



Engineering  
Innovation &  
Entrepreneurship

# 4TH ANNUAL CELEBRATION OF INNOVATION & ENTREPRENEURSHIP

Faculty Club,  
McGill University  
3450 McTavish St.  
Montreal, QC H3A 0E5



**McGill**

Faculty of  
Engineering

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

## 2017-2018 WILLIAM & RHEA SEATH AWARDS REVIEW COMMITTEE

**Dr Ronald Chwang** (B.Eng.'72 with honors) in Electrical Engineering, FAB member, chairman and president of ID Ventures America, a venture investment and management consulting service group. He was the chief executive officer of Acer America from 1992 until 1997, growing it to over \$1 Billion in revenues, and then became chairman and president of Acer Technology Ventures until 2004, managing high-tech venture investment activities in North America. Previously, he was president of two Acer business groups in Taiwan, from 1986 to 1991.

**Dr Avak Kahvejian** is a partner at Flagship Pioneering which he joined in 2011, focusing on internal biotechnology innovation and venture creation. Avak was on the founding teams of Seres Therapeutics and Codiak BioSciences, and he is a co-founder of Rubius Therapeutics. Currently, Avak serves as founding president and CEO of Cygnal Therapeutics, a company pioneering the field of exoneural biology for the treatment of cancer, autoimmunity and other diseases. Avak earned his Ph.D. from McGill University in the laboratory of Dr. Nahum Sonenberg, where his research focused on modulators of mRNA translation and their regulation.

**Dr Neal Gordon** (BEng'83) in Chemical Engineering, is currently chief development officer at Cobalt Biomedicine a life-science start-up founded by Flagship Venture Labs. Neal is a serial entrepreneur in the life sciences with product development and operating roles across research tools, therapeutics and diagnostics. He is a hands-on leader with a strong record of technology innovation and translation of platform technology into products.

**Naser Partovi** (BEng'80, MEng'81), Electrical Engineering, FAB member, 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, and he is a highly successful entrepreneur with more than 20 years of management, corporate development and operating experience.

**Professor Gordon W. Roberts** received a B.A.Sc. degree from the University of Waterloo, and M.A.Sc. and Ph.D. degrees from the University of Toronto, all in electrical engineering. At McGill University, he holds the James McGill Chair in Electrical and Computer Engineering. He has co-written seven textbooks on analog IC design and mixed-signal test. Dr. Roberts is named on 14 patents, and has received numerous awards for teaching and for his work on mixed-signal testing. In 2003, he started DFT Microsystems, a company specializing in high-speed timing measurement. He is a Fellow of the IEEE.



## 2017-2018 WILLIAM & RHEA SEATH WINNERS IN ENGINEERING INNOVATION

**Professor Brett Meyer**  
**Professor Warren Gross**  
(Electrical and Computer Engineering)

**Project Title**  
Effortless AI Makes Artificial Intelligence Easy

**Summary**  
While AI is clearly the future, most developers lack the expertise to build such systems. Effortless AI, by automating the design and optimization of machine learning systems, makes it possible to bring efficient AI to more devices, faster. Though we are not the first or only to automate the design of machine learning algorithms (e.g., Google's AutoML, NYTimes) we are unique in our approach: by explicitly considering issues that matter for mobile/IoT systems (e.g., the time or energy required to perform facial recognition), we produce the best systems possible for these platforms. The WRSA will offer critical support at a key time as we work to prepare our prototype for customer validation and early contracts, and ultimately to raise seed funding.

**Professor Showan Nazhat**  
(Materials Engineering)  
and his team:

**Professor Anie Philip**  
(Surgery)  
**PhD student Gabriele Griffanti**  
(Materials Engineering)

**Project Title**  
Rapid High Through-Put 3D-Printed In Vitro Skin Models for Drug Discovery and Screening

**Summary**  
This proposal aims to advance a world unique 3D printing technology developed at McGill University that is based on a recently granted U.S patent (9,764,060). Our breakthrough development is the 3D bioprinting of tissue structures with varying architectures based on a platform "bioink" system with a novel printing method. By using naturally derived bioink hydrogels with incorporated cells, the printed tissue structures can be tailored to mimic collagen fibril density and alignment, as well as cell loading and density according to the intended use. This novel approach will overcome current challenges in the bioprinting of tissues such as maintaining cell viability and spatial control in 3D microenvironments during processing. In this WRSA proposal, we intend to reduce to practice this technology by focusing on the 3D bioprinting of in vitro skin models to investigate a novel therapeutic in the treatment of fibrosis and cancer.

# 2018 ISSUED PATENTS

TITLE	US PATENT NO.	INVENTORS
Time sampled photodetector devices and methods	9917650	Odile Liboiron-Ladouceur, Md. Shafiqul Hai Michael Menard
Biomaterial of chymotryptically isolated fraction of fibroin in a hydrogel	9993525	Showan N. Nazhat Benedetto Marelli Giuliano Freddi Antonio Alessandrino Jake E. Barralet
Methods and systems for board level photonic bridges	10009668	Odile Liboiron-Ladouceur Md. Shafiqul Hai Monireh Moayedi Pour Fard Chunshu Zhang Meer Sakib
Methods and systems for decoding polar codes	10075193	Warren Gross Gabi Sarkis
Heating mechanism for DNA amplification, extraction or sterilization using photo-thermal nanoparticles	10093971	Philip Roche Andrew Kirk Lenore Beitel Miltiadis Paliouras Mark Trifiro Vamsy Chodavarapu Mohamed Najih Joachim Thiemann
Carbonate-bonded construction products from steel-making residues and method for making the same	10112871	Yixin Shao Mehrdad Mahoutian Zaid Ghouleh



# NATURAL SCIENCES & ENGINEERING RESEARCH COUNCIL OF CANADA (NSERC) GRANTS & AWARDS

## IDEA TO INNOVATION GRANTS

### **Professor Ferri Hassani**

Development of Bit Condition Monitoring System (BCMS) for Mine Blasthole Drilling

### **Professor Showan Nazhat**

Market Assessment of a Bioactive Sol-Gel-Derived Borate Glass Platform Technology

### **Professor Gordon Roberts**

Embedded Analog Performance Monitors for Reliable Semiconductor Circuits and Systems

## INDUSTRIAL RESEARCH CHAIRS

### **Professor Derek Nowrouzezahrai**

NSERC/Ubisoft

“Believable Virtual Character Experiences”

The mandate of this new chair is to further 3D rendering methods to develop more believable and authentic characters in interactive virtual environments. The requirements and constraints facing 3D rendering make it a fertile ground for the study and application of new breakthroughs in this field. In addition to the development of techniques that will increase the credibility of our virtual worlds, this research will be useful to other fields such as medical imaging or real-time software acceleration methods.

### **Professor Raynald Gauvin**

NSERC/Hydro Quebec

“Characterization and Synthesis of New High-Energy Density Materials Beyond Li Ion Batteries”

The mandate of this chair is to work in the areas of synthesis, electrochemistry and processing of nanostructured electrode and/or electrolyte materials for high-energy density Li-ion and beyond, battery devices. Research in emerging energy materials is a strategic area for McGill.

## SYNERGY AWARD FOR INNOVATION

### **Professor Jozsef Kovacs**

For work enabling hyper-realistic simulation of the physical world performed in collaboration with CM Labs. Established in 1995, the NSERC Synergy awards program recognizes and rewards academic/industry partnerships that lead to groundbreaking Canadian innovations. Prof Kovacs’ team has created advanced physics-based mathematical models for use in virtual environments. CM Labs integrates these cutting-edge algorithms into their Vortex® Studio simulation software, helping to make their simulations act and feel more lifelike.

# TECHACCEL & TECHACCEL R GRANTEES

## TECHACCEL

The TechAccel Grants help students jump-start their technologically-based ideas that have business potential and social impact. These grants come out of the Faculty of Engineering Innovation Fund\*, which is funded by charitable gifts from alumni and other community donors. They are available throughout the year and can reach up to \$10,000 per project. Applications are reviewed every two to four weeks by members of the Innovation Committee.

### **Inti Aerospace**

Elie Bou-Gharios  
Callaghan Wilmott  
Mathew Morgan  
(all Mechanical Engineering)

### **UV LED Curing**

Justin Ye  
Mariane Kim  
(both Electrical and Computer Engineering)

### **UCrea**

Ethienne Racine  
(Mechanical Engineering)

### **JobeLink**

Ebou Job (Software Engineering)  
Nicholas Toronga (BCom)

### **DawaSwift**

Odero Otieno  
(Computer Engineering)

## TECHACCEL R

The TechAccelR Grants are intended to help professors accelerate their research-based ideas that are reported as inventions but need further validation prior to commercialization. These grants come out of the Faculty of Engineering Innovation Fund\*, which is funded by charitable gifts from alumni and other community donors. They are available throughout the year and can go up to \$7,500 per project. Applications are reviewed every two to four weeks by members of the Innovation Committee.

### **Novel Convolutional-Neural Network (CNN) Processing System**

Professor Zeljko Zilic  
Pavel Sinha, PhD student  
(both Electrical and Computer Engineering)

Deep learning has resulted in state-of-the-art performance in image recognition and vision tasks such as object recognition, semantic segmentation, image captioning, human pose estimation and more. Most of these achievements can be attributed to the use of convolutional neural networks (CNNs) capable of learning complex hierarchical feature representation. We have developed an efficient CNN architecture that allows us to achieve over 90% reduction in computation cost in the inference path and approximately 75% reduction of computation in back-propagation (per iteration). We achieve accuracy that surpasses the state-of-the-art results for MNIST, CIFAR-10/100, Caltech-101 and ImageNet-2012 datasets. The funding from TechAccel-R grant has helped us validate some of our results on the path to commercialization.



# 2017-2018 IAN McLACHLIN PRIZE FOR ENTREPRENEURSHIP IN ENGINEERING

## **Odero Otieno**

(Computer Engineering, Undergraduate Student)

### **Project Title:**

TechAngle Young Leaders Initiative

### **Summary**

Discovering the next generation of young leaders in STEM and Technological Entrepreneurship from high schools, colleges & universities in Kenya and Africa.

## **Asad Lesani**

(Civil Engineering and Applied Mechanics, PhD Student)

### **Project Title:**

Blue City Technology

### **Summary**

Blue City Technology Inc. makes sensors for monitoring key traffic metrics in real-time. Our Cloud-based platform analyzes the data collected by those sensors to provide solutions such as origin-destination reports, real-time traffic light optimization, and insights into infrastructure planning.



# INAUGURAL MCGILL ENGINE DOBSON CUP PRIZE WINNER

Established in 2017, the McGill EngInE Prize is offered to support a venture with at least one member that is a current student or professor from the Faculty of Engineering and competing in the final round in of the Innovation-Driven Enterprise track of the McGill Dobson Cup competition.

## **UltraSense**

UltraSense aims to improve water quality monitoring systems with low-cost, high-precision sensors realized with integrated graphene technology.

### **Team**

Ibrahim Fakhri, Raed Abdo, Professor Thomas Szkopek, all Electrical and Computer Engineering

# THE INNOVATION FUND NEEDS YOUR SUPPORT.

The Innovation Fund lies at the heart of our Faculty's mission of encouraging entrepreneurial thinking—at all levels—through our six departments and two schools. The fund supports team-based, innovative projects through the TechAccel Grants that help students jump-start and accelerate technologically-based ideas that have business and social impact potential.

For more information contact:  
Ms. Katya Marc, the McGill EngInE Manager  
Tel: 514-398-3355 or [katya.marc@mcgill.ca](mailto:katya.marc@mcgill.ca)

## **The Innovation Fund is being supported by alumni:**

Jim & Barbara Brodeur (BEng '56)  
Ian Mclachlin (BEng '60)  
Pasquale Di Pierro (BEng '76)  
Fonex Data Systems Inc.  
The Anna & Louis Viglione (BEng '78) Foundation  
Michael Barski (BEng '68)  
Mark Levine (BEng '91)  
Arthur Levine (BEng '61)  
Howard Stotland (BEng '66)  
Robert Walsh (BEng '65)

## **The Innovation Fund needs your support through:**

1. An annual contribution (Suggested amount is \$1K)
2. A named endowment within the Innovation Fund

## **For more information contact:**

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**The McGill EngInE**, the Faculty of Engineering Innovation and Entrepreneurship hub, focuses on stimulating technologically-based innovation and entrepreneurship at McGill in collaboration with the McGill Dobson Centre for Entrepreneurship and the Office of Innovation and Partnerships. The EngInE aims to help develop the next-generation of McGill technological innovators and entrepreneurs, to promote and accelerate the commercialization of inventions and software out of the Faculty, and to increase engagement and R&D collaborations between innovation-driven companies and the Faculty of Engineering.