



Human-Computer Interaction IS4300



P6 – Software Prototyping due 11/18

- DUE IN 2 WEEKS (11/18):
- IMPORTANT:
 - Your system ***must actually run*** and support your 3+ tasks to some level of fidelity.
 - Other students in the class must be able to download your software on any readily available (e.g. lab) computer and walk through the 3 tasks with little or no help from you.
 - If you must develop for a unique device (e.g. iPhone) you must be prepared to loan 3-5 other students a device for a day each so they can do heuristic evaluation.

Group Project Deployment & Testing Plans?

UbiComp

- Ubiquitous Computing, aka
- Pervasive Computing

- “Computing off the desktop”
- Mark Weiser @ Xerox PARC
1990’s



Xerox PARC Projects

- PARCtab ('90s)
 - Location sensitive mobile computing
 - IR communication with each room



Ubicomp Topics

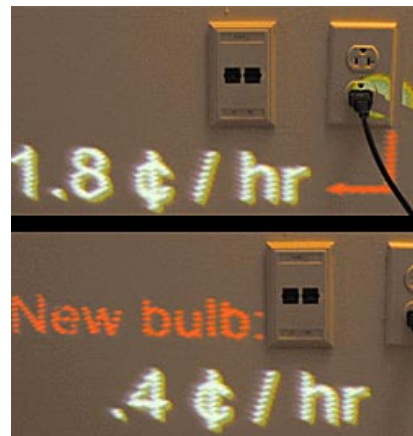
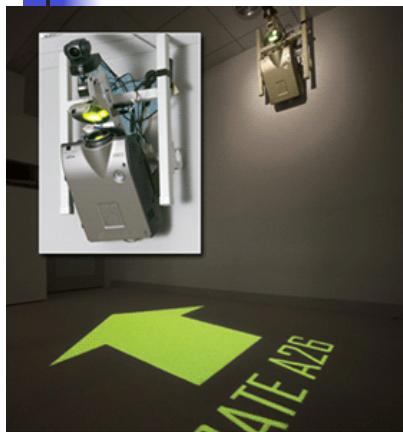
- Mobile computing
- Smart homes
- Passive sensing
- Context aware systems
- Ambient interfaces
- Automated capture & access
- Etc.

Professional Conferences

- ~CHI
- Ubicomp
- Pervasive Computing
- Mobile HCI
- MobiCom

Non-mobile Ubicomp examples

IBM Anywhere Display



Non-mobile Ubicomp examples Interactive wall-sized displays



Non-mobile Ubicomp examples PlaceLab



Ambient Interfaces: Ambient Orb



Ambientdevices.com

Context-Aware Computing

- Apps that automatically respond to, or incorporate, context
- What is context?
 - Location
 - Time
 - Activity
 - People
- Current examples?
- Trying to guess 'user intent' is notoriously difficult...

Challenge in Context-aware Computing: Inferring User Intent



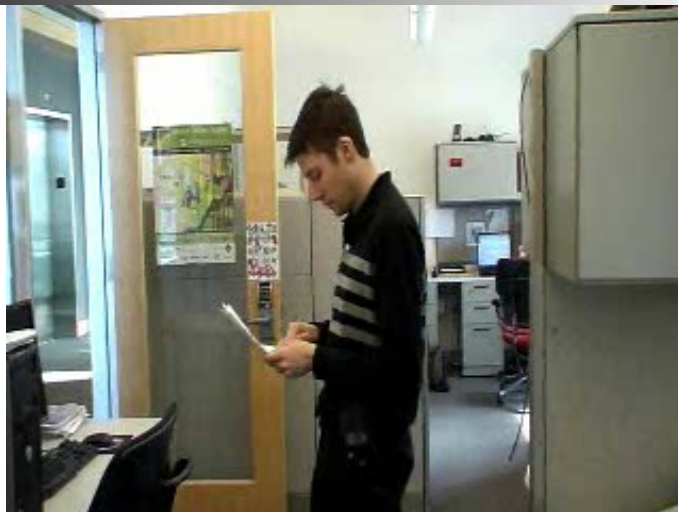
Exercise


- Design an algorithm for the Star Trek doors.
 - Assume any existing sensors.

Challenge in ubiquitous computing: how to monitor and interact proactively



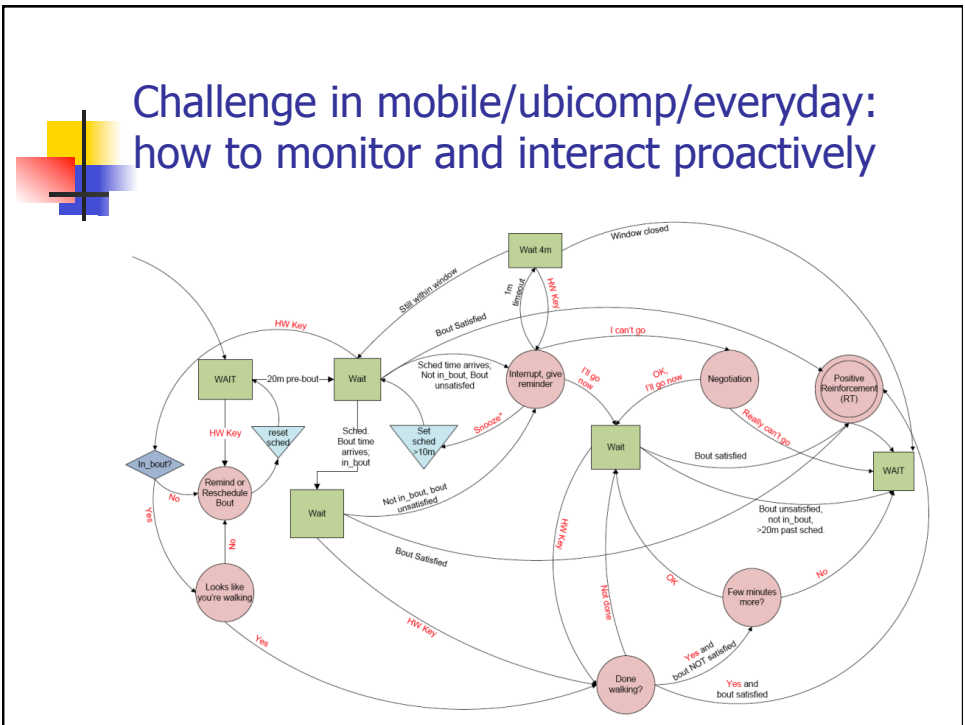
Challenge in mobile/ubicomp/everyday: how to monitor and interact proactively

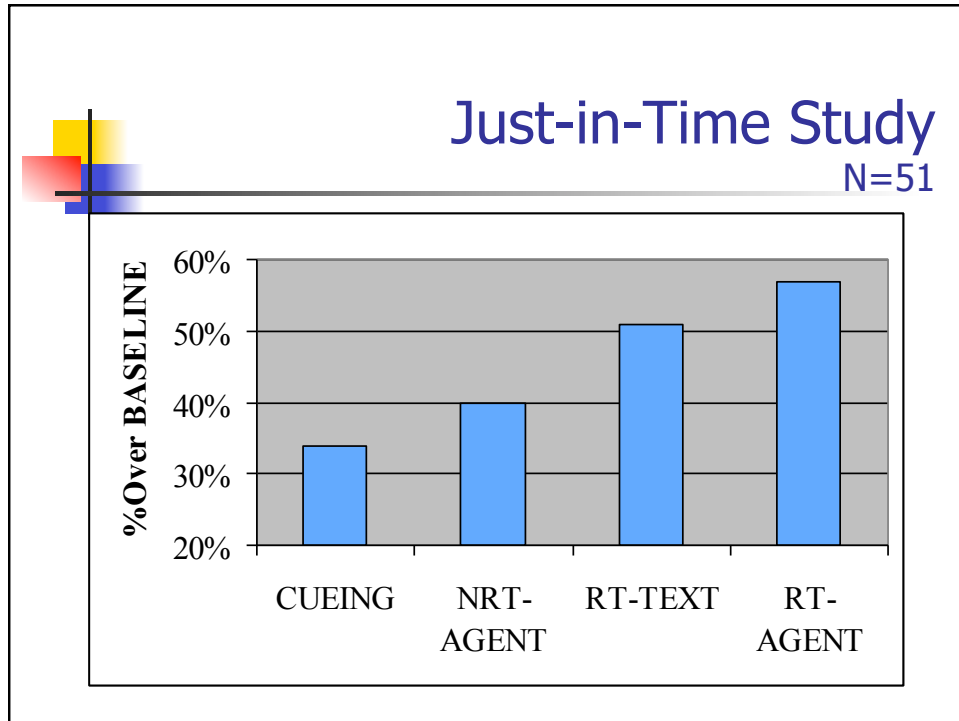




Wearable Agent Field Study

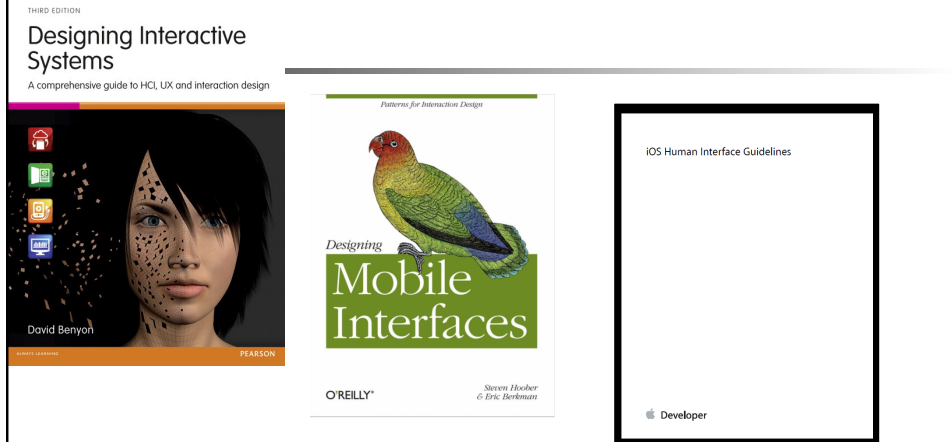
- Primary hypothesis: real-time intervention more effective than retrospective.
- 5-week, 5-treatment within-subjects design
- 100 free-living, sedentary adults





- ## How do our models of interaction need to change for ubicomp?
- Model Human Processor / Norman's Interaction Model, Assumes:
 - single user
 - uninterrupted task
 - state either on screen or in working memory
 - Alternate theoretical frameworks
 - Activity theory, Distributed cognition, Ethnography

Mobile UIs



Mobile Computing

Jesper Kjeldskov

- Relatively new area of research
- Intense competition and innovation
- mobile interaction design
 - mobile computing
 - social sciences
 - human-computer interaction
 - industrial design
 - user experience design

History of Mobile Computing

1. Portability
2. Miniaturization
3. Connectivity
4. Convergence
5. Divergence
6. Apps
7. Digital ecosystems



Convergence vs. Divergence

- Convergence
 - E.g., camera phones
 - Cons: any single function worse than dedicated device
 - Pros: new hybrid, integrated functions
 - mobile user experience is proportionally related to the functional scope of interactive systems: "more means more"
- Divergence
 - Pros: mobile user experience is inversely proportionate to the functional scope of interactive mobile devices and systems: "less is more"

Mobile UIs

- What's different in designing for mobile vs. desktop apps?
 - What's easier?
 - What's harder?

Define "mobile UI"





Differences from Desktop

- Challenges

- Limited screen space, or no screen at all.
- battery life
- limitations on storage, memory, processor and communication ability
- screens on non-smartphone mobiles may not be 'bit-mapped' (feature phone: alphanumeric)
- All sorts of people will be using the device - used in all manner of physical and social **contexts**.
- Kjeldskov: contextual task may be more important than mobile task - eg, walking down street




Differences from Desktop

- Advantages

- novel forms of interaction
- sensors
- "anytime anywhere"
- Design for "grocery store moments"

How do mobile UIs (apps) impact design principles?

- Visibility?
- Feedback?
- Modes (memory)?
- Learnability?
- External consistency?
- Affordances?



Patterns for Interaction Design

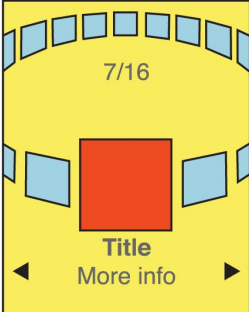
Designing

Mobile Interfaces

O'REILLY®

*Steven Hooper
& Eric Berkman*

- 584 pages
- Design patterns





Mobile UIs

- Hooper & Berkman
 - Small
 - Portable
 - Connected
 - Interactive
 - Contextually Aware



Some Issues in Designing for Mobile Devices?

- Small UI
- Limited input ability
- Wide variety of
 - Screen size / resolution
 - Hardware inputs
 - Sensor inputs
 - Connectivity options
 - OS / API versions
- Rapidly changing device & OS (some)

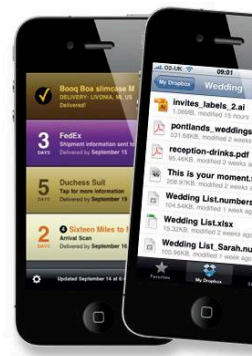
Principles of Mobile Design

Hooker & Berkman

- Respect User-Entered Data
 - Input is hard
- Mobiles are Personal
 - Assume one user, with personal data active
- Lives Take Precedence
 - Don't interrupt unless necessary
- Must Work in all Contexts
 - E.g., screen brightness
- Use Sensors & Smarts
 - Do things for the user when possible
- User Tasks Take Precedence
 - User-directed interaction
- Consistency (external & internal)

Page Layout Guidelines

- Mobile screen real estate is valuable.
 - Skip unnecessary banners, images, graphics ("administrative clutter" – Tufte)
- Consistent & simple navigation elements
- Keep everything as simple as possible
- For Serious tools (vs. games)
 - Minimal number of colors
 - Keep UI data-centered



Design Methodology

Hooker & Berkman

- Storyboard UIs (as before)
- Additional considerations
 - Gestural interface & finger size
 - Use contexts
 - Asynchronous events
 - Use of sensors, devices
 - Different display sizes, orientations (e.g., auto-switch landscape / portrait)

iPhone

<https://developer.apple.com/library/ios/navigation/>

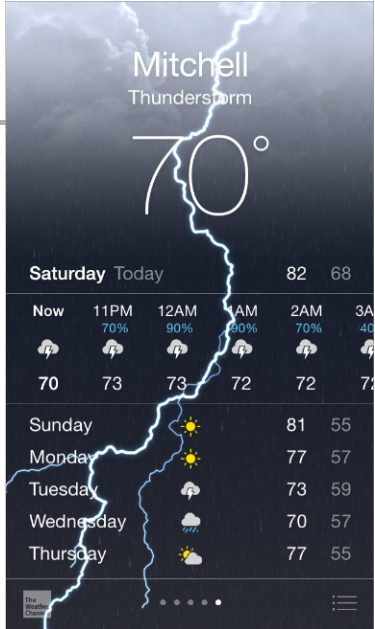
Themes in iOS8/9:

- Defer to content
- Clarity.
- Depth.

iOS Human Interface Guidelines

Developer

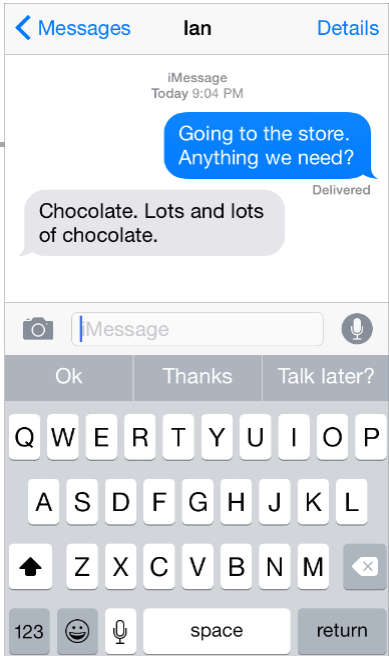
Defer to Content

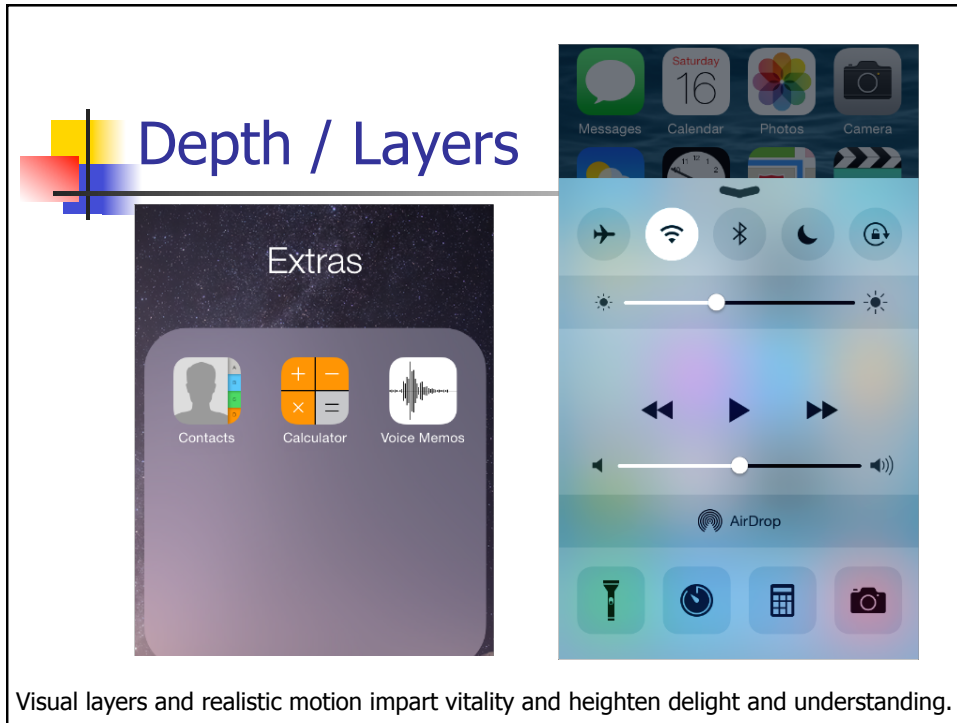


Defer to content – content is central, not UI

Clarity

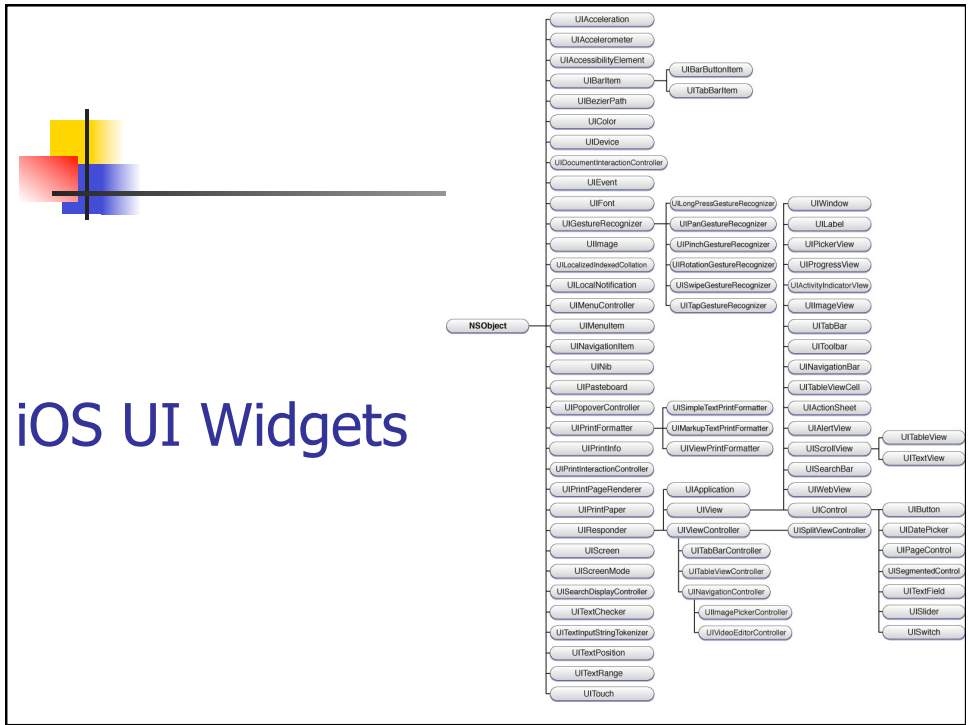
- Negative space / whitespace
- System fonts
- Color to signal diff functions
- Borderless buttons





iPhone 6(s) / iOS 9.1

- 4.7" (5.5") dia, 1334x750 (1920x1080) screen resolution
- Multi-touch / 3D touch screen
- Audio output
- Vibration output
- Front and rear cameras
- Accelerometer (orientation, motion)
- Connectivity: GSM, CDMA, Wi-Fi, Bluetooth, etc.
- GPS, compass
- Fingerprint ID
- 1M+ apps



iOS Widgets

Navigation Bar (top)
To traverse hierarchical information

< Sounds Ringtone Store

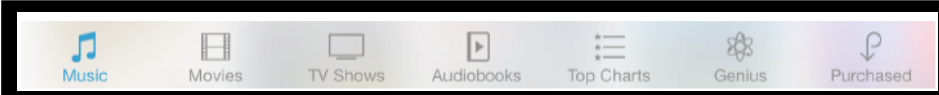
Tool Bar (bottom)
Controls that perform actions related to objects in the screen or view.

Inbox (13) ^ v [Flag] [Folder] [Trash] [Undo] [Redo]

iOS Widgets

Tab Bar

ability to switch between different subtasks, views, or modes.



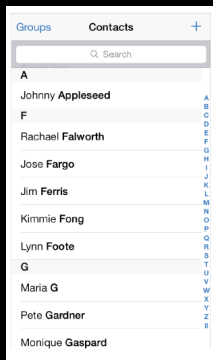
The image shows a horizontal bar with seven icons: a musical note for Music, a film strip for Movies, a TV set for TV Shows, a play button for Audiobooks, a list icon for Top Charts, a brain for Genius, and a circular arrow for Purchased.

iOS Widgets

Table View

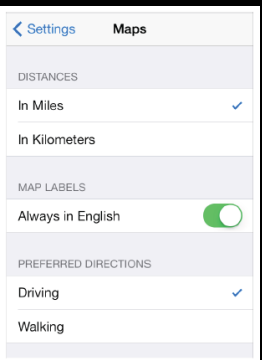
Display objects in single column

Simple



A screenshot of the 'Contacts' app showing a list of names: Johnny Appleseed, Rachael Falworth, Jose Fargo, Jim Ferris, Kimmie Fong, Lynn Foote, Maria G, Pete Gardner, and Monique Gaspard. A vertical alphabetical index is on the right.

Grouped

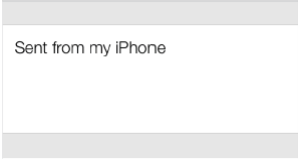


A screenshot of the 'Maps' settings app showing grouped settings. The 'DISTANCES' section has 'In Miles' selected. The 'MAP LABELS' section has 'Always in English' toggled on. The 'PREFERRED DIRECTIONS' section has 'Driving' selected.

iOS Widgets

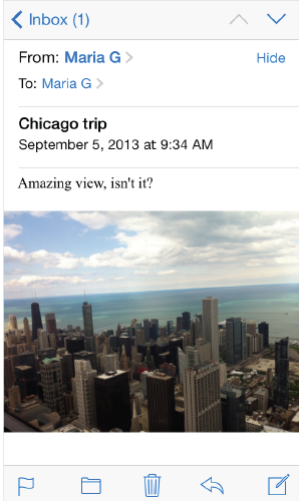
Text View

accepts & displays lines of text



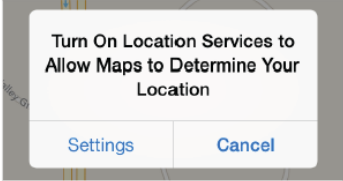
Web View

displays HTML




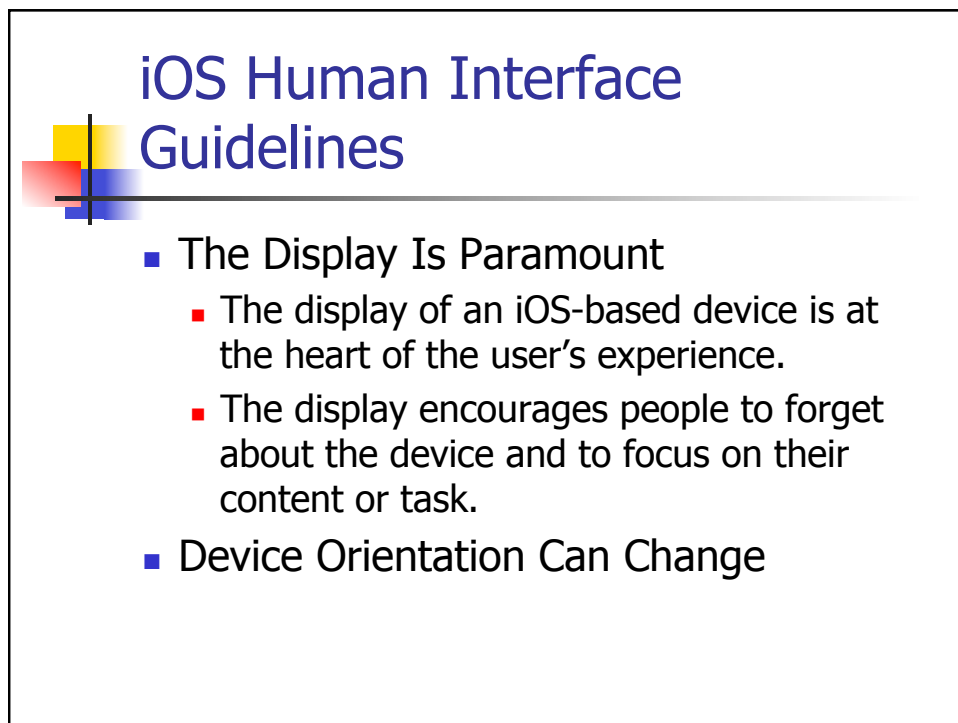
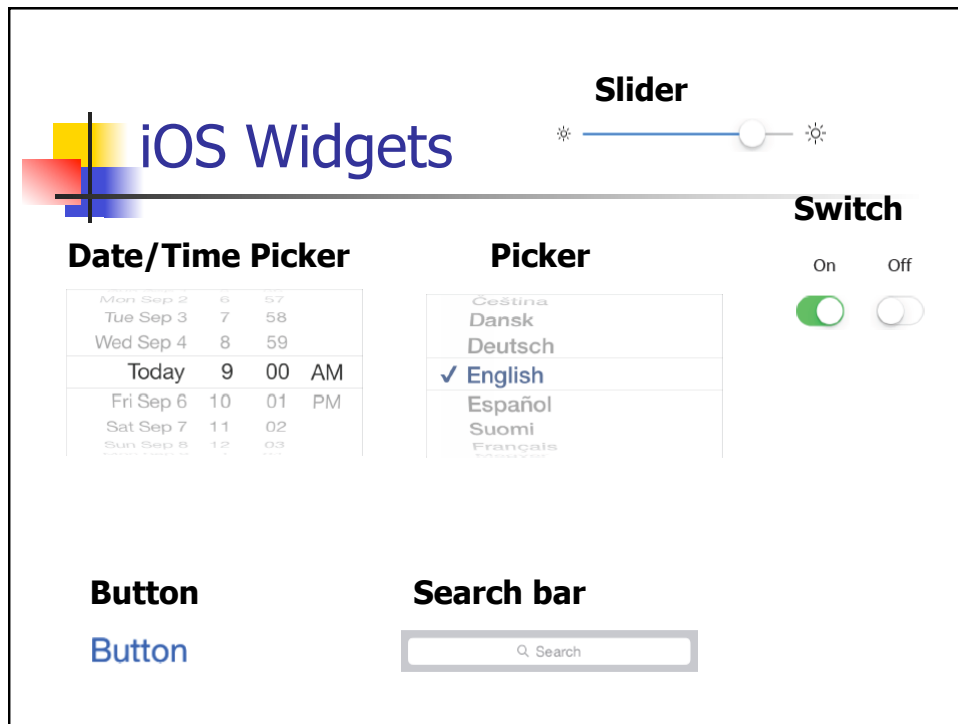
iOS Widgets

Alerts



Action Sheet





Apps Respond to Gestures, Not Clicks

- Tap
 - To press or select a control or item
- Drag
 - To scroll or pan; To drag an element.
- Flick
 - To scroll or pan quickly.
- Swipe
 - To reveal hidden content / widgets.
- Double tap
 - Zoom in and center; Zoom out.
- Pinch
 - Zoom in ; Zoom out
- Pressure (3D touch)
 - Spring-back mode (e.g., preview)



iOS Human Interface Guidelines

- People Interact with One App at a Time
- Preferences Are Available in Settings
 - Single, common settings app.
- Onscreen User Help Is Minimal
- Most iOS Apps Have a Single Window



iOS Design Methodology

1. Create an App Definition Statement (aka requirements analysis)

1. List All the Features (tasks) You Think Users Might Like
2. Determine Who Your Users Are
3. Filter the Feature List Through the Audience Definition



iOS Design Methodology

2. Design the App for the Device

- Follow iOS UI Paradigms
 - Controls should look tappable
 - App structure should be clean and easy to navigate
 - User feedback should be subtle, but clear
- Reconsider Web-Based Designs
 - Focus your app – narrow set of tasks
 - Make sure your app lets people do something – interactive
 - Design for touch
 - Let people scroll

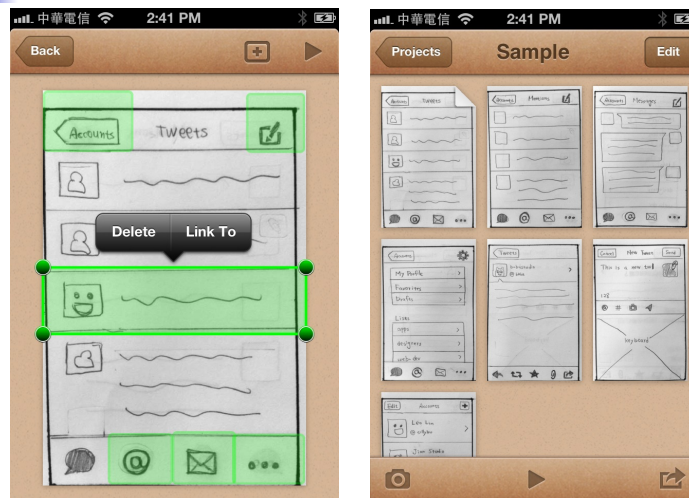
Remember SILK?

Try POP – Prototyping On Paper



Remember SYLK?

Try POP – Prototyping On Paper



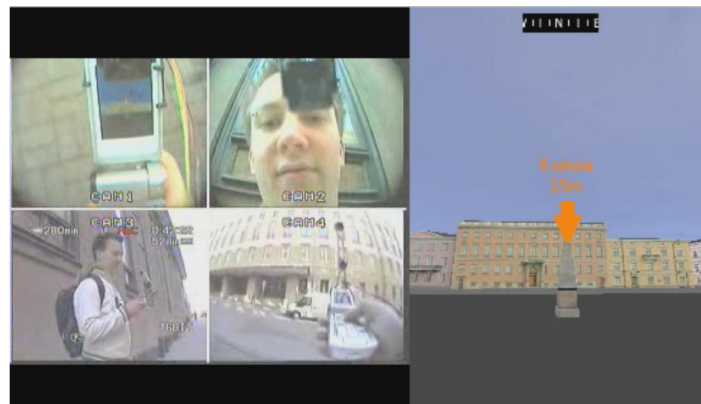
Usability Testing for Mobile



How to do usability studies of *in situ* mobile users?

Oulasvirta & Nyysönen, "Flexible Hardware Configurations for Studying Mobile Usability"

Mobile Usability Lab...




Example Apps

30 Superb Examples of iPhone
Interface Design
topDesign mag

Simplicity

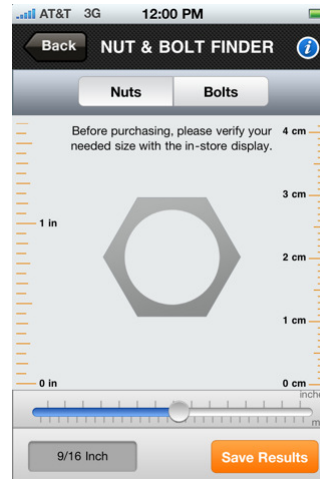
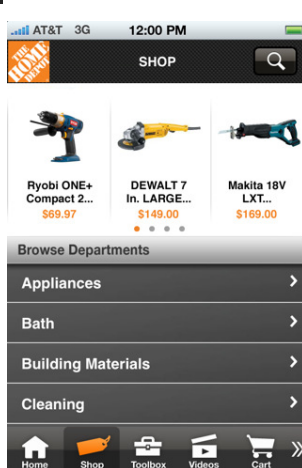
support few tasks – but do them well



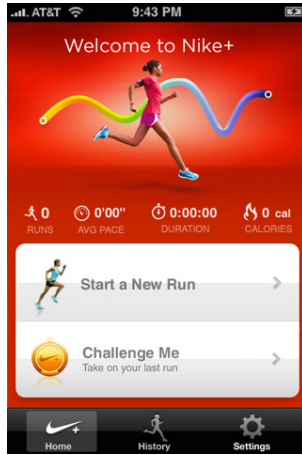
Golfscape Augmented Reality Rangefinder



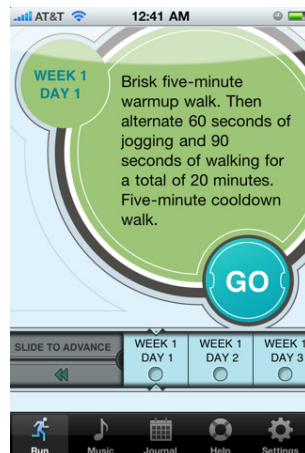
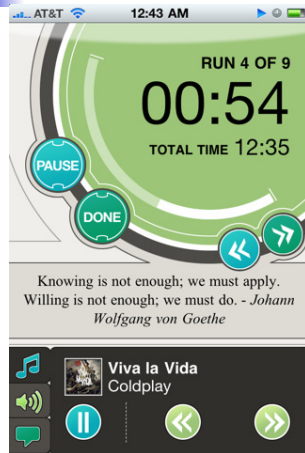
Home Depot research and purchase over 100,000 products

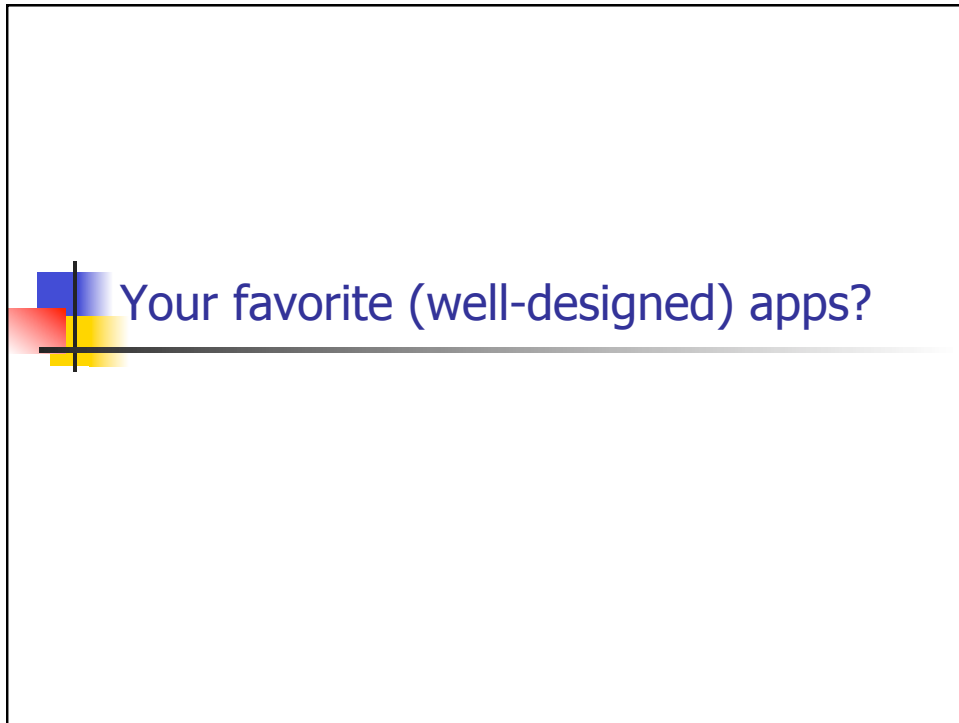


Nike+ GPS

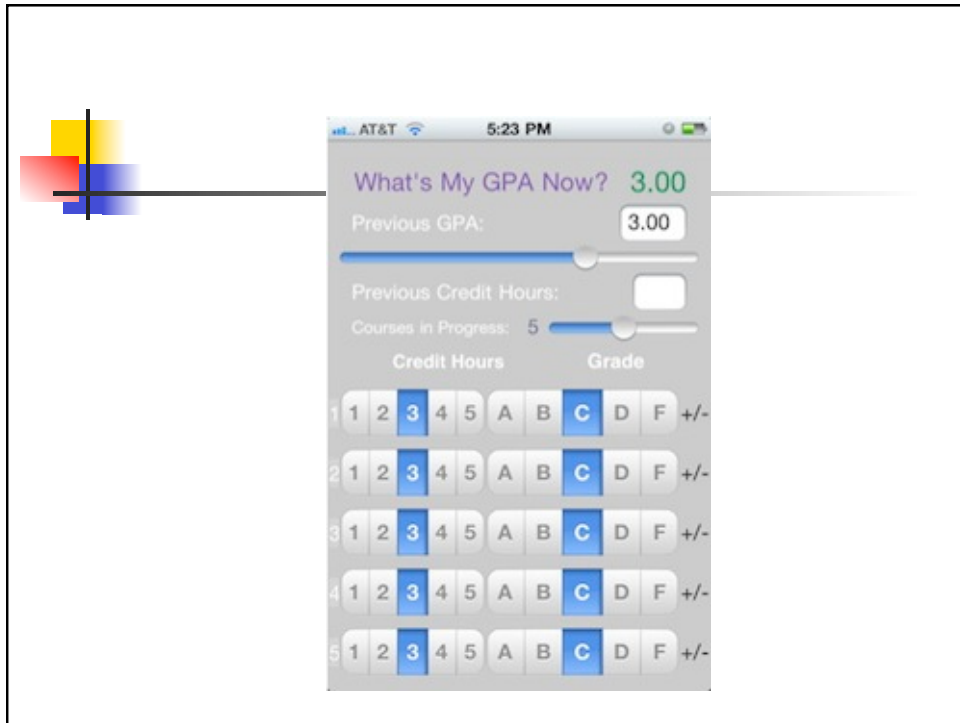


Couch to 5K

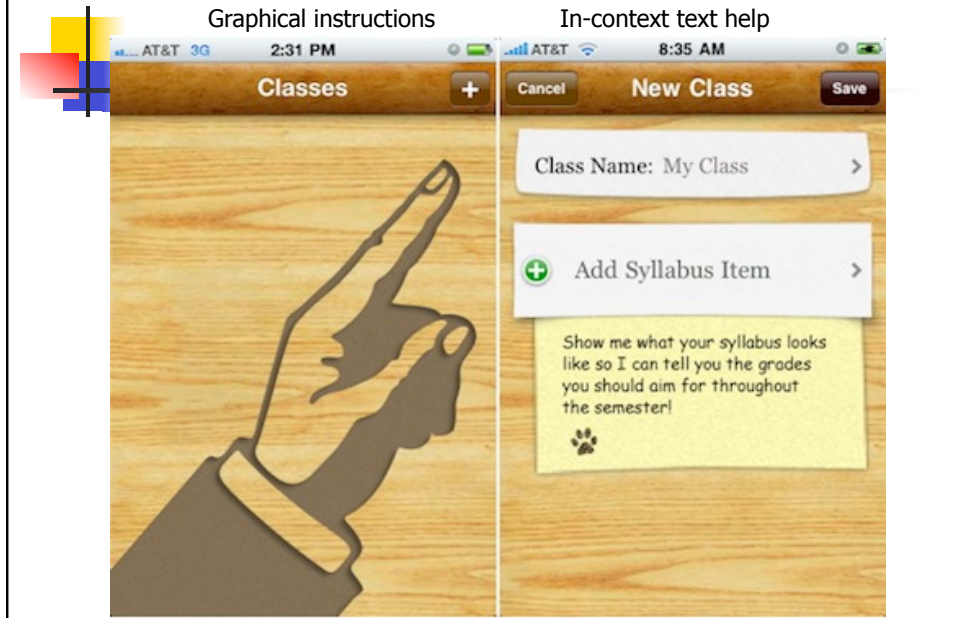








Instead of help manual...



Basics of Graphic Design

Contrast: poor contrast between the background and the content.

Repetition: Last two rows in the left example break the font size pattern, and the right example doesn't have much repetition at all

Alignment: Left alignment generally looks more professional than centered alignment (left) or no alignment (right).

Proximity: Very weak spatial groupings



Exercise

- Break into teams
- Design a new myNEU portal* for an iPhone
 - How would you do requirements analysis?
 - Determine most important subset of tasks
 - Sketch a conceptual design
 - Sketch main app page
 - How is your design different from a desktop app?

* *or other NU-related app*



To do

- No class Weds (Veteran's day)
- Read
 - Affective Computing chapter (guest lecture)
- Work on P6 software prototype
 - due 11/18