CS 147 Introduction & Course Overview
Design Thinking for User Experience Design, Prototyping & Evaluation

Prof. James A. Landay
Computer Science Department
Stanford University
Winter 2021
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Hall of Fame or Shame?
weather.com

- Need to click for weather
- What is the “first read”?
- videos
- ads
- not my local weather!
- It used to be worse!

Hall of Shame!
weather.yahoo.com

- Good!
- aesthetic
- clean typography & icons
- Bad!
- image is 1st read & ad 2nd?
- lots of empty space!

Hall of Fame!
bing.com/weather

- Good!
- aesthetic
- clean typography & icons
- Bad!
- image is 1st read & ad 2nd?
Who are We?

James Landay

- Professor in Computer Science at Stanford
- PhD in CS from Carnegie Mellon
- Co-authored The Design of Sites with Doug van Duyne & Jason Hong
- Office Hours: TBD
- Email: landay@stanford.edu

Abdallah AbuHashem

- Slowterm (HCl+AI), CS Undergrad with Ed minor
- Interested in education, ethics in CS, chess (past, Queen's Gambit)
- I love indie video games and musical theatre
- Office Hours: TBD
Education Technology
Technology is becoming more present in the education process from devices in the classroom to parents communicating with teachers. In this studio we will look at educational technology, and how this technology fits in the education ecosystem. We will look for ways that you can use careful design and technology to enhance traditional learning experiences or create new opportunities for learning that haven’t been possible before.

Examples
ClassDojo, Khan Academy, Udemy, Motion Math: Pizza!, Wonderment, Code.org

Thursday 7:30 PM-9:20 PM PT

Clara Kelley
- Stanford CS Undergrad & CS Masters (both in HCI)
- Interested in UX research, autonomy, and archery!
- I go ham for halloween costumes every year
- Office Hours
  - Wednesdays from 10-11 (before class)
- Studio: Fri 10:30-12:30

Digital Wellbeing
Especially during the pandemic, we spend much of our day staring at a screen. All of the digital activities we engage in affect our behavior and our mental and physical health. Screen addiction is real, but not totally inevitable! There are lots of unique approaches to mitigating the harms of our digital lives. In this studio we will explore topics such as social comparison and doom scrolling, and discover ways to build digital experiences that work with you, not against you.

Examples
- The Light Phone, https://www.thelightphone.com/
- Forest, https://www.forestapp.cc/
- Hinge: Designed to be Deleted, https://hinge.co/
- Off (previous CS147 project), https://web.stanford.edu/class/cs147/projects/InformationOverload/Off

Fri 10:30-12:30 PT

Victoria Ding
- CS coterm (HCI), SymSys undergrad (AI)
- Interested in interaction design, UX research, sushi
- Office Hours
  - Mondays 7:30 PM - 9:30 PM
- Studios
  - Friday 11:30 AM - 1:30 PM
  - Friday 1:30 PM - 3:30 PM

Sustainability
Sustainability is a mounting global challenge, with environmental health being inextricably linked to human health. In this studio we will explore local and global efforts to promote the health of the environment, with an eye towards maintaining a habitable planet for future generations. We will look into applications of design and technology within sustainability, such as creating eco-friendly living spaces, reducing food waste, and promoting ethical consumerism.

Examples
- Food: Too Good to Go, HappyCow
- Shopping: Think Dirty - Shop Clean, Poshmark

Friday 11:30 AM - 1:30 PM
Friday 1:30 PM - 3:30 PM

Tzu-Sheng Kuo
- National Taiwan University UG
- Stanford EE MS
- Interested in HCI research, prototyping, Mario Kart
- Office Hours
  - Tuesday & Thursday 1 - 2 PM
- Studio: Friday 09:30 - 11:30 AM
Behavior Change for Everyday Life

The widespread use of mobile devices with sensing and artificial intelligence enables technology to keep track of and infer our daily routines, such as physical activities and screen time usage. This rich and personalized data allows technology to help change and shape our behaviors for better lifestyles. In this studio, we will look into commercial products and research projects of mobile technology that encourage daily behavior change. We will also discuss the potential risks of personal data collection, including privacy and security.

Examples:

- Forest
- Nike Run Club
- UbiFit Garden
- WhoIsZuki

Friday 09:30 - 11:30 PT

Health and Wellness

Digital health is one of the most important and fastest growing industries, especially given the new necessity of remote care. In this studio, we will explore how the intersection of health and technology can help us better understand our health and take proactive action. This area is filled with opportunities for innovation like smart devices that monitor and improve our health, solutions that enable more accessible and effective healthcare, and products that enhance our physical or mental wellbeing.

Examples:

- Apple Health
- Headspace
- Strava
- Doctor on Demand

Friday 10:30 AM - 12:30 PM
Friday 1:00 PM - 3:00 PM

Multimodal Interfaces to Broaden Access

Information seeking has become, for many people, an indispensable part of modern life, yet always presents significant challenges for users with special needs, such as elders, blind or visually impaired users, or children. Could there be a better multimodal system to facilitate users with special needs in the online information acquisition process? In this studio, we will explore approaches such as voice-interaction, mobile phone assistants, and human-environment interaction, as well as how these could work together to better create a positive impact in the special needs community.

Examples:

- Voice assistants
- Amazon QA
- Microsoft Seeing AI app
- Scratch by MIT
- PainChek

Thursdays & Fridays 10:30 AM - 12:30 PM
Engagement in Digital/Physical Space
Now more than ever, online communities are blooming, but to engage with others in digital space we often must disengage from our own physical experiences. How might we bridge the gap between the digital and physical worlds? How might we engage and connect more deeply with the real world through the power of technology?

Examples:
- Airbnb Online Experiences
- Ubiquity6
- GooseChase
- PokemonGo

Fri 9:30 - 11:30am

Vincent Nicandro
- CS coterm (HCI), CS UG (HCI) + minor in Classics
- Interested in equity, accessibility, community-based design
- Love theme parks (especially Disneyland!), theater, travel
- Office hours (calendly.com/vincenricandro)
  - Tues 11am - 1pm, by appointment

Arts & Culture
Art and culture are integral to a vibrant community, illuminating our inner selves and expanding our worldview through common values and shared experiences. In this studio, we will explore arts and culture from the lenses of the creator, curator, and consumer across a medium of your choice (e.g. visual arts, design, music, performance). We will look into using design and technology to help creators execute on their creativity and enable people to discover content which they resonate with.

Examples:
- Canva
- last.fm
- Google Arts & Culture
- Goodreads
- Letterboxd

Thurs 4:30 - 6:30pm, Fri 9:30 - 11:30am

Kally Zheng
- CS coterm (HCI), CS UG (HCI)
- Interested in product management and social impact
- Love hiking, diving and skiing. Most outdoorsy things!
- Office hours (https://calendly.com/kally-z/kally-s-ch)
  - Tues 10am - 12pm, by appointment

Financial Literacy, Health and Resilience
Financial health (personal and business) has a huge impact on reducing poverty, the gender gap and wealth inequality. Existing financial products do not meet the needs of financially underserved individuals or businesses. In addition, most financial products are neither affordable nor accessible to these groups and this impacts the wealth of local economies. This studio will explore how technology can help increase financial health and resiliency for both individuals and small businesses thus better addressing financial needs in the 21st century.

Examples:
- LendingClub
- Mint
- EveryDollar
- PocketGuard
- Prosper
- Paypal
- Square
- Robinhood
- Acorns

Thurs 9:30 - 11:30am, 2:30 - 4:30pm

Some Norms for Lecture
- COVID
  - Be flexible with us & each other. It is a tough time for everyone right now & more so for some. Let’s respect that!
  - Video
    - have it on if you are able to as much as possible (we understand sometimes it isn’t)
    - some voting with Zoom feedback & polleverywhere
- Participate
  - harder than in person in some ways & in some ways easier
  - slack will be primary (cs147-2021w) – you should have been invited
  - some voting with Zoom feedback & polleverywhere
What Do You Hope to Learn in CS147?

Outline

- Who are we?
- AI & User experience design
- Balancing design thinking & technology
- Design discovery & exploring ideas
- Rapid prototyping & evaluation
- Goals of the course
- Course format & schedule
- Example projects
- Tidbits

AI Needs User Experience (UX) Design

- Tesla Model S “Autopilot”
- Future of autonomous cars
- How do we design the UX?

AI Needs User Experience (UX) Design

- Amazon Echo, Google Home & other Smart Speakers use Voice UI
- How do we design them to deal with natural human conversation?
- How do we design to support multimodal input? (e.g., + screen or vision)

AI Needs User Experience (UX) Design

- What is appropriate to show a patient?
- What should be the interface for the doctor?
- Is there a set of design patterns for these Smart UIs?

Balance

Computer vision-based skin cancer detection getting better and better
Approach to Application Design & Prototyping

Design Thinking Process

How to Design and Build Good UIs

• Iterative development process
• Usability goals
• User-centered design
• Design discovery
• Rapid prototyping
• Evaluation
• Programming

Iteration

Usability

According to the ISO:

The effectiveness, efficiency, and satisfaction with which specified users achieve specified goals in particular environments.

This doesn’t mean you have to create a “dry” design

Usability/User Experience Goals

• Set goals early & later use to measure progress
• Goals often have tradeoffs, so prioritize

• Example goals:
  - Learnable
  - Faster the 2nd time & so on
  - Memorable
  - From session to session
  - Flexible
  - Multiple ways to do tasks
  - Efficient
  - Perform tasks quickly
  - Robust
  - Minimal error rates
  - Good feedback so user can recover
  - Discoverable
  - Maintain functionality over time
  - Pleasing
  - High user satisfaction
  - Fun
User-centered Design

"Know thy User"

- Cognitive abilities
  - perception
  - physical manipulation
  - memory

- Organizational / educational job abilities

- Keep users involved throughout
  - developers working with target customers
  - think of the world in users' terms

User-centered Design: Needfinding

- Observe existing practices for inspiration
- Make sure key questions answered
- Ethical questions in design w/ underserved communities

Unpacking the Needfinding

Develop Point of Views
(Person + Insight + Challenge)

Brainstorm on How Might We Solve

Sketching & Storyboarding
### Concept Videos
- Illustrate context of use rather than specific UI
- Quick & inexpensive
- Forces designers to consider details of how users will react to the design

### Concept Videos: Planning Storyboards

#### Concept Videos: Planning Storyboards

1. **Scene 1: Time to Sleep**
   - Time to sleep
   - Guest in bed
   - UGH!
   - Rent

2. **Scene 2: Intro Ramble**
   - UGH!
   - Rent
   - Ramble
   - Rent

### Rapid Prototyping
- Build a mock-up of design so you can test it
- Low fidelity techniques
  - Paper sketches
  - Cut, copy, paste
- Interactive prototyping tools
  - HTML, Balsamiq, Axure, proto.io, Sketch+Marvel, Modao, etc.
- UI builders
  - Expression Blend + Visual Studio, Xcode Interface Builder, etc.

### Low-fi Prototyping & Testing
- Flutter
- Flutter
Goal of CS 147

Learn to design, prototype, & evaluate UIs

• Tasks, activities & practices of prospective users
• Cognitive/perceptual constraints affecting design
• Techniques for brainstorming, ideation & prototyping
• Methods for evaluating UI designs
• Importance of iterative design for usability
• Technology used to prototype UIs
• How to work together as a team
• Communicating results to a group

Interactive Prototypes

Low-fi Prototyping & Testing

Vibes

Interactive Prototypes

Medium Fidelity

Medium Fidelity

Interactive Prototypes

Hi-Fidelity

coll

butter

thread

Evaluation

• Test with real customers (participants)
  - w/ interactive prototype
  - low-fi with paper "computer"
• Low-cost techniques
  - expert evaluation (Heuristic Evaluation)
  - online testing

Course Format

• Interactive lectures → you speak!
• Each week
  - 2 lectures on techniques & background
  - 30 minutes of lecture
  - 30 minutes of lecture meeting each lecture → you need to be here to work with your team
  - some limited exceptions for some teams that are truly time zones away
  - 20 minutes for in class exercises

  1 studio with hands-on activity or team presentation
  - Quarter-long project
  - Readings, Videos, Podcasts
  - Course material will be online
  - slides, exercises, readings, schedule
  - lecture videos
• Have fun & participate!

Winter 2021
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Projects

- Each team will propose a UI-oriented project
  - fixing something broken or a completely new idea
  - based on team needfinding

- Theme
  - each Thursday/Friday studio has a theme
  - all projects mobile/wearable/off desktop

- Groups
  - 3-4 students to a group (4 preferred)
  - works with students of different ABMs
  - CS students should have had 142/193p/193a or equivalent
  - take CS47 if not, learn ReactNative, dual use project for CS47/147
  - groups meet in class & studio weekly

- Cumulative
  - apply several HCI methods to one interface
  - If you let your team down, we will lower your grade

Design Studios

Teams attend small weekly studio (9-16 students)
- critique/feedback in more intimate environment

Project Process Timeline

- Needfinding
- Concept Video
- Experience Prototyping
- Testing
- Low-F Prototype
- Medium-F Prototype
- Heuristic Evaluation
- Project Fair

Books

We will give you web links to all necessary readings/videos

Recommended textbook (if you need one)

*Designing the User Interface: Strategies for Effective Human-Computer Interaction* by Shneiderman et. al, 6th edition (2016)

Assignments

- Individual
  - 1 presentation each
  - 1-2 written (handed in online)
  - class & studio participation (graded)
  - exit tickets to show you saw lecture

- Group
  - 10 assignments
  - 4-5 presentations with 3-4 write-ups + video + poster
  - all group work handed in online
  - team web site & online submission site

Grading

- A combination of
  - individual assignments & presentation (10%)
  - class/studio participation (10%)
  - midterm (20%)
  - group project (60%)
    - presentations/poster (group component)
    - project write-ups

- No final
  - must present at project fair on Fri., 3/19 instead (tentative date)
**Tidbits**

- **Late Policy**
  - no late groups
  - individual assignments: lose one letter grade/day

- **Course web site**
  - [cs147.stanford.edu](http://cs147.stanford.edu)

- **Studio preferences & team signups**
  - due Wed at 5 PM

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**Summary**

- **UX design is an important part of most software**
- **Getting the interface right is hard, but…**
- **Solution is Iterative Design** including repeated cycles of
  - Design
  - Prototyping
  - Evaluation

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**Next Time**

- **Design Discovery**

  - **Read**
    - Holtzblatt & Beyer, Ch. 3 from *Contextual Design*
    - c-school’s *Empathy Fieldguide*

  - **Watch**
    - ABC News Nightline IDEO Deep Dive, July 1999 (22 minutes)
      - optional: ABC News, IDEO Design Thinking, January 2013 (13 minutes)