

Part 1: The Display

History



Image: Ivan Sutherland

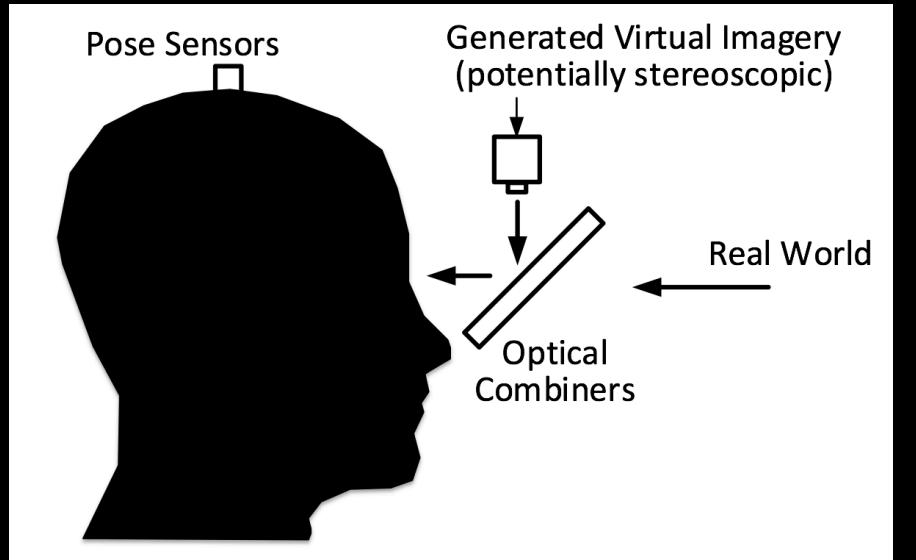


The Sword of Damocles (1968)



Kinds of AR Displays

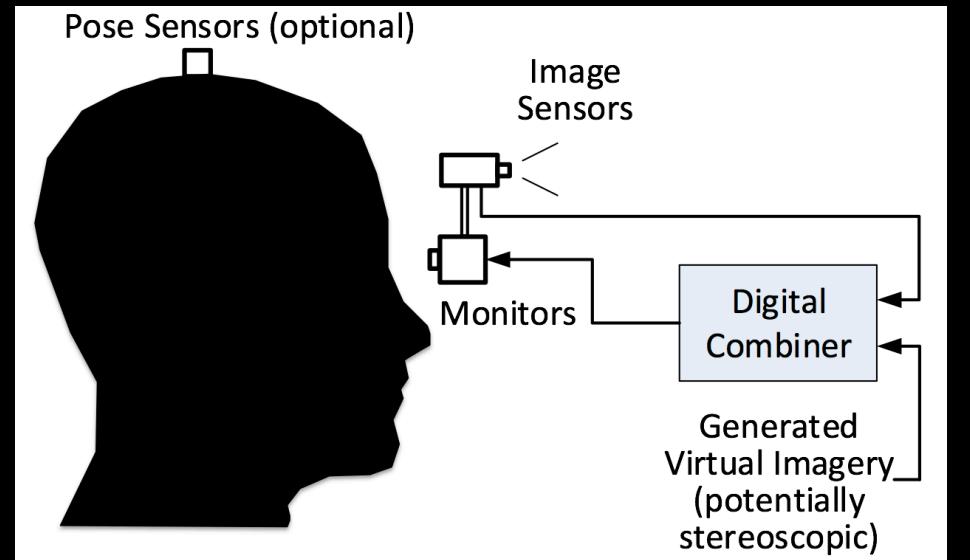
- See-Through AR
 - Optical see-through
 - Video see-through
- Spatial AR



An optical see-through display uses an optical element to combine a user's view of the real world with computer-generated images

Kinds of AR Displays

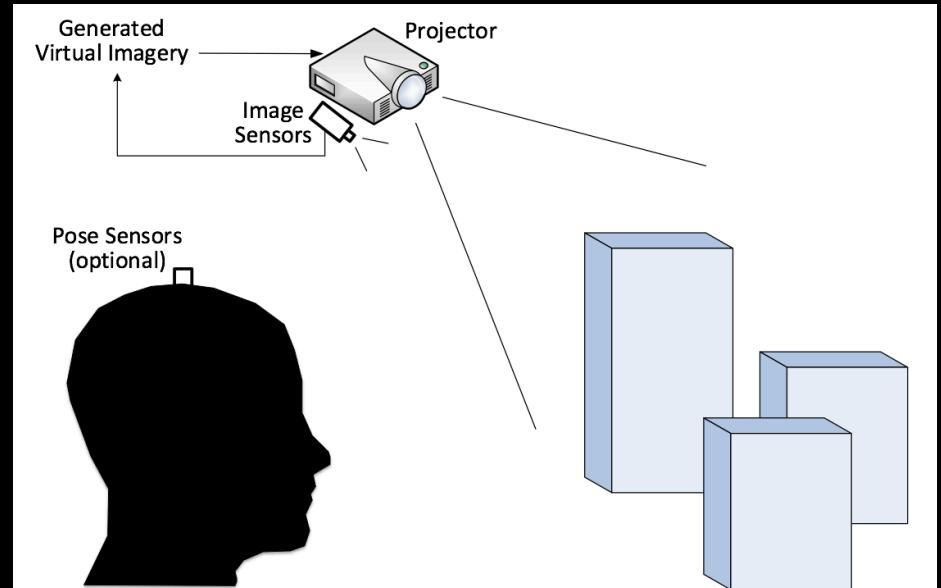
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A video see-through display captures the real world with a video camera and digitally modifies the resulting image to deliver a combined real + virtual image to the user.

Kinds of AR Displays

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Spatial projection casts images directly onto real-world objects

No combiner unit is required

Optical See-Through AR Headsets



Microsoft HoloLens



ODG R-7 Smart Glasses



Meta-2

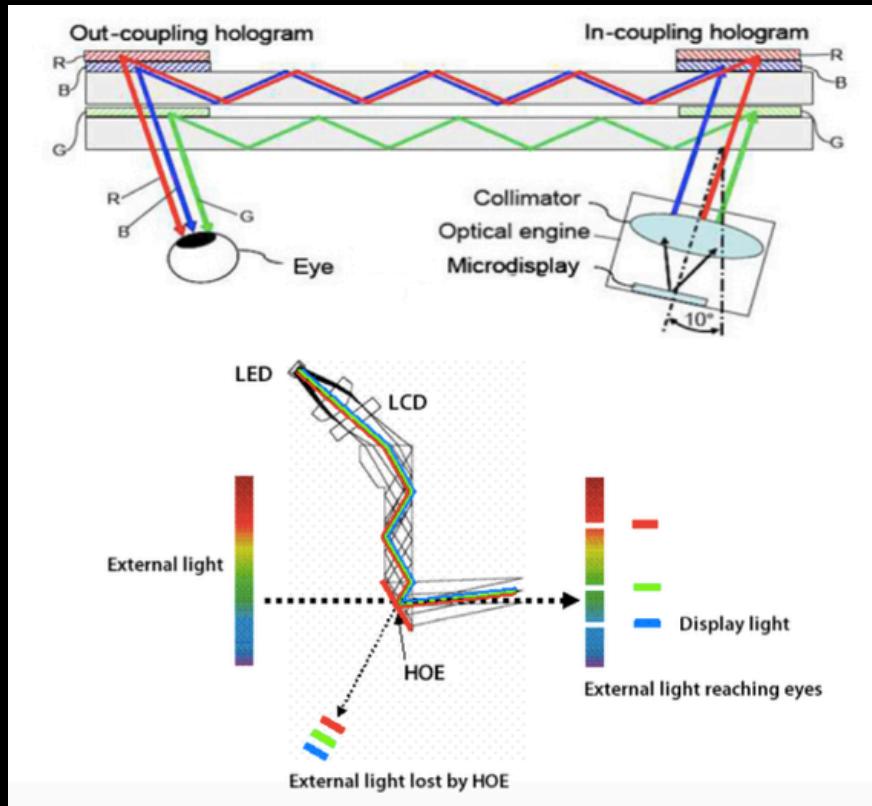


DAQRI Smart Helmet

Optical Combiners and Waveguides



<https://www.theverge.com/2016/4/6/11376442/microsoft-hololens-holograms-parts-teardown-photos-hands-on>



<https://www.forbes.com/sites/quora/2017/01/09/how-do-augmented-reality-displays-work/#459c2a8f4731>

The Hologram Hype

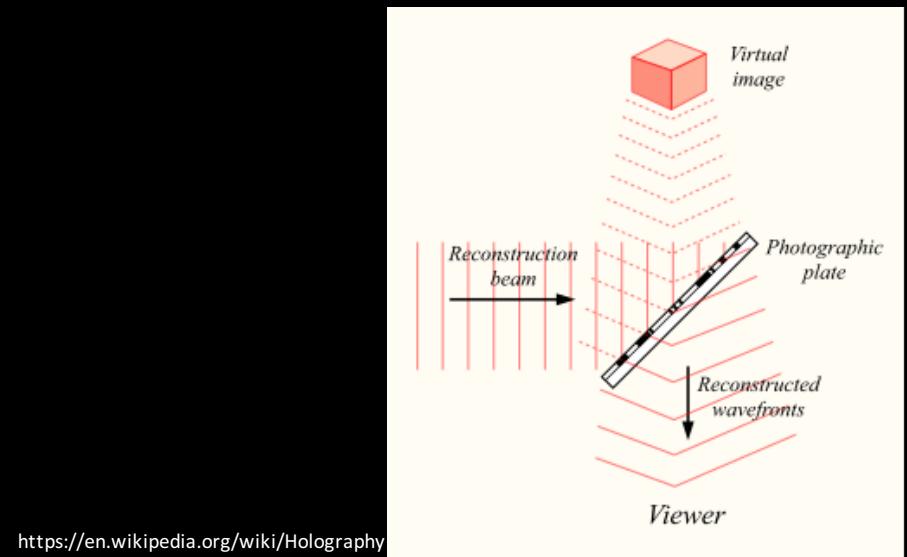
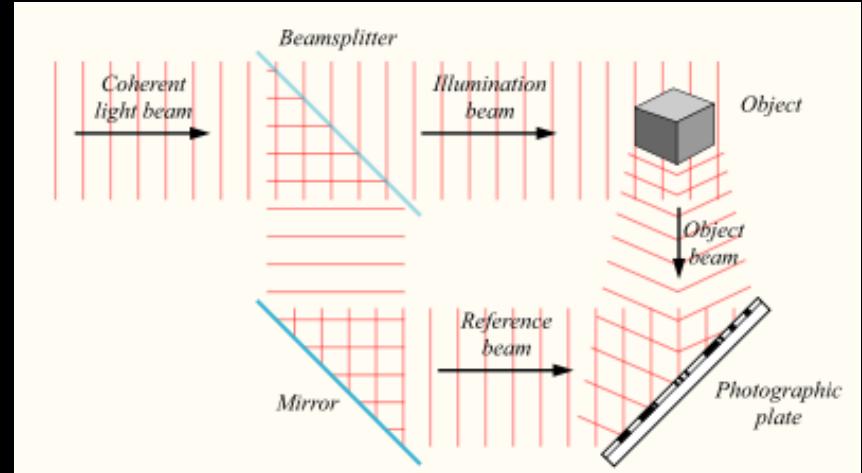
There is no
“hologram.”



<https://www.starwars.com>

The Hologram Hype

A true hologram is a recording of a lightfield.



<https://en.wikipedia.org/wiki/Holography>

Video See-Through AR Headsets



COASTAR was the first commercial parallax-free video see-through HMD

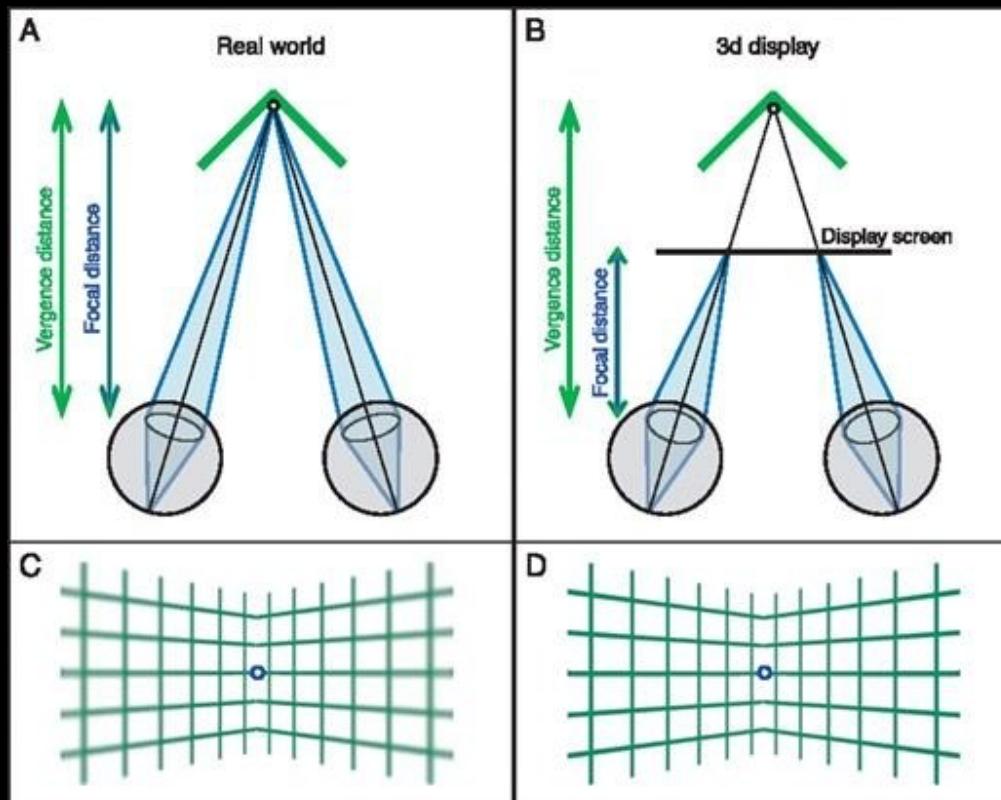
Canon MR Laboratory, 2002

Image: Hiroyuki Yamamoto



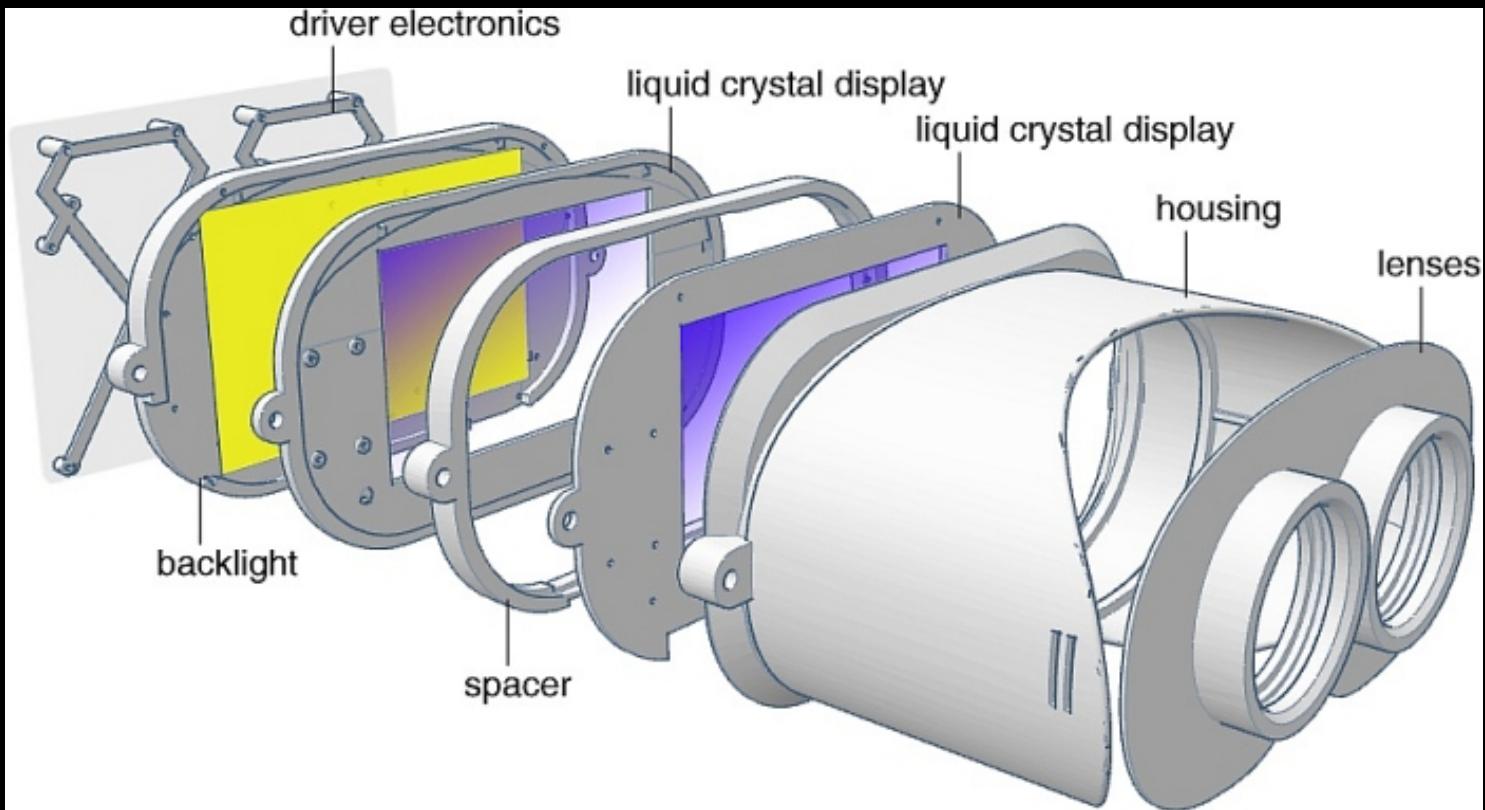
Vuzix Wrap 1200DXAR (2014)

Vergence-Accommodation Conflict



The vergence-accommodation conflict, Hoffman et al., Journal of Vision 2008

Cutting Edge: Light-Field Displays



The Light Field Stereoscope, Huang et al, SIGGRAPH 2015

Augmented Reality Sandbox, Oliver Kreylos et al., 2013

Spatial AR

