Brendon G. Anderson

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Education

University of California, Berkeley   Aug. 2018 – Present
Ph.D. in Control Theory
Advisor: Somayeh Sojoudi
Research Areas: Optimization, Machine Learning, Control Theory
Minors: Mathematics, Optimization

University of California, Berkeley   Aug. 2022 – Present
M.A. in Mathematics

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

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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Publications * indicates equal contribution.

[1] **B. G. Anderson**, S. Pfrommer, and S. Sojoudi, "Tight certified robustness via min-max representations of ReLU neural networks," *Under review*, 2023. URL `https://brendon-anderson.github.io/files/publications/anderson2023tight.pdf`.

[2] **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`.

[3] 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`.

[4] 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`.

[5] Y. Bai, **B. G. Anderson**, A. Kim, and S. Sojoudi, "Improving the accuracy-robustness trade-off of classifiers via adaptive smoothing," *Preprint*, 2023. URL `https://arxiv.org/pdf/2301.12554.pdf`.

[6] Y. Bai, **B. G. Anderson**, and S. Sojoudi, "Mixing classifiers to alleviate the accuracy-robustness trade-off," *Under review*, 2023. URL `https://bai-yt.github.io/files/publications/MixedClassifier_PrePrint.pdf`.

[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.

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

Awards		
	1. Outstanding Graduate Student Instructor Award, UC Berkeley *Schoolwide award for teaching excellence.*	Mar. 2023
	2. INFORMS Data Mining Best Student Paper Award Runner-Up	Oct. 2022
	3. Graduate Division Block Grant Award, UC Berkeley	May. 2022
	4. John and Janet McMurtry Fellowship, UC Berkeley *Departmental award for academic excellence, sole recipient.*	Dec. 2020
	5. Travel Support Award, Conference on Decision and Control	Dec. 2020
	6. Graduate Assembly Professional Development Award, UC Berkeley	Aug. 2020
	7. Graduate Division Block Grant Award, UC Berkeley	Apr. 2019
	8. Harry M. Showman Prize, UCLA *Schoolwide research award, sole undergraduate recipient.*	Jun. 2018
	9. Jonathan David Wolfe Memorial Scholarship, UCLA *Departmental award for academic excellence, one of two recipients.*	Apr. 2018

Teaching	**Graduate Student Instructor — UC Berkeley**

1. *Convex Optimization* (EE 227BT)   Fall 2022
   Student ratings: Mean 97.3%, Median 100%, Standard deviation 6.7%.

2. *Nonlinear and Discrete Optimization* (IEOR 160)   Fall 2021
   Student ratings: Mean 93.4%, Median 100%, Standard deviation 9.6%.

3. *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

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 International Conference on Machine Learning (ICML), 2023.

3. Reviewer for Learning for Dynamics and Control Conference (L4DC), 2023.

4. Graduate Student Mentor for incoming students, hosted by UC Berkeley Mechanical Engineering Graduate Student Council, 2022.

5. Reviewer for Conference on Neural Information Processing Systems (NeurIPS), 2022.

6. Reviewer for Conference on Decision and Control (CDC), 2022.

7. Organizer and co-chair of the session "Safety and Robustness in Machine Learning," INFORMS Annual Meeting, 2022.

8. Reviewer for IEEE Control Systems Letters, 2022.

9. Reviewer for IEEE Open Journal of Control Systems, 2022.

10. Organizer and co-chair of the session "Robustness of Neural Networks," INFORMS Annual Meeting, 2021.

11. Graduate Student Mentor for incoming students, hosted by UC Berkeley Mechanical Engineering Graduate Student Council, 2021.

12. Reviewer for Conference on Decision and Control (CDC), 2021.

13. Reviewer for IEEE Transactions on Automatic Control, 2021.

14. Reviewer for Artificial Intelligence and Statistics Conference (AISTATS), 2020.

15. Reviewer for American Control Conference (ACC), 2020.

16. Peer Advisor for the Bay Area Graduate Pathways to Stem (GPS) program, hosted by UC Berkeley Engineering and Stanford Engineering, 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.