

Programming TelosB Motes

General description

Your task is to design and program a TinyOS application to run on TelosB motes that will utilize the built-in *light* and *temperature and humidity* sensors to provide real-time readings and display the notification on the on-board available LEDs.

Prerequisites

As discussed/demo-ed in class, you will need to install a version of TinyOS 2.0 or higher on your machine and, by now, you should have already played with the “Blink” application and know how to connect a given mote to the USB port¹. We assume that, by now, each of you has received a TelosB mote with the batteries included.

Assignment Specifics

The source node – note: there will be a “sink” node in your subsequent projects, building upon this one – must sample:

1. the light sensor at 1 Hz (i.e., every second);
2. the temperature and humidity sensors at 0.2 HZ (i.e., once every five seconds, or twelve times per minute);

In addition:

1. the *blue LED* of the node should light up (*on*) when it is “*dark*” outside, and *off* otherwise.
2. the *green LED* of the node should light up (*on*) whenever the temperature is above 85 degrees (Fahrenheit), and *off* otherwise.

The *red led* can be used at your discretion (for example, you could toggle it *on/off* to indicate that *both* events (“dark and hot”) have been detected or not...

Submission

Your *report* should include a detailed information regarding the program analysis and your calibration process. We expect you to hand in:

- 1) A brief report that includes a printed copy of your source code (.nc files, NOT C files!!!), and
- 2) The source code (again, all the .nc files you wrote, not the TinyOS ones), which will be submitted using the “Digital Drop Box” of the course’s Blackboard page – zipped in one folder called <Your_Name>_EECS369_Project_1

¹ As mentioned, if you insist on using Windows, you will need to also install Cygwin to emulate linux, although probably the easiest solution is to install the Xubuntu VMware Player

Hints:

As part of developing this program, you will have to calibrate the temperature sensor readings to correspond to Fahrenheit degrees, and the light sensor such that you are able to report whether the light is on or off. Towards that end, there are specifics for the TelosB (posted, as an additional document with this project), as well as plenty of information that you can obtain by google-ing. Also, the TinyOS guide can give you quite a bit of helpful hints.

- **Start early!** You will face a number of challenges that you should try to resolve as quickly as possible. You work with real hardware, and sometimes hardware will fail. Test your sensor as best as you can and try to convince yourself that your sensor node works as expected. If you believe you have found a problem or your board is malfunctioning, do not hesitate to let the instructors know about it, and include all the information you can think of, including the source code to the application you are trying to compile, etc. The discovery of bugs/flaws in the compile system and the submission of informative bug reports will add positively to the evaluation of your report.
- You already have the example of the “Blink” application regarding the use of *Timer* and *Leds* interfaces.
- *Browse TinyOS folders for OS provided interfaces and components that you can use to fulfill this project. Most notable, you can “peek” at the Sense application and, from there – well, use your imagination...*