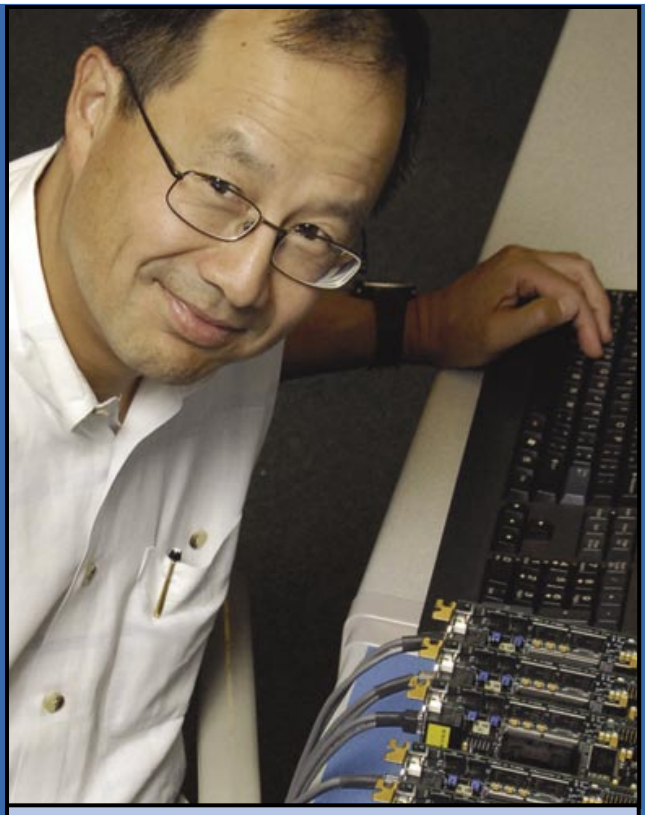
CMC MICROSYSTEMS IMPACT

Accelerating Drug Discovery to Develop New, Cost-Effective Therapies that Improve Treatment of Childhood Diseases

Researchers at the University of Toronto and the Hospital for Sick Children are using powerful equipment provided by CMC Microsystems to accelerate the discovery of new pharmaceuticals—drugs that enable more cost-effective and efficient therapies for diseases that affect children in Canada and around the world

"CMC has provided our team with 10 FPGA development boards from AMIRIX Systems (of Halifax) through the System-on-Chip Research Network. We are leveraging this research infrastructure to build faster circuits that will result in faster computers for large-scale applications such as molecular dynamics simulations (for drug development) and weather monitoring. This technology has proven to be invaluable to our research."

Dr. Paul Chow
Dusan and Anne Miklas Chair in Engineering Design
University of Toronto



Dr. Paul Chow, Dusan and Anne Miklas Chair in Engineering Design at the University of Toronto, is using tools and technologies provided by CMC to accelerate the availability of life-saving drugs for children who suffer from illnesses such as cancer, diabetes and hypertension.

Biomolecular simulation offers significant efficiencies to the process of investigating powerful new drugs that could improve therapies and treatments for critically ill patients. Identifying the right drug candidate for a particular illness is time-consuming work: it could take a standard PC workstation about 30 years to complete the simulations that might lead to a promising drug discovery.

Dr. Paul Chow, a computer engineer at the University of Toronto, is collaborating with Dr. Régis Pomès, a biochemist at the Hospital for Sick Children (SickKids), to accelerate the availability of life-saving drugs for children who suffer from illnesses such as cancer, diabetes and hypertension.

The collaborators are using re-programmable platforms (with field-programmable gate array or FPGA technology) provided by CMC to develop a new computing architecture that will improve techniques for biomolecular simulation in pharmaceutical research. This new architecture could replace hundreds of PCs—working in parallel—with a single workstation.

Dr. Chow explains that designing new drugs—particularly understanding the behaviour of proteins or other molecules, or the interactions between them—requires significant processing power. "If you visit the lab of Dr. Pomès, you will find a room full of PCs. Using this new technology, I could replace all the PCs in that room with one system. This would enable more efficient simulation for drug discovery and reduce the associated capital equipment and operating costs of the lab. The savings realized could translate into promising new research opportunities."

One FPGA-based processor can outperform a single PC by 40 to 80 times when programmed for a specific application. Hundreds or thousands of these processors working in parallel can build a low-cost supercomputer. "Very few universities in other parts of the world benefit from access to the industry-grade infrastructure that is provided by CMC. The large-scale installation of these sophisticated technologies is typically only available at leading research institutions—many of which are found in the United States." In the coming year, the team will also explore potential applications in climatology, meteorology, astronomy and high-energy physics. *cmc*