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=RhCJq7EAJJA

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

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 1st/ 2nd week of December

Cloud services

- 'Changes everything"

Cyber-Physical Interactions

- QR Codes

Voice recognition

Near Field Communication (NFC)

Make
your phone
your wallet

Pay in-store by tapping
your phone.

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?