

NAREK HARUTYUNYAN

[Website ↗](#) | [Google Scholar ↗](#) | narek.harutyunyan@brown.edu | +1 (857) 404-2113

EDUCATION

Brown University <i>Bachelor of Science in Computer Engineering</i> GPA: 4.0/4.0	Sep 2022 – May 2026 Providence, RI, USA
University of New South Wales <i>Study Abroad Program in Computer Engineering and Robotics</i>	Jan – May 2025 Sydney, Australia

RESEARCH EXPERIENCE

Brown University Prof. Nora Ayanian ↗ <i>Undergraduate Researcher (UTRA Scholar)</i> at ACT Lab ↗	Nov 2022 – Present Providence, RI, USA
<ul style="list-style-type: none">• Design reinforcement learning policies in IsaacLab for cooperative object transport with swarms of Crazyflie drones, enabling robust multi-agent coordination.• Characterized quadcopter downwash interactions using Particle Image Velocimetry and MATLAB, improving close-proximity flight stability and formation safety.• Engineered a custom aerial painting quadrotor and Python control pipeline used as the core hardware platform for 75+ students in project-based robotics courses.• Built a real-time LED + audio-responsive quadrotor choreography system in Python and C, enabling synchronized drone performances that react dynamically to music.	
California Institute of Technology Prof. Soon-Jo Chung ↗ <i>Research Intern (SURF Fellow)</i> at ARCL Lab ↗	May – Sep 2025 Pasadena, CA, USA
<ul style="list-style-type: none">• Engineered a high-fidelity IsaacLab simulation of the Unitree Go1 quadruped on a moving ground plane, emulating ship-like dynamics to address the sim-to-real gap in maritime environments.• Developed a certified RL algorithm with contraction theory for stable quadruped locomotion and handstands on a moving platform, achieving 100% success rate across all hardware trials.• Built a custom SDK for real-robot deployment and validated Unitree Go1 policies under extreme disturbances, including wind on a motion platform and tests on an inflatable boat.• Designed and deployed reinforcement learning policies for locomotion and fault recovery on the humanoid robot Booster T1, demonstrating reliable performance on hardware.	
Carnegie Mellon University Prof. Sebastian Scherer ↗ <i>Research Intern (RISS Scholar)</i> <i>Remote Researcher</i> at AirLab ↗	May 2024 – Jul 2025 Pittsburgh, PA, USA
<ul style="list-style-type: none">• Refactored the MapEx framework (probabilistic frontier-based exploration with predictive maps) into Gym, added an IoU evaluation metric, and fixed algorithmic issues like agent backtracking.• Proposed and led MapExRL, a human-inspired RL exploration framework using frontier-based planning, global map predictions, and uncertainty modeling for long-horizon reasoning.• Achieved up to 18.8% performance gains over state-of-the-art exploration baselines on real-world indoor maps with MapExRL.	

PUBLICATIONS AND POSTERS

- [1] **N. Harutyunyan***, B. Moon*, S. Kim, C. Ho, A. Hung, S. Scherer, “**MapExRL**: Human-Inspired Indoor Exploration with Predicted Environment Context and Reinforcement Learning,” to appear at the IEEE International Conference on Advanced Robotics (ICAR), 2025; presented at ICRA 2025 Workshop on Structured Learning for Efficient, Reliable, and Transparent Robots | [📄](#) | [🌐](#)
- [2] V. Zinage*, **N. Harutyunyan***, E. Verheyden*, F. Hadaegh, S.-J. Chung, “**ContractionPPO**: Certified Reinforcement Learning via Differentiable Contraction Layers,” in IEEE Robotics and Automation Letters (RA-L), under review | [📄](#) | [🌐](#)

