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Welcome Message from the Technical Program Chairs

Welcome to GlobalSIP 2019 in Ottawa. With a crisp fall breeze, warm sunshine, and a kaleidoscope of beautiful fall colors, autumn is a wonderful time to explore Ottawa. Fall colors in Gatineau Park, Camp Fortune's aerial experience, the entertaining Haunted tour and the ByWard market, among others are all options to meet your diverse needs. Please do not forget the conference while you try to squeeze in some local activities. The conference presents many interesting sessions covering several exciting and new directions in signal processing. There is a breadth of topics covered in the symposia and the general sessions and we are confident you will find something of interest to you. We expect these sessions will provide a glimpse of the innovations taking place currently to shape our future.

This year's GlobalSIP technical program reflects the continued growth of data-driven "machine learning" techniques in signal processing, in applications from healthcare to energy delivery systems to wireless communications. Some of the underpinning of the technology such as optimization, statistical inference, and computing have much history, but the availability of large data and massive computing resources along with the ability to imagine big have led to many fascinating developments in recent years. The technology holds the promise of being able to deal with many exciting and large-scale problems of much interest to society.

Signal processing research has always been fun and exciting, with a wealth of applications, and the data-driven and nonlinear processing techniques we see, in part, at GlobalSIP have made them even more compelling. We have done our best to make this year's conference a rewarding and stimulating experience; we hope the various talks, posters and interactions further your future research. The technical program would not be possible without the help of many individuals. First and foremost, our thanks to the organizers of each of the symposia, who conceived the cutting-edge areas for exposition, sought submissions from experts in the area, found keynote speakers, assigned and managed the reviews, etc. Thanks to them, the symposia, which are at the heart of GlobalSIP, make it unique among our society's meetings. We also want to acknowledge the many reviewers for the conference who played a critical part in ensuring the quality of our meeting. Lastly, but not the least, we want to thank all the authors and presenters for choosing this venue for disseminating their work. We sincerely hope you have a wonderful time at the conference and look forward to interacting with you during the course of the conference.

Sincerely,

Bhaskar Rao & Peter Willett
IEEE GlobalSIP 2019 Technical Program Chairs

IEEE GlobalSIP 2019 Organizing Committee

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Advanced Bio-Signal Processing and Machine Learning for Assistive and Neuro-Rehabilitation Systems

General Chairs:

Arash Mohammadi (Concordia University, Canada)
S. Farokh Atashzar (New York University, USA)

Artificial Intelligence for Future Wireless Communication

General Chairs:

Chuan Zhang (National Mobile Communications Research Laboratory, Southeast University, P.R. China)
Jienan Chen (University of Electronic Science and Technology of China, P.R. China)

Deep Learning for Healthcare Engineering

General Chairs:

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Graph Signal Processing

General Chairs:

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Santiago Segarra (Rice University, USA)
Sundeep Prabhakar Chepuri (Indian Institute of Science, India)

Machine Learning for Rare Event Detection in Healthcare

General Chairs:

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Machine Learning for Wireless Communications, Networking, and Security

General Chairs:

Silvija Kokalj-Filipovic (Perspecta Labs, USA)
Tim O'Shea (DeepSig and Virginia Tech, USA)
Yalin E. Sagduyu (Intelligent Automation, Inc., USA)
Yi Shi (Virginia Tech and Intelligent Automation, Inc., USA)
George Stantchev (Naval Research Laboratory, USA)
Osman Yagan (Carnegie Mellon University, USA)

Machine Learning, Optimization and Security for Future Energy Delivery Systems

General Chairs:

Mahnoosh Alizadeh (University of California, Santa Barbara, USA)
Josh Taylor (University of Toronto, Canada)
Anna Scaglione (Arizona State University, USA)

Signal Processing for Human Machine Learning Systems

General Chairs:

Aditya Vempaty (Xio Research Inc., USA)
Bhavya Kailkhura (Lawrence Livermore National Lab, USA)
Pramo Varshney (Syracuse University, USA)

TPC Chairs:

Sijia Liu (IBM)
Jayaraman Thiagarajan (Lawrence Livermore, USA)
Qunwei Li (Lawrence Livermore, USA)

Signal and Information Processing for Person-centered and Citizen-centered Smart Living

General Chairs:

Sethuraman Panchanathan (Arizona State University, USA)
Abdulmotaleb El Saddik (uOttawa, Canada)

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Konstantinos Plataniotis (University of Toronto, Canada)
Anup Basu (University of Alberta, Canada)
Troy McDaniel (Arizona State University, USA)
Hemanth Venkateswara (Arizona State University, USA)

Signal Processing and Machine Learning for Social Good

General Chairs:

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Charalampos Chelmis (University at Albany, USA)

TPC Chairs:

Theodora Chaspari (Texas A&M University, USA)
Reihaneh Rabbany (McGill University, Canada)
Yasin Yilmaz (University of South Florida, USA)

Signal/Information Processing and AI for Finance and Business

General Chairs: Xiao-Ping (Steven) Zhang (Ryerson University, Canada)
Kumar Bhaskaran (IBM, USA)

Tensor Methods in Signal Processing and Machine Learning

General Chairs:

Xiao Fu (Oregon State University, USA)
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Chen He, Unknown
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Tao Mei, JD.com
Hagit Messer, Tel-Aviv University
Benjamin Miller, MIT Lincoln Laboratory
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Kumar Vijay Mishra, The University of Iowa
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Baosen Zhang, University of Washington
Di Zhang, Zhengzhou University
June Zhang, University of Hawaii Manoa
Mi Zhang, Michigan State University
Tao Zhang, Starkey
Tao Zhang, Starkey Hearing Technologies
Wenyi Zhang, University of Science and Technology of China
Xu Zhang, University of Science and Technology of China
Yu Zhang, University of California, Santa Cruz
Yue Zhang, Siemens
Yue Zhao, Stony Brook University
Jiannan Zheng, University of British Columbia
Sheng Zhou, Tsinghua University
Xiong Zhou, Amazon
Yi Zhou, Henan University
Hao Zhu, The University of Texas at Austin
Lijun Zhu, Georgia Institute of Technology
Yada Zhu, IBM Research
Saman Zonouz, Rutgers University

Plenary Speakers

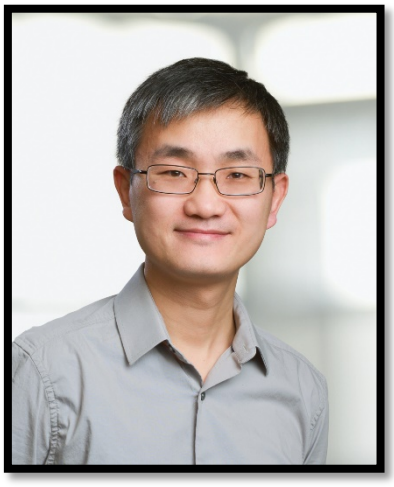
Tuesday, November 12
8:00

Haizhou Li (National University of Singapore)

Haizhou Li received the B.Sc., M.Sc., and Ph.D degree in Electrical and Electronic Engineering from South China University of Technology, Guangzhou, China. He is currently a Professor at the Department of Electrical and Computer Engineering, National University of Singapore (NUS). Prior to joining NUS, he was the Principal Scientist and Department Head of Human Language Technology in the Institute for Infocomm Research, Singapore (2003-2016). Prof. Li's research interests include speech information processing, natural language processing, and human-machine interface. Prof. Li has served as the Editor-in-Chief of IEEE/ACM Transactions on Audio, Speech and Language Processing (2015-2018), a Member of the Editorial Board of Computer Speech and Language (2012-2018), and a Member of IEEE Speech and Language Processing Technical Committee (2013-2015). He was the President of the International Speech Communication Association (ISCA, 2015-2017), the President of Asia Pacific Signal and Information Processing Association (2015-2016), and the President of Asian Federation of Natural Language Processing (2017-2018). He was the General Chair of ACL 2012, INTERSPEECH 2014, and IEEE ASRU 2019. Prof. Li is a Fellow of the IEEE, and a Fellow of ISCA. He was a recipient of the President's Technology Award 2013 in Singapore. He was named one of the two Nokia Visiting Professors in 2009 by the Nokia Foundation, and U Bremen Excellence Chair Professor in 2019 by Bremen University, Germany.

Wednesday, November 13
8:15

Wei Yu (University of Toronto)



Wei Yu received the B.A.Sc. degree in Computer Engineering and Mathematics from the University of Waterloo, and M.S. and Ph.D. degrees in Electrical Engineering from Stanford University. He has been with the Electrical and Computer Engineering Department at the University of Toronto since 2002, where he is now Professor and holds a Canada Research Chair (Tier 1) in Information Theory and Wireless Communications. Prof. Wei Yu serves as the Second Vice President of the IEEE Information Theory Society in 2019, and has served on its Board of Governors since 2015. He was an IEEE Communications Society Distinguished Lecturer (2015-16), an Area Editor for the IEEE Transactions on Wireless Communications (2017-20), and chaired the Signal Processing for Communications and Networking Technical Committee of the IEEE Signal Processing Society (2017-18). He received the IEEE Communications Society Award for Advances in Communication in 2019, the IEEE Marconi Prize Paper Award in Wireless Communications in 2019, the IEEE Signal Processing Society Best Paper Award in 2017 and 2008, the Journal of Communications and Networks Best Paper Award in 2017, an E.W.R. Steacie Memorial Fellowship in 2015, and an IEEE Communications Society Best Tutorial Paper Award in 2015. Prof. Wei Yu is a Fellow of IEEE, a Fellow of Canadian Academy of Engineering, and a member of the Royal Society of Canada's College of New Scholars, Artists and Scientists. He is recognized as a Highly Cited Researcher.

Plenary Speakers (Continued)

Wednesday, November 13
13:00

Robert W. Heath Jr. (University of Texas at Austin; UT SAVES)

Robert W. Heath Jr. is a Cullen Trust for Higher Education Endowed Professor in the Department of ECE at The University of Texas at Austin, and Director of UT SAVES. He has received several paper awards including recently the 2017 IEEE Marconi Prize Paper Award and the 2019 IEEE Communications Society Stephen O. Rice Prize. He also received the 2017 EURASIP Technical Achievement Award and is co-recipient of the 2019 IEEE Kiyo Tomiyasu Award. He authored "Introduction to Wireless Digital Communication" (Prentice Hall in 2017) and "Digital Wireless Communication: Physical Layer Exploration Lab Using the NI USRP" (National Technology and Science Press in 2012). He co-authored "Millimeter Wave Wireless Communications" (Prentice Hall in 2014) and Foundations of MIMO Communications (Cambridge 2019). He is a licensed Amateur Radio Operator, a registered Professional Engineer in Texas, a Private Pilot, a Fellow of the National Academy of Inventors, and a Fellow of the IEEE.

Thursday, November 14
8:15

Min Wu (University of Maryland, College Park)

Min Wu is a Professor of Electrical and Computer Engineering and a Distinguished Scholar-Teacher at the University of Maryland, College Park. She received her Ph.D. degree in electrical engineering from Princeton University in 2001. At UMD, she leads the Media and Security Team (MAST), with main research interests on information security and forensics and multimedia signal processing. Her research and education have been recognized by a U.S. NSF CAREER award, a TR100 Young Innovator Award from the MIT Technology Review, an U.S. ONR Young Investigator Award, a Computer World "40 Under 40" IT Innovator Award, University of Maryland Invention of the Year Awards, IEEE Distinguished Lecturer recognition, IEEE SPS Meritorious Service Award, and several paper awards from IEEE SPS, ACM, and EURASIP. She was elected IEEE Fellow and AAAS Fellow for contributions to signal processing, multimedia security, and forensics. Dr. Wu chaired the IEEE Technical Committee on Information Forensics and Security (2012-2013), and has served as Vice President - Finance of the IEEE Signal Processing Society (2010-2012), Founding Chief Editor of the IEEE SigPort initiative (2013-2014), and Editor-in-Chief of the IEEE Signal Processing Magazine (2015-2017).

Mathworks Workshop

Wednesday, November 13th
10:00 AM - 12:00 PM
Room 201

Title: Developing AI-based Smart Signal Processing Systems using MATLAB

The use of AI techniques on signals is growing in popularity across a variety of applications. In this practical session, we will explore how MATLAB can help accelerate the development and deployment of predictive models as applicable to timeseries data using transfer learning workflows. We will explore some specific tools to speed up AI workflow – From signal labeling to deployment on Embedded Systems such as NVIDIA Jetson. We will also look at newer techniques at the intersection of signal processing and deep learning that can be particularly useful when available data is low.

Presenter Bio: Kirthi K. Devleker is WW Medical Devices and Healthcare Industry Marketing Manager at MathWorks. Previously, he served as a product manager at MathWorks focusing on Machine Learning and Deep Learning applications for sensor data. Kirthi is responsible for overall medical devices and healthcare strategy and execution. Kirthi has been with MathWorks for 9 years; and has a master's in electrical engineering from San Jose State University, CA USA. Prior to joining MathWorks, Kirthi worked as a software evangelist developing sensor characterization tools in MATLAB.

Presenter Bio: Akhilesh Mishra is an Application Engineer for the Medical devices and Healthcare industry at MathWorks. He specializes in the signal/data processing, artificial intelligence and GPU computing workflows. He has been with MathWorks since 2016. Akhilesh holds a M.S. degree from University of Kansas where he was the signal processing lead in a group working on radar and sonar systems for sounding the ice sheets of Greenland and Antarctica to study global sea-level rise.

IEEE SPS AutoDefense Winter School on Autonomous Systems

Wednesday, November 13
10:00 AM - 4:00 PM
Room 102
***Registration required**

Over the last decade, there has been an increasing surge of interest for proposing, development, and investigation of Autonomous Cyber-Physical Systems (CPS) with advanced levels of autonomy in order to manage the ever-increasing requirements in complexity and autonomy across different interconnected fields. An autonomous system is an artificial system capable of performing a pre-defined number of specified tasks with high accuracy and in an autonomous fashion. Generally speaking, a fully autonomous system can: (i) Obtain/learn information about the environment; (ii) Work over an extended horizon without human intervention; (iii) Move, fully or partially, throughout its operating environment without human intervention; (iv) Avoid harmful situations, and; (v) Learn new knowledge to adjust/adapt to changing environments. Given recent exponential growth in Artificial Intelligence (AI) and advancement of Deep Neural Networks (DNNs), autonomous systems are gaining more and more attention in a wide range of practical applications of significant engineering importance requiring complex perception-action cycles including surveillance, cognitive radio, traffic control, and robot-mediated industrial and domestic applications. Despite recent advancements, autonomous CPSs are still in their infancy and suffer from several shortcomings. For example, autonomous systems lack in adaptability to internal and external non-stationary conditions. Many real-world CPSs frequently experience non-stationary conditions (i.e., unknown situations) due to uncertain interactions with the environment and users, cyber-attacks, failures, and/or structural changes. These shortcomings call for an urgent quest to develop novel and innovative signal processing and machine learning models to further improve and enhance advanced autonomous human-machine interactions.

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Svetlana Yanushkevich (University of Calgary, Canada)

Konstantinos N. Plataniotis (University of Toronto, Canada)

Yingxu Wang (University of Calgary, Canada)

Mark Coates (McGill University, Canada)

Fakhri Karray (University of Waterloo, Canada)

Marina Gavrilova (University of Calgary, Canada)

Henry Leung (University of Calgary, Canada)

Yaoping Hu (University of Calgary, Canada)

IEEE SPS AutoDefense Winter School on Autonomous Systems

Keynote Speakers

1. Presenter: Dr. Ming Hou
Affiliation: Senior Defense Scientist, Defense Research & Development Canada (DRDC)
Title of Talk: Human Interactions with Technology and Human-Autonomy/AI Teaming

2. Presenter: Prof. Svetlana Yanushkevich
Affiliation: Professor, Electrical and Computer Engineering, University of Calgary
Title of Talk: Towards Trustworthy Technologies for Cognitive Human-Machine Systems

3. Presenter: Prof. Yingxu Wang
Affiliation: Professor, Electrical and Computer Engineering, University of Calgary
Title of Talk: On Autonomous Systems: From Reflexive, Imperative and Adaptive Intelligence to Autonomous and Cognitive Intelligence

4. Presenter: Prof. Konstantinos N. Plataniotis
Affiliation: Professor, Electrical and Computer Engineering, University of Toronto
Title of Talk: Acquiring Information from Surprise

5. Presenter: Prof. Yaoping Hu
Affiliation: Professor, Human-Computer Interaction within Virtual Environments, Associate Member, Hotchkiss Brain Institute
Title of Talk: Integration of Sensory Cues for User Interaction with Uncertain Information

6. Presenter: Prof. Mark Coates
Affiliation: Professor, Electrical and Computer Engineering, McGill University
Title of Talk: Graph Neural Networks: Learning from Graph-Structured Data in Networked Autonomous Systems

7. Presenter: Prof. Marina Gavrilova
Affiliation: Associate Head Computer Science Department, University of Calgary, Editor in chief TCS Journal Springer
Title of Talk: Cybersecurity Solutions Through Deep Learning of Social Behavioural Traits for Identity Recognition

8. Presenter: Prof. Arash Mohammadi
Affiliation: Assistant Professor, Concordia University, Director Membership-Services IEEE SPS
Title of Talk: Distributed, Event-based, and Secure Multi-Agent Autonomous Systems

9. Presenter: Prof. Henry Leung
Affiliation: Professor, ECE, University of Calgary
Title of Talk: Decision Support for Autonomous Systems

10. Presenter: Prof. Fakhri Karray,
Affiliation: Professor, University of Waterloo, University Research Chair, Director, Centre for Pattern Analysis and Machine Intelligence
Title of Talk: Advances in Continual Learning and Applications in Continuous and Categorical Classification

DRDC Workshop: Workshop on Wireless communications and sensing for Space-based Applications

Tuesday, November 12
10:00 AM – 3:30 PM
Chair: Ms. Anne Young, DRDC

Space-based observation, navigation and communications systems operate in a harsh physical environment (e.g., solar radiation, particle radiation) and need to deal with the mechanical and electromagnetic hazards that occur from human activities, such as orbital debris and RF spectral congestion.

The capabilities of Space systems and their payloads are constrained by system design choices and the impacts upon them due to this congested, contested and competitive space environment. Space system resiliency is a means for these space systems to mitigate these effects upon them and their payloads.

This workshop is inviting presentations on areas of research that can mitigate electromagnetic space hazards upon the wireless element of space systems.

Topic areas could be quantum radar, quantum communications, autonomous control of wireless devices, novel signal processing techniques to detect wireless signals in space, and the use of machine-learning algorithms to characterize and control signals.

Draft Agenda

	Activity	Lead/location
10:00	Registration/Check-in/Coffee	Shaw Centre, Ottawa
10:00	Workshop Overview The Problem – Wireless Communications and Sensing for Space-based Applications.	Ms. Anne Young – DRDC, Chairperson, Workshop on Wireless Communications and Sensing for Space-based Applications
10:20	Investigation of techniques for signal targeting of unmanned aerial systems	Dr. Pierre Luc Drouin
10:40	Sensor fusion for space applications	Dr Bhashyam Balaji -DRDC
11:00	Quantum Radars for Space Platforms	David Leung – DRDC, Carleton
11:20	Direction of arrival estimation for interference sources using differential geometry	Mr. Hossein Chahour
11:40	Novel RF Sensing techniques for Space	Mr. Mamoon M Rashid - DRDC
12:00 – 13:30	LUNCH BREAK (on your own)	
13:30	"Practical, Portable and Jamming Resilient Space-Based Quantum Sensing; Introducing Functional LIDAR"	Dr Amr Helmy University of Toronto
14:15	Plenary session	Ms. Anne Young, WS Chairperson and Plenary lead Prof S. Rajan [All presenters] Balaji, Dr. Bhashyam Dr C. Livingstone
15:15	Closing Remarks and Workshop Wrap-up	Ms. Anne Young

NRC Workshop

Thursday, November 14
10:00 AM – 3:30 PM
Room 204

Co-Chair: Dr. Prakash Patnaik, NRC Aerospace Research Centre, Ottawa, Canada
Co-Chair: Prof. Sreeraman Rajan, Systems & Computer Engineering, Carleton University, Ottawa Canada

Agenda

10:00 AM-10:30 AM: Prof. Mohamed Atia, Topic: Navigation in Satellite denied environments: Challenges and Possible Solutions

10:30 AM-11:30 AM: Keynote by Dr. Prakash Patnaik Topic: Sensors for Aerospace Applications

11:30 AM-12:00 PM: Dr. Roy ChihChung Wang, Topic: Independent samples from low-dimensional and compactly supported unnormalized densities

12:00 PM-13:30 PM: Lunch Break (on your own)

1:30 PM-2:00 PM: Mr. David Luong, Topic: Quantum Radars and Aerospace Systems

2:00 PM-3:00 PM: Prof. R. Doraiswami, Topic: Automated Proactive and Predictive Health and Usage Monitoring Systems

Keynote:

Sensors for Aerospace Applications
By Dr. Prakash Patnaik
Principal Research Scientist
Aerospace Defence Science & Technology
National Research Council Canada
Aerospace Research Centre, Ottawa, Ontario, Canada

Abstract: This presentation will address topical themes of sensors for aerospace operational needs. The spectrum of sensor requirements on-board a modem aircraft (both military and civil markets) is extremely broad and complex. The impact of new system architectures and technology developments, places new requirements on sensor performance and reliability. This presentation will review the development of advanced sensors for aerospace applications, e.g., engine and structures, highlighting the need for product quality and integrity whilst recognizing the increasing needs for their applications in extreme operating environments.

AN AUTOMATED PROACTIVE AND PREDICTIVE HEALTH AND USAGE MONITORING SYSTEMS
Rajamani Doraiswami (1) and Sreeraman Rajan (2)
1 Department of Electrical and Computer Engineering, University of New Brunswick, Fredericton New Brunswick, Canada dorai@unb.ca
2 Systems and Computer Science, Carleton University, Ottawa, Ontario, Canada sreeramanr@sce.carleton.sa

Abstract: An automated Health and Usage Monitoring Systems (HUMS), fault detection and isolation (FDI), condition-based maintenance (CBM), and predictive maintenance using a hierarchical approach is proposed for a wider class of complex, nonlinear aerial vehicles including aircrafts and drones, whose outputs are corrupted by stochastic and deterministic disturbances. Critical components are monitored in real time to avoid developing excessive stresses and vibrations A linear model is derived using the computed torque approach by introducing a new input to replace all the nonlinear terms including the applied, Coriolis, and gravitational forces. The resulting system formed of the aerial vehicle and the disturbances is described using Box-Jenkins (BJ) model. In order to develop proactive and predictive maintenance, an emulator is connected to all accessible inputs and its parameters are varied to mimic likely scenarios that system can encounter. The system and the associated Kalman filter are identified using the emulator-generated data. The vehicle model, termed signal model, and disturbance-free output¸ termed signal, are respectively the identified model and its output. To meet the critical requirement of high probability of correct decision with low false alarm probability, a fusion of model-based and model-free approach employed using the estimated signal and not the corrupted data. Model-free approach

includes Limit-checking and Plausibility analysis (LP); artificial neural network (ANN); and fuzzy inference (ANFIS) system. The Kalman filter is the backbone of model-based scheme. A fault is quickly detected via the faster of the two schemes and the health of the subsystems such as the actuator, and sensors is unfolded sequentially. Decisions from model-free and model-based approaches are weighted by a Bayes classifier. The proposed scheme was successfully evaluated.
The FDI of the faulty subsystems such as the sensor, the actuator or others are accurately determined using a Bayes' Classifier and tagged for maintenance. The proposed scheme is evaluated on a simulated system.

Quantum Radars and Aerospace Systems

David Luong (1), Sreeraman Rajan (1) and Balaji Bhashyam (2)
1. *Department of Systems and Computer Engineering, Carleton University, Ottawa, Ontario, Canada*
2. *Defence Research and Development Canada, Ottawa, Ontario, Canada*

Abstract: Recently, much attention has been focused on radars which rely on quantum mechanical phenomena to enhance detection performance. In this talk, a practically realizable quantum radar scheme will be presented, and possible applications to the detection of aircraft are discussed.

Navigation in Satellite-denied Environments, Challenges and Possible Solutions

Mohamed Atia
Department of Systems and Computer Engineering, Carleton University, Ottawa, Ontario, Canada

Abstract: Global Positioning System (GPS), the first operational satellite-based positioning system, is a powerful system that dramatically expanded autonomous systems capabilities to navigate anywhere anytime worldwide. However, GPS, and other satellite-based systems, is vulnerable to interference and jamming. This presentation will discuss how sensor fusion and multi-sensors integrated navigation technologies can enhance the accuracy and expand the navigation and positioning services in GPS-challenging environments. The presentation will discuss new emerging technologies used for multi-sensors navigation such as inertial sensors, laser scanners, vision sensors and radar. The talk will discuss how these sensors can be fused on-board in real-time to support the operation of unmanned aerial vehicles in satellite-denied environments.

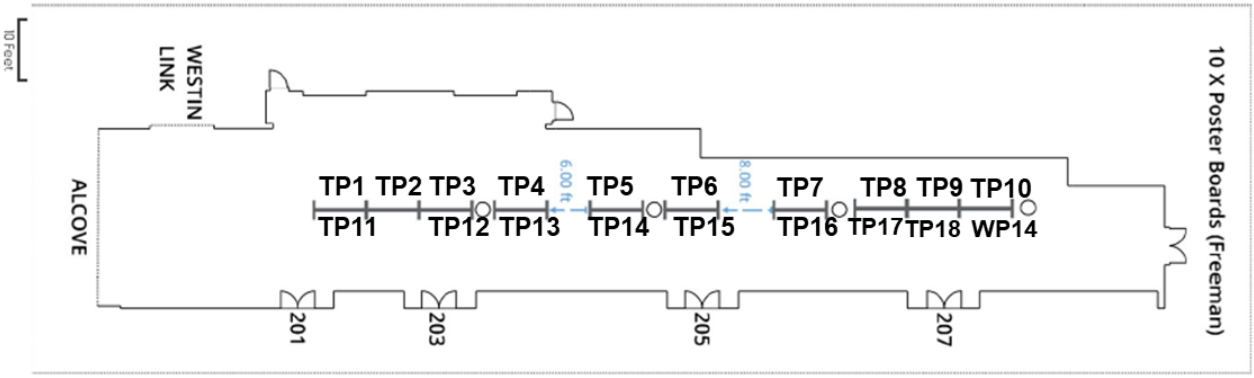
Independent samples from low-dimensional and compactly supported unnormalized densities

Roy.C-C. Wang, Sreeraman Rajan, James. R. Green
Department of Systems and Computer Engineering, Carleton University, Ottawa, Ontario, Canada

Abstract: Uncertainty quantification has many applications in risk management and anomaly detection. Sequential Monte Carlo is a method for online uncertainty quantification via a Bayesian inference framework. Essential to this family of simulation-based methods is the ability to draw independent samples from the prior or conditional probability densities.
Our current work in progress is about using a particular transport map, called the Knothe-Rosenblatt rearrangement, to draw independent samples from a given unnormalized density that satisfies certain constraints.

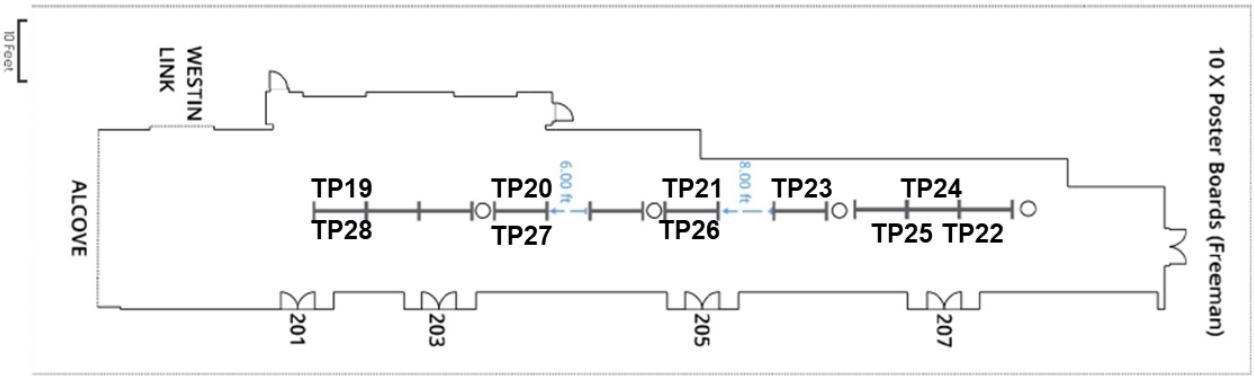
Poster Layouts

Poster Layout: Tuesday, November 12 (AM)



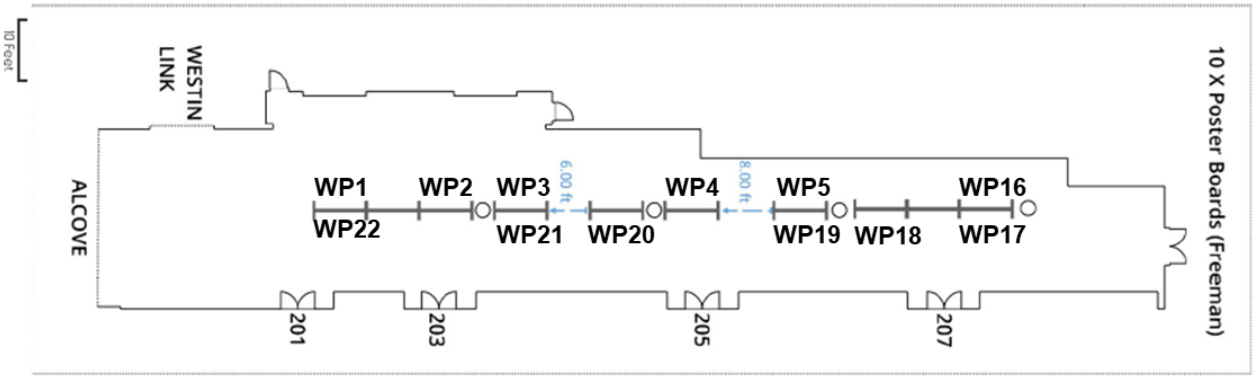
GS: Signal Processing Theory and Methods & Signal Processing for Human Machine Learning Systems

Poster Layout: Tuesday, November 12 (PM)



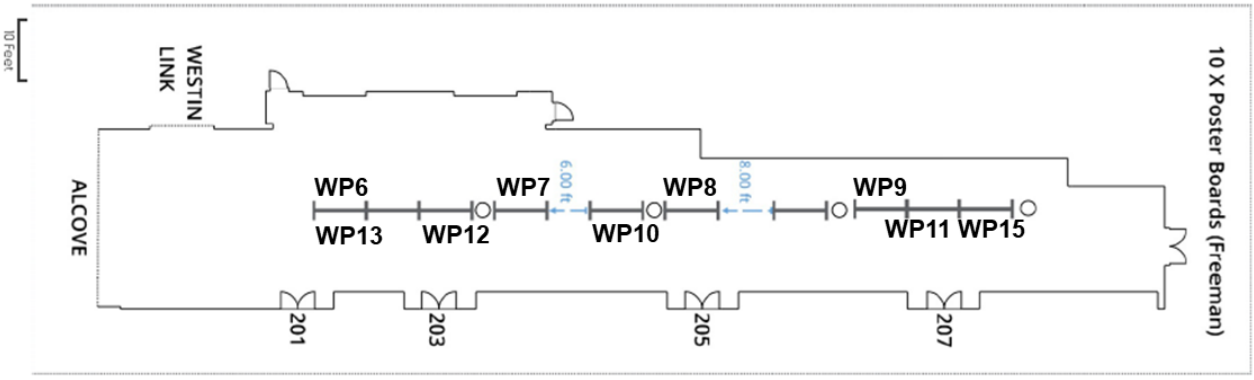
Graph Signal Processing & Machine Learning for Rare Event Detection in Healthcare

Poster Layout: Wednesday, November 13 (AM)



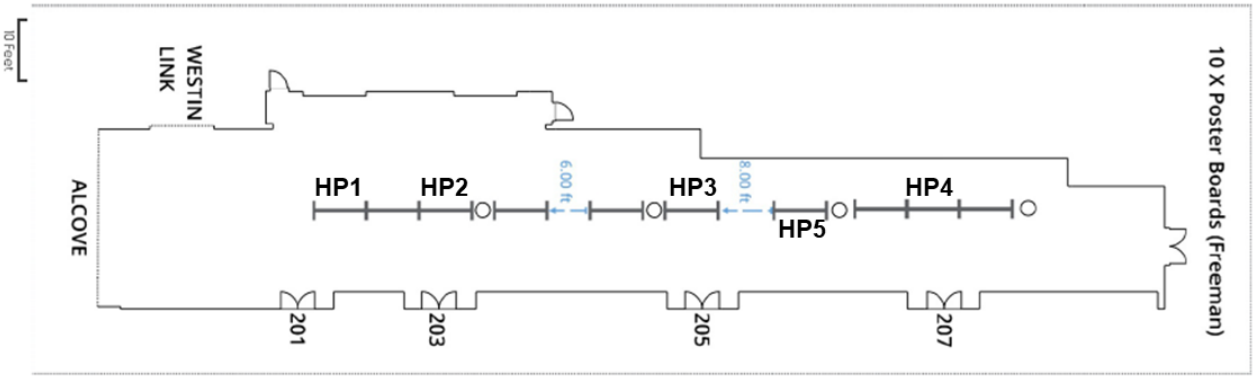
Machine Learning for Wireless Communications, Networking, and Security II & GS: Classification and Learning

Poster Layout: Wednesday, November 13 (PM)



GS: Image and Video Processing

Poster Layout: Thursday, November 14



Signal/Information Processing and AI for Finance and Business III & Machine Learning for Rare Event Detection in Healthcare I

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IEEE Signal Processing Society

Tuesday, November 12

Grid: Tuesday, November 12						
			GS=General Symposium			
08:00 - 09:30	Opening Remarks & Plenary I Gatineau 205 & 207					
09:30 - 10:00	Coffee Break & Poster Sessions GS: Signal Processing Theory and Methods & Signal Processing for Human Machine Learning Systems					
10:00 - 12:00	Room 201	Graph Signal Processing I Room 202	Machine Learning, Optimization and Security for Future Energy Delivery Systems I Room 203	Machine Learning for Rare Event Detection in Healthcare I Room 204	Signal Processing for Human Machine Learning Systems I Room 211	DRDC Workshop Gatineau 205 & 207
12:00 - 13:30	Lunch (on your own)			Young Professional's Networking Lunch (*Registration required) Room 102		
13:30 - 15:30	Deep Learning for Healthcare Engineering I Room 201	Graph Signal Processing II Room 202	Machine Learning, Optimization and Security for Future Energy Delivery Systems II Room 203	Machine Learning for Rare Event Detection in Healthcare II Room 204	Artificial Intelligence for Future Wireless Communication I Room 211	DRDC Workshop Gatineau 205 & 207
15:30 - 16:00	Coffee Break & Poster Sessions Graph Signal Processing & Machine Learning for Rare Event Detection in Healthcare					
16:00 - 18:00	Deep Learning for Healthcare Engineering II Room 201	GS: Array Signal Processing Room 202	Machine Learning, Optimization and Security for Future Energy Delivery Systems III Room 203	Signal Processing for Human Machine Learning Systems II Room 204	Artificial Intelligence for Future Wireless Communication II Room 211	
18:00 – 19:00	Panel Gatineau 205 & 207 (Cash bar will be available to lead into welcome reception)					
19:00 - 22:00	Welcome Reception Shaw Centre Trillium Ballroom					

Tuesday, November 12

8:00 - 9:30 **Opening Remarks and Plenary I**
Haizhou Li
Room: Gatineau 205 & 207

9:30 - 10:00 **Coffee Break & Poster Sessions**

9:30 - 10:00 **GS: Signal Processing Theory and Methods: Poster Session**
Chair: Sundeep Prabhakar Chepuri (Indian Institute of Science, India)

TP1: Cramer-Rao Bound for Joint Angle and Delay Estimators by Partial Relaxation
Ahmad Bazzi (CEVA, France)
Dirk Slock (EURECOM, France)

TP2: Interactive Multi-model Tracking of a Highly Maneuvering Target using MSPDAF with Least Squares Virtual Fusion
Qin Tang (University of Electronic Science and Technology of China, P.R. China)
Fangqi Zhu (University of Texas at Arlington, USA)
Jing Liang (University of Electronic Science and Technology of China, P.R. China)

TP3: Cramér-Rao Bound for Wideband DOA Estimation with Uncorrelated Sources
Yibao Liang (Beijing Institute of Technology, P.R. China)
Qing Shen (Beijing Institute of Technology, P.R. China)
Wei Cui (Beijing Institute of Technology, P.R. China)
Wei Liu (University of Sheffield, United Kingdom (Great Britain))

TP4: Localization in Autonomous Vehicles Using a Generalized Inner Product
Samuel Todd Flanagan (Texas A&M University, USA)
Drupad K Khublani (Texas A&M University, USA)
Jean-Francois Chamberland (Texas A&M University, USA)
Siddharth Agarwal and Ankit Vora (Ford Motor Company, USA)

TP5: Velocity Estimation Algorithms for Suspensions
Diana Hernandez-Alcantara (Universidad de Monterrey, Mexico)
Luis Amezquita-Brooks (Universidad Autonoma de Nuevo Leon, Mexico)
Nancy Morales-Villarreal (Universidad de Monterrey, Mexico)
Omar Juarez-Tamez (Universidad de Monterrey, Mexico)

TP6: Multi-Objective Gain Optimizer for an Active Disturbance Rejection Controller
Brayden M DeBoon (Ontario Tech University, Canada)
Brayden Kent (Ontario Tech University, Canada)
Maciej Lacki (Ontario Tech University, Canada)
Scott B. Nokleby (University of Ontario Institute of Technology, Canada)
Carlos Rossa (Ontario Tech University, Canada)

TP7: Low Complexity Frequency Monitoring Filter for Fast Exon Prediction Sequence Analysis
Daniel Massicotte (Universite du Quebec a Trois-Rivieres, Canada)
Marwan Jaber (Universite du Quebec a Trois-Rivieres, Canada)
Marie-Ange Massicotte (Universite Laval, Canada)
Philippe Massicotte (Universite du Quebec a Trois-Rivieres, Canada)

TP8: α Belief Propagation as Fully Factorized Approximation
Dong Liu (KTH, Sweden)
Nima N. Moghadam (Huawei Technologies Sweden AB, Sweden)
Lars Kildehoj Rasmussen (KTH Royal Institute of Technology, Sweden)
Jingliang Huang (Huawei, Sweden)
Saikat Chatterjee (KTH - Royal Institute of Technology & Communication Theory Lab, Sweden)

Tuesday, November 12

WP14: Data Driven QoE-QoS Association Modeling of Conversational Video *(moved from another)
HongCheng Gu (Nanjing University of Posts and Telecommunications, P.R. China)
Yu-ning Dong (Nanjing University of Posts and Telecommunications, P.R. China)
TingTing Cao (Nanjing University of Posts and Telecommunications, P.R. China)

9:30 - 10:00 Signal Processing for Human Machine Learning Systems: Poster Session
Chair: Bhavya Kailkhura (Lawrence Livermore National Lab, USA)

TP9: An Accurate Evaluation of MSD Log-likelihood and its Application in Human Action Recognition
Nuha Zamzami Bouguila (Concordia University, Canada)
Nizar Bouguila (Concordia University, Canada)

TP10: Mechanical Acoustic Signal Assisted Translational Model for Industrial Human-Machine Interaction
Zhiduo Ji (Shanghai Jiao Tong University, P.R. China)
Cailian Chen (Shanghai Jiao Tong University, P.R. China)
Jianping He (Shanghai Jiao Tong University, P.R. China)
Xinping Guan (Shanghai Jiao Tong University, P.R. China)

TP11: A Novel Slip-Kalman Filter to Track the Progression of Reading Through Eye-Gaze Measurements
Stephen Bottos (University of Windsor, Canada)
Balakumar Balasingam (University of Windsor, Canada)

TP12: Identity Retaining and Redundancy Reducing GAN for Person Re-identification
Presented by Yihang Li on behalf of Jiangbo Pei (Beijing University of Posts and Telecommunications, P.R. China)
Yinsong Xu (Beijing University of Posts and Telecommunications, P.R. China)

TP13: A Comparison of Boosted Deep Neural Networks for Voice Activity Detection
Harshit Krishnakumar (Indiana University Bloomington, USA)
Donald S Williamson (Indiana University, USA)

TP14: Privacy Preserving Deep Learning with Distributed Encoders
Yitian Zhang (University of Toronto, Canada)
Hojjat Salehinejad (University of Toronto, Canada)
Joseph Barfett (St. Michael's Hospital, Canada)
Errol Colak (University of Toronto, Canada)
Shahrokh Valaee (University of Toronto, Canada)

TP15: Visually Assisted Time-Domain Speech Enhancement
Elham Ideli (Simon Fraser University & SingSoftNext, Canada)
Bruce Sharpe (Singular Software Inc., Canada)
Ivan V. Bajic and Rodney Vaughan (Simon Fraser University, Canada)

TP16: Generative Counterfactual Introspection for Explainable Deep Learning
Shusen Liu (Lawrence Livermore National Laboratory, USA)
Bhavya Kailkhura (Lawrence Livermore National Lab, USA)
Donald Loveland and Yong Han (Lawrence Livermore National Laboratory, USA)

TP17: On Amelioration Of Human Cognitive Biases In Binary Decision Making
Baocheng Geng (Syracuse University, USA)
Pramod Varshney (Syracuse University, USA)
Muralidhar Rangaswamy (AFRL, USA)

TP18: A Privacy Solution for Voice Enabled Devices Connected to the Internet
Mohammad Niknazar (Xio Research Inc., USA)
Aditya Vempaty (Xio Research Inc., USA)
Paul Haley (Xio Research Inc., USA)

Tuesday, November 12

10:00 - 12:00 Graph Signal Processing I
Room 202
Chair: Gonzalo Mateos (Rochester University, USA)

10:00 Sampling Signals on Meet/Join Lattices
Chris Wendler (ETH Zurich, Switzerland)
Markus Püschel (ETH Zurich, Switzerland)

10:20 Modeling and Recovery of Graph Signals and Difference-Based Signals
Ariel Kroizer (Ben Gurion University of the Negev, Israel)
Yonina C. Eldar (Weizmann Institute of Science, Israel)
Tirza Routtenberg (Ben Gurion University of the Negev, Israel)

10:40 Mapping brain structural connectivities to functional networks via graph encoder-decoder with interpretable latent embeddings
Yang Li (University of Rochester, USA)
Rasoul Shafipour (University of Rochester, USA)
Gonzalo Mateos (University of Rochester, USA)
Zhengwu Zhang (Duke University & SAMSI, USA)

11:00 On Folded Graph Signals
Feng Ji (Nanyang Technological University, Singapore)
Pratibha Pratibha (Nanyang Technological University, Singapore)
Wee Peng Tay (Nanyang Technological University, Singapore)

11:20 Sampling and Reconstruction of Diffusive Fields on Graphs
Siddartha Reddy (Indian Institute of Sciences, India)
Sundeep Prabhakar Chepuri (Indian Institute of Science, India)

10:00 - 12:00 Machine Learning, Optimization and Security for Future Energy Delivery Systems I
Room 203
Chair: Mahnoosh Alizadeh (University of California, Santa Barbara, USA)

10:00 – 11:00 Keynote Speaker: Alejandro Dominguez-Garcia, UIUC

11:00 Risk-Sensitive Energy Procurement with Uncertain Wind
Avinash N Madavan (University of Illinois at Urbana-Champaign, USA)
Subhonmesh Bose (University of Illinois at Urbana Champaign, USA)

11:20 Invited: Enabling Real-time, Network-admissible Disaggregation of Market Services with Convex Inner Approximations
Mads Almassalkhi (University of Vermont, USA)

11:40 Invited: Measurement-based Optimal DER Dispatch via Distributed ADMM Optimization
Christine Chen (The University of British Columbia, Canada)
Severin Nowak (The University of British Columbia, Canada)
Liwei Wang (The University of British Columbia, Canada)

Tuesday, November 12

10:00 – 12:00 Machine Learning for Rare Event Detection in Healthcare I
Room 204
Chairs: Mohamed Abdelazez (Carleton University, Canada)
Yasmina Souley Dosso (Carleton University, Canada)

10:00 – 11:00 Keynote Speaker: Dr. Thomas Heldt, Massachusetts Institute of Technology
Finding the Needle in the Haystack: Approaches to Identifying Septic Patients in the Emergency Department

Abstract: Sepsis is by no means a rare condition, contributing by some estimates to 1 to 2 of every three in-hospital deaths. While much effort has been focused on identifying the onset of sepsis in intensive care patients, the vast majority of patients with sepsis come through the Emergency Department, which consequently is the first point of patient contact and the first point to identify patients with sepsis and to initiate appropriate therapy.

In this talk, I will outline the challenges associated with identifying septic patients in a busy, tertiary care Emergency Department and our work to address this challenge at triage and throughout the patient's stay in the Emergency Department. I will also outline model-based approaches to determine which patients might benefit from transitioning from fluid resuscitation to vasopressor therapy to support prevent transition to septic shock.

Bio: Thomas Heldt studied physics at Johannes Gutenberg University, Germany, at Yale University, and at MIT. He received the PhD degree in Medical Physics from MIT's Division of Health Sciences and Technology and undertook postdoctoral training at MIT's Laboratory for Electromagnetic and Electronic Systems. Prior to joining the MIT faculty in 2013, Thomas was a Principal Research Scientist with MIT's Research Laboratory of Electronics. He currently holds the W.M. Keck Career Development Chair in Biomedical Engineering. He is a member of MIT's Institute for Medical Engineering and Science and on the faculty of the Department of Electrical Engineering and Computer Science.

Thomas's research interests focus on signal processing, mathematical modeling and model identification in support of real-time clinical decision making, monitoring of disease progression, and titration of therapy, primarily in neurocritical and neonatal critical care. In particular, Thomas is interested in developing a mechanistic understanding of physiologic systems, and in formulating appropriately chosen computational physiologic models for improved patient care. His research is conducted in close collaboration with clinicians from Boston-area hospitals, where he is integrally involved in designing and deploying high-quality data-acquisition systems and collecting clinical data.

11:00 Continuous Parkinsonian Tremor Estimation Using Motion Data
Murtadha D. Hssayeni (Florida Atlantic University, USA)
Joohi Jimenez-Shahed (Baylor College of Medicine, USA)
Michelle A. Burack (University of Rochester Medical Center, USA)
Behnaz Ghoraani (Florida Atlantic University, USA)

11:20 ITD Modeling Based on Anthropometrics and KEMAR Coefficients Using Deep Neural Networks
Saif Alotaibi (University of Colorado Colorado Springs, USA)
Mark Wickert (University of Colorado at Colorado Springs, USA)

Tuesday, November 12

10:00 – 12:00 Signal Processing for Human Machine Learning Systems I
Room 211
Chairs: Pramod Varshney (Syracuse University, USA)
Aditya Vempaty (Xio Research Inc., USA)

10:00 – 11:00 Keynote Speaker: Ahmed H Tewfik, University of Texas
Towards Man-Machine Symbiosis

Bio: A. H. Tewfik Department of Electrical and Computer Engineering, University of Texas Austin Numerous articles in the general press warn against a dark future in which evermore powerful machines will displace humans. Yet, empirical evidence establishes that properly designed human - machine systems outperform man and machine and have the potential of increasing human creativity and cognitive abilities. In this talk, I will provide an overview of cognitive biases in human decision-making, give examples of man-machine symbiosis and review our recent work in the area. In particular, I will focus on machine-assisted human decision making and the use of brain machine interfaces to improve speech recognition, recognize the audio source a person is listening to and whether the person is listening to her mother tongue. Time permitting, I will describe some of the work that we have been performing on reducing the amount of data needed to train support vector machines and deep neural networks.

Ahmed H Tewfik received his B.Sc. degree from Cairo University, Cairo Egypt, in 1982 and his M.Sc., E.E. and Sc.D. degrees from MIT, in 1984, 1985 and 1987 respectively. He is the Cockrell Family Regents Chair in Engineering and the Chairman of the Department of Electrical and Computer Engineering at the University of Texas Austin. He was the E. F. Johnson professor of Electronic Communications with the department of Electrical Engineering at the University of Minnesota until September 2010. Dr. Tewfik worked at Alphatech, Inc. and served as a consultant to several companies. From August 1997 to August 2001, he was the President and CEO of Cognicity, Inc., an entertainment marketing software tools publisher that he co-founded, on partial leave of absence from the University of Minnesota. His current research interests are in cognitive augmentation through man-machine symbiosis and mobile computing, low energy broadband communications, applied machine learning and brain computing interfaces. Prof. Tewfik is a Fellow of the IEEE. He was a Distinguished Lecturer of the IEEE Signal Processing Society in 1997 - 1999. He received the IEEE third Millennium award in 2000 and the IEEE Signal Processing Society Technical Achievement Award in 2017. He was elected to the positions of President-elect of the IEEE Signal Processing Society in 2017 and VP Technical Directions of that Society in 2009. He served as VP from 2010-2012 and on the board of governors of that Society from 2006 to 2008. He has given several plenary and keynote lectures at IEEE conferences.

11:00 On Amelioration Of Human Cognitive Biases In Binary Decision Making
Baocheng Geng (Syracuse University, USA)
Pramod Varshney (Syracuse University, USA)
Muralidhar Rangaswamy (AFRL, USA)

11:20 An Accurate Evaluation of MSD Log-likelihood and its Application in Human Action Recognition
Nuha Zamzami (Concordia University, Canada)
Nizar Bouguila (Concordia University, Canada)

11:30 Mechanical Acoustic Signal Assisted Translational Model for Industrial Human-Machine Interaction
Zhiduo Ji (Shanghai Jiao Tong University, P.R. China)
Cailian Chen (Shanghai Jiao Tong University, P.R. China)
Jianping He (Shanghai Jiao Tong University, P.R. China)
Xinping Guan (Shanghai Jiao Tong University, P.R. China)

11:40 A Novel Slip-Kalman Filter to Track the Progression of Reading Through Eye-Gaze Measurements
Stephen Bottos (University of Windsor, Canada)
Balakumar Balasingam (University of Windsor, Canada)

11:50 A Privacy Solution for Voice Enabled Devices Connected to the Internet
Mohammad Niknazar (Xio Research Inc., USA)
Aditya Vempaty (Xio Research Inc., USA)
Paul Haley (Xio Research Inc., USA)

10:00 – 15:30 DRDC Workshop: Workshop on Wireless communications and sensing for Space-based Applications
Gatineau 205 & 207

12:00 - 13:30 Lunch (on your own)

Tuesday, November 12

12:00 - 13:30 Young Professionals Networking Event (*Registration required)
Room 102
Join early-career engineers and scientists as well as senior graduate students for an opportunity to network with peers and hear from Peyman Moeini, B. Eng., MASc, PMP, P.Eng. as he shares his career story and experience.

13:30 - 15:30 Deep Learning for Healthcare Engineering I
Room 201
Chair: Martin McKeown (University of British Columbia, Canada)

13:30 – 14:10 Keynote Speaker: Le Lu, PAII Inc.

Abstract: Recent progresses have been evident on employing deep learning principles upon large quantities (e.g., at hospital scale) of clinical imaging and text databases. However, in modern academic hospitals, there are tremendous amounts of unstructured patient data scattered among different clinical databases (PACS, BTRIS, RIS, CRIS, etc.), which mostly remain non-indexable, non-searchable to a semantic degree and are not useful means yet to tackle the quantitative precision healthcare challenge at scale. In this talk, I will review some of our recent research work in two aspects: 1) a general view on the research studies and insights for three key problems to solve: detection (computer-aided diagnosis/detection), semantic and anatomical segmentation (for precision quantitative imaging), and “big data, weak label” robust deep learning paradigms; 2) organizing and exploiting a large quantity of clinically significant image findings by learning a deep feature representation, and building deep semantic hierarchical (ontology-preserving) lesion similarity embedding over more than 10 thousand patient studies, to permit personalized precision medicine in radiology.

Bio: Dr. Le Lu is the executive director of Bethesda Research Lab of PAII Inc., the US research arm by one of the world's largest insurance companies. He founded the deep learning for medical imaging and clinical informatics group at NVIDIA in 2017 and was a senior research manager until June 2018. Before that, he was a staff scientist at National Institutes of Health Clinical Center, Bethesda, Maryland during 2013-2017. He solved on various core R&D problems with critical technical contributions for Siemens colonic polyp and lung nodule CADx systems, vessel, and bone imaging at Siemens Corporate Research and Siemens Healthcare from 2006 to 2013 where his last post was a senior staff scientist. He has authored or co-authored 140 peer-reviewed papers, invented 26 granted and pending US/WO/PCT patents and 37 inventions. He helped his trainees win two research trainee awards at RSNA 2016/2018, the young scientist "runner-up" award at MICCAI 2017 and the young researcher "test of time" publication award at MICCAI 2018, NSF/NDSEG/NSERC fellowships. During his career at NIH, He made instrumental contributions on the public releases of several large-scale radiology datasets, including NIH-ChestXray14 and NIH-DeepLesion databases. He also edited a book on “Deep Learning and Convolutional Neural Networks for Medical Image Computing” by Springer in 2017. He was mentored by Harry Shum, Kentaro Toyama and Zhengyou Zhang at Microsoft Research, and received his Ph.D. in computer science from Johns Hopkins University in 2007, advised by Gregory Hager. He won the NIH Mentor of the Year award in 2015 and NIH Clinical Center Director's award for "research excellence and significant patient care impacts" in 2017. He serves the Area chair for AAAI 2020, WACV 2020, CVPR 2020, 2019, 2017, ICIP 2017; MICCAI 2018, 2016, 2015, Demo chair of CVPR 2017; Industrial Track Chair for IEEE ICHI 2019; and won two outstanding reviewer awards at CVPR 2018, BMVC 2017.

14:10 An Attention Based Deep Neural Network for Automatic Lexical Stress Detection
Tian Xia (PingAn AI Lab, USA)
Xianfeng Rui (PingAn AI Lab, USA)
Chien-Lin Huang (PingAn AI Lab, USA)
Iek Heng Chu (PingAn AI Lab, USA)
Shaojun Wang (PingAn AI Lab, USA)
Mei Han (PingAn AI Lab, USA)

14:30 LSTM Siamese Network for Parkinson's Disease Detection from Speech
Presented by Laureano Moro-Velazquez on behalf of Saurabhchand Bhati (Johns Hopkins University, USA)
Laureano Moro Velazquez (Johns Hopkins University, USA)
Jesus Villalba (Johns Hopkins University, USA)
Najim Dehak (Hopkins University, unknown)

14:50 A Deep Convolutional-Recurrent Neural Network Architecture for Parkinson's Disease EEG
Soojin Lee (UBC, Canada)
Ramy Hussein (Unversity of British Columbia, Canada)
Martin McKeown (University of British Columbia, Canada)

15:10 Epileptic Seizure Prediction: A Multi-Scale Convolutional Neural Network Approach
Ramy Hussein (Unversity of British Columbia, Canada)
Rabab Ward (University of British Columbia, Canada)

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13:30 - 15:30 Graph Signal Processing II
Room 202
Chair: Gonzalo Mateos (Rochester University, USA)

13:30 – 14:30 Keynote Speaker: Wee Peng Tay, Nanyang Technological University
Generalized Graph Signal Processing

13:30 - 15:30 Machine Learning, Optimization and Security for Future Energy Delivery Systems II
Room 203
Chair: Christine Chen (University of British Columbia, Canada)

13:30 Exploration of tensor decomposition applied to commercial building baseline estimation
David Hong (University of Pennsylvania, USA)
Shunbo Lei (University of Michigan, USA)
Johanna Mathieu (University of Michigan, USA)
Laura Balzano (University of Michigan, USA)

13:50 A Data-driven Convex-optimization Method for Estimating Load Changes
Abdullah Al-Digs and Bo Chen (University of British Columbia, Canada)
Sairaj Dhople (University of Minnesota, USA)
Christine Chen (University of British Columbia, Canada)

14:10 Invited: Online management of electric and autonomous mobility on demand vehicles
Mahnoosh Alizadeh (University of California, USA)
Berkay Turan (University of California, USA)
Ramtin Pedarsani (University of California, USA)

14:30 Invited: Power system harmonics: identification and mitigation
Josh Taylor (University of Toronto, Canada)

14:50 Invited: Machine Learning for Resource Allocation and Scheduling in Device-to-Device (D2D) Microgrid Communications
Melike Erol-Kantarci (University of Ottawa, Canada)

15:10 Partial Discharge Classification in Power Electronics Applications using Machine Learning
Ebrahim Balouji (Chalmers University of Tech Company, Sweden)
Thomas Hammarstroem (Chalmers University of Technology, Sweden)
Tomas McKelvey (Chalmers University of Technology, Sweden)

13:30 - 15:30 Machine Learning for Rare Event Detection in Healthcare II
Room 204
Chairs: Madison Cohen-McFarlane (Carleton University, Canada)
Yasmina Souley Dosso (Carleton University, Canada)

13:30 Classifying Melanoma and Seborrheic Keratosis Automatically with Polarization Speckle Imaging
Wang Yuheng (University of British Columbia, Canada)
Jiayue Cai (University of British Columbia, Canada)
Daniel C. Louie (University of British Columbia, Canada)
Harvey Lui (University of British Columbia, Canada)
Tim Lee (University of British Columbia, Canada)
Z. Jane Wang (University of British Columbia, Canada)

13:50 Combining TD-IDF with symptom features to differentiate between lymphoma and tuberculosis case reports
Moanda Pholo (Tshwane University of Technology, South Africa)
Abdelbaset Abdelrahim Khalaf (Tshwane University of Technology, South Africa)
Chunling Tu (Tshwane University of Technology, South Africa)
Yskandar Hamam (Tshwane University of Technology, South Africa)

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14:10 Serious Games and ML for Detecting MCI
Robert D McLeod (University of Manitoba, Canada)
Marcia Friesen (University of Manitoba, Canada)
Mahmood Aljumaili (University of Manitoba, Canada)

14:30 GMM-UBM based Person Verification using footfall signatures for Smart Home Applications
Sahil Anchal (Indian Institute of Technology Delhi, India)
Bodhibrata Mukhopadhyay (Indian Institute of Technology Delhi, India)
Manohar Parvatini (Indian Institute of Technology Delhi, India)
Subrat Kar (Indian Institute of Technology, Delhi, India)

14:50 Identification of Essential Proteins Based on Centrality Methods Using Improved Collective Influence Algorithm
Presented by Tong Chen on behalf of Houwang Zhang (China University of Geosciences (Wuhan), P.R. China)
He Zhang (Beijing University of Posts and Telecommunications, P.R. China)
Chong Wu (City University of Hong Kong, P.R. China)

13:30 - 15:30 Artificial Intelligence for Future Wireless Communication I
Room 211
Chair: Jienan Chen (University of Electronic Science and Technology of China, P.R. China)

13:30 – 14:10 Keynote Speaker: Warren Gross, McGill University

14:10 ML-Based Block Sparse Recovery for distributed MIMO Radars in Clutter Environments
Azra Abtahi (Sharif University of Technology & INSF, Iran)
Mohammad Mahdi Kamjoo (Sharif University of Technology, Iran)
Farokh Marvasti (Sharif University of Technology (SUT), Iran)
Saeed Gazor (Queen's University, Canada)

14:30 Energy Efficiency of Full-Duplex Two-Way Channels
Wei Guo (UESTC, P.R. China)
Chuan Huang (University of Electronic Science and Technology of China, P.R. China)

14:50 Blind Recognition of Channel Codes via Deep Learning
Boxiao Shen (University of Electronic Science and Technology of China, P.R. China)
Hongyi Wu (University of Electronic Science and Technology of China, P.R. China)
Chuan Huang (University of Electronic Science and Technology of China, P.R. China)

15:10 Constructing Index Codes with Coded Demands and Side Information through Matrix Completion
Lakshmi Narasimhan Theagarajan (Indian Institute of Technology, Palakkad, India)

15:30 - 16:00 Coffee Break & Poster Session

15:30 – 16:00 Graph Signal Processing & Machine Learning for Rare Event Detection in Healthcare: Poster Session
Chairs: Sundeep Prabhakar Chepuri (Indian Institute of Science, India)
Yasmina Souley Dosso (Carleton University, Canada)

TP19: Kernel Node Embeddings
Abdulkadir Celikkanat (CentraleSupelec, University of Paris-Saclay, France)
Fragkiskos Malliaros (CentraleSupelec, University of Paris-Saclay, France)

TP20: Graph Filtering with Quantization over Random Time-varying Graphs
Leila Ben Saad (University of Agder, Norway)
Elvin Isufi (Delft University of Technology, The Netherlands)
Baltasar Beferull-Lozano (University of Agder, Norway)

TP21: The Cosine Number Transform: A Graph Signal Processing Approach
Guilherme Ribeiro (Universidade Federal de Pernambuco, Brazil)
Juliano B. Lima (Federal University of Pernambuco, Brazil)

TP22: Bayesian Design of Sampling Set for Bandlimited Graph Signals
Xuan Xie (Fudan University, P.R. China)
Junhao Yu (Fudan University, P.R. China)
Hui Feng (Fudan University, P.R. China)
Bo Hu (Fudan University, Shanghai, P.R. China)

TP23: Anomalous Sensor Detection Based on Nonlinear Graph Filter
Zhuo Li (Xiamen University, P.R. China)
Zhenlong Xiao (Xiamen University, P.R. China)
Chao Lan (University of Wyoming, USA)

TP24: GSP Analysis of Brain Imaging Data from Athletes with History of Multiple Concussions
Saurabh Sihag (Rensselaer Polytechnic Institute & Computational Biology Center, T. J. Watson IBM Research Center, USA)
Sebastien Naze (T. J. Watson IBM Research Center, USA)
Foad Taghdiri (Tanz Centre for Research in Neurodegenerative Diseases, University of Toronto, Canada)
Maria Carmela Tartaglia (Tanz Centre for Research in Neurodegenerative Diseases, University of Toronto, Canada)
James Kozloski (IBM Research, USA)

TP25: On Critical Sampling of Time-Vertex Graph Signals
Junhao Yu (Fudan University, P.R. China)
Xuan Xie (Fudan University, P.R. China)
Hui Feng (Fudan University, P.R. China)
Bo Hu (Fudan University, Shanghai, P.R. China)

TP26: Towards a Graph Signal Processing Framework for Modeling Power System Dynamics
Xinyue Hu (University of Minnesota, USA)
Zhi-Li Zhang (University of Minnesota, USA)

TP27: AMA: An Open-source Amplitude Modulation Analysis Toolkit for Signal Processing Applications
Raymundo Cassani (INRS-EMT, Canada)
Isabela Albuquerque (INRS-EMT, Canada)
João Monteiro (INRS-EMT, Canada)
Tiago Falk (INRS-EMT, Canada)

TP28: Where am I Looking: Localizing Gaze in Reconstructed 3D Space
Devarth Parikh (Rochester Institute of Technology, USA)
Yawen Lu (Rochester Institute of Tech, USA)
Yuan Xin (Tencent Deep Sea Lab, P.R. China)
Di Wu (Tencent Deep Sea Lab, P.R. China)
Jeff Pelz (Rochester Institute of Technology, USA)
Guoyu Lu (Rochester Institute of Technology, USA)

16:00 - 18:00 Deep Learning for Healthcare Engineering II
Room 201
Chair: Martin McKeown (University of British Columbia, Canada)

16:00 Infant Brain Development Prediction using Multi-Task Hypergraph Neural Network
Yan Wang (Tsinghua University, P.R. China)
Yue Gao (Tsinghua University, P.R. China)
Qionghai Dai (Tsinghua University, P.R. China)

Tuesday, November 12

16:20 Deep learning methods for Image Segmentation Containing Translucent Overlapped Objects
Tayebeh Lotfi Mahyari (Carleton University, Canada)
Richard Dansereau (Carleton University, Canada)

16:40 A Two-Tier Convolutional Neural Network for Combined Detection and Segmentation in Biological Imagery
Amir Koushyar Ziabari (Oak Ridge National Lab, USA)
Abbas Shirinifard (St. Jude Children's Research Hospital, USA)
Matthew Eicholtz (Florida Southern College, USA)
David Solecki (St. Jude Children's Research Hospital, USA)
Derek Rose (Oak Ridge National Lab, USA)

17:00 Pain Detection from Facial Videos Using Two-Stage Deep Learning
Zhanli Chen (University of Illinois at Chicago, USA)
Menchetti Guglielmo (University of Illinois Chicago, USA & Politecnico di Milano, Italy)
Rashid Ansari (University of Illinois at Chicago, USA)
Diana Wilkie (University of Florida, USA)
Enis Cetin (Bilkent University, Ankara, Turkey)
Yasemin Yardimci (Middle East Technical University, Turkey)

17:20 Deep Learning Based Mass Detection in Mammograms
Zhenjie Cao (PingAn Tech, US Research Lab, USA)
Zhicheng Yang (PingAn Tech, US Research Lab, USA)
Yanbo Zhang (PingAn Tech, US Research Lab, USA)
Ruei-Sung Lin (PingAn Tech, US Research Lab, USA)
Shibin Wu (PingAn Technology, P.R. China)
Lingyun Huang (PingAn Technology, P.R. China)
Mei Han (PingAn Tech, US Research Lab, USA)
Jie Ma (Shenzhen People's Hospital, P.R. China)

17:40 COMPUTER ASSISTED READING OF CHEST RADIOGRAPHS
Z. Jane Wang (University of British Columbia, Canada)

16:00 - 18:00 GS: Array Signal Processing
Room 202
Chair: Dirk Slock (EURECOM, France)

16:00 Joint Angle and Delay Estimation (JADE) by Partial Relaxation
Ahmad Bazzi (CEVA, France)
Dirk Slock (EURECOM, France)

16:20 Majorization-Minimization Algorithms for Analog Beamforming with Large-Scale Antenna Arrays
Aakash Arora (SnT, University of Luxembourg, Luxembourg)
Christos G. Tsinos (University of Luxembourg, Luxembourg)
Bhavani Shankar Mysore R (Interdisciplinary Centre for Security, Reliability and Trust & University of Luxembourg, Luxembourg)
Symeon Chatzinotas (University of Luxembourg, Luxembourg)
Björn Ottersten (University of Luxembourg, Luxembourg)

16:40 Coverage Analysis for Cellular-Connected UAVs with 3D Antenna Patterns
Xueyuan Wang (Syracuse University, USA)
M. Cenk Gursoy (Syracuse University, USA)

17:00 Statistical Analysis of Antenna Array Systems with Perturbations in Phase, Gain and Element Positions
Mohammad Hossein Moghaddam (Chalmers University of Technology, Sweden)
Sina Rezaei Aghdam (Chalmers University of Technology, Sweden)
Thomas Eriksson (Chalmers University of Technology, Sweden)

17:20 Beam Alignment-Based mmWave Spectrum Sensing in Cognitive Vehicular Networks
Presented by Tong Chen on behalf of He Zhang (Beijing University of Posts and Telecommunications, P.R. China)
Caili Guo (Beijing University of Posts and Telecommunications, P.R. China)

17:40 Robust Direction of Arrival Estimation in the Presence of Array Faults using Snapshot Diversity
Gary C.F. Lee (Massachusetts Institute of Technology, USA)
Ankit Singh Rawat (Google Research, USA)
Gregory Wornell (MIT, USA)

16:00 – 18:00 Machine Learning, Optimization and Security for Future Energy Delivery Systems III
Room 203
Chair: Joshua Taylor (University of Toronto, Canada)

16:00 – 17:00 Keynote Speaker: Vincent Wong, University of British Columbia
Demand Response Programs for Workload Scheduling in Data Centers

Abstract: The issue of energy efficiency poses a crucial challenge to today's data centers owing to the growing requirements for data storage and analysis services. Data centers often support a range of delay-tolerant workloads with adjustable execution time under a service level agreement. This potential for workload management has motivated utility companies to deploy demand response programs to encourage data centers toward shifting workload execution away from peak load periods. However, deployment of a demand response program for data centers is challenging as there is always uncertainty in the arrival rate of workload, the local renewable generation (e.g., photovoltaic (PV) panels, wind turbines), and electricity price (e.g., in a real-time pricing scheme). The uncertainties require a dynamic provisioning of servers to optimally schedule the workload. In this talk, we will discuss how data centers can benefit from participating in demand response programs. We will focus on data centers demand response in deregulated electricity markets, where a data center can enter a contract with one of several competing utility companies. The joint decision of utility company choices and workload scheduling will be captured as a many-to-one matching game with externalities and a distributed algorithm will be developed to determine a stable outcome of such a game. Finally, we will discuss how online convex optimization techniques can be applied to obtain a local optimal workload scheduling for data centers in a demand response program without any knowledge of the stochastic process that uncertain parameters follow.

Bio: Vincent Wong is a Professor in the Department of Electrical and Computer Engineering at the University of British Columbia, Vancouver, Canada. His research areas include protocol design, optimization, and resource management of communication networks, with applications to the Internet, wireless networks, smart grid, fog computing, and Internet of Things. Currently, he is an executive editorial committee member of the IEEE Transactions on Wireless Communications, an Area Editor of the IEEE Transactions on Communications, and an Associate Editor of the IEEE Transactions on Mobile Computing. Dr. Wong is a Fellow of the IEEE and an IEEE Communications Society Distinguished Lecturer (2019 - 2020).

17:00 Integrated Power and D2D Communications Simulator for Future Power Systems
Kevin Shimotakahara (University of Ottawa, Canada)
Medhat Elsayed (University of Ottawa, Canada)
Karin Hinzer (University of Ottawa, Canada)
Melike Erol-Kantarci (University of Ottawa, Canada)

17:20 Invited: Towards a Co-Simulation-Data Analytics Platform for IT/OT Converged Smart Grid Cybersecurity Analysis
Marthe Kassouf (Hydro Québec Research Institute (IREQ), Canada)
Scott Sanner (University of Toronto, Canada)
Amir Abiri (University of Toronto, Canada)
Yew Meng Khaw (University of Toronto, Canada)
Deepa Kundur (University of Toronto, Canada)

17:40 Invited: Hidden Convexities in Decentralized Microgrid Coordination
Pirathayini Srikantha (York University, Canada)

Tuesday, November 12

16:00 – 18:00 Signal Processing for Human Machine Learning Systems II
Room 204
Chairs: Bhavya Kailkhura (Lawrence Livermore National Lab, USA)
Pramod Varshney (Syracuse University, USA)

16:00 – 17:00 Keynote Speaker: Dennis Wei, IBM Research
One Explanation Does Not Fit All: A Toolkit and Taxonomy of AI Explainability Techniques

17:00 Generative Counterfactual Introspection for Explainable Deep Learning
Shusen Liu (Lawrence Livermore National Laboratory, USA)
Bhavya Kailkhura (Lawrence Livermore National Lab, USA)
Donald Loveland (Lawrence Livermore National Laboratory, USA)
Yong Han (Lawrence Livermore National Laboratory, USA)

17:20 A Comparison of Boosted Deep Neural Networks for Voice Activity Detection
Harshit Krishnakumar (Indiana University Bloomington, USA)
Donald S Williamson (Indiana University, USA)

17:30 Privacy Preserving Deep Learning with Distributed Encoders
Yitian Zhang (University of Toronto, Canada)
Hojjat Salehinejad (University of Toronto, Canada)
Joseph Barfett (St. Michael's Hospital, Canada)
Errol Colak (University of Toronto, Canada)
Shahrokh Valaee (University of Toronto, Canada)

17:40 Visually Assisted Time-Domain Speech Enhancement
Elham Ideli (Simon Fraser University & SingSoftNext, Canada)
Bruce Sharpe (Singular Software Inc., Canada)
Ivan V. Bajic and Rodney Vaughan (Simon Fraser University, Canada)

17:50 Identity Retaining and Redundancy Reducing GAN for Person Re-identification
Presented by Yihang Li on behalf of Jiangbo Pei (Beijing University of Posts and Telecommunications, P.R. China)
Yinsong Xu (Beijing University of Posts and Telecommunications, P.R. China)

16:00 – 18:00 Artificial Intelligence for Future Wireless Communication II
Room 211
Chair: Jienan Chen (University of Electronic Science and Technology of China, P.R. China)

16:00 Deep Neural Hybrid Beamforming for Multi-User mmWave Massive MIMO System
Jiyun Tao, Jing Xing (University of Electronic Science and Technology of China, P.R. China)
Jienan Chen (University of Electronic Science and Technology of China, P.R. China)
Chuan Zhang (National Mobile Communications Research Laboratory, Southeast University, P.R. China)
Shengli Fu (University of North Texas, USA)

16:20 Reinforcement Learning-Driven QoS-Aware Intelligent Routing for Software-Defined Networks
Md Billal Hossain (The University of Akron, USA)
Jin Wei (Purdue University, USA)

16:40 Occupancy Estimation Using WiFi Motion Detection Via Supervised Machine Learning Algorithms
Muhammad Azam (Smart Building Lab, BrainBox AI, Montreal, Quebec, Canada)
Marion Blayo (Smart Buildings Lab, BrainBox AI, Montreal, Quebec, Canada)
Jean-Simon Venne (Smart Buildings Lab, BrainBox AI, Montreal, Quebec, Canada)
Michel Allegue (Aerial, Canada)

17:00 Impact analysis of Reciprocity Mismatch in Relaying Systems
Rongjiang Nie (University of Science and Technology of China, P.R. China)
Chen Li (University of Science And Technology of China, P.R. China)

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17:20 A BP Neural Network Based Punctured Scheduling Scheme Within Mini-slots for Joint URLLC and eMBB Traffic
**Presented by Yihang Li*
Qingqing Shang (Beijing University of Posts and Telecommunications, P.R. China)
Fangfang Liu (Beijing University of Posts and Telecommunications, P.R. China)
Chunyan Feng (Beijing University of Posts and Telecommunications, P.R. China)
Ruiyi Zhang (Beijing University of Posts and Telecommunications, P.R. China)
Shulun Zhao (Beijing University of Posts and Telecommunications, P.R. China)

17:40 Q-Learning Based Aerial Base Station Placement for Fairness Enhancement in Mobile Networks
Rozhina Ghanavi (University of Toronto, Canada)
Maryam Sabbaghian (University of Tehran, Iran)
Halim Yanikomeroglu (Carleton University, Canada)

18:00 – 19:00 Panel Session
Gatineau 205 & 207
Cash bar available to lead into welcome reception

19:00 - 22:00 Welcome Reception
Shaw Centre
Trillium Ballroom

Wednesday, November 13

Grid: Wednesday, November 13						
08:15 - 09:30	Plenary II Gatineau 205 & 207					
09:30 - 10:00	Coffee Break & Poster Sessions Machine Learning for Wireless Communications, Networking, and Security II & GS: Classification and Learning					
10:00 - 12:00	Mathworks Workshop Room 201	Signal Processing and Machine Learning for Social Good I Room 202	Machine Learning, Optimization and Security for Future Energy Delivery Systems IV Room 203	Machine Learning for Wireless Communications, Networking, and Security I Room 204	Room 211	Winter School Room 102
12:00 - 13:00	Lunch (on your own)					
13:00 - 14:00	Plenary III Gatineau 205 & 207					
14:20 - 16:00	Tensor Methods in Signal Processing and Machine Learning I Room 201	Signal Processing and Machine Learning for Social Good II Room 202	GS: Classification and Learning I Room 203	Advanced Bio-Signal Processing and Machine Learning for Assistive and Neuro-Rehabilitation Systems I Room 204	GS: Image and Video Processing II Room 211	
16:00 - 16:30	Coffee Break & Poster Sessions GS: Image and Video Processing					
16:30 - 18:30	Tensor Methods in Signal Processing and Machine Learning II Room 201	GS: Hardware and Real-Time Implementations Room 202	GS: Speech and Acoustic Signal Processing Room 203	Machine Learning for Wireless Communications, Networking, and Security III Room 204	GS: Image and Video Processing I Room 211	
18:30 – 19:30	Panel Session Gatineau 205 & 207 (Cash bar available)					
19:30 - 22:00	Conference Dinner Gatineau 206 & 208					

Wednesday, November 13

8:15 - 9:30 **Plenary II**
Wei Yu
Room: Gatineau 205 & 207

9:30 - 10:00 **Coffee Break & Poster Session**

9:30 - 10:00 **Machine Learning for Wireless Communications, Networking, and Security II: Poster Session**
Chairs: Silvija Kokalj-Filipović (Perspecta Labs, Inc, USA)

WP1: Deep Learning-Based Detection of Fake Task Injection in Mobile Crowdsensing
Ankkita Sood (University of Ottawa, Canada)
Murat Simsek (University of Ottawa & Istanbul Technical University, Canada)
Yueqian Zhang (University of Ottawa, Canada)
Burak Kantarci (University of Ottawa, Canada)

WP2: Power Delay Profile in Coordinated Distributed Networks: User-Centric v/s Disjoint Clustering
Hussein A. Ammar (University of Toronto, Canada)
Raviraj Adve (University of Toronto, Canada)

WP3: Deep Ensemble Learning: A Communications Receiver Over Wireless Fading Channels
Amer Al Baidhani (University of Cincinnati, USA)
Howard Fan (University of Cincinnati, USA)

WP4: Multi-Discriminator Distributed Generative Model for Multi-Layer RF Metasurface Discovery
John Hodge (Virginia Tech, USA)
Kumar Vijay Mishra (The University of Iowa, USA)
Amir I Zaghloul (US Army Research Laboratory & Virginia Tech, USA)

WP5: Neural Network-based Equalizer by Utilizing Coding Gain in Advance
Chieh-Fang Teng (National Taiwan University, Taiwan)
Han-Mo Ou (National Taiwan University, Taiwan)
An-Yeu Wu (National Taiwan University, Taiwan)

9:30 - 10:00 **GS: Classification and Learning: Poster Session**
Chair: Pramod Varshney (Syracuse University, USA)

WP16: Component Splitting-based Approach for Multivariate Beta Mixture Models Learning
Narges Manouchehri, Hieu Nguyen (Concordia University, Canada)
Nizar Bouguila (Concordia University, Canada)

WP17: Collaborative Machine Learning at the Wireless Edge with Blind Transmitters
Mohammad Mohammadi Amiri (Princeton University, USA)
Tolga M. Duman (Bilkent University, Turkey)
Deniz Gündüz (Imperial College London, United Kingdom (Great Britain))

WP18: An Unsupervised Sequence-to-Sequence Autoencoder based Human Action Scoring Model
Presented by Mr. Tushar Shinde on behalf of Hiteshi Jain (Indian Institute of Technology Jodhpur, India)
Gaurav Harit (IIT Rajasthan, India)

Wednesday, November 13

WP19: Learning Based Regularization for Spatial Multiplexing Cameras
Oğuzhan Fatih Kar (ASELSAN Research Center, Turkey)
Alper Gungor (Aselsan Research Center & Bilkent University, Turkey)
H. Emre Güven (ASELSAN Inc., Turkey)

WP20: Stochastic Principal Component Analysis Via Mean Absolute Projection Maximization
Mayur Dhanaraj (Rochester Institute of Technology, USA)
Panos P. Markopoulos (Rochester Institute of Technology, USA)

WP21: Dynamic Texture Recognition using a Hybrid Generative-Discriminative Approach with Hidden Markov Models and Support Vector Machines
Samr Samir Ali (Concordia University, Canada)
Nizar Bouguila (Concordia University, Canada)

WP22: Copy and Move Forgery Detection Using SIFT and Local Color Dissimilarity Maps
Gaël Mahfoudi (University of Technology of Troyes, France)
Frédéric Morain-Nicolier (Université de Reims Champagne Ardenne, France)
Florent Retraint (UTT & University of Technology of Troyes, France)
Marc Pic (SURYS, France)

10:00 - 12:00 Mathworks Workshop
Room 201

Title: Developing AI-based Smart Signal Processing Systems using MATLAB

10:00 – 12:00 Signal Processing and Machine Learning for Social Good I
Room 202
Chairs: Theodora Chaspari (Texas A&M University, USA)
Daphney-Stavroula Zois (University at Albany, SUNY, USA)

10:00 – 11:00 Keynote Speaker: Stefanie Blain-Moraes, McGill University
Signal processing for the detection of consciousness in unresponsive patients

11:00 Robust Bayesian and Maximum a Posteriori Beamforming for Hearing Assistive Devices
Poul Hoang (Aalborg University & Oticon A/S, Denmark)
Zheng-Hua Tan (Aalborg University, Denmark)
Jan de Haan (Oticon, Denmark)
Thomas Lunner (Eriksholm Research Centre, Oticon A/S, Denmark)
Jesper Jensen (Oticon A/S, Denmark)

11:20 Generation of References by Minimum Norm Projection Operators for Frequency Dependent Subtraction in Fetal Biological Signals
Neslihan Bisgin (University of Arkansas at Little Rock, USA)
James Wilson (University of Arkansas at Little Rock, USA)
Hari Eswaran (University of Arkansas for Medical Sciences, USA)

11:40 Radar as a Security Measure - Real Time Neural Model based Human Detection and Behaviour Classification
Prakhar Kaushik (Johns Hopkins University, USA)

Wednesday, November 13

10:00 – 12:00 Machine Learning, Optimization and Security for Future Energy Delivery Systems IV
Room 203
Chair: Mads Almassalkhi (University of Vermont, USA)

10:00 – 11:00 Keynote Speaker: Johanna Mathieu, University of Michigan
Learning about loads to improve power system operation and control

11:00 Dynamic Power Network State Estimation with Asynchronous Measurements
Guido Cavraro (National Renewable Energy Laboratory, USA)
Emiliano Dall'Anese (University of Colorado Boulder, USA)
Andrey Bernstein (National Renewable Energy Laboratory, USA)

11:20 Detection of False Data Injection Attack using Graph Signal Processing for the Power Grid
Raksha Ramakrishna (Arizona State University, USA)
Anna Scaglione (Arizona State University, USA)

11:40 Power System Dynamic State Estimation Using Smooth Variable Structure Filter
Hadis Karimipour (University of Guelph, Canada)
Ibrahim Al-Omari (University of Guelph, Canada)
Abolfazl Rahimnejad (University of Guelph, Canada)
Stephen Andrew Gadsden (University of Guelph, Canada)
Medhat Moussa (University of Guelph, Canada)

10:00 – 12:00 Machine Learning for Wireless Communications, Networking, and Security I
Room 204
Chairs: Silvija Kokalj-Filipović (Perspecta Labs, Inc, USA)

10:00 – 11:00 Keynote Speaker: Prof. Deniz Gunduz, Imperial College London
Machine Learning for and with Wireless Communications

11:00 Feature Learning for Enhanced Security in the Internet of Things
Enrico Mattei (Expedition Technology, Inc., USA)

11:20 Spectrum Activity Estimation by Partition-blind Block Partitioned Tensor Decomposition
Christopher Mueller-Smith (Rutgers University & SRI International, USA)
Predrag Spasojević (Rutgers University, USA)

11:40 Age of Information Analysis for Dynamic Spectrum Sharing
Yao Zhao (ShanghaiTech University, P.R. China)
Bo Zhou (Virginia Tech, USA)
Walid Saad (Virginia Tech, USA)
Xiliang Luo (ShanghaiTech University, P.R. China)

10:00 – 16:00 IEEE SPS AutoDefense Winter School on Autonomous Systems
Room 102
Registration required

12:00 - 13:00 Lunch (on your own)

13:00 - 14:00 Plenary III
Robert W. Heath Jr.
Room: Gatineau 205 & 207

Wednesday, November 13

14:20 - 16:00 Tensor Methods in Signal Processing and Machine Learning I
Room 201
Chair: Kejun Kuang (University of Florida, USA)

14:20 – 15:00 Keynote Speaker: M. Alex O. Vasilescu

15:00 Robust Multi-Relational Learning with Absolute Projection Rescal
Dimitris G. Chachlakis (Rochester Institute of Technology, USA)
Yorgos Tsitsikas (University of California, USA)
Evangelos Papalexakis (University of California Riverside, USA)
Panos P. Markopoulos (Rochester Institute of Technology, USA)

15:20 Tensor-based Blind fMRI Source Separation Without Gaussian Noise Assumption --- A Beta-Divergence Approach
Christos Chatzichristos (KU Leuven, Belgium)
Michiel Vandecappelle (KU Leuven, Belgium)
Eleftherios Kofidis (University of Piraeus & Computer Technology Institute (CTI), Greece)
Sergios Theodoridis (University of Athens, Greece)
Lieven De Lathauwer (KU Leuven Kulak, Belgium)
Sabine Van Huffel (Katholieke Universiteit Leuven, Belgium)

15:40 Tensor completion via global low-tubal-rankness and nonlocal self-similarity
Tian Lu (University of Electronic Science and Technology of China, P.R. China)
Xi-Le Zhao (University of Electronic Science and Technology of China, P.R. China)
Yu-Bang Zheng (University of Electronic Science and Technology of China, P.R. China)
Meng Ding (University of Electronic Science and Technology of China, P.R. China)
Xiao-Tong Li (University of Electronic Science and Technology of China, P.R. China)

14:20 – 16:00 Signal Processing and Machine Learning for Social Good II
Room 202
Chairs: Yasin Yilmaz (University of South Florida, USA)
Daphney-Stavroula Zois (University at Albany, SUNY, USA)

14:20 Estimating Public Speaking Anxiety from Speech Signals Using Unsupervised Transfer Learning
Kexin Feng (Texas A&M University, USA)
Megha Yadav (Texas A&M University, USA)
Md Nazmus Sakib (Texas A&M University, USA)
Amir Behzadan (Texas A&M University, USA)
Theodora Chaspari (Texas A&M University, USA)

14:40 Butterfly Classification with Machine Learning Methodologies for an Android Application
Lili Zhu (University of Guelph, Canada)
Petros Spachos (University of Guelph, Canada)

15:00 Evaluation of Bias in Sensitive Personal Information Used to Train Financial Models
Reginald Bryant (IBM Research Africa, Kenya)
Celia Cintas (IBM, Kenya)
Andrew Kinai (IBM, Kenya)
Isaac Wambugu (IBM, Kenya)
Abdigani Diriye (IBM, Kenya)
Komminist Weldemariam (IBM, Kenya)

15:20 Scenario Planning for Sea Level Rise via Reinforcement Learning
Salman Shuvo (University of South Florida, USA)
Yasin Yilmaz (University of South Florida, USA)
Alan Bush (University of South Florida, USA)
Mark Hafen (University of South Florida, USA)

15:40 VayuAnukulani: Adaptive Memory Networks for Air Pollution Forecasting
**Bodhibrata Mukhopadhyay (Indian Institute of Technology Delhi, India) presenting on behalf of*
Divyam Madaan (KAIST, Korea)
Radhika Dua (IIT Hyderabad, India)
Prerana Mukherjee (IIIT Sri City)
Brejesh Lall (Indian Institute of Technology Delhi, India)

14:20 – 16:00 GS: Classification and Learning I
Room 203
Chair: Wee Peng Tay (Nanyang Technological University, Singapore)

14:20 Orthogonal Projection in Linear Bandits
Qiyu Kang (Nanyang Technological University, Singapore)
Wee Peng Tay (Nanyang Technological University, Singapore)

14:40 Improved Subspace K-Means Performance via a Randomized Matrix Decomposition
Trevor C Vannoy (Montana State University, USA)
Jacob Senecal (Montana State University, USA)
Veronika Strnadová-Neeley (Montana State University, USA)

15:00 Bayesian Learning for Classification using a Uniform Dirichlet Prior
Paul Rademacher (Naval Research Laboratory, USA)
Milos Doroslovacki (The George Washington University, USA)

15:20 New Filtering Approaches to Improve the Classification Capability of Resting-state fMRI Transfer Functions
Michael Smith (University of Calgary, Schulich School of Engineering, Canada)
Ehsan Shahrabi Farahani- (University of Calgary, Canada)
Samiul Choudhury (University of Calgary, Canada)
Fiona Costello (University of Calgary, Canada)
Bradley Goodyear (University of Calgary, Canada)

15:40 New Results on Testing Against Independence with Rate-Limited Constraints
Sebastian Espinosa (Universidad de Chile, Chile)
Jorge F Silva (University of Chile, Chile)
Pablo Piantanida (CentraleSupélec-CNRS-Université Paris-Sud, France)

14:20 – 16:00 Advanced Bio-Signal Processing and Machine Learning for Assistive and Neuro-Rehabilitation Systems I
Room 204
Chair: Seyed Farokh Atashzar (Imperial College London, United Kingdom (Great Britain))

14:20 – 15:00 Keynote Speaker: TBD

15:00 Convergence Initiative Presentations

Wednesday, November 13

14:20 – 16:00 GS: Image and Video Processing II
Room 211
Chair: Jean-Francois Chamberland (Texas A&M University, USA)

14:20 Finite Inverted Dirichlet Mixture Optimal Pixel Predictor
Omar Graja (Concordia University, Canada)
Nizar Bouguila (Concordia University, Canada)

14:40 Learning product codebooks using vector-quantized autoencoders for image retrieval
Hanwei Wu (KTH Royal Institute of Technology, Sweden)
Markus Flierl (KTH Royal Institute of Technology, Sweden)

15:00 An Improved Image Codec Based on the Steerable Discrete Cosine Transform
Geraldo Arruda Filho (Federal University of Pernambuco, Brazil)
Juliano B. Lima (Federal University of Pernambuco, Brazil)

15:20 FHDR: HDR Image Reconstruction from a Single LDR Image using Feedback Network
**Diptiben Patel (Indian Institute of Technology Gandhinagar, India) presenting on behalf of*
Zeeshan Khan (Indian Institute of Technology, Gandhinagar, India)
Mukul Khanna (Indian Institute of Technology, Gandhinagar, India)
Shanmuganathan Raman (Indian Institute of Technology, Gandhinagar, India)

15:40 Bring Light to the Night: Classifying Thermal Image via Convolutional Neural Network based on Visible Domain Transformation
Guoyu Lu (Rochester Institute of Technology, USA)

16:00 - 16:30 Coffee Break & Poster Session

16:00 – 16:30 GS: Image and Video Processing: Poster Session
Chair: Yasin Yilmaz (University of South Florida, USA)

WP6: Scene Text Aware Image Retargeting
Diptiben Patel (Indian Institute of Technology Gandhinagar, India)
Shanmuganathan Raman (Indian Institute of Technology, Gandhinagar, India)

WP7: TwinsAdvNet : Adversarial Learning for Semantic Segmentation
Yan Zhou (Xiangtan University, P.R. China)
Dongli Wang (Xiangtan University, P.R. China)
Bo Wang (Xiangtan University, P.R. China)

WP8: GOP Level Quality Dependency Based Frame Level Rate Control Algorithm
Meng Zhang (Northwestern Polytechnical University, P.R. China)
Wei Zhou (Northwestern Polytechnical University, P.R. China)
Zhemin Duan (Northwestern Polytechnical University, P.R. China)
Guanwen Zhang (Northwestern Polytechnical University, P.R. China)
Henglu Wei (Northwestern Polytechnical University, P.R. China)

WP9: A Novel Blurring based Method for Video Compression
Himanshu Kumar (IIT Jodhpur, India)
Sumana Gupta (IIT, Kanpur - INDIA, India)
Venkatesh K Subramanian (IIT Kanpur, India)

Wednesday, November 13

WP10: Image Alpha Matting via Residual Convolutional Grid Network
Presented by Xiafei Yu on behalf of Huizhen Zhang (University of Ottawa, Canada)
Yang Zhou (University of Ottawa, Canada)
Lei Chen (University of Ottawa, Canada)
Jiying Zhao (University of Ottawa, Canada)

WP11: Low-Complexity Adaptive Switched Prediction-based Lossless Compression of Time-lapse Hyperspectral Image Data
Tushar Shankar Shinde (Indian Institute of Technology Jodhpur, India)
Anil Tiwari (IIT Jodhpur, India)
Weiyao Lin (Shanghai Jiao Tong University, P.R. China)

WP12: Wide Separate 3D Convolution for Video Super Resolution
Xiafei Yu (University of Ottawa, Canada)
Jiying Zhao (University of Ottawa, Canada)

WP13: A QoE-Based Alarm Model for Terminal Video Quality
Xiang Peng (Tsinghua University, P.R. China)
Yiping Duan (Tsinghua University, P.R. China)
Bingrui Geng (University of Tsinghua, P.R. China)
Xiwen Liu (Tsinghua University, P.R. China)
Xiaoming Tao (Tsinghua University, P.R. China)
Ning Ge (Tsinghua University, P.R. China)

WP15: Efficient motion estimation and predictive coding methods for compression of spatio-temporal sequences
Tushar Shankar Shinde (Indian Institute of Technology Jodhpur, India)

16:30 - 18:30 Tensor Methods in Signal Processing and Machine Learning II
Room 201
Chair: Panos P. Markopoulos (Rochester Institute of Technology, USA)

16:30 – 17:10 Keynote Speaker: Piya Pal

17:10 Low-complexity Proximal Gauss-Newton Algorithm for Nonnegative Matrix Factorization
Kejun Huang (University of Florida, USA)
Xiao Fu (Oregon State University, USA)

17:30 A Tensor-Based Spectrum Sensing Technique for MIMO Cognitive Radio Networks
Tilahun M. Getu (École de Technologie Supérieure (ETS), Canada)
Wessam Ajib (Université du Québec à Montréal, Canada)
Rene Jr. Landry (University of Quebec & Ecole de Technologie Supérieure, Canada)
Georges Kaddoum (ETS Engineering School, University of Québec, Canada)

17:50 Matrix- and Tensor-Based RFI Detectors for Multi-Antenna Wireless Communications
Tilahun M. Getu (École de Technologie Supérieure (ETS), Canada)
Wessam Ajib (Université du Québec à Montréal, Canada)
Rene Jr. Landry (University of Quebec & Ecole de Technologie Supérieure, Canada)
Georges Kaddoum (ETS Engineering School, University of Québec, Canada)

18:10 Stochastic Tucker-Decomposed Recurrent Neural Networks for Forecasting
Zachariah J. L. Carmichael (Rochester Institute of Technology, USA)
Dhireesha Kudithipudi (Rochester Institute of Technology, USA)

Wednesday, November 13

16:30 – 18:30 GS: Hardware and Real-Time Implementations
Room 202
Chair: Sayed Ahmad Salehi (University of Kentucky, USA)

16:30 A Multitaper Model for Quiet Voltage in Relative Ionospheric Opacity Meters
François Marshall (Queen's University, Canada)
David Thomson (Queen's University, Canada)
Glen Takahara (Queen's University, Canada)
Robyn Fiori (Geomagnetic Laboratory, NRCan, Canada)

16:50 Low-correlation Low-cost Stochastic Number Generators for Stochastic Computing
Sayed Ahmad Salehi (University of Kentucky, USA)

17:10 Real-time Compressive Video Reconstruction for Spatial Multiplexing Cameras
Oğuzhan Fatih Kar (ASELSAN Research Center, Turkey)
Alper Gungor (Aselsan Research Center & Bilkent University, Turkey)
H. Emre Güven (ASELSAN Inc., Turkey)

17:30 3-D MIMO-SAR Imaging Using Multi-Chip Cascaded Millimeter-Wave Sensors
Muhammet Yanik (The University of Texas at Dallas, USA)
Dan Wang (Texas Instruments, Inc., USA)
Murat Torlak (The University of Texas at Dallas, USA)

17:50 Computer-Generated Holography Using a Digital Signal Processor
Youchao Wang (University of Cambridge, United Kingdom (Great Britain))
Daoming Dong (University of Cambridge, United Kingdom (Great Britain))
Andrew C Kadis (University of Cambridge, United Kingdom (Great Britain))
Peter J. Christopher (Cambridge University, United Kingdom (Great Britain))
Timothy David Wilkinson (University of Cambridge, United Kingdom (Great Britain))

18:10 A Block-Floating-Point Arithmetic Based FPGA Accelerator for Convolutional Neural Networks
Heshan Zhang (Northwestern Polytechnical University, P.R. China)
Zhenyu Liu (Tsinghua University, P.R. China)
Guanwen Zhang (Northwestern Polytechnical University, P.R. China)
Jiwu Dai (Northwestern Polytechnical University, P.R. China)
Xiaocong Lian (Tsinghua University, P.R. China)
Wei Zhou (Northwestern Polytechnical University, P.R. China)
Xiangyang Ji (Tsinghua University, P.R. China)

16:30 – 18:30 GS: Speech and Acoustic Signal Processing
Room 203
Chair: Balakumar Balasingam (University of Windsor, Canada)

16:30 Adaptation of an EMG-Based Speech Recognizer via Meta-Learning
Krsto Proroković (IDSIA, Switzerland)
Michael Wand (IDSIA, Switzerland)
Tanja Schultz (University of Bremen, Germany)
Juergen Schmidhuber (IDSIA, Switzerland)

Wednesday, November 13

16:50 Virtual Phone Discovery for Speech Synthesis Without Text
Presented by Laureano Moro-Velazquez on behalf of Shekhar Nayak (IIT Hyderabad, India)
Chintigari Shiva Kumar (IIT Hyderabad, India)
Ramesh Gundluru (IIIT RK Valley, RGUKT-AP, India)
Saurabhchand Bhati (Johns Hopkins University, USA)
Sri Rama Murty Kodukula (Indian Institute of Technology Hyderabad, India)

17:10 Adaptive Feedback Active Noise Control (AFB-ANC) System Equipped with Online Adaptation and Convergence Monitoring of the Cancellation-Path Estimation (CPE) Filter
Muhammad Tahir Akhtar (Nazarbayev University, Kazakhstan)

17:30 Speaker Embedding Extraction with Virtual Phonetic Information
Presented by Laureano Moro-Velazquez on behalf of Sreekanth Sankala (RGUKT RK Valley, India)
Shaik Mohammad Rafi (RGUKT RK Valley, India)
Sri Rama Murty Kodukula (Indian Institute of Technology Hyderabad, India)
Saurabhchand Bhati (Johns Hopkins University, USA)

17:50 Bottom-Up Unsupervised Word Discovery via Acoustic Units
Presented by Laureano Moro-Velazquez on behalf of Saurabhchand Bhati (Johns Hopkins University, USA)
Chunxi Liu (Johns Hopkins University, USA)
Jesus Villalba (Johns Hopkins University, USA)
Jan Trmal (Johns Hopkins University, USA)
Sanjeev Khudanpur (Johns Hopkins University, USA)
Najim Dehak (Hopkins University, USA)

18:10 Multi-scale Generative Adversarial Networks for Speech Enhancement
Yihang Li (Beijing University of Posts and Telecommunications, P.R. China)
Ting Jiang (Beijing University of Posts & Telecommunications, P.R. China)
Shan Qin (Beijing University of Posts and Telecommunications, P.R. China)

16:30 – 18:30 Machine Learning for Wireless Communications, Networking, and Security III
Room 204
Chairs: Silvija Kokalj-Filipović (Perspecta Labs, Inc, USA)

16:30 – 17:30 Keynote Speaker: Prof. Danijela Cabric, UCLA

17:30 Communication without Interception: Defense against Modulation Detection
Muhammad Zaid Hameed (Imperial College London, United Kingdom (Great Britain))
András György (DeepMind, United Kingdom (Great Britain))
Deniz Gündüz (Imperial College London, United Kingdom (Great Britain))

17:50 Adversarial Examples in RF Deep Learning: Detection and Physical Robustness
Silvija Kokalj-Filipović (Perspecta Labs, Inc, USA)
Robert D Miller (Perspecta Labs, USA)
Garrett M Vanhoy (Perspecta Labs, USA)

18:10 Smart Spying via Deep Learning: Inferring Your Activities from Encrypted Wireless Traffic
Presented by Yasin Yilmaz on behalf of Tao Hou (University of South Florida, USA)
Tao Wang (New Mexico State University, USA)
Zhuo Lu (University of South Florida, USA)
Yao Liu (University of South Florida, USA)

Wednesday, November 13

16:30 – 18:30 GS: Image and Video Processing I
Room 211
Chair: Markus Flierl (KTH Royal Institute of Technology, Sweden)

16:30 Fixed-Point Accuracy Analysis of 2D FFT for the Creation of Computer Generated Holograms
Daoming Dong (University of Cambridge, United Kingdom (Great Britain))
Youchao Wang (University of Cambridge, United Kingdom (Great Britain))
Peter J. Christopher (Cambridge University, United Kingdom (Great Britain))
Andrew C Kadis (University of Cambridge, United Kingdom (Great Britain))
Timothy David Wilkinson (University of Cambridge, United Kingdom (Great Britain))

16:50 Super-Resolution for Imagery Enhancement Using Variational Quantum Eigensolver
Ystallonne C. S. Alves (Boxcat Inc., Canada & Federal University of Rio Grande do Norte, Brazil)

17:10 An embedding framework for video reconstruction using Gaussian mixture models
Vahid Khorasani Ghassab (Concordia University, Canada)
Nizar Bouguila (Concordia University, Canada)

17:30 Hybrid IMU-Aided Approach for Optimized Visual Odometry
Ahmed G. Mahmoud (Carleton University, Canada)
Mohamed Atia (Carleton University & Queen's University, Canada)

17:50 Single Image 3D Vehicle Pose Estimation for Augmented Reality
Yawen Lu (Rochester Institute of Tech, USA)
Sophia Kourian (Rochester Institute of Technology, USA)
Carl Salvaggio (Rochester Institute of Technology, USA)
Chenliang Xu (University of Rochester, USA)
Guoyu Lu (Rochester Institute of Technology, USA)

18:10 Compressive Super-Pixel LiDAR for High-Framerate 3D Depth Imaging
Andreas Aßmann (Heriot-Watt University & STMicroelectronics R&D Ltd., United Kingdom (Great Britain))
Joao Mota (Heriot-Watt University, United Kingdom (Great Britain))
Brian Stewart (STMicroelectronics R&D Ltd., United Kingdom (Great Britain))
Andrew M Wallace (Heriot-Watt University, United Kingdom (Great Britain))

18:30 Panel Session
Gatineau 205 & 207
Cash bar available

19:30 Conference Dinner
Shaw Centre
Gatineau 206 & 208

Thursday, November 14

Grid: Thursday, November 14					
08:15 - 09:30	Plenary IV Gatineau 205 & 207				
09:30 - 10:00	Coffee Break				
10:00 - 12:00	GS: Compressed sensing, sparsity aware processing Room 201	Signal/Information Processing and AI for Finance and Business I Room 202	Machine Learning for Wireless Communications, Networking, and Security IV Room 203	NRC Workshop Room 204	GS: Cognitive communications and radar Room 211
12:00 - 13:30	Lunch (on your own)				
13:30 - 15:30	Signal and Information Processing for Person-centered and Citizen-centered Smart Living I Room 201	Signal/Information Processing and AI for Finance and Business II Room 202 Signal/Information Processing and AI for Finance and Business III: Poster Session	Advanced Bio-Signal Processing and Machine Learning for Assistive and Neuro-Rehabilitation Systems II Room 203	NRC Workshop Room 204	GS: MIMO Systems Room 211
15:30 - 16:00	Coffee Break				
16:00 - 18:00	Signal and Information Processing for Person-centered and Citizen-centered Smart Living II Room 201	Signal/Information Processing and AI for Finance and Business IV Room 202	Advanced Bio-Signal Processing and Machine Learning for Assistive and Neuro-Rehabilitation Systems III Room 203	GS: Machine Learning Networks Room 204	GS: Signal Processing for Communications Room 211

Thursday, November 14

8:15 - 9:30 **Plenary IV**
Min Wu
Room: Gatineau 205 & 207

9:30 - 10:00 **Coffee Break**

10:00 - 12:00 **GS: Compressed sensing, sparsity aware processing**
Room 201
Chair: Chinmay Hegde (Iowa State University, USA)

10:00 **On theoretical optimization of the sensing matrix for sparse-dictionary signal recovery**
Jianchen Zhu (Tongji University, P.R. China)
Shengjie Zhao (Tongji University, P.R. China)
Xu Ma (Beijing Institute of Technology, P.R. China)
Gonzalo Arce (University of Delaware, USA)

10:20 **A Fast Iterative Method for Removing Sparse Noise from Sparse Signals**
Seyedeh Sahar Sadrizadeh (Sharif University of Technology, Iran)
Nematollah Zarmehi (Sharif University of Technology, Iran)
Farokh Marvasti (Sharif University of Technology (SUT), Iran)
Saeed Gazor (Queen's University, Canada)

10:40 **A Compressibility Result for AMS Processes**
Jorge F Silva (University of Chile, Chile)

11:00 **Covariance Matrix Decomposition Using Cascade of Linear Tree Transformations**
Navid Tafaghodi Khajavi (University of Hawaii at Manoa, USA)
Anthony Kuh (Univ of Hawaii, Manoa, USA)

11:20 **Signal Reconstruction from Modulo Observations**
Viraj Shah (Iowa State University, USA)
Chinmay Hegde (Iowa State University, USA)

11:40 **A robust algorithm for multichannel EEG compressed sensing with mixed noise**
Wei Tao (Hefei University of Technology, P.R. China)
Chang Li (Hefei University of Technology, P.R. China)
Juan Cheng (Hefei University of Technology, P.R. China)

10:00 - 12:00 **Signal/Information Processing and AI for Finance and Business I**
Room 202
Chairs: Kumar Bhaskaran (IBM Research, USA)
Xiao-Ping (Steven) Zhang (Ryerson University, Canada)

10:00 – 10:40 Keynote: Mei Han, Director of Ping An Technology, US Research Lab
AI Applications to Financial Services

Abstract: In this talk I will describe a few application scenarios of artificial intelligence techniques to financial scenarios, including: damage estimation for car claims, speech recognition in chatbots for customer services, livestock identification for anima husbandry, etc. The techniques of deep learning, computer vision, NLP, ASR, voice recognition are integrated with the business workflow by leveraging the domain knowledge and historic data to make impacts.

Bio: Dr. Mei Han is the director of Ping An Technology, US Research Lab at Silicon Valley. She has published over 30 conference and journal papers on video analysis, visual tracking, object detection, geometric modeling, image processing, multimedia processing, computer vision and machine learning. Prior to joining Ping An, she held the position of research scientist at Google and research staff member at NEC Labs America. Technologies developed by Dr. Han and her colleagues are at the

core of the company Vidient's innovative surveillance products. Mei Han holds Doctorates in Robotics and Computer Science from Carnegie Mellon University and Tsinghua University.

10:40 Evaluating goal-advice appropriateness for personal financial advice
Sue Ann Chen (IBM Research, Australia)
Adam Makarucha (IBM Australia)
Nebula Alam (IBM Research, Australia)
Wanita Sherchan (IBM Research, Australia)
Simon Harris (IBM Research)
George Yiapanis (Deloitte, Australia)
Christopher J. Butler (IBM Research, Australia)

11:00 A Divide-and-Conquer Framework for Attention-based Combination of Multiple Investment Strategies
Presented by Yihang Li (Beijing University) on behalf of Xiao Yang (Microsoft Research, P.R. China)
Weiqing Liu (Microsoft Research, P.R. China)
Lewen Wang (Peking University, P.R. China)
Cheng Qu (University of Science and Technology of China, P.R. China)
Jiang Bian (Microsoft Research, P.R. China)

11:20 A Study of Cross Sectional Stock Returns Using High-Dimensional SUR model and Many Firm Level Characteristics
Qingliang Fan (Xiamen University, P.R. China)
Yong Han (Xiamen University, P.R. China)
Xiao-Ping (Steven) Zhang (Ryerson University, Canada)

11:40 Large-Scale Regularized Portfolio Selection via Convex Optimization
Ziping Zhao (The Hong Kong University of Science and Technology, Hong Kong)
Daniel P Palomar (Hong Kong University of Science and Technology, Hong Kong)

10:00 - 12:00 Machine Learning for Wireless Communications, Networking, and Security IV
Room 203
Chairs: Silvija Kokalj-Filipović (Perspecta Labs, Inc, USA)

10:00 Dynamic Network Slicing for Fog Radio Access Networks
Almuthanna Nassar (University of South Florida, USA)
Yasin Yilmaz (University of South Florida, USA)

10:20 A Novel Quantization Method for Deep Learning-Based Massive MIMO CSI Feedback
Tong Chen (Southeast University, P.R. China)
Jiajia Guo (Southeast University, P. R. China)
Shi Jin (Southeast University, P.R. China)
Chao-Kai Wen (National Sun Yat-sen University, Taiwan)
Geoffrey Li (Georgia Tech, USA)

10:40 High-Dimensional Stochastic Gradient Quantization for Communication-Efficient Edge Learning
Yuqing Du (The University of Hong Kong, Hong Kong)
Sheng Yang (CentraleSupélec, France)
Kaibin Huang (The University of Hong Kong, Hong Kong)

11:00 Policy Based Synthesis: Data Generation and Augmentation Methods for RF Machine Learning
Silvija Kokalj-Filipović (Perspecta Labs, Inc, USA)
Robert D Miller (Perspecta Labs, USA)
Garrett M Vanhoy (Perspecta Labs, USA)
Joshua Morman (Rutgers University, USA)

11:20 MAC ID Spoofing-Resistant Radio Fingerprinting
Tong Jian (Northeastern University, USA)
Bruno Costa Rendon (Northeastern University, USA)
Andrey Gritsenko (Northeastern University, USA)
Jennifer Dy (Northeastern University, USA)
Kaushik Chowdhury (Northeastern University, USA)
Stratis Ioannidis (Northeastern University, USA)

11:40 Machine Learning-Based Roadside Vehicular Traffic Localization via Opportunistic Wireless Sensing
Kyle McClintick (Worcester Polytechnic Institute, USA)
Mark Page (University of Massachusetts Lowell, USA)
Thanuka Wickramarathne (University of Massachusetts Lowell, USA)
Alexander M. Wyglinski (Worcester Polytechnic Institute, USA)

10:00 – 12:00 GS: Cognitive communications and radar
Room 211
Chair: David Luong (Defence Research and Development Canada & Carleton University, Canada)

10:00 Exploiting Structural Information in Camera Aided Radar Parameter Estimation
Khurram Usman (The University of Texas at Austin, USA)
Sai Annaluru (The University of Texas at Austin, USA)
Amine Mezghani (The University of Texas at Austin, USA)
Robert Heath (The University of Texas at Austin, USA)

10:20 Extended Logarithmic Frequency Domain Rulers for Joint Radar-Communications
Alexander Byrley (University at Buffalo, USA)
Adly T. Fam (University at Buffalo, USA)

10:40 Estimating Correlation Coefficients for Quantum Radar and Noise Radar: A Simulation Study
David Luong (Defence Research and Development Canada & Carleton University, Canada)
Sreeraman Rajan (Carleton University, Canada)
Bhashyam Balaji (DRDC-Ottawa, Canada)

11:00 Integrated Camera and Radar Tracking using Multi-Model Cubature Kalman Filter
Venkata Pathuri Bhuvana (Silicon Austria Labs GmbH, Austria)
Mario Huemer (Johannes Kepler University Linz, Austria)

11:20 Extended Target Frequency Response Estimation Using Infinite HMM in Cognitive Radars
Ahmed A Abouelfadl (McGill University, Canada)
Ioannis Psaromiligkos (McGill University, Canada)
Benoit Champagne (McGill University, Canada)

11:40 ADMM for gridless DOD and DOA estimation in bistatic MIMO radar based on decoupled atomic norm minimization with one snapshot
Wen-gen Tang (Jilin University, P.R. China)
Hong Jiang (Jilin University, P.R. China)
Qi Zhang (Jilin University, P.R. China)

10:00 – 15:30 NRC Workshop
Room 204

12:00 - 13:30 Lunch (on your own)

Thursday, November 14

13:30 - 15:30 Signal/Information Processing and AI for Finance and Business II & III
Room 202
Chairs: Sue Ann Chen (IBM Research, Australia)
Kumar Bhaskaran (IBM Research, USA)

13:30 – 14:10 Keynote: Xiao-Ping (Steven) Zhang, Ryerson University
Signal Processing Path to Nobel Prize in Economics

Abstract: Economic data and financial markets are intriguing to researchers working on big data and quantitative models. With rapid growth and increasing access to data in digital form, finance, economics, and marketing data are poised to become one of the most important and tangible big data applications, owing not only to the relative clean organization and structure of the data but also to clear application objectives and market demands. However, data related economic and social science studies often have different viewpoints from signal processing (SP) and artificial intelligence (AI).

This talk intends to introduce some foundational concepts in finance/economics/marketing research, from signal and data processing point of view. Some of these ideas led to Nobel Prize in Economics. We explain the different focuses between economic and social science data analysis and physical signal processing, such as co-integration and causality analysis. For example, in most physical systems using signal processing and machine learning, the causality (input/output) relationship is often known and taken for granted, but it is generally not obvious/unknown in social and economic sciences. It is critical to discriminate causalities from spurious correlations in data. We illustrate a marketing dynamic response model that uses signal processing tools to identify and catch fleeting business opportunities. We also introduce the concept of predictive analytics from probabilistic point of view. We hope to inspire multimedia researchers to broaden their knowledge beyond their current areas of expertise and grasp some basics concepts and evaluation criteria in economics and social science fields.

Bio: Dr. Xiao-Ping (Steven) Zhang received B.S. and Ph.D. degrees from Tsinghua University, in 1992 and 1996, respectively, both in Electronic Engineering. He holds an MBA in Finance, Economics and Entrepreneurship with Honors from the University of Chicago Booth School of Business, Chicago, IL.

Since Fall 2000, he has been with the Department of Electrical and Computer Engineering, Ryerson University, Toronto, ON, Canada, where he is currently a Professor and the Director of the Communication and Signal Processing Applications Laboratory. He has served as the Program Director of Graduate Studies. He is cross-appointed to the Finance Department at the Ted Rogers School of Management, Ryerson University. He was a Visiting Scientist with the Research Laboratory of Electronics, Massachusetts Institute of Technology, Cambridge, MA, USA, in 2015 and 2017. He is a frequent consultant for biotech companies and investment firms. He is the Co-Founder and CEO for EidoSearch, an Ontario-based company offering a content-based search and analysis engine for financial big data. His research interests include statistical signal processing, sensor networks and electronic systems, image and multimedia content analysis, machine learning, and applications in big data, finance, and marketing.

Dr. Zhang is a registered Professional Engineer in Ontario, Canada, and a member of Beta Gamma Sigma Honor Society. He is the general Co-Chair for the IEEE International Conference on Acoustics, Speech, and Signal Processing, 2021. He is the general co-chair for 2017 GlobalSIP Symposium on Signal and Information Processing for Finance and Business, and the general co-chair for 2019 GlobalSIP Symposium on Signal, Information Processing and AI for Finance and Business. He is an elected Member of the ICME steering committee. He is the General Chair for the IEEE International Workshop on Multimedia Signal Processing, 2015. He is the Publicity Chair for the International Conference on Multimedia and Expo 2006, and the Program Chair for International Conference on Intelligent Computing in 2005 and 2010. He served as a Guest Editor for Multimedia Tools and Applications and the International Journal of Semantic Computing. He was a tutorial speaker at in ACMMM2011, ISCAS2013, ICIP2013, ICASSP2014, IJCNN2017 and ISCAS2019. He is a Senior Area Editor for the IEEE TRANSACTIONS ON SIGNAL PROCESSING and the IEEE TRANSACTIONS ON IMAGE PROCESSING. He was an Associate Editor for the IEEE TRANSACTIONS ON IMAGE PROCESSING, the IEEE TRANSACTIONS ON MULTIMEDIA, the IEEE TRANSACTIONS ON CIRCUITS AND SYSTEMS FOR VIDEO TECHNOLOGY, the IEEE TRANSACTIONS ON SIGNAL PROCESSING, and the IEEE SIGNAL PROCESSING LETTERS. He is selected as an IEEE Signal Processing Society Distinguished Lecturer for the term from January 2020 to December 2021.

14:10 Poster Session

HP1: Conservative or Aggressive? Confidence-Aware Dynamic Portfolio Construction
Presented by Yihang Li (Beijing University) on behalf of Lewen Wang (Peking University, P.R. China)
Weiqing Liu (Microsoft Research, P.R. China)
Jiang Bian (Microsoft Research, P.R. China)
Xiao Yang (Microsoft Research, P.R. China)

HP2: Incentivizing Crowdsourced Workers via Truth Detection
Chao Huang (The Chinese University of Hong Kong, Hong Kong)
Haoran Yu (Northwestern University, USA)
Jianwei Huang (The Chinese University of Hong Kong, Hong Kong)
Randall A Berry (Northwestern University, USA)

HP3: Generative-Discriminative Crop Type Identification using Satellite Images
Nan Qiao (PingAn Tech, US Research Lab)
Bo Gong (PingAn Tech, US Research Lab)
Ruei-Sung Lin (PingAn Tech, US Research Lab)
Yi Zhao (PingAn Tech, US Research Lab)
Mei Han (PingAn Tech, US Research Lab, USA)
Zhongxiang Wu (PingAn Tech, US Research Lab)

HP4: Double-Selection Based High-dimensional Factor Model with Application in Asset Pricing
Qingliang Fan (Xiamen University, P.R. China)
Fan Hu (Xiamen University, P.R. China)
Xiao-Ping (Steven) Zhang (Ryerson University, Canada)

HP5: A comparative study of motor imagery based BCI classifiers on EEG and iEEG Data
Naresh Nagabushan (Virginia Tech, USA)
Taber Fisher (Virginia Tech, USA)
Giovanni Malaty (Virginia Tech, USA)
Mark Witcher (Virginia Tech, USA)
Sujith Vijayan (Virginia Tech, USA)

13:30 - 15:30 Signal and Information Processing for Person-centered and Citizen-centered Smart Living I
Room 201
Chair: Troy L McDaniel (Arizona State University, USA)

13:30 – 14:10 Keynote: Prabhakaran Balakrishnan, Professor, University of Texas at Dallas
Personalized Care and Intervention: Challenges and Opportunities

14:10 Framework for promoting social interaction and physical activity in elderly people using gamification and fuzzy logic strategy
Juana Isabel Méndez (Tecnologico de Monterrey, Mexico)
Pedro Ponce (Tecnologico de Monterrey, Mexico)
Alan Meier (University of California, Davis)
Therese Peffer (University of California, Berkeley, USA)
Omar Mata (Tecnologico de Monterrey, Mexico)
Arturo Molina (Tecnologico de Monterrey, Mexico)

14:30 MisophoniAPP: Person-Centric Gamified Therapy for Smarter Treatment of Misophonia
Rachel Noziglia (Arizona State University, USA)
Troy L McDaniel (Arizona State University, USA)
Derrick Anderson (Arizona State University, USA)
Ramin Tadayon (Arizona State University, USA)
Sethuraman Panchanathan (Arizona State University, USA)

14:50 Providing navigation assistance through ForceHand: a wearable force-feedback glove
Swagata Das (Hiroshima University, Japan)
Yuichi Kurita (Hiroshima University, Japan)

15:10 Using Multimodal Data for Automated Fidelity Evaluation in Pivotal Response Treatment Videos
Corey Heath, Hemanth Venkateswara
Troy L McDaniel (Arizona State University, USA)
Sethuraman Panchanathan (Arizona State University, USA)

13:30 - 15:30 Advanced Bio-Signal Processing and Machine Learning for Assistive and Neuro-Rehabilitation Systems II
Room 203
Chair: Arash Mohammadi (Concordia University, Canada)

13:30 Semi-autonomous Robot-assisted Cooperative Therapy Exercises for a Therapist's Interaction with a Patient
Carlos Martínez (University of Alberta, Canada)
Jason Fong (University of Alberta, Canada)
Seyed Farokh Atashzar (Imperial College London, United Kingdom (Great Britain))
Mahdi Tavakoli (University of Alberta, Canada)

13:50 Linear Discriminant Analysis with Bayesian Risk Parameters for Myoelectric Control
Evan D Campbell (University of New Brunswick & Institute of Biomedical Engineering, Canada)
Angkoon Phinyomark (University of New Brunswick, Canada)
Erik Scheme (University of New Brunswick, Canada)

14:10 Training of Deep Bidirectional RNNs for Hand Motion Filtering via Multimodal Data Fusion
Soroosh Shahtalebi (Concordia University, Canada)
S. Farokh Atashzar (New York University, USA)
Rajni Patel (Canadian Surgical Technologies & Advanced Robotics, Canada)
Arash Mohammadi (Concordia University, Canada)

14:30 sEMG-Based Hand Gesture Recognition via Dilated Convolutional Neural Networks
Elahe Rahimian (Concordia University, Canada)
Soheil Zabihi (Concordia University, Canada)
S. Farokh Atashzar (New York University, USA)
Amir Asif (Concordia University, Canada)
Arash Mohammadi (Concordia University, Canada)

14:50 Speech Recognition Driven Assistive Framework for Remote Patient Monitoring
Marc Jayson Baucas (University of Guelph, Canada)
Petros Spachos (University of Guelph, Canada)

15:10 A Multivariate Approach for Denoising of T2 Relaxation Decay Curves in Myelin Water Fraction Imaging
Tobias R Baumeister (The University of British Columbia, Canada)
Z. Jane Wang (University of British Columbia, Canada)
Martin McKeown (University of British Columbia, Canada)

13:30 - 15:30 GS: MIMO Systems
Room 211
Chair: M. Cenk Gursoy (Syracuse University, USA)

13:30 PCA-Aided Precoding for Correlated MIMO Broadcast Channels
Mouncef Benmimoune (Universite du Quebec a Trois-Rivieres, Canada)
Sofiane Hachemi (Université de Québec à Trois Rivières, Canada)
Daniel Massicotte (Universite du Quebec a Trois-Rivieres, Canada)
Messaoud Ahmed Ouameur (Université du Québec à Trois-Rivières, Canada)

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13:50 A Worst-Case Performance Optimization Based Design Approach to Robust Symbol-Level Precoding for Downlink MU-MIMO
Alireza Haqiqatnejad (University of Luxembourg & Interdisciplinary Centre for Security, Reliability and Trust (SnT), Luxembourg)
Shahram ShahbazPanahi (University of Ontario Institute of Technology, Canada)
Björn Ottersten (University of Luxembourg, Luxembourg)

14:10 Single RF Chain Hybrid Analog/Digital Beamforming for mmWave Massive-MIMO
Alireza Morsali (McGill University, Canada)
Sara Norouzi (McGill University, Canada)
Benoit Champagne (McGill University, Canada)

14:30 Distributed Sparse Activity Detection in Cell-Free Massive MIMO Systems
Mangqing Guo (Syracuse University, USA)
M. Cenk Gursoy (Syracuse University, USA)

14:50 Multi-Mode Generalized Space-Time Index Modulation: A High-Rate Index Modulation Scheme for MIMO-ISI Channels
Lakshmi Narasimhan Theagarajan (Indian Institute of Technology, Palakkad, India)

15:10 Energy- and Spectral-Efficiency Tradeoff in Beam Domain Massive MIMO Downlink with Statistical CSIT
Jiayuan Xiong (Southeast University, P.R. China)
Li You (Southeast University, P.R. China)
Alessio Zappone (CentraleSupelec, France)
Wenjin Wang (Southeast University, P.R. China)
Xiqi Gao (Southeast University, P.R. China)

15:30 - 16:00 Coffee Break

16:00 - 18:00 Signal and Information Processing for Person-centered and Citizen-centered Smart Living II
Room 201
Chair: Troy L McDaniel (Arizona State University, USA)

16:00 – 17:00 Keynote: Shervin Shirmohammadi and Alaa Eddin Alchalabi, University of Ottawa, Canada
Applied AI in EEG-Assisted Detection of ADHD: The FOCUS Game

17:00 Bridging Connected Vehicles with Artificial Intelligence for Smart First Responder Services
Nima Taherifard (University of Ottawa, Canada)
Murat Simsek (University of Ottawa & Istanbul Technical University, Canada)
Burak Kantarci (University of Ottawa, Canada)

17:20 Robust Minimum Variance Distortionless Response Beamformer based on Target Activity Detection in Binaural Hearing Aid Applications
Hala As'ad (University of Ottawa, Canada)
Martin Bouchard (University of Ottawa, Canada)
Homayoun Kamkar Parsi (Sivantos Group, Germany)

17:40 The Blind Date: Improving the Accessibility of Mobile Dating Platforms for Individuals with Visual Impairments
Meredith K Moore (Arizona State University & Center for Cognitive Ubiquitous Computing, USA)
Corey Heath (Arizona State University, USA)
Troy L McDaniel (Arizona State University, USA)
Sethuraman Panchanathan (Arizona State University, USA)

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16:00 – 18:00 Signal/Information Processing and AI for Finance and Business IV
Room 202

Academia/Industry Mixer Panel: Challenges in Artificial Intelligence, Big data and Signal Processing in Finance and Business
Moderator: Xiao-Ping (Steven) Zhang (Ryerson University, Canada)

16:00 – 18:00 Advanced Bio-Signal Processing and Machine Learning for Assistive and Neuro-Rehabilitation Systems III
Room 203
Chair: Seyed Farokh Atashzar (Imperial College London, United Kingdom (Great Britain))

16:00 The Onset of Parietal Alpha- and Beta- Band Oscillations Caused by an Initial Video Delay
Yifeng Liu (Tsinghua University, P.R. China)
Xiaoming Tao (Tsinghua University, P.R. China)
Yiping Duan (Tsinghua University, P.R. China)

16:20 Adaptive Subject-specific Bayesian Spectral Filtering for Single Trial EEG Classification
Mahsa Mirgholami (Concordia University, Canada)
Soroosh Shahtalebi (Concordia University, Canada)
William Cui (Concordia University, Canada)
Raika Karimi (Concordia University, Canada)
Amir Asif (Concordia University, Canada)
Arash Mohammadi (Concordia University, Canada)

16:40 Identifying High-resolution Spatiotemporal Components Contributing to the Fast Spiking Response Dynamics of Visual Neurons
Yasin Zamani (University of Utah, USA)
Neda Nategh (University of Utah, USA)

17:00 Recovery of Event Related Potential Signals using Compressive Sensing and Kronecker Technique
Seyed Alireza Khoshnevis (University of South Florida, USA)
Seyed Ghorshi (The University of Texas at Tyler, USA)

17:20 Study on Novel Designs with Reduced Fatigue for Steady State Motion Visual Evoked Potentials
Raika Karimi (Concordia University, Canada)
Laura Rosero (Concordia University, Canada)
Mahsa Mirgholami (Concordia University, Canada)
Amir Asif (Concordia University, Canada)
Arash Mohammadi (Concordia University, Canada)

17:40 Extracting Audio-Visual Features for Emotion Recognition through Active Feature Selection
Fasih Haider (University of Edinburgh, United Kingdom (Great Britain))
Senja Pollak (University of Edinburgh, United Kingdom (Great Britain))
Pierre Albert (University of Edinburgh, United Kingdom (Great Britain))
Saturnino Luz (University of Edinburgh, United Kingdom (Great Britain))

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16:00 – 18:00 GS: Machine Learning Networks
Room 204
Chair: Alireza Morsali (McGill University, Canada)

16:00 Efficient Multi-Domain Dictionary Learning with GANs
Cho-Ying Wu (University of Southern California, USA)
Ulrich Neumann (USC, USA)

16:20 A Domain Knowledge -Enabled Hybrid Semi-Supervision Learning Method
Yifu Wu (Purdue University, USA)
Jin Wei (Purdue University, USA)
Rigoberto Roche' (NASA Glenn Research Center, USA)

16:40 On Convex Stochastic Variance Reduced Gradient for Adversarial Machine Learning
Saikiran Bulusu (Syracuse University, USA)
Qunwei Li (Syracuse University, USA)
Pramod Varshney (Syracuse University, USA)

17:00 Ising Dropout with Node Grouping for Training and Compression of Deep Neural Networks
Hojjat Salehinejad (University of Toronto, Canada)
Zijian Wang (University of Toronto, Canada)
Shahrokh Valaee (University of Toronto, Canada)

17:20 Video Manipulation Detection via Recurrent Residual Feature Learning Networks
Matthew J Howard (University of California, Santa Cruz, USA)
Alexander Williamson (University of California, Santa Cruz, USA)
Narges Norouzi (University of California at Sant Cruz, USA)

17:40 A Geometric Convolutional Neural Network for 3D Object Detection
Yawen Lu (Rochester Institute of Tech, USA)
Qianyu Guo (Rochester Institute of Technology, USA & Shanxi University, P.R. China)
Guoyu Lu (Rochester Institute of Technology, USA)

16:00 – 18:00 GS: Signal Processing for Communications
Room 211
Chair: Timothy N. Davidson (McMaster University, Canada)

16:00 A Power Control Game with Uncertainty On the Type of the Jammer
Andrey Garnaev (WINLAB, Rutgers University, USA)
Athina Petropulu (Rutgers, The State University of New Jersey, USA)
Wade Trappe (WINLAB, Rutgers University, USA)
H. Vincent Poor (Princeton University, USA)

16:20 Application of FBMC to DVB-T2: a Comparison vs Classical OFDM Transmissions
Honfoga Anne-Carole (University of Mons, Belgium)
Tu T. Nguyen (AIPT, Aston University, United Kingdom (Great Britain))
Michel Dossou (University of Abomey-calavi, Benin)
Véronique Moeyaert (Université de Mons (UMONS) & Faculté Polytechnique, Belgium)

16:40 Optimized Polarization Filtering Based Self-Interference Cancellation Scheme for Full-Duplex Communication
Presented by Jianchen Zhu on behalf of Fengqi Bai (Beijing University of Posts and Telecommunications, P.R. China)
Fangfang Liu (Beijing University of Posts and Telecommunications, P.R. China)
Chunyan Feng (Beijing University of Posts and Telecommunications, P.R. China)

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17:00 Ergodic Capacity Analysis for Full-Duplex Integrated Access and Backhaul System
Presented by Rongjiang Nie on behalf of Xiaoqian Zhang (Beijing University of Posts and Telecommunications, P.R. China)
Fangfang Liu (Beijing University of Posts and Telecommunications, P.R. China)
Hailun Xia (Beijing University of Posts and Telecommunications, P.R. China)

17:20 Ambient OFDM Pilot-Aided Delay-Shift Keying and Its Efficient Detection for Ultra Low-Power Communications
Ryuhei Takahashi (The University of Electro-Communications, Japan)
Koji Ishibashi (The University of Electro-Communications, Japan)

17:40 Joint Subchannel and Power Allocation for Cognitive NOMA Systems with Imperfect CSI
Yongjun Xu (Chongqing University of Posts and Telecommunications, P.R. China)
Yang Yang (Chongqing University of Posts and Telecommunications & School of Communication and Information Engineering, P.R. China)
Guoquan Li (Chongqing University of Posts and Telecommunications, P.R. China)
Zhengqiang Wang (Chongqing University of Posts and Telecommunications, P.R. China)

18:00 End of Symposium