# Spanish scientists develop a new generation of intelligent sensors

***The sensors have a guaranteed energy supply through photovoltaic microelements and take measures of Temperature and Relative Humidity every 60 seconds***

**24/10/2016**. Spanish scientists are revolutionizing the market for smart meters with wireless sensors that have hardware and software itself. The sensors have a guaranteed energy supply through photovoltaic microelements. The device reduces the cost barriers to deploying advanced sensors in buildings to enable optimization of energy usage.

The wireless sensor is networked and scalable, consumes very little power, is software programmable, capable of fast data acquisition, reliable and accurate over the long term, costs little to purchase and install, and requires no real maintenance. Take measures of Temperature and Relative Humidity every 60 seconds.

The source of energy is a PV micro cell that provides a microprocessor with electricity. The mean intensity in the microprocessor is 0.06mA. Data are sent without a battery and without any cables. PV microcells are the energy source to the wireless device. Furthermore, the embedded firmware can be upgraded through the wireless network in the field.

The PV microcell consists of a monolithic photovoltaic solar cell chain, when operating in sunlight or in an environment of bright artificial light, optical energy activates a selection of cells to generate a voltage at the output. Solar cells are capable of generating a floating current source and sufficient to activate voltage integrated circuits, logic gates and / or provides "maintenance charge" for power applications.

Smart meters are digital electric meters that collect information on energy use and securely sent to the operations center and control form. They are especially useful for zero energy buildings (ECC buildings with a net energy

consumption close to zero in a typical year), whose potential of cost efficiency has not been tackled widely so far.

In fact, the market of Zero Energy Buildings lacks reliable and cost effective data logging and measuring devices of energy parameters in Buildings.

The challenge for those devices consists of the need of sending data every minute without being affected by the lack of sun. The device is continuously provided with Tension, so that it can send regular data over the years.

## Need of sensors

Sensors integrated into structures, machinery, and the environment, coupled with the efficient delivery of sensed information, could provide tremendous benefits to society.

Sensors and controls have demonstrated potential to reduce building energy consumption by 20–30%. Bundles of wires are subject to breakage and connector failures. Long wire bundles represent a significant installation and long term maintenance cost, limiting the number of sensors that may be deployed, and therefore reducing the overall quality of the data reported.

Wireless sensing networks can eliminate these costs, easing installation and eliminating connectors. Low-cost and non-invasive temperature and relative humidity sensors using wireless technology have been developed.

Achieving accurate data requires the ability to integrate sensors, radio communications, and digital electronics into a single integrated circuit package. This capability is enabling networks of very low cost sensors that are able to communicate with each other using low power wireless data routing protocols.

A key feature of any wireless sensing node is to minimize the power consumed by the system and the need of electricity storage. If batteries

are going to have to be changed constantly, widespread adoption of these devices will not occur.

By combining smart sensors and PV microcells, long term, maintenance free, wires and batteries can be eliminated, which is what scientists from the School of Engineering Aeronautics and Space of the Polytechnic University of Madrid, member of the Computer Simulation Center, have managed.