

Human-Computer Interaction

Course

Introduction

Professor Bilge Mutlu

Today's Agenda

- » Topic introduction
- » HCI research at Wisconsin
- » Course introduction

Questions

To ask questions during class:

- » Go to slido.com and use code #**2938904** or [direct link](#) or scan QR code
- » Anonymous
- » I will monitor during class



Instructional Team

Instructor: Bilge Mutlu

Professor of Computer Science, Psychology, & Industrial Engineering

Director of People and Robots Laboratory

PhD, 2009, Carnegie Mellon University

bilge@cs.wisc.edu, <http://bilgemutlu.com>

<http://bmutlu.github.io/research-summary/>



Instructional Team

TA: Ru Wang / 王儒

Third year graduate student

Department of Computer Sciences



*How about you?
Give us your name, program, year.*

What is this course about?

Human-Computer Interaction

*What does HCI mean to you?
Who can give a definition?*

Different Perspectives

Design Implications

I want to design a computer system and need to know what to design.

Systems

I would like to discover new ways of making user interfaces.

Evaluation

I have designed a computer system and would like to understand whether it is any good (for people).

Understanding Impact

I would like to understand how a computer system that I designed affects people's lives.

Societal Change

I would like to understand how a computer technology affects society at large.

Definitions

“...a discipline concerned with the design, evaluation and implementation of interactive computing systems for human use and with the study of major phenomena surrounding them.”

— ACM

Where does HCI fit within Computer Science?

1



¹Image sources: [1](#), [2](#), [3](#), [4](#), [5](#), [6](#)

What's missing here?

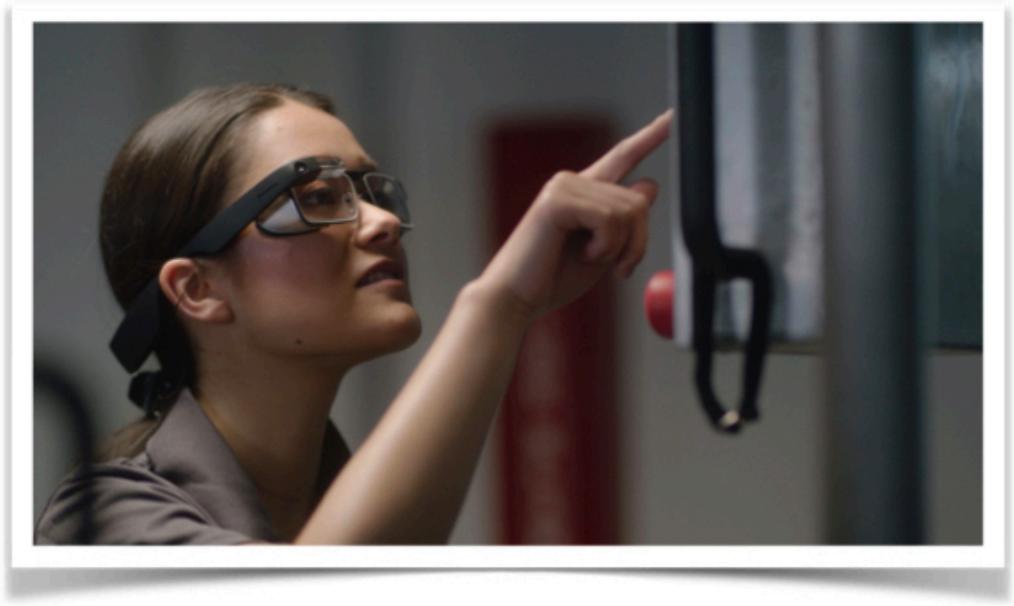
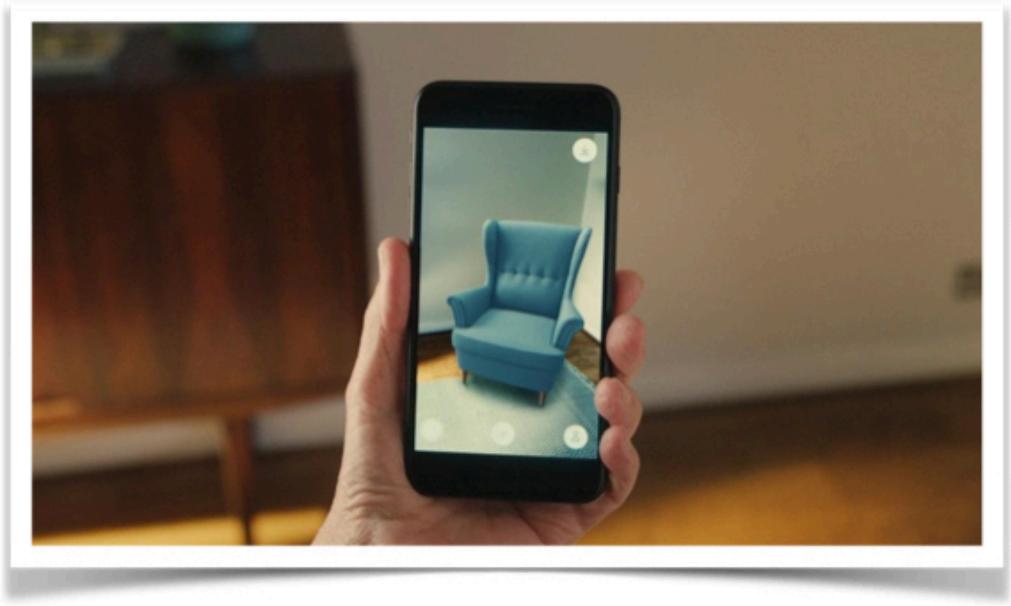
“The old computing is about what computer can do, the new computing is about what people can do [using the computer].”²

— Schneiderman, 2002

²Image source



3



³ Image sources: [1](#), [2](#), [3](#), [4](#), [5](#), [6](#)

*Where does HCI fit within psychology/
education?*

4



⁴ Image sources: [1](#), [2](#), [3](#), [4](#)

What's missing here?

5



⁵ Image sources: [1](#), [2](#), [3](#), [4](#)

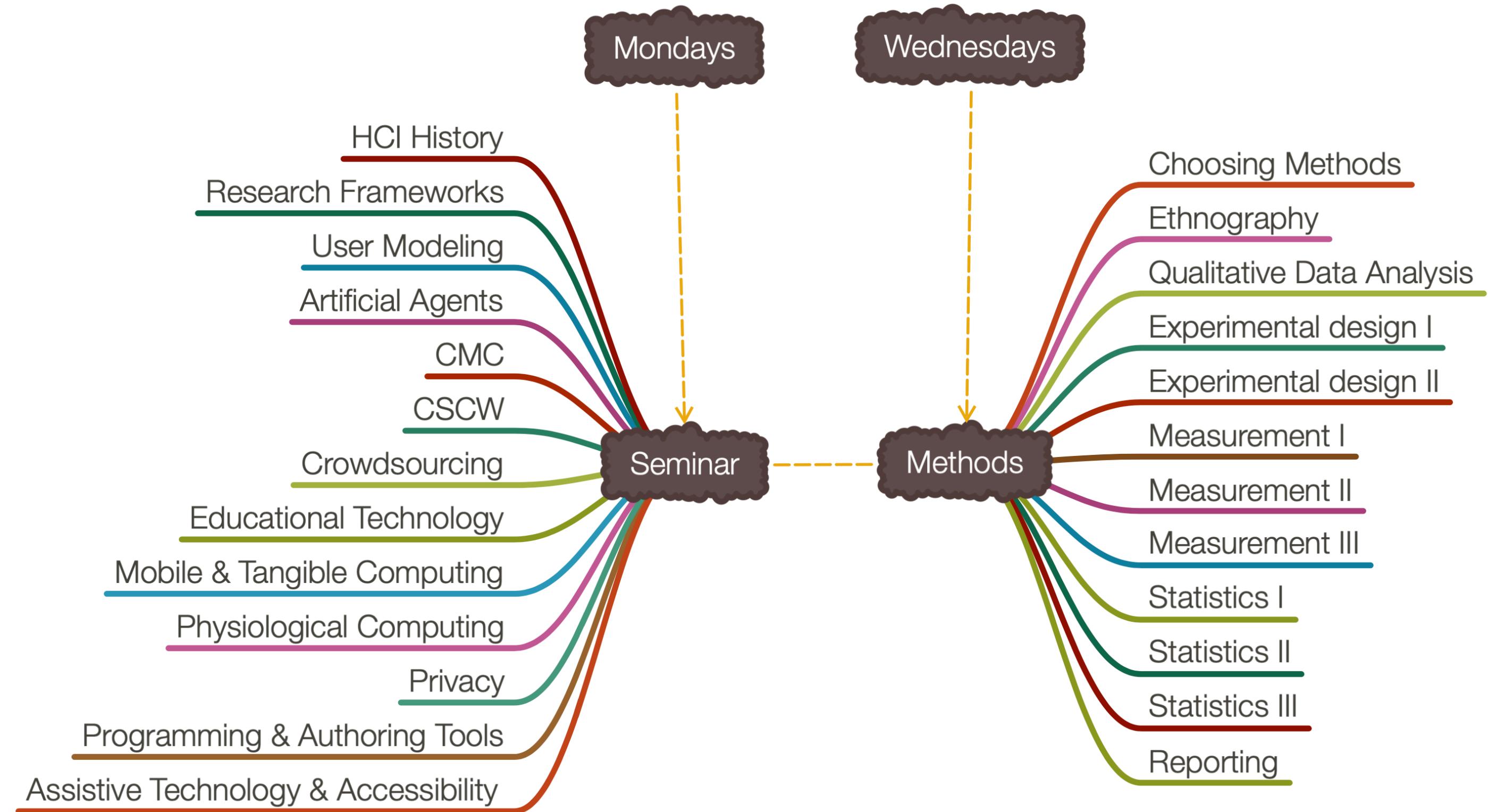
Seminar in HCI

+

Research Methods in HCI

+

Independent Study in HCI



Wearable computing⁷



CSCW



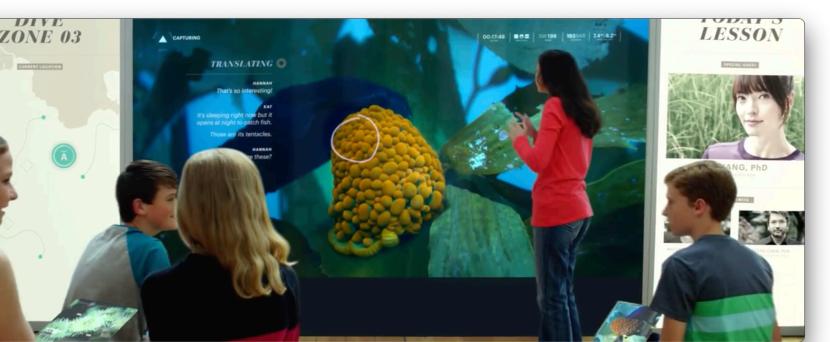
CMC



Tangible computing/AR



Educational Technology

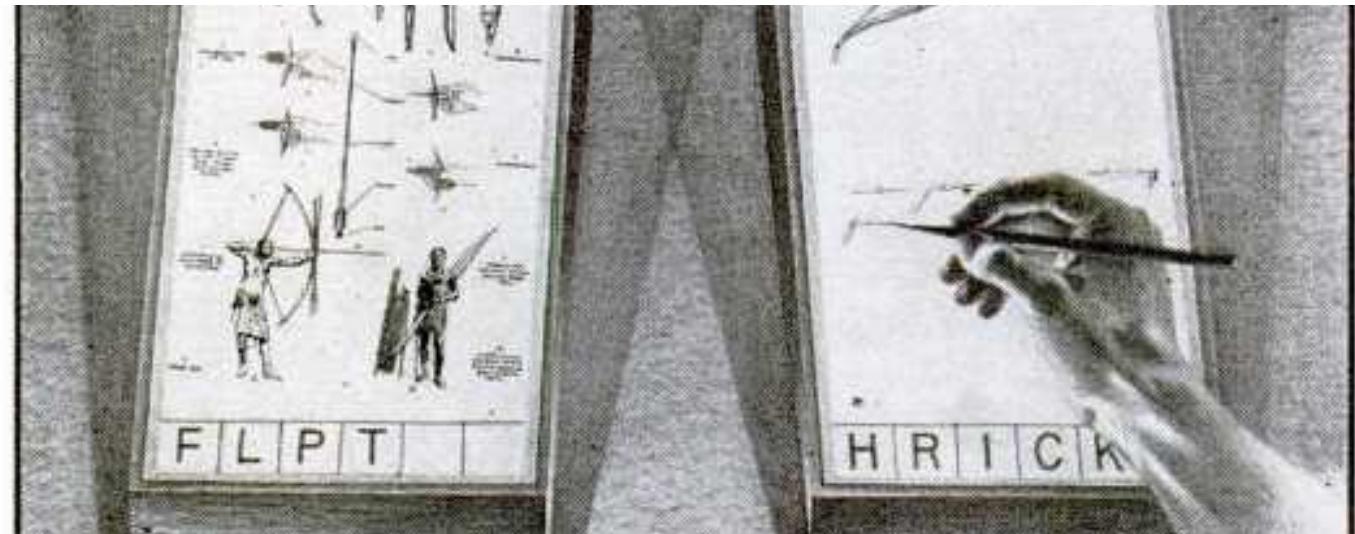


Human-Robot Interaction

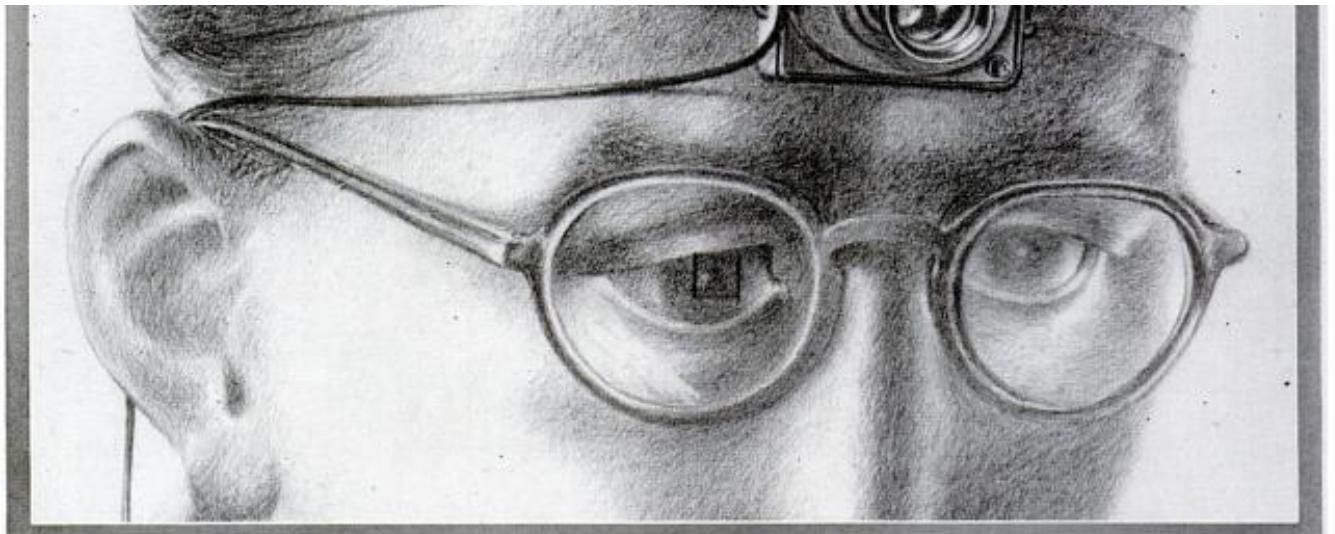
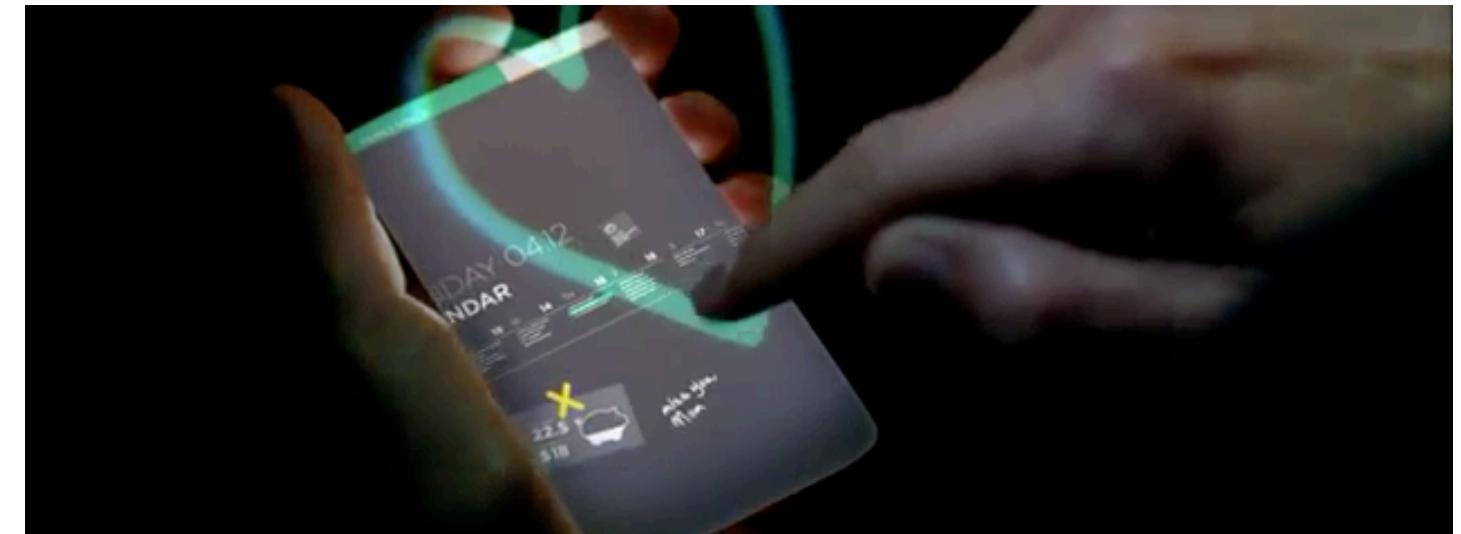


⁷ Microsoft Office

1945 (Vannevar Bush)⁸



2011 (Microsoft)



⁸[Wired](#), [Microsoft](#)

Questions?

HCI Research @ Wisconsin

CDIS[CS, iSchool]

Distributed [ISyE, EdPsych, Psych, ME]

HCI Research in CS

Yea-Seul Kim



Bilge Mutlu



Michael Gleicher



Yuhang Zhao



**Information
visualization,
data-driven
decision making**

**HRI, end-user
programming,
educational
technology**

**Information
visualization,
graphics, HRI**

**AR/VR interfaces,
accessibility**

HCI Research at the iSchool

Corey Jackson



Adam Rule



Jacob Thebault-Spieker



Citizen science, science engagement, online communities

Medical informatics, health decision making, information visualization

Social computing, bias and fairness

Other HCI-related Research on Campus

John Lee (ISyE)



*AR/VR,
automotive
interfaces*

**Paula Niedenthal
(Psych)**



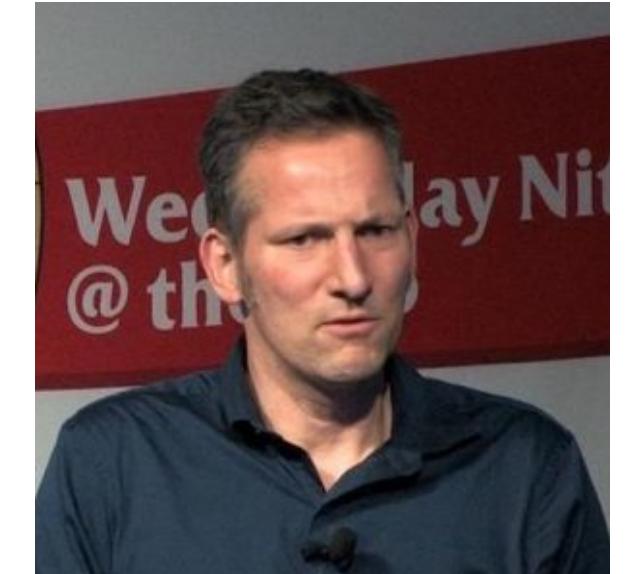
*Affective human-
machine
interaction*

**Shamya Karumbaiah
(Ed Psych)**



*Human-centered
AI, learning*

**Michael Zinn
(ME)**



Haptic interfaces

Questions?

Course Outline

What's the difference between 570, 571, and 770?

“...a discipline concerned with the design, evaluation and implementation of interactive computing systems for human use and with the study of major phenomena surrounding them.”

— ACM

“...a discipline concerned with (570, 571) [the design, evaluation and implementation of interactive computing systems for human use] and with (770) [the study of major phenomena surrounding them].”

— ACM

770

- » Research methods
- » For grads from across campus
- » Project-based
- » No technical background

570

- » Design methods
- » For undergrads
- » Project-based
- » No technical background

571

- » Design/building methods
- » For CS undergrads
- » Assignment-based
- » Needs at least CS-400 & JS

Let's focus on 770

Learning Goals

1. Define research questions, construct hypotheses, map out and identify gaps in the research literature, and situate research questions and hypotheses in existing knowledge
2. Gain familiarity with seminal research across various topics in human-computer interaction
3. Determine the research approach that best fits a research question, identify variables of interest for empirical investigation, and design qualitative, quantitative, and hybrid studies

1. Determine appropriate objective, behavioral, physiological, subjective, and composite measures for empirical investigation
2. Design survey questions, construct scales, and assess reliability and validity
3. Analyze qualitative and quantitative data using grounded theory and statistical methods
4. Carry out a project to investigate an original research question in human-computer interaction
5. Write an academic paper to report on research design and findings

Setting Expectations

1. Be prepared to read a lot ~ 2 papers + 1 book chapter each week
2. This class will take about 10-15 hours/week (university guidelines require a *minimum* of 9 hours for 3-credit courses, and that's for undergraduates)
3. A substantial semester-long project where you will work with others
4. Be prepared to engage in discussion in class

Questions?

Overview of Syllabus

Three modules

1. Seminar
2. Methods
3. Project

Module 1: Seminar

General Outline⁹

We will read seminal papers, discuss them online and in class.

- » You will read 1–2 papers per week and will find 1 resource (an academic paper, popular science article, a video) yourself
- » First 45 minutes of Tuesday class
- » I will give a 30-minute overview of the topic and lead a 30-minute in-class discussion

⁹Image source



Online Discussion

Students reflect on the topic (from the readings and/or the resource they found) in online forum

- » Minimum of 250 words
- » Due Sunday midnights
- » Post on Canvas
- » Graded on timeliness, depth, and substantiveness

Reply

Sam Lemley
Sep 15, 2018

In reading *A Moving Target—The Evolution of Human-Computer Interaction*, I was surprised to varying fields that contributed to Human Computer Interaction, as well as the various fields applied. For instance, I did not realize that the field of Library Science was a fundamental component of what we consider HCI today. Library Science involves the efficient management of information, which makes perfect sense as an inspiration for the tools computers have been developed. Additionally had not considered the overlap of programming languages research and HCI research and debugs code in programming languages at work, essentially all of my tasks involve a computer. However, I understand that I benefit from later exploration into novice systems and expert systems mapping research which seemed to focus on expert systems and human factors. It is interesting to think about human factors and ergonomics as a distinct division of HCI. Before words like usability and design came to mind when I would think of HCI. I hadn't thought much towards expert users. But as an example, a tool that takes time to master such as Vim is designed for users who are comfortable with the commands, while a user with no experience may be lost. This doesn't mean that Vim is poorly designed - undoubtedly countless hours went into its design, and it works well for people who have taken the time to learn it. While it is "usable" for new people, this does not mean that expert tools are developed without HCI.

Classroom Discussion

We will work together to try to come up with a list of takeaways.

- » 15-minute group discussion — write down key points to a note doc
- » 15-minute summary & discussion from each group
- » We will distill takeaways and share the notes after class

We'll review the process on Monday.

Why are we doing this?

- » **Dialectics** — through discussion, we establish common themes/concerns/ground
- » **Reflection** — you rarely get the chance to engage in open-ended discussion on research topics
- » **Trivium** — you will get the grammar (language), logic (mechanics), and rhetoric (arguments) of a topic

Module 2: Methods

General Outline¹⁰

We will learn about HCI research methods through lectures and hands-on-activities.

- » Every week, a new research method is presented
- » Reading a chapter from the textbook (necessary for hands-on activity)
- » Lecture for ~30 minutes
- » A~30-minute hands-on activity (graded for completeness)

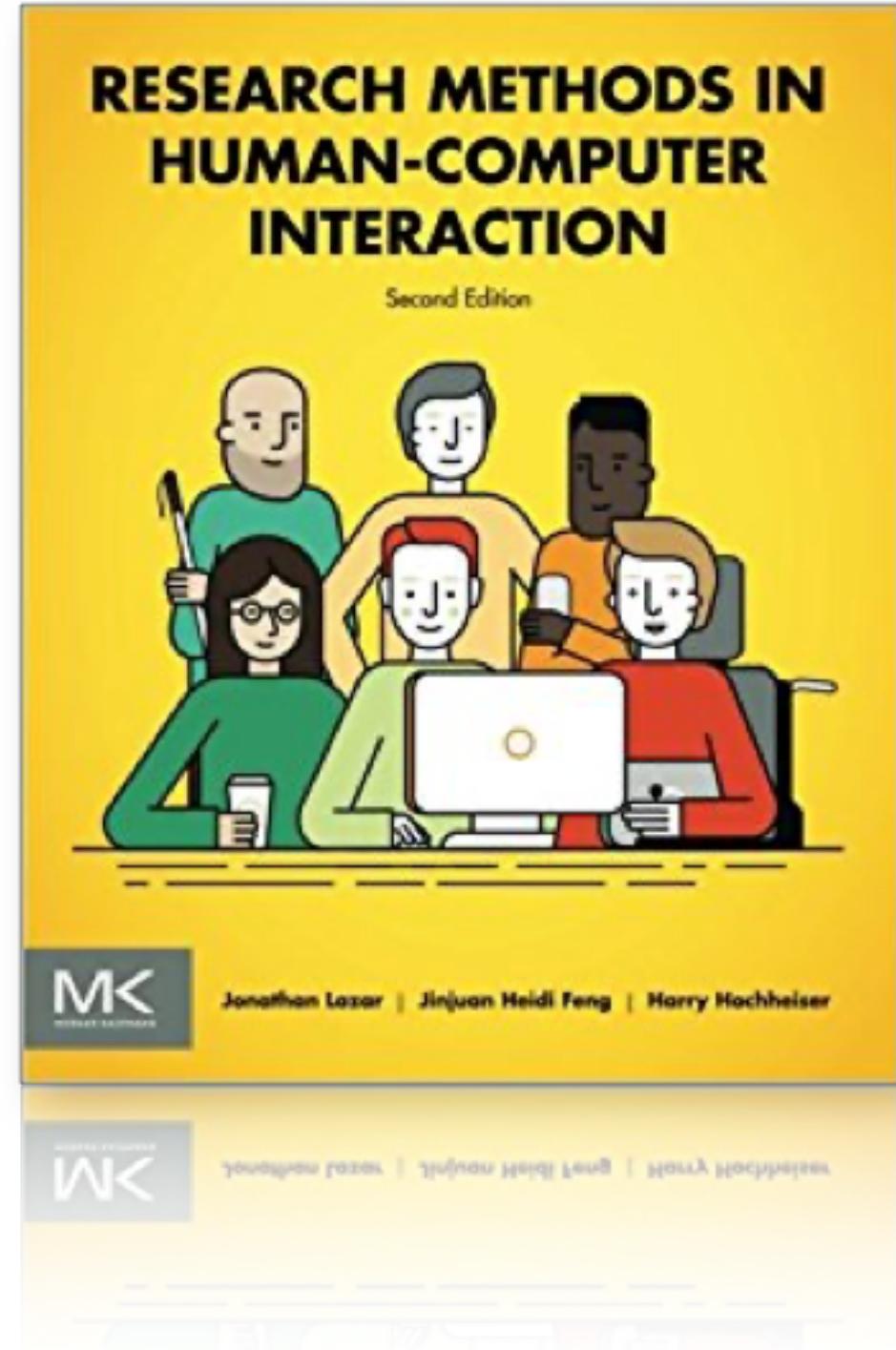
¹⁰[Image source](#)



Textbook

Research Methods in Human-Computer Interaction, *Second Edition*, Lazar et al., 2017

Free through the University Library



Why are we doing this?

- » **Learning** — you will learn a sample of all of the major methods and tools used in HCI research
- » **Practice** — you will practice some of the critical ones in structured, guided ways

Module 3: Project

General Outline

We will carry out a semester-long research project where you will connect and practice the **seminar** and **methods** modules.

- » ~3-student teams
- » We will use the last 15 minutes of class on Mondays and Wednesdays to discuss project goals, steps, deliverables
- » Feedback during office hours, through deliverables
- » Expectations will differ based on the number of group members

Project Deliverable

- » We will incrementally write a ~8-page paper in the ACM SigCHI format, potentially submittable to an HCI conference.
- » The project should include both qualitative and quantitative methods.

2012

Chidambaram et al.

Designing Persuasive Robots: How Robots Might Persuade People Using Vocal and Nonverbal Cues

Vijay Chidambaram, Yueh-Hsuan Chiang, Bilge Mutlu
Department of Computer Sciences, University of Wisconsin-Madison
{vchidam, yhc, bilge}@cs.wisc.edu

ABSTRACT

Social robots have the potential to serve as personal, organizational, and social media agents. In this paper, we explore how the robot's voice and body language can affect participants' perceptions of the robot's intentions, and encourage respondents. The success of the robot's persuasive intent depends on the type of cues it uses and the context in which it uses them. We conducted two experiments to investigate the role of the robot's vocal and nonverbal cues in encouraging them to follow execution instructions. Our results indicate that the robot's vocal and nonverbal cues are effective in persuading people to follow execution instructions. We also found that the robot's vocal and nonverbal cues are more effective than the robot's text-based instructions in persuading people to follow execution instructions. We also found that the robot's vocal and nonverbal cues are more effective than the robot's text-based instructions in persuading people to follow execution instructions.

In this paper, we explore how a robot can use its vocal and nonverbal cues to persuade users. In our experiments, we show that the robot's one of nonverbal cues affected participants' perceptions of the robot's intentions, and encouraged them to follow the robot's suggestions across four conditions: (1) no vocal and nonverbal cues; (2) vocal only; (3) nonverbal only; and (4) vocal and nonverbal cues. The results showed that participants perceived the robot's intentions more when it used nonverbal cues than they did when it did not use nonverbal cues. The results also showed that participants perceived the robot's intentions more when it used both vocal and nonverbal cues than when it used either vocal or nonverbal cues. Cheating is not accepted in one-player games in the game world; other players either resent to cheating themselves or disengaging entirely with the game (Kubas, Terpna, Cilia, & Buchmann, 2005).

Categories and Subject Descriptors

H.I.2.2 Models and Principles: User/Machine System

H.I.2.3 Information Integration and Presentation: User Interfaces/Information Integration and Presentation

H.I.2.4 Interaction Techniques: User-centered design

General Terms

Design, Human Factors

Perception, Persuasion, Persuasion, Persuasion, Persuasion

Persuasion, Persuasion, Persuasion, Persuasion, Persu

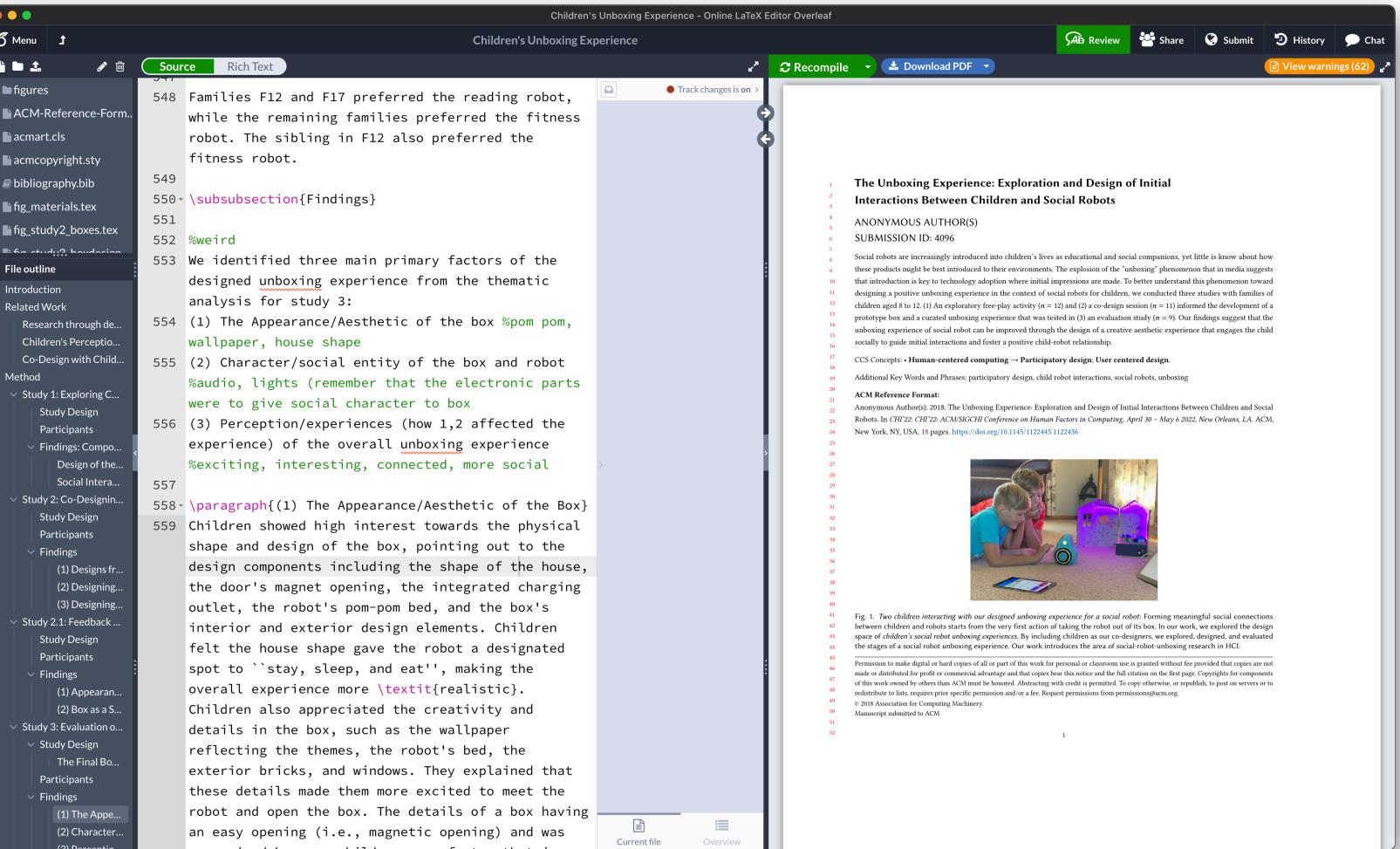
Project Topics

Take inspiration from last year's CHI paper-award winners at CHI using the algorithm:

1. Skim a set of papers
2. Focus on 2–3 based on interest/research style
3. Read related work to understand gap
4. Read what the paper did to understand where it fits
5. Determine what else remains unexplored from limitations
6. Zoom out, choose topic, find partner (optional)

Project Deliverables¹¹

- » Project Topic
- » Literature survey, RQs
- » Method
- » Data
- » Analysis, results
- » Final paper



¹¹Image source

Why are we doing this?

- » Practicing research in an uncontrolled, unstructured, long period
- » Bridging the seminar and the methods, contextualizing the methods within the seminar topics

Questions?

Course Policies

Grading

Assessments	Points
Seminar: Participation in online discussions	15
Methods: Hands-on activities	20
Project	40
Final presentation & Paper	20
General: Attendance, classroom participation	5
<i>Total</i>	100

Letter grade	Grade range	Description
A	93.5–100	Excellent work (<i>Exceeds expectations</i>)
AB	89.5–93.4	Good work (<i>Robustly meets all stated requirements</i>)
B	83.5–89.4	Adequate work (<i>Meets the spirit of all stated requirements</i>)
BC	79.5–83.4	Slightly below adequate (<i>Missing small required elements or turned in late without approved extension</i>)
C	73.5–79.4	Below adequate (<i>Missing required elements or turned in late without approved extension</i>)
D	73.4–63.5	Well below adequate (<i>Missing many required elements or turned in late without approved extension</i>)
F	63.5	Inadequate (<i>Work not turned in, no extension requested</i>)

Rule of Thumb: If you complete every assignment, you should be getting an **A** or an **AB**. So, just come to class, do the work, and don't worry about your grade.

Communication

Type	Examples	Channel
Question about course content	"R is giving me a singularity error;" "Should we be turning in our data file?"	Post on Piazza
Personal questions	"I am traveling to a conference on <date>;" "I have to travel to my home country because of an emergency!"	Send message to me/TA via email
Feedback request	"Can we get feedback on our study design;" "Can you check if I'm doing this analysis right?"	Office hours + appointment

During Class

Laptops/tablets: Laptop and tablet use is encouraged for the ongoing class and discouraged for anything else:

- » Engaging in Piazza; looking through readings, slides; researching
- » We will have sli.do at every lecture for questions

Phones: Should be put away.

In general, please strive to **be present**.

Late, Absence Policy

Late assignments: Will lose 20% of the total grade for the assignment for each day it is late. Only true emergencies (e.g., hospital visits) justify extensions.

Each project group will have **one grace day** for your assignment across the semester (Five project assignments in total; cannot be used for the final paper submission).

Missing class: $E[m] = 2, m = \{0, 1, \dots, 29\}$, so we will discount two absences from hands-on-activities/classroom discussion.

Logistics

- » [Course Website](#) | [Course Canvas](#)

Office Hours

- » **Instructor:** Wednesday 2:30–3:30 pm, CS 6381
- » **TA:** Tuesday/Thursday 4:00–5:00 pm,
[Zoom](#)

CS-770 HCI

Search CS-770 HCI

Overview

Schedule

Syllabus

Welcome to CS-770 Human-Computer Interaction!

This course introduces graduate students in computer science, psychology, educational psychology, and other disciplines research topics, principles, and research methods in human-computer interaction (HCI), *an interdisciplinary area concerned with the study of the interaction between humans and interactive computing systems*. Research in HCI looks at major social, cognitive, and physical phenomena surrounding human use of computers with the goal of understanding their impact and creating guidelines for the design and evaluation of software and physical products and services in industry.

The course consists of three modules: (1) **seminar**, which reviews major research topics in HCI through a set of readings, class presentations, and discussions; (2) **methods**, which covers qualitative and quantitative human-subjects research through lectures, tutorials, hands-on activities, and weekly assignments; and (3) **project**, where students complete a semester-long project, usually involving empirical research, that culminates in the writing of a short paper. Below is a visual overview of the topics that will be covered in the seminar and methods modules.

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graph TD; subgraph Mondays [Mondays]; A[HCI History]; B[Research Frameworks]; C[Artificial Agents]; D[CMC]; E[CSCW]; F[Crowdsourcing]; G[Accessibility]; H[Educational Technology]; I[Mobile & Tangible Computing]; J[Physiological Computing]; K[Privacy]; L[Assistive Tech & Accessibility]; M[Final Presentation]; end; subgraph Wednesdays [Wednesdays]; N[Choosing Methods]; O[Ethnography]; P[Qualitative Data Analysis]; Q[Experimental design I]; R[Experimental design II]; S[Measurement I]; T[Measurement II]; U[Measurement III]; V[Statistics I]; W[Statistics II]; X[Statistics III]; Y[Reporting]; end; A --> M; B --> M; C --> M; D --> M; E --> M; F --> M; G --> M; H --> M; I --> M; J --> M; K --> M; L --> M; M --> Seminar; N --> Seminar; O --> Seminar; P --> Seminar; Q --> Seminar; R --> Seminar; S --> Seminar; T --> Seminar; U --> Seminar; V --> Seminar; W --> Seminar; X --> Seminar; Y --> Seminar; Seminar --> Methods; Methods --> N; Methods --> O; Methods --> P; Methods --> Q; Methods --> R; Methods --> S; Methods --> T; Methods --> U; Methods --> V; Methods --> W; Methods --> X; Methods --> Y;
```

Course Resources

[Course Canvas Page](#) [Course Piazza Page](#) [Course Textbook](#)

COURSE LOCATION	MW 11:00 am-12:15 pm, VILAS 4028
INSTRUCTOR OFFICE HOURS	Wednesday 2:30-3:30 pm, CS 6381
TA OFFICE HOURS	Tuesday/Thursday 4:00-5:00 pm, Zoom

This site uses [Just the Docs](#), a documentation theme for Jekyll.

Questions?

What's next?

- » **Seminar**

- » *Readings* due on Monday; *forum comment* — due on Monday

- » **Method**

- » *Chapter reading* — due on Wednesday

- » **Project**

- » We'll discuss on Monday; *topic selection* — due Feb 9