CURRICULUM VITAE

Ran Tu, Ph.D. Candidate, MSc

Affiliation: Department of Civil and Mineral Engineering, University of Toronto

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Research interests: traffic emission and traffic-related air pollution, low-carbon transportation, vehicle life-cycle assessment

Education

- ***PhD** in Transportation (GPA: 3.95/4), 2016 – 2020*

  Dept. of Civil and Mineral Engineering, University of Toronto

  Supervisor: Marianne Hatzopoulou (marianne.hatzopoulou@utoronto.ca)

  Dissertation title: Traffic Emission Modelling for Robust Policy Design in Connected and Electric Transportation

- ***Master of Science** in Transportation (GPA: 3.8/4), 2014 – 2016*

  Dept. of Civil and Environmental Engineering, Virginia Polytechnic Institute and State University

  Supervisor: Hesham Rakha (hrakha@vt.edu)

- ***Exchange Student** in Civil Engineering, 2013 – 2014*

  Dept. of Civil Engineering, École polytechnique fédérale de Lausanne

  Advisor: Geroliminis Nikolaos (nikolas.geroliminis@epfl.ch)

- ***Bachelor of Engineering** in Transportation (GPA: 86/100), 2010 - 2014*

  School of Transportation Engineering, Tongji University

  Advisor: Chao Yang (tongjiyc@tongji.edu.cn)

Awards and Scholarships

- Dr. Mazen Hassounah Graduate Scholarship in Mass Events Transportation And Crowd Management (2018, 2017, 2016)
- Second prize for Pavement Management Challenge at ICMPA9 (9th International Conference on Managing Pavement Assets) (2015)
- China Scholarship Council scholarship for exchange student (2013)
- Third prize, Mathematical Modelling Competition of Tongji University (2013)
- First prize, National Transportation Technology Competition for University Student (2013)
- Scholarship of Tongji University (2011)

Journal Publications

Tu Ran, Yijun Gai, Bilal Farooq, Marianne Hatzopoulou. 2019. *"Electric Vehicle Charging Optimization to Minimize Marginal Greenhouse Gas Emissions*". Under review of Applied Energy.

Tu Ran, An Wang, Marianne Hatzopoulou (2019) Improving the Accuracy of Emission Inventories with a Machine-Learning Approach and Investigating Transferability across Cities, Journal of the Air & Waste Management Association, DOI: 10.1080/10962247.2019.1668872

Tu Ran, Lama Alfaseeh, Shadi Djavadian, Bilal Farooq, Marianne Hatzopoulou. 2019. "*Quantifying the Impacts of Dynamic Control in Connected and Automated Vehicles on Greenhouse Gas Emissions and NO_2 concentrations*". Transportation Research Part D: Transport and Environment. 73, 142-151. https://doi.org/10.1016/j.trd.2019.06.008

Tu Ran, Islam Kamel, Baher Abdulhai, and Marianne Hatzopoulou. "*Reducing Transportation Greenhouse Gas Emissions Through the Development of Policies Targeting High-Emitting Trips*." Transportation Research Record, no. April (2018). doi:10.1177/0361198118755714.

Tu Ran, Islam Kamel, An Wang, Baher Abdulhai, and Marianne Hatzopoulou. 2018. "*Development of a Hybrid Modelling Approach for the Generation of an Urban On-Road Transportation Emission Inventory*." Transportation Research Part D: Transport and Environment 62. Elsevier: 604–18. doi:10.1016/j.trd.2018.04.011.

Wang An, **Ran Tu**, Yijun Gai, Lucas G. Pereira, I. Daniel Posen, and Marianne Hatzopoulou (2019). "*Capturing the Uncertainties in Regional Emission Estimates Related to Vehicle Electrification Can Improve the Robustness of Decision-Making*". Accepted by Applied Energy, April 2020.

Djavadian Shadi, **Ran Tu**, Marianne Hatzopoulou, Bilal Farooq (2020). "*Multi-Objective Eco-Routing for Dynamic Control of Connected and Automated Vehicles*". Under review of Transportation Research Part D: Transport and Environment.

Xu Junshi, Marc Saleh, An Wang, **Ran Tu**, and Marianne Hatzopoulou. "*Embedding local driving behaviour in regional emission models to increase the robustness of on-road emission inventories.*" Transportation Research Part D: Transport and Environment 73 (2019): 1-14.

Xu Junshi, Jonathan Wang, Nathan Hilker, Masoud Fallah-Shorshani, Marc Saleh, **Ran Tu**, An Wang et al. 2018. "*Comparing emission rates derived from a model with a plume-based approach and quantifying the contribution of vehicle classes to on-road emissions and air quality*." Journal of the Air & Waste Management Association. 68 (11): 1159-1174. https://doi.org/10.1080/10962247.2018.1484395.

Xu Junshi, Nathan Hilker, Matheus Turchet, Mohamad-Kenan Al-Rijleh, **Ran Tu**, An Wang, Masoud Fallahshorshani, Greg Evans, and Marianne Hatzopoulou. "*Contrasting the direct use of data from traffic radars and video-cameras with traffic simulation in the estimation of road emissions and PM hotspot analysis.*" Transportation Research Part D: Transport and Environment 62 (2018): 90-101.

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Wang An, Junshi Xu, **Ran Tu**, Marc Saleh, and Marianne Hatzopoulou. (2019). "High-Resolution Mapping of Fine Particulate Matters: Understanding Land Use Regression and Machine Learning Models". Prepared to submit to Environmental Science and Technology.

Conference Papers

Tu Ran, Yijun Gai, Bilal Farooq, Marianne Hatzopoulou. "Electric Vehicle Charging Optimization to Minimize Marginal Greenhouse Gas Emissions". Presented in the 99th Transportation Research Board Annual Meeting. Washington DC, USA, 2020

Tu Ran, Lama Alfaseeh, Shadi Djavadian, Bilal Farooq, Marianne Hatzopoulou. "*Quantifying the Air Quality and Energy Consumption Impacts of Connected and Autonomous Vehicles in an Urban Network*". Presented in the Air and Waste Management Association's the 112th Annual Conference & Exhibition (ACE), Quebec City, QC, Canada, 2019

Tu Ran, An Wang, Marianne Hatzopoulou. (2018). "*Improving the Spatial Accuracy of Regional Emission Inventories and Investigating the Transferability of Emission Modeling Approaches across Different Cities"*. Paper presented in 98th Transportation Research Board Annual Meeting, Washington DC, USA, 2019

Tu Ran, Lama Alfaseeh, Shadi Djavadian, Marc Saleh, Bilal Farooq, Marianne Hatzopoulou. 2018. "*What Happens to On-Road Emissions when Travel Time on a Road Network is Improved Through End-to-End Dynamic Routing for Connected Autonomous Vehicles?".* Paper presented in 98th Transportation Research Board Annual Meeting, Washington DC, USA, 2019

Tu Ran, Marianne Hatzopoulou. (2018). "*Reconstructing Urban Built Environments for Greener Transportation Implementing Superblocks in Downtown Toronto*". Abstract accepted by 65th Annual North American Meetings of the Regional Science Association International. San Antonio, USA. November 7-10, 2018

Tu Ran, Islam Kamel, Baher Abdulhai, Marianne Hatzopoulou. (2017). "*Reducing transportation greenhouse gas emissions through the development of policies targeting high-emitting trips*". Paper presented in the 97th Transportation Research Board Annual Meeting, Washington DC, USA, 2018

Tu Ran, Islam Kamel, An Wang, Baher Abdulhai, Marianne Hatzopoulou. (2017). "*Developing Urban Transportation GHG Emission Inventories: Which Model Resolution and Input Detail is Appropriate?".* Paper presented in the 97th Transportation Research Board Annual Meeting, Washington DC, USA, 2018

Tu Ran, Jianhe Du, Hesham Rakha. (2016). "*Network-wide Assessment of Eco-Cooperative Adaptive Cruise Control Systems on Freeway and Arterial Facilities"*. Paper presented in the 96th TRB Annual Meeting. Washington DC, USA, Jan 8-12, 2017

Xu Junshi, An Wang, **Ran Tu**, Marc Saleh, Nicole Schmidt, Marianne Hatzopoulou. "Data-Driven Approach to Capture the Association Between Local Truck Movements and Near-Road Black Carbon Concentrations Using Mobile Measurements". Presented in the 99th Transportation Research Board Annual Meeting. Washington DC, USA, 2020

Alfaseeh Lama, Shadi Djavadian, **Ran Tu**, Bilal Farooq, Marianne Hatzopoulou. (2019) "Multi-Objective Eco-Routing in a Distributed Traffic Management Framework with a Case

Study of Downtown Toronto". Presented in the 99th Transportation Research Board Annual Meeting. Washington DC, USA, 2020

Alfaseeh Lama, Shadi Djavadian, **Ran Tu**, Bilal Farooq, Marianne Hatzopoulou. (2019) "Multi-objective Real-Time Eco-routing Using a Distributed Routing System". Presented in the 5th IEEE International Smart Cities Conference

Wang An, **Ran Tu**, Yijun (Jessie) Gai, I. Daniel Posen, Marianne Hatzopoulou. (2018) "*Capturing the Uncertainties in Regional Emission Estimates Related to Vehicle Electrification Can Improve the Robustness of Decision-making"*. Paper presented in the 98th Transportation Research Board Annual Meeting, Washington DC, USA, 2019

Xu Junshi., Marc Saleh, An Wang, **Ran Tu**, Marianne Hatzopoulou. 2019. "*Towards a Canadian Version of the MOVES Model: Capturing Driving Behaviours in Greater Toronto and Comparison against US Defaults*". Paper presented in the 98th Transportation Research Board Annual Meeting, Washington DC, USA, 2019

Xu Junshi, **Ran Tu**, An Wang, Laura Minet, Christos Stogios, Marc Saleh, Nathan Hilker, Jonathan Wang, Greg Evans, and Marianne Hatzopoulou. "*Quantifying the Contribution of Diesel Vehicles to Traffic Emissions Along an Urban Corridor: Implications for Cleaner Public Transit*". Paper presented in the 97th TRB Annual Meeting. Washington DC, USA, Jan 7-11, 2018

Stogios Christos, Marc Saleh, Arman Ganji, **Ran Tu**, Junshi Xu, Matthew Roorda, Marianne Hatzopoulou. (2018). "*Determining the Effects of Automated Vehicle Driving Behavior on Vehicle Emissions and Performance of an Urban Corridor"*. Paper presented in the 97th TRB Annual Meeting. Washington DC, USA, Jan 7-11, 2018

Xu Junshi, Jonathan Wang, Nathan Hilker, Masoud Fallah Shorshani, **Ran Tu**, An Wang, Laura Minet, Christos Stogios, Greg Evans, Marianne Hatzopoulou. (2018). "*Evaluation of MOVES Emission Factors Against Data from On-Road Measurements in a Large Canadian City"*. Paper presented in the 97th TRB Annual Meeting. Washington DC, USA, Jan 7-11, 2018

Ahmed Istiak, Shivesh Shrestha, **Ran Tu**, Qichao Wang, Nazana Weeks. (2015). "*Analysis and Visualization of Pavement Management Data"*. Paper presented in the 9th International Conference on Managing Pavement Asset. Washington DC, USA, May 18-21, 2015

Zhu Rongrong, Chao Yang, **Ran Tu**. (2015). "*Traveler Behavior Analysis Based on Smartphone Survey Data"*. Paper presented in the 11th National Young Academic Conference for Transportation Field. Lanzhou, Gansu, China, Sep 17-20, 2015

Seminars and Talks

- ***Academic Talks***

  "What Happens to On-Road Emissions when Travel Time on a Road Network is Improved Through End-to-End Dynamic Routing for Connected Autonomous Vehicles?" in ADC10 lecture session at 98th Transportation Research Board Annual Meeting, Washington DC, USA, 2019

"Reducing transportation greenhouse gas emissions through the development of policies targeting high-emitting trips" in ADC20 lecture session at 97th Transportation Research Board Annual Meeting, Washington DC, USA, 2019

Selected Projects

- ***Active Projects***

  Eco-Score: environmental evaluation of driving operations (2019 – Current, collaboration with TD Insurance)

  Measuring Traffic Emissions using Portable Emission Measurement System (2019 – Current)

  Investigating the Use of An Innovative Mobile Platform to Capture High-Resolution Spatiotemporal Variability in Urban Air Pollution (2019-Current, collaboration with Scentroid)

  Multi-objective Distributed Routing Optimization for the Connected and Automated Vehicles (2019 – Current, collaboration with Ryerson University)

  Time-based Battery Electric Vehicle (BEV) Charging Plan Optimization for Life-Cycle GHG emissions minimization (2018 – Current)

- ***Completed Projects***

  Investigation of Emission Uncertainties for On-Road Light-Duty Vehicles (2017 – 2018)

  Improving Accuracy of Traffic GHG emissions Modelling in Meso Scale: CLustEr-based Validated Emission Re-Calculation (CLEVER) (2016 – 2018)

  Toronto 2030 Platform: GHG and Energy Consumption Estimation for Toronto 2030 District (2017 – 2018, collaboration with Canadian Urban Institute)

  Zonal-based Urban Traffic Emission Classification and Policy Exploration for GHG reduction (2016 – 2017)

  Network-wide Traffic Emission Evaluation of Eco-Cooperative Adaptive Cruise Control in a Congested Suburban Road Network (2015 – 2016)

  Developing Household Survey App Based on Android (2012 – 2013)

  Analysis of Relationship Between Cross-Sea Bridge and Shipment in Zhoushan, Zhejiang Province (2012 – 2013)

Mentorship

Christos Stogios, for his Master of Applied Science research "Investigating the Effects of Automated Vehicle Driving Operations on Road Emissions and Traffic Performance", University of Toronto, 2016 – 2018

Samuel Abiola, for his Master of Engineering research on the Air Quality Impact of King Street Pilot Project in Downtown Toronto, University of Toronto, 2018 – 2019

May Lim, for her Master of Science research "Considerations for a Low Emission Zone in Toronto's Financial District to Reduce Transportation Greenhouse Gas Emissions", University of Toronto, 2019

Teaching Experiences

- ***Engineering Mathematics II***, *University of Toronto (2019 – 2020 Winte)*
- ***Engineering Mathematics I***, *University of Toronto (2019 – 2020 Fall, 2018 – 2019 Fall, 2017 – 2018 Fall)*

  Responsibility: practice session (including question tutoring and MATLAB coding guidance), develop quiz questions, grading, Q&A session

- ***Urban Activity, Air Pollution and Health***, *University of Toronto (2018 – 2019 Winter)*

  Responsibility: course project supervision, grading, Q&A session, prepare lecture materials

- ***Modelling Transport Emissions***, *University of Toronto (2017 – 2018 Winter)*

  Responsibility: course project supervision, grading, prepare lecture materials

- ***Transport Planning***, *University of Toronto (2016 – 2017 Fall)*

  Responsibility: simulation software and course experiment guidance, grading

- ***Introduction to Transportation Engineering***, *Virginia Tech (2014 – 2015 Spring)*

  Responsibility: grading, Q&A session

Other Working Experiences

- ***Research Assistant***

  2016 – current, Dept. of Civil and Mineral Engineering, University of Toronto

  Oct 2014 – May 2016, Dept. of Civil and Environmental Engineering, Virginia Tech

- ***Executive Committee***

  2017-current: Institute of Transportation Engineering (ITE) University of Toronto Student Chapter (UT-ITE) executive member and webmaster

- ***Internship***

  Jul 2013-Aug 2013, Mar 2014-May 2014: Traffic Engineer at Architecture Design & Research Institute of Tongji University Group

Skills

Programming and Data Analysis: MATLAB, Python, SQL, R, SPSS, JMP

Simulation: AIMSUN, VISSIM, EMME, VISUM, Synchro, INTEGRATION

Others: ArcGIS, AutoCAD