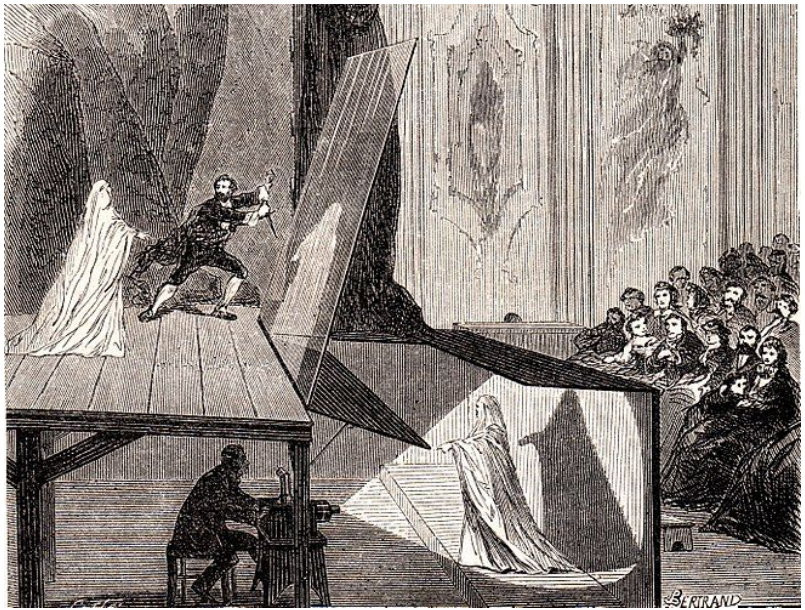
History of AR

Thr, June 25 (Week 1.5)

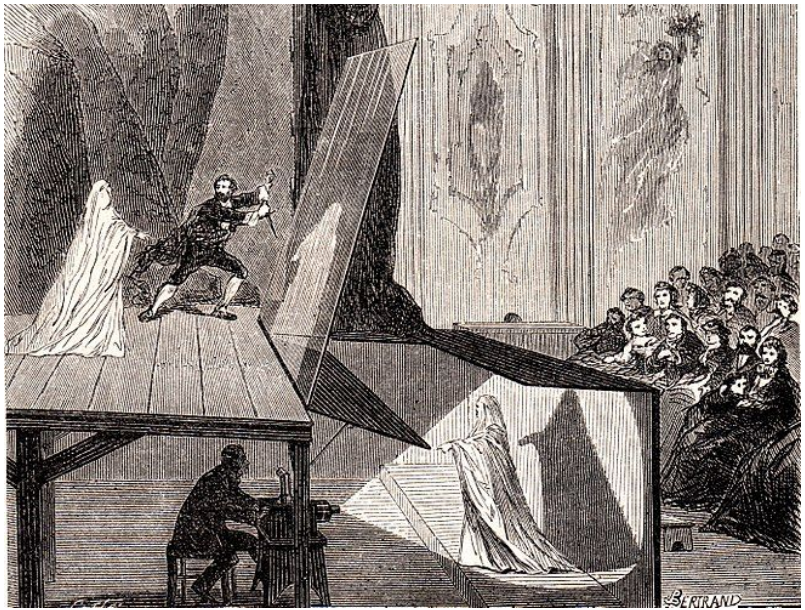
https://youtu.be/e9VRUJWU9lM

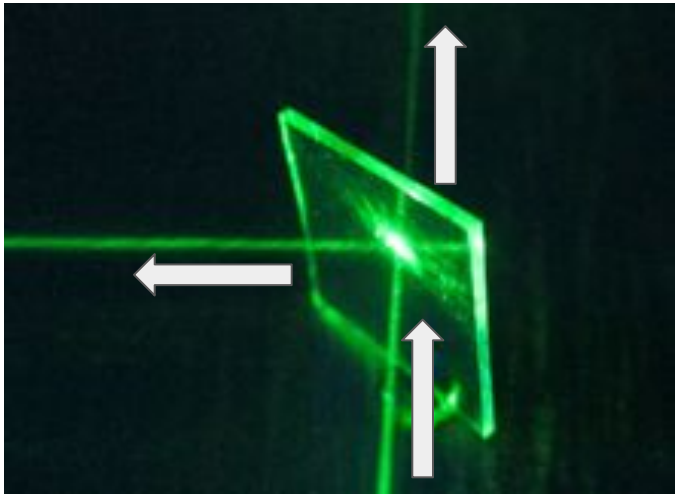
Pepper’s Ghost (Pepper, 1862)



Pepper's Ghost (Pepper, 1862)

Beam splitter: the idea behind transparent AR displays.

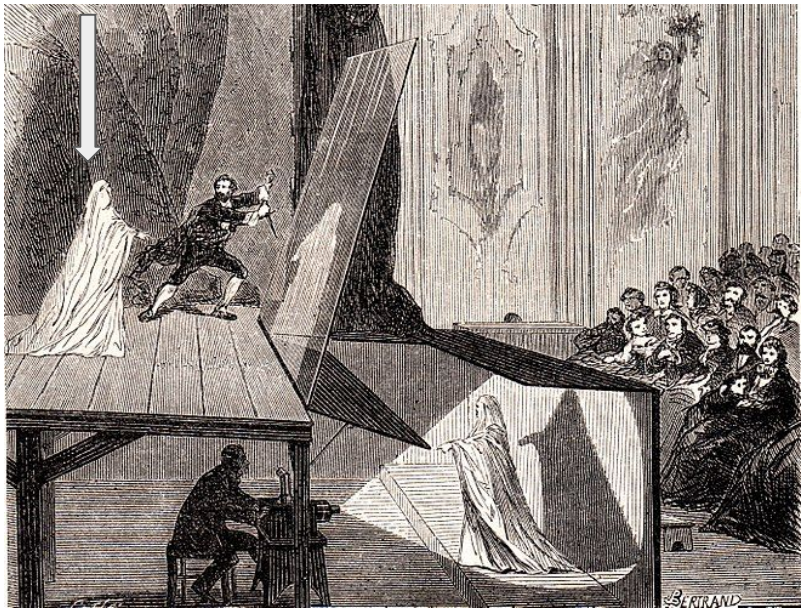


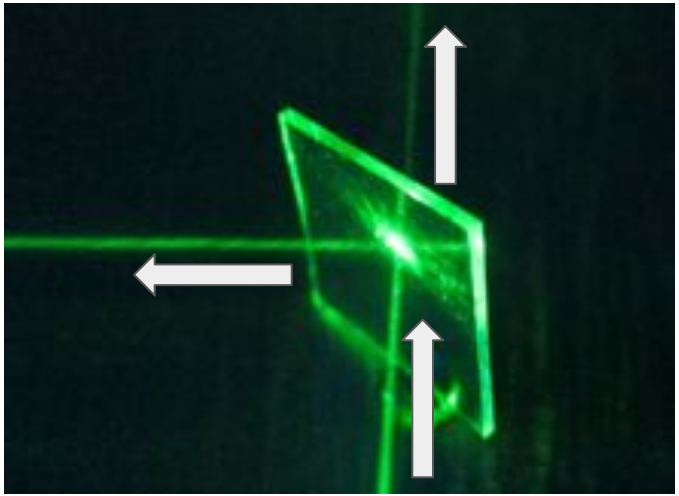


Pepper’s Ghost (Pepper, 1862)

Beam splitter: the idea behind transparent AR displays.

Ghost on the stage is not real but only a reflection.





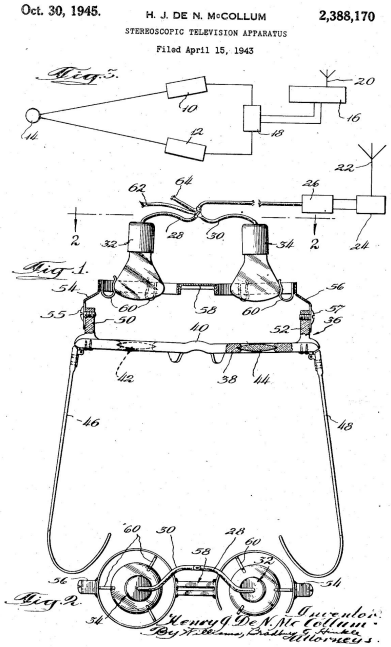
https://youtu.be/TcqyoYfHIFM?t=51

Stereoscopic Television Apparatus

Filed by Mccollum Thelma in 1943, granted 1945.

From Thelma's application:

My invention relates to stereoscopic television apparatus. An object of my invention is to provide a new and improved stereoscopic television apparatus whereby a plurality of people can simultaneously and with equal facility view an object which has been transmitted by stereoscopic television.


Oct. 30, 1945. H. J. DE N. McCOLLUM 2,388,170

STEREOSCOPIC TELEVISION APPARATUS

Filed April 15, 1943

Fig. 3.

Fig. 1.

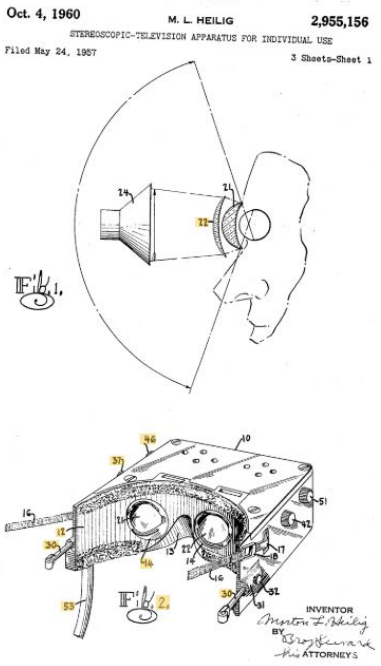
Fig. 2.

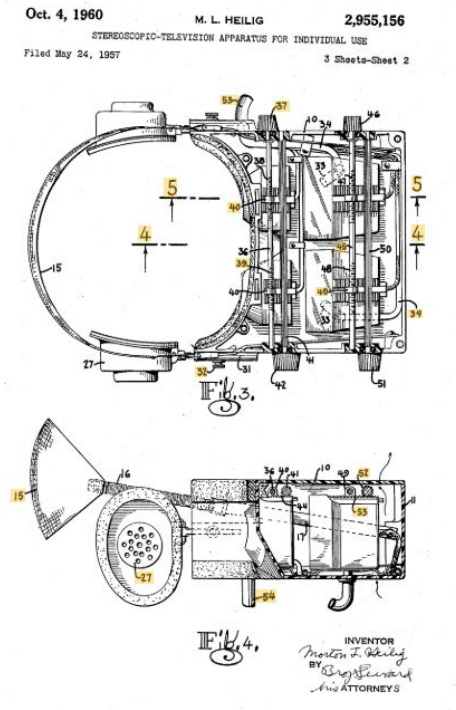
Inventor: Henry J. De N. McCollum

By ... Attorneys

Telesphere Mask (Morton Heilig)

Patent applied 1957, granted 1960.


Oct. 4, 1960 M. L. HEILIG 2,955,156
STEREOSCOPIC-TELEVISION APPARATUS FOR INDIVIDUAL USE
Filed May 24, 1957 3 Sheets-Sheet 1
Fig. 1.
Fig. 2.
INVENTOR
Morton L. Heilig
BY
Brophy & Lovard
his ATTORNEYS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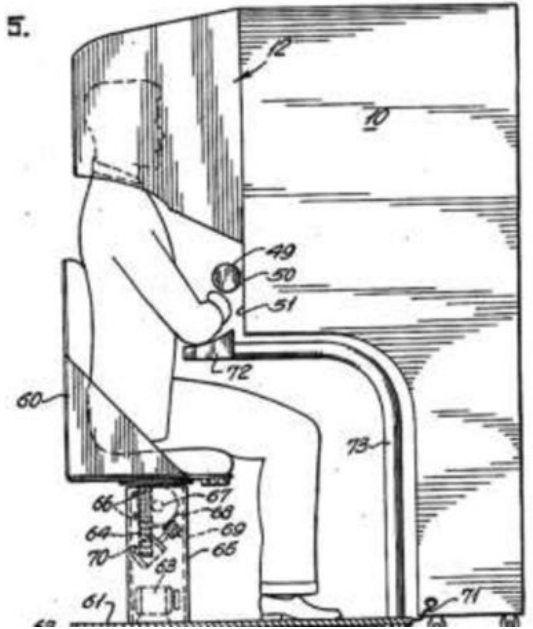
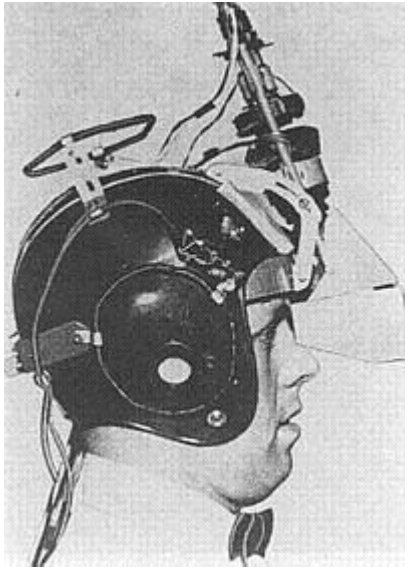
STEREOSCOPIC-TELEVISION APPARATUS FOR INDIVIDUAL USE
Filed May 24, 1957 3 Sheets-Sheet 2
Fig. 3.
Fig. 4.
INVENTOR
Morton L. Heilig
BY
Brophy & Lovard
his ATTORNEYS

Sensorama (Morton Heilig)

Applied 1961, Granted 1962.

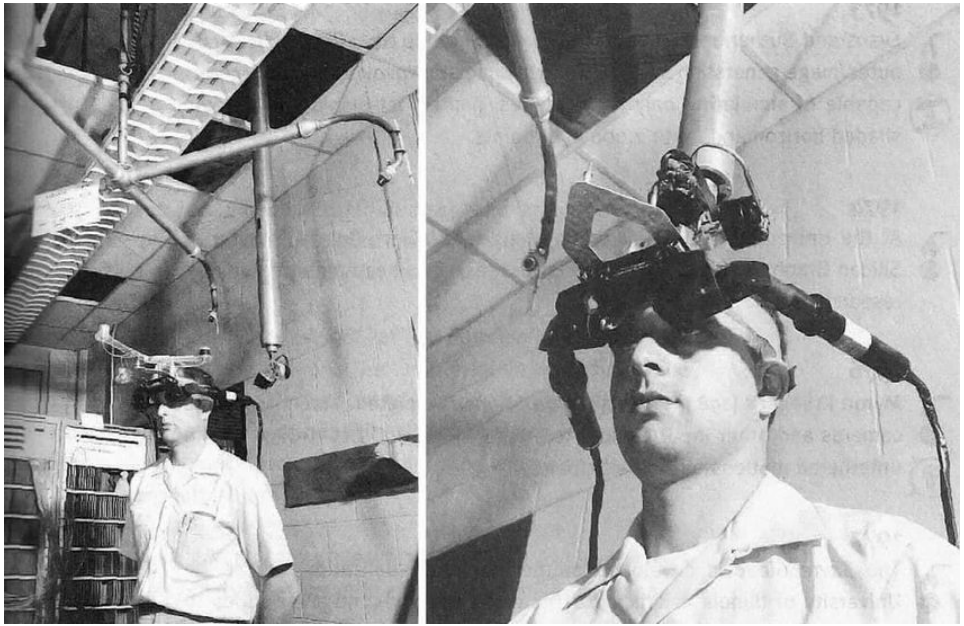


Philco Headsight (1961)



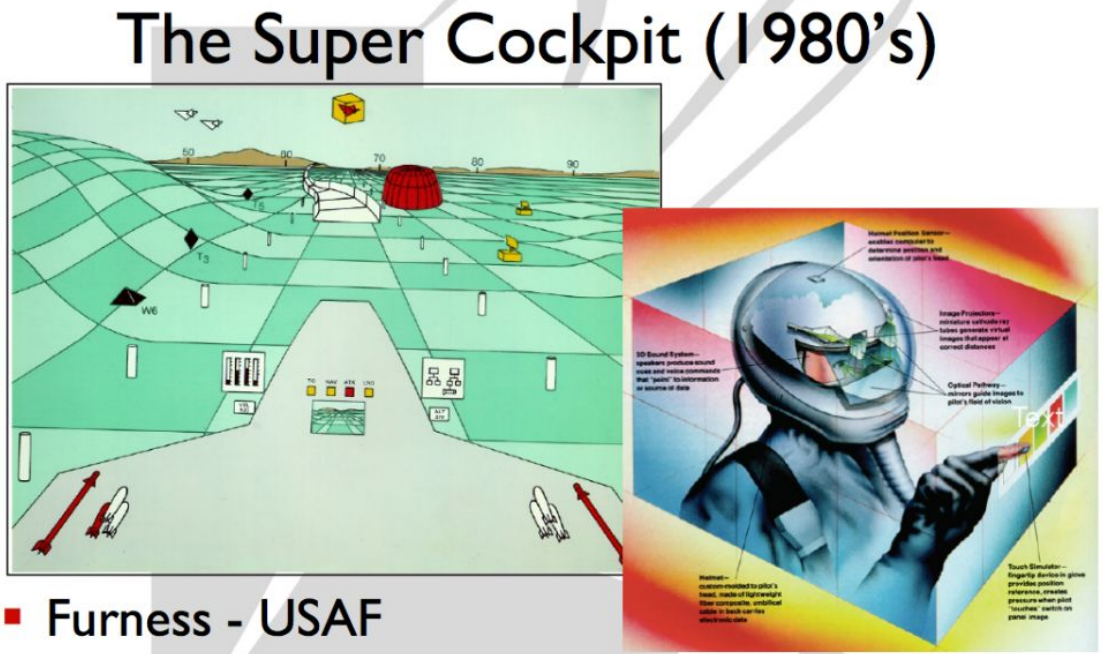
The Sword of Damocles (Sutherland, 1968)

or The Ultimate Display

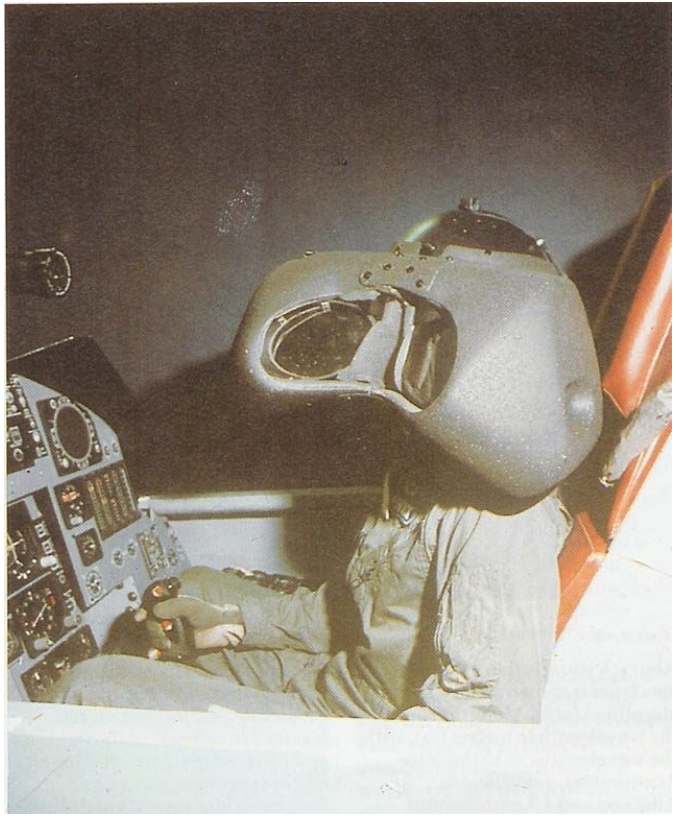



https://youtu.be/NtwZXGprxag

The Super Cockpit (1986)



- Furness - USAF



Furness, T. A. (1986, September). The super cockpit and its human factors challenges. In *Proceedings of the Human Factors and Ergonomics Society Annual Meeting* (Vol. 30, No. 1, pp. 48-52). SAGE Publications.

Boeing (Caudell & Mizell, 1992)

Coined the Term “Augmented Reality”

To increase productivity by telling what to do.

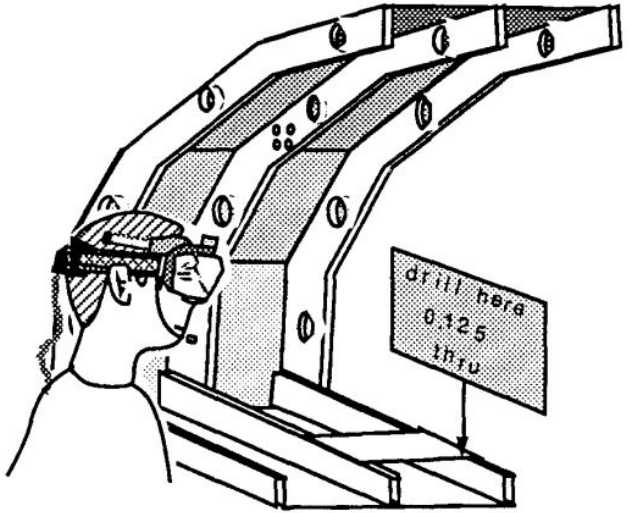
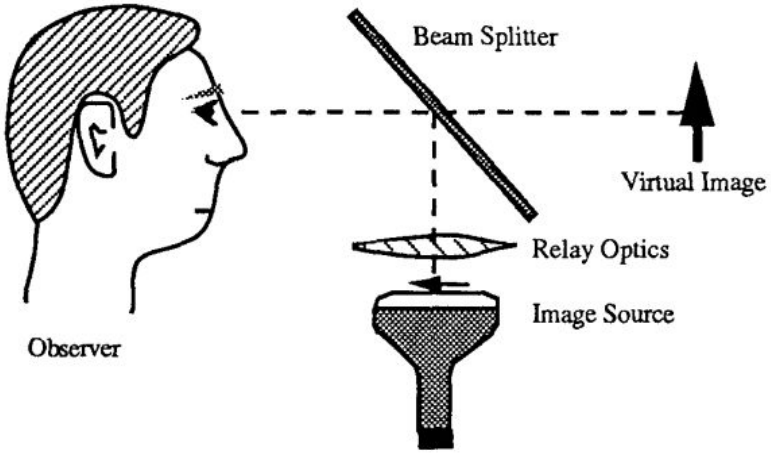
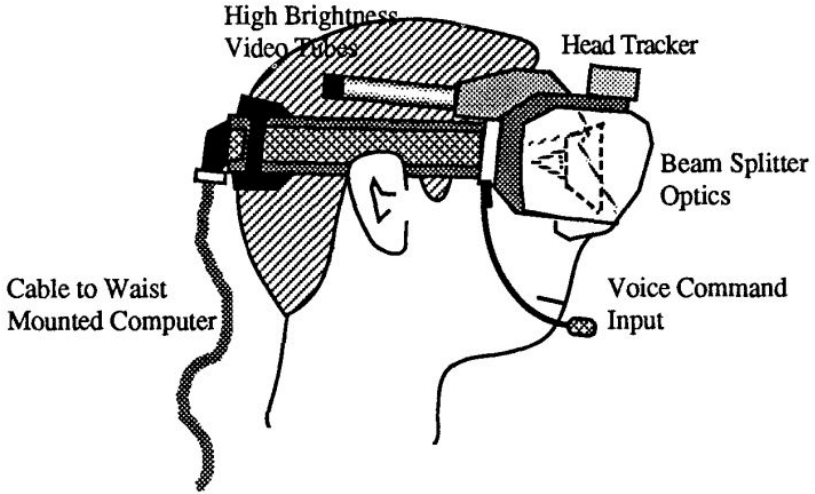


Figure 1. An application where the HUDset is used to dynamically mark the position of a drill/rivet hole inside an aircraft fuselage.

Boeing (Caudell & Mizell, 1992)





Other AR Systems (From Azuma 1997)

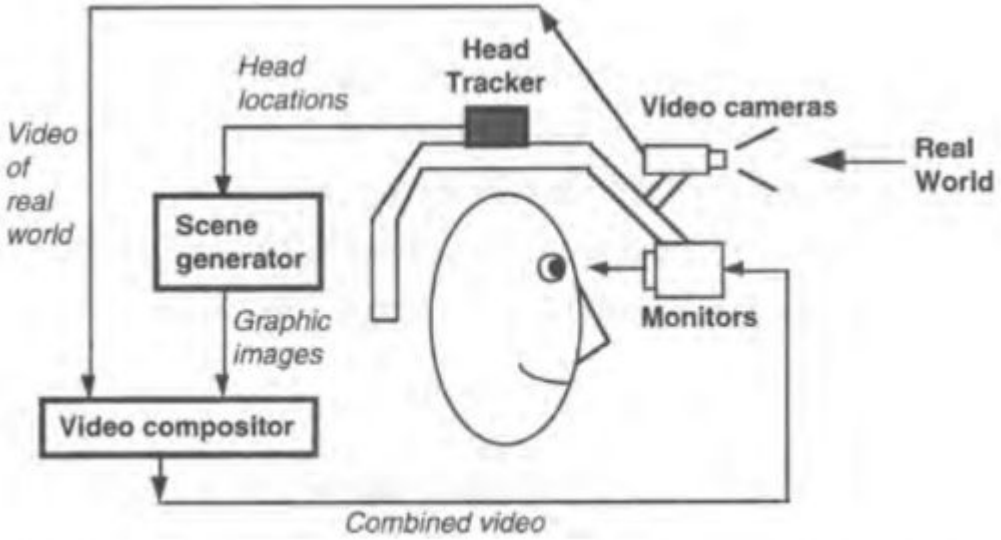


Figure 13. *Video see-through HMD conceptual diagram.*

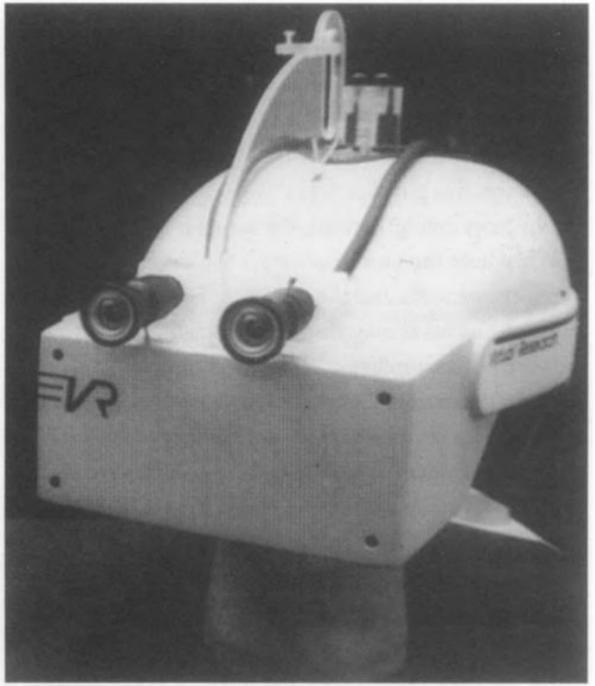


Figure 14. *An actual video see-through HMD. (Courtesy Jannick Rolland, Frank Biocca, and UNC Chapel Hill Dept. of Computer Science. Photo by Alex Tremi.)*

Other AR Systems (From Azuma 1997)

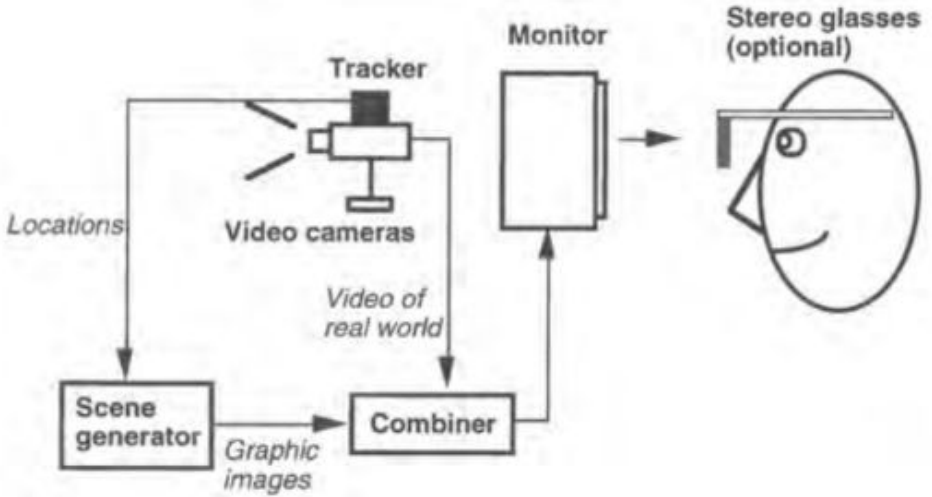
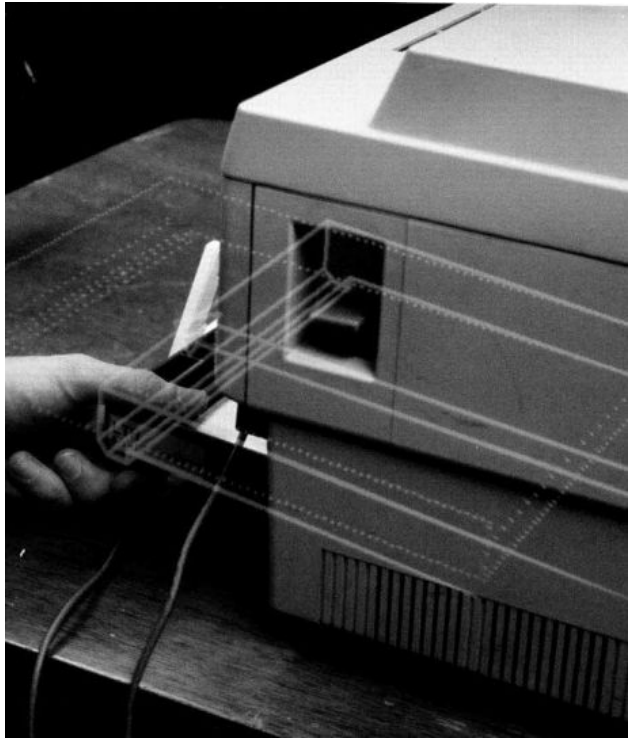


Figure 15. *Monitor-based AR conceptual diagram.*

Figure 16. *External view of the ARGOS system, an example of monitor-based AR. (Courtesy David Drascic and Paul Milgram, U Toronto.)*

Knowledge-based AR (Feiner et al., 1993)

Example: Printer Maintenance



https://youtu.be/eMWdgB6upeU

Accurate Registration (Azuma & Bishop, 1994)

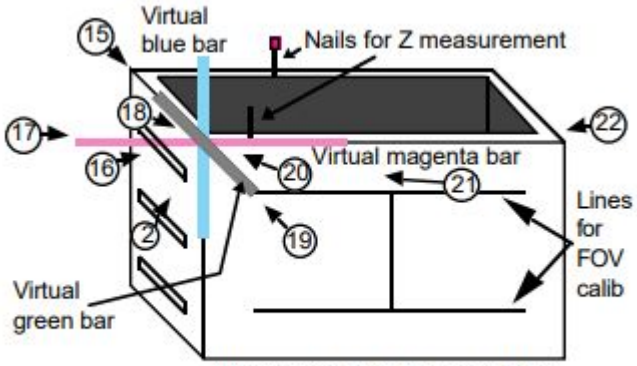


Figure 14: Wooden frame and static registration viewpoints


Figure 1: Wooden frame for calibration and registration

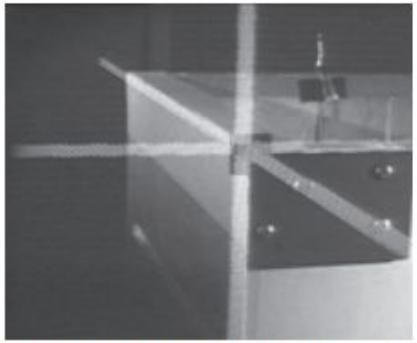


Figure 2: View seen in HMD, virtual axes on real frame

Room-sized Tracking (Wang, 1990)

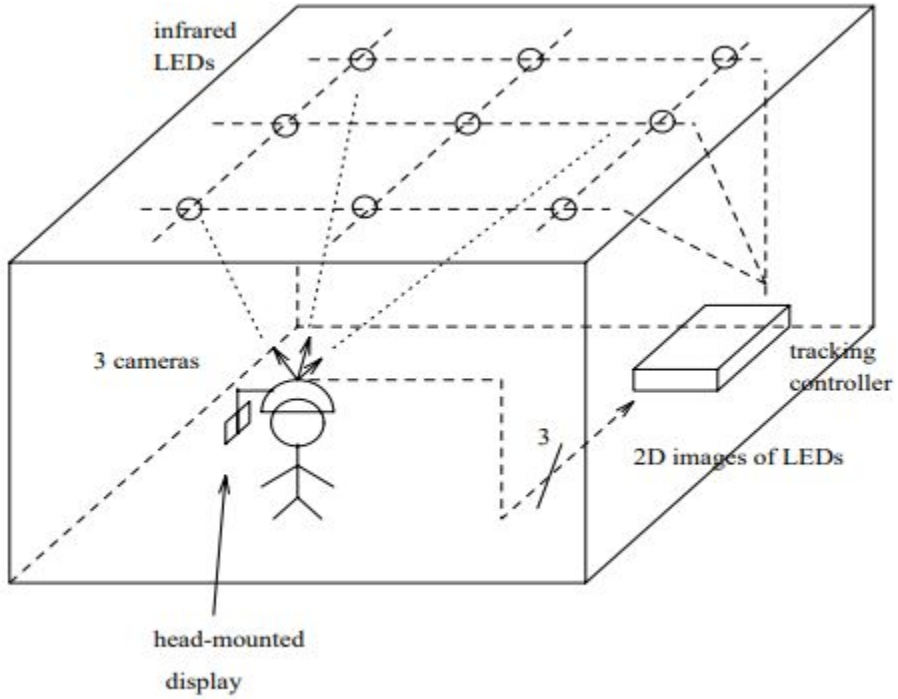
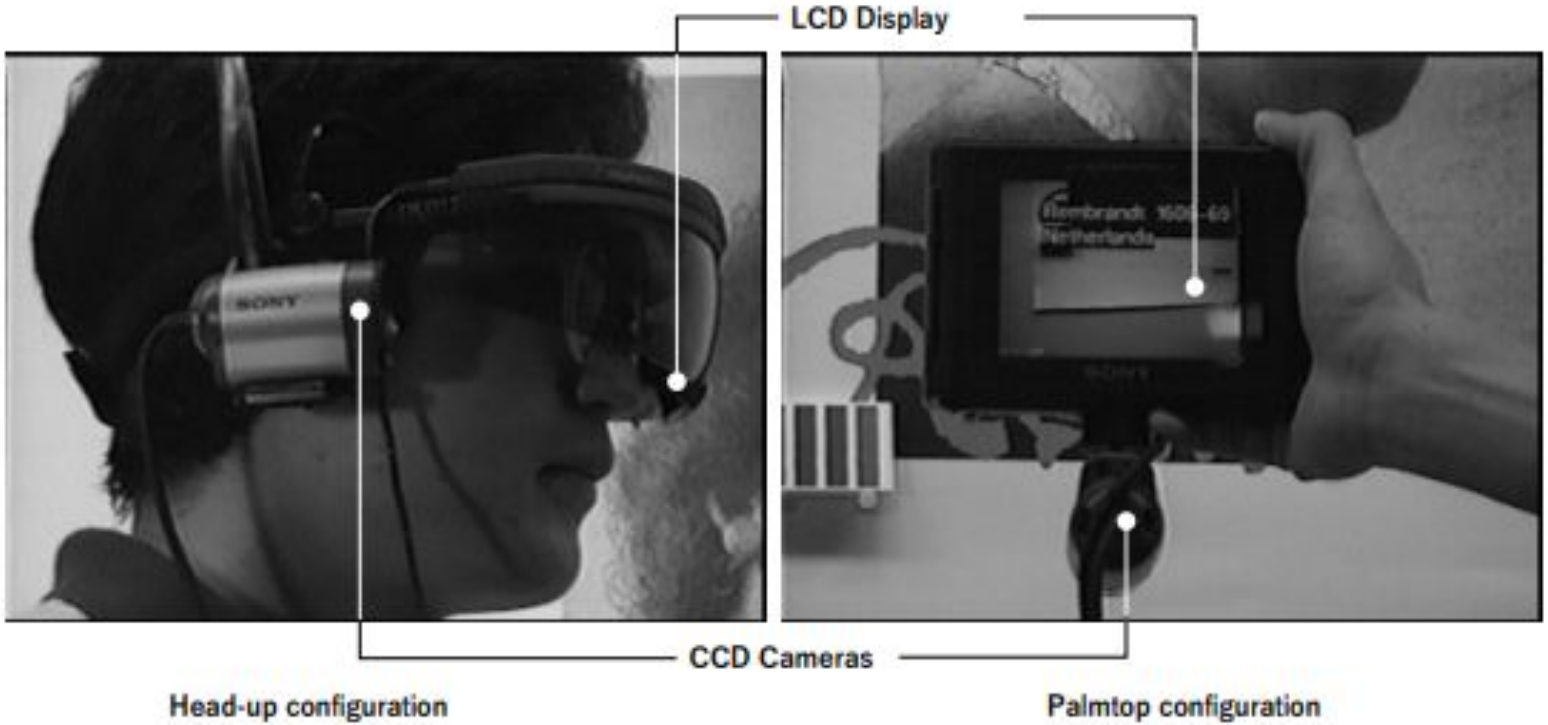


Figure 1: The inside-out tracking system

https://ronaldazuma.com/videos/CeilingTracker.webm

Sony (Rekimoto & Nagao, 1995)



Sony (Rekimoto & Nagao, 1995)

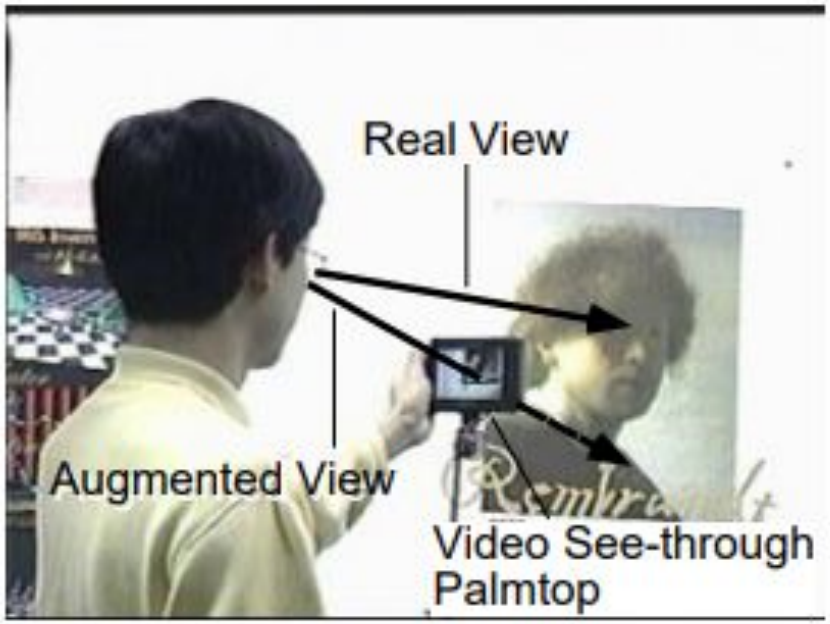


Figure 3: The magnifying glass metaphor

Figure 4: NaviCam generates information about Rembrandt

Sony (Rekimoto & Nagao, 1995)

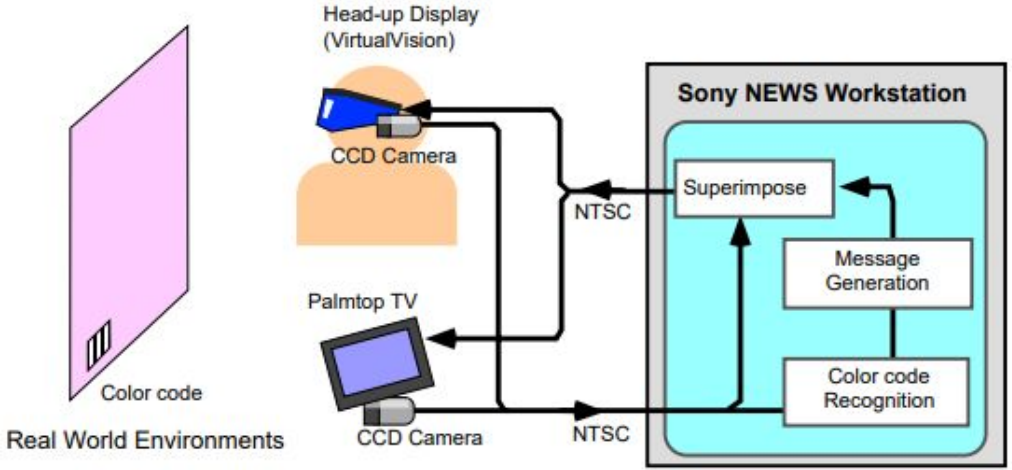


Figure 5: The system architecture of NaviCam

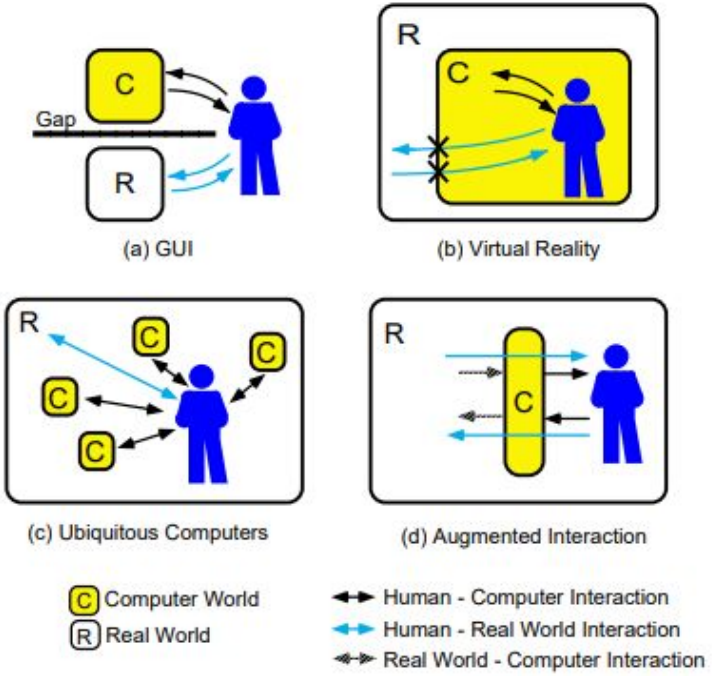
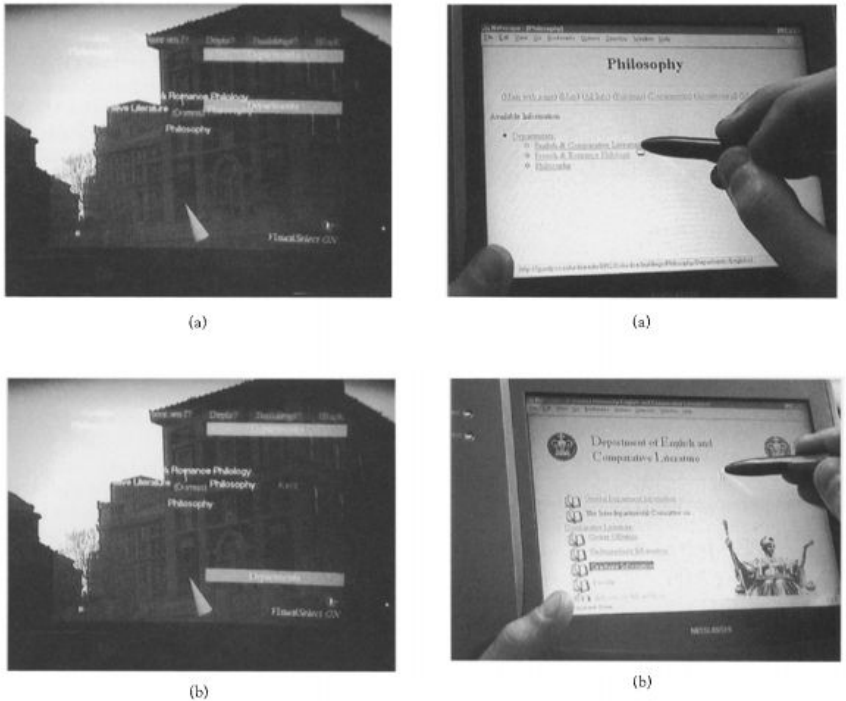


Figure 1: A comparison of HCI styles

Mobile AR (Feiner et al., 1997)

A Touring Machine (a desktop on your back)

Mobile AR (Feiner et al., 1997)



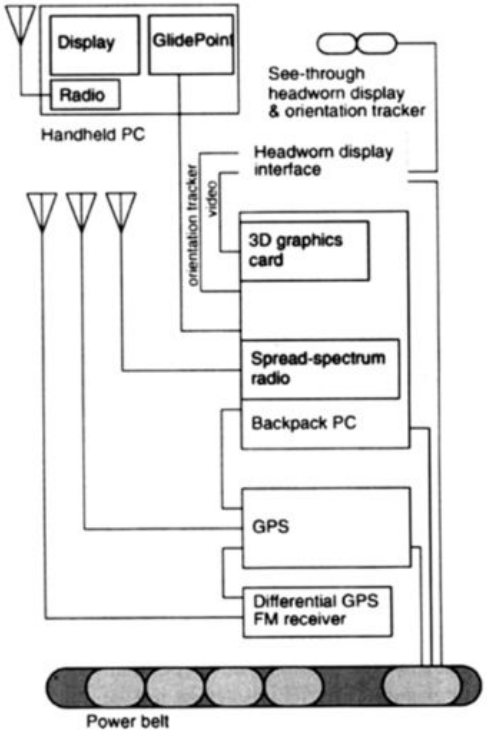


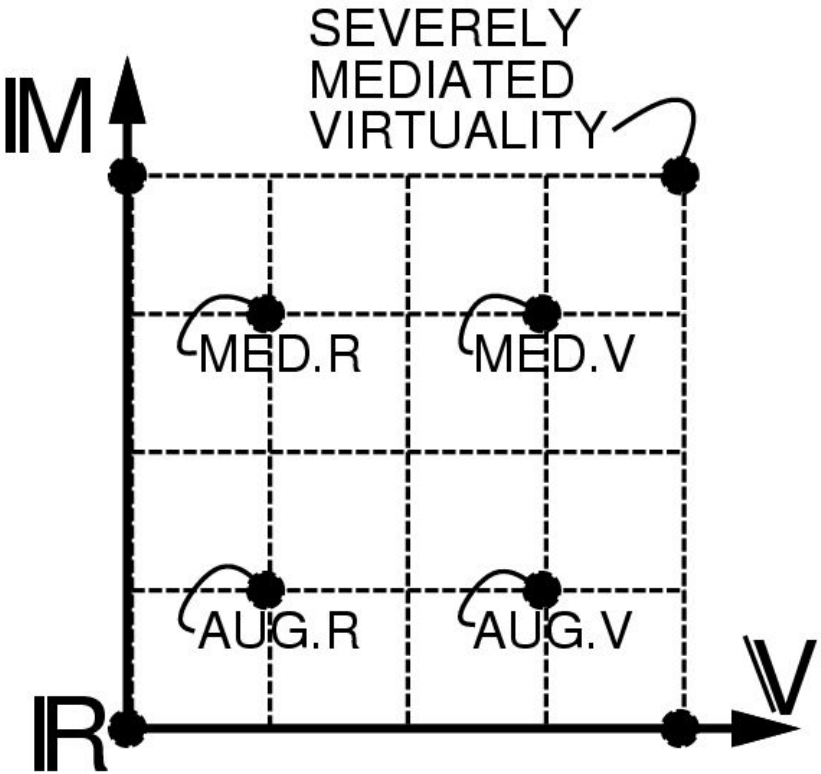
Fig. 6. Hardware design of our prototype campus information system.

Visionnaires at somewhere of MIT (circa 1997)

Figure 2: Different styles of wearable computing hardware.

Wearable Computer

Steve Mann

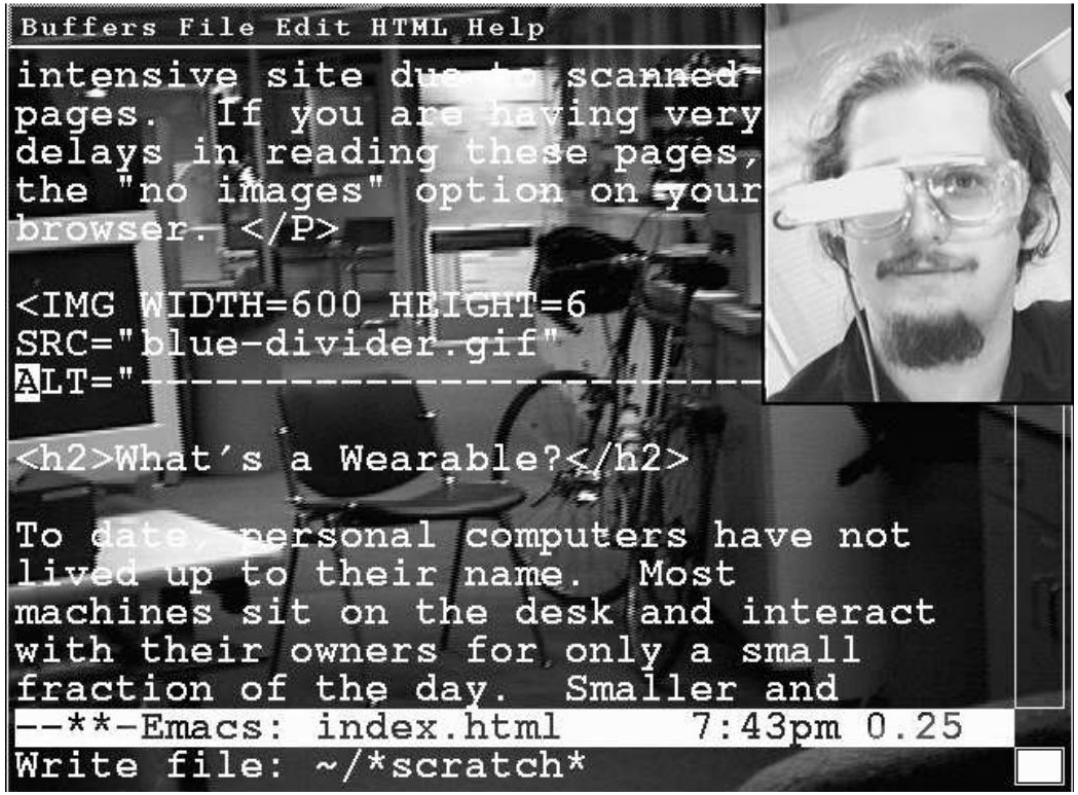


AR Headset as a Wearable Computer's Display

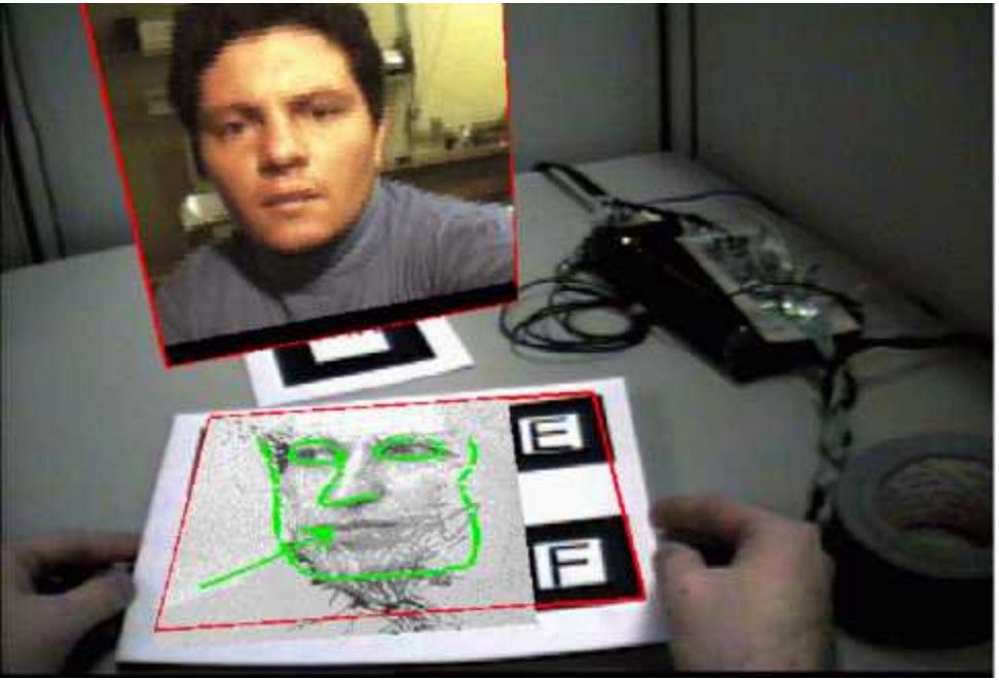
Thad Starner




AR Headset as a Wearable Computer's Display



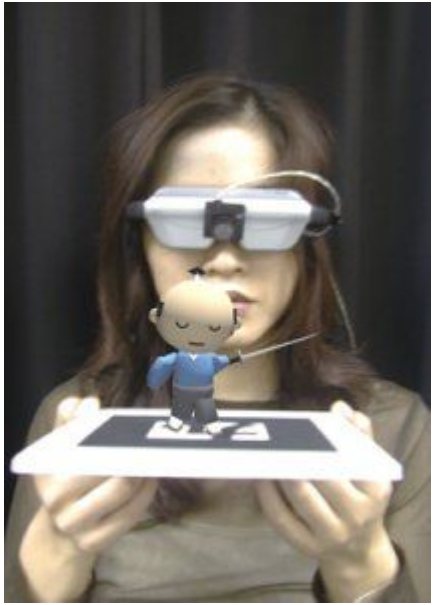
AR Conferencing (Kato & Billinghurst, 1999)



ARToolKit (1999)

A popular tracking library for AR applications.

Sold to Daqri in 2015, which stopped operating 2019, but still alive and the idea is living inside libraries, for example, OpenCV.



Magic Book (Billinghurst et al., 2001)

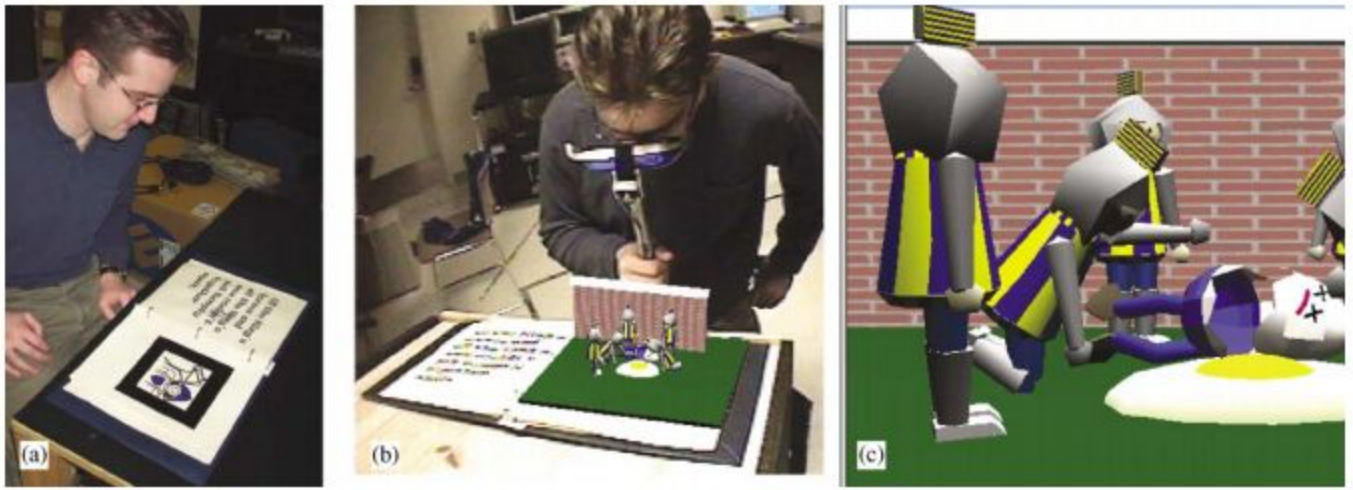


Fig. 3. Using the MagicBook to move between Reality and Virtual Reality.

Magic Book (Billinghurst et al., 2001)

Collaboration (Sharing)

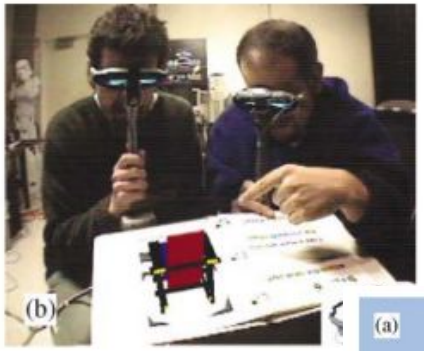


Fig. 4. (a) Collaboration in the real world, (b) Sharing an AR view.

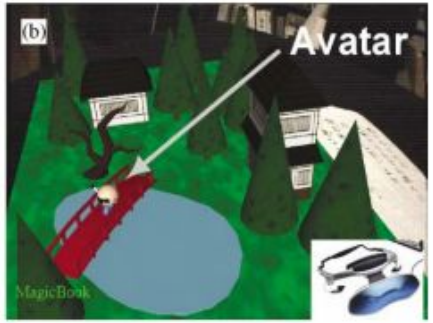


Fig. 5. Collaboration in the MagicBook.

SPAAM (Tuceryan et al., 2002)

The classic of calibration (registration) method.

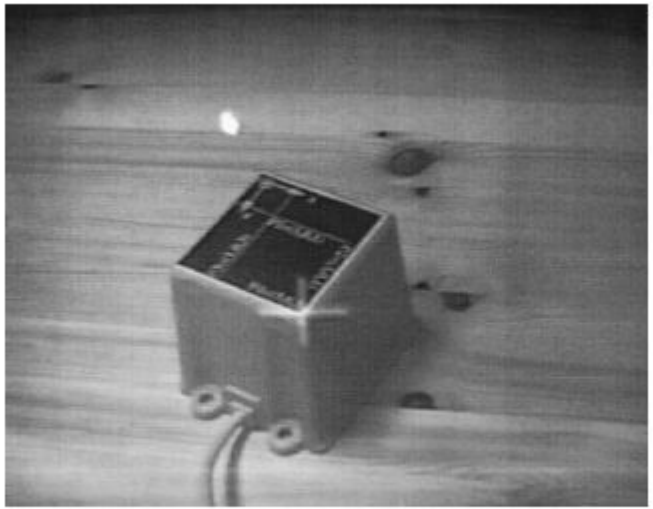


Figure 4. *The calibration procedure requires the user to align a cursor as shown here with a fixed point in the world.*

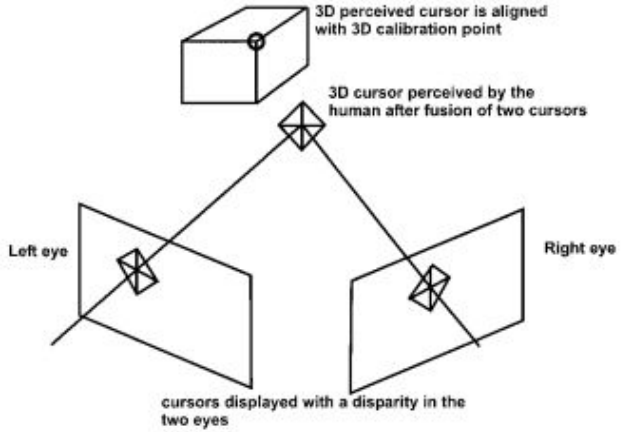


Figure 6. *The data collection by the user for calibrating the display is performed by the user moving his head until the perceived crosshair in 3D is colocated with the 3D calibration point.*

Summary

60s: The First Attempts

80s-Mid 90s: Development of Basic Functionalities

Mid 90s-: Introduction of Applications