Shangjia Dong

Personal Information

Dept. of Civil and Environmental Engineering, DuPont 344B
Disaster Research Center, Graham 166B
University of Delaware
Newark, DE 19716

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Google Scholar
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Professional Experience

University of Delaware — *Newark, Delaware*
Assistant professor in Civil and Environmental Engineering — *2020.8 – Present*
Core Faculty in Disaster Research Center (DRC)
Faculty Member in Sociotechnical Systems Center (SSC)

Texas A&M University — *College Station, Texas*
Postdoctoral Research Associate, PI: Ali Mostafavi — *2018.9 – 2020.7*

Oregon State University — *Corvallis, Oregon*
Graduate Research Assistant PI: Haizhong Wang — *20013.10 – 2018.9*

Education

Oregon State University — *Corvallis, Oregon*

Ph.D. in Civil Engineering (Transportation) — *2015.11 – 2018.9*
Minor in Computer Sciences

- Dissertation: Percolation Modeling of Transportation Network Robustness Towards a Resilient Infrastructure System: From a Single Network to Interdependent Networks
- Advisor: Prof. Haizhong Wang

M.S. in Civil Engineering (Transportation) — *2013.10 – 2015.11*

- Thesis: Stochastic Characterization of Highway Capacity and Its Applications
- Advisor: Prof. Haizhong Wang

University of Electronic Science and Technology of China — *Chengdu, Sichuan*

B.S. in Information and Computational Science — *2009.9 – 2013.6*
Dual B.S. in Finance

Refereed Journal Articles

——— *Published at Assistant Professor Rank with University of Delaware as Affiliation*

J1. **Dong, S.**, Gao, X., Mostafavi, A., and Gao, J., 2022, Modest flooding can trigger catastrophic road network collapse due to compound failure. (2022) *Communications Earth & Environment*, doi.org/10.1038/s43247-022-00366-0

J2. Esmalian, A. Yuan, F., Rajput, A., Farahmand, H., **Dong, S.**, Li, Q., Gao, X., Fan, C., Lee, C., Hsu, C., Patrascu, F., and Mostafavi, A., 2022. Operationalizing resilience practices in transportation infrastructure planning and project development. *Transportation Research Part D: Transport and Environment*, doi.org/10.1016/j.trd.2022.103214

J3. Farahmand, H., Liu, X., **Dong, S.**, Mostafavi, A., and Gao, J., 2022. A Network Observability Framework for Sensor Placement in Flood Control Networks to Improve Flood Situational Awareness and Risk Management. *Reliability Engineering System Safety*, 108366. doi.org/10.1016/j.ress.2022.108366

J4. **Dong, S.**, Yu, T., Farahmand, H., and Mostafavi, A. (2022). Predictive Multi-Watershed Flood Monitoring Using Deep Learning on Integrated Physical and Social Sensors

Data. *Environment and Planning B: Urban Analytics and City Science*, doi.org/10.1177/23998083211069140

J5. **Dong, S.**, Malecha, M., Farahmand, H., Mostafavi, A., Berke, P.R. and Woodruff, S.C., 2021. Integrated infrastructure-plan analysis for resilience enhancement of post- hazards access to critical facilities. *Cities*, 117, p.103318. doi.org/10.1016/j.cities.2021.103318

J6. Farahmand, H., **Dong, S.** and Mostafavi, A., 2021. Network analysis and characterization of vulnerability in flood control infrastructure for system-level risk reduction. *Computers, Environment and Urban Systems*, 89, p.101663. doi.org/10.1016/j.compenvurbsys.2021.101663

J7. Li, Z., Yu, H., Zhang, G., **Dong, S.** and Xu, C., 2021. Network-wide traffic signal control optimization using a multi-agent deep reinforcement learning. *Transportation Research Part C: Emerging Technologies*, 125, p.103059. doi.org/10.1016/j.trc.2021.103059

J8. Esmalian, A., **Dong, S.**, and Mostafavi, A., 2021. Susceptibility Curves for Humans: Empirical Survival Models for Determining Household-level Disturbances from Hazards-induced Infrastructure Service Disruptions. *Sustainable Cities and Society*. 1026-94. doi.org/10.1016/j.scs.2020.102694

J9. Esmalian, A., **Dong, S.**, Coleman, N. and Mostafavi, A., 2021. Determinants of risk disparity due to infrastructure service losses in disasters: a household service gap model. *Risk analysis*. doi.org/10.1111/risa.13738

J10. **Dong, S.**, Yu, T., Farahmand, H. and Mostafavi, A., 2020. A Hybrid Deep Learning Model for Urban Flood Prediction and Situation Awareness using Channel Network Sensors Data. *Computer-Aided Civil and Infrastructure Engineering* doi.org/10.1111/mice.12629

J11. **Dong, S.**, Yu, T., Farahmand, H., and Mostafizi, A., 2020. Probabilistic Modeling of Cascading Failure Risk in Interdependent Channel and Road Networks in Urban Flooding. *Sustainable Cities and Society* doi.org/10.1016/j.scs.2020.102398

J12. **Dong, S.**, Li, Q., Farahmand, H., Mostafavi, A., Berke, P. and Vedlitz, A., 2020. Institutional Connectedness in Resilience Planning and Management of Interdependent Infrastructure Systems. *ASCE Journal of Management in Engineering*. doi.org/10.1061/(ASCE)ME.1943-5479.0000839

——— *Published as Research Associate*

J13. **Dong, S.**, Mostafizi, A., Wang, H., Gao, J. and Li, X., 2020. Measuring the topological robustness of transportation networks to disaster-induced failures: A percolation approach. *ASCE Journal of Infrastructure System*. doi.org/10.1061/(ASCE)IS.1943-555X.0000533

J14. **Dong, S.**, Wang, H., and Mostafizi, A. and Song, X., 2020. A network-of-networks percolation analysis of cascading failures in spatially co-located road-sewer infrastructure networks. *Physica A: Statistical Mechanics and Its Application*, p.122971. doi.org/10.1016/j.physa.2019.122971

J15. **Dong, S.**, Esmalian, A., Farahmand, H. and Mostafavi, A., 2020. An Integrated Physical-Social Analysis of Disrupted Access to Critical Facilities and Community Service-loss Tolerance in Urban Flooding. *Computers, Environment and Urban Systems*. 80, 101443. doi.org/10.1016/j.compenvurbsys.2019.101443

J16. **Dong, S.**, Wang, H., Mostafavi, A. and Gao, J., 2019. Robust component: a robustness measure that incorporates access to critical facilities under disruptions. *Journal of the Royal Society Interface*, 16(157), p.20190149. doi.org/10.1098/rsif.2019.0149

J17. **Dong, S.**, Yu, T., Farahmand, H. and Mostafavi, A., 2019. Bayesian Modeling of Flood Control Networks for Failure Cascade Characterization and Vulnerability Assessment. *Computer-Aided Civil and Infrastructure Engineering*. doi.org/10.1111/mice.12527

J18. *Farahmand, H., **Dong, S.**, Mostafavi, A., Berke, P., Woodruff, S., Hannibal, B. and Vedlitz, A., 2019. Institutional Congruence for Resilience Management in Interdependent Infrastructure Systems. *International Journal of Disaster Risk Reduction*. doi.org/10.1016/j.ijdrr.2020.101515

J19. *Li, Q., **Dong, S.** and Mostafavi, A., 2019. Modeling of Inter-organizational Coordination Dynamics in Resilience Planning of Infrastructure Systems: A Multilayer Network Simulation Framework. *Plos ONE*. doi.org/10.1371/journal.pone.0224522

J20. *Li, Q., **Dong, S.** and Mostafavi, A., 2019. A Meta-Network Framework for Analysis of Actor-Plan-Task-Infrastructure Networks in Resilience Planning and Management. *ASCE Natural Hazards Review 21 (2)*. doi.org/10.1061/(ASCE)NH.1527-6996.0000376

J21. Mostafizi, A., Wang, H. and **Dong, S.**, 2019. Understanding the Multimodal Evacuation Behavior for a Near-Field Tsunami. *Transportation Research Record*, p.1-13. doi.org/10.1177/0361198119837511

J22. Mostafizi, A., Wang, H., Cox, D. and **Dong, S.**, 2019. An agent-based vertical evacuation model for a near-field tsunami: Choice behavior, logical shelter locations, and life safety. *International journal of disaster risk reduction*, 34, pp.467-479. doi.org/10.1016/j.ijdrr.2018.12.018

J23. **Dong, S.**, Mostafizi, A., Wang, H. and Li, J., 2018. A stochastic analysis of highway capacity: Empirical evidence and implications. *Journal of Intelligent Transportation Systems*, 22(4), pp.338-352. doi.org/10.1080/15472450.2017.1396898

J24. Mostafizi, A., **Dong, S.** and Wang, H., 2017. Percolation phenomenon in connected vehicle network through a multi-agent approach: Mobility benefits and market penetration. *Transportation Research Part C: Emerging Technologies*, 85, pp.312-333. doi.org/10.1016/j.trc.2017.09.013

J25. Anderson, J.C. and **Dong, S.**, 2017. Heavy-vehicle driver injury severity analysis by time of week: a mixed logit approach using HSIS crash data. *Institute of Transportation Engineers. ITE Journal*, 87(9), p.41. HSIS Highway Safety Data Best paper award

J26. Mostafizi, A., Wang, H., Cox, D., Cramer, L.A. and **Dong, S.**, 2017. Agent-based tsunami evacuation modeling of unplanned network disruptions for evidence-driven resource allocation and retrofitting strategies. *Natural Hazards*, 88(3), pp.1347-1372. doi.org/10.1007/s11069-017-2927-y

J27. Wang, H., Liu, L., **Dong, S.**, Qian, Z. and Wei, H., 2016. A novel work zone short-term vehicle-type specific traffic speed prediction model through the hybrid EMD-ARIMA framework. Transportmetrica B: Transport Dynamics, 4(3), pp.159-186. doi.org/10.1080/21680566.2015.1060582

J28. **Dong, S.**, Wang, H., Hurwitz, D., Zhang, G. and Shi, J., 2015. Nonparametric modeling of vehicle-type-specific headway distribution in freeway work zones. Journal of Transportation Engineering, 141(11), p.05015004. doi.org/10.1061/(ASCE)TE.1943-5436.0000788

J29. Wang, H., Liu, L., Qian, Z., Wei, H. and **Dong, S.**, 2014. Empirical Mode DecompositionâAutoregressive Integrated Moving Average: Hybrid Short-Term Traffic Speed Prediction Model. Transportation Research Record, 2460(1), pp.66-76. doi.org/10.3141/2460-08

J30. Chen, L., Li, B., **Dong, S.** and Pan, H., 2013. A combined CFAHP-FTOPSIS approach for portfolio selection. China Finance Review International, 3(4), pp.381-395. ISSN: 2044-1398

Referred Conference Proceedings

* *represents research conducted under my supervision*

C1. *Li, Q., **Dong, S.** and Mostafavi, A., 2019. Community Detection in Actor Collaboration Networks of Resilience Planning and Management in Interdependent Infrastructure Systems. *ASCE Construction Research Congress 2020*. Tempe, AZ. doi.org/10.1061/9780784482858.073

C2. *Farahmand, H., **Dong, S.** and Mostafavi, A., 2019. Vulnerability Assessment in Co-Located Flood Control and Transportation Networks. *ASCE Construction Research Congress 2020*. Tempe, AZ. doi.org/10.1061/9780784482858.081

C3. *Esmalian, A., **Dong, S.** and Mostafavi, A., 2019. Empirical Assessment of Household Susceptibility to Hazards-Induced Prolonged Power Outages *ASCE Construction Research Congress 2020*. Tempe, AZ. doi.org/10.1061/9780784482858.100

C4. *Li, Q., **Dong, S.** and Mostafavi, A., 2019. Modeling of Inter-Organizational Coordination Dynamics in Resilience Planning: A Multilayer Network Simulation Framework. *In Computing in Civil Engineering 2019: Smart Cities, Sustainability, and Resilience* (pp. 515-522). Reston, VA: American Society of Civil Engineers. doi.org/10.1061/9780784482445.066

C5. **Dong, S.**, Mostafizi, A., Wang, H. and Bosa, P., 2016. Post-disaster Mobility in Disrupted Transportation Network: Case Study of Portland, Oregon. In Seventh China-Japan-US Trilateral Symposium on Lifeline Earthquake Engineering, Shanghai, China, ASCE. doi.org/10.1061/9780784480342.068

C6. **Dong, S.**, Wang, H. and Li, J., 2015. Short-Term Forecasting of Highway Capacity through Wavelet Transform and Dynamic Neural Time Series: A Stochastic Analysis (No. 15-5048). *Transportation Research Board 94rd Annual Meeting*, Washington, DC.

C7. Wang, H., Li, J., Yu, Y. and **Dong, S.**, 2014. Modeling and Analysis of Bottleneck Breakdown on Freeways with Multiple On-Ramps: a Copula Approach (No. 14-0987). *Transportation Research Board 93rd Annual Meeting*, Washington, DC.

C8. **Dong, S.**, Wang, H., Hurwitz, D. and Heaslip, K., 2014. Vehicle-type Specific Headway Distribution in Freeway Work Zone: A Nonparametric Approach (No. 14-4355). *Transportation Research Board 93rd Annual Meeting*, Washington, DC.

Technical Project Reports

R1. **Dong, S.**, Farahmand, H., and Mostafavi, A.. 2019. Flood Control System - Before and After Harvey. *ASCE IRD - Post-Harvey Resilience Investigation Report*

R2. Farahmand, H., Sherer, B., **Dong, S.**, and Mostafavi, A.. 2019. Residents and Infrastructure during Disaster Recovery: Priorities, and Attitude Implications for Resilient Planning and Management. *ASCE IRD - Post-Harvey Resilience Investigation Report*

R3. **Dong, S.**, Mostafizi, A. and Wang, H. 2017. Understanding Interdependencies Between Systems Towards Resilient Critical Lifeline Infrastructure in the Pacific Northwest. *Pacific Northwest Transportation Consortium.*

R4. McMullen, S. Wang, H., Ke, Y., Vogt, R. and **Dong, S.**, 2016. Road Usage Charge Economic Analysis. *No. FHWA-OR-RD-16-13.*

Conference Presentation

P1. An Integrative Framework to Measure the Impacts of Earthquake-induced Landslides on Transportation Network Mobility and Accessibility, *ASCE Lifelines Conference 2021-22*, (Virtual) Los Angeles, CA., 2022

P2. Assessment and Modeling of Water Infrastructure Resilience, *ASCE Infrastructure Resilience Division (IRD) Research Forum: Enabling Resilient and Sustainable Communities*, Reston, VA., 2019

P3. Assessing and Modeling of the Societal Impacts of Infrastructure Disruptions in Disasters, *ASCE Infrastructure Resilience Division (IRD) Research Forum: Enabling Resilient and Sustainable Communities*, Reston, VA., 2019

P4. Understanding Interdependencies between Systems towards Resilient Critical Lifeline Infrastructures, 2016. *Engineering Mechanics Institute and Probabilistic Mechanics & Reliability Conference (EMI & PMC)*. Nashville, TN.

P5. Post-Earthquake Mobility: Portland, *PacTrans Regional Transportation Conference Presentation Competition*. Seattle, WA. (2nd Place), 2015

P6. Stochastic Modeling of Lifeline Infrastructure Interdependency: A Copula Approach, *2nd Annual Oregon State University College of Engineering Graduate Student Research Exposition*. Portland, OR., (1st Place), 2015

P7. Short-term Forecasting of Highway Capacity through Wavelet Transform and Dynamic Neural Time Series: A Stochastic Analysis, *Transportation Research Board 94rd Annual Meeting*. Washington D.C., 2015

P8. A Time-Series Analysis of Highway Capacity: Case Study of Georgia 400, *Traffic Flow Theory and Characteristic Committee Summer Symposium*. Portland, OR., 2014

P9. Modeling and Analysis of Bottleneck Breakdown on Freeway with Multiple On-Ramps: a Copula Approach, *Transportation Research Board 93rd Annual Meeting*. Washington D.C., 2014

P10. Vehicle-Type Specific Headway Distribution in Freeway Work Zones: A Nonparametric Approach, *Transportation Research Board 93rd Annual Meeting*. Washington D.C., 2014

Invited Talks

T1. Risk and Resilience Modeling in the Human-Disaster-Built Environment Nexus, *University of Delaware, Department of Civil and Environmental Engineering, Disaster Research Center*, Newark DE. November 2019

T2. Anatomy of Coupled Human-Infrastructure Systems Resilience to Urban Flooding: Integrated Assessment of Social, Institutional, and Physical Networks, *Urban Flooding Open Knowledge Network (UFOKN)*, Raleigh, NC. November 2019

T3. An Integrated Physical-Social Analysis on Disrupted Access to Critical Facilities in Urban Flooding, *Oregon State University, School of Civil and Construction Engineering*, Corvallis OR. June 2019

T4. Disrupted Access to Critical Facilities and Its Societal Impacts in Urban Flooding, *ASCE Infrastructure Resilience Division (IRD) 2019 Research Forum: Enabling Resilient and Sustainable Communities*, Reston, VA. May 2019

T5. Towards a Smart and Resilient City of Connected Autonomous Vehicle and Interdependent Infrastructure Networks, *University of Hawaii at Manoa, Department of Civil and Environmental Engineering*, Honolulu HI. April 2019

T6. Towards a Resilient and Sustainable Urban System: Percolation Modeling of Interdependent Infrastructure Networks, *Ohio State University, Department of Civil, Environmental, and Geodetic Engineering*, Columbus, OH. February 2019

T7. Complex Infrastructure Network Modeling and Simulation, *Texas A&M University, Zachry Department of Civil and Environmental Engineering, CVEN 641*, College Station, TX. March 2019

T8. Post-disaster Mobility in Disrupted Transportation Network: Case Study of Portland, Oregon. *Portland Metro*. Portland OR. June 2016

T9. Network-Wide Impacts Of Connected Vehicles On Mobility: An Agent-Based Modeling Approach, *U.S. DOT T3e Webinar*, Online. August 2016

Selected Research Projects

UDRF #21A00986 Integrated Household Vulnerability and Flood Risk Analysis for Equitable Transportation Access to Emergency Medical Services

Principle Investigator *2021.6 – Present*

NSF #1832662 CRISP 2.0 Type 2: Anatomy of Coupled Human-Infrastructure Systems Resilience to Urban Flooding: Integrated Assessment of Social, Institutional, & Physical Networks

Leading Postdoctoral Researcher *2018.9 – 2020.8*

NSF #1760258 RAPID: Assessment of Risks and Vulnerability in Coupled Human-Physical Networks of Houston's Flood Protection, Emergency Response, and Transportation Infrastructure in Harvey

Leading Postdoctoral Researcher *2018.9 – 2020.8*

NSF #1846069 CAREER: Household Network Modeling and Empathic Learning for Integrating Social Equality into Infrastructure Resilience Assessment

Leading Postdoctoral Researcher *2019.2 – 2020.8*

NSF #1563618 An Integrated Social Science and Agent-based Modeling Approach to Improve Life Safety from Near-field Tsunami Hazards

Resilience Modeler *2016.6 - 2018.9*

TEACHING

Instructor

Fall 2020, 2021, CIEG641 Risk Analysis, University of Delaware
Spring 2022, CIEG351 Transportation Engineering, University of Delaware
Spring 2022, CIEG451 Transportation Engineering Laboratory, University of Delaware

Guest Lecturer

Spring 2019, CVEN 641 Construction Engineering Systems, Texas A&M University

Teaching Assistant

Spring 2014, CE491 Transportation Engineering, Oregon State University
Winter 2014, CE392 Introduction to Highway Engineering, Oregon State University
Fall 2013, ENGR 211 Statics, Oregon State University

ADVISING & MENTORING

Committee Chair

- Utkarsh Gangwal, Ph.D. student (UD) *2021.09 – Present*
  Research: Resilient and Equitable Design of Human-Infrastructure Network

Committee Member

- Michael Palese, Ph.D. student (UD) *2021.05 – Present*
  Research: Artificial Intelligence for Advanced Landslide Warning along Railroad Tracks
- Maryam Shaygan, Ph.D. Candidate (UD) *2020.10 – Present*
  Research: Equilibrium Analysis in Mixed Traffic Environments
- Wanxin Li, Ph.D. Candidate (UD) *2020.10 – Present*
  Research: Frontiers in Blockchain for Secure Information Sharing in Connected Vehicle Environments
- Di Yuan, Ph.D. Student (UD) *2020.10 – Present*
  Research: Connected Autonomous Vehicles (CAVs)

Research Adviser

- Hamed Farahmand, Ph.D. Candidate (TAMU) *2018.9 – 2020.8*
  Research: Resilience assessment of coupled flood control and

roadway network

- Qingchun Li, Ph.D. Candidate (TAMU) *2018.9 – 2020.8*
  Research: Network analysis of human system governing interdependent infrastructures
- Amir Esmalian, Ph.D. Candidate (TAMU) *2018.9 – 2020.8*
  Research: Social impact of infrastructure service disruption
- Xinyu Gao, Ph.D. Student (TAMU) *2019.8 – 2020.8*
  Research: Disaster impacted network mobility behavior
- Tianbo Yu, M.S. Student (TAMU) *2019.2 – 2020.8*
  Research: Probabilistic graph modeling of flood control network
- Conner Lutz, Undergraduate Student (TAMU) *2019.5 – 2019.9*
  Research: Infrastructure network and critical facility mapping

Honors & Awards

- 1st Place, Highway Safety Information System Research Paper Competition 2017
- 1st Place, OSU College of Engineering Graduate Student Research Exposition 2015
- 2nd Place, PacTrans Student Conference Student Research Poster Competition 2015
- Richard and Lilo Smith Fellowship Award Recipient 2015

Professional Services

University of Delaware

- Undergraduate Showcase Recruitment Committee, Department of Civil and Environmental Engineering (CEE), 2020.8 - Present
- Graduate Policy Committee, Department of Civil and Environmental Engineering (CEE), 2021.9 - Present
- Qualifier Committee, DISA program, Disaster Research Center (DRC), 2020.10 - Present
- Space Committee, Disaster Research Center (DRC), 2021.9 - Present
- Grand Challenge Scholars Program Mentor (GCSP), College of Engineering, 2021.9 - Present
- George W. Laird Fellowship Interview, Department of Civil and Environmental Engineering (CEE), 2021, 2022

Grant Proposal Review

- National Science Foundation (NSF) Reviewer and Panelist, 2020
- Transportation Consortium of South-Central States (Tran-SET) Reviewer, 2020

Conference Committee

- Area Editor, COTA International Symposium on Emerging Trends in Transportation (ISETT), 2019

Journal Reviewer

- Journal of the Royal Society Interface
- Transportation Research Part C: Emerging Technologies
- Transportation Research Part D: Transport and Environment
- Sustainable Cities and Society
- Current Opinion in Environmental Sustainability
- Sustainable and Resilient Infrastructure
- Natural Hazards Review
- Sustainability
- Journal of Transportation Engineering
- Journal of Modern Transportation

- Journal of Traffic and Transportation Engineering
- Journal of Management in Engineering
- Journal of Infrastructure Systems
- Transportation Research Record
- Scientific Reports
- Advances in Mechanical Engineering
- International Journal of Environmental Research and Public Health
- International Journal of Disaster Risk Reduction
- IEEE Transactions on Vehicular Technology
- IEEE Transactions on Intelligent Transportation Systems
- Journal of Ambient Intelligence & Humanized Computing
- Frontiers Built Environment
- Plos ONE
- Journal of Emergency Management

Conference Reviewer

- Complex Network (2018)
- Transportation Research Board (TRB) Annual Meeting (2014, 2015, 2016, 2017, 2018)
- Chinese Overseas Transportation Association (COTA) CICTP (2015, 2016, 2017)
- ASCE Construction Research Congress (CRC) (2020)
- International Symposium on Emerging Trends in Transportation (ISETT) (2019)