# Tianyi Li
## Curriculum Vitæ

267 Civil Engineering Building
University of Minnesota
500 SE Pillsbury Dr.
Minneapolis, MN 55455

Email: li001915@umn.edu
Website: tianyili.xyz
Phone: (206) 331–5867

## Education

- **Doctor of Philosophy**, Transportation Engineering — August 2024 (Expected)
  The University of Minnesota
  Advisor: Raphael Stern
- **Master of Science**, Transportation Engineering — December 2019
  The University of Washington
  Advisor: Yinhai Wang
- **Bachelor of Science**, Civil Engineering — May 2017
  **Tau Beta Pi, Cum Laude**
  Iowa State University
  Undergraduate Research Advisor: Sri Sritharan and Kejin Wang
- **Coursera Certification**
  Python Programming, Python Data Structures, Using Python to Access Web Data, Mathematics for Machine Learning, Mathematics for Machine Learning: Multivariate Calculus, Machine Learning Foundations: A Case Study Approach, Machine Learning: Classification, Machine Learning: Regression, Machine Learning, Introduction to Blockchain Technologies, Deep Learning with PyTorch :Generative Adversarial Network, Neural Networks and Deep Learning

## Research Interests

- Transportation-Cyber-Physical systems (T-CPS)
- Machine Learning with Transportation Priors
- Machine Learning and Data Science for Modeling and Control of Traffic
- Traffic Estimation and Modeling
- Sustainable Urban Mobility
- Urban Computing
- Transportation Safety

## Working articles

3. **Li, T.**, et al. (2023). Traffic mode decomposition. (Collaborate with researchers from UC-Berkeley)
2. **Li, T.**, et al. (2023). Physical Constrained Deep Learning Model with Transportation Priors for Car-following Behavior.
1. Kiani, A., **Li, T.**, & Stern, R. (2023). Modeling the evolution of traffic dynamics as an epidemic spread process. Working paper

## Journal articles

6. **Li, T.**, Halatsis, A., & Stern, R. (2023). RACER: Rational Artificial Intelligence Car-following-model Enhanced by Reality. Under review
5. **Li, T.**, Shang, M., Wang, S., & Stern, R. (2022). Understanding and detecting malicious cyberattacks on adaptive cruise control vehicles: A machine learning approach. Under review in *IEEE Transactions on Intelligent Transportation Systems.*
4. **Li, T.**, Klavins, J., Xu, T., Davis, G., & Stern, R. (2023). Understanding driver-pedestrian interactions to predict driver yielding: field experiments in Minnesota. Under review in *ASCE Journal of Transportation Engineering, Part A: Systems.*
3. **Li, T.**, & Stern, R. (2023). Car-following-response based vehicle classification via deep learning. *ACM Transactions on Intelligent Transportation Systems.*
2. Xu, T., Barman, S., Levin, M.W., Chen, R., & **Li, T.**(2022) Integrating public transit signal priority into max-pressure signal control: Methodology and simulation study on a downtown network. *Transportation Research Part C: Emerging Technologies*, *138*, 103614
1. **Li, T.**, Qi, G.J., & Stern, R. (2022). Taxi Utilization Rate Maximization by Dynamic Demand Prediction: A Case Study in the City of Chicago. *Transportation Research Record: Journal of the Transportation Research Board*, *2676(4)*, 367-379

## Conference proceedings

8. **Li, T.**, Rosenblad, B., Wang, S., Shang, M. & Stern, R. (2023, June). Exploring Energy Impacts of Cyberattacks on Adaptive Cruise Control Vehicles. *The IEEE Intelligent Vehicles Symposium (IV 2023)*, IEEE
7. **Li, T.**, Iogansen, X. & Stern, R. (2023, May). Assessing the Impact of Disruptive Events on Urban Mobility: A Case Study of Chicago Taxis during COVID-19 *In 2023 3rd Workshop on Data-Driven and Intelligent Cyber-Physical Systems for Smart Cities Workshop (DI-CPS)*, IEEE
6. **Li, T.**, Shang, M., Wang, S., Filippelli, M. & Stern, R. (2022, October). Detecting Stealthy Cyberattacks on Automated Vehicles via Generative Adversarial Networks. *In 2022 IEEE 25th International Conference on Intelligent Transportation Systems (ITSC)*, (pp. 3632-3637), IEEE
5. **Li, T.**, & Stern, R. (2022, May). Robustness of vehicle identification via trajectory dynamics to noisy measurements and malicious attacks. *In 2022 2nd Workshop on Data-Driven and Intelligent Cyber-Physical Systems for Smart Cities Workshop (DI-CPS)*, (pp. 36-39), IEEE
4. **Li, T.**, & Stern, R. (2021, September). Classification of adaptive cruise control vehicle type based on car following trajectories. *In 2021 IEEE International Intelligent Transportation Systems Conference (ITSC)*, (pp. 1547-1552), IEEE
3. **Li, T.**, Cullom, J., & Stern, R. (2021, May). Leveraging video data to better understand driver-pedestrian interactions in a smart city environment. *In Proceedings of the Workshop on Data-Driven and Intelligent Cyber-Physical Systems*, (pp. 6-11), ACM
2. **Li, T.**, Wu, X., Ban, X., & Wang, Y. (2020, August). "Centralized" Taxi Services in Big Metropolitan Areas: Evidenced by Chicago Data. *In International Conference on Transportation and Development 2020*, (pp. 287-299), Reston, American Society of Civil Engineers (ASCE)
1. **Li, T.**, Zhou, L., Du, W., Sun, Z., & Zhang, N. (2017, August). The conceptual discussion of the long-distance public passenger transportation system." In 2017 4th International Conference on Transportation Information and Safety *In 2017 4th International Conference on Transportation Information and Safety (ICTIS)*, (pp. 306-311), IEEE

## Conference/Invited talks

15. **Li, T.** RACER: Rational Artificial Intelligence Car-following-model Enhanced by Reality. To be Presented at Neural Information Processing Systems (**NeurIPS 2023**) workshop on Machine Learning and the Physical Sciences, New Orleans, Louisiana, December 17, 2023.
14. **Li, T.** RACER: Rational Artificial Intelligence Car-following-model Enhanced by Reality. To be Presented at Transportation Research Board (TRB) 104th Annual Meeting, Washington, D.C., January 7, 2024.
13. Kiani, A. & **Li, T.** Modeling the Evolution of Traffic Dynamics as an Epidemic Spread Process for Lagrangian Control. To be Presented at Transportation Research Board (TRB) 104th Annual Meeting, Washington, D.C., January 7, 2024.
12. **Li, T.** Harmonizing AI and Traffic Priors in Transportation-Cyber-Physical Systems (T-CPS). Lightning Talk at 2023 CTS Transportation Research Scholar Conference, Minneapolis, Minnesota, September 12, 2023.
11. **Li, T.** Energy Impacts of Cyberattacks on Adaptive Cruise Control Vehicle. Presented at The IEEE Intelligent Vehicles Symposium (IV 2023), Anchorage, Alaska, June 9, 2023.
10. **Li, T.** Assessing the Impact of Disruptive Events on Urban Mobility: A Case Study of Chicago Taxis during COVID-19. Presented at the 3rd Workshop on Data-Driven and Intelligent Cyber-Physical Systems for Smart Cities (DI-CPS), San Antonio, Texas, May 9, 2023.
9. **Li, T.** Understanding driver-pedestrian interactions to predict driver yielding: field experiments in Minnesota. Presented at Transportation Research Board (TRB) 103rd Annual Meeting, Washington, D.C., January 12, 2023.
8. **Li, T.** Understanding and detecting malicious cyberattacks on adaptive cruise control vehicles: A machine learning approach. Presented at Transportation Research Board (TRB) 103rd Annual Meeting, Washington, D.C., January 12, 2023.
7. **Li, T.** Understanding and detecting malicious cyberattacks on adaptive cruise control vehicles: A machine learning approach. Presented at NSF AI workshop, Gainesville FL, December 12, 2022.
6. **Li, T.** & Stern. R Understanding driver-pedestrian interactions to predict driver yielding: field experiments in Minnesota. Presented at the 2022 CTS Transportation Research Conference, Minneapolis, Minnesota, November 3, 2022.
5. **Li, T.** Understanding and detecting malicious cyberattacks on adaptive cruise control vehicles: A machine learning approach. Presented at the 2022 Mid-Continent Transportation Research Symposium Program and Compendium, Ames, Iowa, September 14, 2022.
4. **Li, T.** Classification of Car-following Dynamics of Adaptive Cruise Control and Human-driven Vehicles via Deep Learning. Presented at the ASCE International Conference on Transportation and Development Conference, Seattle, Washington, May 12, 2022.
3. **Li, T.** Understand Driver-pedestrian Interactions to Predict Driver Yielding Using Data-driven Methods: Field Experiments in Minnesota. Presented at the ASCE International Conference on Transportation and Development and the Automated People Movers & Automated Transit Systems Conference, Seattle, Washington, May 12, 2022.
2. **Li, T.** A data-driven approach to understanding driver yielding to pedestrians. Presented at the ASCE International Conference on Transportation and Development, Austin, Texas, August 17, 2021.
1. **Li, T.** Taxi Utilization Rate Maximization by Dynamic Demand Prediction: A Case Study in the City of Chicago. Presented at Transportation Research Board (TRB) 100th Annual Meeting, Washington, D.C., January 12, 2021.

## Technical reports:Undergraduate Research

2. **Li, T.**, Lin, S., & Sritharan, S. (2016). Non-destructive evaluation of bonding between ultra-high-performance concrete (UHPC) overlays and concrete slabs *Undergraduate Research Report (Independent Study)*
1. **Li, T.**, Lomboy, G., & Wang, K. (2016). Methods of reducing concrete shrinkage *Undergraduate Research Report (Independent Study)*

## Work Experience

- **Futurewei Technology**, Bellevue, Washington Summer 2020
  Artificial Intelligence (Smart City) Research Intern advised by Dr. Guo-Jun Qi
  - Worked on applied Machine Learning in transportation.
  - Published one journal paper about taxi mobility service.
- **Washington State Department of Transportation**, Seattle, Washington Summer & Fall 2019
  Tolling Data Analyst Research Intern supervised by Sara Myers
  - Collected and monitored daily tolling transaction data from the facility reports (e.g., I-405, SR520, and SR167).
  - Conducted performance evaluations and supported operational improvement projects.
  - Researched on tolling facilities, and congestion pricing with UW DSSG (Data Science for Social Good) team.
- **China Railway First Group**, China Summer 2017
  Assistant Engineer Intern
  - Took site survey, field measurement, instrument operation, and AutoCAD drawing.
  - Attended international conferences (WTC 2017) and participated in analysis and studies on domestic and international transportation development tendencies.

## Teaching

- CEGE 5180 (4160) Methods for intelligent transportation systems
  - Teaching Assistant
  - Fall 2023 at the University of Minnesota
- CEGE 3201 Introduction to Transportation Engineering
  - Teaching Assistant
  - Spring 2021 at the University of Minnesota
- CEE 320 Transportation Engineering
  - Teaching Assistant
  - Spring 2019 at the University of Washington
- CEE 410 Traffic Engineering Fundamentals
  - Teaching Assistant
  - Winter 2019 at the University of Washington
- Engineering Discovery Days
  - Guest Lecturer
  - Spring 2019 at the University of Washington

## Undergraduate students Supervised

5. Alexander Halatsis, Aerospace Engineering, *Driving behavior modeling project*, Summer & Fall 2023.
4. Benjamin Rosenblad, Civil Engineering, *Energy impact of cyberattacks on AVs project*, Fall 2022.

   **Li, T., Rosenblad, B.,** Wang, S., Shang, M. & Stern, R. (2023, June). Energy Impacts of Cyberattacks on Adaptive Cruise Control Vehicle. *The IEEE Intelligent Vehicles Symposium (IV 2023)*, Accepted, IEEE
3. Matthew Fillippeli, Civil Engineering, *Cyberattacks detection of AVs project*, Spring 2022.

   **Li, T.**, Shang, M., Wang, S., **Filippelli, M.** & Stern, R. (2022, October). Detecting Stealthy Cyberattacks on Automated Vehicles via Generative Adversarial Networks. *In 2022 IEEE 25th International Conference on Intelligent Transportation Systems (ITSC)*, (pp. 3632-3637), IEEE
2. Joshua Klavins, Civil Engineering, *Pedestrian yielding project*, Spring 2021 - Summer 2022.

   **Li, T.**, **Klavins, J.**, Xu, T., Davis, G., & Stern, R. (2022). Understanding driver-pedestrian interactions to predict driver yielding: field experiments in Minnesota. Under review in *Transportation Research Part F: Traffic Psychology and Behaviour.*
1. John Cullom, Computer Science, *Pedestrian yielding project*, Fall 2020 - Spring 2021.

   **Li, T., Cullom, J.,** & Stern, R. (2021, May). Leveraging video data to better understand driver-pedestrian interactions in a smart city environment. *In Proceedings of the Workshop on Data-Driven and Intelligent Cyber-Physical Systems*, (pp. 6-11), ACM

## Honors and awards

- Dwight David Eisenhower Transportation Fellowship — Fall 2023
- Department of Civil, Environmental, and Geo- Engineering Travel Award — Spring 2023
- Dwight David Eisenhower Transportation Fellowship — Fall 2022
- 2022 ITS Minnesota Educational Scholarship - ITS Minnesota — Fall 2022
- Best Presentation Award - UMN Transportation Seminar — Fall 2022
- NSF Travel Award - AI workshop — Fall 2022
- Transportation Research Board (TRB) Student Travel Award — Fall 2022
- Dwight David Eisenhower Transportation Fellowship — Fall 2021
- Hsiao Shaw-Lundquist Fellowship — Spring 2021
- 2018 Mt. Rainier Scholarship, the first recipient in Washington State — Fall 2018
- Midwest Transportation Center (MTC) Undergraduate Research Award — Spring 2016
- Dean Farnsworth Scholarship in Civil Engineering — 2014 - 2016
- Ira B. Shinkle's Scholarship — Spring 2015

## Professional service

- **Technical committee member** *Data-Driven and Intelligent Cyber-Physical Systems for Smart Cities (DI-CPS)*
- **Reviewer** *Reviewed more than 20 journal/conference papers*
- **Journals refereed:** *Transportation Research Part C: Emerging Technologies*, *Transportation Research Record*, *ACM Journal on Autonomous Transportation Systems*, *IEEE Transactions on Intelligent Transportation Systems publication information*

- **Conferences refereed:** *Transportation Research Board*, *IEEE Conference on Intelligent Transportation Systems*, *ASCE Transportation & Development Institute (T&DI)*, *World Conference on Transport Research*, *CPS Week: Cyber-physical Systems*, *IEEE Intelligent Vehicles Symposium (IV)*, *IEEE Conference on Decision and Control*
- **Graduate Student Board Committee Member - UMN CEGE** 2022–present
- **ASCE Student Member** 2019–present
- **IEEE Student Member** 2019–present
- **ACM Member** 2023–present
- **APA Member** 2023–present
- **Tau Beta Pi Member** 2015–present
- **Institute of Transportation Engineers (UW & UMN) member** 2017–present
- **Transportation Research Board** 2019–present
  Friends of the Artificial Intelligence (AED 50), Intelligent Transportation Systems (ACP 15), Traffic Flow Theory and Characteristics Committee (ACP 50), Public Transportation Planning and Development (AP 025), Statistical Methods (AED 60), and Urban Transportation Data and Information Systems (AED 20)
- **EIT Certification** 2018–present

  Affiliated with the National Council of Examiners for Engineering and Surveying
- **Volunteer Editor** 2023–present

  Affiliated with the The Sustainable Urban and Transportation Account (Chinese)
- **Volunteer Teacher** 2013 & 2015

  Affiliated with the Gansu Province's Gangou Town & Central Iowa's Bridge Building Challenge

## Professional Skills

Python, PyTorch, Tensorflow, MATLAB, R, SQL, HTML, ArcGIS, VISSIM, LaTeX, Linux, CPLEX, PostgreSQL, SUMO, AutoCAD, Microsoft Office, Git, Docker

## Reference

- **Professor Raphael Stern** *Civil, Environmental, and Geo- Engineering, University of Minnesota*
- **Professor Michael W. Levin** *Civil, Environmental, and Geo- Engineering, University of Minnesota*
- **Professor Alireza Khani** *Civil, Environmental, and Geo- Engineering, University of Minnesota*
- **Professor Di Zhu** *Geography, Environment, and Society, University of Minnesota*
- **Professor Gary Davis** *Civil, Environmental, and Geo- Engineering, University of Minnesota*