Introduction

"Wireless Sensor Network Project" is part of an introduction program for new PhD students at CERES.

Many new applications and systems are made possible by taking advantage of the opportunities created by embedding computers in many of the things (devices and systems) that surround us. To provide interesting functions and better characteristics the systems often are designed as distributed systems where their computer nodes cooperate via wired and/or wireless networks, interoperating and integrated via: operating systems, schedulers, protocols, middleware, data structures and algorithms.

To enable interaction with the surrounding system and its environment the computer nodes in such embedded and distributed real-time systems typically contain a combination of sensor, actuator, processing, memory and communication devices. In order to do research in the field of cooperating embedded systems based on wireless sensor networks some hands on experience of the software technologies and platforms that are used is considered important. The overall behaviour of a wireless sensor network application is integrated and controlled by software programs and configuration parameters, distributed over sensor nodes, base stations, gateways and back-end servers.

Goals

A first goal of this project activity is to get used to the development environments for TinyOS and NesC. A second goal and a means to achieve the first goal is to develop a simple demonstration application that also can be used as a lab exercise in a master level course on wireless sensor networks and related software development techniques. A proposal is to try to involve multiple sensors and some sensor fusion and decision logic to "distinguish a seagull from a man". Before this a simple "hello I can talk with you" like application should be set up, for example, you can set up a slightly improved multi "baby watching" application.

Organization

You are supposed to work as a team and cooperate to find the solutions. The project work can be seen as a team building activity. The activities and meetings needed is in principle organized by you as a team. Each of you should spend at least 40 hours in the project, some of you might need more time. As an initial idea I propose most of the work could be done w.24 in June and w.33 in August.

Technical Platform

The course is based on the use of a development and experiment kit from Crossbow Technology Inc called MICA2/DOT Professional Kit (MOTE-KIT 5x4x). The kit contains several different processor and radio boards that differ in size and their sensor capabilities. There is also possibilities to attach your own sensors.

Preparation

To get a clue what wireless sensor networks is about and get started quickly you may read the paper by Culler D., Estrin D., and Srivastava M., "Overview of sensor networks", IEEE Computer, August 2004. However, to get something practical done you need to use the resource links provided in the menu column. The most important resource is the one to the TinyOS Community (you can find most of the other needed resources via this link).