embeddedworld 2014
Exhibition&Conference
... it´s a smarter world

THE OFFICIAL DAILY 2014

Elektronik · Markt&Technik · DESIGN&ELEKTRONIK · Computer&AUTOMATION · elektroniknet.de

Energy harvesting:

Energy-autonomous sensor node

Wireless sensor networks are the dream of many a user/operator. They could measure or monitor a variety of values longterm over a large area for instance, and could be distributed outdoors or in places like the factory floor. Rainfall, all kinds of levels, air humidity, temperature – the uses go on and on. The world of physics must play a bigger role however. Because to date wireless transmission of measured data consumed too much energy to develop a system that will remain truly useful for a lengthy period, for years in fact.

Now, from embedded brains, comes ELEFANT, a floor platform on the way to implementing wireless sensor networks. ELEFANT (an acronym for low-energy expandable wireless network node to detect natural test variables) uses an STM32 controller with an ARM Cortex-M core and an economical wireless chip. In terms of wireless, embedded brains chooses the 868-MHz band. This is a well balanced compromise between range and bandwidth, and with defined access rules presenting a viable safeguard against disturbing interference from devices that want to transmit at the same time.

The power supply can come from different harvesting modules of a variety of producers. Economizing on the scarce and valuable energy, ELEFANT uses an energy-optimized wireless protocol. Here some of the wireless nodes are powered better, e.g. by a larger solar cell, and receive continuously. The harvesting nodes can transmit at a random point in time and consequently need only very little energy. Measured data are buffered on the nodes that are supplied better.

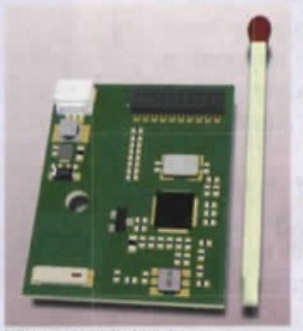

Bild: embedded brains

The ELEFANT wireless network node can be connected to a variety of energy harvesting modules and combined with many different sensors.

Universal connectivity for the sensor technology allows modular system expansion. In addition to humidity or radiation, other variables such as temperature, brightness, magnetic fields or atmospheric pressure could be measured in the free field. Also imaginable is monitoring of temperature distribution in a cold-storage room or detection of levels and air quality, and in future small bistable displays.

The base node can be equipped with PC interfaces without a deal of effort, as necessary for the data collecting node for example. Use of the Contiki operating system, designed for sensor networks, enables use of a large number of ready software components and a large selection of protocols.

Joachim Kroll, Elektronik

embedded brains
Hall 5, Booth 261

Sensor nodes

Autonomous plus compact plus energy-efficient

Compact sensor nodes, consisting essentially of a system with a microcontroller, memory, wireless transceiver and various interfaces to connect sensors, are focused by embedded brains. It takes barely 50 µW to power them, they are featured to work with different energy harvesters and sensors, and are modular to adapt to various applications and expand for them. Using an energy harvester means that energy to power a sensor node can be drawn from its immediate environment, through light for example, vibration or differences in temperature. These marginal conditions make special hardware and software demands on design and architecture of the individual sensor nodes. Optimal layout of a sensor network for the particular application also needs proper selection of wireless standard, communication protocols and topology.

embedded brains
Hall 5, Booth 261