

Raúl Astudillo

Homepage: <https://raulastudillo.netlify.app/> ◊ Email: rastudil@caltech.edu

EDUCATION

- Cornell University** *August 2016-August 2022*
Ph.D. in Operations Research and Information Engineering
Advisor: Peter Frazier
Minors: Computer Science and Statistics
- University of Guanajuato & Center for Research in Mathematics** *August 2011-June 2016*
B.Sc. in Mathematics
GPA: 9.7/10
Highest GPA of the 2011-2016 class

ACADEMIC POSITIONS

- California Institute of Technology** *September 2022-Present*
Department of Computing and Mathematical Sciences
Postdoctoral Fellow
Supervisor: Yisong Yue

INDUSTRY POSITIONS

- Facebook** *October 2020-March 2021*
Visiting Researcher
Supervisor: Eytan Bakshy
- Research Intern *June-September 2020*
Supervisor: Daniel Jiang
- ExxonMobil Upstream Research Company** *June-August 2019*
Research Intern
Supervisors: Liz Curry and Xiao-Hui Wu
- Research Intern *June-August 2018*
Supervisors: Damian Burch and Xiao-Hui Wu

RESEARCH INTERESTS

My research focuses on developing intelligent algorithms for data-driven decision-making in complex, data-intensive environments. Through close collaboration with domain experts, my work has been applied to real-world challenges in materials design, cellular agriculture, and protein engineering.

PUBLICATIONS & PREPRINTS

1. J. Yang, W. Chu, D. Khalil, R. Astudillo, F. Arnold, and Y. Yue, “Steering generative models with experimental data for protein fitness optimization”, *Submitted*.
2. V. Mishra, R. Astudillo, P. Frazier, and F. Zhang, “Probably-convergent source seeking with mobile agents”, *Submitted*.
3. F. Huber, S. Rojas Gonzalez, and R. Astudillo, “Bayesian preference elicitation for decision support in multi-objective optimization”, *Submitted*.
4. R. Astudillo, K. Li, M. Tucker, X. Chen, A. Ames, and Y. Yue, “Preferential multi-objective Bayesian optimization”, *To appear in Transactions on Machine Learning Research, 2025*.

5. J. Yang, R. Lal, J. Bowden, R. Astudillo, M. Hameedi, Y. Yue, and F. Arnold, “Active learning-assisted directed evolution”, *Nature Communications*, 2025.
6. C. Cheng, R. Astudillo, T. Desautels, and Y. Yue, “Practical Bayesian algorithm execution via posterior sampling” (Finalist in the 2024 INFORMS Undergraduate Operations Research Prize Competition), *Advances in Neural Information Processing Systems*, 2024.
7. Q. Xie, R. Astudillo, P. Frazier, Z. Scully, and A. Terein, “Cost-aware Bayesian optimization via the Pandora’s box Gittins index” (Finalist in the 2024 INFORMS Data Mining Best Paper Competition), *Advances in Neural Information Processing Systems*, 2024.
8. B. Sha, R. Astudillo, and P. Frazier, “Multi-attribute optimization under preference uncertainty” (Finalist in the 2020 INFORMS Undergraduate Operations Research Prize Competition), *Winter Simulation Conference*, 2024.
9. P. Buathong, J. Wan, R. Astudillo, S. Daulton, M. Balandat, and P. Frazier, “Bayesian optimization of function networks with partial evaluations”, *International Conference on Machine Learning*, 2024.
10. J. Jannink, R. Astudillo, and P. Frazier, “Insight into a two-part plant breeding scheme through Bayesian optimization of budget allocations”, *Crop Science*, 2023.
11. R. Astudillo, Z. Lin, E. Bakshy, and P. Frazier, “qEUBO: A decision-theoretic acquisition function for preferential Bayesian optimization”, *International Conference on Artificial Intelligence and Statistics*, 2023.
12. Z. Cosenza, R. Astudillo, P. Frazier, K. Baar, and D. Block, “Multi-information source Bayesian optimization of culture media for cellular agriculture” (Spotlight in the ICML 2022 Adaptive Experimental Design and Active Learning in the Real World Workshop), *Biotechnology and Bioengineering*, 2022.
13. Z. Lin, R. Astudillo, P. Frazier, and E. Bakshy, “Preference exploration for efficient Bayesian optimization with multiple outcomes”, *International Conference on Artificial Intelligence and Statistics*, 2022.
14. R. Astudillo, and P. Frazier, “Thinking inside the box: A tutorial on grey-box Bayesian optimization”, *Advanced Tutorial in the Winter Simulation Conference*, 2021.
15. R. Astudillo, D.R. Jiang, M. Balandat, E. Bakshy, and P. Frazier, “Multi-step budgeted Bayesian optimization with unknown evaluation costs”, *Advances in Neural Information Processing Systems*, 2021.
16. R. Astudillo and P. Frazier, “Bayesian optimization of function networks”, *Advances in Neural Information Processing Systems*, 2021.
17. S. Cakmak, R. Astudillo, P. Frazier and E. Zhou, “Bayesian optimization of risk measures”, *Advances in Neural Information Processing Systems*, 2020.
18. R. Astudillo and P. Frazier, “Multi-attribute Bayesian optimization with interactive preference learning”, *International Conference on Artificial Intelligence and Statistics*, 2020.
19. R. Astudillo and P. Frazier, “Bayesian optimization of composite functions”, *International Conference on Machine Learning*, 2019.

SELECTED AWARDS

Rising Star in Data Science - UChicago and UC San Diego	2024
Rising Star in Management Science & Engineering - Stanford University	2024
Finalist - INFORMS Data Mining Best Paper Competition	2024
Finalist - INFORMS Undergraduate Operations Research Prize Competition (Mentee’s Award)	2024
Computing, Data, and Society Postdoctoral Fellowship - Caltech	2024
Spotlight Presentation - ICML Workshop on Adaptive Experimental Design in the Real World	2022
Outstanding Reviewer Award - NeurIPS	2021

Finalist - INFORMS Undergraduate Operations Research Prize Competition (Mentee's Award)	2020
Second Prize - XXII International Mathematics Competition for University Students	2015
<i>Orgullo UG Academic Excellence Award - University of Guanajuato</i>	2014
Academic Excellence Fellowship - Center for Research in Mathematics	2012-2016

SELECTED PRESENTATIONS

1. "Bayesian optimization with Bayesian deep kernel learning", *SIAM Conference on Uncertainty Quantification, Trieste, Italy, 2024.*
2. "Composite Bayesian optimization for efficient and scalable adaptive experimentation", *Online Reading Group on Modern Adaptive Experimental Design and Active Learning in the Real World, Virtual, 2024.*
3. "Multi-information source Bayesian optimization of culture media for cellular agriculture", *SIAM Conference on Computational Science and Engineering, Amsterdam, Netherlands 2023.*
4. "Composite Bayesian optimization for efficient and scalable adaptive experimentation", *Georgia Tech's ISyE Seminar, 2022.*
5. "qEUBO: A decision-theoretic acquisition function for preferential Bayesian optimization", *INFORMS Annual Meeting, Indianapolis, IN 2022.*
6. "Thinking inside the box: A tutorial on grey-box Bayesian optimization", *Advanced Tutorial in the Winter Simulation Conference, Phoenix, AZ, October 2021.*
7. "Grey-box Bayesian optimization", *Young Researchers Workshop, Cornell University's School of Operations Research and Information Engineering, Ithaca, NY, 2021.*
8. "Interactive Bayesian optimization with user preferences", *Facebook Adaptive Experimentation Workshop, New York City, NY, 2020.*
9. "Bayesian optimization of composite functions with application to computationally-expensive inverse problems", *Applied Inverse Problems Conference, Grenoble, France, 2019.*
10. "Bayesian optimization of composite functions", *2nd Uber Science Symposium, San Francisco, CA, 2019.*

MENTORING EXPERIENCE

Graduate Students

- Victor Amaya Carvajal - Duke University *June 2024-Present*
- Felix Huber - University of Stuttgart *April 2024-Present*
- Qian Xie - Cornell University *August 2023-Present*
- Poompol Buathong - Cornell University *June 2022-May 2024*

Undergraduate Students

- Eric Lee - California Institute of Technology *July 2024-Present*
- Andrew Zabelo - California Institute of Technology *March 2024-Present*
- Chu Xin (Cloris) Cheng - California Institute of Technology *November 2023-Present*
- Bhavik Sha - Cornell University *February 2020-October 2020*

TEACHING EXPERIENCE

Instructor

- Probabilistic Machine Learning (Graduate) - California Institute of Technology *Spring 2023*

- Engineering Stochastic Processes (Undergraduate) - Cornell University *Summer 2021*

Teaching Assistant

- Statistical Principles (Graduate) - Cornell University *Fall 2018*
- Engineering Stochastic Processes (Undergraduate) - Cornell University *Fall 2017*
- Basic Probability and Statistics (Undergraduate)- Cornell University *Fall 2016*
- Measure Theory and Probability (Graduate) - Center for Research in Mathematics *Fall 2015*
- Complex Analysis (Undergraduate) - University of Guanajuato *Spring 2015*

ACADEMIC SERVICE

Conference Reviewing

AISTATS, ICLR, ICML, NeurIPS

Journal Reviewing

Artificial Intelligence, INFORMS Journal on Computing, Neural Computation, Operations Research, SIAM Review, Technometrics

LANGUAGES

English (proficient), Spanish (native)

CONTACT REFERENCES

1. Peter Frazier
Eleanor and Howard Morgan Professor
School of Operations Research and Information Engineering
Cornell University
pf98@cornell.edu
<https://people.orie.cornell.edu/pfrazier/>
2. Yisong Yue
Professor
Department of Computing and Mathematical Sciences
California Institute of Technology
yyue@caltech.edu (please CC Professor Yue's assistant at sabedin@caltech.edu)
<http://www.yisongyue.com/>
3. Eytan Bakshy
Research Director
Meta
eytan@meta.com
<https://eytan.github.io/>
4. Juergen Branke
Professor of Operational Research and Systems
Warwick Business School
University of Warwick
Juergen.Branke@wbs.ac.uk
<https://www.wbs.ac.uk/about/person/juergen-branke/>