



## \$120 million nanotechnology centre at University of Alberta aligned with iCORE's aims

iCORE nanotechnology researchers at the University of Alberta are besieged with email from interested nanotechnologists after the August 17 joint federal and Alberta government announcement of the creation of a \$120 million National Institute for Nanotechnology.

"We are in the enviable position of having to select only the best of the best for our research team," says Dr Michael Brett, an iCORE Fellow who heads up the Nanoscale Engineering Physics Initiative at the U of A with Dr Mark Freeman.

The announcement greatly enhances the ability of the iCORE Nanoscale Engineering Physics Initiative to recruit top students, and maintain the excellent quality of the research team, according to Dr Brett. Brett was involved in initiating the nanotech capabilities several years ago at the University of Alberta when he received joint funding through the Natural Sciences and Engineering Research Council of Canada (NSERC) and Micalyne Inc to establish the Micalyne/NSERC Industrial Research Chair. Brett and other researchers created the university MicroFab, a unique microfabrication (nano tech) lab. "With superb facilities, we can get the best people, and the best people mean the best results."

"This new announcement opens up great opportunities for collaboration with gifted researchers who come to Edmonton because of the facilities of the Nanotechnology Institute," he explains. "It enhances the potential of the iCORE research team because we will be able to network and collaborate with National Research Council researchers to optimize research, and rapid progress in turn could lead to early commercialization of results."

The new facility will focus on research and development of nanotechnology, a leading-edge, multidisciplinary science that will have profound impacts on everything from health care to computer technology.

The federal government, through the National Research Council, will jointly fund the research centre with the provincial government. Each will contribute \$60 million over five years.

The institute will take up 20,000 square feet on the sixth floor

of the new Electrical and Computer Engineering Research Facility (ECERF). The MicroFab will move from its present location in the aging Newton Research Building to occupy another 6,500 square feet in the new building.

In another five years, the institute will move into its own building, U of A Engineering Dean Dr. David Lynch said. Lynch is hoping to cut the ribbon on the new 180,000-square-foot nanotech building early in 2005.

The centre will also make huge economic waves. Experts predict the nanotechnology field will have an economic impact of \$1 trillion per year in the next 10 – 15 years. John Martin, who manages the Edmonton Research Park for the EDE, estimates the centre will directly employ several hundred workers independent of the NRC or U of A. The world market for microsystem devices alone could range from \$8 to \$34 billion in 2002. "The institute will catalyze a profound structural change in the region that might otherwise take longer to achieve," said Martin.

For more information, visit Dr Brett's home page ([www.ee.ualberta.ca/~brett/](http://www.ee.ualberta.ca/~brett/)), the MicroFab web site ([www.ualberta.ca/~microfab](http://www.ualberta.ca/~microfab)) or the NRC web site ([www.nrc.ca](http://www.nrc.ca)).

### iCORE Chair named editor-in-chief of IEEE communications journal

Dr Norman Beaulieu, Chair of the iCORE Wireless Communications Laboratory at the University of Alberta, has been appointed to the top post of the world's premier research journal in communications, the *IEEE Transactions on Communications*.

Earlier this year, he was also appointed to the editorial board of the *Proceedings of the IEEE*, the IEEE's flagship publication. The IEEE Computer Society publishes numerous prestigious research journals and periodicals in areas related to computing.



## Wireless research now active in four areas

In operation for almost a year, iCORE Chair Dr Norman Beaulieu and his Wireless Communications Laboratory are now actively investigating four areas of research: interference compensation in wireless networks, digital signal classification, transmitter and receiver diversity for enhanced network capability, and wireless channel state prediction. The research team – which now includes four graduate students transferred from Queen's University and two new graduate students – is actively collaborating with researchers nationally and internationally, including the Wireless Systems Research Department at AT&T Labs; Mobile and Portable Radio Research Group; Electrical Engineering Department at the University of LAquila, Italy; Department of Engineering Science, University of Modena, Italy; and Department of Mathematics and Statistics, Queen's University. Dr Beaulieu is also investigating collaborative opportunities with Siemens Canada and Nortel Networks. Since starting at U of A, Dr Beaulieu was elected Fellow of the Engineering Institute of Canada, and was awarded a Canada Research Chair in Broadband Wireless Communications.

## GPS industry agreements and licenses in works

Since receiving an iCORE Chair award, Dr Gérard Lachapelle and his Wireless Location Research Group have created a new faculty position in wireless location and recruited three graduate students. The group has also reached a cooperative agreement with the University of Alberta Department of Mechanical Engineering in the area of RF/self-contained sensor fusion for personal location and has held discussions with Nokia Mobile Telephones for long-term cooperation. Also in the past six months, licensing of GPS software co-developed by Dr Lachapelle has been granted to several organizations around the world, including the Navy NAWC, Daimler Chrysler, Sandia National Laboratories, and S. Yan Inc in the United States, as well as University of Dresden in Germany and Hitachi in Japan. Dr Lachapelle was also awarded a Canada Research Chair earlier this year.

## Staff and funding secured for chip research

In the last six months, Dr Graham Jullien has focused on hiring, and has expanded the ATIPS research team to include Dr. Dimitrov, Associate Professor, two postdoctoral fellows, four graduate students, and the ATIPS laboratory manager and laboratory research assistant. Dr Jullien has secured \$80,000 in industrial funding for his work on machine vision and video and studio VLSI processors, and a \$79,000 test equipment loan from the Canadian Microelectronics Corporation. Dr Jullien has also been involved in the launch of Canada's System-On-Chip (SOC) Research Network during this period. The ATIPS team is now focusing on a research thrust towards integrated systems for biomedical applications.

## High performance AI team in development

Dr Jonathan Schaeffer's iCORE High Performance Artificial Intelligence Systems team has focused on building up the team itself, and accessing additional industrial funding. The team now consists of two professors, one research associate, one programmer/analyst, 11 graduate students and two undergraduate summer students.

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## “Graduate students are the lifeblood of research programs”

**iCORE recognizes the importance of graduate students to energetic research teams. Through its Graduate Student Fellowships, iCORE attracts high-calibre graduate students to Alberta by awarding recipients of NSERC Post-Graduate Scholarships A and B additional funds for studying at an Alberta university. In this newsletter, we feature several graduate students now playing a role in Alberta's information and communications technology research community.**

For more information on iCORE's Graduate Student Fellowship program, visit [www.icore.ca](http://www.icore.ca) or contact Carole Carlton at [carlton@icore.ca](mailto:carlton@icore.ca), 403-210-5335.

## Pablo Figueroa

Pablo Figueroa decided to pursue graduate studies in virtual reality and software engineering after meeting some of the faculty from the Computer Graphics Lab at the University of Alberta. The Columbia native was impressed with the faculty member's personal and professional qualities.

“I think the most important aspect of



*Pablo Figueroa*

graduate work is discussing results with peer students and faculty. The comments and suggestions from knowledgeable others is extremely valuable. However, this process takes time: it is necessary to present your work in a clear and concrete manner, and it is necessary to meet with such people. Conferences and workshops are excellent opportunities, but not always accessible.”

Currently, Pablo's work is focused on methods for rapid development of virtual reality applications, and testing of these applications in different platforms. Additional research interests include augmented reality, mobile computing, and the process of technology transfer to other countries.

Graduate students, Pablo believes, must find ways to successfully present their work, and to do so require research institutions

that help students create the required links with other researchers in their areas of interest.

“Alberta is creating a very interesting environment for research ... this environment will be very important in my decision to stay in the province,” he explains.

For more information, contact Pablo Figueroa at [pfiguero@cs.ualberta.ca](mailto:pfiguero@cs.ualberta.ca).

## Glenn Watson

Before starting graduate studies, Glenn Watson played a major role in some of the leading industry research and development programs in wireless communications, under the guidance of mentors such as Dr. Steven Knudsen and Dr. Michel Fattouche. By strengthening his academic research, he hopes to complement his industry experience and entrepreneurial spirit to become a strong industry player or consultant focused on advanced technologies requiring his DSP and communications background.

Glenn found it a natural fit to study at an Alberta university. With the lifestyle, proximity to the mountains, and the University of Calgary's strong reputation in



*Glenn Watson*

wireless communications and digital signal processing, Calgary made sense. More important, was the opportunity to study under Dr. Len Bruton, whose achievements and teaching ability Glenn feels are extraordinary. In fact, the only reason Glenn could see leaving the province would be if he was unable to find suitably challenging and interesting work here. He has also enjoyed the exposure to new and radical ideas generated by faculty members and other graduate students.

Glenn is currently investigating novel techniques for enhancing and detection signals that arrive from a particular direction, such as distant point sources, in the field of multidimensional digital signal processing (MD-DSP). New filter techniques may enable or improve many applications in diverse fields such as sonar, seismic, wireless communications and astronomy.

For more information, contact Glenn Watson at [watson@enel.ucalgary.ca](mailto:watson@enel.ucalgary.ca).

## Dion Leung

One of Dion Leung's research goals is to design cost-effective, reliable 'backbone' networks, that can minimize the impact of network failures, restore information without noticeable interruption, and eliminate corporate and end-user revenue loss due to days of down time.

“One of the main motivations I chose to pursue research at an Alberta university comes from the strong vision and commitment towards the ICT sector from the Government of Alberta. Its willingness to invest in people and ICT research infrastructure has made Alberta a fruitful and energetic place for research,” he said. Another reason for choosing to study at the University of Alberta was the opportunity



*Dion Leung*

to work with Dr. Wayne Grover, Chief Scientist of the Network Systems Group at TRILabs, and an international leader in the theory, design and operation of survivable transport networks.

In a dynamic environment, where accurately forecasting user traffic is extremely difficult, Dion also hopes to design networks that are future-proof under demand uncertainty. He intends to gain design and operational experience in the field of network planning, and then become a technical consultant in a fast-paced working environment.

For Dion, a major highlight of his graduate work has been the opportunity to contribute to a patent idea called 'Ring Mining.' According to Dion, graduate studies requires “self-exploration on innovative ideas and new methodologies to implement the ideas. The out-of-the-box thinking and self-governed learning atmosphere” enhance the challenge of graduate research.

For more information, contact Dion Leung at [dion@ee.ualberta.ca](mailto:dion@ee.ualberta.ca).

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Industry funding and arrangements have been completed with Electronic Arts, Bioware and BioTools. In addition, Dr Schaeffer is actively trying to hire someone to work on research problems that are of interest to the group and Celcorp. In July 2002, the iCORE-funded research group will host the Computer Games 2002 conference in Edmonton.

## Nanotechnology team in recruiting mode

Dr Michael Brett and Dr Mark Freeman's iCORE Nanoscale Engineering Physics Initiative has been focused on the initial hiring and establishment of research teams in nanotechnology and nanoscience. To date, six graduate students, two summer students, a research associate, and a microfabrication technician have joined the team. Currently, Brett and Freeman are recruiting for postdoctoral fellows in the areas of nanolithography and nanomaterials, and expect to hire more personnel soon.

### IN BRIEF

**Research Grants program on hold – allocated funds fully awarded:** The Research Grants program is currently suspended, and there is no schedule to accept proposals at this time. This decision could change in future years. Thirteen applications for Research Grants were received since the program was introduced, with three grants being awarded. Recipients included: Dr Jonathan Schaeffer, Dr Gérard Lachapelle, and Drs Michael Brett and Mark Freeman. Research Grants were similar to the ongoing Chair and Professorship Establishment Grants, however, they were intended exclusively to help outstanding researchers already in Alberta. Alberta researchers are encouraged at this time to explore funding possibilities through the Chair and Professorship Establishment Grant program and the Industrial Chair Establishment Grant program.

**Annual report available:** iCORE's report on its first full year of operation has been published as a pair of documents. The 32-page *2000-2001 Year in Review* is now available. To order copies, contact Starrlyn Muscoby at (403) 210-5340 or email muscoby@icore.ca. The *2000-2001 Financial Report* is also available upon request.

**Secretariat changes:** The iCORE secretariat is pleased to welcome Peter Garrett, formerly VP of Wireless Access Development at Nortel, to the iCORE secretariat, where he will be working with businesses to support iCORE's researchers and programs. For more information, contact garrett@icore.ca.

iCORE would like to thank John Kendall who has served as iCORE's Director of University Relations for the University of Calgary for the past year. He played a valuable role with iCORE and we wish him the best of luck in what is emerging as a surely intriguing role as president of VisuaLabs. University relations for all of Alberta's research universities will now be handled by Terry Caelli and his assistant David Epp. They can be reached at tcaelli@ualberta.ca and depp@cs.ualberta.ca.

**Fall launch planned for October:** Two new iCORE Chairs will be celebrated at a launch to be held this fall at the University of Calgary.

**Add your name to iCORE's mailing list:** If you would like your name to be added to our invitation list for events, please send your mailing address to Starrlyn Muscoby at muscoby@icore.ca. To join the list serve for iCORE news only, simply send email.

