

## Sensor Technology that Could Safeguard Aircrafts and Pipelines

Researchers at the University of New Brunswick are using tools and technologies provided by CMC Microsystems to make more cost-effective systems for monitoring structural health

*"Most of my embedded system design work has been supported by CMC Microsystems. In addition to providing hardware and software, CMC has also facilitated access to expertise and technical support. This includes researchers such as Dr. David Luke and Troy Lavigne at UNB, as well the engineering team at CMC. They have all demonstrated great passion in supporting my research."*

**Ethan (Rong-An) Zheng**  
Master's student  
Electrical and Computer Engineering  
University of New Brunswick



Dr. Bruce Colpitts, Professor, Electrical and Computer Engineering, UNB (right) is working with Ethan Zheng, graduate student (left) on an experimental technology that can detect rapid strain change or vibration in bridges, buildings or other structures.



The UNB team used CMC-supplied equipment to develop an industry-grade prototype.

Researchers at the University of New Brunswick (UNB) have developed an experimental fiber optic technology to measure strain and structural weaknesses in airplanes, pipelines, bridges, dams or buildings. To move this sensor technology closer to commercialization, the team is now collaborating with experts from CMC Microsystems, academia and industry who have knowledge spanning mechanical engineering, civil engineering and forestry.

The technology significantly advances the speed and capability of existing systems for monitoring the health of structures. For example, the system could monitor a remote gas pipeline at a rate of 10,000 times per second, at each metre of its length. The fiber optic technology could also provide continuous and instant data on vibrations, temperature and structural changes in an airplane's engine and fuselage.

"Existing fiber systems are slow and provide only static strain information," explains Dr. Bruce Colpitts, the professor at UNB who is working with graduate student Ethan (Rong-An) Zheng on the project. "The ability to detect a rapid change in strain or vibration in an airplane would significantly increase the diagnostic information available to the pilot. In addition to identifying an abnormal operating condition, the system could identify the location and probable cause of the issue."

CMC helped the research team to develop an industry-calibre prototype by providing access to the latest FPGA (field-programmable gate array) technology.

"To move the concept from the laboratory to a commercial environment, we must significantly reduce the cost of the system," says Mr. Zheng. "FPGA development tools are helping our team to achieve this goal." *cmc*