Augmented Reality

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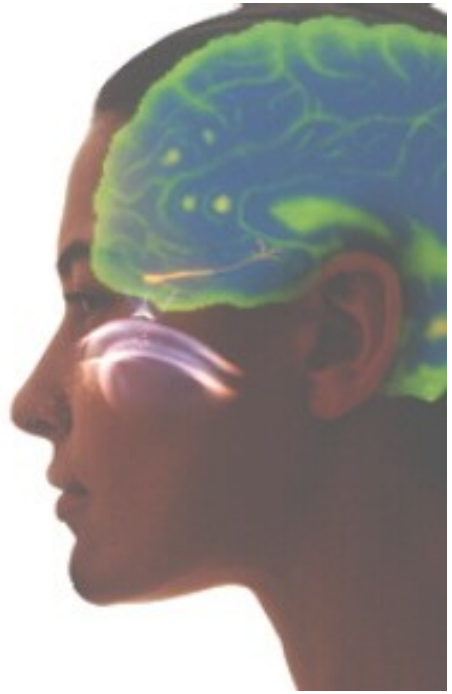
Topics discussed

- Augmented Reality
- Augmented Reality System
- How it Works
- Display techniques
- AR vs VR
- Technology
- Applications & Examples

What is Augmented Reality?



- A combination of a real scene viewed by a user and a virtual scene generated by a computer that augments the scene with additional information.

- An AR system adds virtual computer-generated objects, audio and other sense enhancements to a real-world enviornment in real time.

What is the Goal of AR?

- To enhance a person's performance and perception of the world
- But, what is the ultimate goal????

The Ultimate Goal of AR

- Create a system such that a user CANNOT tell the difference between the real world and the virtual augmentation of it.

Augmented Reality vs. Virtual Reality

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 under control of system (sometimes aural and proprioceptive senses too)

Miligram's Reality-Virtuality Continuum

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

This is how AR works

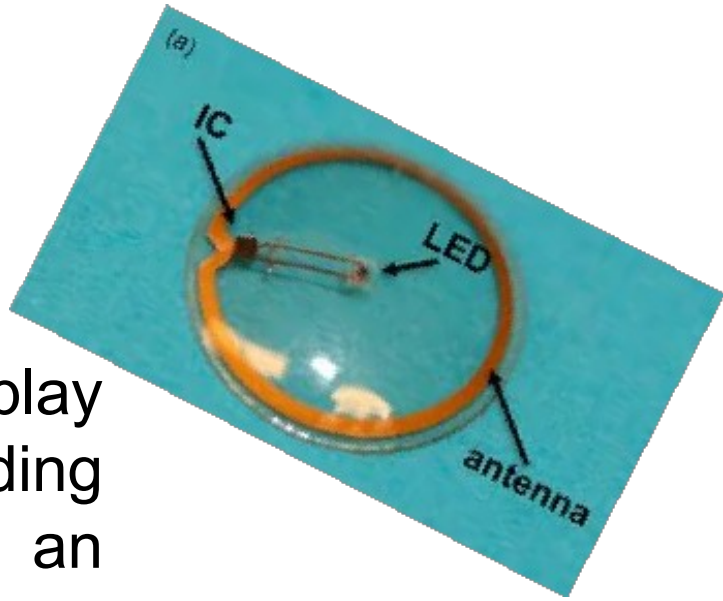
- Pick A Real World Scene
- Add your Virtual Objects in it.
- Delete Real World Objects
- Not Virtual Reality since Environment Real.

DISPLAY

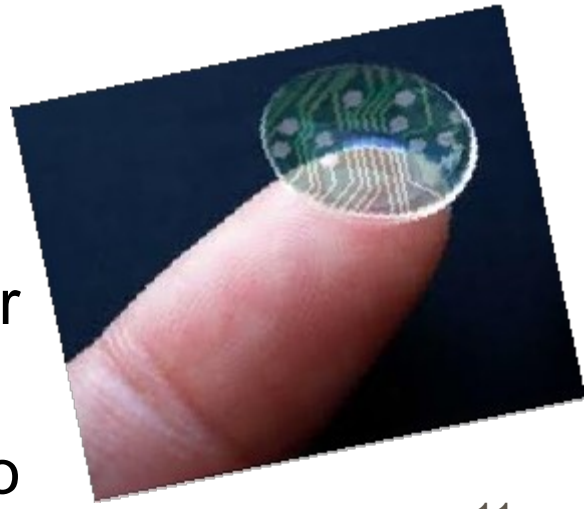
- **Head-mounted Display(HMD)**
  - device paired to a headset such as a harness or helmet

- **Eye Glasses**
  - eye wear that employs cameras to intercept the real world view and re-display it's augmented view through the eye pieces

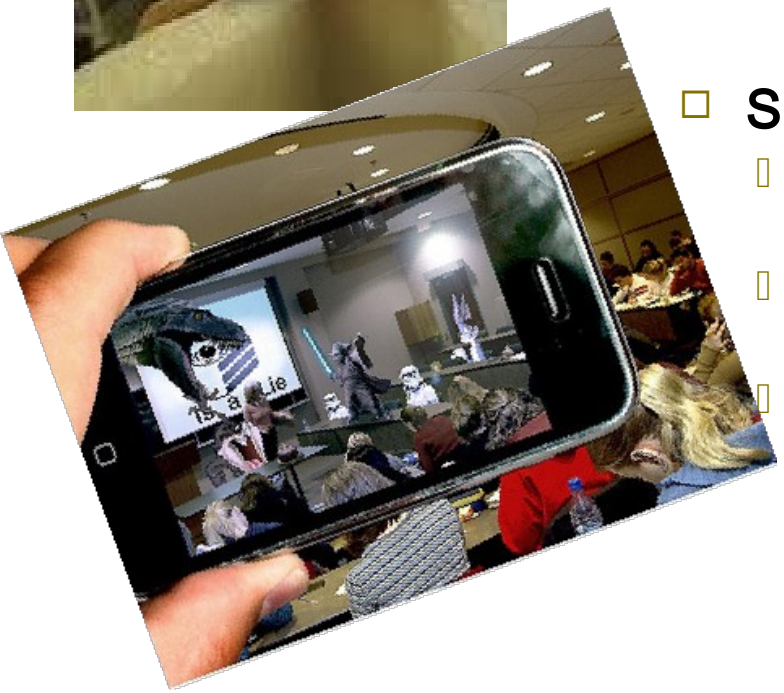
DISPLAY(cont..)



- **Contact Lenses**
  - Contain the elements for display embedded into the lens including integrated circuitry, LEDs and an antenna for wireless communication.
  - Under development
- **Virtual Retina Display**
  - a personal display device under development .
  - a display is scanned directly onto the retina of a viewer's eye.



DISPLAY(cont..)



- **Handheld**
  - a small display that fits in a user's hand.
  - Portable
  - Ubiquitous
  - Physical constraints of the user having to hold the device
  - Distorting effect

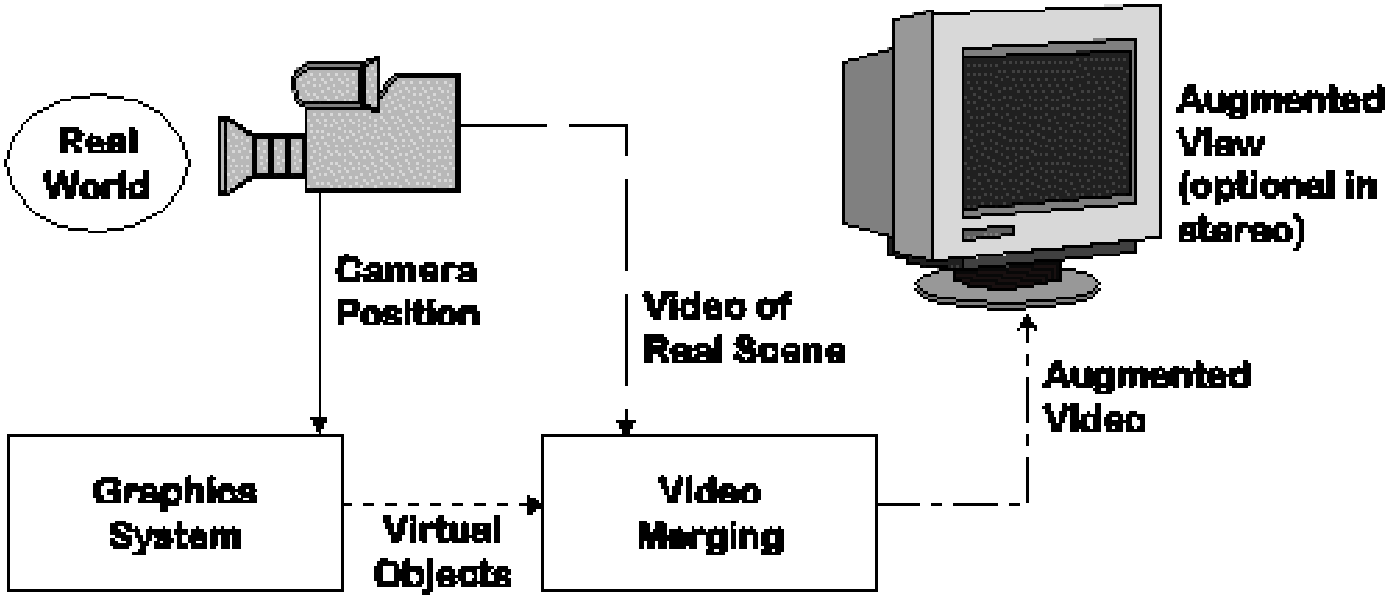
- **Spatial**
  - makes use of digital projectors to display graphical information.
  - user is not required to carry equipment or wear the display over their eyes.
  - can be used by multiple people at the same time without each having to wear a head-mounted display.

Display Technologies

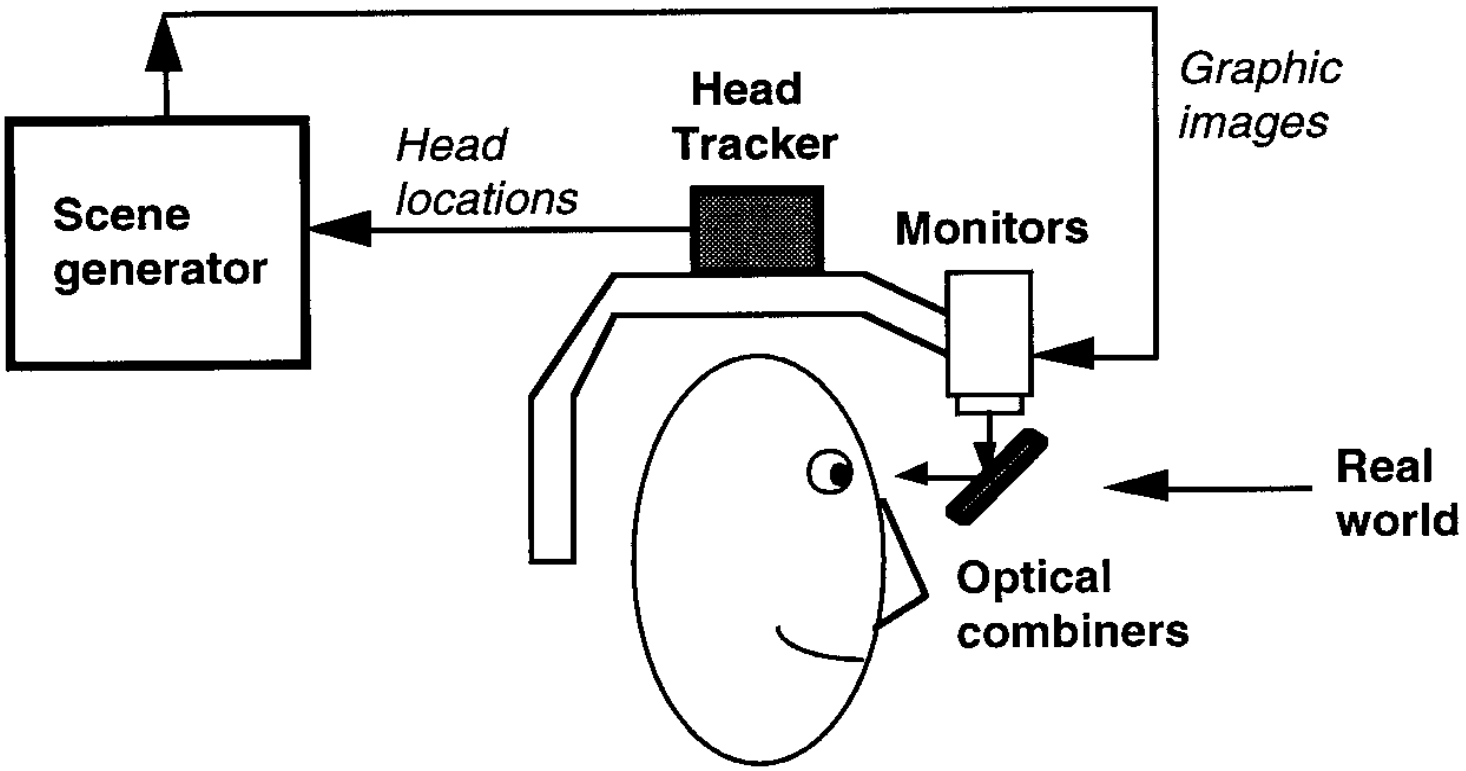
- Monitor Based
- Head Mounted Displays:
  - Video see-through
  - Optical see-through

Monitor Based Augmented Reality

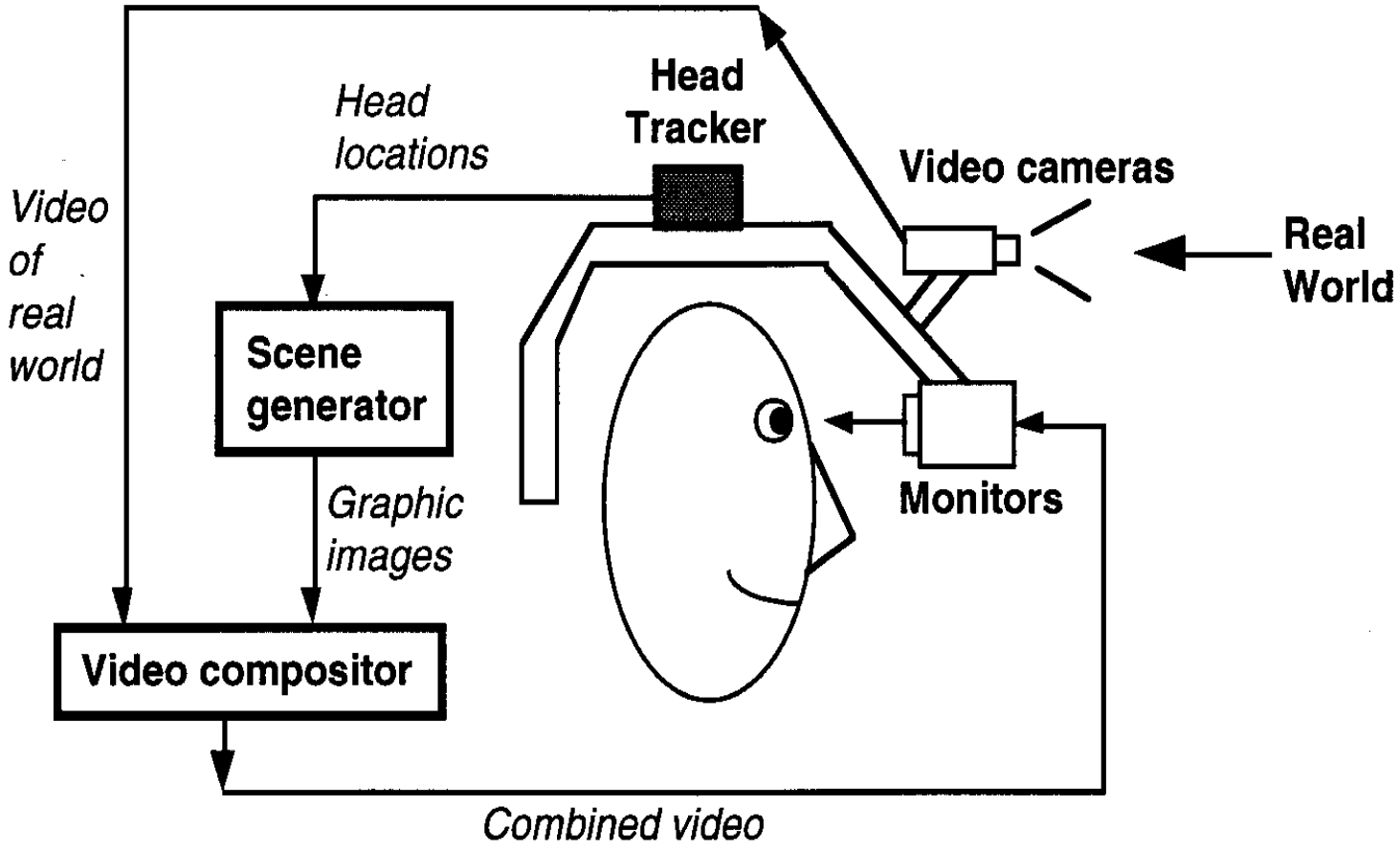
- Simplest available
- Little feeling of being immersed in environment



Optical see-through HMD



Video see-through HMD



Video Composition for Video see-through HMD

- Chroma-keying
  - Used for special effects
  - Background of computer graphics images is set to a specific color
  - Combining step replaces all colored areas with corresponding parts from video
- Depth Information
  - Combine real and virtual images by a pixel-by-pixel depth comparison

Advantages of Video see-through HMD

- Flexibility in composition strategies
- Wide field of view
- Real and virtual view delays can be matched

Advantages of Optical see-through HMD

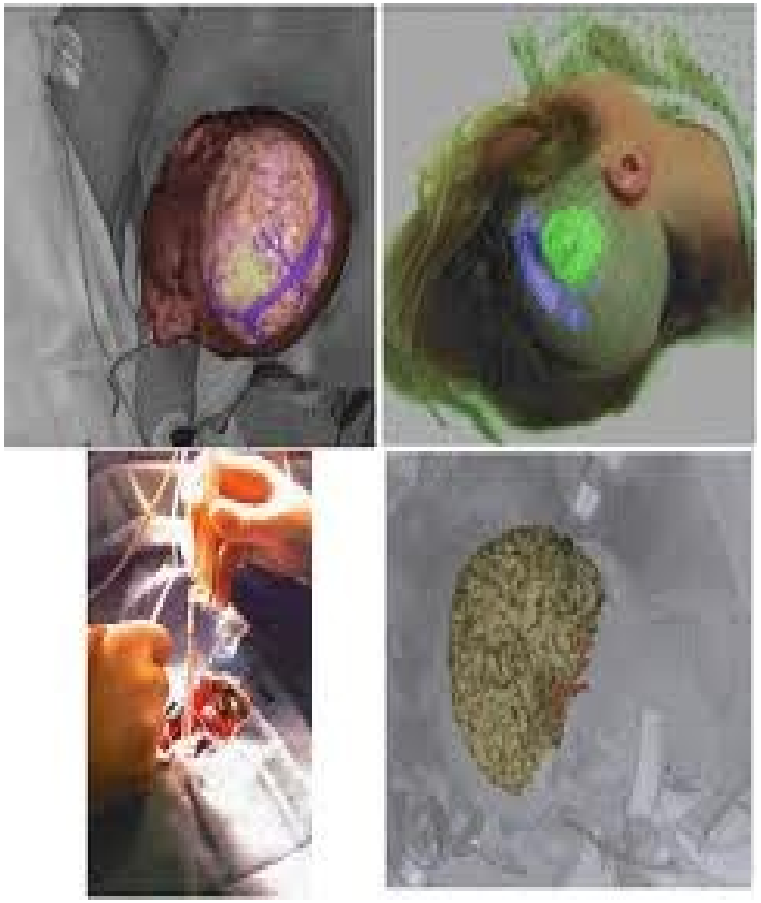
- Simplicity
- Resolution
- No eye offset

Applications

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

Medical

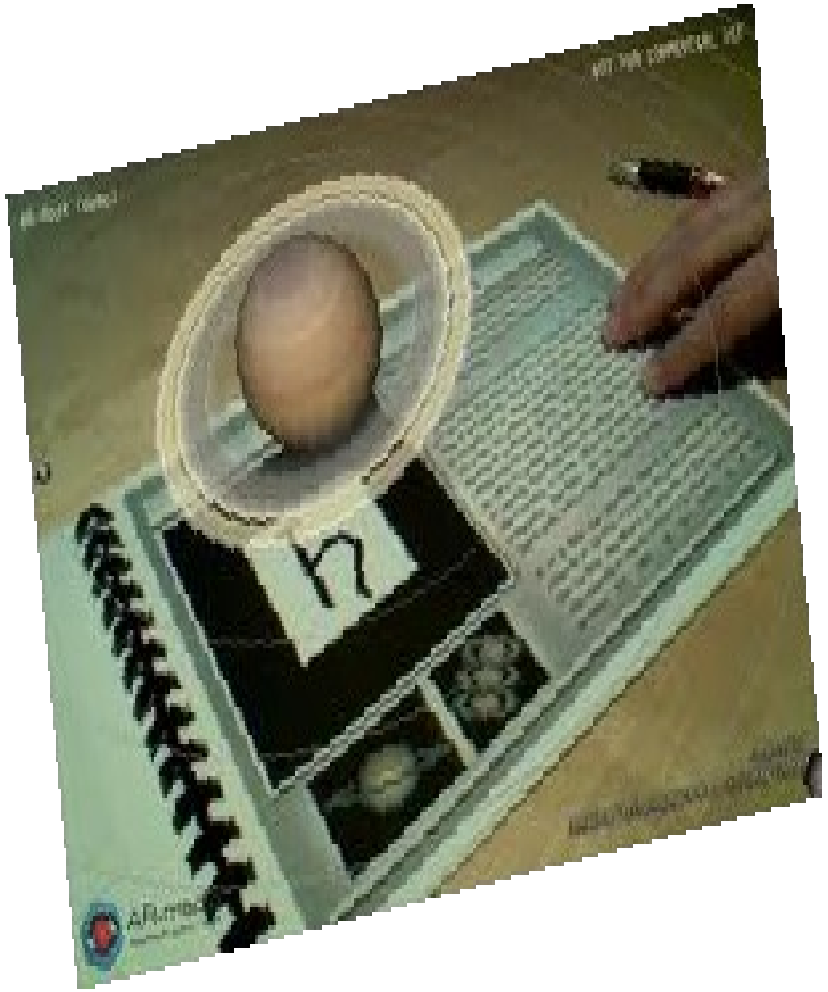

File Navigation View Window ?
Radius (The radius is the bone of the forearm that extends from the lateral side of the elbow to the thumb side of the wrist. The radius is situated on the lateral side of the ulna, which exceeds it in length and size. It is a long bone, prism-shaped and slightly curved longitudinally. The radius articulates with the capitulum of the humerus.
The word "radius" is Latin for "ray." In the context of the radius bone, a ray can be thought of rotating around an axis line extending diagonally from centre of capitulum to the centre of distal ulna. The purpose of the radius is to connect the elbow to the forearm
Radius



Entertainment

Defence

Education




Thank you