

Improving the Safety of 'Smart' Electric/Hybrid Cars: Research Collaboration Drives Automotive Innovation

Microsystems researchers from across the country are collaborating on the development of a new electrical power management and safety system to protect passengers, car mechanics and emergency crews on the scene of car crashes from the dangers of high-voltage, high-current systems in automobiles

"The integration of high-voltage circuits and MEMS technology provides a cost-effective approach to the design and fabrication of connectors for the electrical systems in vehicles. This technology will allow automotive manufacturers to gain increased capability and value from 'smart' connectors, at the same cost as existing connectors on the market today."

Dr. Wai-Tung Ng
Project Leader
Associate Professor of Electrical Engineering
University of Toronto



Dr. Mirabbasi (right), Mr. Karim Allidina (centre) and Ms. Behnoosh Rahmatian (left) of the University of British Columbia are contributing to the development of a new electrical power management system to safeguard passengers, car mechanics and emergency crews on the scene of car crashes from the dangers of high-voltage, high-current systems in automobiles.

High-voltage electric/hybrid systems add significant value to vehicles, including improved performance and substantial savings on fuel. However, the higher voltage and currents required in these automobiles demand new approaches for management of the power distribution system to ensure the safety of vehicle occupants.

Multiple researchers from the University of Toronto, McGill University and the University of British Columbia comprise a cross-Canada team that is developing 'smart' connectors to improve the safety of these vehicles. This research is an integral part of a national project sponsored by AUTO21, a Network of Centres of Excellence that is helping to advance Canada as a leader in automotive research and development.

The 'smart' connector brings together a MEMS-based pressure sensor with electronic circuits to address key risks associated with high-voltage electrical systems in vehicles. The device will help guard against arcing, electrical shorts and overloads in electrical subsystems of the car; alert the driver or passengers to anomalous system behaviour; and cut off the power to electrical subsystems if necessary—for example, in the event of an accident.

"CMC is a key contributor to this project," says Dr. Shahriar Mirabbasi, Assistant Professor at the University of British Columbia, who first benefited from tools and technologies provided by CMC as a graduate student in the late 1990s.

"We are currently using rapid prototyping platforms supplied by CMC to develop the best techniques for the detection and prevention of electrical faults. We also designed, manufactured and tested the MEMS sensors and associated electronic circuits using tools, technologies and access to fabrication provided by CMC." cmc

Contributors to the project
Dr. W.T. Ng, Dr. J.K. Mills, and
Dr. W.L. Cleghorn,
all of the University of Toronto;
Dr. G. Roberts of McGill
University; and
Dr. S. Mirabbasi of the University
of British Columbia