Ali Baheri

Curriculum Vitae

Research Interests

Theory	Reinforcement learning, Bayesian optimization, machine learning, decision making under uncertainty
Application areas	Autonomous systems, robotics, energy systems

Position

2023–onward	**Assistant Professor (tenure-track)**, *Rochester Institute of Technology*
2022–2023	**Visiting Scholar**, *Stanford University*
2019–2022	**Assistant Professor (research-track)**, *West Virginia University*
2018–2019	**Postdoctoral Fellow**, *University of Michigan Ann Arbor*

Education

2015–2018	**Ph.D**, *University of North Carolina at Charlotte* Specialized in machine learning and control theory
2012–2014	**M.S.**, *University of Louisiana at Lafayette* Specialized in Mechanical Engineering - systems, dynamics, and control
2002–2006	**B.S.**, *Sharif University of Technology* Specialized in Mechanical Engineering - solid design

Honors and Awards

2023	AAAI-23 New Faculty Highlights
2022	National Science Foundation EPSCoR Fellowship
2018	Ford Motor Company Postdoctoral Fellowship
2018	SigOpt Inc. Graduate Research Fellowship

Research Funding

2022-2024	**RII Track-4: NSF: Safety Validation of Autonomous Systems from Multiple Sources of Information**, *NSF- ≈$200K*, Single PI
2021-2023	**Safety Verification Framework for Learning-based Aviation Systems (SVF-LAS)**, *Federal Aviation Administration- $400K*, Lead PI
2021-2022	**Fault Diagnosis for Safety-Critical Autonomous Systems using Reinforcement Learning**, *NASA- $100K*, Lead PI
2021-2022	**Black-Box Verification of Autonomous Systems Using Modular Reinforcement Learning**, *NASA WV Space Grant Consortium- ≈$30K*, Single PI

2021-2022 **Verification of Multi-Agent Autonomous Planning and Control**, *West Virginia University Research Office Program- ≈$25K*, Single PI

2020–2021 **Robust Autonomy Through Experimentally Infused Decision Making with the Application to Planetary Mars Rover**, *NASA WV Space Grant Consortium- ≈$23K*, Single PI

Publications

Journal Publications

[J10] P. Razzaghi, A. Tabrizian, W. Guo, S. Chen, A. Taye, E. Thompson, A. Bregeon, **Ali Baheri**, P. Wei, A survey on reinforcement learning in aviation applications. *Engineering Applications of Artificial Intelligence*, Vol. 135, 2024.

[J9] L. Yifru, **Ali Baheri**, Concurrent Learning of Control Policy and Unknown Safety Specifications in Reinforcement Learning. *IEEE Open Journal of Control Systems*, Vol. 3, pp. 266-281, 2024.

[J8] **Ali Baheri**, Exploring the role of simulator fidelity in the safety validation of learning-enabled autonomous systems. *AI Magazine*, Vol. 44, pp. 453-459, 2023.

[J7] **Ali Baheri**, Safety validation of learning-based autonomous systems: a multi-fidelity approach. *Proceedings of the AAAI Conference on Artificial Intelligence*, Vol. 37, Issue 13, pp. 15432-15432, 2023.

[J6] **Ali Baheri**, Safe Reinforcement Learning with Mixture Density Network, with Application to Autonomous Driving. *Results in Control and Optimization*, Vol. 6, 2022.

[J5] **Ali Baheri**, C. Vermillion, Combined Plant and Controller Design Using Batch Bayesian Optimization: A Case Study in Airborne Wind Energy Systems. *ASME Journal of Dynamics, Measurement, and Control*, Vol. 141, Issue 9, 2019.

[J4] S. Bin-Karim, A. Bafandeh, **Ali Baheri**, and C. Vermillion, Spatiotemporal Optimization Through Gaussian Process Based Model Predictive Control: Case Study in Airborne Wind Energy. *IEEE Transactions on Control Systems Technology*, Vol. 27, Issue 2, pp. 798-805, 2019.

[J3] **Ali Baheri**, P. Ramaprabhu, and C. Vermillion, Iterative 3D Layout Optimization and Parametric Trade Study for a Reconfigurable Ocean Current Turbine Array Using Bayesian Optimization. *Renewable Energy*, Vol. 127, pp. 1052-1063, 2018.

[J2] A. Bafandeh, S. Bin-Karim, **Ali Baheri**, and C. Vermillion, A Comparative Assessment of Hierarchical Control Structures for Spatiotemporally Varying Systems, with Application to Airborne Wind Energy. *Control Engineering Practice*, Vol. 74, pp. 71-83, 2018.

[J1] **Ali Baheri**, S. Bin-Karim, A. Bafandeh, and C. Vermillion, Real-Time Control Using Bayesian Optimization: A Case Study in Airborne Wind Energy Systems. *Control Engineering Practice*, Vol. 69, pp. 131-140, 2017.

Conference and Workshop Publications

[C18] Z. Shahrooei, **Ali Baheri**, Optimal Transport-Assisted Risk-Sensitive Q-Learning. *Towards Safe Autonomy: Emerging Requirements, Definitions, and Methods* workshop, RSS 2024.

[C17] **Ali Baheri**, C. Alm, LLMs-Augmented Contextual Bandit. *Optimal Transport and Machine Learning* workshop, NeurIPS 2023.

[C16] **Ali Baheri**, Understanding Reward Ambiguity Through Optimal Transport Theory in Inverse Reinforcement Learning. *Optimal Transport and Machine Learning* workshop, NeurIPS 2023.

[C15] **Ali Baheri**, Risk-Aware Reinforcement Learning Through Optimal Transport Theory *3rd RL-CONFORM* workshop, IROS 2023.

[C14] Z. Shahrooei, M. Kochenderfer, and **Ali Baheri**, Falsification of Learning-Based Controllers through Multi-Fidelity Bayesian Optimization. *In European Control Conference*, Bucharest, Romania, 2023.

[C13] **Ali Baheri**, H. Ren, B. Johnson, P. Razzaghi, and P. Wei, A Verification Framework for Certifying Learning-based Safety-Critical Aviation Systems. *In AIAA*, Chicago, IL, 2022.

[C12] **Ali Baheri**, Safe Reinforcement Learning with Mixture Density Network: A Case Study in Autonomous Highway Driving. *In Robotics: Science and Systems*, Corvallis, OR, 2020.

[C11] **Ali Baheri**, S. Nageshrao, I. Kolmanovsky, A. Girard, E. Tseng, and D. Filev, Deep Reinforcement Learning with Enhanced Safety for Autonomous Highway Driving. *In 31st IEEE Intelligent Vehicles Symposium*, Las Vegas, NV, 2020.

[C10] **Ali Baheri**, I. Kolmanovsky, A. Girard, E. Tseng, and D. Filev, Vision-Based Autonomous Driving: A Model Learning Approach. *In American Control Conference*, Denver, CO, 2020.

[C9] **Ali Baheri**, C. Vermillion, Waypoint Optimization Using Bayesian Optimization: A Case Study in Airborne Wind Energy Systems. *In American Control Conference*, Denver, CO, 2020.

[C8] **Ali Baheri**, S. Nageshrao, I. Kolmanovsky, A. Girard, E. Tseng, and D. Filev, Deep Q-Learning with Dynamically-Learned Safety Module: A Case Study in Autonomous Driving. *In Neural Information Processing Systems*, Vancouver, Canada, 2019.

[C7] **Ali Baheri**, C. Vermillion, Context-Dependent Bayesian Optimization in Real-Time Optimal Control: A Case Study in Airborne Wind Energy Systems. *In Neural Information Processing System, NIPS Workshop on Bayesian Optimization*, Long Beach, CA, 2017.

[C6] **Ali Baheri**, J. Deese, and C. Vermillion, Combined Plant and Controller Design Using Bayesian Optimization: A Case Study in Airborne Wind Energy Systems. *In ASME Dynamic Systems and Control Conference*, Tysons Corner, VA, 2017.

[C5] **Ali Baheri**, P. Ramaprabhu, and C. Vermillion, Iterative In-Situ 3D Layout Optimization of a Reconfigurable Ocean Current Turbine Array Using Bayesian Optimization. *In ASME Dynamic Systems and Control Conference*, Tysons Corner, VA, 2017.

[C4] **Ali Baheri**, C. Vermillion, Altitude Optimization of Airborne Wind Energy Systems: A Bayesian Optimization Approach. *In American Control Conference*, Seattle, WA, 2017.

[C3] **Ali Baheri**, J. Vaughan, Concurrent Design of Unity-Magnitude Input Shapers and Proportional-Derivative Feedback Controllers. *In American Control Conference*, Chicago, IL, 2015.

[C2] **Ali Baheri**, J. Vaughan, Robust Concurrent Design of Input and Proportional-Derivative Feedback Controllers. *In International Symposium on Flexible Automation*, Awaji-Island, Japan, 2014.

[C1] **Ali Baheri**, J. Vaughan, Concurrent Command and Mechanical System Design to Limit Transient and Residual Vibration. *In International Conference on Motion and Vibration Control*, Sapporo, Japan, 2014.

Invited Talk and Presentations

Mar 2024   Evolving AI Decision-Making: From Safe Reinforcement Learning to Intelligent Systems with Language Models, RIT Center for Human-aware AI (CHAI) Seminar

Feb 2023	On the Role of Fidelity in the Safety Evaluation of Learning-Based Autonomous Systems, RIT Graduate Seminar
Feb 2023	On the Role of Fidelity in the Safety Evaluation of Learning-Based Autonomous Systems, AAAI-23 New Faculty Highlights Program
May 2022	Safety Verification of Autonomous Systems: a Multi-Fidelity Reinforcement Learning Approach, ICRA 2022 Workshop on the Verification of Autonomous Systems (VAS)
Apr 2022	Safe Decision Making in Evolving Environments for Safety-Critical Autonomous Systems, The University of North Texas
Mar 2022	Lessons from Safe Learning and Safety Validation Research for Autonomous Systems in the Wild, Rochester Institute of Technology
Aug 2020	Safety Learning in Autonomous Driving, Ford Motor Company
Feb 2020	Safe and Human-like Decision Making for Autonomous Systems, University of New Mexico
Nov 2018	Guest Invited Lecture, Deep Reinforcement Learning, University of North Carolina at Charlotte
Oct 2017	ASME Dynamic Systems and Control Conference
May 2017	American Control Conference
July 2015	American Control Conference

Teaching Experience

Course Instructor

C1. Developed and taught new graduate level course entitled **Reinforcement Learning and Control**, Spring 2021 (class size: 18, SEI: 4.6/5.0)

C2. MAE 460: **Automatic Control**, Summer 2021 (class size: 45, SEI: 4.7/5.0)

C3. Developed new undergraduate level course entitled **Deep Learning for Engineering Students**, Fall 2024

Professional Services

Panel Reviewer, National Science Foundation: DCSD, CPS, SLES, FMitF

Co-organize "Machine Learning for Autonomous Driving (ML4AD)" workshop at NeurIPS 2021 & 2022

Co-organize "Fault Diagnosis for Safety-Critical Autonomous Spacecraft Systems" workshop, 1st Meeting of the Mid-Atlantic Space Grant Data Science Consortium funded by NASA

Co-organize "Robotics Seminar Series" at West Virginia University

Reviewer Services

IEEE Transactions on Intelligent Vehicles, IEEE Transactions on Vehicular Technology, IEEE Transactions on Vehicular Technology, Journal of Advanced Research, Energies, Sustainable Energy Technologies and Assessments, Journal of Machine Learning Research, Energy for Sustainable Development Journal, IEEE Aerospace and Electronic Systems, Conference on Decision and Control, American Control Conference, European Control Conference, ASME Dynamic Systems and Control Conference, IEEE Intelligent Vehicles Symposium, IEEE International Conference on Intelligent Transportation Systems