CSC 540 Mobile App Development II

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Outline

Administrivia
Information Appliances
Mobile Devices
Course Topics
Mobile Usability
Assignments
- Assignment #0
- Assignment #1

Administrivia

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Administrivia

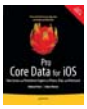
Office Hours
- Mon, 4:00pm-5:30pm CST826

Prerequisite
- CSC471: Mobile App Development

Web Page
- http://facweb.cs.depaul.edu/asteele/Courses/CSC540/default.html
- Detailed Administrivia (including syllabus) will be on the Web page

Administrivia

Book(s)
- Primary Text



ISBN:9781430233558
http://library.books24x7.com.ezproxy1.lib.depaul.edu/toc.aspx?bookid=41215

Administrivia

Book(s)
- Supplemental Text

ISBN:9781430230243
http://library.books24x7.com.ezproxy1.lib.depaul.edu/toc.aspx?bookid=41215
- We will also make use of readings and papers
  - **Designing From Both Sides of the Screen,** Ellen Isaacs, ISBN 978-0672321511

Administrivia

Grading

- Assignments 50%
- Final project 40%
  - **Proposal, Paper and Presentation**
- Attendance and Participation: 10%
  Participation for DL students will be evaluated based on submissions to the forums

Plagiarism & Incompletes

- Review relevant sections of website

Information Appliances

"Information Appliance" was coined by Jef Raskin in 1978

- Led the team that designed the Macintosh UI
- Started a company called Information Appliance
  - **Simple word processor – Canon Cat**
  - **"use front" key – Command key**
  - **"leap" key – search key**
    Similar to Firefox search

Information Appliances

Argued the PC was too complex

- General purpose & (too?) powerful
- Need for simpler, more focused computing devices
- The same argument can perhaps be made for phones
- Mobile phones are becoming the dominant computing platform
  - **Lots of people have one (esp. in 2nd are 3rd world)**
  - **>4bn mobile subscriptions**
  - **"Always on" connectivity**

Information Appliances

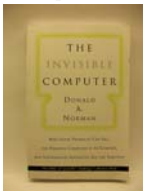
Analogy with Electric Motors

- 1918 Sears Roebuck Catalog
- "Home electric motor"
  - **Attachments (fan, egg beater, sewing machine, vacuum cleaner)**
- Modern house has many motors, but they are invisible

Information Appliances

Don Norman made the argument that the future of computers is analogous to that of the electric motor

- Invisible Computer, ISBN: 0262640414



Information Appliances

Ubiquitous Computing is another buzzword that came from Xerox PARC

- Predict the future by inventing it
- Invent the future by living in it

Information Appliances

EBooks


Information Appliances

Tivo


Information Appliances

Sony PlayStation

- Stealth Information Appliance

Information Appliances

Telematics – GM Onstar

- Access to personalized music, news, sports, stocks, and weather
- Server-based navigation and traffic information
- Access to e-mail, voice mail, points-of-interest
- Telematics security functions such as:
  - **Road-side assistance**
  - **Emergency call**

Information Appliances

In-Car GPS navigation

- And more (audio, cruise control, etc.)


Information Appliances

Personal GPS navigation


Information Appliances

Microsoft Table

http://www.youtube.com/watch?v=CZrr7AZ9nCY

Information Appliances

The Biggies

Information Appliances

The Biggies

Information Appliances

Characteristics

- Simple
- Inexpensive
- Quick
- Pervasive

"Information Appliances are more noticeable by their absence than their presence"

Information Appliances

IAs differ from general-purpose PCs

- Communication
  - **Data-path defines the application**
  - **The term "Service" is perhaps more appropriate**
- Specialization
  - **Well-defined purpose, e.g. Cell-phone**
  - **Ubiquity, e.g. Light-Switches**
  - **No Updates – Must get the interface right first-time**
    This is becoming less true – but is still important
- Diversity
  - **Wide range of I/O devices and computational support**
- Predictability

Information Appliances

Enabling Technologies

- Dynamic networking
  - **Ad-hoc wireless networks**
  - **Communication protocols**
  - **Data compression**
  - **CSCW**
- Multimedia information retrieval
  - **Question answering**
  - **Distributed databases**
- Security
  - **Information Assurance**
  - **Biometric authentication**

Information Appliances

Enabling Technologies

- Speech & natural language understanding
  - **Speech recognition**
  - **Interactive dialogue**
- Computer vision
  - **Face recognition, Eye-tracking**
  - **Detecting, localizing, tracking people**
  - **Gesture recognition (Kinect – project Natal)**
  - **Augmented reality**

    Word Lens:

    http://www.youtube.com/watch?v=h2OfQdYrHRs

    http://questvisual.com/

Information Appliances

Enabling Technologies

- Context awareness
  - **GPS**
  - **Localization**
  - **Personalization**
  - **Social connections**
- Sensors
  - **Shake sensor**
  - **Body monitors**
  - **EEG sensors**

Information Appliances

New Paradigm for IT

- Small, inexpensive computing devices linked together in an ad-hoc distributed (radio) network
- The traditional PC will serve as an important, but not central part of this network

The personal assistant will become more important than the PC providing services such as:

- **Electronic wallet & personal e-business**
- **Location & navigation**
- **Communication & coordination**
- **Health and security monitoring, *etc*.**

The likely platform will be some kind of phone

Information Appliances

User Interfaces of IAs

- Characterized by their limitations:
  - **Limited size & weight (portability)**
  - **Limited I/O**
  - **Limited sales price (consumer product)**
  - **Limited time to market**
  - **Limited learning time**
  - **Limited acceptable error rates (safety-critical applications)**
  - **Changing users (Information Kiosks)**
  - **Limited processing power**

    This is subject to Moore's law
- IAs do not have to be physically small, but their interfaces usually are.

Information Appliances

Challenges of IAs for the development team

- Feature creep/overflow
  - **IAs are by nature specific**
- Limited input/output devices
- Lack of standards and guidelines
- Unlimited target group for most consumer electronics
  - **Problem of ubiquity**
  - **Cross-cultural issues**
- No common terminology
- No upgradeability
  - **Have to get it right first time**

    As mentioned before this is starting to change

Information Appliances

Challenges of IAs contd.

- Low priority and inappropriate process
- Ignorance of User's needs

Not surprisingly many of these challenges are those faced system designers, in general

"For the user, the interface is the system"

Information Appliances

Four trends affecting the design of Information Appliances:

- Rate of rollout
- Network Access: A cheap, ubiquitous commodity
- Who can afford to switch off
  Hint: No one
- There's a fine line between socially acceptable and creepy

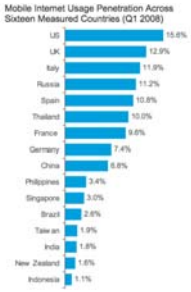
http://www.fastcodesign.com/1665425/research-superstar-jan-chipchase-lays-out-4-deep-trends-affecting-tech-today

Information Appliances

Jan Chipchase

- Nokia researcher and TED presenter
  http://www.youtube.com/watch?v=Qn2NR901NMY

Mobile Devices



http://searchengineland.com/080922-114308.php

Mobile Devices

Apple Newton

- Early PDA
- Handwriting recognition
- Too far ahead of its time

Mobile Devices

Palm Pilot

- First successful PDA
- Key aspect was the ability to sync with a PC
- Graffiti + specific usability guidelines

Mobile Devices

Blackberry

- Integrated with corporate email systems
- So popular it has been dubbed the "crackberry"

Mobile Devices

Bluetooth Technology

- 2.4 GHz Spread Spectrum
- Connects up to seven devices

Mobile Devices

Ipod

- ~75% of portable music market (2006-2009)
- Iconic design, simple UI

Mobile Devices

Nokia N95

- Bluetooth
- Camera
- GPS
- Organizer
- Can personalize phone
  - **Phone rings**
  - **$400M business in Japan**
- Hardware comparable to PC of Year 2000
  - **Graphics engine is probably slightly better (driven by gaming)**

Mobile Devices

Motorola RAZR V3c

- Stealth project inside Motorola
- Strong industrial design
- Big plus for Motorola
- UI has some problems

Mobile Devices

Pocket PC

- Windows CE and Mobile 6.0 environment
  - **Stripped down versions of Microsoft Office**
- Wireless data and Bluetooth connectivity

Mobile Devices

Phone Platform

- The phone is becoming a ubiquitous platform

Mobile Devices

iPhone Platform

- The iPhone adoption rate was/is meteoric

Mobile Devices

iPad Platform

- The iPad's adoption rate is even greater
- Sold 4.5M in the first Quarter after its release

Mobile Devices

"What I like / What I hate"

- Try and articulate what you like or hate about one or more of your handheld devices
  - **User Interface**
  - **Style**
  - **Value**
  - **Anything else**
- You are a target consumer for handheld devices
  - **However, you probably have a different skill set from many of your intended users (especially for cell-phones)**
- Assignment #1 tries to begin this analysis

Course Topics

Introduction

Developing Applications for iPhones/iPads

- Mobile Usability
- Design Guidelines
- Product Design/Prototyping
- Platform Constraints
  - **OS Constraints**
  - **I/O Constraints**
- Platform Development
- Security

Course Topics

Enabling Technologies

- GPS
- Location Awareness
- iPhone & iPad Sensors
- Speech Recognition

Deploying Applications

- Provisioning for devices
- Submitting applications to the App store

Course Topics

Cross-Platform Development

- Application Frameworks
- Web Frameworks
  - **HTML5 + JavaScript**
  - **Touch based frameworks**
  - **Mobile frameworks**

Major Project

- Research and/or project based
  - **Want you to do something exciting**

Course Topics

Course Project

- Should communicate an idea that is of interest to your colleagues in this class
- May be done independently, or in groups of two
- Ideas may come from readings or from past or current experience
- Should produce results that could be generalized and possibly published
  - **Assess a mobile framework**
  - **Look at new input methods for mobile devices/IAs**
  - **Implement a mobile application based on a specific problem domain**
  - **Something wild**

Course Topics

Research

- CDM Research Resources
  http://www.cdm.depaul.edu/SoC/research/Pages/ResearchLabs.aspx
- Library Resources
  http://library.depaul.edu/
- Examples
  - **ACM Digital Library**

Petteri Nurmi, Andreas Forsblom, Patrik Floréen, Peter Peltonen, and Petri Saarikko. 2009. Predictive text input in a mobile shopping assistant: methods and interface design. In *Proceedings of the 14th international conference on Intelligent user interfaces* (IUI '09). ACM, New York, NY, USA, 435-438. DOI=10.1145/1502650.1502714 http://doi.acm.org.ezproxy1.lib.depaul.edu/10.1145/1502650.1502714

Mobile Usability

The usability of their mobile devices has been a key differentiator in Apple's success

Sir Jonathan Ives

Mobile Usability

Good and Bad Interface Design for IAs

- Bad

Mobile Usability

Good and Bad Interface Design for IAs

- Good

Mobile Usability

Good and Bad Interface Design for IAs

- Good

Mobile Usability

For the user the interface is a major part the device

- It should be easy to use and support the user's tasks

Mobile Usability

Some Considerations

- Quality: how can good design be recognized?
- A good design is made for, experienced in and judged from the right context.
- Quantitative metrics may be insufficient measures
  - **Qualitative guidelines may be all we can hope for**

Mobile Usability

Usability Goals

- To be suitable and appropriate for its purpose (physical characteristics, controls, implementation, feedback).
- To be easy to use and understand
- To be satisfying and fun to use
- Usability goals (ideally) should be tied to (measurable) business goals (ROI)

Mobile Usability

Suitability

- The appropriate functions
- The controls used
- The information given (what & how)
- Other physical attributes

Mobile Usability

Appropriate Functions

- A balance between functional complexity and oversimplification
- Finding a balance between the number of tasks and the amount of controls required for the tasks
- Majority of Population Rule: the system should aim to please the majority (say 80%) of users
  - **Pareto Principle (80/20 Rule)**

Mobile Usability

Appropriate Controls

- Fitts' Law (paraphrased):
  - **The most important and frequently used functions should be easiest to use. Less important functions can be less convenient.**
- Avoiding accidental triggering
- For handhelds: natural positioning
- Appropriateness of number of steps (or keypresses) and importance of the function

Mobile Usability

Self-Explanatory Interfaces

Interfaces that can be:

- Used the first time
- Require few instructions
- Build on and help to build user knowledge through their use
  - **Easy entry to devices functionality**

Mobile Usability

Self-Explanatory Interfaces contd.

Familiarity, assumed knowledge, and "common sense":

- Cultural/Social expectations
- Expectations of the way things work
  - **Affordances**
- "Common Sense" – but be careful.

Mobile Usability:

Satisfaction

- How interesting is the device
- Whether or not it is pleasing to the senses (sight, sound, touch)
- "Wow" factor

Mobile Usability

User Patterns (Tidwell)

- Safe Exploration
  - **Every action should have an undo**
  - **Every page a Back button**
  - **Don't sign up for expensive services**
- Instant Gratification
  - **Make introductory functionality easy**
  - **Make likely functionality easy**

Mobile Usability

User Patterns (Tidwell) contd.

- Satisficing (Simon)
  - **Make labels short and simple**
  - **Use layout and color as guides**
  - **Easy forward/backward navigation**
- Incremental Construction
  - **Changes in Midstream**
  - **Defer Choices**
  - ***Support Reentrance***
  - ***Sensible Defaults***

Mobile Usability

User Patterns (Tidwell) contd.

- Habituation
  - **Universal Gestures**
  - **Be careful with Confirmations**
- Spatial Memory
- Prospective Memory
- Streamlined Repetition
- Pay attention to input modalities
  - **Especially Accessibility issues**
- Social Component

Mobile Usability

Palm Pilot User Interface (old)

Mobile Usability

Palm OS UI Design Philosophy

- Fast applications
- Match use frequency and accessibility
- Create easy-to-use applications

Fast Applications

- Typically Palm applications are zero-wait
- Processing power is limited so functions should be restricted

Mobile Usability

Match Use Frequency and Accessibility

- Several times per hour
  - **Checking today's schedule**

  One tap
- Several time per day
  - **One hour meeting starting at the top of the hour**

  One tap, write in place
- Several times per week
  - **Setting a weekly meeting**

  Several taps, dialog box

Mobile Usability

Minimize

- Number of taps to execute a function or change a setting
- Need to change screens
- Number of dialogs users have to open and close

Provide command buttons for commonly executed multi-step operations

Mobile Usability

Tradeoffs

- Buttons on screen provide instant access, but take up valuable screen space
- Push buttons are quicker than popup lists but again take up valuable space
- Popup lists are faster than manual input (and more accurate)
- Popup lists are cumbersome if there too many items

Mobile Usability

Easy-to-use applications

- Indicate clearly where the user is in the application
- Make it obvious how to get different views
- Buttons for important commands
  - **Fewer buttons means less time to learn the product**
  - **However, keeping frequently used buttons on screen helps user learn functionality**
- Don't let advanced features get in the way

Mobile Usability

Easy-to-use applications contd.

- Provide a base screen that offers an overview of the information available
- Allow users to view most record information by pressing navigation keys
- Organize records into (user-definable) categories
- Overload bottom buttons, but be sure to release the functionality frequently
- Provide menus with Graffiti shortcuts

Mobile Usability

On Being a Butler

- Always available
- Always polite
- Rarely disturbs
- Always anticipates
- Provides gentle feedback

On Being an Employer

- Recognizes feedback
- Cooperate

Mobile Usability

Cooperative Principle for Technology

Don't Impose

- Respect user's physical effort
- Respect user's mental effort

Be Helpful

- Offer sufficient information; prevent errors
- Solve problems
- Predictable
- Relevant information only (plain language)

Mobile Usability

Respect Physical Effort

- **Treat clicks as sacred**
  - **Especially with complex clicks such as menus, scrolling, etc.**
- Trade extra implementation effort for user effort
- Implement undo rather than rely on confirmation

Mobile Usability

Respect Physical Effort contd.

- Design for the norm
- Think about the system as a whole
- Persistence
- Consider possible repetition
- Stick with an input mode
  - **Be careful of multiple input modes try to make sure the transactions can be completed in a single modality**

Mobile Usability

Respect Mental Effort

- Use visual elements sparingly
- Make common tasks visible/Hide infrequent tasks
- Give feedback/show signs of progress
  - **Let the user know if you can't comply with a request**
  - **Allow the user to interrupt the task**
  - **Combine sounds and visual cue**
- Default behavior is application behavior
  - **Use preferences only for appearance**

Mobile Usability

Respect Mental Effort contd.

- Use platform conventions
- Use widgetless features
  - **Microsoft spell-check**
  - **Auto scrolling**
  - **Only present legal input for addresses, etc.**
- Be careful about being too helpful
  - **Microsoft capitalization, list-making**

Mobile Usability

Be Helpful

- Try to prevent errors
- Give users relevant information about complex processes
- Use everyday language of users

Be Predictable

- Develop explicit conventions
- Don't mislead
  - **Gray out unavailable options**

Mobile Design Guidelines

Design Guidelines

- Apple iPhone Design Guidelines

http://developer.apple.com/library/ios/#documentation/UserExperience/Conceptual/MobileHIG/Introduction/Introduction.html

http://developer.apple.com/library/ios/documentation/userexperience/conceptual/mobilehig/MobileHIG.pdf [pdf]

http://surgeworks.com/blog/lab-mobile/iphone/how-to-build-an-iphone-user-interface-prototype-that-follows-apple-guidelines

Assignments

Assignment #0

- Install Xcode Development Environment

http://developer.apple.com/devcenter/ios/index.action

- Xcode 4 will only run under Moac OS X Lion
  - **Previous version of Xcode should be fine for this course**

Assignment #1

- Analyze two devices with respect to good and bad usability

http://facweb.cs.depaul.edu/asteele/Courses/CSC540/Assignments/default.html