Hyunwoo Shin

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Education

Virginia Polytechnic Institute and State University — Blacksburg, VA
Ph.D. in Industrial & Systems Engineering — *Aug 2021 – Present*

Korea Aerospace University — Goyang, South Korea
M.S. in Logistics, School of Air Transport, Transportation, and Logistics — *Mar 2018 – Feb 2020*

Korea Aerospace University — Goyang, South Korea
B.S. in Logistics, School of Air Transport, Transportation, and Logistics — *Mar 2012 – Feb 2018*

Publications

[1] H. Shin, S. Tunc, X. Chen, J. M. Reynolds. "A Comprehensive Simulation Framework for Evaluating U.S. Lung Allocation Policies." *(Major Revision at Health Care Management Science)*

[2] H. Shin, S. Tunc, P. Afeche, M. Begen, B. Sandikci, F. Murillo, B. Hansen, M. Claasen, G. Sapisochin. "An In-depth Analysis of Organ Offer Decisions in the Canadian Liver Transplant System." *(Working paper)*

[3] H. Shin, S. Tunc, X. Chen, J. M. Reynolds. "Enhancing Organ Transplant Allocation: A Machine Learning Approach to Predicting and Interpreting LAS Dynamics." *(Working paper)*

[4] Y. Ha, **H. Shin**, J. Mueller. "Scalable Traffic Signal Control for Urban Mobility: A Subspace-based Optimization Approach Using Deep Reinforcement Learning." *(Working paper)*

[5] H. Shin, and J. Chae. "A Performance Review of Collision-Free Path Planning Algorithms." *Electronics*, 9(2), 316, 2020. DOI: 10.3390/electronics9020316

[6] H.-Y. Lee, **H. Shin**, and J. Chae. "Path Planning for Mobile Agents Using a Genetic Algorithm with a Direction Guided Factor." *Electronics*, 7(10), 212, 2018. DOI: 10.3390/electronics7100212

[7] M. Kim, **H. Shin**, and J. Chae. "Merge Control using Reserve Ahead Point in Baggage Handling Systems." *Journal of the Society of Korea Industrial and Systems Engineering*, 40(2), 60-67, 2017.

Research Experience

National Renewable Energy Laboratory — June 2025 – Aug 2025
Summer Internship (Mentor: Yunsoo Ha; Supervisor: Juliane Mueller) — *Remote*

- Simulation optimization for traffic simulation.
- Finding the subspace for optimizing via the simulation model using a deep reinforcement learning model.

Virginia Tech — Spring 2022, Fall 2024, Fall 2025
Graduate Research Assistant (Advisor: Sait Tunc) — *Blacksburg, VA*

- Optimized U.S. lung allocation policy using high-performance computing and discrete-event simulation.
- Verified and validated a liver and kidney transplant simulation model via Bayesian optimization approaches and ASTRO-DF algorithm.
- Developed a simulation model for U.S. lung transplant allocation and processed large-scale clinical data.
- Investigated modeling techniques to estimate lung allocation scores under uncertainty.

Korea Aerospace University — Mar 2016 – Jul 2021
Researcher & Research Assistant (Advisor: Junjae Chae) — *Goyang, South Korea*

- Collaborated on a multi-shuttle control logic for an automated container yard (CyberLogitec & Korea Maritime Institute).
- Developed job assignment algorithms for a new business model (Nexen Tire & SL Solution).
- Analyzed automation logic for gantry cranes using simulation (Hanjin Logistics Institute).
- Evaluated methodologies for UAV path planning; conducted efficiency and performance analyses.
- Developed a vehicle routing problem (VRP) solution incorporating real map distances and operational constraints (SK Telecom & SL Solution).
- Built an unmanned logistics system with UAV pathfinding via Genetic Algorithms (Ministry of Land, Infrastructure and Transport).
- Analyzed a baggage handling system merging control logic using AutoMod.

Teaching Experience

Instructor of Record, Virginia Tech Spring 2026 (Planned)
Department of Industrial & Systems Engineering *Blacksburg, VA*
- **Undergraduate Course**: Logistics Engineering

Teaching Assistant, Virginia Tech 2022 – 2025
Department of Industrial & Systems Engineering and Department of Statistics *Blacksburg, VA*
- **Undergraduate Courses (ISE)**: Deterministic Operations Research, Logistics Engineering, Data Management, Statistical Quality Control
- **Undergraduate Course (Statistics)**: Statistics for Engineers
- **Graduate Courses (ISE)**: Random Process, Facilities Planning

Lecturer, Korea Aerospace University Spring 2021
Operations Research I *Goyang, South Korea*
- Taught foundational linear programming concepts to sophomore-level students.

Conference Presentations

INFORMS Annual Meeting 2025 (Planned)
- **H. Shin**, X. Chen, and S. Tunc. "Optimizing U.S. Lung Allocation Policy via a Multi-Objective Trust-Region-based Simulation Optimization Algorithm."

INFORMS Annual Meeting 2024
- **H. Shin**, X. Chen, and S. Tunc. "Calibration of Simulation Models for Organ Allocation Using Conformal Prediction Concepts."

INFORMS Annual Meeting 2023
- **H. Shin**, X. Chen, and S. Tunc. "Forecasting Organ Transplant Allocation Scores Using Machine Learning Models."

Decision Science Institute (DSI) 49th Annual Meeting 2018
- **H. Shin**, J. Chae, and J.-H. Bae. "The Algorithms Solving Collision-free Shortest Path Planning for Mobile Agents: A Performance Review."

Honors & Awards

ISE Graduate Student Travel Awards, Virginia Tech 2023–2025

GPSS Travel Fund Program, Virginia Tech 2025

Technical Skills

Languages: Python, C++, R, Java

Software Tools: AutoMod, Arena, ExtendSim, CPLEX, Gurobi

Methodologies: Simulation Optimization, Bayesian Optimization, Surrogate Modeling, Machine Learning, Deep Reinforcement Learning, Nonparametric Bayesian Methods

Operating Systems: Linux (Ubuntu/HPC), Windows (WSL)

Selected Coursework

- **Probability & Statistics:** ISE 5034 (*Math Probability & Statistics for ISEs*), ISE 5984 (*Stat Learning and Data Sci*) CS 5525 (*Data Analytics*), STAT 5114 (*Statistical Inference*), STAT 5444 (*Bayesian Statistics*), STAT 6105 (*Measure & Probability*), STAT 6474 (*Advanced Topics in Bayesian Statistics*), STAT 6544 (*Surrogate Modeling*)
- **Simulation & Stochastic Modeling:** ISE 5424 (*Simulation I*), ISE 6494 (*Advanced Simulation*), ISE 5414 (*Random Process*), ISE 6464 (*Queueing Networks*)
- **Optimization:** ISE 5405, 5406 (*Optimization I & II*)

Academic Service

- Session Chair
  - 2024, 2025 INFORMS Annual Meeting
- VT INFORMS Student Chapter
  - VP Event (2025-2026)