Introduction & Course Overview
CS 147: Human-Computer Interaction + Design

Prof. James A. Landay
Computer Science Department
Stanford University
Autumn 2014
September 23, 2014

Hall of Fame or Shame?

Page setup for printing in IE5

• Page preview nice, but
• Problems
  – codes for header & footer information
    • requires recall!
  – no equivalent GUI
    – help is the way to find out, but not obvious

Later Versions of IE Fix This

Hall of Shame!

Asiana Airlines interface for sending email or SMS from plane

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 Fame or Shame?

weather.com

what is the “first read”?

videos

not weather!

Hall of Shame!

Hall of Fame or Shame?

bing.com/weather

good!

less clutter

eye drawn to current weather

Hall of Fame!

Hall of Fame or Shame?

weather.yahoo.com

good!

aesthetic

clean typography & icons

bad!

image is 1st read

Hall of Fame!
Introduction & Course Overview

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James Landay

- Professor in Computer Science at Stanford
  - formerly professor in Information Science at Cornell NYC Tech,
    CSE at the University of Washington & EECS at UC Berkeley
  - spent 3 years as Director of Intel Labs Seattle
  - 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. 2-3 PM & Wed. 10-11 AM in 390 Gates
  - we will also monitor CS147 Piazza site
- Email: landay@[insert usual stanford email domain]
Human-Computer Interaction (HCI)

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

User Interfaces (UIs)

• Part of application that allows people
  - to interact with computer
  - to carry out their task

• User vs. Customer vs. Client
  - user is a term only used by 2 industries → bad!
  - customer – person who will use the product you build
  - client – the company who is paying you to build it

HCI = design, prototyping, evaluation, & implementation of UIs

Why is HCI Important?

• Major part of work for “real” programs
  - approximately 50%
• Bad user interfaces cost
  - money
    - 60% satisfaction → up to 85% profits
    - finding problems early makes them easier to fix
  - reputation of organization (e.g., brand loyalty)
  - lives (Therac-25)
• 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

HCI Approach to UI Design

“People change their knowledge as they perform, i.e., they learn”

Organisational and Social Issues

Humans

Tasks & Activities

Technology

Design

SOMA2014 HCI+D: User Interface Design, Prototyping, and Evaluation
How to Design and Build Good UIs

- UI Development process
- Usability goals
- User-centered design
- Design discovery
- Rapid prototyping
- Evaluation
- Programming

User Interface Development Process

- Design Discovery
- Design Exploration
- Evaluate
- Production

Work together to realize the design in detail
Evaluate with Customers

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

UI Design Representations

Flow / Site Maps
Storyboards
Schematics/Wireframes
Mock-ups

 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
Task Analysis & Contextual Inquiry

Contextual Inquiry & Task Analysis
- observe existing work practices
- make sure key questions answered

Tuned CI participant
Tuned field work in record store

Design Discovery
Task Analysis & Contextual Inquiry

Observe existing work practices
- augment with self-report tools (e.g., ESM)

Video Prototyping

- Illustrate how users will interact w/ system
- Unlike brainstorming…
  video prototyping contracts the design space
- Quick to build
- Inexpensive
- Forces designers to consider details of how users will react to the design
- May better illustrate context of use
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, Flash, DENIM, SketchFlow, Balsamiq, Axure, proto.io, etc.
- UI builders
  - Expression Blend + Visual Studio, etc.

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
  - 1 studio hands-on activity or team presentation
- Quarter (10 week) long project & homework
- Readings
  - All material will be online
    - slides, exercises, readings, schedule, lecture video
- Have fun & participate!

How HCI Fits into CS Curriculum

- Most courses for learning technology
  - compilers, operating systems, databases, etc.
- HCI 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

Project Proposal (due next Tue)

- Each of you will propose an UI-oriented project idea
  - fixing something you don’t like or a new idea
  - base on Fri. thematic brainstorming
- Groups
  - 4 students to a group
  - work with students w/ different skills/interests
  - groups meet in studio weekly
- Cumulative
  - apply several HCI methods to a single interface

Project Process (10 weeks)

- Project proposal (individual)
  - due Tue (September 30)
- Break-up into groups that Friday
- Project contextual inquiry/task analysis & sketches
- In studio presentations & critiques
- Design sketching & concept videos
  - i.e., rough proposals that can & will change
- Low fidelity prototyping & user testing
- In studio presentations & critiques

Project Process (10 weeks)

- Medium-fi prototype (using tools)
- In studio presentations & critiques
- Heuristic Evaluation of medium-fi prototype
- High-fi Prototype (code)
- Poster presentations & project fair with industry guests

Trippin’
Who are We?

Nicole Zhu (Head CA)

- BS ME, MS CS w/ HCI concentration
- Mobile apps, interaction and product design, eldercare
- I love to run and cook, done in that order =]
- Office hours
  - Tue. and Thur. 1:15 - 2:15 PM, d.school 1st floor
- Studio times
  - Fri. 9:00 - 9:50 AM in 200-107
  - Fri. 10:00 - 10:50 AM in Littlefield-107

Makiko Fujimoto

- BS in SymSys, MS in CS (HCI)
- Needfinding, rapid ideation and prototyping, user testing, ed-tech
- I went to school in 3 different countries!
- Office hours
  - Mon. and Wed. 3:15 - 4:15 PM in TBD
- Studio times
  - Fri. 10:00 - 10:50 AM in 380-381U
  - Fri. 11:00 - 11:50 AM in 380-381T

Discovery

Uncovering new ideas, new places, new people

Discovery is a process. Whereas search engines gave us results, discovery apps emphasize the joy of uncovering something new. From an HCI perspective, how might we create the mechanics and interaction styles for discovery? This is where we encounter a plethora of design challenges from providing backtracking to contextual relevance. In this studio, you'll design and build compelling experiences that highlight the journey of discovery.

Studio times
- Fri. 9:00 - 9:50 AM in 200-107
- Fri. 10:00 - 10:50 AM in Littlefield-107

Learning

Design next generation learning experiences

We're constantly learning by acquiring new skills, knowledge, and behaviors. Whether you're taking notes or getting tips from your friends on how to get that elusive 2048 tile, the opportunities for learning are infinite. Explore different ways of using technology to enable new ways of learning that couldn't be possible before! How can we improve on currently existing learning methods? Can technology be used to reframe traditional learning?

Studio times
- 10:00 - 10:50 AM in 380-381U
- 11:00 - 11:50 AM in 380-381T
Behavioral Design

**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.

**Studio Times**

- Fri. 1:15 – 2:05 PM in 380-381U
- Fri. 11:00 – 11:50 AM in 50-S2H

Sustainability

Students can interpret "sustainability" flexibly and creatively, with applications that somehow enable or encourage responsible use of natural resources. Sustainability often means using natural resources in a way that ensures their future availability and does not irreparably damage nature. We might create applications that reduce or change individual consumption of water, energy, food, or transportation. We might also consider how these resources are produced and create easier ways to produce more sustainable alternatives.

**Studio Times**

- Fri. 10:00 - 10:50 AM in 160-321
- Fri. 11:00 - 11:50 AM in 160-321

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, and Foldit are all examples of achieving ambitious goals using the crowd. Technology can also provide powerful tools to support offline collaborations.

**Studio Times**

- Fri. 10:00 - 10:50 AM in 160-321
- Fri. 11:00 - 11:50 AM in 160-321
Achievement/Motivation

Feeling the "do" to do, and doing

How do we measure success and happiness? What keeps us motivated towards achieving our goals and redefining ourselves? Apps like Moodkit and Fitness Buddy, and the "24-hour challenge" concept, all revolve around two things: feeling the "do" to do, and doing. Self-actualization sits at the top of our pyramid of needs, and we need both the "do" and the do to get there. How might we leverage exciting and enjoyable user interfaces to satisfy our needs for motivation and accomplishment?

Creation

Design tools to facilitate user creativity

Photoshop, GarageBand, and iMovie are great tools. But their mobile versions often feel cluttered and clunky. Creating on the move requires a more streamlined approach. The right interface can help a single app kickstart a new creative genre, often driven by something as simple as 7-second videos or pseudo-filtered photographs.

Build an app that allows users to create while on the go, or just capture their inspirations for later development.

Less can be more.
Creativity thrives within constraints!

Information

Interactive and Shareable Information

The ability to effectively collect and digest information has always been a key to success. Nowadays, technology inundates us with information from various sources. From news to company stock prices and friends' stories, information is always available. Yet, we still digest information in passive ways: we barely interact with the news nor do others who consume the same.

Your job is to envision a novel, interactive mechanism to collect and digest information.

Hello
Information

Interactive and Sharable Information

Books

- *The Design of Sites* by van Duyne, Landay, & Hong
  - online copies of the 4-5 chapters we will use
- We will also hand out other papers, give you web links, & refer to lecture slides
- Recommended textbook

Assignments

- Individual
  - 5 written/studio + 1 presentation each
  - handed in online
  - 3-5 very short in class quizzes (drop lowest)
- Group
  - 9 “written” assignments
  - 3 presentations with the write-ups + video + poster
  - all group work handed in on Web
  - group web site & online submission site

Grading

- A combination of
  - individual assignments & presentation (15%)
  - class/studio participation (5%)
  - midterm (20%)
  - group project (60%)
    - demos/presentations/poster (group component)
    - project write-ups & exercises
- No final
  - must present at project fair on Fri., 12/5 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

- Early Visions of HCI
- Read
  - *As We May Think* by Vannevar Bush
  - *Tools For Thought* Ch 9 (Engelbart Demo)