Yiming Xu

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EDUCATION

University of Florida **Aug 2019 - May 2023**
Ph.D. in Civil Engineering *Gainesville, FL*
Advisor: Dr. Xilei Zhao
Committee members: Dr. Lily Elefteriadou, Dr. Siva Srinivasan, Dr. Daisy Wang
Dissertation: AI-enabled Travel Demand Forecasting for Shared Mobility

Tongji University **Sep 2016 - Jun 2019**
M.S.E. in Transportation Engineering *Shanghai, China*
Advisor: Dr. Jian Sun

Tongji University **Sep 2012 - Jun 2016**
B.E. in Transportation Engineering *Shanghai, China*
Advisor: Dr. Jian Sun

ACADEMIC APPOINTMENTS

The University of Texas at Austin **Sep 2023 - Present**
Postdoctoral Fellow, Community and Regional Planning *Austin, TX*

University of Florida **Aug 2019 - Aug 2023**
Research Assistant, Department of Civil and Coastal Engineering *Gainesville, FL*

University of Massachusetts Lowell **Jun 2018 - Aug 2018**
Research Assistant, Department of Civil and Environmental Engineering *Lowell, MA*

Tongji University **Sep 2016 - Jun 2019**
Research Assistant, School of Transportation Engineering *Shanghai, China*

RESEARCH INTERESTS

Innovative Mobility: shared mobility, micromobility, electric vehicles, automated vehicles
Transportation: travel demand modeling, travel behavior analysis, built environment, transportation safety, evacuation
Artificial Intelligence: LLMs, digital twin, data analytics, machine learning, deep learning, trustworthy ML

RESEARCH EXPERIENCE

Digital Twin as Catalyst for Sustainable and Smart City *Aug 2023 - Present, The University of Texas at Austin*

- Developed a web-based platform for real-time urban data publication and visualization, including transit, micromobility, traffic conditions and incidents, accessibility, and emergency.
- Created a 3D city model for Austin, TX on the Nvidia Omniverse platform. Visualized the city dynamics in 3D.
- Constructed an urban simulation model incorporating transportation, air pollution, noise, and facilities for Austin, TX.

LLM for Emergency Preparedness *Sep 2023 - Present, The University of Texas at Austin*

- Gathered corpus data corpus data through web scraping and inputting official documents.
- Fine-tuned LLM model (LLaMA) on millions of QA pairs extracted from the City of Austin and government data.
- Developed a Chatbot based on the fine-tuned LLM, complemented with a user-friendly web interface.
- Integrated multi-language chat functionality into the chatbot using NVIDIA Riva.

Autonomous Vehicle Accidents Analysis *Sep 2024 - Present, The University of Texas at Austin*

- Utilized LLMs (GPT-4o) via the OpenAI API to extract key insights from autonomous vehicle (AV) accident reports.
- Conducted spatiotemporal analysis of AV accidents to identify trends and inform management strategies.
- Developed a Random Forest (RF) model to investigate factors contributing to crash severity.

Electric Vehicle Safety and Crash Pattern Analysis *Mar 2024 - Present, The University of Texas at Austin*

- Compared the spatiotemporal distribution, crash severity, and contributing factors between EV-involved crashes and other crashes.
- Developed an ordered logistic regression model to assess the impact of environmental, geographical, and human behavioral factors on EV crash severity.
- Applied Association Rule Mining (ARM) to identify patterns of co-occurring contributing factors in EV crashes.

Electric Vehicle Charging Accessibility and Equity *Feb 2024 - Present, The University of Texas at Austin*

- Calculated accessibility measures for public electric vehicle charging stations in Austin, TX, and analyzed disparities.
- Assessed accessibility inequality using the Lorenz Curve, Gini Coefficient, Theil Index, Palma Ratio, and Segplot, and accessibility poverty through needs-gap analyses and FGT scores.
- Investigated egalitarian and sufficitarian philosophies in federal EV infrastructure programs, identifying misalignments in equity-focused policies.

Evolution of E-scooter Sharing in Austin, TX *Sep 2023 - Present, The University of Texas at Austin*

- Developed a Random Forest (RF) model to dissect the influence of built environment and demographic variables on shared e-scooter usage in Austin, TX.
- Assessed the non-linear effects of variables on shared e-scooter trip frequency using Partial Dependence Plots (PDP).
- Explored the spatial heterogeneity of e-scooter's relationship with ridesourcing trips using the model interpretation method, Shapley Additive Explanations (SHAP).

Real-Time Traffic Monitoring Using Transit Buses as Probes *July 2023 - Dec 2023, University of Florida*

- Identified the distinct operational on/off-boarding events of bus fleets and estimated the average traffic speed for each road segment using GTFS Realtime data.
- Validated the estimated traffic speed using other data sources including Bluetooth and Google Maps data.

Shared Micromobility Demand Forecasting with Deep Learning *Jan 2021 - Aug 2023, University of Florida*

- Formulated a novel spatiotemporal model using a Convolutional Neural Network (CNN) and interactive learning mechanisms to predict demand trends in shared micromobility services.
- Developed a deep learning framework using Transformer and Graph Convolutional Network (GCN) to forecast travel demand for dockless scooter-sharing systems.
- Applied the proposed models on real-world dataset in Washington, D.C., Austin, TX, and Chicago, IL. The proposed models achieved over 25% improvement in prediction accuracy compared with the benchmark models.

Evacuation Behavior Analysis using Large-Scale GPS Data *Jan 2021 - Aug 2022, University of Florida*

- Developed methods to infer and analyze the evacuation behavior (i.e., evacuation decision, destination, route choice) of residents during wildfire event using large-scale GPS data.
- Explored the key factors associated with residents' evacuation decision and their effects on evacuation compliance rate in Sonoma County, CA during the 2019 Kincade Fire.
- Developed a deep learning model that incorporates Graph Convolutional Network (GCN) and Gated Recurrent Unit (GRU) to forecast spatiotemporal trip generation during wildfire evacuation.

Micromobility as a Solution to Reduce Urban Traffic Congestion *Mar 2020 - Aug 2021, University of Florida*

- Scraped real-time micromibility services data and developed algorithms to infer micromobility trip origins and destinations based on the real-time system status data.
- Analyzed the spatial and temporal usage patterns of shared micromibility services in Washington, D.C.
- Investigated the factors associated with shared micromobility usage, providing insights to aid policymakers' decisions.

Interpretable Machine Learning on the Adoption of Ride-splitting *Aug 2019 - Feb 2021, University of Florida*

- Modeled ridesourcing users' adoption of ride-splitting services in Chicago using the Random Forest (RF) model.
- Identified the key factors associated with model outcome using Variable Importance.
- Analyzed nonlinear relationships between factors and outcome using model interpretation methods, i.e., Partial Dependence Plot and Accumulated Local Effects.
- Explored how understanding nonlinear patterns can assist professionals in managing and promoting ride-sharing.

Evaluation for Autonomous Vehicle Safety *Dec 2017 - Mar 2019, Tongji University*

- Extracted critical driving scenarios from Shanghai naturalistic driving data for autonomous vehicle safety testing.
- Proposed an accelerated testing scheme for autonomous vehicle safety evaluation using importance sampling technique. Achieved an over 30 times acceleration compared with the Monte Carlo method.
- Designed a software-in-the-loop testing platform for autonomous vehicle testing based on the proposed test scheme.

Vehicle Turning Behavior Modeling at Mixed-Flow Intersections *Aug 2016 - Sep 2018, Tongji University*

- Developed a quasi-two-dimensional model based on potential field theory to predict trajectories of turning vehicles.
- Evacuated the proposed model by reproducing trajectories of the left-turn vehicles at a mix-flow intersection in Shanghai.

Vehicle Cooperation Around Lane-Changing *Jun 2018 - Aug 2018, University of Massachusetts Lowell*

- Identified lane-changing scenarios and extracted vehicle trajectories in lane-changing scenarios using NGSIM data.
- Explored vehicle cooperations before, during, and after lane-changing. Characterized and categorized cooperative lane-changing based on the behaviors of leading, ego, and following vehicles.

INTERNSHIP EXPERIENCE

Motion Prediction for Autonomous Driving *Sep 2022 - Dec 2022, Didi Labs*

- Developed a motion prediction model based on imitation learning. The model incorporated Graph Convolutional Network (GCN), Variational Autoencoder (VAE), and attention operations.
- Evaluated the proposed model using Waymo Open Dataset. The proposed model achieved 13% improvement in predicting accuracy and 70% improvement in trajectory diversity compared with the baseline model (i.e., Multipath++ model).

PUBLICATIONS

Peer-Reviewed Journal Papers

(**Indicates corresponding author*)

Published

1. Jiao, J., **Xu, Y.***, Li, Y. (2024). Exploring Spatial Heterogeneity of E-scooter's Relationship with Ridesourcing using Explainable Machine Learning. *Transportation Research Part D: Transport and Environment*.
2. Jiao, J., **Xu, Y.*** (2024). Analyzing Shared E-Scooter Trip Frequency on Urban Road Segments in Austin, TX. *Case Studies on Transport Policy*.
3. **Xu, Y.***, Ke, Q., Zhang, X., Zhao, X. (2024). ICN: Interactive Convolutional Network for Forecasting Travel Demand of Shared Micromobility. *GeoInformatica*.
4. Zhang, X., Zhao, X., **Xu, Y.**, Lovreglio, R.*, Nilsson, D. (2024). Situational-Aware Multi-Graph Convolutional Recurrent Network (SA-MGCRN) for Travel Demand Forecasting During Wildfires. *Transportation Research Part A: Policy and Practice*.
5. Zhang, X.*, Zhou, Z., **Xu, Y.**, Zhao, X. (2024). Analyzing spatial heterogeneity of ridesourcing demand determinants using explainable machine learning. *Journal of Transport Geography*.
6. Jiang, S., Sun, Y., Wong, W.*, **Xu, Y.**, Zhao, X. (2024). Real-Time Urban Traffic Monitoring Using Transit Buses as Probes. *Transportation Research Record*.
7. **Xu, Y.**, Zhao, X.*, Zhang, X., Paliwal, M. (2023). Real-time forecasting of dockless scooter-sharing demand: a spatio-temporal multi-graph transformer approach. *IEEE Transactions on Intelligent Transportation Systems*.
8. **Xu, Y.**, Zhao, X.*, Lovreglio, R., Kuligowski, E., Nilsson, D., Cova, T. J., Yan, X. (2022). A highway vehicle routing dataset during the 2019 Kincade Fire evacuation. *Scientific data*.
9. **Xu, Y.**, Yan, X., Sisiopiku, V., Merlin, L., Xing, F., Zhao, X.* (2022). Micromobility trip origin and destination inference using general bikeshare feed specification data. *Transportation Research Record*.
10. Zhao, X.*, **Xu, Y.**, Lovreglio, R., Kuligowski, E., Nilsson, D., Cova, T. J., Wu, A., Yan, X. (2022). Estimating wildfire evacuation decision and departure timing using large-scale GPS data. *Transportation Research Part D: Transport and Environment*.

11. Wu, A., Yan, X.*, Kuligowski, E., Lovreglio, R., Nilsson, D., Cova, T. J., **Xu, Y.**, Zhao, X. (2022). Wildfire evacuation decision modeling using GPS data. *International Journal of Disaster Risk Reduction*
12. **Xu, Y.**, Yan, X., Liu, X. and Zhao, X.* (2021). Identifying key factors associated with ridesplitting adoption rate and modeling their nonlinear relationships. *Transportation Research Part A: Policy and Practice*.
13. Merlin, L.*, Yan, X., **Xu, Y.**, Zhao, X. (2021). A segment-level model of shared, electric scooter origins and destinations. *Transportation Research Part D: Transport and Environment*.
14. Qi, X., Ni, Y., **Xu, Y.**, Tian, Y., Wang, J., Sun, J.* (2021). Autonomous vehicles' car-following drivability evaluation based on driving behavior spectrum reference model. *Transportation Research Record*.
15. Yan, X., Yang, W., Zhang, X., **Xu, Y.**, Bejleri, I., Zhao, X.* (2021). A spatiotemporal analysis of e-scooters' relationships with transit and station-based bikeshare. *Transportation research part D: transport and environment*.
16. **Xu, Y.**, Ma, Z., Sun, J.* (2019). Simulation of turning vehicles' behaviors at mixed-flow intersections based on potential field theory. *Transportmetrica B: Transport Dynamics*.
17. Sun, J.*, Qi, X., **Xu, Y.**, Tian, Y. (2019). Vehicle turning behavior modeling at conflicting areas of mixed-flow intersections based on deep learning. *IEEE Transactions on Intelligent Transportation Systems*.
18. **Xu, Y.**, Zou, Y., Sun, J.* (2018). Accelerated testing for automated vehicles safety evaluation in cut-in scenarios based on importance sampling, genetic algorithm and simulation applications. *Journal of Intelligent and Connected Vehicles*.
19. Ma, Z., Xie, J., Qi, X., **Xu, Y.**, Sun, J.* (2017). Two-dimensional simulation of turning behavior in potential conflict area of mixed-flow intersections. *Computer-Aided Civil and Infrastructure Engineering*.

Under Review

1. **Xu, Y.***, Jiao, J., Wang, H. (2025). From Data to Decisions: An Urban Digital Twin Framework for Sustainable and Proactive Urban Management. *Under review*.
2. Chio, S., **Xu, Y.***, Jiao, J. (2025). Utility or Equity? A Critical Analysis of Existing Public Electric Vehicle Charger Allocations in Austin, Texas. *Under review*.
3. Xu, N., **Xu, Y.***, Liu, J., Jiao, J. (2025). How Do EV Crashes Differ from ICEV Crashes: A Comparative Study of Pennsylvania. *Under review*.
4. Jiao, J., Afroogh, S.*, **Xu, Y.**, Phillips, C. (2025). Navigating LLM ethics: Advancements, challenges, and future directions. *Under review*.
5. Wang, H., Jiao, J., **Xu, Y.** (2025). Street Function Representation Learning on Long-Term Traffic Flow Prediction. *Under review*
6. Wang, H., Davis, W., Jiao, J., **Xu, Y.** (2025). Urban e-scooter usage prediction based on semantic descriptions: A knowledge-driven AI. *Under review*

Conference Proceedings

1. **Xu, Y.**, Jiao, J. (2025). Assessing the Effects of Built Environment and Demographics on E-Scooter and E-Bike Usage on City Streets: A Case Study of Austin, TX. *Transportation Research Board 104th Annual Meeting, Washington, D.C.*
2. **Xu, Y.**, Jiao, J., Wang, H. (2025). An Urban Digital Twin Framework for Sustainable Transportation and Smart Cities: A Case Study of Austin, TX. *Transportation Research Board 104th Annual Meeting, Washington, D.C.*
3. **Xu, Y.**, Jiao, J., Li, Y. (2025). Exploring Spatial Heterogeneity of E-scooter's Relationship with Ridesourcing using Explainable Machine Learning. *Transportation Research Board 104th Annual Meeting, Washington, D.C.*
4. Xu, N., **Xu, Y.**, Liu, J., Jiao, J. (2025). How Do EV Crashes Differ from ICEV Crashes: A Comparative Study of Pennsylvania. *Transportation Research Board 104th Annual Meeting, Washington, D.C.*
5. Wang, H., Jiao, J., **Xu, Y.** (2025). Street Function Representation Learning on Long-Term Traffic Flow Prediction. *Transportation Research Board 104th Annual Meeting, Washington, D.C.*
6. Wang, H., Davis, W., Jiao, J., **Xu, Y.** (2025). Urban e-scooter usage prediction based on semantic descriptions: A knowledge-driven AI. *Transportation Research Board 104th Annual Meeting, Washington, D.C.*

7. Wang, T., He, C., Li, H., Li, Y., **Xu, Y.**, Wang, Y., Jiao, J. (2025). Hierarchical Lane-Changing Gaming Decision Model for Heterogeneous Traffic on Two-Lane Highway. *Transportation Research Board 104th Annual Meeting, Washington, D.C.*
8. Wang, T., Guo, Q., He, C., Li, H., **Xu, Y.**, Wang, Y., Jiao, J. (2025). Impact of Connected and Automated Vehicles on Longitudinal and Lateral Performance of Heterogeneous Traffic Flow in Shared Autonomy on Two-Lane Highways. *WCX SAE World Congress Experience, Detroit, MI*
9. Chio, S., **Xu, Y.**, Jiao, J. (2024). Utility or Equity? A Critical Analysis of Existing Public Electric Vehicle Charger Allocations in Austin, Texas. *Association of Collegiate Schools of Planning Annual Conference, Seattle, WA*
10. Jiang, S., **Xu, Y.**, Wai, W., Zhao, X. (2024). Real-Time Urban Traffic Monitoring Using Transit Buses as Probes. *Transportation Research Board 103rd Annual Meeting, Washington D.C.*
11. **Xu, Y.**, Ke, Q., Zhao, X. (2023). ICN: Interactive Convolutional Network for forecasting travel demand of shared micromobility. *Transportation Research Board 102nd Annual Meeting, Washington, D.C.*
12. **Xu, Y.**, Xiong, R., Lovreglio, R., Nilsson, D., Zhao, X. (2023). Forecasting real-time travel demand during wildfire evacuations: A situational-aware multi-graph convolutional recurrent network (SA-MGCRN) approach. *Transportation Research Board 102nd Annual Meeting, Washington, D.C.*
13. **Xu, Y.**, Paliwal, M., Zhao, X. (2022) Real-time forecasting of dockless scooter-sharing demand: A context-aware spatio-temporal multi-graph convolutional network approach. *Transportation Research Board 101st Annual Meeting, Washington, D.C.*
14. Zhao, X., **Xu, Y.**, Lovreglio, R., Kuligowski, E., Nilsson, D., Cova, T. J., Wu, A., Yan, X. (2022) Estimating wildfire evacuation decision and departure timing using massive GPS data. *Transportation Research Board 101st Annual Meeting, Washington, D.C.*
15. **Xu, Y.**, Yan, X., Sisiopiku, V., Merlin, L., Xing, F., Zhao, X. (2021). Micromobility trip origin and destination inference using General Bikeshare Feed Specification (GBFS) data. *Transportation Research Board 100th Annual Meeting, Washington, D.C.*
16. Qi, X., Ni, Y., **Xu, Y.**, Tian, Y., Wang, J., Sun, J. (2021). Autonomous vehicles' car-following drivability evaluation based on driving behavior spectrum reference model. *Transportation Research Board 100th Annual Meeting, Washington, D.C.*
17. Chen, D., **Xu, Y.**, Sun, J. (2019). Vehicle cooperation around lane-changing. *Transportation Research Board 98th Annual Meeting, Washington, D.C.*

Patents

1. Sun, J., **Xu, Y.**, Yu, R., "A road-virtual parallel testing scheme for autonomous vehicles". China Patent No.201810417326.2, issued October, 2018.
2. Sun, J., **Xu, Y.**, Ye, Y., "A scenario regeneration and accelerated test method for autonomous vehicles". China Patent No.201710568536.7, issued October, 2017.

PRESENTATIONS & TALKS

1. **Xu, Y.**, Jiao, J. (2024). A Digital Twin for the City of Austin. *2nd Annual Smart Cities and AI Innovations Symposium, Austin, TX.*
2. **Xu, Y.**. (2024). Where There's Fire, There's Smoke. Using AI and Digital Twins to Prepare for Climate Change. *Smart Cities Connect Conference, Austin, TX.*
3. **Xu, Y.** (2023). Real-Time Forecasting of Dockless Scooter-Sharing Demand. *UT Smart Cities Talk Series, Austin, TX.*
4. **Xu, Y.**, Paliwal, M., Zhao, X. (2021). Real-time forecasting of dockless scooter-sharing demand: A spatio-temporal multi-graph convolutional network approach. *The 2021 TRB Workshop Sponsored by AED50, Washington, DC. & The UF AI Research Catalyst Fund Seminar.*
5. **Xu, Y.**, Yan, X., Liu, X., Zhao, X. (2020). Applying interpretable machine learning to identify key factors associated with neighborhood ride-splitting adoption rate and to model their nonlinear relationships. *Transportation Research Board ABJ70 Committee meeting, Washington, DC.*

TEACHING EXPERIENCE

UGS 302 Ethical AI: Good Systems **Spring 2025**
Guest Lecturer *The University of Texas at Austin*

CRP386 Urban Geographic Information Systems **Fall 2024**
Guest Lecturer *The University of Texas at Austin*

CRP395D/386/BDP 319 Smart City Practicum **Spring 2024**
Guest Lecturer *The University of Texas at Austin*

LA 329 Global Learning Seminar **Spring 2024**
Guest Lecturer *The University of Texas at Austin*

CGN 6905 Machine Learning Applications in Civil Engineering **Spring 2021**
Teaching Assistant *University of Florida*

TEACHING INTERESTS

- Transportation Engineering
- Machine Learning in Transportation
- Big Data Analytics in Transportation
- Urban Transportation Planning
- Smart Cities and Intelligent Transportation System

GRANTS

Digital Twins as a Catalyst for Sustainable and Smart Cities **Oct 2023 - Sep 2024**
J. Jiao (PI), D. Niyogi (co-PI), ***Y. Xu (co-PI)***
- Center for Climate-Smart Transportation (CCST), UTC founded by USDOT, **$241,478**

A Highway Vehicle Routing Dataset During the 2019 Kincade Fire Evacuation **Apr 2021 - Oct 2021**
X. Zhao (PI), ***Y. Xu (co-PI)****, R. Lovreglio, E. Kuligowski, D. Nilsson*
- Natural Hazards Center Weather Ready Research Award Program, **$2,500**

MENTORING EXPERIENCE

Tianyi Wang **Summer 2024 - Present**
M.S. Student, Department of Mechanical Engineering and Materials Science *Yale University*

Claire Deng **Fall 2024 - Present**
High School Student *Westwood High School*

Yu Chen **Fall 2024 - Present**
M.S. Student, School of Architecture *The University of Texas at Austin*

Aaron Purewal **Fall 2023 - Spring 2024**
B.S. Student, McCombs School of Business *The University of Texas at Austin*

Xiaohe Yin **Fall 2023 - Spring 2024**
Research Assistant, Tandon School of Engineering *New York University*

Kay Kong **Fall 2023 - Spring 2024**
B.S. Student, Department of Computer Science *The University of Texas at Austin*

Jakob Love **Fall 2023 - Spring 2024**
B.S. Student, Department of Aerospace Engineering and Engineering Mechanics *The University of Texas at Austin*

Ruoyang Xiong **Fall 2021 - Fall 2022**
M.S. Student, Department of Computer and Information Science and Engineering *University of Florida*

Yepeng Liu **Fall 2020 - Fall 2021**
M.S. Student, Department of Computer and Information Science and Engineering *University of Florida*

Mudit Paliwal **Spring 2020 - Spring 2021**
M.S. Student, Department of Industrial and Systems Engineering *University of Florida*

Alex Wu **Spring 2020 - Fall 2021**
B.S. Student, Department of Civil and Coastal Engineering *University of Florida*

SERVICE AND PROFESSIONAL AFFILIATIONS

Journal/Conference Reviewer

- Transportation Research Part D: Transport and Environment
- Transportation Research Part C: Emerging Technologies
- Journal of Transport Geography
- Cities
- Research in Transportation Economics
- Transport Policy
- Case Studies on Transport Policy
- Multimodal Transportation
- Humanities and Social Sciences Communications
- Journal of Intelligent Transportation Systems: Technology, Planning, and Operations
- Transportation Research Record
- PeerJ
- Transportation Research Board Annual Meeting
- International Association for China Planning (IACP) Conference
- COTA International Conference of Transportation Professionals

Member

- Association of Collegiate Schools of Planning (ACSP)
- American Association of Geographers (AAG)
- Chinese Overseas Transportation Association (COTA)
- TRB AED50 Standing Committee on Artificial Intelligence and Advanced Computing Applications (friend)
- TRB ACH20 Standing Committee on Bicycle Transportation (friend)
- TRB AED20 Standing Committee on Urban Transportation Data and Information Systems (friend)
- Institute of Transportation Engineers (ITE) Student Chapter (2019 - 2023)

SKILLS

Programming: Python, C++, C#, SQL, R, MATLAB, JavaScript, AWS
Libraries: PyTorch, TensorFlow, Keras, Scikit-Learn, Numpy, Pandas, GeoPandas
Softwares: ArcGIS, QGIS, PTV Vissim, SUMO, Nvidia Omniverse, MATSim, CARLA, Blender