ENPM677 Syllabus

Course: ENPM 677 – Wireless Sensor Networks
Semester: Fall 2016
Instructor: Dr. S. Farshad Bahari, Ph.D.
Day; Time: Wed, 7:00 PM - 9:40 PM
Location: JMP 2217
Email: fbahari at umd dot edu
Office Hour: Wednesdays, 6:45 PM - 7:00 PM at JMP 2217, by appointment

Prerequisites

Prior understanding of digital communications and communication networks. Exceptions can be made only with the permission of the instructors

Recommended Textbook


Course Objective

The use of distributed wireless sensor networks has surged in popularity in recent years with applications ranging from environmental monitoring, transportation, industrial automation, structural health monitoring, to people- and object-tracking in both cooperative and hostile environments. This course is targeted at understanding and obtaining experience with the state-of-the-art in such wireless sensor networks which are often composed using relatively inexpensive tiny sensor nodes that have low power consumption, low processing power and bandwidth and equipped with sensing, computation, and wireless communication capabilities. After sensing their local environment, these sensors self-organize to form multi-hop wireless networks capable of relaying their data to a backbone server. Upon completion of this course, you should be able to: list various applications of wireless sensor networks, describe the concepts, protocols, and differences underlying the design, implementation, and use of wireless sensor networks, and propose, implement, and evaluate new ideas for solving wireless sensor network design issues.
Grading System

Grading criteria will include classroom participation/homework sets/reading assignments (10%), midterm exam (40%), and term project content and report (50%). An in-class midterm exam with open book format will evaluate the students' understanding of the materials covered. In-class term project presentations will be supplemented by a written report. The term project will have three components: 10% for a written proposal is due on midterm date, 25% for final oral presentation and 15% for final written report.

It is the student’s responsibility to inform the instructor of any intended absences for religious observations in advance. Notice should be provided as soon as possible but no later than the end of the adjustment period.

Course Syllabus

The course will span a variety of topics ranging from radio communications, network stack, systems infrastructure including QoS support and energy management, programming paradigms, distributed algorithms and example applications. It covers wireless sensor node and network architectures, and communication protocols in data-link, network, and transport layers. We will address how the unique constraints of sensor networks - wireless, low power, small form factor, limited memory/CPU - affect the design of networking protocols, operating systems, applications, middleware. Advanced topics such as time synchronization, localization, mobility, and topology management will be discussed as well. Lectures will be discussion-oriented and may require the reading of book chapters or papers. The tentative list of topics to be covered is as follow:

Wireless sensor network architecture

Different platforms and standardization

Distributed infrastructure and design parameters

Physical layer

Modulation

MAC layer

Network layer

Cross layer design

Time synchronization
Localization

Design challenges

Code of Academic Integrity

The University of Maryland, College Park has a nationally recognized Code of Academic Integrity, administered by the Student Honor Council. This Code sets standards for academic integrity at Maryland for all undergraduate and graduate students. As a student you are responsible for upholding these standards for this course. It is very important for you to be aware of the consequences of cheating, fabrication, facilitation, and plagiarism. For more information on the Code of Academic Integrity of the Student Honor Council, please visit http://shc.umd.edu/SHC/HonorPledgeInformation.aspx.