Osbert Bastani

Research Interests

I lead the Trustworthy Machine Learning Group at the University of Pennsylvania. We are interested in problems at the intersection of programming languages and machine learning, including both how programming languages techniques can be applied to building more trustworthy machine learning systems as well as how machine learning can improve programmer productivity. My research statement is available at `https://obastani.github.io/research.pdf`, and my teaching statement is available at `https://obastani.github.io/teaching.pdf`.

Employment

2022- **Assistant Professor in Computer and Information Sciences**, *University of Pennsylvania*, Philadelphia, PA

2018-2022 **Research Assistant Professor in Computer and Information Sciences**, *University of Pennsylvania*, Philadelphia, PA

2017-2018 **Postdoctoral Fellow in CSAIL**, *Massachusetts Institute of Technology*, Cambridge, MA

Education

2012-2018 **Ph.D. in Computer Science**, *Stanford University*, Stanford, CA

2008-2012 **A.B. in Mathematics**, *Harvard University*, Cambridge, MA

Awards & Honors

2024 **NSF CAREER Award**

2024 **Amazon Research Award**

2024 **IEEE International Conference on Robotics and Automation (ICRA) Finalist for Best Paper Award in Robot Vision**

2024 **IEEE International Conference on Robotics and Automation (ICRA) Best Paper Award (Open X-Embodiment Collaboration)**

2023 **The Conference on Robot Learning (CoRL) Learning Effective Abstractions for Planning (LEAP) Workshop Best Paper Award**

2023 **The International Conference on Machine Learning (ICML) Trustworthy, Enhanced, Adaptable, Capable and Human-centric (TEACH) Workshop Best Paper Award**

2018 **ACM SIGPLAN conference on Programming Language Design and Implementation (PLDI) Distinguished Paper Award**

2015-2017 **Google Ph.D. Fellowship**

Journal Publications

1 Kavi Gupta, Chenxi Yang, Kayla McCue, Osbert Bastani, Phillip Sharp, Christopher Burge, Armando Solar-Lezama, *Improved modeling of RNA-binding protein motifs in an interpretable neural model of RNA splicing*, Genome Biology, 2024

2 Osbert Bastani, Christopher Hillar, Dimitar Popov, Maurice Rojas, *Randomization, sums of squares, near-circuits, and faster real root counting*, Contemporary Mathematics, 2011

Highly Selective Conference Publications

1 Kan Xu, Hamsa Bastani, Surbhi Goel, Osbert Bastani, *Stochastic Bandits with ReLU Neural Networks*, The International Conference on Machine Learning (ICML), 2024

2 Jason Ma, William Liang, Hung-Ju Wang, Yuke Zhu, Linxi Fan, Osbert Bastani, Dinesh Jayaraman, *Language Model Guided Sim-To-Real Transfer*, Robotics: Science and Systems (RSS), 2024

3 DROID Dataset Team, *DROID: A Large-Scale In-The-Wild Robot Manipulation Dataset*, Robotics: Science and Systems (RSS), 2024

4 Shuo Li, Sangdon Park, Insup Lee, Osbert Bastani, *TRAQ: Trustworthy Retrieval Augmented Question Answering via Conformal Prediction*, Annual Conference of the North American Chapter of the Association for Computational Linguistics (NAACL), 2024

5 Jason Ma, William Liang, Guanzhi Wang, De-An Huang, Osbert Bastani, Dinesh Jayaraman, Yuke Zhu, Linxi Fan, Anima Anandkumar, *Eureka: Human-Level Reward Design via Coding Large Language Models*, The International Conference on Learning Representations (ICLR) (Spotlight), 2024

6 Alexander Shypula, Aman Madaan, Yimeng Zeng, Uri Alon, Jacob Gardner, Yiming Yang, Milad Hashemi, Graham Neubig, Parthasarathy Ranganathan, Osbert Bastani, Amir Yazdanbakhsh, *Learning Performance-Improving Code Edits*, The International Conference on Learning Representations (ICLR) (Spotlight), 2024

7 Wenwen Si, Sangdon Park, Insup Lee, Edgar Dobriban, Osbert Bastani, *PAC Prediction Sets Under Label Shift*, The International Conference on Learning Representations (ICLR), 2024

8 Charles Zhang, Yunshuang Li, Osbert Bastani, Abhishek Gupta, Dinesh Jayaraman, Jason Ma, Lucas Weihs, *Universal Visual Decomposer: Long-Horizon Manipulation Made Easy*, IEEE International Conference on Robotics and Automation (ICRA), 2024

9 Open X-Embodiment Collaboration, *Open X-Embodiment: Robotic Learning Datasets and RT-X Models*, IEEE International Conference on Robotics and Automation (ICRA), 2024

10 Haosen Ge, Hamsa Bastani, Osbert Bastani, *Rethinking Fairness for Human-AI Collaboration*, Innovations in Theoretical Computer Science (ITCS), 2024

11 Stephen Mell, Steve Zdancewic, Osbert Bastani, *Optimal Program Synthesis via Abstract Interpretation*, ACM SIGPLAN Symposium on Principles of Programming Languages (POPL), 2024

12 Yahan Yang, Sunghye Cho, Maxine Covello, Azia Knox, Osbert Bastani, James Weimer, Edgar Dobriban, Robert Schultz, Insup Lee, Julia Parish-morris, *Automatically Predicting Perceived Conversation Quality in a Pediatric Sample Enriched for Autism*, Interspeech Conference, 2023

13 Yanju Chen, Chenglong Wang, Xinyu Wang, Osbert Bastani, Yu Feng, *Fast and Reliable Program Synthesis via User Interaction*, IEEE/ACM International Conference on Automated Software Engineering (ASE), 2023

14 Adam Khakhar, Stephen Mell, Osbert Bastani, *PAC Prediction Sets for Large Language Models of Code*, The International Conference on Machine Learning (ICML), 2023

15 Yecheng Jason Ma, Vikash Kumar, Amy Zhang, Osbert Bastani, Dinesh Jayaraman, *LIV: Language-Image Representations and Rewards for Robotic Control*, The International Conference on Machine Learning (ICML), 2023

16 Kishor Jothimurugan, Steve Hsu, Osbert Bastani, Rajeev Alur, *Robust Subtask Learning for Compositional Generalization*, The International Conference on Machine Learning (ICML), 2023

17 Rajeev Alur, Osbert Bastani, Kishor Jothimurugan, Mateo Perez, Fabio Somenzi, Ashutosh Trivedi, *Policy Synthesis and Reinforcement Learning for Discounted LTL*, International Conference on Computer Aided Verification (CAV), 2023

18 Stephen Mell, Favyen Bastani, Steve Zdancewic, Osbert Bastani, *Synthesizing trajectory queries from examples*, International Conference on Computer Aided Verification (CAV), 2023

19 Jason Yecheng Ma, Kausik Sivakumar, Jason Yan, Osbert Bastani, Dinesh Jayaraman, *Learning Policy-Aware Models for Model-Based Reinforcement Learning via Transition Occupancy Matching*, Annual Learning for Dynamics & Control Conference (L4DC), 2023

20 Wenwen Si, Shuo Li, Sangdon Park, Insup Lee, Osbert Bastani, *Angelic Patches for Improving Third-Party Object Detector Performance*, IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR), 2023

21 Sangdon Park, Osbert Bastani, Taesoo Kim, *ACon2: Adaptive Conformal Consensus for Provable Blockchain Oracles*, USENIX Security Symposium, 2023

22 Wanqiao Xu, Jason Yecheng Ma, Kan Xu, Hamsa Bastani, Osbert Bastani, *Uniformly Conservative Exploration in Reinforcement Learning*, The International Conference on Artificial Intelligence and Statistics (AISTATS), 2023

23 Jason Yecheng Ma, Shagun Sodhani, Dinesh Jayaraman, Osbert Bastani, Vikash Kumar, Amy Zhang, *VIP: Towards Universal Visual Reward and Representation via Value-Implicit Pre-Training*, The International Conference on Learning Representations (ICLR) (Spotlight), 2023

24 Jason Yecheng Ma, Jason Yan, Dinesh Jayaraman, Osbert Bastani, *Offline Goal-Conditioned Reinforcement Learning via f-Advantage Regression*, Annual Conference on Neural Information Processing Systems (NeurIPS), 2022

25 Osbert Bastani, Varun Gupta, Christopher Jung, Georgy Noarov, Ramya Ramalingam, Aaron Roth, *Practical Adversarial Multivalid Conformal Prediction*, Annual Conference on Neural Information Processing Systems (NeurIPS) (Oral), 2022

26 Osbert Bastani, Jason Ma, Estelle Shen, Wanqiao Xu, *Regret Bounds for Risk-Sensitive Reinforcement Learning*, Annual Conference on Neural Information Processing Systems (NeurIPS), 2022

27 Halley Young, Maxwell Du, Osbert Bastani, *Neurosymbolic Deep Generative Models for Sequence Data with Relational Constraints*, Annual Conference on Neural Information Processing Systems (NeurIPS), 2022

28 Sangdon Park, Edgar Dobriban, Insup Lee, Osbert Bastani, *PAC Prediction Sets for Meta-Learning*, Annual Conference on Neural Information Processing Systems (NeurIPS), 2022

29 Souradeep Dutta, Kaustubh Sridhar, Osbert Bastani, Edgar Dobriban, James Weimer, Insup Lee, Julia Parish-Morris, *Exploring with Sticky Mittens: Reinforcement Learning with Expert Interventions via Option Templates*, The Conference on Robot Learning (CoRL), 2022

30 Soham Dan, Osbert Bastani, Dan Roth, *Understanding Robust Generalization in Learning Regular Languages*, The International Conference on Machine Learning (ICML), 2022

31 Sooyong Jang, Sangdon Park, Insup Lee, Osbert Bastani, *Sequential Covariate Shift Detection Using Classifier Two-Sample Tests*, The International Conference on Machine Learning (ICML), 2022

32 Jason Yecheng Ma, Andrew Shen, Dinesh Jayaraman, Osbert Bastani, *SMODICE: Versatile Offline Imitation Learning via State Occupancy Matching*, The International Conference on Machine Learning (ICML), 2022

33 Kishor Jothimurugan, Suguman Bansal, Osbert Bastani, Rajeev Alur, *Specification-Guided Learning of Nash Equilibria with High Social Welfare*, International Conference on Computer Aided Verification (CAV), 2022

34 George Tolkachev, Stephen Mell, Steve Zdancewic, Osbert Bastani, *Counterfactual Explanations for Natural Language Interfaces*, Annual Meeting of the Association for Computational Linguistics (ACL) (Short), 2022

35 Sangdon Park, Edgar Dobriban, Insup Lee, Osbert Bastani, *PAC Prediction Sets Under Covariate Shift*, The International Conference on Learning Representations (ICLR), 2022

36 Jason Y. Ma, Andrew Shen, Osbert Bastani, Dinesh Jayaraman, *Conservative and Adaptive Penalty for Model-Based Safe Reinforcement Learning*, Annual AAAI Conference on Artificial Intelligence (AAAI), 2022

37 Jason Y. Ma, Dinesh Jayaraman, Osbert Bastani, *Conservative Offline Distributional Reinforcement Learning*, Annual Conference on Neural Information Processing Systems (NeurIPS), 2021

38 Yichen Yang, Jeevana P. Inala, Osbert Bastani, Yewen Pu, Armando Solar-Lezama, Martin Rinard, *Program Synthesis Guided Reinforcement Learning for Partially Observed Environments*, Annual Conference on Neural Information Processing Systems (NeurIPS) (Spotlight), 2021

39 Kishor Jothimurugan, Suguman Bansal, Osbert Bastani, Rajeev Alur, *Compositional Reinforcement Learning from Logical Specifications*, Annual Conference on Neural Information Processing Systems (NeurIPS), 2021

40 Alexis Ross, Himabindu Lakkaraju, Osbert Bastani, *Learning Models for Actionable Recourse*, Annual Conference on Neural Information Processing Systems (NeurIPS), 2021

41 Soham Dan, Osbert Bastani, Dan Roth, *Few-Shot Novel Concept Learning for Semantic Parsing*, Findings of the Conference on Empirical Methods in Natural Language Processing (Findings of EMNLP), 2021

42 Jason Y. Ma, Jeevana I. Priya, Dinesh Jayaraman, Osbert Bastani, *Likelihood-Based Diverse Sampling for Trajectory Forecasting*, IEEE International Conference on Computer Vision (ICCV), 2021

43 Favyen Bastani, Songtao He, Ziwen Jiang, Osbert Bastani, Sam Madden, *SkyQuery: An Aerial Drone Video Sensing Platform*, Symposium on New Ideas in Programming and Reflections on Software (Onward!), 2021

44 Radoslav Ivanov, Kishor Jothimurugan, Steve Hsu, Vaidya Shaan, Rajeev Alur, Osbert Bastani, *Compositional Learning and Verification of Neural Network Controllers*, ACM SIGBED International Conference on Embedded Software (EMSOFT), 2021

45 Osbert Bastani, Shuo Li, Anton Xue, *Safe Reinforcement Learning via Statistical Model Predictive Shielding*, Robotics: Science and Systems (RSS), 2021

46 Kan Xu, Xuanyi Zhao, Hamsa Bastani, Osbert Bastani, *Group-Sparse Matrix Factorization for Transfer Learning of Word Embeddings*, The International Conference on Machine Learning (ICML), 2021

47 Jocelyn Chen, Aaron Lamoreaux, Xinyu Wang, Greg Durrett, Osbert Bastani, Isil Dillig, *Web Question Answering with Neurosymbolic Program Synthesis*, ACM SIGPLAN conference on Programming Language Design and Implementation (PLDI), 2021

48 Osbert Bastani, *Safe Reinforcement Learning with Nonlinear Dynamics via Model Predictive Shielding*, American Control Conference (ACC), 2021

49 Kishor Jothimurugan, Osbert Bastani, Rajeev Alur, *Abstract Value Iteration for Hierarchical Deep Reinforcement Learning*, The International Conference on Artificial Intelligence and Statistics (AISTATS), 2021

50 Min Wen, Osbert Bastani, Ufuk Topcu, *Algorithms for Fairness in Sequential Decision Making*, The International Conference on Artificial Intelligence and Statistics (AISTATS), 2021

51 Sangdon Park, Shuo Li, Insup Lee, Osbert Bastani, *PAC Confidence Predictions for Deep Neural Network Classifiers*, The International Conference on Learning Representations (ICLR), 2021

52 Jeevana P. Inala, Yichen Yang, James Paulos, Yewen Pu, Osbert Bastani, Vijay Kumar, Martin Rinard, Armando Solar-Lezama, *Neurosymbolic Transformers for Multi-Agent Communication*, Annual Conference on Neural Information Processing Systems (NeurIPS), 2020

53 Jiani Huang, Calvin Smith, Osbert Bastani, Rishabh Singh, Aws Albarghouthi, Mayur Naik, *Generating Programmatic Referring Expressions via Program Synthesis*, The International Conference on Machine Learning (ICML), 2020

54 Himabindu Lakkaraju, Nino Arsov, Osbert Bastani, *Robust and Stable Black Box Explanations*, The International Conference on Machine Learning (ICML), 2020

55 Yanju Chen, Chenglong Wang, Osbert Bastani, Isil Dillig, Yu Feng, *Program Synthesis using Deduction-Guided Reinforcement Learning*, International Conference on Computer Aided Verification (CAV), 2020

56 Shuo Li, Osbert Bastani, *Robust Model Predictive Shielding for Safe Reinforcement Learning with Stochastic Dynamics*, IEEE International Conference on Robotics and Automation (ICRA), 2020

57 Osbert Bastani, *Sample Complexity of Estimating the Policy Gradient for Nearly Deterministic Dynamical Systems*, The International Conference on Artificial Intelligence and Statistics (AISTATS), 2020

58 Sangdon Park, Osbert Bastani, Jim Weimer, Insup Lee, *Calibrated Prediction with Covariate Shift via Unsupervised Domain Adaptation*, The International Conference on Artificial Intelligence and Statistics (AISTATS), 2020

59 Sangdon Park, Osbert Bastani, Nikolai Matni, Insup Lee, *PAC Confidence Sets for Deep Neural Networks via Calibrated Prediction*, The International Conference on Learning Representations (ICLR), 2020

60 Jeevana P. Inala, Osbert Bastani, Zenna Tavares, Armando Solar-Lezama, *Synthesizing Programmatic Policies that Inductively Generalize*, The International Conference on Learning Representations (ICLR), 2020

61 Himabindu Lakkaraju, Osbert Bastani, *"How do I fool you?": Manipulating User Trust via Misleading Black Box Explanations*, AAAI Conference on AI, Ethics, and Society (AIES), 2020

62 Kishor Jothimurugan, Rajeev Alur, Osbert Bastani, *Composable Specifications for Reinforcement Learning*, Annual Conference on Neural Information Processing Systems (NeurIPS), 2019

63 Osbert Bastani, Xin Zhang, Armando Solar-Lezama, *Verifying Fairness Properties via Concentration*, ACM Conference on Object-Oriented Programming, Systems, Languages, and Applications (OOPSLA), 2019

64 Jai Chen, Jiayi Wei, Yu Feng, Osbert Bastani, Isil Dillig, *Relational Verification using Reinforcement Learning*, ACM Conference on Object-Oriented Programming, Systems, Languages, and Applications (OOPSLA), 2019

65 Zhengkai We, Evan Johnson, Wei Yang, Osbert Bastani, Dawn Song, Jian Peng, Tao Xie, *REINAM: Reinforcement Learning for Input-Grammar Inference*, ACM International Conference on the Foundations of Software Engineering (FSE), 2019

66 Arbaaz Khan, Chi Zhang, Shuo Li, Jiayue Wu, Brent Schlotfeldt, Sarah Tang, Alejandro Ribeiro, Osbert Bastani, Vijay Kumar, *Learning Safe Unlabeled Multi-Robot Planning with Motion Constraints*, IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2019

67 Halley Young, Osbert Bastani, Mayur Naik, *Learning Neurosymbolic Generative Models via Program Synthesis*, The International Conference on Machine Learning (ICML), 2019

68 Osbert Bastani, Yewen Pu, Armando Solar-Lezama, *Verifiable Reinforcement Learning via Policy Extraction*, Annual Conference on Neural Information Processing Systems (NeurIPS), 2018

69 Osbert Bastani, Rahul Sharma, Alex Aiken, Percy Liang, *Active learning of points-to specifications*, ACM SIGPLAN conference on Programming Language Design and Implementation (PLDI), 2018

70 Yu Feng, Ruben Martins, Osbert Bastani, Isil Dillig, *Program synthesis using conflict-driven learning*, ACM SIGPLAN conference on Programming Language Design and Implementation (PLDI), 2018

71 Osbert Bastani, Rahul Sharma, Alex Aiken, Percy Liang, *Synthesizing program input grammars*, ACM SIGPLAN conference on Programming Language Design and Implementation (PLDI), 2017

72 Yu Feng, Osbert Bastani, Ruben Martins, Isil Dillig, Saswat Anand, *Automated synthesis of semantic malware signatures using maximum satisfiability*, The Network and Distributed System Security Symposium (NDSS), 2017

73 Osbert Bastani, Yani Ioannou, Lenonidas Lampropoulos, Dimitrios Vytiniotis, Aditya Nori, Antonio Criminisi, *Measuring neural net robustness with constraints*, Annual Conference on Neural Information Processing Systems (NeurIPS), 2016

74 Lazaro Clapp, Osbert Bastani, Saswat Anand, Alex Aiken, *Minimizing GUI event traces*, ACM International Conference on the Foundations of Software Engineering (FSE), 2016

75 Osbert Bastani, Saswat Anand, Alex Aiken, *Interactively verifying absence of explicit information flows in Android apps*, ACM Conference on Object-Oriented Programming, Systems, Languages, and Applications (OOPSLA), 2015

76 Osbert Bastani, Saswat Anand, Alex Aiken, *Specification inference using context-free language reachability*, ACM SIGPLAN Symposium on Principles of Programming Languages (POPL), 2015

Invited Talks

March 2024 **Cornell AI Seminar**, *Conformal Prediction for Large Language Models*

February 2024 **Cornell Tech NLP Seminar**, *Large Language Models for Program Optimization*

February 2024 **Stanford MLSys Seminar**, *Large Language Models for Program Optimization*

February 2024 **Pennsylvania State University Systems, Controls, and Robotics Seminar**, *Safe Visual Reinforcement Learning via Conformal Prediction*

June 2023 **University of British Columbia TrustML Workshop**, *Specifying Machine Learning Components with Conformal Prediction*

May 2023 **ACC Safe Perception-based Control Workshop**, *Probabilistic Safety Guarantees for Reinforcement Learning via Model Predictive Shielding*

February 2023 **University of Pennsylvania ASSET Seminar**, *Decision-Aware Learning for Global Health Supply Chains*

January 2023 **IPAM Workshop on Explainable AI for the Sciences: Towards Novel Insights**, *Interpretable Machine Learning via Program Synthesis*

July 2022 **ICML Workshop on Distribution-Free Uncertainty Quantification**, *PAC Prediction Sets: Theory and Applications*

February 2022 **University of Pennsylvania CIS Colloquium**, *Trustworthy Machine Learning Systems via PAC Uncertainty Quantification*

February 2022 **Yale CS Seminar**, *Trustworthy Machine Learning Systems via PAC Uncertainty Quantification*

August 2021 **IFDS Summer Workshop on Statistical Approaches to Understanding Modern Machine Learning Methods**, *PAC prediction sets under distribution shift*

April 2021 **Simons Institute Workshop on Games and Equilibria**, *Safe Human-Interactive Control via Shielding*

July 2020 **ICML Workshop on Explainable AI: Beyond Deep Models and Classifiers**, *Interpretable, Robust, and Verifiable Reinforcement Learning*

February 2020 **UCSD AI Seminar**, *Statistical Techniques for Building Trustworthy Machine Learning Systems*

February 2020 **UCSB Programming Languages Seminar**, *Statistical Techniques for Building Trustworthy Machine Learning Systems*

April 2019 **UT Austin Programming Languages Seminar**, *Incorporating Structure into Machine Learning*

May 2019 **ICLR Workshop on Debugging Machine Learning Models**, *Verifiable Reinforcement Learning via Policy Extraction*

April 2018 **CPS Week Workshop on Design and Analysis of Robust Systems (DARS)**, *Measuring Neural Net Robustness*

March 2017 **University of Pennsylvania Computer Science Seminar**, *Beyond Deductive Inference in Program Analysis*

March 2017 **Northwestern University Computer Science Seminar**, *Beyond Deductive Inference in Program Analysis*

February 2017 **Cornell University Computer Science Colloquium**, *Beyond Deductive Inference in Program Analysis*

February 2017 **Penn State University Computer Science Seminar**, *Beyond Deductive Inference in Program Analysis*

Funded Grants

2024-2025 **PI**, *Amazon Research Award: Uncertainty Quantification for Trustworthy Language Generation*, $70K

2024-2029 **PI**, *NSF CAREER: Formal Guarantees for Neurosymbolic Programs via Conformal Prediction*, $598K

2023-2027 **Co-PI**, *NSF SLES: SPECSRL: Specification-guided Perception-enabled Conformal Safe Reinforcement Learning*, $1.50M

2023-2024 **Co-PI**, *ASSET/IBI Collaborative Research in Trustworthy AI for Medicine*, $100K

2020-2025 **Co-PI**, *NSF Expeditions: Collaborative Research: Understanding the World Through Code*, $8.66M (Penn's portion: $807K)

2020-2025 **Co-PI**, *ARO MURI: Robust Concept Learning and Lifelong Adaptation Against Adversarial Attacks*, $3.74M

2019-2023 **PI**, *NSF SHF: Small: Inferring Specifications for Blackbox Code*, $500K

2019-2022 **Co-PI**, *DARPA Learning with Less Labels: FLASH: Fast Learning via Auxiliary signals, Structured knowledge, and Human expertise*, $2.80M

Ph.D. Student Advising

2023- **Michael Yao (co-advised with James Gee)**, *Current student, working on optimizing surrogate objectives using generative adversarial learning*

2022- **Alex Shypula**, *Current student, working on program optimization using large language models*

2022- **Yimeng Zeng (co-advised with Jake Gardner)**, *Current student, working on constrained deep generative models*

2021- **Ramya Ramalingam (co-advised with Aaron Roth)**, *Current student, working on online conformal prediction*

2020- **Jason Ma (co-advised with Dinesh Jayaraman)**, *Current student, working on foundation reward models for robot skill acquisition*

2020- **Shuo Li (co-advised with Insup Lee)**, *Current student, working on applications of conformal prediction to trustworthy machine learning*

2019- **Stephen Mell (co-advised with Steve Zdancewic)**, *Current student, working on neurosymbolic programming*

2019-2024 **Halley Young**, *Thesis: Specification Guided Generative Models*

2019-2021 **Sangdon Park (co-advised with Insup Lee)**, *Thesis: Uncertainty Estimation Toward Safe AI*

Undergraduate/Masters Student Advising

2023- **Botong Zhang (undergraduate)**

2021-2024 **Estelle Shen (undergraduate)**, *Publication in the Annual Conference on Neural Information Processing Systems (NeurIPS)*

2020-2024 **Sarah Luthra (undergraduate)**

2023-2024 **Divya Kumari (masters)**, *Master's Thesis: Testing Program Equivalence using LLMs*

2023 **Ranbir Mahtani (undergraduate)**, *Senior Thesis: GPT's Theory, Performance, Applications, and Future Direction*

2022-2023 **Yuting Deng (masters)**

2021-2022 **Angelina Heyler (masters)**, *Master's Thesis: PAC Prediction Sets for Deep Neural Networks Trained via Federated Learning*

2021-2022 **Aishwarya Wesanekar (masters)**

2021-2022 **Utkarsh Kashyap (masters)**

2020-2022 **Ryan Gannon (undergraduate)**

2020-2022 **Aryan Singh (undergraduate)**

2020-2021 **Jian Zhang (undergraduate)**

2020-2021 **George Tolkachev (masters)**, *Publication in Annual Meeting of the Association for Computational Linguistics (ACL)*

2020-2021 **Wanqiao Xu (undergraduate)**, *Publications in the Annual Conference on Neural Information Processing Systems (NeurIPS) and the International Conference on Artificial Intelligence and Statistics (AISTATS)*

2020 **Maxwell Du (undergraduate)**, *Publication in the Annual Conference on Neural Information Processing Systems (NeurIPS)*

2019-2020 **Shuo Li (masters)**, *Publication in IEEE International Conference on Robotics and Automation (ICRA)*

2019 **Brian Heath (masters)**

Service

2024 **Penn Departmental of Computer and Information Science Colloquium**, Organizer

2024 **International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS)**, Program Committee Member

2023 **The International Conference on Learning Representations (ICLR) 2024**, Area Chair

2023 **Annual AAAI Conference on Artificial Intelligence (AAAI) 2024**, Senior Program Committee Member

2023 **ACM Conference on Object-Oriented Programming, Systems, Languages, and Applications (OOPSLA) 2023**, Review Committee Member

2022 **Annual AAAI Conference on Artificial Intelligence (AAAI) 2023**, Senior Program Committee Member

2022 **ACM Conference on Object-Oriented Programming, Systems, Languages, and Applications (OOPSLA) 2022**, Program Committee Member

2021 **ACM SIGPLAN conference on Programming Language Design and Implementation (PLDI) 2022**, Program Committee Member

2020 **ACM SIGPLAN conference on Programming Language Design and Implementation (PLDI) 2021**, Program Committee Member

2019 **ACM SIGPLAN Symposium on Principles of Programming Languages (POPL) 2020**, Program Committee Member

2019 **International Conference on Computer Aided Verification (CAV) 2019**, Program Committee Member

2018 **ACM SIGPLAN conference on Programming Language Design and Implementation (PLDI) 2019**, External Program Committee Member

2017 **ACM SIGPLAN conference on Programming Language Design and Implementation (PLDI) 2018**, External Program Committee Member

Teaching

Spring 2024 **CIS 7000: Trustworthy Machine Learning**, *University of Pennsylvania*

Fall 2023 **CIS 4190/5190: Applied Machine Learning**, *University of Pennsylvania*

Spring 2023 **CIS 4190/5190: Applied Machine Learning**, *University of Pennsylvania*

Fall 2022 **CIS 4190/5190: Applied Machine Learning**, *University of Pennsylvania*