

Course: Ad-hoc Wireless Sensor Networks (CS-385)

Prerequisite: CS-315

Instructor: Ali A. Kooshesh

Semester: Spring 2009

Credit-hours: 3

Meetings: 2 lecture hours and 3 lab hours per week

A Wireless Sensor Network consists of an array of small devices that perform specific functions. For example, cellular phones, pagers, personal digital assistant devices are example of such networks. One specific set of devices that have been used extensively to support networking and remote sensing are tiny wireless computing devices capable of interfacing with an array of sensor devices. These computing devices, called Motes (<http://www.xbow.com>), consist of a small microprocessor (413 MHz), a limited amount of memory to store and execute programs (around 32MB each)¹, and a radio with a range of about 100 yards. The sensor devices are capable of environmental monitoring or they may be used to control other devices. Even though each of these devices is small and has limited functionality, a networked collection of them together could perform very complex tasks. Current applications of wireless sensor networks are fine grain environmental monitoring systems, detecting and reporting evacuation plans in forest fires, and tracking wild-life. For some applications of this technology, point your browser to http://www.intel.com/references/pdfs/Intel_ESS_Union_Pacific_Case_Study_HR.pdf.

In this course, we will study the principles of Distributed Computing and will learn the specific algorithms that are used in programming Motes². In this process, we will program Motes to, using their radios, form different networks to support a diverse number of application needs. These systems, on the one hand, communicate with desktop applications, and on the other hand, with sensor-boards or with Gumstix boards (<http://www.gumstix.com>). Gumstix boards are used for autonomous applications such as robotics.

¹These are the specifications for Imote2, the newest member of the Mote family. We also own and will use Mica2 Motes that are less powerful, but more commonly in use due to their lower prices.

²For the purpose of programming Motes, we will use nesC (networked embedded systems C), an event-driven, component-based programming language.