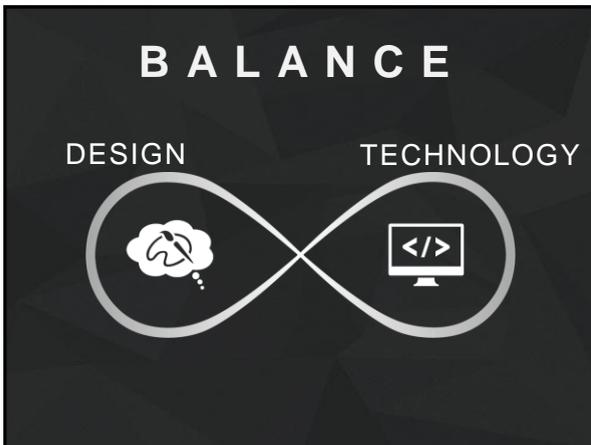


USER INTERFACE DESIGN + PROTOTYPING + EVALUATION

Introduction & Course Overview
 CSE 440: Introductory HCI

Prof. James A. Landay
 University of Washington

Winter 2013
 January 8, 2013



Hall of Fame or Shame?

Page setup for printing in IE5

1/8/2013 HCI: User Interface Design, Prototyping, and Evaluation 4

Hall of Shame!

Page setup for printing in IE5

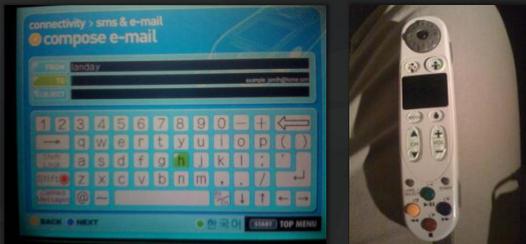
- Page preview nice, but
- Problems
 - codes for header & footer information
 - requires recall!
 - want recognition
 - no equivalent GUI
 - help is the way to find out, but not obvious

1/8/2013 HCI: User Interface Design, Prototyping, and Evaluation 5

Later Versions of IE Fix This

1/8/2013 HCI: User Interface Design, Prototyping, and Evaluation 6

Hall of Fame or Shame?



Asiana Airlines interface for sending email or SMS from plane

1/8/2013

HCI: User Interface Design, Prototyping, and Evaluation

7

Hall of Shame!



Asiana Airlines interface for sending email or SMS from plane

- Cool, but
 - text entry using this input device is VERY tedious
 - crashes often

1/8/2013

HCI: User Interface Design, Prototyping, and Evaluation

8

USER INTERFACE DESIGN + PROTOTYPING + EVALUATION

Introduction & Course Overview *CSE 440: Introductory HCI*

Prof. James A. Landay
University of Washington

Winter 2013
January 8, 2013



Who are We?

James Landay

- Professor in CSE at the University of Washington
 - formerly professor in EECS at UC Berkeley
 - spent 3 years as Director of Intel Labs Seattle
 - Dec 2011 finished 2.5 year sabbatical at Microsoft Research Asia
- Ph.D. in CS from Carnegie Mellon '96
- HCI w/ focus on informal input (pens, speech, etc.), web design (tools, patterns, etc.), & Ubiquitous Computing (UbiComp)
- Founded NetRaker, leader in web experience management (later sold to Keynote)
- Co-authored *The Design of Sites* with Doug van Duyn & Jason Hong
- Office Hours: Wed, 3-4 PM, 642 CSE & Mon 11 AM-12, Online
 - Send me your IM address to my email
- Email: landay at cs.washington.edu

1/8/2013

HCI: User Interface Design, Prototyping, and Evaluation

11

Nikki Lee

- M.S. student in HCDE at the University of Washington
- B.S. in ECE from Olin College 2010
- HCI w/ focus on interaction design, ubicomp, web
- TAd CSE 440 x 2 and CSE 441
- Office Hours: Tue 1:30 - 2:30 PM, HCI Lab (605 CSE)
- Email: nblee at uw.edu

1/8/2013

HCI: User Interface Design, Prototyping, and Evaluation

12

Kim Brown

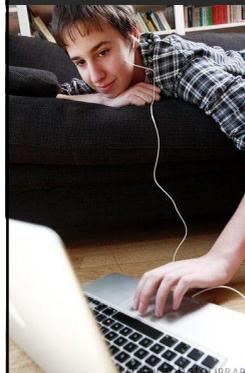
- Undergraduate student in HCDE at the University of Washington
- Took CSE 440 a year ago & TAd last quarter
- Office Hours: Tue 11AM - 12, HCI Lab (605 CSE)
- Email: brownks at uw.edu

1/8/2013

HCI User Interface Design, Prototyping, and Evaluation

18

Human-Computer Interaction (HCI)



Human

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

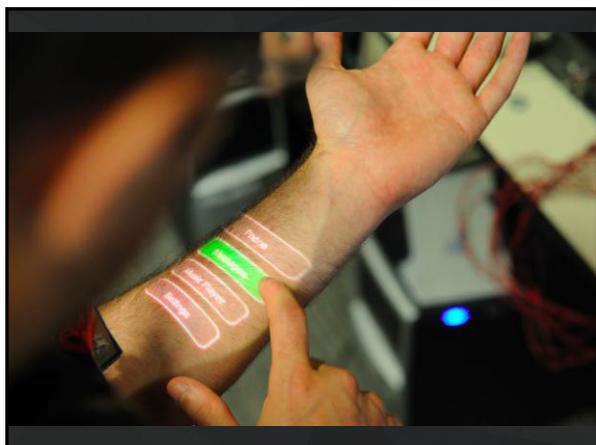
Computer

- the machine program runs on
- split between clients & servers

Interaction

- user tells the computer what they want
- computer communicates results

1/8/2013



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

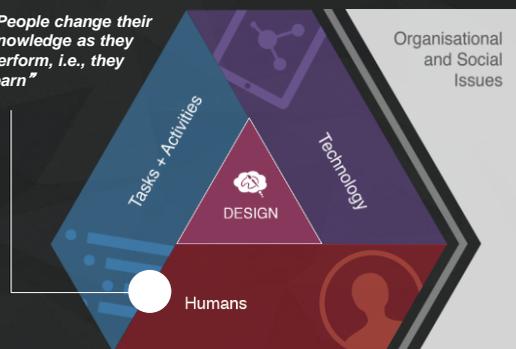
1/8/2013

HCI User Interface Design, Prototyping, and Evaluation

19

HCI Approach to UI Design

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



Why is HCI Important?

- Major part of work for “real” programs
 - approximately 50%
- Bad user interfaces cost
 - money
 - 5%↑ 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

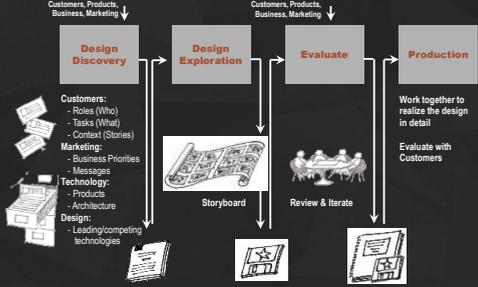


How to Design and Build Good UIs

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

1/8/2013 HCI: User Interface Design, Prototyping, and Evaluation 20

User Interface Development Process



Design Discovery

- Customers: Roles (Who), Tasks (What), Context (Stories)
- Marketing: Business Priorities, Messages
- Technology: Products, Architecture
- Design: Leading competing technologies

Design Definition: Design Problem Statement, Targeted User Roles (Who), Targeted User Tasks (What), Design Direction Statements

Design Exploration

Storyboard

Proposals: Demos, Lo-Fi Prototypes (How)

Evaluate

Review & Iterate

Specification: Hi Fidelity, Refined Design (Based on customer feedback), Foundation in product reality, Refined Design description

Production

Work together to realize the design in detail, Evaluate with Customers

1/8/2013 HCI: User Interface Design, Prototyping, and Evaluation 21

Iteration

At every stage!

Design

Prototype

Evaluate



1/8/2013 HCI: User Interface Design, Prototyping, and Evaluation 22

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 (7)

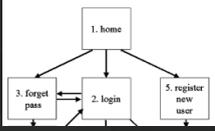
- screen sketches or storyboards
- flow diagrams/outline showing task structure
- executable prototypes
- representations simplify

Write essay
 start word processor
 write outline
 fill out outline
Start word processor icon
 double click on icon
Write outline
 write down high-level ideas

1/8/2013 HCI: User Interface Design, Prototyping, and Evaluation 23

UI Design Representations

Flow / Site Maps



Storyboards



Schematics



Mock-ups



1/8/2013 HCI: User Interface Design, Prototyping, and Evaluation 24

Usability(?)

According to the ISO:

The *effectiveness*, *efficiency*, and *satisfaction* with which specified users achieve specified **goals** in particular environments

This does not mean you have to create a “dry” design or something that is only good for novices – it all depends on your goals

1/8/2013

HCI: User Interface Design, Prototyping, and Evaluation

26

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



1/8/2013

HCI: User Interface Design, Prototyping, and Evaluation

28

User-centered Design “Know thy User”

- Cognitive abilities
 - perception
 - physical manipulation
 - memory
- Organizational / educational job abilities & skills
- Keep users involved throughout
 - developers working with target customers
 - think of the world in users terms
 - not technology-centered/feature driven

1/8/2013

HCI: User Interface Design, Prototyping, and Evaluation

29

Design Discovery Task Analysis & Contextual Inquiry

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



HCI: User Interface Design, Prototyping, and Evaluation

28

Design Discovery Task Analysis & Contextual Inquiry

- Observe existing work practices
 - augment with self-report tools (e.g., ESM)
- Create examples & scenarios of actual use
- Discover tasks to design for
- Answer key questions about tasks & users
- “Try-out” new ideas before building software

1/8/2013

HCI: User Interface Design, Prototyping, and Evaluation

29

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



1/8/2013

HCI: User Interface Design, Prototyping, and Evaluation

30

Team Buddy Map

Backcountry Savior

Craig Panthen : Philip Kuo : Heidi Tanamulla : Christopher White
CSE 440F : Professor Landay

1/8/2013 HCI User Interface Design, Prototyping, and Evaluation 31



Rapid Prototyping

Fantasy Basketball

- Build a mock-up of design so you can test
- Low fidelity techniques
 - paper sketches
 - cut, copy, paste
- Interactive prototyping tools
 - HTML, Visual Basic, Flash, DENIM, SketchFlow, Balsamiq, etc.
- UI builders
 - Expression Blend + Visual Studio, etc.

1/8/2013 HCI User Interface Design, Prototyping, and Evaluation 33

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

1/8/2013 HCI User Interface Design, Prototyping, and Evaluation 34

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

1/8/2013 HCI User Interface Design, Prototyping, and Evaluation 35

Course Format

- Interactive lectures
- Quarter long project & homework
- Readings
- All material will be online
 - slides, exercises, readings, schedule
- Have fun & participate!

1/8/2013 HCI User Interface Design, Prototyping, and Evaluation 36

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

1/8/2013

HCI: User Interface Design, Prototyping, and Evaluation

37

Project Proposal (due Thursday)

- Each of you will propose an interface idea
 - fixing something you don't like or a new idea
- Groups
 - 4-5 students to a group
 - work with students w/ different skills/interests
 - groups meet with teaching staff every 2 weeks
- Cumulative
 - apply several HCI methods to a single interface

1/8/2013

HCI: User Interface Design, Prototyping, and Evaluation

38

Project Process Overview

- Project proposal (individual)
 - due Thursday (January 10)
- Break-up into groups the following week
- Project contextual inquiry & sketches
- Project task analysis & sketches
 - based on CI & field work
- In class presentations & critiques
- Design sketching & concept videos
 - i.e., rough proposals that can & will change
- Low fidelity prototyping & user testing
- In class presentations & critiques

1/8/2013

HCI: User Interface Design, Prototyping, and Evaluation

39

Project Process Overview

- Rapid prototype using tools
- Final presentations & project fair with industry guests

1/8/2013

HCI: User Interface Design, Prototyping, and Evaluation

40

Trippin'

Trippin' Step 1 of 4
Start From:
 Current Location
 Specify Location
Loc. Name: Soda Hall
Address: 405 Soda Hall
City: Berkeley
State: CA
Zip: 94720
*Optional Info
Cancel Next

Trip: To Foo Bar	Trip: To Foo Bar	Trip: To Foo Bar
Summary	Map	Directions
From: My Apartment To: Foo Bar Cost: \$3.00 Distance: 30 miles Transportation: Bus 2 transfers Leave By: 4:20 pm 1/11/99 Total Time: 30 minutes		Summary Map Directions

1/8/2013

HCI: User Interface Design, Prototyping, and Evaluation

41

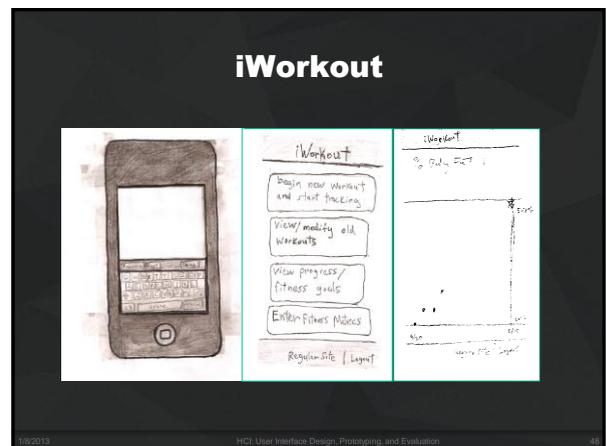
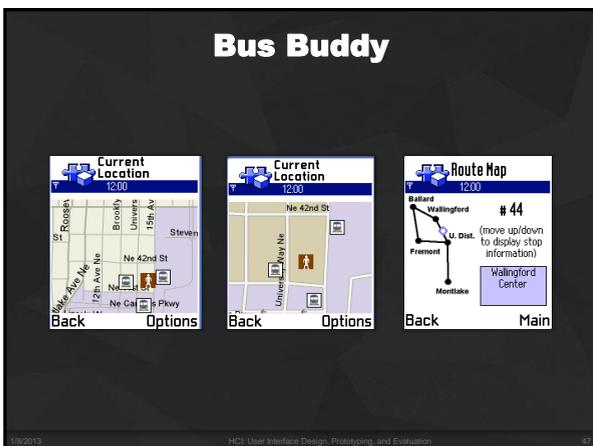
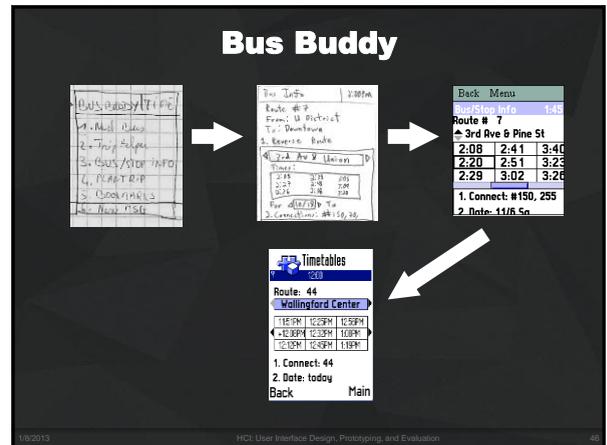
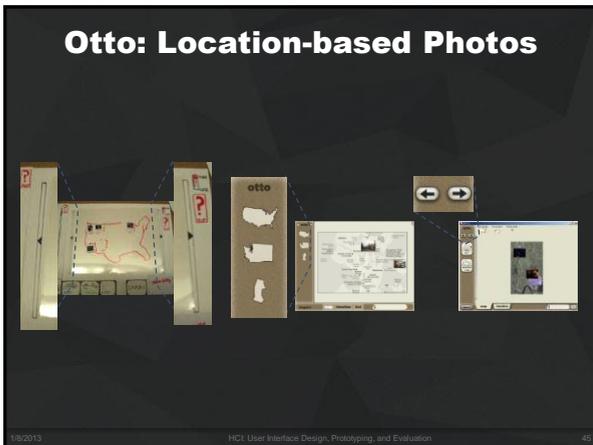
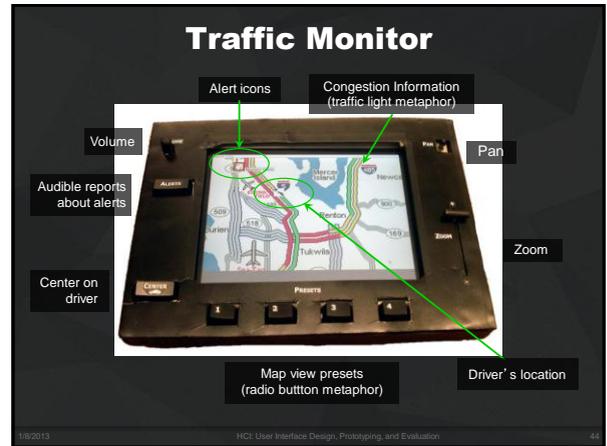
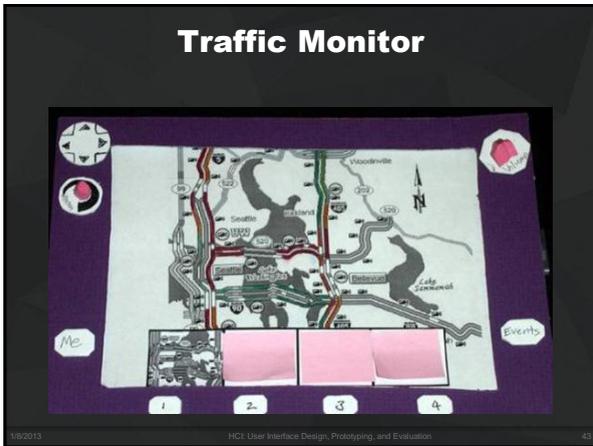
Traffic Monitor

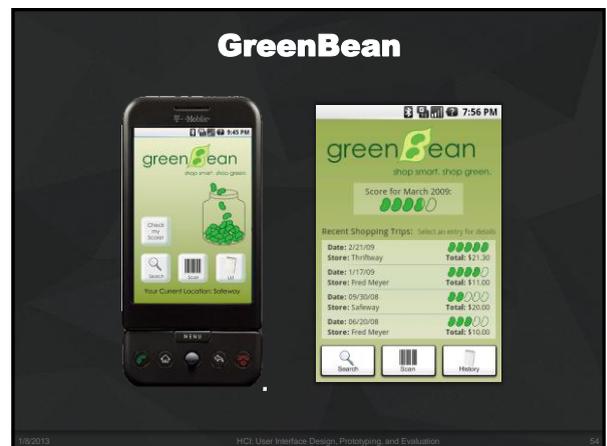
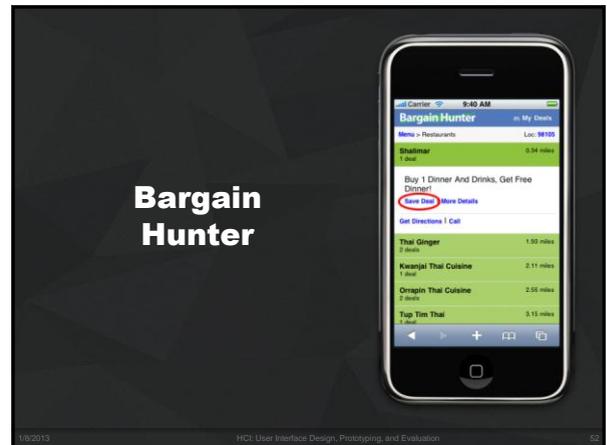
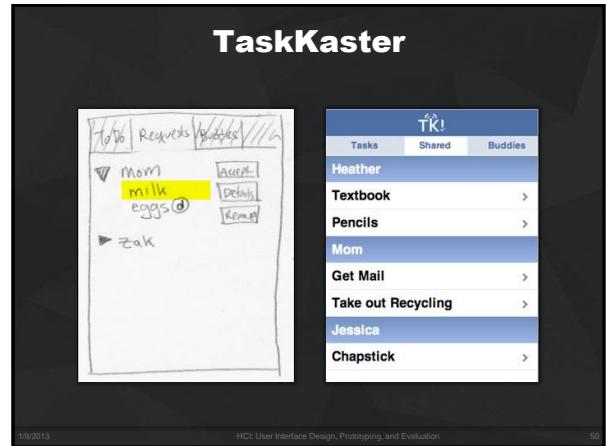
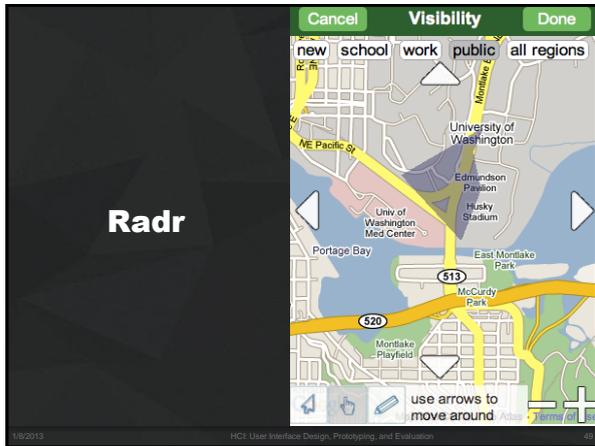


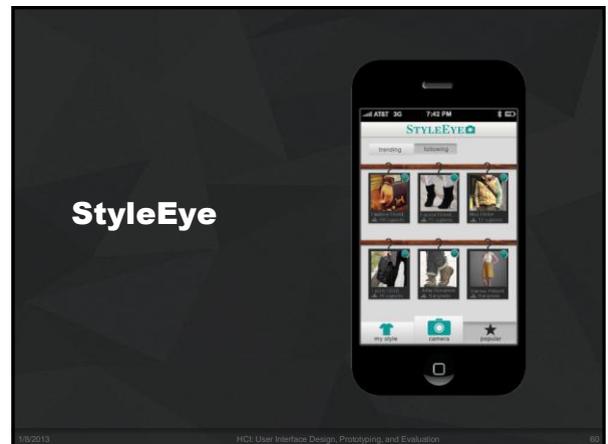
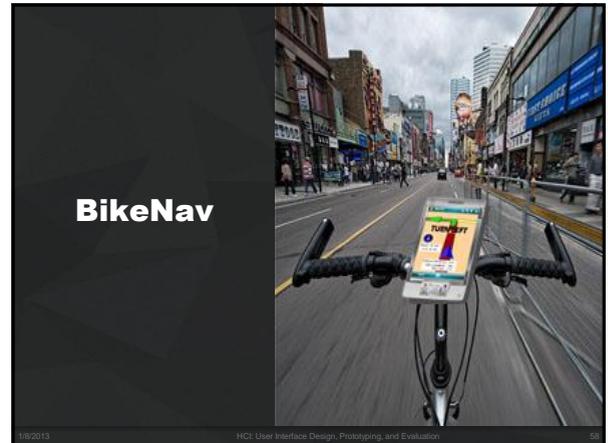
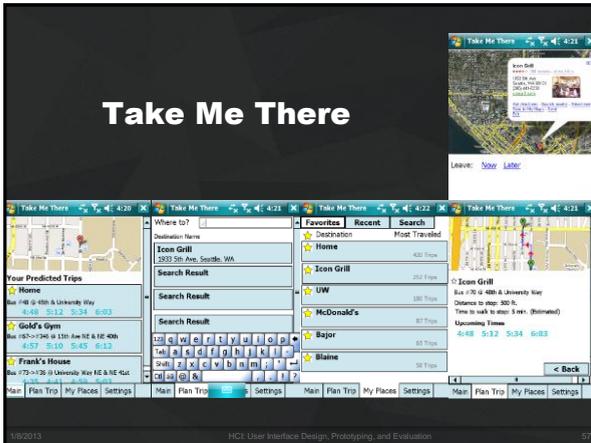
1/8/2013

HCI: User Interface Design, Prototyping, and Evaluation

42







Project Themes

- Mobile computing (e.g., phone or tablet)
- Projects should address one or more of the following briefs
- Change
 - Transform your or your family's behavior
 - Past examples: fitness, sustainability, etc.
- Crowd-sourced mobile AI
 - Use Mechanical Turk to give an application perfect vision, speech recognition, sorting data, etc.
 - Design two UIs: 1 for end-user and 1 for Turk worker
- Creativity
 - Help people be more creative in their everyday live



1/8/2013

HCI: User Interface Design, Prototyping, and Evaluation

61

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 textbooks
 - *Designing the User Interface: Strategies for Effective Human-Computer Interaction* by Shneiderman & Plaisant, 5th edition (2009)
 - order from Amazon.com (link off class web page)
- Other recommended books on web page

1/8/2013

HCI: User Interface Design, Prototyping, and Evaluation

62

Assignments

- Individual
 - 3 written + in-class studio + one talk each
 - handed in via Collect It dropbox
- Group
 - 6 written assignments
 - 3 presentation/demos with the write-ups + poster
 - all group work handed in on Web
 - group web site & blog

1/8/2013

HCI: User Interface Design, Prototyping, and Evaluation

63

Grading

- A combination of
 - midterm (20%)
 - individual assignments & presentation (15%)
 - group project (60%)
 - demos/presentations/poster (group component)
 - project write-ups and exercises
 - ratings given by other team members & class
 - in class participation (5%)
- No curve
- No final (though late midterm)

1/8/2013

HCI: User Interface Design, Prototyping, and Evaluation

64

Tidbits

- Late Policy
 - no lates on group assignments
 - individual assignments lose one letter grade/day
- Cheating policy
 - will get you an failing grade in the course

1/8/2013

HCI: User Interface Design, Prototyping, and Evaluation

65

Administrivia

- Roll
- Waiting list for those who want to add
 - sort out after 1st week

1/8/2013

HCI: User Interface Design, Prototyping, and Evaluation

66

Summary

- HCI an important part of most software produced today
- Getting the interface right is hard, but...
- Solution in *Iterative Design* including repeated cycles of
 - Design
 - Prototyping
 - Evaluation

1/8/2013

HCI: User Interface Design, Prototyping, and Evaluation

67

Next Time

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

1/8/2013

HCI: User Interface Design, Prototyping, and Evaluation

68



Introductions

- Name
- Major
- What you want to get out of the class

1/8/2013

HCI: User Interface Design, Prototyping, and Evaluation

69