

YOONJU SIM

AI-assisted Optimization Researcher

☎ +82 10 7310 5268

✉ syj5268@kaist.ac.kr

📍 Daejeon, South Korea

🌐 github.com/syj5268

🌐 [/in/yoonju-sim](https://in.linkedin.com/in/yoonju-sim)

ABOUT ME

Yoonju Sim is a PhD candidate in Industrial Management and Engineering at KAIST and a member of the [Computational Optimization Methods \(COMET\) Lab](#) led by Prof. C Kwon. Her research focuses on designing AI-assisted algorithms for solving large-scale discrete optimization problems, particularly vehicle routing, but also broader MILP-based models. She uses techniques such as cutting planes and column generation together with AI, machine learning, and large language models (LLMs). Her goal is to build faster and more adaptive optimization methods by integrating classical OR principles with modern learning-based strategies.

RESEARCH INTERESTS

- Domain:**
- Transportation and Logistics
 - Quantum Computing
- Methods:**
- Mixed-Integer Programming based Approaches
 - Machine Learning
 - Large Language Models (LLMs)
- Programming:** Python, Julia

EDUCATION

2023.08 - Now	Korea Advanced Institute of Science and Technology (KAIST) Combined MS&PhD Candidate in Industrial Engineering	Daejeon, South Korea
2019.03 - 2023.08	Korea University (KU) Bachelor of Science in Industrial Engineering GPA: 4.4/4.5	Seoul, South Korea
2022.01 - 2022.05	Arizona State University Exchange student in Industrial Engineering	Arizona, US

RESEARCH EXPERIENCE

2023.08 - Now	Computational Optimization Methods (COMET) Lab, KAIST Advisor: Prof. C Kwon <ul style="list-style-type: none">- Implementing large-scale optimization methods in Python- Investigating machine learning accelerated heuristics for vehicle routing problems- Executing projects to solve real-world business challenges	Daejeon, South Korea
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WORK EXPERIENCE

2023.01 - 2022.07	Presales Intern @ SAP Korea Study spend management software, so-called 'Ariba' and assist in client meeting	Procurement Business Team
2022.07 - 2022.12	Presales Intern @ SAP Korea Study SAP Business Technology Platform and Low-code/No-code tools	Technology Team

UNDER REVIEW

- **Sim, Y., and Kim, H.** et al. *Test-Time Search for Neural Graph Coarsening Procedures for the CVRP*. [arXiv preprint \(arXiv:2510.00958\)](#). Submitted to **Transportation Science (INFORMS), Special Issue — under review**.

WORKING PAPERS

- **Sim, Y.** and **F. Berto** et al. *QuantumEvo: LLM-based Hyper-Heuristic Algorithm for Reversible Circuit Synthesis*. **In progress**.
- **Sim, Y.** et al. *Learning to Improve Lagrangian Relaxation and Column Generation Lower Bounds for Packing Problems*. **In progress**.

PROJECT

- 2025.02 - 2025.09 **Research on AI-accelerated Production Planning** Samsung Electronics
Developed an AI-accelerated Lagrangian relaxation model for CLSP, achieving near-optimal solutions and supporting fast 3-month production planning.
- 2023.09 - 2023.12 **Project on modeling UAM Simulation** GS E&C
Designed and implemented a Python-based simulation to analyze UAM vertiport capacity, optimizing gate/FATO configurations using queueing and event-based modeling.
- 2023.01 - 2023.01 **Research on a supplier performance management system** IME Department, Korea University
Conduct a research on a supplier performance management system with respect to management consulting. Korea university, City of Vancouver, and UBC engaged Leader of a team of 6 students
- 2022.09 - 2022.12 **Project about RUL prediction and Anomaly Detection** IME Department, Korea University
Conduct a project to predict the residual life of equipment using unsupervised learning on sensor data. Win the first prize in the competition hosted by the IME Department, Korea University.
- 2021.06 - 2021.07 **Project on Smart Campus - deploy a service named 'Subject Phd'** Korea University
Develop a website that assists students with course registration. Utilize text mining on syllabus data to make recommendation algorithm and elevate search algorithm. Win the first prize in the competition hosted by Korea University. Leader of a team of 4 students

ACTIVITIES

- 2023.01 - 2023.12 **Industrial Engineering Study Club in KU, WeTIE** Vice President
Serve as a vice president of the club with approximately 50 members and Organize sessions of introducing industrial engineering to the freshmen

CONFERENCE PRESENTATIONS

- 2025.10.22 **Test-Time Search for Neural Graph Coarsening Procedures for the CVRP** INFORMS Annual Meeting
Oral Presentation
- 2024.10.28 **Charaterizing and Learning the Lagrangian Multipliers for the Bin Packing Problem** INFORMS Annual Meeting
Oral Presentation

HONORS AND AWARDS

- 2025.11.18 **Poster Competition for Industrial/Social Problem Solving** Excellence Award
Department of Industrial and Systems Engineering, KAIST

Last updated: December 3, 2025