Wentao Zhao

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RESEARCH INTEREST

- Theories: reinforcement learning, machine learning, stochastic programming
- Applications: transportation, supply chain management

EDUCATION

University of Southern California — Los Angeles, US
Doctoral Candidate in Industrial & Systems Engineering — Sep 2022 – 2026(Expected)
- Advisor: Dr. Maged Dessouky

Master of Science in Computer Science — Sep 2023 – 2025(Expected)

Columbia University — New York, US
Master of Science in Operations Research — Sep 2020 – Dec 2021

Zhejiang University — Hangzhou, China
Bachelor of Engineering in Mechanical Engineering — Sep 2016 - May 2020

HONORS AND AWARDS

- USC CURVE Fellowship: fellowship for selected research mentors — 2023-2024
- USC Graduate School Fellowship: merit-based fellowship for selected PhD students — 2022-2023
- Advanced Honor Class of Engineering Education: honor Program of Engineering College — 2020
- Research Special Scholarship: selected excellent research student — 2019

PUBLICATIONS

Papers Under Review:

- **Wentao Zhao**, Yikang Hua, Xin Wang, "Energy-Sponge Electric Vehicle Sharing System Design," under 3rd round review at *Transportation Research Part C: Emerging Technology*.

Working Paper:

- **Wentao Zhao**, Maged Dessouky, "Closed-Loop Supply Chain Network Design and Operations for Electric Vehicle Battery."
- **Wentao Zhao**, Maged Dessouky, "Multi-Agent Reinforcement Learning for Dynamic Electric Vehicle Sharing Relocation."

Paper before PhD program

- Weifei Hu, **W. Zhao**, et al., Design Optimization of Composite Wind Turbine Blades Considering Tortuous Lightning Strike and Non-Proportional Multi-Axial Fatigue Damage. *Engineering Optimization* (2019): 1-19 (doi).

CONFERENCE PRESENTATIONS

- **Wentao Zhao**, Maged Dessouky, "Dynamic Closed-Loop Supply Chain Network Design and Operations for Electric Vehicle Battery," *INFORMS Annual Meeting*, Seattle, WA, October 2024.
- **Wentao Zhao**, Maged Dessouky, "A Two-Stage Distributed Learning-Based Framework for Dynamic Electric Vehicle Sharing," *INFORMS Annual Meeting*, Phoenix, AZ, October 2023.
- **Wentao Zhao**, Yikang Hua, Xin Wang, "Energy-sponge Service in Electric Vehicle Sharing System", *Transportation Research Board Annual Meeting*, Virtual, 2021 (poster).

RESEARCH EXPERIENCES

University of Southern California, School of Industrial & System Engineering — **Los Angeles, US**
Advisor: Prof. Maged Dessouky — Dec. 2023 – Now

- Developed a backward approximate dynamic programming framework for supply chain infrastructure planning, leveraging neural networks for efficient value function approximation.

- Designed and implemented a reinforcement learning framework with a partial forward training strategy, allowing the neural network to efficiently prioritize and learn estimates for the most critical states.
- Conducted numerical experiments showing that the proposed method improved total profit by 30% over the rolling-horizon algorithm and scaled to over 60 vertices, tripling the capacity of other approaches.

University of Southern California, School of Industrial & System Engineering **Los Angeles, US**
Advisor: Prof. Maged Dessouky Dec. 2022 – Dec. 2023

- Proposed a multi-agent reinforcement learning framework to address the relocation problem in an electric vehicle sharing system, where each charging station is treated as an agent.
- Developed a centralized-training-decentralized-execution strategy to enhance the learning process with centralized information while enabling large-scale deployment through decentralized execution.
- Designed a special reward function that mitigated the delayed reward problem during learning and allowed the algorithm to be tailored toward specific goals, such as maximizing customer satisfaction.
- Conducted numerical experiments, demonstrating that the proposed method increased the total profit by 10% over traditional relocation strategies while maintaining a similar level of customer satisfaction.

Columbia University, School of Civil Engineering **New York, US**
Advisor: Prof. Sharon Di Jun. 2021 – Dec. 2021

- Proposed a learning-based approach that integrated a graph neural network model into a local search algorithm to optimize the matching policy in an online ride-hailing system.
- Designed a training method combining imitation learning and evolutionary strategy, where the model was trained to imitate traditional algorithms and then evolve through interactions with the environment.
- Developed a ride-hailing simulation environment using historical data; Demonstrated that the proposed algorithm outperformed the traditional algorithm regarding total profit and customer waiting time.

University of Wisconsin-Madison, School of Industrial & System Engineering **Madison, US**
Advisor: Prof. Xin Wang May 2019 – Jan. 2020

- Established an optimization model for an electric vehicle sharing system to optimize its strategies in energy bidding, serving customers, charging, and relocation.
- Designed a two-stage stochastic robust optimization approach that incorporate the spatial-temporal uncertainty of customer demand and consider the worst-case scenarios.
- Implemented and solved the model via Python and Gurobi; Conducted a case study in Austin to demonstrate managerial insights.

TEACHING / MENTORING

ISE 530 Optimization Method for Analytics (Master Core at USC), Teaching Assistant Fall 2024

- Independent hold office hours, grade assignment, and provide homework solutions.

USC Curve Program, Research Mentor Sep. 2023 – Sep 2024

- Advise two undergraduate students conduct their own research projects.

SKILLS AND INTERESTS

- **Computer Skills:** Python, C, Gurobi, MATLAB, Latex
- **Languages:** Mandarin (native), English (fluent)