# Yanlin Zhang

✉ yanlinz4@illinois.edu  🌐 https://yanlinzhang-tech.github.io/

🔗 https://www.linkedin.com/in/yanlin-zhang-489295155/

🎓 https://scholar.google.com/citations?user=qhO_nfcAAAAJ&hl=en&oi=sra

## Education

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| 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

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| 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:**
  - **Phase I – 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.
  - **Phase II – 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 and FHWA reviewers.

🔖 **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 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

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| 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 |