CS 147 Introduction & Course Overview
Design Thinking for User Experience Design, Prototyping & Evaluation
Prof. James A. Landay
Computer Science Department
Stanford University
Autumn 2019
September 23, 2019

Hall of Fame or Shame?
weather.com

Hall of Shame!
weather.com
Need to click for weather
What is the “first read”?
  videos
  red cross ad
  not weather!
  It used to be worse!

Hall of Fame or Shame?
weather.yahoo.com

Hall of Fame!
weather.yahoo.com
Good!
  aesthetic
  clean typography & icons
Bad!
  image is 1st read & ad 2nd
  lots of empty space!

Hall of Fame or Shame?
bing.com/weather
Hall of Fame!

- bing.com/weather
  - Good!
  - less clutter
  - eye drawn to current temp
  - Bad?
  - maybe a little boring…

Hall of Fame!

- iOS yahoo weather
  - Good!
  - aesthetic
  - clean typography & icons
  - image recedes to background w/ flick or tap

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Who are We?

James Landay
- Professor in Computer Science at Stanford
  - formerly professor at Cornell Tech, University of Washington, & Berkeley
  - spent 3 years as Director of Intel Labs Seattle
  - PhD in CS from Carnegie Mellon
  - HCI w/ focus on ubiquitous computing, web design (tools, patterns, etc.), HAI
  - Founded NetRaker, 1st in web experience management (sold to Keynote)
  - Co-authored The Design of Sites with Doug van Duyne & Jason Hong
  - Office Hours: TBD
  - Email: landay@[insert usual Stanford email domain]

Parastoo Abtahi
- CS PhD student (HCI)
- Virtual/Augmented Reality, Haptics, Perceptual Illusions
- I like collecting musical instruments
- Office Hours:
  - Thursdays 4:00 - 5:00 PM @ Gates 382
  - And by appointment
Human-Centered AI

We are increasingly surrounded by AI-powered systems that not only have impacted our everyday lives, from the way we manage our sleep (SleepCycle) to how we seek information (Virtual Assistants), but also have radically changed a variety of industries and professions, including healthcare. Human-Centered AI highlights the need for designing AI-powered systems that understand humans physically, intellectually, and emotionally, and are able to interact with humans in such nuanced, multiple dimensional ways.

In this studio we will explore how we can leverage a human-centered approach to AI to augment human capabilities in a transparent and interpretable manner. Examples: Amazon Echo, SleepCycle, Pandora, Focuster

Thursday: 5:00 - 6:50 PM @ Gates 392
"must have special reason for taking this studio

Abdullah AbuHashem

• CS Undergrad and Education minor, CS coterm
• Interested in education, mental health, video games
• Big fan of musical theatre
• Office Hours - TBD

Educational 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, Motion Math: Pizza!, Wonderment, Code.org.

Friday 10:30 AM - 12:20 PM @ 460-334
Friday 1:30 PM - 3:20 PM @ Thornton 210

Julea Chin

• Mechanical engineering coterm
• Interested in UI/UX design, mechatronics, gaming
• HUUUGE fan of Christina Aguilera
• Office Hours – Thursdays @ 1:30 PM or by appointment

Information Overload

Although living in the Digital Age has its perks, having access to so much information and content online can feel confusing, distracting, overwhelming, or even paralyzing. Information overload is the difficulty in understanding an issue and effectively making decisions due to too much data. This studio seeks to understand the mental & emotional burdens related to digital media and help humans regain control over their content consumption.

Examples: TrueCaller, Trello, Slack, and HootSuite.

Friday 8:30 - 10:20 AM @ 160-326
Friday 10:30 - 12:20 PM @ Green Earth Science 134

Janna Huang

• CS (HCI) Undergrad; Sociology Masters
• Interested in how technology and society shape each other, design thinking, public policy, reading, food systems
• I drove across the country in a truck this summer
• Office Hours - Mondays 1:30 pm (before class) or email me!
Digital Democracy

For a democracy to flourish, citizens need to be well-informed to meaningfully engage with each other and the larger public sphere. Though much of this occurs online today, the outcomes are still manifested in real-world political, social, and economic institutions.

In this studio, we will build novel and ethical design solutions bridging technology and the public sphere. How might we leverage technological tools to enrich online knowledge-sharing, debate, trust, and participation? How can we present complex information to voters in clear and relevant ways? How can we design platforms to reach beyond cyberspace and encourage real-world organizing and voting?

Friday 11:30 – 1:20 PM @ 160-326
Friday 1:30 – 3:20 PM @ 160-318

Assistive Technologies and Accessibility

There are many opportunities for technology to improve the lives of people with special needs. However, these communities are often underserved due to lack of awareness and failure to incorporate accessibility into applications designed for the general public. In this studio we will explore how the intersection of design, technology, and accessibility can create a positive impact in special needs communities.

Examples: Microsoft Seeing AI, Be My Eyes, Tactile

Fridays 9:30 – 11:20 AM @ Thornt 211

Online/Local Community

Digital communities continue to appear and we’re spending more time online than offline. While online communities are blooming, we tend to overlook the community that exists outside the digital realm. How might we bridge the gap between the digital world and the real world? How might we engage more with the real world through the power of technology?

Examples: Meetup, Eventbrite, Facebook dating, Waze Carpool, Oculus venues

Fri 11:30 am – 1:20 pm @ 160-326
Fri 2:30 pm – 4:20 pm @ 460-334

Anthony Li

• CS Undergrad @ UMD, Stanford CS MS
• Interest in HCI research, security, systems
• I have lived in five US states
• Office Hours
  - TBD

KiJung Park

• Product Design Undergrad, CS Masters (HCI)
• Interested in design thinking, UX research/design, wine & beer
• I was offered a job in the Korean CIA back in high school
• Office Hours
  - after class on Wednesdays (may change)
  - by appointment
  Fri 11:30 am – 1:20 pm @ 300-303
  Fri 2:30 pm – 4:20 pm @ 460-334

Chloe Thai

• ME coterm; product design for undergrad
• Interested in UI/UX design, travel, Yelp-ing
• I currently have 156 playlists made on Spotify
• Office Hours
  - Mondays & Wednesdays @ 1:30 PM (before class)
Health and Wellness

Our current healthcare system is centered around reactive responses to ailment and disease. Through our studio, we will explore how the intersection of health and technology can help us provide a more comprehensive, and ultimately proactive picture of our health. We'll be looking at how to design products that use smart devices to monitor and improve different aspects of our health.

Examples:
- Apple Health, Headspace, My Fitness Pal, and Noom

Friday 12:30 - 2:30 PM @ Thornton 211
Friday 2:30 - 4:30 PM @ Thornton 211

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

- Computer vision-based skin cancer detection getting better and better
- 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
How to Design and Build Good UIs

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

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
  - Rememberable
- Flexible
  - Multiple ways to do tasks
- Efficient
  - Perform tasks quickly
- Robust
  - Minimal error rates
- Good feedback so user can recover
- Discoverable
  - Learn new features over time
- Pleasant
  - 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

WE WERE AMazed TO REALIZE
THAT 

IT WOULD BE GAME-CHANGING TO

HOW bring 

we need to do 

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
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.

Interactive Prototypes

Medium Fidelity
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

Projects

- Each team will propose a UI-oriented project
  - Younger students: Learning to prototype
  - Older students: Completing a UI idea
- Themes
  - Each Friday studio has a theme
  - All projects: mobile/wearable/desktop
- Groups
  - 3-4 students in a group
  - Work with students with different skills
- Technology
  - CS students should have taken 408/410/413b or equivalents
  - Others: cs47, cs142, or similar
- Team presentation: Due in class on Tuesday 10/29
- Final portfolio: Due in class on Friday 11/15

- 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

Course Format

- Interactive lectures → you speak!
- Each week
  - 2 lectures on techniques & background
  - Reserve 20-30 minutes team meeting each lecture → you need to be here to work with your team
  - 1 studio with hands-on activity or team presentation
- Quarter-long project
- Readings
- Course material will be online
  - slides, exercises, readings, schedule
  - no lecture video
- Have fun & participate!

Interactive Prototypes

Hi-Fidelity

Evaluation

- Test with real customers (participants)
  - w/ interactive prototype
  - low-fi w/ paper "computers"

- Low-cost techniques
  - expert evaluation (Heuristic Evaluation)
  - online testing

Wanderlust

How dt+UX Fits into CS Curriculum

- Most courses for learning technology
  - ML, operating systems, databases, compilers, etc.
- dt+UX concerned w/ design & evaluation
  - technology as a tool to evaluate via prototyping
  - skills will become very important upon graduation
  - complex systems, working on teams
Design Studios
Teams attend small weekly studio (9-16 students) - critique/feedback in more intimate environment

Project Process Timeline

Week 2
Needfinding

Week 3
Experience Prototypes & Testing

Week 4
Low-fi Prototype

Week 7
Heuristic Evaluation

Midterm

Week 9
High-fi Prototype

Week 10
Project Fair

History

Cookable

Token

NightOwl

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)
    • 4 pop quizzes in class (drop 1)
• Group
  10 assignments
  • 4-6 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., 12/6 instead (tentative date)

Tidbits
• Late Policy
  - no lates on group assignments
  - individual assignments lose one letter grade/day
• Course web site
or cs147.stanford.edu
• Studio preferences & team signups
  • due Wed at 5 PM

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

Next Time
• Design Discovery
• Read
  - Tom Kelley, The Perfect Brainstorm
  - Excerpt from The Art of Innovation (pw: hcid)
  - Holtzblatt & Beyer, Ch. 3 from Contextual Design
• Listen
  - Invisible Women, 99% Invisible, Episode 363 (39 minutes)