

# Brendon G. Anderson

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**I am on the academic job market as of Fall 2023.** Please feel free to reach out if you know of relevant open positions, or if you'd like to get to know me and my research.

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**Research Interests** I am interested in the development and analysis of safe and reliable computational methods by applying rigorous mathematics to interdisciplinary problems in the areas of **optimization**, **machine learning**, **control theory**, and **game theory**. My latest projects surround provable safety for neural networks using robust optimization theory, stability guarantees for infinite-dimensional evolutionary games using functional analysis, and robust control of distributed systems using optimal transport theory.

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**Education** **University of California, Berkeley** Aug. 2018 – May 2024 (Expected)  
Ph.D. in Control Theory  
*Advisor:* [Somayeh Sojoudi](#)  
*Research Areas:* Optimization, Machine Learning, Control Theory  
*Minors:* Mathematics, Optimization

**University of California, Berkeley** Aug. 2022 – Dec. 2023 (Expected)  
M.A. in Mathematics  
*Thesis:* “Dissipativity theory for evolutionary games on infinite strategy sets”

**University of California, Berkeley** Aug. 2018 – May 2020  
M.S. in Control Theory  
*Thesis:* “[Towards optimality and robustness guarantees for data-driven learning and decision making](#)”

**University of California, Los Angeles** Sep. 2015 – Mar. 2018  
B.S. in Mechanical Engineering (*summa cum laude*)  
*Technical Breadth Area:* Mathematics

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**Research Experience** **Graduate Student Researcher — UC Berkeley** Aug. 2018 – Present  
*Advisor:* [Somayeh Sojoudi](#)

**Jr. Development Engineer — UCLA Engineering** Jan. 2018 – Jun. 2018  
*Advisor:* [Robert M'Closkey](#)

**Research Assistant — UCLA Mathematics** Jun. 2017 – Aug. 2017  
*Advisors:* [Matt Haberland](#), [Olga Turanova](#), and [Andrea L. Bertozzi](#)

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<b>Awards</b>	1. Second place method on <a href="#">RobustBench</a> CIFAR-100 $\ell_\infty$ -leaderboard	May 2023
	<i>For the paper “<a href="#">Improving the accuracy-robustness trade-off of classifiers via adaptive smoothing.</a>”</i>	
	2. Graduate Division Block Grant Award, UC Berkeley	May 2023
	3. <a href="#">Outstanding Graduate Student Instructor Award</a> , UC Berkeley	Mar. 2023
	<i>Schoolwide award for teaching excellence.</i>	
	4. INFORMS Data Mining Best Student Paper Award Runner-Up	Oct. 2022
	<i>For the paper “<a href="#">Projected randomized smoothing for certified adversarial robustness.</a>”</i>	
	5. Graduate Division Block Grant Award, UC Berkeley	May 2022
	6. John and Janet McMurtry Fellowship, UC Berkeley	Dec. 2020
	<i>Departmental award for academic excellence, sole recipient.</i>	
	7. Travel Support Award, Conference on Decision and Control	Dec. 2020
	8. Graduate Assembly Professional Development Award, UC Berkeley	Aug. 2020
	9. Graduate Division Block Grant Award, UC Berkeley	May 2019
	10. <a href="#">Harry M. Showman Prize</a> , UCLA	Jun. 2018
	<i>Schoolwide research award, sole undergraduate recipient.</i>	
	11. Jonathan David Wolfe Memorial Scholarship, UCLA	Apr. 2018
	<i>Departmental award for academic excellence, one of two recipients.</i>	

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**Publications** \* indicates equal contribution.

- [1] **B. G. Anderson**, Z. Ma, J. Li, and S. Sojoudi, “[Towards optimal branching of linear and semidefinite relaxations for neural network robustness certification,](#)” *Under review*, 2023. URL <https://arxiv.org/pdf/2101.09306.pdf>.
- [2] S. Pfrommer\*, **B. G. Anderson\***, J. Piet, and S. Sojoudi, “[Asymmetric certified robustness via feature-convex neural networks,](#)” *Under review*, 2023. URL <https://brendon-anderson.github.io/files/publications/pfrommer2023asymmetric.pdf>.
- [3] S. Pfrommer, **B. G. Anderson**, and S. Sojoudi, “[Projected randomized smoothing for certified adversarial robustness,](#)” *Under review*, 2023. **INFORMS Data Mining Best Student Paper Award Runner-Up**. URL <https://brendon-anderson.github.io/files/publications/pfrommer2023projected.pdf>.
- [4] Y. Bai, **B. G. Anderson**, A. Kim, and S. Sojoudi, “[Improving the accuracy-robustness trade-off of classifiers via adaptive smoothing,](#)” *Under review*, 2023. **Second place method on [RobustBench](#) CIFAR-100  $\ell_\infty$ -leaderboard as of May 2023**. URL [https://bai-yt.github.io/files/publications/AdaptiveSmoothing\\_PrePrint.pdf](https://bai-yt.github.io/files/publications/AdaptiveSmoothing_PrePrint.pdf).
- [5] **B. G. Anderson**, S. Pfrommer, and S. Sojoudi, “[Tight certified robustness via min-max representations of ReLU neural networks,](#)” in *Proceedings of the 62nd IEEE Conference on Decision and Control (CDC)*, 2023.

- [6] Y. Bai, **B. G. Anderson**, and S. Sojoudi, “[Mixing classifiers to alleviate the accuracy-robustness trade-off](#),” in *Proceedings of the 7th IEEE Conference on Control Technology and Applications (CCTA)*, 2023.
- [7] **B. G. Anderson\***, T. Gautam\*, and S. Sojoudi, “[An overview and prospective outlook on robust training and certification of machine learning models](#),” in *IFAC Symposium on System Structure and Control (SSSC)*, 2022.
- [8] T. Gautam, **B. G. Anderson**, S. Sojoudi, and L. El Ghaoui, “[A sequential greedy approach for training implicit deep models](#),” in *Proceedings of the 61st IEEE Conference on Decision and Control (CDC)*, 2022.
- [9] **B. G. Anderson** and S. Sojoudi, “[Data-driven certification of neural networks with random input noise](#),” *IEEE Transactions on Control of Network Systems (TCNS)*, 2022.
- [10] **B. G. Anderson**, S. Pfrommer, and S. Sojoudi, “[Towards optimal randomized smoothing: A semi-infinite linear programming approach](#),” in *ICML Workshop on Formal Verification of Machine Learning (WFVML)*, 2022. One of six selected for oral presentation.
- [11] **B. G. Anderson** and S. Sojoudi, “[Certified robustness via locally biased randomized smoothing](#),” in *Proceedings of the 4th Annual Learning for Dynamics and Control Conference (L4DC)*, 2022.
- [12] F. Gama, **B. G. Anderson**, and S. Sojoudi, “[Node-variant graph filters in graph neural networks](#),” in *Proceedings of the IEEE Data Science and Learning Workshop (DSLW)*, 2022.
- [13] **B. G. Anderson**, Z. Ma, J. Li, and S. Sojoudi, “[Tightened convex relaxations for neural network robustness certification](#),” in *Proceedings of the 59th IEEE Conference on Decision and Control (CDC)*, 2020.
- [14] **B. G. Anderson** and S. Sojoudi, “[Global optimality guarantees for nonconvex unsupervised video segmentation](#),” in *Proceedings of the 57th Annual Allerton Conference on Communication, Control, and Computing*, 2019.
- [15] **B. G. Anderson**, E. Loeser, M. Gee, F. Ren, S. Biswas, O. Turanova, M. Haberland, and A. L. Bertozzi, “[Quantifying robotic swarm coverage](#),” in *Informatics in Control, Automation and Robotics: 15th International Conference, ICINCO 2018, Porto, Portugal, July 29–31, 2018, Revised Selected Papers*, vol. 613 of *Lecture Notes in Electrical Engineering*, pp. 276–301, Springer, 2019.
- [16] **B. G. Anderson**, E. Loeser, M. Gee, F. Ren, S. Biswas, O. Turanova, M. Haberland, and A. L. Bertozzi, “[Quantitative assessment of robotic swarm coverage](#),” in *Proceedings of the 15th International Conference on Informatics in Control, Automation and Robotics (ICINCO)*, 2018.

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<b>Invited Talks and Poster Presentations</b>	1. INFORMS Annual Meeting, Indianapolis, IN “Projected randomized smoothing for certified adversarial robustness.” Research talk.	Oct. 2022
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2. NorCal Control Workshop, UC Santa Cruz, Santa Cruz, CA June 2022  
“Certified robustness via locally biased randomized smoothing.” Research poster presentation.
3. Tsinghua-Berkeley Shenzhen Institute, Berkeley, CA May 2022  
“Robust neural networks.” Guest lecture for *Optimization Theory and Machine Learning*.
4. INFORMS Annual Meeting, Anaheim, CA Oct. 2021  
“Data-driven certification of neural networks with random inputs.” Research talk.
5. Tsinghua-Berkeley Shenzhen Institute, Berkeley, CA May 2021  
“Robust neural networks.” Guest lecture for *Optimization Theory and Machine Learning*.
6. University of Michigan, Ann Arbor, MI Apr. 2021  
“Robust neural networks.” Guest lecture for *Advanced Topics in Applied Data Analytics* (IOE 491).
7. INFORMS Annual Meeting, National Harbor, MD Nov. 2020  
“Partition-based convex relaxations for robustness certification of ReLU neural networks.” Research talk.
8. Conference on Control Technology and Applications, Montréal Aug. 2020  
“Robustness analysis of neural networks.” Tutorial session.
9. Institute for Pure and Applied Mathematics, Los Angeles, CA Aug. 2017  
“Robotic swarm analysis.” Research talk.

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**Teaching**      **REU Mentor — UC Berkeley** Summer 2023  
Mentor for [SUPERB Research Experience for Undergraduates \(REU\)](#) program, UC Berkeley Electrical Engineering and Computer Sciences (EECS) Department.  
Mentee: [Owen Frausto](#)  
Project: “Robust optimal transport over dynamical systems”

**Graduate Student Instructor — UC Berkeley**

1. [Convex Optimization](#) (EE 227BT) Fall 2023
2. [Convex Optimization](#) (EE 227BT) Fall 2022  
**[Recipient of the Outstanding Graduate Student Instructor Award.](#)**  
Student ratings: Mean 97.3%, Median 100%, Standard deviation 6.7%.
3. [Nonlinear and Discrete Optimization](#) (IEOR 160) Fall 2021  
Student ratings: Mean 93.4%, Median 100%, Standard deviation 9.6%.
4. [Nonlinear and Discrete Optimization](#) (IEOR 160) Fall 2020  
Student ratings: Mean 90.8%, Median 100%, Standard deviation 15.2%.

**Guest Lecturer — UC Berkeley**

1. [Nonlinear and Discrete Optimization](#) (IEOR 160) Fall 2022
2. [Linear Programming and Network Flows](#) (IEOR 162) Fall 2022
3. [Nonlinear and Discrete Optimization](#) (IEOR 160) Fall 2021

## Supplemental Instructor — Palomar College

1. *Electromagnetism* (PHYS 231)

Spring 2015

2. *General Chemistry* (CHEM 115)

Fall 2014, Spring 2015

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### Professional Activities

1. Co-organizer of the [2nd Workshop on Formal Verification of Machine Learning \(WFVML\)](#), International Conference on Machine Learning (ICML), 2023.
2. Reviewer for Conference on Neural Information Processing Systems (NeurIPS), 2023.
3. Reviewer for Conference on Decision and Control (CDC), 2023.
4. Co-chair of the second morning session, NorCal Control Workshop, 2023.
5. Reviewer for International Conference on Machine Learning (ICML), 2023.
6. Reviewer for Learning for Dynamics and Control Conference (L4DC), 2023.
7. Reviewer for Conference on Neural Information Processing Systems (NeurIPS), 2022.
8. Reviewer for Conference on Decision and Control (CDC), 2022.
9. Organizer and co-chair of the session “Safety and Robustness in Machine Learning,” INFORMS Annual Meeting, 2022.
10. Reviewer for IEEE Control Systems Letters, 2022.
11. Reviewer for IEEE Open Journal of Control Systems, 2022.
12. Organizer and co-chair of the session “Robustness of Neural Networks,” INFORMS Annual Meeting, 2021.
13. Reviewer for Conference on Decision and Control (CDC), 2021.
14. Reviewer for IEEE Transactions on Automatic Control, 2021.
15. Reviewer for Artificial Intelligence and Statistics Conference (AISTATS), 2020.
16. Reviewer for American Control Conference (ACC), 2020.
17. Grant proposal contributor; assisted with writing DARPA funding proposal, 2019.
18. Chair of the session “Data Analytics,” 57th Annual Allerton Conference on Communication, Control, and Computing, 2019.

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### Outreach

1. Graduate Student Mentor for incoming students, hosted by UC Berkeley Mechanical Engineering Graduate Student Council, 2023.
2. Volunteer for [College Skateboarding Educational Foundation \(CSEF\)](#), 2023.  
*Community event organizer to promote scholarships for skateboarders and to foster academia’s inclusion of skateboarders from diverse backgrounds.*
3. Graduate Student Mentor for incoming students, hosted by UC Berkeley Mechanical Engineering Graduate Student Council, 2022.
4. Graduate Student Mentor for incoming students, hosted by UC Berkeley Mechanical Engineering Graduate Student Council, 2021.
5. Peer Advisor for the Bay Area Graduate Pathways to Stem (GPS) program, hosted by UC Berkeley Engineering and Stanford Engineering, 2020.

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**References** **Somayeh Sojoudi** —

Assistant Professor

Electrical Engineering and Computer Sciences

University of California, Berkeley

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**Javad Lavaei** —

Associate Professor

Industrial Engineering and Operations Research

University of California, Berkeley

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