

# Compact vibration harvester power supply with highest efficiency opens door to "fix-and-forget" sensor nodes

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OMRON and Holst Centre/imec have unveiled a prototype of an extremely compact vibrational energy harvesting DC power supply with worlds' highest efficiency. The prototype will be demonstrated at the

TECHNO-FRONTIER2014 exhibition in Tokyo from July 23rd till July 25th. Combining OMRON's electret energy harvester with a Holst Centre/imec power management IC, it can convert and store energy from vibrations in the  $\mu\text{W}$  range with high efficiency to the driving voltage of general sensors. The prototype measures just 5 x 6 cm – with potential to shrink as small as 2 x 2 cm. Its small size, light weight (15.4 gram) and user-variable output voltage are ideal for a wide-range of autonomous wireless sensor node applications in the industrial and consumer domains, particularly in inaccessible locations.

Small, autonomous wireless sensors that can simply be installed and then left to collect and share data are attracting huge interest. They are the foundation of the emerging, Internet of Things. And they could enable new levels of automation and equipment monitoring in industrial applications. The ongoing miniaturization and reduction of [power](#) consumption of sensors and microelectronics make these devices possible. However, a key question has been how to power them.

"Energy harvesting – extracting unused or waste energy from the local environment – is perfect for autonomous sensor nodes. It does away with the need for cables and changing batteries, allowing true "fix-and-forget" systems. The combination of OMRON's robust electrostatic vibration harvester and our efficient power management technology enables an extremely compact design that can be installed in even the most inaccessible places – whereas today's vibrational harvester power supplies are too large and too heavy," says René Elfrink, Senior Researcher Sensors & Energy Harvesters at Holst Centre/imec.

"The vibration in the environment of customers are various and volatile. Under such an environment, our harvester can produce energy even just a little. But so far, we could not use our harvester as a stable DC power supply. Before developing this compact vibrational harvesting power supply, we benchmarked power management technologies from many

potential partners and found Holst Centre/imec's offering to be the most mature. The resulting [power supply](#) meets all the requirements for small, low-power wireless sensors, particularly industrial applications such as equipment control and predictive maintenance systems," adds Daido Uchida, General manager of Technology Produce & Start-up division of OMRON Corporation.

Working closely with OMRON, researchers from Holst Centre/imec integrated the electrostatic harvester and [power management](#) electronics into a power-optimized module just 5 cm x 6 cm. Initial feedback from potential customers suggests this is already small enough for industrial application. However, the module has potential for further miniaturization down to 2 cm x 2 cm.

The supply's output can be set to anything between 1.5 V and 5 V, giving users complete flexibility to replace any kind of battery in existing designs or create brand new products. The module contains an ON/OFF signal for efficient duty cycling with low power sensor systems.

OMRON is currently putting the prototype through a number of field tests with customers to gather further input before entering volume production.

Provided by IMEC

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