

Bionic Ear—Improving the Quality of Life for the Hearing Impaired

“MEMS-based microphones are a significant advance in hearing aid technology. They will be able to track what is being spoken anywhere within a hemisphere. For Gennum, that represents real value-add for the customer and the potential for increased sales.”

Andrew Cervin-Lawry
Manager, Technology R&D
Gennum Corp.



Brian Csermak (left), and Dave Simmons (right), listen to a new digital circuit using an acoustic research mannequin at Gennum Corp. in Burlington, Ontario.

The bionic human may no longer be light years away. Sazzadur Chowdhury, Dr. William Miller and researchers at the University of Windsor are working with Gennum Corp. to fabricate a new generation of hearing aids that have the potential to eliminate background noise and track a speaker's voice as a person moves through a crowded room.

The microarray device was developed over four years at the University of Windsor's Research Centre for Integrated Microsystems (RCIM). A working prototype will be available later this year, with commercial launch expected in three to five years. CMC-supported tools and technologies helped to make this university-industry research possible, enabling the development of a working prototype and accelerating future product development.

“This is a significant advancement in hearing aids,” says Andrew Cervin-Lawry, Manager of Technology R&D at Gennum. “With the appropriate signal processing, you can direct the microphone to listen in any direction. That’s the main feature in hearing aids that’s been clinically proven to improve the speech intelligibility in noise.”

Using MEMS (microelectromechanical system)-based design and fabrication techniques, the researchers arranged nine microphones onto a 4.0 mm² area, providing enough beamsteering capability and sensitivity to track moving sounds. MEMS-based microphones have other advantages, including smaller size, lower power consumption, and relatively inexpensive high-volume manufacturing. The device can also be used as an acoustical sensor in a variety of other applications, from sound location detection to medical ultrasound, cell phones and automobiles.

“They can be used, for example, to locate and measure the noise from an automotive engine as part of a fault detection system to ensure advanced quality control during manufacturing and engine testing,” says Dr. William Miller, who supervised the research carried out by Sazzadur Chowdhury, PhD student.

The bionic ear is an exemplary use of microsystems technology that will improve the quality of life for the hearing impaired. [cmc](#)