CCECE 2021 – complete details on tutorials/speakers/panels

CCECE 2021
Sunday September 12, 2021 (all times are Eastern Daylight Time)

Tutorial 1 - Edge-based distributed inference for efficient IoT Applications
Tutorial Leaders: Amr Mohamed, Aiman Erbad, and Mohsen Guizani,
Date & Time: September 12, 2021 – 10:00 am – 1:00 pm

Abstract:
Traditional cloud-based IoT architectures suffer from many issues, including scalability, communication and computational efficiency, in addition to privacy. This motivated the need for new emerging trends such as Edge, Fog, and Pervasive Computing, where we merge hierarchical computing with efficient communication, leveraging learning-based distributed optimization, in order to resolve many of the issues highlighted above.

In this tutorial, we will highlight the motivation behind distributed AI models for Internet of Things (IoT) applications, and cyber-physical systems (CPS), in light of traditional cloud-based architectures. We will discuss state-of-the-art contributions we have recently published regarding distributed inference/classifications in IoT, and multi-drone systems, taking into consideration privacy and mobility of network users. We will motivate the need for segment-based vs layer-based inference for achieving different objectives as part of distributed inference over resource-constrained IoT devices.

Biographies:
Amr Mohamed (S' 00, M' 06, SM' 14) received his M.S. and Ph.D. in electrical and computer engineering from the University of British Columbia, Vancouver, Canada, in 2001, and 2006 respectively. He has worked as an advisory IT specialist in IBM Innovation Centre in Vancouver from 1998 to 2007, taking a leadership role in systems development for vertical industries.
He is currently a professor in the college of engineering at Qatar University. He has over 25 years of experience in wireless networking research and industrial systems development. He holds 3 awards from IBM Canada for his achievements and leadership, and 4 best paper awards from IEEE conferences. His research interests include wireless networking, and edge computing for IoT applications. Dr. Amr Mohamed has authored or co-authored over 200 refereed journal and conference papers, textbooks, and book chapters in reputable international journals, and conferences. He is serving as a technical editor for international journals and has served as a technical program committee (TPC) co-chair for many IEEE conferences and workshops.

Aiman Erbad is an associate Professor at the 2Division of Information and Computing Technology, College of Science and Engineering, Hamad Bin Khalifa University, Qatar. Dr. Erbad obtained a PhD in Computer Science from the University of British Columbia (Canada), and a Master of Computer Science in Embedded Systems and Robotics from the University of Essex (UK). Dr. Erbad received the Platinum award from H.H. The Emir Sheikh Tamim bin Hamad Al Thani at the Education Excellence Day 2013 (PhD category). Dr. Erbad research interests span cloud computing, multimedia systems and networking, and his research is published in reputed international conferences and journals.

Mohsen Guizani (S'85-M'89-SM'99-F'09) received the B.S. (with distinction) and M.S. degrees in electrical engineering, the M.S. and Ph.D. degrees in computer engineering from Syracuse University, Syracuse, NY, USA, in 1984, 1986, 1987, and 1990, respectively. He is currently a Professor at the Computer Science and Engineering Department in Qatar University, Qatar. Previously, he served in different academic and administrative positions at the University of Idaho, Western Michigan University, University of West Florida, University of Missouri-Kansas City, University of Colorado-Boulder, and Syracuse University. His research interests include wireless communications and mobile computing, computer networks, mobile cloud computing, security, and smart grid. He is currently the Editor-in-Chief of the IEEE Network Magazine,

serves on the editorial boards of several international technical journals and the Founder and Editor-in-Chief of Wireless Communications and Mobile Computing journal (Wiley). He is the author of nine books and more than 500 publications in refereed journals and conferences. He guest edited a number of special issues in IEEE journals and magazines. He also served as a member, Chair, and General Chair of a number of international conferences. Throughout his career, he received three teaching awards and four research awards. He also received the 2017 IEEE Communications Society WTC Recognition Award as well as the 2018 AdHoc Technical Committee Recognition Award for his contribution to outstanding research in wireless communications and Ad-Hoc Sensor networks. He was the Chair of the IEEE Communications Society Wireless Technical Committee and the Chair of the TAOS Technical Committee. He served as the IEEE Computer Society Distinguished Speaker and is currently the IEEE ComSoc Distinguished Lecturer. He is a Fellow of IEEE and a Senior Member of ACM.,

Tutorial 2 & 4 - IoT Workshop
Leaders: Reza Vahidnia
Date & Time: September 12, 2021 Part 1: 10:00 am – 1:00 pm; Part 2: 1:30-4:30

Reza is a faculty at British Columbia Institute of Technology. He was a Project manager of a consortium including TELUS, Microsoft, Canfor, UBC and Vigil Technologies established to develop an Industrial IoT Device Ecosystem. Product development prime responsible to define the scope of smart city initiative and analyze the technical and business requirements and manage the product life cycle through stage-gate processes.

IT is providing IoT courses and provides opportunities for industry to test out their IoT solutions.

1. Introduction to IoT
 o Genesis of IoT
 o IoT vs. M2M
 o IoT value chain
 o IoT clusters and use cases
 o IoT challenges
2. IoT Network Architecture and Design
 o IT vs. IoT network architect
 o IoT network challenges and architectural drivers
 o IoT standardized architectures - IoTWF
 o Simplified IoT Architecture
 o IoT Data Management and Compute Stack
3. Connecting Smart Objects
 o Smart object - characteristics
 o IoT Communication criteria
 o IoT Access Technologies
 o IEEE 802.15.4: Zigbee, 6LowPAN, Thread
 o IEEE 1901.2a: NB-PLC
 o IEEE 802.11: WiFi
 o Bluetooth, 9-12-21 10:00, 9-12-21 13:00
4. LPWA and Cellular IoT
 o LPWAN Technology Attributes
 o Un-licensed LPWAN
 o LoRaWAN

- o Sigfox
- o Cellular LPWAN
- o NB-IoT
- o LTE-M

5. EC-GSM-IoT 5.
   - o 5G as a catalyst for IoT innovation
   - o The Path to future 5G IoT
   - o Evolution of LTE-M towards 5G IoT requirements
6. IoT Application Protocols
   - o HTTP
   - o MQTT
   - o CoAP
7. IoT Platforms
   - o IoT Platform building blocks
   - o IoT Platforms in Action
   - o Different IoT Platform Types, 9-12-21 13:30, 9-12-21 16:30

Tutorial 3 - Collaborative Intelligence for the Internet of Things
Tutorial Leader: Ivan Bajic, Simon Fraser University,
Date & Time: September 12, 2021: 1:30 – 4:30 pm

Biography: Ivan Bajic is a Professor of Engineering Science at Simon Fraser University. His professional interests revolve around signal processing, machine learning, and their applications in image and video processing, coding, communications, and collaborative intelligence. He is currently serving as the Vice Chair of the IEEE Multimedia Signal Processing Technical Committee and as Senior Area Editor of IEEE Signal Processing Letters. He has previously served on editorial boards of several journals, including IEEE Signal Processing Magazine, IEEE Transactions on Multimedia, and Signal Processing: Image Communication.

He was born in Belgrade, Serbia, in 1976 and received his B.Sc.Eng. degree (summa cum laude) in Electronic Engineering from the University of Natal, South Africa, in 1998, and M.S. degree in Electrical Engineering, and in Mathematics, and Ph.D. degree in Electrical Engineering from Rensselaer Polytechnic Institute, Troy, NY, USA, in 2000, 2002, and 2003, respectively.

Besides professional life, he is also a wine enthusiast. He has been fortunate enough to visit some of the top wine producing regions in the world in the last number of years, including the Napa and Sonoma valleys in California, Cape Town/Stellenbosch region in South Africa, La Rioja in Spain, Douro valley in Portugal, Chianti in Italy and, closer to home, Okanagan and Cowichan valleys in British Columbia, as well as the Olympic Peninsula wineries in Washington State.

Monday, September 13, 2021(all times are Eastern Daylight Time)

Detailed Events:

IEEE Awards Gala
Date & Time: September 13, 2021 – 9:15 – 10:10
Award Winners:

A.G.L McNaughton Award - Rajni Patel
R.A. Fessenden Award - Weihua Zhuang
P.D. Ziogas Electric Power Award - Chi Yung Chung
C.C. Gotlieb Computer Award - Andreas Moshovos
J.M Ham Outstanding Engineering Educator Award - Lukas Chrostowski
Outstanding Engineer Award - Tongwen Chen
W.S. Read Outstanding Service Award - Voicu Groza
E.F Glass Western Canada Merit Award - Lawrence Whitby
M.B. Broughton Central Canada Merit Award - John Harris

VTools Link: https://events.vtools.ieee.org/m/280077

Keynote Speech: IEEE in an Internet Dominated World
Keynote Speaker: Dr. Susan (Kathy) Land - President IEEE Inc.
Date & Time: September 13, 2021 – 10:15 -11:15 am
VTools Link: https://events.vtools.ieee.org/m/280080

Abstract: As we work together to support the mission and vision of the IEEE, we must remain steadfast in our support for the use of a standardized and peer-reviewed approach in support of scientific research. This will remain is a critical tool for successfully navigating our complex world. Without it, we would be forced to rely solely on intuition, other people's authority, and blind luck.

IEEE President Land will discuss cancel culture, social media, its possible impact on the science and technology community and the role IEEE and our members must play.

Biography: Susan K. (Kathy) Land is a Program Manager for the U.S. Department of Defense's Missile Defense Agency. She has more than 30 years of industry experience in the application of software engineering methodologies, the management of information systems, and leadership of software development teams.

Kathy served as the 2018 Vice President, IEEE Technical Activities. She also served two additional terms on the IEEE Board of Directors as Division VIII Director/Delegate in 2011 and 2012 and as Division V Director/Delegate in 2014 and 2015. She was President of the IEEE Computer Society in 2009. Kathy was a member of the IEEE-USA Board of Directors in 2013 and 2016

McNaughton Winner Talk: Teleoperation, Force Sensing, Haptics and Control Issues in Medical Robotic
Speaker: Dr. Rajni Patel, Western University, ON,
Date & Time: September 13, 2021: 12:30 – 1:30 pm
VTools Link: https://events.vtools.ieee.org/m/280078

Abstract: Teleoperated (leader-follower) robotic systems offer advantages to the user of increased dexterity and precision, tremor filtering, motion repeatability, and the possibility of autonomous or semi-autonomous functions. In the time of a pandemic such as COVID-19, they provide a means of improved safety for healthcare workers through the possibility of performing certain functions from short or long distances such as patient monitoring, assessment and treatment. However, these teleoperated systems also have some disadvantages, primarily as a result of limitations of the current technology. These issues will be discussed in the talk in the context of two specific areas of application: robotics-assisted medical interventions and robotics for neurological movement disorders. Particular focus will be on issues arising from the absence of accurate haptic (sense of touch) feedback which prevents transmission to the user of realistic interaction forces between a robot and a patient or objects in the robot's environment. The role of haptics-based teleoperation will be discussed based on experimental studies

to highlight the key issues associated with incorporating force sensing, haptics and teleoperation in patient-oriented robotic systems and the advantages and potential uses of such interaction in specific applications.

Biography: Dr. Rajni Patel received the PhD degree in Electrical Engineering from the University of Cambridge, England in 1973 and currently holds the position of Distinguished University Professor and Tier-1 Canada Research Chair in the Department of Electrical and Computer Engineering with cross appointments in the Department of Surgery and the Department of Clinical Neurological Sciences at Western University. Dr. Patel is a founding member of Canadian Surgical Technologies and Advanced Robotics (CSTAR) and serves as its Director of Engineering. He has over 35 years of research experience in the design, simulation, prototyping and control of advanced robotic systems. He has also made significant contributions to the development and application of intelligent control techniques, and computational and robustness issues in control system design. From 1991 to 2000, Dr. Patel collaborated with the Canadian Space Agency (CSA) and Bombardier Inc. on three of CSA's Strategic Technologies in Automation and Robotics (STEAR) programs. Since 2000, Dr. Patel's research has focused on applications of robotics, teleoperation and haptics in minimally invasive surgery and therapy, surgical training and skills assessment, and more recently on applications for neurological movement disorders including those due to Parkinson's disease and stroke. Dr. Patel is a Life Fellow of the IEEE, Fellow of the Royal Society of Canada, the Canadian Academy of Engineering, and the American Society of Mechanical Engineers (ASME). He has served on the editorial boards of several journals including the IEEE Transactions on Robotics, the IEEE/ASME Transactions on Mechatronics, the IEEE Transactions on Automatic Control, Automatica, and the Journal of Medical Robotics Research. Dr. Patel is the Editor of "Minimally Invasive Surgical Robotics", Volume 1 (of 4 volumes) of the Encyclopedia of Medical Robotics published in 2018.,

Panel 1 - Evolving Dynamics of Industry-Academia Collaboration
Panel Leader: Deyasini Majumdar – IEEE Canada
Panelists: Witold Kinser – Professor University of Manitoba & Ex-Vice President, IEEE EAB
Mohammad Moshirpour – MEng Software Program Director, University of Calgary
Julia Elvidge – Ex-President & Co-Founder Chipworks, Co-Founder SheBoot, Advisor Invest Ottawa
Tom Murad – Country Lead - Engineering & Technical Excellence, Siemens Mobility

Date & Time: September 13, 2021 – 3:30 -4:30 pm
VTools Link: https://events.vtools.ieee.org/m/280537

Abstract: A key measure of a productive tech ecosystem in any society is the successful transition of new graduates from academia into industry. While the academic system primarily focuses on building a broader knowledge base, a very important factor for successful transition of the trainees is their industry-readiness. Hence, the need for dynamically evolving industry-academia collaborations.

While technological trends largely dictate the needs of the dynamically evolving industrial ecosystem, recent times have highlighted the need for easily scalable methods that can help effectively empower students transitioning into industry.

This panel discussion aims to focus on the dynamically evolving requirements of the tech ecosystem and the challenges and trends that drive current and next-gen industry-academia interfaces

Tuesday, September 14, 2021

Keynote Speech: Future Optical Network Architecture
Keynote Speaker: Prof. Vincent Chan - MIT & President IEEE ComSoc
Date & Time: September 14, 2021 – 9:00 -10:00 am

VTools Link: https://events.vtools.ieee.org/m/280082

Abstract: Future optical networks with orders of magnitude increase in data rates and large granularity bursty traffic need an architecture with high efficiency and also adapt dynamically to fluctuating offered loads and rapidly changing networks states. Moreover, applications and computing will impose new requirements on the network infrastructure such as time deadlines. The current network management and control systems only adapt quasi-statically (from minutes to days) due the smoothing effects of significant statistical multiplexing of traffic. Future networks will see increase in demands mostly due to large granularity sessions. These granular sessions present large dynamic range and bursty offered traffic to the network, resulting in unpredictable congestions and blocking. We will explore efficient and agile network algorithms to adapt quickly to changing network conditions: a cognitive network management and control system resides in the network control plane as a collection of coordinated algorithms that sense and infer network states, decide and implement fast scheduling of flows, predict intention of users/applications and take appropriate actions, perform rapid load balancing, and handle resiliency via reconfiguration, restoration and reconstitution of failed network assets.

Bio: Vincent Chan, the Joan and Irwin Jacobs Professor of EECS, MIT, received his BS(71), MS(71), EE(72), and Ph.D.(74) degrees in EE from MIT. From 1974 to 1977, he was an assistant professor, EE, at Cornell University. He joined MIT Lincoln Laboratory in 1977 and had been Division Head of the Communications and Information Technology Division until becoming the Director of the Laboratory for Information and Decision Systems (1999-2007). In July 1983, he initiated the Laser Intersatellite Transmission Experiment Program and the follow-on GeoLITE Program. In 1989, he formed and chaired the All-Optical-Network Consortium among MIT, AT&T and DEC, the Next Generation Internet Consortium, ONRAMP among AT&T, Cabletron, MIT, Nortel and JDS, and a Satellite Networking Research Consortium formed between MIT, Motorola, Teledesic and Globalstar. He chaired the Defense Science Board Task Force on Defense Communications, Networks and Satellite Communications and the Department of Homeland Security's Science and Technology Advisory Committee. He also has been active with start-ups and was a Board Member of a Fortune-500 network company and a member of the Draper Corporation. After chairing the Strategic Planning Committee of ComSoc from 2018-2019, he is serving as the President of the IEEE Communication Society since January 2020.

Panel 2 - IEEE Standards, Innovations to Standardization: The Role of Standards in Innovation
Panel Leader: Glenn Parsons – IEEE Canada Standards & Ericsson
Date & Time: September 14, 2021: 10:30 – 12:30
VTools Link: https://events.vtools.ieee.org/m/280539
Speakers: Mehmet Ulema, Manhattan College
Alex Gelman, NetOvation
Rudi Schubert, IEEE SA

Abstract: Some people believe that standards and innovation are opposites. Is this true? Is this a misperception? In other words, is it possible that standards actually support innovation? The panel brings together standardization experts to explore the relationship between industry innovation and standardization. The panel discussion aims to address these issues and more.

IEEE Canada Award Winners Addresses
Award Winners: **Andreas Moshovos** - C.C. Gotlieb Computer Award

Abstract: Computing applications have transformed our world, from science, to medicine, commerce and communications. Many of those applications would not have been possible without the ever more powerful, energy efficient and cost effective computing devices that are available today. Computer architecture has in part made such devices possible and continues to fuel further advances. This short presentation will review the role of computer architecture and some of the opportunities that lie ahead for further innovation

Lukas Chrostowski - J.M Ham Outstanding Engineering Educator Award
Lawrence Whitby – E.F. Glass Western Area Merit Award – My Experience as a Volunteer.
Chi Yung Chung - P.D. Ziogas Electric Power Award - Grid Modernization: Challenges and Opportunities

Date & Time: September 14, 2021 – 12:30 -1:30 pm
VTools Link: https://events.vtools.ieee.org/m/280079

Panel 3 - Where Next? Innovation and Partnerships in Emerging Technologies
Panel Leader: Philippa King - Director Advanced Technology Platform Programs, OCI,
Date & Time: September 14, 2021 – 3:30 – 4:30 pm
VTools Link: https://events.vtools.ieee.org/m/280541

Abstract: Industry academic partnerships are a key driver in innovation and building a globally competitive economy. This panel brings together the perspectives of industry, both large and small, and academia to discuss where's next in digital technologies and the opportunities that lie therein for collaboration. The panel will highlight examples of successful collaborations supported by funding programs such as ENCQOR 5G and speak to the continued support opportunities that are available to help foster industry academic partnerships and innovation.

Wednesday, September 15, 2021

Keynote Speech: **Foundation for Localization-of-Things in 5G Ecosystem and Beyond**
Keynote Speaker: Prof. Moe Win - MIT
Date & Time: September 15, 2021 – 9:00 -10:00
VTools Link: https://events.vtools.ieee.org/m/280083

Abstract: The availability of real-time, high-accuracy location awareness is essential for numerous wireless applications, particularly those involving Internet-of-Things and the 5G ecosystem. The coming years will see the emergence of network localization and navigation in challenging environments with sub-meter accuracy and minimal infrastructure requirements. This will call for the Localization-of-Things (LoT), a new paradigm referring to locating, tracking, and navigating collaborative and non-collaborative nodes (e.g., sensors, vehicles, and objects). Our work –relying on statistics, optimization, and communication theory– approaches LoT from different perspectives. This talk will give an overview of LoT, examining our recent research results in this exciting new field, from the perspectives of theoretical framework, cooperative algorithms, network operations, and network experimentation.

Biography: Moe Win is a Professor at the Massachusetts Institute of Technology (MIT) and the founding director of the Wireless Information and Network Sciences Laboratory. Prior to joining MIT, he was with AT&T Research Laboratories and NASA Jet Propulsion Laboratory. His research encompasses fundamental theories, algorithm design, and network experimentation for a broad range of real-world problems. Current research topics include network localization and navigation, network interference exploitation, and quantum information science.

Professor Win is a Fellow of the AAAS, the EURASIP, the IEEE, and the IET. He has served the IEEE Communications Society as an elected Member-at-Large on the Board of Governors, as elected Chair of the Radio Communications Committee, and as an IEEE Distinguished Lecturer. He was honored with two IEEE Technical Field Awards: the IEEE Kiyo Tomiyasu Award and the IEEE Eric E. Sumner Award. His publications, co-authored with students and colleagues, have received several awards. Other recognitions include the IEEE Communications Society Edwin H. Armstrong Achievement Award; the Copernicus Fellowship and the *Laurea Honoris Causa* from the Università degli Studi di Ferrara; and the U.S. Presidential Early Career Award for Scientists and Engineers. He is an ISI Highly Cited Researcher.

Panel 4 - Power System Transformation World-wide
Panel Leader: Maike Luiken, Past President IEEE Canada
Date & Time: September 15, 2021 – 10:30 am – 12:30 pm
VTools Link: https://events.vtools.ieee.org/m/280542

Abstract: Changing nature of electric Power systems world wide. Talking about what is new and exciting in power system transformation.

Keynote Speech - Aerial: An AI/ML Enabled Software Defined Radio Approach for Next Generation Wireless
Keynote Speaker: Dr. Chris Dick - NVIDIA
Date & Time: September 15, 2021 – 12:30 – 1:30 pm
VTools Link: https://events.vtools.ieee.org/m/280085

Abstract: As the rollout of 5G progresses and research for 6G begins, the key themes of softwarization, virtualization, open systems and artificial intelligence form foundational principles for communication systems of the future.

The application of AI/ML to wireless communication is an extremely active research area with many 10's to 100's of papers published weekly reporting new results on the application of AI/ML to the physical layer (L1), MAC layer (L2) and at the network optimization level.

To realize the Industry's vision of an AI/ML powered wireless future, a full stack solution supporting a software defined radio (SDR) approach for the vRAN, together with optimized silicon for AI, coupled with application development frameworks for AI/ML development is essential. NVIDIA GPU technology and associated CUDA programming model, together with a rich suite of AI/ML SDKs (Software Development Kits) provides these capabilities.

In this talk we present The Aerial software-defined GPU-based cloud native 5G NR RAN platform. Aerial implements not only 5G NR the baseband signal processing, but using GPU virtualization supports additional concurrently operating workloads, such as AI/ML inference, training and data analytics on this one hyper-converged system. We provide an overview of the L1 signal processing pipeline and describe efficient mechanisms for data movement between the GPU and NIC-based fronthaul interface using a GPU-enabled Data Plane Development Kit (DPDK). A brief survey of some of the promising deep learning approaches for L1 and L2 enhancements is presented.

Biography: Dr. Chris Dick joined NVIDIA in 2020 where he is a wireless architect and the technical lead for the application of Artificial Intelligence and Machine Learning to 5G and 6G wireless. From 1998 to 2020 he was a Fellow and the DSP Chief Architect at Xilinx.

In his 30 years working in signal processing and communications he has delivered silicon and software products for 3G, 4G and 5G baseband DSP and Docsis 3.1 cable access. He has performed research and delivered products for digital front-end (DFE) technology for cellular systems with a particular emphasis on digital pre-distortion for power amplifier linearization. Chris has also worked extensively on silicon architecture and compilers for machine learning. Prior to moving to Silicon Valley in 1998 he was a tenured academic in Melbourne Australia for 13 years. He has over 200 publications, 70 patents and is an adjunct Professor at Santa Clara University where he has taught courses on real-time signal processing and machine learning for 18 years. In 2018 he was awarded the IEEE Communications Society Award for Advances in Communication for research in the area of full-duplex wireless communication.,

Panel 5 - Net Zero Emissions and the Technology Required
Panel Leaders: Dale Tardiff, Chair: Outreach and Partnership Committee;
Gamal Refai-Ahmed, Vice-Chair; Ray Barton – member
Panelists: Soheil Asgarpour - Petroleum Technology Alliance of Canada

Peter Devita - Engineers for the Profession
Barrie Kirk - CAVCOE
Jiri Skopek - Jiri Skopek Architect and Planner

Date & Time: September 15, 2021 – 3:30 – 5:00 pm
VTools Link: https://events.vtools.ieee.org/m/280543

Abstract: There is much discussion of reaching zero emission by various proposed dates. As with any goal, a plan, or roadmap is required to reach this target. In the case of reducing emissions of greenhouse gases significant sectors of the economy are impacted. Some notable examples are energy production and transportation.

In this panel discussion, possible technologies that can be implemented by several sectors will be introduced. The intention is to initiate a discussion and get people thinking about various ideas and what their impact could be. Our expectation is that participants will have an increased understanding of the technology requirements and technical challenges to be overcome in attempting to reach net-zero economy

Thursday, September 16, 2021

Keynote Speech - Federated Learning and its applications to Internet of Things
Keynote Speaker: Prof. Mohsen Guizani - Qatar University
Date & Time: September 16, 2021 – 9:00 – 10:00 am
VTools Link: https://events.vtools.ieee.org/m/280086

As the Internet-of-Things devices are being widely adopted in all fields, such as smart houses, healthcare, and transportation, large amounts of data are being collected, shared, and processed. This fact raises many challenges on how to make the best use of this huge amount of data to improve the IoT systems' security using artificial intelligence, taking into consideration the resource limitations in IoT devices and issues regarding data privacy. Different techniques have been studied and developed throughout the years. For example, Federated Learning (FL), which is an emerging learning technique that is very well known for preserving and respecting the privacy of the collaborating clients' data during model training. The concepts of FL and Hierarchical Federated Learning (HFL) are evaluated and compared with respect of detection accuracy and speed of convergence, through simulating an Intrusion Detection System for Internet-of-Things applications. Different kinds of datasets (e.g., NSL-KDD) are used in our work to prove that our developed schemes are superior compared to other schemes in terms of training loss, testing accuracy, and speed of convergence. HFL also showed its efficiency over FL in reducing the effect of the non-identically and independently distributed data on the collaborative learning process.

In this Keynote, we review the current efforts by experts around the world to mitigate some of these challenges. Then, we showcase our research activities to contribute to these efforts and advocate possible solutions using AI and other tools. We provide ways on how to manage the available resources intelligently and efficiently in order to offer better conditions and provide improved services. Finally, we discuss some of our research results to support a variety of applications including how to secure these devices for successful healthcare service delivery in different aspects.

Biography: Mohsen Guizani (S'85-M'89-SM'99-F'09) received the B.S. (with distinction), M.S. and Ph.D. degrees in Electrical and Computer engineering from Syracuse University, Syracuse, NY, USA. He is currently a Professor at the Computer Science & Engineering Department in Qatar University, Qatar. Previously, he worked in different institutions: University of Idaho, Western Michigan University, University of West

Florida, University of Missouri-Kansas City, University of Colorado-Boulder, and Syracuse University. His research interests include wireless communications and mobile computing, applied machine learning, cloud computing, security and its application to healthcare systems. He was elevated to the IEEE Fellow in 2009. He was listed as a Clarivate Analytics Highly Cited Researcher in Computer Science in 2019 and 2020. Dr. Guizani has won several research awards including the "2015 IEEE Communications Society Best Survey Paper Award" as well 4 Best Paper Awards from ICC and Globecom Conferences. He is the author of nine books and more than 800 publications. He is also the recipient of the 2017 IEEE Communications Society Wireless Technical Committee (WTC) Recognition Award, the 2018 AdHoc Technical Committee Recognition Award, and the 2019 IEEE Communications and Information Security Technical Recognition (CISTC) Award. He served as the Editor-in-Chief of IEEE Network and is currently serves on the Editorial Boards of many IEEE journals/Transactions. He was the Chair of the IEEE Communications Society Wireless Technical Committee and the Chair of the TAOS Technical Committee. He served as the IEEE Computer Society Distinguished Speaker and is currently the IEEE ComSoc Distinguished Lecturer.

Panel 6 - NSERC Research Grants and Alliance Opportunities

Panel Chair: Félix Moore, Program Officer, NSERC
Date & Time: September 16, 2021 – 10:30 am – 12:30 pm
VTools Link: https://events.vtools.ieee.org/m/280544

Abstract: NSERC will discuss Discovery Grants results for 2021, NSERC news, Research Grants and Scholarships Programs Updates and Alliances Programs

Panel 7 - Women in Engineering, Awards Applications and Membership Advancement

Panel Chair: Dr. Winnie Ye - Professor - Carleton University, Ottawa, ON
Panelist: Dr. Hadis Karimipour - Professor - University of Calgary, Calgary, AB
Panelist: Dr. Maryam Davoudpour - Professor - Ryerson University, Toronto, ON
Panelist: Mr. Jeffrey Arcand - Software Engineering & IEEE Volunteer, Ottawa, ON
Panelist: Ms. Leanne Dawson - PhD Candidate, University of Calgary, Calgary, AB
Date & Time: September 16, 2021 – 3:30 – 4:30 pm
Vtools Link: https://events.vtools.ieee.org/m/280546

Abstract : Various Panel members will discuss opportunities and awards for the advancement of women in engineering.

Learn from WIE professionals from across Canada about how to create a successful award application and how to move upward in your membership with IEEE.

Friday, September 17, 2021

IoT Connect Keynote Speech - Edge Intelligence: Challenges and Opportunities

Keynote Speaker: Dr. Soumaya Cherkaoui
Date & Time: September 17, 2021 – 9:00 – 10:00 am
VTools Link: https://events.vtools.ieee.org/m/280087

Biography: Dr. Soumaya Cherkaoui is a Full Professor at Department of Electrical and Computer Engineering of Université de Sherbrooke, Canada which she joined as a faculty member in 1999. Her research and teaching interests are in wireless networks. Particularly, she works on next generation networks (5G and beyond), Edge computing/Network Intelligence, and communication networks for verticals such as Connected and Autonomous Vehicles, IoT, and Industrial IoT. Since 2005, she has been the Director of INTERLAB, a research group which

conducts research funded both by government and industry. Before joining U. Sherbrooke, she worked for industry as a project leader on projects targeted at the Aerospace Industry. Her work resulted in technology transfer to companies and to patented technology. Pr. Cherkaoui has published over 200 research papers in reputed journals and conferences. She has been on the editorial board of several journals including IEEE JSAC, and IEEE Systems, IEEE Network, IET Quantum Communication, Elsevier COMNET and Elsevier VehCom. Her work was awarded with recognitions and best paper awards including a best paper award at the IEEE Communications Society Flagship conference IEEE ICC in 2017. She has chaired prestigious conferences and workshops such as IEEE LCN 2019, and has served as a symposium co-chair for flagship conferences including IEEE ICC 2018, IEEE Globecom 2018, IEEE Globecom 2015, IEEE ICC 2014, and IEEE PIMRC 2011. She is currently an IEEE ComSoc Distinguished Lecturer. She is a Professional Engineer in Canada, a senior IEEE Member, and is serving as the Chair of the IEEE Communications Society IoT-Ad hoc and Sensor Networks Technical Committee since 2020.

IoT Connect Talk – Humans, AI, and IoT
IoT Connect Speaker: Damla Turgut – University of Central Florida
Date & Time: September 17, 2021 – 10:00 – 10:30 am

Biography: Damla Turgut is Charles Millican Professor of Computer Science at the University of Central Florida (UCF). She received her Ph.D. from the Computer Science and Engineering Department of the University of Texas at Arlington. She held visiting researcher positions at the University of Rome ``La Sapienza'', Imperial College of London, and KTH Royal Institute of Technology, Stockholm, Sweden. Her research interests include wireless ad hoc, sensor, underwater, vehicular, and social networks, edge/cloud computing, smart cities, IoT-enabled healthcare and augmented reality, as well as considerations of privacy in the Internet of Things. She is also interested in applying big data techniques for improving STEM education for women and minorities. Her most recent honors include serving as IEEE ComSoC Distinguished Lecturer for 2021-22, the NCWIT 2021 Mentoring Award for Undergraduate Research (MAUR), the UCF Research Incentive Award, and the UCF Women of Distinction Award. She is the Vice-Chair of the Social Networks Technical Committee, an advisor of the SIG on Machine Learning for Ad Hoc, Sensor, and IoT Networks of the IoT-AHSN Technical Committee, a member of the IEEE ComSoc Emerging Technologies Standing Committee, a member of the steering committee of the IEEE LCN. Since 2019, she serves as the N2Women Board Co-Chair where she co-leads the activities of the N2Women Board in supporting female researchers in the fields of networking and communications. She has been a Technical Program/Symposium Co-Chair of IEEE GC/ICC conferences multiple times. She is a member of the ACM and a senior member of the IEEE.

IoT Connect Talk - Multi-agent Reinforcement Learning for Scalable Smart Health Applications
IoT Connect Speaker: Amr Mohamed – Qatar University
Date & Time: September 17, 2021 – 10:30 – 11:00 am

Biography: Amr Mohamed (S' 00, M' 06, SM' 14) received his M.S. and Ph.D. in electrical and computer engineering from the University of British Columbia, Vancouver, Canada, in 2001, and 2006 respectively. He has worked as an advisory IT specialist in IBM Innovation Centre in Vancouver from 1998 to 2007, taking a leadership role in systems development for vertical industries.

He is currently a professor in the college of engineering at Qatar University. He has over 25 years of experience in wireless networking research and industrial systems development. He holds 3 awards from IBM Canada for his achievements and leadership, and 4 best paper awards from IEEE conferences. His research interests include wireless networking, and edge computing for IoT applications. Dr. Amr Mohamed has authored or co-authored over 200 refereed journal and conference papers, textbooks, and book chapters in reputable international journals, and conferences. He is serving as a technical editor for international journals and has served as a technical program committee (TPC) co-chair for many IEEE conferences and workshops.

IoT Connect Talk – New Trends in IoT Networks towards 6G

IoT Connect Speaker: Ayman Radwan – Instituto de Telecomunicações and Universidade de Aveiro
Date & Time: September 17, 2021 – 11:00 – 11:30 am

Biography: Dr. Radwan has received his Ph.D. from Queen's University (Kingston, ON, Canada), in 2009, and his Master of Applied Science (M. A. Sc.) from Carleton University (Ottawa, ON, Canada). He has worked for a year at Queen's University, as a research assistant, before moving to Portugal, in January 2010.
In January 2010, he joined Institute de Telecomunicações (IT), as a Senior Researcher and to help with EU project coordination and technical management. Since then, Dr. Radwan has been intensively active in European projects, coordinating and technically managing multiple EU projects. He has acted as the coordinator of multiple EU joint research projects, with multiple International partners. He was the co-PI of the EU FP7 Project "C2POWER" (10 partners and Budget: €5M). He also acted as the coordinator of the multi-partner projects: EU CELTIC "Green-T" project (17 partners and Budget: €6.5M) and the CELTIC Plus project "MUSCLES" (6 partners and Budget: €4.5M). He is currently coordinating the EU project CELTIC-NEXT "SAFE-HOME", with emphasis on eHealth, Smart-Home, and energy efficient fog-cloud networking. He was involved in multiple successful funded proposals, raising more than 2M€ in funding for his own institute.

His research interests include mobile network architecture targeting current and next generations of networking (specifically 5G and 6G), IoT networking, software defined networking, and fog-cloud networking and computing. He has more than 100 published highly cited peer-reviewed articles (with 22 h-index, and 1365 citations).

Dr. Radwan is an active IEEE Senior member, involved in multiple IEEE activities, including being an active reviewer for multiple journals and IEEE Comsoc conferences. He is an associate editor for IEEE Comm. Letters and IEEE Network. Additionally, he has been an active TPC member of ICC and Globecom, since 2008.

IoT Connect Talk - Intelligent Management of Future IIoT Networks: A tale of IT/OT convergence and DevOps
IoT Connect Speaker: Luca Foschini – Università degli Studi di Bologna
Date & Time: September 17, 2021 – 11:30 am – 12:00 pm

Biography: Luca Foschini, Ph.D., is an Associate Professor of Distributed and Mobile Systems at the Computer Science and Engineering Dept. (DISI) of the University of Bologna. He has been habilitated as Full Professor in the national examination called Abilitazione Scientifica Nazionale 2020. His research interests span from from context-aware service composition to federated cloud resource management, from mobile crowdsensing to scalable online stream processing for smart cities, from edge computing management in Industry 4.0 to design and performance assessment of Industrial IoT (IIoT) platforms. His research has been sponsored by local regional funds and industrial companies, and he is currently involved in various EU H2020 projects. He has been Visiting Expert Researcher in Brazil at UDESC State University of Santa Catarina. He is a Senior Member of IEEE and a Member of ACM. Within IEEE ComSoc, Prof. Foschini is a voting member of the EMEA Board, and he is also volunteering as EMEA Awards Committee/Young Researcher Award Program Chair and as secretary of the IEEE CSIM TC.

He has published over 200 conference and journal papers in these areas, receiving best paper award recognitions from various IEEE ComSoc technically sponsored conferences, such as ICC'21, ICC'18, ISCC'19, and CAMAD'19, and highly-cited paper mentions in IEEE journals. From the point of view of his publication record (Google Scholar – September 2021: h-index=32; i10-index=89; citations=5029), he has co-authored more than 64 international journal/magazine articles (in publication venues that are considered the excellent ones in his research field, such as IEEE COMST, ACM CSUR, Proceedings of the IEEE, IEEE TNSM, IEEE TC, IEEE TETC, IEEE TCC, IEEE TPDS, IEEE JSAC, IEEE ComMag, and IEEE WCM), guest-edited 5 special issues in international journals/magazines, co-authored 5 chapters in international books,

and 130+ additional works published in other international venues (conferences, workshops etc.) such as CCGrid, ISWC, Globecom, ICC, and ISCC. He has served as General Co-Chair and as TCP Co-Chair for several IEEE conferences, and as reviewer for several IEEE, Elsevier, and Wiley journal venues; he is also member of the Editorial Boards of IEEE Networking Letters, IGI IJHCR and IJARAS, and Hindawi IJDSN and WCMC.

For a longer CV, please refer to:
http://www.lia.deis.unibo.it/Staff/LucaFoschini/pdfDocs/shortCV_English.pdf

IoT Connect Talk - Cellular IoT – From 5G to 5G Advanced
IoT Connect Speaker: Olof Liberg - Ericsson
Date & Time: September 17, 2021 – 12:30 – 1:00 pm

Biography: Olof Liberg is a researcher and program manager at Ericsson's department for Standards & Technologies. Olof joined Ericsson in 2008 and has specialized in the design and standardization of cellular radio access technologies. He is currently leading Ericsson's 3GPP radio access network standardization team. Olof holds a bachelor's degree in Business and Economics and a master's degree in Engineering Physics, both from Uppsala University. He has, over the years, actively participated to the work in several standardization bodies such as 3GPP, ETSI and the MulteFire Alliance. He was the chairman of 3GPP TSG GERAN and its Working Group 1, during the 3GPP study on new radio access technologies for Internet of Things leading up to the specification of NB-IoT. Olof is the leading author of the first and second edition of the book Cellular Internet of Things (Elsevier), has co-authored 10 IEEE articles and contributed to 50 US patents.

IoT Connect Talk - IoT Security – Even More Complex Than It Seems (2021 update)
IoT Connect Speaker: Matthew Krieger – Cobra Electronics
Date & Time: September 17, 2021 – 1:00 – 1:30 pm
Abstract: IoT security is a complex topic with broad scope. Beyond basic physical device security and protection of communications from prying eyes are considerations around device authentication, ensuring message integrity, ongoing patch management, standardizing protocols, securing the massive surface area of the rapidly growing footprint of IoT sensors, secure-from-the-start development practices, the mismatch between IT and industrial networks and more. This talk will explore the definition of security in the context of IoT, cover threats to the IoT devices and networks, touch on the current state of IoT security from a regulatory perspective and explore options for securing the IoT ecosystem.

Biography: Matthew Krieger is a technologist and executive with experience in IT, manufacturing and publishing. He is President of Cober, Inc. and previously held senior IT leadership positions at Time, Inc. and the Reader's Digest Association. Matthew is Founder of Whysper, an audio aggregation platform allowing the consumption of text content as high quality text-to-speech. Matthew is Chairman of the Board of the Reader's Digest Partners for Sight Foundation, a non-profit focusing on the needs of the blind and visually impaired community. Matthew is also on the advisory board of Cyber-Seniors, is Chair of the Southern Connecticut State University Computer Science Technical Advisory Council, is Chief Technology Officer of the SCORE Fairfield County Connecticut chapter. Matt is a frequent presenter on topics of business and technology and the intersection of each.

IoT Connect Talk - Reinforcement Learning for Efficient and Privacy Preserving Distributed Inference in Smart City IoT Systems
IoT Connect Speaker: Aiman Erbad – Hamad Bin Khalifa University
Date & Time: September 17, 2021 – 1:30 – 2:00 pm

Biography: Aiman Erbad is an associate Professor at the 2Division of Information and Computing Technology, College of Science and Engineering, Hamad Bin Khalifa University, Qatar. Dr. Erbad obtained a PhD in Computer Science from the University of British Columbia (Canada), and a Master of Computer Science in Embedded Systems and Robotics from the University of Essex (UK). Dr. Erbad received the Platinum award from H.H. The Emir Sheikh Tamim bin Hamad Al Thani at the Education Excellence Day 2013 (PhD category). Dr. Erbad research interests span cloud computing, multimedia systems and networking, and his research is published in reputed international conferences and journals.