David J. Eckman

CONTACT INFORMATION

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RESEARCH INTERESTS

Decision-making under uncertainty: Optimization via simulation, stochastic optimization, simulation analysis methodology, discrete-event simulation

ACADEMIC APPOINTMENTS

Assistant Professor August 2021 to present

Department of Industrial and Systems Engineering, Texas A&M University

Postdoctoral Research Fellow July 2019 to July 2021

Department of Industrial Engineering & Management Sciences, Northwestern University

- Focus: Plausible inference methods
- Supervisors: Professors Matthew Plumlee and Barry L. Nelson

EDUCATION

Cornell University

Ph.D., Operations Research, May 2019

- Dissertation: Reconsidering Ranking-and-Selection Guarantees
- Adviser: Professor Shane G. Henderson

M.S., Operations Research, May 2017

University of Pittsburgh

B.S., Industrial Engineering, April 2014

SUBMITTED JOURNAL PUBLICATIONS

Zhao, J. and D. J. Eckman. One-Shot Screening of Simulated Systems for Acceptability. Under review.

Shashaani, S., D. J. Eckman, and S. M. Sanchez. Data Farming the Parameters of Simulation-Optimization Solvers. Under review.

REFEREED JOURNAL PUBLICATIONS

Eckman, D. J., S. G. Henderson, and S. Shashaani. SimOpt: A Testbed for Simulation-Optimization Experiments. *INFORMS Journal on Computing*. 2023. 35(2):495–508.

Eckman, D. J., S. G. Henderson, and S. Shashaani. Diagnostic Tools for Evaluating and Comparing Simulation-Optimization Algorithms. *INFORMS Journal on Computing*. 2023. 35(2):350–367.

Eckman, D. J., M. Plumlee, and B. L. Nelson. Plausible Screening Using Functional Properties for Simulations with Large Solution Spaces. *Operations Research*. 2022. 70(6):3473–3489. **Awarded 2023 Outstanding Simulation Publication by INFORMS Simulation Society.**

Eckman, D. J. and S. G. Henderson. Posterior-Based Stopping Rules for Bayesian Sequential Selection Procedures. *INFORMS Journal on Computing*. 2022. 34(3):1711–1728.

Eckman, D. J. and S. G. Henderson. Fixed-Confidence, Fixed-Tolerance Guarantees for Selection-of-the-Best Procedures. *ACM Transactions on Modeling and Computer Simulation*. 2021. 31(2):7:1–7:33.

Eckman, D. J. and S. G. Henderson. Reusing Search Data in Ranking and Selection: What Could Possibly Go Wrong? *ACM Transactions on Modeling and Computer Simulation*. 2018. 28(3):18:1–18:15.

Eckman, D., L. Maillart, and A. Schaefer. Optimal Pinging Frequencies in the Search for an Immobile Beacon. *IIE Transactions*. 2016. 48(6):489–500. **Awarded Best Applications Paper in Operations Engineering & Analytics Issue.**

CONFERENCE PUBLICATIONS

Eckman, D. J., S. G. Henderson, and S. Shashaani. Stochastic Constraints: How Feasible is Feasible? C. G. Corlu, S. R. Hunter, H. Lam, B. S. Onggo, J. Shortle, and B. Biller, eds. In: *Proceedings of the 2023 Winter Simulation Conference*. (Piscataway, New Jersey: IEEE) 3589–3600.

Zhao, J., J. Gatica, and D. J. Eckman. Screening Simulated Systems for Optimization. C. G. Corlu, S. R. Hunter, H. Lam, B. S. Onggo, J. Shortle, and B. Biller, eds. In: *Proceedings of the 2023 Winter Simulation Conference*. (Piscataway, New Jersey: IEEE) 1–15.

Ford, M. T., D. J. Eckman, and S. G. Henderson. Automatic Differentiation for Gradient Estimators in Simulation. B. Feng, G. Pedrielli, Y. Peng, S. Shashaani, E. Song, C. G. Corlu, L. H. Lee, E. P. Chew, T. Roeder and P. Lendermann, eds. In: *Proceedings of the 2022 Winter Simulation Conference*, (Piscataway, New Jersey: IEEE) 3134–3145.

Eckman, D. J., M. Plumlee, and B. L. Nelson. Flat Chance! Using Stochastic Gradient Estimators to Assess Plausible Optimality for Convex Functions. S. Kim, B. Feng, K. Smith, S. Masoud, Z. Zheng, C. Szabo and M. Loper, eds. In: *Proceedings of the 2021 Winter Simulation Conference*, (Piscataway, New Jersey: IEEE) Article No. 247. 1–12.

Eckman, D. J., M. Plumlee, and B. L. Nelson. Revisiting Subset Selection. K.-H. Bae, B. Feng, S. Kim, S. Lazarova-Molnar, Z. Zheng, T. Roeder, and R. Thiesing, eds. In: *Proceedings of the 2020 Winter Simulation Conference*, (Piscataway, New Jersey: IEEE) 2972–2983.

Eckman, D. J. and S. G. Henderson. Biased Gradient Estimators in Simulation Optimization. K.-H. Bae, B. Feng, S. Kim, S. Lazarova-Molnar, Z. Zheng, T. Roeder, and R. Thiesing, eds. In: *Proceedings of the 2020 Winter Simulation Conference*, (Piscataway, New Jersey: IEEE) 2935–2946.

Eckman, D. J., S. G. Henderson, and R. Pasupathy. Redesigning a Testbed of Simulation-Optimization Problems and Solvers for Experimental Comparisons. N. Mustafee, K.-H. G. Bae, S. Lazarova-Molnar, M. Rabe, C. Szabo, P. Haas, and Y.-J. Son, eds. In: *Proceedings of the 2019 Winter Simulation Conference*, (Piscataway, New Jersey: IEEE) 3457–3467.

Eckman, D. J. and M. B. Feng. Green Simulation Optimization Using Likelihood Ratio Estimators. M. Rabe, A. A. Juan, N. Mustafee, A. Skoogh, S. Jain, and B. Johansson, eds. In: *Proceedings of the 2018 Winter Simulation Conference*, (Piscataway, New Jersey: IEEE) 2049–2060. **Awarded Best Student Paper by INFORMS Simulation Society.**

Eckman, D. J. and S. G. Henderson. Guarantees on the Probability of Good Selection. M. Rabe, A. A. Juan, N. Mustafee, A. Skoogh, S. Jain, and B. Johansson, eds. In: *Proceedings of the 2018 Winter Simulation Conference*, (Piscataway, New Jersey: IEEE) 351–365.

Dong, N., D. J. Eckman, X. Zhao, M. Poloczek, and S. G. Henderson. Empirically Comparing the Finite-Time Performance of Simulation-Optimization Algorithms. W. K. V. Chan, A. D'Ambrogio, G. Zacharewicz, N. Mustafee, G. Wainer, and E. Page, eds. In: *Proceedings of the 2017 Winter Simulation Conference*, (Piscataway, New Jersey: IEEE) 2206–2217.

Bountourelis, T., D. Eckman, L. Luangkesorn, A. Schaefer, S. G. Nabors, and G. Clermont. Sensitivity Analysis of an ICU Simulation Model. C. Laroque, J. Himmelspach, R. Pasupathy, O. Rose, and A. M. Uhrmacher, eds. In: *Proceedings of the 2012 Winter Simulation Conference*, (Piscataway, New Jersey: IEEE) 931–942.

CONFERENCE TALKS

Stochastic Constraints: How Feasible is Feasible? In: *2023 Winter Simulation Conference*, December 10–13, 2023.

Confidence Bands for Shape-Constrained Performance Measures of Simulation Models. In: *2023 IISE Annual Conference*, May 20–23, 2023.

Confidence Bands for Shape-Constrained Performance Measures of Simulation Models. In: *2022 INFORMS Annual Meeting*, October 16–19, 2022.

Flat Chance! Using Stochastic Gradient Estimators to Assess Plausible Optimality for Convex Functions. In: *2021 Winter Simulation Conference*, December 13–17, 2021.

Screening Simulated Solutions Using Stochastic Gradient Estimators. In: *2021 CORS Annual Conference*, June 7–10, 2021.

Revisiting Subset Selection. In: *2020 Winter Simulation Conference*, December 14–18, 2020.

Using Functional Properties to Screen Out Simulated Solutions in Large Decision Spaces. In: *2020 INFORMS Annual Meeting*, November 8–13, 2020.

Redesigning a Testbed of Simulation-Optimization Problems and Solvers for Experimental Comparisons. In: *2019 Winter Simulation Conference*, December 8–11, 2019.

Posterior-Based Stopping Rules for Bayesian Ranking-and-Selection Procedures. In: *2019 INFORMS Annual Meeting*, October 20–23, 2019.

Green Simulation Optimization Using Likelihood Ratio Estimators. In: *2018 Winter Simulation Conference*, December 9–12, 2018.

Guarantees on the Probability of Good Selection. In: *2018 Winter Simulation Conference*, December 9–12, 2018.

Comparing Frequentist and Bayesian Fixed-Confidence Guarantees for Selection-of-the-Best Problems. In: *2018 INFORMS Annual Meeting*, November 4–7, 2018.

Empirically Comparing the Finite-Time Performance of Simulation-Optimization Algorithms. In: *2017 Winter Simulation Conference*, December 3–6, 2017.

Probably Approximately Correct (PAC) Selection in Simulation/Best-Arm Problems. In: *2017 INFORMS Annual Meeting*, October 22–25, 2017.

Challenges in Applying Ranking and Selection after Search. In: *2016 INFORMS Annual Meeting*, November 13–16, 2016.

CONFERENCE POSTERS

Green Simulation Optimization Using Likelihood Ratio Estimators. In: *2018 Winter Simulation Conference*, December 9–12, 2018.

Comparing Frequentist and Bayesian Fixed-Confidence Guarantees for Selection-of-the-Best Problems. In: *2018 Day of Statistics at Cornell University*, September 7, 2018.

Challenges in Applying Ranking and Selection after Search. In: *2016 Winter Simulation Conference*, December 11–14, 2016.

INVITED TALKS

All-Purpose Screening Procedures for Ranking and Selection. *University of Houston, Industrial Engineering*, October 27, 2023.

Methods of Plausible Inference for Stochastic Simulation Models. *Purdue University, Industrial Engineering*, October 19, 2022.

GRANTS

PI, "Inference on Expensive, Grey-Box Simulation Models", NSF, CMMI-2206972, $283,099, August 1, 2022 to July 31, 2025.

ADVISING

Postdoctoral Researchers

Taeho Kim
Industrial and Systems Engineering, Texas A&M University. Sequential sampling algorithms for good selection. Summer 2023–present.

Ph.D. Students

Jinbo Zhao
Industrial and Systems Engineering, Texas A&M University. Screening simulated systems with multiple performance measures. Summer 2022–present.

Mohammadmahdi Ghasemloo
Industrial and Systems Engineering, Texas A&M University. Simulation analytics. Fall 2023–present.

Tianqi Qiao
Industrial and Systems Engineering, Texas A&M University. Plausible inference methods for simulation. Fall 2023–present.

Undergraduate Students

Nikitha Joshy
Industrial and Systems Engineering, Texas A&M University. Contributing code to SimOpt library. Spring 2024–present.

William Grochocinski
Industrial and Systems Engineering, North Carolina State University. (Co-advised with Dr. Sara Shashaani.) Creating GUI for SimOpt library. Spring 2024–present.

Nicole Felice
Industrial and Systems Engineering, North Carolina State University. (Co-advised with Dr. Sara Shashaani.) Creating GUI for SimOpt library. Summer 2023–present.

Javier Gatica Ramirez
Mathematical Engineering, Pontificia Universidad Católica de Chile. Subset selection for large-scale ranking and selection. Spring 2023–present.

McLaren Wang
Industrial and Systems Engineering, Texas A&M University. Contributing code to SimOpt library. Summer 2023.

Kaiwen Wang
Industrial and Systems Engineering, Texas A&M University. Contributing code to SimOpt library. Spring 2023.

Noah Bigler
Industrial and Systems Engineering, Texas A&M University. Contributing code to SimOpt library. Summer and Fall 2022.

Patrick Rangel
Industrial and Systems Engineering, Texas A&M University. Contributing code to SimOpt library. Summer 2022.

Kyle Beck, Nolan Berry, Lilibeth Escamilla, Natalia Londono, and Shucheng (Mark) Zhang
Industrial and Systems Engineering, Texas A&M University. Contributing code to SimOpt library. Spring 2022.

Rina Davila Severiano
Industrial and Systems Engineering, North Carolina State University. (Co-advised with Dr. Sara Shashaani.) Creating GUI for SimOpt library. Spring and Summer 2022.

Joe Anita Shi, Joe Ye, Eva Zhang, and Jody Zhu
Operations Research and Industrial Engineering, Cornell University. (Co-advised with Dr. Shane Henderson.) Fall 2021 and Spring 2022.

Nicole Colberg
Industrial and Systems Engineering, North Carolina State University. (Co-advised with Dr. Sara Shashaani.) Creating GUI for SimOpt library. Fall 2021.

Zack Horton
Industrial and Systems Engineering, North Carolina State University. (Co-advised with Dr. Sara Shashaani.) Creating GUI for SimOpt library. Summer 2021.

Teaching Experience

Texas A&M University

- ISEN 689: Monte Carlo Methods — Spring 2024
- ISEN 613: Engineering Data Analysis — Fall 2023
- ISEN 355: System Simulation — Spring 2023
- ISEN 413: Advanced Data Analytics for Industry — Spring 2022
- ISEN 625: Simulation Methods and Applications — Fall 2021

Northwestern University

- IEMS 201: Introduction to Statistics — Fall 2020

Cornell University

- ORIE 5582: Monte Carlo Methods for Financial Engineering — Spring 2018, 2019
- ENGRD 2700: Basic Engineering Probability & Statistics — Summer 2017

Professional Service

Referee Service

- *ACM Transactions on Modeling and Computer Simulation*
- *European Journal of Operational Research*
- *IEEE Transactions on Automatic Control*
- *IISE Transactions*
- *INFORMS Journal on Computing*
- *International Journal of Simulation and Process Modelling*
- *Journal of Simulation*
- *Management Science*
- *Naval Research Logistics*
- *Operations Research*
- *Statistical Analysis and Data Mining*
- *Proceedings of the Winter Simulation Conference*

Track Chair

- Simulation Optimization, *2024 Winter Simulation Conference*
- Simulation Optimization, *2023 Winter Simulation Conference*
- Analysis Methodology, *2022 Winter Simulation Conference*

Elected Positions

- Council Member, *INFORMS Simulation Society* — Summer 2022–Present

Software

`simopt`
Testbed of simulation-optimization problems and solvers. Links to GitHub repo and Python package.

`mrg32k3a`
Random number generator with streams, substreams, and subsubstreams. Links to GitHub repo and Python package.

Professional Memberships

Institute of Industrial and Systems Engineers (IISE), 2022–present
Institute for Operations Research and the Management Sciences (INFORMS), 2016–present
Association for Computing Machinery (ACM), 2019–2021
Society for Industrial and Applied Mathematics (SIAM), 2012–2019

Awards

Journal of Simulation
- Outstanding Reviewer, 2023

Winter Simulation Conference
- Outstanding Reviewer, 2022

Cornell University,
- Graduate-Voted Teaching Assistant of the Year, 2018

National Science Foundation
- Graduate Research Fellowship Program (GRFP) Fellowship, 2015

Barry M. Goldwater Foundation
- Goldwater Scholar, 2013