Siyang Gao

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Research Interests

Simulation modeling and optimization, machine learning, healthcare management

Academic Experience

Associate Professor — Aug 2020 to present
Department of Systems Engineering & School of Data Science,
City University of Hong Kong

Assistant Professor — Aug 2014 to July 2020
Department of Systems Engineering and Engineering Management,
City University of Hong Kong

Education

Ph.D. Industrial and Systems Engineering, University of Wisconsin-Madison, May 2014.
- Thesis: *Statistical Optimization: Theory and Applications*

B.S. Statistics and Probability, Peking University, China, May 2009.

Honors and Awards

- Finalist, INFORMS Conference on Service Science, Best Student Paper Competition, 2020 (as advisor)
- Winner, IEEE Conference on Automation Science and Engineering (IEEE-CASE) Best Conference Paper Award, 2019
- Winner, International Conference on Logistics and Maritime Systems (LOGMS) Best Paper Competition, 2019
- 3rd prize, POMS International Conference in China Best Student Paper, 2019 (as advisor)
- 2nd prize, Sichuan Outstanding Social Science Award, 2019
- Winner, International Research Conference on Systems Engineering and Management Science (IRC-SEMS) Best Young Faculty Paper Award, 2018
- Winner, Ho Pan Qing Yi Paper Award, 2018
- Winner, IRC-SEMS Best Student Paper Award, 2017 (as advisor)
- Finalist, INFORMS Service Science Student Paper Competition, 2016 (as advisor)
- Rea C. and David Gustafson Scholarship, University of Wisconsin-Madison, 2013
- Travel Award, University of Wisconsin-Madison, 2010

Refereed Journal Publications

1. J. Du, **S. Gao** and C.-H. Chen, "A contextual ranking and selection method for personalized medicine", *Manufacturing & Service Operations Management*, In press.
   — `Finalist of INFORMS Conference on Service Science Best Student Paper Competition 2020`
   — `Winner of IEEE-CASE Best Conference Paper Award 2019`
   — `Winner of International Conference on LOGMS Best Paper Competition 2019`
   — `3rd prize of POMS International Conference (China) Best Student Paper 2019`
2. Y. Li and **S. Gao**, "Convergence rate analysis for optimal computing budget allocation algorithms", *Automatica*, 153, 111042, 2023.

3. Y. Li, **S. Gao** and T. Shi, "Asymptotic optimality of myopic ranking and selection procedures", *Automatica*, 151, 110896, 2023.

4. C. Li, **S. Gao** and J. Du, "On the convergence rates of stochastic kriging assisted-simulation with covariates", *INFORMS Journal on Computing*, 35(2), 386-402, 2023.

5. W. Chen, **S. Gao**, W. Chen and J. Du, "Optimizing service system resource allocations with probabilistic measures: A simulation optimization perspective", *Production and Operations Management*, 32(1), 65-81, 2023.

6. M. Qin, Z. Shi, W. Chen, **S. Gao** and L. Shi, "Wafer defect inspection optimization with partial coverage: A numerical approach", *IEEE Transactions on Automation Science and Engineering*, 18(4), 1916-1927, 2020.

7. Z. Shi, **S. Gao**, H. Xiao and W. Chen, "A worst-case formulation for constrained ranking and selection with input uncertainty", *Naval Research Logistics*, 66, 648-662, 2019.

8. F. Gao, Z. Shi, **S. Gao** and H. Xiao, "Efficient simulation budget allocation for subset selection using regression metamodels", *Automatica*, 106, 192-200, 2019.

9. F. Gao, **S. Gao**, H. Xiao and Z. Shi, "Advancing constrained ranking and selection with regression in partitioned domains", *IEEE Transactions on Automation Science and Engineering*, 16(1), 382-391, 2019.

10. Q. Zhang, L. Zhong, **S. Gao** and X. Li, "Optimizing HIV interventions for multiplex social networks via partition-based random search", *IEEE Transactions on Cybernetics*, 48(12), 3411-3419, 2018.

11. H. Xiao and **S. Gao**, "Simulation budget allocation for selecting the top-m designs with input uncertainty", *IEEE Transactions on Automatic Control*, 63(9), 3127-3134, 2018.

12. **S. Gao**, L. Shi and Z. Zhang, "A peak-over-threshold search method for global optimization", *Automatica*, 89, 83-91, 2018.

13. F. Gao and **S. Gao**, "A new strategy for selecting good enough designs using optimal computing budget allocation", *Journal of Simulation*, 12(3), 238-247, 2018.
    — `Winner of IRC-SEMS Best Student Paper Award 2017`

14. H. Xiao, **S. Gao** and L. H. Lee, "Simulation budget allocation for simultaneously selecting the best and worst subsets", *Automatica*, 84, 117-127, 2017.
    — `2nd prize of Sichuan Outstanding Social Science Award 2019`
    — `Winner of Ho Pan Qing Yi Paper Award 2018`

15. **S. Gao**, H. Xiao, E. Zhou and W. Chen, "Robust ranking and selection with optimal computing budget allocation", *Automatica*, 81, 30-36, 2017.

16. **S. Gao**, W. Chen and L. Shi, "A new budget allocation framework for the expected opportunity cost", *Operations Research*, 65(3), 787-803, 2017.
    — `Winner of IRC-SEMS Best Young Faculty Paper Award 2018`

17. H. Guo, **S. Gao**, K. L Tsui and T. Niu, "Simulation optimization for medical staff configuration at emergency department in Hong Kong", *IEEE Transactions on Automation Science and Engineering*, 14(4), 1655-1665, 2017.
    — `Finalist of INFORMS Service Science Student Paper Competition 2016`

18. **S. Gao** and W. Chen, "A partition-based random search for stochastic constrained optimization via simulation", *IEEE Transactions on Automatic Control*, 62(2), 740-752, 2017.

19. **S. Gao**, L. H. Lee, C.-H. Chen and L. Shi, "A sequential budget allocation framework for simulation optimization", *IEEE Transactions on Automation Science and Engineering*, 14(2), 1185-1194, 2017.

20. **S. Gao** and W. Chen, "Efficient feasibility determination with multiple performance measure constraints", *IEEE Transactions on Automatic Control*, 62(1), 113-122, 2017.

21. **S. Gao** and W. Chen, "A new budget allocation framework for selecting top simulated designs", *IIE Transactions*, 48(9), 855-863, 2016.

22. **S. Gao** and W. Chen, "Efficient subset selection for the expected opportunity cost", *Automatica*, 59, 19-26, 2015.

23. **S. Gao** and L. Shi, "Selecting the best simulated design with the expected opportunity cost bound", *IEEE Transactions on Automatic Control*, 60(10), 2785-2790, 2015.

24. W. Chen, **S. Gao**, C.-H. Chen and L. Shi, "An optimal sample allocation strategy for partition-based random search", *IEEE Transactions on Automation Science and Engineering*, 11, 177-186, 2014.

25. H. H. Zhang, **S. Gao**, W. Chen, L. Shi, W. D. D'Souza and R. R. Meyer, "A surrogate-based metaheuristic global search method for beam angle selection in radiation treatment planning", *Physics in Medicine and Biology*, 58, 1933-1946, 2013.

Papers in Review

26. S. Chen, **S. Gao** and J. He, "Evaluating factual consistency of summaries with large language models".

27. L. Yang, **S. Gao**, C. Li and Y. Wang, "Stochastically constrained best arm identification".

Refereed Conference Publications

28. L. Yang, **S. Gao** and C. Ho, "Improving the knowledge gradient algorithm", *Advances in Neural Information Processing Systems (NeurIPS)*, 2023, In press.

29. Z. Yu, L. Dai, S. Xu, **S. Gao** and C. Ho, "Fast Bellman updates for Wasserstein distributionally robust MDPs", *Advances in Neural Information Processing Systems (NeurIPS)*, 2023, In press.

30. S. Chen, Y. Zhao, J. Zhang, I.-C. Chern, **S. Gao**, P. Liu and J. He, "FELM: Benchmarking factuality evaluation of large language lodels", *Advances in Neural Information Processing Systems (NeurIPS)*, 2023, In press.

31. Y. Li and **S. Gao**, "On the finite-time performance of the knowledge gradient algorithm", *Proceedings of the 39th International Conference on Machine Learning (ICML)*, 12741-12764, 2022.

32. Y. Li and **S. Gao**, "On the convergence of optimal computing budget allocation algorithms", *Proceedings of the 2021 Winter Simulation Conference*, 1-12, 2021.

33. S. Cakmak, E. Zhou and **S. Gao**, "Contextual ranking and selection with gaussian processes", *Proceedings of the 2021 Winter Simulation Conference*, 1-12, 2021.

34. J. Du, **S. Gao** and C.-H. Chen, "Selecting the optimal system design under covariates", *Proceedings of the 2019 IEEE International Conference on Automation Science and Engineering*, 547-552, 2019.

35. **S. Gao**, C. Li and J. Du, "Rate analysis for offline simulation online application", *Proceedings of the 2019 Winter Simulation Conference*, 3468-3479, 2019.

36. Z. Shi, **S. Gao**, J. Du, H. Ma and L. Shi, "Automatic design of dispatching rules for real-time optimization of complex production systems", *Proceedings of the 2019 IEEE/SICE International Symposium on System Integration*, 55-60, 2019.

37. F. Gao and **S. Gao**, "Efficient simulation budget allocation for stochastically constrained simulation optimization with regression in partitioned domains", *Proceedings of the 2017 IEEE/SICE International Symposium on System Integration*, 214-219, 2017.

38. W. Liu, **S. Gao** and L. H. Lee, "A multi-objective perspective on robust ranking and selection", *Proceedings of the 2017 Winter Simulation Conference*, 2116-2127, 2017.

39. F. Gao and **S. Gao**, "Selecting good enough simulated designs", *Proceedings of the 2017 IEEE International Conference on Automation Science and Engineering*, 1053-1058, 2017.

40. **S. Gao**, H. Xiao, E. Zhou and W. Chen, "Optimal computing budget allocation with input uncertainty", *Proceedings of the 2016 Winter Simulation Conference*, 839-846, 2016.

41. F. Gao and **S. Gao**, "Optimal computing budget allocation with exponential underlying distribution", *Proceedings of the 2016 Winter Simulation Conference*, 682-689, 2016.

42. **S. Gao** and W. Chen, "Feasibility determination in presence of multiple performance measure constraints", *Proceedings of the 2016 IEEE International Conference on Industrial Technology*, 988-992, 2016.

43. S. Zhang, J. Xu, E. Huang, C.-H. Chen and **S. Gao**, "Improving ordinal transformation through optimal combination of multi-model predictions", *Proceedings of the 2016 IEEE International Conference on Industrial Technology*, 1545-1549, 2016.

44. **S. Gao** and W. Chen, "A note on the subset selection for simulation optimization", *Proceedings of the 2015 Winter Simulation Conference*, 3768-3776, 2015.

45. **S. Gao** and L. Shi, "An optimal opportunity cost selection procedure for a fixed number of designs", *Proceedings of the 2014 Winter Simulation Conference*, 3952-3958, 2014.

46. **S. Gao**, X. Zhang and L. Shi, "Evaluation of improvement probability for IMRT plans", *Proceedings of the 2013 IEEE International Conference on Automation Science and Engineering*, 474-479, 2013

Funded Projects

Research

- "Research on the whole chain multi-dimensional collaboration and cross-scale integration optimization of high-end equipment digital intelligent supply chain" (**co-I**), Key Program of the National Natural Science Foundation of China, Project No. 72331004, 2024-2028, RMB2,650,000.
- "Personalized medical decision making" (**PI**), National Science Foundation of China, Project No. 72371214, 2024-2027, RMB533,000.
- "Optimizing interventions for changing HIV risk behaviors via temporal link prediction in MSM social networks", (**Co-I**), Hong Kong Research Grant Council, General Research Fund, Project No. 11218221, 2022-2024, HK$601,000.
- "Contextual ranking and selection" (**PI**), City University of Hong Kong, Strategic Research Grant, Project No. 7005269, 2019-2021, HK$100,000.
- "Ranking and selection with parallel computing" (**PI**), City University of Hong Kong, Strategic Research Grant, Project No. 7005095, 2018-2020, HK$100,000.
- "Ranking and selection under input uncertainty" (**PI**), Hong Kong Research Grant Council, General Research Fund, Project No. 11214317, 2018-2020, HK$582,000.
- "Simulation-based optimization for medical staff configuration at emergency department" (**Co-I**), National Science Foundation of China, Project No. 71701132, 2018-2020, RMB170,000.
- "Efficient algorithms for constrained simulation optimization" (**PI**), Hong Kong Research Grant Council, Early Career Scheme, Project No. 21204316, 2017-2019, HK$456,050.
- "Optimal control of discrete event dynamic systems with constraints" (**PI**), National Science Foundation of China, Project No. 61603321, 2017-2019, RMB190,000.
- "A new selection framework with the opportunity cost" (**PI**), City University of Hong Kong, Strategic Research Grant, Project No. 7004464, 2015-2017, HK$100,000.

- "Efficient simulation budget allocation for the expected opportunity cost" (**PI**), City University of Hong Kong, Start-Up Grant, Project No. 7200419, 2014-2016, HK$200,000.

Teaching

- "Enhancing learning experience by introducing Monte Carlo simulation technologies" (**PI**), City University of Hong Kong, Start-Up Grant, Project No. 6000528, 2014-2016, HK$100,000.

Teaching Experience

- SEEM3101 – Basic Methodologies and Tools for Risk Engineering
- JC4031 – Management of Technological Innovation
- SEEM4103 – Decision Analysis & Risk Management
- SEEM5006 – Operations Management
- SEEM8202 – Systems Modeling and Management

Service

Professional Society Service

- Associate editor:
  IEEE Transactions on Automation Science and Engineering (2021-present)
  Journal of Simulation (2021-present)
  IEEE/SICE International Symposium on System Integration (2017-2021)
- Guest editor:
  Flexible Services and Manufacturing Journal (special issue)
  Mathematics (special issue)
  Journal of Simulation (special issue)
- Journal reviewer:
  IEEE Transactions on Automatic Control
  Automatica
  Operations Research
  Management Science
  INFORMS Journal on Computing
  IEEE Transactions on Automation Science and Engineering
  European Journal of Operational Research
  IISE Transactions
  ACM Transactions on Modeling and Computer Simulation
  International Journal of Production Research
  Naval Research Logistics
  Transportation Research Part C
  Operations Research Perspectives
  Journal of Simulation
  Flexible Services and Manufacturing Journal
  IEEE Access
  IEEE Robotics and Automation Letters
  IEEE Systems Journal
  IEEE Transactions on Systems, Man and Cybernetics: Systems
  Computers & Operations Research
  Asia-Pacific Journal of Operational Research
  Methodology and Computing in Applied Probability
  BMC Health Services Research
  International Journal of Simulation and Process Modeling
  International Transactions in Operational Research
  Journal of Industrial and Management Optimization
  Simulation: Transactions of The Society for Modeling and Simulation International
- Conference (Associate) Program Co-chair:
  Winter Simulation Conference (WSC) 2022
  NSFC-RGC Conference on Frontiers of Industrial Big Data and Intelligent Systems 2023

- Conference Track Coordinator:
  Winter Simulation Conference (WSC) 2022-2024
  INFORMS Conference on Service Science (ICSS) 2021
  IFAC Conference on Manufacturing Modeling, Management and Control (MIM) 2019
- Conference (Special) Session Chair/Program Committee/Reviewer:
  Winter Simulation Conference (WSC)
  IEEE Conference on Automation Science and Engineering (CASE)
  Conference on Neural Information Processing Systems (NeurIPS)
  INFORMS Annual Meeting
  INFORMS Conference on Service Science (ICSS)
  IEEE Conference on Decision and Control (CDC)
  American Control Conference (ACC)
  International Conference on Logistics and Maritime Systems (LOGMS)
  IEEE/SICE International Symposium on System Integration (SII)
  IEEE International Conference on Industrial Technology (ICIT)
  International Conference on Advances in System Simulation
  North American Manufacturing Research Conference

University Service

- Associate Head of Department SYE, 2023-present
- University Senate, 2019-2023
- College Board of Engineering, 2018-present
- Search Committee for Appointment of Head of Department ADSE, 2021-2022
- Departmental Staffing Committee, 2017-2018, 2020-2023
- Departmental Undergraduate Program Leader, 2021-2023
- Departmental Master Program Leader, 2018-2021
- Departmental Master Program Deputy, 2016-2018
- Departmental Scholarship Coordinator, 2015-present
- Student Exchange Coordinator, 2018-2020
- Deputy Student Exchange Coordinator, 2015-2018

MEMBERSHIP

- Senior Member, Institute of Electrical and Electronics Engineers (IEEE)
- Member, Institute for Operations Research and the Management Science (INFORMS)
  Simulation Society, Optimization Society, Service Science Society
- Member, POMS Hong Kong Chapter