



INAUGURAL
CELEBRATION
OF INNOVATION
AND
ENTREPRENEURSHIP

WEDNESDAY APRIL 22, 2015
5:00 PM TO 7:00 PM
MCGILL UNIVERSITY
MACDONALD ENGINEERING
BUILDING LOBBY



THE WILLIAM AND RHEA SEATH AWARDS SUPPORT INNOVATIVE RESEARCH AT THE FACULTY OF ENGINEERING. THEY WERE MADE POSSIBLE THROUGH THE GENEROSITY OF ALUMNUS WILLIAM SEATH, B.ENG'52. THE AWARDS RECOGNIZE OUTSTANDING WORK BY ENGINEERING, ARCHITECTURE AND URBAN PLANNING STUDENTS AT THE UNDERGRADUATE AND GRADUATE LEVELS, AND BY PROFESSORS WHO CONDUCT INNOVATIVE RESEARCH WITH POTENTIAL FOR COMMERCIALIZATION.

Annual calls for applications to the William and Rhea Seath Awards competition are made in the fall. Two awards of approximately \$14,000 are given in the spring. The call for the 2015/16 competition will be October 1, 2015, with a submission deadline of December 1, 2015.

Applications are reviewed and awarded by the Dean of Engineering and a review committee composed of Faculty, industry and alumni representatives. Winners use the awards to support the commercialization of their research. Examples of eligible support include development, testing, prototype construction, specific market research, creation of a business plan and reduction in teaching time for professors, or salary stipends for students.

2014-2015 WRSA REVIEW COMMITTEE

Côme Laguë, BEng'89, is CEO of Zetta Research, an intellectual property management company that acquires, develops and sells portfolios of patents from start-ups and inventors. Earlier in his career he co-founded Nueva Ventures, a venture fund focused on capital efficient ventures in the communications, internet and software sectors. Mr. Laguë is a member of the Faculty of Engineering Advisory Board.

Naser Partovi, BEng'80, MEng'81, is Managing Director of Salzburg Investments Inc., a start-up focused on developing outpatient management software for patients with chronic conditions. He is also Chairman and CEO of Wellaho, a member of the Faculty of Engineering Advisory Board and a highly successful entrepreneur with more than 20 years of management, corporate development and operating experience.

Howard C. Stotland, BEng'66, is President of NSB Retail Solutions, Inc. and a director and investor in two start-ups—Blueslice and Momentis Systems, a Montreal-based application software firm that provides application software for the apparel industry. He is a member of the Faculty of Engineering Advisory Board and an Ernst & Young Entrepreneur of the year winner.

Neal Gordon, BEng'83, is acting head of research products at 121 Bio, LLC, a Cambridge-based biopharmaceutical start-up that is developing a unique portfolio of antibody-based solutions for academic and commercial research laboratories. Dr. Gordon is a serial entrepreneur in the life sciences with product development and operating roles across research tools, therapeutics and diagnostics.

Emeritus Professor John Dealy was Dean of the Faculty of Engineering from 1994 to 1999. He is a Fellow of the Royal Society of Canada; he holds four patents; and he is the author or co-author of four books and 90 scholarly papers. Educated in the US, professor Dealy has received numerous teaching and research awards. He taught at McGill's Chemical Engineering Department from 1964 to 2004.

2014-2015 WILLIAM & RHEA SEATH AWARD WINNERS IN ENGINEERING INNOVATION

PROFESSOR
DAMIANO PASINI

MECHANICAL ENGINEERING
DEPARTMENT

Project Title:
Fully Porous Hip Replacement
Implant Capable of
Eliminating Bone Resorption

Need: Existing hip replacement procedures often require follow-up surgery that can increase the risk of complications and even death. Current hip implants are incapable of preventing long-term stress-related bone loss, which is a risk factor for the success of revision hip surgery.

Solution: A novel implant developed through research at the McGill Faculty of Engineering uses a fully porous structural biomaterial that avoids bone resorption by seamlessly matching the properties of the local host bone tissue.

Impact: Avoid possibility of suffering for untold thousands of people worldwide.

Summary: A major disadvantage of existing hip replacement procedures is a degradation of the femoral bone stock caused by mechanical stress from the implant. This bone stock loss can cause total hip replacements to wear and loosen, requiring revision surgery—a much more complex procedure than the original replacement that increases the risk of complications and death.

The stress is the result of a difference in stiffness between fully solid metallic hip stems and the natural host bone in which they are implanted. A novel implant that uses a fully porous structural biomaterial is tailored to seamlessly match the properties of the local host bone tissue. The new design can be adopted with no modifications to existing surgical technique and hospital infrastructure.

The last step toward the implant's commercialization requires animal studies in dogs. The William and Rhea Seath Award is contributing to the cost of the dog study.

PROFESSOR
MILICA POPOVIC

ELECTRICAL AND COMPUTER
ENGINEERING DEPARTMENT

Project Title:
Early Breast Cancer Screening
with Low-Power Microwaves

Need: Detection of early stage breast tumors is critically important, but current detection techniques—such as mammography, ultrasound and MRI—are not sufficiently sensitive, leading to delayed detection and a reduced success rate of surgical treatment.

Solution: Low power microwave based screening under study by McGill Faculty of Engineering researchers promises inexpensive, comfortable and safe monitoring of breast tissue and early detection of malign lesions. The William and Rhea Seath Award is providing funds to help build a more compact and portable second-generation prototype for use in ongoing feasibility studies.

Impact: Improve the health of women worldwide who are potentially at risk of breast cancer.

Summary: Detection of early stage breast tumors is critically important. Each of the current modalities, such as mammography, ultrasound and MRI, has downsides, often resulting in late tumor detection and, consequently, a lower success rate in post surgical treatment.

Low power microwave based screening is an emerging field that promises inexpensive, comfortable and safe monitoring of breast tissue, to enable early detection of malignant lesions. The McGill research team is among only a few in the world that has evaluated the underlying technology [ultra-wide-band (UWB) microwave detection] for monitoring breast tissue in human subjects.

The William and Rhea Seath Award is providing funds to continue constructing a second-generation prototype which will, in comparison with the first prototype used in feasibility studies, be compact and portable.

2014-2015 MCGILL FACULTY OF ENGINEERING INNOVATION AWARD WINNERS

PROFESSOR SUBHASIS GHOSHAL

CIVIL ENGINEERING AND APPLIED
MECHANICS DEPARTMENT

Project Title: A Sustainable
Iron Nanoparticle-Based
Technology for Degradation
of Toxic Chlorinated Organic
Compounds in Water Treatment

Need: A non-toxic, more cost-effective water treatment technology to restore groundwater resources polluted by chlorinated solvents.

Solution: A sustainable water treatment process that uses ubiquitous, non-toxic elements such as iron and sulfur to effectively treat a wide range of pollutants—particularly persistent, organic pollutants of emerging concern that are used in industrial processes.

Impact: Provide sustainable access to increasingly scarce groundwater resources.

Summary: Nanoparticles of zero valent iron (NZVI), coated with a palladium catalyst, can be used to degrade (i) chlorinated solvent pollutants such as trichloroethene—an industrial solvent widely used in manufacturing—and (ii) persistent organic pollutants of emerging concern. The cost of palladium, however, as well as concerns about its toxicity in water, are deterrents to its widespread use.

A reaction of NZVI with sulfur, at very specific sulfur doses, eliminates the need for palladium and enhances the reactivity of NZVI almost 40 fold. The Faculty of Engineering Innovation Award will pay for additional research at the Faculty and market research studies to help commercialize the technology.

PROFESSOR THOMAS SZKOPEK

ELECTRICAL AND COMPUTER
ENGINEERING DEPARTMENT

Project Title: Graphene Oxide
Headphones: High Definition
Sound from Low Dimensional
Materials

Need: Develop a high-fidelity headphone diaphragm, with professional sound without the cost, for use in the manufacture of hundreds of millions of over-ear headphones produced annually across the globe.

Solution: Replace currently used carbon based diaphragms with graphene oxide diaphragms prepared at the McGill Faculty of Engineering and tested at the Music Multimedia Room at McGill's Schulich School of Music.

Impact: Obtain the quality of expensive beryllium diaphragms, at much lower cost, to access the multi-billion-dollar over-ear consumer headphone market which accounts for 44% of the headphones sold worldwide.

Summary: Consumer demand for high quality over-ear headphones is increasing exponentially. The diaphragm of these headphones is typically made of polymer and does not deliver the quality of sound that can be achieved with prohibitively expensive materials such as beryllium. Graphene oxide, a chemical derivative of graphite, may provide the performance of high-end materials at a cost suitable for the consumer headphone market.

Researchers at the McGill Faculty of Engineering are replacing carbon based diaphragms in commercial headphones with graphene oxide diaphragms prepared at the Faculty, and the modified headphones are being tested at the state-of-the-art Music Multimedia Room at McGill's Schulich School of Music. The prototypes and test results will be used to attract an industrial partner with the market presence and facilities for volume production required to commercialize the invention.

2014-2015 MCGILL FACULTY OF ENGINEERING INNOVATION AWARD WINNERS

PROFESSOR
ZETIAN MI

ELECTRICAL AND COMPUTER
ENGINEERING DEPARTMENT

Project Title:
Solar Water
Splitting Devices

Need: Design a hydrogen-producing technology that does not require the use of fossil fuels.

Solution: Produce hydrogen by using water splitting under direct solar irradiation.

Impact: Protect the environment by using a clean, renewable process to produce a vitally important fuel.

Summary: At present, hydrogen—a potential fuel of the future—is largely produced from fossil fuels. Researchers at the McGill Faculty of Engineering are developing a new technology for hydrogen production that uses a clean, renewable process via photochemical water splitting under direct solar irradiation. To prove the dependability of the process, proof is required of the stability of hydrogen production over time using non-filtered water. The Faculty of Engineering Innovation Award has provided urgently needed resources to test the new technology and to develop a solid business plan for its implementation. The technology has already won a major innovation prize through the Grand Challenges Program developed by the Alberta-based Climate Change and Emissions Management Corporation.

2014-2015 IAN MCLACHLIN PRIZE FOR ENTREPRENEURSHIP IN ENGINEERING

ALEXANDER KRAML

MECHANICAL ENGINEERING
UNDERGRADUATE STUDENT

Project Title:

RAEDEF - Generation of
360 degree multimedia
content within Montreal

Summary: Music and multimedia transcend age, race and gender, but many people never experience the thrill of attending a live music event because of mobility issues, where they reside or scheduling constraints.

RAEDEF, a Montreal-based multimedia start-up, will film live music events and private studio sessions on a 360 degree camera and make the content available via streaming on computers, smart TVs, mobile phones, tablets or virtual reality headsets. RAEDEF will provide the most realistic experience technologically possible in the comfort of people's homes.

The Ian McLachlin prize will enable the firm to purchase the licenses, additional camera and audio equipment, and multiple virtual reality headsets required to further produce and test the 360 degree footage it is generating.

COLIN GALLACHER

MECHANICAL ENGINEERING
MASTER'S STUDENT

Project Title:

The Haplet

Summary: Life today increasingly revolves around people's interaction with the virtual world via electronic devices that tether us to the web and one another. These interactions rely primarily on sights and sounds relayed between the user and the device. Few involve touch, even though touch is hugely important in exchanging energy with the world around us. Student research at the McGill Faculty of Engineering is bridging that gap by using haptics to simulate human sensations associated with touch. One of the objectives is to utilize the proliferation of mobile devices on the market as platforms to introduce force feedback to the virtual world and the public.

The Ian McLachlin prize is providing funding to refine a current prototype and build a low-cost planar haptic device that can be used with existing Android and iOS devices. No products occupy this niche at present.

ADDITIONAL ALUMNI SUPPORT

DURING THE PAST TWO YEARS THE FACULTY OF ENGINEERING HAS HAD RESOURCES TO AWARD ONLY TWO PRIZES FOR INNOVATIVE RESEARCH—THE WILLIAM AND RHEA SEATH AWARDS. THANKS TO ADDITIONAL SUPPORT FROM GENEROUS ALUMNI, OUR FACULTY IS IN A POSITION THIS YEAR TO AWARD ADDITIONAL INNOVATION PRIZES.

THE FACULTY OF ENGINEERING HOPES TO CONTINUE GROWING THIS POOL OF AWARDS BY ESTABLISHING A PERMANENT INNOVATION FUND TO ENCOURAGE EVEN GREATER NUMBERS OF OUR STUDENTS AND PROFESSORS. THIS OBJECTIVE WILL ONLY BE ACCOMPLISHED WITH YOUR SUPPORT. WE WILL PROVIDE INFORMATION ABOUT THIS PERMANENT INNOVATION FUND IN THE NEAR FUTURE.

THIS YEAR'S ADDITIONAL AWARDS WERE MADE POSSIBLE THROUGH A GENEROUS GIFT FROM FONEX DATA SYSTEMS INC. FOUNDER PASQUALE DI PIERRO, BENG '76, MBA '80, WITH SUPPORT FROM ALIZETI MICROTECHNOLOGIES INC. PRESIDENT LOUIS VIGLIONE, BENG '78, AND MEADE WILLIS INC. PRESIDENT MICHAEL BARSKI, BENG '68.

WAYS YOU CAN PARTICPATE

BOTH ALUMNI AND STUDENTS CAN:

- HELP BUILD THE INNOVATION FUND
- SERVE AS MENTORS
- OBTAIN GUIDANCE FROM MENTORS
- PROVIDE INPUT ON OUR FACULTY'S INITIATIVES