CS 407: Foundations of Mobile Systems and Applications

Instructor
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Welcome

• Class times
  – Monday, Wednesday, Friday: 2.30-3.45pm
    • CS1221
    • Labs will be in the 1350 / 1370 (details later)
If you are wait listed, and have confirmed access to a Mac, you should have been invited to the class.
Where to get a Mac laptop

• https://kb.wisc.edu/repair/page.php?id=44970
How to keep up

• Everything will be posted on piazza

• Your responsibility to check posts and updates

• Usually I use the “email” option, but it also depends on your setting
What to expect

- Focus on fundamentals of mobile systems and applications

- Not going to teach programming in detail
  - However, will give you some intro to it
1 Lab coordinator + Two TAs

• Mickey Barboi
• Achin Kulshrestha
• Xuan Wang
Topics

• Programming platforms
  – Overview of different mobile programming environments

• Wireless communication
  – Variability of the wireless channel, intermittent connectivity, and design for unpredictable performance.

• Location and location-based services
  – GPS and how it works, non-GPS localization techniques.

• Energy efficiency
  – Energy consumption by different components, computation and communication tradeoffs for energy

• Design for usability
  – Interface design issues for smartphones — touchscreen, gesture-based input, etc.

• Miscellany
  – Mobile device security, privacy; cloud-based services, peer-to-peer applications, and delay tolerance
Labs

- Will happen in 1350 / 1370

- Special room requirements to be announced
Some facts

• 4 Billion phones compared to 1 billion PCs (Dec 2009)
• 20% of US households are mobile only!
• 130 Billion texts are sent each month
  – Nearly negligible in 2000
What does a phone have?

- CPU/RAM/Storage: 1 GHz, 512 MB, 16 GB
- Touch (and multi-touch) screen
- Communication: Bluetooth, WiFi (b/g/n), Cellular
- Location (GPS, and others)
- Gyroscope
- Magnetic sensors
- Accelerometer
- Proximity sensor
- Light sensor
- NFC
- Camera (5+ MP, 720p HD video)
  - Some with dual cameras
- Battery
Some demos

• Layar
  – http://www.youtube.com/watch?v=b64_16K2e08

• Ocarina
  – http://www.youtube.com/watch?v=RhCJq7E2JJA

• Word Lens
  – http://www.youtube.com/watch?v=h20fQdYrHRs
Outline for the semester

• About 6 weeks of labs: one overview lecture followed by two lab sessions to practice
  – With a few other lectures thrown in the middle

• Mid-term-1: Around end October

• Mid-term 2: Around end November

• No final exam
Outline for semester

• Will have a class to brainstorm projects and form teams
• Start planning/thinking about your projects now
• Look at projects from previous semesters for inspiration
Other course activities

• Some assignments

• COURSE PROJECT
  – Groups of 3 or more (not very large or it will not be easy to manage)
Project requirements

• Has some mobile component

• Can be on any platform: iOS, Android, Windows, mobile web, etc.

• Need to have at least some “natural” users as target
  – Not group members
Project tips

• Do not need to demo or implement on a mobile device (for class grade purpose)
  – But strongly encouraged for learning purposes

• To ensure regular progress, each project will be given a wiki in which they have to explicitly describe their progress

• Always keep a running version of the app going and make enhancements
Proposed timeline

• Have a rough project idea by end of September

• Submit formal project proposal by mid October
  – Submit rough project schematic/design

• First review meeting early November

• Demos and final presentation 1\textsuperscript{st}/ 2\textsuperscript{nd} week of December
Cloud services

• ‘Changes everything’
Cyber-Physical Interactions

• QR Codes
Voice recognition
Near Field Communication (NFC)
What’s in the future?

• Projection
• HD video capture (1080P) or more, significant storage, video editing, etc.
• Augmented Reality
  – Also as IO methods --- projected keyboards, Head mounted displays, etc.
• Desktop replacement
• Mobile cloud
• 4G and beyond (1 Gbps?)
• Biometrics
• OS merge path
• Multiple other form factors, e.g., pen, watch, etc.
• Green
  – Eco-charging, solar panels?