



## Accelerating DNA Matches

**Computer scientists at Memorial University are tapping into the System-on-Chip Research Network (SOCRN) to build special purpose computers for complex pattern matching**

*“With this project, we have researchers with a theoretical interest in computer science finding an application in the hardware domain for something that has potential applications in computational biology, and potentially medicine and linguistics over the longer term.”*

**Dr. Paul Gillard  
Professor  
Department of Computer Science  
Memorial University of Newfoundland**



Dr. Todd Wareham (right), Dr. Paul Gillard (centre) and David Churchill, undergraduate student (left) of Memorial University are working on a technology that could speed the discovery of new drugs, improve our understanding of linguistics and even help national security agencies.

Computer scientists Dr. Todd Wareham and Dr. Paul Gillard are combining the flexibility of software with the performance speed of hardware to more quickly pinpoint DNA matches. The technology—a field-programmable gate array (FPGA) hardware accelerator—could speed the discovery of new drugs, improve our understanding of linguistics and even help national security agencies.

Comparing DNA or protein sequences is a fundamental task in molecular biology, and an increasingly complex one. Being able to do it quickly provides the researcher with competitive advantage. As not every lab can afford a supercomputer, these Memorial researchers are designing specialized microchips that will transform a standard PC into a high-performance computer capable of simultaneously comparing thousands or even millions of genetic sequences.

“If you’re a drug company interested in doing these DNA matches, you could have hundreds of these chips working in parallel,” says Dr. Gillard.



Memorial researchers are using the System-on-Chip Research Network to design microchips that will accelerate comparisons of DNA sequences.

Using a System-Level Prototyping Station delivered through the SOCRN managed by CMC, the team is able to translate algorithms for pattern matching into hardware.

“This is a unique opportunity for one of my students to use these tools to develop novel applications on the hardware side,” says Dr. Wareham. “It has also opened a new door for multidisciplinary research here at Memorial.” *cmc*