Designing Interactive Systems I

Prof. Dr. Jan Borchers
Media Computing Group
RWTH Aachen University

Winter term 2011/2012

http://hci.rwth-aachen.de/dis

Who Am I?

- Studied CS at Karlsruhe (& Imperial)
  - Human-Computer Interaction

- PhD CS, TU Darmstadt (& Linz, Ulm)
  - Interaction with multimedia
  - HCI design patterns

- Assistant professor at Stanford & ETH
  - Interactive rooms
  - Ubicomp user interfaces

- Full professor at RWTH since Oct. 2003
  - Interaction with audio & video
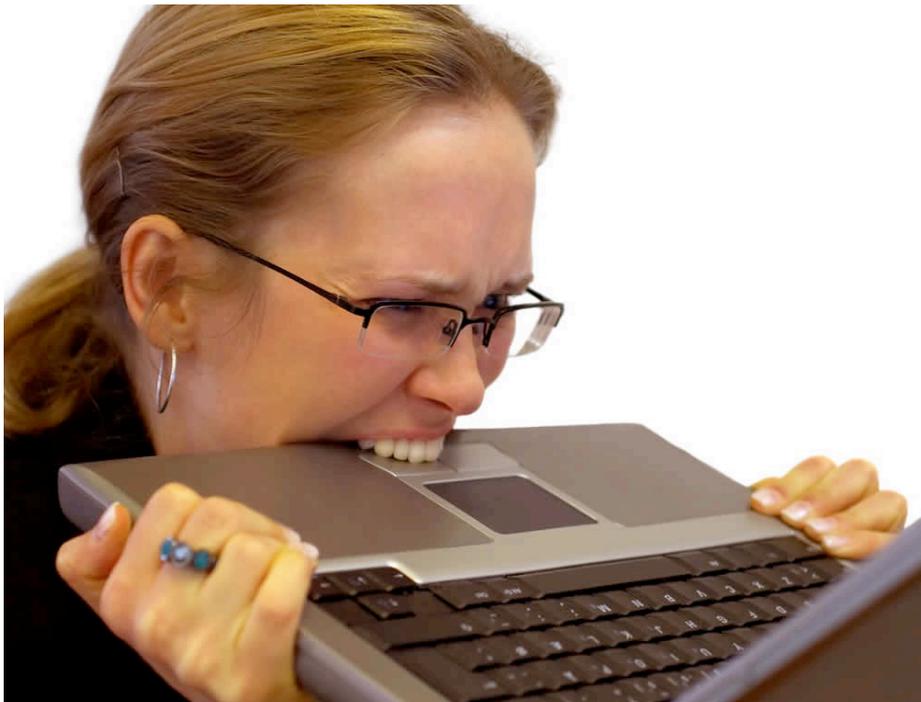 - Tangible UIs
  - Physical computing

Our Team

Chat Wacharamanotham
Touchscreen usability
Gestural Interface
chat@cs.rwth-aachen.de

Simon Völker
Interactive surfaces
Curved surface
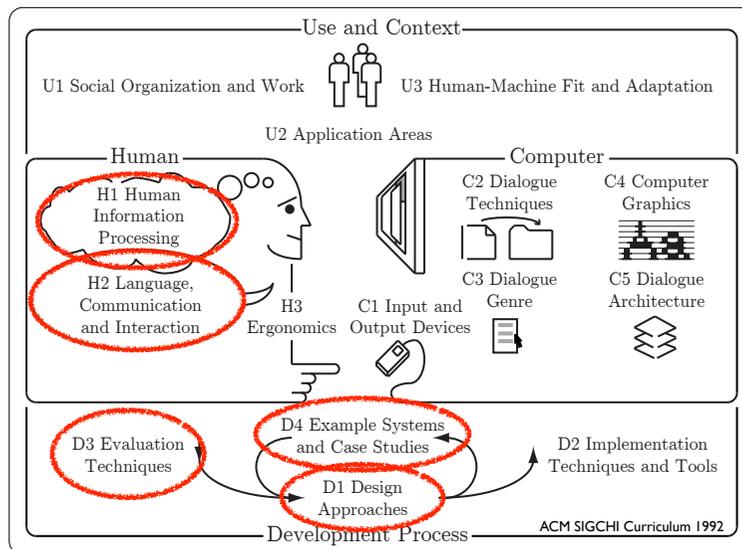voelker@cs.rwth-aachen.de

Questions go to them!

Usability Sells

DVD Player (1996) — 350,000
iPhone (1st Q '07) — 1,000,000
iPad (1st 80d '10) — 3,000,000

Source: CNBC

What's Human-Computer Interaction?

Use and Context

U1 Social Organization and Work   U3 Human-Machine Fit and Adaptation

U2 Application Areas

Human   Computer

H1 Human Information Processing   C2 Dialogue Techniques   C4 Computer Graphics

H2 Language, Communication and Interaction   H3 Ergonomics   C1 Input and Output Devices   C3 Dialogue Genre   C5 Dialogue Architecture

D3 Evaluation Techniques   D4 Example Systems and Case Studies   D2 Implementation Techniques and Tools

D1 Design Approaches

ACM SIGCHI Curriculum 1992

Development Process

Class Topics

Theory

- Models of interaction
  - Affordances, mappings, constraints

- Human cognition and performance

- History and vision of HCI

Practice

- Sketching, ideation

- Iterative design

- Prototyping

- User study and evaluation

Format

- Group oriented, project centered

- Credits (6 ECTS): Graded 'Schein'
  - 40% assignments, projects, and idea logs
  - 25% written exam part 1 (midterm)
  - 35% written exam part 2 (final)

- Passing the course
  - You need a passing grade in the assignments (average of 4.0) to write the exams
  - You need to pass the final exam to pass the course
  - You need to participate in at least one user study at our chair or the Psychology chair

Details

- BSc/MSc/Diplom regulations

- Work time @uni vs. @home is roughly 1:2!

- Each lecture: theory + practice

- Limited to 100 seats
  - Register via Campus Office by October 24, 18:00
  - Registration result: October 25, 18:00
  - Priority: compulsory > past grades > BSc

Media Computing and HCI
— English • annual —

SS, WS	P	The Media Computing Project
WS	S	Post-Desktop User Interfaces
SS	V3Ü2	Current Topics in HCI
WS	V3(Ü2)	iPhone Application Programming
SS	V3Ü2	Designing Interactive Systems II
WS	V3Ü2	Designing Interactive Systems I
SS	PS	Human-Computer Interaction
SS	SW-Pr	M3: Multimodal Media Madness

Lecture: iPhone Programming

- Dates
  - Lecture: Tue. 09:00 – 11:30 (2010)
  - Lab: Mon. 16:00 – 17:30 (4U15; max. 16 students)

- Credits:
  - Lecture + Lab: 6
  - Lecture: 3

- Assignments + Exam + Final Project

- Sign up by Thursday (October 13, 12:00)
  - http://hci.rwth-aachen.de/iphone

iPhone Programming Topics

- Mobile application design principles

- iOS development basics

- View Controllers & Dialogs

- Input techniques

- Networking

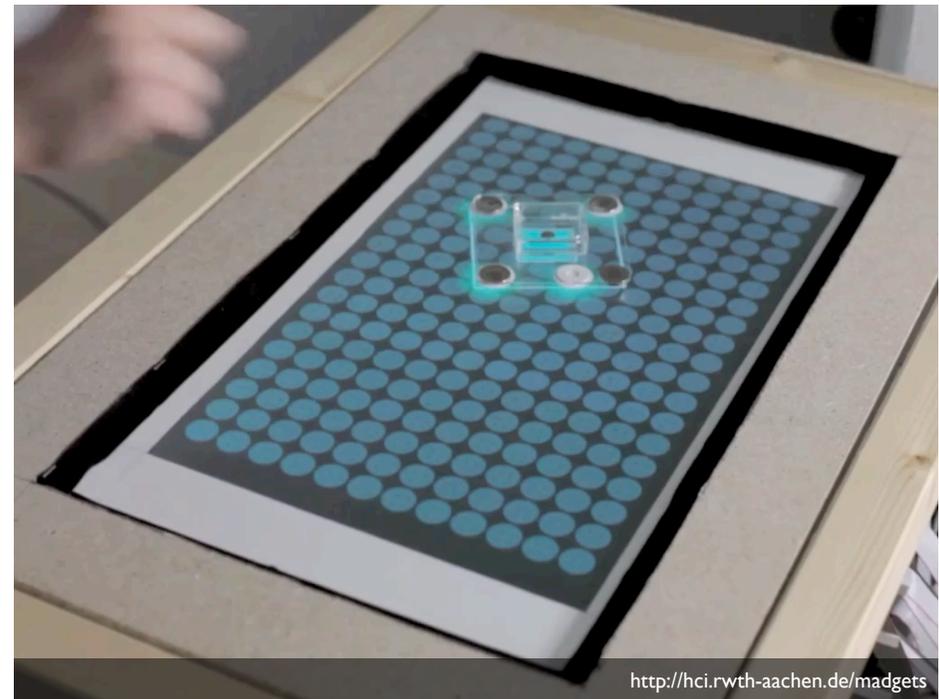- Multimedia

- Performance tweaking

- iPad programming

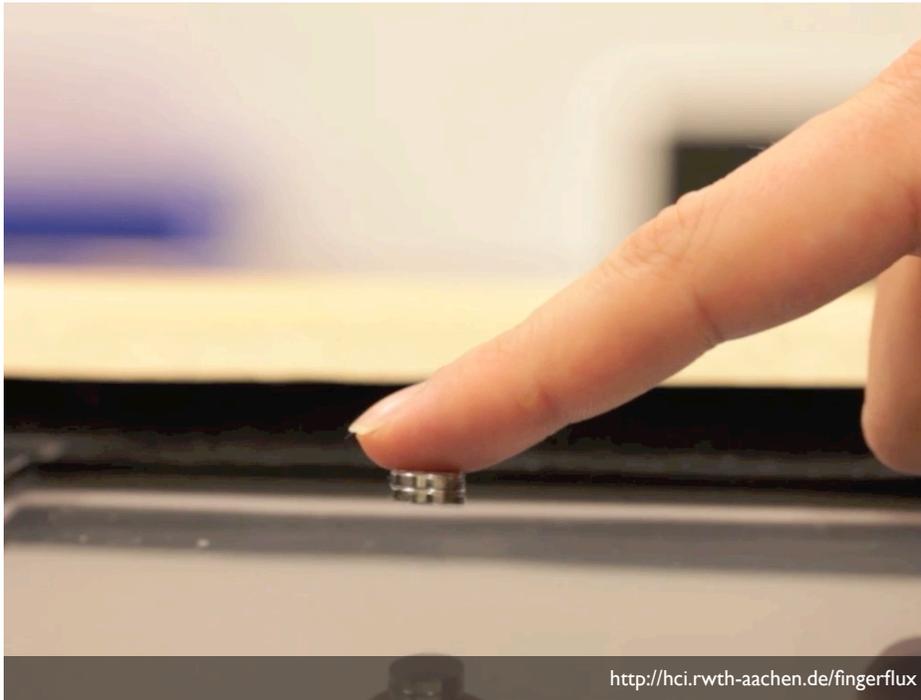All slides and lecture videos for both DIS1 and iPhone Programming will be available on iTunes U

http://hci.rwth-aachen.de/dis
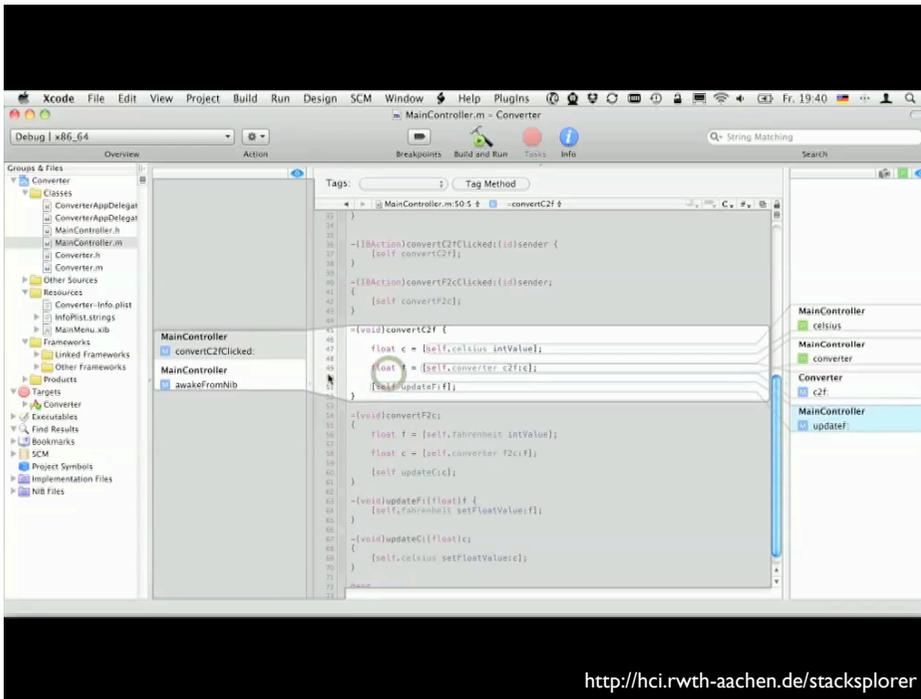
Tabletop Tower Defense:
http://hci.rwth-aachen.de/moellers

http://hci.rwth-aachen.de/madgets

http://hci.rwth-aachen.de/fingerflux

http://hci.rwth-aachen.de/pinstripe

http://hci.rwth-aachen.de/stacksplorer

http://hci.rwth-aachen.de/expo
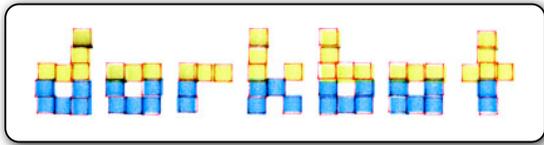
- People doing strange things with electricity in Aachen

- Next meeting: October 19, 18:30 (Room 2010)

- http://www.dorkbot.de

CocoaHeads Aachen

- International group devoted to discussion of Apple's Cocoa Framework for Mac OS X and iOS

- Next meeting: October 27, 19:00 (Room 2010)
  - Talk/Demo: OpenCL & AppCode

- http://www.cocoaheads.de

In-class Exercise: Your First Design

- Sketch a universal remote control for radio, TV, DVD player, and VCR player
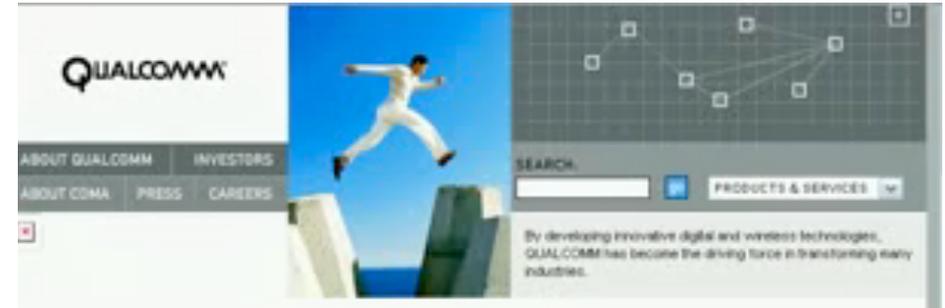
- You have five minutes.

  Get set, ready, go!

User Errors Are Design Errors

- A Big Message of DIS1

- We tend to blame users for mistakes

- But usually it's the product / user interface design that is to blame

- Computers are nothing special—they have many of the same problems as everyday things (and others because of their flexibility)

Visibility

- The mind is excellent at noticing and interpreting clues in the world, rationalizing, explaining cause and effect
  - Much everyday knowledge is in the world, not in the head
  - So visibility is one of the most important aspects in design
  - Ideally, natural clues are made visible, requiring no conscious thought: natural design
  - Just the right things have to be visible: excess is as bad as lack of visible clues

"Mystery Meat Navigation"

- What is wrong here?

http://www.webpagesthatsuck.com/

Swedish Hair Dryer

Improving the Swedish Hair Dryer

- Detach scale (labels) and control

- Provide at-a-glance overview of possible settings (What Can I Do?)

- Design control knob to show how it can be operated (e.g., pushed)

- Make current setting of control against scale easy to determine (Where Am I?)

- Use natural ordering of settings (0 < I < II)

- These all work for a new product—but design for use
  - One-handed operation, labels must not wear off, water-resistant controls, voltage settings,…

- Apply the First Rule of UI Design: Keep It Simple

Visibility & Superstitions

- Coincidence and lack of visibility can cause false causalities (thinking your action had a bad or no effect).

- They lead to superstition and loss of control.

- Example: Multiple clicks because system doesn't respond—and then the chaos when it does…

Market Constraints

- Better UIs are not automatically business goals

- Consumers have to prioritize usability before industry changes (it's happening gradually)

- Goal of this class: Turn you into nitpickers that notice bad (and good) UIs everywhere.
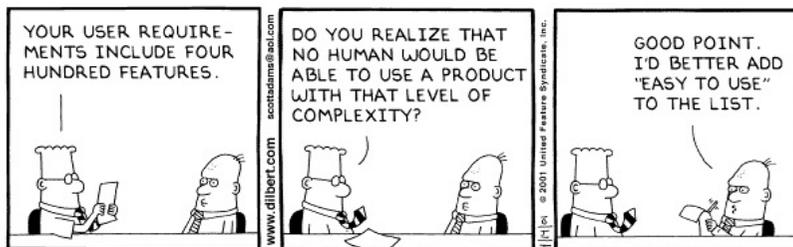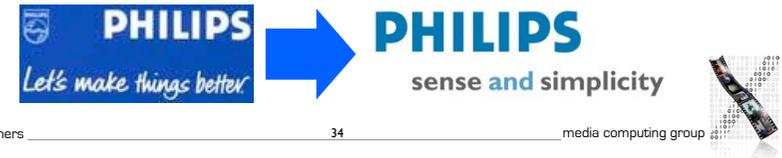
How do you check your voicemail?

RWTH University Phones

- More phone issues
  - Tone dialing doesn't work, have to dial "✳✳8" to activate
  - Missed calls are hard to retrieve, and numbers disappear after looking at them once
  - Etc. …

- Mobile phones ("network features") are not much better (e.g., blocking caller ID)

Dial ✳71

Affordances

- Model by Norman, after Gibson
  - "…affordances of the environment are what it offers the animal…" [Gibson77]

- Affordances are the actions that the design of an object suggests to the user
  - "…the term affordance refers to the perceived and actual properties of the thing, primarily those fundamental properties that determine just how the thing could possibly be used…" [Norman88]

Utility of Affordances

- Affordances provide strong clues
  - No instructions/labels needed
  - A design with labels is often a bad design!
  - Also true for many software UIs
  - Exceptions: complex, abstract functions that do not support simple "physical" affordances

- Product design can support usability when using affordances well

British Rail Shelters

- British Rail shelters with glass walls were being vandalized routinely
  - Glass suggests ("affords") being broken

- After replacing them with equally strong plywood, the demolishing stopped
  - Wood suggests/affords stability and support

- However, now they were being scribbled upon…
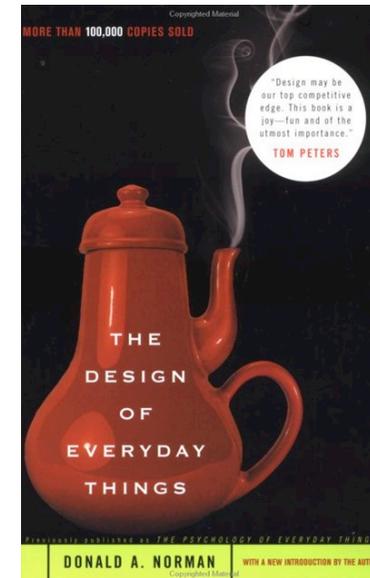 - Smooth, even surfaces "afford" drawing!

Example: Headlamp
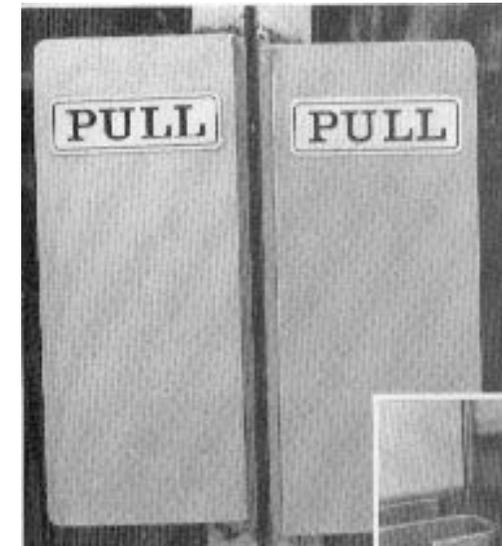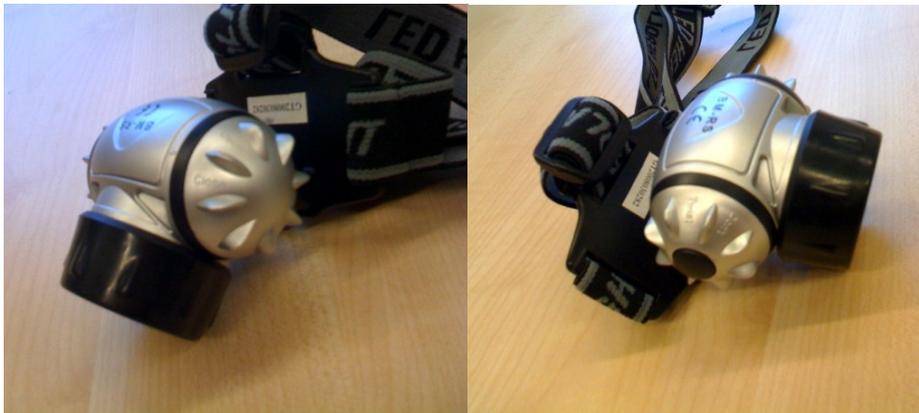
Flat surfaces suggest pushing, so a label "PULL" is needed.

False Affordances

- False affordances suggest actions that are not actually possible or the right ones

- Example: Winchester Mystery House
  - Staircases leading nowhere
 - Cupboards with nothing behind their door

A Note on Active Reading

- Highlight 1–2 key points per page

- Scribble brief summaries, '!' marks, crazy associations, project ideas,… in margins

- Put sticky notes with keywords onto pages you keep referring back to

- Type short bullet-point summaries of each chapter

- Make sure you can tell your copy of the book apart from 10ft

- Increases value of the book for you many times
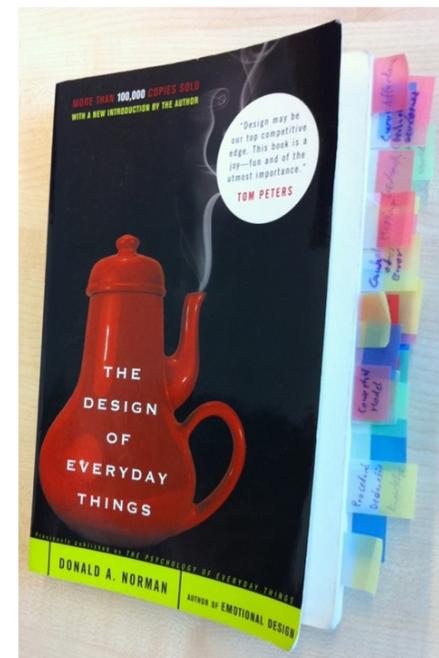
Idea Logs

- One place to store your ideas as you have them.

- A place to develop your idea.

- Graphical record in a physical medium

- "Just for you"
  - Submit snapshots during projects and annotated log at the end of the semester

- Gayle Curtis on idea log:
  - http://hci.stanford.edu/courses/cs247/2011/readings/WhatsAnIdeaLog.pdf
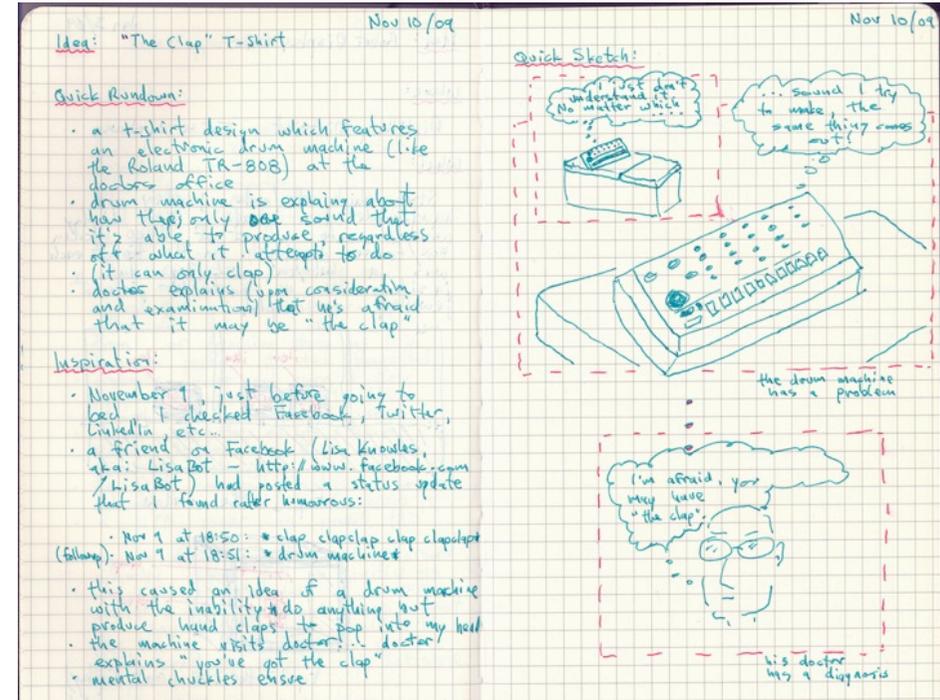
Example from CS 247: Interaction Design Studio, Stanford University
http://hci.stanford.edu/courses/cs247/2011/idealog.html

How to Draw Users

- Star Man and friends
  - Stick Man (bad)
  - Star Man
  - Sad, happy Star Man
  - Star Man pressing a button
  - A hand
  - Star Trek Man, Simple Star Trek Man
  - Family, users around an exhibit
  - Architect Man, Suits

References on How to Draw Users

- The full version of Sketching lecture by Bill Verplank:
  http://hci.rwth-aachen.de/verplank

- More examples: Brenda Laurel, "The Art of Human-Computer Interface Design"

- Learn to draw: Betty Edwards, "The New Drawing on the Right Side of the Brain"
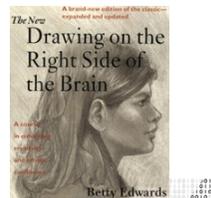
Revisiting the Remote Control

- In your idea log, refine your remote control using what you have learned today

- Reflection:
  - What did you change? Why?
  - What stayed the same? Why?

Assignment

- Get an idea log and a suitable pen
  - Recommended: A4 size, heavy papers that feels good when you sketch on it
  - Put date on every page as you go through

- Universal remote control
  - Put your first remote control sketch in the idea log
  - Reflect and develop your idea further from what you have learned

- Get Norman's book and start reading
  - You have four weeks to finish the book
  - You should get through half of the book by the next lecture

Summary

- The Media Computing Group does cool stuff.

- HCI is about humans, computers, the design process, and the social context

- Visibility and affordance provide clues how the system can be used

- Idea logs are great way to collect and develop your ideas

- Register if you have not done so yet.
  - (Step-by-step guide: http://hci.rwth-aachen.de/dis)

No lecture & lab next week