Wireless environmental monitoring preserving our heritage

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NVSI of Sydney has successfully completed the first installation of EnviroPoint, its wireless, back-to-database environmental monitoring system, at the National Artillery Museum, North Head, Sydney.

Why is this relevant to the cabling industry? Because EnviroPoint can easily be retro-fitted to existing buildings without the need for cabling through walls.

Now, before panic about falling profit sets in, consider this. How much effort and cost does it take to put cabling into existing buildings? How many OH&S accidents have occurred due to workers having to get into difficult or high places to put the cables in? How many inaccurate building/electrical plans have been presented to guide the installation? Think about the complaints about workplace disruption. And drilling holes in heritage building walls is a no-no.

While it is cost-effective for cabling to be installed when a building is under construction, changes to the internal structure after completion can be a headache. New 'green building' regulations will require ongoing monitoring but it is usually unknown where monitoring stations will be prior to installation and, for museums, monitoring is becoming more common as greater recognition is given to atmospheric conditions, such as UV light and acid rain, attacking precious relics.

Currently, stand-alone dataloggers are widely used but much valuable time and money can be spent collecting and downloading data which is already out-of-date. Wireless systems enable immediate on-screen access to everyone with the need to know; alarm alerts to the appropriate personnel and reporting capability of data history without leaving the office.

Another advantage of a wireless system is that sensor pods can be placed almost anywhere that can be reached. And moved if internal wall changes are made. Each EnviroPoint pod both relays and sends data; pods also store data when temporarily unable to send. Then, again, the possibilities for monitoring are seemingly endless.

For example, the A1-01 pod measures temperature, humidity, light, sound and vibration via internal sensors but can also connect to external sensors for gas, pressure, UV, particulate, force, peak vibration, movement, voltage, … You get the idea. Thermocouple, thermistor and RTD connectors are available in other pods in the series.

The artillery museum board is especially concerned about ongoing salt and water damage to its metal, cloth and paper artifacts because the North Head site is surrounded by sea on three sides and built over an underground spring. Built for the defence of Sydney during the Second World War, the site now encompasses several buildings, some made of brick and others lately added of metal, plus underground tunnels where water seepage is a particular concern.
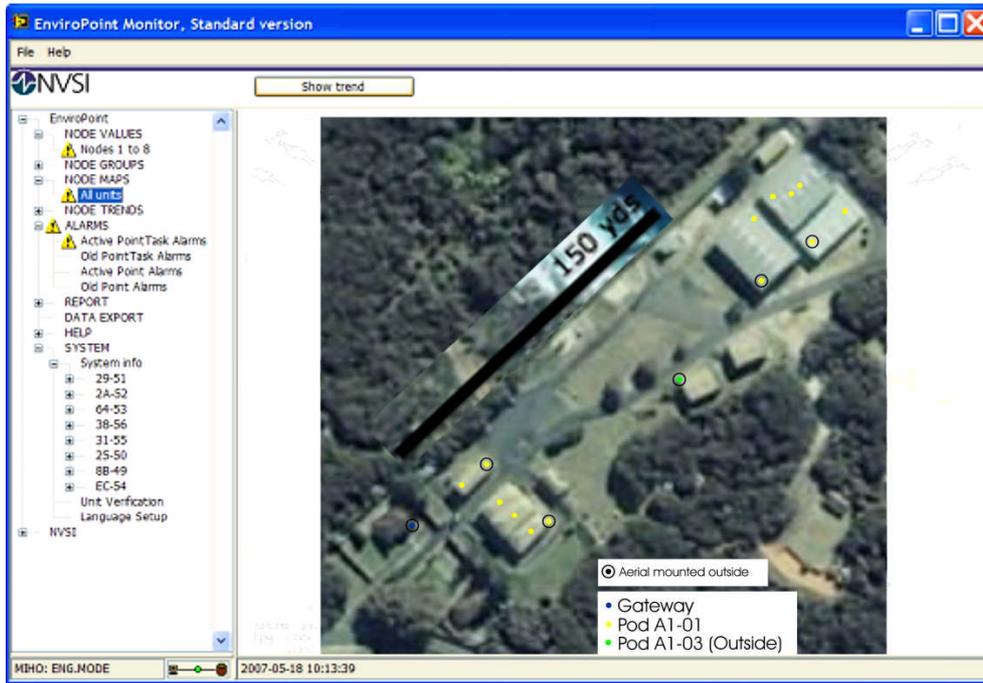
Figure 1 Screen view of map showing pod placement.

The main advantage over stand-alone dataloggers is the immediate on-screen display of the data in numeric and trend form. Everyone with appropriate access on the computer network can check the current status, look at the history and print reports. Even the locality of tour groups in the tunnels can be pinpointed (by acoustic levels).

The ability to boost signal strength using higher-powered antennas made the National Artillery Museum installation very cost-effective. Trials indicated that to relay the signal through the metal hangar walls, extra sensor hardware would be needed to almost double the cost. The solution was to mount a dipole antenna on the roof of one building and bounce the signal down through skylights. For the underground tunnels, another antenna was mounted at the tunnel entrance to boost the signal.

Figure 2 Tunnel Entrance

Once on a level and straight part of the tunnel, the 3-foot-thick (90cm) concrete walls created a wave-guide effect allowing the signal to travel 38% longer than it would outside in a straight line.
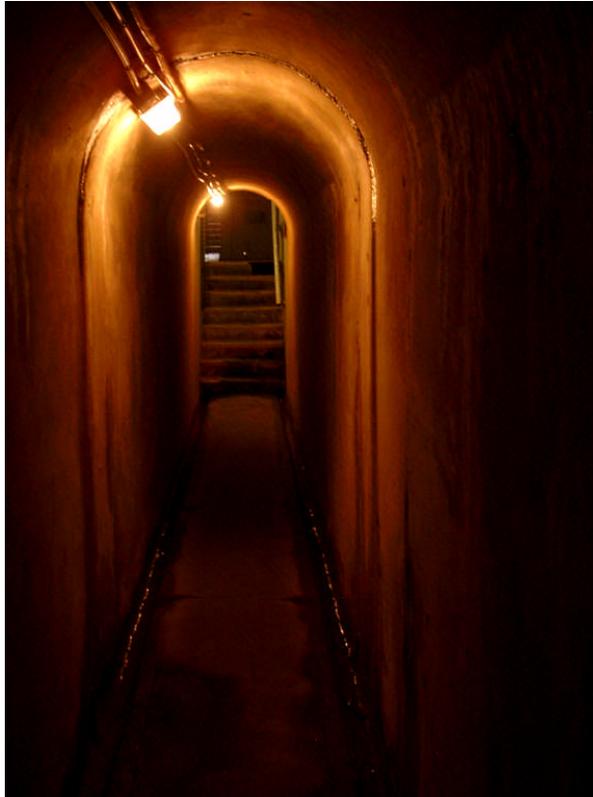

Figure 3 On the straight and narrow - underground tunnel at North Head

Already, the system has highlighted a rising damp problem in the library where irreplaceable military and personal records and manuals are stored. The (good) data from the exhibition areas will be used to support applications for artifact loans from the Australian War Memorial in Canberra and to justify further air-conditioning to preserve books and equipment.

The Artillery Museum is run as a non-profit venture, mainly by volunteers. NVSI donated the software for and installed EnviroPoint at no charge; the hardware manufacturer, Accsense Inc. provided the monitoring hardware at cost.

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