



Unconventional User Interaction

User Interfaces in a Pervasive Computing World

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Introduction – 8.10.2007

- Motivation
 - Design for creative use
 - What is User Interface Engineering
 - Technology trends
- Examples
 - LumiTouch
 - Bed as communication media
 - You are in control
- Design Space for Interactive Systems

- Exercise – Concept Video



Is it difficult to create user interfaces?



User Interface Engineering

- User centered design process?
- Focusing on user needs?
- Intuitive user interfaces?
- Straight forward to do?

Creative users (1) designed for user's needs?



Write on paper → capture on photo → send as MMS

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Creative users (2) designed for user's needs?

DECEMBER 11, 2006

BRITISH INTELLIGENCE BOMB TALIBAN WITH SMS IN PSYCHOLOGICAL WARFARE



According to an article in [The Sun](#), SMS - instead of leaflets falling from the sky - are being used in psychological warfare by the British in Afghanistan - a concept used by military institutions throughout history. [via [SMS Text News](#)]

"Taliban fighters in Afghanistan are being bombarded by a devastating new British weapon — the text message.

"Intelligence chiefs find out the numbers of the enemy's mobile phones then send them waves of messages to confuse them and destroy morale.

Texts range from simple abuse such as "We know who you are, give up" or "Go home, you'll never beat us". Others are disguised as messages from comrades to spread duff information.

The text attacks are carried out by the [15 \(UK\) Psychological Operations Group](#), based at the Intelligence Corps' HQ in

<http://www.textually.org>

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Creative users (3) designed for user's needs?

MAINE CONSIDERS RESTRICTIONS ON TEXT MESSAGING BETWEEN LAWMAKERS AND LOBBYISTS



Maine is taking steps to ban text messages and e-mails to lawmakers in session as it becomes the latest state to address the ever-expanding use of electronic communications in statehouses. [USA Today](#) reports.

"Maine's proposed House of Representatives rule seeks to prevent abuse of "secret, instant communications" by lobbyists who closely monitor actions by legislators in session, said the sponsor, state Rep. [Herbert Adams](#). Maine's proposed rule is one of farthest-reaching in the country, he said.

"It's an effort to deal with a serious problem that will only get worse if it's not dealt with now," said Adams, a Democrat. "

More than 30 states have in some fashion restricted the use of electronic devices, such as pagers, cellphones and desktop printers in legislatures. Some states are concerned about possible ethical implications of such private, instant communication, while others are

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User Interface Engineering

- ❑ User centered design process?
- ❑ **Focusing on user needs?**
- ❑ Intuitive user interfaces?
- ❑ Straight forward to do?

Not the whole story!

- ❑ Developing new technologies with a focus on human use
- ❑ Evaluating these developments with people
- ❑ **Allowing technology to drive innovation**
- ❑ Situating new technologies in the context of use

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User Interfaces in a Pervasive Computing World

What is the difference?

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

- ▣ 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.



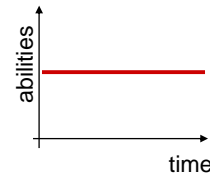
trends (3) declining willingness for training

- ▣ 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.
- ▣ Draw on the prior knowledge of potential users ("intuitive UIs" and "natural interaction") and 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.

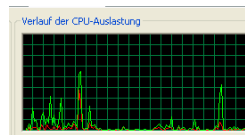
trends (5) appliance computing

- 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 (6) computing, storage and communication bandwidth are not the limit

- Traditional technical limitations appear
- 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



trends (7) 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 (8) functionality is non-discriminative

- ▣ Features and functionality is similar between products
- ▣ Quality of the functional aspects vary little (e.g. same decoder chip, same display-panel)
- ▣ Design, experience, user interface become important factors to have a different product

trends (9) The process is key

- ▣ Advancing technology is not sufficient
- ▣ Innovation happens when entire processes are considered



trends (10) education changes

- ▣ Values in education change
- ▣ Experiences people have are changing
- ▣ Learning and training is not a constant



What has this to do with human computer interaction?

Interaction is key

- Anytime and everywhere
- Design restrictions are gone
- Sensing and actuators are part of the UI
- Must be obvious to use (affordances)
- Processing, storage and communication without limits
- Current cost of technology is not an issue
- The overall process is crucial
- Acquired knowledge is the basis

The interface between the user and the machine or the information is most critical to create pleasant, effective and efficient systems

Examples: Communication Appliances (1)

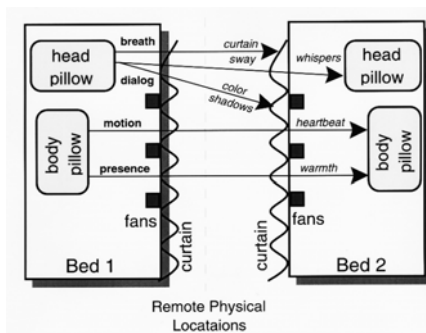
- LumiTouch: An Emotional Communication Device



Chang, A., Resner, B., Koerner, B., Wang, X., and Ishii, H. 2001. LumiTouch: an emotional communication device. In CHI '01 Extended Abstracts on Human Factors in Computing Systems (Seattle, Washington, March 31 - April 05, 2001). CHI '01. ACM Press, New York, NY, 313-314. DOI=<http://doi.acm.org/10.1145/634067.634252>

Examples: Communication Appliances (2)

- The bed: a medium for intimate communication



Dodge, C. 1997. The bed: a medium for intimate communication. In CHI '97 Extended Abstracts on Human Factors in Computing Systems: Looking To the Future (Atlanta, Georgia, March 22 - 27, 1997). CHI '97. ACM Press, New York, NY, 371-372. DOI=<http://doi.acm.org/10.1145/1120212.1120439>

Examples: Unconventional Game Interface

- You're In Control: A Urinary User Interface

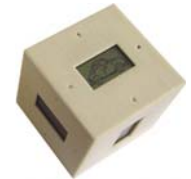


Maynes-Aminzade, D. and Raffle, H. 2003. You're In Control: A Urinary User Interface. In CHI '03 Extended Abstracts on Human Factors in Computing Systems. CHI '03. ACM Press, New York, NY, 986-987. DOI=<http://doi.acm.org/10.1145/765891.766108>

How do future user interface look like?

Design Space for Interactive Systems Implicit and explicit multimodal interaction

		<i>mode of interaction</i>	
		explicit	implicit
<i>modality</i>	command line		
	GUI & direct manipulation		
	gestures & speech		
	tangible and physical UIs		
	eye gaze		



Take away message

- ❑ Create systems that satisfy users' needs but do not stop there
- ❑ Design and implement for users' curiosity, creativity and ingenuity
- ❑ In a world of integrated chips and SOAs user interfaces make the difference and sell the product

References

- ❑ Chang, A., Resner, B., Koerner, B., Wang, X., and Ishii, H. 2001. LumiTouch: an emotional communication device. In CHI '01 Extended Abstracts on Human Factors in Computing Systems (Seattle, Washington, March 31 - April 05, 2001). CHI '01. ACM Press, New York, NY, 313-314. DOI= <http://doi.acm.org/10.1145/634067.634252>
- ❑ Dodge, C. 1997. The bed: a medium for intimate communication. In CHI '97 Extended Abstracts on Human Factors in Computing Systems: Looking To the Future (Atlanta, Georgia, March 22 - 27, 1997). CHI '97. ACM Press, New York, NY, 371-372. DOI= <http://doi.acm.org/10.1145/1120212.1120439>
- ❑ Maynes-Aminzade, D. and Raffle, H. 2003. You're In Control: A Urinary User Interface. In CHI '03 Extended Abstracts on Human Factors in Computing Systems. CHI '03. ACM Press, New York, NY, 986-987. DOI=DOI=<http://doi.acm.org/10.1145/765891.766108>

Group Exercise 1

- Concept video to communicate an idea about a new system

Concept Video

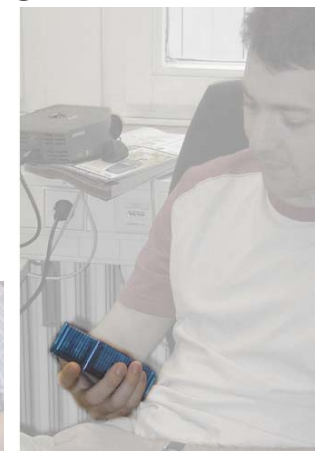
- Efficient means for communication of an idea (product, service, tool)
 - In the project team
 - For the customer
 - For the end user (marketing)
- Showing key concepts in easy to understand scenarios
- Create a story board first
- ... like a very short movie – try to tell a story
- Developing scenarios helps to make a meaningful video
- Different levels effort into the video

Steps to a “Quick Video”

- Have an idea :-)
- What are the key issues? How to visualize them?
- What is a convincing use-case story – make a storyboard
- take one or more photos digital for each key scene
- If required manipulate the digital photo to highlight a certain action/device/interaction within the picture
- Script audio and written text to explain
- Speak audio and record it or use a good text2speech engine
- Make a movie...
 - Add pictures in a sequence
 - Use transitions and motion to transport you message

Manipulation of the images (1)

- Highlight the center of interest
How-To:
 - Select the area of interest (e.g. center of action)
 - Inverse section
 - Reduce color and/or contrast

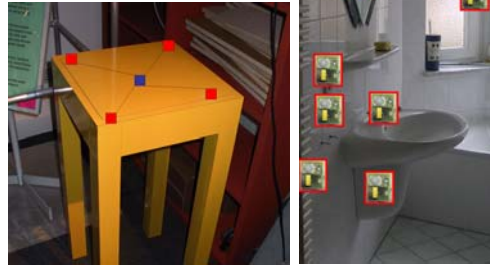


Manipulation of the images (2)

Overlay images or drawings

How-To:

- Select a base image
- Insert overlay image(s) / drawings on top

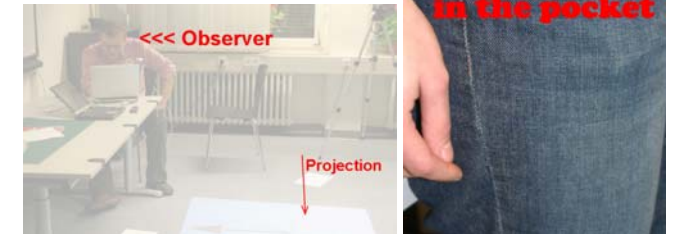


Manipulation of the images (3)

Insert labels and explanations

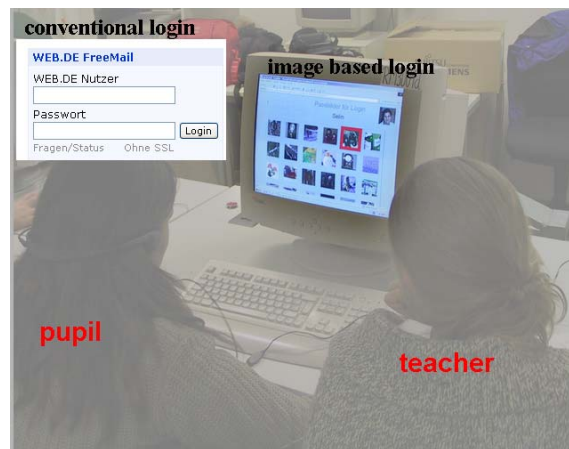
How-To

- Select a base image
- Insert text, symbols and arrows on top



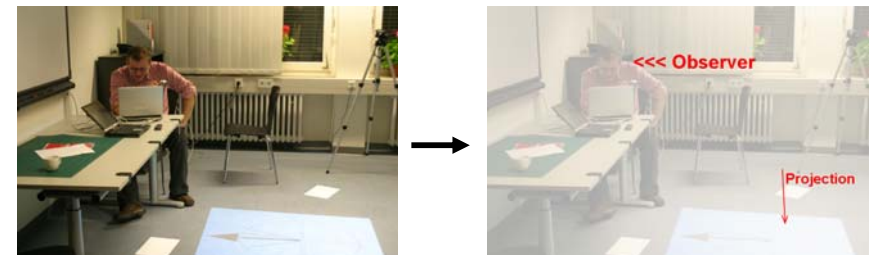
Combine image manipulation

- Highlight
- Overlay
- Label



Transitions

- Use transitions between stills to introduce motion
- Use transitions between images careful (flying animations usually do not look good ;-)
- Example below: use a fade from one image to the next



Zoom and Motion

- Use zoom and motion to guide the user to look at the “right place”
- Make transitions that support the effect



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Hints

- Read a tutorial to your image processing program
- Read a basic tutorial on cutting movies with your favorite program
- Make your concept video between 20 and 90 seconds – do not make them longer
- About the story: sometimes it is useful to make 2 parts. One as it is today (highlighting the problem) and one showing how the new system changes this (showing a solution)

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Tools required for “quick videos”

- Hardware
 - Computer
 - Digital camera
 - (Headset)
- Software
 - Audio recorder software or text2speech (e.g. <http://www.naturalvoices.att.com/demos/>)
 - Image manipulation program
 - Video editing program (e.g. Premiere)
 - ... or standard tools on Windows or MacOS will do

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Reference

- John Zimmerman. Video Sketches: Exploring Pervasive Computing Interaction Designs. IEEE Pervasive Computing 4, 4 (Oct. 2005), 91-94. DOI=<http://dx.doi.org/10.1109/MPRV.2005.91>

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