Bardh Hoxha

Curriculum Vitae, November 2026

Senior Principal Scientist, Toyota Research Institute of North America, Ann Arbor, Michigan
bardhh@gmail.com · www.bhoxha.com · Google Scholar

SUMMARY

I study how formal requirements can guide the design of autonomous systems and help establish what guarantees an existing system can support. Across perception, planning, and control, I develop methods for constructing systems that satisfy a specification and for verifying their behavior under explicit assumptions. Where uncertainty limits those guarantees, I use statistical methods to quantify risk. When testing is the available evidence, I use the requirements to choose experiments that expose weaknesses and inform the next design revision.

EDUCATION

2017	**Ph.D. in Computer Science**, Arizona State University Thesis: Formal Requirements-Driven Analysis of Cyber Physical Systems. Advisor: Georgios Fainekos.
2010	**M.A. in Mathematics**, Central Connecticut State University Area of study: Actuarial Science. Advisor: Frank Bensics.

APPOINTMENTS

Present	**Senior Principal Scientist** Toyota Research Institute of North America, Ann Arbor, Michigan
2017 – 2020	**Assistant Professor, Department of Computer Science** Southern Illinois University, Carbondale, Illinois
2011 – 2017	**Research Assistant** Arizona State University, Tempe, Arizona
2010 – 2011	**Mathematics Lecturer** Central Connecticut State University, New Britain, Connecticut
2009 – 2011	**Mathematics Lecturer** Capital Community College, Hartford, Connecticut

HONORS AND AWARDS

2026	**Oral Presentation (Top 2%)** Conference on Uncertainty in Artificial Intelligence (UAI), for “Sample-Efficient Learning of Probabilistic Causes for Reachability in Markov Decision Processes with Probabilistic Guarantees”
2024	**Finalist for Best Paper Award** ACM/IEEE International Conference on Cyber-Physical Systems (ICCPS), for “Robust Conformal Prediction for STL Runtime Verification under Distribution Shift”
2023	**Finalist for Best Paper Award** International Conference on Runtime Verification, for “Pattern Matching for Perception Streams”
2022	**Best Software Artifact Award** International Conference on Formal Modeling and Analysis of Timed Systems, for “Neural network repair with reachability analysis”
2017	**Outstanding PhD Student** Computer Science, Arizona State University
2014	**Finalist for Best Student Paper Award** The 4th Annual IEEE International Conference on Cyber Technology in Automation, Control and Intelligent, for “Robustness-guided temporal logic testing and verification for stochastic cyber-physical systems”

PATENTS

5 granted US patents and 12 pending applications.

1. Bardh Hoxha, Georgios Fainekos, Hideki Okamoto, Danil V. Prokhorov, Mitchell Black. System and method for manipulating an omnidirectional cart using an armed robot. US 12,759,133 B2, granted 2026.
2. Naman P. Shah, Georgios Fainekos, Bardh Hoxha, Hideki Okamoto, Danil V. Prokhorov. Learning abstractions for multi-robot path planning in unstructured environments. US 12,654,320 B2, granted 2026.
3. Mitchell Black, Bardh Hoxha, Georgios Fainekos, Tomoya Yamaguchi, Danil V. Prokhorov. Systems and methods for risk-bounded control barrier functions. US 12,487,598 B2, granted 2025.
4. Jacob W. Anderson, Georgios Fainekos, Bardh Hoxha, Hideki Okamoto, Danil V. Prokhorov. Methods and systems for spatio-temporal regular expression matching. US 12,361,086 B2, granted 2025.

5. Bardh Hoxha, Tomoya Yamaguchi, Abdelrahman Hekal, Sergiy Bogomolov. Systems and methods for online monitoring using a neural model by an automated vehicle. US 12,358,532 B2, granted 2025.
6. Hardik Parwana, Georgios Fainekos, Bardh Hoxha, Hideki Okamoto. Barrier rate-guided model predictive path integral (MPPI) for collision aware and narrow environment navigation. US App. 19/188,556, pending.
7. Hardik Parwana, Mitchell Black, Georgios Fainekos, Bardh Hoxha, Hideki Okamoto, Danil V. Prokhorov, Dimitra Panagou. Risk aware model predictive path integral control for stochastic hybrid systems. US App. 19/080,119, pending.
8. Kehan Long, Georgios Fainekos, Bardh Hoxha, Hideki Okamoto. Neural configuration distance function for continuum robot control. US App. 19/057,472, pending.
9. Bardh Hoxha, Georgios Fainekos, Hideki Okamoto, Danil Prokhorov, Hoang-Dung Tran. Methods of qualitative and quantitative verification of complex learning-enabled systems and temporal logic verification. US App. 19/003,350, pending.
10. Yan Miao, Bardh Hoxha, Georgios Fainekos, Hideki Okamoto, Miles J. Johnson, Vladimeros Vladimerou. Producing a simulation recording to test an automated driving system. US App. 19/016,308, pending.
11. Jacob W. Anderson, Georgios Fainekos, Bardh Hoxha, Hideki Okamoto, Danil V. Prokhorov. Methods and systems for spatio-temporal regular expression matching. US App. 19/230,678, pending.
12. Noah T. Curran, Georgios Fainekos, Bardh Hoxha, Hideki Okamoto, Danil V. Prokhorov. System and method for optimization of vehicle perception sensor configuration. US App. 18/593,630, pending.
13. Shuo Yang, Georgios Fainekos, Bardh Hoxha, Mitchell Black, Hideki Okamoto, Danil V. Prokhorov, Hardik Parwana. System and method for safe control synthesis for hybrid systems through local control barrier functions. US App. 18/751,977, pending.
14. Mitchell Black, Georgios Fainekos, Bardh Hoxha, Hideki Okamoto, Danil Prokhorov. Systems and methods for predictive risk-aware control of vehicles in dynamic environments. US App. 18/486,324, pending.
15. Hardik Parwana, Mitchell Black, Georgios Fainekos, Bardh Hoxha, Hideki Okamoto, Danil V. Prokhorov. Systems and methods for control barrier functions for enhanced feasibility in optimization-based control. US App. 18/477,965, pending.
16. Kandai Watanabe, Bardh Hoxha, Georgios Fainekos, Tomoya Yamaguchi, Danil Prokhorov. Timed partial order identification for task learning from data. US App. 18/297,481, pending.
17. Bardh Hoxha, Georgios Fainekos, Tomoya Yamaguchi, Danil Prokhorov. Neural network verification for neural network controllers. US App. 18/171,035, pending.
18. Georgios Fainekos, Bardh Hoxha, Houssam Abbas. Temporal logic robustness guided testing for cyber-physical systems. US App. 15/034,979, abandoned.

PUBLICATIONS

82 peer-reviewed publications and 6 preprints. 2,008 citations, h-index 25, i10-index 50 (Google Scholar, November 2026).

88. Avishree Khare, Hideki Okamoto, **Bardh Hoxha**, Georgios Fainekos, Rajeev Alur. Temporal Specification Guidance for Text-to-Video Generation. Under review at International Conference on Learning Representations (ICLR), 2027.
87. Avishree Khare, Hideki Okamoto, **Bardh Hoxha**, Georgios Fainekos, Rajeev Alur. LogSTOP: Temporal Scores over Prediction Sequences for Matching and Retrieval. Conference on Neural Information Processing Systems (NeurIPS), 2026.
86. Yiqi Zhao, Taekyung Kim, Hideki Okamoto, **Bardh Hoxha**, Jyotirmoy V. Deshmukh, Lars Lindemann, Georgios Fainekos. Safety-aware Model Predictive Path Integral Control with Signal Temporal Logic. arXiv preprint arXiv:2608.23972, 2026.
85. Tanmay Khandait, Preetom Biswas, Hideki Okamoto, **Bardh Hoxha**, Georgios Fainekos, Giulia Pedrielli. Diffusion-Guided Search via Exponential Tilting (DiffTilt): An Application to Falsification of Safety-Critical Systems. International Conference on Embedded Software (EMSOFT), 2026.
84. Yan Miao, Karteek Gandiboyina, Noah Giles, Hideki Okamoto, **Bardh Hoxha**, Georgios Fainekos, Sayan Mitra. FalconTrack: Photorealistic Auto-Labeled Perception and Physics-Aware Vision-Based Aerial Tracking. IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2026.
83. Ryohei Oura, Georgios Fainekos, Hideki Okamoto, **Bardh Hoxha**. Sample-Efficient Learning of Probabilistic Causes for Reachability in Markov Decision Processes with Probabilistic Guarantees. Conference on Uncertainty in Artificial Intelligence (UAI), 2026. **Oral Presentation (Top 2%).**
82. Xinyi Wang, Taekyung Kim, **Bardh Hoxha**, Georgios Fainekos, Dimitra Panagou. DiffCVaR: Reinforcement Learning for Risk Adaptation via Differentiable CVaR Barrier Functions. IEEE Robotics and Automation Letters (RA-L), 2026.
81. Taekyung Kim, Hideki Okamoto, **Bardh Hoxha**, Georgios Fainekos, Dimitra Panagou. Policy Library CBF: Finite-Horizon Safety at Runtime via Parallel Rollouts. arXiv preprint arXiv:2605.16588, 2026.
80. **Bardh Hoxha**, Oliver Schön, Hideki Okamoto, Lars Lindemann, Georgios Fainekos. Vision-Based Runtime Monitoring under Varying Specifications using Semantic Latent Representations. IEEE Conference on Decision and Control (CDC), 2026.
79. **Bardh Hoxha**, Mitchell Black, Keyvan Majd, Hideki Okamoto, Georgios Fainekos, Danil Prokhorov. Bayesian Risk-Aware CBFs for Discrete-Time Stochastic Systems with Learned Dynamics. American Control Conference (ACC), 2026.
78. Taekyung Kim, Keyvan Majd, Hideki Okamoto, **Bardh Hoxha**, Dimitra Panagou, Georgios Fainekos. Safe Model Predictive Diffusion with Shielding. IEEE International Conference on Robotics and Automation (ICRA), 2026.

77. Yan Miao, Ege Yuceel, Georgios Fainekos, **Bardh Hoxha**, Hideki Okamoto, Sayan Mitra. Performance-Guided Refinement for Visual Aerial Navigation using Editable Gaussian Splatting in FalconGym 2.0. IEEE International Conference on Robotics and Automation (ICRA), 2026.
76. Yuntao Li, Sung Woo Choi, Hideki Okamoto, **Bardh Hoxha**, Georgios Fainekos, Hoang-Dung Tran. Quantitative Verification of Learning-Enabled Systems using ProbStar Reachability. Nonlinear Analysis: Hybrid Systems 2026, 2026.
75. Nathan Fronda, **Bardh Hoxha**, Houssam Abbas. FiReFly: Fair Distributed Receding Horizon Planning for Multiple UAVs. IEEE Intelligent Transportation Systems Conference (ITSC), 2026.
74. Nathan Fronda, Peter Smith, **Bardh Hoxha**, Yash Pant, Houssam Abbas. Fair-CoPlan: Negotiated Flight Planning with Fair Deconfliction for Urban Air Mobility. IEEE Intelligent Transportation Systems Conference (ITSC), 2026.
73. Jacob Anderson, **Bardh Hoxha**, Georgios Fainekos, Hideki Okamoto, Danil V. Prokhorov. Spatio-Temporal Grounding of Large Language Models from Perception Streams. NeurIPS 2025 Workshop on Space in Vision, Language, and Embodied AI, 2025.
72. Tomoya Yamaguchi, Ippei Nishitani, Yusuke Ota, **Bardh Hoxha**, Georgios Fainekos. Scalable Multi-Agent Path Finding for Delivery Robot Systems with Temporal and Edge Capacity Constraints on Weighted Graphs. 2025 IEEE 21st International Conference on Automation Science and Engineering (CASE), 2025.
71. Keyvan Majd, Hardik Parwana, **Bardh Hoxha**, Steven Hong, Hideki Okamoto, Georgios Fainekos. GPU-Accelerated Barrier-Rate Guided MPPI Control for Tractor-Trailer Systems. IEEE Intelligent Transportation Systems Conference (ITSC), 2025.
70. Yiqi Zhao, Xinyi Yu, **Bardh Hoxha**, Georgios Fainekos, Jyotirmoy Deshmukh, Lars Lindemann. STL-GO: Spatio-Temporal Logic with Graph Operators for Distributed Systems with Multiple Network Topologies. ACM Transactions on Embedded Computing Systems (TECS), 2025.
69. Junhui Zhang, **Bardh Hoxha**, Georgios Fainekos, Dimitra Panagou. Conformal Prediction in the Loop: Risk-Aware Control Barrier Functions for Stochastic Systems with Data-Driven State Estimators. IEEE Control Systems Letters, 2025.
68. Hoang-Dung Tran, Sung Woo Choi, Yuntao Li, Hideki Okamoto, **Bardh Hoxha**, Georgios Fainekos. ProbStar Temporal Logic for Verifying Complex Behaviors of Learning-enabled Systems. 28th ACM International Conference on Hybrid Systems: Computation and Control (HSCC), 2025.
67. Hardik Parwana, Taekyung Kim, Kehan Long, **Bardh Hoxha**, Hideki Okamoto, Georgios Fainekos, Dimitra Panagou. BR-MPPI: Barrier Rate guided MPPI for Enforcing Multiple Inequality Constraints with Learned Signed Distance Field. arXiv:2506.07325, 2025.
66. Hoang-Dung Tran, Sung Woo Choi, Yuntao Li, Qing Liu, Hideki Okamoto, **Bardh Hoxha**, Georgios Fainekos. StarV: A Qualitative and Quantitative Verification Tool for Learning-Enabled Systems. International Conference on Computer Aided Verification (CAV), 2025.

65. Yiqi Zhao, Emily Zhu, **Bardh Hoxha**, Georgios Fainekos, Jyotirmoy V Deshmukh, Lars Lindemann. Distributionally Robust Predictive Runtime Verification under Spatio-Temporal Logic Specifications. Transactions on Cyber-Physical Systems (TCPS), 2025.
64. Xinyi Wang, Taekyung Kim, **Bardh Hoxha**, Georgios Fainekos, Dimitra Panagou. Safe Navigation in Uncertain Crowded Environments Using Risk Adaptive CVaR Barrier Functions. IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2025.
63. Sung Woo Choi, Yuntao Li, Xiaodong Yang, Tomoya Yamaguchi, **Bardh Hoxha**, Georgios Fainekos, Danil Prokhorov, Hoang-Dung Tran. Reachability Analysis of Recurrent Neural Networks. Nonlinear Analysis: Hybrid Systems, 2025.
62. Navid Hashemi, **Bardh Hoxha**, Danil Prokhorov, Georgios Fainekos, Jyotirmoy V Deshmukh. Scaling Learning-based Policy Optimization for Temporal Logic Tasks by Controller Network Dropout. Transactions on Cyber-Physical Systems, 2025.
61. Hardik Parwana, Mitchell Black, **Bardh Hoxha**, Hideki Okamoto, Georgios Fainekos, Danil Prokhorov, Dimitra Panagou. Risk-aware MPPI for Stochastic Hybrid Systems. American Control Conference, 2025.
60. Kehan Long, Hardik Parwana, Georgios Fainekos, **Bardh Hoxha**, Hideki Okamoto, Nikolay Atanasov. Neural Configuration Distance Function for Continuum Robot Control. IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2025.
59. Victoria Marie Tuck, Hardik Parwana, Pei-Wei Chen, Georgios Fainekos, **Bardh Hoxha**, Hideki Okamoto, S Shankar Sastry, Sanjit A Seshia. MRTA-Sim: A Modular Simulator for Multi-Robot Allocation, Planning, and Control in Open-World Environments. arXiv, 2025.
58. Yan Miao, Georgios Fainekos, **Bardh Hoxha**, Hideki Okamoto, Danil Prokhorov, Sayan Mitra. From Dashcam Videos to Driving Simulations: Stress Testing Automated Vehicles Against Rare Events. Machine Learning for Autonomous Driving - AAAI, 2025.
57. Hardik Parwana, Mitchell Black, **Bardh Hoxha**, Hideki Okamoto, Georgios Fainekos, Danil Prokhorov, Dimitra Panagou. Feasible Space Monitoring for Multiple Control Barrier Functions with application to Large Scale Indoor Navigation. IEEE Conference on Control Technology and Applications (CCTA), 2025.
56. Jacob Anderson, Georgios Fainekos, **Bardh Hoxha**, Hideki Okamoto, Danil Prokhorov. Querying Perception Streams with Spatial Regular Expressions. Software Tools for Technology Transfer, 2024.
55. Hardik Parwana, Mitchell Black, Georgios Fainekos, **Bardh Hoxha**, Hideki Okamoto, Danil Prokhorov. Model Predictive Path Integral Methods with Reach-Avoid Tasks and Control Barrier Functions. Towards Safe Autonomy: Emerging Requirements, Definitions, and Methods, July 2024, 2024.
54. Navid Hashemi, **Bardh Hoxha**, Danil Prokhorov, Georgios Fainekos, Jyotirmoy Deshmukh. Scaling Learning-based Policy Optimization for Temporal Logic Tasks by Controller Network Dropout. ACM Transactions on Cyber-Physical Systems, 2024.

53. Navid Hashemi, Sam Williams, **Bardh Hoxha**, Danil Prokhorov, Georgios Fainekos, Jyotirmoy Deshmukh. LB4TL: Smooth Semantics for Temporal Logic for Scalable Training of Neural Feedback Controllers. The 8th IFAC Conference on Analysis and Design of Hybrid Systems (ADHS), July 2024, 2024.
52. Kandai Watanabe, Georgios Fainekos, **Bardh Hoxha**, Morteza Lahijanian, Hideki Okamoto, Sriram Sankaranarayanan. Optimal Planning for Timed Partial Order Specifications. 2024 IEEE International Conference on Robotics and Automation (ICRA), May 2024, 2024.
51. Mitchell Black, Georgios Fainekos, **Bardh Hoxha**, Hideki Okamoto, Danil Prokhorov. CBFKit: A Control Barrier Function Toolbox for Robotics Applications. IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2024.
50. Mitchell Black, Georgios Fainekos, **Bardh Hoxha**, Dimitra Panagou. Risk-Aware Fixed-Time Stabilization of Stochastic Systems under Measurement Uncertainty. American Control Conference (ACC), 2024.
49. Victoria Marie Tuck, Pei-Wei Chen, Georgios Fainekos, **Bardh Hoxha**, Hideki Okamoto, S Shankar Sastry, Sanjit A Seshia. SMT-Based Dynamic Multi-Robot Task Allocation. NASA Formal Methods (NFM), 2024.
48. Shuo Yang, Mitchell Black, Georgios Fainekos, **Bardh Hoxha**, Hideki Okamoto, Rahul Mangharam. Safe Control Synthesis for Hybrid Systems through Local Control Barrier Functions. American Control Conference (ACC), 2024.
47. Yiqi Zhao, **Bardh Hoxha**, Georgios Fainekos, Jyotirmoy V Deshmukh, Lars Lindemann. Robust Conformal Prediction for STL Runtime Verification under Distribution Shift. ACM/IEEE International Conference on Cyber-Physical Systems (ICCPS), 2024. **Finalist for Best Paper Award.**
46. Mohammad Hekmatnejad, **Bardh Hoxha**, Jyotirmoy V Deshmukh, Yezhou Yang, Georgios Fainekos. Formalizing and Evaluating Requirements of Perception Systems for Automated Vehicles using Spatio-Temporal Perception Logic. International Journal of Robotics Research (IJRR), 2024.
45. Jacob Anderson, Georgios Fainekos, **Bardh Hoxha**, Hideki Okamoto, Danil Prokhorov. Pattern Matching for Perception Streams. International Conference on Runtime Verification, 2023. **Finalist for Best Paper Award.**
44. Tomoya Yamaguchi, **Bardh Hoxha**, Dejan Ničković. RTAMT – Runtime Robustness Monitors with Application to CPS and Robotics. International Journal on Software Tools for Technology Transfer (STTT), 2023.
43. Ippei Nishitani, Tomoya Yamaguchi, **Bardh Hoxha**. Checkmate: Fault Timing Localization for Multi-Robot Scenarios. 2023 IEEE 19th International Conference on Automation Science and Engineering (CASE), 2023.
42. Hoang-Dung Tran, Sungwoo Choi, Hideki Okamoto, **Bardh Hoxha**, Georgios Fainekos, Danil Prokhorov. Quantitative Verification for Neural Networks using ProbStars. Proceedings of the 26th ACM International Conference on Hybrid Systems: Computation and Control, 2023.

41. Hoang Dung Tran, Sung Woo Choi, Xiaodong Yang, Tomoya Yamaguchi, **Bardh Hoxha**, Danil Prokhorov. Verification of Recurrent Neural Networks with Star Reachability. Proceedings of the 26th ACM International Conference on Hybrid Systems: Computation and Control, 2023.
40. Navid Hashemi, **Bardh Hoxha**, Tomoya Yamaguchi, Danil Prokhorov, Geogios Fainekos, Jyotirmoy Deshmukh. A Neurosymbolic Approach to the Verification of Temporal Logic Properties of Learning enabled Control Systems. ACM/IEEE International Conference on Cyber-Physical Systems (ICCPS), 2023.
39. Navid Hashemi, Xin Qin, Jyotirmoy V Deshmukh, Georgios Fainekos, **Bardh Hoxha**, Danil Prokhorov, Tomoya Yamaguchi. Risk-awareness in learning neural controllers for temporal logic objectives. 2023 American Control Conference (ACC), 2023.
38. Kandai Watanabe, Georgios Fainekos, **Bardh Hoxha**, Morteza Lahijanian, Danil Prokhorov, Sriram Sankaranarayanan, Tomoya Yamaguchi. Timed partial order inference algorithm. Proceedings of the International Conference on Automated Planning and Scheduling, 2023.
37. Mitchell Black, Georgios Fainekos, **Bardh Hoxha**, Danil Prokhorov, Dimitra Panagou. Safety Under Uncertainty: Tight Bounds with Risk-Aware Control Barrier Functions. IEEE International Conference on Robotics and Automation (ICRA), 2023.
36. Muslum Ozgur Ozmen, Xuansong Li, Andrew Chun-An Chu, Z Berkay Celik, **Bardh Hoxha**, Xiangyu Zhang. Discovering physical interaction vulnerabilities in IoT deployments. ACM SIGSAC Conference on Computer and Communications Security (CCS), 2022.
35. Xiaodong Yang, Tomoya Yamaguchi, **Bardh Hoxha**, Danil Prokhorov, Taylor T Johnson. Safety Verification and Repair of Deep Neural Networks. Workshop on Formal Verification of Machine Learning (WFVML), 2022.
34. Sergiy Bogomolov, Abdelrahman Hekal, **Bardh Hoxha**, Tomoya Yamaguchi. Runtime Assurance for Autonomous Driving with Neural Reachability. 2022 IEEE 25th International Conference on Intelligent Transportation Systems (ITSC), 2022.
33. Xiaodong Yang, Tom Yamaguchi, Hoang-Dung Tran, **Bardh Hoxha**, Taylor T Johnson, Danil Prokhorov. Neural network repair with reachability analysis. International Conference on Formal Modeling and Analysis of Timed Systems, 2022. **Best Software Artifact Award.**
32. Shakiba Yaghoubi, Georgios Fainekos, Tomoya Yamaguchi, Danil Prokhorov, **Bardh Hoxha**. Risk-bounded control with kalman filtering and stochastic barrier functions. 2021 60th IEEE Conference on Decision and Control (CDC), 2021.
31. Anand Balakrishnan, Jyotirmoy Deshmukh, **Bardh Hoxha**, Tomoya Yamaguchi, Georgios Fainekos. PerceMon: online monitoring for perception systems. Runtime Verification: 21st International Conference, RV 2021, Virtual Event, October 11--14, 2021, Proceedings 21, 2021.
30. Keyvan Majd, Shakiba Yaghoubi, Tomoya Yamaguchi, **Bardh Hoxha**, Danil Prokhorov, Georgios Fainekos. Safe navigation in human occupied environments using sampling and control barrier functions. 2021 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2021.

29. Xiaodong Yang, Taylor T Johnson, Hoang-Dung Tran, Tomoya Yamaguchi, **Bardh Hoxha**, Danil V Prokhorov. Reachability analysis of deep ReLU neural networks using facet-vertex incidence. HSCC, 2021.
28. Shakiba Yaghoubi, Keyvan Majd, Georgios Fainekos, Tomoya Yamaguchi, Danil Prokhorov, **Bardh Hoxha**. Risk-bounded control using stochastic barrier functions. IEEE Control Systems Letters, 2020.
27. Mohammad Hekmatnejad, **Bardh Hoxha**, Georgios Fainekos. Search-based test-case generation by monitoring responsibility safety rules. 2020 IEEE 23rd International Conference on Intelligent Transportation Systems (ITSC), 2020.
26. Tomoya Yamaguchi, **Bardh Hoxha**, Danil Prokhorov, Jyotirmoy V Deshmukh. Specification-guided software fault localization for autonomous mobile systems. 2020 18th ACM-IEEE International Conference on Formal Methods and Models for System Design (MEMOCODE), 2020.
25. Yuji Date, Takeshi Baba, **Bardh Hoxha**, Tomoya Yamaguchi, Danil Prokhorov. Application of Simulation-Based Methods on Autonomous Vehicle Control with Deep Neural Network: Work-in-Progress. 2020 International Conference on Embedded Software (EMSOFT), 2020.
24. Joseph Cralley, Ourania Spantidi, **Bardh Hoxha**, Georgios Fainekos. Tltk: A toolbox for parallel robustness computation of temporal logic specifications. Runtime Verification: 20th International Conference, RV 2020, Los Angeles, CA, USA, October 6--9, 2020, Proceedings 20, 2020.
23. Georgios Fainekos, **Bardh Hoxha**, Sriram Sankaranarayanan. Robustness of specifications and its applications to falsification, parameter mining, and runtime monitoring with s-taliro. Runtime Verification: 19th International Conference, RV 2019, Porto, Portugal, October 8--11, 2019, Proceedings 19, 2019.
22. Adel Dokhanchi, Shakiba Yaghoubi, **Bardh Hoxha**, Georgios Fainekos, Gidon Ernst, Zhenya Zhang, Paolo Arcaini, Ichiro Hasuo, Sean Sedwards. ARCH-COMP18 Category Report: Results on the Falsification Benchmarks. ARCH, 2018.
21. Cumhur Erkan Tuncali, **Bardh Hoxha**, Guohui Ding, Georgios Fainekos, Sriram Sankaranarayanan. Experience report: Application of falsification methods on the UxAS system. NASA Formal Methods: 10th International Symposium, NFM 2018, Newport News, VA, USA, April 17-19, 2018, Proceedings 10, 2018.
20. Luan V Nguyen, **Bardh Hoxha**, Taylor T Johnson, Georgios Fainekos. Mission planning for multiple vehicles with temporal specifications using UxAS. IFAC-PapersOnLine, 2018.
19. Adel Dokhanchi, **Bardh Hoxha**, Georgios Fainekos. Formal requirement debugging for testing and verification of cyber-physical systems. ACM Transactions on Embedded Computing Systems (TECS), 2017.
18. Adel Dokhanchi, Shakiba Yaghoubi, **Bardh Hoxha**, Georgios Fainekos. Vacuity aware falsification for MTL request-response specifications. 2017 13th IEEE Conference on Automation Science and Engineering (CASE), 2017.

17. Adel Dokhanchi, Shakiba Yaghoubi, **Bardh Hoxha**, Georgios Fainekos. ARCH-COMP17 Category Report: Preliminary Results on the Falsification Benchmarks. ARCH, 2017.
16. **Bardh Hoxha**, Adel Dokhanchi, Georgios Fainekos. Mining parametric temporal logic properties in model-based design for cyber-physical systems. International Journal on Software Tools for Technology Transfer, 2017.
15. Adel Dokhanchi, **Bardh Hoxha**, Cumhur Erkan Tuncali, Georgios Fainekos. An efficient algorithm for monitoring practical TPTL specifications. 2016 ACM/IEEE International Conference on Formal Methods and Models for System Design (MEMOCODE), 2016.
14. **Bardh Hoxha**, Georgios Fainekos. Pareto front exploration for parametric temporal logic specifications of cyber-physical systems. Workshop on Monitoring and Testing of Cyber-Physical Systems, 2016.
13. Adel Dokhanchi, **Bardh Hoxha**, Georgios Fainekos. MITL specification debugging for monitoring of cyber-physical systems. Electronic Proceedings in Theoretical Computer Science, EPTCS, 2016.
12. **Bardh Hoxha**, Georgios Fainekos. Planning in Dynamic Environments Through Temporal Logic Monitoring. AAAI Workshop: Planning for Hybrid Systems, 2016.
11. Adel Dokhanchi, **Bardh Hoxha**, Georgios Fainekos. Metric interval temporal logic specification elicitation and debugging. 2015 ACM/IEEE International Conference on Formal Methods and Models for Codesign (MEMOCODE), 2015.
10. **Bardh Hoxha**, Nikolaos Mavridis, Georgios Fainekos. VISPEC: A graphical tool for elicitation of MTL requirements. 2015 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2015.
9. **Bardh Hoxha**, Hoang Bach, Houssam Abbas, Adel Dokhanchi, Yoshihiro Kobayashi, Georgios Fainekos. Towards formal specification visualization for testing and monitoring of cyber-physical systems. Int. Workshop on Design and Implementation of Formal Tools and Systems, 2014.
8. Adel Dokhanchi, **Bardh Hoxha**, Georgios Fainekos. On-line monitoring for temporal logic robustness. International Conference on Runtime Verification, 2014.
7. Houssam Abbas, **Bardh Hoxha**, Georgios Fainekos, Jyotirmoy V Deshmukh, James Kapinski, Koichi Ueda. Conformance testing as falsification for cyber-physical systems. arXiv preprint arXiv:1401.5200, 2014.
6. H. Abbas, **B. Hoxha**, G. Fainekos, J. V. Deshmukh, J. Kapinski, K. Ueda. WiP Abstract: Conformance Testing as Falsification for Cyber-Physical Systems. ACM/IEEE International Conference on Cyber-Physical Systems (ICCPS), Berlin, Germany, April 2014, 2014.
5. Houssam Abbas, **Bardh Hoxha**, Georgios Fainekos, Koichi Ueda. Robustness-guided temporal logic testing and verification for stochastic cyber-physical systems. The 4th Annual IEEE International Conference on Cyber Technology in Automation, Control and Intelligent, 2014. **Finalist for Best Student Paper Award.**

4. **Bardh Hoxha**, Houssam Abbas, Georgios Fainekos. Benchmarks for Temporal Logic Requirements for Automotive Systems. Workshop on Applied Verification for Continuous and Hybrid Systems (ARCH), 2014.
3. **Bardh Hoxha**, Houssam Abbas, Georgios Fainekos. Using S-TaLiRo on industrial size automotive models. Proc. of Applied Verification for Continuous and Hybrid Systems, 2014.
2. **Bardh Hoxha**, Adel Dokhanchi, Georgios Fainekos. System Testing with S-TaLiRo: Recent Functionality and Additions. ACM International Conference on Hybrid Systems: Computation and Control (HSCC), 2014.
1. Hengyi Yang, **Bardh Hoxha**, Georgios Fainekos. Querying parametric temporal logic properties on embedded systems. IFIP International Conference on Testing Software and Systems, 2012.

SOFTWARE

CBFKit: A Control Barrier Function Toolbox. Published at IROS 2024; 116 GitHub stars.

STREM: Spatio-Temporal Pattern Matching over Perception Streams. Best paper finalist at RV 2023; Journal version in STTT 2024; Granted US patent 12,361,086 B2.

RTAMT: Runtime Robustness Monitors for STL. 83 GitHub stars, 32 forks; Tool paper cited 40+ times.

TLTk: Parallel Robustness Computation for Temporal Logic. Tool paper at RV 2020.

S-TaLiRo: Toolbox for Testing and Verification of CPS. Benchmarks used in the ARCH-COMP falsification competition; Benchmark paper cited 160+ times; Applied to industrial-size automotive models and the UxAS autonomy software.

VERITEX: Deep Neural Network Verification. Best Software Artifact Award at FORMATS 2022; Repair paper cited 60+ times.

NDF-CoRoCo: Continuum Robot Control

TEACHING

Southern Illinois University

Fall 2019	CS 437: Machine Learning and Soft Computing
Spring 2019	CS 404: Autonomous Mobile Robots
Fall 2018	CS 591: Testing and Verification of Cyber-Physical Systems
Spring 2018	CS 499: Senior Project
Spring 2018	CS 410: Computer Security
Fall 2017	CS 498: Senior Project
Fall 2017	CS 290: Communication Skills

MENTORSHIP

2026

Muhan Lin [Purdue University]
Tool substitution for vision-language-action policies
hellosunnyworld.github.io

Kai-Chun Chang [UC Berkeley]
Requirements-driven falsification of automated vehicles using diffusion models
kevinchang73.github.io

Taekyung Kim [University of Michigan]
JEPA-Shield and safety guarantees for vision-language-action models
www.taekyung.me Papers

Ege Yuceel [University of Illinois Urbana-Champaign]
Kinodynamic planning for tractor-trailer parking
yuceelege.github.io Papers

Evangelos Psomiadis [Georgia Tech]
Graph neural networks for multi-agent pickup and drop-off
www.linkedin.com/in/evangelos-psomiadis

2025

Eric Vin [UC Santa Cruz]
Diffusion-based trajectory generation
eric-vin.github.io

Yan Miao [University of Illinois Urbana-Champaign]
Vision-based UAV control with an editable digital twin
yanmiao.netlify.app Papers Patents

Taekyung Kim [University of Michigan]
www.taekyung.me Papers

Yiqi (Nick) Zhao [USC]
zhaoy37.github.io Papers

Sung Woo Choi [University of Florida]
Verification of graph neural networks
2026.formalise.org/profile/sungwoochoi2 Papers

2024

Victoria Tuck [UC Berkeley]
github.com/victoria-tuck Papers

Hardik Parwana [University of Michigan]
sites.google.com/view/hardik-parwana/home Papers Patents

Kehan Long [UC San Diego]
Learning-based control barrier functions
kehanlong.github.io Papers Patents

Yan Miao [University of Illinois Urbana-Champaign]
Perception
yanmiao.netlify.app Papers Patents

2023 **Hardik Parwana** [University of Michigan]
Trust-based control barrier functions
sites.google.com/view/hardik-parwana/home Papers Patents

Naman Shah [Arizona State University]
Planning and routing for stochastic systems
www.namanshah.net Patents

Shuo Yang [University of Pennsylvania]
Data-driven AI for perception, planning and control
shuoyang2000.github.io Papers Patents

Ozgur Ozmen [Purdue University]
Search-based testing for vulnerability detection in multi-robot systems
ozgurozmen.github.io Papers

Noah Curran [University of Michigan]
Human–autonomy handoffs in control barrier function applications
ntcurran.com Patents

2022 **Kandai Watanabe** [University of Colorado]
Learning timed automata for factory planning and scheduling
watakandai.github.io Papers Patents

Jacob Anderson [Arizona State University]
Querying perception streams with regular expressions
www.linkedin.com/in/andersonjwan Papers Patents

Mitchell Black [University of Michigan]
Risk-based guarantees for control with barrier functions
www.blackmitchell.com/about Papers Patents

2021 **Xiaodong Yang** [Vanderbilt University]
Reachability analysis of deep neural networks
usa.visa.com/about-visa/visa-research/xiaodong-yang.html Papers

2020 **Anand Balakrishnan** [University of Southern California]
Online monitoring for perception systems
anandb.dev Papers

Shakiba Yaghoubi [Arizona State University]
Risk-bounded control using stochastic barrier functions
sites.google.com/asu.edu/syaghoub Papers

INVITED TALKS

2024	**Future Mobility: Challenges and Recent Developments in V&V** Dagstuhl Seminar on Safety Assurance for Autonomous Mobility Seminar Report
2023	**Advancing Safety in ML-Driven Systems: Spatio-Temporal Quantitative Verification Techniques** Stony Brook University
2023	**Safety in Advanced ML-Driven Systems** University of Michigan · November 15
2022	**Verification and Synthesis of Cyber-Physical Systems with Learning-enabled Components** NSF Center of Cognitive Autonomy · April 8 Program
2021	**Autonomous CPS: Verification and Control** SNR Workshop at QONFEST · August 23 Program
2021	**Simulation-Based Testing of Autonomous CPS** Stony Brook University · April 15
2021	**Verification of Deep Neural Networks** University of Southern California, Center for Cyber-Physical Systems and the Internet of Things

PROFESSIONAL SERVICE

Program Chair: Workshop on Monitoring and Testing of Cyber-Physical Systems (MT-CPS), 2018

Repeatability Evaluation Chair: ACM International Conference on Hybrid Systems: Computation and Control (HSCC), 2021, 2020

Advisory Committee Member: HSCC Repeatability Evaluation, 2020

Program committees: HSCC (2027 (with ICCPS), 2026 (with ICCPS), 2025, 2024, 2023, 2022); NFM (2027, 2026, 2023, 2022); RV (2026, 2025); EMSOFT (2026, 2018 (work in progress track)); AAAI (2024, 2023); IJCAI (2016); VehicleSec (2027 (Cycle 1), 2026); AutoSec (2022); SafeThings (2020); MT-CPS (2021, 2020, 2019); DARS (2019); HSCC RE (2019, 2018, 2017, 2016)

Journal and magazine reviewing: IEEE Transactions on Automatic Control, IEEE Systems Journal, IEEE Computational Intelligence Magazine (2021, 2022), Nonlinear Analysis: Hybrid Systems (2024), Acta Informatica, Logical Methods in Computer Science

Conference reviewing: IEEE Conference on Decision and Control (CDC), IEEE International Conference on Automation Science and Engineering (CASE 2023), IEEE International Conference on Robotics and Automation (ICRA 2027), American Control Conference (ACC), IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), International Conference on Cyber-Physical Systems (ICCPS), Applied Verification for Continuous and Hybrid Systems (ARCH)

Memberships: IEEE Senior Member, ACM Member