UNIVERSITY OF TORONTO
FACULTY OF APPLIED SCIENCE & ENGINEERING
Transportation Research Institute

CATTS | CENTRE FOR AUTOMATED AND TRANSFORMATIVE TRANSPORTATION SYSTEMS

TRANSFORMATIVE TRANSPORTATION '21
CATTS Symposium
June 15, 2021

A G E N D A

9:00-9:10 Welcome and Opening Remarks, Baher Abdulhai

9:10-10:40 **Session I-** moderated by Amer Shalaby and Toka S. Mostafa

- *Next Generation Activity/Travel Demand Modelling: A Mobility Service Oriented Approach-* Eric Miller
- *Multi-dimensional Impacts of Autonomous Vehicles on Travel Demand-* Mohammad Salehin *and* Khandker Nurul Habib
- *iCity Park – Game Based Parking Choice Data Collection-* Matthew Roorda
- *Simulation of Robot Delivery in Dense Pedestrian Spaces-* Farah Ghizzawi, Ruowei Li, *and* Matthew Roorda
- *An Analysis of Greenhouse Gas Emissions Associated with Shared Automated Electric Vehicles -* Macr Saleh *and* Marianne Hatzopoulou

10:40-10:45 **Break**

10:45-12:15 **Session II-** moderated by Baher Abdulhai and Islam Taha

- *Long-range 3D Detection for Queue Length Estimation-* Steven Waslander
- *Visual 3D Understanding of Mixed Traffic in Busy Intersections-* James Elder
- *Microscopic Model-Based RL Approaches for Traffic Signal Control Generalize Better than Model-Free RL Approaches-* Parth Jaggi, Baher Abdulhai, *and* Scott Sanner
- *Minimizing Freeway Corridor Delay While Balancing Mainline and On-ramp Prioritization–* Omar Elsamadisy *and* Baher Abdulhai
- *Two-Way Transit Signal Priority Algorithm for Optimizing Transit Reliability and Speed: A Deep Reinforcement Learning Approach-* Wenxun (Ariel) Hu *and* Amer Shalaby
- *Novel Transit Improvement Strategies for Multi-modal Arterials-* Kareem Othman *and* Amer Shalaby

12:15-1:00   **Break**

1:00-2:20   **Guest Speakers' Session**
                   Moderated by Baher Abdulhai, Amer Shalaby, Toka S. Mostafa and Islam Taha

1:00-1:40   "**Next stop, Autonomous! The use case of SmartShuttle Sion, Switzerland**"
           Title: SmartShuttle Sion – Pilot project overview (15 min)
           Speaker: Martin Neubauer (PostBus Switzerland) and Eric Imstepf (Mobility Lab, Switzerland)

           Title: Improving social inclusion of people with special needs through Automated Vehicles (10 min)
           Speaker: Benjamin Nanchen (University of Applied Sciences Western Swizterland-Valais-Wallis-HES-SO)

           Title: Automated Vehicles Acceptation Through a Socio-Demographic Lens (10 min)
           Speaker: Julien Reichenbach (University of Applied Sciences Western Swizterland-Valais-Wallis-HES-SO)

1:40-2:20   **"*Autonomous Driving using Multi-Policy Decision Making*"**

                   Speaker: Edwin Olson, CEO and Co-founder of May Mobility

2:20-2:30   **Break**

2:30-3:30   **Session III-** moderated by Toka S. Mostafa and Amer Shalaby

- *City of Toronto's Congestion Management Plan-* Mike Barnet, Manager of Traffic System Planning, Design, and Capital Coordination, Traffic Management Section, The City of Toronto
- *Implementation of Advanced Transportation Technologies in York Region –* Lauren Crawford, Manager, Transportation Long-Term Planning, Transportation Services Department, York Region
- *Empowering small businesses with low-cost delivery-* Ignacio Tartavull, Tiny mile

3:30-3:40   **Concluding Remarks, Amer Shalaby**
3:40-4:00   **Break**
4:00-5:00   Partner's Planning Workshop (Closed session with partners only), moderated by Baher Abdulhai and Amer Shalaby.

Speakers' Bios:

Eric J. Miller, BASc (1973, UofT); MASc (1975, UofT); PhD (1978, MIT), has been a faculty member in the Department of Civil & Mineral Engineering, University of Toronto since 1983, where he is currently Professor and Director of the U of T Transportation Research Institute. He is past-Chair of the U.S. Transportation Research Board (TRB) Committee on Travel Behavior and Values, the International Association for Travel Behaviour Research (IATBR) and the TRB Sub-Committee on Integrated Transportation – Land Use Modeling, and is Member Emeritus of the TRB Transportation Demand Forecasting Committee. He served on the TRB Task Force on Moving Activity-Based Approaches to Practice and the US National Academy of Sciences Committee for Determination of the State of the Practice in Metropolitan Area Travel Forecasting. He has chaired or been a member of 50 demand modelling peer review panels throughout North America, including the California High-Speed Rail Authority's Ridership Technical Advisory Panel (2011-16). Professor Miller is the recipient of the 2009 Wilbur S. Smith Distinguished Educator Award from the Institute of Transportation Engineers, inaugural winner of the University of British Columbia Margolese National Design for Living Award (2012), the 2018 IATBR Lifetime Achievement Award and the 2020 U of T Faculty of Applied Science and Engineering Safwat Zaky Research Leader Award. Professor Miller is the developer of GTAModel, a state-of-the-art activity-based microsimulation regional travel demand modeling system used by GTHA municipalities to forecast travel demand, and ILUTE, an integrated land use – travel demand model system for the GTHA. His international experience includes transit planning in Cairo, travel demand model development in Mumbai and Hyderabad, and urban mobility solutions for Latin American cities. He is co-author of the textbook "Urban Transportation Planning: A Decision-Oriented Approach," currently in its third edition.

Mohammad Salehin is a final-year PhD student working under the supervision of Prof. Khandker Nurul Habib in the Department of Civil and Mineral Engineering at the University of Toronto. As a part of his PhD thesis, he is investigating the impacts of autonomous vehicles (AVs) on travel mode choices and consumers' willingness to pay for automation. He is also interested in exploring consumer preferences for AV ownership and usage in the post-COVID-19 era. Before joining U of T in 2017, Mohammad earned his BSc in Civil Engineering and MSc in Transportation Engineering degrees from Bangladesh. He also has some professional experience of working in Bangladesh University of Engineering and Technology (BUET). Mohammad loves playing table tennis and volleyball.

Khandker Nurul Habib is the Percy Edward Hart Professor in Civil & Mineral Engineering at the University of Toronto. His overall research focus is sustainable transportation planning and policy development. For this, he recognizes that we need a clear understanding of peoples' transportation behaviour and appropriate methodology for capturing such behaviour while forecasting demand for transportation infrastructure or results of any transportation and land-use policies. So, his research involves developing activity-based travel demand forecasting models, integrated land-use and transportation models, and advanced travel survey methods. For his pioneering contribution in these areas, he received numerous national and international awards. He is the recipient of the 2020 Sandford Fleming Award from the Canadian Society of Civil Engineering (CSCE), and he is the chair of TRB's Standing Committee on Travel Behaviour and Values.

Matthew Roorda has been a Professor of Civil Engineering at the University of Toronto since 2005, and a transportation engineer since 1998. He is the Canada Research Chair in Freight Transportation and Logistics and Chair of the Smart Freight Centre, a multi-university research centre. Dr. Roorda's research interests include urban freight transportation, freight planning and operations, freight and passenger survey methods, city logistics, parking, curbside management, emissions analysis, travel demand modelling, and firm behaviour.

Farah Ghizzawi is a PhD student at the Civil & Mineral Engineering Department at the University of Toronto. She worked in engineering consulting in the GCC region for over six years before pursuing graduate studies. Her experience includes transportation modeling and planning, as well as traffic engineering. Currently, her research interests are vehicle automation, urban freight and parking design and management.

Ruowei Li is an MASc candidate under the supervision of Professor Matthew Roorda at the University of Toronto. Her research interests include last-mile logistics, pedestrian simulation, and transportation/urban

planning. Ruowei's current research involves evaluating the performance of sidewalk autonomous delivery robots in dense pedestrian crowds.

Marc Saleh is a PhD candidate in the Department of Civil and Mineral Engineering at the University of Toronto. His research explores the role of emerging technologies in mitigating transport sector emissions. His on-going projects vary from investigating the traffic emissions of freight demand management strategies; to understanding the potential impact of electric automated vehicles on vehicle ownership and their respective emissions. His most recent work explores the importance of smart charging in minimizing pollutant emissions from electricity power generation. Prior to pursing his PhD, Marc received a Bachelor of Science in Civil Engineering from the University of Toronto. He also holds a federal NSERC Postgraduate Scholarship – Doctoral (PGS D) award.

Marianne Hatzopoulou is Professor and Associate Chair of Graduate Studies in the Department of Civil and Mineral Engineering at the University of Toronto. She holds a Canada Research Chair in Transportation and Air Quality. Dr. Hatzopoulou leads an active research group studying the interactions between transportation, air quality, climate change, and public health. She supported municipal governments and community groups in the appraisal of transportation policies in terms of climate and air impacts. She also served on national and international expert panels, providing advice on the development of strategies to reduce transportation-related emissions. Dr. Hatzopoulou works closely with epidemiologists in the development of improved measures for air pollution exposure and has received funding from provincial, federal, and international health agencies to conduct integrative research in transportation engineering, air pollution, and public health. She serves on the Transportation Research Board of the National Academies of Sciences, Engineering, and Medicine as the committee research coordinator for the standing committee on "Air Quality and Greenhouse Gas Mitigation". She is also an associate editor of the journal *Transportation Research Part D: Transport and Environment*.

Steven Waslander is a leading authority on autonomous aerial and ground vehicles, including multirotor drones and autonomous driving vehicles, Simultaneous Localization and Mapping (SLAM) and multi-vehicle systems. He received his MS in 2002 and his PhD in 2007, both from Stanford University in Aeronautics and Astronautics, and is currently an associate professor at the University of Toronto Institute for Aerospace Studies (UTIAS), where he founded the Toronto Robotics and Artificial Intelligence Laboratory (TRAILab). His work on autonomous vehicles has resulted in the Autonomoose, the first autonomous vehicle created at a Canadian University to drive on public roads

James Elder, York University is Professor and York Research Chair in Human and Computer Vision at York University, Toronto, Canada. He is jointly appointed to the Department of Psychology and the Department of Electrical Engineering & Computer Science at York and is a member of York's Centre for Vision Research (CVR) and Vision: Science to Applications (VISTA) program. His research seeks to improve machine vision systems through a better understanding of visual processing in biological systems. Dr. Elder's current research is focused on natural scene statistics, perceptual organization, contour processing, shape perception, single-view 3D reconstruction, attentive vision systems and machine vision systems for dynamic 3D urban awareness.

Parth Jaggi is a 2nd Year MASc student under Prof. Scott Sanner's D3M Lab in Mechanical and Industrial Engineering Department of University of Toronto. He is working with learned models and planning methodologies to provide scalable and robust adaptive Traffic Signal Control strategies.

Omar Elsamadisy is a PhD candidate in the Civil and Mineral Engineering Department at the University of Toronto (UofT), under the supervision of Prof. Baher Abdulhai. His PhD research is in the field of Intelligent Transportation Systems (ITS). His main goal is to develop a control strategy for both manually driven vehicles and Autonomous Vehicles (AVs) on freeways to prevent congestion and preserve safe and efficient flows at bottlenecks using the latest Artificial Intelligence (AI) methods and techniques.

Wenxun (Ariel) Hu received her MASc degree in 2015 and is pursuing a PhD in transportation engineering at the University of Toronto, Ontario, Canada. Her research interests include transit planning and operations, traffic signal control, and intelligent transportation systems.

Kareem Othman received his BSc and MSc degrees from the civil engineering department, faculty of engineering, Cairo University. Kareem is currently a PhD candidate at the civil engineering department, University of Toronto under the supervision of Professors Amer Shalaby and Baher Abdulhai.

Mike Barnet is the Manager of Traffic Systems Planning, Design, and Capital Coordination, Transportation Services, at the City of Toronto. As a manager, Mike oversees the design and implementation of Traffic Signals and Intelligent Transportation Systems including Variable Message Signs, CCTVs, Adaptive Traffic Control technology and Transit Signal Priority. His work at the City of Toronto has also covered the areas of Traffic Safety / Vision Zero implementation as well as Automated Enforcement.

Lauren Crawford is a professional engineer with over 20 years of experience managing major transit/transportation infrastructure in the public and private sectors. She is currently the Manager of Transportation Long-Term Planning at York Region with responsibility for transportation planning studies, capital plan prioritizing and programming, data forecasting and modelling and researching and planning for transportation technology initiatives. Prior to joining the Region, Lauren spent 10 years in the private sector as a transportation consultant working on traveller information system projects for clients in Ontario and the US. Lauren enjoys spending time with her family, cheering on her kids in sports, travelling, skiing, reading, and running marathons.

Ignacio Tartavull is the founder and CEO of Tiny Mile; a company working on fundamentally decreasing the cost of transportation to increase the world's GDP. Previously, Ignacio was an Autonomy Researcher at Uber ATG. Before that, he was neuroscience researcher at Sebastian Seung's lab at Princeton University.