

Zhuoli Yin

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RESEARCH INTERESTS

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

ACADEMIC EMPLOYMENT

- **University of South Carolina** 08/2026 - present
Assistant Professor of Industrial Engineering
Department of Mechanical Engineering Columbia, SC, USA

EDUCATION

- **Purdue University** 08/2021 - 08/2026
Ph.D. in Industrial Engineering, Advisor: Dr. Hua Cai West Lafayette, IN, USA
 - Interdisciplinary Computational Science and Engineering Graduate Program
 - Graduate Certificate in Applied Statistics
- **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: Drs. X. Sun & S. Wandelt Beijing, China
- **Polytechnic University of Madrid** 02/2019 - 05/2019
Exchange undergraduate student in Computer Science, Advisor: Dr. M. Zanin Madrid, Spain

INDUSTRY 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  [Google Scholar](#)

- [C1] **Yin, Z.**, Ding, Y., Khir, R., & Cai, H. (2026). ViTSP: A Vision Language Models Guided Framework for Large-Scale Traveling Salesman Problems. *The 14th International Conference on Learning Representations (ICLR)*. <https://arxiv.org/pdf/2509.23465>
- [J2] **Yin, Z.**, Bass, K., Karakaya, E., & Cai, H. (2026). Arthur: An Artificial Intelligence Powered Teaching Assistant Tool for Engineering Economy Class. *International Journal of Artificial Intelligence in Education*, 36(1), 100003. <https://doi.org/10.1016/j.ijaied.2026.100003>
- [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] Sustainable Development Track Special Session on "Does AI Belong at the Sustainability Table?" *Panelist, 2026 IISE Annual Conference, Arlington, TX, USA*
- [2] **Yin, Z.**, Ding, Y., Khir, R., & Cai, H. (2026). When Does AI Use Help Improve Sustainability? A Marginal Carbon Accounting Framework for AI-enabled Vehicle Routing *Oral Presentation at the 2026 IISE Annual Conference,, Arlington, TX, USA*.
- [3] **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*.
- [4] **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*.
- [5] **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*.

- [6] **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.
- [7] **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.
- [8] **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.
- [9] **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.
- [10] **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.
- [11] **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.
- [12] **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.
- [13] **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.
- [14] 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.
- [15] **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.
- [16] **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**

08/2023 - 12/2023

Undergraduate Student in Computer Science, Purdue University

• **Karen Fortunat, Elaine Sui**

02/2023 - 05/2023

Undergraduate Students in Industrial Engineering, Purdue University

• **Laura Almeida Tinjaca**

08/2022 - 02/2023

Undergraduate Student with the National University of Colombia-Purdue Program

- Admitted into MS program in Environmental and Ecological Engineering at Purdue with Lynn Fellowship

• **Kalei Bass**

05/2022 - 08/2022

Undergraduate Student in Industrial Engineering, Purdue University

PROFESSIONAL SERVICE

• **Journal Reviewer**

- *Journal of Cleaner Production*
- *Engineering Applications of Artificial Intelligence*
- *Networks and Spatial Economics*
- *IEEE Transactions on Intelligent Transportation Systems (ITS)*
- *Transportation Research Part D: Transport and Environment*
- *Journal of Simulation*

• **Conference Reviewer**

- International Symposium for Sustainable Systems and Technology (ISSST) 2024
- Neural Information Processing Systems (NeurIPS) 2025, 2026
- 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

- **Estus H. and Vashti L. Magoon Research Excellence Award**, College of Engineering, Purdue University, 2026
- **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