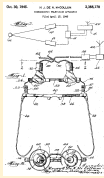


Some History and Fundamentals of Mobile, Wearable, Wireless AR and PHENOMENAugmented Reality. See also IEEE ISTAS2013, <http://wearcam.org/arvis.htm>

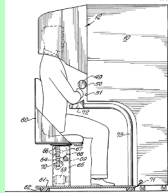
Surveillance / Military / Commercial "Big AR"

Precursor to wearable AR



1943, McCollum: Cathode ray tubes in a spectacle frame

1950s, '60s: Building-mounted AR (not portable; e.g., ceiling mounted):



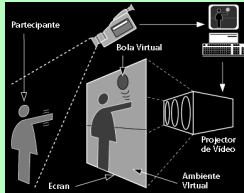
1955, Heilig: Sensorama



1961, Philco: HMD for remote video surveillance

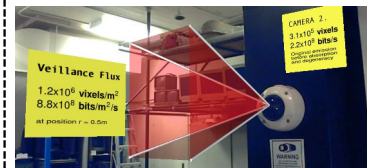
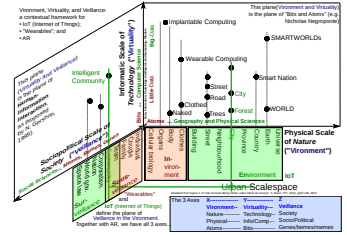
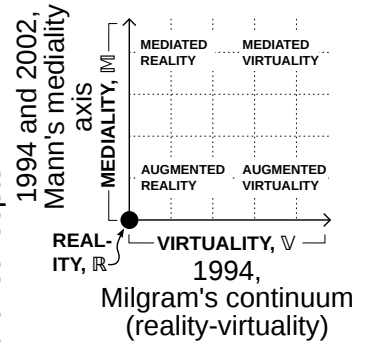


1968, Ivan Sutherland: "The Sword of Damocles"



1970s, M. Krueger: video projection system (non-portable, fixed to walls, etc.)

Fundamental principles and concepts



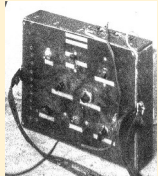
2013, Mann, Janzen, Michael: Wearables + IoT + AR: SMARTWORLD Alliance, IEEE ISTAS 2013

References:

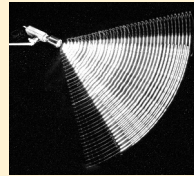
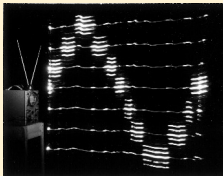
- [1] Sutherland, I. E. (1968). "A head-mounted three dimensional display". Proceedings of AFIPS '68, pp. 757-764
- [2] Campus Canada ISSN 0823-4531, p55 Feb-Mar 1985, pp58-59 Apr-May 1986, p72 Sep-Oct 1986
- [3] Impulse 12(2), October 1985, ISSN 03153694.
- [4] Milgram, P. et al. 1994. "Augmented Reality: A class of displays on the reality-virtuality continuum", SPIE Vol. 2351, Telemanipulator and Telepresence Technologies, pp282-292
- [5] S. Mann (1994), "Mediated Reality", MIT Tech. Report #260 <http://wearcam.org/mr.htm>
- [6] Mann (2002), "Mediated Reality with impl. for everyday life, Presence Connect, 2002 August 6
- [7] Lightspace: A New Language of Imaging", PHOTO Electronic Imaging, 1995, 38 (2), 14-16.
- [8] S. Mann, 1992, "Wavelets and Chirplets: Time-Frequency Perspectives, With Applications", Archibald & Petriu, Eds., in "Advances in Machine Vision, Strategies and Applications", World Scientific Series in Computer Science - Vol. 32".
- [9] Mann, S. (1996). "Wearable, tetherless computer-mediated reality: WearCam as a wearable face-recognizer..." American Association of Artificial Intelligence, 1996 Symposium. <http://wearcam.org/vmp/>
- [10] Feiner, et al. (1997). "A touring machine..." Personal Technologies, 1(4), 208-217.
- [11] Mann, S. (1997). Wearable computing: A first step toward personal imaging. IEEE Computer, 30(2), 25-32.
- [12] Thad Starner, Steve Mann, Bradley Rhodes... (1997), Augmented Reality Through Wearable Computing, Presence 6(4), 386-398.
- [13] Janzen and Mann (2014). "...Extransmissive formulation of sensing to measure surveillance..."
- [14] Mann, S., Janzen, R., Feiner, S., Hansen, J., Harner, S., Baldassi, S. & Ali, M. A. (2015). Wearable Computing, 3D Aug Reality, Photographic/Video-graphic: Gesture Sensing... TEI2015 (pp. 497-500). ACM. <http://wearcam.org/tei2015/>

"Superpowers to the People*" = Personal Empowerment = "Little AR"

1970s and 1980s, Mann: Mobile, Wearable Wireless Free-roaming AR: Wearable Computing, Wireless, Sensing, and Metasensing with light bulbs.



1974, Wearable Computer for PHENOMENAugmented Reality (lamp-based AR oscilloscope and physical phenomena visualizer sees TV and radio signals, etc.)



1981, HMD-based Wearable AR



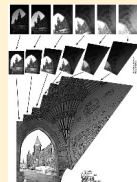
1985, Wearable AR as a visual art form: <http://wearcam.org/abaq/>

S.W.I.M. (Sequential Wave Imprinting Machine) <http://wearcam.org/swim/>

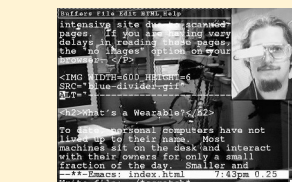
Wearable Computing goes to MIT and then goes mainstream:



1990s, Founding of MIT Wearable Computing Project [\[http://wearcam.org/nm.htm\]](http://wearcam.org/nm.htm)



1993: Invention of HDR+Projective+Image Stitching. ... VideoOrbits head-tracker... <http://wearcam.org/hdr.htm>



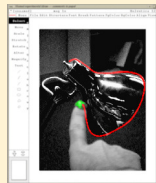
1993, Thad Starner's "Tin Lizzy" wearable computer [11]



1994-1996, Wearable Wireless Webcam: AR system worn every day nonstop for 2 years [10,11].



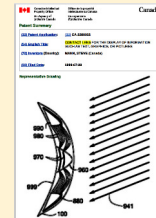
1996, Mann: Wearable face recognizer[8]



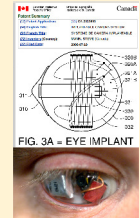
1997, Mann: Gesture-based wearable comp. 3D AR, "SixthSense"[10]



1997, Feiner et al.: Touring Machine[9]



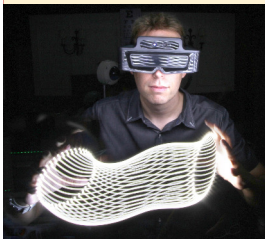
1999, Mann: Contact Lens Display



2000, Mann, Desjardins, and Spence: Implantable Camera for visually-impaired



2002, Dobbelle: Artificial Vision system



2013, Meta-glasses Future of AR: Jayse Hansen, Hollywood's #1 User Interface designer: Hunger Games, Ender's Game, Iron Man...



2010, Ori Inbar Co-Founds World's Largest AR Conference

*AWE2015: Augmented World Expo, 2015 June 8-10, Santa Clara, California