Ali BaniAsad

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Education

Sharif University of Technology **Sep. 2022 – Apr. 2025**
Master of Science in Aerospace Engineering *Tehran, Iran*

Sharif University of Technology **Sep. 2017 – May 2022**
Bachelor of Science in Aerospace Engineering, GPA: 3.72/4 (17.56/20) last 6 semesters *Tehran, Iran*

Research Interests

- Reinforcement Learning
- Optimal Control
- Artificial Intelligence
- Deep Learning
- Robotics
- Computer Vision
- Automatic Control
- Game Theory

Publications *[Google Scholar profile]*

- Alireza Sharifi, **Ali BaniAsad**. "Applied an In-Motion Transfer Alignment Approach During Global Positioning System Outages Utilizing a Recurrent Neural Network Algorithm." *Engineering Applications of Artificial Intelligence*, 2025 (Minor Review).
- **Ali BaniAsad**, Reza Pordal, Alireza Sharifi, Hadi Nobahari. "Attitude Control of a 3-DoF Quadrotor Platform Using a Linear Quadratic Integral Differential Game Approach." *ISA Transactions, Elsevier*, 2024.
- **Ali BaniAsad** and Hadi Nobahari. "Robust DDPG Reinforcement Learning Differential Game Guidance in Low-Thrust, Multi-Body Dynamical Environments." *The 23rd International Conference of Iranian Aerospace Society*, 2025. (Accepted)
- Mahdi Amirpour, **Ali BaniAsad**, Hadi Nobahari. "Reinforcement Learning-Based Controller Design for a Suspended Ball Plant" *The 23rd International Conference of Iranian Aerospace Society*, 2025. (Accepted)
- Hadi Nobahari, **Ali BaniAsad**, Alireza Sharifi. "Linear Quadratic Integral Differential Game Applied to the Real-time Control of a Quadrotor Experimental Setup." *ICRoM, IEEE*, 2022.

Research Experience

Embedded RL Control for Robots on Resource-Constrained Hardwares **Aug. 2022 – Apr. 2025**
Master's Thesis, Sharif University of Technology *Tehran, Iran*

- Built a 15 k-LOC PyTorch/TensorFlow + Gymnasium stack for real-time control on embedded robots.
- Implemented four RL algorithms: DDPG, TD3, SAC, and PPO.
- Outperformed classical MPC, cutting trajectory-tracking error by 22% within strict on-board CPU/memory limits.
- Built a mixed-fidelity stack spanning Python, MATLAB/Simulink, and C++.
- Crafted zero-sum disturbance-augmented training that kept policies stable at 10× worst-case perturbations.
- Validated robustness on standard Gymnasium locomotion tasks—Ant, Humanoid, HalfCheetah, and Walker2d.
- Created a ROS 2 hardware-in-the-loop node to validate RL policies on embedded hardware.

Researcher at CNAV Lab **May 2020 – Feb. 2025**
Head of Lab (Current), Researcher (Former) *Tehran, Iran*

- Led projects on **Embedded AI** in C, **Reinforcement Learning (RL)**, and **ROS** for robotic control systems.
- Robust in-motion Transfer Alignment method based on the multilayer Neural Network.
  - Proposed **LSTM–MLP** that performs in-motion using only IMU + SINS data when GPS is unavailable.
  - Cuts navigation drift to $< 0.1\%$ of the Kalman-INS error during 100 s GPS outages.
  - Generalises across ship, ROV, and car datasets, outperforming conventional methods out of domain.

Game Theory-Based Control for Three Degrees of Freedom Platform **Feb. 2021 – Sep. 2023**
Bachelor's Thesis, Sharif University of Technology *Tehran, Iran*

- Controlled a 3DoF setup using **Differential Game** theory, employing **Nash Equilibrium** for **Robust** controller.
- Evaluated performance through Simulink simulations and practical **Implementation** on an experimental setup.
- Modelled a 3-DoF quadcopter stand and implemented a MATLAB/Simulink–to–C pipeline for real-time testing.

Awards and Honors

- Iranian Aerospace Society's **Best Undergraduate Thesis** Award.
- Ranked **Top 0.5%** in Nationwide Undergraduate Entrance Exam among more than 150,000 participants, 2017.

Technical Skills

Programming Languages: C/C++, Embedded C, MATLAB, Python
Tools and Platforms: Git, Linux, ROS, Simulink, Terminal, LaTeX
Libraries/Frameworks: Matplotlib, NumPy, Pandas, PyTorch, TensorFlow
Quantitative Skills: Reinforcement Learning, Robotics, Data Structures, Deep Learning, Embedded Machine Learning, Heuristic Optimization, Game Theory