

Chapter 5

Immersive technology
VR,AR,MR

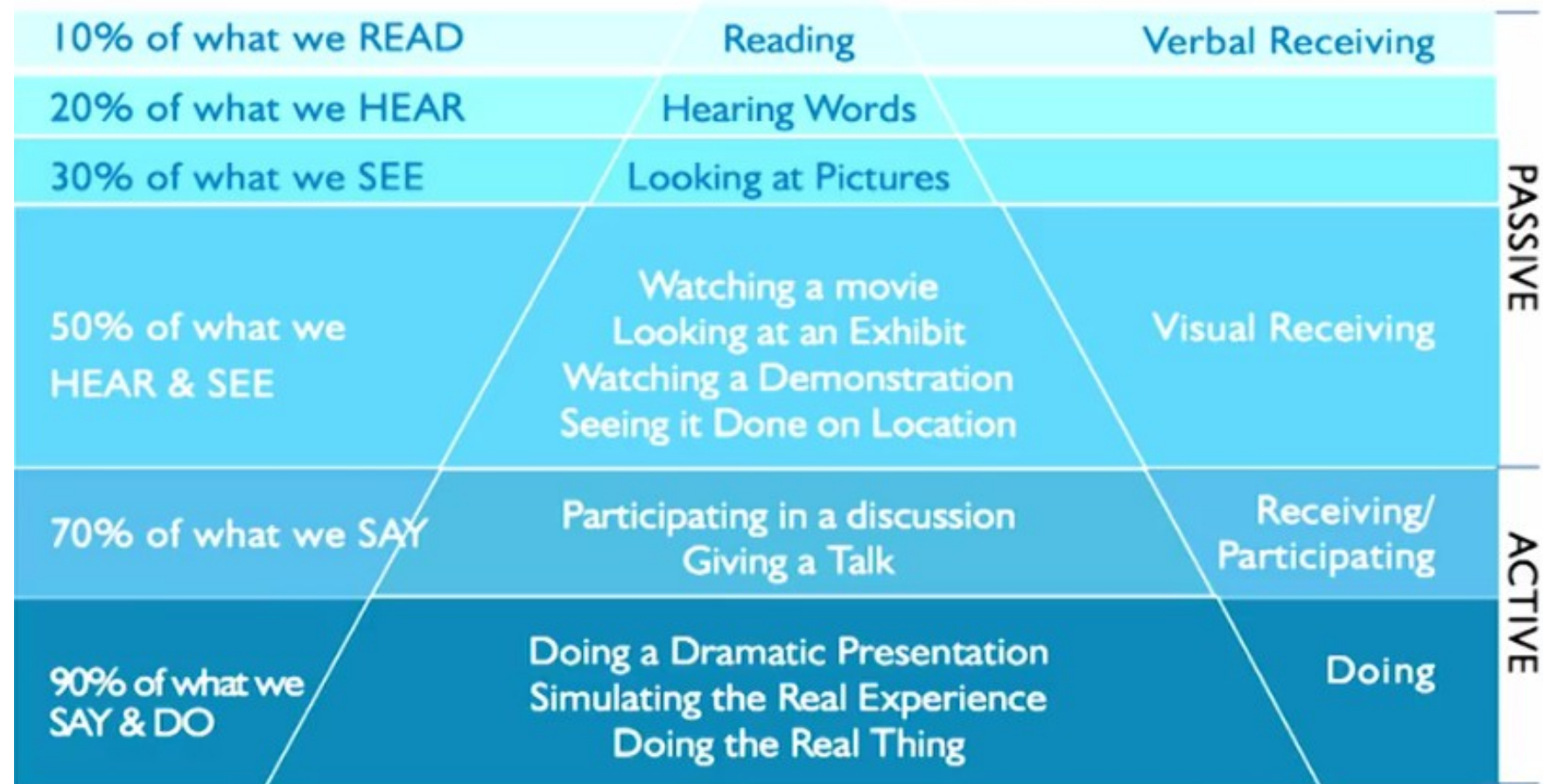
Introduction

- Immersive technology refers to technology that attempts to emulate a physical world through the means of a digital or simulated world by creating a surrounding sensory feeling, thereby creating a sense of immersion.
- This technology is created in digital environment
- Information digested
 - Physical ☐ ordered ☐ GUI (abstracted physical object and digitized) ☐ VR

CONE OF LEARNING (EDGAR DALE)

After 2 Weeks
we tend to remember

**Nature of
Involvement**



Introduction

- Cognitive ecologist: Knowledge exist in Body-mind-world system
- In this chapter we will see the following
 - Virtual Reality (VR),
 - Augmented Reality (AR),
 - Mixed Reality (MR),
 - Architecture of AR systems, and its application

Display Technologies



- The Visual Unit can be classified into two types of system, depending on the followed visualization technology:
 - Video see-through: It uses a Head-Mounted Display (HMD) that employs a video-mixing and displays the merged images on a closed-view HMD.
 - Optical see-through: It uses an HMD that employs optical combiners to merge the images within an open-view HMD.
- Head attached, Body attached, Spatial

History

- Cinerama Widescreen film format invented in 1939 by Fred Waller and Ralph Walker.
- In 1950s, Flight simulators were built by the US Air Force to train student pilots.
- Sensorama simulator was built by Morton Heilig in 1962. Simulation that contained Stereoscopic images, motion chair, audio, temperature changes, odours, and blown air. One could see, hear, feel motion and smell during the simulation.

Introducing . . .

sensorama

The Revolutionary Motion Picture System
that takes you into another world
with

- 3-D
- WIDE VISION
- MOTION
- COLOR
- STEREO-SOUND
- AROMAS
- WIND
- VIBRATIONS



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SENSORAMA, INC., 855 GALLOWAY ST., PACIFIC PALISADES, CALIF. 90272

TEL. (213) 459-2162

Aug. 28, 1962

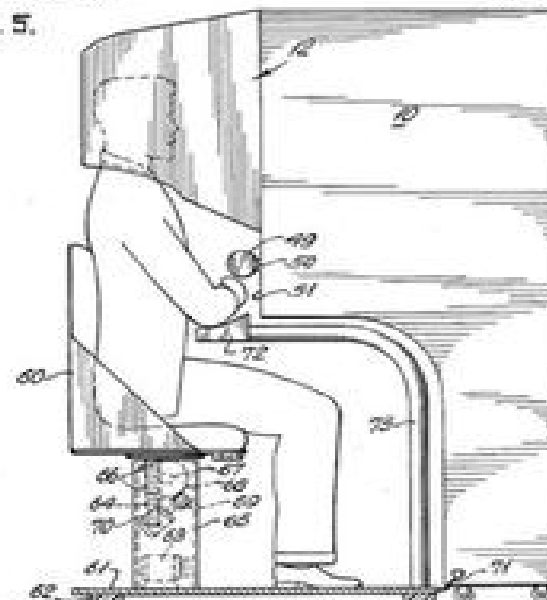
M. L. HEILIG
SENSORAMA SIMULATOR

3,050,870

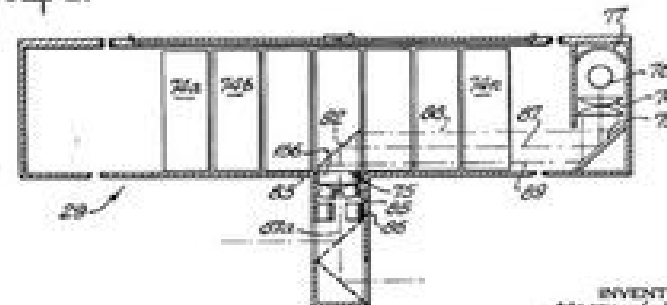
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T. 9. 6.



INVENTOR
Morton L. Heilig
BY
Douglas M. Chisholm
ATTORNEY

History

- In 1965, Ivan Sutherland led a research program for computer graphics and developed a VR system called “The Ultimate Display”. This was a virtual environment seen through an HMD (head-mounted display). Users could manipulate objects in a realistic way.
- In 1991, first commercial entertainment VR system “Virtuality” was released.
- In 1992 a method of the showing and testing of scientific visualizations called the CAVE was created

Applications

- Design
 - Architecture, Construction
- Expertise and education
- Logistics
 - DHL
- In Entertainment
- Medicine
- Manufacturing
- Museum
- Marketing
 - Try before you buy
- Gaming
- Web application
- Healthcare
- Transportation
- Analytics

Applications

- **Movies** - Virtual reality is applied in 3-D movies to try and immerse the viewer into the movie and/or virtual setting and environments.
- **Video Games** - Virtual reality is evident in video games. Now you can physically interact with a game by using your body and motions to control characters and other elements of the game that years ago people would only imagine.
- **Education and training** - Training and education is done through virtual reality because it can prepare you for many dangerous jobs and put the worker in real scenarios without the risk of them being hurt. Virtual reality can give them the experience they need without actually putting them or others in danger.
 - Driving simulator, Flight simulator, Ship simulator, Shooting simulator

Virtual Reality (VR)

- A virtual reality is an immersive technology that uses a head-mounted headset that provides virtual reality for the wearer.
- Virtual reality aims to immerse the user in a completely different environment, usually via the use of a headset.
- It contains virtual objects in a virtual environment: everything is generated by a computer.
- VR is fully immersive, which tricks your senses into thinking you're in a different environment or world apart from the real world.

Virtual Reality (VR)

- Using a head-mounted display (HMD) or headset, you'll experience a computer-generated world of imagery and sounds in which you can manipulate objects and move around using haptic controllers while tethered to a console or PC.
- Defining Characteristics
 - Immersion
 - Interaction
 - Imagination
- Steven Spielberg :READY PLAYER ONE, 2018 ·
Sci-fi/Action

Augmented Reality (AR)

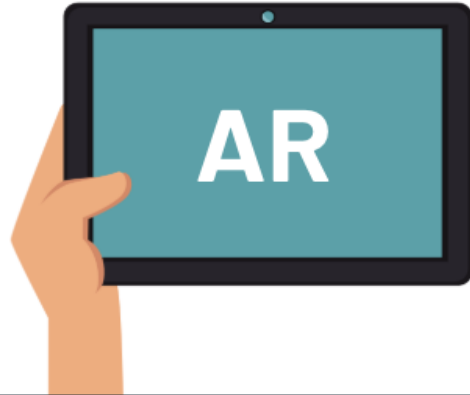
- The fundamental idea of AR is to combine, or mix, the view of the real environment with additional, virtual content that is presented through computer graphics.
- It has a convincing effect achieved by ensuring the virtual content is aligned and registered with the real objects.
- As a person moves in an environment and their perspective view of real objects changes, the virtual content should also be presented from the same perspective

Augmented Reality (AR)

- In augmented reality, users see and interact with the real world while digital content is added to it.
- Augmented reality aims to create a “hybrid” environment, one that maps interactive virtual objects to physical surroundings and therefore blends the real and the virtual.
- Augmented Reality
 - Defining Characteristics
 - Combines Real and Virtual Images
 - Interactive in real-time
 - Registered in 3D

Augmented Reality (AR)

- Example:
 - Smartphone,
 - download an AR app like poke man go.
 - Navion-wayray
 - Microsoft -HoloLens
 - Vuzix -Blade: smart glasses
 - Magic leap -one



- User is immersed in a mix of the real world and a virtual world
- Interact with both worlds and clearly distinguish between them
- Uses a smartphone, tablet, or other mobile device



- User is immersed in an entirely virtual world
- Hard to differentiate between reality and virtual reality
- Uses head-mounted display or glasses





Mixed Reality (MR)

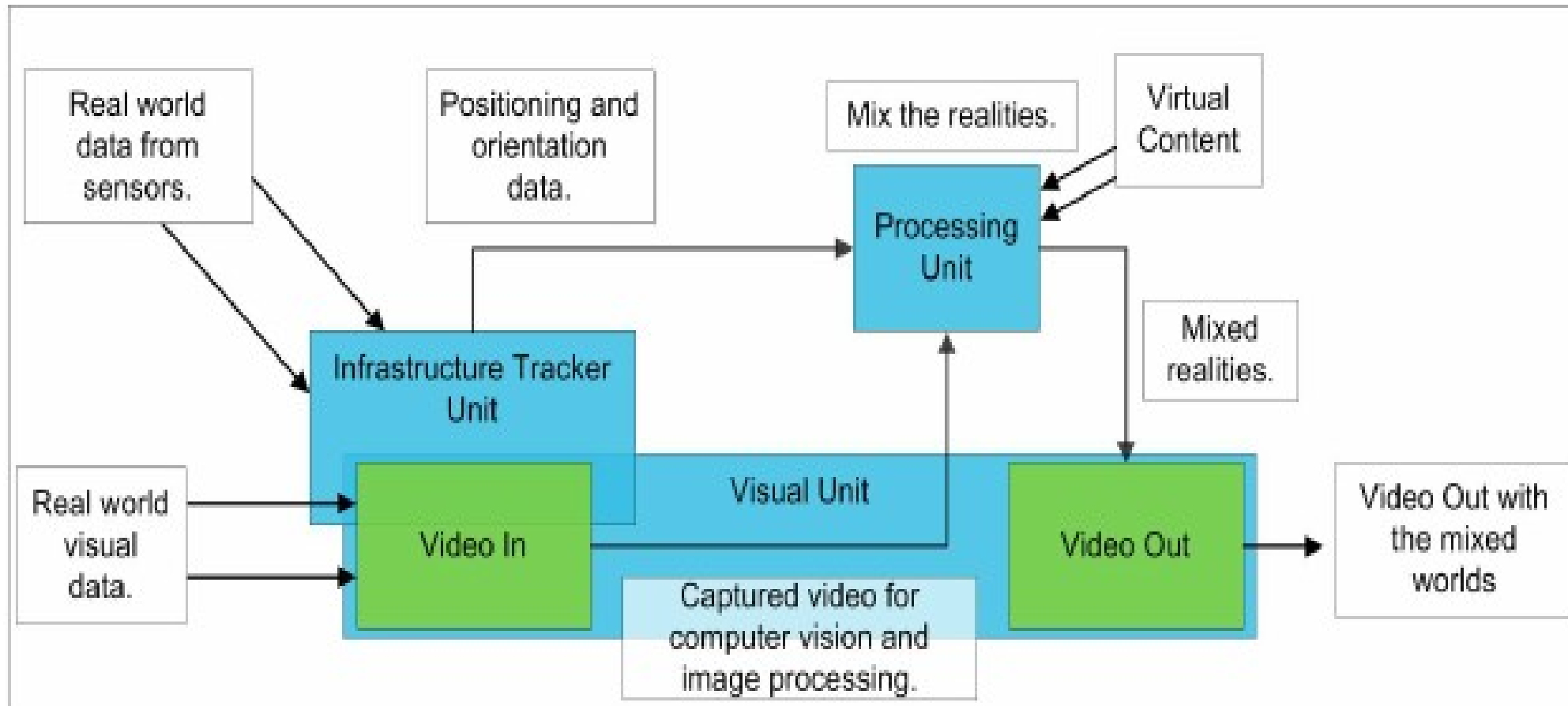


- Mixed reality takes things a step further. Much like augmented reality, MR overlays virtual objects (digital media such as animations, images, audio, video, etc.) onto physical surroundings.
- A mixed-reality definition that helps to differentiate it from augmented reality is that MR creates virtual objects that can interact with the real world.
- MR allow virtual overlay graphics to interact with the real world

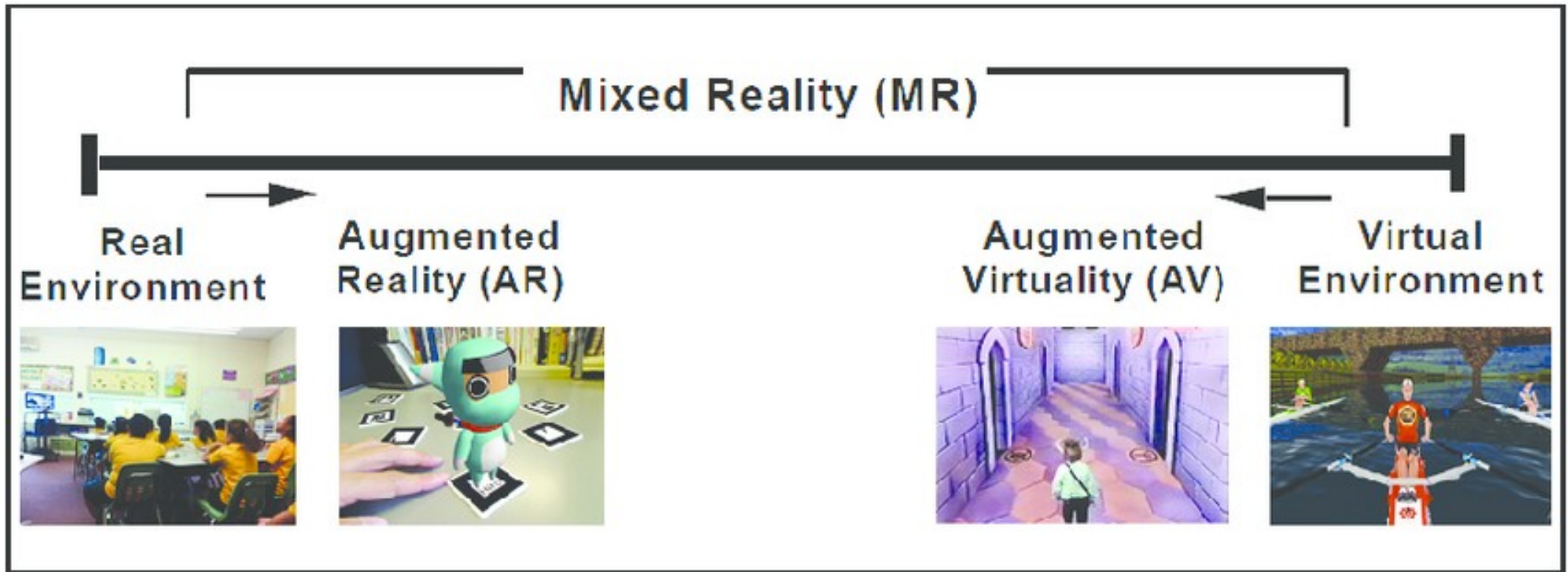
Mixed Reality (MR)

- Mixed Reality (MR), sometimes referred to as hybrid reality, is the merging of real and virtual worlds to produce new environments and visualizations where physical and digital objects co-exist and interact in real-time.
- Blending digital/physical worlds..
 - Productivity
 - Marketing
 - Training
 - Collaboration

The architecture of AR Systems



Virtual reality (VR), Augmented Reality (AR) vs Mixed reality (MR)



Virtual reality	Augmented reality	Mixed reality
Completely a digital and virtual world completely independent of the real world	It incorporates real world with the digital information overlay	Real and virtual world intertwined in this case
User need not to be present for experiencing the imaginary world	User's presence is required for the experience	It also needs user's presence
Fully enclosed reality	Partially enclosed reality	It is not constrained by the boundaries
Synthetic experience with no sense of the real world	Real world remains central to the experience, enhanced by virtual details	Interaction with and manipulation of both physical and virtual world
Time horizon for adopting VR in different fields is expected to be 2 to 4 years	Fully adoption of AR is going to take the time span of around 3 to 7 years	MR is having the same time span for adoption as in case of VR
Not having see through capabilities	Having partial see through capabilities	It's a package of see through capabilities

END