

Yunsoo Ha

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ACADEMIC POSITIONS

- **National Renewable Energy Laboratory** 2024 - Present
Postdoctoral Researcher - Computational Science Center USA

EDUCATION

- **Ph.D. in Industrial and Systems Engineering** 2018 - 2023
North Carolina State University USA
 - Advisor: Sara Shashaani
 - Committee: Yunan Liu, Reha Uzsoy, Quoc Tran-Dinh, Naihuan Jing
 - Thesis: Expediting Stochastic Derivative Free Optimization
 - ISE Distinguished Dissertation Award of the 2024 CA Anderson Awards
 - Second Place Winner of the 2025 Pritsker Doctoral Dissertation Award by IISE
- **Master of Operations Research** 2018 - 2021
North Carolina State University USA
- **M.S. in Logistics, School of Air Transport, Transportation, and Logistics** 2015 - 2017
Korea Aerospace University South Korea
- **B.S. in Logistics, School of Air Transport, Transportation, and Logistics** 2010 - 2015
Korea Aerospace University South Korea

RESEARCH INTEREST

Stochastic Optimization, Stochastic Simulation, Decision-Focused Learning, Quantum Computing, Reinforcement Learning

PUBLICATIONS

W=WORKING, C=CONFERENCE, J=JOURNAL



- [W.1] **Scalable Traffic Signal Control for Urban Mobility: A Subspace-Based Optimization Approach Using Deep Reinforcement Learning.**
Yunsoo Ha, Hyunwoo Shin, Juliane Mueller.
- [W.2] **Regularized Adaptive Sampling Trust Region Methods for Stochastic Nonconvex Optimization.**
Yunsoo Ha, Sara Shashaani, Quoc Tran-Dinh.
- [J.1] **Adaptive Sampling Bi-Fidelity Stochastic Trust Region Method for Derivative-Free Stochastic Optimization.**
Yunsoo Ha, Juliane Mueller.
Under second review at *Mathematical Programming Computation* (submitted 2024).
- [J.2] **Complexity of Zeroth-and First-Order Stochastic Trust-Region Algorithms.**
Yunsoo Ha, Raghu Pasupathy, Sara Shashaani.
Accepted at *SIAM Journal on Optimization* (2025).
- [J.3] **Two-Stage Estimation and Variance Modeling for Latency-Constrained Variational Quantum Algorithms.**
Yunsoo Ha, Sara Shashaani, Matt Menickelly.
INFORMS Journal on Computing (2025).
- [J.4] **Iteration Complexity and Finite-Time Efficiency of Adaptive Sampling Trust-Region Methods for Stochastic Derivative-Free Optimization.**
Yunsoo Ha, Sara Shashaani.
IISE Transactions (2025).
- [J.5] **Latency Considerations for Stochastic Optimizers in Variational Quantum Algorithms.**
Matt Menickelly, Yunsoo Ha, Matthew Otten.
Quantum (2023).
- [J.6] **A Decision Model to Determine the Number of Shuttles in a Tier-to-Tier SBS/RS.**
Yunsoo Ha, Junjae Chae.
International Journal of Production Research (2019).
- [J.7] **Free Balancing for a Shuttle-Based Storage and Retrieval System.**
Yunsoo Ha, Junjae Chae.
Simulation Modelling Practice and Theory (2018).

- [C.1] **Multi-Fidelity Stochastic Trust Region Method with Adaptive Sampling**
Yunsoo Ha, Juliane Mueller.
Accepted at *Winter Simulation Conference 2025*.
- [C.2] **Towards Greener Stochastic Derivative-Free Optimization with Trust Regions and Adaptive Sampling.**
Yunsoo Ha, Sara Shashaani.
Winter Simulation Conference 2023.
- [C.3] **Improved Complexity of Trust-Region Optimization for Zeroth-Order Stochastic Oracles With Adaptive Sampling.**
Yunsoo Ha, Sara Shashaani, Quoc Tran-Dinh.
Winter Simulation Conference 2021.

HONORS AND AWARDS

- **Second Place Winner of the 2025 Pritsker Doctoral Dissertation Award** 2025
Institute of Industrial and Systems Engineers
- **Outstanding Reviewer Award** 2024
Winter Simulation Conference 2024
- **ISE Distinguished Dissertation Award of the 2024 CA Anderson Awards** 2024
North Carolina State University
- **Travel Awards for the 2023 Annual Midwest Optimization Meeting** 2023
Michigan State University
- **Mentored Teaching Fellowship** 2022
North Carolina State University
- **Scholarship for Excellent Academic Records** 2010, 2013-2016
Korea Aerospace University

RESEARCH EXPERIENCE

- **National Renewable Energy Laboratory** 2024 – Present
Postdoctoral Researcher (Mentors: Juliane Mueller and Devon Sigler) USA
 - Designed an adaptive sampling rule for multi-fidelity simulation oracles.
 - Developed a novel stochastic trust region method for multi-fidelity stochastic optimization.
 - Developing a second-order optimizer that uses diagonal Hessian approximations for deep learning applications.
 - Developing a differentiable optimization algorithm for mixed-integer problems.
 - Developing subspace-based optimizers for large-scale traffic signal control by learning subspaces via deep reinforcement learning.
- **North Carolina State University** 2019 – 2023
Research Assistant (Advisor: Sara Shashaani) USA
 - Analyzed the computational complexities with and without Common Random Numbers (CRN) in stochastic optimization, and theoretically demonstrated that CRN can significantly reduce the computational burden.
 - Enhanced the finite-time performance of the adaptive sampling trust-region method for simulation optimization through four key refinements:
 - Improved the chances of identifying better solutions through the integration of direct search techniques,
 - Constructed a quadratic model with diagonal Hessian within the trust region framework,
 - Reused previously evaluated solutions and corresponding simulation outputs to reduce computational cost,
 - Applied CRN to reduce the variance in function and gradient estimates.
 - Showed that the refined algorithms converge to the first-order stationary point almost surely.
 - Developed simulation optimization solvers and problems from scratch and tested them using Python ( [SimOpt](#)).
 - Developed a stochastic oracle for traffic signal control problems, analyzed its loss landscape characteristics, and evaluated the performance of various solvers in addressing the problem ( [Poster](#)).
- **Argonne National Laboratory** Summer 2022
Summer Intern (Mentors: Matt Menickelly and Jeffrey Larson) USA
 - Designed a gaussian process based trust region algorithm for noisy derivative-free optimization problems.
- **Argonne National Laboratory** Summer 2021
Summer Intern (Mentors: Matt Menickelly and Matt Otten) USA
 - Improved the randomized coordinate algorithm with adaptive sampling as a stochastic optimizer for variational hybrid quantum-classical algorithms.

- **Korea Aerospace University** 2015 - 2018
Researcher & Research Assistant (Advisor: Junjae Chae) South Korea
 - Developed original heuristics for machine operations, including shuttle's dynamic allocation.
 - Developed the decision model for the number of shuttles according to the demands.

TEACHING EXPERIENCE

- **ISE 362: Stochastic Models in Industrial Engineering** Spring 2023
Instructor North Carolina State University
- **ISE 441: Introduction to Simulation** Fall 2019, Spring 2020, Fall 2020, and Fall 2022
Teaching Assistant North Carolina State University
- **ISE 748: Quality Engineering** Spring 2019
Teaching Assistant North Carolina State University
- **ISE 498: Senior Design Project** Fall 2018
Teaching Assistant North Carolina State University
- **Analysis of Logistics System** Fall 2015 and Fall 2016
Teaching Assistant Korea Aerospace University

MENTORING EXPERIENCE

- **Graduate Students**
 - Hyunwoo Shin (Ph.D. Candidate at Virginia Tech ISE) Summer 2025
- **Undergraduate Students**
 - Kevin Xu (NCSU Statistics) Fall 2022
 - Wes Hankinson (NCSU ISE) Spring 2022

PRESENTATION

Invited Talks

- **International Symposium on Mathematical Programming** 2024
Two talks: Multi-Fidelity Stochastic Trust-Region Method, Is Building First-Order Simulation Oracles Really Worth It?
- **INFORMS Optimization Society Conference 2024** 2024
First-Order Trust-Region Methods with Adaptive Sampling.
- **2023 Annual Midwest Optimization Meeting** 2023
Common Random Numbers and Complexity in Simulation Optimization with Adaptive Sampling.
- **2023 INFORMS Annual Meeting** 2023
Consistency and Complexity of Adaptive Sampling Based Trust-Region Optimization.
- **Modeling and Optimization: Theory and Applications (MOPTA) 2023** 2023
Expediting Stochastic Derivative Free Optimization.
- **2022 INFORMS Annual Meeting** 2022
Complexity Analysis of Trust-Region Optimization with Adaptive Sampling for Zeroth-Order Stochastic Oracles.
- **INFORMS Optimization Society Conference 2022** 2022
Adaptive Sampling Trust-Region Optimization with Diagonal Hessian for Derivative-Free Stochastic Oracles.

Contributed Talks

- **Institute of Industrial and Systems Engineers Annual Conference 2025** 2025
First-Order Trust-Region Methods with Adaptive Sampling.
- **Winter Simulation Conference 2023** 2023
Towards Greener Stochastic Derivative-Free Optimization with Trust Regions and Adaptive Sampling.
- **Winter Simulation Conference 2021** 2021
Improved Complexity of Trust-Region Optimization for Zeroth-Order Stochastic Oracles with Adaptive Sampling.
- **Winter Simulation Conference 2020** 2020
Traffic Signal Control Simulation and Optimization (Poster).

ACADEMIC SERVICE

- **Journal Refereeing**
 - Journal of Simulation
 - Journal of Scientific Computing
 - Computational Optimization and Applications
- **Conference Refereeing**
 - Winter Simulation Conference 2024-2025
- **Session Chair**
 - 2022, 2023, 2025 INFORMS Annual Meeting
 - Modeling and Optimization: Theory and Applications (MOPTA) 2023
 - Winter Simulation Conference 2023