Ye Hong

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Homepage

EDUCATION

2020–25 Doctor of Sciences, ETH Zurich, Switzerland
Data-Driven Modeling of Multifaceted Individual Mobility Behavior
Supervisors: Prof. Dr. Martin Raubal, Prof. Dr. Konrad Schindler
Co-examiners: Prof. Dr. Harvey J. Miller, Prof. Dr. Francisco C. Pereira

2018–20 M.S. ETH in Geomatics, ETH Zurich, Switzerland
Conserved Quantities in Transport Mode Choices and Mobility Patterns of People
Supervisor: Prof. Dr. Martin Raubal

2014–18 B.S. GIS and RS, Sun Yat-sen University, China
Hierarchical Community Detection and Functional Area Identification
Supervisor: Prof. Dr. Li Xia

RESEARCH AREAS

Human Mobility: inter- and intra-personal variability; movement behavior and contexts; spatial recommendation; behavior simulation

Sustainable Transportation: shared, on-demand, and electrified mobility; travel demand and traffic forecasting; dynamic urban segregation and inequality

Geographical Information Science: spatial data science; GeoFoundation model; urban microsimulation

EXPERIENCE

2025– Mobility Information Engineering Lab, ETH Zurich, Switzerland
Postdoctoral Researcher with Prof. Dr. Martin Raubal

2025– Urban Analytics, Department of Geography, University of Zurich, Switzerland
Postdoctoral Researcher with Prof. Dr. Esra Suel

2025 Department of Geography, University of California, Santa Barbara, United States
Visiting Researcher with Prof. Dr. Konstadinos Goulias

2017 Guangzhou Institute of Geography, Guangdong Academy of Sciences, China
Software Engineer Intern

PUBLICATIONS

Journal Articles[1]

2025 **Hong, Y.**, Xin, Y., Dirmeier, S., Perez-Cruz, F., and Raubal, M. "Revealing behavioral impact on mobility prediction networks through causal intervention." *Transportation Research Interdisciplinary Perspectives*. 31, 101398. 10.1016/j.trip.2025.101398

2024 Jin, T., Wang, K., Xin, Y., Shi, J., **Hong, Y.**, and Witlox, F. "Is a 15-Minute City Within Reach? Measuring Multimodal Accessibility and Carbon Footprint in 12 Major American Cities." *Land Use Policy*, 142, 107180. 10.1016/j.landusepol.2024.107180

2023 **Hong, Y.**, Stüdeli, E., and Raubal, M. "Evaluating geospatial context information for travel mode detection." *Journal of Transport Geography*, 113, 103736. 10.1016/j.jtrangeo.2023.103736

2023 **Hong, Y.**, Zhang, Y., Schindler, K., and Raubal, M. "Context-aware multi-head self-attentional neural network model for next location prediction." *Transportation Research Part C: Emerging Technologies*, 156, 104315. 10.1016/j.trc.2023.104315

2023 Martin, H.[#], **Hong, Y.**[#], Wiedemann, N.[#], Bucher, D., and Raubal, M. "Trackintel: An open-source Python library for human mobility analysis." *Computers, Environment and Urban Systems*, 101, 101938. 10.1016/j.compenvurbsys.2023.101938.

2023 **Hong, Y.**, Martin, H., Xin, Y., Bucher, D., Reck, D. J., Axhausen, K. W., and Raubal, M. "Conserved quantities in human mobility: from locations to trips." *Transportation Research Part C: Emerging Technologies*, 146, 103979. 10.1016/j.trc.2022.103979.

2023 Yao, Y.[#], Guo, Z.[#], Dou, C., Jia, N., **Hong, Y.**, Guan, Q., and Luo, P. "Predicting mobile users' next location using the semantically enriched geo-embedding model and the multilayer attention mechanism." *Computers, Environment and Urban Systems*, 104, 102009. 10.1016/j.compenvurbsys.2023.102009.

2023 Wiedemann, N.[#], Martin, H.[#], Suel, E., **Hong, Y.**, and Xin, Y. "Influence of tracking duration on the privacy of individual mobility graphs." *Journal of Location Based Services*, 17(4), 370-388. 10.1080/17489725.2023.2239190.

2023 Yao, Y., Zhou, J., Sun, Z., Guan, Q., Guo, Z., Xu, Y., Zhang, J., **Hong, Y.**, Cai, Y., and Wang, R. "Estimating China's poverty reduction efficiency by integrating multi-source geospatial data and deep learning techniques." *Geo-Spatial Information Science*, 1-17. 10.1080/10095020.2023.2165975.

2022 Guan, Q., Yao, Y., Ma, T., **Hong, Y.**, Bie, Y., and Lyu, J. "Under the Dome: A 3D Urban Texture Model and Its Relationship with Urban Land Surface Temperature." *Annals of the American Association of Geographers*, 112(5), 1369-1389. 10.1080/24694452.2021.1972790

2021 Yao, Y., Wang, J., **Hong, Y.**, Qian, C., Guan, Q., Liang, X., Dai, L. and Zhang, J. "Discovering the homogeneous geographic domain of human perceptions from street view images." *Landscape and Urban Planning*, 212, 104125. 10.1016/j.landurbplan.2021.104125

2021 Yao, Y.[#], Liu, Y.[#], Guan, Q., **Hong, Y.**, Wang, R., Wang, R., and Liang, X. "Spatiotemporal distribution of human trafficking in China and predicting the locations of missing persons." *Computers, Environment and Urban Systems*, 85, 101567. 10.1016/j.compenvurbsys.2020.101567

2021 Zhang, J., Li, X., Yao, Y., **Hong, Y.**, He, J., Jiang, Z., and Sun, J. "The Traj2Vec model to quantify residents' spatial trajectories and estimate the proportions of urban land-use types."

[1][#] Equal Contribution

International Journal of Geographical Information Science, 35(1), 193-211. 10.1080/13658816.2020.1726923

2020 Yao, Y., Wu, D., **Hong, Y.**, Chen, D., Liang, Z., Guan, Q., Xun, L. and Dai, L. "Analyzing the Effects of Rainfall on Urban Traffic-Congestion Bottlenecks." *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing*, 13, 504-512. 10.1109/JSTARS.2020.2966591

2019 Chen, D., Zhang, Y., Yao, Y., **Hong, Y.**, and Guan, Q. "Exploring the spatial differentiation of urbanization on two sides of the Hu Huanyong Line – based on nighttime light data and cellular automata." *Applied Geography*, 112, 102081. 10.1016/j.apgeog.2019.102081

2019 Yao, Y., Liu, P., **Hong, Y.**, Liang, Z., Wang, R., Guan, Q., and Chen, J. "Fine-scale intra- and intercity commercial store site recommendations via multisource big data." *Transactions in GIS*, 23(5), 1029-1047. 10.1111/tgis.12553

2019 **Hong, Y.**, and Yao, Y. "Hierarchical community detection and functional area identification with OSM roads and complex graph theory." *International Journal of Geographical Information Science*, 33(8), 1569-1587. 10.1080/13658816.2019.1584806

2018 He, J., Li, X., Yao, Y., **Hong, Y.**, and Zhang, J. "Mining transition rules of cellular automata for simulating urban expansion by using the deep learning techniques." *International Journal of Geographical Information Science*, 32(10), 2076-2097. 10.1080/13658816.2018.1480783

2018 Yao, Y., **Hong, Y.**, Wu, D., Zhang, Y., and Guan, Q. "Estimating the effects of "community opening" policy on alleviating traffic congestion in large Chinese cities by integrating ant colony optimization and complex network analyses." *Computers, Environment and Urban Systems*, 70, 163-174. 10.1016/j.compenvurbsys.2018.03.005

2018 Yao, Y., Zhang, J., **Hong, Y.**, Liang, H., and He, J. "Mapping fine–scale urban housing prices by fusing remotely sensed imagery and social media data." *Transactions in GIS*, 22(2), 561-581. 10.1111/tgis.12330

2017 Liu, X., He, J., Yao, Y., Zhang, J., Liang, H., Wang, H., and **Hong, Y.** "Classifying urban land use by integrating remote sensing and social medias data." *International Journal of Geographical Information Science*, 31(8), 1675-1696. 10.1080/13658816.2017.1324976

2017 Yao, Y., Liu, X., Li, X., Liu, P., **Hong, Y.**, Zhang, Y., and Mai, K. "Simulating urban land-use changes at a large scale by integrating dynamic land parcel subdivision and vector-based cellular automata." *International Journal of Geographical Information Science*, 31(12), 2452-2479. 10.1080/13658816.2017.1360494

Conference Proceedings

2025 **Hong, Y.**, and Raubal, M. "Causal inference for interpretable and robust deep learning in mobility analysis." In *25th Swiss Transport Research Conference (STRC '25)*. Monte Verità, Ascona, Switzerland. STRC. 10.3929/ethz-b-000744423.

2024 **Hong, Y.**, Zhang, Y., and Raubal, M. "Towards realistic individual activity location demand synthesis using deep generative networks." In *24th Swiss Transport Research Conference (STRC '24)*. Monte Verità, Ascona, Switzerland. STRC. 10.3929/ethz-b-000683550.

2023 Wiedemann, N., **Hong, Y.**, and Raubal, M. "Predicting visit frequencies to new places." In *Proceedings of the 12th International Conference on Geographic Information Science (GIScience '23)*, (pp.84:1–84:6). Leeds, UK. Schloss Dagstuhl – Leibniz-Zentrum für Informatik. 10.4230/LIPIcs.GIScience.2023.84.

2022 **Hong, Y.**, Martin, H., and Raubal, M. "How do you go where? improving next location

prediction by learning travel mode information using transformers." In *Proceedings of the 30th International Conference on Advances in Geographic Information Systems (SIGSPATIAL '22)*, (pp. 1-10). Seattle, Washington, USA. ACM. 10.1145/3557915.3560996

2022 Martin, H., Wiedemann, N., Suel, E., **Hong, Y.**, and Xin, Y. "Influence of tracking duration on the privacy of individual mobility graphs." In *Proceedings of the 17th International Conference on Location-Based Services (LBS '22)*, (pp.78–88). Munich, Germany. Technical University of Munich. 10.3929/ethz-b-000572753

2021 **Hong, Y.**, Xin, Y., Martin, H., Bucher, D., and Raubal, M. "A clustering-based framework for individual travel behaviour change detection." In *Proceedings of the 11th International Conference on Geographic Information Science - Part II (GIScience '21)*, (pp.4:1–4:15). Virtual. Schloss Dagstuhl – Leibniz-Zentrum für Informatik. 10.4230/LIPIcs.GIScience.2021.II.4

2020 Martin, H., Bucher, D., **Hong, Y.**, Buffat, R., Rupprecht, C., and Raubal, M. "Graph-resnets for short-term traffic forecasts in almost unknown cities." In *Proceedings of the NeurIPS 2019 Competition and Demonstration Track*, (pp.153–163). Vancouver, Canada. PMLR. 10.3929/ethz-b-000437682

Working Papers

2025 **Hong, Y.**, Zhang, Y., Schindler, K., and Raubal, M. "Deep Generative Model for Human Mobility Behavior." In Preparation.

Preprints

2024 Li, J., Xin, Y., **Hong, Y.**, and Raubal, M. "Interpreting Deep Learning Models for Traffic Forecast: A Case Study of UNet." 10.2139/ssrn.4370154

2024 Dirmeier, S., **Hong, Y.**, and Perez-Cruz, F. "Synthetic location trajectory generation using categorical diffusion models." 10.48550/arXiv.2402.12242

2023 Timans, A., Wiedemann, N., Kumar, N., **Hong, Y.**, and Raubal, M. "Uncertainty Quantification for Image-based Traffic Prediction across Cities." 10.48550/arXiv.2308.06129

2023 Dirmeier, S., **Hong, Y.**, Xin, Y., and Perez-Cruz, F. "Uncertainty quantification and out-of-distribution detection using surjective normalizing flows." 10.48550/arXiv.2311.00377

CONFERENCE ACTIVITY

Session organized

2023 "1st ACM SIGSPATIAL International Workshop on Reproducibility in tracking data analysis and mobility research." 31st ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems (SIGSPATIAL '23). Hamburg, Germany. Nov 13–16.

Conference Presentations

2025 "Causal inference for interpretable and robust deep learning in mobility analysis." 25th Swiss Transport Research Conference (STRC '25). Monte Verità, Ascona, Switzerland. May 14–16.

2025 "Deep Generative Model for Human Mobility Behavior." Pacific Southwest Region (PSR) University Transportation Center (UTC) Annual Congress (PSR UTC '25). Berkeley, California, USA. March 24–25.

2024 "Towards realistic individual activity location demand synthesis using deep generative networks." 24th Swiss Transport Research Conference (STRC '24). Monte Verità, Ascona, Switzerland. May 15–17.

2022 "How do you go where? Improving next location prediction by learning travel mode information using transformers." 30th ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems (SIGSPATIAL '22). Seattle, Washington, USA. Nov 01–04.

2021 "A Clustering-Based Framework for Individual Travel Behaviour Change Detection." 11th International Conference on Geographic Information Science (GIScience '21). Virtual. Sep 27–30.

2021 "Trackintel An open-source python library for human mobility modeling and analysis." GeoPython 2021. Virtual. Apr 22–23.

AWARDS

Awards and Honors

2020 Culmann-funds (outstanding master thesis), ETH Zurich

2019 Traffic4cast 2nd Place, NeurIPS 2019 challenge

2018 Outstanding bachelor thesis, Sun Yat-sen University

2018 Excellent national undergraduate's creative project, Ministry of Education of China

2017 Excellent student scholarship, Sun Yat-sen University

TEACHING

Teaching Assistants

2025 Spatial Data Science (Geomatics Master): Lecturer for literature discussion.

Advanced GIS (Geomatics Master): Lecturer and TA for Geosensors and VGI.

2024 Geoinformation Technologies and Analysis (Geospatial Engineering Bachelor): Head TA for course and project organization; TA for Spatial database, Mobile GIS and Movement analysis.

Advanced GIS

2023 Geoinformation Technologies and Analysis

Advanced GIS

2022 Geoinformation Technologies and Analysis

2021 GIS III (Geomatics Master): Lecturer and TA for Geosensors and VGI.

Geomatics Seminar (Geomatics Master): TA for project supervision.

Project GIS & Cartography (Geospatial Engineering Bachelor): TA for project supervision.

2020 GIS III

Student Project and Thesis Supervision

2025 Mühlematter, D. J. "UrbanFusion: Stochastic Multimodal Fusion for Contrastive Learning of Robust Spatial Representations" Master thesis. ETH Zurich.

2023 Mühlematter, D. J. "A Reinforcement Learning Environment for Vehicle-to-Grid Charging Strategies in Car-Sharing" Geomatics Master Project. ETH Zurich.

2023 Vuadens, E. "Heuristic Optimization of Smart Charging and Vehicle-to-Grid for an Electric Car-sharing Fleet" Master thesis. ETH Zurich.

2023 Li, J. "Robust Cross-Domain Traffic Prediction Through Invariant Causal Mechanisms" Master thesis. ETH Zurich.

2022 Stüdeli, E. "Evaluating Geospatial Context Information for Transport Mode Detection." Bachelor thesis. ETH Zurich.

2022 Timans, A. "Uncertainty Quantification for Image–based Traffic Prediction." Master thesis. ETH Zurich.

2021 Li, J. "Enhancing the Interpretability of Deep Learning Models for Traffic Forecast Through Visual Analytics." Master Interdisciplinary Project. ETH Zurich.

Invited Guest Lecture

2025 "Data-driven modeling of multifaceted individual mobility behavior" GeoG 211C Travel Behavior Analysis (Graduate, Department of Geography, UC Santa Barbara).

2025 "Mobility modeling from individual tracking data" GeoG 111B Transportation Modeling and Simulation (Undergraduate, Department of Geography, UC Santa Barbara).

SERVICE

Academic Journal Peer Review

Artificial Intelligence Review

Cities

Computers, Environment and Urban Systems

Connection Science

Ecological Indicators

Engineering Applications of Artificial Intelligence

GIScience & Remote Sensing

IEEE Access

IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing

IEEE Transactions on Industrial Informatics

IEEE Transactions on Computational Social Systems

IEEE Transactions on Geoscience and Remote Sensing

IEEE Transactions on Knowledge and Data Engineering

IEEE Transactions on Mobile Computing

IEEE Transactions on Vehicular Technology

Information Processing and Management

International Journal of Digital Earth
International Journal of Geographical Information Science
ISPRS International Journal of Geo-Information
Journal of Spatial Science
Journal of Traffic and Transportation Engineering (English Edition)
Journal of Transport Geography
Journal of Urban Management
Landscape and Urban Planning
npj Urban Sustainability
PLOS One
Scientific Reports
SoftwareX
Sustainable Cities and Society
Sustainability
Transactions in GIS
Transportation Research Interdisciplinary Perspectives
Transportation Research Part C: Emerging Technologies
Transportation Safety and Environment
Urban Climate
Urban Informatics

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