

Zhuoli Yin

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Last Updated: February 18, 2026

RESEARCH INTERESTS

AI/ML-Augmented Combinatorial Optimization, Reinforcement Learning, Transportation and Logistics Systems, Sustainable Computing, Intelligent Tutoring Systems

EDUCATION

- **Purdue University** 08/2021 - 08/2026 (*Expected*)
Ph.D. in Industrial Engineering, Advisor: Dr. Hua Cai West Lafayette, IN, USA
 - Graduate Certificate in Applied Statistics
 - Interdisciplinary Computational Science and Engineering Graduate Program
- **Purdue University** 08/2019 - 08/2021
M.S. in Industrial Engineering, Advisor: Dr. Hua Cai West Lafayette, IN, USA
- **Beihang University** 09/2015 - 07/2019
B.E. in Electronic and Information Engineering, Advisor: Dr. Xiaoqian Sun Beijing, China
- **Polytechnic University of Madrid** 02/2019 - 05/2019
Exchange undergraduate student in Computer Science, Advisor: Dr. Massimiliano Zanin Madrid, Spain

PROFESSIONAL EXPERIENCE

- **Amazon** 06/2025 - 09/2025
Applied Scientist Intern, Global Transportation Services New York, NY, USA
 - Developed Amazon's next-generation AI-driven decision-making tools for resilient and dynamic middle-mile network design.

PUBLICATIONS

Published

- [C1] **Yin, Z.**, Ding, Y., Khir, R., & Cai, H. (2026). ViTSP: A Vision Language Models Guided Framework for Large-Scale Traveling Salesman Problems. (*Just accepted*) *The 14th International Conference on Learning Representations (ICLR)*. <https://arxiv.org/pdf/2509.23465.pdf>
- [J2] **Yin, Z.**, Bass, K., Karakaya, E., & Cai, H. (2026). Arthur: An Artificial Intelligence Powered Teaching Assistant Tool for Engineering Economy Class. (*Just accepted*) *International Journal of Artificial Intelligence in Education*.
- [J3] Liu, Y., **Yin, Z.**, & Cai, H. (2025). Enhanced global oil spill dataset from 1967 to 2023 based on text-form incident information. *Scientific Data*, 12(1), 1-14.
<https://doi.org/10.1038/s41597-025-05601-9>
- [C4] **Yin, Z.**, Kou, Z., & Cai, H. (2023). A Deep Reinforcement Learning Model for Large-Scale Dynamic Bike Share Rebalancing with Spatial-Temporal Context. *In Proceedings of the 12th International Workshop on Urban Computing. ACM, Long Beach*.
https://urban-computing.com/urbcomp2023/file/UrbComp2023_paper_7.pdf

- [J5] **Yin, Z.**, Hardaway, K., Feng, Y., Kou, Z., & Cai, H. (2023). Understanding the Demand Predictability of Bike Share Systems: A Station-Level Analysis. *Frontiers of Engineering Management*, 1-15. <https://doi.org/10.1007/s42524-023-0279-8>

Under Review

- [1] **Yin, Z.**, Kou, Z., & Cai, H. DeepBike: A Deep Reinforcement Learning Based Model for Large-scale Online Bike Share Rebalancing. (*Under Review*) *International Journal of Sustainable Transportation*. <https://doi.org/10.21203/rs.3.rs-3998473/v1>
- [2] Li, S., **Yin, Z.**, & Cai, H. Assessing the Food-Emissions-Water-Land (FEWL) Impacts and Reduction Potentials of U.S. Household Diets. (*Under Review*) *Science of the Total Environment*.
- [3] Chen, H., **Yin, Z.**, Jian, X., Dang, M., Chen, W., Cai, H., On-Demand Food Delivery Reshapes Urban Diets and Increases Emissions. (*Under Review*) *Nature Cities*.

Working Papers

- [4] **Yin, Z.**, Khir, R., & Cai, H. Integrated Dynamic Rebalancing and Decentralized Charging Strategies for Electric Scooter Share Systems. *To be submitted to Transportation Research Part-B*.
- [5] **Yin, Z.**, Bass, K., Karakaya, E., & Cai, H. Assessing the Effectiveness of An Artificial Intelligence Powered Teaching Assistant System on Student Learning in Engineering Economics Class. *To be submitted to Journal of Engineering Education*.
- [6] **Yin, Z.**, Ding, Y., Khir, R. & Cai, H. When do AI use help improve sustainability? An evaluation of marginal benefits and additional costs in transportation models. *To be submitted to Environmental Science & Technology*.
- [7] Liu, T., **Yin, Z.**, Hua, I., & Cai, H. Using Data Linkage Approach to Estimate the Urban Industrial Water Uses in the United States. *To be submitted to Environmental Science & Technology*.

PRESENTATIONS

- [1] **Yin, Z.**, Ding, Y., Khir, R., & Cai, H. (2026). ViTSP: A Vision Language Models Guided Framework for Large-Scale Traveling Salesman Problems. *Oral Presentation at the 2026 TRB Annual Meeting*, Washington, DC, USA.
- [2] **Yin, Z.**, Ding, Y., Khir, R., & Cai, H. (2025). Rethink Artificial Intelligence for Vehicle Routing: Towards Generalization and Sustainability. *Oral Presentation at the 2025 INFORMS Annual Meeting, Job Market Showcase Track*, Atlanta, GA, USA.
- [3] **Yin, Z.**, Ding, Y., Khir, R., & Cai, H. (2025). ViTSP: A Vision Language Models Guided Framework for Large-Scale Traveling Salesman Problems. *Oral Presentation at the 2025 IISE Doctoral Colloquium 3MT Competition*, Atlanta, GA, USA.
- [4] **Yin, Z.**, Karakaya, E., Bass, K., & Cai, H. (2025). Using Artificial Intelligence Powered Teaching Assistant Tool to Enhance Student Learning in Engineering Economics Class. *Oral Presentation at the 2025 IISE Annual Conference*, Atlanta, GA, USA.
- [5] **Yin, Z.**, Khir, R., & Cai, H. (2025). Integrated Dynamic Rebalancing and Charging Strategy for Electric Scooter Sharing System. *Oral Presentation at the 2025 IISE Annual Conference*, Atlanta, GA, USA.
- [6] **Yin, Z.**, Ding, Y., Khir, R., & Cai, H. (2025). ViTSP: A Vision Language Models Guided Framework for Large-Scale Traveling Salesman Problems. *Oral Presentation at the 2025 IISE Annual Conference*, Atlanta, GA, USA.

- [7] **Yin, Z.**, Khir, R., & Cai, H. (2024). Integrated Dynamic Rebalancing and Charging Strategy for Electric Scooter Sharing System. *Oral Presentation at the 2024 INFORMS Annual Meeting*, Seattle, WA, USA.
- [8] **Yin, Z.**, & Cai, H. (2024). DeepBike: A Deep Reinforcement Learning Based Model for Large-scale Online Bike Share Rebalancing. *Poster Presentation at the TRB Annual Meeting 2024*, Washington, DC, USA.
- [9] **Yin, Z.**, & Cai, H. (2023). Optimal Rebalancing and Charging Strategies for Life Cycle Net Emissions for Shared Electric Scooter System. *Oral Presentation at the 2023 INFORMS Annual Meeting*, Phoenix, AZ, USA.
- [10] **Yin, Z.**, Kou, Z., & Cai, H. (2023). DeepBike: A Deep Reinforcement Learning Based Model for Large-scale Online Bike Share Rebalancing. *Oral Presentation at the 2023 Purdue Research Symposium on Operations*, West Lafayette, IN, USA.
- [11] **Yin, Z.**, Kou, Z., & Cai, H. (2023). DeepBike: A Deep Reinforcement Learning Based Model for Large-scale Online Bike Share Rebalancing. *Oral Presentation at the 12th International Workshop on Urban Computing (with KDD 2023)*, Long Beach, CA, USA.
- [12] Liu, T., **Yin, Z.**, Hua, I., & Cai, H. (2023). Using Data Linkage Approach to Refine the Industrial Water Consumption Data Resolution in the United States. *Poster Presentation at the Ecological Sciences and Engineering 2023 Symposium*, West Lafayette, IN, USA.
- [13] **Yin, Z.**, Kou, Z., & Cai, H. (2022). DeepBike: A Deep Reinforcement Learning Based Model for Large-scale Online Bike Share Rebalancing. *Oral Presentation at the 2022 INFORMS Annual Meeting*, Indianapolis, IN, USA.
- [14] **Yin, Z.**, Kou, Z., & Cai, H. (2022). DeepBike: A Deep Reinforcement Learning Based Model for Large-scale Online Bike Share Rebalancing. *Oral Presentation at the 2022 IISE Annual Conference*, Seattle, WA, USA.

RESEARCH PROJECTS AND COLLABORATIONS

• Graduate Research Assistant

2025

Development of Indiana-Specific Trip Generation Procedures & Models of e-Commerce Demand: Implications for INDOT's Travel Demand Modeling and Investment Planning

- Funder: Indiana Department of Transportation (INDOT)
- PIs: Dr. Nadia Gkritza and Dr. Hua Cai
- Responsibility: Co-lead the project and develop agent-based models integrating e-commerce demand with daily personal travel patterns based on survey data in Indianapolis.

• Graduate Research Assistant

2022

Teaching Innovation Project: Developing an AI-powered "TA" tool for IE343 (Engineering Economics)

- Funder: Purdue Innovation Hub
- PIs: Dr. Hua Cai and Dr. Erhan Karakaya
- Leveraged Gradescope data to develop a web-based intelligent educational tool that predicts causes of incorrect answers and delivers personalized feedback.
- Collaborated with software engineers and instructors for classroom deployment and evaluated the tool's effectiveness, resulting in two under-reviewed papers.
- Highlighted by Purdue Today Article ([A new kind of teaching assistant](#)), and Purdue InnovatED Graduate Research Magazine ([Meet Arthur: Your AI Virtual Teaching Assistant](#)).

• Graduate Research Assistant

2021

A Computational Approach for Industrial Water Consumption Estimation, Prediction, and Impact Evaluation

- Funder: Purdue College of Engineering Initiative on Smart City
- PIs: Dr. Inez Hua and Dr. Hua Cai
- Responsibility: Co-Led the project and developed optimization model and natural language processing approach for pairing large-scale water withdrawal and discharge.

TEACHING EXPERIENCE

• **Teaching Interests**

Engineering Economics, Linear Programming, Integer Programming, Dynamic Programming, Stochastic Models, Probability and Statistics, Manufacturing Processes, Supply Chain and Logistics Modeling, Systems Simulation

• **Teaching Certificates**

Fall 2022

Certificate in Foundations of College Teaching, Purdue University

• **Instructor, Purdue University**

Fall 2023

IE 343 - Engineering Economics (In-person)

- Enrollment: 148 undergraduate students from 10 different engineering disciplines.
- Student evaluation score: 4.5 out of 5.0
- Fully responsible for the class, and supervised two teaching assistants and two graders.
- Topics covering the time value of money, cash flow analysis, capital depreciation, and cost-benefit analysis.
- Administered a flipped class model to promote student-centered active learning.
- Maintained an AI-based virtual teaching assistant tutoring system, supporting the practice of assignments.
- Evaluated students' learning outcomes for Accreditation Board for Engineering and Technology (ABET)

• **Guest Lecturer, Purdue University**

Fall 2024

EEE 560 - Environmental Data Science (In-person)

- Enrollment: 37 graduate students
- Developed a session on leveraging artificial intelligence for environmental problem solving using applicable data.
- Led the discussion on the state-of-the-art artificial intelligence algorithms.
- Provided feedback to students' group research proposals.

• **Teaching Assistant, Purdue University**

Fall 2021 - Fall 2025

IE 343 - Engineering Economics (In-person; Online in Spring 2022 and Summer 2024)

- Nine sections in total
- Enrollment: 100-200 undergraduate students per section
- Average student evaluation scores across eight sections: 4.6 out of 5.0
- Hosted regular office hours and led the online forum discussion.
- Mentored graders for developing solution keys and grading assignments.
- Taught review sessions to facilitate the preparation for the exams.
- Designed exams and case study projects.
- Provided ABET assessment materials for the courses.

• **Teaching Assistant, Purdue University**

Spring 2024

IE 590 / EEE 595 - Urban Mobility Optimization (In-person)

- Enrollment: 22 graduate students
- Student evaluation score: 4.8 out of 5.0
- Developed example codes to showcase the application of Gurobi modeling.
- Organized the forum discussion on the latest topics in urban mobility, such as electric vehicles, autonomous vehicles, and ride sharing.
- Mentored the case study project and supported coding, data processing, and results analysis.

STUDENT MENTORING

• Quan The Dinh <i>Undergraduate Student in Computer Science, Purdue University</i>	08/2023 - 12/2023
• Karen Fortunat, Elaine Sui <i>Undergraduate Students in Industrial Engineering, Purdue University</i>	02/2023 - 05/2023
• Laura Almeida Tinjaca <i>Undergraduate Student with the National University of Colombia-Purdue Program</i> ◦ Admitted into MS program in Environmental and Ecological Engineering at Purdue with Lynn Fellowship	08/2022 - 02/2023
• Kalei Bass <i>Undergraduate Student in Industrial Engineering, Purdue University</i>	05/2022 - 08/2022

PROFESSIONAL SERVICE

• Journal Reviewer	
◦ <i>Journal of Cleaner Production</i>	
◦ <i>Networks and Spatial Economics</i>	
◦ <i>IEEE Transactions on Intelligent Transportation Systems (ITS)</i>	
◦ <i>Engineering Applications of Artificial Intelligence</i>	
• Conference Reviewer	
◦ International Symposium for Sustainable Systems and Technology (ISSST) 2024	
◦ Neural Information Processing Systems (NeurIPS) 2025	
◦ Transportation Research Board Annual Meeting (TRBAM) 2026	
• External Service to Professional Societies	
◦ Session Chair, IISE Annual Conference & Expo 2022	
◦ Support team, 2023 Purdue Research Symposium on Operations	
• Internal Service at Purdue University	
◦ Vice President, Industrial Engineering Graduate Student Organization (05/2022 - 05/2023)	
- Organized the Industrial Engineering research symposium.	
- Coordinated a series of bi-weekly IE graduate student research showcases.	
- Invited external speakers and facilitated workshops on Resume writing	
◦ Judge, 2022 Summer Undergraduate Research Symposium, College of Engineering (07/2022)	
◦ Graduate Student Representative, Industrial Engineering Graduate Showcase (08/2022)	
◦ Moderator, Prospective Ph.D. Student Panel, School of Industrial Engineering (03/2023)	
◦ Student representative on the faculty search committee (10/2023 - 12/2023)	

HONORS AND AWARDS

- **IISE Doctoral Colloquium** (3 participants nominated per department), 2025
- **NSF IISE Annual Conference Student Travel Award**, 2025
- **IISE Future Faculty Fellow** (15 participants selected per year), 2024–2025
- **InnovatED Graduate Research Magazine**, Purdue University (10 out of 65 articles selected), 2024
- **Lee A. Chaden Fellowship in Industrial Engineering**, Purdue University, 2023–2024
- **Graduate Student Government Travel Award (Tier 1)**, Purdue University, 2023
- **Graduate School Summer Research Grant**, Purdue University, 2023
- **Frederick N. Andrews Environmental Travel Grant Award**, Purdue University, 2023
- **Student Scholarship**, Seth Bonder Foundation INFORMS, 2022
- **Honorable Mention Poster Award** (5.3% award rate), Purdue Engineering Graduate Showcase, 2022
- **Center for the Environment Travel Grant**, Purdue University, 2022