JON TITUS BLOG

Titus regularly contributes articles on electronics and measurement. He has extensive experience designing with microprocessors and microcontrollers, and developed data-acquisition and instrument-control systems and taught many courses on software and hardware design. A recipient of the George R. Stibitz Computer & Communications Pioneer Award, he holds a BS from Worcester Polytechnic Institute, an MS from Rensselaer Polytechnic Institute, and a PhD from Virginia Polytechnic Institute.

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Tuesday, March 16, 2010

An mbed Module to the Rescue

Mar 16 2010 12:01PM | **Permalink** |**Comments (3)** |

A request for design help arrived by email: An engineer needed ideas about how to get data from several sensors into a PC in a format he could easily use. Each sensor circuit provides an SPI port for communication of commands and setup information to the sensors, and communication of 2's complement data to a microcontroller, so I thought of several options, starting with a bare MCU chip. But because I recently worked with an mbed module that provides an NXP LPC1768 ARM Cortex-M3 processor, it seemed like a good choice to start.

The mbed module provides two SPI ports and has plenty of digital outputs for sensor chip-enable signals. An mbed serial port could communicate information to a host computer. To learn more about the mbed module, documents, and online compiler, go to: **embed.org**.

The utility of the mbed module centers on its library of functions that greatly simplify the setup and use of its many peripherals. Easy-to-use functions establish port-control bits and bytes without forcing engineers to learn about data-direction registers, flag settings, and so on. You can get into that level of detail if you wish.

In the sensor project, the serial port would require a 3.3V-logic to RS-232 (EIA-232) converter, but not much more. Many people use what's called "wedge" programs to take ASCII characters and place them into an Excel spreadsheet. Or, the mbed could convert the binary information from the sensors into values for a comma-separated-values (CSV) file that other software could read, too. The mbed module's **USB** connection with a host PC used to create code and download binary files to the module, also can serve as a virtual serial port.

While thinking about this sensor problem, I connected my mbed module to a Digi

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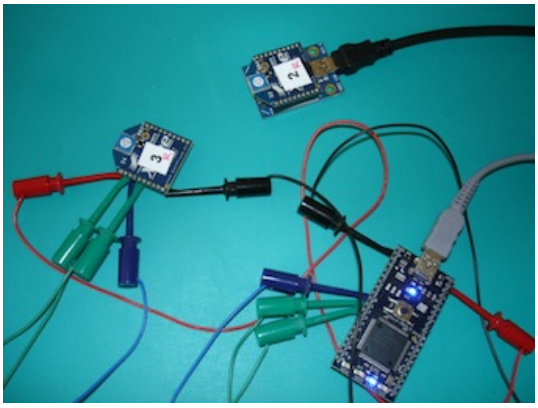
International XBee radio transceiver and used a Parallax **USB**/XBee adapter on my lab PC to provide another transceiver. The mbed Web site provides some information and sample code, but it took a bit more digging to get all of the information necessary to set up my PC with a virtual serial port to connect with the mbed module. Within about 30 minutes I had one XBee radio communicating with the other XBee module. The code example took only 21 lines of code, six of which controlled LEDs on the mbed board. Perhaps my email correspondent could also take advantage of wireless communications and battery power near the sensors.



Here's my quick set up for XBee-to-XBee transceiver communications that used HyperTerminal and Digi International's X-CTU software to act as a terminal on each side of the RF link. The range for these modules can extend to 100 feet or more. The mbed module made it easy to create and download code.

For more information on the mbed module and how to use it, read my "Lab Rat" review in the May 2010 issue of *Design News* magazine. The printed review includes a link to a longer online review. --Jon Titus

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at 4/8/2010 9:17:28 PM, ericwertz said:
Jon, the very same thing could likely have been prototyped on an Arduino, as there's already a large(r) body of knowledge about how they also play well with XBees. After all, the mbed.org environment was probably patterned after the Arduino environment (but with the [deal-breaking] liability of being tethered to the Internet to get at your development tools).

The other benefit of going the Arduino route is if one wanted to take something like this from prototype to "production", they'd end up one step closer to a solution with (very likely) a significantly lower unit cost and power consumption, all other things being equal.

Any one-off/prototype is sweet if you can get it done in an hour, sub-$100... mbed, Arduino, whatever. Hard to beat for things like this, no?

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