HCI4H
Human Computer Interaction for Health
Winter 2018

Instructor: Nadir Weibel
Teaching Assistant: Yonatan Vaizman
Who am I?

• Originally from Southern Switzerland (Ticino)
  • Languages: Italian (native), German, French, English and Spanish (basic)

• BSc. and MSc. in Computer Science and Engineering from ETH Zurich (Switzerland)

• PhD. in Computer Science (2009) from ETH Zurich

• Researcher and Lecturer at UCSD in Computer Science and Cognitive Science since 2009
UCSD

- Research Faculty in CSE
- Human-Centered and Ubiquitous Computing Lab (The Weibel Lab, HCC-Ubicomp)
- Affiliated Faculty with Calit2
- The Design Lab (http://designlab.ucsd.edu)
- Center for Wireless and Population Health Systems (http://cwphs.ucsd.edu)
- Research Health Science Specialist at VA San Diego
The Future of Healthcare

https://www.youtube.com/watch?v=-SKJlCmHOAyU

Microsoft, 2009
HCI4H
Human-Computer Interaction for Health
HCl4H Goals

- Comprehensively understand ethics, privacy, and research regulations to work in the healthcare field.
- First-person experience of real-world medical settings and what is the role of technology in them
- Comprehensive understanding of fieldwork in healthcare
- Exposure to a variety of methods to collect data in medical environments
- Knowledge to propose technology-centered research in the healthcare setting
- Clear description of a plan to study or address a real-world problem in healthcare through the introduction of interactive technology
- Experience in prototyping technology for health.
Overall Goal

• To develop the skills undertake research at the intersection of computer science, emerging interactive technologies, and healthcare
Weekly Topics

- Week 1: Introduction/Admins + Research Ethics
- Week 2: Access to Healthcare settings + Studying HCI4H
- Week 3: Models, Methods and Theories for HCI4H
- Week 4: Teamwork: Emergency and Trauma Medicine
- Week 5: Operating Rooms and Medical Devices
- Week 6: Vulnerable Populations
- Week 7: Health Information Systems and Imaging
- Week 8: Mobile Health and Studies of Physical Activity
- Week 9: Beyond the Clinic
- Week 10: Final Presentations
Exposure to HCI4H

• Introduction of core concepts for working in the healthcare and technology fields
• Introduction to methods
• Site Visits
• Case Studies
• Experiences
Reflection on HCI4H

- Ideas on research project in HCI4H
- Research design and proposal writing
- Discussions and reflections
- Human-centered design and prototyping
The Course: Logistics

Goal 1: Exposure to HCI4H

• Site-Visits (Center for Future Surgery, Simulation Labs, Emergency Department, High-tech clinics, ICU, Radiology, Radiation Oncology, Physical Activity Research Center, WestHealth.)
  Tuesdays 2pm-3.20pm at the different sites

• Class Discussions
  Thursdays 2pm-3.20pm, EBU3B 2154

Goal 2: Research Proposal/Ideas/Prototypes

• Research Discussions and Presentations
  Thursdays 2pm-3.20pm, EBU3B 2154
The Course: Logistics

Web page: http://hci4h.ucsd.edu

Piazza: http://piazza.com/ucsd/winter2018/hci4h

• Register today! (group discussions, peers formation, etc.)
Readings - Books

Fieldwork for Healthcare
Case Studies Investigating Human Factors in Computing Systems
Dominic Furniss
Aisling O’Kane
Rebecca Randell
Svetlena Taneva
Helena Mentis
Ann Blandford

Fieldwork in Healthcare
Guidance for Investigating Human Factors in Computing Systems
Dominic Furniss
Rebecca Randell
Aisling Ann O’Kane
Svetlena Taneva
Helena Mentis
Ann Blandford

http://www.morganclaypool.com/
doi/pdf/10.2200/S00552ED1V01Y201311ARH005

http://www.morganclaypool.com/
doi/pdf/10.2200/S00606ED1V02Y201410ARH007
Readings - Books


http://link.springer.com/978-3-319-17272-9

- All chapters are part of their 3 books and are available for free as a PDF while on UCSD campus (or VPN) through the class page URLs.
2) Fieldwork for Healthcare - Case studies: Ch 5, "Finding Balance: Matters of Ethics, Consent, and Emotional Work When Studying Handover in Hospitals"  
3) Fieldwork for Healthcare - Guidance: Ch 1, "Ethics, Governance, and Patient and Public Involvement in Healthcare" |
2) Fieldwork for Healthcare - Case studies: Ch 6, "Fieldwork and Challenges of Access"  
3) Fieldwork for Healthcare - Guidance, Ch 2: "Fieldwork and Challenges of Access"  
4) Fieldwork for Healthcare - Guidance, Ch 5: "Healthcare Intervention Studies in the Wild" |
| W3 | Models, Methods and Theories for HCI4H | 1) Cognitive Informatics for Biomedicine: HCI in Healthcare, Ch 6, "Computational Ethnography: Automated and Unobtrusive Means for Collecting Data In Situ for Human–Computer Interaction Evaluation"  
2) Fieldwork for Healthcare - Guidance, Ch 4, "Practicalities of Data Collection in Healthcare Fieldwork Studies"  
| W4 | Teamwork: Emergency and Trauma Medicine | 1) Cognitive Informatics for Biomedicine: HCI in Healthcare, Ch 10 "Design for Supporting Healthcare Teams"  
2) Fieldwork for Healthcare - Case studies: Ch 2, "Understanding Trauma Resuscitation: Experiences from the Field and Lessons Learned"  
3) Fieldwork for Healthcare - Guidance: Ch 3, "Establishing and Maintaining Relationships in Healthcare Fields" |
| W5 | Operating Rooms and Medical Devices | 1) Cognitive Informatics for Biomedicine: HCI in Healthcare: Ch 8, "Human Computer Interaction in Medical Devices"  
2) Fieldwork for Healthcare - Case studies: Ch 1, "Confessions from the Operating Suite: Negotiating Capture, Resistance, Errors, and Identity"  
3) Fieldwork for Healthcare - Case studies: Ch 11, "Studying Patients' Interactions with Home Haemodialysis Technology: The Ideal and The Practical" |
| W6 | Vulnerable Populations | 1) Fieldwork for Healthcare - Case studies: Ch 3, "HCI Observations on an Oncology Ward: A Fieldworker’s Experience"  
2) Fieldwork for Healthcare - Case studies: Ch 9, "Designing Technology for Extremely Vulnerable Adults: The Important Role of Staff in Design and Ethics"  
3) Fieldwork for Healthcare - Guidance: Ch 6, "Impact of Fieldwork in Healthcare: Understanding Impact on Researchers, Research, Practice, and Beyond" |
2) Fieldwork for Healthcare - Case studies: Ch 7, "Building Relationships: HCI Researchers at a Gastro Surgical Department"  
3) Cognitive Informatics for Biomedicine: HCI in Healthcare: Ch 5, "Evaluation of Health Information Technology: Methods, Frameworks and Challenges" |
| W9 | Beyond the Clinic | 1) Fieldwork for Healthcare - Case studies: Ch 12, "Experiences in HCI, Healthcare, and Development: Lessons from the ParoPen Project in Kenya"  
2) Fieldwork for Healthcare - Case studies: Ch 10, "The Challenges of Interviewing Older People in Their Own Homes: Reflections and Suggestions from the Field"  
3) Cognitive Informatics for Biomedicine: HCI in Healthcare, Ch 12 "The Role of Human Computer Interaction in Consumer Health Applications: Current State, Challenges and the Future"
Assignments

- Week 1: CITI Training (see later)
- Week 2-8: Weekly essay (in groups of 2 selected by the instructors) on the site visit experience
  - Tailored to a specific point of view (the patient, the clinician, the researcher, the bioethicist, the entrepreneur)
  - Pointers to the readings
- Week 3-9: Reading’s presentation (1 chapter per student: select the chapter and week ASAP at http://hci4h2018.youcanbook.me)
- Week 2-10: Iterative work on research design and prototype
  - W2: Design Thinking Proposal
  - W10: Final presentation and prototype demo
Presentations

- 3 presentations by 3 students on Thursday
  - 10min presentation
  - 5min questions
  - 5min discussion
MeshEdu

Words that were not understood, were never spoken

http://meshedu.org/
Essays and PeerStudio

- Weekly essays
  - Reflect on the site visit and the topic of the week
  - Reference the readings
  - Submit Draft by Friday night
- Draft Reviews and Revision
  - By Sunday night: 3x reviews (random assignment of other students’ submissions)
  - By Tuesday night: Revision of the draft based on the reviews
- Final Review
  - By Thursday (before class) 3x final review (random assignment of another student’s submission)
PeerStudio helps you get meaningful feedback from peers

Submit work
Each project is broken down into smaller parts to make it easy for you to submit your work. You’ll know exactly how your work will be evaluated: preview your submission and the evaluation criteria before you submit.

How it works
PeerStudio is a tool for peer evaluations.

https://compare.peerstudio.org/
The paper tries to find one good solution to one problem. I feel that this is a good approach because it is better to make one good solution, rather than having many small bad ones. I would love to see in the discussion and conclusion potential negative sides with the solution and how they would think their solution overcomes these negative sides, or how the ins are better than the outs. For example, how can the sender be certain that the receiver has received the message? How do you decide who is receiving the message? (priority-queue?) And how long do you wait for a confirmed message response before you send the message to the next person?

Style & Structure
A good essay is well written from start to finish, without spelling, grammar, or use of English errors. Good essays should also be well organized, clear, and present ideas in a coherent way. Finally, the essay should be objective and address all the issues referred in the proposed topic, with an in-depth analysis. The information provided in the essay should be sufficient to discuss and understand these issues completely.

The essay is free of spelling and grammar errors.
Yes: 2  No: 0  
The essay has a proper use of English (sentence structure, vocabulary, punctuations).
Yes: 2  No: 0  
The essay has a proper distribution of paragraphs and sections.
Yes: 2  No: 0  
The essay is well formatted, organized, and indented.
Yes: 2  No: 0  
The essay is within the appropriate length (500 to 1000 words)
Yes: 1  No: 0  
The essay is coherent, clear, and easy to understand.
Yes: 2  No: 0  

Introduction
Accidents happen in an instant. They're unprecedented and unexpected and often times can be catastrophic. It's times like these where emergency medicine comes into play. Emergency medicine is a medical specialty focused on treating and caring for patients who present in a critical state of illness or injury. On Tuesday, January 19th, we were given the opportunity to explore the Emergency Department (ED) at Thornton Hospital as part of the UCSD Emergency Department Site Visit: A User Researcher's Perspective.

Methods
We modeled our research approach with the DCoT framework that Furniss & Blandford (2008) used in their study of an EMD (emergency department) team, where “the focus was on describing the work system, identifying sources of weakness and projecting the likely consequences of a redesign” (R.J. Kaufman et al., 2009). After our on-site field research, we too identified weaknesses in inefficient forms of communication.

Discussion
After some observation, we realized a workable solution involving a small, wearable device that could fit on the user and not be a hassle to carry around, this way the physician would be most likely to have it with them when contacted or else the device would fail its purpose, and comfortable. We propose a wearable Bluetooth device that fits snugly in the ear of the provider in which the user attempting to reach that provider need only dial their “Bluetooth number”. However, if the user wishes to broadcast their message, they may do so by typing a “dial broadcast” message. This would decrease the amount of overload noise created by messages received over the intercom for physicians and patients. A trial would need to be conducted to test the effectiveness and usability of the device as well as determine if it decreases the amount of noise in the ED.

Another solution is the Vocera Collaboration System (Vocera CS), an integrated voice and HIPAA-compliant secure messaging platform that enables device-agnostic voice-activated access to patient electronic medical records (EMRs). This system leverages the BioVocera ReadWrite Health System (RWHS) team to integrate care in real-time while allowing for secure communication of relevant information to the nursing station to ascertain who is caring for a patient.
Research Proposal and Prototype

• Your idea for a research project to solve a problem in the healthcare space with interactive technology
• Driven by the experiences during the site visits
• Pairs of students (team up yourself)
• Iteratively developed over 8 weeks
• Guidance from the instructors
• Iterative prototype (more later in week 2)
• Final submission by the end of Week 10
• Final Presentation during Week 10
Evaluation

1. Weekly essay covering specific site visits and assigned topic: 40% (25% the essay, 15% the peer reviews)

2. Readings Presentation and engagement in the discussions: 20% (10% the presentation, 5% the MashEdu quizzes, 5% the discussion and participation)

3. Final “Vision” Proposal, Prototype, and Presentation: 40% (25% Final proposal, 15% Final presentation)
Communication

- Instructors email address: hci4h@hci.ucsd.edu (start the subject line with the [HCI4H] tag.)

  - Students discussions
  - Instructors discussions
  - The way we will communicate with you,
HCI4H: Human-Computer Interaction for Health - Winter 2018

HCl4H

Human-Computer Interaction for Health (HCI4H) explores the challenges of designing and introducing new interactive and sensing technology to study healthcare and address its core problems.

The advent of new interactive technology including tablets, smartphones, tracking devices, depth cameras, wearable devices, augmented reality goggles, and so on, has raised new opportunities for studying and applying this technology to the healthcare domain. However, healthcare is an extremely challenging environment to research and develop technology for. Numerous regulations for the protection of patients and their data has an impact on how technology can be used in healthcare. These rules include the Health Insurance Portability and Accountability Act (HIPAA), federal administrations such as the Food and Drug Administration (FDA), and institutional bodies such as the human subject protection programs and the Institutional Review Board (IRB).

Nevertheless, developing technology to improve care and study human-computer interaction in healthcare has the potential to have a clear and important impact on improving the workflow of healthcare professionals, and ultimately the life of people.

In this class students will be exposed to the healthcare domain at large, including visits to hospital facilities, such as emergency rooms, trauma rooms, operating rooms, radiology clinics, outpatient medical offices, medical students teaching facilities such as the new multimillion Medical Education Building (MET), which includes the Simulation Training Center (STC), the Center for the Future of Patient Care (CFPS), and the Center for the Future of Surgery (CFS), but also other measurement centers such as the Calit2 Exercise and Physical Activity Resource Center (EPARC), sleep clinics, and technology-centered health companies such as the West Health Institute.

The HCI4H class will approach the field by being exposed to the health-related regulations and the human protection courses offered by the CITI program. We will also brainstorm about the application of a variety of cutting-edge interactive technologies that are currently being used and can potentially be used in the near future to support healthcare, including Microsoft Kinect, Google glasses, Digital Pens, Mobile Health tracking devices (Pittb1/Digital scales/Elasta/Microsoft Band/Apple Watch), Microsoft Hololens, and more. We will explore current research with and around this technology based on a variety of currently running projects such as TraumaPen and TraumaGlass, the wearable Google Glass Chroma, the SMART physical activity and diet project, UbiStroke, the QUICK project on quantifying use of the electronic medical records, and others.

SCHEDULE
Lecture
Tuesdays and Thursdays 2:00pm - 3:20pm
EBU3B (CSE Building) 2154
(Visits are offsite on UCSD campus or close-by, typically on Tuesdays, see schedule)

TEACHING TEAM
Prof. Nadir Weibel
Email: weibel@ucsd.edu
Office: CSE 3224
Office Hours: By Appointment

Yoanatan Vaizman (TA)
Email: yvaizman@eng.ucsd.edu
Office Hours: TBD
Where: TBD

COMMUNICATION AND EXTERNAL RESOURCES
Teaching team: hci4h@hci.ucsd.edu
Piazza: http://piazza.com/ucsd/winter2018/hci4h
PeerStudio: https://www.peerstudio.org/
Grades: https://www.gradesource.com

http://hci4h.ucsd.edu/
Assignment 1
CITI/HIPAA Training

https://www.citiprogram.org/
http://irb.ucsd.edu/hipaatutorial/login.html

Start in Class on Thursday
due Thursday 1/18 2pm, before class.
For Thursday

• Register on Piazza and start discussion on groups
• Start looking at Assignment 1 (CITI Training), due Thursday 1/18, 2pm
• Read course website
Readings for Week 1


2. Fieldwork for Healthcare - Case studies: Ch 5, "Finding Balance: Matters of Ethics, Consent, and Emotional Work When Studying Handover in Hospitals"

3. Fieldwork for Healthcare - Guidance: Ch 1, "Ethics, Governance, and Patient and Public Involvement in Healthcare"
Next... [Tentative]

- Next week Tuesday: Site Visits: Center for the Future of Surgery

http://cfs.ucsd.edu/
Thank you!