EE5369 Sensor Networks
Dr. Frank Lewis

TinyOS Tutorial

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Mica2 Mote

Chipcon CC1000 radio, 38K or 19K baud, Manchester, 315, 433, or 900MHz

128KB Instruction EEPROM

4KB Data EEPROM

Atmel ATmega128L µP 7.3827MHz

512KB External Flash Memory
(16 bytes x 32768 rows)

2 AA

SPI bus

UART 2

3 LEDs

ADC 0-7

UART 1

I2C Bus

51 pin I/O Connector

To Sensors, JTAG, and/or Programming Board
MTS300CA Sensor Board

- 2 Axis Accelerometer
- 4.6KHz Speaker
- 51 pin MICA2 Interface
- Tone Detector
- Light and Temperature
- Microphone
- Magnetometer
Hardware Setup
TinyOS ??

- An operating system
- An open-source development environment
  - A programming language and model (NesC)
- Main Ideology
  - HURRY AND GO TO SLEEP!!
  - Sleep as often as possible to save power
  - High concurrency, interrupt driven (no polling)
Where to download?

- [http://www.tinyos.net/download.html](http://www.tinyos.net/download.html)

Read installation instructions provided
Programming Model

• Separation of construction and composition
• Programs are built out of components
• Each component is specified by an interface
  – Provides “wires” for wiring components together
• Components are statically wired together based on their interfaces
  – Increases runtime efficiency
Components

- Components use and provide interfaces, commands, and events
  - Specified by a component’s interface
- Components implement the events they use and the commands they provide:

<table>
<thead>
<tr>
<th>Component</th>
<th>Commands</th>
<th>Events</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use</td>
<td>Can call</td>
<td>Must Implement</td>
</tr>
<tr>
<td>Provide</td>
<td>Must Implement</td>
<td>Can signal</td>
</tr>
</tbody>
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Types of Components

- There are two types of components:
  - **Modules**: Implement the application behavior
  - **Configurations**: Wires components together
- A component does not care if another component is a module or configuration
- A component may be composed of other components
Implementation

There are two types of components in nesC: modules and configurations:

- Modules provide application code, implementing one or more interface.
- Configurations are used to assemble other components together, connecting interfaces used by components to interfaces provided by others. This is called wiring.
- nesC uses the filename extension ".nc" for all source files -- interfaces, modules, and configurations.
In class demonstrations