# Augmented Reality

*an introduction*

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AR@2011

- https://www.youtube.com/watch?v=nxUwJSnbIbQ&feature=youtu.be

# Oracle IoT Connected Worker With Augmented Reality

https://www.youtube.com/watch?v=4b47-n3pQIi


https://www.youtube.com/watch?v=oeZzVnZtP14

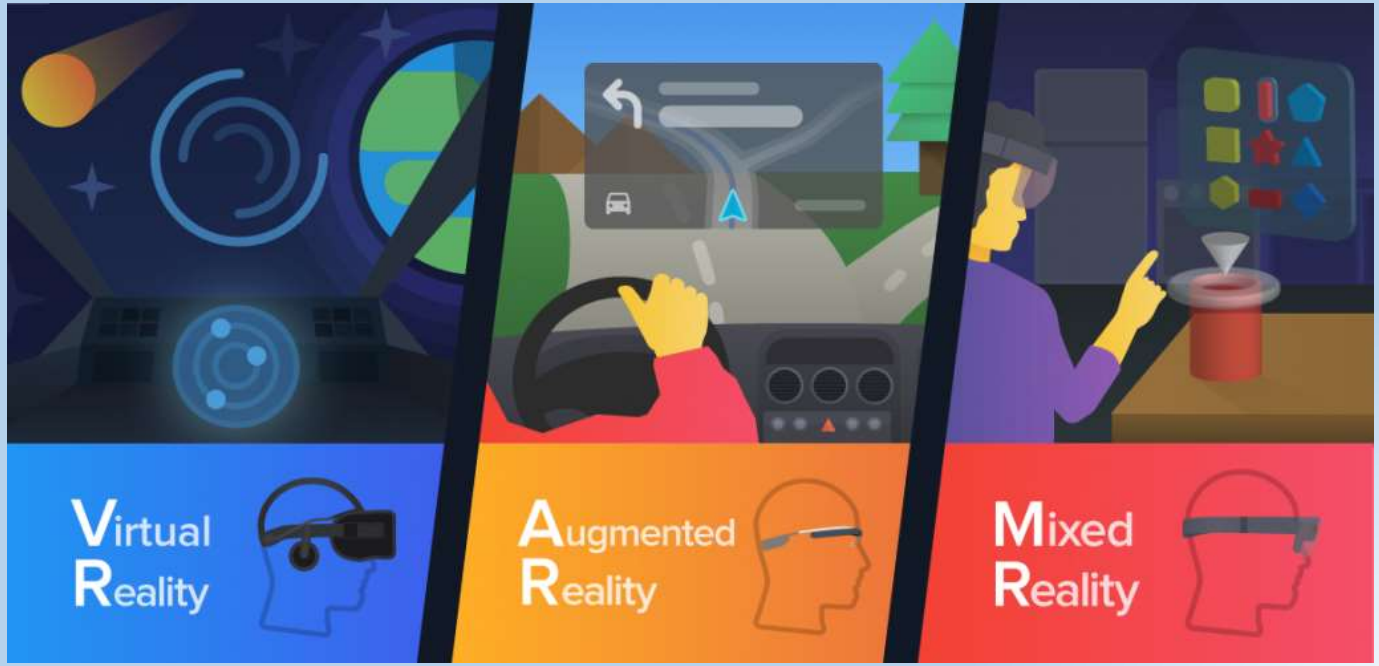
# Kinect for Windows Retail Clothing Scenario Video

https://www.youtube.com/watch?v=Mr71jrkzWq8&t=58s

# Agenda

- Introduction
- AR vs VR
- Mixed Reality (MR)
- History
- Virtuality Continuum
- History of VR

AR is both a disruptive technology and an exciting vision of the future.

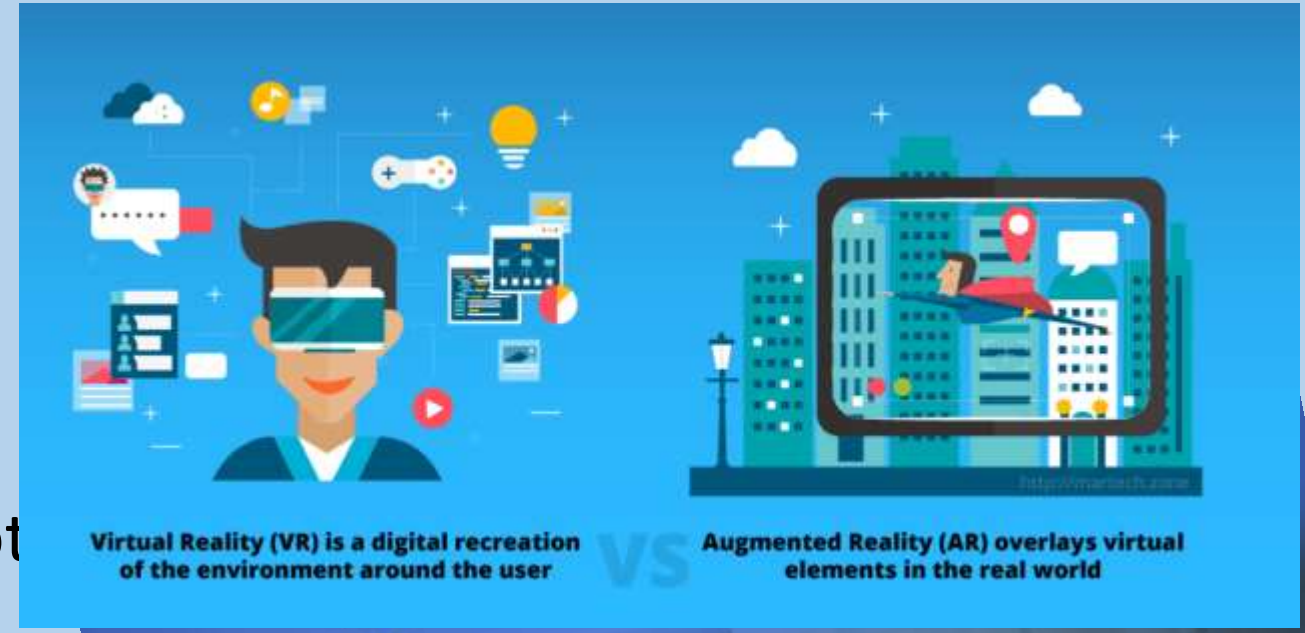


# Introduction

- A combining real scene view by a user and a virtual scene generated by computer is known as Augmented reality.
- Augmenting the scene with additional information
- AR system, adds virtual computer generated objects, audio and other sense enhancements to a real-world environment in real time.
- Goal is *to enhance a person's performance and perception of the world.*

# AR vs VR

- VR technologies completely immerse a user inside a completely artificial environment, where user cannot see the real world around him
- In AR, user see the real world, with virtual objects superimposed upon or composited with the real world.




**Augmented Reality**

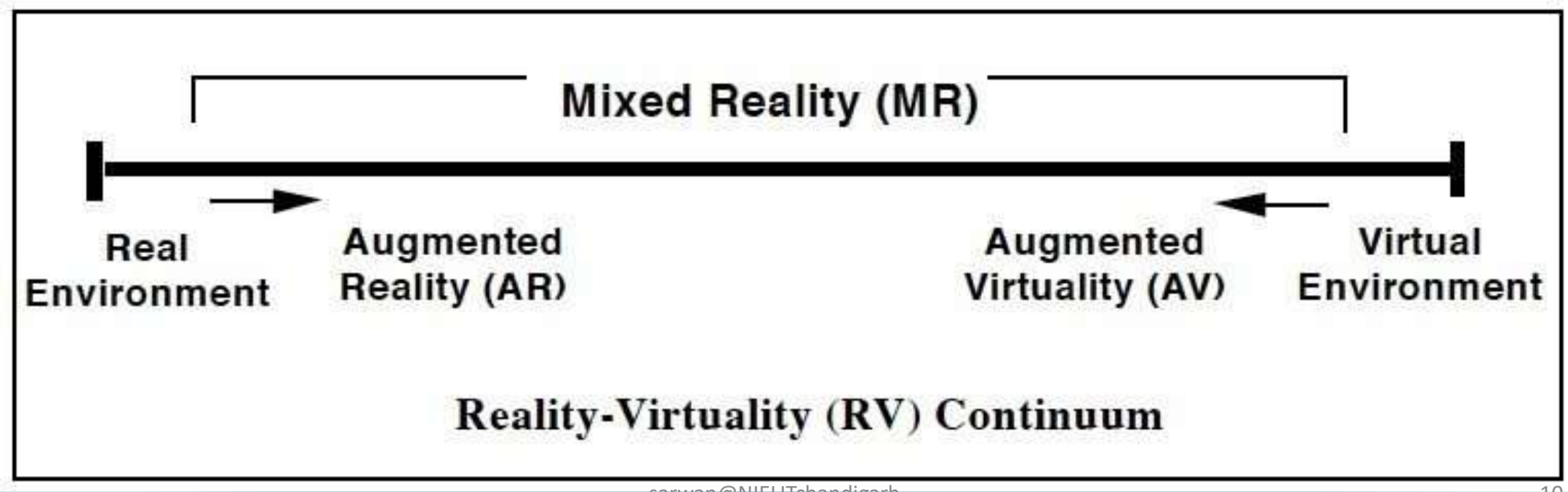
- System augments the real world scene
- User maintains a sense of presence in real world
- Needs a mechanism to combine virtual and real worlds

**Virtual Reality**

- Totally immersive environment
- Visual senses are of under control of system(sometimes aural and proprioceptive senses too)

Source https://www.slideshare.net/Khyati14Ganatra/augmented-reality-ppt-47315337

- In 1994 Paul Milgram and Fumio Kishino defined a mixedreality as *"anywhere between the extrema of the virtual continuum" where the Virtuality Continuum extends from completely real through to the completely virtual environment with augmented reality and augmented virtuality ranging between .*



# Miligram's Reality- Virtuality Continuum

| Real Enrironment | -> Augmented Reality(AR) | Augmented Virtuality (AV) | <- Virtual Environment |
|---|---|---|---|

Miligram coined the term "Augmented Virtuality" to identigy systems which are mostly synthetic with some real world imagery added such as texture mapping video onto virtual objects.

# VIRTUALITY CONTINUUM

MIXED REALITY

REALITY

AUGMENTED REALITY (AR)

AUGMENTED VIRTUALITY (AV)

VIRTUAL REALITY

REAL ENVIRONMENT

VIRTUAL ENVIRONMENT

## MIXED REALITY (MR)

### Tangible User Interfaces (TUI)

A TUI uses real physical objects to both represent and interact with computer-generated information (Ishii & Ullmer, 2001).

### Augmented Reality (AR)

AR 'adds' computer-generated information to the real world (Azuma, et al. 2001).

### Augmented Virtuality (AV)

AV 'adds' real information to a computer-generated environment (Regenbrecht, et al. 2004).

### Virtual Reality (VR)

VR refers to completely computer-generated environments (Ni, Schmidt, Staadt, Livingston, Ball, & May, 2006; Burdea & Coffet 2003)

Projection Augmented models (PA model) are a type of Spatial AR display, and are closely related to TUIs

### Spatial AR

Spatial AR displays project computer-generated information directly into a user's environment (Bimber & Raskar, 2005).

### 'See-through' AR (either optical or video)

A user wears a head-mounted display, through which they can see the real world with computer-generated information superimposed on top (Cakmakci, Ha & Rolland, 2005; Billinghurst, Grasset & Looser, 2005).

### Semi-immersive VR

A semi-immersive VR display fills a limited area of a user's field-of-view.

### Immersive VR

Immersive VR, which uses either a head-mounted-display or a projection-based system, completely fills the user's field-of-view.

Using physical objects to create a virtual model (Ichida, Itoh, & Kitamur, 2004). As a user adds a physical 'ActiveCube' to the construction, the equivalent virtual model is automatically updated.

The 'Bubble Cosmos' – 'Emerging Technology' at SIGGRAPH'06. The paths of the smoke-filled bubbles are tracked, and an image is projected into them as they rise.

See-through AR: the butterfly is computer-generated, and everything else is real (Fischer, Bartz & Straßer, 2006; Kölsch, Bane, Höllerer, & Turk, 2006).

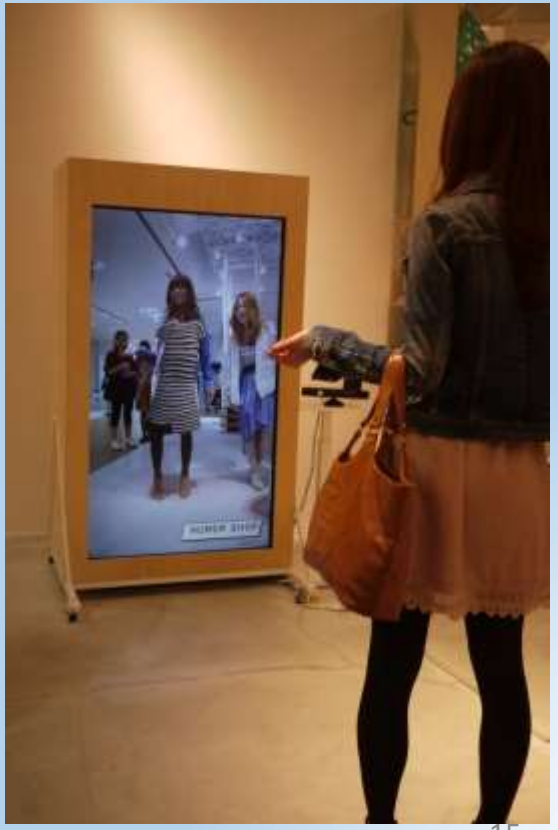
Semi-immersive VR using the Barco Baron workbench (Drettakis, Roussou, Tsingos, Reche & Gallo, 2004).

Projection-based immersive VR. The users are fully immersed in the 'CAVE' (FakeSpace, 2006; Cruz-Neira, Sandin & DeFanti, 1993).

# AR apps in Interior Designing


# Display

- Head-mounted Display(HMD)
- Eye Glasses
- Contact Lenses
- Virtual Retina Display
- Handheld
- Spatial



# Applications

- Medical
- Entertainment
- Military training
- Engineering Design
- Robotics and Telerobotics
- Manufacturing, Maintenance and Repair
- Consumer Design
- Hazard Detection
- Audio

# A Short History of VR


https://www.youtube.com/watch?v=nWcGhuX6N7w

https://www.youtube.com/watch?v=AsD0DuPT1GI&feature=youtu.be