

# Vorlesung

## Advanced Topics in HCI

### (Mensch-Maschine-Interaktion 2)

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<http://www.medien.informatik.uni-muenchen.de/>

- User Interfaces for Ubiquitous Computing

# How do we interact with mobile and ubiquitous systems?



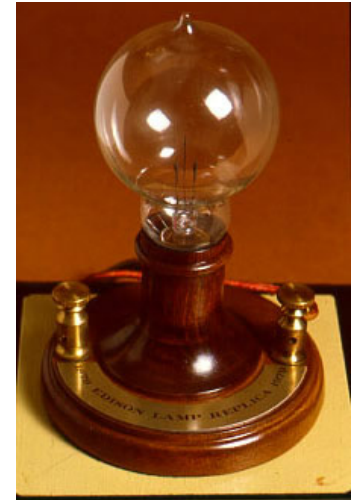
Write on paper → capture on photo → send as MMS

# First some trends...

# Trends (1)

## mobile communication is ubiquitous

- Terminals for mobile communication have advanced significantly over recent years
- **Infrastructure is ubiquitously deployed**
- Interesting developments happen beyond the classical handsets (when thinking of electricity it is not the advances in light bulbs that changed the world)
  
- How many handset will a user have 10 years?  
→ a guess 2-6 (some mobile phones, car phone, ...)
- How many communicating appliances and devices will users have in 10-20 years?  
→ a guess 20+ (security system, TV, front door, dog collar, wrist watch, camera, headset, coffee machine, alarm clock...)



# Trends (2)

## mechanical and electro-mechanical systems will be computer controlled

- Mechanical and electro-mechanical systems become computer controlled.
- User interfaces for mechanical and electro-mechanical systems have a tradition of being tangible.
- Many **design restrictions** due to mechanics **are gone** – novel interfaces (for the better or the worse) are possible and emerge.
- **Sensing of actions and reactions from users becomes an interface option.**
- Examples: automotive, industrial machinery, tools, buildings.



# Trends (3)

## declining willingness for training

- An average person acts today as driver, telephonist, photographer, film-maker, and type setter without much training (many task with just one device – the phone).
- In a fast paced job market training to operate a system is a significant obstacle (and cost factor) for the introduction of new systems.
- Dangerous actions should be prohibited in the first place by the controls available in the user interface.
- User interfaces that have **clear affordances** and draw on the **prior knowledge** of potential users (“intuitive UIs” and “natural interaction”) reduce the need for leaning

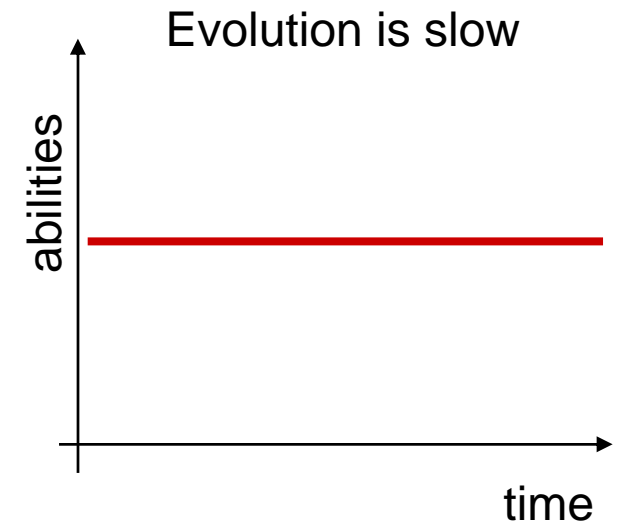


# Trends (4)

## user's abilities



- Abilities of un-augmented users in general do not change a lot over time, e.g.
  - ability to cope with cognitive load
  - willingness to cope with stress
  - time one can concentrate on a particular problem
- Abilities between individual users vary a lot
  - long term, e.g. physical and intellectual abilities
  - short term, e.g. effect of stress or fatigue
- Abilities of one individual users changes over time (e.g. getting old)



**Human in the loop**  
Interactive systems for “augmenting the human intellect” as alternative to automation.



# Trends (5)

## technology becomes widely available

- Technologies that may be today “specialist devices” become common in a *few* years
- Technologies that are shared now may become personal technologies
- Technologies that are expensive at one point are not even considered as additional cost in the future, e.g.
  - Video camera connected to a computer
  - Biometric authentication
  - Book printing on demand
  - Eye gaze tracking
  - 3D scanning and printing
  - Integrated production systems



# Trends (6)

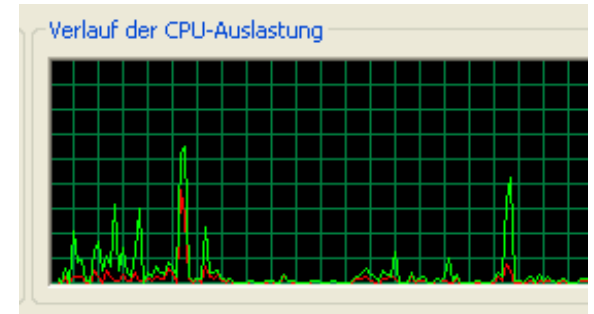
## appliance computing

- Post-PC area
  - Specific tools that are designed to support a specific task
  - Not a all-round tool
  - Different tools for different tasks
- “[...] *the primary motivation behind the information appliance is clear: simplicity. Design the tool to fit the task so well that the tool becomes part of the task, ...*”  
(Don Norman)
- Context and adaptation to the real world is an option to overcome the multi-device dilemma



# Trends (7)

## computing, storage and communication are not the limit



- For personal computing there are few technical limitations
- Processing power is available
  - Already now desktop machines run with minimal processing power
- Massive amounts of storage are readily available
  - Phones with 4GB disk
  - Record everything you ever said on a hard drive
  - Have all movies ever produced in a single device
- Bandwidth (wireless and wired) is huge
  - While you tie your shoe laces you can cache all the latest 20 different news papers
  - While you wait for the bus you can transfer a complete movie



# User interfaces and interaction for networked devices that are embedded into the users' lives.

- Anytime and everywhere
- Design restrictions are gone
- Sensing and actuators are part of the UI
- Must be obvious to use (affordances)
- Current cost of technology is not an issue

**The interface between the user and the machine is most critical to create effective and efficient systems**

# Advanced Topics in HCI

- many topics are still not covered in detail
- The following videos are to from conferences an report on current research in the area of new user interfaces in the field of ubiquitous an pervasive computing

# User Interfaces Beyond the Desktop

- Roomware (Video 7:06)  
<http://www.ipso.fraunhofer.de/ambiente/english/projekte/projekte/roomware.html>
- MetaDesk (Video 3:43)  
<http://www.zib.de/ullmer/videos/metaDESK/>
- MediaBlocks (2 Videos 4:45)  
<http://www.zib.de/ullmer/videos/DataTiles/index.html>
- Attentive Office Cubicles: Mediating Visual and Auditory Interactions Between Office Co-Workers (Video 1:58)  
Aadil Mamuji et al. Ubicomp 2004 Video Proceedings