Designing Interactive Systems I

Course Introduction

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

Winter term 2019/20

http://hci.ac/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 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

Krishna Subramanian, M. Sc.
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Oliver Nowak, M. Sc.
nowak@cs.rwth-aachen.de

They answer all your questions!

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

Source: CNBC

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

- Oct 9th: Course Introduction, Introduction to Fitts’ Law, The CMN Model
- Oct 14th: Gestalt Laws, Information Content, Visibility, Affordances
- Oct 21st: Mappings, Constraints, Seven Stages of Actions
- Oct 28th: Knowledge in the World and Head, Mistakes, Slips
- Nov 4th: History of HCI 1: From Abacus to Macintosh
- Nov 11th: History of HCI 2: Visions, UbiComp, Phase of Technology
- Nov 18th: Midterm Exam Preparation
- Nov 25th: Visual Design
- Dec 2nd: DIA Cycle, Observing Users, Brainstorming, Storyboards
- Dec 9th: Prototyping
- Dec 16th: Evaluating With and Without Users
- Jan 6th: Responsiveness, GOMS Model, Interface Efficiency, Golden Rules of Design
- Jan 13th: Notations I: Grammars and STNs
- Jan 20th: Notations II: Petri Nets, State Charts, Design in Business
- Jan 27th: Exam Preparation
- Final Exam
  - Final Exam 1st Chance: Feb 4th
  - Final Exam 2nd Chance: Mar 6th
Textbooks

Required Read

_The Design of Everyday Things_

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Recommended Read

_Human–Computer Interaction_
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>
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<tr>
<td>SS</td>
<td>V/Ü</td>
<td>6</td>
<td>Current Topics in HCI</td>
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<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>
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### Only for B.Sc. students

| SS     | PS   | 4              | Human-Computer Interaction                               |
| SS     | SW-Pr| 7              | M3: Multimodal Media Madness                            |
Course: iOS Application Development

- Mobile application design principles
- iOS development basics
- Swift and UIKit
- Navigation and Workflow
- Input techniques
- Networking
- Augmented Reality
- Modeling via SpriteKit
- Performance tweaking
Course: iOS Application Development

- Dates
  - Tue., 10:30–12:00, Room 2222 (started 08.10.) and Mon., 12:30–14:00, Room 2222 (starting 14.10.)

- 6 ECTS credits

- Lecture (5 weeks) + Seminar (4 weeks) + Project (6 weeks)
  - [http://hci.rwth-aachen.de/ios](http://hci.rwth-aachen.de/ios)

- Full for now, but check wait list, or next year
But modern multitouch tables are so big that people can start working on them in separate workspaces.

Tangible Awareness
https://hci.rwth-aachen.de/tangibleawareness
Springlets
https://hci.rwth-aachen.de/springlets
Student project “Safe” from Multimodal Media Madness, SS 2019
https://hci.rwth-aachen.de/m3
ForcePicker
https://hci.rwth-aachen.de(forcepicker)
Silhouettes at EXPO 2010, Shanghai
http://hci.rwth-aachen.de/expo
The vest has a depth camera facing forward to record the area in front of the wearer.

HaptiVest
http://hci.rwth-aachen.de/haptivest
Aachen Maker Meetup

- People doing strange things with electricity in Aachen

- 3rd Wednesday every month
  Next meetup: Wednesday, **Oct. 16, 18:30**

- Sign up here: [https://www.meetup.com/Aachen-Maker-Meetup/](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

• Further details in the lab starting next Monday, Oct. 14 at 14:30 in AH VI
Registering for this Class

• Limited to **120 seats** (already 200+ registrations)

  • Register via RWTHonline **by the end of tomorrow** (i.e., 23:59h, Thursday)
  
  • We will announce who we have selected on Friday via email

  • Students for whom DIS 1 is mandatory (e.g., TK students) will be prioritized; others will be selected randomly

• M.Sc. SSE, Erasmus students, and others who cannot register via RWTHonline: Email **Oliver** (nowak@cs.rwth-aachen.de) your matriculation number and full name from your official @rwth-aachen.de email-address
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

  • B.Sc. students: you won’t be registered for the second final exam automatically!

  • 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

• **Register for the course** on RWTHonline by **tomorrow**—selection results will be announced this **Friday**

• Also check out other classes this week—please deregister if you’re not taking DIS 1!

• By **5pm, Oct. 10 (tomorrow):**
  • **Hand in** your **signed Declaration of Compliance** form.

• Before next Lab on **Monday, Oct. 14, 14:30-16:00, AH VI:**
  • **Watch** videos for the first week on YouTube, see **http://hci.ac/dis**
  • **Buy** Don Norman’s *The Design of Everyday Things* (2nd edition, 2013) (required read)

• Before next **Wednesday, Oct. 16:**
  • **Read** Dix’ *Human-Computer Interaction*, chapter “The Human” (pp. 11–59) (PDF will be made available on Moodle)