



Vehicular Technology Chapter Spring 2021 Online Events

IEEE Toronto Section

IEEE Toronto Section, Vehicular Technology Chapter is pleased to announce our Spring 2021 events. Please see following pages for details.

Distinguished Lecturer Series talk

- Dr. Shahrokh Valaee, Tuesday, April 27, 2021, 7-8pm

Women-in-Engineering Series talk

- Dr. Fatima Hussain, Tuesday, April 13, 2021, 7-8pm

Rising-Star Series talks:

The two invited speakers are at their final stages of their PhD studies. They will share their research on mobile edge computing/caching/ communication, network slicing, Artificial Intelligence (AI) enabled IoV networks, and integrated space-air-ground vehicular networks during their PhD studies.

- Haixia Peng, Tuesday, March 23, 2021, 7-8pm
- Huaqing Wu, Tuesday, March 30, 2021, 7-8pm

All events are held with Zoom Meeting
<https://ryerson.zoom.us/j/96808290854>
Meeting ID: 968 0829 0854

All are welcome

Please contact Lian Zhao at l5zhao@ryerson.ca for any questions

Distinguished Lecturer Series

**Speaker: Dr. Shahrokh Valaee, University of Toronto
Fellow, IEEE; Fellow, Engineering Institute of Canada
Distinguished Lecturer, IEEE ComSoc**



Title: Positioning methodologies for the next generation of wireless vehicular networks

Time: Tuesday, April 27, 2021, 7:00-8:00pm

Abstract: Future wireless networks will benefit from flying base-stations, mounted on drones and unmanned air vehicles. These flying network elements, integrated with ground-based network nodes, will form 3D agile networks with time varying topologies. Proper application of such networks will need precise positioning – not available through Global Navigation Satellite Systems (GNSS) – which motivates the need for designing novel localization and positioning algorithms for 6G networks. Localization is also a critical component of realizing autonomous driving. The new advancements in wireless systems, such as the introduction of mmWave, device-to-device (D2D) communication and Reflective Intelligent Surfaces (RIS), will introduce new opportunities and challenges for localization in beyond 5G networks. In this talk, we will discuss the research directions for node positioning in next generation of wireless vehicular networks and autonomous driving. Especially, in the presence of mobile network components in 3D vehicular environment, we will show how D2D communication and cooperative positioning will be a key factor in realizing smart networks of the future.

Speaker Biography: Shahrokh Valaee received his Ph.D. degree from McGill University, Canada. He is a Professor with the Edward S. Rogers Sr. Department of Electrical and Computer Engineering, University of Toronto. He is the Founder and the Director of the Wireless and Internet Research Laboratory (WIRLab) at the University of Toronto. Professor Valaee was the TPC Co-Chair and the Local Organization Chair of the IEEE Personal Mobile Indoor Radio Communication (PIMRC) Symposium 2011. He was the TPC Chair of PIMRC 2017, the Track Co-Chair of WCNC 2014, the TPC Co-Chair of ICT 2015. He has been the guest editor for various journals. From December 2010 to December 2012, he was the Associate Editor of the IEEE Signal Processing Letters. From 2010 to 2015, he served as an Editor of IEEE Transactions on Wireless Communications. Currently, he is an Editor of Journal of Computer and System Science. Professor Valaee is a Fellow of IEEE, and a Fellow of the Engineering Institute of Canada.

Women in Engineering Series

Speaker: Dr. Fatima Hussain, Senior Member, IEEE,
Manager, Event Management and Analytics, User Behaviour Analytics and Insider Threat,
Global Cyber Security, Royal Bank of Canada, Toronto
Adjunct Professor, Ryerson University, Toronto



Title: Insider Threat and Behaviour Modelling /Professional Career Development Discussions

Time: Tuesday, April 13, 2021, 7:00-8:00pm

Abstract: In the first half of the talk, discussion about behaviour modelling and insider threat is done. Insider threat classification and related threat vectors are discussed in detail. Afterwards, various methods used for identification and remediation of insider threat are presented, along with cutting edge enterprise level tools and frameworks.

In the second half of the talk, we will have on-live discussions for professional career development, through experience sharing and opinion sharing, to encourage and guide young researchers career development plan, and to motivate women career development in engineering.

Speaker Biography: Fatima Hussain received the Ph.D. and [M.A.Sc.](#) degrees in Electrical and Computer engineering from Ryerson University, Toronto, ON, Canada. Upon graduation, she was a Postdoctoral Fellow with the Network-Centric Applied Research Team (N-CART), where she worked on various NSERC-funded projects in the realm of the Internet of Things. Currently, she is part of User Behaviour and Insider Threat team, working as a Manager, Event Management and Analytics in Royal Bank of Canada (RBC), Toronto. She is responsible for employee profiling and detection of insider threats, by establishing baseline behaviours.

She is working as an editor for IEEE Newsletter (Toronto), and associate editor for various journals. She is also an Adjunct Professor with Ryerson University and her role includes supervision of graduate research projects. Her research interests include cyber security, insider threat, XAI etc. Her background includes a number of distinguished professorships with Ryerson University and University of Guelph, where she has been awarded for her research, teaching, and course development accomplishments within wireless telecommunication and Internet of Things.

Rising Stars Series

Speaker: Haixia Peng, University of Waterloo



Title: Intelligent Multi-Dimensional Resource Slicing in MEC-Assisted Vehicular Networks

Time: Tuesday, March 16, 2021, 7:00-8:00pm

Abstract: Benefiting from advances in the automobile industry and wireless communication technologies, the vehicular network has been emerged as a key enabler of intelligent transportation services. However, with more and more services and applications, mobile data traffic generated by vehicles has been increasing and the issue of the overloaded computing task has been getting worse. Because of the limitation of spectrum resources and vehicles' onboard computing/caching resources, it is challenging to promote vehicular networking technologies to support the emerged services and applications, especially those requiring sensitive delay and diverse resources. To effectively address the above challenges, two potential technologies, multi-access edge computing (MEC) and unmanned aerial vehicle (UAV), can be exploited in vehicular networks. In this presentation, I will introduce how to adopt optimization and AI technologies for efficient resource slicing, and therefore supporting various applications with satisfied quality of service (QoS) requirements in MEC- and/or UAV-assisted vehicular networks. For a relatively simple vehicular network scenario with only terrestrial MEC servers, a model-based method is applied for dynamic spectrum management, including spectrum slicing, spectrum allocating, and transmit power controlling. For a vehicular network supported by both terrestrial and aerial MEC servers, an AI-based method is applied to effectively manage the spectrum, computing, and caching resources while satisfying the QoS requirements of different applications.

Speaker Biography: Haixia Peng received her M.S. and Ph.D. degrees in Electronics and Communication Engineering and Computer Science from Northeastern University, Shenyang, China, in 2013 and 2017, respectively. She is currently a Ph.D. student in the Department of Electrical and Computer Engineering at the University of Waterloo, Canada. Her current research focuses on Internet of vehicles, resource management, multi-access edge computing, and reinforcement learning. She has authored or co-authored more than 30 technical papers. She serves/served as a reviewer for IEEE Journals on Selected Areas in Communications (JSAC), IEEE Transactions on Communications, IEEE Transactions on Vehicular Technologies, etc. more than 20 prestigious journals, and as a TPC member in IEEE ICC, Globecom, VTC, etc. conferences.

Speaker: Huaqing Wu, University of Waterloo



Title: Content Caching and Delivery in Heterogeneous Vehicular Networks

Time: Tuesday, March 30, 2021, 7:00-8:00pm

Abstract: Connected and automated vehicles (CAVs), which enable information exchange and content delivery in real time, are expected to revolutionize current transportation systems. However, the emerging CAV applications such as content delivery pose stringent requirements on latency, throughput, and global connectivity. To empower multifarious CAV content delivery, heterogeneous vehicular networks (HetVNETs), which integrate the terrestrial networks with aerial networks and space networks, can guarantee reliable, flexible, and globally seamless service provisioning. In addition, edge caching can facilitate content delivery by caching popular files in the HetVNET access points (APs) to relieve the backhaul traffic with a lower delivery delay. In this talk, we investigate the content caching and delivery schemes in the caching-enabled HetVNET. First, we study the content caching in terrestrial HetVNETs with intermittent network connections. A coding-based caching scheme is designed and a matching-based content placement algorithm is proposed to minimize the content delivery delay. Second, UAV-aided caching is considered to assist vehicular content delivery in aerial-ground vehicular networks (AGVN) and a joint caching and trajectory optimization (JCTO) problem is investigated to jointly optimize content caching, content delivery, and UAV trajectory. To enable real-time decision-making in highly dynamic vehicular networks, we propose a deep supervised learning scheme to solve the JCTO problem. Third, we investigate caching-assisted cooperative content delivery in space-air-ground integrated vehicular networks (SAGVNs), where the vehicle-to-AP association, bandwidth allocation, and content delivery ratio are jointly optimized. To address the tightly coupled optimization variables, we propose a load- and mobility-aware cooperative delivery scheme to solve the joint optimization problem with the consideration of user fairness, load balancing, and vehicle mobility.

Speaker Biography: **Huaqing Wu** received the B.E. and M.E. degrees in Electrical Engineering from Beijing University of Posts and Telecommunications, Beijing, China, in 2014 and 2017, respectively. She is currently working toward the Ph.D. degree at the Department of Electrical and Computer Engineering, University of Waterloo, Waterloo, ON, Canada. Her current research interests include vehicular networks with emphasis on edge caching, wireless resource management, space-air-ground integrated networks, and application of artificial intelligence (AI) for wireless networks. She has authored/co-authored more than 30 technical papers which are published in prestigious refereed journals (IEEE JSAC, TWC, WCM, etc.) and conferences (IEEE ICC, Globecom, VTC, etc.).