Title: "Sensing Capabilities Go Wireless"

Description (max 10 lines)

Wireless Sensor Networks (WSNs) will be an integral part of a wide variety of CIs, for a number of reasons, and in particular:

- Technical Since they have the potential of significantly improving the sensing capabilities of SCADA sub-systems, as well as of increasing the resilience of the overall SCADA architecture;
- Political Governments have recognized the importance of WSNs as a key technology for the protection of CIs, and have issued formal directives as well as funded specific programs for favoring the development of WSN technology in the context of CI protection.

Mastering this technology is a definite plus for researchers and practitioners of the CI domain.

Objectives (max three objectives)

State of the art

Provide an overview of the main products currently available on the market.

Gap analysis

Highlight uncovered features and open issues wrt to SOTA offerings.

Practical implementation

Try the following:

1. Switch the mote on;

Connect the mote to the USB port of a computer (Figure 1a); Launch and configure the Waspmote IDE to communicate with the mote via USB port; Choose an ID for your sensor and for the sensor network zone and program the mote device to generate the following message every 2 seconds:

"Hello World! My ID is x and my WSN zone is y"

Open the serial monitor (from the IDE interface, Figure 1b) and show the communications on the USB serial port just configured.

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 Connect a temperature and a water level sensor to the Event sensor board (Figure 2a); Configure the switches on the Event sensor board (Figure 2b); Program the mote which is attached to the USB port of a computer in order to obtain the temperature value and the water level flag every 2 seconds; the mote should produce a message formatted as follows:

SensorID=x&SensorZone=y&TemperatureValue=z&WaterLevelFlag=t Mount the Event sensor board attached to the sensors on the mote; Open the serial monitor and show the communication on the USB serial port;





(b) Event sensor board details

3. Connect the WSN gateway to the PC (Figure 3);

Unmount the Event sensor board from the mote device;

Connect the mote to the PC via the USB port;

Program the mote to send the messages built during step 2 to the gateway; choose the 802.15.4 protocol;

Remove the USB connection from the mote device;

Mount a Wireless Module on the mote device and the Event sensor board;

Monitor the USB of the WSN gateway.





Figure 3 - Gateway to PC connection

- 4. Implement security within the communications: add data encryption and data authenticity by means of AES-128 on the 802.15.4 protocol;
- Take another mote and configure it to obtain temperature measurements; Implement a Wireless Network between the 2 motes and collect data through the gateway; Monitor the USB of the WSN gateway.

Resources that can be accessed from there

The following resources will be made available on-site:

- Laptop: Acer Aspire One ZG5 with Windows XP sp3 (user: SDCI 2012 no password)
- Wireless Gateway: Libelium Waspmote Gateway 802.15.4-PRO SMA 5dBi
- Wireless motes: Libelium Waspmote 802.15.4-PRO SMA 5dB with Battery Li Ion rechargeable
- Sensor board: Libelium Events sensor board
- Sensors for the sensor board: Temperature Sensor (MCP9700A); Liquid Level Sensors (PTFA0100)
- IDE: Libelium Waspmote IDE v0.1 with API v0.21

List of useful links, references, and resources

Libelium homepage: http://www.libelium.com/

Libelium Waspmote page: http://www.libelium.com/products/waspmote/

Wireless Sensor Networks - research group (maintained by Libelium): http://www.sensor-networks.org/

Libelium Waspmote support page: <u>http://www.libelium.com/support/waspmote/</u>

Libelium Waspmote development page: http://www.libelium.com/development/waspmote/

Libelium API libraries: http://www.libelium.com/api/waspmote/

Waspmote datasheet: <u>http://www.libelium.com/documentation/waspmote/waspmote-datasheet_eng.pdf</u>

Wasomote technical guide: <u>http://www.libelium.com/documentation/waspmote/waspmote-technical_guide_eng.pdf</u>

Waspmote networking guide: <u>http://www.libelium.com/documentation/waspmote-802.15.4-networking_guide.pdf</u>

Event sensor board manual: <u>http://www.libelium.com/documentation/waspmote/events-sensor-board_eng.pdf</u>