APPLIED RESEARCH AT BCIT

Solving Real World Problems for Industry

BCIT™

ABOUT BCIT

With over 47,000 students enrolled annually, BCIT is one of British Columbia's largest post-secondary institutes. Our approach to education is like no other post-secondary institute, making us integral to the economic, social, and environmental prosperity of British Columbia.

Founded in 1964, BCIT has established itself as one of the leading educational institutes in engineering; health sciences; business; computing; trades, apprenticeship and technician programs; and applied sciences.

Renowned for offering hands-on, practical learning, our graduates are prepared to succeed in their careers from day one. BCIT's curriculum and applied research endeavors are industry connected, and help ensure, year-after-year, that BCIT is advancing the state of practice.

WHAT IS APPLIED RESEARCH?

Applied research is scientific and technical study that seeks innovative solutions to real world problems for a client or project sponsor.

COMPANY/ INDUSTRY PROBLEM + SCIENTIFIC/ TECHNICAL STUDY + INNOVATION = **APPLIED RESEARCH**

Applied research is practiced in many areas of BCIT, from student-led applied research projects for community groups or small- to medium-sized enterprises, to collaborative research programs involving faculty, students, and external partners that provide solutions for problems affecting an entire industry.

OUR MISSION

BCIT Applied Research meets the needs of industry partners and maximizes the institute's impact on economic development and environmental sustainability by enhancing the learning experience and advancing the state of practice.

Applied research provides innovative solutions to the real world challenges of business and industry, helping them increase their competitive strength and productivity. Applied researchers use a collaborative and technology-based approach to problem solving that provides accelerated solutions that benefit society today.

APPLIED RESEARCH AT BCIT TODAY

BCIT Applied Research is home to state-of-the-art facilities and seasoned experts producing outstanding results for small- to medium-sized businesses and industry clients.

Our Resources

20
research labs with specialized equipment

53,800 sq ft
laboratory space

40
full-time, dedicated researchers

$10 million
research grants annually

100
faculty experts

$28 million
Centre for Applied Research and Innovation

4,000+
highly qualified, skilled students available to participate in research projects

Our Annual Results

50+
collaborative industry projects

$2.5 million
of industry services contracts annually

100+
prototypes (product, part, hardware, software, process)

1,000+
applied research projects (faculty and students)

300+
companies/clients served

RESEARCH THEMES

BCIT Applied Research falls into five key themes:

1 Sustainability and the Built Environment

Research strengths in this area include:
Architectural Ecology; Building Science; Civil Engineering; Green Roofs and Living Walls; Structural and Earthquake Engineering; Non-Destructive Testing of Building Materials; Sustainable Development; Whole-Building Performance

Established research initiatives and centres include:
Building Science Centre of Excellence; Centre for Architectural Ecology; AFRESH Home

2 Health, Natural Health, and Biotechnology

Research strengths in this area include:
Safety and Chemical Analysis of Natural Health Products; Provenance and Quality of Agri-foods; Plant and Animal Development using Spatial Modeling; Medical Device Development; Prosthetics and Orthotics; Drug Development and Delivery; Molecular Diagnostics; Application of Translational Genomics; Clinical and Educational Practice; eHealth initiatives; Molecular and Cell Biology to Human Autoimmunity; Biotechnology; Food Science and Technology; Forensic DNA Analysis for Human Identification; Drug Analysis; Phytoanalytics

Established research initiatives and centres include:
HEAL (Herbal Evaluation and Analysis Laboratory); CREATE (Centre for Rehabilitation Engineering and Technology that Enables); Dr. Tong Louie Living Laboratory; Integrated Molecular Biology Laboratory; Rehabilitation Engineering Design Laboratory

3 Social Enterprise, Human Capital, and Entrepreneurship

Research strengths in this area include:
Business Intelligence; Sustainable Resource Management; Transportation Economics; Mobile Devices for Clinical Teaching and Learning; Technology Assessment and Utilization; Crime and Intelligence Analysis for Public Safety and Security Initiatives

Established research initiatives and centres include:
Infrastructure; Transportation and Environmental Economics Centre for Applied Research (SITE)

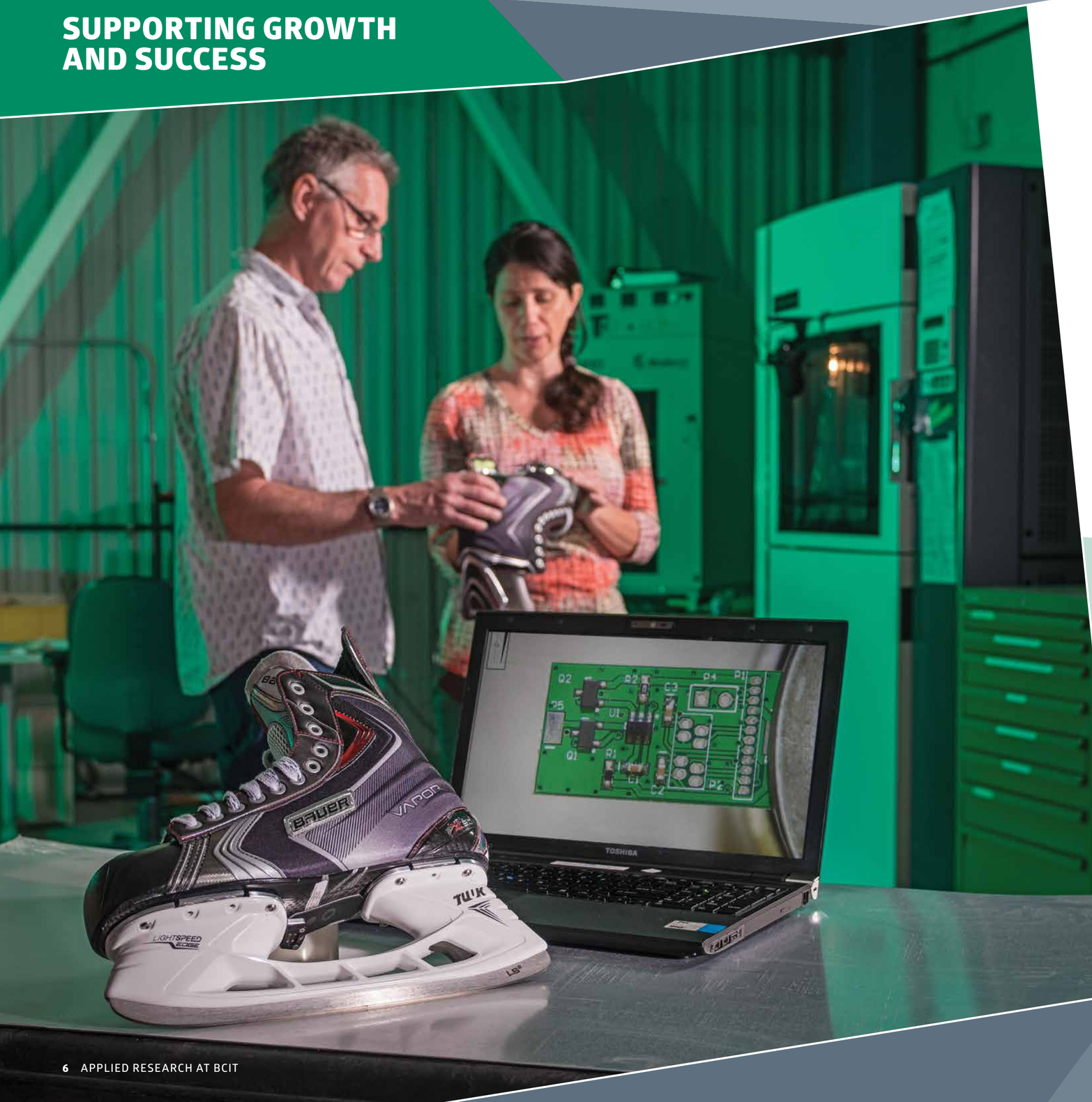
4 Energy, Resources, Manufacturing, and Transportation

Research strengths in this area include:
Advanced Manufacturing Processes (including advanced sensors); Marine Manufacturing; Bio Diesel; Demand-Side Energy Processes; Energy Systems; Industrial Energy Applications; Industrial Networking Technology; Industrial Waste Recycling; Pulp and Paper; Mechanical Pulping; Renewable Energy Sources; Energy and Environmental Testing; Engine Performance Using Alternative Fuels; Composite Materials; Plastics; Water-Based Paints; Simulation and Industrial Instrumentation; Cold Atom Physics and Engineering

Established research initiatives and centres include:
Smart Microgrid; NSERC Smart Microgrid Network (NSMG-Net); Internet Engineering Lab; Spartan Controls Centre for Energy Education and Research; Advanced Prototyping Hub; Engine Performance Testing Laboratory; Marine Vessel and Port Simulation Facilities

5 Information/Communications, Technology, and Security

Research strengths in this area include:
Cellular Gateways and Networks; Cyber-Security; Wireless Networks; Optics and Imaging; Sensor Technology; Digital Signal Processing; Distributed Computing; DNA Profiling; Network Communication Infrastructure and Protocols; Network Security; Security of Industrial Control/SCADA Systems



Analyzing Performance with the BLUR Skate

Scott McMillan knows that in the competitive world of professional sports, optimizing performance is key to winning. After six years working with the Adidas Innovation Team, Scott branched out to pursue his own innovative idea: a hockey skate that would track various aspects of a player's stride - timing and coordination, differences between right and left legs, and how their balance shifts as they skate.

McMillan brought his idea to BCIT and MAKE+ and got to work on an alpha prototype. MAKE+ worked with Scott to create a device that would integrate with a hockey skate to monitor the skater's activity without interfering with the skater. In six months' time, the project was complete, and the initial prototype was leveraged to generate more funding for the next phase of the project.

"What we are doing [for the second project] is building another ten units and making everything smaller and more efficient, and getting it into more of a production-ready mode," says MAKE+ director, Nancy Paris. "This is a very exciting project that will have a great impact on the economy and ice sports. This technology doesn't currently exist. This will be brand-new."

MAKE+

MAKE+ is a multi-disciplinary team of expert product developers and evaluators in the areas of health, consumer, and industrial technology. With help from BCIT students and faculty, MAKE+ supports BC businesses, solving industry problems and paving the way for future economic and social prosperity.

The MAKE+ group contains a sub-group of experts, the Product and Process Applied Research Team (PART), certified to conduct projects following ISO 13485 and ISO 9001. This team is capable of taking complex projects and ideas from requirement discovery and concept development on through to verification and validation of a product's performance.

Hug Medical Tubing Manager Helps Save Lives

Imagine an infant, sick in hospital, tubes and IV lines crisscrossing her small body. Her parents' worry is compounded by a feeling of helplessness, of being separated from their child by the mass of medical tubing between them. Not only are the lines distressing and difficult to manage, but they also pose a strangulation risk, particularly for children between six and 36 months. Nevertheless, they are essential: literal lifelines for many children facing medical treatment.

Reducing or eliminating the risk of strangulation was the challenge presented to designers from MAKE+ by their client, Children's and Women's Health Centre of British Columbia.

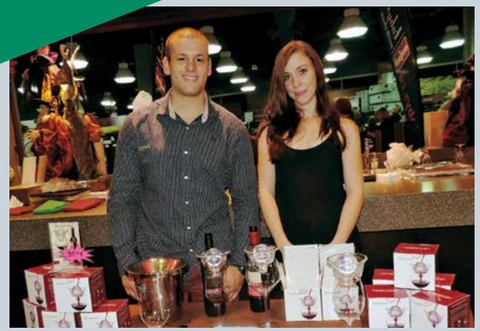
Designers Thom Bellaire and Theresia Fladl answered this challenge and created a lightweight, wearable device for babies and small children that manages intravenous lines and other medical tubing. By containing the lines in a wearable tubing harness, the risk of strangulation, the stress of dealing with entangled lines, and the fear of hurting the baby is reduced.

"The device meets the objective of reducing strangulation risk, which is great, but we also discovered that it is an extremely useful tool for handling the children. It makes the nursing workflow easier because they don't have to deal with a line popping out as often when they're picking up the children, and they don't have to deal with untangling as often, either. It's been a benefit to the parents because it's much easier to pick up the child," says Nancy Paris, MAKE+ Director.

Hug was also honoured with the prestigious Red Dot Design Award in the Life Sciences category.

"The Red Dot award is meaningful in that it provides validation from the design world. And, as a global competition, winning this award will help market the device internationally," says Bellaire.

STUDENT INNOVATION



Ventorosso

Lots of students have great ideas, but what did it take for BCIT student Gabriel Castanon to score top prize in the 4th annual Student Innovation Challenge? The Ventorosso wine aerator is uniquely designed to delicately aerate wines of all ages by exposing wine to the air by the glass, allowing customers to enjoy their wine right away – instead of needing time to let it sit in a decanter. Castanon's design wowed the judges at the Student Innovation Challenge and, in late 2013, the first shipment of aerators were available through Vancouver retailers.

"This would not have been possible without BCIT! Thank you all for your support and advice," Castanon says.

Verathon Glidescope© Gives Doctors a New Perspective

New inventions often shed new light on old processes, and that is exactly what the Verathon Glidescope© did for doctors around the world.

Intubation is an invasive and uncomfortable medical procedure that involves inserting a plastic tube down the throat of a patient. Intubation is not easy in the best of cases, and in 18% of the population it is even trickier due to differences in patient anatomy. Watching time and again as anesthesiologists, EMTs, and fellow surgeons struggled to intubate a patient, Dr. Jack Pacey of Burnaby Hospital identified a real need for a solution.

Dr. Pacey envisioned a device that would use an LED light and video camera to give medical professionals a much needed look at the internal anatomy of their patients, thereby making intubation far easier for all involved. Dr. Pacey's vision became a reality when he partnered with Saturn Biomedical Systems' Awni Ayoubi and BCIT's MAKE+ to create the Glidescope©. The Glidescope© has proven to be a revolutionary medical device and is now used by medical professionals worldwide.

Rayne Longboards Standardize Safety Testing

As Rayne Longboards' business grew, they needed a more reliable way to test the integrity and performance of their natural-fibre composite longboards and skateboards. With no appropriate testing equipment available on the market, the North Vancouver-based company tested boards by having a staff member repeatedly jump off a table onto the board. As production ramped up, Rayne knew they needed a more scientific method to test the boards and ensure safety for their customers. That's when they turned to MAKE+ for help.

Researchers from MAKE+ worked with Rayne to create an innovative test bench that simulates riders' movements in order to measure the board's performance. The bench applies repeated torsional (twisting) and bending stresses to the sample board for a specified duration of time. The findings of these tests gave the longboarding manufacturer information that will result in consistent and durable construction of their boards. Beyond this, it also allows for safer board testing that can be conducted off the streets.

Julian Richter, a BCIT second-year CNC Machinist student, participated in this applied research project as part of his program.

"I was involved in brainstorming and machined some of the components," Richter says. "The experience broadened my skills, including organization, design, and how to come up with an innovative solution to a problem."

Pioneering Quality Standards for Canada's Natural Health Industry

Dr. Paula Brown, Canada Research Chair, Phytoanalytics

Ever wonder if that ginseng you're taking to prevent a cold is actually working? Are you getting the best product available? Dr. Paula Brown, Canada Research Chair in Phytoanalytics, is dedicated to finding the answers to critical questions like these. Dr. Brown focuses on improving the quality of standards of natural health products manufactured, prescribed, and consumed in Canada.

"The foundations of our research are to help ensure that Canadians can readily access both the potential health benefits and economic benefits afforded by medicinal plants," says Dr. Brown. "So whether you are talking about viable agricultural alternatives, specialty crop development, novel product development, or advanced therapeutics, we impact it from a health promotion and health protection standpoint, as well as from an economic development standpoint for the development of new and improved products. We help provide new opportunities at a producer level, not just a manufacturing commercialization level."

From the Ministry of Agriculture to Health Canada, Dr. Brown has worked with agencies across the country to standardize the approach taken when testing products for potency, strength, and efficacy. She sits on multiple boards and committees including the American Botanical Council, the Joint Committee for Dietary Supplements, and NSF International. She also collaborates with researchers at universities around the world to constantly find new ways to improve agricultural management practices, advance laboratory testing of products, support development of novel therapeutics, and effect policy in the regulation of natural health products (NHPs).

Dr. Brown's Canada Research Chair appointment has enabled her to recruit more students to help with her research. Mentoring and training students is important for Dr. Brown's growth as a scientist, and improves students' research skills so they can more readily solve industry problems.

"The foundations of our research are to help ensure that Canadians can readily access both the potential health benefits and economic benefits afforded by medicinal plants."

Natural Health and Food Products Research Group (NRG)

BCIT's Natural Health and Food Products Research Group (NRG) addresses issues of product quality, process improvement, and human health using basic and applied science along with state-of-the-art technology. The group's goal is to ensure that all Canadians can achieve the potential health and economic benefits offered by medicinal plants, natural health products, and the food industry.

With an emphasis on product sources and quality standards, this group's projects focus on health policy, regulatory affairs, product formulation, botanical authentication, analytical method development and validation, chemometrics, and therapeutic monitoring for preclinical and clinical studies.

The research and development conducted by NRG is closely linked with the priorities and policies created within the provincial and national natural health product, food, and agricultural industry, and by the government agencies regulating these sectors.

Converting Military Skills into Meaningful Civilian Careers

SITE Centre for Applied Research

Transitioning into a civilian career can be very difficult for military personnel. Many soldiers are unable to convert their skills and training into meaningful careers, even though many of the skills and experiences accumulated by soldiers are highly valued by civilian employers.

Charged with this problem, BCIT's SITE Centre developed a solution. The Legion Military Skills Conversion program is designed to accelerate and advance the civilian careers of former and current Reserve Forces and Regular Forces Canadian military members. By mapping learning outcomes rather than course equivalences, those from non-traditional education backgrounds are given advanced placement into post-secondary programs.

The program has produced impressive results and has received attention in Canada and the US.

"BCIT has been invited to join a national steering committee, established by the U.S. Department of Defense, that has determined to emulate the BCIT model across the United States, and towards this end they seek BCIT's participation," says Dr. Kevin Wainwright, Principal Researcher, and SITE Advisory Board Member.

In Canada, the program was given prominent inclusion in a Veterans Affairs Canada Report for the Canadian Senate Committee.

Improving the Soundscapes of Everyday Life

Centre for Architectural Ecology

As the director of the Centre for Architectural Ecology, Dr. Maureen Connelly has an ear for improving the health and well-being of the people and communities around her. Dr. Connelly's research explores the effectiveness of green roofs and living walls in reducing sound levels in the buildings we live and work in every day.

"[Healthy noise levels are] up to 45 decibels in your kitchen, up to 40 in your living room, but only 35 decibels in your bedroom," says Dr. Connelly. "30% of the European Economic Community is living above those thresholds; 70% of people in developing countries are living above those thresholds. It is now being investigated that this is actually the major cause of many illnesses. It's noise."

Dr. Connelly's research is collaborative and involves students, faculty, and researchers from other post-secondary institutions. Her research facilities include a 14,000 foot, Elevated Lab green roof and living wall at BCIT's Burnaby campus. Through these living entities, Dr. Connelly is developing solutions that will improve the soundscapes of a range of buildings, from laneway houses to hospices and everything in between.

STUDENT INNOVATION

Saving Vancouver's Cherry Blossoms

BCIT's Biotechnology program caught the attention of the Vancouver Sun, CBC, and other media with a unique applied research project aimed at saving threatened varieties of Vancouver's historic cherry trees. Acting on a request from the UBC Botanical Garden, biotechnology instructor Keith Turner provided his class with material from the rare trees. After some time in a test tube, the resulting plants will be gradually acclimatized to life outdoors. Students have successfully established in-vitro cultures of three rare cultivars and are currently working to initiate cultures of another four.

BCIT's Smart Microgrid is Shaping the Future of Energy

Canada's electric power utilities are facing a serious crisis. Aging infrastructure, rising demand for electricity, and environmental concerns have made it crucially important to improve how the electrical grid manages both the distribution and intake of electricity. BCIT's Dr. Hassan Farhangi and smart microgrids have an integral role to play in solving this problem.

A smart microgrid is a modern, small-scale version of the electricity system with smart new features. They incorporate variable electricity generation such as wind and photovoltaic solar, which must either be used or stored when available. Smart microgrids can also connect and disconnect from the larger macrogrid without negative impact. Modern smart microgrids use forecasting, sensing, and communication technologies to more closely match demand and available generation. All of this is great, but with so much new technology, how do we know what will work with our existing grids and what won't? Dr. Farhangi wanted to answer this question.

Dr. Farhangi's research started in 2007 in close collaboration with BC Hydro. They developed a strategic road map to build North America's very first smart microgrid on BCIT's Burnaby campus.

"We were fortunate enough to get support from the government of BC through the ICE (Innovative Clean Energy) fund. Further funding was obtained from the federal government through the Western Economic Diversification fund to begin the project and lay the framework," says Dr. Farhangi.

BCIT's Burnaby campus is comprised of industrial areas, housing, office space, and commercial restaurants—all of the same components seen on a larger grid, just on a smaller scale. From this base, Dr. Farhangi and his team were able to smarten-up the infrastructure with the addition of photovoltaic and wind power sources and the technology to monitor the grid.

The success of the BCIT-BC Hydro smart microgrid project sparked the creation of the NSERC Smart Microgrid Network (NSMG-Net) of which Dr. Farhangi is the principal investigator and scientific director. This network is a multi-disciplinary research program, in partnership with government and industry that is testing and verifying the technologies and regulations required for Canada's future smart grid. NSMG-Net involves eight different universities, more than 50 researchers, and approximately 250 master's and PhD students.

"Energy is our biggest challenge in the new millennium."

BCIT's smart microgrid provides much needed opportunities for electrical utility companies, technology providers, and researchers to work together to develop architecture, protocols, configurations, and models of the evolving smart grid. The work done here enables researchers to develop and validate technologies required to meet Canada's growing electricity needs.

"Energy is our biggest challenge in the new millennium. The fact of the matter is that, we are growing as an economy and there is a need for reliable energy across the country," says Dr. Farhangi.

Canada is not the only country with growing electricity needs. Dr. Farhangi's research has garnered international attention, with delegations from Mexico, Brazil, Singapore, China, and Europe touring the BCIT Smart Microgrid and learning how they can collaborate and apply his findings to their energy problems.

Greening the Industrial Landscape

Spartan Controls Centre for Energy Education and Research

The research and teaching that happens at Spartan Controls Centre for Energy Education and Research is helping shift Canada's industrial plants toward cleaner and more efficient modern technology and processes.

Forty-eight percent of all energy produced in Canada is consumed by industry and any improvements in industrial processes have significant impacts on overall consumption patterns.

The facility is 20–30% more efficient than a conventional boiler facility and uses some of the same technologies that the automotive sector uses to reduce fuel consumption while simultaneously producing lower emissions. It is the cleanest operating boiler in Western Canada with a 300 kW electrical generator to harness the output from the boiler as part of BCIT's Smart Microgrid. This state-of-the-art multi-fuel boiler produces enough steam to supply multiple remote labs around campus.

Spartan Controls Centre for Energy Education and Research brings industry, students, academics, and researchers together to work in a cross-disciplinary learning and research environment focused on energy production, distribution, sustainability, and management.

STUDENT INNOVATION

Third Wheel Solutions

Road trips will soon get easier, thanks to three creative Mechanical Engineering degree students. Aaron Huffsmith, Tariq Shobab, and Clayton McMunn designed and developed a single-wheel recreational trailer for motorcycles. The only one of its kind, the Third Wheel features a long frame that allows a motorcyclist to haul large recreational items including bikes, surfboards, and kayaks, or to attach a cargo box that can accommodate up to 200 lbs. The students' design won the Applied Research category in the 4th Annual BCIT Student Innovation Challenge, an annual competition that encourages and supports BCIT students who have innovative ideas. The trailer also won first place in the Western Engineering Competition, and accolades at the Canadian Engineering Competition. The students hope to have the Third Wheel on the streets soon.

BCIT Researchers Collaborate to Save Lives Around the World

When a 7.0 magnitude earthquake hit 25 km west of Haiti's capital, Port-au-Prince, more than 200,000 people were killed, mostly due to poor concrete and masonry construction. Motivated by this tragedy, BCIT Civil Engineering instructor Dr. Svetlana Brzev and a multidisciplinary team of BCIT researchers focused their research on finding an inexpensive way to test masonry blocks prior to use in construction.

"We can't prevent earthquakes, but we can prevent and protect people from losing lives due to poor construction," says Dr. Brzev.

Over the course of four years, Dr. Brzev and her team of faculty from the Civil Engineering department, Electrical Engineering department, Physics department, and the MAKE+ group worked with BCIT students to develop a solution to this global problem. The multi-disciplinary team is currently working on an alpha device that will determine the strength of masonry blocks not by destroying them, but by analyzing the sound or vibration made by individual blocks. Dr. Brzev hopes her team can develop a low-cost device that would be used around the world.

Nearly every country in the world uses concrete masonry blocks for construction of dwellings and school buildings. Dr. Brzev's research has far reaching implications and has received support from various non-governmental organizations, including Builders Without Borders, and the NSERC USRA program.

Smart Microgrid Applied Research Team (SMART)

SMART combines information technology, communication engineering, and computing fields to develop prototypes and solutions for complex problems. SMART conducts applied research and development in emerging and next generation technologies and helps stimulate BC's IT industry through collaborative industry, academic, and government research. SMART has established a reputation for unique expertise in three strategic research themes, including: the Smart Microgrid, mobile wireless application development, and web performance analysis.

The researchers within SMART partner with various governments, funding agencies, industries, and universities. They have a key partnership with BCNET, the provincial research and education network that provides BCIT with access to the high-bandwidth, next-generation internet network of CANARIE and Internet2.

A Better Life by Design

Dr. Jaimie Borisoff, Canada Research Chair, Rehabilitation Engineering Design

Canada Research Chair Dr. Jaimie Borisoff is dedicated to making the lives of those with disabilities better through rehabilitation engineering design. Rehabilitation engineering design looks at how people use devices in real life and, based on these observations, designs better versions.

One of these innovations is Dr. Borisoff's creation, the Elevation wheelchair. Light-weight and featuring adjustable seating, the Elevation wheelchair is a functional wheelchair that allows users to adjust their position to suit different daily activities.

"Most wheelchairs are designed as fixed frames," says Dr. Borisoff. "So you order a wheelchair, specify and configure it for yourself, and it's a static position that you end up sitting in. That has a lot of drawbacks, as you can imagine. A dynamic product is one that allows the user to adjust the seat, position, and other aspects of the wheelchair."

With this focus on dynamic wheel mobility, Dr. Borisoff is taking his Elevation wheelchair to the next level by adapting the technology to make it possible for users to bring the chair lower and closer the floor. With this adaptation, playing with children, changing a flat tire, or getting into the chair from a fall will become much easier. Beyond the physical, the updated design will significantly increase a user's ability to interact more fully with others, the environment, and their world.

Dr. Borisoff and his team work closely with wheelchair users, occupational therapists, and the International Collaboration on Repair Discoveries (ICORD) research centre to ensure that the end user gets the most benefit from their research.

"Rehabilitation engineering, by its definition, often involves users," explains Dr. Borisoff. "You try to have a user or user groups in the loop during your research cycle. We propose something, and then we get some feedback on it. Then, in the cases where we progress toward prototypes and things that they could actually touch, feel, and try, [we have them] try them out."

"Getting a product to market that has impact on people's lives is a goal of the lab."

Dr. Borisoff and his team are looking forward to exploring newer technologies like robotics and exoskeletons and seeking new ways to merge them in order to increase the ways in which technology can improve the lives of people with mobility issues.

"Just getting a product to market that has impact on people's lives is a goal of the lab and we had one success with the Elevation wheelchair already. Hopefully there'll be other ones down the road. That's the measuring stick and the goal is to design things that people find useful."

Inspired Building Codes for BC and Beyond

Dr. Fitsum Tariku, Canada Research Chair, Whole-Building Performance

British Columbia was the breeding ground for the leaky condo crisis from the late 1980s to the early 2000s. More than 900 buildings and 31,000 individual housing units sustained approximately $4 billion in damages over that time due to poorly designed building envelopes that were unsuited for BC's wet, windy weather.

Dr. Fitsum Tariku, Canada Research Chair in Whole-Building Performance, is the director of BCIT's Building Science Centre of Excellence, and one of three Canada Research Chairs at the institute. His research focuses on whole-building performance, testing materials before they are used in real-life building scenarios to help us avoid crises like those faced in the past.

"We have seen in the past, with the leaky condo crisis, new materials were introduced without the proper design and research, and they were a huge liability to us and a great cost to British Columbians," says Dr. Tariku. "That might be repeated if we are not conducting our research, applying the research, and then adapting our knowledge and building standards."

By working directly with the construction industry in BC, Dr. Tariku has helped to define new building code standards and optimize the types of materials used for building envelopes. With a focus on whole-building performance, his research has evolved to study the interior air quality and energy efficiency of a building. Dr. Tariku conducts his research at three customized building envelope test facilities on BCIT's Burnaby campus that were funded by the Canada Foundation for Innovation (CFI). They include a 48' × 28' structure that provides a controlled environment to test how materials hold up to weather and wear.

"The idea is, if you have new innovation in materials, insulation, sheeting, or whatever, you can have a side-by-side comparison of the new material, new idea, new design versus the code design. We have instrumentation to measure temperature and moisture content, humidity, pressure, and air flow. We also have a weather station on the top of the building to measure rainfall."

Dr. Tariku continues to find new ways to improve upon current building standards and everyday energy consumption – helping to make high performance buildings more affordable and reliable around the world.

"... with the leaky condo crisis, new materials were introduced without the proper design and research ..."

Integrated Molecular Biology Lab

The Integrated Molecular Biology Lab (IMBL) is a cross-disciplinary hub for collaborations between groups at BCIT involved in life sciences research and training. The IMBL was created through infrastructure funding from the Canadian Foundation for Innovation (CFI), BC Knowledge Development Fund, Genome BC, and the Western Economic Diversification Fund. IMBL fosters partnerships with other academic institutions and the biotechnology sector.

IMBL is equipped with state-of-the-art instruments, including a multi-label (Envision™) plate reader, microplate scintillation (luminescence) counter, real-time PCR, genetic analyzer (sequencer), microarray scanner, and epifluorescence microscope imaging system.

Safeguarding Against Grow-Op Damage

With an estimated 20,000 residential grow-ops in British Columbia alone, Canada continues to face a serious challenge beyond the trafficking of illegal drugs. Dr. Silvia Raschke and her multi-disciplinary team of researchers are looking into the wide-ranging affects a grow-op has on the structure and other systems of a building. With this information, they hope to develop ways to detect damages that aren't obvious to the naked eye.

"It's not just the mould that you hear about in the media, but [grow-op operators] cut holes in things and they remove supporting structures, so they actually damage the structural integrity of the home," says Dr. Raschke. "We are looking at how moisture migrates from the inside of the home to the outside and how it damages the walls in the process. We're also looking at the chemicals in the fertilizers that they use and the damage that they do to HVAC systems, and the modifications that they do to plumbing systems, the dumping on the property, etc. There are a lot of different things that can impact the value of that home and could potentially impact the well-being of the family that moves in afterward."

Beyond economic and social benefits, the knowledge gained from this research will be incorporated into curriculum, meaning future BCIT grads will integrate this new knowledge into their work as HVAC technicians, building engineers, forensic investigators, and others working in the field.

Rivers Institute

The BCIT Rivers Institute has embarked on a large-scale, multi-year applied research project to restore the residual pocket estuaries in Vancouver's Burrard Inlet. Estuaries are among the most productive, yet most endangered aquatic habitats in British Columbia and beyond. BCIT students and the Rivers Institute engaged the community and requested seed funding from Habitat Conservation Trust Foundation (HCTF) to develop restoration plans for five estuaries and tidal stream reaches in Burrard Inlet. This applied research project was made possible due to a creative sentencing court award to the HCTF.

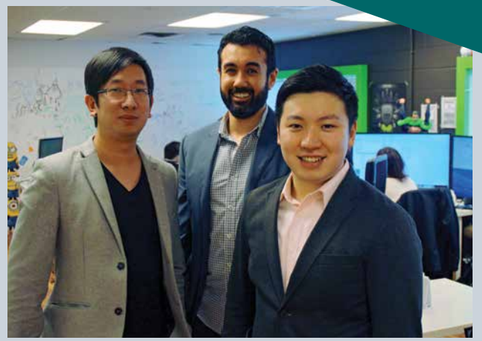
Building Science Centre of Excellence

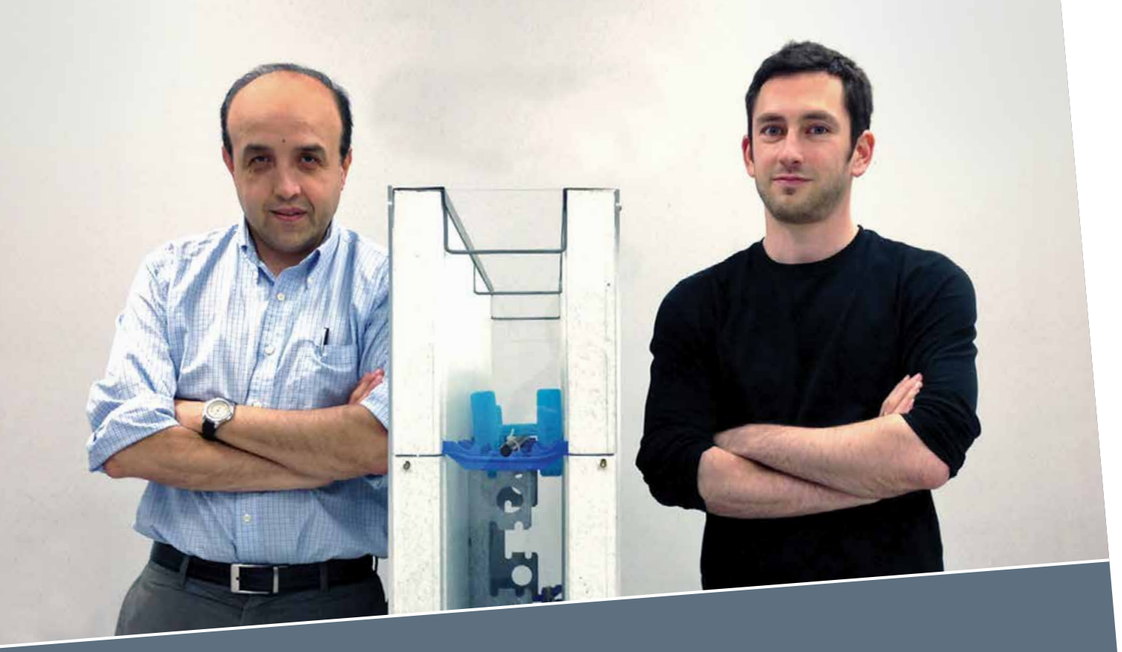
The Building Science Centre of Excellence (BSCE) was created within the School of Construction and the Environment in 2005. The Centre's vision is to establish BCIT as a key provider of building science knowledge and master's degree graduates through advanced educational programs, leading edge applied research, technology development, and knowledge transfer. The mandate of the BSCE is to support the construction industry with outcomes that transcend regional interests, as demonstrated by its participation in major international research efforts.

STUDENT INNOVATION

Procurify

BCIT Business Operations Management grads Kenneth Loi, Eugene Dong, and Aman Mann received enormous recognition in 2014 when they received $1.2 million in funding for their cloud procurement software firm, Procurify. Seed money came from investors Nexus Venture Partners, BDC, and Dallas Mavericks' owner Mark Cuban. What began as a class project at BCIT, Procurify now helps companies streamline purchasing, track spending, and stop cash leakage. With clients on more than five continents, these Business Operations Management grads have illustrated the success that comes with hard work and a great idea.





WE CAN HELP

Quad-Lock Building Systems came to BCIT for help. The company is committed to providing cost-effective, sustainable, and resilient building envelopes; but in order to do this most effectively, they needed information and tools not currently available.

A research partnership between BCIT School of Construction and the Environment faculty member Dr. Rodrigo Mora, Master of Engineering in Building Science student Julien Schwartz, and industry partner Quad-Lock Building Systems Ltd. was formed and received project funding from Mitacs.

The goal of the project is to compare the combined life-cycle cost and carbon footprint of Insulated Concrete Forms (ICF) with wood-frame construction for residential buildings. With this key information, solutions such as energy models and simulations will be created to assist in determining the most sustainable, cost-effective, and environmentally-friendly way to optimize the performance of building systems.

BCIT applied research activities are focused in areas that engage faculty and students to solve business and industry problems to increase competitive strength and advance the state of practice. BCIT applied researchers and research groups have a 25-year history of working with industry clients, from independent entrepreneurs with a unique prototype idea to established companies and organizations developing new technologies, products, and services. The resulting innovations enhance the learner experience, advance the state of practice, and provide practical solutions to industry challenges.

Find out how BCIT Applied Research can help you find a solution.
Email us at research@bcit.ca.

HISTORY OF APPLIED RESEARCH AT BCIT

1989 BCIT's mandate is broadened to include applied research. A new Technology Centre is created for multi-disciplinary research and development.

1990–2002 Technology Centre researchers develop research niches to meet the needs of industry in Information Technology, Health Technology, Engineering Technology, and Chemical and Biological Sciences.

1999 BCIT is successful with Canada Foundation for Innovation (CFI) in its initial round of funding ($640,000) for three laboratories; Centre for Rehabilitation Engineering And Technology that Enables (CREATE) led by Dr. Silvia Raschke; The Photovoltaic Energy Applied Research Lab (PEARL) led by Ljubisav Stamenic; and Internet Engineering Lab led by Paul Thiel.

2003 BCIT is a founding member of Polytechnics Canada, which has a mandate to increase applied research at its member institutions.

2003–2004 BCIT's first major research centre, the Centre for the Advancement of Green Roof Technology (CAGRT) is established.

2004 BCIT Technology Commercialization Office opens.

2005 BCIT Research Services Office opens.

Building Science Centre of Excellence (BSCE) created within the School of Construction and the Environment.

2006 BCIT is eligible to apply to Natural Sciences and Engineering Research Council of Canada (NSERC) as a university. First NSERC Discovery Grant awarded to Dr. Hua Ge, School of Construction and the Environment, for research on "Wind-driven rain and its impact on building envelopes" (ie. leaky condos).

2007 BCIT and BC Hydro embark on a joint research initiative to create Canada's first smart microgrid at BCIT's Burnaby campus.

BCIT's first NSERC Undergraduate Student Research Award (USRA).

2010 NSERC Smart Microgrid Network (NSMG-Net) initiated with Dr. Hassan Farhangi of BCIT's GAIT research group as the network leader. NSMG-Net has nine co-researchers in addition to Dr. Farhangi, and 24 research partners from industry, post-secondary, and provincial power authorities. Much of the funding is allotted to student research.

2011 Dr. Fitsum Tariku, Canada Research Chair in Whole-Building Performance, becomes BCIT's first Canada Research Chair. He is followed by Dr. Jaimie Borisoff, Canada Research Chair in Rehabilitation Engineering Design later in 2011, and Dr. Paula Brown, Canada Research Chair in Phytoanalytics in 2013.

2012 BCIT is awarded first Canadian Institutes of Health Research (CIHR) funding for Dr. Jaimie Borisoff's Canada Research Chair in Rehabilitation Engineering Design.

2013 BCIT's first ever Master of Engineering (M. Eng.) graduates receive their degrees at the winter convocation.

2014 Energy OASIS project constructed at BCIT Burnaby campus as part of the Smart Microgrid.

BCIT celebrates 25 years of applied research and innovation services for industry.

The Energy OASIS (Open Access to Sustainable Intermittent Sources) at BCIT is leading the charge in Canada's green technology research. The Energy OASIS Demonstration Project is a research project designed to help solve the challenge of harnessing these sustainable intermittent sources by creating a novel storage and distributed energy management system.

Our faculty, researchers, and students solve real world problems for industry. Find out how we can help.

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