2023 Annual DL Series Talks
Vehicular Technology Chapter
IEEE Toronto Section

IEEE Vehicular Technology Chapter of IEEE Toronto Section, is pleased to announce our annual Distinguished Lecturer (DL) Series Talks on May 23, 2023.

This series of talks will be a great opportunity to exchange with our colleagues and Chapter members in Toronto area. Details of the events are given below. All are welcome!

Time: 10:00-2:00pm, Tuesday, May 23, 2023.

Location: SHE651 (99 Gerrard Street East, Toronto) at Toronto Metropolitan University

Please note: SHE (Sally Horsfall Eaton Centre) is the top levels of EPH (Eric Palin Hall). The elevator is located at the north-east corner of the main floor of EPH (cross at Gerrard St East and Mutual St).
Call: 416-509-2067 for direction if you get lost.

Pizza Lunch will be provided

Organization committee: Lian Zhao, Ajmery Sultana, and Farhan Pervez
Chair/Vice-Chairs for Vehicular Technology Chapter, IEEE Toronto Section

vTools posted at:
https://events.vtools.ieee.org/m/360865

https://events.vtools.ieee.org/m/360867

Aknowledgement: Great thanks for the leadership and financial support from DL Program of IEEE Vehicular Technology Society (VTS), VTS Chapter Support Program, and IEEE Toronto Section

Speaker: Jelena Mišić, Toronto Metropolitan University
Fellow, IEEE
IEEE VTS Distinguished Lecturer

Title: Consensus protocols for IoT systems with blockchains

Abstract: This work proposes Practical Byzantine Fault Tolerance (PBFT) ordering service needed for block formation in permissioned blockchain environments. Contrary to current PBFT implementations that only provide a single point of entry to the ordering service, we allow each ordering node to act as an entry point that proposes and conducts the consensus process of including new record in the distributed ledger. To ensure atomicity of record insertion in distributed ledger, we have developed a bandwidth reservation protocol that uses a modification of CSMA/CA protocol to regulate access to the broadcast medium formed by the P2P network of TCP connections between orderers. Further we address proof of stake (PoS) and delegated proof of stake consensus protocols integrated with PBFT. We also address cluster interconnections which can increase coverage of PBFT system.

Speaker Biography: **Jelena Mišić** is a Professor in the Department of Computer Science at Ryerson University, Canada. She received her PhD in Computer Engineering from University of Belgrade, Serbia, in 1993. She is an internationally recognized expert in the area of IoT, blockchain, wireless networking and network security, where she has authored or co-authored four books, 155+ journal papers, 24 book chapters, and 215+ conference papers. She has chaired more than a dozen major international events and guest-edited more than a dozen special issues of various journals. She serves on the editorial boards of IEEE Transactions on Vehicular Technology, IEEE Internet of Things Journal, IEEE Transactions on Emerging Topics in Computing, IEEE Network, ACM Computing Surveys and Ad Hoc Networks journal (published by Elsevier). She is an IEEE Fellow, ACM member and serves as IEEE VTS distinguished lecturer.

Speaker: Dr. Ping Wang, York University
Fellow, IEEE
IEEE VTS Distinguished Lecturer

Title: Over-the-Air Federated Learning with Massive MIMO Using Antenna Selection

Abstract: Over-the-air federated learning (OTA-FL) has been recently proposed as an enabling technology for learning a shared model collaboratively in a wireless network in a privacy-preserving fashion. With the implementation of massive MIMO, the large antenna array provides a promising beamforming gain at the server, and hence leads to a considerable suppression of error in the over-the-air aggregation step. This talk will present our recent work that studies OTA-FL in massive MIMO systems by considering a realistic scenario in which the edge server, despite its large antenna array, is restricted in the number of radio frequency (RF)-chains. For this setting, the beamforming for over-the-air model aggregation needs to be addressed jointly with antenna selection. This leads to an NP-hard problem due to the integral nature of the optimization. We tackle this problem via two different approaches, which will be briefly introduced in this talk. Our experimental restuls depict that learning performance of scenario with all the antennas being active at the parameter server (PS) can be closely tracked by selecting less than 20% of the antennas at the PS.

Speaker Biography: **Ping Wang** is an Associate Professor at the Department of Electrical Engineering and Computer Science, York University, and a Tier 2 York Research Chair. Prior to that, she worked with Nanyang Technological University, Singapore, from 2008 to 2018. Her research interests are mainly in the area of wireless communication networks, cloud computing and Internet of Things with the recent focus on integrating Artificial Intelligence (AI) techniques into communications networks. She has published more than 250 papers/conference proceedings papers. Her scholarly works have been widely disseminated through top-ranked IEEE journals/conferences and received the Best Paper Awards from IEEE Wireless Communications and Networking Conference (WCNC) in 2022, 2020 and 2012, from IEEE Communication Society: Green Communications & Computing Technical Committee in 2018, and from IEEE International Conference on Communications (ICC) in 2007. Her work received 21,000+ citations with H-index 70 (Google Scholar). She is an IEEE Fellow and a Distinguished Lecturer of the IEEE Vehicular Technology Society.

Speaker: Dr. Hina Tabassum, York University

Title: **A Deep Unsupervised Learning Framework for Constrained Radio Resource Management Problems**

Abstract: The next generation wireless networks are anticipated to be more complex and heterogeneous. Subsequently, the application of traditional optimization-based radio resource management (RRM) solutions is becoming difficult as they are typically non-scalable and computationally exhaustive. In this context, deep unsupervised learning is emerging as a potential solution to enable online implementation of RRM solutions without high-quality training labels and much reduced time complexity. Nevertheless, incorporating and satisfying various constraints with zero violation in a deep unsupervised learning architecture is a fundamental challenge. Therefore, this talk will discuss two novel differentiable projection-based approaches and their application to solve the classical power control problem in the presence of minimum data rate constraints. The first approach utilizes a differentiable convex optimization layer to implicitly define a projection function, whereas the other approach uses an iterative differentiable correction process. To enhance the sum-rate performance of the proposed models even further, the application of Frank-Wolfe algorithm (FW) will be shown. Our results depict that the proposed solutions not only improve the achievable data rate but also achieve zero constraint violation probability, compared to the existing approaches. Also, the proposed solutions outperform the classic optimization methods in terms of computation time complexity. .

Speaker Biography: **Hina Tabassum** is an Assistant Professor at the Lassonde School of Engineering, York University, Canada. Prior to that, she was a PDF at the Department of ECE, University of Manitoba, Canada. She received her PhD degree from King Abdullah University of Science and Technology (KAUST) in 2013. She is a Senior member of IEEE and a P.ENG in the province of Ontario. She has published over 70 technical articles in well-reputed IEEE journals and conferences. She is the founding chair of a special interest group on THz communications in IEEE ComSoc: Radio Communications Committee (RCC). She has been recognized as an Exemplary Editor by IEEE Communications Letters, 2020, and an Exemplary Reviewer (Top 2% of all reviewers) by IEEE Transactions on Communications in 2015-2017, 2019, and 2020. Currently, she is serving as an Associate Editor in IEEE Communications Letters, IEEE Transactions on Green Communications, IEEE Communications Surveys and Tutorials, and IEEE Open Journal of Communications Society. Her research interests include stochastic modeling, analysis, and optimization of energy efficient multi-band 5G/6G wireless networks jointly operating on sub-6GHz, millimeter, and Terahertz frequencies with applications to vehicular, aerial, and satellite networks.

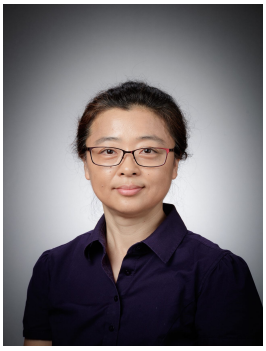
Speaker: Lian Zhao, Toronto Metropolitan University
IEEE VTS Distinguished Lecturer

Title: Network control and management for ultra-dense LEO satellite networks

Abstract: With the rapid development of low earth orbit (LEO) satellites, the ultra-dense LEO satellite-terrestrial integrated networking has become a promising paradigm to provide wide coverage, high capacity, and flexible services for the sixth generation (6G) mobile communication networks. In this talk, an integration of medium earth orbit (MEO) satellites, LEO satellites, and satellite early stations (SESs) is introduced to implement seamless connectivity and high-speed data rate service. For service provision, the service data needs to go through a series of on-board processing, before being downloaded to the terrestrial network for further applications. To this end, service function chain (SFC), an ordered concatenation of network functions (NFs), is introduced to support service provision. By allocating the constituent NFs over the network, three efficient multiple service delivery schemes are proposed to minimize the overall delivery completion latency, while considering resource sharing and competition among multiple SFCs.

Speaker Biography: **Lian Zhao** received her Ph.D. degree from the Department of Electrical and Computer Engineering (ELCE), University of Waterloo, Canada, in 2002. She joined the Department of Electrical, Computer, & Biomedical Engineering at Toronto Metropolitan University (formerly Ryerson University), Toronto, Canada, in 2003 and as a professor in 2014. She has been a distinguished lecture for IEEE Communication Society (ComSoc) (2020-2021) and IEEE Vehicular Technology Society (VTS) (starting July 2022). She has been serving as an Editor for IEEE Trans. on wireless communication, Trans. on vehicular technologies, and IEEE Internet of Things Journal. She has served various Chair positions in organizing IEEE conferences. She received the Best Land Transportation Paper Award from IEEE Vehicular Technology Society in 2016; Best Paper Award from the 2013 International Conference on Wireless Communications and Signal Processing (WCSP) and Best Student Paper Award (with her student) from Chinacom in 2011; the Canada Foundation for Innovation (CFI) New Opportunity Research Award in 2005.

Speaker: Dongmei Zhao, McMaster University, Hamilton, Ontario, Canada
Professor



Title: Network resource management for supporting digital twins with data age targets

Abstract: Digital twins (DTs) are virtual implementations of physical systems (PSs) and can represent the states of the PSs in realtime. In order to update the DTs with changes in their corresponding PSs, the PSs should regularly send their state information data to the DTs. Each DT must be assigned to an execution server (ES) that processes the forwarded data from its corresponding PS. The output is then made available to applications that are operating at an internet cloud server. In this talk we consider the problem of DT placement and server time allocations such that the maximum data request-response delay experienced by the application over all PSs is minimized, subject to maximum data age target constraints at the DTs and the application server. The problem is first formulated as an integer quadratic program (IQP) and then transformed into a semidefinite program (SDP). The problem is NP-complete. Since exact polynomial solutions are unavailable, several practical polynomial-time approximation algorithms are introduced. The algorithms are designed to give solutions with different trade-offs between the accommodation of the application input timing latency and the achievement of data age targets.

Dongmei Zhao received her BS degree in Wireless Communication from Northern Jiaotong University (now Beijing Jiaotong University), Beijing, China in 1992 and a Ph.D degree in the Department of Electrical and Computer Engineering, University of Waterloo, Waterloo, Ontario, Canada in June 2002. In July 2002 she joined the Department of Electrical and Computer Engineering at McMaster University, where she is a full professor. From April 2004 to March 2009 she was an adjunct Assistant Professor in the Department of Electrical and Computer Engineering at University of Waterloo. Dr. Zhao is an editor of the IEEE Internet of Things Journal. She served as an editor of the IEEE Transactions on Vehicular Technology from 2007 to 2017. She also served as an editor for EURASIP Journal on Wireless Communications and Networking and Journal of Communications and Networks.

Prof. Zhao is a leading co-chair of the Project & Awards committee in the IEEE ComSoc Frontier Networking Symposium 2023, a co-chair of the Mobile and Wireless Networks Symposium of IEEE Global Communications Conference (GLOBECOM) 2020, a co-chair of the Wireless Networking Symposium in IEEE GLOBECOM 2007, a co-chair of the Green Computing, Networking, and Communications Symposium (GCNC) in International Conference on Computing, Networking and Communications 2020, a co-chair of the technical program committee for IEEE International Workshop on Computer Aided Modelling and Design of Communication Links and Networks (CAMAD) 2016, a co-chair of the General Symposium of the International Wireless Communications and Mobile Computing (IWCMC) Conference 2007, and a co-chair of the Vehicular Networks Symposium of IWCMC from 2012 to 2023. She has been in Technical Program Committee of many international conferences in her fields. She has been an expert panel member for NSERC (Natural Science Engineering Research Council of Canada) from 2021-2023.