

SHANGJIA DONG

PERSONAL INFORMATION

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Disaster Research Center
University of Delaware
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PROFESSIONAL EXPERIENCE

University of Delaware

Assistant professor in *Civil and Environmental Engineering*
Core Faculty in *Disaster Research Center (DRC)*
Faculty Member in *Sociotechnical Systems Center (SSC)*

Newark, Delaware
2020.8 – Present

Texas A&M University

Postdoctoral Research Associate, PI: Ali Mostafavi

College Station, Texas
2018.9 – 2020.7

Oregon State University

Graduate Research Assistant PI: Haizhong Wang

Corvallis, Oregon
20013.10 – 2018.9

EDUCATION

Oregon State University

Ph.D. in Civil Engineering (Transportation)
Minor in Computer Sciences

Corvallis, Oregon
2015.11 – 2018.9

- 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

B.S. in Information and Computational Science
Dual B.S. in Finance

Chengdu, Sichuan
2009.9 – 2013.6

PREPRINT

* *represents research conducted under my supervision*

- J1. *Farahmand, H., Liu, X., **Dong, S.**, Mostafavi, A., and Gao, J., 2020. Network Observability Framework for Optimal Sensor Placement in Flood Control Networks to Improve Risk Management. *Journal of the Royal Society Interface*. (Under review)
- J2. *Esmalian, A., Coleman, N., **Dong, S.** and Mostafavi, A., 2020. Empirical Survival Models for Determining Household-level Disturbances from Hazards-induced Infrastructure Service Disruptions. *Sustainable Cities and Societies*. (Under review)
- J3. **Dong, S.**, Malecha, M., Farahmand, H., Mostafavi, A., Berke, P. and Woodruff, S., 2020. Integrated Infrastructure-Plan Analysis of Resilience Enhancement on Post-hazards Access to Critical Facilities. *Cities: The International Journal of Urban Policy and Planning* (Under Review)
- J4. *Esmalian, A., Coleman, N., **Dong, S.** and Mostafavi, A., 2020. Determinants of Risk Disparity Due to Infrastructure Service Losses in Disasters: a Household Service Gap Model. *Risk Analysis*. (Under 2nd round review)

- J5. *Farahmand, H., **Dong, S.**, and Mostafavi, A., 2020. Network Analysis and Characterization of Vulnerability in Flood Control Infrastructure for System-level Risk Reduction. *Computers, Environment and Urban Systems* (Under review)
- J6. *Gao, X., **Dong, S.**, Mostafavi, A., and Gao, J., 2020. Macroscopic and Microscopic Characteristics of Networks with Time-variant Functionality for Evaluating Resilience to External Perturbations. *Nature Scientific Report* (Under review)

* represents research conducted under my supervision

- J1. **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
- J2. **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
- J3. **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](https://doi.org/10.1061/(ASCE)ME.1943-5479.0000839)
- J4. **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](https://doi.org/10.1061/(ASCE)IS.1943-555X.0000533)
- J5. **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
- J6. **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
- J7. **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
- J8. **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
- J9. *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
- J10. *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
- J11. *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*. (In press)
- J12. 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

- J13. 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.ijdr.2018.12.018
- J14. **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
- J15. 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
- J16. 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](https://doi.org/10.1080/08958412.2017.1396898)
- J17. 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
- J18. 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
- J19. **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](https://doi.org/10.1061/(ASCE)TE.1943-5436.0000788)
- J20. Wang, H., Liu, L., Qian, Z., Wei, H. and **Dong, S.**, 2014. Empirical Mode Decomposition-Autoregressive Integrated Moving Average: Hybrid Short-Term Traffic Speed Prediction Model. *Transportation Research Record*, 2460(1), pp.66-76. doi.org/10.3141/2460-08
- J21. 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. Network Analysis of Collective Action in Resilience Planning of Interdependent Infrastructure. *ASCE Construction Research Congress 2020*. Tempe, AZ. (Accepted)
- 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. (Accepted)
- 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. (Accepted)
- 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. Assessment and Modeling of Water Infrastructure Resilience, *ASCE Infrastructure Resilience Division (IRD) Research Forum: Enabling Resilient and Sustainable Communities*, Reston, VA., 2019
- P2. 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
- P3. Understanding Interdependencies between Systems towards Resilient Critical Lifeline Infrastructures, 2016. *Engineering Mechanics Institute and Probabilistic Mechanics & Reliability Conference (EMI & PMC)*. Nashville, TN.
- P4. Post-Earthquake Mobility: Portland, *PacTrans Regional Transportation Conference Presentation Competition*. Seattle, WA. (2nd Place), 2015
- P5. 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
- P6. 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
- P7. A Time-Series Analysis of Highway Capacity: Case Study of Georgia 400, *Traffic Flow Theory and Characteristic Committee Summer Symposium*. Portland, OR., 2014
- P8. 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
- P9. 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

[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

[Cascadia Lifelines Program \(CLiP\)](#) Lifeline Network Resiliency And Recovery For Emergency Response

Model developer

2014.9 - 2018.9

[PacTrans](#) Understanding Interdependence Between Systems Towards Resilient Critical Lifeline Infrastructure in the Pacific Northwest

Leading Researcher

2015.12 - 2016.12

Characterizing the System Impact of Connected/Autonomous Vehicle in Transition Phase
Leading Researcher 2016.6 - 2018.9

TEACHING

Instructor

Fall 2020, CIEG641 Risk Analysis, 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

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

Grant Proposal Review

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

Conference Committee

- Co-chair, The 20th COTA International Conference of Transportation, Professionals on Advanced Transportation, Enhanced Connection ([CICTP](#)), 2020
- Area Editor, COTA International Symposium on Emerging Trends in Transportation ([ISETT](#)), 2019

Journal and Conference Reviewer

- Journal of the Royal Society Interface ([JRSIF](#))
- Journal of Transportation Engineering ([JTE](#))
- Journal of Modern Transportation ([JMTR](#))
- Journal of Traffic and Transportation Engineering ([JTTE](#))
- Journal of Management in Engineering ([JME](#))
- Journal of Infrastructure Systems ([JIS](#))
- Advances in Mechanical Engineering ([AIME](#))
- International Journal of Environmental Research and Public Health ([IJERPH](#))
- International Journal of Disaster Risk Reduction ([IJDRR](#))
- IEEE Transactions on Vehicular Technology ([IEEE TVT](#))
- IEEE Transactions on Intelligent Transportation Systems ([IEEE ITS](#))
- Journal of Ambient Intelligence & Humanized Computing ([AIHC](#))
- Frontiers Built Environment ([FBE](#))
- Plos ONE ([PLOS ONE](#))
- 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)