CS240E Programming Assignment 1 (TinyOS)

April 4, 2014

1 Getting Started

You should have received some Telos motes in class. You will want to install TinyOS under Linux (e.g., use a VM) as Debian packages. Add

deb http://tinyos.stanford.edu/tinyos/dists/ubuntu natty main

as a repository for the Debian package manager. You can either do this through the synaptic GUI tool or by creating a file in /etc/apt/sources.list.d/ with the above line in it.

You'll need to install tinyos-2.1.2, tinyos-tools, and msp430-46. This will put TinyOS source code in /opt/tinyos-2.1.2 and the msp430 binaries (programs to compile code for the microcontroller, rather than your Intel processor) in /opt/msp430-46. You'll need to change some environment variables to make everything work. Follow the instructions at

`http://tinyos.stanford.edu/tinyos-wiki/index.php/Automatic_installation`

for the environment variables. Your local TinyOS path is "/opt/tinyos-2.1.2". You might also need to add "/opt/msp430-46/bin" to your PATH variable.

2 Tutorials

You can find over a dozen tutorials at this URL: `http://tinyos.stanford.edu/tinyos-wiki/index.php/TinyOS_Tutorials`. Complete tutorials 1 through 12 (up through "Network Protocols"), but skipping tutorials 8 (power management), 10 (platforms) and 11 (TOSSIM).

3 Assignment

Write a program that has a network of up to 7 TinyOS devices display the number of devices on LEDs. Use the LEDs as bits: led0 is the least significant bit, led1 is the next significant, etc. You can use the Leds.set command. The count should update on every device within 1 second of a node joining or leaving the network. If you program two devices with your program, they should both have LED 1 on. If you turn off one, the one that remains on should change within one second to have LED 0 on, denoting one device. Nodes may update their display at different times: all must update within one second, however.

4 Extra Credit

Synchronize the change so that all nodes change their LEDs at the same time (assuming no packets are lost).