Haoxuan (Nick) Ma

Ph.D. Student, UCLA Civil & Environmental Engineering | Advisor: Prof. Jiaqi Ma

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RESEARCH INTERESTS

Human mobility and behavior modeling; generative models for spatiotemporal trajectories and activities; synthetic populations; LLM-agent and agent-based simulation of people and cities; evaluating simulated behavior against real-world data.

EDUCATION

University of California, Los Angeles — Ph.D. in Civil Engineering — Expected 12/2027
Advisor: Prof. Jiaqi Ma (Civil Engineering & Computer Science), UCLA Mobility Lab

Carnegie Mellon University — M.S. in Information Systems Management — May 2023

University of Rochester — B.S. Business Analytics, B.A. Data Science (dual degree) — May 2021

PUBLICATIONS ** equal contribution † corresponding author*

Journal Articles

- **Ma, H.***, Liao, X.*†, Liu, Y., Jiang, Q., Stanford, C., Cao, S., Ma, J. (2025). *Learning Universal Human Mobility Patterns with a Foundation Model for Cross-Domain Data Fusion. Transportation Research Part C: Emerging Technologies*, 180, 105311.
- **Ma, H.**, Liu, Y., Jiang, Q., He, B.Y., Liao, X.†, Ma, J. (2024). *Mobility AI Agents and Networks. IEEE Transactions on Intelligent Vehicles*, 9(7), 5124–5129.

Conference Papers

- Yang, B.*, **Ma, H.*†**, Liu, Y., Zhang, Z., Stanford, C., Sun, M., Ma, J. (2026). *Uncertainty-Aware Trip Purpose Inference from GPS Trajectories via POI Semantic Zones and Pareto Calibration. IEEE ITSC 2026* (accepted).
- Liu, Y.*, Sang, Y.*, Liao, X., Sun, M., Yang, B., Zhang, Z., Stanford, C., **Ma, H.†**, Ma, J. (2026). *GPS-Enhanced Tourist Mobility Modeling with Seasonal Spatial Priors and LLM-Based Activity Chain Generation. IEEE ITSC 2026* (accepted).
- Cai, T.*, Liu, Y.*, Zhou, Z., **Ma, H.**, Zhao, S.Z., Wu, Z., Han, X., Huang, Z.†, Ma, J. (2026). *Driving with Regulation: Trustworthy and Interpretable Decision-Making for Autonomous Driving with Retrieval-Augmented Reasoning. AAAI-26*, 38287–38295.
- **Ma, H.**, Liao, X.†, Liu, Y., Stanford, C., Ma, J. (2025). *Beyond 9-to-5: A Generative Model for Augmenting Mobility Data of Underrepresented Shift Workers. IEEE ITSC 2025*, 3654–3661.
- Liu, Y., Liao, X.†, **Ma, H.**, He, B.Y., Stanford, C., Ma, J. (2025). *Human Mobility Modeling with Household Coordination Activities under Limited Information via Retrieval-Augmented LLMs. IEEE ITSC 2025*, 951–958.
- Liu, Y., Liao, X.†, **Ma, H.**, Liu, J., Jadhav, R., Ma, J. (2025). *MobiVerse: Scaling Urban Mobility Simulation with Hybrid Lightweight Domain-Specific Generator and Large Language Models. IEEE ITSC 2025*, 1547–1553.
- Liao, X., **Ma, H.**, Liu, Y., Wei, Y., He, B.Y., Stanford, C., Ma, J.† (2025). *Next-Generation Travel Demand Modeling with a Generative Framework for Household Activity Coordination. IEEE ITSC 2025*, 561–568.
- Xiang, H., Zheng, Z., Xia, X., Xu, R., Gao, L., Zhou, Z., Han, X., Ji, X., Li, M., Meng, Z., Jin, L., Lei, M., Ma, Z., He, Z., **Ma, H.**, Yuan, Y., Zhao, Y., Ma, J.† (2024). *V2X-Real: A Large-Scale Dataset for Vehicle-to-Everything Cooperative Perception. ECCV 2024*, LNCS 15110, 455–470.
- Liu, Y., Kuai, C., Liao, X.†, **Ma, H.**, He, B.Y., Ma, J. (2024). *Semantic Trajectory Data Mining with LLM-Informed POI Classification. IEEE ITSC 2024*, 207–213. Best Paper Award.
- He, B.Y.†, Jiang, Q., **Ma, H.**, Ma, J. (2024). *Multi-Agent Multimodal Transportation Simulation for Mega-Cities: Application of Los Angeles. Procedia Computer Science*, 238, 736–741 (ABMTRANS 2024).

Under Review

- **Ma, H.***, Liu, Y.*†, Yang, B., Zhang, Y., Stanford, C., Fox, E., Liao, X., Ma, J.† *PopTraj: Hierarchical Multi-Source Generation of Household-Coordinated Weekly Activity–Location Trajectories with Urban Populations Synthesis. Information Fusion*, major revision.
- Liu, Y.*, **Ma, H.*†**, et al. *TABI: Zero-Shot Cross-City Tourist Mobility Generation with POI Semantics as Transferable Knowledge. The Web Conference (WWW 2027)*, under review.

RESEARCH EXPERIENCE

University of California, Los Angeles — UCLA Mobility Lab Los Angeles, CA | Aug 2023 – Present

Graduate Student Researcher, Advisor: Prof. Jiaqi Ma

- Generative population modeling: learning human behavior from GPS, survey and census data and generating heterogeneous synthetic populations and their activity–location trajectories.
- LLM-agent and agent-based simulation of urban mobility (MATSim, SUMO), evaluated against travel surveys, census data and observed traffic counts.
- Multiday simulation pipelines on AWS Batch for Los Angeles County and Tokyo.

Research Project — Population-Scale What-If Simulation 2024 – Present

- End-to-end what-if simulation platform: synthetic populations from the mobility foundation model drive an agent-based MATSim simulation, with a web interface for event, policy and infrastructure scenarios (Los Angeles, Seattle, Mexico City, Cairo, Tokyo).

Amazon Research Innovation Fellow — Knowledge-Grounded Mobility World Model for Urban Delivery Current

- Extending the lab's mobility world model into a delivery world model of customers, autonomous delivery systems and pedestrians, with satellite and street-level imagery.

Aibee Co. Ltd. — Machine Learning and Software Development Intern Beijing, China | Jul – Sep 2021

- Built LiDAR–camera fusion to track shopper trajectories in malls and build shopper demographic profiles.

AWARDS, FELLOWSHIPS & FUNDED PROGRAMS

- **Amazon Research Innovation Fellowship** — knowledge-grounded mobility world model for urban delivery
- **Best Paper Award** — IEEE ITSC 2024 (Semantic Trajectory Data Mining with LLM-Informed POI Classification)
- **IARPA HAYSTAC (Final Phase)** — human-trajectory anomaly detection and large-scale microsimulation (team program)
- **ARPA-I CivicTwin** — next-generation transportation digital-twin infrastructure (team program)

SERVICE

- **Workshop Co-Organizer:** AIGI-HMM (IEEE ITSC 2025); DriveX series (ICCV, CVPR, IV, ITSC, ECCV; 2025–26).
- **Peer Reviewer:** ICML, ICLR, NeurIPS, ECCV, IEEE T-ITS, IEEE ITSC, Transportation Research Board (TRB).
- **Mentorship:** Mentor two junior Ph.D. students and three undergraduate researchers at UCLA Mobility Lab.

TECHNICAL SKILLS

Languages: Python, SQL, C++, Java. **ML/AI:** PyTorch, Transformers, LLM agents and RAG, generative models (VAE, diffusion, flow). **Simulation & Data:** MATSim, SUMO, PySpark, AWS, Docker, Kubernetes.