Wearable Computers

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Wearable Computers

- 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.
- 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.
- Areas of study include user interface design, augmented reality, pattern recognition, use of wearables for specific applications or disabilities, electronic textiles and fashion design.
Wearable Computers

• A wearable computer is a computer that is subsumed into the personal space of the user, controlled by the user, and has both operational and interactional constancy, i.e. is always on and always accessible.
• It is a device that is always with the user, and into which the user can always enter commands and execute a set of such entered commands, and in which the user can do so while walking around or doing other activities.
• The wearable computer is more than just a wristwatch or regular eyeglasses: it has the full functionality of a computer system but in addition to being a fully featured computer, it is also inextricably intertwined with the wearer.
Wearable Computers

• This is what sets the wearable computer apart from other wearable devices such as wristwatches, regular eyeglasses, wearable radios.
• Unlike these other wearable devices that are not programmable, the wearable computer is as reconfigurable as the familiar desktop or mainframe computer.
• There are three operational modes in this new interaction between human and computer:
Wearable Computers

1. Constancy: The computer runs continuously, and is 'always ready' to interact with the user. Unlike a hand-held device, laptop computer, or PDA, it does not need to be opened up and turned on prior to use.

2. Augmentation: Traditional computing paradigms are based on the notion that computing is the primary task. Wearable computing, however, is based on the notion that computing is NOT the primary task. The assumption of wearable computing is that the user will be doing something else at the same time as doing the computing. Thus the computer should serve to augment the intellect, or augment the senses.

3. Mediation: Unlike hand held devices, laptop computers, and PDAs, the wearable computer can encapsulate it doesn't necessarily need to completely enclose us, but the concept allows for a greater degree of encapsulation than traditional portable computers.
Wearable Computers

• The six attributes of wearable computers:
  1. Unmonopolizing of the user's attention
  2. Unrestrictive to the user
  3. Observable by the user
  4. Controllable by the user
  5. Attentive to the environment
  6. Communicative to others
Advantages of Wearable Computers

- Enhanced communication
- Wearable computers can be used to recognise a person in a high alerted area such as an airport.
- A personal wearable computer will facilitate the wearers needs
- Unlikely to be dropped or lost as they are embedded to the clothes as opposed to the handheld devices.
- Able to use wearable computers to complete daily tasks such as a computer which tracks the movements and habits of a person.
- Flexibility
- Freedom
Advantages of Wearable Computers

- Work from anywhere
- Convenience
- Surgeons can allow data to be transferred to their wearable computers, saving time where the surgeons can look up information helping to improve the efficiency of an operation.
History - Thorp and Shannon

• Professor Edward O. Thorp and Claude Shannon, father of Info Theory worked on it 1955-1962
• A computer to help predict the outcome of roulette wheel spins.
• Utilized timers in order to predict where the ball would fall on the roulette
• Consisted of:
  o Computer with 12 transistors, size of a pack of cigarettes
  o Microswitches in the users shoes
  o Computer transmitted musical tones to an ear piece
History - Steve Mann

- 1981 [Steve Mann](#) designed and built a backpack-mounted 6502-based computer to control flash-bulbs, cameras and other photographic systems.
- "Predecessors like the wristwatch, the shoe-based gambling timers, etc., were used for computation of specific tasks, whereas Mann's invention was a general-purpose field programmable computer inserted into the visual reality stream of all day-to-day tasks."
History - 90s to Today

- Early 90s brought the utilization of overlay displays
- In 1993 the University of Columbia created KARMA: Knowledge-based Augmented Reality
  - A display over one eye would result in an overlay effect when looking through both eyes
  - The system would overlay schematics and instructions over whatever object the user was working with.
- "In October 1997, Carnegie Mellon University, MIT, and Georgia Tech co-hosted the IEEE International Symposium on Wearables Computers (IWSC) in Cambridge, Massachusetts."
US Army's Land Warrior
Land Warrior Breakdown

- A. Eye piece display
  - Friendly Positions
  - Maps
  - Mission data
- B&C. Mic and Earphones
- D. Input device that acts as a mouse.
- E. Laser range finder to send data about targets to others
- F. Thermal Sight for night vision
- G. Video Camera
  - Send pics and clips
  - Shoot around corners
Sixth Sense
Hardware

- Web cam, a 3M pico projector and a mirror, all connected wirelessly to a Bluetooth smart phone in his pocket. Which only comes out to be $350!!!
Sixth Sense

- Pranav Mistry is the genius behind Sixth Sense
- is a PhD student in the Fluid Interfaces Group at MIT's Media Lab. Before his studies at MIT, he worked with Microsoft as a UX researcher. Mistry is passionate about integrating the digital informational experience with our real-world interactions.
Capabilities

• You hold up your left hand, fingers pointing to the right. The system recognizes that you want to make a call, and projects a dialing pad onto your fingers. You tap the virtual keypad with your right hand to dial the call.
Capabilities - Wear Ur World (WUW)

WUW Video Demo
Metaio
Metaio AR

- Augmented Reality (AR) describes the fusion of 3D and real-life imagery, achieved via the use of modern image-processing technology.
- Developed as a modular, comprehensive technology platform, Unifeye makes it possible for users in many different fields to realize their innovative Augmented Reality applications.
- Since it is based on established software and hardware technologies, the result is a portfolio of innovative products for both commercial and industrial customers.
How it works

• The software utilizes special made 2d prints in order to track where the virtualization where begin
• 2d prints are the optimal choice due to their generous error correcting built into the images
• Since the software has the image preloaded in, once it is found in the image provided by the camera it can extrapolate in real time the size, angle, and location the virtualization should occur in order to look natural in the photo
Current Limitations

• Currently the software does support the ability to use real time video streams in order to produce augmented reality
• However there exists hardware limitations of the devices that we currently carry around with us
• For example many phones will not allow the external camera feed to be manipulated in real time
• Post processing can occur however
Future of metaio

• Interactive Advertisements
• True 3d print media
• 3d visualizations
Sources