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

Prof. James A. Landay
Computer Science Department
Stanford University
Autumn 2015
September 22, 2015

Hall of Shame!
Asiana Airlines interface for sending email or SMS from plane
- Cool, but
  - text entry using this input device is tedious
  - crashes often
- Lost the strong brand value for me

Hall of Shame!
weather.com
what is the "first read"?
videos
advertisements
not weather!
Hall of Fame!

bing.com/weather

good!
less clutter
eye drawn to current weather

bad!
feels boring

Hall of Fame or Shame?

weather.yahoo.com

good!
aesthetic
clean typography & icons

bad!
image is 1st read

Hall of Fame!

weather.yahoo.com

iOS yahoo weather

good!
aesthetic
clean typography & icons

image recedes to background w/flick

Hall of Fame!

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Who are We?
James Landay

• Professor in Computer Science at Stanford
  – formerly professor in Information Science at Cornell Tech,
  CSE at the University of Washington & EECs at UC Berkeley
  – Dec 2011 finished 2.5 year sabbatical at Microsoft Research Asia

• PhD in CS from Carnegie Mellon ’96
• HCI w/ focus on informal input (pens, speech, etc.), crowdwork,
  web design (tools, patterns, etc.), & Ubiquitous Computing (Ubicomp)
• Founded NetRaker, 1st in web experience management (sold to Keynote)
• Co-authored The Design of Sites with Doug van Duyne & Jason Hong
• Office Hours: Mon. 1-2 PM / Thur 2-3 PM in 390 Gates
  – we will also monitor CS147 Piazza site (signup @ piazza.com/stanford/fall2015/cs147)

• Email: landay[@insert usual Stanford email domain]

Behavioral Change

Change the way people act

People make decisions and actions based on certain inputs and considerations. Technology can add additional parameters and inputs that may in turn affect the outcome of these decisions, or change people’s values. This may happen on an individual level or with a community. I’m particularly interested in applications for social good.

Cathy Zhu

• MSCS (HCI/Systems), BSCS (HCI/Art)
• Ask me about: web dev, design, javascript
• I draw, dance, and write code.
• Office hours
  – Mon/Tu 6:30 - 7:30 PM, Lathrop
• Studio times
  – Fri. 10:30 - 11:50 am in 200-015
  – Fri. 1:30-2:50 pm in 200-013

Learning / Education

Designing next generation learning experiences

Throughout different stages in life, we learn for many purposes and in many ways. In this studio, we ask the question: how can technology can enable, supplement, or support learning and teaching. How can we use research on memory and motivation to enable knowledge retention? Which kinds of logistical issues can we solve with technology to enable teachers to focus on teaching? What kinds of social infrastructures can we put in place to help students succeed? Feel free to look around and beyond your own learning environment and the myriad of tech products that surround us for inspiration.

Chris Min

• BA Economics, MS CS
• Need finding, rapid design iteration, healthcare tech
• I like traveling, biking, and traveling by bike
• Office hours
  – Tue. 1:30 PM - 2:30 PM, Lathrop Tech Lounge
  – Wed. 3:00 PM - 4:00 PM (TBC), Lathrop Tech Lounge
• Studio times
  – Fri. 10:30 AM - 12:00 PM in TBD
  – Fri. 1:30 PM - 3:00 PM in TBD
Wellness

The pursuit of wellbeing—in mind, body, and soul

Historically, we’ve often required experts to handle the technology that improves our health. However, the rise of personal technology provides an opportunity for everyday people to directly access the solutions that make our lives better. Perhaps the most concrete examples lie in physical health but the creativity may find applications in mental, emotional, and spiritual wellbeing as well. From the perspective of interface design, we tackle a greater challenge but for an even greater reward.

Studio times
Fri. 10:30 AM - 12:00 PM in TBD
Fri. 1:30 PM - 3:00 PM in TBD

Crowd Power

Empower the crowd to accomplish the impossible

Technology can help us gather crowds of people online to collaborate towards a common goal. Kickstarter, Wikipedia, Yelp, and Reddit are all examples of achieving ambitious goals using the crowd. Technology can also provide powerful tools to support offline collaborations.

Studio Times
Fri. 10:30 - 11:50 AM in 280-001
Fri. 1:30 - 2:55 PM in 20-22K

Focus

Fight distraction and reclaim lost (or squandered) time

Our digital world operates on an attention economy. In this world, the products, apps, and websites that succeed go to great lengths to get us to spend time with them (see: clickbait, infinite scroll, autoplay). This is a world that thrives on distraction. Sadly, humans do not thrive on distraction. How can we reverse this equation, making ourselves focused, productive, and more human? How can we use technology to reclaim the time we’ve lost to it?

Studio Times
Fri. 11:15 - 2:05 PM in 380-381U
Fri. 11:00 - 11:50 AM in 50-52H

Erin Singer

- Senior majoring in CS (HCI)
- User experience and interface design, ubiquitous computing, and crowdsourcing
- I love Marvel Movies. Specifically Iron Man!
- Office hours
  - Wed. 4 - 5 PM, Thurs. 3 - 4 PM in Lathrop Tech Lounge
- Studio times
  - Fri. 10:30 - 11:50 AM in 280-001
  - Fri. 1:30 - 2:55 PM in 20-22K

Helen Anderson

- BS in STS, MS in CS (HCI)
- Needfinding, rapid prototyping, user testing, web development
- I write code, but I also write novels.
- Office hours
  - Wed. 11am - noon; Thurs. 10:30 - 11:30am; Lathrop Tech Lounge
- Studio times
  - Fri. 10:30 - 11:50 AM in 20-22K
  - Fri. 2:30 - 3:50 PM in TBD

Leigh Hagestad

- M.S. CS (Real World Computing)
- B.S. CS (Graphics + HCI)
- Graphic Design, Mockups, User Experience, Photoshop, Needfinding, Web Dev, iOS
- Coffee, baking, building things, graphics, travel, more coffee
- Office hours
  - Mon/Weds 9-10am – Bytes Cafe
- Studio times
  - Fri. 9:10-20 in TBD
  - Fri. 10:30-11:50 in TBD
Designing for Journeys
Life's about the journey, not the destination. In the same spirit, this section will focus on journeys, travel, and mobility. How can we design for improved travel and the experience of getting from place to place? From commuting to road trips, from getting a workout to getting more safety, saving costs, or exploring new and exciting places, there are endless contexts and cases of travel to consider, explore, and solve for. This section will focus on thoughtfully designing application interfaces and experiences for those in transit or on the move.

Louis Eugene
BS in Math/Physics, MS in CS (France) and currently 2nd MS in Management Science and Engineering @ Stanford
• Passion for entrepreneurship
  – Currently working on two startup projects
• Developed multiple iOS apps
• Love music and photography
• OH (Huang Basement)
  Wednesday 2:00-3:00 pm
  Thursday 6:00-7:00 pm

Health
Help people live a better life
New technologies have radically changed the way we think about Health. While we used to rely exclusively on one to one meetings with doctors, people can now search for answers online, connect with health professionals directly from their smartphones (see for example the startup HealthTap), gather data about their own health (thanks to the use of wearable) and so much more. As new technologies become available (iWatch) and mindsets shift, new opportunities arise to build great products. This theme encompasses many sub domains: you can decide to target people who are aging or specific diseases like diabetes. You can design for hospitals or more generally for how people interact with their doctors.

Lucas Throckmorton
• MS CS (HCI), BS CS (Systems)
• Ask me about: iOS dev, design, and algorithms
• I love music and being outdoors!
• Office hours
  – Tue (4:30-5:30) Wed (1:30-2:30), Lathrop Tech Lounge
• Studio times
  – Fri. 12:30-1:50 pm in 160-323
  – Fri. 2:30-3:50 pm in TBD

Sustainability
Transform our relationship with nature with the future in mind
Sustainability often means using natural resources in a manner that ensures their future availability and in a way that won’t temporarily damage the environment. To do so, we can address both production and consumption of these resources. We can create applications that encourage and enable more responsible use of natural resources such as water, food, and energy, or we might further consider how these resources are produced and make it easier to transition to more sustainable alternatives.

Sarah Nader
• BS & MS in CS (HCI)
• Visual design, ethnography, rapid ideation, user testing
• I hiked up Mount Fuji and slept on top.
• Office hours
  Mon 12:15 - 1:15 PM in Lathrop Tech Lounge
  Thurs 10:00 – 11:00 AM in Lathrop Tech Lounge
• Studio times
  Fri. 9:00 - 10:20 AM in TBD
  Fri. 10:30 - 11:50 AM in 20-21B
Sharing

Building the foundations of sharing through technology

Everyone shares - whether it's motivated by convenience or benevolence, whether it's a spare bedroom or afternoon tea. The act of sharing operates on varying levels of intimacy in today's ever-connected world. Regardless, there are some core values at the heart of every exchange: trust, gratification, and communication. In this studio, we will explore different ways to facilitate and even encourage sharing.

Studio Times
Fri 9:00 - 10:20 AM in TBD
Fri 10:30 - 11:50 AM in 20-21B

Stephany Yong

• BS CS (HCI concentration)
• Interaction and product design, mobile apps, needfinding
• Interests: journalism, publishing, taking artistic pictures of food
• Office hours
  – Mon 2:30 - 3:30 pm, Th 10:30 - 11:30 am in Lathrop Tech Lounge
• Studio times
  – Fri. 9:00 AM - 10:20 AM in 160-319
  – Fri. 2:30 – 3:50 PM in TBD

Creation

Design tools to facilitate user creativity

Creativity can strike anywhere, which makes mobility on the move requires a streamlined approach. However, mobile versions of Photoshop and iMovie often come up short. There are significant limitations to the experiences that are conducive to self-expression and easy sharing? The right interface can kick start a new creative genre like 6-second Vine videos or filtered photos. Creativity thrives within constraints!

Studio Times
Fri. 9:00 AM - 10:20 AM in 160-319
Fri. 2:30 PM - 3:50 PM in TBD

Human-Computer Interaction (HCI) Approach to UX Design

Human
  – the end-user of a program
  – the others they work or communicate with

Computer
  – the machine program runs on
  – split between clients & servers

Interaction
  – user tells the computer what they want
  – computer communicates results

Balance

Design

Technology
Why is HCI Important?

- Major part of work for “real” programs
  - approximately 50%
- Bad user interfaces cost
  - money
    - 5% satisfaction → up to 85% profits
- User interfaces hard to get right
  - people are unpredictable
  - intuition of designers often wrong

Who Creates UIs?

A team of specialists (ideally)
- graphic designers
- interaction / interface designers
- information architects
- technical writers
- marketers
- program managers
- test engineers
- usability engineers
- researchers (ethnographers, etc.)
- software engineers
- hardware engineers
- industrial designers
- customers

How to Design and Build Good UIs

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

Iteration
At every stage!
Design
Prototype
Evaluate

Design

Design is driven by requirements
- what the artifact is for
- not how it is to be implemented
- e.g., phone not as important as mobile app

A design represents the artifact
- for UIs these representations include:
  - screen sketches or storyboards
  - flow diagrams/outline showing task structure
  - executable prototypes
- representations simplify

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
    - learn new features 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
### Design Discovery

**Needfinding, Contextual Inquiry & Task Analysis**

Observe existing practices for inspiration

Make sure key questions answered

- Tuned CI participant
- Tuned field work in record store

**Concept Videos**

- Illustrate context of use rather than specific UI
- Quick to build
- Inexpensive
- Forces designers to consider details of how users will react to the design
- More important when context is not traditional work scenario

### 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, SketchFlow, Balsamiq, Axure, proto.io, etc.
- UI builders
  - Expression Blend + Visual Studio, etc.

### Evaluation

- Test with real customers (participants)
  - w/ interactive prototype
  - low-fi with paper “computer”
- Build models
  - GOMS
- Low-cost techniques
  - expert evaluation
  - walkthroughs
  - online testing

**Fantasy Basketball**

- ESP
- Evaluation
- ESP
Goals of the Course

1) Learn to design, prototype, & evaluate UIs
   - the needs & tasks of prospective customers
   - cognitive/perceptual constraints that affect design
   - technology & techniques used to prototype UIs
   - techniques for evaluating a user interface design
   - importance of iterative design for usability
   - how to work together on a team project
   - communicate your results to a group
   key to your future success

2) Understand where technology is going & what UIs of the future might be like

Course Format

• Interactive lectures ➔ you speak!
• Each week
  – 2 lectures on techniques & background
  • Reserved 20-30 minutes team meeting each lecture
  – 1 studio 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!

How dt+UX Fits into CS Curriculum

• Most courses for learning technology
  – compilers, operating systems, databases, etc.
• dt+UX concerned w/ design & evaluation
  – technology as a tool to evaluate via prototyping
  – skills will become very important upon graduation
    • complex systems, large teams
    • don’t look for large immediate impact in other CS courses

Projects

• Each team will propose a UI-oriented project idea / team
  – fixing something you don’t like or completely new idea
  – based on team needfinding
• Theme
  – each Friday studio has a theme
  – all projects mobile/wearable
• Groups
  – 3-4 students to a group
  – work with students w/ different skills/interests
  – groups meet in class & studio weekly
• Cumulative
  – apply several HCI methods to one interface

Project Process (10 weeks)

• Break into teams (Fri)
• Needfinding
  – In studio presentations & critiques
• Experience prototypes
  – In studio presentations & project selection
• Concept videos
  – In studio viewing & critiques
• Low fidelity prototyping & user tests
  – In studio presentations & critiques

Project Process (10 weeks)

• Medium-fi prototype (using tools)
  – In studio presentations & critiques
• Heuristic Evaluation of medium-fi prototype
  – In studio group merge exercise
• High-fi prototype (code on target platform)
  – Half-way in studio presentations & critiques
• Poster presentations & project fair with industry guests
Project Process Timeline

- Needfinding
- Concept Video
- Medium-fi Prototype
- Heuristic Evaluation
- Project Fair

- Experience Prototypes & Testing
- Low-fi Prototype
- Medium-fi Prototype
- High-fi Prototype

Weeks:
- Week 2
- Week 3
- Week 4
- Week 5
- Week 6
- Week 7
- Week 8
- Week 9
- Week 10

9/22/2015

Swickr

9/22/2015

GreenBean

9/22/2015

CarbonShopper

9/22/2015

StyleEye

9/22/2015

ProjectHarmony

9/22/2015
Books

- *The Design of Sites* by van Duyne, Landay, & Hong
  - online copies of the 3-4 chapters we will use

- We will also hand out other papers, give you web links, & refer to lecture slides

- Recommended textbook
Assignments

• Individual
  – 1-2 presentations each
  – 1-2 written (handed in online)
  – class participation

• Group
  – 9 “written” assignments
    • 6 presentations with 2-3 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., 12/4 instead

Tidbits

• Late Policy
  – no lates on group assignments
  – individual assignments lose one letter grade/day

Summary

• HCI an important part of most of today’s 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