CSC8260: Wireless Networking and Cyber-Physical Systems

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Objectives of the course

Build up your background in wireless cyber-physical systems (WCPS)

- Wireless networking
- Real-time systems and networking
- Wireless networked control

- Basic scientific methodology: control, optimization, etc
- Applications of WCPS in next-generation transportation, power grid, and healthcare systems
Topics to cover

- CPS applications
  - smart energy grid, transportation system, healthcare, etc.

- Fundamentals of wireless communication
  - wireless channel, signal propagation, modulation, link models, etc.

- Fundamentals of control systems
Topics (contd.)

- Wireless networking in a local region: MAC
- Large scale wireless networking: routing, transport
- Real-time wireless networking: real-time MAC, routing, and transport in wireless settings
- Predictable wireless networking in an uncertain world: wireless system and environmental dynamics, jamming, etc.
- Wireless networked control
Textbooks

- **Strongly recommended**

- **Recommended**
Logistics

- Class timings
  - MW 3:00pm-4:20pm

- Office hours
  - MW 4:30pm-5:30pm in *Suite 14101.3, Maccabees Building*, or by appointment

- Teaching Assistant
  - TBA
Logistics (contd.)

- **Prerequisites**
  - Basic knowledge of computer networks (e.g., materials covered in CSC6290 or equivalent), elementary probability theory, statistics, and mathematical logic
  - Or consent of instructor

- **Course website**
Logistics (contd.)

- Grading
  - Class participation: 20%
  - Paper presentation: 35%
  - Project: 45%

- Letter grades will be assigned based on performance *relative* to other students;
  A tentative grading scale:
  
  - A: 93-100
  - A-: 90-92
  - B+: 85-89
  - B: 80-84
  - B-: 75-79
  - C+: 70-74
  - C: 65-69
  - C-: 60-64
  - F: 0-60
Project

- Solve one research issue in
  - *Wireless, real-time, embedded networking* technologies and applications in cyber-physical systems
    - vehicles: V2V, V2I, sensing and control, infotainment, etc.
    - power-grid: alternative energy microgrid, hybrid power grid, etc.
    - industrial control: feedback control, machine health monitoring, etc.
    - healthcare: assisted living, etc.
    - Others

- Can focus on issues such as *MAC, interference management and control, routing, transport control, networked control, wireless sensing enabled decision making*
Project (contd.)

- **Rules**
  - Students are allowed to form groups in doing projects, but the number of students per group should be no more than 2

- **Deliverables**
  - Written project report (in the form of a research report)
  - In-class presentation

- **Timeline**
  - Select the topic and form your project group by 01/31/2012
  - Detailed project report outline & list of references are due on 02/29/2012
  - Submit slides for your presentation at least one day before your presentation (date to be decided)
  - Submit your project report electronically by midnight 04/28/2012
Policies

- Frequently check out the course website for updated information
- Actively participate in open discussion on research issues
- Read assigned research articles, if any, before coming to class
- Project required
- Other WSU polices
How to succeed in this course?

- Attend/follow lectures, read books & papers
- Work on project
- Ask questions!!!

Questions?
Student questionnaire

- Name (optional): E-mail (optional):
- Major: Degree/Expected Year:
- Mathematics courses (e.g., elementary probability theory, statistics, and mathematical logic) taken:
- Computer Networking courses taken:
- What do you expect to learn from this course? How do you think this course should be taught?
- How might this course contribute to your career objectives?