



**iCORE**

ALBERTA INFORMATICS  
CIRCLE OF RESEARCH EXCELLENCE

# newsletter

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## iCORE and Alberta Ingenuity to collaborate on graduate awards

Two major Alberta research funding agencies will be working together to increase the appeal of Alberta universities for the top students in computer science and engineering.

Alberta Ingenuity and the Alberta Informatics Circle of Research Excellence will offer complementary awards in the area of informatics, concentrated in areas of computer science, and electrical and computer engineering. The new award agreement will be effective January 2003.

All new computer science and electrical and computer engineering students entering or transferring to an Alberta university with an Alberta Ingenuity award are eligible for an additional iCORE award. Up until now, iCORE awards have only been granted to students with prestigious Natural Sciences and Engineering Research Council awards. This new agreement recognizes the outstanding quality of recipients of Alberta Ingenuity Studentships.

The complementary programs will allow total compensation of up to \$30,000 for master's students and \$35,000 for doctoral students.

"At this point in Alberta's development, the creation of strong research teams in information science and engineering warrants special attention," iCORE president Dr Brian Unger says. "By working with Alberta Ingenuity, we can make Alberta universities a very attractive option for the top students in informatics from across the country."

"The competition is tough for the top students in any area. By pooling our efforts, we can make Alberta that much more compelling in the highly competitive area of computer science and engineering," Alberta Ingenuity president Dr Bill Bridger says.

Alberta Ingenuity is an endowment fund that supports excellent research teams in science and engineering. The Alberta Informatics Circle of Research Excellence is a government-funded organization that focuses specifically on supporting excellent research teams in informatics.

## Focus on informatics crucial

iCORE is undertaking a new strategic planning cycle that calls for continued focus and commitment in the wake of early success, according to iCORE President Brian Unger. "We are at a point where we can see the strategy is working. What we do next will dictate whether our initial investment will yield the intended results."

The creation of iCORE is just one piece of a larger information and communications technology (ICT) strategy and action plan now being implemented in this province, a strategy originally prepared by a task force of the Alberta Science and Research Authority in 1998. A significant portion of the strategy is designed to change the profile of Alberta in the decades to come, so that companies in the information sector are attracted to and grown in Alberta.

"The returns are coming in and it is because we have been focused -- focused on target areas, focused on excellence and focused on strengths that we know we have in Alberta," Director of Corporate Relations Fred Stewart says. "We are at that crucial juncture where the complex scenario that leads to technology commercialization is starting to amass right here in Alberta in a couple of critical areas. This is a time to maintain focus."

The new strategic plan is expected to be made public early in the new year.



### Wireless Science and Technology Initiative officially launched

Speakers at the October 29 event included, from left to right, Dr Roger Pederson, President of TRILabs, Dr Jim Haslett, iCORE/NSERC/TRILabs Industrial Chair of the Wireless Science and Technology Initiative, Dr Tom Brzustowski, President of NSERC, Dr Brian Unger, President of iCORE, and Dr Bob Church, Chair of the Alberta Science and Research Authority.

## 2002–2003 grad student scholarship recipients

83 top graduate students received iCORE Graduate Student Scholarships this year bringing the total number of graduate students supported up to 132. Graduate students supported by iCORE represent the top students working in information and communications (ICT) related disciplines today, primarily in Electrical and Computer Engineering (ECE) and Computing Science (CS).

- Peter Ajemba, U of A, ECE (PhD)
- Mehboob Alam, U of C, ECE (Masters)
- Paulo Alves, U of C, Geomatics Engineering (PhD)
- Kristopher Breen, U of A, ECE (Masters)
- Siyue Chen, U of C, ECE (PhD)
- Lin Cheng, U of A, CS (PhD)
- Michael Chung, U of A, CS (Masters)
- Michael Closson, U of A, CS (Masters)
- Scott Crawford, U of C, Geomatics Engineering (Masters)
- Anthony Dechant, U of A, ECE (Masters)
- Erika Dempsey, U of C, ECE (Masters)
- Christian Digout, U of A, CS (Masters)
- Mohamed Elkamesh, U of A, Civil Engineering (PhD)
- Tamer Mohamed Elsoukkary, U of A, Mechanical Engineering (PhD)
- Alan Fedoruk, U of C, CS (PhD)
- Dmitry Gavinsky, U of C, CS (PhD)
- Megan Glover, U of A, Physics (Masters)
- Andreas Hirt, U of C, CS (Masters)
- Bret Hoehn, U of A, CS (Masters)
- Christopher Holdenried, U of C, ECE (PhD)
- Roman Holenstein, U of A, ECE (Masters)
- Damon Holmes, U of C, ECE (Masters)
- Peter Hrudehy, U of A, ECE (Masters)
- Aaron Hryciw, U of A, Physics (Masters)
- Jeremiah Hu, U of A, ECE (Masters)
- Scott Irvine, U of A, ECE (PhD)
- Scott Jacobsen, U of C, ECE (Masters)
- Jeffrey Keilman, U of C, ECE (Masters)
- Jonathan Kelly, U of A, CS (Masters)
- Sean Kirkwood, U of A, ECE (PhD)
- Karla Krewulak, U of C, Biological Science (PhD)
- Russell Kruger, U of C, CS (Masters)
- Gilbert Lee, U of A, CS (Masters)
- Greg Lee, U of A, CS (Masters)
- Dion Leung, U of A, ECE (PhD)
- Jody Lilley, U of A, Mechanical Engineering (Masters)
- Jie Luo, U of A, CS (Masters)
- Allan MacDairmid, U of A, Physics (PhD)
- Wesley MacKay, U of A, CS (Masters)
- Daniel Mallett, U of A, CS (Masters)
- Katherine (Kaye) Mason, U of C, CS (PhD)
- Mark Matthew, U of A, CS (PhD)
- Leah Marie McCartney, U of C, ECE (Masters)
- Greg McFeetors, U of C, ECE (Masters)
- Evan Minty, U of A, Physics (Master)
- Keith Nakonechny, U of A, Physics (Masters)
- Natalya Nicholson, U of C, Geomatics Engineering (PhD)
- David O'Connell, U of A, CS (PhD)
- Kyle O'Keefe, U of C, Geomatics Engineering (PhD)
- Patrick Pantel, U of A, CS (PhD)
- Andriyka Papish, U of C, Biological Science (Masters)
- Christopher Parker, U of A, CS (PhD)
- Yaling Pei, U of A, CS (Masters)
- Amr Pertew, U of A, ECE (PhD)
- Dijana Popovic, U of C, ECE (PhD)
- Brett Poulin, U of A, CS (Masters)
- Michael Pycrz, U of A, Civil Engineering (PhD)
- Tianhao Qiu, U of A, CS (PhD)
- Faruq Rajwani, U of A, ECE (Masters)
- Anthony Rapley, U of A, ECE (Masters)
- Slobodan Rasetic, U of A, CS (Masters)
- Scott Rayner, U of C, Geology and Geophysics (Masters)
- Jasen Robillard, U of C, Geology and Geophysics (Masters)
- Reginald Sawilla, U of C, Mathematics and Statistics (Masters)
- Ryan Schneider, U of C, ECE (PhD)
- Stacey Scott, U of C, CS (PhD)
- Jayanti Sharma, U of C, Geomatics Engineering (Masters)
- Anthony Tang, U of C, CS (Masters)
- Shui-Chun Tang, U of C, CS (Masters)
- Julia Taylor-Hell, U of C, CS (Masters)
- Kenneth Townsend, U of C, ECE (Masters)
- Tuan Tran, U of C, ECE (PhD)
- Andy van Popta, U of A, ECE (Masters)
- Tim Van Zwol, U of A, Civil Engineering (Masters)
- David Waldbillig, U of A, Chemical and Materials Engineering (Masters)
- Konrad Walus, U of C, ECE (Masters)
- Yang Wang, U of A, CS (PhD)
- Trevor Williams, U of C, ECE (PhD)
- Yi Xu, U of A, CS (Masters)
- Aisha Yahya, U of A, ECE (Masters)
- Atiyah Yahya, U of A, ECE (PhD)
- Jonathan Yip, U of A, CS (Masters)
- Jun Zhou, U of A, CS (PhD)

# Profiles: Grad

## Natalya Nicholson

PhD, Geomatics Engineering, University of Calgary



I did my BSc at McGill in physics and geophysics and then went off in search of grad schools to do astrophysics. I ended up in space physics here in Calgary. I did my MSc thesis on a type of

northern lights caused by protons precipitating into the atmosphere. I was unsure what I was going to do after my MSc. I could either join the working world (likely the oil and gas industry here in Calgary to start), continue on in space physics or try geomatics engineering. I went travelling to clear my head and decided that I wanted to try geomatics engineering.

The group I am planning to work with is involved in research about satellite navigation and positioning with GPS. It is extremely well known internationally and is considered an international center of excellence in this area. Susan Skone is one of my co-supervisors and sat on my MSc defense committee. Elizabeth Cannon is my other co-supervisor.

When GPS signals are transmitted from the satellites to the ground they must pass through the atmosphere. The length of the path from the satellite to the receiver is changed as it passes through the atmosphere. There are effects from the ionosphere due to the free electrons in that layer and there are effects from the neutral atmosphere or the troposphere. These effects introduce errors to the positions that GPS users receive on the ground. These are not the only errors, but they are the two types of atmospheric errors. The effects of the troposphere can be divided into hydrostatic and non-hydrostatic components. The non-hydrostatic or "wet" component of the troposphere is very difficult to model. This will be the focus of my research.

What I find interesting is that by producing a better model for this wet component of tropospheric delay, it not only makes GPS more accurate but the model can also be used in reverse. It will allow us to use GPS as a tool to probe the troposphere. This could have a tremendous effect on the accuracy of short-term weather prediction (up to 24 hours). I am hoping to make GPS measurements more precise for users by modeling the tropospheric effect of water vapour – that's the engineering side.

# students join world-class research teams

Atiyah and Aisha are sisters, three years apart, both studying in biomedical-related areas at the University of Alberta. Both received iCORE Graduate Student Scholarships this year.

## Atiyah Yahya

**PhD, Electrical and Computer Engineering, U of A**

I am doing a joint PhD with the departments of biomedical engineering and electrical engineering. I did my undergraduate degree at the University of Alberta in Engineering Physics. In my third year Dr Peter Allen (my current supervisor) taught me a course. I asked him if he needed any summer students and he did. So in the summer of 1998 I worked in the department of biomedical engineering working on an MRI (magnetic resonance imaging) coil (an electronic device that picks up the radiofrequency signal that constitutes the NMR – nuclear magnetic resonance-signal). I really enjoyed it and that is what made me decide to pursue a graduate degree in the department of biomedical engineering. Since my work also involves electrical engineering, I combined my degree with the electrical engineering department.



My research area is the development of techniques using carbon 13 nuclear magnetic resonance spectroscopy to study the metabolism of the brain. In general an NMR experiment involves placing an object or a person (if the experiment is *in vivo*) inside a strong magnet, running pulse sequences on the subject and then acquiring the NMR signal using an RF coil.

My work involves designing pulse sequences for carbon 13 NMR and constructing the radiofrequency coils to go along with the work (the EE part of my degree).

Part of the reason that I carried on at the U of A is that it now has a new NMR facility with three magnetic field strengths (1.5 T, 3T, and 4.7T). The 4.7 T is the largest field strength in Canada for human research.

## Aisha Yahya

**Master's, Electrical and Computer Engineering, U of A**

I graduated in computer engineering last April and now I am doing my Masters in Electrical and Computer Engineering. My area of research is to do with improving the method of identifying epileptogenic regions in the brain responsible for seizures in patients with focal epilepsy. The main, non-invasive method used these days to detect epileptic events in the brain is the scalp electroencephalogram (EEG) – a way of recording electrical potentials on the scalp.



To improve on this, I hope to use Magnetic Resonance Imaging (MRI) as well which provides

exceptional spatial resolution of the brain. Combining scalp EEG with MRI techniques would give a non-invasive and accurate way of identifying epileptogenic zones in the brain underlying seizures in patients with epilepsy.

I became interested in this area after talking with Dr Koles, who is now my supervisor. He has a lot of experience in the biomedical field and seemed like a wonderful person to work under.

iCORE encouraged me to stay in Alberta and in the Electrical and Computer Engineering department. The nice thing about the department is that it has its own building, which was constructed just over a year ago. The new research facility provides students with a professional working environment, accommodating the needs of the different research areas.

WINTER/SPRING 2003

## iCORE Distinguished Lecturer Series

The iCORE Distinguished Lecturer Series will continue this fall with lectures from world-class researchers and iCORE grant recipients.

The purpose of the lecture series is to present highlights of research in information science and engineering relevant to Alberta research teams, and to create a regular forum to network and share ideas concerning research related to the information and communications technology (ICT) sector in Alberta. As the series progresses, it is also intended to increase awareness of the scope, quality and potential impact of excellent information science and engineering research in Alberta.

Wednesday, January 29, 4 pm

**GUENTHER RUHE**, iCORE Chair  
DECISION MAKERS

*Intelligent Decisions to Make Better Software*  
Live location: Telus Centre 134, U of A

Wednesday, February 26, 4 pm

**CHRISTIAN SCHLEGEL**, iCORE Chair  
DIGITAL FUTURES

*The Rise of Digital Communications*  
Live location: 587 Bio Sciences, U of C

Wednesday, April 30, 4 pm

**JIM HASLETT**, iCORE/NSERC/TR Labs  
Industrial Chair  
WIRELESS COWBOYS

*New Frontiers in Wireless Technology*  
Live location: Telus Centre 134, U of A

### Multicast locations

This lecture series is multicast to several locations on the Alberta Video Classroom Network.

Multicast locations include:

University of Alberta (Telus Centre 134)  
University of Calgary (Biosciences 587)  
University of Lethbridge (PE256)  
Mount Royal College (T107)  
SAIT (TRT 304)  
NAIT (H003)

### Webcast

Webcast available at  
[www.icore.ca](http://www.icore.ca) 48 hours later

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## President's report

In this era of constant change, it is important to continuously examine our programs and strategies to see how they are contributing to a relatively stable long-term vision. Our long-term vision is driven by ideals for excellence, prosperity and productivity, while protecting quality of life.

In the knowledge society, information and communications technology (ICT) is a ubiquitous enabler in the health, education, government and industrial sectors. Moreover, the exploration of new ICT tools is a driver for innovation. As the OECD 2002 Highlights on the Science and Technology Outlook suggest, science and technology continue to be *the key* drivers of economic prosperity. And, despite the current economic slowdown, ICT in particular plays a central role.

iCORE has been wonderfully successful in its first three years of operation. It is not a time to coast on this success, it is a time to increase attention to it, to maximize its obvious potential, and to maintain a special focus that will yield the hoped-for long-term dividends.

This is the long-term vision for iCORE. May your holidays be filled with visions – of sugar plums or otherwise – and best wishes for great success in the new year.

Brian Unger, President, iCORE

## New target research areas

iCORE's target research areas have been revised to update the areas supported by its flagship Chair and Professorship Establishment (CPE) grants program. The newly defined target research areas of interest for the CPE program include:

- networks and communications (for example, wireless communications, Internet protocols, protocol design and performance analysis)
- high performance computing (for example, grid computing, very large database systems, and computational science)
- human and computer interfaces (for example, computer graphics, multimedia, collaboration, privacy, cryptography and secure systems integration)
- intelligent information systems (for example, artificial intelligence, machine learning, data mining, and data integration)
- software systems (for example, system design, development, tools, and evaluation; embedded and distributed systems)
- new architectures and devices (for example, quantum computing, molecular computing, and nanocomputing)

iCORE's Industrial Chair Establishment (ICE) Program, also supports awards in application areas that can be outside the above core areas of informatics, for example, bioinformatics and geoinformatics. These ICE grants are always awarded in collaboration with other funding partners such as industry and NSERC.

The CPE program is restricted to funding iCORE Chairs and Professors who are recruited to Alberta research universities as part of the grant. In contrast, current Alberta university faculty members are eligible for the Industrial Chair Establishment (ICE) program. When NSERC is involved, ICE awards always result in a new junior position being created in the same research area as the chair.

## New faces

Dr Dennis Russell Salahub, Vice President (Research) at the University of Calgary joins the iCORE board. He replaces Dr Keith Archer, who previously held the position of VP (Research) at the U of C. Dr Robert Fedosejevs has joined the iCORE Internal Review Committee. He replaces Dr Michael Brett who resigned to dedicate more time to research. Dr John Kendall has rejoined the iCORE secretariat as Director of University Relations after an exciting stint as president of VisuaLabs.

## Correction

Michael Cummings should have been listed in the iCORE Research Report, published in September 2002. He is a graduate student working with Professor Abdulhakem Elezzabi, and is funded as part of the Nanoscale Engineering Physics Initiative.