Privacy and Social Consequences of Wearable Computing

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Social Influences on Tracking Accuracy

- Strength in numbers. . .
- Collaborative tracking
  - Release personal info to help others (e.g., own hand position)
  - Release info about other user’s hand (to help her if obscured from her tracker)
Social Influences on Tracking Accuracy

- Even with “perfect” tracking, need to know vs. need to let know will influence accuracy, precision, update rate, . . .
  - Transmitting — Filter based on recipient
  - Receiving — Filter based on transmitter

Appearance and Comfort

- “Location, location, location”
  - Three most important factors in real estate?
- “Registration, registration, registration”
  - Three most important factors in AR?
- Many useful AR apps require no registration and trivial sfw, yet don’t exist yet!
  - clock
  - caller ID
  - notes
Appearance and Comfort

It’s the display, stupid!

Appearance and Comfort

- Head-mounted display worn

MicroOptical
**Mobility Breeds Collaboration**

- Computational interaction should be as easy as social interaction
- How many CS professors does it take to connect two laptops...  
  - with ethernet?
  - with IR?
- Overload current human–human interaction to initiate computational interaction

**Integration with Other Devices**

- User’s head-worn display coexists with
  - *user’s other* displays/devices
  - *other users’* displays/devices
  - *stationary* displays/devices
Hybrid User Interfaces

- Combine technologies to create hybrid UI that benefits from best of all
  - 2D 3D
  - opaque see-through
  - held worn
  - large small
  - stationary mobile
  - permanent temporary

Implications for Personal Privacy

- User tracks world (wearable computing) vs. world tracks user (smart environment)
- Does this solve the problem?
  - No: “vs.” will really be “and”
    - Parts of the world will track the user precisely because some users won’t release their information and others will profit from providing it
Implications for Personal Privacy

Wearable cameras/mics

- tracking
- recording personal experience
- context-sensitive UIs
- small/inexpensive

+ Wearable storage/wireless networking
  - high capacity/throughput

= Potential for violating privacy

Implications for Personal Privacy

- Current approach to cyborg privacy violation:
  "Just say no."

- But what happens when everyone can capture, record, and transmit?
Implications for Personal Privacy

- “Safety net” (Mann)
  - Groups of users “watch out” for their members, coming to their aid if needed
  - Users
    - “watch the watchers”
    - keep an eye on Big Brother

- Organization X pays users for real-time access to their experiences
- Users can control access
  - Expurgate interactions at home/work, with close friends, . . .
  - Feel their privacy is preserved
Implications for Personal Privacy

- Organization X reconstructs for a buyer any person’s activities
  - harvests isolated time/space-stamped bits of interaction overheard/seen in passing by others
  - assembles bits to recreate significant/useful portions using massively parallel multimedia processing
- Price paid to free agent users based on
  - user’s proximity to events/people of interest

Implications for Personal Privacy

- User’s wearable agents handle bidding with competing organizations if user isn’t under contract
- Subject of surveillance may buy others’ silence, but many may already be under contract
- Information gatherers not shady underworld infobrokers, but “just plain folks”
Implications for Personal Privacy

- Not misappropriation of user’s video/audio likeness
- Low-tech private-eye version happens now, but . . .
  - expensive, requires serious human effort
- High-tech net version happens now, but . . .
  - limited to info in databases
  - may even have subject’s consent (freepc.com)

What will keep this from happening?
Conclusions

- Social influences on tracking accuracy
- Appearance and comfort
- Mobility breeds collaboration
- Integration with other devices
- Implications for personal privacy