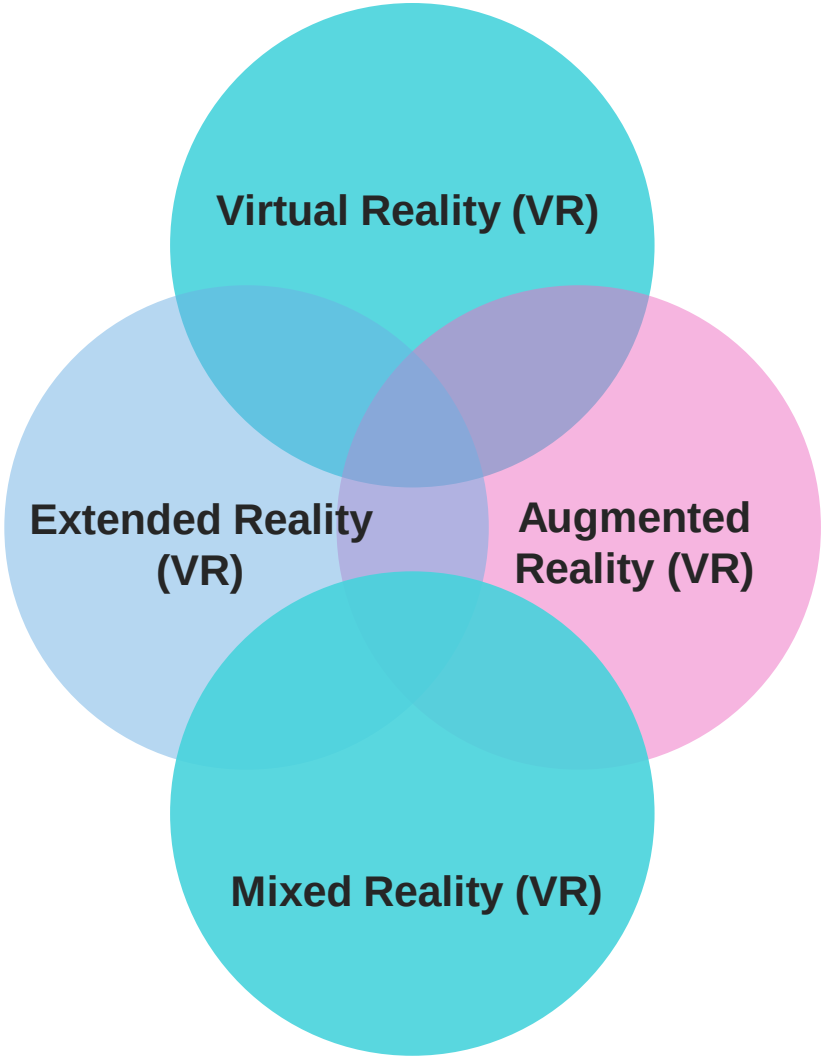
- VR and AR applications provide controlled and repeatable scenarios rehearsing muscle memory and situational awareness.
- VR applications make it possible to explore places otherwise inaccessible.
- VR applications have the potential to proved access to resources that may be prohibitively expensive or otherwise inaccessible
- VR and AR applications provide innovative ways to visualize and manipulate data.

- **Skilled Trade Programs**
- **Music / Fine Arts Education**
- **History and Geography**
- **STEM programs**
- **Sports and Athletic Training**
- **Medical Training**

VR applications

- Very useful in Education
- Visit Ancient Rome (History)
- Virtually visit a museum
- Useful for Architecture & Construction industry
- Better design and envision a space
- Meet people
- Display Sharing

AR/VR Approaches



Virtual Reality (VR)

Replace the entire real world with a virtual one to fully immerse the user

Augmented Reality (AU)

Add items to the real world, i.e. augment it; the real world is still visible

Extended Reality (XR)

Attempt to define a term that is inclusive of both augmented and virtual reality

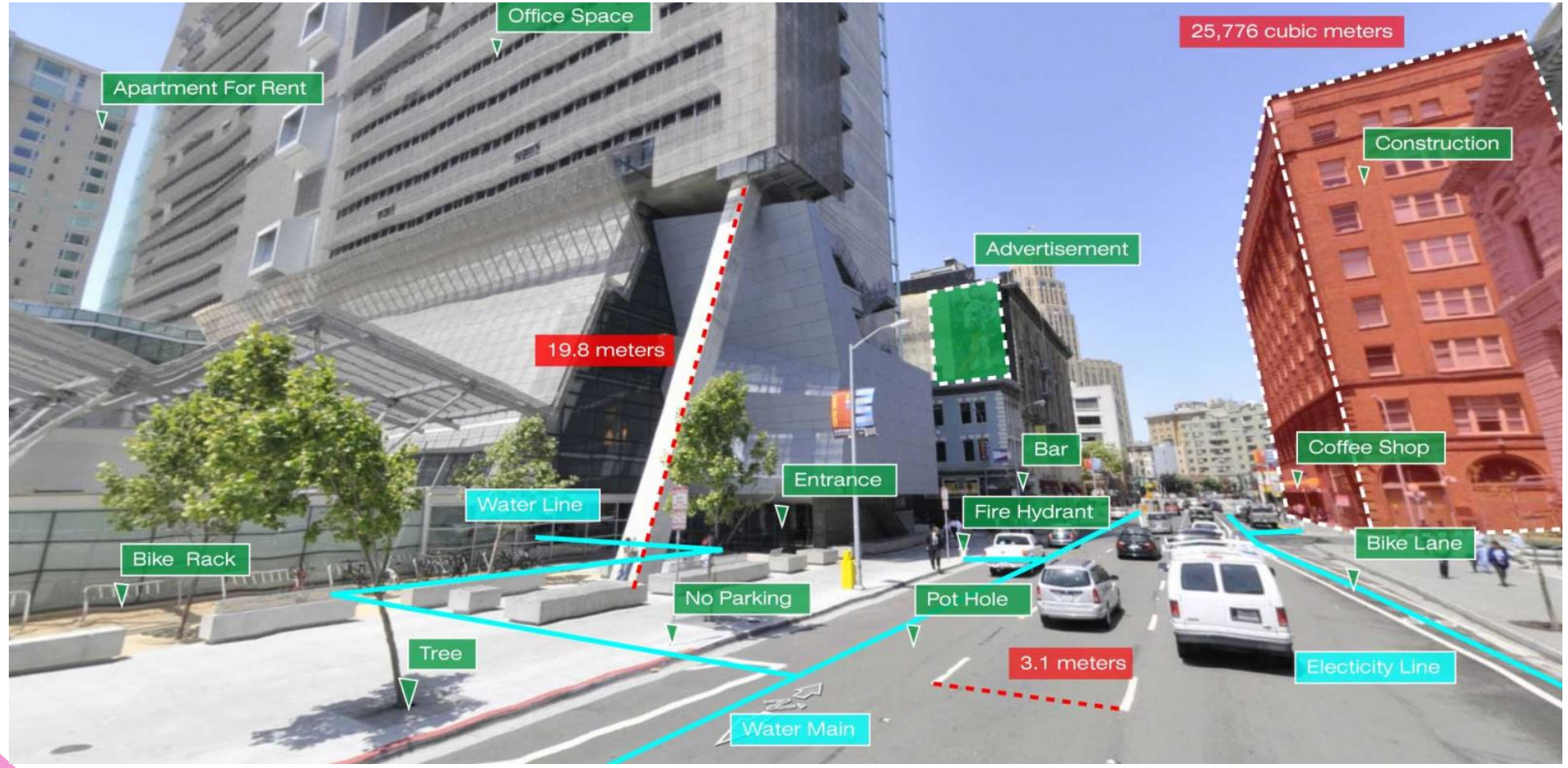
Mixed Reality

Windows version of coining an inclusive term; MR supports devices such as Hololens and Mixed Reality headsets

Augmented Reality (AG)

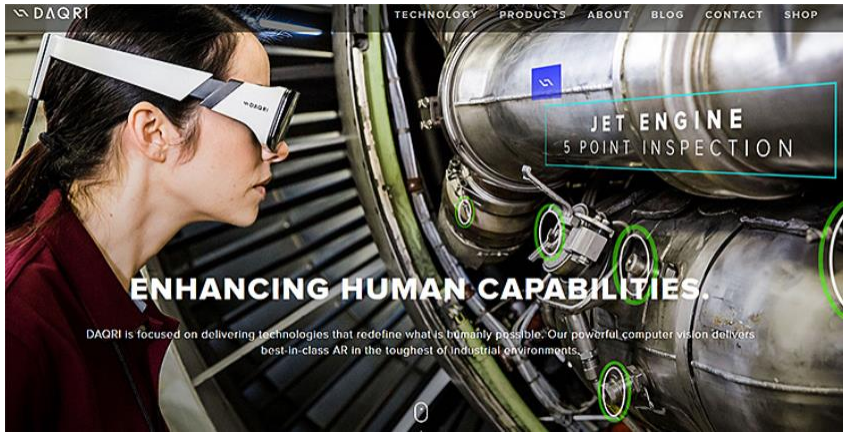
- Unlike in VR, you can see the real world around you, but with graphic overlays, 3D models and videos on it

- AR superimposes computer-generated images on user's view of the real world



Augmented Reality Uses

- Applications in technical support and in trouble shooting
- Fixing engines, elevators, and more
- Even bring in remote experts
- More educationally-related applications to arrive as AR goes mainstream

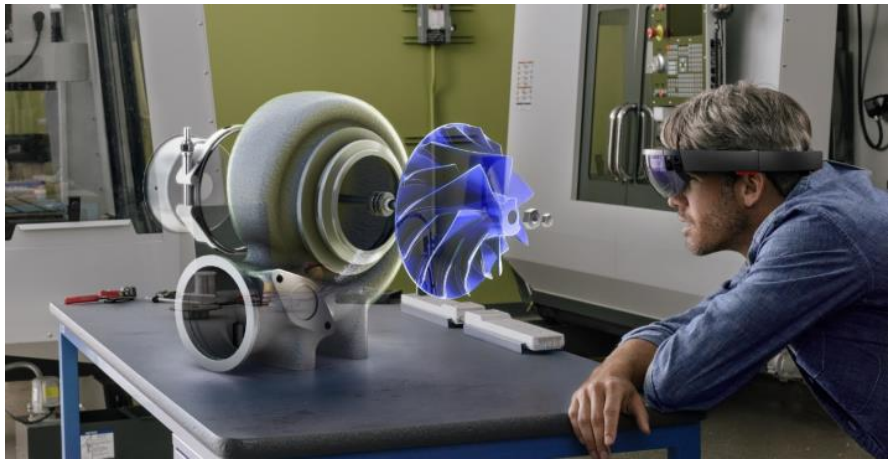


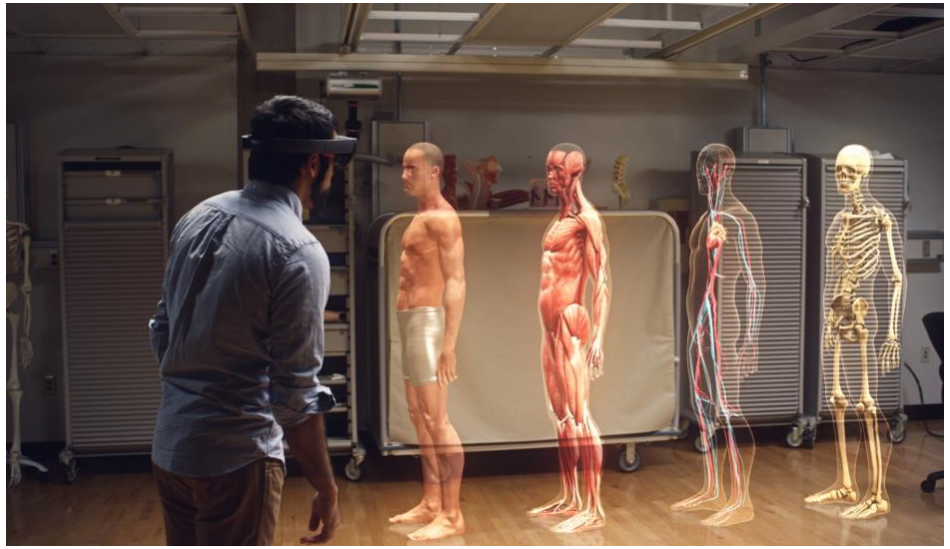
Mixed Reality (AG)

- Very similar to AR, but a device can scan the real-world environment around you and can interact with that environment
- Additional technologies and afordances are involved
- Best example is Mircrosoft’s HoloLnes device

Mixed Reality Uses

- Microsoft is working with case western reserve U. and the Cleveland clinic
- Developing new ways t learn about human anatomy
- Useful in technical support, troubleshooting, fixing things
- Can brind in remote experts
- More educationally-related applications





THANK YOU