Research endowment creates new partnership in medical technology research and diagnostics

A strategic partnership between SFU, Fraser Health Authority, Surrey Memorial Hospital Foundation and the Province of B.C. has created a world-class research program, with an initial investment of $5.25 million, focussing on medical technology innovation.

Earlier this year, the partners behind the Surrey Memorial Hospital Foundation B.C. Leadership Chair in Multimodal Technology for Healthcare Innovation officially appointed SFU neuroscientist Ryan D’Arcy (pictured above) to the prestigious position.

The B.C. Leadership Chair is funded by the Province’s Leading Edge Endowment Fund (LEEF), SFU and Surrey Memorial Hospital Foundation. Fraser Health Authority provides lab space and access to clinical facilities and resources at Surrey Memorial Hospital, the Jim Pattison Outpatient Care and Surgery Centre, and other healthcare facilities.

Partnerships continues...
Science and technology outreach program to reach 1000 more youth

Science Alive, a not-for-profit science and technology education program housed at SFU, has received an extra $44,550 from one of its key sponsors, Actua, to expand outreach across B.C.

The funding boost will enable the organization to reach an estimated 1000 more youth in nine communities in Northern B.C., in addition to the 22 communities across B.C. they reached last year.

“We constantly strive to engage youth across B.C., to fulfill their full potential in life, whether or not it involves science,” says Raven Haan, Director of Science Alive. “We aim to make learning fun and comfortable to children, and expose them to universities as well as different careers and role models.”

Andrew Petter, president and vice-chancellor SFU, said: “The support of the Province’s Leading Edge Endowment Fund has enabled SFU to forge a unique partnership with Surrey Memorial Hospital Foundation and to bring a world-class innovator in medical technology to B.C.”

As the B.C. Leadership Chair, D’Arcy will mobilize research with community health partners and business in the Fraser Health Region. He will lead the development of a diverse and prosperous medical technology sector, starting with neurotechnologies for advanced diagnosis and treatment at Surrey Memorial Hospital.

“Dr. D’Arcy brings great passion, drive, and applied research talent to Fraser Health,” said Nigel Murray, president and CEO, Fraser Health Authority.

Born and raised in B.C., D’Arcy was attracted home from his role as the head and senior research officer of the Institute for Biodiagnostics in Halifax, Nova Scotia, a world-renowned Institute that he founded in 2002. During his time there, D’Arcy raised over $50 million in investment and established a critical mass of scientists, engineers, and clinicians focused on health technology products to help neurological patients. He has also been instrumental in leading the development of diagnostic devices, including the Halifax Consciousness Scanner, a portable scanner to evaluate brain status following trauma.

“Dr. D’Arcy’s work has the potential to bring important new medical devices to market very quickly, benefiting our economy as well as helping doctors better diagnose and treat brain injuries in patients of all ages,” said Jane Adams, president and CEO, Surrey Memorial Hospital Foundation.

This is SFU’s fifth B.C. Leadership Chair and the first joint research position to be established at Surrey Memorial Hospital and Fraser Health in partnership with SFU.

Front row: Hon. Stephanie Cadieux, Province of BC. Back row, left-right: Rowena Rizzotti, Surrey Memorial Hospital; Mario Pinto, SFU; Ryan D’Arcy, SFU; Jane Adams, Surrey Memorial Hospital Foundation; Andrew Petter, SFU; Martha Salcudean, Leading Edge Endowment Fund.

Community Engagement

Science Alive has been a member of Actua—a national science, technology, engineering and mathematics (STEM) outreach organization—since 1995. This year, Actua’s extra direct sponsorship has allowed the program to hire two additional full-time outreach staff and deliver an anticipated eight more weeks of outreach.

Science Alive depends on corporate partnerships and government funds for its operations, while various SFU Faculties participate on its governing board. SFU Faculty of Applied Sciences provides overall leadership to the Science Alive core staff.

Using marshmallows, contained fire, brightly coloured blocks and Lego, Science Alive strives to provide engaging educational opportunities in the STEM areas for youth in Grades 2–9. It is run entirely by undergraduate students. A group of 12 Science Alive core staff, along with the organization’s 80+ volunteers comprised of high school students, university instructors and community professionals, commit their time and effort to sparking children’s interest in natural and applied sciences, serving as positive and engaging role models.

Haan, a fourth-year biomedical physiology student, discovered Science Alive while walking by its office one day, and seeing an ad saying they were hiring. She completed an application and that year, she became a summer camp instructor before becoming this year’s director.

“The program provides not only education and outreach for youth, but also valuable transferable job skills and networking opportunities for undergraduate students,” she said.

Science Alive offers a wide range of programs for youth. It hosts a girls’ club, a co-ed weekend club and various community events. During the school year, participants attend on-campus workshops that simultaneously expose them to the university environment. Summer camps are available in July and August, including a Tech Camp hosted by the Faculty of Applied Sciences, where computing and engineering professors teach participants to build robots that square off in battle and race through a maze.
Research

Clean energy research targets idling engines

Majid Bahrami’s latest research project will not only bring a cutting-edge research facility to SFU’s Surrey campus, taking the university to the forefront of innovation in sustainable energy systems—it will also help bring groceries to your local store in a more sustainable way.

Bahrami, an associate professor in the School of Mechatronic Systems Engineering, has been awarded $4.5 million in funding and equipment for his proposal to develop an automotive system that will feed waste thermal energy into air conditioning and refrigeration for service vehicles. This green air conditioning and refrigeration system (AC-R) could reduce fuel consumption and emissions caused by idling engines.

“This project places SFU at the forefront of innovative sustainable energy conversion and will bring a cutting-edge research facility to our Surrey campus,” said Bahrami. “For consumers, it will help bring milk and frozen food to the local supermarkets in a more environmentally friendly manner.”

The Automotive Partnership Canada program, which invests in large automotive research collaborations, has committed $2.9 million to the four-year project. Industry partners are contributing $1.1 million in cash and in-kind services, and BC Knowledge Development Fund and the Ontario Research Fund are contributing $500,000.

Bahrami is targeting delivery trucks, heavy and light duty vans, tourist buses and emergency vehicles, which today have to keep their engines idling to stay cool. The proposed sustainable AC-R system uses the process of adsorption, which has a myriad of environmental advantages, such as using benign refrigerants and porous media, such as water, ethanol and silica gels. An adsorption system also has low energy requirements and CO2 emissions, does not generate noise and requires minimal maintenance.

In developing this proposal, Bahrami has cultivated strong relationships with three key industry partners: Cool-It Hi Way, a HVAC repair and parts supplier; CrossChasm Technologies, hybrid and electric vehicle specialists; and Saputo Canada, the dairy producer with the largest transport fleet in the country. These three companies will provide both financial support and collaboration.

Bahrami is also partnering with Amir Khajepour, professor in the Department of Mechanical and Mechatronics Engineering at the University of Waterloo, and the Canada Research Chair in Mechatronic Vehicle Systems.

The project will involve at least 71 researchers across Canada and provide a unique opportunity for SFU and Waterloo students. SFU is expected to train at least 14 graduate students and 25 undergraduate co-op students.

“Innovation in energy technology is being showcased at the forefront of industry and academic collaboration,” said Nimal Rajapakse, dean of SFU’s Faculty of Applied Sciences.

Faculty of Applied Sciences

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Alumni Snapshot: Cheng-Hsin Hsu

What I do:
My research is in the broad area of multimedia networking, mobile computing, and computer networks. I’m interested in real-life problems that will affect our daily life and solving cutting-edge research problems.

What I do makes a difference because...:
The research problems I address are from actual systems, and thus the research outcomes can directly benefit the research community and industry. For example, with collaborators from Academia Sinica and National Taiwan Ocean University, I recently developed an open-source cloud gaming platform, called GamingAnywhere ([http://gaminganywhere.org](http://gaminganywhere.org)], which allows users to run complex computer games on powerful servers, and interact with games using commodity computers and mobile devices over the Internet. We believe GamingAnywhere will stimulate more research in highly interactive remote applications.

What advice I would give to students who want to teach and do research in a post-secondary institution:
The ability to conduct independent and original research is what research universities look for the most. In addition, great communication skills, both verbal and written, are crucial for securing teaching and research positions in universities. Last, similar to getting any job, interpersonal skills are also important.

How I keep up to date in my field:
When I just started my PhD studies at SFU, I got advice from a talk given by associate professor Greg Mori: graduate students in computer systems should spend 1/3 of their time reading, 1/3 writing and 1/3 coding. This guideline works very well for me. The only difference is now I allocate more time for activities in the research community.

How I obtained this position:
After graduating from SFU in 2009, I spent two years with Deutsche Telekom Lab (Silicon Valley) as a senior research scientist. I had the opportunity to collaborate with research teams from universities such as Stanford, University of California Irvine, University of Southern California and University of Virginia, among others. However, although I enjoyed working with student interns, they usually only visited our lab for a few months. Being able to work with students for longer terms is why I took a teaching position in 2011.

How my degree from SFU prepared me for my job:
I was lucky to learn a lot from my senior supervisor, associate professor Mohamed Hefeeda, supervisor, professor Ramesh Krishnamurti, and other professors in Computing Science. I am especially grateful to Hefeeda for training me to conduct original research and introducing me to the research community, which took a tremendous amount of his time.
In my own words: Student Tanminder Rai

Experimenting with nanowires for the first time, Tanminder Rai made some remarkable findings that led to a publication in well-known engineering journal IEEE Electron Device Letters. Rai is an undergraduate student in mechatronic systems engineering who was doing research with fellow student Paolo Dantes during a co-op term.

What did you learn about doing research through this co-op?
I learned that research requires a lot of patience and hard work. It’s not everyday that one can make breakthrough discoveries, but when it does happen, it is definitely worth it.

Why is your discovery important?
The research proved that an antenna made with highly conductive silver nanowires on a flexible substrate can sense strain when pressure is applied. This technology could have many applications in the areas of wearable electronics and tactile sensing, as it is light, stretchable and can conform to any shape.

What made you submit the findings to Institute of Electrical and Electronics Engineers (IEEE) Electron Device Letters?
After we collected sufficient data to conclusively prove our hypothesis, it seemed fit to share this new discovery. It will potentially encourage further studies into this topic and perhaps turn it into a useful product in the near future.

What was your reaction to learning the paper was published?
I was very excited. Not many undergraduate students get the opportunity to have their research published. I feel that I have made a useful contribution to the world of science.

What are your immediate plans in the next 1-3 years? Can you incorporate this experience into your academics or future work experience?
I am graduating this August and I am currently applying for employment. This work experience will certainly help me in my future academic/work experience as it taught me to think outside the box and this is a skill that can be useful in any given setting.

What have you realized is important in both a research setting and the workplace in order to attain your goals?
Having good team dynamics is important in both research and the workplace as it creates an inviting environment and promotes collaboration and innovation.
Alexandra Fedorova
Alexandra Fedorova’s research team in Computing Science to receive $442,000 over three years from an NSERC Strategic Project grant to develop green software for mobile phones. She is developing smartphone software that will manage the energy consumption of its underlying hardware.

Bozena Kaminska
Bozena Kaminska, Engineering Science, has been appointed to the Council of the Natural Sciences and Engineering Research Council (NSERC). The Council’s role is to set policies, to maximize the strategic impact for Canada from investing in research, and to advance the country’s research and development agenda. NSERC is one of the three federal academic granting agencies and it provides undergraduate research assistant scholarships, major scholarships for grad students and faculty grants.

Carlo Menon
Engineering Science’s Carlo Menon is co-investigator on a Canadian Institutes of Health Research project led by Andrew Blaber in SFU’s Biomedical Physiology and Kinesiology department. They are creating innovative medical and consumer products, such as compression stockings, to potentially alleviate cardiovascular disorders caused by swelling, and chronic or temporary standing hypotension.

Richard Vaughan
NSERC invested $5 million to establish the NSERC Canadian Field Robotics Network (NCFRN), a project designed to enable robots to work in teams on land, at sea, and in the air, to advance exploration and for other purposes. SFU will play a key role in the McGill University-led project by taking the lead on one of its three main research teams. Richard Vaughan, Computing Science, will oversee the unmanned aerial vehicle team, working closely with other leaders responsible for sea and ground robot technology development, in addition to serving on the scientific committee.

Ash Parameswaran
Engineering Science’s Ash Parameswaran designed a lab-on-a-chip (LOC) that can quickly do bacterial tests for infant diarrhea, a project that earned him a $100,000 research grant. The federal government’s Stars in Global Health program recently funded 102 projects aimed at tackling health care issues. Parameswaran is also collaborating with Engineering’s Craig Scratchley to make a cell phone-compatible LOC device that could be used widely in future.

Edward Park
Edward Park, Mechatronic Systems Engineering, is now a Fellow in the Canadian Society for Mechanical Engineering. The fellowship recognizes excellence in mechanical engineering and contribution to the progress of the profession and society. In addition, Park received an NSERC Strategic Project Grant of $445,000 to enhance video game motion capture technology using cost-effective wireless sensor networks.

Anoop Sarkar
Computing Science’s Anoop Sarkar received a $120,000 NSERC Discovery Accelerator Supplement (DAS) award. He aims to widen the scope of automatic machine translation to all the languages spoken and written around the world. He investigates how machine learning methods can be used to transfer linguistic information from language pairs with a lot of resources, such as French-English, to low-resource language pairs, such as English-Inuktitut. The eventual goal is to exploit language phylogeny and universals to improve machine translation.

Richard Vaughan
Richard Vaughan, Computing Science, will oversee the unmanned aerial vehicle team, working closely with other leaders responsible for sea and ground robot technology development, in addition to serving on the scientific committee.
Message from the Dean of Applied Sciences

In the last four years, the number of students applying to study in the Faculty of Applied Sciences rose by nearly 50 per cent. Over this same four-year period, the Faculty has not been able to expand its student spaces. As a result, the grade point average for entrance to FAS has risen substantially. We are turning away qualified students who hold enormous potential to become future leaders – and in the case of applied sciences, future technology leaders.

There is a great demand for well-trained computer scientists and engineers. The Information and Communications Technology (ICT) Council reports that between 2011-2016 Canadian employers will need to hire 106,000 ICT workers. A particular emphasis is on workers with multidisciplinary skills, such as expertise in e-health, e-finance and digital media, and those who are able to understand the business backbone of their companies.

According to a Globe Foundation report, Securing the Workforce of Tomorrow, in a high-growth scenario, B.C. GDP from green sectors of the economy could increase approximately 80% from $15.3 billion in 2008 to $27.4 billion in 2020, creating an estimated 85,000 new green jobs. In addition, B.C. is positioning itself as a premier location for liquefied natural gas production and export, presenting enormous employment opportunities for engineers and trades people.

SFU has three campuses – Downtown Vancouver, Burnaby and Surrey. The B.C. South Fraser Region, in particular, has been in dire need of an increase in spaces in post-secondary schools. Look at the figures: by 2016, one-third of graduating B.C. Grade 12 students will be from a South Fraser secondary school. According to the Surrey Board of Trade, Kwantlen Polytechnic University and SFU Surrey together only provide 12.7 post-secondary spaces for every one hundred 18-24-year-olds in the region. By comparison, the rest of B.C. has four times the level of access, with an average of 48.7 spaces for every hundred of these young adults.

The facts are clear: we need to train more engineers and computer scientists. More students want to study with us and industry is ready to employ them. It is our hope that with additional support from government we can open the doors of applied sciences to more students from B.C., especially those living in the South Fraser Region. This investment is crucial to keep our economy competitive, and ensure that B.C. has the human resources capital needed to support its energy, as well as knowledge-based industries.

Dr. Nimal Rajapakse
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