Current Topics in Human–Computer Interaction

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

Organization • Research Contribution Types

Summer Semester ’24

https://hci.rwth-aachen.de/cthci
Team

Lecturer

Prof. Dr. Jan Borchers

Teaching Assistant

Sarah Sahabi

Current Topics in HCI Lectures

Marcel Lahaye
Oliver Nowak
René Schäfer
Kevin Fiedler
Paul Preuschoff
The Question Flow Chart :) 

Does it contain matters of personal concern? 

- No (Default) 
  - RWTHmoodle Forum 
- Yes 
  - Email with the subject prefix [CTHCI] to Sarah (Not Jan 😊) 

Alternatively: A quick chat after the lecture ☕️
Goals

• Our most advanced class, with a clear focus and audience

• Understand (and practice!) **how scientific research in HCI is conducted**
  • **Empirical** research is quite unique to HCI in your CS education

• Practice how to **retrieve** and **evaluate** information from research literature
  • Prepare for your **thesis** and future (research) work

• Learn about **current HCI research** from **conference papers and journal articles**

• **Meet our PhD students** and learn about our research areas, to find a favorite topic and advisor for your thesis
Who Are You?

• Audience
  • M.Sc. Computer Science / Media Informatics / Software Systems Engineering
  • B.Sc. / M.Sc. Technical Communication (with focus on CS/HCI research)
  • B.Sc. / M.Sc. Electrical Engineering, Information Technology, and Computer Engineering
  • M.Sc. Data Science / Computational Social Systems / Simulation Science
  • B.Sc. Computer Science, …

• Prerequisite: Designing Interactive Systems (DIS1) strongly recommended
  • In our labs, assignments, and exams, we assume that you know DIS1
Administrative

- Format: 6 ECTS (but check your individual Examination Regulations / PO)
- Lecture: Tuesdays, 10:30–12:00
- Lab: Wednesdays, 12:30–14:00
- Course language is English (no dictionaries allowed in exam)
- Expect to spend around 9h/week in total on this class
Limited Seats

- **39 seats** available (groups of 3)

- Register in RWTHonline by the end of today(!)

- Seats will be assigned before tomorrow's lab

- **Sign the Declaration of Compliance document** and upload it to the Sciebo folder (all on the class website) as a PDF using this naming scheme:

  `CTHCI24_DoC_matriculationNumber_lastName.pdf`

  *(Example: CTHCI24_DoC_123456_sahabi.pdf)*

  **Deadline: Today, 09.04.24, 23:59**

  A script will parse these files, so following the naming scheme improves your chances :)}
Course Structure

Part 1: HCI Research Methods
Lectures: Concepts (Tuesday)
• Interactive classes with Prof. Borchers

April 9th – June 18th

Lab
Practice (Wednesday)
• Assignments
• Solutions
• Discussions

Part 2: Current Topics
Lectures: Current Topics in HCI (Tuesday)
• Interactive classes with i10 researchers

June 25th – July 9th

Mini HCI Research Project
Practice Conducting HCI Research (Wednesday)
• Conduct actual HCI research and present your own research project in groups of three

* Mandatory Attendance
Oliver Nowak: *Textile Interfaces in the Home*

Marcel Lahaye: *Empowering Indirect Maker Collaboration*

René Schäfer: *Personal Fabrication*

Sarah Sahabi: *Accessibility Computing*

Paul Preuschoff: *Immersive Design*

Kevin Fiedler: *Spatial Computing*

Knibbe et al., *Smart Makerspace, ITS '15*

Weichel et al., *ReForm, UIST '15*
Mini HCI Research Project

• Apply the HCI research methods you learned in an actual small project

• You will come up with a research question, analyze related work, design an experimental protocol, conduct a study, analyze the data, and present your findings

• You will work in teams of three students

• We will guide you with a structure of weekly milestones and discussions
Evaluating Your Mini HCI Research Project

• To evaluate your project, we will consider how well you have applied all concepts covered in our class to your research questions, study, data analysis, and presentation

• In doing so, we will follow the evaluation criteria for research papers you will be learning about in this class: Contribution, Benefits, Novelty, Validity, Applicability, Format

• The project will be graded using our standard grading guidelines:
  • 1.0: Exceptional work that clearly went above and beyond the task specification
  • 2.0: Project was completed satisfactorily as per the task specification
  • 3.0: Project was completed, but has some problems
  • 4.0: Little or no effort was put into the project
  • 5.0: Incomplete project
Final Grade Distribution

You must pass all partial exams to qualify to pass the course.

**Note:** You can only deregister from the course up to three days before the final project presentations (July 16).

Final exam: 70%

Project: 30%
Literature Sources: Methods

Recent Books

- Research Methods in HCI (Lazar et al., 2nd ed., 2017)
  - Highly **recommended reading** for more details about evaluation methods—especially if you are considering doing your thesis at our chair!

  - Further **recommended reading** for more details about experimental research methods
Literature Sources: Current Topics

Conferences

Journals

ACM Transactions on Computer-Human Interaction

SPECIAL ISSUE ON DIGITAL TOUCH: RESHAPING INTERPERSONAL COMMUNICATIVE CAPACITY AND SOCIAL TOUCH PRACTICES

Article 18
S. Price
Introduction

M. Bianchi-Berthouze
C. Jewitt
J. Steimle
S. Nanayakkara
ANISMA: A Prototyping Toolkit to Explore Haptic Skin Deformation Applications Using Shape-Memory Alloys

Article 19
M. A. Messerschmidt
S. Mathukumanana
N. A. M. Hamdan
A. Wagner
H. Zhang
J. Borchers
S. C. Nanayakkara
TickleFoot: Design, Development and Evaluation of a Novel Foot-Tickling Mechanism That Can Evoke Laughter

Article 20
D. S. Elvitigala
R. Boldu
S. Nanayakkara
D. J. C. Mathews
Physecology: A Conceptual Framework to Describe Data Physicalizations in their Real-World Context
Citing and Quoting Correctly

Usability testing—whether inside a lab facility, using portable equipment, or outside of a lab facility—was rated highest as an effective usability methodology to create greater strategic impact. One reason for this high rating

“Usability testing—whether inside a lab facility, using portable equipment, or outside of a lab facility—was rated highest as an effective usability methodology to create greater strategic impact.” [1]

Usability testing has the largest impact on strategic improvement [1].


Cite and quote instead of plagiarizing!
Consequences of Plagiarism in this Class

• Plagiarism will result in an immediate 5.0 for this class, and may be reported to the university.

• Repeated plagiarism will also ban you from our other classes, and can have severe university consequences, including exmatriculation.
CHAPTER 1

Seven Research Contribution Types in HCI

(Based on: Wobbrock et al., "Research contributions in human-computer interaction", interactions 23(3), 38–44, ACM Press, 2016)
CHI 2016 by Contribution Type

[2,316 submissions, 546 acceptances, 23.6%]

- Percentage of Submissions (2,316 papers)
- Percentage of Program (546 papers)
- Acceptance Rate

<table>
<thead>
<tr>
<th>Contribution Type</th>
<th>Submissions</th>
<th>Program</th>
<th>Acceptance Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Empirical Study of System Use</td>
<td>44.0% (1026)</td>
<td>23.5% (240)</td>
<td>23.5%</td>
</tr>
<tr>
<td>Empirical Study of People</td>
<td>28.6% (657)</td>
<td>31.7% (173)</td>
<td>24.3%</td>
</tr>
<tr>
<td>Artifact or System</td>
<td>24.2% (561)</td>
<td>24.5% (34)</td>
<td>24.5%</td>
</tr>
<tr>
<td>Method</td>
<td>19.2% (445)</td>
<td>14.5% (79)</td>
<td>23.9%</td>
</tr>
<tr>
<td>Theory</td>
<td>17.8% (88)</td>
<td>4.6% (25)</td>
<td>17.6%</td>
</tr>
<tr>
<td>Essay/Argument</td>
<td>17.6% (88)</td>
<td>6.1% (142)</td>
<td>21.6%</td>
</tr>
<tr>
<td>Meta-Analysis/Literature Survey</td>
<td>17.9% (30)</td>
<td>2.4% (56)</td>
<td>21.6%</td>
</tr>
<tr>
<td>Dataset</td>
<td>16.7% (65)</td>
<td>1.3% (10)</td>
<td>21.6%</td>
</tr>
<tr>
<td>Overall Acceptance Rate</td>
<td></td>
<td></td>
<td>23.6%</td>
</tr>
</tbody>
</table>
RESEARCH CONTRIBUTION TYPES

Empirical Contributions
Empirical Contributions

• Based on observation and data gathering

• From experiments, user tests, field observations, interviews, surveys, focus groups, diaries, ethnographies, sensors, log files

• Evaluated based on the importance of findings and the soundness of the methods
Example: Soft Buttons

• Lee et al. studied the **efficacy of soft buttons** on touch screens compared to hard buttons (published at CHI ’09)

• Three **empirical experiments**
  
  • OPERATING MODE (finger vs. stylus) and FEEDBACK TYPES (acoustic vs. haptic)
  
  • ACTIVATION MECHANISM (contact–capacitive vs. force activation–resistive)
  
  • BUTTON SIZE (2 sizes) and ACTIVATION MECHANISM

• Measured input accuracy, speed, amount of corrections, and subjective ratings with soft and hard buttons
Example: User Awareness

• Cherek et al. (our lab) studied the **effect on users’ awareness** regarding tangible objects on a screen vs. their virtual presentation (published at CHI ’18)

• **Empirical experiment**
  • Groups of 2–4 users played a game grabbing their attention
  • Users had to become aware of other players actions occasionally
  • Measured the **reaction time**
RESEARCH CONTRIBUTION TYPES

Artifact Contributions
Artifact Contributions

• Driven by new systems, architectures, tools, toolkits, techniques & sketches

• Enable new exploitations, and suggest new insights and possible futures

• Evaluated based on:
  • What they make possible (e.g., toolkits),
  • Performance (e.g., techniques),
  • Innovation insightfulness (e.g., sketches)

• Empirical studies can be harmful for some artifacts
Example: Springlets

- We developed **Springlets**: expressive, non-vibrating mechano-tactile interfaces on the skin based on SMAs (published at CHI ’19)

- **Artifact contribution**
  - Thin & flexible tactile interfaces that are easy to reproduce

- **Empirical evaluation**
  - Study on effectiveness & wearability in stationary and mobile situations
What to Do Now

Today

1. Register for the course on RWTHonline
2. Upload your signed Declaration of Compliance

   File Name: CTHCI24_DoC_matriculation number_last name.pdf
   (E.g.: CTHCI24_DoC_123456_sahabi.pdf).

   Deadline: Today, 09.04.24, 23:59

3. Feel free to check out our other classes

Otherwise, see you tomorrow at the lab where we will introduce you to literature reviews 🙋‍♂️