

## ‘Bionic Vision’ Implant to Provide the Gift of Sight to the Visually Impaired

Dr. Mohamad Sawan of École Polytechnique de Montréal and his research team are working to enrich the lives of the visually-impaired and those who suffer from brain-related injuries. Using products and services supplied by CMC Microsystems, the team has developed a visual cortex stimulator with the potential to provide those who cannot see at all with bionic vision. The technology promises to provide the blind with new abilities to identify family members and friends, read and improve their overall quality of life

*“We are discovering the most appropriate tools and technology to help make a more powerful connection between physical devices and the brain. Working prototypes are essential to this type of research. With the increasing costs and complexity of proof-of-concept devices, very few researchers, if any, could afford to fabricate a chip directly—it is just not feasible. The same is true of design tools. Without access to the design, fabrication and test capabilities offered by CMC, I could not perform this research. It’s that simple.”*

**Dr. Mohamad Sawan**  
Canada Research Chair in  
Smart Medical Devices  
École Polytechnique de Montréal



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In September 2006, researchers from electrical engineering at École Polytechnique de Montréal and from psychology at McGill University began testing the innovative visual cortex stimulator with animals, as a precursor to human trials. Dr. Sawan is relying on design, simulation, FPGA technology and prototyping services provided by CMC to develop a device that creates artificial vision for the blind.

The implant—which integrates several system-on-chip devices—uses a tiny camera installed on a pair of glasses to transmit images to a controller in the patient’s pocket. A device in the controller then transmits radio signals to a microstimulator embedded in the visual cortex of the brain. Images are introduced directly into the brain, bypassing the eyes and optical nerve.

Dr. Sawan is the founder and director of the Polystim Neurotechnologies Laboratory at École Polytechnique and project team leader, which brings together electrical engineers, psychologists, neurologists, medical researchers, and up to a dozen Master’s and PhD students.

Working closely with medical experts, the research team expects to initiate human trials by the end of 2008. Dr. Sawan hopes to develop a fully functional system that can be used in human patients by 2010. “Canadian scientists truly achieved a head start in the research of smart medical devices. This is attributed in part to the microsystems capability available through CMC. This has significantly increased Canada’s international credibility in this field,” says Dr. Sawan, who worked together with CMC to fabricate his first microchip as a PhD student in 1987.

Helping to improve the quality of life for the visually impaired by providing the gift of sight, enriching their interactions with others and the world around them: this is Dr. Sawan’s goal. He anticipates that this technology will evolve to deliver these benefits by the end of the decade. *cmc*