Kaifa Lu-CV (2024-12-03)

Kai-Fa Lu
Ph.D. Candidate in Urban and Regional Planning
University of Florida, Gainesville, FL, USA
Phone: (352)-871-4546
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Website: https://kaifalu917.github.io/kaifalu_page/
Research Interests: Transportation Planning; Microtransit and Micromobility; Urban Planning AI; Urban Resilience; Environmental Planning; Spatial Data Science

EDUCATION

2021-2025(expected): Ph.D. Degree in Urban and Regional Planning, University of Florida, FL, USA

- GPA: 3.89/4.00
- Advisor/Committee Chair: Prof. Zhong-Ren Peng
- Committee Member: Dr. Ruth L. Steiner (Transportation Planning), Dr. Jose C. Principe (Electrical and Computer Engineering), Dr. Shenhao Wang (Urban AI)
- Dissertation: *AI-Driven Approach to Optimize and Automate Shared Micromobility System Planning and Operation*

2021-2024: Master's Degree in Electrical and Computer Engineering, University of Florida, FL, USA

- GPA: 3.97/4.00
- Key Courses: *Machine Learning, Neural Networks and Deep Learning, Data Analytics and Decision Sciences, Time Series, Pattern Recognition*

2018-2021: Master's Degree in Transportation Engineering, Shanghai Jiao Tong University, Shanghai, China

- GPA: 3.83/4.00
- Thesis: *Characterizing Traffic-related Pollutant Distribution Patterns Under the Impacts of Urban Viaduct and Street Canyon*

2014-2018: Bachelor's Degree in Transportation Engineering, Central South University, Changsha, China

- GPA: 92.40/100.00
- Thesis: *Optimization of Vehicle Routing Problem over Local Road Network within Changsha South Railway Station*

CERTIFICATES

2024: Machine Learning (ECE) Certificate, Electrical and Computer Engineering, University of Florida, FL, USA

2024: Urban Analytics (URP) Certificate, Urban and Regional Planning, University of Florida, FL, USA

2024: Generative AI with Diffusion Models, NVIDIA, Inc., USA

2023: Data Parallelism: How to Train Deep Learning Models on Multiple GPUs, NVIDIA, Inc., USA

2022&2023: Certificate of Outstanding Merit, University of Florida International Center (UFIC), University of Florida, FL, USA

JOURNAL PAPER PUBLICATIONS

Urban Planning AI

J1. Peng, Z., **Lu, K.**, Liu, Y., & Zhai, W. (2024). The Pathway of Urban Planning AI: From Planning Support to Plan-Making. *Journal of Planning Education and Research*, *44*(4), 2263-2279. https://doi.org/10.1177/0739456X231180568

J2. Liu, Y., Peng, Z., Hou, Q., & **Lu, K.** (2024). The Role, Opportunities, and Challenges of Generative AI in Comprehensive Planning of American Small Towns – Using ChatGPT as an Example (in Chinese). *Journal of Urban Regional Planning*, 16(1), 215-228.

Machine Learning & Deep Learning

J3. Miao, C., Peng, Z., Cui, A., He, X., Chen, F., **Lu, K.**, ... & Chen, W. (2024). Quantifying and Predicting Air Quality on Different Road Types in Urban Environments Using Mobile Monitoring and Automated Machine Learning. *Atmospheric Pollution Research*, *15*(3), 102015. https://doi.org/10.1016/j.apr.2023.102015

J4. Wang, D., Wang, H., **Lu, K.**, et al. (2022). Regional Prediction of Ozone and Fine Particulate Matter Using Diffusion Convolutional Recurrent Neural Network. *International Journal of Environmental Research and Public Health*, 19(7), 3988. https://doi.org/10.3390/ijerph19073988

J5. Wang, D., Wang, H., Li, C., **Lu, K.**, et al. (2020). Roadside Air Quality Forecasting in Shanghai with a Novel Sequence-to-sequence Model. *International Journal of Environmental Research and Public Health*, 17(24), 9471. https://doi.org/10.3390/ijerph17249471

Transportation Policy & Planning

J6. Liu, Y., **Lu, K.**, Peng, Z., & Zhai, W. (2024). Autonomous Shuttle Acceptance in an American Suburban Context: A Revealed Preference Study in Lake Nona, Florida. *Travel Behaviour and Society*, *37*, 100865. https://doi.org/10.1016/j.tbs.2024.100865

J7. **Lu, K.**, Peng, Z. (2023). Impacts of Viaduct and Geometry Configurations on the Distribution of Traffic-related Particulate Matter in Urban Street Canyon. *Science of the Total Environment*, 858, 159902. https://doi.org/10.1016/j.scitotenv.2022.159902

J8. **Lu, K.**, Wang, H., Li, X., et al. (2022). Assessing the Effects of Non-local Traffic Restriction Policy on Urban Air Quality. *Transport Policy*, 115, 62-74. https://doi.org/10.1016/j.tranpol.2021.11.005

J9. Zhao, H., He, H., **Lu, K.**, et al. (2022). Measuring the Impact of an Exogenous Factor: An Exponential

Smoothing Model of the Response of Shipping to COVID-19. *Transport Policy*, 118, 91-100. https://doi.org/10.1016/j.tranpol.2022.01.015

J10. Jia, Y., **Lu, K.**, Zheng, T., et al. (2021). Effects of Roadside Green Infrastructure on Particle Exposure: A Focus on Cyclists and Pedestrians on Pathways Between Urban Roads and Vegetative Barriers. *Atmospheric Pollution Research*, 12, 1-12. https://doi.org/10.1016/j.apr.2021.01.017

Urban Resilience

J11. Yang, X., Li, X., **Lu, K.**, & Peng, Z. (2023). Integrating Rural Livelihood Resilience and Sustainability for Post-disaster Community Relocation: A Theoretical Framework and Empirical Study. *Natural Hazards*, 116(2), 1775-1803. https://doi.org/10.1007/s11069-022-05739-4

Environmental Monitoring & Planning

J12. Jin, M., Gallagher, J., Li, X., **Lu, K.**, Peng, Z., & He, H. (2024). Characterizing the Distribution Pattern of Traffic-related Air Pollutants in Near-road Neighborhoods. *Environmental Monitoring and Assessment*, *196*(8), 767. https://doi.org/10.1007/s10661-024-12917-3

J13. Lu, D., He, H., Zhao, H., **Lu, K.**, Peng, Z., & Li, J. (2023). Quantifying Traffic-related Carbon Emissions on Elevated Roads through On-road Measurements. *Environmental Research*, 231, 116200. https://doi.org/10.1016/j.envres.2023.116200

J14. Wang, H., Hu, Q., Huang, C., **Lu, K.**, He, H., & Peng, Z. (2023). Quantification of Gaseous and Particulate Emission Factors from a Cargo Ship on the Huangpu River. *Journal of Marine Science and Engineering*, 11(8), 1580. https://doi.org/10.3390/jmse11081580

J15. Zhu, X., He, H., **Lu, K.**, et al. (2022). Characterizing Carbon Emissions from China V and China VI Gasoline Vehicles Based on Portable Emission Measurement Systems. *Journal of Cleaner Production*, 378(10), 134458. https://doi.org/10.1016/j.jclepro.2022.134458

J16. Zhao, H., He, H., **Lu, K.**, et al. (2022). Characterizing the Distribution Pattern of Submicron and Coarse Particles on High-density Container Truck Roads through Mobile Monitoring. *Atmospheric Pollution Research*, 13(10), 101561. https://doi.org/10.1016/j.apr.2022.101561

J17. Zhu, X., **Lu, K.**, Peng, Z, et al. (2022). Spatiotemporal Variations of Carbon Dioxide (CO2) at Urban Neighborhood Scale: Characterization of Distribution Patterns and Contributions of Emission Sources. *Sustainable Cities and Society*, 78, 103646. https://doi.org/10.1016/j.scs.2021.103646

J18. Cai, W., Wang, H., Wu, C., **Lu, K.**, et al. (2021). Characterizing the Interruption-Recovery Patterns of Urban Air Pollution under the COVID-19 Lockdown in China. *Building and Environment*, 205, 108231. https://doi.org/10.1016/j.buildenv.2021.108231

J19. **Lu, K.**, He, H., Wang, H., et al. (2020). Characterizing Temporal and Vertical Distribution Patterns of Traffic-emitted Pollutants Near an Elevated Expressway in Urban Residential Areas. *Building and Environment*, 172, 106678. https://doi.org/10.1016/j.buildenv.2020.106678

MANUSCRIPTS UNDER REVIEW

Deep Reinforcement Learning

J20. **Lu, K.**, Peng, Z. (2025). AI-Driven Approach to Optimize and Automate Shared Micromobility System Planning and Operation. (Under Preparation)

Transportation Policy & Planning

J21. **Lu, K.**, Liu, Y., Peng, Z. (2024). Unraveling Urban Bike-sharing Dynamics: Spatiotemporal Imbalances in Bike Rentals and Returns in Washington D.C. *Cities*. (Under the Second Round of Review)

J22. **Lu, K.**, Liu, Y., Peng, Z. (2024). Integrating Public Transit Effects and Street View Imagery into a Dynamic Spatiotemporal Graph-Based Machine Learning Model for Analyzing and Predicting Bike-Sharing Ridership. *Computer, Environment and Urban Systems*. (Under Review)

J23. **Lu, K.**, Liu, Y., Peng, Z. (2024). Spatial Analysis of Dockless Shared E-scooter Usage in a University Town: Insights from Gainesville, Florida. *Transportation Research Part A: Policy and Practice*. (Under Review)

J24. **Lu, K.**, Liu, Y., Peng, Z. (2024). Assessing the Impact of Dockless Shared E-scooters on Transit Accessibility and Ridership: Insights from Florida Cities for Multimodal Integration. *Travel Behaviour and Society*. (Under Review)

Urban Resilience & Deep Learning

J25. **Lu, K.**, Liu, Y., Zhai, W., Peng, Z. (2024). Characterizing Performance Resilience of Transportation Networks against Extreme Weather Events. *Transportation Research Part D: Transport and Environment*. (Under the Second Round of Review)

J26. **Lu, K.**, Liu, Y., Che, L., Zhai, W., Peng, Z. (2024). Leveraging Deep Learning with Geospatial Data Analytics for Quantification and Prediction of Performance Resilience of Transportation Networks against Extreme Weather Events. *Transportation Research Part A: Policy and Practice*. (Under Review)

BOOK CHAPTERS

B1. Peng, Z., **Lu, K.**, Jin, M., et al. (2022). *China's Metro Explosion: Lessons from China's Big Four Cities*. In: Landis, J. D. (eds) Megaprojects for Megacities. Edward Elgar Publishing, Inc., USA. http://dx.doi.org/10.4337/9781803920634

B2. Peng, Z., Zhai, W., **Lu, K.** (2022). *Smart, Sustainable, and Resilient Transportation System*. In: Li, B., Shi, X., Zhu, AX., Wang, C., Lin, H. (eds) New Thinking in GIScience. Springer, Singapore. https://doi.org/10.1007/978-981-19-3816-0_34

TEACHING

University of Florida, Dept. Urban and Regional Planning, FL, USA

- Fall 2024 — Transportation Policy and Planning (Graduate level) — Teaching Assistant
- Spring 2024 — Transportation and Land Use Modeling (Graduate level) — Teaching Assistant
- Spring 2022 — Transportation and Land Use Modeling (Graduate level) — Co-Instructor

Shanghai Jiao Tong University, Dept. Transportation Engineering, Shanghai, China

- Spring 2018 Operations Research (Undergraduate level) Teaching Assistant

ACADEMIC SERVICES

Mentor-Mentee Experience

- University of Florida (Ph.D. level): Khalid A. Aljuhani, Ph.D. Dissertation Proposal 2024
- University of Florida (Graduate level): Yue Dong, Master Thesis 2023
- Shanghai Jiao Tong University (Graduate level): Xinghang Zhu, Master Thesis 2020-2021

Paper Reviewers

- Travel Behaviour and Society 2023
- Journal of Environmental Management 2023
- Humanities and Social Sciences Communications 2023
- Environmental Research 2023
- Air Quality, Atmosphere & Health 2023
- Stochastic Environmental Research and Risk Assessment 2022

Affiliations

- International Association for China Planning (IACP), Student Member
- International Center for Adaptation Planning and Design (iAdapt), Member
- University of Florida Transportation Institute (UFTI), Student Member
- The Committee on Extreme Weather and Climate Change Adaptation (AMR50), Friend Member

AWARDS & SCHOLARSHIP

- **Merit Commendation** (PhD Research Poster), Graduate Student Research Symposium, College of Design, Construction and Planning, University of Florida, USA, 2023
- **COSCO maritime scholarship** (top 5%), China Ocean Shipping Company, China, 2021
- **Outstanding Graduates of Shanghai** (top 3%), Shanghai, China, 2021
- **The Second Prize** in the National Graduate Mathematical Contest in Modeling, China, 2019
- **Outstanding Undergraduates of Hunan Province** (top 3%), Changsha, Hunan Province, China, 2018
- **The Meritorious Winner** in the America Undergraduate Mathematical Contest in Modeling, USA, 2017
- **National Scholarship** (top 3%), The Ministry of Education of China, 2017
- **The First Prize** in the National Undergraduate Mathematical Contest in Modeling, China, 2016
- **The Third Prize** in the National Undergraduate Mathematical Contest, China, 2015
- **National Encouragement Scholarship** (top 5%), The Ministry of Education of China, 2015&2016
- **First-class Scholarship** (top 10%) **of Shanghai Jiao Tong University & Central South University**, China, 2015-2021

PRESENTATIONS & TALKS

Conference Presentations

C1. **2025.01: Transportation Research Board 104th Annual Meeting**. *Characterizing Performance Resilience of Transportation Networks against Extreme Weather Events*. Washington D.C., USA.

C2. **2025.01: Transportation Research Board 104th Annual Meeting**. *Integrating Public Transit Effects and Street View Imagery into a Dynamic Spatiotemporal Graph-based Machine Learning Model for Predicting Bike-sharing Ridership*. Washington D.C., USA.

C3. **2024.11: Association of Collegiate Schools of Planning (ACSP) Conference**. *Impact of Shared Micromobility System Sizes on Usage Patterns: Planning Implications*. Seattle, WA, USA.

C4. **2024.07: The 18th International Association for China Planning (IACP) Conference**. *Impact of Shared Micromobility System Sizes on Usage Patterns and its Planning Implications*. Hangzhou, China.

C5. **2024.01: Transportation Research Board 103rd Annual Meeting**. *Demystifying the Spatiotemporal Heterogeneity of Rental-Return Imbalance on Bike-Sharing Systems: A Bayesian Additive Regression Trees (BART) Model*. Washington D.C., USA.

C6. **2023.10: Association of Collegiate Schools of Planning (ACSP) Conference**. *Leveraging Deep Learning with Geospatial Data Analytics for Quantification and Prediction of Performance Resilience of Transportation Networks against Extreme Weather Events*. Chicago, IL, USA.

C7. **2023.07: The 17th International Association for China Planning (IACP) Conference**. *Using Origin-Destination Flow Graph and Public Transit Information to Enhance Short-Term Ridership Prediction in Bike-Sharing Systems*. Tianjin, China.

C8. **2023.01: Transportation Research Board 102nd Annual Meeting**. *Characterization and Prediction of Transportation Network Resilience: A Spatiotemporal Graph Diffusion Convolutional Recurrent Neural Network Approach*. Washington D.C., USA.

C9. **2023.01: Transportation Research Board 102nd Annual Meeting**. *Characterizing Carbon Emissions from China V and China VI Gasoline Vehicles Based on Portable Emission Measurement Systems*. Washington D.C., USA.

C10. **2023.01: Transportation Research Board 102nd Annual Meeting**. *Characterizing the Traffic-related Carbon Emission Factors on Elevated Roads Based on On-road Measurements*. Washington D.C., USA.

C11. **2021.01: Transportation Research Board 100th Annual Meeting**. *Investigating Pedestrians' Exposure to Traffic-Related PM and BC at Intersections: A Case Study in Shanghai, China*. Washington D.C., USA.

C12. **2020.01: Transportation Research Board 99th Annual Meeting**. *Characterization of Traffic-related Pollutant Distribution Patterns in Urban Residential Areas with an Elevated Expressway*. Washington D.C., USA.

Invited Talks

T1. **2024.06: Guest Lecture at Chang'an University**. *Integrating Public Transit Effects and Street View Imagery into a Dynamic Spatiotemporal Graph-Based Machine Learning Model for Analyzing and Predicting Bike-Sharing Ridership*. Xi'an, China.

PROJECT EXPERIENCES

Ph.D. Dissertation Research, *AI-Driven Approach to Optimize and Automate Shared Micromobility System Planning and Operation*, 2023.08-2025.06 (expected), Principal Investigator

- Apply spatial data analysis and machine learning (i.e., Bayesian Additive Regression Tree) models to the data of bike/scooter trips and influencing factors to reveal usage patterns and underlying causes
- Use deep learning models (i.e., Graph Neural Networks) to predict bike- or scooter-sharing ridership
- Develop a multi-agent deep reinforcement learning approach to optimize and automate infrastructure planning and vehicle rebalancing toward efficiency, cost-effectiveness, multimodal integration, equity, and resilience

Research Project, *Assessment of Modelling Framework for Micromobility*, 2023.03-2024.10, Research Assistant

- Funded by the Florida Department of Transportation (FDOT), FL, USA
- Develop a modeling framework for micromobility analytics that integrates survey analysis, spatial data analysis, and machine learning to understand their usage patterns, crash patterns, and relationships with public transit in Florida.

Research Project, *Florida's Transportation Revenue Forecasting and Allocation Process and Modeling – Phase I*, 2022.07-2022.10, Research Assistant

- Funded by the Florida Department of Transportation (FDOT), FL, USA
- Develop models to understand the forces that will affect future transportation revenues in Florida
- Delineate the whole process and concerns of allocating the revenue to Districts and MPOs

Research Project, *Examining Data Needs and Implementation Process of AV-based Microtransit Service: A Case Study in Lake Nona*, 2021.06-2023.01, Research Assistant

- Funded by the Florida Department of Transportation (FDOT), FL, USA
- Develop a framework for examining various aspects of the AV-based microtransit system, including policy and government support, infrastructure and technology, service and management, financial sustainability, ridership, and community impact.

Research Project, *Microtransit and Micromobility Inventory in the State of Florida*, 2021.07-2022.03, Research Assistant

- Funded by the Florida Department of Transportation (FDOT), FL, USA
- Inventory all forms of microtransit and micromobility in Florida, map the geofenced service areas, and identify their relationship, if any, with transit agencies

Research Project, *Study on the Impact of Urban Transportation Policy and Facility Construction on Atmospheric Environment*, 2018.09-2021.03, Research Assistant

- Funded by the National Planning Office of Philosophy and Social Science, Beijing, China
- Investigate the potential of different transportation policies (i.e., traffic restriction policy) and infrastructure planning (i.e., viaduct, street canyon) in improving urban air quality, as well as their impacts on the spatiotemporal distribution patterns of traffic-related pollutants

Research Project, *Vertical Observation Technologies of Atmospheric Pollution Based on Unmanned Aerial Vehicle and Heavy Load Airship*, 2018.09-2021.03, Research Assistant

- Funded by the Ministry of Science and Technology, Beijing, China
- Patent: "He, H., Li, B., Cao, R., Lu, K., & Luo, Z. (2022). *An Intelligent Pod System for Three-Dimensional Atmospheric Environment Monitoring* (China Patent, No. CN215932395U). China National Intellectual Property Administration: Patent and Trademark Office."

Research Project, *RFID-based Automatic Toll System for Roadside Parking*, 2016.06-2017.07, Principal Investigator

- Funded by the Hunan Education Commission, Changsha, Hunan Province, China
- Develop an RFID-based automatic toll system for roadside parking to monitor illegal parking behaviors and improve charging efficiency and accuracy

Design & Planning Practice Project, *China Railway Guangzhou & Wuhan Groups*, Planner Internship

- Cognition practice of passenger and freight transport in Zhuzhou railway station, 2017.04-2017.05
- Production practice of Centralized Traffic Control for train scheduling in Wuhan & Guangzhou Dispatch Centers, 2018.10-2018.11
- Railway station design and planning for freight transport, 2017.09-2018.01

EXPERTISE & TECHNICAL SKILLS

Programming Language: Python, MATLAB, R, C (++)

Software: AutoCAD, Sketch Up, ArcGIS, PTV VISUM, TransCAD, FLUENT, MS OFFICE, ORIGIN

REFERENCES

Zhong-Ren Peng
Professor of Urban and Regional Planning
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University of Florida
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Ruth L. Steiner
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Jose C. Principe
Professor of Electrical and Computer Engineering
Don D. & Ruth Eckis Endowed Distinguished Professor
University of Florida

Shenhao Wang
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