



UNIVERSITY OF ALBERTA

News Release

Improved Communications Chip Has Exciting Potential

University of Alberta researchers have created a communications chip with exciting potential for unsurpassed energy efficiency. The team at the iCORE High-Capacity Digital Communications Laboratory, in the Faculty of Engineering, have designed a computer chip that uses about 100 times less energy than current state-of-the-art digital chips.

The greatly reduced energy consumption of this novel technology offers promise for many small devices with relatively low power needs. This technology could one day eliminate the need to recharge cellphones, help introduce smaller, ultra-high-speed communications systems, and advance the use of implantable health care devices such as drug delivery chips. Research and development is ongoing before this technology can be implemented in products.

Professor Vincent Gaudet, iCORE Professor Christian Schlegel, and former graduate students Dave Nguyen and Chris Winstead collaborated on the project in the Department of Electrical and Computer Engineering. The communications chip was designed by Nguyen, manufactured by CMC (the Canadian Microelectronics Corporation) and tested at the University of Alberta.

This new analog processing technology has been used by Winstead to build the largest analog decoder chip fabricated to date, also built at iCORE's High-Capacity Digital Communications Laboratory at the University of Alberta. The iCORE HCDC Laboratory is a recognized world leader in this novel and promising technology.

"It is well known that there is a power barrier for future increases in process speeds and device sizes, and to overcome this, the world needs a new, disruptive technology," said Dr. Schlegel. "A fundamental new idea gave our team the edge, and we have been fortunate to have maintained a strong group here working on this technology for the last few years."

The invention employs a new method of processing digital data, known as analog decoding, which uses extremely low levels of power to execute its detection algorithm. The team's research shows no other reported chip uses a lower amount of energy consumed per decoded information bit.

The team has published two conference papers based on this project this year: one for the International Symposium on Turbo Codes in Brest, France, and another for the International Symposium on Circuits and Systems (ISCAS) in Vancouver.

The team's research is supported by iCORE, Science and Engineering Research Canada (more commonly known as NSERC), CMC (Canadian Microelectronics Corporation), the Canada Foundation for Innovation (CFI) and the Alberta Science and Research Authority (ASRA).

The University of Alberta's Faculty of Engineering is among North America's leading engineering research and teaching centres with 4,300 students, 30 research chairs, \$73 million in annual research activity, over 120 new professors, several new buildings, and outstanding facilities. Visit www.engineering.ualberta.ca for further information.

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Backgrounder

About the Chip

At 0.04nJ/bit (nanoJoules per bit) the chip uses the lowest reported amount of energy consumed per decoded information bit.

Analog Decoding information: www.analogdecoding.org

About the Faculty of Engineering

The Faculty of Engineering is among North America's leading engineering research and teaching centres, with 30 research chairs, \$73 million in annual external support, and over 120 new professors. With 4,300 students and several new buildings and outstanding facilities, the Faculty is among the top three largest Engineering Faculties in Canada.

Faculty of Engineering: www.engineering.ualberta.ca

Department of Electrical and Computer Engineering: www.ece.ualberta.ca

About the University of Alberta

Located in Edmonton, the University of Alberta is one of Canada's leading research-intensive institutions, with more \$377 million in externally sponsored research in 2003-04, serving some 35,000 students with 8,000 faculty and staff in 15 faculties. The University's technology transfer unit, TEC Edmonton, helps researchers protect the intellectual property of inventions and share technologies with the community through the marketplace..

University of Alberta is available: www.ualberta.ca.

TEC Edmonton: www.TECedmonton.com.

About iCORE

The informatics Circle of Research Excellence (iCORE) was established in 1999 by the Government of Alberta to foster world-class university-based research that supports the information and communications technology (ICT) sector. iCORE invests in the highest caliber research scientists at Alberta universities who work on fundamental and applied problems in informatics, around which world-class research teams are developed.

iCORE: www.icore.ca

iCORE High Capacity Digital Communications Laboratory: www.ece.ualberta.ca/~hcdc

About CMC

CMC (Canadian Microelectronics Corporation) builds partnerships among government, industry and universities to accelerate Canadian competitiveness through microsystems. Established in 1984, the not-for-profit corporation provides industry-calibre tools and technologies to enable world-class research and the commercialization. CMC is funded by the Science and Engineering Research Canada (NSERC), matched by industrial contributions of technology, services and cash. CMC also manages major grants from the Canada Foundation for Innovation (CFI) and the Ontario Innovation Trust (OIT) to deliver research infrastructure for system-on-chip investigations.

CMC information: www.cmc.ca

About NSERC

Science and Engineering Research Canada (also known as NSERC) is the national instrument for making strategic investments in Canada's capability in science and technology. Reporting to Parliament through the Minister of Industry, NSERC promotes discovery and innovation by funding more than 10,000 university professors every year, by supporting more than 20,000 university students and postdoctoral fellows, and by encouraging more than 500 Canadian companies to invest in university research. In 2004-2005, NSERC will invest \$850 million in university-based research and training in all the natural sciences and engineering.

NSERC: www.nserc.ca

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