

Yunsoo Ha

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ABOUT ME

Yunsoo Ha is a Postdoctoral Researcher at the National Renewable Energy Laboratory within the Artificial Intelligence, Learning, and Intelligent Systems (ALIS) group. He earned his Ph.D. from the Department of Industrial and Systems Engineering at North Carolina State University. His research focuses on developing stochastic optimization algorithms to tackle real-world problems. He is particularly interested in bridging theory and practice to design efficient, scalable solutions for decision-making under uncertainty.

RESEARCH INTEREST

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

EDUCATION

- **North Carolina State University** Aug 2018 - Dec 2023
Ph.D. in Industrial and Systems Engineering Minor in Mathematics
Raleigh, 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
- **North Carolina State University** Aug 2018 - May 2021
Master of Operations Research
Raleigh, United States
- **Korea Aerospace University** Aug 2015 – Feb 2017
M.S. in Logistics, School of Air Transport, Transportation, and Logistics
Goyang city, South Korea
- **Korea Aerospace University** Mar 2010 – Aug 2015
B.S. in Logistics, School of Air Transport, Transportation, and Logistics
Goyang city, South Korea

PUBLICATIONS

W=WORKING, C=CONFERENCE, J=JOURNAL



- [W.1] **Regularized Adaptive Sampling Trust Region Methods for Stochastic Nonconvex Optimization.**
Yunsoo Ha, Sara Shashaani, Quoc Tran-Dinh.
Expected Submission to *SIAM Journal on Optimization*, June 2025.
- [J.1] **Adaptive Sampling Bi-Fidelity Stochastic Trust Region Method for Derivative-Free Stochastic Optimization.**
Yunsoo Ha, Juliane Mueller.
Under major revision at *Mathematical Programming Computation* (2024).
- [J.2] **Complexity of Zeroth-and First-Order Stochastic Trust-Region Algorithms.**
Yunsoo Ha, Raghu Pasupathy, Sara Shashaani.
Under minor revision at *SIAM Journal on Optimization* (2024).
- [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.
IIE 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.
Submitted to *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** Jan 2024 – Present
Postdoctoral Researcher (Mentors: Juliane Mueller and Devon Sigler) Remote, United States
 - 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.
- **North Carolina State University** Sep 2019 – Dec 2023
Research Assistant (Advisor: Sara Shashaani) Raleigh, United States
 - 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** June 2022 - Aug 2022
Summer Intern (Mentors: Matt Menickelly and Jeffrey Larson) Lemont, United States
 - Designed a gaussian process based trust region algorithm for noisy derivative-free optimization problems.
- **Argonne National Laboratory** May 2021 - Aug 2021
Summer Intern (Mentors: Matt Menickelly and Matt Otten) Remote, United States
 - Improved the randomized coordinate algorithm with adaptive sampling as a stochastic optimizer for variational hybrid quantum-classical algorithms.

- **Korea Aerospace University** Mar 2015 - April 2018
Researcher & Research Assistant (Advisor: Junjae Chae) Goyang city, 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

PRESENTATION

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

REFERENCES

- **Dr. Sara Shashaani**
Assistant Professor at the Edward P. Fitts Department of Industrial and Systems Engineering
North Carolina State University
Contact: sshasha2@ncsu.edu

- **Dr. Raghu Pasupathy**
Professor at the Department of Statistics
Purdue University
Contact: pasupath@purdue.edu
- **Dr. Quoc Tran-Dinh**
Associate Professor at the Department of Statistics and Operations Research
University of North Carolina at Chapel Hill
Contact: quoctd@email.unc.edu
- **Dr. Juliane Mueller**
Manager of the Artificial Intelligence, Learning, and Intelligent Systems (ALIS) Group
National Renewable Energy Laboratory
Contact: Juliane.Mueller@nrel.gov
- **Dr. Matt Menickelly**
Computational Mathematician
Argonne National Laboratory
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