Introduction to Augmented Reality and its Future in Education and Learning

Stephan Lukosch
Faculty of Technology, Policy and Management

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VIRTUAL AND AUGMENTED REALITY

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Virtual Reality

- Head mounted display, gloves
- Separation from the real world

https://www.youtube.com/watch?v=Ykf4gDEzIC8

Augmented Reality

- Combines Real and Virtual Images
- Interactive in real-time
- Registered in 3D

https://www.youtube.com/watch?v=Qm2gnnyyvEg

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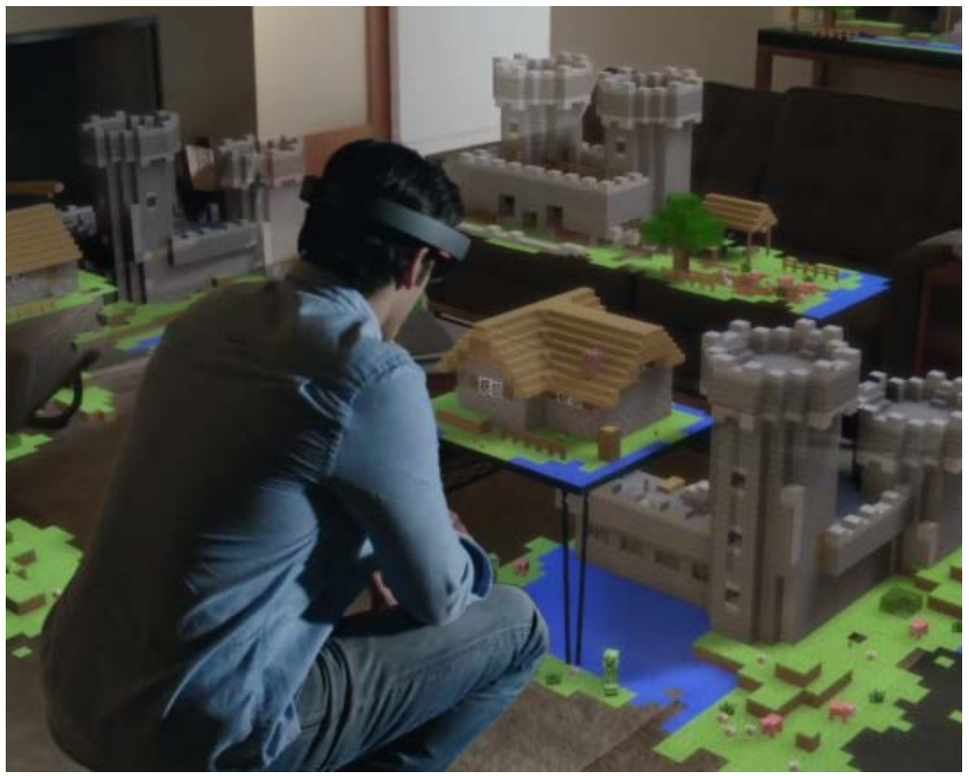
Strong vs. weak AR

- Weak AR
  - Imprecise tracking
  - No knowledge of environment
  - Limited interactivity
  - Handheld AR

- Strong AR
  - Very accurate tracking
  - Seamless integration into real world
  - Natural interaction
  - Head mounted AR



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Augmented vs. virtual reality

	Virtual Reality *Replaces Reality*	**Augmented Reality** *Enhances Reality*
Scene Generation	Requires realistic images	Minimal rendering okay
Display Device	Fully immersive, wide field of view	Non-immersive, small field of view
Tracking	Low to medium accuracy is okay	The highest accuracy possible

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HISTORY OF AR

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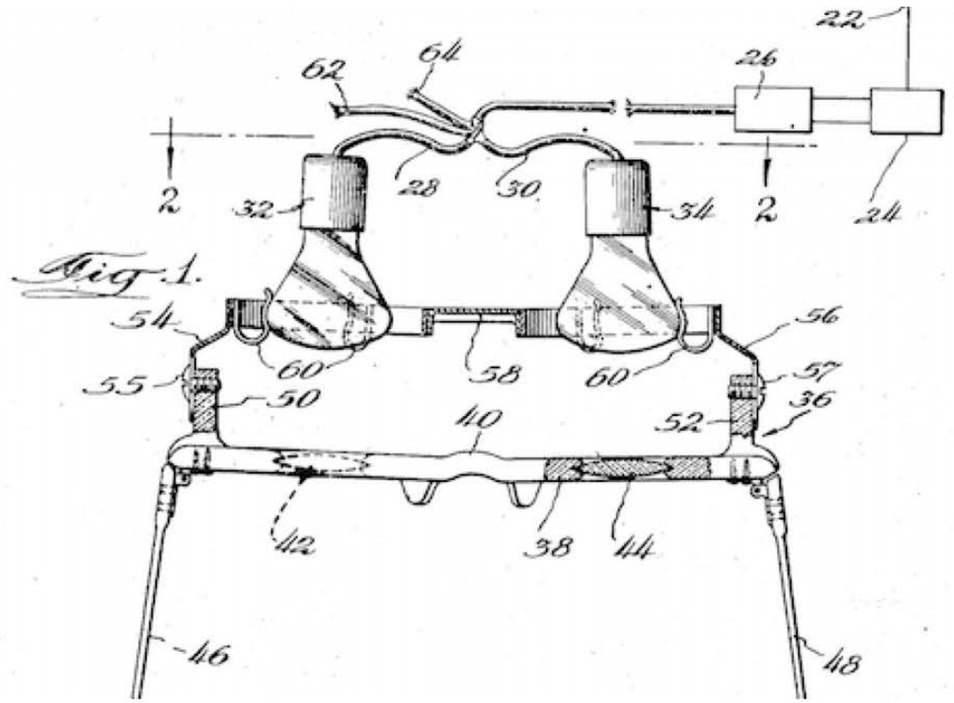
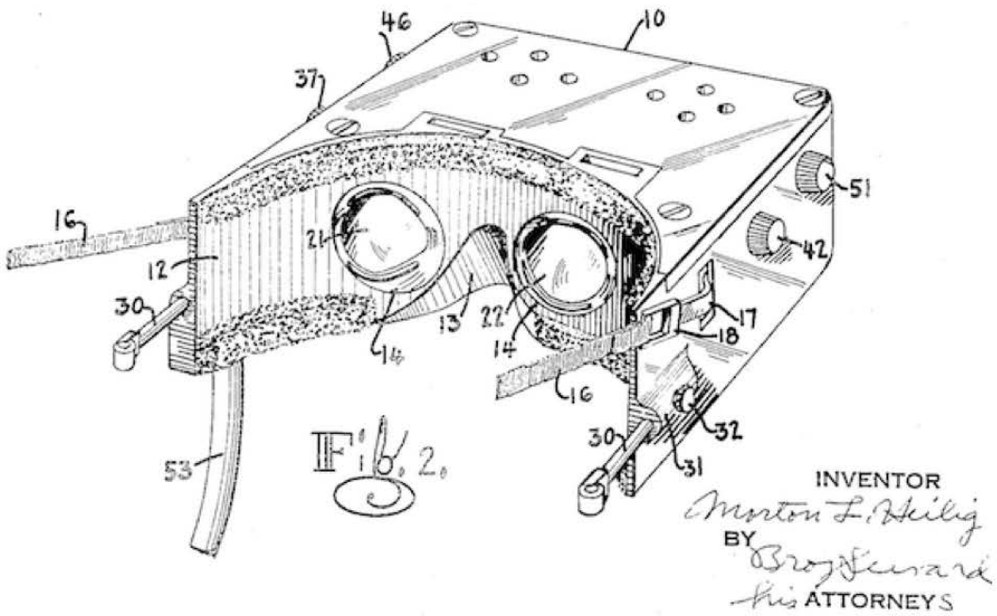
Early head-mounted display (HMD) patents



McCollum's Stereo TV HMD (1943)

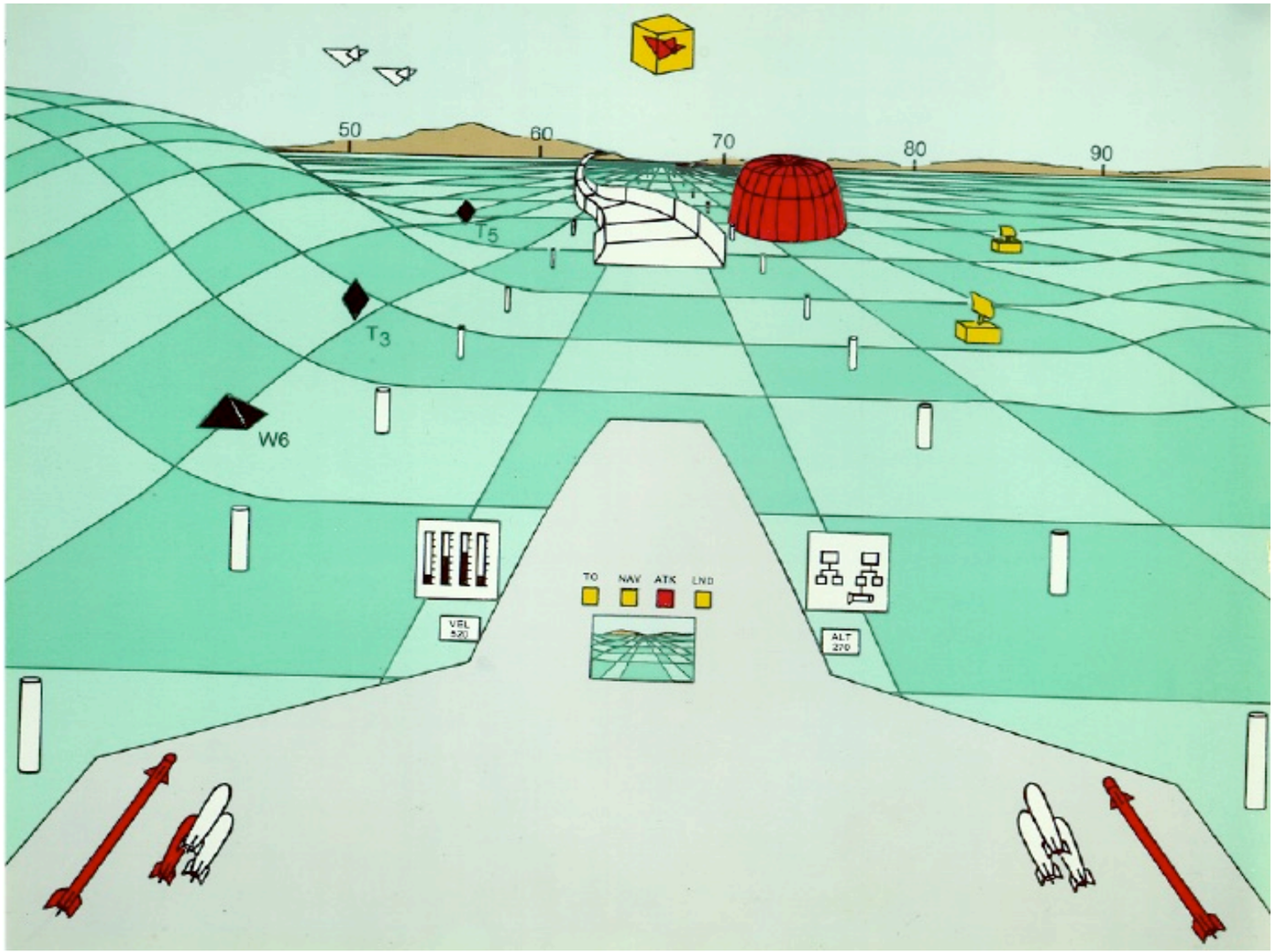


Heilig's Multisensory HMD (1960)

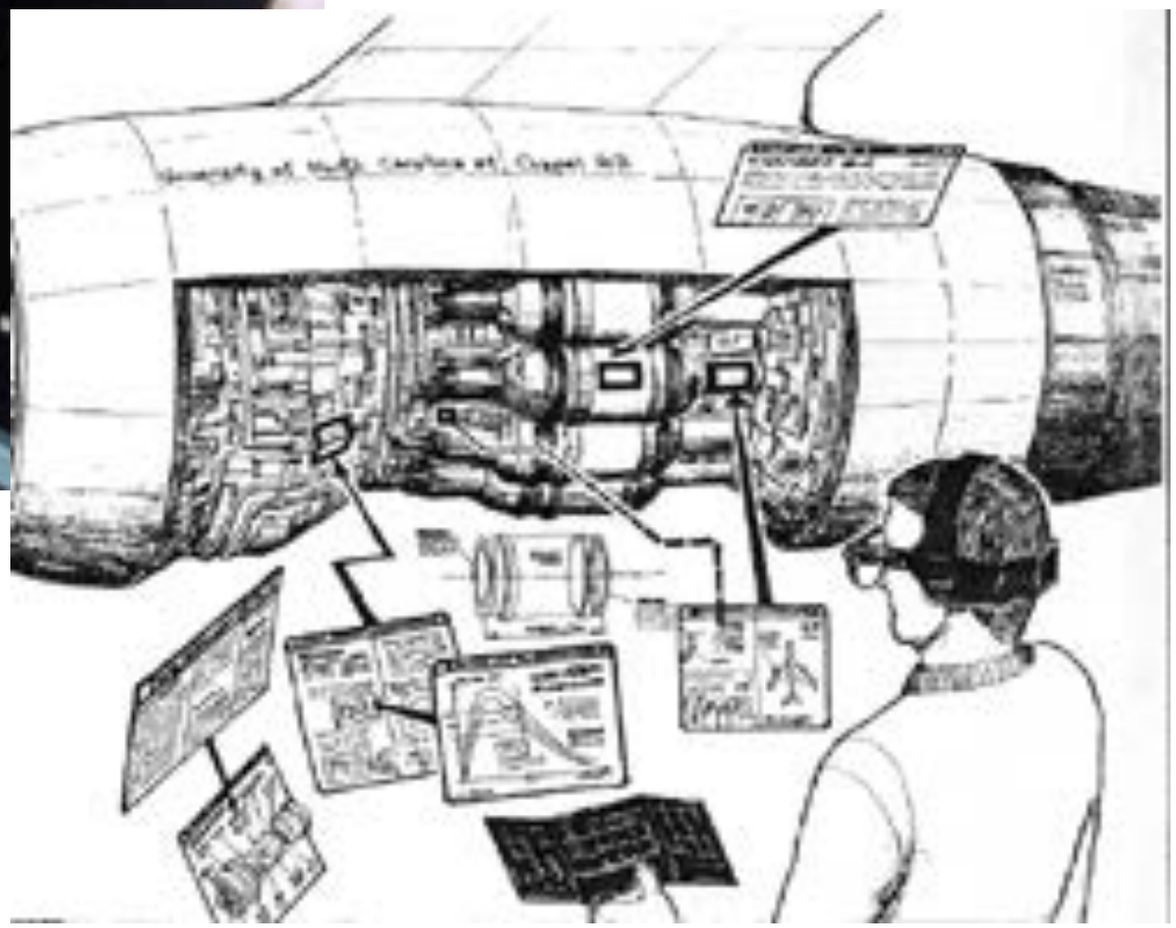
Sutherland's first see-through HMD system (1968)

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

US Air Force SuperCockpit Program (1970-80's)

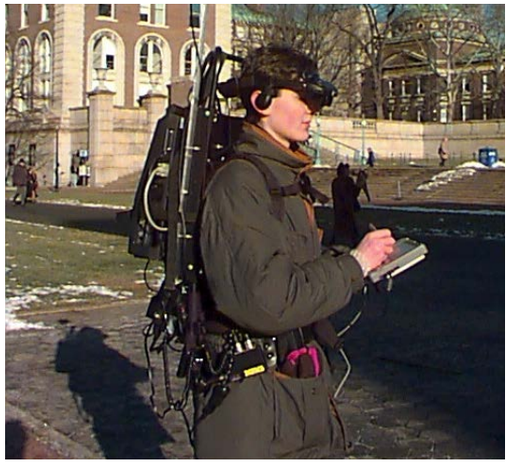


First industrial use – Boeing wire harness assembly (early 1990's)

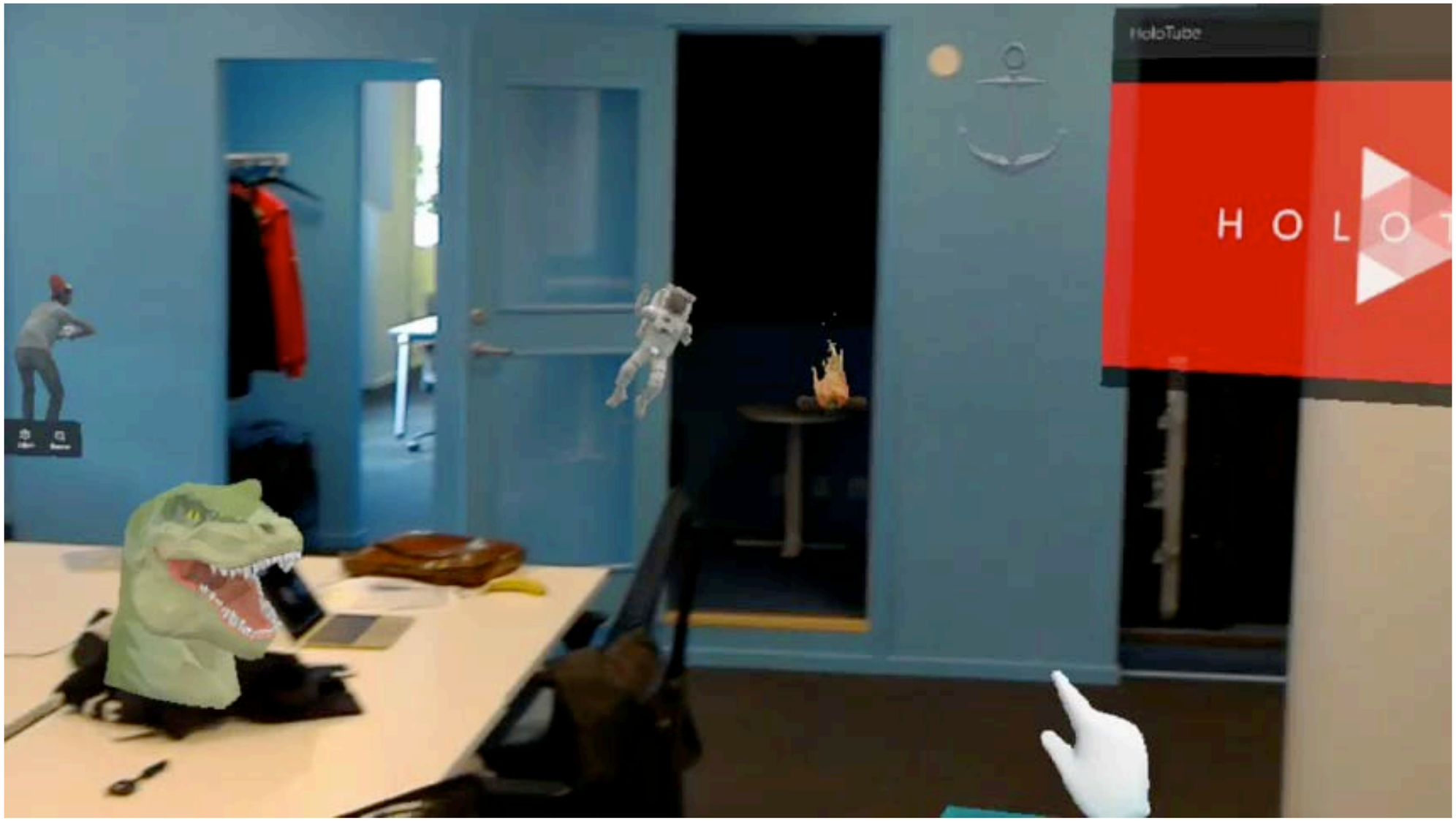


Further development of the field

- 1990's: Collaboration, outdoor, interaction
- 1990's: Augmented sports broadcasts
- 1995 - … : Tools and applications (interaction, usability, theory)
- 2005 - …: Commercial Applications (games, medical, industry)
- March 2007: MIT Technology Review, one of 10 most exciting technologies
- December 2007: Economist, AR like reality, only better
- 2013: Google Glass
- 2014: Epson Moverio BT-200
- 2016: Microsoft Hololens



View through Microsoft Hololens



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

History summary

- Augmented Reality has a long history going back to the 1960's
- Interest in AR has exploded over the last few years
- AR is being commercialized quickly
- AR is growing in a number of areas
  - Mobile AR
  - Web based AR
  - Marketing experiences
  - Gaming
  - Learning

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SAMPLE AR APPLICATIONS

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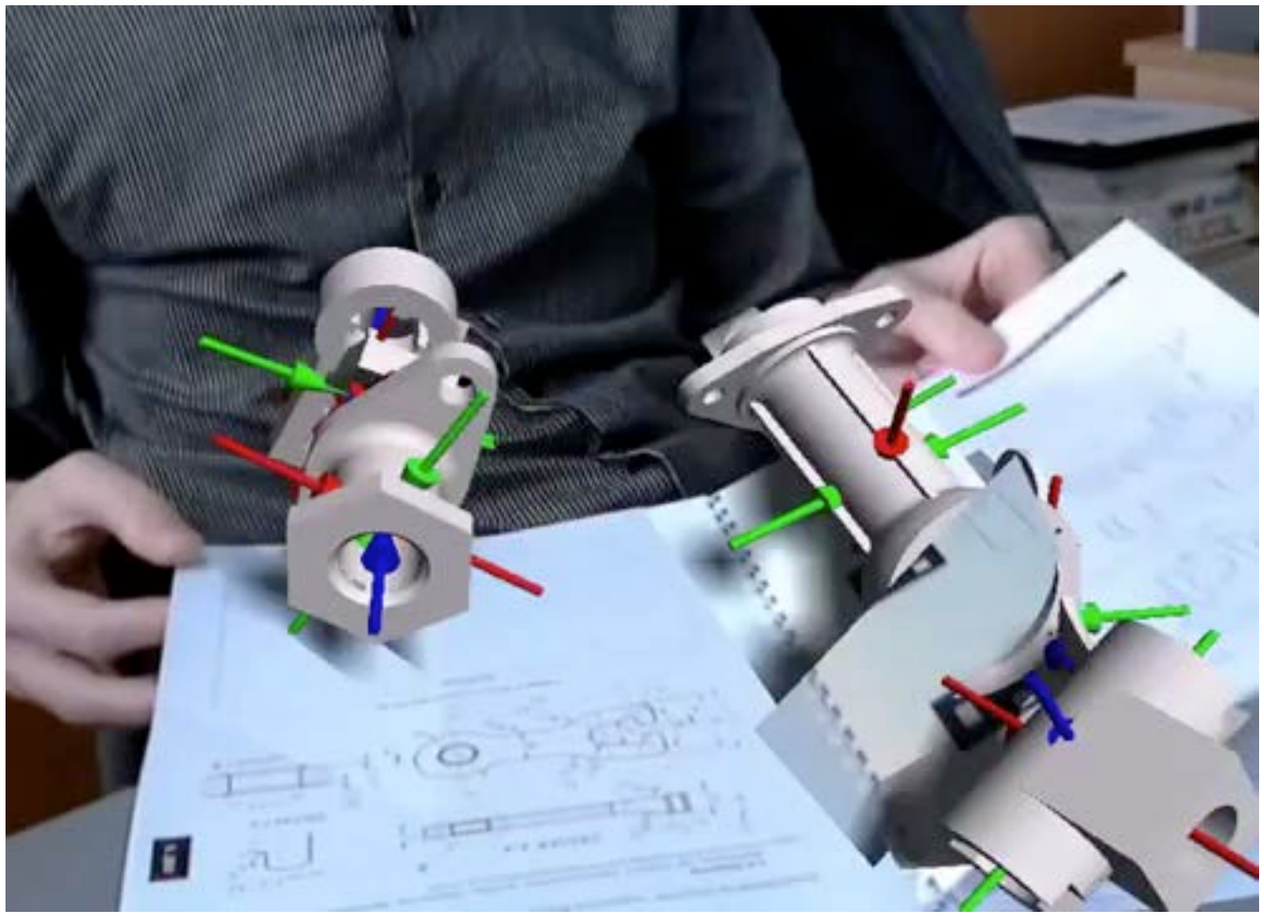
Typical AR Experiences

- Web based AR
  - Flash, HTML 5 based AR
  - Marketing, education
- Outdoor Mobile AR
  - GPS, compass tracking
  - Viewing Points of Interest in real world
- Handheld AR
  - Vision based tracking
  - Marketing, gaming
- Location Based Experiences
  - HMD, fixed screens
  - Museums, point of sale, advertising

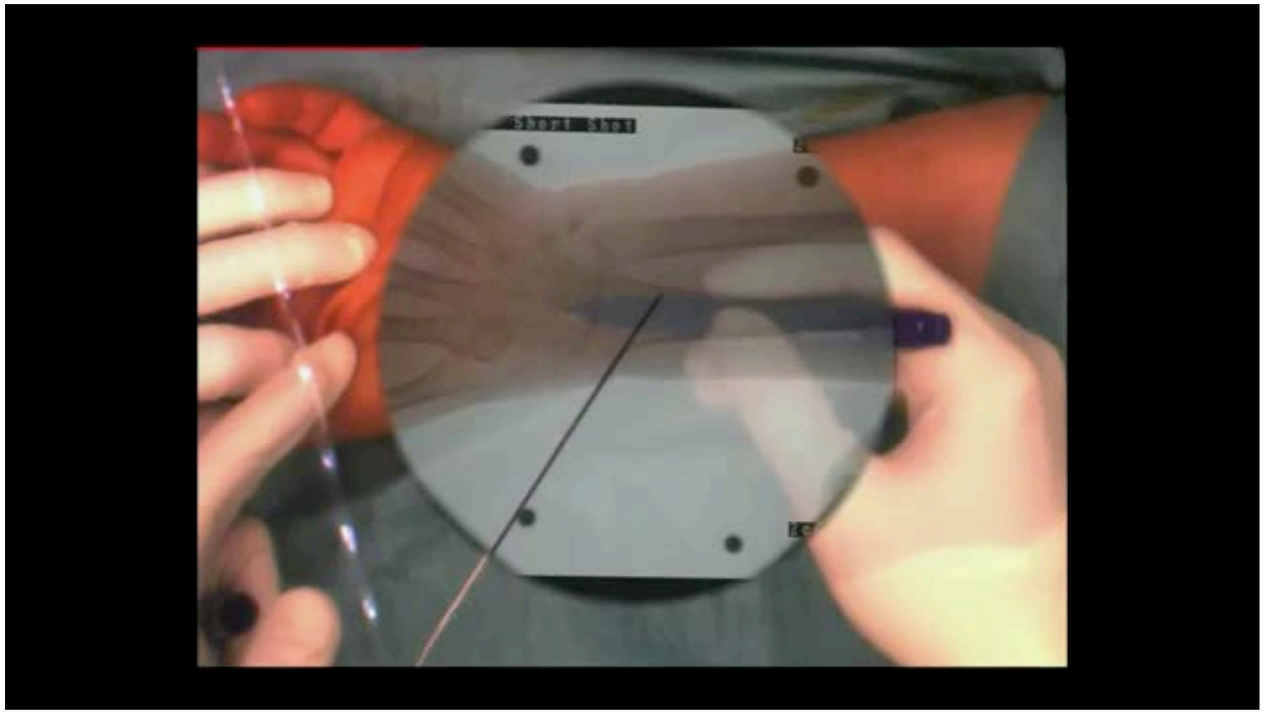
AR books



https://www.youtube.com/watch?v=tRtLs6n_9Vw

https://www.youtube.com/watch?v=X4UGOd9gHrg

Medical AR applications



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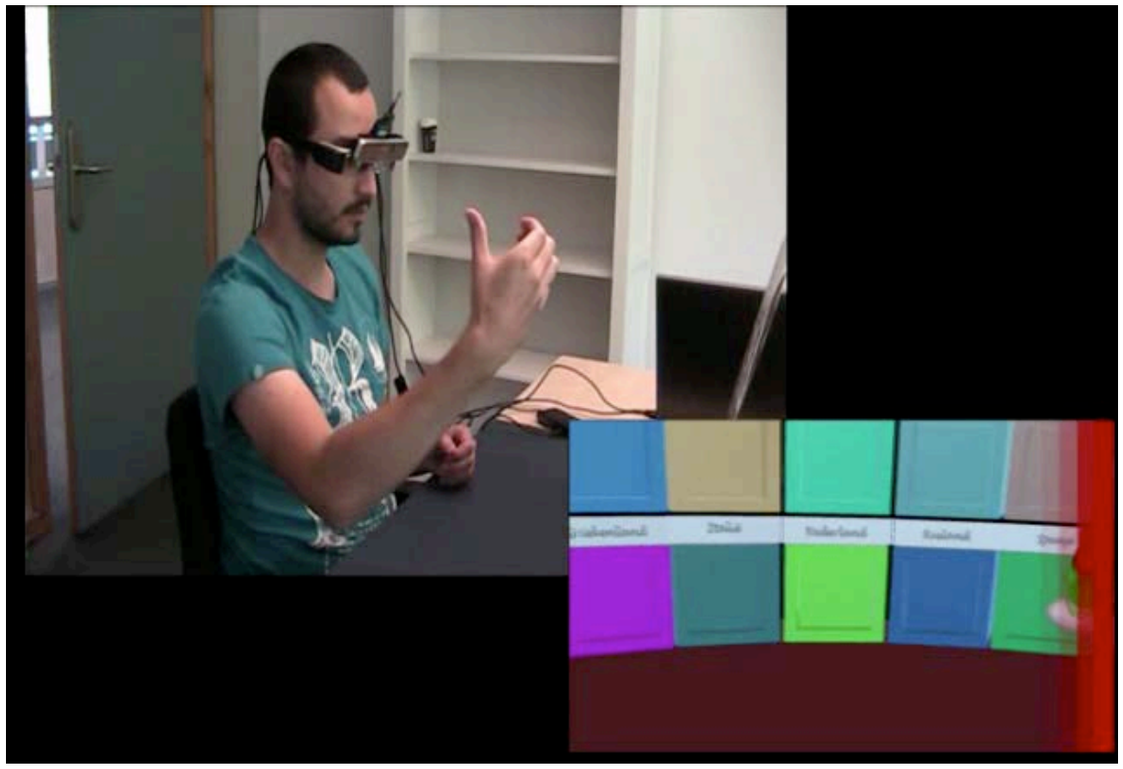

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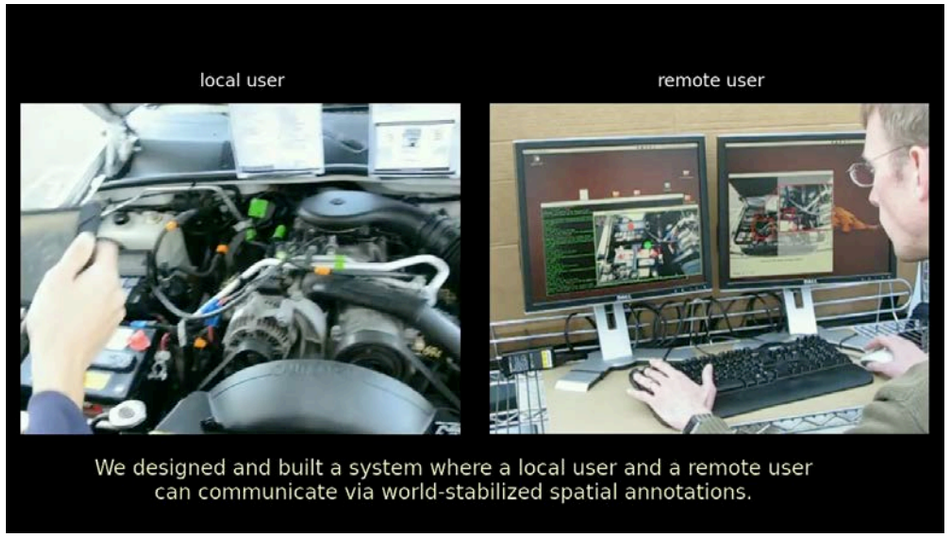
Remote support



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Holoportation

http://research.microsoft.com/en-us/projects/holoportation/

AUGMENTED REALITY FOR FUTURE EDUCATION AND LEARNING

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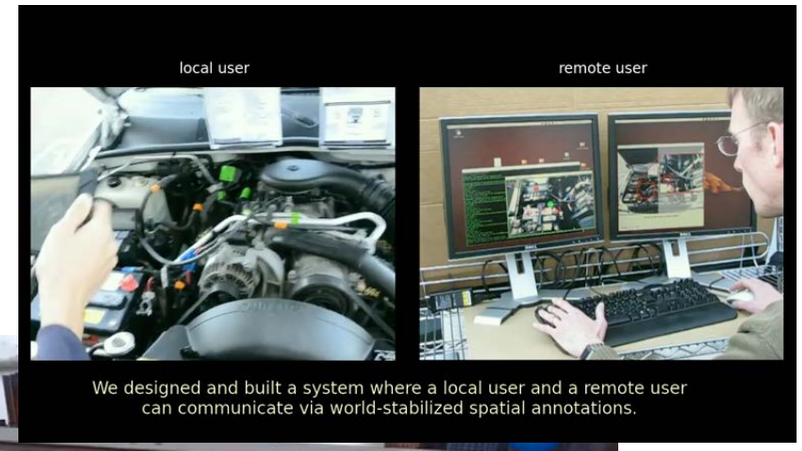
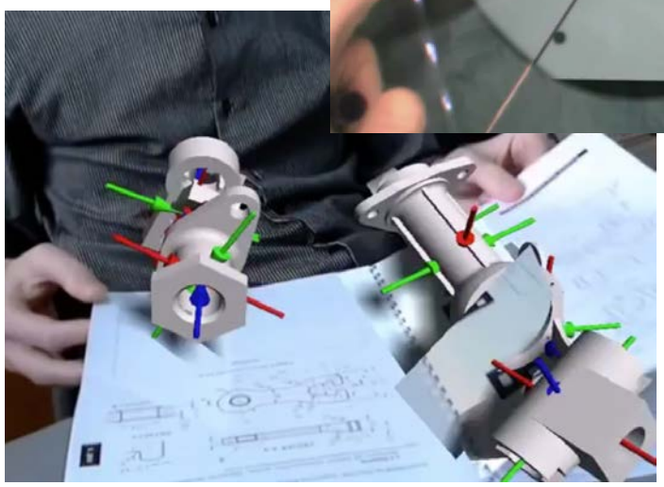
Vision for teaching and education with augmented reality

- Use AR to support remote presence in labs
- Use AR to review designs in real environments
- Use AR to train skills and procedures
- Use AR to analyse large data sets
- Use AR to augment and extend standard teaching material





MICROSOFT HOLOLENS DEMO

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