Liuhui Zhao, Ph.D.

Personal Website

Education

- Georgia Institute of Technology, Atlanta, GA
  M.S. student in Analytics 2019-2021
- New Jersey Institute of Technology, Newark, NJ
  Ph.D. in Transportation Engineering 2016
  Dissertation: Optimization of headway, stops, and time points considering stochastic bus arrivals.
- The University of Alabama, Tuscaloosa, AL
  M.S. in Geography 2011
  Thesis: Spatial equity analysis in the Atlanta 10-County region.
- Beijing Normal University, Beijing, China
  B.S. in Resources Science and Technology 2009
  Thesis: Characteristics of vegetation changes in the farming-withdrawn grassland in semiarid region.

Academic Appointments

- University of Delaware — Newark, DE
  Postdoctoral Research Associate — Jun. 2017 – May. 2019
- New Jersey Institute of Technology — Newark, NJ
  Technical Research Planner — Sep. 2016 – Jan. 2017
- New Jersey Institute of Technology — Newark, NJ
  Graduate Research Assistant — Aug. 2011 – May 2016
- University of Alabama — Tuscaloosa, AL
  Graduate Research Assistant — Aug. 2009 – May 2011
- Beijing Normal University — Beijing, China
  Research Assistant — Aug. 2006 – Dec. 2008

Honors and Awards

- ICTPA-USNE Chapter Outstanding Service Award 2015
- NJIT Graduate Student Association Club Excellence Award 2015
- ITS-NJ Chapter Outstanding Student Award 2015
- NJIT Graduate Student Association Club Excellence Award 2014
- Third Place Award in ITE Met Section Traffic Bowl 2013
- Outstanding Undergraduate Thesis Award, College of Resources, Beijing Normal University 2009
- Outstanding Undergraduate Project Award, Beijing Normal University 2009
- Academic Merit Scholarship, Beijing Normal University 2008
- Academic Merit Scholarship, Beijing Normal University 2007

Professional Affiliations

- IEEE, Institute of Electrical & Electronics Engineers since 2017
- ASCE, American Society of Civil Engineers since 2015

Research Interests

- Connected and Automated Vehicles Technology
- Data Analytics
- Geographic Information Systems
- Intelligent Transportation Systems
- Traffic Simulation
- Transit Planning and Shared Mobility

Skill Sets

- **Transportation Software**: ArcGIS, QGIS, VISSIM, Aimsun, CORSIM
- **Mathematical Software**: MATLAB, LINGO, R, SPSS, Minitab
- **Computing Languages**: C++, C#, Java, Python, HTML/CSS, JavaScript (D3), PHP
- **Data Analytics Framework**: Hadoop, Spark
- **Others**: MySQL, SQLite, Microsoft Access, Microsoft Visio
- **Language**: Chinese, English, Japanese

Research Experience

– University of Delaware — Newark, DE
Postdoctoral Research Associate — Jun. 2017 – May. 2019

- Simultaneous Optimization of Vehicle and Powertrain Operation Using Connectivity and Automation (ARPAE NEXTCAR Program)
  - Managed driving simulator lab for human-in-the-loop simulation test in a mixed traffic environment with connected and automated vehicles
  - Developed decentralized optimization frameworks for connected and automated vehicle to smoothly travel through a corridor
  - Led the integration efforts of control algorithms developed by team members, and established the VISSIM-based platform for simulation evaluation of proposed algorithms
  - Coordinated with team members in the process of technology-to-market, and successfully delivered codes for vehicle implementation of developed control algorithms

– New Jersey Institute of Technology — Newark, NJ
Graduate Research Assistant — Aug. 2011 – Aug. 2016

- Smart Bus System under Connected Vehicles Environment (UTRC-II/USDOT)
  - Established a smart bus operation management center, integrating mobile app-database-server for dynamic bus routing and smart transferring
  - Developed a VISSIM-based micro-simulation test bed in a C# environment, for evaluating the proposed system with a hardware-in-the-loop approach
- Intelligent Transportation Systems Resource Center (NJDOT)
  - Designed simulation-based tests for connected vehicle applications: e.g., hard shoulder use, speed harmonization, freeway merge control
  - Managed the Driving Simulator Lab at New Jersey Institute of Technology
  - Drafted research proposals, prepared technical memorandums and final reports for research projects
- Feasibility of Lane Closures Using Probe Data (USDOT-FHWA/NJDOT)
  - Processed and analyzed statewide historical traffic data
  - Built the prototype of an online real-time work zone traffic monitoring suite
  - Developed statistical models to quantify traffic impact of constructions
- Evaluating the Effectiveness of Traffic Diversion and Managed Lanes on Highway Work Zones (UTC-CAIT)
  - Investigated historical work zone activities

    - Formulated evolutionary algorithm-based optimization models to quantify effects of the planning traffic diversion and managed lanes for temporary work zone on multi-lane highways

  - Vulnerability of Transportation System and Evacuation Plan for Coastal Flooding in Climate Change (UTRC-II)
    - Applied spatial analysis with ArcGIS to identify flood prone residential area and facilities
    - Estimated affected population under various scenarios of coastal flooding in climate change

  - Road Weather Information System (RWIS) Statewide Implementation Plan (NYSDOT/UTRC-II)
    - Evaluated potential locations for RWIS implementation in a GIS environment
    - Formulated GIS-based optimization models to prioritize candidate locations
    - Conducted life-cycle cost-benefit analysis for statewide implementation

– The University of Alabama — Tuscaloosa, AL
Graduate Research Assistant — Aug. 2009 – May 2011
  - USGS Geographic Names Information System (GNIS) database Update (USGS) Spatial equity analysis in Atlanta area in GIS environment through network analysis

– Beijing Normal University — Beijing, China
Research Assistant — May 2007 – Aug. 2008
  - Residential impact assessment of Zhalong national nature reserve (Beijing Normal University Undergraduate Research Program)
  - A comparative study of the capabilities of different vegetation water indices in monitoring water status of wheat (National University Innovation Program)

Industry Experience

– Greenman-Pedersen, Inc. — New York, NY
Transportation Engineer — Jan. 2017 – Aug. 2019
  - Worked on NJ-495 traffic mitigation assessment project, calibrated microscopic simulation model with dynamic traffic assignment, evaluated traffic mitigation plans during rehabilitation, created scripts and applications to facilitate data process and improve calibration efficiency.
  - Provided engineering support for the development of select bus service (SBS) in Queens, NY, calibrated simulation model with current traffic demand for assessing SBS operational impacts

Teaching Experience

– New Jersey Institute of Technology — Newark, NJ
Teaching Assistant — Jun. 2013 – Dec. 2016
  - CE351 - Introduction to Transportation Systems, F16
  - TRAN625 - Public Transportation Operations and Technology, S15, S16
  - TRAN705 - Mass Transportation Systems, F15
  - NJIT International Summer Research Symposium, S13

– Hwachong Institution (Singapore) Beijing Satellite Campus — Beijing, China
Teaching Assistant — Oct. 2008 – May 2009
  - Assisted teachers in class assignments and midterm preparation
  - Prepared a full-year agenda for off-campus activities

Professional Service

Workshop Co-Organizer

- IEEE ACC workshop on Sociotechnical Systems Approach for Energy-Efficient Mobility 2019
- IEEE ITSC workshop on Next Generation Mobility Systems 2018

Technical Committee Member

- TRB Standing Committee on Transit Capacity and Quality of Service - AP015 2019-2022
- World Transport Convention Committee on Traffic Simulation 2017-2019

Reviewer

- IEEE Transactions on Intelligent Transportation Systems
- IEEE Transactions on Intelligent Vehicles
- International Journal of Geographical Information Systems
- Journal of Advanced Transportation
- Journal of Infrastructure Systems
- Journal of Intelligent Transportation Systems: Technology, Planning, and Operations
- KSCE Journal of Civil Engineering
- PLOS ONE
- Public Transport
- Transportation Research Part A: Policy
- Transportation Research Part C: Emerging Technologies
- Transportation Research Part E: Logistics and Transportation Review
- Transportmetrica A: Transport Science
- COTA International Conference for Transportation Professionals
- COTA International Symposium Emerging Trends in Transportation
- IEEE Conference on Intelligent Transportation Systems
- Transportation Research Board Annual Conference

Public Service

- GISCorps — Volunteer
  URISA (Urban and Regional Information Systems Association) 2020-

- TryEngineeringTogether — Tutor
  IEEE 2019-

- NJIT Student Chapter of ITS — President
  Newark, NJ 2013-2014
  - Reactivated ITS NJIT Student Chapter, developed and maintained ITS NJIT website
  - Organized seminars, field trips, workshops, and supported ITS NJ Chapter's activities
- NJIT Student Chapter of WTS — Vice-President
  Newark, NJ 2014-2015
  - Coordinated with the President to reactivate the student chapter
  - Organized seminars and developed websites, supported NJIT Graduate Student Association's activities
- ICTPA-USNE Chapter — Web Master
  New York, NY 2014-
  - Developed and published a new website for promoting Chapter's activities
  - Maintaining website on a regular basis

Publications

Journal Articles (Published or in press)

1. Mahbub, A.M., Malikopoulos, A.A., **Zhao, L.** (2020). A Decentralized Optimal Control Framework of Connected and Automated Vehicles in a Corridor. Automatica 117, 108958.
2. Beaver, L.E., Chalaki, B., Mahbub, A.M., **Zhao, L.**, Zayas,R., and Malikopoulos. A.A. (2020). Demonstration of a Time-Efficient Mobility System Using a Scaled Smart City. Vehicle System Dynamics: 1-18. doi: 10.1080/00423114.2020.1730412.
3. **Zhao, L.**, and Malikopoulos, A.A. (2020). Enhanced Mobility with Connectivity and Automation: A Review of Shared Autonomous Vehicle Systems. IEEE Intelligent Transportation Systems Magazine. doi: 10.1109/MITS.2019.2953526.
4. **Zhao, L.**, Chien, S., and Du, B. (2018). Optimizing work zone schedule with floating car data considering traffic diversion and managed lanes. Journal of Transportation Engineering, Part A: Systems, 145(1), 04018076.
5. **Zhao, L.**, Chien, S, Spasovic, L., and Liu, X. (2018). Modeling and optimizing an urban bus transit considering headway variation for cost and service reliability analysis. Transportation Planning and Technology, 41(7), 706-723.
6. **Zhao, L.**, Lee, J., Chien, S., and Oh, C. (2017). Shockwave-based automated vehicle longitudinal control algorithm for non-recurrent congestion mitigation. Journal of Advanced Transportation. doi: 10.1155/2017/6568135.
7. Zhong, Z., Lee, J., and **Zhao, L.** (2017). Multi-objective optimization controller for cooperative adaptive cruise control. Transportation Research Record: Journal of the Transportation Research Board, 2625: 32-42.
8. **Zhao, L.**, Chien, S., Meegoda, J., Luo, Z., and Liu, X. (2015). Cost-benefit analysis and microclimate-based optimization of RWIS network. Journal of Infrastructure Systems, 22: 1-11.
9. **Zhao, L.**, Chien, S., Liu, X., and Liu, W. (2015). Planning a road weather information system with GIS. Journal of Modern Transportation, 23:176-188.
10. **Zhao, L.**, and Chien, S. (2015). Investigating the impact of stochastic vehicle arrivals to optimal stop spacing and headway for a feeder bus route. Journal of Advanced Transportation, 49: 341-357.
11. Tang, H., Chien, S., Temimi, M., Blain, C. A., Qu, K., **Zhao, L.**, and Kraatz, S. (2013). Vulnerability of population and transportation infrastructure at the east bank of Delaware Bay due to coastal flooding in sea-level rise conditions. Natural Hazards (69): 1-23.
12. Wang, P., Wu, J., Nie, J., Kong, F., Ding, H., and Zhao, L. (2010). A comparative study of the capabilities of different vegetation water indices in monitoring water status of wheat. Remote Sensing for Land & Resources (3): 97-100.
13. Wang, S., Sun, J., and **Zhao, L.** (2008). Impact assessment of residential income in core zone of Zhalong national nature reserve. China's Collective Economy (15): 199-200.

Peer-Reviewed Conference Publications

1. Malikopoulos, A.A., and **Zhao, L.**, Impact of Connected and Automated Vehicles in a Corridor. Proceedings of 2020 American Control Conference, 2020 (to appear).
2. Malikopoulos, A.A., and **Zhao, L.**, Decentralized optimal Path Planning for Connected and Automated Vehicles at Urban Intersections. Proceedings of the 58th IEEE Conference on Decision and Control, 2019 (to appear).
3. **Zhao, L.**, Malikopoulos, A.A., and Rios-Torres, J., On the Traffic Impacts of Optimally Controlled Connected and Automated Vehicles. Proceedings of 2019 IEEE Conference on Control Technology and Applications, 2019 (CCTA 2019): 882-887.
4. **Zhao, L.**, Mahbub, A M., I., and Malikopoulos, A.A., Optimal Vehicle Dynamics and Powertrain Control for Connected and Automated Vehicles. Proceedings of 2019 IEEE Conference on Control Technology and Applications, 2019 (CCTA 2019): 33-38.
5. Malikopoulos, A.A., and **Zhao, L.**, A Closed-Form Analytical Solution for Optimal Coordination of Connected and Automated Vehicles. Proceedings of 2019 American Control Conference, 2019 (ACC 2019): 3599-3604.
6. Mahbub, A. M., **Zhao, L.**, Assanis, D, D., and Malikopoulos, A.A., Energy-Optimal Coordination of Connected and Automated Vehicles at Multiple Intersections. Proceedings of 2019 American Control Conference, 2019 (ACC 2019): 2664-2669.
7. **Zhao, L.**, and Malikopoulos, A.A. Decentralized Optimal Control of Connected and Automated Vehicles in a

Corridor. Proceedings of 2018 IEEE 21st International Conference on Intelligent Transportation Systems (ITSC 2018): 1252-1257.

8. Assanis, D, D., **Zhao, L.**, and Malikopoulos, A.A. Characterization of the new Class of Driving Cycles for Connected and Automated Vehicles. Proceedings of 2018 IEEE 21st International Conference on Intelligent Transportation Systems (ITSC 2018): 3668-3673.
9. Stager, A., Bhan, L., Malikopoulos, A.A., and **Zhao, L.**, A scaled smart city for experimental validation of connected and automated vehicles. Proceedings of the 15th IFAC Symposium on Control in Transportation Systems (CTS 2018): 120-135.
10. **Zhao, L.**, Malikopoulos, A.A., and Rios-Torres, J., Optimal control of connected and automated vehicles at roundabouts: an investigation in a mixed-traffic environment. Proceedings of the 15th IFAC Symposium on Control in Transportation Systems (CTS 2018): 73-78.
11. **Zhao, L.**, Malikopoulos, A., and Rios-Torres, J. Optimal control of connected and automated vehicles at roundabouts. Proceedings of the 97th TRB Annual Meeting, 2018, Washington, D.C.
12. Du, B., Chien, S., Lee, J., **Zhao, L.**, Zhong, Z., and Singh, B. WIMAP-P: Work zone interactive management application for planning. International Conference on Sustainable Design, Engineering and Construction, 2016, Austin, TX.
13. **Zhao, L.**, He, Y., and Lee, J. Shockwave-based automated vehicle longitudinal control algorithm for non-recurrent congestion mitigation. Automated Vehicles Symposium, 2015, Ann Arbor, MI.
14. Du, B., **Zhao, L.**, Ibrahim, A., Restrepo, J., and Lee, J. Evaluating the impact of dynamic shoulder lane for freeway work zone congestion mitigation. The 26th ITS America Annual Meeting, 2015, Pittsburgh, PA.
15. He, Y., Gutesa, S., **Zhao, L.**, Lee, J., and Besenski, D. Evaluating a variable speed limit control strategy in a work zone. The 26th ITS America Annual Meeting, 2015, Pittsburgh, PA.
16. **Zhao, L.**, and Chien, S. Optimizing stop spacing and headway for a feeder bus route considering stochastic vehicle arrivals. The 92nd TRB Annual Meeting, 2013, Washington D.C.
17. Tang, H., Chien, S., Temimi, M., Qu, K., **Zhao, L.**, Blain, C. A., and Kraatz, S. Prediction of coastal flooding and evacuation demand estimation considering climate change. The 92nd TRB Annual Meeting, 2013, Washington, D.C.
18. **Zhao, L.**, and Chien, S. Analysis of weather impact on travel speed and travel time reliability. CICTP 2012: 1145-1155.
19. Wang, P., Kong, F., Ding, H., **Zhao, L.**, and Nie, J. (2008). A comparison between different vegetation water indices in the ability of monitoring water status of wheat in April. EORSA 2008: 1-6.

Technical Reports

1. Lee, J., **Zhao, L.**, Chien, S., Wang, G., and Gao, X. Development and Evaluation of Smart Bus System. Project Report, UTRC/RF 49198-27-27, US DOT Region II University Transportation Research Center, December 2016.
2. Chien, S. and **Zhao, L.** Evaluating the Effectiveness of Traffic Diversion and Managed Lanes on Highway Work Zones. Project Report, CAIT-UTC-051, New Jersey Department of Transportation, December 2015.
3. Chien, S., Meegoda, M., Luo, Z., Corrigan, P., and **Zhao, L.** Road Weather Information System Statewide Implementation Plan. Project Report, C-11-54, New York State Department of Transportation, June 2014.
4. Tang, H., Chien, S., Temimi, M., Blain, C. A., Qu, K., **Zhao, L.**, and Kraatz, S. Vulnerability of Transportation System and Evacuation Plan for Coastal Flooding in Climate Change. Project Report, UTRC 49111-26-22, University Transportation Research Center - Region II, March 2014.

Thesis and Dissertation

1. **Zhao, L.**, *Optimization of Headway, Stops, and Time Points Considering Stochastic Bus Arrivals*, Ph.D. Dissertation, Department of Civil and Environmental Engineering, New Jersey Institute of Technology, Aug. 2016.
2. **Zhao, L.**, *Spatial Equity Analysis in the Atlanta 10-County Region*, M.S. Thesis, Department of Geography, The University of Alabama, May. 2011.
3. **Zhao, L.**, *Characteristics of Vegetation Changes in the Farming-withdrawn Grassland in Semiarid Region*, B.S. Thesis, College of Resources, Beijing Normal University, May. 2009.

Professional Presentations

1. **Zhao, L.**, Malikopoulos, A., and Rios-Torres, J. On the Traffic Impacts of Optimally Controlled Connected and Automated Vehicles. The 19th COTA International Conference of Transportation Professional, Nanjing, China, 2019.
2. **Zhao, L.**, Malikopoulos, A., and Rios-Torres, J. Optimal Control of Connected and Automated Vehicles at Roundabouts. The 97th TRB Annual Meeting, 2018, Washington, D.C.
3. Lee, J., **Zhao, L.**, Chien, S., and Wang, G. Development and evaluation of smart bus system. 2016 ITS New Jersey Annual Meeting, 2016, New Brunswick, NJ.
4. **Zhao, L.** and Lee, J. Smart bus system under connected vehicles environment. WTS Annual Conference, 2016, Austin, TX.
5. **Zhao, L.**, Lee, J., Chien, S., Wang, G., Yang, J., and Song, S. Smart bus system under connected vehicles environment. The 17th PTV User Group Meeting, 2016, Arlington, VA.
6. **Zhao, L.**, Du, B., and Chien, S. Optimizing work zone schedule with floating car data considering traffic diversion and managed lanes. The 95th TRB Annual Meeting, 2016, Washington, D.C.
7. **Zhao, L.**, Lee, J., Chien, S., Wang, G., Yang, J., and Song, S. Smart bus system under connected vehicles environment. The 4th Connected & Autonomous Vehicles Symposium, 2015, Albany, NY.
8. **Zhao, L.**, Chien, S., Meegoda, J. N., and Luo, Z. Development of a life-cycle model to optimize RWIS locations. The 94th TRB Annual Meeting, 2015, Washington, D.C.
9. **Zhao, L.**, Lee, J., and Chien, S. Shockwave-based variable speed limit algorithm for non-recurrent congestion mitigation. 2015 ITS New Jersey Annual Meeting, 2015, New Brunswick, NJ.
10. **Zhao, L.**, Chien, S., Meegoda, J., and Luo, Z. Microclimate-based optimization of road weather information system and a life-cycle cost benefit analysis. The 17th Annual NJDOT Research Showcase, 2015, Mt. Laurel, NJ.
11. **Zhao, L.**, and Chien, S. Optimal locations for RWIS sites considering traffic and regional weather conditions. The 93rd TRB Annual Meeting, 2014, Washington, D.C.
12. **Zhao, L.**, and Chien, S. Optimal locations for RWIS sites considering traffic and regional weather conditions. The 15th Annual NJDOT Research Showcase, 2013, West Windsor, NJ.
13. **Zhao, L.**, and Chien, S. Investigating the impact of stochastic vehicle arrivals to optimal stop spacing and headway for a feeder bus route. The Dana Knox Student Research Showcase, NJIT, 2013, Newark, NJ.
14. **Zhao, L.**, and Chien, S. Analysis of weather impact on travel speed and travel time reliability. The 12th International Conference of Transportation Professionals, 2012, Beijing, China.