Winter 2010

CEG 404/604-01: Wireless Sensor Networks

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Department of Computer Science and Engineering
Wright State University

CEG 404/604 Wireless Sensor Networks

SYLLABUS

Winter 2010
Drop dates: 1/22 no grade; 2/19 with a W

Time/Place Section 1: 4:10-5:50pm, M, W 148 Russ Engineering Center

Instructor Dr. Bin Wang, Associate Professor, Joshi Research Center
Tel: (937) 775-5115, E-mail: ***send email via WebCT by selecting Bin Wang in the send to list***
Office hours: 1:30-2:30pm M, W or by appointment

Prerequisites CEG402/602

Textbooks Holger Karl and Andreas Willig, *Protocols and Architectures for Wireless Sensor Networks*, Addison-Wesley, 2005.
References: C. Cordeiro and D. Agrawal, *Ad Hoc & Sensor Networks*, World Scientific, 2006.
References: Feng Zhao and Leonidas Guibas, *Wireless Sensor Networks: An Information Processing Approach*, Morgan Kaufmann, 2004.
References: James F. Kurose and Keith W. Ross, *Computer Networking: A top down approach featuring the Internet*, 3rd edition, Addison-Wesley, 2005.
References: Computer Networks, 4th Ed, Andrew S. Tanenbaum, Prentice Hall, 2002.

Webpage http://wisdom.wright.edu
News Group Check WebCT for announcements, questions and answers

Course Objectives In this course we will provide an introduction to Wireless Sensor Networks (WSN) and cover latest topics in WSNs. The goal of this course is to give an overview of fundamental problems in the area of WSNs. We will discuss existing solutions for some of these problems. Data aggregation, information dissemination, security issues, power management, localization, topology control, routing, naming, collaborative signal and information processing for target tracking, security, are some of the topics that will be covered in this course. In this course, students will be assigned labs (Ubiquitous Computing related applications) that will involve implementation on Micaz motes, from Crossbow, and other mobile wireless sensors using a light weight event driven operating system called Tinyos. Most of the materials covered will be from recent research work in wireless sensor networks.

Contents (coverage may depend on availability of time):

1. Introduction to wireless sensor network and application of sensor networks
2. Single node architecture: hardware components, energy consumption of

sensor networks, operating system and execution environment

3. Wireless sensor network architecture: optimization goals and figures of merit, design principles for WSNs
4. Physical layer and transceiver design considerations in WSNs
5. WSN MAC protocols: requirements, design constraints, important classes of MAC protocols (low duty cycle protocols, contention-based protocols, schedule-based protocols, IEEE 802.15.4 MAC)
6. Link layer protocols: error control, framing, link management
7. Naming and addressing
8. Routing protocols: energy-efficient unicast, broadcast and multicast, geographic routing
9. Localization and positioning: single-hop localization, positioning in multi-hop environments
10. Topology control: controlling topology in flat network using power control
11. Data-centric and content-based networking: publish/subscribe interaction paradigm, data-centric routing, data aggregation
12. Transport layer and QoS: coverage and deployment, reliable data transport, congestion control and rate control
13. WSN security
14. Collaborative signal and information processing for target tracking
15. WSN Applications: motes and TinyOS

Students' Responsibilities

You are expected to:

1) read assigned materials **prior to** class and come up with questions. Reading materials will be assigned in advance.
2) attend classes on a regular and timely basis. Regular class attendance is mandatory and is essential to success in the course. You are responsible for all contents, handouts, and announcements distributed/made in class.
3) complete and turn in your assignments timely. You are expected to write your own programs. **Do not** copy from or give your work to others, and **do not** make it possible for others to copy any portions of your work. Violators will receive a **zero** credit on the assignment.
4) be present for exams at the scheduled times. If there is a catastrophic event that prevents you form taking an exam, please contact the instructor as soon as possible.
5) not disturb/disrupt the class.
6) set up an appointment with the instructor and/or graduate teaching assistant or visit during office hours if you have questions regarding course contents, lectures, handouts, and other problems.

Course Evaluation

You will receive a final course grade comprised of the weighted score earned on all required course assignments and exams.

Methods:	**% of final grade**
1. Participation(show up, in class discussion, etc):	5%
2. Labs:	40% (4 labs using TinyOS and motes)
3. Homework:	25% (about 4 homework)
4. Final exam:	30% (3/15, Monday, 5:45-7:45pm)
Total	100%

Grading scale:

404		**604**
90-100	A	93-100
80-89.9	B	83-92.9
70-79.9	C	73-82.9
60-69.9	D	63-72.9
Below 60	F	<63

Undergraduates and graduates will be graded separately.
Re-grading policy: If you have questions about the way an assignment or exam was graded, you must submit **in writing** a re-grading request detailing the rationale for re-grading.

Late Submission of Programming Assignments

You may discuss homework assignments with classmates but all solutions must be original and individually prepared.
You will lose 10% of the total points for an assignment for each 24-hour period (or fraction of a 24 hour period) the assignment is late. Late assignments will be accepted up to 4 days after the due date as specified in the assignment handout. Late penalty is accrued on weekends just as during the week. Partial credits will be given to students who turn in partially completed assignments.

Special considerations will be given for students who have a medical excuse for late submission (written proof of illness is required). These considerations may extend to medical emergencies involving children or other family members. Such consideration is at the discretion of the instructor, and will be as reasonable and fair as possible. Special consideration may also be given for employment conflicts (e.g. military duty, travel) if brought to the attention of the instructor **prior to** the due date for an assignment.

Course requirements for other courses are **NOT** a valid reason for special consideration.

Missed Quizzes and Exam

Missed quizzes and exams can be made up only under extenuating circumstances such as medical emergencies and work conflicts as mentioned above. Please see the instructor as soon as possible if you know you will be unable to attend a quiz or exam. You are expected to schedule your departure for any end of quarter travel after your final exam.

Plagiarism

Students are members of a learning community committed to the search for knowledge and truth. Essential to that search is the faithful adherence by all students to the highest standards of honesty and integrity. A grade of "0" or "F" will be assigned to examinations or assignments on which cheating, plagiarism or any other form of academic dishonesty is committed or determined to have occurred. For the detail, see Wright State University Student Handbook under "Academic Dishonesty".