What Is (And Isn’t) HCI Research?
Announcements

The magic of Stanford’s library proxy: https://library.stanford.edu/using/connecting-e-resources/connect-campus-faq

Project brainstorm due next Friday

Watch your email for discussant assignments being sent out (sign up for studio if you haven’t yet!)
Why are we here?

This is a good class for you if: you are looking to get engaged in HCI research or theory, or want to deepen your understanding of it.

HCI Research is a graduate-level research seminar course, not your typical HCI project course. It requires mastery of HCI concepts or concepts in adjacent fields.
Research vs. practice

Research introduces fundamental new ideas into the world. These fundamental new ideas are called contributions. Research contributions often follow a formula:

• **Setup:** Industry and other researchers all thought one way about a problem.

• **Punchline:** “No, let’s do it this way instead.” The researcher offered a new perspective that nobody had ever considered or made feasible before. They proved out their idea as the better approach.
Research vs. practice

Research contributions in HCI articulate a high-level approach to design, or a social scientific insight. While they are situated or studied in a particular context, ideas are generalizable and can be applied to new situations.

Examples from last class: embedding interfaces into clothing, projecting interfaces onto body surfaces, using a depth sensor to detect interaction in a room.
How do I know?

For design and engineering ideas

Ask yourself: is it possible to solve this problem using a set of techniques that is already known?

• If so, it is usually not original research.
• If not, it is more likely to be research.

Ask yourself: has this technique been introduced in other HCI contexts?

• If so, it is usually not original research.
• If not, it is more likely to be research.
Ask yourself: is the problem already known to the HCI community?
• If so, it is not research.
• If not, it is more likely to be research.

A good idea may be old news!
State of the literature

Address a new problem
with an old solution

Activity recognition
(new) solved
with off-the-shelf ML (old)

Hard to convince the world

Address an old problem
with a new solution

Address a new problem
with a new solution

ESP Game
Ask yourself: is this phenomenon describable or is this question answerable using our existing social scientific knowledge?

- If so, it is usually not original research.
- If not, it is more likely to be research.

A good idea may be old news!

For **social science** ideas
Reasoning about invisible algorithms in news feeds

State of the literature

Answer a new question with an old method

Hard to convince the world

Tie strength and Facebook use

Answer an old question with a new method

Solve a new problem with a new technique
Examples: Research or not?
“Location sensing to autoshare shopping habits.”

Could be research if:

New problem space (e.g., no one has studied shopping before).

Your method is novel (e.g., sensing location based on smell).

Your solution generalizes to other problems (e.g., using autoshares to somehow change behavior).

Probably not research if:

You are applying a solution that we know about already to a problem that we know about already.
“Researching the new hot app TikTak.”

Could be research if:

- TikTak exemplifies an interesting point in the design space, and we use it to understand that design space.
- Theories suggest that TikTak should work one way or should not succeed, but it’s the opposite.

Probably not research if:

- You have trouble articulating what broader design choice TikTak exemplifies.
- We have studied applications like TikTak in the past, and TikTak works the same way.
For this course: if you’re doing research already...

Final project “Macro” option
Continue on your research path with the faculty member
Write up the overall project as your final project submission

Final project “Micro” option
Carve out a sub-research problem of the larger project, or a riff on the project, and tackle it end-to-end within the scope of the class

Either way, submit the idea brainstorms. The point of the assignment is to train you to articulate research concepts.
Social Computing
Human-computer interaction
Ubiquitous computing
Social computing
Social computing goals

Design systems that create new forms of human interaction

Draw on the technology-mediated nature of the medium to understand human social interaction
Sociotechnical system

The two components are interrelated and both responsible

Social interactions define the system

Technical infrastructure defines the system
Sociotechnical system

Why we use this term: it captures that the technical elements of the system are not enough to determine its behavior or outcomes.

- Wikis don’t imply Wikipedia as the outcome
- Short text messages don’t imply Twitter as the outcome

“Sociotechnical systems” emphasizes that the users and the platform are in a loop—both are literally part of the system.
The intellectual challenge of social computing [Ackerman 2000]

“The social-technical gap is the divide between what we know we must support socially and what we can support technically.”

The social sciences teach us mechanisms that are important for effective social interaction. But we lack designs that facilitate those mechanisms.

Intuitively: we know how to throw parties IRL/take classes/do work, but generally not how to engage those same mechanisms online.
Major research questions

Technological mediation lowers some transaction costs to connect with others, and increases other transaction costs. What new forms of social interaction might this produce?

How do we encourage pro-social behaviors, and regulate anti-social behaviors?

Current hot topics include:

• How sociotechnical system users are influenced by invisible algorithms that change their experience

• How to empower underserved communities to organize and resist
Algorithms and sociotechnical systems

Many are unaware of the algorithms mediate their social interactions; as a result they mis-attributed the effects of the algorithm, and reacted negatively when made aware [Eslami et al., 2015]
Major research questions

Sociotechnical systems offer a new lens onto traditional social science theory:

• How has technology-mediated interaction changed our relationships with each other and with the world?

• By observing or manipulating the technology platform, can we learn how people interact with each other?
From Social Science Theory to Social Computing Research
New data, new theories

Social science theory was built around a world where most interactions occurred offline.

How can online interactions allow us to observe social behavior in new ways, extending or complementing offline theories?

Do online interactions create entirely new forms of social behavior that require new theory?
Predicting Tie Strength

The Strength of Weak Ties [Granovetter, Am. Jour. of Soc. ’73]

Strong ties: a small number of people you know very well

Weak ties: your large number of acquaintances

Theory: your weak ties are bridges to other parts of the network; they can help you find jobs and information

How well can you predict tie strength observationally using social media?
Predicting tie strength

[Gilbert and Karahalios, CHI ’09]

Most predictive:
Days since last communication
Days since first communication
Wall words exchanged
Mean strength of mutual friends

INTIMACY
last comm num friends intimacy words

32.8%

INTENSITY
wall words outbound posts thread depth

19.7%

DURATION
first comm

16.5%

SOCIAL DIST.
educational diff political diff occupational diff

13.8%

SERVICES
links shared apps shared

7.9%

EMO. SUPPORT
inbox positive words wall positive words

4.8%

STRUCTURAL
mutual strength interest overlap common groups

4.5%

TIE STRENGTH
Adj. $R^2 = 0.534$
MAE = 0.0994
Social capital

Collective benefits derived from involvement in social environments

Bridging social capital
Social capital built up with a community or across groups (e.g., Stanford students)

Bonding social capital
Social capital built up between close friends and family
Social capital in social network sites

Facebook usage increases all types of social capital, especially bridging social capital

[Ellison, Steinfeld and Lampe, JCMC ’07]

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Emotional contagion

[Kramer et al., PNAS ’14]

If you see positive or negative status updates via social media, does it put you in a more positive or negative mood?

Method: selectively hide positive or negative status updates, and measure how many positive and negative status updates were posted.
Computer-Supported Collaborative Work
Answer Garden

[Ackerman and Malone, OIS '90]

The original Stack Overflow, Quora, Piazza

An “organizational memory” system: knowing what we know

Main idea: members leave traces for others to solve their questions
Games with a Purpose

Label every image on the internet using a game

[von Ahn and Dabbish, CHI ’06]
Scientific Collaboration

FoldIt: protein-folding game. Amateur scientists have found protein configurations that eluded scientists for years.
Flash Teams

[Retelny et al., UIST ’14]

Computationally-guided teams of crowd experts supported by lightweight team structures.
Collaborative filtering

Learning from one user's behavior to predict another user's behavior

GroupLens, aimed at personalizing and filtering usenet [Resnick et al., CSCW '94]

This paper is one of the highest cited HCI papers of all time! It is the foundation of every modern recommender system (e.g., Netflix, online shopping, …)
Collaborative filtering

Recent work has extended the idea to create a system, allowing searchers to sift through reviews and builds “lenses” reflecting their interests to generate personalized interfaces [Chang et al., IUI 2019]
Social Justice Informatics
Harassment and moderation

Reddit’s ban subreddits violating anti-harassment policy succeeded: accounts either left entirely, or migrated to other subreddits and drastically reduced their hate speech. [Chandrasekharan et al. 2017]

Friends intercept harassing emails before they appear in your inbox [Mahar, Karger and Zhang 2018]
EJI HCI

Design Justice is a new book diving into justice-focused design practices [Costanza-Chock, 2020]

Researchers are starting to draw on frameworks from other fields like intersectionality (coined originally by legal scholar Kimberlé Crenshaw) in the context of HCI [Schlesinger, Edwards, and Grinter, 2021]
Algorithmic Bias

Racial bias in Google ads—queries of people’s names suggested an arrest record twice as often for Black-sounding names compared to white-sounding names [Sweeney, 2013]

Google Image Search results for common occupations underrepresent gender and racial minorities, and such results change people’s perceptions of the world and themselves [Metaxa et al., 2021]
Critical research

Meta: researchers have criticized efforts to integrate ethics into CS education [Raji et al, 2021]

Other researchers have also explored the limitations of current language and efforts in AI fairness work [Crawford, 2018]

- (Kate Crawford is giving a talk through Stanford’s McCoy Center for Ethics on April 12!)
FIN
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