

Startup company drawn by Cornell expertise

Cornell University

In a few years, MicroGen Systems Inc., a startup incubating in the Cornell Business and Technology Park adjacent to Ithaca Airport, may have its products in everything from cars to clothes dryers.

At a recent trade show, the company, which moved to Ithaca to be close to Cornell's expertise, demonstrated its BOLT microscopic power source that turns vibrations into electricity. The product is the result of more than a year of development using the nanofabrication tools at the Cornell NanoScale Science and Technology Facility (CNF).

MicroGen plans to provide its technology for a variety of industrial and building applications. An immediate use, according to Robert Andosca, founder, president and CTO of MicroGen, would be in wireless tire pressure monitoring systems required in new automobiles since 2007. (Underinflated tires waste gas and make tire failure more likely.) Current units are powered by batteries that last only about three years, but the company's vibration-powered generator could last up to 20 years and is less expensive to manufacture, Andosca said.

The generator, a microelectromechanical systems (MEMS) device, can be mass produced on silicon wafers by the same processes used to make electronic circuit chips. "This is the first time in the world that a commercial company has produced a self-powered wireless sensor node using a MEMS-based energy harvester," Andosca said.

The power source consists of a tiny sheet of a piezoelectric material that generates electricity when it is flexed, mounted on a proprietary shock-resistant base. Vibration, such as from a spinning tire, causes the tiny flap to swing back and forth, generating current that charges an adjacent thin-film battery. The prototype, about the size of a dime or less, puts out up to 200 microwatts. As circuits become smaller and need less power the device can shrink with them, Andosca said.

Other sensors in cars, such as airbag accelerometers, could go wireless too, he added. Wireless humidity sensors in clothes dryers are another possible application -- in fact, anything that pins, rolls, jiggles or shakes is a candidate.

Several companies have already expressed strong interest, Andosca said. He sees a potential market of more than 160 million units annually in tire pressure sensors alone, and expects that by 2016 MicroGen will be running an assembly plant employing some 40 people.

Andosca came to New York from Vermont because of research funding made available by Sen. Charles Schumer (D-N.Y.) through the Infotonics Technology Center in Canandaigua, N.Y. To refine the technology, he needed the state-of-the-

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art facilities at CNF. "There are 17 of these facilities in the country and Cornell's is one of the two best," said Andosca.

Paul Mutolo, director of external partnerships for the university's Energy Materials Center (emc2), arranged research funding from the New York State Foundation for Science, Technology and Innovation, through its New York State Center for Future Energy Systems, to support the work at CNF. The funding enabled Andosca to build, test and redesign until he had a product that would meet the industry standard power level required for wireless sensor units. MicroGen also secured startup funding from the New York State Energy Research and Development Authority, which it will eventually reimburse through a sales-based royalty.

MicroGen also is working with R. Bruce van Dover, professor of materials science and engineering, to refine the piezoelectric materials technology, particularly to develop a version that can withstand high temperatures for such applications as sensors in jet engines.

"It's not only the Cornell facilities that attracted MicroGen, but it's the Cornell graduates. Cornell is turning out a lot of smart people that I can hire," said Andosca, adding that upstate's lower cost of living is another draw. "Business people, engineers and scientists can not only create high-paying jobs in central New York, but also have a wonderful family life with a great education base for their children," he said.

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