Ali BaniAsad
Curriculum Vitae

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PROFESSIONAL SUMMARY

Aerospace Engineering graduate student with 4+ years of research experience in reinforcement learning, robotics, and embedded systems. Published 5 papers in control systems and AI applications. Proven expertise in developing robust multi-agent RL algorithms, embedded machine learning for resource-constrained hardware, and real-time control systems using ROS, PyTorch, and TensorFlow. Strong background in differential game theory, optimal control, and system identification with hands-on experience in hardware-in-the-loop testing.

TECHNICAL SKILLS

Programming Languages: C, C++, Embedded C, Python, MATLAB
Machine Learning Frameworks: PyTorch, TensorFlow, Keras, JAX, Scikit-learn, OpenAI Gym
Robotics & Simulation: ROS, ROS 2, Gazebo, MuJoCo, Simulink
Data Analysis: NumPy, Pandas, Matplotlib, Seaborn, Plotly, OpenCV
Development Tools: Git, Linux, LaTeX, Terminal
AI/ML Specializations: Reinforcement Learning, Deep Learning, Multi-Agent Systems, Embedded Machine Learning, Neural Networks, Computer Vision, Optimization, Game Theory
Control Systems: Optimal Control, Automatic Control, Robust Control, MPC, System Identification
Languages: English (TOEFL iBT 96), Farsi (Native)

EDUCATION

Master of Science in Aerospace Engineering   Sep 2022 – Sep 2025
Sharif University of Technology, Tehran, Iran
Thesis: Embedded RL Control for Robots
Advisors: Hadi Nobahari, PhD

Bachelor of Science in Aerospace Engineering   Sep 2017 – May 2022
Sharif University of Technology, Tehran, Iran
Thesis: Game Theory-Based Control for 3-DoF Platform (Best Undergraduate Thesis Award)

RESEARCH EXPERIENCE

Graduate Research Assistant   Aug 2022 – Apr 2025
Sharif University of Technology, Tehran, Iran
Master's Thesis: Embedded RL Control for Robots
Supervisor: Hadi Nobahari, PhD

- Developed zero-sum disturbance-augmented reinforcement learning training framework achieving stable policies under 10x worst-case perturbations for robotic control systems
- Built 15,000+ lines of code RL control stack implementing DDPG, TD3, SAC, and PPO algorithms in PyTorch and TensorFlow with OpenAI Gym integration for embedded robot platforms
- Optimized neural network models through quantization techniques to reduce memory footprint by 75% for deployment on CPU-constrained embedded hardware
- Validated algorithm robustness on 4 Gymnasium locomotion benchmarks (Ant, Humanoid, HalfCheetah, Walker2d) demonstrating 30% improvement in disturbance rejection compared to baseline methods
- Implemented C++ and Python ROS 2 hardware-in-the-loop node for on-board testing and real-time control validation
- Open-sourced complete codebase with LaTeX documentation and Jupyter notebooks enabling one-command reproduction for research community

Research Assistant and Lab Head   May 2020 – Feb 2025
CNAV Lab, Sharif University of Technology, Tehran, Iran
Supervisors: Hadi Nobahari, PhD and Alireza Sharifi, PhD

- Led 5+ research projects on embedded AI in C, reinforcement learning algorithms, and ROS-based robotic control systems as Lab Head
- Designed reinforcement learning algorithms improving robotic navigation accuracy by 40% and enhancing autonomous decision-making capabilities in dynamic environments
- Developed LSTM-MLP neural network architecture for in-motion transfer alignment using IMU and SINS data during GPS outages, published in Engineering Applications of Artificial Intelligence
- Reduced navigation drift to less than 0.1% of Kalman-INS error during 100-second GPS outages in real-world testing scenarios
- Achieved cross-domain generalization across ship, ROV, and car datasets with 25% performance improvement over conventional Kalman filtering methods
- Published 2 journal papers and 2 conference papers on AI-enhanced navigation and robust control systems

Undergraduate Research Assistant   Feb 2021 – Sep 2023
Sharif University of Technology, Tehran, Iran
Bachelor's Thesis: Game Theory-Based Control for 3-DoF Platform
Supervisor: Hadi Nobahari, PhD

- Developed robust control system for 3-DoF quadcopter test stand using differential game theory and Nash equilibrium optimization achieving 45% better disturbance rejection than baseline controllers
- Performed system identification and parameter estimation using optimization algorithms to model quadcopter dynamics in Simulink with 95% accuracy

- Implemented real-time controller through MATLAB Simulink-to-C code generation pipeline for embedded hardware deployment on microcontroller

- Benchmarked controller performance against ADRC and DOBC methods demonstrating superior robustness to external disturbances and parameter uncertainties

- Awarded Best Undergraduate Thesis by Iranian Aerospace Society for excellence in control systems research

Research Project: Multi-Agent Autonomous Systems   July 2023
Sharif University of Technology, Tehran, Iran
Supervisor: Hadi Nobahari, PhD

- Optimized multi-agent swarm model addressing communication delays and obstacle avoidance for coordinated robot navigation

- Implemented flocking behavior algorithms in Simulink and validated through hardware-in-the-loop testing using embedded C on microcontroller platforms

- Demonstrated system robustness and reliability through real-time performance validation in dynamic environments

Research Project: Multi-Objective Heuristic Optimization   Feb 2023
Sharif University of Technology, Tehran, Iran
Supervisor: Hadi Nobahari, PhD

- Implemented REMARK algorithm for multi-objective optimization with conflicting objectives enabling effective trade-off evaluation

- Utilized heuristic optimization methods achieving high-quality approximations of Pareto Set for optimal multi-criteria decision-making

Research Project: Aircraft Trim Stability Analysis   Mar 2022
Sharif University of Technology, Tehran, Iran
Supervisor: Afshin Banazadeh, PhD

- Developed advanced GUI software for aircraft stability analysis providing real-time interactive adjustments for performance evaluation

- Created DATCOM-based trim diagram tool streamlining aircraft design process for engineers and researchers

AIAA Regional Jet Design Competition   June 2021
Sharif University of Technology, Tehran, Iran
Supervisor: Afshin Banazadeh, PhD

- Led regional jet design project integrating multidisciplinary analysis for aerodynamic performance and industry compliance

- Applied computer modeling for aerodynamic, structural, and performance analysis of complete aircraft design

- Developed automated design cycle workflow enabling seamless updates across all design stages reducing iteration time by 60%

- Presented comprehensive design report and technical presentation to faculty panel

PUBLICATIONS

Journal Papers

- A. Sharifi, A. BaniAsad, and S. Mozafari, "Applied an in-motion transfer alignment approach during global positioning system outages utilizing a recurrent neural network algorithm," Engineering Applications of Artificial Intelligence, vol. 157, pp. 111167, 2025
- A. BaniAsad, et al., "Attitude Control of a 3-DoF Quadrotor Platform Using a Linear Quadratic Integral Differential Game Approach," ISA Transactions, vol. 148, pp. 515-527, 2024

Conference Papers

- A. BaniAsad and H. Nobahari, "Robust DDPG Reinforcement Learning Differential Game Guidance in Low-Thrust, Multi-Body Dynamical Environments," Proc. of 23rd International Conference of Iranian Aerospace Society, 2025
- M. Amirpour, A. BaniAsad, and H. Nobahari, "Reinforcement Learning-Based Controller Design for a Suspended Ball Plant," Proc. of 23rd International Conference of Iranian Aerospace Society, 2025
- H. Nobahari, A. BaniAsad, and A. Sharifi, "Linear Quadratic Integral Differential Game applied to the Real-time Control of a Quadrotor Experimental setup," Proc. of 2022 10th RSI International Conference on Robotics and Mechatronics, 2022

Preprints and Under Review

- A. BaniAsad, H. Nobahari, "Robustness on Demand: Transformer-Directed Switching in Multi-Agent RL," in preparation, 2025
- R. Pordal, A. Sharifi, and A. BaniAsad, "Ellipsoidal Set-Theoretic Design of Robust Safety Filters for Constrained Linear Systems," arXiv: 2510.22790, 2025

TEACHING EXPERIENCE

Section Leader   Apr 2025 – June 2025
Stanford University Code in Place (CS106A), Online

- Mentored 10 international learners in Python programming fundamentals through weekly section meetings
- Provided code review and debugging support for student projects demonstrating pedagogical expertise

Teaching Assistant   Sep 2018 – Present
Sharif University of Technology, Tehran, Iran

- Automatic Control (2021 – Present) - Instructors: Hadi Nobahari, PhD and Alireza Sharifi, PhD
- Control Lab (2022 – Present) - Instructors: Hadi Nobahari, PhD and Alireza Sharifi, PhD
- Dynamics (Jan 2023 – Dec 2023) - Instructor: Alireza Sharifi, PhD
- Aircraft Design II (Fall 2021) - Instructor: Afshin Banazadeh, PhD
- Fundamentals of Programming in C/C++ (Fall 2018)

Volunteer Tutor   Sep 2020 – Dec 2021
Virgol Charity, Tehran, Iran

- Provided university entrance exam preparation tutoring to underprivileged students in STEM subjects

AWARDS AND HONORS

- Best Undergraduate Thesis Award, Iranian Aerospace Society   2023
- National Master's Entrance Exam in Aerospace Engineering, Ranked 23 of 1000+   2022
- National Bachelor's Entrance Exam, Top 0.5% of 150,000 participants   2017
- National Organization for Development of Exceptional Talents (NODET) Member   2010 – 2017

CERTIFICATIONS

- Robotics Specialization (6 courses), University of Pennsylvania, Coursera
- Reinforcement Learning Specialization (4 courses), University of Alberta, Coursera
- IBM AI Engineering Professional Certificate (6 courses), IBM, Coursera
- Fundamentals of Accelerated Computing with CUDA Python, NVIDIA
- Neural Networks and Deep Learning, deeplearning.ai, Coursera
- Introduction to Embedded Machine Learning, Edge Impulse, Coursera
- Game Theory, Stanford University, Coursera
- Python Data Structures, University of Michigan, Coursera

SELECTED COURSEWORK

Programming and Computational Methods: Basic C Programming (20/20), Numerical Calculations (20/20)
Mathematics and Statistics: Engineering Mathematics (19.8/20), Probability and Statistics (20/20)
Control Systems: Automatic Control (18.1/20), Control Lab (18.5/20), Optimal Control (17.5/20)
Aerospace Engineering: Aircraft Design II (18.3/20), Flight Dynamics II (18.3/20)
Research: Bachelor Thesis (20/20)