Wearable computer

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Wearable computers are computers that are worn on the body. They have been applied to areas such as behavioral modeling, health monitoring systems, information technologies and media development. Government organizations, military, and health professionals have all incorporated wearable computers into their daily operations. Wearable computers are especially useful for applications that require computational support while the user's hands, voice, eyes or attention are actively engaged with the physical environment.

One of the main features of a wearable computer is consistency. There is a constant interaction between the computer and user, ie. there is no need to turn the device on or off. Another feature is the ability to multi-task. It is not necessary to stop what you are doing to use the device; it is augmented into all other actions. These devices can be incorporated by the user to act like a prosthetic. It can therefore be an extension of the user’s mind and/or body.

Such devices look far different from the traditional cyborg image of wearable computers, but in fact these devices are becoming more powerful and more wearable all the time. The most extensive military program in the wearables arena is the US Army's Land Warrior system, which will eventually be merged into the Future Force Warrior system.

History

Broadly speaking, the first wearable computer could be as early as the 1500s with the invention of the pocket watch or even the 1200s with the invention of eyeglasses.

The first device that would fit the modern-day image of a wearable computer was constructed in 1961 by the mathematician Edward O. Thorp, better known as the inventor of the theory of card-counting for blackjack, and Claude E. Shannon, who is best known as "the father of information theory." The system was a concealed cigarette-pack sized analog computer designed to predict roulette wheels. A data-taker would use microswitches hidden in his shoes to indicate the speed of the roulette wheel, and the computer would indicate an octant to bet on by sending musical tones via radio to a miniature speaker hidden in a collaborator's ear canal. The system was successfully tested in Las Vegas in June 1961, but hardware issues with the speaker wires prevented them from using it beyond their test runs. Their wearable was kept secret until it was first mentioned in Thorp's book Beat the Dealer (revised ed.) in 1966 and later published in detail in 1969. The 1970s saw rise to similar roulette-prediction wearable computers using next-generation technology, in particular a group known as Eudaemonic Enterprises.
that used a CMOS 6502 microprocessor with 5K RAM to create a shoe-computer with inductive radio communications between a data-taker and better (Bass 1985).

In 1967, Hubert Upton developed an analogue wearable computer that included an eyeglass-mounted display to aid lip reading. Using high and low-pass filters, the system would determine if a spoken phoneme was a fricative, stop consonant, voiced-fricative, voiced stop consonant, or simply voiced. An LED mounted on ordinary eyeglasses illuminated to indicate the phoneme type.

The 1980s saw the rise of more general-purpose wearable computers. In 1981 Steve Mann designed and built a backpack-mounted 6502-based computer to control flash-bulbs, cameras and other photographic systems. Mann went on to be an early and active researcher in the wearables field, especially known for his 1994 creation of the Wearable Wireless Webcam (Mann 1997). In 1989 Reflection Technology marketed the Private Eye head-mounted display, which scanned a vertical array of LEDs across the visual field using a vibrating mirror. 1993 also saw Columbia University's augmented-reality system known as KARMA: Knowledge-based Augmented Reality for Maintenance Assistance. Users would wear a Private Eye display over one eye, giving an overlay effect when the real world was viewed with both eyes open. KARMA would overlay wireframe schematics and maintenance instructions on top of whatever was being repaired. For example, graphical wireframes on top of a laser printer would explain how to change the paper tray. The system used sensors attached to objects in the physical world to determine their locations, and the entire system ran tethered from a desktop computer (Feiner 1993).

**Commercial viability**

The commercialization of general-purpose wearable computers, as led by companies such as Xybernaut, CDI and ViA Inc, has thus far met with limited success. Publicly-traded Xybernaut tried forging alliances with companies such as IBM and Sony in order to make wearable computing widely available, but in 2005 their stock was delisted and the company filed for Chapter 11 bankruptcy protection amid financial scandal and federal investigation. Xybernaut emerged from bankruptcy protection in January, 2007. In 1998 Seiko marketed the Ruputer, a computer in a (fairly large) wristwatch, to mediocre returns. In 2001 IBM developed and publicly displayed two prototypes for a wristwatch computer running Linux, but the product never came to market. In 2002 Fossil, Inc. announced the Fossil Wrist PDA, which ran the Palm OS. Its release date was set for summer of 2003, but was delayed several times and was finally made available on January 5, 2005.

Evidence of the allure of the wearable computer and the weak market acceptance is evident with market leading Panasonic Computer Solutions Company's failed product in this market. Panasonic has specialized in mobile computing with their Toughbook line for over 10 years and has extensive market research into the field of portable, wearable computing products In 2002, Panasonic introduced a wearable brick computer coupled with a handheld or armworn touchscreen. The brick would communicate wirelessly to the screen, and concurrently the brick would communicate wirelessly out to the internet or other networks. The wearable brick was quietly pulled from the market in 2005, while the screen evolved to a thin client touchscreen used with a handstrap.

**In fiction**

- One of the most well known instances of wearable computers in fiction is that of James Bond, usually - but not only - in the form of a watch.
In Neal Stephenson's cyberpunk novel Snow Crash, a minority of people known as "gargoyles" wear computers for information gathering.

In the manga and anime Dragon Ball series, the Scouter is a Head-mounted display worn over one eye to determine the relative strength of combatants.

In the 2004 Robin Williams film The Final Cut an implant called a 'Zoe' chip was placed into new-born infants so that their entire lives would be recorded and could be replayed after their death.

The 2006 Vernor Vinge novel Rainbows End deals with a near-future society in which wearable computing has reached a level whereby individuals who "wear" are at all times fully integrated into both the "real" world and the Internet, and in which users may customise their experience of the world, seeing and hearing and feeling what they choose to.

Cookie from Ned's Declassified has one. The screen is in his glasses, the mouse in his hand, and a printer in his back pocket.

In the movie The Tuxedo Jackie Chan is using a state-of-the-art spy suit with an advanced wearable computer and electronics.

In the movie "Resident: Evil," the computer techie wore one on his arm.

In the animated television series Futurama, the captain of the ship, Leela, wears a computer on her wrist.

In the video game series Splinter Cell, the main character Sam Fisher has almost always used a wrist computer called an OPSAT on his wrist.

In the anime series Dennou Coil, the main characters live in a city prevalent with Augmented Reality, and wear glasses that function as computers.

See also

calculator watch
EyeTap
Head-mounted display
Head-up display
Laptop
Personal digital assistant
Tablet PC
Virtual retinal display
Pocket computer
OQO

References

Andre F. Marion, Edward A. Heinsen, Robert Chin, and Bennie E. Helmso, wrist instrument

- The Winnebiko II and Maggie
- J. Peter Bade, G.Q. Maguire Jr., and David F. Bantz, The IBM/Columbia Student Electronic Notebook Project, IBM, T. J. Watson Research Lab., Yorktown Heights, NY, 29 June 1990. (The work was first shown at the DARPA Workshop on Personal Computer Systems, Washington, D.C., 18 January 1990.)

[1]
Lizzy: MIT's Wearable Computer Design 2.0.5
- Steve Feiner, Bruce MacIntyre, and Doree Seligmann, "Knowledge-based augmented reality," in Communications of the ACM, 36(7), July 1993, 52-62. See also the KARMA webpage.

External links

- ETH Zurich, Switzerland - Wearable Computing Lab
- University of South Australia Wearable Computer Lab
- UCLA Embedded Reconfigurable Systems Research Lab (ERLAB)
- Eyetap Personal Imaging (ePI) Lab
- Eleksen Plc:- World leader in smart fabrics
- Georgia Tech College of Computing wearables group
- MIT Media Lab wearables group
- CMU wearables group
- Andy Felong's wearable computing resource
- Artificial Intelligence in Wearable Computing (Special Issue in IEEE Intelligent Systems)
- Eyetap Wearable Computing Webpage
- The theory of Humanistic Intelligence
- Visual Memory Prosthetic (Wearable Face Recognizer)
- Wearable Face Recognizer web link
- Wearable Computing for the Blind (cross-modal vision)
- IEEE International Symposium on Wearable Computers (Academic Conference)
- TransVision 2004
- Continuous Archival and Retrieval of Personal Experiences.
- International Workshop on Inverse Surveillance.
- WearIT@work: a large European research project on wearable computing at work.
- Project iWear: a project developing a framework to enhance wearable development
- IBM Almaden Research Center's half-keyboard belt computer
A brief history of wearable computing
The Tummy PC: A Practical Wearable Computer
ZYPAD: The Latest Wearable Computer
ZYPAD: Video Demo on YouTube
ZYPAD: Video Demo on Google Video
ZYPAD: Video Demo on Yahoo Video


Categories: Articles to be merged | Multimodal interaction | Toughbook | Mobile computer | Laptops | PDAs | Mobile | Wireless

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