

Yanlin Zhang

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Education

- 2021 – now - **Ph.D., University of Illinois Urbana-Champaign** in Transportation Engineering & Computational Science and Engineering. (Expected May 2026)
- 2020 – 2021 - **M.Sc., Northwestern University** in Transportation System Analysis and Planning.
Thesis: *Integrated Bike Sharing and Transit Network Design Under Heterogenous Demand.*
- 2016 – 2020 - **B.Eng., Tongji University** in Traffic Engineering (Highest Honors).
Thesis: *Analysis of incentive-triggered travel behavior changes.*
- 2019 – 2020 - **Visiting Student, University of California, Berkeley** in the GLOBE Program for two semesters.

Honors and Awards

- 2024 - **Best Poster Award at NGTS-4 Conference**, Purdue University.
- 2023 - **Charles E. DeLeuw Scholarship**, CEE Department, University of Illinois Urbana-Champaign.
- 2020 - **Outstanding Graduate Award of Shanghai (top 5%)**, Tongji University.
- 2017 - **National Scholarship with highest honor (top 1%)**, Tongji University.

Projects

- **TGSIM: the Third Generation of SIMulation** A \$500K project funded by the Federal Highway Administration (FHWA), with me serving as the Lead Graduate Research Assistant.
 - **Objective:** Collect accurate trajectory datasets capable of characterizing human-automated vehicle interactions under diverse scenarios in highway and city environments.
 - **Key Contributions:**
 - **Developed a comprehensive data processing pipeline:** Integrated deep-learning-based object detection, tracking, image stabilization, and data cleaning to extract accurate trajectory data from fixed/moving aerial videography.
 - **Dataset Generation:** Processed 14 hours of high-definition video, converting it into over 11K+ vehicle-kilometers of high-fidelity trajectory data.
 - **Research and Publications:** Authored 3 journal papers and 1 report to USDOT about data collection and modeling.
- **AVA: Automated Vehicles for All** A \$7M project funded by the U.S. Department of Transportation, with me serving as the Lead Graduate Research Assistant in the Perception and Data Analytics Team.
 - **Objective:** Test the safe integration of automated driving systems on rural roadways.
 - **Key Contributions:**
 - **Perception Stack Development:** Designed and deployed a multi-modal perception system integrating LiDAR segmentation, radar tracking, and camera detection within ROS for real-time operation.
 - **Automated Analysis Pipeline:** Built an end-to-end pipeline for extracting safety-critical interactions and surrounding-object data from raw sensor inputs.
 - **On-Road Safety Testing:** Conducted field validation of longitudinal control algorithms using the Dataspeed Drive-by-Wire system.

Projects (continued)

- **SER: Self-Enforcing Roadways** A multi-phase initiative funded by the Illinois Department of Transportation (IDOT) and FHWA, with me serving as the Lead Graduate Research Assistant.
 - **Objective:** Evaluate and design roadway environments that naturally regulate driver speeds using geometric and perceptual cues.
 - **Key Contributions:**
 - **Safety Modeling:** Applied deep-learning-based image segmentation on Google Street View imagery and linked roadway/vegetation features to crash severity via multinomial logit analysis.
 - **Causal Inference and AI Tools:** Leading development of causal inference frameworks and foundational visual-language models for automated detection of SER features.
 - **Pilot Design:** Contributing to the selection and design of SER pilot deployments across Illinois in collaboration with IDOT engineers.
- **ENACT: Energy-Aware Connected and Automated Transport** A collaborative project with Argonne National Laboratory, with me serving as the Perception Team Lead.
 - **Objective:** Assess how perception and control strategies influence energy consumption in connected and automated vehicles (CAVs).
 - **Key Contributions:**
 - **Sensor Fusion:** Developed radar-camera-LiDAR fusion modules enhanced with Kalman filtering for robust forward vehicle detection.
 - **On-Road Energy Testing:** Integrated perception outputs with control systems to evaluate real-world CAV energy consumption under different driving scenarios.
 - **Research Output:** Findings led to a peer-reviewed journal publication on perception-enabled, energy-aware CAV operation.

Publications

Published Articles

- 1 R. Ammourah, P. Beigi, B. Fan, S. H. Hamdar, J. Hourdos, C.-C. Hsiao, R. James, M. Khajeh-Hosseini, H. S. Mahmassani, D. Monzer, T. Radvand, A. Talebpour, M. Yousefi, and **Y. Zhang**, "Introduction to the third generation simulation dataset: Data collection and trajectory extraction," *Transportation Research Record*, vol. 2679, no. 1, pp. 1768–1784, 2025.
- 2 N. Li, H. S. Mahmassani, **Y. Zhang**, A. Talebpour, and S. Hamdar, "Close look into the spatial-temporal distribution of speed, lane changes, and heavy vehicles in a congested freeway weaving section," *Transportation Research Record*, vol. 2679, no. 2, pp. 862–878, 2025.
- 3 **Y. Zhang**, A. Talebpour, H. S. Mahmassani, and S. H. Hamdar, "Investigation of discretionary lane-changing decisions: Insights from the third generation simulation (tgsim) dataset," *Transportation Research Record*, p. 03 611 981 251 318 329, 2025.
- 4 A. Talebpour, **Y. Zhang**, T. Radvand, and M. Yousefi, "Advancing self-enforcing streets phase 1: The relationship between roadway environment and crash severity," FHWA-ICT-24-023 2024.
- 5 **Y. Zhang** and A. Talebpour, "Characterizing human-automated vehicle interactions: An investigation into car-following behavior," *Transportation research record*, vol. 2678, no. 5, pp. 812–826, 2024.

In Revisions

- 1 **Y. Zhang**, S. Chung, N. Li, D. Monzer, H. S. Mahmassani, S. H. Hamdar, and A. Talebpour, "Can the waymo open motion dataset support realistic behavioral modeling? a validation study with naturalistic trajectories," 2025.

Conference Presentations

- 1 T. Radvand, **Y. Zhang**, A. Talebpour, and S. H. Hamdar, *Dynamics of traffic jam formation and dissipation*, Presented at the Transportation Research Board (TRB) 104th Annual Meeting, Washington, D.C. Paper No. TRBAM-25-05042 (Poster), Jan. 2025.
- 2 **Y. Zhang**, D. Monzer, N. Li, V. Okoth, Z. Chen, C.-C. Hsiao, T. Radvand, H. S. Mahmassani, S. H. Hamdar, and A. Talebpour, *Coexistence in motion: Unveiling the behavioral dynamics of humans and highly automated vehicles in naturalistic mixed traffic*, Presented at the Transportation Research Board (TRB) 104th Annual Meeting, Washington, D.C. Paper No. TRBAM-25-05831 (Poster), Jan. 2025.
- 3 S. Hegde, H. Mahmassani, **Y. Zhang**, A. Talebpour, and S. H. Hamdar, *Investigating Conflicts, Lane Changes, and Platoons in Relation to Local Densities Along a Congested Freeway Weaving Section*, Presented at the Transportation Research Board 103rd Annual Meeting, Washington, D.C. Presentation Number: TRBAM-24-03331 (Poster), 2024.
- 4 N. Li, H. Mahmassani, **Y. Zhang**, A. Talebpour, and S. H. Hamdar, *A Close Look into the Spatio-Temporal Distribution of Speed, Lane Changes, and Heavy Vehicles in a Congested Freeway Weaving Section*, Presented at the Transportation Research Board 103rd Annual Meeting, Washington, D.C. Presentation Number: TRBAM-24-06069 (Poster), 2024.
- 5 N. Li, H. Mahmassani, **Y. Zhang**, A. Talebpour, and S. H. Hamdar, *Using the third generation simulation (tgsim) dataset to understand complex traffic dynamics*, Presented at the Next-Generation Transport Systems Conference (NGTS-4), West Lafayette, IN. **Best Poster Award**, 2024.
- 6 A. Talebpour, H. Mahmassani, S. H. Hamdar, C.-C. Hsiao, D. Monzer, N. Li, R. Ammourah, T. Radvand, V. Okoth, and **Y. Zhang**, *A Closer Look at the Differences Between Human Driver Behavior and Automated Vehicle Decision Making*, Presented at the Transportation Research Board 103rd Annual Meeting, Washington, D.C. Presentation Number: TRBAM-24-06373 (Poster), 2024.
- 7 **Y. Zhang**, A. Talebpour, H. Mahmassani, and S. H. Hamdar, *An Investigation of Discretionary Lane-Changing Decisions: Insights from the Third Generation SIMulation (TGSIM) Data Set*, Presented at the Transportation Research Board 103rd Annual Meeting, Washington, D.C. Presentation Number: TRBAM-24-06377 (Lectern), 2024.
- 8 **Y. Zhang** and A. Talebpour, *Characterizing human-automated vehicle interactions: an investigation into car-following behavior*, Presented at the Transportation Research Board 102nd Annual Meeting, Washington, D.C. Presentation Number: TRBAM-23-02584 (Lectern), 2023.
- 9 **Y. Zhang** and A. Talebpour, *Impacts of Automated Vehicles on Mixed Traffic Flow: a Causal Analysis of Changes in Car-following Behavior*, Presented at the Traffic Flow Theory and Characteristics Committee (ACP50) Summer meeting (TFTC-2023), Amsterdam, NL, 2023.
- 10 **Y. Zhang** and A. Talebpour, *Characterizing human-automated vehicle interactions: an investigation into car-following behavior*, Presented at the 2022 INFORMS Annual Meeting, Indianapolis, IN, 2022.
- 11 **Y. Zhang** and A. Talebpour, *Characterizing human-automated vehicle interactions: Safety Implications on Mixed Autonomy Traffic*, Presented at the 71st Annual Illinois Transportation Engineering and Safety Conference, Champaign, IL, 2022.

Skills

Programming & Tools	- Python, C, C++, ROS, R, MATLAB, \LaTeX , Git, Linux/Unix, Docker
Machine Learning	- PyTorch, TensorFlow, Keras, Scikit-learn, Hugging Face, OpenCV
Data Science	- Time-series analysis, causal inference, Bayesian methods
Communication	- Academic writing, proposal preparation, teaching/mentoring, and technical presentations