

# Xianyuan Zhan

CURRICULUM VITAE

Institute for AI Industry Research (AIR), Tsinghua University

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## Research Interests

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Offline Deep Reinforcement Learning, Offline Imitation Learning, Foundation Models for Decision-Making, Complex Industrial System Optimization, Embodied AI, Autonomous Driving, Urban Computing

## Education

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### Doctor of Philosophy

Jan. 2013 - Aug. 2017

PURDUE UNIVERSITY

Transportation Systems, Civil Engineering. Advisor: Dr. Satish V. Ukkusuri

### Master of Science

Jan. 2014 - Dec. 2016

PURDUE UNIVERSITY

Computer Science

### Master of Science in Engineering

Aug. 2011 - Dec. 2012

PURDUE UNIVERSITY

Transportation Systems, Civil Engineering

### Bachelor of Engineering

Aug. 2007 - Jul. 2011

TSINGHUA UNIVERSITY

Beijing, China

Civil Engineering

## Professional Experience

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### Research Assistant Professor

Jul. 2021 - Present

TSINGHUA UNIVERSITY

Beijing, China

Institute for AI Industry Research

### Dual-Appointed Young Researcher

Oct. 2022 - Present

SHANGHAI ARTIFICIAL INTELLIGENCE LABORATORY

Shanghai, China

### Data Scientist

Jan. 2018 - Jun. 2021

JD TECHNOLOGY

Beijing, China

JD Intelligent City Research

### Associate Researcher

Aug. 2017 - Jan. 2018

MICROSOFT RESEARCH ASIA

Beijing, China

Urban Computing Group

### Visiting Research Fellow

May. - Aug. 2015

MICROSOFT RESEARCH ASIA

Beijing, China

Mentor: Dr. Yu Zheng

### Research Assistant

Aug. 2011 - Aug. 2017

PURDUE UNIVERSITY

West Lafayette, US

Lyles School of Civil Engineering

## Honors & Awards

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2024	Outstanding Paper Awards at ICML 2024 Workshop on Multi-modal Foundation Model meets Embodied AI (MFM-EAI) ( <b>two papers</b> )	ICML 2024 MFM-EAI Workshop
2023	2nd Prize of Science and Technology Progress Award of Chinese Association of Automation (CCA)	CCA
2022	2022 Global Top Chinese Young Scholars in Artificial Intelligence (AI+X)	Baidu
2022	3rd Prize of Wu Wen Jun AI Science & Technology Award	CAAI
2021	Committee Member of Intelligent Vehicles of China Computer Federation (CCF)	CCF
2020	2019 Synced Machine Intelligence Awards: 30 Best AI Use Cases of the Year	SYNCED
2018	Artificial Intelligence Innovation Award	CAIS 2018
2018	Committee Member of Technical Committee on Artificial Intelligence & Pattern Recognition of China Computer Federation (CCF-AI)	CCF
2016	James S. McDonnell Foundation (JSMF) Postdoctoral Fellowship Award in Studying Complex Systems	James S. McDonnell Foundation
2014	Pai Tao Yeh Fellowship	Purdue University
2013	Pai Tao Yeh Fellowship	Purdue University
2010	2nd Prize of Fifth National Competition of Transport Science and Technology	China
2010	Gammon Scholarship	Tsinghua University
2009	Zheng Ge Ru Scholarship	Tsinghua University
2008	Gammon Scholarship	Tsinghua University

## Publications

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### CONFERENCE PROCEEDINGS

1. Li, J, Wang, Z., Zheng, J., Zhou, X., Wang, G., Song, G., Liu, Y., Liu, J., Zhang, Y., **Zhan, X.** Robo-MUTUAL: Robotic Multimodal Task Specification via Unimodal Learning. In the *NeurIPS 2024 Workshop on Open-World Agents (OWA)*.
2. Wang, G, Niu, H., Li, J., Jiang, L., Hu, J., **Zhan, X.** Are Expressive Models Truly Necessary for Offline RL?. In the *NeurIPS 2024 Workshop on Open-World Agents (OWA)*.
3. Niu, H, Chen, Q., Liu, T., Li, J., Zhou, G., Zhang, Y., Hu, J., **Zhan, X.** xTED: Cross-Domain Adaptation via Diffusion-Based Trajectory Editing. In the *NeurIPS 2024 Workshop on Open-World Agents (OWA)*.
4. Mao, L., Xu, H., Zhang, W., **Zhan, X.**, Zhang, A. Diffusion-DICE: In-Sample Diffusion Guidance for Offline Reinforcement Learning. In the *Thirty-Eighth Annual Conference on Neural Information Processing Systems (NeurIPS 2024)*.
5. Zheng, J., Li, J., Cheng, S., Zheng, Y., Li, J., Liu, J., Liu, Y., Liu, J., **Zhan, X.** Instruction-Guided Visual Masking. In the *Thirty-Eighth Annual Conference on Neural Information Processing Systems (NeurIPS 2024)* (**Outstanding paper award of ICML 2024 MFM-EAI Workshop**).
6. Qin, H., **Zhan, X.**, Li, Y., Zheng, Y. FlexSSL : A Generic and Efficient Framework for Semi-Supervised Learning. In the *27th European Conference on Artificial Intelligence (ECAI-2024)*.
7. Yin, J., **Zhan, X.**, Ji, T., Xu, B., He, Y., Zhang, D., Li, L. Motion Planning Integrated with Vehicle-terrain Interactions for Off-road Autonomous Ground Vehicles. In the *27th IEEE International Conference on Intelligent Transportation Systems (ITSC 2024)*.
8. Geng, H., Sun, Y., Li, Y., Leng, J., Zhu, X., **Zhan, X.**, Li, Y., Zhao, F., Liu, Y. TESLA: Thermally Safe, Load-Aware, and Energy-Efficient Cooling Control System for Data Centers. In the *53rd International Conference on Parallel Processing (ICPP 2024)*.
9. Luo, Y., Sun, F., Ji, T., **Zhan, X.** Bidirectional-Reachable Hierarchical Reinforcement Learning with Mutually Responsive Policies. In the *1st Reinforcement Learning Conference (RLC 2024)*.
10. Li, J., Zheng, J., Zheng, Y., Mao, L., Hu, X., Cheng, S., Niu, H., Liu, J., Liu, Y., Liu, J., Zhang, Y. Q., **Zhan, X.** DecisionNCE: Embodied Multimodal Representations via Implicit Preference Learning. In the *41st International Conference on Machine Learning (ICML 2024)* (**Outstanding paper award of ICML 2024 MFM-EAI Workshop**).
11. Luo, Y., Ji, T., Sun, F., Zhang, J., Xu, H., **Zhan, X.** OMPO: A Unified Framework for Reinforcement Learning under Policy and Dynamics Shifts. In the *41st International Conference on Machine Learning (ICML 2024)* (**oral**).

12. Luo, Y., Ji, T., Sun, F., Zhang, J., Xu, H., **Zhan, X.** Offline-Boosted Actor-Critic: Adaptively Blending Optimal Historical Behaviors in Deep Off-Policy RL. In the *41st International Conference on Machine Learning (ICML 2024)*.
13. Ji, T., Luo, Y., Sun, F., **Zhan, X.**, Zhang, J., Xu, H. Seizing Serendipity: Exploiting the Value of Past Success in Off-Policy Actor-Critic. In the *41st International Conference on Machine Learning (ICML 2024)*.
14. Niu, H., Hu, J., Zhou, G., **Zhan, X.** A Comprehensive Survey of Cross-Domain Policy Transfer for Embodied Agents. In the *33rd International Joint Conference on Artificial Intelligence (IJCAI 2024)* **(oral)**.
15. Niu, H., Ji, T., Liu, B., Zhao, H., Zhu, X., Zheng, J., Huang, P., Zhou, G., Hu, J., **Zhan, X.** H2O+: An Improved Framework for Hybrid Offline-and-Online RL with Dynamics Gaps. In *ICLR 2024 Workshop on Data-centric Machine Learning Research (DMLR): Harnessing Momentum for Science*.
16. Mao, L., Xu, H., Zhang, W., **Zhan, X.** Revealing the Mystery of Distribution Correction Estimation via Orthogonal-gradient Update. In the *Twelfth International Conference on Learning Representations (ICLR 2024)* **(spotlight)**.
17. Hu, X., Li, J., **Zhan, X.**, Jia, Q., Zhang, Y. Query-Policy Misalignment in Preference-Based Reinforcement Learning. In the *Twelfth International Conference on Learning Representations (ICLR 2024)* **(spotlight)**.
18. Zheng, Y., Li, J., Yu, D., Yang, Y., Li, S., **Zhan, X.**, Liu, J. Safe Offline Reinforcement Learning with Feasibility-Guided Diffusion Model. In the *Twelfth International Conference on Learning Representations (ICLR 2024)*.
19. Wang, G., Cheng, S., **Zhan, X.**, Li, X., Song, S., Liu, Y. OpenChat: Advancing Open-source Language Models with Mixed-Quality Data. In the *Twelfth International Conference on Learning Representations (ICLR 2024)*.
20. Cheng, P.\*, **Zhan, X.**\*, Wu, Z., Zhang, W., Song, S., Wang, H., Lin, Y., Jiang, L. Look Beneath the Surface: Exploiting Fundamental Symmetry for Sample-Efficient Offline Reinforcement Learning. In the *Thirty-seventh Annual Conference on Neural Information Processing Systems (NeurIPS 2023)*.
21. Wang, X., Xu, H., Zheng, Y., and **Zhan, X.** Offline Multi-Agent Reinforcement Learning with Implicit Global-to-Local Value Regularization. In the *Thirty-seventh Annual Conference on Neural Information Processing Systems (NeurIPS 2023)*.
22. Hu, X., Jiang, L., Li, J., Yang, Z., Wang, Z., Chan, V., **Zhan, X.** Offline RL with No OOD Actions: In-Sample Learning via Implicit Value Regularization. In the *Eleventh International Conference on Learning Representations (ICLR 2023)* **(oral)**.
23. Li, J., **Zhan, X.**, Xu, H., Zhu, X., Liu, J., and Zhang, Y. When Data Geometry Meets Deep Function: Generalizing Offline Reinforcement Learning. In the *Eleventh International Conference on Learning Representations (ICLR 2023)*.
24. Li, J., Hu, X., Xu, H., Liu, J., **Zhan, X.**, Jia, Q., Zhang, Y. Mind the Gap: Offline Policy Optimization for Imperfect Rewards. In the *Eleventh International Conference on Learning Representations (ICLR 2023)*.
25. Jiang, L., Wang, X., Yang, A., Wang, X., Jin, X., Wang, W., Ye, X., Ouyang, Y., and **Zhan, X.** An Efficient Multi-Agent Optimization Approach for Coordinated Massive MIMO Beamforming. In *IEEE International Conference on Communications (ICC 2023)*.
26. Wang, X. and **Zhan, X.** Offline Multi-Agent Reinforcement Learning with Coupled Value Factorization. In the *22nd International Conference on Autonomous Agents and Multiagent Systems (AAMAS 2023)* (Extended Abstract).
27. Xu, H., Li, J., Li, J. and **Zhan, X.** A Policy-Guided Imitation Approach for Offline Reinforcement Learning. In the *Thirty-Sixth Annual Conference on Neural Information Processing Systems (NeurIPS 2022)* **(oral)**.
28. Niu, H., Sharma, S., Qiu, Y., Li, M., Zhou, G., Hu, J. and **Zhan, X.** When to Trust Your Simulator: Dynamics-Aware Hybrid Offline-and-Online Reinforcement Learning. In the *Thirty-Sixth Annual Conference on Neural Information Processing Systems (NeurIPS 2022)* **(spotlight)**.
29. Wang, G., Niu, H., Zhu, D., Hu, J., **Zhan, X.**, and Zhou, G. A Versatile and Efficient Reinforcement Learning Framework for Autonomous Driving. In *NeurIPS 2022 Reinforcement Learning for Real Life (RL4RealLife) Workshop*.
30. Zhang, W., Xu, H., Niu, H., Cheng, P., Li, M., Zhou, G., and **Zhan, X.** Discriminator-Guided Model-Based Offline Imitation Learning. In the *6th Annual Conference on Robot Learning (CoRL 2022)*.
31. Yu, Q., Lou, J., **Zhan, X.**, Li, Q., Liu, J., Zuo W. and Liu Y. Adversarial Contrastive Learning via Asymmetric InfoNCE. In the *17th European Conference on Computer Vision (ECCV 2022)*, 17(5), 53-69.
32. Xu, H., **Zhan, X.**, Yin, H., and Qin, H. Discriminator-Weighted Offline Imitation Learning from Suboptimal Demonstrations. In the *Thirty-ninth International Conference on Machine Learning (ICML22)*, 24725-24742.
33. **Zhan, X.**, Zhu, X. and Xu, H. Model-Based Offline Planning with Trajectory Pruning. In the *Thirty-First International Joint Conference on Artificial Intelligence (IJCAI-22)*, 3695-3701.
34. **Zhan, X.**, Xu, H., Zhang, Y., Zhu, X. and Yin, H. DeepThermal: Combustion Optimization for Thermal Power Gen-

- erating Units Using Offline Reinforcement Learning. In the *Thirty-Sixth AAAI Conference on Artificial Intelligence (AAAI2022)* 36(4), 4680-4688 (**Spotlight paper at ICML 2021 RL4RealLife workshop**).
35. Xu, H., **Zhan, X.**, and Zhu, X. Constraints Penalized Q-Learning for Safe Offline Reinforcement Learning. In the *Thirty-Sixth AAAI Conference on Artificial Intelligence (AAAI2022)* 36(8), 8753-8760 (**Spotlight paper at ICML 2021 RL4RealLife workshop**).
  36. Xu, H., **Zhan, X.**, Li, J., and Yin, H. Offline Reinforcement Learning with Soft Behavior Regularization. In *NeurIPS 2021 Offline RL Workshop*.
  37. Qin, H., **Zhan, X.**, Li, Y., Yang, X. and Zheng, Y. Network-Wide Traffic States Imputation Using Self-interested Coalitional Learning. In *Proceedings of the 27th ACM SIGKDD Conference on Knowledge Discovery and Data Mining (KDD'21)*, 1370-1378.
  38. Qin, H., Ke, S., Yang, X., Xu, H., **Zhan, X.**, and Zheng, Y. Robust Spatio-Temporal Purchase Prediction via Deep Meta Learning. In *Proceedings of the AAAI Conference on Artificial Intelligence (AAAI2021)* 35 (5), 4312-4319.
  39. Yang, C., Zhang, Y., **Zhan, X.**, Ukkusuri, S. V., and Qiu, W. Activity Chain Inference Using Travel Survey and Mobile Phone data. In *Proceedings of Transportation Research Board Meeting*, Washington D.C., January 2017.
  40. Zischg, J., Klinkhamer, C., **Zhan, X.**, Krueger, E., Ukkusuri, S., Rao, P. S. C., Rauch, W. and Sitzenfrei, R. Evolution of Complex Network Topologies in Urban Water Infrastructure. In *World Environmental and Water Resources Congress 2017*, Sacramento, May 2017.
  41. **Zhan, X.**, Ukkusuri, S. V. A Probabilistic Urban Link Travel Time Estimation Model Using Large-scale Taxi Trip Data. In *Proceedings of 94th Transportation Research Board Meeting*, Washington D.C., January 2015.
  42. **Zhan, X.**, Qian, X., Ukkusuri, S. V. Measuring the Efficiency of Urban Taxi Service System. In *Proceedings of the 3rd ACM SIGKDD International Workshop on Urban Computing*, New York, August 2014.
  43. Qian, X., **Zhan, X.**, Ukkusuri, S. Characterizing Urban Dynamics Using Large Scale Taxicab Data. In *Proceedings of 93rd Transportation Research Board Meeting*, Washington D.C., January 2014.
  44. **Zhan, X.**, Ukkusuri, S. V.. Multi-User Class, Simultaneous Route and Departure Time Choice Dynamic Traffic Assignment with an Embedded Spatial Queuing Model. *5th International Symposium on Dynamic Traffic Assignment*. Salerno, Italy, June, 2014.
  45. Hasan, S., **Zhan, X.**, and Ukkusuri, S. V. Understanding Urban Human Activity and Mobility Patterns Using Large-scale Location-based Data from Online Social Media. *Proceedings of the 2nd ACM SIGKDD International Workshop on Urban Computing*, 2013.

## JOURNAL PUBLICATIONS

1. Liu, S., Weng, D., Tian, Y., Deng, Z., Xu, H., Zhu, X., Yin, H., **Zhan, X.**, Wu, Y., 2023. ECoalVis: Visual Analysis of Control Strategies in Coal-fired Power Plants. In *IEEE Transactions on Visualization and Computer Graphics*, 29(1), 1091-1101.
2. Feng, J., Jiang, L., Yu, X., Xu, H., Sun, X., Wang, J., **Zhan, X.**, Chan., W., 2022. Curriculum Goal-conditioned Imitation for Offline Reinforcement Learning. In *IEEE Transactions on Games*.
3. Qin, H., **Zhan, X.**, and Zheng, Y., 2022. CSCAD: Correlation Structure-based Collective Anomaly Detection in Complex System. In *IEEE Transactions on Knowledge and Data Engineering (TKDE)*.
4. **Zhan, X.**, Li, R., and Ukkusuri, S. V., 2020. Link-based Traffic State Estimation and Prediction for Arterial Networks Using License-plate Recognition Data. *Transportation Research Part C: Emerging Technologies*, 117, 102660.
5. Yang, C., Zhang, Y., **Zhan, X.**, Ukkusuri, S. V. and Chen, Y., 2020. Fusing Mobile Phone and Travel Survey Data to Model Urban Activity Dynamics. In *Journal of Advanced Transportation*.
6. **Zhan, X.**, and Ukkusuri, S. V., 2019. Spatial Dependency of Urban Sprawl and the Underlying Road Network Structure. *Journal of Urban Planning and Development*, 145(4), 04019014.
7. Zischg, J., Klinkhamer, C., **Zhan, X.**, Rao, S. C., and Sitzenfrei, R., 2019. A Century of Topological Co-Evolution of Complex Infrastructure Networks in an Alpine City. *Complexity*, 2019, 2096749.
8. Gehlot, H., **Zhan, X.**, Qian, X., Thompson, C., Kulkarni, M. and Ukkusuri, S. V., 2018. A-Rescue 2.0: A High Fidelity, Parallel, Agent-based Evacuation Simulator. *Journal of Computing in Civil Engineering*, 33(2), 04018059.
9. **Zhan, X.**, Ukkusuri, S. V., and Rao, S. C., 2017. Dynamics of Functional Failures and Recovery in Complex Road Networks. *Physical Review E*, 96(5), 052301.
10. **Zhan, X.**, and Ukkusuri, S. V., 2017. Multiclass, Simultaneous Route and Departure Time Choice Dynamic Traffic Assignment with an Embedded Spatial Queuing Model. *Transportmetrica B: Transport Dynamics*, doi: 10.1080/21680566.2017.1354738.

11. Mo, B., Li, R., **Zhan, X.**, 2017. Speed Profile Estimation Using License Plate Recognition Data. *Transportation Research Part C: Emerging Technology*, 82, 358–378.
12. Kreuger, E., Klinkhamer, C., Urich C., **Zhan, X.**, and Rao, S. C., 2017. Generic Patterns in the Evolution of Urban Water Networks: Evidence from a Large Asian City. *Physical Review E*, 95(3), 032312.
13. Li, R. Ye, Z., Li. B. and **Zhan, X.**, 2017. Simulation of Hard Shoulder Running Combined with Queue Warning During Traffic Accident with CTM model. *IET Intelligent Transport Systems*, 11(9), 553-560.
14. **Zhan, X.**, Zheng, Y., Yi, X., and Ukkusuri, S. V., 2016. Citywide Traffic Volume Estimation Using Trajectory Data. *IEEE Transactions on Knowledge and Data Engineering (TKDE)*, 29(2), 272-285.
15. **Zhan, X.**, Qian, X., Ukkusuri, S. V., 2016. A Graph Based Approach to Measure the Efficiency of Urban Taxi Service System. *IEEE Transactions on Intelligent Transportation Systems*, 17(9), 2479-2489.
16. **Zhan, X.**, Ukkusuri, S., V., Yang, C., 2016. A Bayesian Mixture Model for Short-term Average Link Travel Time Estimation Using Large-scale Limited Information Trip-based Data. *Automation in Construction*, 72(3), 237-246.
17. Mesa-Arango, R., **Zhan, X.**, Ukkusuri, S. V., Mitra, A., 2016. Direct Transportation Economic Impacts of Highway Networks Disruptions Using Public Data from United States. *Journal of Transportation Safety & Security*, 8(1), 36-55.
18. Hasan, S., Ukkusuri, S., **Zhan, X.**, 2016. Understanding Social Influence in Activity-Location Choice and Life-Style Patterns Using Geo-location Data from Social Media. *Frontiers in ICT*, 3:10, doi: 10.3389/fict.2016.00010.
19. Aziz, H. M., Ukkusuri, S., **Zhan, X.**, 2016. Determining the Impact of Personal Mobility Carbon Allowance Schemes in Transportation Networks. *Network and Spatial Economics*, 17(2), 505-545.
20. Ukkusuri, S., Hasan, S., Doan, K., Luong, B., **Zhan, X.**, Murray-Tuite, P., Yin, W., 2016. A-RESCUE: An Agent-based Regional Evacuation Simulator Coupled with User Enriched Behavior. *Network and Spatial Economics*, 17(1), 197-223.
21. **Zhan, X.**, Aziz, H. M., Ukkusuri, S. V., 2015. An Efficient Parallel Sampling Technique for Multivariate Poisson-Lognormal Model: Analysis with Two Crash Count Datasets. *Analytic Methods in Accident Research*, 8, 45-60.
22. **Zhan, X.**, Li, R., Ukkusuri, S. V., 2015. Lane-based Real Time Queue Length Estimation Using License Plate Recognition Data. *Transportation Research Part C: Emerging Technology*, 57, 85-102.
23. **Zhan, X.**, Ukkusuri, S., V., Zhu, F., 2014. Inferring Urban Land Use Using Large-Scale Social Media Check-in Data. *Network and Spatial Economics*, 14, 647-667.
24. **Zhan, X.**, Hasan, S., Ukkusuri, S. V., Kamga, C., 2013. Urban Link Travel Time Estimation Using Large-scale Taxi Data with Partial Information. *Transportation Research Part C: Emerging Technologies*, 33, 37-49.
25. Ukkusuri, S., **Zhan, X.**, Sadri A., Ye, Q., 2013. Exploring Crisis Informatics Using Social Media Data: A Study on 2013 Oklahoma Tornado. *Transportation Research Record*, 2459, 110-118.

## CONTRIBUTED BOOK CHAPTERS

1. **Zhan, X.** *Miscellaneous Topics: Offline Reinforcement Learning*. In Reinforcement Learning for Sequential Decision and Optimal Control. Springer Verlag, Singapore, 2022.
2. Qian, X, **Zhan, X.**, Ukkusuri, S. V. *Characterizing Urban Dynamics Using Large Scale Taxicab Data*. In Engineering and Applied Sciences Optimization: Vol. 38, 17-32, Springer International Publishing, 2015.
3. Ukkusuri, S. V., Hasan, S., and **Zhan, X.** *Checking the Urban Pulse: Social Media Data Analytics for Transportation Applications*. In Best Practices for Transportation Agency Use of Social Media Data. Taylor and Francis/CRC Press, 2013.

## THESES

1. Novel Approaches to Model Congestion Evolution and Dependencies in Complex Road Networks. Ph.D. Dissertation, Purdue University, 2017.
2. Understanding the Aggregate Level Urban Activity Patterns Using Large-Scale Geo-Location Data. MS Thesis, Purdue University, 2012.
3. A Cellular Automaton Based Microscopic Traffic Flow Simulation Model for Abnormal Traffic Flow. Undergraduate Thesis, Tsinghua University, 2011.

## Talks & Presentations

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1. Towards Real-World Deployable Data-Driven Reinforcement Learning. Invited talk at Shanxi University. August 2024, Taiyuan, China.

2. Towards Generalizable and Data-Efficient Embodied Decision-Making. Invited talk at iDLab, Tsinghua University. July 2024, Beijing, China.
3. Towards Generalizable and Data-Efficient Embodied Decision-Making. Invited talk at *Workshop on Computational Sustainability in Digital Infrastructure*. June 2024, NTU, Singapore.
4. Towards Generalizable and Data-Efficient Embodied Decision-Making. Invited talk at *ChinaMAS 2024*. May 2024, Taiyuan, China.
5. End-to-End Autonomous Driving: From a Decision-Making Perspective. Talk at *Haomo & AIR Open Course*. September 2023.
6. Offline RL and Beyond: Towards Generalizable Data-Driven Reinforcement Learning. Invited talk at Institute of Automation, Chinese Academy of Sciences. August 2023.
7. Data-Driven Decision Making for Real-World Scenarios. Invited talk at UMNI Lab, Purdue University. April 2023.
8. Frontiers in Offline RL Research. Invited talk at iDLab, Tsinghua University. Jan 2023, Beijing, China.
9. Data-Driven Decision Making for Real-World Scenarios. Invited talk at *DataFun Summit 2022*. September 2022, Beijing, China.
10. Data-Driven Decision Making for Real-World Scenarios. Invited talk at *Didi Tech Salon*. August 2022, Beijing, China.
11. Data-Driven Decision Making for Real-World Scenarios. Invited talk at *Haomo AI Day*. April 2022, Beijing, China.
12. DeepThermal: Combustion Optimization for Thermal Power Generating Units Using Offline Reinforcement Learning. *Thirty-Sixth AAAI Conference on Artificial Intelligence (AAAI2022)*. February 2022
13. Discriminator-Weighted Offline Imitation Learning from Suboptimal Demonstrations. *NeurIPS 2021 Deep RL Workshop*. December 2021.
14. Podcast interview at “TalkRL: The Reinforcement Learning Podcast” with Robin Chauhan. August 30, 2021.
15. Offline RL and Its Potential Applications in Healthcare Decision Making. Guest lecture at DeeCamp 2021. June 2021, online.
16. Network-Wide Traffic State Inference Using Emerging Urban Data Sources. Guest lecture at University of Central Florida. March 2021, online.
17. Application of Deep Reinforcement Learning in Control Optimization of Thermal Power Plants. *IEEE Services - Industry Symposium*. October 2020.
18. Urban Computing: Building Intelligent Cities with Big Data and AI. Invited talk at Tsinghua University. November 2019, Beijing, China.
19. Data-driven Methods in Urban Applications: New Problems, New Directions and New Approaches. Invited talk at Tsinghua University. December 2018, Beijing, China.
20. Spatio-Temporal Deep Learning in Intelligent Cities. *Smart Cities and Urban Computing Forum, China National Computer Congress (CNCC 2018)*. October 2018, Hangzhou.
21. Data-driven Optimization Models for Logistics in Urban Applications. *3rd Workshop on Applications of the Mathematical Modeling in Enterprises*. July 2018, University of Chinese Academy of Sciences, Beijing.
22. Data-driven Methods in Urban Transportation Applications. Invited talk at Tsinghua University. September 2017, Beijing, China.
23. A Vertex Split-Recovery Model for Congestion Evolution Process on Road Networks. *INFORMS 2016*. November 2016, Nashville.
24. Traffic State Estimation for Arterial Networks Using License-plate Recognition Data. *INFORMS 2016*. November 2016, Nashville.
25. A Node Split-Recovery Model for Congestion Evolution Process on Road Networks. *Resilience Week 2016*. August 2016, Chicago.
26. A Node Splitting-Recovery Model for Congestion Evolution Process on Road Networks. *4th International Symposium on Water, Feedbacks, and Complexity*. March 2016, Purdue University.
27. A Bayesian Mixture Model for Short-term Average Link Travel Time Estimation Using Large-scale Limited Information Trip-based Data. *INFORMS 2015*, November 2015, Philadelphia.
28. A Graph-based Approach to Measure the Efficiency of Urban Taxi Service System. *INFORMS 2015*, November 2015, Philadelphia.
29. Measuring the Efficiency of Urban Taxi Service System. *KDD 2014 International Workshop on Urban Computing*, August 2014, New York.

30. Urban Link Travel Time Estimation Using Large-scale Taxi Data with Partial Information. *MPE 2013+ Workshop on Sustainable Human Environments*. April 2014, Rutgers University.
31. Multiclass Dynamic User Equilibrium with a Path Based Cell Transmission Model for General Traffic Networks. *INFORMS 2013*, October 2013, Minneapolis.
32. Real Time Link Travel Time Estimation Using License-plate Recognition Data. *INFORMS 2013*, October 2013, Minneapolis.

## Research Projects

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### **Closed-Loop Model Fine-Tuning for Autonomous Driving.** 2022-Present

NATIONAL KEY RESEARCH AND DEVELOPMENT PROGRAM OF CHINA (GRANT 2022YFB2502904)

Technical lead for developing data-driven policy fine-tuning methods for autonomous driving models.

### **Data-Driven Decision Making Under Complex Autonomous Driving Scenarios.** 2022-Present

FUNDED BY HAOMO.AI

Research project manager for developing data-driven decision-making models under complex autonomous driving scenarios. Three research papers are published in NeurIPS 2022, CoRL 2022, and ICLR 2023.

### **Key Technology Research on AI-driven Data Center Server Energy Saving Optimization.** 2022-2024

FUNDED BY INTEL CORPORATION

Technical leader for developing data-driven AI models for data center energy saving optimization.

### **Key Technology Research on AI+Energy Efficiency Optimization and Integrated Energy Management in Data Centers.** 2022-2024

FUNDED BY GLOBAL DATA SOLUTIONS LIMITED

Technical leader for developing deployable data-driven AI models for data center energy saving optimization.

### **5G Massive MIMO Wireless Network Optimization.** 2021-2023

FUNDED BY ASIAINFO

Technical lead for developing optimization algorithms to optimize 5G Massive MIMO Beamforming configurations. The developed optimization algorithms have been successfully deployed on 5,000 5G base stations in Tianjin and Hunan Province by AsiaInfo. Two research papers are published in NeurIPS 2022 and ICC 2023.

### **Artificial Intelligence-based Optimization System for Thermal Power Generating Units.** 2018-2020

FUNDED BY CNH ENERGY AND JD INTELLIGENT CITY RESEARCH

Research project manager for developing a deep reinforcement learning model and system to optimize power generation efficiency for thermal power generating units in power plants. Two research papers are published in AAAI/2022. This research has already finished software productization in JD Technology and been deployed in **6** power plants and **9** TPGUs in China.

### **Collective Anomaly Detection for Large-Scale Complex Sensory Systems.** 2018

JD INTELLIGENT CITY RESEARCH

Research project manager for developing a collective anomaly detection algorithm for very high dimensional sensory data in complex systems. Corresponding research paper is published in IEEE Transactions on Knowledge and Data Engineering (TKDE).

## **Bridging Information, Uncertainty and Decision-Making in Hurricanes Using an Interdisciplinary Perspective**

2015 - 2017

FUNDED BY NATIONAL SCIENCE FOUNDATION (NSF)

Project leader for developing parallelized large-scale agent-based traffic simulator for hurricane evacuation in urban road networks. Corresponding research paper is published in Journal of Computing in Civil Engineering.

## **Incorporating Household Decision Making with Dynamic Transportation Modeling in Hurricane Evacuation**

2012 - 2015

FUNDED BY NATIONAL SCIENCE FOUNDATION (NSF)

Participated in coding a Java-based large-scale agent-based traffic simulator for hurricane evacuation (A-RESCUE). Corresponding research paper is published in Network and Spatial Economics.

## **The Use of Large Scale Datasets for Understand Traffic Network State**

2012 - 2013

SPONSOR: UNIVERSITY TRANSPORTATION RESEARCH CENTER - REGION 2

Developed a real-time link travel time estimation model using large-scale taxi trip data from New York City. Corresponding research paper is published in Transportation Research Part C.

## **Collaborative Research Activities**

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### **Traffic Signal Optimization: A Data-driven and Deep Reinforcement Learning Approach**

2017 - 2018

COLLABORATED WITH DIDI CHUXING

1 patent granted.

### **Citywide Traffic Volume Estimation Using Large-scale Trajectory Data**

2015 - 2016

COLLABORATED WITH MICROSOFT RESEARCH ASIA (MSRA)

Corresponding research paper is published in IEEE Transactions on Knowledge and Data Engineering (TKDE).

### **Real Time Queue Length Estimation Using License-plate Recognition Data**

2014 - 2015

COLLABORATED WITH TSINGHUA UNIVERSITY, CHINA

Corresponding research paper is published in Transportation Research Part C.

### **The Use of Large-scale Dataset for Understanding Network State**

2013

COLLABORATED WITH THE CITY UNIVERSITY OF NEW YORK (CUNY)

Corresponding research paper is published in Transportation Research Part C.

## **Academic Activities**

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### **MEMBER OF EDITORIAL BOARD**

- Data Science for Transportation: *Editorial Board Member*
- Frontiers in Built Environment - Transportation and Transit Systems: *Review Editor*

### **AREA CHAIR OF CONFERENCES**

- Conference on Neural Information Processing Systems (NeurIPS): NeurIPS 2024

### **REVIEWER OF CONFERENCES**

- International Conference on Artificial Intelligence and Statistics (AISTATS): AISTATS 2025
- International Conference on Learning Representations (ICLR): ICLR 2024, 2025
- Conference on Neural Information Processing Systems (NeurIPS): NeurIPS 2022 (**top reviewer**), 2023
- International Conference on Machine Learning (ICML): ICML 2022, 2023, 2024
- AAAI Conference on Artificial Intelligence (AAAI): AAAI 2021, 2022, 2023, 2024, 2025
- International Joint Conference on Artificial Intelligence (IJCAI): IJCAI 2023, 2024
- IEEE International Conference on Robotics and Automation (ICRA): ICRA 2023, 2024
- Reinforcement Learning Conference (RLC): RLC 2024



- IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS): IROS 2022
- China Conference on Data Mining (CCDM): CCDM 2021,2022
- IEEE International Conference on Intelligent Transportation (ITSC)
- IEEE Conference on Decision and Control
- Transportation Research Board Annual Meeting

## REVIEWER OF JOURNALS

- IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI)
- IEEE Transactions on Neural Networks and Learning Systems (TNNLS)
- IEEE Transactions on Knowledge and Data Engineering (TKDE)
- IEEE Transactions on Big Data (TBD)
- IEEE Transactions on Knowledge Discovery from Data (TKDD)
- IEEE Transactions on Intelligent Transportation Systems (ITS)
- IEEE Transactions on Systems, Man and Cybernetics: Systems (SMC)
- IEEE Transactions on Mobile Computing (TMC)
- IEEE Transactions on Green Communications and Networking (TGCN)
- IEEE Signal Processing Letters
- IEEE Access
- ACM Transactions on Intelligent Systems and Technology (TIST)
- Transportation Research Part A: Policy and Practice
- Transportation Research Part B: Methodological
- Transportation Research Part C: Emerging Technologies
- Transportation Research Part D: Transport and Environment
- Transportmetrica B: Transport Dynamics
- Expert Systems With Applications
- Frontiers of Computer Science
- Scientific Report
- PLOS ONE
- European Journal of Operational Research
- Computers & Industrial Engineering
- Network and Spatial Economics
- Transportation
- Journal of Advanced Transportation
- Environment and Planning B: Urban Analytics and City Science
- IET Intelligent Transport Systems
- Applied Energy
- Sustainable Energy, Grids and Networks
- Journal of Physics: Complexity

## Teaching Experience

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### Course Lecturer at Tsinghua University

TSINGHUA UNIVERSITY

- **Future Automobiles (Global Open Course)** (Fall 2021): Data-driven Methods for Intelligent Urban Transportation Systems

### Courses as Teaching Assistant at Purdue University

LYLES SCHOOL OF CIVIL ENGINEERING, PURDUE UNIVERSITY

- **CE 597** (Fall 2015): The Science and Business of Logistics Systems
- **CE 398** (Spring 2013): Introduction to Civil Engineering System Design

### Co-Instructor of a Summer Course

Jun 2016

SCHOOL OF TRANSPORTATION ENGINEERING, TONGJI UNIVERSITY, CHINA

- **Summer Course:** Big Data Transportation Analytics

### Instructor at Workshop

Jun. - Jul. 2015

KOREA UNIVERSITY, SEOUL, SOUTH KOREA

Synthesis Workshop on “Dynamics of Structure and Functions of Complex Networks”

### Advised/Co-Advised Students

2021 - Present

INSTITUTE FOR AI INDUSTRY RESEARCH (AIR), TSINGHUA UNIVERSITY

- Yinan Zheng (2023-present), PhD student at Tsinghua University, China
- Jinliang Zheng (2023-present), PhD student at Tsinghua University, China
- Jianxiong Li (2021-present), PhD student at Tsinghua University, China

### Supervised Research Interns

2021 - Present

INSTITUTE FOR AI INDUSTRY RESEARCH (AIR), TSINGHUA UNIVERSITY

- Wenjia Zhang (2021-present), PhD student at Tsinghua University, China
- Peng Cheng (2021-present), PhD student at Beijing Jiaotong University, China
- Haoyi Niu (2021-present), Master student at Tsinghua University, China
- Guanming Wang (2024), Undergraduate student at University College London, UK
- Tenglong Liu (2024), PhD student at National University of Defense Technology, China
- Kexin Zheng (2024), Undergraduate student at Chinese University of Hong Kong, China
- Liyuan Mao (2023-2024), Undergraduate student at Shanghai Jiao Tong University, China
- Yu Luo (2022-2024), PhD student at Tsinghua University, China
- Tianying Ji (2022-2024), PhD student at Tsinghua University, China
- Xiangsen Wang (2022-2023), Master student at Beijing Jiaotong University, China
- Weiye Xi (2021-2022), Undergraduate student at Tsinghua University, China (Current: PhD student at Columbia University, USA)
- Jiang Li (2021-2022), Master student at Tsinghua University (Current: PhD student at McGill University, Canada)
- Yiwen Qiu (2021-2022), Undergraduate student at Tsinghua University (Current: Master student at Carnegie Mellon University, USA)
- Yong Wang (2021), PhD student at Beijing Institute of Technology, China

### Supervised Interns

2018 - 2021

JD INTELLIGENT CITY RESEARCH

- Huilin Qin (2018-2021), PhD student at Xidian University, China (Current: Faculty at Beijing Normal University, China)
- Haoran Xu (2018-2021), Master student at Xidian University, China (Current: PhD student at UT Austin, USA)

### Supervised Interns

2017

MICROSOFT RESEARCH ASIA

- Huilin Qin (2017-2018), PhD student at Xidian University, China (Current: Faculty at Beijing Normal University, China)

### Supervised Exchange Undergraduate Students at Purdue

2015

LYLES SCHOOL OF CIVIL ENGINEERING, PURDUE UNIVERSITY

- Jingxing Wang (Jan. - Feb. 2015), from Tsinghua University, China
- Xiaodong Qian (Jun. - Sep. 2015), from Tsinghua University, China
- Victorial Mutran (Jul. - Aug. 2015), from Universidade do Estado do Pará, Brazil

## Membership & Affiliations

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### Committee Member

2018 - Present

Technical Committee on Artificial Intelligence & Pattern Recognition of China Computer Federation (CCF-AI)

<b>Committee Member</b> Executive Committee on Intelligent Vehicles of China Computer Federation (CCF)	<i>2021 - Present</i>
<b>Member</b> Association for Computing Machinery (ACM)	<i>2024 - Present</i>
<b>Member</b> Institute of Electrical and Electronics Engineers (IEEE)	<i>2020 - Present</i>
<b>Member</b> China Computer Federation (CCF)	<i>2018 - Present</i>
<b>Co-chair</b> Tsinghua University Alumni Association of Purdue University	<i>2012 - 2014</i>