CMC MICROSYSTEMS IMPACT

Taking an Ultrasound of the Earth's Interior—The Identification of New Oil Deposits Begins with Better Seismic Imaging

Dwindling oil supplies are driving the need for new technologies that provide more accurate, three-dimensional images of hydrocarbon reserves below the earth's surface. A team of researchers are developing a new computational tool that aims to process complex data at record speeds and accelerate the discovery of new oil and gas.

"CMC is providing our team with prototyping platforms that will allow us to increase the computation speed of our hardware by at least a factor of 10. This technology could reduce the drilling required to identify new oil and gas sources, by enabling the retrieval of well-defined, seismic images that provide a better picture of the earth's interior."

Dr. Lesley Shannon
Assistant Professor, Engineering Science
Simon Fraser University

Dr. Lesley Shannon (centre) of Simon Fraser University is working with Joe Dudas (left) and Michelle La Haye (right), both graduate students at SFU, on the development of new technology that could accelerate the discovery of new oil and gas deposits.

Researchers at the University of Calgary, Simon Fraser University (SFU) and the University of British Columbia hope to overcome two key limitations in the widespread use of seismic imaging–limited microchip memory bandwidth and slow data processing speeds. Working together with CMC Microsystems, the team is developing new technology that could reduce the time and money required to process the massive amounts of data from ultrasound-like devices that take pictures of the earth's interior.

"Our goal is to develop a proof-of-concept by the end of this year," says Dr. Lesley Shannon, Assistant Professor of Engineering Science at SFU. She is collaborating on the project with Drs. Matt Yedlin and Steve Wilton at the University of British Columbia and Dr. Gary Margrave at the University of Calgary.

Seismic imaging allows scientists to bounce sound waves into the inner layers of the earth and use the reflected waves to construct an image of its internal structure. The technology that is currently available presents a significant challenge for scientists. It can take hours or even days to process the gigabytes of data required for two-dimensional images that represent vertical profiles of the earth's crust. More realistic and accurate three-dimensional images that represent multiple layers of the earth's crust require many terabytes of data and weeks of computation time.

The research team wants to make three-dimensional imaging more practical and efficient by implementing more accurate and complete algorithms onto a new hardware accelerator. That hardware will be installed on next-generation, FPGA (Field Programmable Gate Array)-based prototype platforms provided by CMC.

"These new platforms will enable faster processing of data as they provide increased memory resources. This capability is required to address a key data processing challenge," says Dr. Shannon. "It could help companies locate new sources of energy more quickly, while reducing their level of investment." *cmc*