

# **UNB Woodlot Sensor Network**

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## Description:

This project is part of Geomatics for Informed Decisions (GEOIDE) MNG#BER entitled “Web-based Sensing Networks for Environment Applications”. UNB Woodlot sensor network is developed by Dr. Bradford G. Nickerson and Mr. Jing Lu from faculty of computer science in collaboration with Dr. Fanrui Meng and Dr. Paul Arp from faculty of forestry and environmental management.

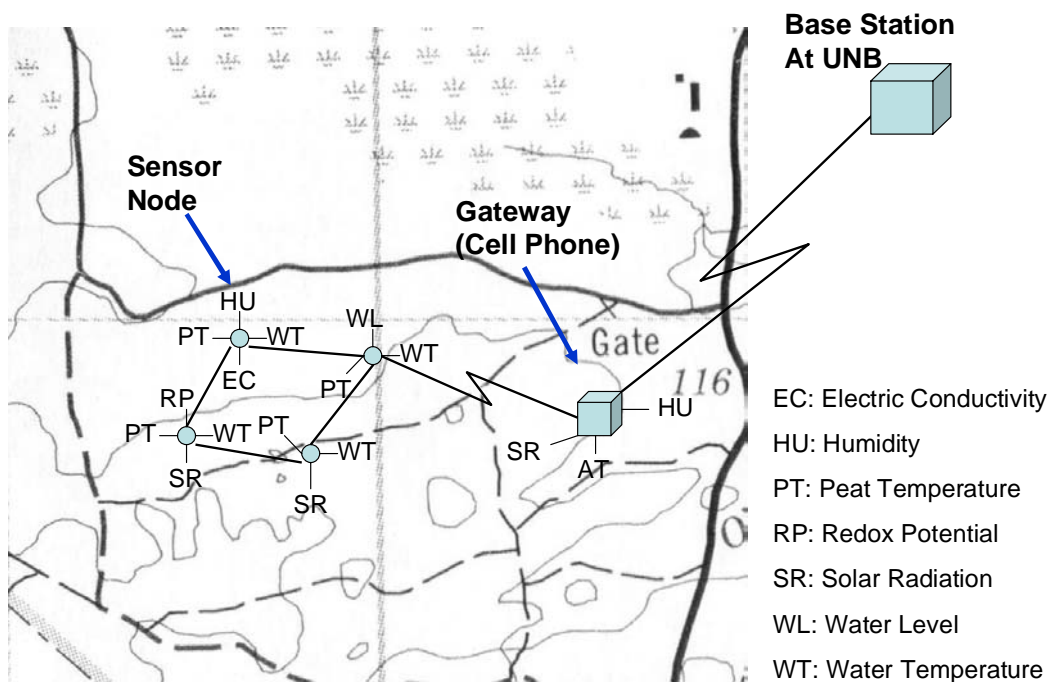


Figure1. Experimental sensor web site in the bog field of UNB woodlot.

The above figure shows our experimental sensor web site in UNB woodlot. We plan to set our sensor site in the bog field of UNB woodlot because it provides not only a secure location for all the equipments but also valuable data for the forestry research work on the bog field.

Each sensor node is a *Mica2* sensor platform manufactured by Crossbow Technology Inc. integrated with different sensor abilities such as air temperature, electric conductivity of the water, and water level etc. There will be two solar radiation sensors placed in the bog field to test the solar radiation in different circumstances, and one will be 1 cm below the bog surface and the other submerges 10 cm into the bog. Sensors communicate with each other to exchange gathered data and configuration information with a maximum range of 300 feet.

Sensor gateway equipped with a Nokia Java supported 6310i cell phone is placed in the dry fields to collect the data from the nodes and send configuration information back to the nodes. It also connects to one of the Mica2 sensor platforms through a serial connection. This sensor is responsible for sensing the humidity, air temperature and solar radiation in the dry fields.

A base station located in UNB ITC building will use the wireless communication provided by Rogers AT&T to communicate with the sensor gateway. Below is a table of the available sensors we'll use in this experiment.

The equipments we will be using in this project are listed in the following tables.

Table 1. Insulated thermocouple wires from Omega Technologies Company.

Part #	Length (feet)	Price (Can\$)
PP-T-24-25 *	25	23.75
PP-T-24-50	50	38.00
PP-T-24-100	100	67.00
PP-T-24-200	200	114.00
PP-T-24-500	500	191.00
PP-T-24-1000	1000	382.00

\* PP : Polyvinyl  
 24: 24 AWG(American Wire Gauge)  
 25: 25 feet

Table 2. Environmental sensors will be purchased for field use.

Attribute measured	Manufacturer	Device name	Units of measurement	Range	Price (Can\$)	Expected Quantity
<b>AT:</b> Air Temperature	Omega Technologies Company	PP-T-24	°C	-60 to 105	See above table	2(sun, shadow)
<b>EC:</b> Electrical Conductivity	Spectrum Technologies, Inc.	2250	mS /cm (millisiemens)	0 to 9.99	100.55	1
<b>HU:</b> Humidity	Blue Earth Research	MiniCap2	RH(Relative Humidity)	10% to 90%	56.00	2
<b>PT:</b> Peat Temperature	Omega Technologies Company	PP-T-24	°C	-60 to 105	See above table	4

<b>RP:</b> ORP (oxidation reduction potential )	Spectrum Technologies, Inc.	2010	mV	-999 to 999	133.61	1
<b>SR:</b> Solar Radiation	Hamamatsu Corp.	Si Photodiode S1133-14	nm	320 to1000	20	4
<b>WT:</b> Water Temperature	Omega Technologies Company	PP-T-24	°C	-60 to 105	See above table	4
<b>WL:</b> Water Level	Global Water Instrumentation Inc.	WL300	feet	0 to 25	672.80	1

Table 3. Mica2 & Mica2Dot professional developer's kit – 868/916Mhz.

<b>Device Name</b>	<b>Device Part Number</b>	<b>Associated sensors/devices</b>
Mica2DOT processor/radio board #1	MPR500CA	EC
		HU
		PT
		WT
Mica2DOT processor/radio board #2	MPR500CA	PT
		RP
		SR
		WT
Mica2DOT processor/radio board #3	MPR500CA	PT
		WL
		WT
Mica2DOT processor/radio board #4	MPR500CA	PT
		SR
		WT
Mica2 processor/radio boards #1	MPR400CB	AT
		HU
		ST
Mica2 processor/radio boards #2	MPR400CB	

Mica2 processor/radio boards #3	MPR400CB	
Mica2 processor/radio boards #4	MPR400CB	
Sensor boards #1	MTS310CA	2-Axis Accelerometer 2-Axis Magnetometer, Light, Temperature Acoustic and Sounder ( can be used with Mica2)
Sensor boards #2	MTS310CA	
Sensor boards #3	MTS310CA	
Prototype/data acquisition boards #1	MDA500CA	(Provides a user-interface for connecting external signals to Mica2Dot mote)
Prototype/data acquisition boards #2	MDA500CA	
PC Interface board	MIB500CA	