

Yunsoo Ha

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ACADEMIC POSITIONS

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| • National Renewable Energy Laboratory
Postdoctoral Researcher, Computational Science Center | 2024 - Present
USA |
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EDUCATION

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|---|----------------------------|
| • Ph.D. in Industrial and Systems Engineering
North Carolina State University
◦ 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 | 2018 - 2023
USA |
| • Master of Operations Research
North Carolina State University | 2018 - 2021
USA |
| • M.S. in Logistics, School of Air Transport, Transportation, and Logistics
Korea Aerospace University | 2015 - 2017
South Korea |
| • B.S. in Logistics, School of Air Transport, Transportation, and Logistics
Korea Aerospace University | 2010 - 2015
South Korea |

RESEARCH INTEREST

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

PUBLICATIONS

W=WORKING, C=CONFERENCE, J=JOURNAL



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|-------|--|
| [W.1] | Regularized Adaptive Sampling Trust Region Methods for Stochastic Nonconvex Optimization.
Yunsoo Ha, Sara Shashaani, Quoc Tran-Dinh.
Expected Submission to <i>Mathematical Programming</i> , Aug 2025. |
| [J.1] | Adaptive Sampling Bi-Fidelity Stochastic Trust Region Method for Derivative-Free Stochastic Optimization.
Yunsoo Ha, Juliane Mueller.
Under major revision at <i>Mathematical Programming Computation</i> (2024). |
| [J.2] | Complexity of Zeroth-and First-Order Stochastic Trust-Region Algorithms.
Yunsoo Ha, Raghu Pasupathy, Sara Shashaani.
Accepted at <i>SIAM Journal on Optimization</i> (2025). |
| [J.3] | Two-Stage Estimation and Variance Modeling for Latency-Constrained Variational Quantum Algorithms.
Yunsoo Ha, Sara Shashaani, Matt Menickelly.
<i>INFORMS Journal on Computing</i> (2025). |
| [J.4] | Iteration Complexity and Finite-Time Efficiency of Adaptive Sampling Trust-Region Methods for Stochastic Derivative-Free Optimization.
Yunsoo Ha, Sara Shashaani.
<i>IIE Transactions</i> (2025). |
| [J.5] | Latency Considerations for Stochastic Optimizers in Variational Quantum Algorithms.
Matt Menickelly, Yunsoo Ha, Matthew Otten.
<i>Quantum</i> (2023). |
| [J.6] | A Decision Model to Determine the Number of Shuttles in a Tier-to-Tier SBS/RS.
Yunsoo Ha, Junjae Chae.
<i>International Journal of Production Research</i> (2019). |
| [J.7] | Free Balancing for a Shuttle-Based Storage and Retrieval System.
Yunsoo Ha, Junjae Chae.
<i>Simulation Modelling Practice and Theory</i> (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

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

RESEARCH EXPERIENCE

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| • National Renewable Energy Laboratory
Postdoctoral Researcher (Mentors: Juliane Mueller and Devon Sigler)
◦ 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. | 2024 – Present
USA |
| • North Carolina State University
Research Assistant (Advisor: Sara Shashaani)
◦ 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). | 2019 – 2023
USA |
| • Argonne National Laboratory
Summer Intern (Mentors: Matt Menickelly and Jeffrey Larson)
◦ Designed a gaussian process based trust region algorithm for noisy derivative-free optimization problems. | Summer 2022
USA |
| • Argonne National Laboratory
Summer Intern (Mentors: Matt Menickelly and Matt Otten)
◦ Improved the randomized coordinate algorithm with adaptive sampling as a stochastic optimizer for variational hybrid quantum-classical algorithms. | Summer 2021
USA |

- **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**
 - 2023 INFORMS Annual Meeting
 - Modeling and Optimization: Theory and Applications (MOPTA) 2023
 - Winter Simulation Conference 2023
 - 2022 INFORMS Annual Meeting