

Local Impact GLOBAL REACH





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Photographs in this book feature UOIT students, faculty, and staff. Visit uoit.ca/OurStory to learn more.









Dr. Michael Owen

UOIT's researchers meet the highest international standards for their scholarly and scientific achievements.

MICHAEL OWEN, PhD
 VICE PRESIDENT, RESEARCH, INNOVATION AND INTERNATIONAL

(Photo: courtesy of Discovery Reports Group)



UOIT pairs technology-enriched learning with hands-on exploration of real life concerns.





AT THE UNIVERSITY OF ONTARIO INSTITUTE OF TECHNOLOGY (UOIT)

we integrate research, innovation, and entrepreneurship with learning, teaching, and professional collaboration.

We invest strategically in research that fosters discovery and technology-driven progress in priority areas for UOIT and Canada's economic prosperity.

Our advanced research infrastructure supports academic excellence and promotes co-operation with community and industry partners. Undergraduate and graduate research students participate in innovative projects, which lead to knowledge and technology transfer—cultivating positive local and global change.



Dynamic decisions in real world jobs



Dr. Bernadette Murphy

DR. BERNADETTE MURPHY,

professor in the Faculty of Health Sciences, examines how our brains incorporate sensory information to give direction to our muscles. Neck pain and muscle overuse injuries often begin in the workplace. Murphy's work investigates how changes in posture and neck fatigue affect the way the brain processes incoming sensory information.

She is currently working with colleagues in the Faculty of Business and Information Technology and Dr. Steve Passmore from the University of Manitoba to develop serious games that incorporate motor learning theory, training the brain to make robust decisions under stress.

Using the facilities at UOIT's Automotive Centre of Excellence (ACE), the researchers test a game that evaluates whether conditions of heat stress encountered by firefighters affect their ability to make decisions. Murphy's team collaborates with colleagues from the Canadian Memorial Chiropractic College to teach firefighters how to move and lift safely while under the extreme stress of their job.

She also works with professionals at Lakeridge Health in Oshawa, Ontario to better understand how exercise combats depression and improves brain function in adults.

Investigating TOXICANTS



Monitoring techniques for pure water



I Dr. Douglas Holdway

DR. DOUGLAS HOLDWAY, UOIT's first Canada Research Chair, investigates the impact of chemical contaminants on aquatic organisms. Our water treatment systems are not designed to remove chemicals such as pharmaceuticals from treated effluent. Dr. Holdway studies how toxicity of such chemicals affects fish and invertebrates. He is working with the Southern Ontario Water Consortium to invent better ways to biologically monitor contaminants and ultimately reduce their toxic effects.

Dr. Holdway also conducts research into the environmental impacts of common agricultural practices. He has investigated the effects of pulp and paper mill effluents and landfill leachates on aquatic organisms. His team looks for biological markers that predict high impact situations, including population collapse in fish and other aquatic species.







Gaming FOR BETTER HEALTH

Using video games to help diabetic children



I Dr. Bill Kapralos

DR. BILL KAPRALOS, together with his advanced research students, has developed a video game to assist juvenile diabetics. In the game called "Power Defense", a child learns to balance a combination of fuel, which represents food, and coolant, which represents insulin. If too much food is consumed, the child learns to counterbalance with insulin.









WE SUPPORT A FULL SPECTRUM OF RESEARCH AND SCHOLARLY ACTIVITIES—from blue sky science to applied research. Our researchers address technological and social questions that relate to energy sustainability and the needs of industry and society.

Energy research emphasizes discoveries that enable environmental conservation. The Energy Systems Engineering and Nuclear Engineering programs at UOIT are the first stand-alone programs of their kind in Canada. Researchers examine various energy technologies including new medical tools that use nuclear energy, viable hydrogen production techniques, as well as renewable sources such as wind, solar, and geothermal.

Collaborations with leading Canadian and international partners are helping us build a safe and efficient energy future. We are investigating new materials to reduce costs and improve long-term performance of fuel cells as an alternative to existing power supplies.

Sustainable manufacturing research covers a broad range of industry demands from automotive and nuclear to business management.

Building communities



WE PROMOTE THE WELL-BEING OF SOCIETY THROUGH SOLUTION-BASED RESEARCH that improves the way we live and work. Successful community development is supported by improving health, purifying water, countering violence, and implementing sustainable energy technologies.

UOIT professors are dedicated to the highest standard of teaching. They understand our social, cultural, and natural environments, and contribute to prosperity in Durham Region, Northumberland County, Ontario, and Canada.



Video SIMULATIONS

Mental health and elder abuse awareness



I Dr. Wendy Stanyon

DR. WENDY STANYON, Associate Professor, Faculty of Health Sciences at UOIT, along with the Durham Regional Police Service (DRPS), the Ontario Provincial Police (OPP), and other community experts, developed a series of real life, critical incident police simulation videos for use in training programs.

Since 2007, the mental health simulations have been used to educate thousands of front-line police officers how to recognize potential indicators of mental illness and how to appropriately respond. Due to the effectiveness of the original video training, a second series of simulations was created to raise awareness of elder abuse.

These simulations are part of mandatory training for several police services, including the OPP and DRPS. They are a powerful tool for facilitating police officers' understanding of mental illness and how to interact effectively with those challenged by mental illness.



Priority AREAS

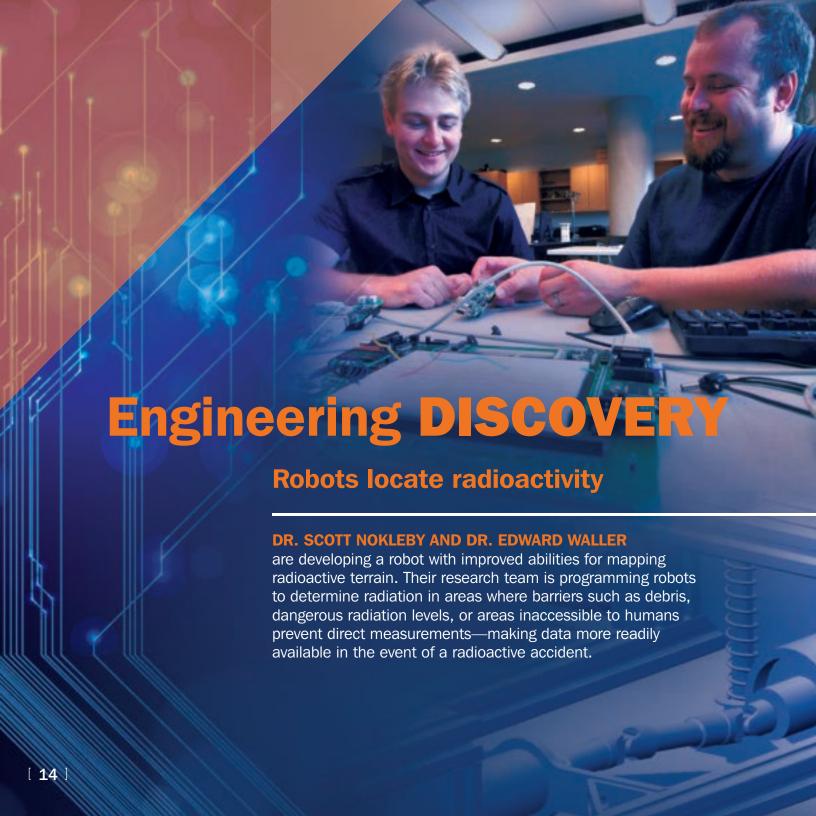
Research and scholarship



UOIT CONDUCTS HIGH-QUALITY, RIGOROUS RESEARCH DESIGNED TO MEET CURRENT AND FUTURE ECONOMIC AND SOCIAL NEEDS. Durham
Region is one of the fastest growing regions in the country and has the capacity to grow in alternative energy, advanced manufacturing, agribusiness, and the health and wellness sector.

Each year, UOIT develops new academic and research programs to meet the demands of today's knowledge-driven economy. Our strategic research themes include:

- Advanced Manufacturing for Innovation
- ▶ Education for the 21st Century
- Energy and the Environment
- ▶ Human Health and Community Wellness
- Information & Communication Technology and Informatics
- ▶ Life Sciences and Biotechnology



Finding solutions FOR DISABILITIES

New rehabilitation methods



Dr. Pierre Côté

DR. PIERRE CÔTÉ's research program as Canada Research Chair in Disability Prevention and Rehabilitation investigates why people develop disability and what can be done to help them recover their health. One in 10 Canadians experience disability because of muscle, joint, and bone pain. His work focuses on identifying evidence-based methods to prevent musculoskeletal disability and to rehabilitate individuals affected by it. Dr. Côté's research promotes healthier workplaces, reduces absenteeism, and facilitates earlier return to work after an injury. Ultimately, this initiative will help reduce costs to employers, employees, and the Canadian economy.







Students become the next generation of leaders in their field.



UOIT STUDENTS ARE EXCEPTIONAL RESEARCHERS AND COMMUNICATORS. By designing their own projects and working on faculty-led research, our students have developed creative outcomes

faculty-led research, our students have developed creative outcomes that address significant day-to-day problems facing Canadian industry, health care, government, and not-for-profits.

Co-operative corporate projects

Our research impacts companies through student internships and industry programs. Students who join companies post-graduation also transfer their knowledge—and our technologies—to these industry partners.

2013-2014



RESEARCH-BASED
MASTER AND DOCTORAL
PROGRAMS



Byte MINDING

Monitoring digital devices



I Dr. Khalil El-Khatib

STUDENT DAVID MILLIE, WORKING WITH DR. KHALIL EL-KHATIB of the Faculty of Business and Information Technology, created an algorithm to monitor electronic communication without infringing on privacy. The algorithm allows parents to set up controls and be notified if certain suspicious behaviours are conducted on digital devices. They can monitor without reading their children's messages. Seeking real world uptake of their research findings, Millie presented their work to Scouts Canada and an international scouting conference in the United Arab Emirates—raising global awareness of Internet security issues and in the process, highlighting the quality of research at UOIT.

Creating JOBS

Initiatives that contribute to Canada's economy



DRAWING ON OUR STRENGTH IN COMPUTER TECHNOLOGY,

we are a member of a consortium with IBM, seven universities, the Government of Canada, and the Government of Ontario to establish a new Ontario-based \$210 million research and development initiative. This consortium, named the Southern Ontario Smart Computing Innovation Platform (SOSCIP), will create new, highly skilled jobs in Ontario and contribute to the profitability of the Canadian economy.

UOIT's students are entrepreneurs. Using their creativity and skills acquired through their education and research, our students create new companies to take cutting-edge ideas to the marketplace. Such companies include AVR Motorsports, IFTech Inc., Kingdom Force Sports, and Provoke Aero.

These new businesses have directly contributed to the economy by creating almost 50 new jobs and generating more than \$3 million in annual sales.







PROVOKE AERO





The graduate programs at UOIT include leading-edge research and collaboration with world-renowned experts who are dedicated to excellence and responsive to expanding the frontier of knowledge. UOIT has outstanding partnerships with major Canadian companies and as a young institution, has received impressive marks in national university rankings.

- JAVAD MIRZAEI

STUDENT, MASTER OF APPLIED SCIENCE IN ELECTRICAL AND COMPUTER ENGINEERING



UOIT HAS SOME OF CANADA'S MOST ADVANCED RESEARCH LABS.

Supported by industry partnerships, we explore grand challenges in engineering, science, and human sciences. Our facilities support faculty and students in conducting explorations without leaving our campus. Our advanced technology brings the world of innovation—and prominent researchers and scholars from around the globe—to our university.

Collaborating with businesses



Corporations bring us their problems and we do the research. We build a partnership, make a commitment we can deliver, teach our undergraduate and graduate students during the process, and provide results that benefit productivity and competitiveness for business. This model is financially attractive for companies, and gives students hands-on experience solving real world problems while training them to be career-ready.

Transporting the world to us

Businesses in our community and beyond find it easy to access our facilities, helping support their own research and product development. We are at the centre of a transportation hub surrounded by highways 401 and 407, the Port of Oshawa on Lake Ontario, the Oshawa Municipal Airport, and a future international airport.



Corporate PARTNERSHIPS

World-class facilities for product testing

PARTNERSHIPS WITH INDUSTRY provide UOIT Automotive Engineering students valuable experiences and learning opportunities after graduation. With mechatronics, hydraulics, and computer-assisted design labs, our facilities give students the ability to gain hands-on experience that will be valuable in the workplace.

Ontario based automotive systems provider, Multimatic Engineering is a customer of the Automotive Centre of Excellence (ACE). Multimatic Vice President Larry Holt said, "We have access to a facility that is the best in the world and it's in our backyard. Anything like this would normally be found inside a manufacturing plant, and out of our reach. So it's fantastic to have access to this kind of facility."

UOIT's industry partners include:











In ten short years

UOIT was ranked one of Canada's top 50 research universities by RE\$EARCH Infosource Inc.'s 2013 classification.





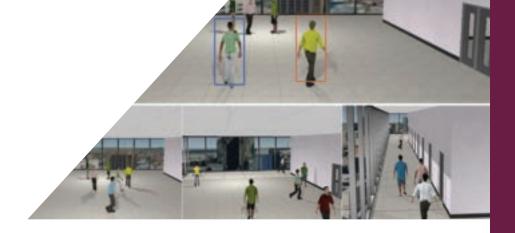


IMPROVING society

Intervention benefits communities

DR. BARBARA PERRY studies some of the most troubling forms of violence in contemporary society. She investigates hate crime and how communities, not just individuals, are affected by this bias motivated violence. The goal of her research is to intervene more effectively to improve situations for affected communities, through policy recommendations, education, and community organizing.

Her anti-homophobia work with community organizations teaches how hostile language choices also impact the lives of victims, often making them fearful. Dr. Perry shares her expertise locally as a board member of Durham Regional Police Service's Diversity Advisory Committee, Communities Involved, and PFLAG (Parents, Families and Friends of Lesbians and Gays), and helps develop educational materials that teach students how to form a more tolerant society. Some of these materials are used by school boards across the Maritimes and Northern Territories, and in Ontario and Manitoba.



Safety AND SECURITY

Smart camera networks



I Dr. Faisal Qureshi

DR. FAISAL QURESHI has harnessed computer technology to create a network of smart cameras capable of observing people's movements in public spaces. He developed a virtual vision simulator that allows researchers to simulate realistic 3D environments—populated with virtual humans—to study and develop camera networks. His simulator is currently being used by both academic and industry researchers to develop better environmental control systems to increase public comfort, safety, and security.

EXPANDING Horizons

Having a relationship with UOIT gives us ties to the academic world, allows us to identify young talent, and provides a plant in a small Ontario town with the ability to attack higher-level problems.

DAN ROSS
 ASSET OPERATIONS LEADER, COBOURG SITE, SABIC INNOVATIVE PLASTICS

UOIT students and faculty continually aspire toward academic excellence.



EVERY DAY WE STRIVE TO BE ONE OF THE MOST INNOVATIVE UNIVERSITIES IN CANADA. UOIT's progressive research contributes to positive economic, social, and intellectual transformations of individuals, companies, and communities.

We strive to incorporate innovation into everything we do—helping to strengthen our region, our nation, and our world.



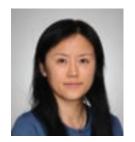
Award-winning research



UOIT professors are honoured for their award-winning research. From relationships with the World Health Organization to refining radiation safety on the International Space Station, UOIT is conducting significant research that has local impact and global reach.

Ontario Early Researcher Awards

This award helps Ontario's outstanding researchers attract talented people to their research teams. The Early Researcher Award encourages innovation among the province's brightest young researchers at universities, colleges, hospitals, and research institutes.



I Dr. Min Dong

Early Researcher Award winners at UOIT have received almost \$1 million in funding. Our most recent recipient is Dr. Min Dong, Faculty of Engineering and Applied Science, for "Building Green Communications".

Dr. Dong creates theories and technologies for improving energy efficiency and increasing the reliability, speed, and range of communications through new wireless solutions and infrastructures. Her scholarly publications are available for use by industry and the academic community.



Banting Postdoctoral Fellowships



I Dr. Janelle Joseph

Each year, 70 two-year Banting Postdoctoral Fellowships are awarded in Canada, valued at \$70,000 per year. The selection of these candidates is based on their ability to contribute to the country's economic and social progress. The fellowships are given to elite postdoctoral researchers from across Canada and around the globe, supporting the recipients as they conduct world-class research.

Dr. Janelle Joseph, a Banting Postdoctoral Fellowship recipient who joined UOIT in 2012, researches youth education programs with the objectives of keeping young people in school, and improving graduation and employment rates.

Industrial Research Chair sponsor



UOIT is a leader in finding solutions to meet the growing demand for alternative energy sources. UOIT's research endeavours to help us develop vehicle opportunities, discover fuel efficiencies, and expand the national infrastructure needed to realize the full potential of natural gas. We are pleased to support UOIT in the decades ahead.

- JEFFREY S. BOYCE

EXECUTIVE CHAIRMAN, PETROAMERICA OIL CORPORATION, INDUSTRIAL RESEARCH CHAIR SPONSOR

UOIT Research Chairs

Canada Research Chairs

Established by the federal government, the Canada Research Chairs Program helps attract and retain some of the most accomplished and promising researchers from around the world.



I Canada Research Chair in Health Informatics

Dr. Carolyn McGregor is a leading international researcher in the area of critical care health informatics and, in particular, neonatal health informatics.



I Canada Research Chair in Disability Prevention and Rehabilitation

Dr. Pierre Côté's research develops and tests interventions for the physical, psychological, and societal issues associated with musculoskeletal pain and disability.



I Canada Research Chair in Digital Life, Media, and Culture

Dr. Isabel Pedersen studies the impact of emerging digital media on life and culture. She evaluates wearable computer media created to augment reality.



L Canada Research Chair in Robotics and Automation

Dr. Dan Zhang is developing a robotic system with higher operational accuracy, increased load capacity, greater task adaptability, and enhanced reliability.



I Canada Research Chair in Aquatic Toxicology

Dr. Douglas Holdway investigates the effect of contaminants on aquatic organisms in various life stages and under a variety of environmental conditions.



Industrial Research Chairs

Industrial Research
Chairs are supported
through contributions
from individuals and
corporations. They
provide targeted support
in defined research fields
and programs.



I Jeffrey S. Boyce Research Chair in Natural Gas as a Transportation Fuel

Professor Daniel Hoornweg's research includes improving public policy and designing equipment and systems to provide natural gas for transportation.



I NSERC-UNENE Senior and Associate Industrial Research Chairs in Health Physics and Environmental Safety

Dr. Anthony Waker and Dr. Edward Waller focus their research on understanding and minimizing radiation hazards to societies and individuals affected by nuclear power plants.



NSERC-OPG Chair and Associate Chair in Innovative Design Engineering

Dr. Remon Pop-Iliev and Dr. Vijay Sood are integrating design engineering into electrical, computer, software, and mechanical engineering.

IN ITS BRIEF HISTORY, UOIT HAS EARNED:

CANADA RESEARCH CHAIRS

INDUSTRIAL RESEARCH CHAIRS

Dr. Janette Hughes

EMPOWERING youth

Students for social action and social justice

DR. JANETTE HUGHES works with school districts, teachers, students, and community agencies to explore how adolescents use digital media to learn, connect, collaborate, communicate, critique, create, and promote social change. Her research is inspired by United Nations principles. Youth researchers share their work on digital texts through social media, project websites, and in community spaces. Dr. Hughes also focuses on the impacts of digital media on bullying and adolescent identity.

Designing for THE FUTURE

Serious games and serious fun

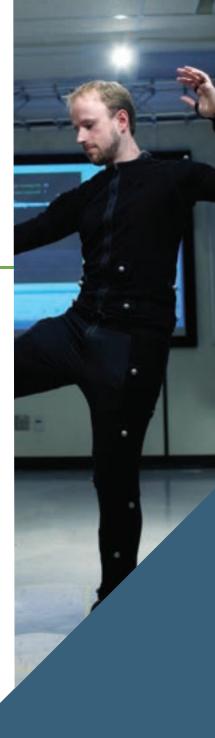


I Dr. Andrew Hogue

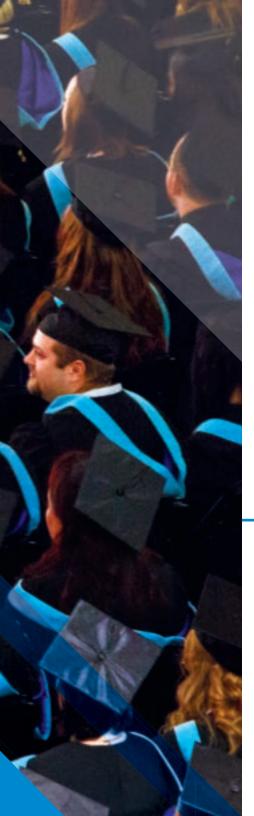
DR. ANDREW HOGUE is reshaping how video games are designed. Often, video game design begins with a pencil and paper sketch that is transferred to a digital format. Dr. Hogue and his MSc student Daniel Buckstein are looking at ways to enhance paper prototyping by using computer vision and sensing techniques to bring the tangible into the digital medium. The goal is to improve the expressiveness of gaming by allowing designers to develop prototypes that computers can then assemble into a game.

Dr. Hogue and his students endeavour to develop games that range from serious gaming to serious fun. An entertaining accounting game allows the player to receive invoices, make business decisions, sort journal entries, and produce financial statements.

PhD student Saad Khattak is developing new modelling techniques for creating 3D objects and environments—an important feature in autonomous robotics. Accurate mapping using autonomous robots has implications on the earth (robotic mining, farming, and transport), in the air (reconnaissance and surveillance), and in space (exploration).









We are proud of UOIT's achievements resulting from the research opportunities provided to undergraduate and graduate students. They collaborate with faculty to develop new ideas and concepts, which prepares them for the 21st century workplace.

- TIM McTIERNAN, PhD PRESIDENT AND VICE-CHANCELLOR, UOIT

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905.721.8668