Alexander Robey

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Education

2018–present **PhD, Electrical and Systems Engineering**, *University of Pennsylvania*, Philadelphia, PA, USA.

2014-2018 **Bachelor of Science, Engineering**, *Swarthmore College*, Swarthmore, PA, USA.

2014-2018 **Bachelor of Arts, Mathematics**, *Swarthmore College*, Swarthmore, PA, USA.

Journal Papers

2018 **Alexander Robey** and Vidya Ganapati. Optimal physical preprocessing for example-based super-resolution. *Optics Express*, volume 26, pages 31333–31350. Optical Society of America, 2018.

Refereed Conference Papers

2021 **Alexander Robey**, George J Pappas, and Hamed Hassani. Model-based domain generalization. In *Advances in Neural Information Processing Systems*, 2021.

2021 **Alexander Robey**, Lars Lindemann, Stephen Tu, and Nikolai Matni. Learning robust hybrid control barrier functions for uncertain systems. *IFAC-PapersOnLine*. Elsevier, 2021.

2021 **Alexander Robey**, Luiz Chamon, George J. Pappas, Hamed Hassani, and Alejandro Ribeiro. Adversarial robustness with semi-infinite constrained learning. In *Advances in Neural Information Processing Systems*, 2021.

2021 **Alexander Robey**, Arman Adibi, Brent Schlotfeldt, George J Pappas, and Hamed Hassani. Optimal algorithms for submodular maximization with distributed constraints. In *Learning for Dynamics and Control*. PMLR, 2021.

2021 Lars Lindemann, Haimin Hu, **Alexander Robey**, Hanwen Zhang, Dimos V Dimarogonas, Stephen Tu, and Nikolai Matni. Learning hybrid control barrier functions from data. *Conference on Robot Learning*. PMLR, 2021.

2020 **Alexander Robey**, Haimin Hu, Lars Lindemann, Hanwen Zhang, Dimos V Dimarogonas, Stephen Tu, and Nikolai Matni. Learning control barrier functions from expert demonstrations. In *2020 59th IEEE Conference on Decision and Control (CDC)*, pages 3717–3724. IEEE, 2020.

2019 Mahyar Fazlyab, **Alexander Robey**, Hamed Hassani, Manfred Morari, and George Pappas. Efficient and accurate estimation of lipschitz constants for deep neural networks. In *Advances in Neural Information Processing Systems*, pages 11427–11438, 2019.

Preprints

2021 Allan Zhou, Fahim Tajwar, **Alexander Robey**, George J. Pappas, and Chelsea Hassani, Hamed Finn. Do deep networks transfer invariances between classes? *Under review*, 2021.

2021 Stephen Tu, **Alexander Robey**, Tingnan Zhang, and Nikolai Matni. On the sample complexity of stability constrained imitation learning. *arXiv preprint arXiv:2102.09161*, 2021.

2021 **Alexander Robey**, Haoze Wu, Fengjun Yang, Corina Pasareanu, Clark Barrett, Nikolai Matni, Hamed Hassani, and George J. Pappas. Certified robustness against natural distribution shifts. *Under review*, 2021.

2021 Lars Lindemann, **Alexander Robey**, Lejun Jiang, George J. Pappas, Stephen Tu, and Nikolai Matni. Learning robust output control barrier functions from safe expert demonstrations. *Under review*, 2021.

2020 **Alexander Robey**, Hamed Hassani, and George J Pappas. Model-based robust deep learning. *arXiv preprint arXiv:2005.10247*, 2020.

2020 Edgar Dobriban, Hamed Hassani, David Hong, and **Alexander Robey**. Provable tradeoffs in adversarially robust classification. *arXiv preprint arXiv:2006.05161*, 2020.

Patents

2020 **Alexander Robey**, Hamed Hassani, and George J Pappas. Model-based robust deep learning, 2020. United States Provisional Patent 63/034,355.

Fellowships & Awards

2021 *Outstanding Reviewer Award*, Neural Information Processing Systems (NeurIPS) 2021.

2021 *Outstanding Reviewer Award*, International Conference on Learning Representations (ICLR) 2021.

2020 *Outstanding Reviewer Award*, International Conference on Machine Learning (ICML) 2020.

2020 *Teaching Assistant of the Year*, Department of Electrical and Systems Engineering, University of Pennsylvania.

Professional Activities

2021 Organizer for the International Conference on Computer Vision (ICCV) workshop on *Adversarial Robustness in the Real World*, 2021.

Reviewing: ICCPS 2020; L4DC 2020, 2021; CDC 2020, 2021; NeurIPS 2020, 2021; ICML 2020, 2021; ICLR 2021, 2022; ACC 2021; JMLR 2021; PAMI 2021; ICCV 2021; TAC 2021; IEEE RA-L 2021

Technical Skills

Programming languages: Python, MATLAB, JavaScript, HTML, CSS, R, C/C++, SQL (Postgres), Verilog HDL, LaTeX

Frameworks: Pytorch, TensorFlow, Jax, Django, Slurm

Teaching Experience

Spring 2021 ESE 605: *Modern Convex Optimization*, University of Pennsylvania.

Spring 2020 ESE 290: *Introduction to Research Methodologies*, University of Pennsylvania

Fall 2020 ESE 530: *Elements of Probability Theory*, University of Pennsylvania

Fall 2019 ESE 530: *Elements of Probability Theory*, University of Pennsylvania

Spring 2018 ENGR 019: *Numerical Methods for Engineering Applications*, Swarthmore College.

Fall 2017 ENGR 011: *Electrical Circuit Analysis*, Swarthmore College.

Spring 2017 ENGR 012: *Linear Physical Systems Analysis*, Swarthmore College.

Fall 2016 ENGR 011: *Electrical Circuit Analysis*, Swarthmore College.

Spring 2016 ENGR 006: *Engineering Mechanics*, Swarthmore College.

Selected Talks

Oct. 2021 *Robustness against Natural Variation: Theory and Practice*, GRASP SFI Seminar, University of Pennsylvania, Philadelphia, PA, USA.

Sept. 2021 *A Critique of "Generalization in Adversarially Robust Deep Learning"*, NSF-Simons Math of Deep Learning (MoDL) annual meeting, Simons Foundation, New York, NY, USA.

Sept. 2021 *Robustness against Natural Variation: Theory and Practice*, NSF-Simons THEORINET seminar, Baltimore, MD, USA (virtual).

July 2021 *Learning Robust Hybrid Control Barrier Functions for Uncertain Systems*, 7th IFAC Conference on Analysis and Design of Hybrid Systems (ADHS), Brussels, Belgium (virtual).

Apr. 2021 *Model-Based Robust Deep Learning: Generalizing to Natural Out-of-Distribution Data*, Italian Conference on CyberSecurity (ITASEC), AI for Security and Security for AI Workshop (virtual).

Mar. 2021 *Model-Based Domain Generalization*, NSF-Simons Math of Deep Learning (MoDL) seminar (virtual).

Dec. 2020 *Learning Control Barrier Functions from Expert Demonstrations*, 59^{th} IEEE Conference on Decision and Control (CDC 2020), Jeju Island, Korea (virtual).

Nov. 2020 *Model-Based Robust Deep Learning: Generalizing to Natural Out-of-Distribution Data*, Intel, Santa Clara, CA, USA (virtual).

Oct. 2020 *Generalizing to Natural Out-of-Distribution Data*, C3.ai Workshop on the Analytical Foundations of Deep Learning (virtual).

Sept. 2020 *Model-Based Robust Deep Learning: Generalizing to Natural Out-of-Distribution Data*, Intel, Santa Clara, CA, USA (virtual).

Sept. 2020 *Model-Based Robust Deep Learning: Generalizing to Natural Out-of-Distribution Data*, Data Augmentation and Equivariance Workshop, University of Pennsylvania, Philadelphia, PA, USA (virtual).

Aug. 2020 *Model-Based Robust Deep Learning: Generalizing to Natural Out-of-Distribution Data*, European Conference on Computer Vision (ECCV) workshop on Adversarial Robustness in the Real World, Glasgow, Scotland (virtual).

July 2020 *Model-Based Robust Deep Learning*, Stanford University, Stanford, CA, USA (virtual).

Dec. 2019 *Efficient and Accurate Estimation of Lipschitz Constants of Deep Neural Networks*, Spotlight talk at Neural Information Processing Systems (NeurIPS), Vancouver, Canada.

May 2018 *Computationally Expediting Fourier Ptychographic Miscroscopy*, Swarthmore Research Showcase, Swarthmore College, Swarthmore, PA, USA.

Selected Poster Presentations

July 2021 *Model-Based Robust Deep Learning: Generalizing to Natural Out-of-Distribution Data*, International Conference on Machine Learning (ICML) Workshop on Uncertainty and Robustness in Deep Learning (virtual).

June 2021 *Optimal Algorithms for Submodular Maximization with Distributed Constraints*, Learning for Dynamics and Control (L4DC), Zurich, Switzerland (virtual).

Nov. 2020 *Learning Hybrid Control Barrier Functions from Data*, Conference on Robot Learning (CoRL), Boston, MA, USA (virtual).

Dec. 2019 *Efficient and Accurate Estimation of Lipschitz Constants of Deep Neural Networks*, Neural Information Processing Systems (NeurIPS), Vancouver, Canada.

Aug. 2017 *Quantifying the Impact of Factors Affecting Communication Performance*, Lawrence Livermore National Laboratory (LLNL), Livermore, CA, USA.

Sept. 2016 *Bird-Window Collision Prevention*, Sigma Xi Poster Session, Swarthmore College, Swarthmore, PA, USA.