Ran Tu, Ph.D.

Transportation System Modeler II, North Central Texas Council of Government, TX, USA

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Research interests: traffic emissions & energy modeling, sustainable transport

Highlighted Skills

Highly organized and self-motivated Ph.D. with 8+ years of hands-on experience in traffic engineering, public transit planning & optimization, human behavior analysis (traveling & driving), and geospatial data analysis. Technological and management services to clients in different industries, including mobility, electric vehicles, ride-hailing services, and public transit, with the aim of strategic and operational improvement

- **Intense experience in behavioral choice modeling, factor analysis, and causal inference** for traffic planning, public transit operation, behavior guidance, and human-machine interaction.
- **Expertise in ML/DL modeling and coding language for mobility**, including Python and R programming for explainable ML modeling, RCNN, and generative adaptive modeling.
- **Hands-on experience in database and computing,** including cloud parallel computing in a Linux environment and query databases such as MySQL and SQLite.
- **Recognized work in multi-scope traffic simulation** for scenario assessment using AIMSUN, VISSIM, EMME, INTEGRATION, etc., and create a pipeline evaluation for energy and air pollutants.
- **Proficient in geospatial data analysis,** including GPS, GIS, and satellite imaging, successfully applying them to mobility-related infrastructure planning and urban land use studies.
- **Trackable writing/presentation records** of behavior data collection, modeling, and analysis, traffic simulation for emerging technologies (CAV, EV, etc.), traffic-related energy, emission, and air quality assessment in top-tier journals, technical reports, and talks in conferences such as TRB.

Education

- **PhD** in Transportation, 2016 – 2020

  Dept. of Civil and Mineral Engineering, University of Toronto

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

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

- **Master of Science** in Transportation, 2014 – 2016

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

  Supervisor: Hesham Rakha (hrakha@vt.edu)

Thesis: Network-wide Assessment of Eco-Cooperative Adaptive Cruise Control Systems on Freeway and Arterial Facilities

- **Bachelor of Engineering** in Transportation, 2010 - 2014

  School of Transportation Engineering, Tongji University

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

Working Experiences

- **Transportation System Modeler II**
  2025.03-current, Transportation Department, North Central Texas Council of Government, USA
- **Visiting Professor**
  2024.09-2025.01, Dept. Chemical Engineering & Applied Chemistry, University of Toronto, Canada
- **Associate Professor**
  2020.11-2025.03, School of Transportation, Southeast University, China
- **Postdoctoral Fellow**
  2020.04-2020.09, Dept. of Civil and Mineral Engineering, University of Toronto, Canada
- **Research Assistant**
  2016.09-2020.04, Dept. of Civil and Mineral Engineering, University of Toronto, Canada

Academic Services

- **Editorial Board Member**
  2023-current, Transportation Research Part D
- **Standing Member**
  2023-current, Transportation Research Board Air Quality and Greenhouse Gas Mitigation Committee
- **Article peer-review expert (selected)**
  Transportation Research Part D
  Transportation Research Part A
  Transportation Research Record
  Transportation Research Board Annual Meeting
  Applied Energy
  Renewable Energy
  Science of the Total Environment
  IEEE Transaction on Vehicular Technology

Awards and Scholarships

1. Best Paper Award, Transportation Research Board Annual Meeting 2025, Air Quality and Greenhouse Gas Mitigation Committee
2. Young Member Spotlight, Transportation Research Board Young Members Council Sustainability and Resilience (2024)
3. Excellent Reviewer of the China Journal of Highway and Transport (2024)
4. Outstanding Reviewer of Transportation Research Part D (2021, 2022, 2023)

5. Young Talent, China Association for Science and Technology (2022)
6. Innovation and Entrepreneurship Talent of Jiangsu Province (2021)
7. Best Dissertation Award 2020, Chinese Overseas Transportation Association (COTA)

Selected Projects

1. Research on Monitoring and Analysis Methods of Passenger Intermodal Transport Volume for Typical Intercity Travel Scenarios, Open Foundation for Key Laboratory of Integrated Transportation Theory Industry, China Academy of Transportation Sciences of Ministry of Transport, China, PI, 2023-2024
2. Dynamic Optimization of Electric Bus Services with Energy Consumption Uncertainties, FAW-Volkswagen China Environmental Protection Foundation Automotive Environmental Innovation Leading Program, PI, 2022-2023
3. Innovative E-Bus Operation and Management Strategies to Improve the Profits. The China Association for Science and Technology Young Talent Program, PI, 2022-2023
4. Eco-driving Guidance Decision Modelling Based on Drivers' Dynamic Cognitive Behaviour, National Natural Science Foundation of China, PI, 2022-2024
5. Eco-driving Guidance Based on the Heterogeneity of Drivers' Cognitive Workload, Natural Science Foundation of Jiangsu Province, PI, 2021-2024

Teaching Experiences

- **Transport Management (Lecturer),** Southeast University (Undergrad)
- **Academic Writing (Lecturer),** Southeast University (Undergrad)
- **Decision Making for Decarbonized Transportation (Lecturer),** Southeast University (Grad)

Seminars and Talks

1. "Influencing Factors, Spatial Distribution, and Mitigation of Light-Duty Vehicle Brake Wear Particle Emissions in the Urban Area" Committee Meeting at the 104th Transportation Research Board Annual Meeting, Washington D.C., US, Jan 8th, 2025
2. "EAEI Seminar: Insights of Electric Bus Planning, Scheduling, and Operation based on a Suburban case in China" Seminar at Lawrence National Berkeley Lab, Berkeley, California, US, Dec 12th, 2024.
3. "Light-Duty Vehicle Brake Wear Particle Emission Modeling and Spatiotemporal Distribution" Seminar at the SOCAAR (Southern Ontario Center for Atmospheric Aerosol Research), University of Toronto, Toronto, Canada, Dec 4th, 2024.
4. "Re-thinking Electric Bus Operation through Planning, Scheduling, and Passenger Incentives" Seminar at the UT-ITE (The University of Toronto Institute of Transportation Engineers), University of Toronto, Toronto, Canada, Oct 11th, 2024.

5. "Decarbonizing daily traveling from a behavior perspective: building up people's attitude towards low-carbon traveling recommendations" Lecture at University of Illinois, Chicago, Feb 2nd, 2024.

Selected Publications (Citation 1013, check my ***Google Scholar*** for detail)

1. Chen, Q., Wang, A., Wang, S., Liu, H., Gong, L., & **Tu, R***. (2025). Modeling urban brake wear particle emissions: A ride-hailing case in Chengdu, China. Transportation Research Part D: Transport and Environment, 139, 104541.
2. Wang, S., Qin, T., **Tu, R.***, Li, T., Chen, G. I., Green, D. C., ... & Fu, Q. (2024). Indoor air quality in subway microenvironments: Pollutant characteristics, adverse health impacts, and population inequity. Environment International, 190, 108873.
3. Tu, H., Zhao, L., **Tu, R.***, & Li, H. (2024). The energy-saving effect of early-stage autonomous vehicles: A case study and recommendations in a metropolitan area. *Energy*, *297*, 131274.
4. Niu, C., Chen, Q., **Tu, R.***, Huang, D., & Ye, Y. (2024). Co-optimizing electric bus dispatching and charging considering limited resources and battery degradation. Multimodal Transportation, 3(4), 100165.
5. Chen, R., Xu, S., Du, Y., Wu, Y., Zhao, S., **Tu, R.***, & Wu, C. (2024). Carbon Generalized System of Preferences (CGSP) programs: Key design dimensions and attitudes of potential participants. Case Studies on Transport Policy, 16, 101205.
6. Zhang, L., Wei, J., & **Tu, R.*** (2024). Temporal-spatial analysis of transportation CO2 emissions in China: Clustering and policy recommendations. *Heliyon*, *10*(2).
7. Chen, Q., Niu, C., **Tu, R.***, Li, T., Wang, A., & He, D. (2023). Cost-effective electric bus resource assignment based on optimized charging and decision robustness. *Transportation Research Part D: Transport and Environment*, *118*, 103724.
8. Xu, H., **Tu, R.***, Li, T., & Chen, H. (2023). Interpretable bus energy consumption model with minimal input variables considering powertrain types. *Transportation Research Part D: Transport and Environment*, *119*, 103742.
9. Nan, S., **Tu, R.*,** Li, T., Sun, J., & Chen, H. (2022). From driving behavior to energy consumption: A novel method to predict the energy consumption of electric bus. Energy, 261, 125188.
10. **Tu, R.,** Xue, L., Meng, C., Xu, L., Li, T., & Chen, H. (2022). Identifying specifications of in-use vehicles failing the inspection/maintenance emission test. Transportation Research Part D: Transport and Environment, 108, 103327.
11. **Tu, R.,** Xu, J., Li, T., & Chen, H. (2022). Effective and Acceptable Eco-Driving Guidance for Human-Driving Vehicles: A Review. International Journal of Environmental Research and Public Health, 19(12), 7310.

12. **Tu, R.*,** Xu, J., Wang, A., Zhang, M., Zhai, Z., Hatzopoulou, M., 2022. Real-world emissions and fuel consumption of gasoline and hybrid light duty vehicles under local and regulatory drive cycles. Sci. Total Environ. 805, 150407.
13. **Tu, R.,** Xu, J., Wang, A., Zhai, Z., Hatzopoulou, M., 2021. Effects of ambient temperature and cold starts on excess NOx emissions in a gasoline direct injection vehicle. Sci. Total Environ. 760, 143402.
14. **Tu, R.,** Li, T., Meng, C., Xie, Y., Xie, F., Yang, F., Chen, H., Li, Y., Gao, J., Liu, Y., 2021. Real-world Emissions of Construction Mobile Machines and Comparison to a Non-road Emission Model. Sci. Total Environ. 771, 145365.
15. **Tu, R.,** Gai, Y. (Jessie), Farooq, B., Posen, D., Hatzopoulou, M., 2020. Electric vehicle charging optimization to minimize marginal greenhouse gas emissions from power generation. Appl. Energy 277, 115517.
16. **Tu, R.,** Alfaseeh, L., Djavadian, S., Farooq, B., Hatzopoulou, M., 2019. Quantifying the impacts of dynamic control in connected and automated vehicles on greenhouse gas emissions and urban NO2 concentrations. Transp. Res. Part D Transp. Environ. 73, 142–151. https://doi.org/10.1016/j.trd.2019.06.008
17. **Tu, R.,** Kamel, I., Abdulhai, B., Hatzopoulou, M., 2018. Reducing Transportation Greenhouse Gas Emissions Through the Development of Policies Targeting High-Emitting Trips. Transp. Res. Rec.
18. **Tu, R.,** Kamel, I., Wang, A., Abdulhai, B., Hatzopoulou, M., 2018. Development of a hybrid modelling approach for the generation of an urban on-road transportation emission inventory. Transp. Res. Part D Transp. Environ. 62, 604–618.
19. **Tu, R.,** Wang, A., Hatzopoulou, M., 2019. Improving the Accuracy of Emission Inventories with a Machine-Learning Approach and Investigating Transferability across Cities. J. Air Waste Manage. Assoc. 69, 1377–1390.
20. Huang, P., **Tu, R.**, Zhang, X., Han, M., Sun, Y., Hussain, S. A., & Zhang, L. (2022). Investigation of electric vehicle smart charging characteristics on the power regulation performance in solar powered building communities and battery degradation in Sweden. Journal of Energy Storage, 56, 105907. (contribution: conceptualization, model development, paper drafting)
21. Wang, A., **Tu, R.**, Xu, J., Zhai, Z., & Hatzopoulou, M. (2022). A novel modal emission modelling approach and its application with on-road emission measurements. Applied Energy, 306, 117967. (contribution: experiment design, data collection, analysis, paper drafting)
22. Wang, A., Xu, J., **Tu, R.**, Saleh, M., & Hatzopoulou, M. (2020). Potential of machine learning for prediction of traffic-related air pollution. Transportation Research Part D: Transport and Environment, 88, 102599. (contribution: data analysis, paper drafting)
23. Alfaseeh, L., **Tu, R.**, Farooq, B., & Hatzopoulou, M. (2020). Greenhouse gas emission prediction on road network using deep sequence learning. Transportation Research Part D: Transport and Environment, 88, 102593. (contribution: model development & calibration, emission estimation, paper drafting)

24. Wang, A., **Tu, R.**, Gai, Y., Pereira, L. G., Vaughan, J., Posen, I. D., ... & Hatzopoulou, M. (2020). Capturing uncertainty in emission estimates related to vehicle electrification and implications for metropolitan greenhouse gas emission inventories. Applied Energy, 265, 114798. (contribution: conceptualization, life-cycle modeling, paper drafting)
25. Liu, Y., Chen, H., Li, Y., Gao, J., Dave, K., Chen, J., ... & **Tu, R.** (2022). Exhaust and non-exhaust emissions from conventional and electric vehicles: A comparison of monetary impact values. Journal of Cleaner Production, 331, 129965. (contribution: emission estimation, paper revision)

Patents & Software copyrights

1. A method for instantaneous energy consumption estimation of electric buses based on energy recovery status. Invention Patent, Certificate No: 6857118. Inventors: Ran Tu, Hao Xu. Grant date: 2024.04.02
2. Robust Evaluation Method for the Economic Efficiency of Resource Allocation in Urban Pure Electric Bus Systems. Innovation Patent, Certificate No: 7060676. Inventors: Ran Tu, Qiuzi Chen. Grant date: 2024.06.04
3. A method for eco-driving evaluation considering different traffic scenarios. Innovation Patent, Certificate No: 6778072. Inventors: Ran Tu; Xiaofeng Li; Nanfang Zheng; Wenhua Zhang; Shenlingrui Yang; Xuetong Wang; Siyu Jiang. Grant date: 2024.03.12
4. Eco-Driving Behavior Guidance Software Considering Traffic Scenarios. Computer Software Copyright Registration. Certificate No: 14431117. Copyright owner: Southeast University. Applicants: Ran Tu, Shan Xue, Xiaofeng Li

Student Supervision

- **Student award**

  First Prize at the 2022 "Fangtian Cup" 2nd Jiangsu Province University Students Energy Conservation and Emission Reduction Social Practice and Technology Competition

- **Graduation & Thesis defense committee**
  1. PhD applicant evaluation committee, 2024
  2. Master thesis defense committee, 2020, 2024
  3. Undergraduate thesis defense committee, 2021-2024
- **Current supervision**
  1. Xinran Ju, from 2024, Ph.D. Student
  2. Yanfeng Xu, from 2023, Ph.D. Student
  3. Suyang Xu, from 2024, Master Student
  4. Yan Wang, from 2024, Master Student
  5. Renrong Su, from 2024, Master Student
  6. Shan Xue, from 2023, Master Student

7. Qiuzi Chen, from 2022, Master Student

- **Alumni**

1. Yiming Wu, Bachelor of Engineering (graduate in 2024), accepted by the Master's program at the National University of Singapore
2. Yihe Chen, Bachelor of Engineering (graduate in 2024), accepted by the Master's program at the National University of Singapore
3. Yaofeng Yu, Bachelor of Engineer (graduate in 2024), accepted by the Master's program at Southeast University
4. Chenming Niu, Bachelor of Engineering (graduate in 2023), accepted by the Master's program at the University of California, Berkeley
5. Shan Xue, Bachelor of Engineer (graduate in 2023), accepted by the Master's program at Southeast University
6. Shiyu Zhao, Bachelor of Engineering (graduate in 2023), accepted by the Master's program at the University of British Columbia
7. Haoran Chen, Bachelor of Engineer (graduate in 2022)
8. Qiuzi Chen, Bachelor of Engineer (graduate in 2022), accepted by the Master's program at Southeast University
9. Yifei Su, Bachelor of Engineering (graduate in 2021), accepted by the Master's program at the University of Hong Kong