Current Topics in Media Computing and HCI

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Media Computing Group
RWTH Aachen University
Summer Semester 2015
http://hci.rwth-aachen.de/cthci
Goals

• Understand ways to do research in HCI

• Practice how to retrieve and evaluate information from the literature
  ⇒ Preparation for thesis and future research work

• Learn about up-to-date developments in Human–Computer Interaction and interactive multimedia from new books and recent conference/journal articles
Topics for 2015

• Research literacy (3.5 weeks)
  • Understanding HCI research approaches
  • Experimental research and user study protocol (case study: text entry techniques)
  • Statistics in HCI research (case study: midair input techniques)
  • Publication and peer-review process

• Research topics (7.5 weeks)
  • Research in coding and IDEs
  • Touch and tangibles on large interactive surfaces
  • Augmented reality in HCI
  • Gestural and stroke input: from touch screens to midair
  • HCI design patterns
  • Interactive e-learning
  • Personal fabrication and personal design
Current Topics in Media Computing and HCI

• Audience
  • M.Sc. Computer Science
  • M.Sc. Media Informatics
  • M.Sc. Software Systems Engineering
  • B.Sc. Computer Science (extra credit / carry-over)
  • B.Sc. / M.A. Technical Communication (with focus on CS/HCI research)

• Prerequisite: **DIS I**
  • In our lectures, assignments, and exams we assume that you know DIS I
Literature Sources

• Recent (usually last 2 years) conference papers
  • CHI, UIST, ITS, DIS, Ubicomp,…
  • Older seminal papers included

• Recent journal articles
  • TOCHI,…
Literature Sources

• Recent books
  • Research Methods in HCI (Lazar et al., 2010)
    Recommended reading for more details about evaluation methods — especially if you are going to do your thesis at our chair!
  • Research Methods for the Behavioral Sciences (Gravetter and Forzano, 2012)
    Recommended reading for more details about experimental research methods
Administrative

- Format: 6 ECTS
- Lecture: Tuesday, 10:15–11:45
  - Presentation & discussion of research topics
  - Small group in-class exercises
  - Weekly reading assignments (individual)
- Lab: Thursday, 08:15–09:45
  - Practice skills learned from the lecture and discuss reading and written assignments
  - 3 written assignments (in groups)
  - 1 mini HCI research project (in groups)
- Extra supervision slots during mini project phase by appointment

Active attendance in both lecture and lab expected!
Final Grade

- 30% midterm (June 9)
- 15% 3 written assignments
- 10% mini HCI research project
- 45% final (July 28)
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<th>Lecture date</th>
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<td>(no lecture: Orientation)</td>
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| 14.04.      | R1: Three approaches to HCI research                                          | Jan               | 16.04.   | Paper reading and identifying contribution types | Nur            | Required:  
  \(\text{Witbrock, 2014}\) Seven Research Contribution Types in Human-Computer Interaction  
  \(\text{Ginnett, n.d.}\) How to Read an Engineering Research Paper | A01: Categorizing research contributions and writing contribution statements  
  16.04. |                                                                                        |
| 21.04.      | R2: Mechanics of experimental research and how to write a user study protocol  | Nur               | 23.04.   | Literature searching and contributions & benefit statement | Nur            | Required:  
  \(\text{MacKinnon, 2007}\) Evaluation of Text Entry Techniques  
  \(\text{TBD}\) | (A01 peer feedback)  
  23.04. |                                                                                        |
| 28.04.      | T1: Research in coding and IDEs                                               | Jan-Peter         | 30.04.   | Designing experimental user studies          | Nur            | Required:  
  TBD  
  TBD Recommended:  
  TBD          | A02: Reverse-engineering user study protocol  
  30.04.  
  28.04.  
  30.04. |                                                                                        |
| 05.05.      | (no lecture: Student Representative Council Meetings)                        | –                 | 07.05.   | –         | –              | Required:  
  \(\text{McGrath, 1985}\) Methodology matters | (A02 peer feedback)  
  07.05.  
  06.05.  
  07.05. |                                                                                        |
| 12.05.      | T2: Touch and Tangibles on Large Interactive Surfaces                        | Simon             | 14.05.   | (no lab: Ascension of Christ)                | –              | Required:  
  TBD  
  TBD Recommended:  
  TBD | A03: Writing a review: Interactive surfaces and tangibles  
  14.05.  
  12.05.  
  14.05. |                                                                                        |
| 19.05.      | T3: Augmented reality HCI                                                     | Nur               | 21.05.   | –         | –              | Required:  
  TBD  
  TBD Recommended:  
  TBD | (A03 peer feedback)  
  21.05.  
  20.05.  
  21.05. |                                                                                        |
| 26.05.      | (no lecture: Excursion week)                                                   | –                 | 28.05.   | –         | –              | None (exam preparation week)                                                       | (Midterm exam preparation)                                                                 |
| 02.06.      | R3: Understanding statistics in HCI research (Case study: midair input techniques) | Krishna          | 04.06.   | (no lab: Corpus Christi)                    | –              | None (exam preparation week)                                                       | (Midterm exam preparation)                                                                 |
| 09.06.      | Midterm: R1–3, T1–2 (30%)                                                     | Nur               | 11.06.   | –         | –              | Required:  
  \(\text{Dugas-kovic \& \# 39; 2014}\) Running an HCI Experiment in Multiple Parallel Universes  
  \(\text{Witbrock, 2011}\) Practical statistics for HCI | A04: Mini HCI research project: Midair input techniques  
  11.06. |                                                                                        |
| 16.06.      | T4: Gestural and stroke input: from touch screens to midair                  | Chat              | 18.06.   | –         | –              | Required:  
  TBD  
  TBD Recommended:  
  TBD | (A04 continued)  
  27.06.  
  17.06.  
  18.06. |                                                                                        |
| 23.06.      | R4: Peer-review process in HCI T3-1, Pattern language                        | Jan               | 25.06.   | –         | –              | Required:  
  TBD  
  TBD Recommended:  
  TBD | (A04 peer feedback)  
  30.06. (in the lab)                                                                 |
| 30.06.      | T5-2 Pattern language                                                          | Jan               | 02.07.   | –         | –              | Required:  
  TBD  
  TBD Recommended:  
  TBD | (A04 continued)  
  02.07. |                                                                                        |
| 07.07.      | T6: Interactive e-learning - Course evaluation                               | Krishna           | 09.07.   | –         | –              | Required:  
  TBD  
  TBD Recommended:  
  TBD | (Final exam preparation)                                                                 |
| 14.07.      | T7: Personal fabrication and personal design - Course reflection              | Jan               | 16.07.   | –         | –              | Required:  
  TBD  
  TBD Recommended:  
  TBD | (Final exam preparation)                                                                 |
Learning Resources

- Public website with all general info: http://hci.rwth-aachen.de/cthci including links to:
  - L²P course room (slides, literature, assignments)
  - Lecture recordings on iTunes U
  - Research papers in the ACM Digital Library
    Free access from inside RWTH network
CTHCI Team

- Prof. Dr. Jan Borchers
- Nur Al-huda Hamdan, M.Sc.
  - hamdan@cs.rwth-aachen.de
- Topic presenters
Limited Seats

- 30 seats available
- Register in CAMPUS or email Nur for registration before Friday
- You will know if you’re in by next lecture (Tue)
- First assignment in the first lab (this Thu)
Plagiarism

The law of similarity captures the idea that elements will be grouped perceptually if they are similar to each other. In the "preferences window" of

• Law of Similarity

The law of similarity captures the idea that elements will be grouped perceptually if they are similar to each other. For instance in the following dialog we tend to divide the given files into two groups:

Law of Similarity

The law of similarity states that objects will be grouped perceptually if they are similar to each other. In other words the repetition in the forms persuades the human mind to group it together. This is the law of similarity for the distribution of objects into the classes they belong to.


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

- Plagiarism will result in an immediate 5.0 for this class.
- Repeated plagiarism will also lead to banning from all other i10 classes.
- Sign the declaration of compliance and hand it in after the lab.

End of this slide: 0:30 min into the lecture
Break 5 min
Three Approaches to HCI Research

Test
Empirical science

Look
Ethnography

Make
Engineering and design
Empirical Approach

Research question

Observation

Hypothesis
Initial Observation

- Begin with casual or informal observation
- Usually comes from personal experience that catches your attention or raises questions in your mind
- Example: “Cloth has an affordance of pinching. Could this be useful for interaction design?”

Research question
Observation
Hypothesis
Research Question

• Identify variables and hypothesis that are associated with your observation

• **Variables**: characteristics or conditions that change or have different values for different individuals

• **Research question**: a statement that describes or explains a relationship between or among variables
  • A proposal to be tested

• Example: “For pinching cloth, different **areas** of the body would differ in **preference** and the **way people pinch**”
Hypothesis

• **Concrete and testable** statements derived from the research question

• **Operational definition:** a specific set of operations for measuring external, observable behavior

• In-class exercise: try giving an operational definition for the variables highlighted below
  
  • “There would be a difference in **user’s preference** among different **areas** on the body for pinching cloth.”
Research Example: Pinstripe

- Karrer et al., CHI ’11

- Recall the prediction:
  - “There would be a difference in user’s preference among different areas on the body for cloth pinching.”

- Method:
  - Identify 16 different body area
  - Ask the participants to perform the pinching gesture in these areas
  - Collect convenience rating in 5-point Likert scale
Planned Observation

- Collect data to support, refute, or refine the original hypothesis

- Three strategies
  - **Descriptive research**: X happens
    Focus on the current state of each individual variable
  - **Relational research**: X and Y happen together
    Measure two or more variables that exist naturally from each participant
  - **Experimental research**: X causes Y
    Manipulate one or more variables and observe their effects to other variables
Descriptive Research

• Describe a naturally-occurring phenomenon

• Measure and report individual variables *without claiming relationships*

• Natural phenomena can occur when using a new technology as well

• Methods: observation, survey, case study
Research Example: Natural Troubles of Driving with GPS

• Brown (Sweden) and Laurier (Edinburgh), Best paper CHI ’12

• Goal: To understand users’ interaction with GPS navigation system in non-controlled setting

• 14 drivers, 2 video cameras, field notes
  • 9 hours of video ⇒ 75 clips ⇒ 37 detailed transcriptions
  • Analyzed the data to find common patterns/themes and construct theories that explain them
Figure 1: Following GPS instructions

While the driver 'follows' what the GPS recommends the driver still needs skill to read what the GPS says and even to ignore GPS instructions.
Natural Troubles of Driving with GPS

• Contribution & benefits:
  • “Presents a video analysis study of driving using GPS navigation systems in natural settings. The paper argues for [understanding] driving with [a] GPS as an active process and not as ‘docile driving’.”

• Conclusion
  • Designer should take into account the “intelligent driver”
    E.g., less persistent instructions when the user decided to deviate from them
  • Normal natural trouble: “GPS is used in the way that was not foreseen. The driver must take instructions and the map and fit them with the situation.”
Relational Research

• Measure a set of variables for each participant

• Examine to identify **patterns** of relationship
  • Changes in one variable are consistently and predictably accompanied by changes in another variable

• Measure the **strength** of the relationship
Research Example: Social Network Activity and Social Well-Being

- Burke (CMU), Marlow, and Lento (Facebook), Best paper CHI ’10
  - “An empirical analysis of the relationship between direct and passive communication on Facebook and social well-being, including loneliness, bridging, and bonding social capital.”

- Survey in Likert scale (N=1193)

- Analyze the past two months of users’ Facebook activity data, e.g.,
  - Friend count (actual)
  - Directed communication: comments, likes
  - Passive consumption of broadcast items such as status updates
Patterns in the Relationship between Variables

Simulated data for instructional purpose, based on the result from [Burke et al., CHI ’10]
Strength of the Relationship between Variables

Weak  ![Graph 1](100x100.png)  ![Graph 2](100x100.png)  ![Graph 3](100x100.png)  Strong

Simulated data for instructional purpose
Limitations of Relational Research

- Correlation does not imply causation
  - E.g., loneliness $\Rightarrow$ less direct communication?
    - or less direct communication $\Rightarrow$ loneliness?
    - or third variable $\Rightarrow$ direct communication and loneliness?

- Third variable problem: unidentified variable controls the correlated variables

- Shallow data from large number of people instead of deep data
  - Can be improved by follow-up interviews, follow-up surveys

- Participant sampling method limits the conclusion
  - Method: advertisement on Facebook
  - Participants: only English-speaking users, but compensated by many countries of origin
What You Need To Do Now

• Sign up for this class in CAMPUS or email Nur by Friday!

• Read this paper today (definitely before the lab!):
  • Seven Research Contribution Types in Human–Computer Interaction
    — Jacob Wobbrock, 2014

• Come to the lab this Thu, April 16th!
  • Literature searching and reading techniques
  • Help with CAMPUS/L2P problems

• Read this paper before the next lecture:
  • How to Read an Engineering Research Paper — William G. Griswold

Links to articles: hci.rwth-aachen.de/cthci
S01 Referenced Literatures


