



A 21st Century Hospital

The University of Calgary will use the National Design Network to build high frequency circuits for a new patient-monitoring system

"This technology can really help with patient care and CMC will play a major and a frequent role when it comes to fabricating and testing low-power circuitry and advanced sensor circuitry. CMC's contribution is essential for improving the design, and getting a working system into hospitals."

Dr. Vijay Devabhaktuni
NSERC/iCORE Post-Doctoral Fellow
University of Calgary



Dr. John Conly, MD (right) from Foothills Medical Centre is working with Dr. Vijay Devabhaktuni (centre) and Dr. James Haslett (left) from the University of Calgary to develop a new patient-monitoring system, using resources provided by CMC.

It's being called the medical ward of the 21st century. A new teaching unit at Foothills Medical Centre in Calgary, under the direction of Dr. John Conly, is testing novel approaches to healthcare delivery, research, education and technology. Later in 2004, it will begin field testing a remote sensing system to monitor patients' vital signs as they move throughout the hospital.

"The technology, called *Ad Hoc Self-Organizing Wireless Sensor Networks*, monitors everything from moisture levels in vineyards to temperature in habitats. We want to develop as many prototypes with CMC as possible so that we can test them in a hospital environment," says Dr. Vijay Devabhaktuni, an NSERC/iCORE Post-Doctoral Fellow. He works for Dr. James Haslett, the TRLabs/iCORE/NSERC Senior Industrial Research Chair in Wireless Science and Technology.

The wireless sensor was constructed with a first-generation commercial circuit called a "mote" for the remote sensing system. About the size of a Canadian dollar coin, the mote connects to biosensors that continuously monitor temperature, heart rate, blood oxygenation and pulse. An embedded transceiver wirelessly transmits data to a base station linked to PCs in a nursing station, or even handheld PDAs.



An electronic circuit called a "mote" (the circular object in the middle) connects to biosensors (mounted on the circular object on the right) to continuously monitor a patient's vital signs in real time. The sensed information is transmitted over radio to a base-station (the object on the left) that connects to a doctor's PC.

Power consumption is a key issue with such a monitoring system. Ken Townsend, PhD student, is building a low-power transceiver system that will eventually extend the system's battery life by weeks or even months. He is working with Dr. John Rogers (Carleton University), Dr. Kris Iniewski (University of Alberta), and Dr. Foster Dai (Auburn University, Alabama). Steven Zhai, a Master's student who is jointly supervised by Drs. Haslett, Sebastian Magierowski and Ed Nowicki, is integrating biosensors that monitor blood oxygenation and heart rate.

The technology could eventually be used in hospitals across Canada. [cmc](http://www.cmc.ca)