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# DONGQIN ZHOU

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## EDUCATION

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<b>The Pennsylvania State University</b> , University Park, PA, USA Ph.D., Civil Engineering Advisor: Vikash V. Gayah Minor: Operations Research	Aug 2019 - May 2024
<b>Southeast University</b> , Nanjing, Jiangsu, China B.Eng., Traffic Engineering Mao Yisheng Elite Class	Aug 2015 - Jun 2019
<b>University of Waterloo</b> , Waterloo, ON, Canada Exchange student, Civil and Environmental Engineering	Sept 2018 - Dec 2018

## WORK EXPERIENCE

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<b>Northeastern University</b> , Portland, ME, USA <ul style="list-style-type: none"><li>• Postdoctoral Research Fellow, Institute for Experiential AI</li><li>• Advisor: Auroop R. Ganguly</li></ul>	May 2024 - present
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## RESEARCH PROFILE

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### **Reinforcement learning-enabled traffic control to improve operational efficiency**

- Small- and large-scale perimeter control via model-free RL
- Joint perimeter and signal control via independent RL
- Disruption-resilient and transferable traffic control via Offline/Meta-RL

### **Assessment and enhancement of surface transportation resilience**

- Healthcare facility accessibility loss under multi-driver flooding
- Multi-modal transit system functionality loss under natural and manmade hazards

### **Critical infrastructure and soft target security**

- Rail systems threat analysis via graph convolutional networks: cited by **congressional testimony**
- Autonomous counter drone capability via multi-agent RL

### **Proposal development and project management**

- Diverse proposal experiences: NSF (CLIMA, CAIG, TTP), DHS (SENTRY, FEMA, CAO), DOD (SERDP, ESTCP, STTR)
- DOD SERDP NICE: Lead final report, final poster, Critical Findings, IPR debriefing memo, etc.
- DHS SENTRY: Lead methodology development, journal publication, technology showcase, etc.

### Journal Publications

1. Mukherjee, O., **Zhou, D.**, Pal, A., Watson, J., Gonzalez, M., Chatterjee, S., and Ganguly, A. (2025) Resilience of urban metro rail networks globally guided by mesoscale and connectivity attribute. Accepted in npj Sustainable Mobility and Transport
2. **Zhou, D.**, & Gayah, V.V. (2024) A Dictionary-Based Bayesian Approach to Optimizing Left-Turn Restriction Locations in Grid Networks. *International Journal of Transportation Science and Technology*, <https://doi.org/10.1016/J.IJTST.2024.10.008>
3. **Zhou, D.**, & Gayah, V.V. (2024) Evaluating the Effectiveness and Transferability of a Data-Driven Two-Region Perimeter Control Method Using Microsimulation. *Transportation Research Record: Journal of the Transportation Research Board*, <https://doi.org/10.1177/03611981241230313>
4. **Zhou, D.**, Gayah, V.V. (2023) Scalable multi-region perimeter metering control for urban networks: A multi-agent deep reinforcement learning approach. *Transportation Research Part C: Emerging Technologies*. 148, 104033. <https://doi.org/10.1016/J.TRC.2023.104033>
5. **Zhou, D.** and Gayah, V.V. (2023) Improving deep reinforcement learning-based perimeter metering control methods with domain control knowledge. *Transportation Research Record: Journal of the Transportation Research Board*, Vol. 2677, No. 7. <https://doi.org/10.1177/03611981231152466>
6. **Zhou, D.**, Gayah, V.V. and Wood, J.S. (2022) Integration of machine learning and statistical models for crash frequency modeling. *Transportation Letters*, 1-12.
7. **Zhou, D.** and Gayah, V. V. (2021) Model-free perimeter metering control for two-region urban networks using deep reinforcement learning. *Transportation Research Part C: Emerging Technologies*, 124, 102949.

### Journal Paper(s) in Review

1. Mansoor, D., Dave, R., **Zhou, D.**, Ganguly, A. (2026) Interconnectedness enhances robustness under mode-specific disruptions that diminishes during concurrent failures in multimodal transit systems. Under review
2. Dave, R., Mansoor, D., **Zhou, D.**, Bhatia, U., Ganguly, A. (2026) Dynamic critical facilities accessibility losses under flooding expose structural resilience and fragility in urban road networks. Under review
3. **Zhou, D.**, Gayah, V.V. (2026) Multi-scale perimeter and signal control with reinforcement learning. Under review, second revision
4. **Zhou, D.**, Chatterjee, S., Mukherjee, O., Dey, S., and Ganguly, A. (2026) Network-level rail system threat analysis and deterrence. Under review, first revision

### Refereed Conference Proceedings

1. **Zhou, D.**, Gayah, V.V. (2025) Multi-Scale Model-Free Perimeter Control and Local Signal Control in Urban Networks. *104th Annual Meeting of the Transportation Research Board*, January, Washington, D.C. [abstract available in conference proceedings]
2. **Zhou, D.**, Gayah, V.V. (2024) Evaluating the Effectiveness and Transferability of a Data-Driven Two-Region Perimeter Control Method Using Microsimulation. *103rd Annual Meeting of the Transportation Research Board*, January, Washington, D.C. [abstract available in conference proceedings]

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3. **Zhou, D.**, Gayah, V.V. (2023) A scalable model-free deep reinforcement learning-based perimeter metering control method for multi-region urban networks. *102nd Annual Meeting of the Transportation Research Board*, January, Washington, D.C. [abstract available in conference proceedings]
  4. Lyu, L., **Zhou, D.**, Liu, H., Gayah, V.V., Guler, S.I. (2023) Adaptive Action Selection Strategy Of Reinforcement Learning Approach For Intelligent Traffic Light Control. *102nd Annual Meeting of the Transportation Research Board*, January, Washington, D.C. [abstract available in conference proceedings]
  5. **Zhou, D.**, Gayah, V.V. (2022) Integration of human guidance into a reinforcement learning-based perimeter metering control method for urban traffic networks. *101st Annual Meeting of the Transportation Research Board*, January, Washington, D.C. [abstract available in conference proceedings]
  6. **Zhou, D.**, Gayah, V.V. (2021) Model free perimeter metering control for urban networks using deep reinforcement learning. *100th Annual Meeting of the Transportation Research Board*, January, Washington, D.C. [abstract available in conference proceedings]
  7. **Zhou, D.**, Cheng, Q., An, Q., Lu, B. and Liu, Z. (2018) Link criticality analysis based on reliable shortest path in a network with correlated link travel times. *18th COTA International Conference of Transportation Professionals*, 5-8 July, Beijing, China. [abstract available in conference proceedings]
  8. Li, Z., Lam, W.H.K., Wepulanon, P. and **Zhou, D.** (2017) Estimating pedestrian walking time on campus based on Wi-Fi detection data. *Transport and Society - Proceeding of the 22nd International Conference of Hong Kong Society for Transportation Studies, HKSTS 2017 (pp. 233-240)*, 9-12 December, Hong Kong, China. [abstract available in conference proceedings]

### Conference Abstracts

1. Mansoor, D., **Zhou, D.**, Dave, R., Ganguly, A. (2025) Floods, Failures, and Flexibility: Resilience of Boston's Multimodal Transit Network to Climate-Driven Disruptions. Abstract accepted for presentation at the AGU Annual Meeting, New Orleans, LA
2. Dave, R., **Zhou, D.**, Mansoor, D., Bhatia, U., Ganguly, A. (2025) Compound Flooding Escalates Unequal Access to Critical Facilities in Urban Areas. Abstract accepted for presentation at the AGU Annual Meeting, New Orleans, LA

## PROPOSAL DEVELOPMENT & PROJECT ENGAGEMENT

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### FEMA FIFA World Cup Grant Program: Protecting large sporting events

- Role: Technical lead; Principal author
- Team: Northeastern University (via SENTRY), PNNL
- Identify key project idea, tasks and operational deliverables, formulate performance timeline and research agenda, methodology lead

### DHS funding opportunity: Counter drone systems

- Role: Technical lead; Principal author for initial white paper
- Team: Northeastern University (via SENTRY), PNNL, MatrixSpace (NU's industry partner)
- Identify project scope, review research and operational state-of-the-art, formulate and propose research ideas, lead methodology description & advancement, plan project schedule and deliverables

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## **NSF CiviL Infrastructure research for climate change Mitigation and Adaptation**

- Role: Technical Project Co-Lead (Project lead: Ganguly A.)
- Team: Northeastern University (Lead), UC Berkeley, SUNY at Buffalo, Missouri S&T
- Lead technical writing: Project Summary, Introduction, Broader Impacts, and a core research thrust
- Prepare administrative materials: project management plan, mentoring plan, data management plan, references
- Coordination of multi-institution interdisciplinary team efforts: Participate in discussion meetings and organize minutes, frame outline and assign writing tasks, integrate and polish individual writeups, ensure scientific soundness and proposal cohesion

## **DOD Strategic Environmental Research and Development Program (SERDP): Networked Infrastructure under Compound Extremes (NICE)**

- Lead preparation of final project report, project-ending poster & Critical Findings Fact Sheet
- Lead preparation of IPR debriefing memo to program manager
- Lead/Contribute to Quarterly Progress Report (QPR) and In-Progress Review (IPR)
- Present team research at DOD SERDP-ESTCP symposiums (2024 & 2026)

## **DHS Center of Excellence: Soft Target Engineering to Neutralize the Threat Reality (SENTRY)**

- Prepare research presentations to facilitate stakeholder connections (TSA, Transit Police)
- Lead the development of technology showcase at year-end Annual Meeting
- Collaborate with cross-project partners on joint technology showcase
- Engage with collaborators and stakeholders at ADSA workshop
- Project impact: work featured in **U.S. congressional testimony**

## **Misc. proposal contributions**

- DOD Strategic Environmental Research and Development Program (SERDP) FY27: Facilitated initial discussions and prepared logistical documents.
- DOD Environmental Security Technology Certification Program (ESTCP) FY25: Prepared initial draft (project summary)
- DOD Small Business Technology Transfer (STTR): Identify domain-specific related datasets, enhance technical soundness, and expand future research areas (with Data Squared USA Inc.)
- DHS Center for Accelerating Operational Efficiency: Enhance reinforcement learning methodology soundness and extensive literature review (with PNNL)
- NSF Collaborations in Artificial Intelligence and Geosciences (CAIG): Enhance AI methodology relevance, identify relevant data/methods, full review and proofreading (with NASA JPL)

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## PRESENTATIONS

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### Research presentations

1. **Zhou, D.** (2025) Multi-scale model-free perimeter control and local signal control in urban networks. *104th Annual Meeting of the Transportation Research Board*, January, Washington, D.C. (Poster presentation)
2. **Zhou, D.** (2024) Multi-scale model-free perimeter control and local signal control in urban networks. Conference in Emerging Technologies in Transportation Systems (TRC-30). 2-4 September, Heraklion, Greece (Oral presentation)
3. **Zhou, D.** (2024) Evaluating the effectiveness and transferability of a data-driven two-region perimeter control method using microsimulation. *103rd Annual Meeting of the Transportation Research Board*, 10 January, Washington, D.C. (Oral presentation)
4. **Zhou, D.** (2023) A scalable model-free deep reinforcement learning-based perimeter metering control method for multi-region urban networks. *102nd Annual Meeting of the Transportation Research Board*, January, Washington, D.C. (Poster presentation)
5. **Zhou, D.** (2022) A scalable model-free deep reinforcement learning-based perimeter metering control method for multi-region urban networks. *2022 Transportation Engineering and Safety Conference*, 7-9 December, University Park, Pennsylvania. (Poster presentation)
6. **Zhou, D.** (2022) Integration of human guidance into a reinforcement learning-based perimeter metering control method for urban traffic networks. *101st Annual Meeting of the Transportation Research Board*, January, Washington, D.C. (Poster presentation)
7. **Zhou, D.** (2021) Model free perimeter metering control for urban networks using deep reinforcement learning. *100th Annual Meeting of the Transportation Research Board*, January, Washington, D.C. (Poster presentation)
8. **Zhou, D.** (2020) Deep reinforcement learning applied to perimeter metering control: An overview. *2020 Transportation Engineering and Safety Conference*, 9-11 December, University Park, Pennsylvania. (Poster presentation)
9. **Zhou, D.** (2019) Travel time prediction using large-scale taxi trip records data. *2019 Transportation Engineering and Safety Conference*, 11-13 December, University Park, Pennsylvania. (Poster presentation)

### Invited talks

1. **Zhou, D.**, (2026) Towards more REsilient, Secure, and Intelligent Surface Transportation (RESIST). *Marquette University*, 9 February, Milwaukee, WI.
2. **Zhou, D.**, (2026) Towards more REsilient, Secure, and Intelligent Surface Transportation (RESIST). *ASCE Technical Committee on Future Weather and Climate Extremes*, 25 February, Online.
3. **Zhou, D.** (2025) Reinforcement learning for road network efficiency and under disruptions. IITB-NEU Joint SCPP Workshop on Resilience of Critical Infrastructure Networks. 27 June, IIT Bombay, India (Keynote, online delivery)
4. **Zhou, D.**, (2025) Towards more REsilient, Secure, and Intelligent Surface Transportation (RESIST). *University of Maine*, 22 May, Orono, ME.

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## AWARDS & HONORS

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- **C. Norwood Wherry Memorial Graduate Fellowship**, Penn State 2022 - 2023
- **Glenn E. Singley Memorial Graduate Fellowship**, Penn State 2022
- **Mark E. and Claire L. Alpert Graduate Fellowship**, Penn State 2021
- **Leo P. Russell Graduate Fellowship**, Penn State 2021
- **College of Engineering Scholarship**, Penn State 2019 - 2020
- **University Graduate Fellowship**, Penn State 2019 - 2020
- **Curriculum Scholarships**, Southeast University 2016 - 2019
- **Zeng Xianzi Education Foundation Scholarship**, Southeast University 2016 - 2019
- **Model Student of Academic Records**, Southeast University 2016 - 2019
- **CSC Scholarships, National Prize** 2018
- **Jiangsu Provincial Merit Student**, Southeast University 2018
- **Third Prize in 14th RoboCup Competition**, Southeast University 2017
- **Pacemaker to Merit Student, Highest Honor**, Southeast University 2017
- **Mao Yisheng Railway Education Student Scholarship**, Southeast University 2017
- **Third Prize in National English Competition for College Students** 2017
- **National Encouragement Scholarship, National Prize** 2017
- **Third Prize in Advanced Mathematics Competition**, Southeast University 2016
- **Third Prize in National English Competition for College Students** 2016
- **China National Scholarship, National Prize** 2016
- **Merit Student**, Southeast University 2016

## TEACHING EXPERIENCE

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### Teaching Assistant, The Pennsylvania State University

- Traffic Operations (Prof. V. Gayah) Fall 2022
  - Prepare lab materials (weekly handouts and presentations, and course project)
  - Lead weekly lab sessions (2-hour)
  - Hold regular office hours (2-hour)
  - Grade lab submittals and course project
  - Modify quiz, homework assignments solutions
  - Average student evaluation score: 6.6/7.0
- Transportation Operations (Prof. V. Gayah) Fall 2021
  - Hold office hours (in-person and online)
  - Advise general study plan
  - Help students structure understandings of the course materials

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## Guest lectures

1. **Zhou, D.**, (2024) Road traffic network simulation and perimeter metering control. *CIVE 7110 – Critical Infrastructure Resilience* (Prof. A. Ganguly, Northeastern University) Online delivery via MS Teams
2. **Zhou, D.**, (2023) Volume studies and characteristics. *CE 423 - Traffic Operations* (Prof. V. Gayah, Penn State), 11 Sept, University Park, PA.
3. **Zhou, D.**, (2022) Macroscopic traffic control with deep reinforcement learning and domain control knowledge. *OR 590 - Operations Research Colloquium* (Prof. J. Ventura, Penn State), 22 Feb, University Park, PA.

## REFEREE SERVICE

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- American Control Conference
- Communications Engineering (Nature Research)
- COTA International Conference of Transportation Professionals
- Hong Kong Society for Transportation Studies
- IEEE Intelligent Vehicles Symposium
- IEEE Intelligent Transportation Systems Conference
- IEEE Transactions on Intelligent Transportation Systems
- IEEE Transactions on Mobile Computing
- IEEE/CAA Journal of Automatica Sinica
- International Journal of Transportation Science and Technology
- PLOS One
- Scientific Reports (Nature Research)
- Transportation Research Board
- Transportation Research Part B: Methodological
- Transportation Research Part C: Emerging Technologies
- Transportation Research Record: Journal of the Transportation Research Board
- Transportmetrica B: Traffic Dynamics

## COMMITTEE MEMBERSHIPS

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ASCE Technical Committee on Future Weather & Climate Extremes

Feb 2026 - present