ANQI LI

anqil4@cs.washington.edu
anqili.github.io

RESEARCH INTERESTS

My research focuses on providing formal performance and safety guarantees for robot learning. Specific research topics include offline reinforcement learning (RL), safe RL, learning stable dynamical systems/policies, learning from human demonstrations, and planning & control with guarantees.

EDUCATION

University of Washington Sept. 2019 – Dec. 2023 (expected)
Ph.D. student in Computer Science & Engineering *Seattle, WA*
· Advisor: Prof. Byron Boots, GPA: 3.96/4.00

Georgia Institute of Technology Aug. 2017 – Aug. 2019
Ph.D. student in Robotics *Atlanta, GA*
· Advisors: Prof. Magnus Egerstedt & Prof. Byron Boots, GPA: 4.00/4.00
· Transferred to the University of Washington in Sept. 2019

Carnegie Mellon University Aug. 2015 – May 2017
Masters in Robotics *Pittsburgh, PA*
· Advisor: Prof. Katia Sycara, GPA: 4.00/4.00

Zhejiang University Sept. 2011 – July 2015
Bachelor of Engineering in Automation *Hangzhou, China*
· GPA: 3.93/4.00, Rank: 1/132

RESEARCH EXPERIENCE

University of Washington Sept. 2019 –
Graduate Research Assistant *Seattle, WA*

· Offline reinforcement learning with unlabeled and mislabeled data

· High-speed off-road autonomous driving on complex terrains

· Safe reinforcement learning with structured policy classes

· Learning spatially coordinated policies from human demonstrations

Facebook AI Research June – Sept. 2021
Research Intern *Remote*

· Learning from expert demonstrations under different dynamics

NVIDIA Research May – Aug. 2019, June – Sept. 2020
Robotics Research Intern *Seattle, WA*

· Fully differentiable composable policy class for robot learning

· Learning Riemannian motion policies from human demonstrations

Georgia Institute of Technology Aug. 2017 – May 2019
Graduate Research Assistant *Atlanta, GA*

· Multi-objectives motion generation for multi-robot systems

· Distributed second-order optimization for multi-agent systems

· Formally correct behavior composition for robot teams

Microsoft Research June 2017 – Aug. 2017
Research Intern, CNTK Group *Redmond, WA*

· Video synthesis from images using generative adversarial networks

Carnegie Mellon University Oct. 2015 – May 2017
Graduate Research Assistant *Pittsburgh, PA*

· Topology-based coordination for large teams of robots

· State abstraction for multi-robot systems under uncertainty

· Human action prediction for cyber-physical systems using recurrent neural networks

PUBLICATIONS

(* indicates equal contribution)

Journal Publications

[J3] J. Urain, **A. Li**, P. Liu, C. D'Eramo, and J. Peters, "Composable Energy Policies for Reactive Motion Generation and Reinforcement Learning." *International Journal of Robotics Research, 2023*

[J2] K. Van Wyk, M. Xie, **A. Li**, M.A. Rana, B. Babich, B. Peele, Q. Wan, I. Akinola, B. Sundaralingam, D. Fox, B. Boots, and N. Ratliff, "Geometric Fabrics: Generalizing Classical Mechanics to Capture the Physics of Behavior." *IEEE Robotics and Automation Letters (RA-L), 2022* (Best Paper Award)

[J1] P. Pierpaoli, **A. Li**, M. Srinivasan, X. Cai, S. Coogan, and M. Egerstedt, "A Sequential Composition Framework for Coordinating Multi-robot Behaviors." *IEEE Transactions on Robotics (T-RO), 2020*

Conference Publications

[C15] **A. Li**, B. Boots, C.-A. Cheng, "MAHALO: Unifying Offline Reinforcement Learning and Imitation Learning from Observations." *International Conference on Machine Learning (ICML), 2023*

[C14] X. Meng, N. Hatch, A. Lambert, **A. Li**, N. Wagener, M. Schmittle, J. Lee, W. Yuan, Q. Chen, S. Deng, G. Okopal, D. Fox, B. Boots, A. Shaban, "TerrainNet: Visual Modeling of Complex Terrain for High-speed, Off-road Navigation." *Robotics: Science and Systems (R:SS), 2023*

[C13] M. A. Rana*, **A. Li***, D. Fox, S. Chernova, B. Boots, and N. Ratliff, "Towards Coordinated Robot Motions: End-to-End Learning of Motion Policies on Transform Trees." *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2021*

[C12] **A. Li***, C.-A. Cheng*, M. A. Rana, M. Xie, K. Van Wyk, N. Ratliff, and B. Boot, "RMP^2: A Structured Composable Policy Class for Robot Learning." *Robotics: Science and Systems (R:SS), 2021*

[C11] J. Urain, **A. Li**, P. Liu, C. D'Eramo, and J. Peters, "Composable Energy Policies for Reactive Motion Generation and Reinforcement Learning." *Robotics: Science and Systems (R:SS), 2021*

[C10] N. Ratliff, K. Van Wyk, M. Xie, **A. Li**, and M. A. Rana, "Generalized Nonlinear and Finsler Geometry for Robotics." *IEEE Conference on Robotics and Automation (ICRA), 2021*

[C9] M. A. Rana, **A. Li**, D. Fox, B. Boots, F. Ramos, and N. Ratliff, "Euclideanizing Flows: Diffeomorphic Reductions for Learning Stable Dynamical Systems." *Conference on Learning for Dynamics and Control (L4DC), 2020*

[C8] **A. Li**, and C.-A. Cheng, B. Boots, and M. Egerstedt, "Stable, Concurrent Controller Composition for Multi-Objective Robotic Tasks." *IEEE Conference on Decision and Control (CDC), 2019*

[C7] M. A. Rana*, **A. Li***, H. Ravichandar, M. Mukadam, S. Chernova, D. Fox, B. Boots, and N. Ratliff, "Learning Reactive Motion Policies in Multiple Task Spaces from Human Demonstrations." *Conference on Robot Learning (CoRL), 2019*

[C6] **A. Li**, M. Mukadam, M. Egerstedt, and B. Boots, "Multi-Objective Policy Generation for Multi-Robot Systems Using Riemannian Motion Policies." *International Symposium on Robotics Research (ISRR), 2019*

[C5] **A. Li**, and M. Egerstedt, "On the Trade-Off Between Communication and Execution Overhead for Control of Multi-Agent Systems." *American Control Conference (ACC), 2019*

[C4] **A. Li**, L. Wang, P. Pierpaoli, and M. Egerstedt, "Formally Correct Composition of Coordinated Behaviors Using Control Barrier Certificates." *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2018*

[C3] **A. Li**, W. Luo, S. Nagavalli, and K. Sycara, "Decentralized Coordinated Motion for a Large Team of Robots Preserving Connectivity and Avoiding Collisions." *IEEE Conference on Robotics and Automation (ICRA), 2017*

[C2] **A. Li**, W. Luo, S. Nagavalli, N. Chakraborty, and K. Sycara, "Handling State Uncertainty in Distributed Information Leader Selection for Robotics Swarms." *IEEE Conference on System, Man and Cybernetics (SMC), 2016*

[C1] **A. Li**, M. Lewis, C. Lebiere, K. Sycara, S. S. Khatib, Y. Tang, M. Siedsma, and D. Morrison, "A Computational Model Based on Human Performance for Fluid Management in Critical Care." *IEEE Symposium Series on Computational Intelligence (SSCI), 2016*

Workshop Papers

[W2] **A. Li**, D. Misra, A. Kolobov, C.-A. Cheng, "Survival Instinct in Offline Reinforcement Learning and Implicit Human Bias in Data." *ICML Workshop on Interactive Learning with Implicit Human Feedback, 2023*

[W1] **A. Li***, C.-A. Cheng*, M. A. Rana, N. Ratliff, and B. Boot, "RMP^2: a Differentiable Policy Class for Robotic Systems with Control-Theoretic Guarantees." *3rd NeurIPS Workshop on Robot Learning, 2020; Microsoft Reinforcement Learning Day, 2021*

Preprints & Technical Reports

[TR4] **A. Li**, D. Misra, A. Kolobov, C.-A. Cheng, "Survival Instinct in Offline Reinforcement Learning." *arXiv preprint arXiv:2306.03286, 2023*

[TR3] M. Xie, **A. Li**, K. Van Wyk, F. Dellaert, B. Boots, and N. Ratliff, "Imitation Learning via Simultaneous Optimization of Policies and Auxiliary Trajectories." *arXiv preprint arXiv:2105.03019, 2021*

[TR2] N. Ratliff, K. Van Wyk, M. Xie, **A. Li**, and M. A. Rana, "Optimization Fabrics." *arXiv preprint arXiv:2008.02399, 2020*

[TR1] P. Pierpaoli, H. Ravichandar, N. Waytowich, **A. Li**, D. Asher, and M. Egerstedt, "Inferring and Learning Multi-Robot Policies by Observing an Expert." *arXiv preprint arXiv:1909.07887, 2019*

Thesis

[T1] **A. Li**, "Decentralized Coordinated Motion for Robot Teams Preserving Connectivity and Avoiding Collisions.", *Master's Thesis, Carnegie Mellon University, 2017*

INVITED TALKS & POSTERS

Learning Reactive Robot Motion Policies with Control-theoretic Guarantees

- Microsoft Research AI Breakthroughs, September 2020
- Robotics Colloquium@UW, November 2020
- NVIDIA GTC, April 2021
- Robotics Seminar@UIUC, May 2021

Safe and Efficient Robot Learning Using Riemannian Motion Policies

- R:SS'21 Workshop on Geometry and Topology in Robotics

HONORS

– **R:SS Pioneer (30 worldwide)** 2022

– **NVIDIA Graduate Fellowship (5 worldwide)** 2020

– Georgia Robotics Fellowship 2017

– ICRA RAS Travel Grant 2017

– GSA Conference Funding, CMU 2016, 2017

– **Siebel Scholar Class of 2017 (72 worldwide)** 2016

– Outstanding Graduate (top 5%), ZJU 2015

– Excellent Undergraduate Thesis Award (top 10%), ZJU 2015

– **Chu Kochen Scholarship (top 0.2%, highest honor), ZJU** 2014

– National Scholarship (top 1%), China 2013

– First-Class Scholarship for Outstanding Students (top 3%), ZJU 2013, 2014

– Excellent Student Awards, ZJU 2012, 2013, 2014

LEADERSHIP AND PROFESSIONAL SERVICE

– Faculty Chair, R:SS Pioneers Workshop 2023

– Student Volunteer, American Control Conference 2021

– Volunteer, Computer Science & Engineering Ph.D. Admission, University of Washington 2020 – 2022

- Student Area Chair in Robotics (2021 – 2022), Student Reader (2020 – 2022)

– Mentor, Pre-Application Mentorship Service*, University of Washington 2020 – 2022

- Hosted 1-on-1 mentoring meetings to provide information on graduate school applications
- Provided verbal and written feedback on prospective students' Ph.D. application materials

* *The PAMS program is especially designed to assist PhD applicants from underrepresented communities and related organizations*

– Member of Executive Board, RoboGrads, Georgia Institute of Technology 2018 – 2019

- President (May – Aug. 2019), Vice-President Academics (May 2018 – May 2019)
- Initiated faculty-student lunch events in the robotics community
- Organized student seminars where students present their research to their peers

– Research Breakout Room Host, Allen School Women's Research Day 2021

- Shared research and career development experience with women undergraduate researchers

– Reviewer

- **Journals:** IEEE Robotics and Automation Letters (RA-L); European Journal of Control (EJC)
- **Conferences:** IEEE International Conference on Robotics and Automation (ICRA); Robotics: Science and Systems (R:SS); Conference on Robot Learning (CoRL); IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS); IEEE Conference on Decision and Control (CDC); IEEE International Conference on Robot & Human Interactive Communication (RO-MAN)
- **Workshops:** NeurIPS Workshop on Imitation Learning and its Challenges in Robotics, AAAI Student Abstract and Poster Program, R:SS Pioneers Workshop

TEACHING EXPERIENCE

University of Washington Mar. 2020 – June 2020, Sept. 2022 – Dec. 2022
Graduate Teaching Assistant *Seattle, WA*

– CSE-599W: Reinforcement Learning, Spring 2020, Instructor: Prof. Byron Boots
– CSE/AMATH 579: Intelligent Control Through Learning and Optimization, Fall 2022, Instructor: Prof. Byron Boots

Georgia Institute of Technology Jan. 2018 – May 2018
Graduate Teaching Assistant *Atlanta, GA*

– CS-3630: Introduction to Robotics and Perception, Spring 2018, Instructor: Prof. Sonia Chernova

SKILLS

Programming Laguages	Python, MATLAB, C/C++, Java
Automatic Differentiation Libraries	PyTorch, Tensorflow
Simulators	OpenAI Gym, MuJoCo, PyBullet
Robotic Software	ROS