CS160: User Interface Design, Prototyping and Evaluation

Prof: John Canny
GSI: Anuj Tewari
Theme for this semester: Mobile apps
Where does the UI begin and end?
Does User Experience design matter?

There are 50,000+ apps in Apple’s App Store. Many variants of the same idea.

How do you stand out?

People don’t want to sit down and figure out how to use a mobile application. They want to do and not think.
We’re studying the science of UI design, not the art.
Top selling smartphones in Q1, 2009:

1.) RIM BlackBerry Curve (all 83XX models)
2.) Apple iPhone 3G (all models)
3.) RIM BlackBerry Storm
4.) RIM BlackBerry Pearl (all models, except the Flip)
5.) T-Mobile G1.

Moral: Capturing everyone’s attention is an art. Capturing market share is still largely a science.
This course

Is about the science of **Usability**.

It’s also about the process of **user-centered design**.

This semester the focus is **mobile applications**.

The goal is not to build a working system, but an “interactive prototype.”

Emphasis is on rapid prototyping and user testing to avoid obvious and not-so-obvious mistakes.
Preferred Platform: iPhone

Excellent set of development tools + style guides

State-of-the-art interaction
• Multitouch
• Accelerometer
• BT sensor API

Soft keyboard and UI
Preferred Platform: iPhone

iPhone development requires an Intel-based Mac running OS-X. We encourage you to use your own machine.

Otherwise there is a new lab in 200 Sutardja-Dai Hall (The CITRIS building) with new Macs G5’s with the iPhone SDK.
Instructor: John Canny

Professor in EECS
Joined Berkeley in 1987

Work in HCI, Education, Health Tech
Language learning games
Persuasive technologies
Mobile applications
Topics

• Course Overview
• Project Description
• Course Mechanics
Course Overview
User-Centered Design

Starts with a user, then their interaction, then backend logic.
Why Study User Interfaces?

Major part of work for most commercial programs
  – Approximately 50%

You will work on software for a market
  – Intended for people other than yourself

Bad user interfaces cost
  – Money (5%↑ satisfaction → up to 85%↑ profits)
  – Lives

User interfaces hard to get right
  – People are unpredictable
Life-Threatening Errors

1995 Am. Airlines jet crashed into canyon wall killing all aboard

- On approach to Rozo airport in Colombia
- Pilot skipped some of the approach procedures
- Pilot typed in “R” and system completed full name of airport to Romeo
- Guidance system executed turn at low altitude to head for Romeo airport

- 9 seconds later plane struck canyon wall

Is the pilot to blame?

http://en.wikipedia.org/wiki/American_Airlines_Flight_965
What is Usability?

Intuitive
- The design should seem natural

Ease of learning
- Faster the second time and so on...

Productivity
- Perform tasks quickly and efficiently

Minimal error rates
- If they occur, good feedback so user can recover

High user satisfaction
- Confident of success
Who Builds Interfaces?

Ideally a team of specialists

– graphic designers
– interaction / interface designers
– technical writers
– marketers
– test engineers
– software engineers
– customers

Some engineers become very good at user-centered design, but its not for all engineers.
Building Successful Interfaces

- Task analysis & contextual inquiry
- Rapid prototyping
- Evaluation
- Iteration

Evaluation brings real users into the design loop.

Design stays user-centered throughout the process.
Why not simulate the user?

People have certainly tried. Its useful in certain special cases, e.g. pointing and typing evaluation.

For most applications, people are far too complex to simulate. Behavior depends on just about every external factor.

Users are their own best simulation. In fact they are ground truth…
Task Analysis & Contextual Inquiry

Observe existing work practices
Create scenarios of actual use
Try-out new ideas before building software
Rapid Prototyping

Build a mock-up of design

Low fidelity techniques
  – Paper sketches
  – Cut, copy, paste

Interactive prototyping tools
  – HTML, Flash, Javascript, Visual Basic/C# etc.

UI builders
  – Interface Builder, Visual Studio, NetBeans
Evaluation

Test with real customers (participants)

Build models

Low-cost techniques
  – expert evaluation
  – walkthroughs

Higher cost
  – Controlled usability study
Goals of the Course

Learn to design, prototype, evaluate interfaces

– Discover tasks of prospective users
– Cognitive/perceptual constraints that effect design
– Techniques for evaluating an interface design
– Importance of iterative design for usability
– Technology used to prototype & implement UI code
– How to work together on a team project
– Communicate your results to a group

Many of these will be key aspects of your future jobs
CS160 and the CS Curriculum

Most courses for learning algorithms and technology
- Compilers, operating systems, databases, etc.

CS160 concerned with design, implementation & evaluation
- Assume you are comfortable programming
- Technology as a tool to evaluate via prototyping
- Skills will become very important upon graduation
  Complex systems, large teams
Project Description
Teams

Each of you will individually propose an interface idea
- Fixing something you don’t like or a new idea
- Novelty and creativity will be considered

Groups
- 3 or 4 students to a team
- Work with students with different skills/interests

Cumulative
- Apply several HCI methods to a single interface
Good design involves many iterations – improvements based on user testing.

Coding is too slow for this purpose. Instead we use low-fidelity, paper prototypes.

Your first several project milestones will involve low-fi prototypes.

You don’t need to write any code until well into the semester.
Theme: Mobile Apps
Successful Apps

Ports of familiar PC apps.
Games

PC and non-PC ancestry
Thinking outside the box

Usually engineers approach design problems with a familiar “frame” for the problem.

This can overly constrain the solution.

It’s very useful during early design to reframe the problem – to think about it in an entirely different way.
Thinking outside the box

Cell phones as cameras – Camera bag pro
Thinking outside the box

Cell phones as motion sensors – RunKeeper
Thinking outside the box

Cell phones as motion sensors - Greenmeter
Thinking outside the box

Cell phones as barcode scanners - Redlaser
Thinking outside the box

Cell phones as speech devices – Talking phrasebooks
Thinking outside the box

Cell phones as audio instruments – Sonar Ruler
Course Mechanics
TAs, Office Hours, Sections

Teaching Assistant
– Anuj Tewari: EECS grad student

Office Hours
– John Canny: M 2-3pm, Tu 3-4pm in 637 Soda Hall
– Anuj: Friday 12:00PM-1:00PM in 544 Soda Hall
– Also by appointment

Sections
– Friday 10-11AM, 11-12N, 405 Soda Hall
– Will cover new material. You should attend!
– No section this week
Reaching Us

Email: cs160@imail.eecs.berkeley.edu
– Mail sent here will get the fastest response
– Please avoid mailing us directly
Class Wiki

http://bid.berkeley.edu/cs160-fall09/
Create Wiki Account

Your 1^{st} assignment (due by this Friday)
Course Petition

Your 2\textsuperscript{nd} assignment (due by Friday)

\textbf{Petition for Admission to CS160}

Name:
Email:
Major:
Year: (Freshman, Sophomore, Junior, Senior)
GPA:
Are you committed to remaining in the course through the semester and collaborating with teammates on a group project?:
Reasons for taking the course:
What skills you would bring to team projects:
Relevant experience (employment or undergraduate research):

\textbf{Email:} cs160@imail.eecs.berkeley.edu

Both enrolled and waitlisted students should send us petition

Information \textbf{will determine admission} for waitlisted students


Readings

Readings are very important to the class
  – Make sure you do the reading *before class*
  – Midterm/Final will include things only in readings

Most readings will be posted on wiki
  – Require username/password:

Online reading discussions (ongoing assignment)
  – Must post *one substantial comment* per lecture
  – We will **not** accept late comment
  – Will be the major factor in your class participation grade
Grading

Class participation (10%)
Individual assignments (20%)
Group project (40%)
Midterm (15%)
Final (15%)

Score distribution is high with small variance. So every point counts! Make sure you turn in all the reading comments.
Policies

Late Assignments
– Most assignments will be due before class on the due date
– Group assignments will not be accepted late
– Individual assignments lose 20% per day

Cheating (official)
– Will get you an F in the course
– More than once can get you dismissed from Cal
Assessment

Goal of cs160 is to teach you to design and evaluate interfaces
- There is often more than one good design
- But, there are also lots and lots of poor designs
- Be critical of your own work (point out pros and cons)
- As in many design disciplines, grading will be qualitative

Specific assessment guidelines will be given in each assignment

Good communication expected in oral & written presentations

Groups self-assess participation
  - Should monitor it throughout the project
  - Meet with us as soon as problems emerge
Next Time

The Design Cycle and Brainstorming

– **The Task-Centered Design Process.** *Task-Centered User Interface Design.* Chap 1. Lewis & Rieman

– **The Perfect Brainstorm.** *The Art of Innovation.* Kelley

Will need username/password for this one