

Developing a Simple Sensor Application using Crossbow Devices and Xserve

a) Learning objectives:

To develop a simple sensing application (MyApp_Sensor) that samples the temperature on a sensor board and sends the message packet over a RS- 232 serial connection or a USB connection to the monitoring terminal using a Programming board/Gateway interface.

Students will learn:

- How to create a simple Mote firmware application that reads the temperature sensor data from the sensor board.
- How to program the Mote with a Programming board using the Programmer's Notepad.
- How to use the X-serve application to display the sensor data at the Monitoring Terminal

b) Tools Utilized:

- MICA2 Mote: Standard edition of MICA2
- One Sensor or Data acquisition board: MTS 310
- One Gateway/Programming board: MIB510/MIB 520
- A Windows PC with MoteWorks platform installed

NOTE: The configuration of the devices and their relationships with the programmer's station is depicted in Figure 1. Illustrated in Figure 2 are the procedure and the configuration of various components used in developing a sensor application.

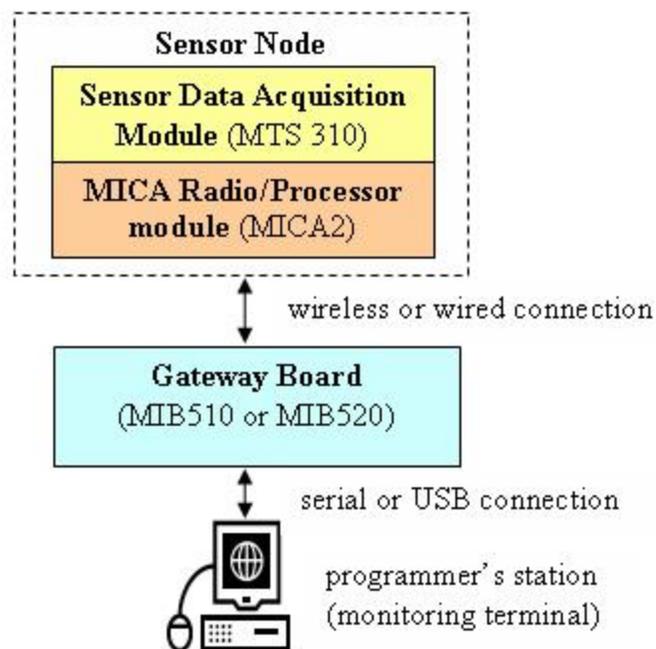


Figure 1. Hardware Configuration of the Simple Sensing Application

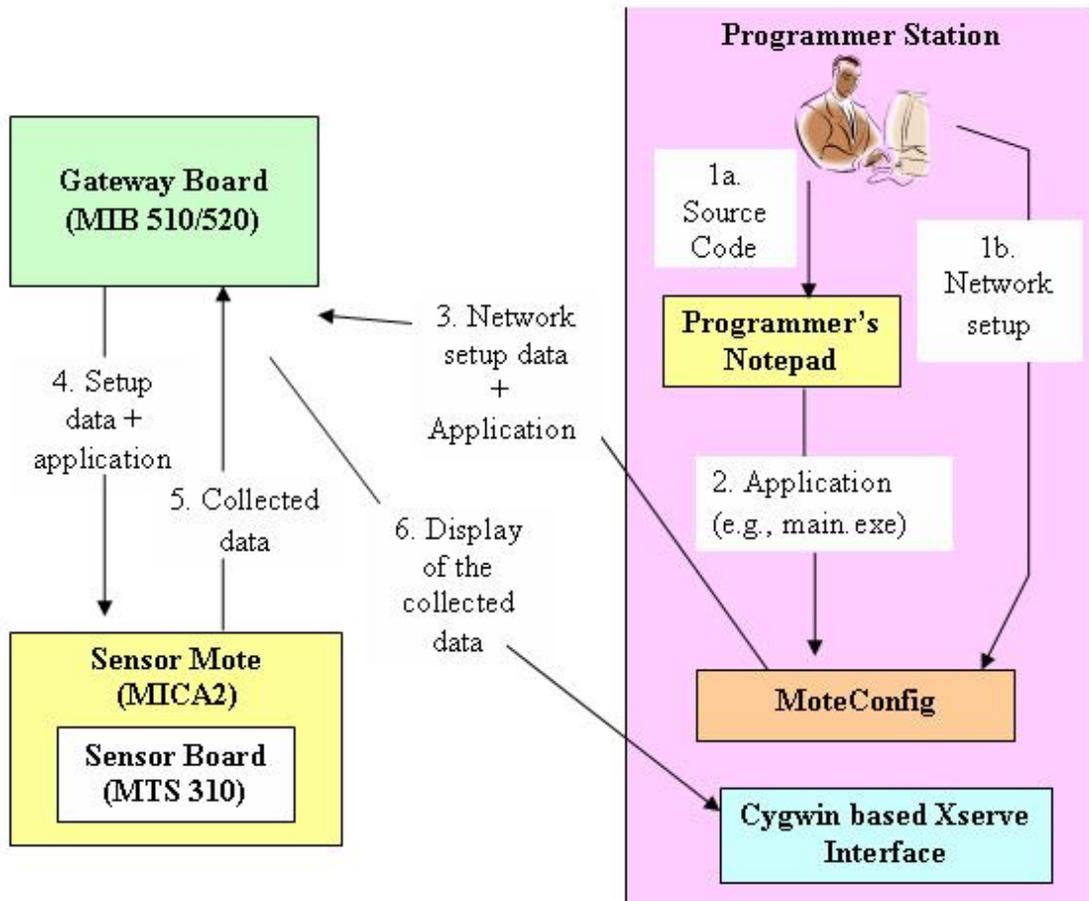


Figure 2. Configuration and Procedure for Developing a Sensor Application

c) Observation:

- By successful execution of the simple sensing application the Monitoring Terminal receives the sensor data.
- To display the sensor reading we use the Xserve application in the Cygwin command prompt window.
- In default, Xserve displays the updated sensor data every second.

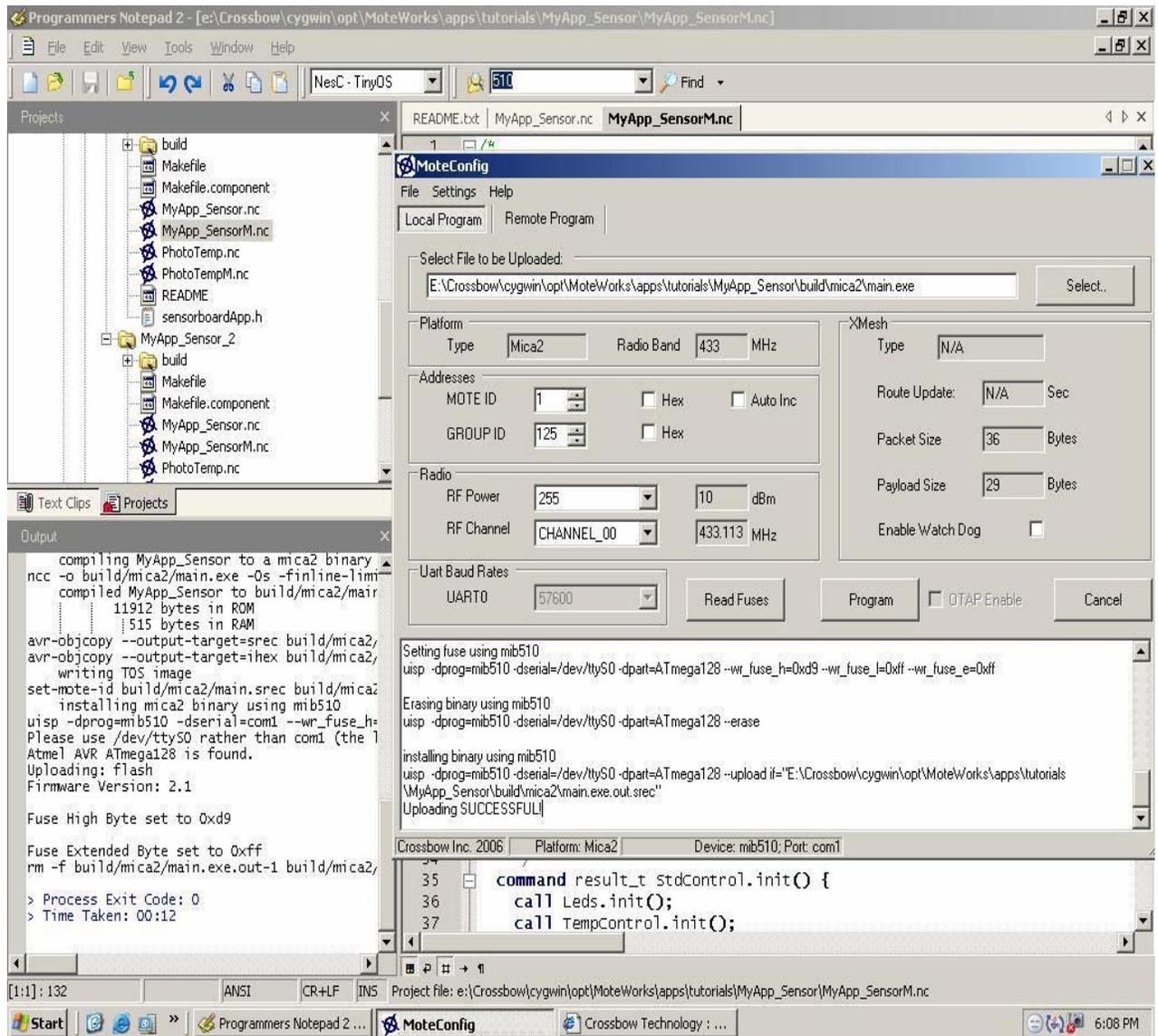


Figure 3. Snapshot of Programmer's Notepad and MoteConfig Interface



```
Administrator@wsnsrv01 ~
$ xserve -device=COM1
[2007/02/27 20:07:45] xdebug: could not open log file /opt/MoteWorks/tools/xserve/bin/logs/xserve_log.txt: No such file or directory
XServe Ver 2: $Id: xserve.c,v 1.8 2006/03/15 04:13:29 rkapur Exp $
Warning: Converting Windows COM1 device to Cygwin device.
Using params: [raw] [parsed] [converted] [server port=9001]
Opening serial device: /dev/ttyS0 @ 57600
[2007/02/27 20:07:46] Serial Source Msg: sync
[2007/02/27 20:07:46] 7E 00 00 7D 14 84 00 01 00 00 0F 02 00 00 00 00 00 00
0 00 00 00 00 00 [25]
[2007/02/27 20:07:46] MTS310 [sensor data converted to engineering units]:
  health:      node id=0x01
  battery:    = 0x00 mv
  temperature=0x20f degC
  light:     = 0x00 ADC mv
  mic:       = 0x00 ADC counts
  AccelX:    = 0x00 milliG, AccelY: = 0x00 milliG
  MagX:      = 0x00 mgauss, MagY: =0x00 mgauss
[2007/02/27 20:07:46] MTS310 [sensor data converted to engineering units]:
  health:      node id=1
  battery:    = 0 mv
  temperature=26.268038 degC
  light:     = 0 ADC mv
```

Figure 4. Snapshot of output from a Cygwin based Xserve interface

d) **Application classification:** The application can be classified as a study experiment because it involves some programming of Motes.

e) **How it may be implemented in the lab:**

By using the required Crossbow Devices and a PC that has the Crossbow MoteWorks development platform installed on it.

Also follow the detailed instructions that are provided in the MoteWorks Getting Started Guide available at <http://www.xbow.com/Support/wUserManuals.aspx>

f) **Level of difficulty:** The level of difficulty of the project is easy.