CS160: User Interface Design, Prototyping and Evaluation
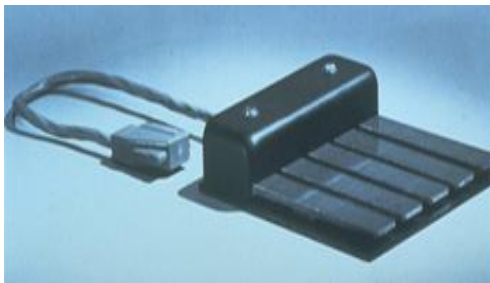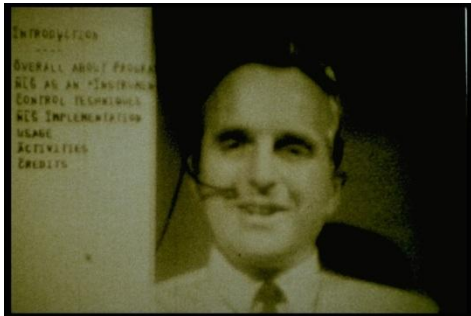
Prof: John Canny
GSI: Anuj Tewari

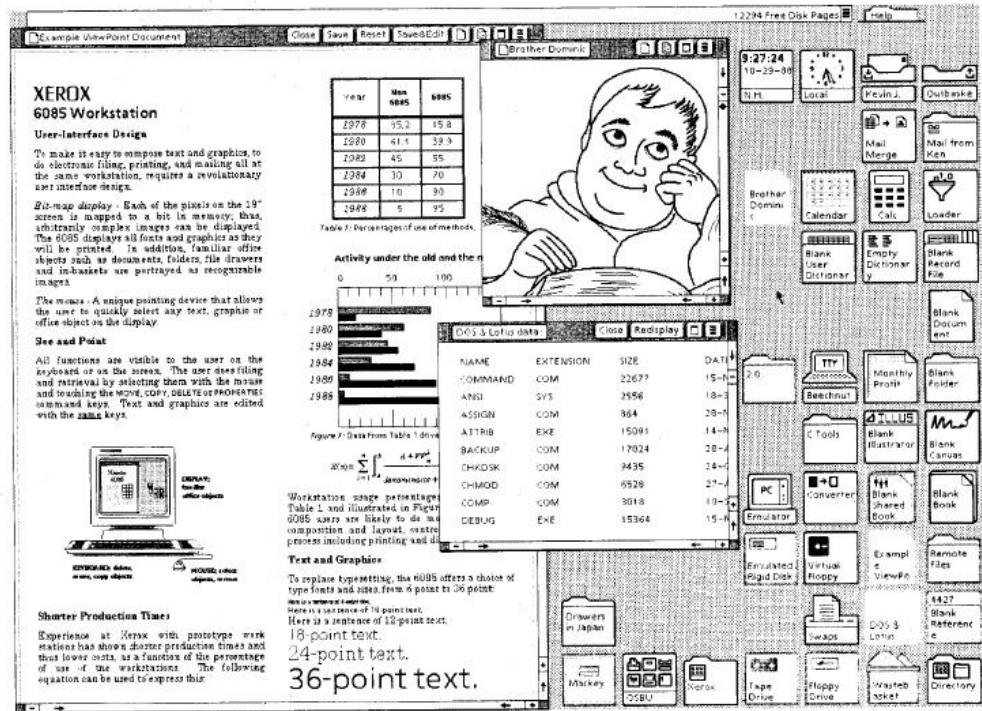# Theme for this semester: Mobile apps

Where we were (1968)

Engelbart demo, NLS (oNLine System)
- Video screen, chording keyboard, mouse, videoconferencing, hyperlinking, word processing, email
- User studies

Video: 10:54 – 17:00

Where we were (1981)

Xerox Star: Bitmapped display, windows, icons, menus, pointer, desktop, direct manipulation, WYSIWYG ...

Video: 1:11 – 8:20

Where we are now

Where we are now

Buttons, screens, but also acceleration, gyroscopes, voice input, vibration output.
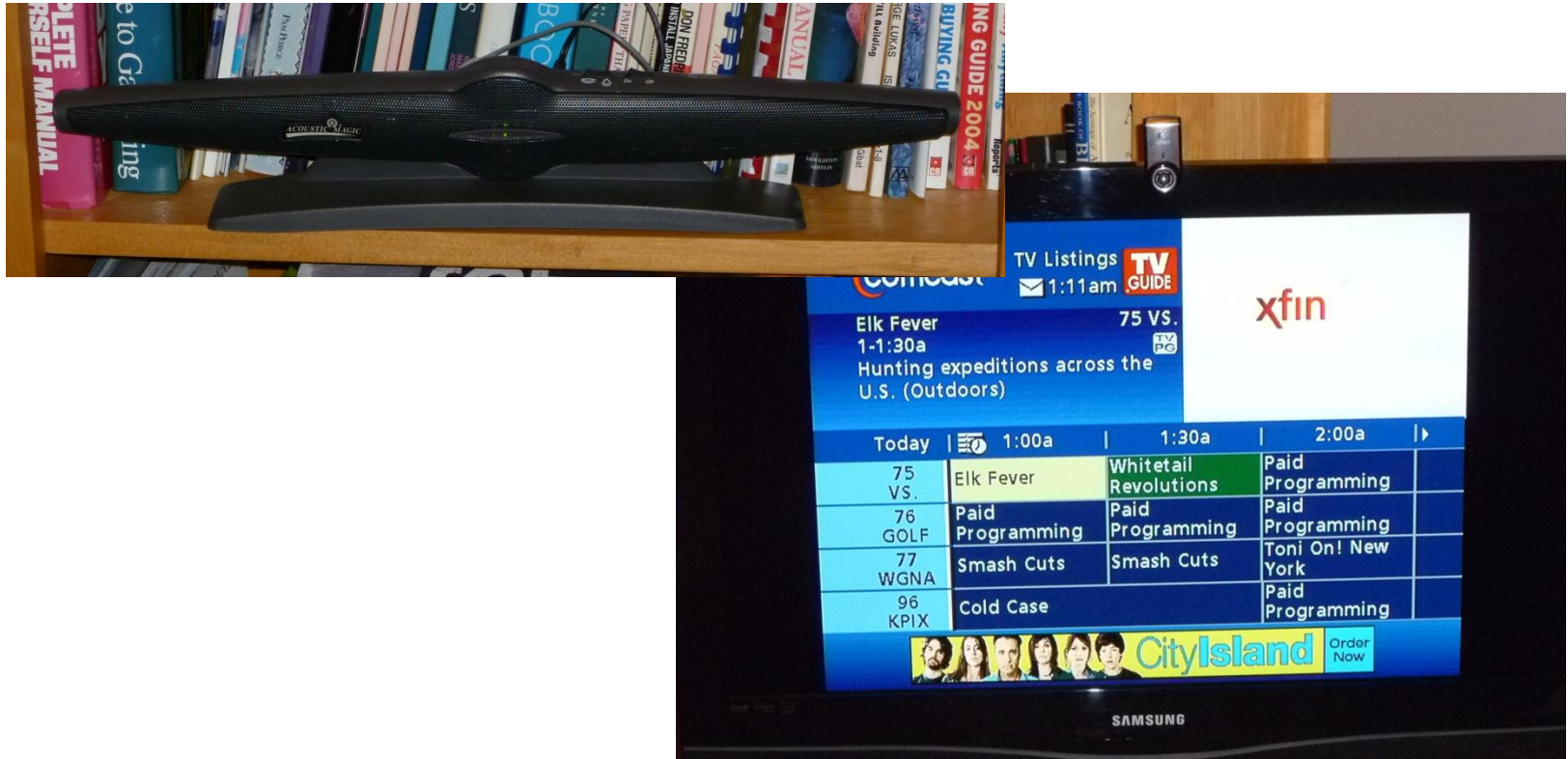
Where we are now

Toys with sensors, motors, vision, networking

Where we are now

Home and media control through voice, video

Where we are now

Tablets, media players, game consoles.

Touch interaction, voice, movement, GPS

Coming soon

Microsoft Kinect

Whole-body interaction via 3D computer vision for gaming.

User Interface Design

We're studying the science of UI design, not the art.

Top selling smartphones in Q4, 2009:

1. RIM – BlackBerry Curve
2. Apple – iPhone 3G S
3. Motorola – DROID
4. Apple – iPhone 3G
5. RIM – BlackBerry Pearl
6. RIM – BlackBerry Bold
7. RIM – BlackBerry Storm

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: Android

Full-featured, open architecture, familiar tools (Java, Eclipse)

State-of-the-art interaction
- Multi-touch input
- GPS
- Accelerometer
- Bluetooth
- Audio
- Camera support

Archos 5

We can provide 1 per group if needed.

Archos 5 16GB Tablet:

- 5" Touch screen (not multitouch)
- Accelerometer
- GPS
- Mic + speaker
- Bluetooth + WiFi
- No cell service, but BT DUN to a tetherable smartphone
- Android 1.6

Instructor: John Canny

Professor in EECS

Joined Berkeley in 1987

Work in HCI, Education, Health Tech

Language learning games
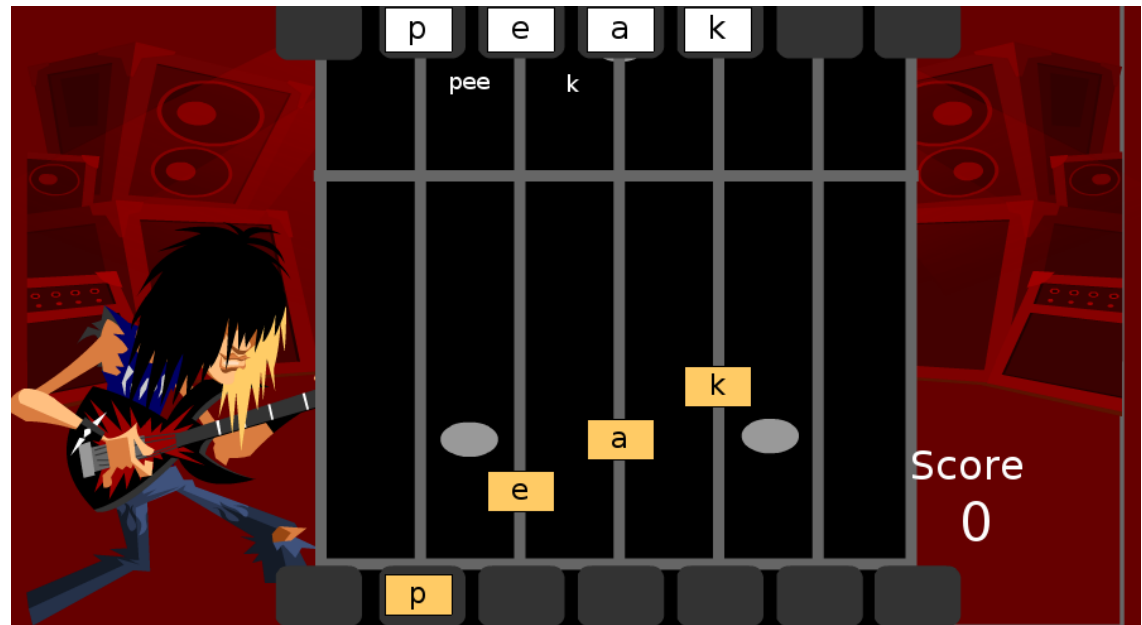Persuasive technologies
Mobile applications

GSI

Name: Anuj Tewari

Areas of interest:
Educational technology,
Speech recognition,
Game design

Research topic: Speech
and Pronunciation
Improvement via
Games, for Hispanic
Children

Advisor: John Canny

Topics

- Course Overview
- Project Description
- Course Mechanics

Course Overview
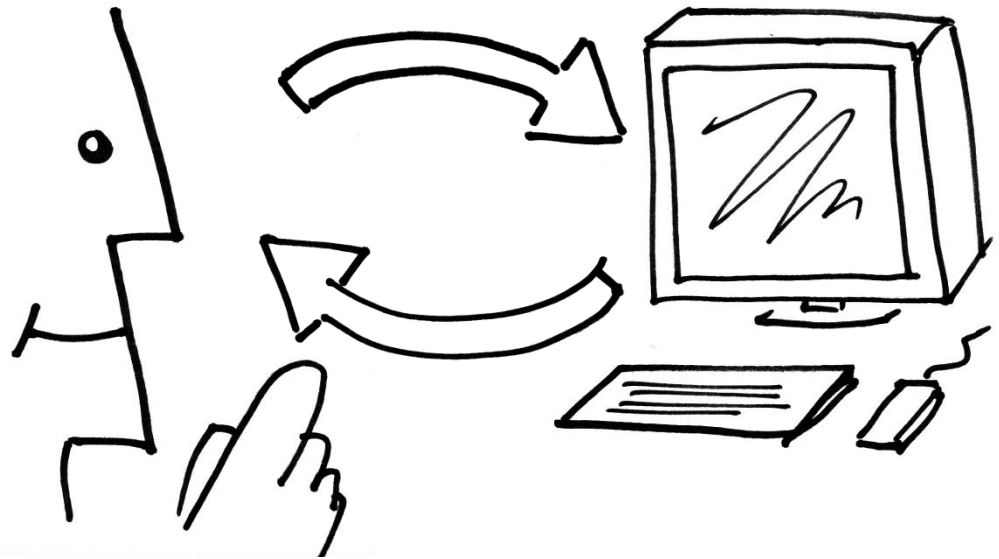
Human-Computer Interaction (HCI)

Human

- User of program
- Others (friends, collaborators, coworkers)

Computer

- Machine program runs on
- Often split: clients & servers

Interaction

- User tells the computer what they want
- Computer communicates results
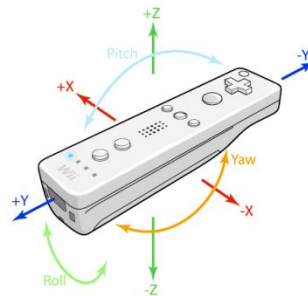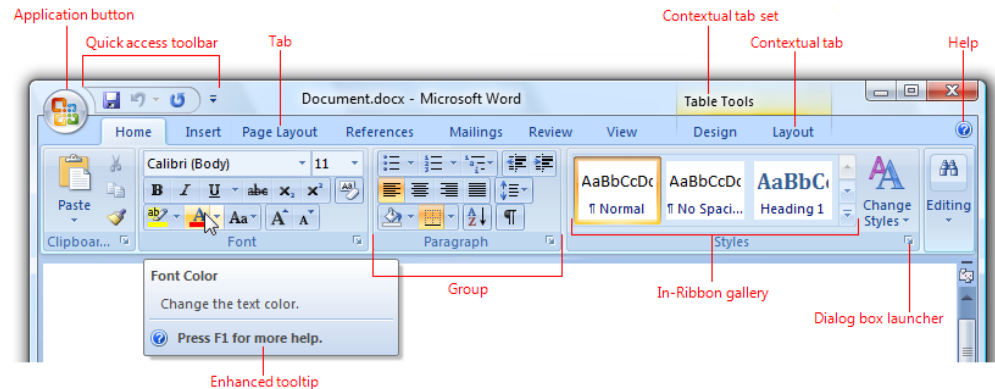
User Interfaces (UIs)

Part of application that allows

- People to interact with computer
- Computer to communicate results

Can include hardware design

- Buttons, sliders, other sensors

HCI =
design, prototyping, implementation & evaluation of UIs

http://www.reactable.com

Why Study User Interfaces?

Major part of work for most commercial programs
- Approximately 50%
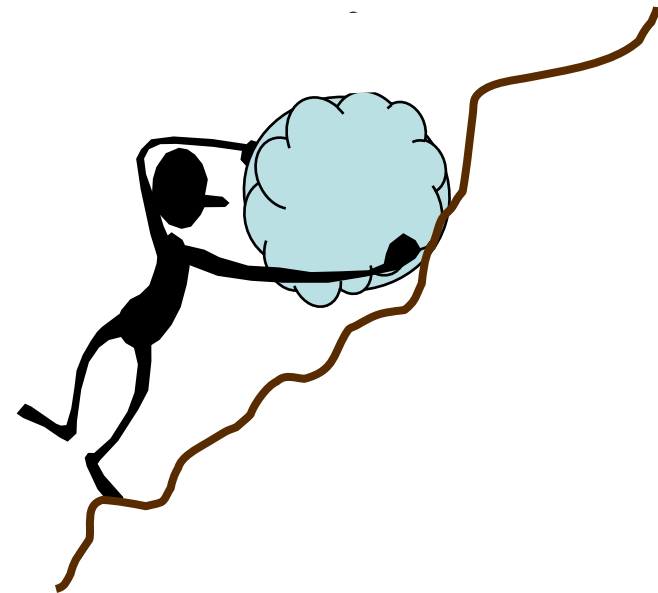
You will work on software for a market
- Intended for people other than yourself

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 American 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
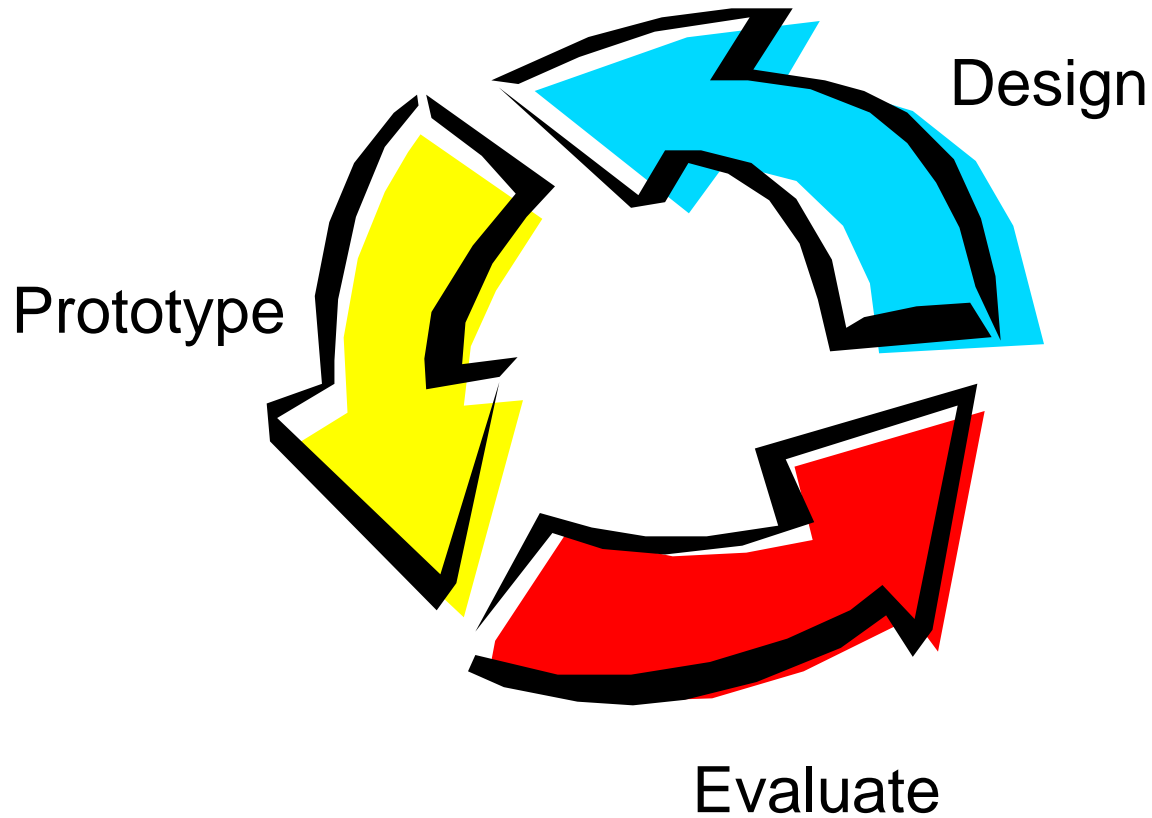
High user satisfaction
- Confident of success

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.

Interface Design Cycle

Design

Prototype

Evaluate

Building Successful Interfaces

1. Task analysis & contextual inquiry
2. Rapid prototyping
3. Evaluation
4. Iteration: Back to 1

Task Analysis & Contextual Inquiry

- Observe existing practices

- Create scenarios of actual use

- Create models to gain insight into work processes

CS247, Stanford, 2006

http://www-personal.umich.edu/~chrisli/m2.html

Rapid Prototyping

- Build a mock-up of design (or more!)

- Low fidelity techniques
  - Paper sketches
  - Cut, copy, paste
  - Video segments

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

- UI builders
  - Interface Builder, Visual Studio, NetBeans
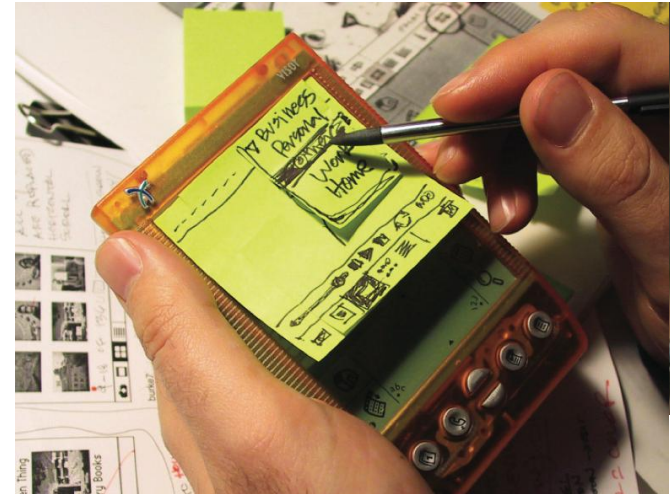
Moggridge, Designing Interactions, p.704

http://www.balsamiq.com/products/mockups/examples#wiki
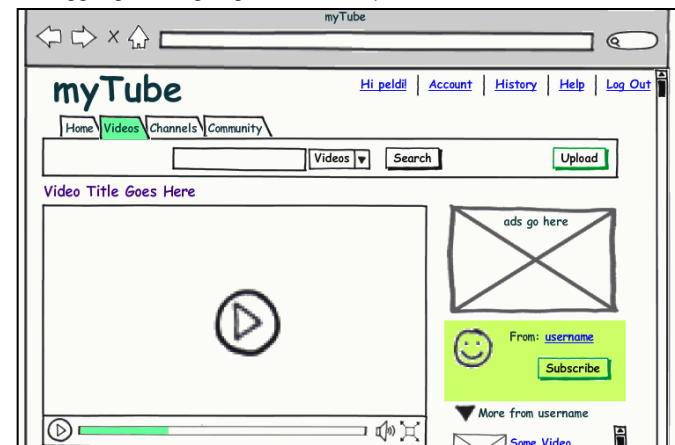
Evaluation

Evaluate analytically (no users)

Test with real target users

Low-cost techniques
– expert evaluation
– walkthroughs

Higher cost
– Controlled usability study

http://www.laurasmith.info/UsabilityTest.jpg
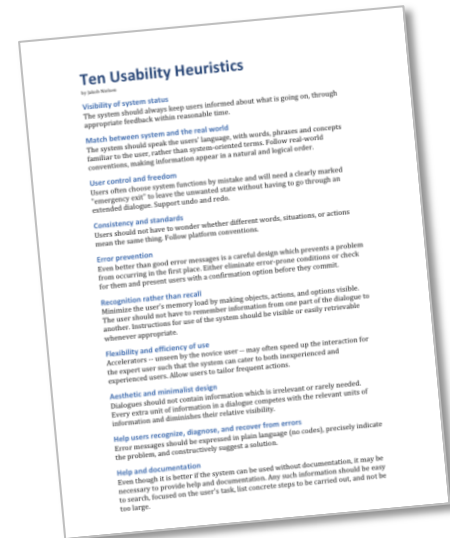
Building Successful Interfaces

- 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…

Goals of the Course

Learn to design, prototype, evaluate interfaces
- Discover needs and preferences of real customers
- Cognitive/perceptual constraints that effect design
- Building and rapidly evolving interactive systems
- Techniques to test and evaluate a product
- How to work together on a team project
- Communicate your results effectively

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These non-technical skills become more important the further you go in your career.

Project Description

Teams

Each of you will individually propose an application idea
- We follow a studio model to help you think outside the box
- Learning and working with others is central to the course

Groups
- 4 or 5 students to a team
- Work with students with different skills/interests

Cumulative
- Apply several HCI methods to a single interface

Theme: Mobile Applications

- Mobile applications are different:
    - Different tasks (local search, not word processing)
    - I/O constraints (slow text entry, few pixels)
    - Input opportunities: Sensing (orientation, acceleration, location, camera)
    - Internet connectivity

Course Platform

- Android Device, Wiimote
  - We have loaner devices (one Archos 5 per team), or use your own.
  - Development tools work on all platforms (Windows, Mac, Linux) – use your own or lab machine.
  - Coding assignments first on emulator, then on real device.

Inspiration: Design for a Particular User
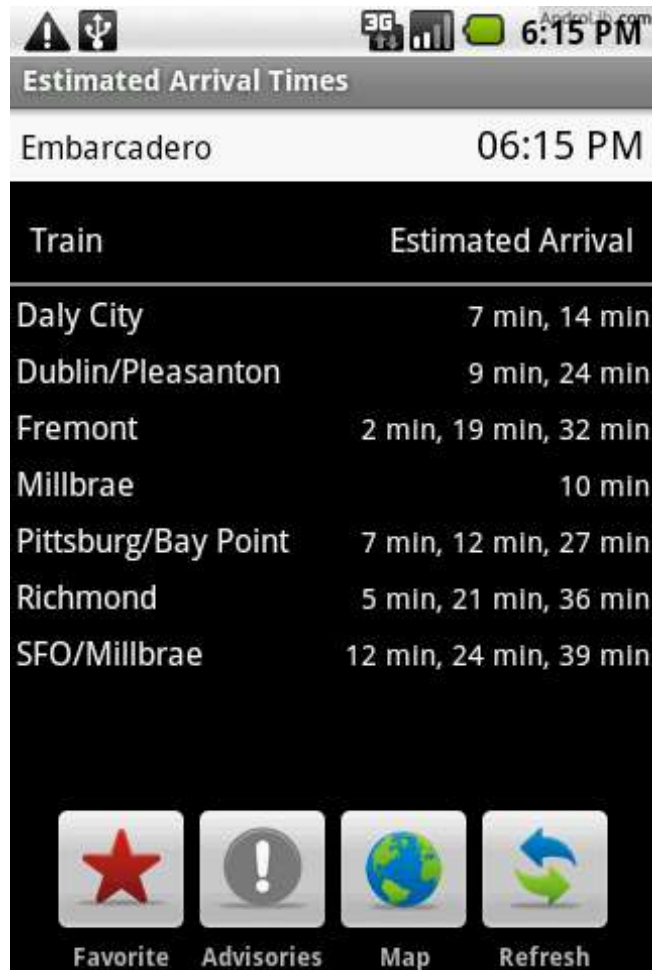
Bart Rider Android App
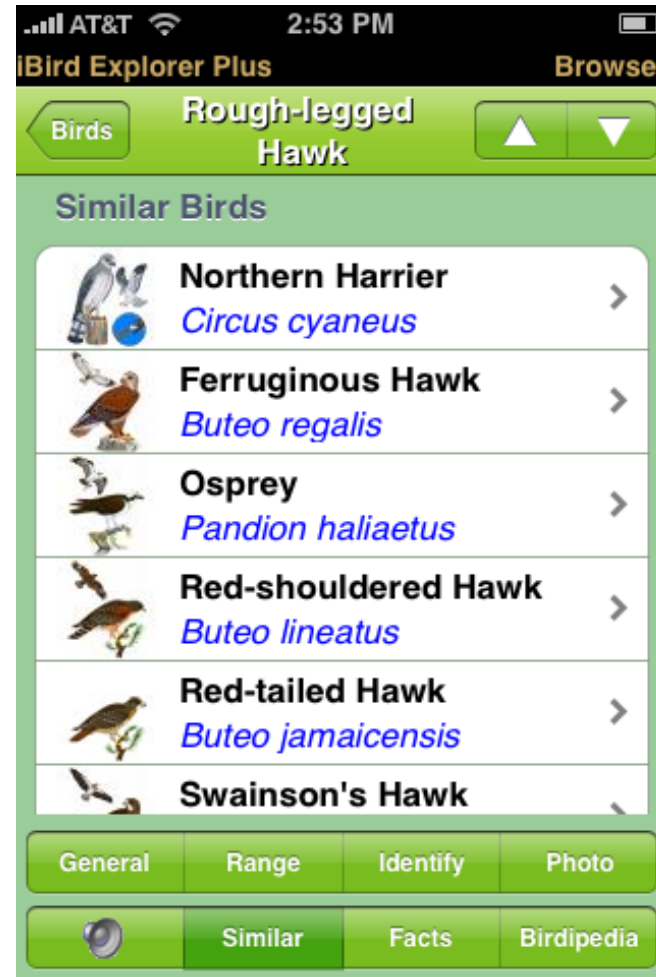
iBird

Inspiration: Location-based Apps

RedFin iPhone App

Navigon Mobile Navigator

RunKeeper

Inspiration: Input

Google Voice Search - http://www.youtube.com/watch?v=y3z7Tw1K17A

Inspiration: Input

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http://www.youtube.com/watch?v=cjnPwV6yP6o
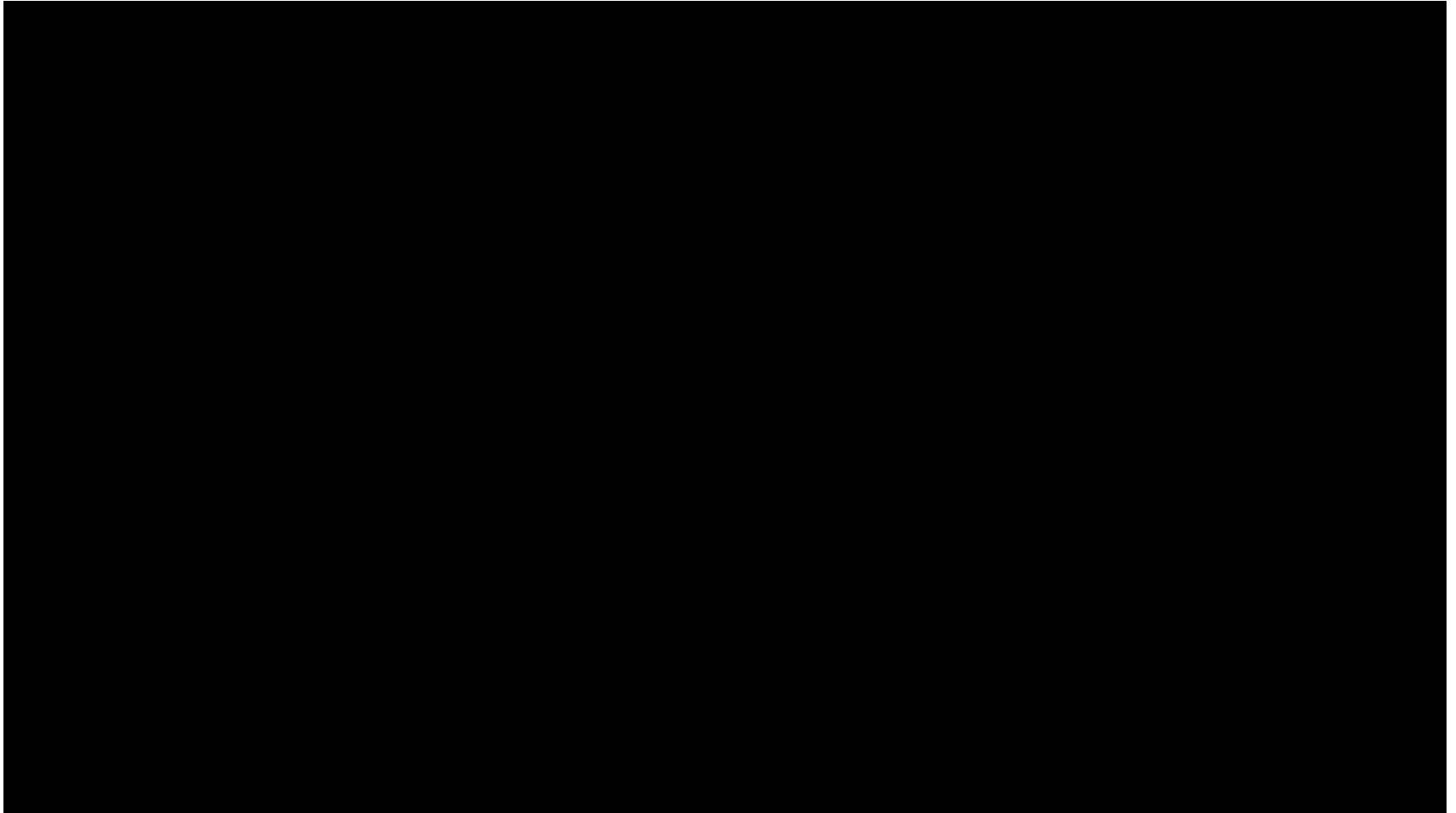
Course Mechanics

TAs, Office Hours, Sections

Teaching Assistant

– Anuj Tewari: EECS grad student

Office Hours

– John Canny: W 2:30-3:30pm, in 637 Soda Hall

– Anuj: Thursday 3:00PM-4:00PM in 354/360 Hearst Mining

– Also by appointment

Sections

– Friday 10-11AM, 11-12N, 405 Soda Hall (first week)

– Will cover new material. You should attend!

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-fall10/

Create Wiki Account

Your 1st assignment (due by this Weds)

Assignment 2: Course Petition

- Due by this Weds, online submission

- Both **enrolled and waitlisted** students have to submit

- Information **will determine admission**

Assignment 3: Individual Project Idea

- **Due** by 5pm **Wednesday**, Sept 8; 5pts
- Start gathering ideas now! Project should be:
  - Exciting to you!
  - Creative!
  - Consider the needs of a well-defined target user group
  - Include sketches to visualize your ideas
  - Grading details on the web (20 points total)
  - Description must be posted to wiki by 5pm on 9/8

Assignment 4: Tip Calculator

Due before class **Monday**, Sept 13; 5pts

Instructions on wiki. Summary:

- Set up your Android environment

- Build a simple interactive App.

- Submit your binary and source to us.

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 you class participation grade

Grading

Class participation (10%)
Individual assignments (20%)
Group project (50%)
Midterm (20%)

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