iBEST Institute for Biomedical Engineering, Science and Technology

9TH ANNUAL iBEST SYMPOSIUM

Institute for Biomedical Engineering, Science and Technology (iBEST) 9th Annual Symposium

DATE

Friday, June 14, 2019

VENUE

2nd Floor, Li Ka Shing Knowledge Institute (LKSKI)
209 Victoria Street, Toronto

TIME

8:45 am to 5:00 pm

AGENDA

Find the complete agenda at ibestresearch.ca/ibest-symposium/2019-symposium

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Ryerson University

St. Michael's
Inspired Care.
Inspiring Science.

9TH ANNUAL iBEST
SYMPOSIUM

AGENDA

8:45 - 9:00 am	**Registration/Breakfast** *(Bernie and Mildred Syron Exhibit Hall)*
9:00 - 9:30 am	**Welcome and Introductions** *(Allan Waters Family Auditorium)* • Dr. David Cramb, Dean, Faculty of Science, Ryerson University **iBEST Update and Overview of the Symposium** • Dr. Ori Rotstein, iBEST Co-Director; Vice-President of Research and Innovation, St. Michael's Hospital • Dr. Michael Kolios, iBEST Co-Director; Associate Dean, Faculty of Science, Ryerson University
9:30 - 10:30 am	**Keynote Speaker** *(Allan Waters Family Auditorium)* Dr. Marzyeh Ghassemi, Assistant Professor in Computer Science and Medicine, University of Toronto; Faculty Member, Vector Institute; Canada CIFAR Artificial Intelligence Chair **Title:** *Learning Healthy Models in Machine Learning for Health*
10:30 - 10:45 am	**Coffee & Tea Break** *Tea Sponsored by DAVIDsTEA*
10:45 am - 12:00 pm	**Design Competition: Innovation Showcase** *(Allan Waters Family Auditorium)* Trainee team finalists will pitch their designed biomedical-related solutions to our judges and the audience for cash prizes and incubation opportunities. **Moderator:** Selena Osman, Graduate Student, Ryerson University

Finalists, in order of appearance:

- *Dermatological Tool for Automatically Identifying Skin Cancer*, by Syeda Suha Rabbani, Rabia Tanvir & Syeda Kaynat Zahra
- *Signal Quality Enhancement of MBioSigs in the Clinic*, by Sourav Kumar Mukhopadhyay & Michael Zara
- *Automation of a Sensor Driven Continuous Flow Bioreactor for Cartilage Tissue Engineering*, by Andrew Goudswaard, Kelvin Jok & Joshlene Nimalraaj
- *Virtual Reality Trunk Muscle Training System*, by Gordon Gray, Bharath Krishnan & Stephen DiGirolamo
- *Wellness: Stress Monitoring in Footwear*, by Stefan Denkovski, Kima Joulji & Alexandra Marzo

Judges Panel

- Paul Chipperton, MedTech Entrepreneur, Commercialization Catalyst and Angel Investor
- Dr. Ozzy Mermut, Assistant Professor, Physics and Astronomy, York University
- Josh Garbe, Associate, Ripple Ventures
- Tony Orsi, Partner, Bereskin & Parr LLP

12:00 - 1:30 pm

iBEST Expo *(Tony and Anne Arrell Classrooms 240/241 | Bernie and Mildred Syron Exhibit Hall)*
Scientists and staff from both institutions will present their research programs, highlight their research capacity and be available to discuss enhancing collaborative activities. Industry, government and community partners will also participate in the exhibition.

Lunch will be provided during this time

1:30 - 2:45 pm

Research Theme Presentations *(Allan Waters Family Auditorium)*
Investigators from each iBEST research theme will present their research and explore opportunities for collaboration and knowledge translation, followed by a panel discussion and audience feedback.
Session Chairs: Drs. Stephen Waldman and Yeni Yücel

Presenters:

- Dr. Raffi Karshafian, Biomedical Delivery Systems (BDS) Theme
  Title: *Ultrasound and Microbubble Potentiated Applications*
- Dr. Dafna Sussman, Biomedical Imaging & Therapy (BIT) Theme
  Title: *Fetal MRI: New Tools and Applications*

	• Dr. Gaspard Montandon, Biomaterials, Tissue Injury & Repair (BTR) Theme **Title:** *Brainstorming Solutions for the Opioid Crisis* • Dr. Muhammad Mandani, Healthcare Analytics & Applications (HAA) Theme **Title:** *Advancing Advanced Analytics in the Hospital: Trials and Tribulations* **Panelists:** • Dr. Scott Tsai, Theme Lead of Biomedical Delivery Systems (BDS) • Dr. Alireza Sadeghian, Theme Lead of Healthcare Analytics and Applications (HAA) • Dr. Miranda Kirby, Theme Lead of Biomedical Imaging & Therapy (BIT) • Dr. Haibo Zhang, Theme Lead of Biomaterials, Tissue Injury & Repair (BTR) • Noel Courage, Partner, Bereskin & Parr LLP
2:45 - 3:00 pm	**Coffee & Tea Break** *Tea Sponsored by DAVIDsTEA*
3:00 - 4:00 pm	**Keynote Speaker** *(Allan Waters Family Auditorium)* Dr. Michelle Khine, Professor, Department of Biomedical Engineering, University of California, Irvine; Director of Faculty Innovation, Henry Samueli School of Engineering; Director of BioENGINE; Fellow at AIMBE and NAI **Title:** *Play Science!*
4:00 - 4:15 pm	**Announcement of Contest Winners and Closing Remarks** *(Allan Waters Family Auditorium)* • Dr. Sri Krishnan, iBEST Co-Director, Associate Dean, Faculty of Engineering and Architectural Science, Ryerson University
4:15 - 5:00 pm	**Social & Mixer** (*136 Multipurpose Room*) Join us for a social co-hosted by the Biomedical Zone and the St. Michael's Hospital Research Student Association (SRSA).

ACKNOWLEDGEMENTS

We are grateful to all the presenters and participants and thank them for their time and effort. We would also like to express our sincere thanks to those who contributed their time and expertise behind the scenes to make this event possible.

Executive Committee

Dr. Ori Rotstein, Vice-President of Research and Innovation, St. Michael's Hospital
Dr. Steven N. Liss, Vice-President, Research and Innovation, Ryerson University
Dr. Michael Benarroch, Provost and Vice-President, Academic, Ryerson University

Scientific Organizing Committee

Dr. Sri Krishnan, iBEST Co-Director, Ryerson University
Dr. Michael Kolios, iBEST Co-Director, Ryerson University
Dr. Tom Schweizer, iBEST Co-Director, St. Michael's Hospital
Dr. Linda Maxwell, Executive Director, Biomedical Zone, Ryerson University and St. Michael's Hospital
Dr. Stephen Waldman, Scientific Consultant, Ryerson University
Dr. Yeni Yücel, Scientific Consultant, St. Michael's Hospital
Dr. Katalin Szaszi, Research Training Centre, St. Michael's Hospital
Jennifer MacInnis, Research Office Liaison, Ryerson University
Samar Saneinejad, Research Office Liaison, St. Michael's Hospital

iBEST Theme Leads

Dr. Miranda Kirby, Biomedical Imaging and Therapy (BIT)
Dr. Alireza Sadeghian, Healthcare Analytics and Applications (HAA)
Dr. Scott Tsai, Biomedical Delivery Systems (BDS)
Dr. Haibo Zhang, Biomaterials, Tissue Injury and Repair (BTR)

Support Staff

Kristina Calletor, iBEST Assistant
Tamara Carvalho, Biomedical Zone, Ryerson University and St. Michael's Hospital
Dina Coronios-Antoniou, Office of Research Administration, St. Michael's Hospital
Robert Danielsen, Audio Visual Consultant, St. Michael's Hospital
Michelle Dubinsky, Student Representative, St. Michael's Hospital Research Student Association
Lina Elfaki, Student Representative, St. Michael's Hospital Research Student Association
Victoria Farmer, Faculty of Engineering and Architectural Science, Ryerson University
Ana Gajic, Communications and Public Affairs, St. Michael's Hospital
Laura Greflund, Events and Administration Coordinator, Ryerson University
Sylvia Kavanagh, Research Communications, Ryerson University
Yuri Markarov, Medical Media, St. Michael's Hospital
Diana Niculescu, Faculty of Science, Ryerson University
Selena Osman, Student Representative, St. Michael's Hospital Research Student Association
Sam Portnoy, Audio Visual Consultant, St. Michael's Hospital
Imran Sheikh, iBEST Coordinator
Carole Zhou, iBEST Marketing Assistant

We would like to thank the Faculty of Science as well as the Faculty of Engineering and Architectural Science at Ryerson University, St. Michael's Hospital, and Bereskin & Parr LLP for their support of the iBEST Symposium.

KEYNOTE SPEAKER

Dr. Marzyeh Ghassemi

Assistant Professor in Computer Science and Medicine,
University of Toronto; Faculty Member, Vector Institute;
Canada CIFAR Artificial Intelligence Chair

Title: *Learning Healthy Models in Machine Learning for Health*

Biography

Dr. Marzyeh Ghassemi is an Assistant Professor in Computer Science and Medicine at the University of Toronto, and a Vector Institute faculty member holding a Canadian CIFAR AI Chair. She currently serves as a NeurIPS 2019 Workshop Co-Chair and Board Member of the Machine Learning for Health Unconference. She is on the Board of Women in Machine Learning (WiML) and has co-organized the 2016/2017/2018 NIPS Workshop on Machine Learning for Health (ML4H), has been 2018 Area Chair for MLHC, and served as an Academic Guest Editor on the 2018 PLoS ONE call on Machine Learning in Health and Biomedicine. Her current research interests include clinical risk prediction with semi-supervised learning, optimal treatment discovery using expert demonstrations, and non-invasive patient phenotyping for behavioural conditions.

Abstract

Health is important, and improvements in health improve lives, but we still don't fundamentally understand what it means to be healthy. Because healthcare providers may be operating with different definitions of "healthiness," the same patient may receive different treatments between different hospitals or clinicians as new evidence is discovered or as individual illnesses are interpreted.

This problem of definition presents a unique challenge to the application of machine learning in healthcare settings. Healthcare is unlike many success stories in machine learning so far – games like Go and self-driving cars – because we do not have well-defined goals that can be used to learn rules. The nuance of health also requires that we keep machine learning models "healthy," working to ensure that they do not learn biased rules or detrimental recommendations.

In this talk, Dr. Ghassemi will cover some of the many novel technical challenges of applying machine learning to healthcare, as well as the unique opportunities made possible by machine learning.

KEYNOTE SPEAKER

Dr. Michelle Khine

Professor, Department of Biomedical Engineering, University of California, Irvine; Director of Faculty Innovation, Henry Samueli School of Engineering; Director of BioENGINE; Fellow at AIMBE and NAI

Title: *Play Science!*

Biography

Michelle Khine was an Assistant and Founding Professor of the School of Engineering at University of California (UC) Merced. She received her BS ('99) and MS ('01, under Dennis Lieu) in Mechanical Engineering from UC Berkeley and her PhD ('05, under Luke P. Lee) in Bioengineering from UC Berkeley and UC San Francisco. While in graduate school, she worked at Sandia National Labs as a MESA Fellow and co-founded Fluxion Biosciences (San Francisco, California), which was based on her dissertation work. Michelle joined UC Irvine in 2009 and co-founded Novoheart and TinyKicks.

Abstract

The challenge of micro- and nano-fabrication lies in the difficulties and costs associated with patterning at such high resolution. To make such promising technology more accessible and pervasive — which could enable pervasive health monitoring and disease detection/surveillance — there is a critical need to develop a manufacturing approach so that prototypes as well as completed manufactured devices cost only pennies. To accomplish this, instead of relying on traditional fabrication techniques largely inherited from the semiconductor industry, we have developed a radically different approach. Leveraging the inherent heat-induced relaxation of pre-stressed thermoplastic sheets — commodity shrink-wrap film — we pattern in a variety of ways on a large scale and achieve desired structures by controlled shrinking down to 5% of the original patterned sizes. The entire process takes only seconds yet enables us to 'beat' the limit inherent in traditional 'top-down' manufacturing approaches. With these tunable shape memory polymers, compatible with roll-to-roll as well as lithographic processing, we can robustly integrate various materials, from thin metal films to various nanomaterials, in order to achieve extremely high surface area, densification, and high aspect-ratio nanostructures directly in our microsystems for conformal wearable sensors as well as other applications. We have started 5 (currently working on the 6th) startup companies to translate our research into inventions that serve patients.

iBEST Scientific Exposition

Booth / Poster	Name
Application of Deep Learning in Health Care	Alex Dela Cruz, Kayvan Tirdad, Khashayar Habibi, Mahshid Farzaneh, Arif Jahangir
Bereskin & Parr LLP	Tony Orsi
Biomedical Physics Graduate Program	Sophia Finos
Biomedical Zone	Tamara Carvalho
BioRender – Create Figures in Minutes	Brigitte Dreger
The Centre for Engineering Innovation & Entrepreneurship (CEIE)	Krystyne Kontos
Effect of human umbilical cord perivascular cell secretomes in an adult zebrafish model of traumatic brain injury	Graham Ferrier, Eileen Liu, Dr. Eugene Park, Tanya Barretto, Dr. Elaine Liu, Dr. Jahan Tavakkoli, Dr. Andrew Baker
Enhancement of Esophageal Pressure Signals	Michael Zara, Dr. Sourav Mukhopadhyay
Frequency-Domain Synthetic Aperture Focusing Techniques for Imaging with Single-Element Focused Transducers	Elyas Shaswary
Graspable Genomics: Understanding Genetic Data Through Tangible Interactions and Interactive Surfaces	Veronica Andric, Daniel Nussey, Syeda Imtiaz, Dr. Ali Mazalek
Kolios Lab Research Interests	Elizabeth Berndl
Maternal-Fetal Imaging Lab	Foustina Nithiyanantham, Eunyoung Cho, Nicole Waddell, Jane Cheung, Dr. Dafna Sussman
Mitacs	Dr. Leslie Bone
Research Core Facility	Chris Spring, Xiaofeng Lu, Dr. Dario Bogojevic, Dr. Pamela Plant, Dr. Caterina Di Ciano-Oliveira
Research Training Centre, St. Michael's Hospital	Kristine Antony
Resili	Morgan Rosenberg, Amanda Argento, Swan Gurung
The Use of Acoustic Harmonics in Real-Time Thermometry During Hyperthermia Treatment	Tyler Hornsby
Use of pulsed high intensity focused ultrasound to study sublethal injury response of bEND.3 cells	Rajwinder Kaur