Designing Interactive Systems I

Course Introduction

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

Winter term 2019/20

http://hci.ac/dis
Prof. Dr. Jan Borchers

- 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 Zurich
  - Interactive rooms
  - UbiComp user interfaces
- Full professor at RWTH since Oct. 2003
  - Interaction with audio & video
  - Wearable & Tangible UIs, Personal Fabrication, IDEs,…
Our Team

They answer all your questions!

Please add this subject line to your mail: “[DIS1]”
Human–Computer Interaction?
Usability Sells!

Source: CNBC

- DVD Player (1996): 350,000
- iPhone (1st Q’07): 1,000,000
- iPad (1st 80d ’10): 3,000,000
What is HCI?

Use and Context

U1 Social Organization and Work

U2 Application Areas

U3 Human-Machine Fit and Adaptation

Human

H1 Human Information Processing

H2 Language, Communication and Interaction

H3 Ergonomics

Computer

C1 Input and Output Devices

C2 Dialogue Techniques

C3 Dialogue Genre

C4 Computer Graphics

C5 Dialogue Architecture

Development Process

D1 Design Approaches

D2 Implementation Techniques and Tools

D3 Evaluation Techniques

D4 Example Systems and Case Studies

ACM SIGCHI Curriculum 1992
Class Topics

Human
- Performance
- Models of interaction
  - Affordances
  - Mappings
  - Constraints
  - Types of knowledge
  - Errors
  - Design principles

Case Studies
- History of HCI
- Visions
- Phases of Technology

Development Process
- Iterative design
- User observation
- Ideation
- Prototyping
- User studies and evaluation
- Interaction design notation
Schedule

Course Introduction, Introduction to Fitts' Law, The CMN Model, Gestalt Laws, Information Content, Visibility, Affordances

Mappings, Constraints, Seven Stages of Actions

Knowledge in the World and Head, Mistakes, Slips

History of HCI 1: From Abacus to Macintosh

History of HCI 2, Midterm Exam Preparation

Visual Design

Midterm Exam
Nov 27th

DIA Cycle, Observing Users, Brainstorming, and Storyboards

Prototyping

Evaluating With and Without Users

Responsiveness, GOMS Model, Interface Efficiency, Golden Rules of Design

Notations I: Grammars, STNs

Notations II: Petri Nets, State Charts, Design in Business

Exam Preparation

Project Presentations
Jan 29th

Final Exam 1st Chance
Textbooks

Required Read

The Design of Everyday Things

Recommended Read

Human–Computer Interaction

Don Norman

Alan Dix, Janet Finlay, Gregory D. Abowd, Russell Beale
Media Computing Group
# Our Classes

<table>
<thead>
<tr>
<th>When?</th>
<th>Type</th>
<th>Credits (ECTS)</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>SS, WS</td>
<td>P</td>
<td>7</td>
<td>The Media Computing Project</td>
</tr>
<tr>
<td>WS, SS</td>
<td>S</td>
<td>4</td>
<td>Post-Desktop User Interfaces</td>
</tr>
<tr>
<td>SS</td>
<td>V/Ü</td>
<td>6</td>
<td>Current Topics in HCI</td>
</tr>
<tr>
<td>WS</td>
<td>V/Ü</td>
<td>6</td>
<td>iOS Application Development</td>
</tr>
<tr>
<td>SS</td>
<td>V/Ü</td>
<td>6</td>
<td>Designing Interactive Systems II</td>
</tr>
<tr>
<td>WS</td>
<td>V/Ü</td>
<td>6</td>
<td>Designing Interactive Systems I</td>
</tr>
</tbody>
</table>

*Only for B.Sc. students*

| SS    | PS   | 4              | Human-Computer Interaction                |
| SS    | SW-Pr| 7              | M3: Multimodal Media Madness              |
But modern multitouch tables are so big that people can start working on them in separate workspaces.
Springlets
https://hci.rwth-aachen.de/springlets

15mm X 40mm
5mm X 30mm
Springlets
https://hci.rwth-aachen.de/springlets
Student project “SAFE” from Multimodal Media Madness, SS 2019
https://hci.rwth-aachen.de/m3
Silhouettes at EXPO 2010, Shanghai
http://hci.rwth-aachen.de/expo
Aachen Maker Meetup

- People doing strange things with electricity in Aachen
- 3rd Wednesday every month
- Sign up here: https://www.meetup.com/Aachen-Maker-Meetup/
CocoaHeads Aachen

- CocoaHeads: International meet-ups about Apple’s Cocoa Framework for macOS and iOS

- Last Thursday every month
  Next event: **Oct. 25, 19:00**, Room 2222

- Sign up here: [https://www.meetup.com/cocoaheads_ac/](https://www.meetup.com/cocoaheads_ac/)
Class Structure
Flipped Classroom

• At **Home**: Learn from videos with slides at your own pace (2.5 hrs/week), work on group assignments and project (6 hrs/week)

• In **Studio**: Work on group assignments and final project with one-on-one feedback (1–2 hrs/week)

  • Attendance in studios is **required**—please make sure you do not take any other classes during this time (Wed. 10–12h)

• In **Lab**: Discuss solutions and new assignments, in-class exercises (1.5 hrs/week)
Credits and Grading

• Group-oriented, project-centered

• 6 ECTS Credits
  • 20% assignments, 20% project
  • 25% midterm (60 min): Nov. 27
    (We will announce the time and exam hall shortly.)
  • 35% final exam (60 min): Feb. 4, 14:30–16:00
    (We will announce the exam hall a week or two before the exam.)

• To pass the course,
  • You need to pass the final exam (at least 4.0), and
  • Overall, you need an average grade of at least 4.0
Exam Registration

• No need to register for the midterm exam

• **No second chance midterm exam** unless you have a valid reason (requires a medical certificate)

• Deadline to register: **Wednesday, Jan. 15, 23:59** (for both final exams)
  
  • If you fail the first final exam, there will be a short period to register for the second chance
  
  • Do not register just for the second chance final directly (possible, but not recommended)
In-Class Experiment 1: Eye Movement

• Work in pairs of 2

  • Read the paragraph handed out
  • Have your friend observe your eye movements while you’re reading
Read the text on the next slide.

Afterwards you will be asked a question about the information in the text.

Press the SPACE bar once you have finished reading the text and are ready to answer the question.

Video: http://www.youtube.com/watch?v=VBTZNydUh0w
In-Class Experiment 2: Bloch’s Law
In-Class Experiment 2: Bloch’s Law
In-Class Experiment 2: Bloch’s Law
A: 0 ms delay
B: 50 ms delay
C: 100 ms delay
In-Class Experiment 3: Memory

• Digit experiment
  • Choose 5 digits secretly from your sheet, then read them to your neighbor
  • Have her count backwards aloud from 50
  • Have her answer some other question (like what she had for dinner 3 days ago)
  • Does she still remember the entire 5-digit sequence correctly?
• Switch roles, repeat with 9 digits
• Finally, switching roles again, read the long sequence of numbers to your neighbor, stopping somewhere suddenly
  • How many of the last numbers can she repeat (in order) immediately?
In-Class Experiment 4: Fitts’ Law

1cm

| 4cm |
|     |

Same for 0.5 cm and 2 cm wide strips
Tap for 10 s, count taps afterwards

| 8cm |
|     |

| 16cm |
Tapping Task Results

- Doubling the distance adds roughly a constant to execution time
  ⇒ indicates logarithmic nature

- Doubling the target width (W) gives about same results as halving the distance (D)
  ⇒ indicates connection of D/W in formula
Summary

• HCI is about people, technology, and design

• This class is your ticket to our other classes, cool thesis projects, and HiWi jobs

• You’ve experienced that mathematical laws seem to govern your perception, memory, and movement—watch the videos for answers!

Link for videos are on the course landing page: http://hci.ac/dis
What to Do Now

• **Watch** videos 1.4., 1.4.1., and 1.4.2. on our YouTube channel, see [http://hci.ac/dis](http://hci.ac/dis)

• **Hand in** your *signed* Declaration of Compliance form
What to Do Next

• Before next Tuesday, Oct. 29:
  
  • Finish **watching** videos for the **first and second week** on YouTube, see **http://hci.ac/dis**
  
  • **Buy** Don Norman’s *The Design of Everyday Things* (2nd edition, 2013) (required read)
  
  • **Read** Dix’ *Human-Computer Interaction*, chapter “The Human” (pp. 11–59) (PDF will be made available on Moodle)
  
  • **Submit** Assignment 1 via RWTHmoodle before **9 am**