Ali BaniAsad

Curriculum Vitae

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EDUCATION

M.S. Aerospace Engineering — Sep. 2022 – Sep. 2025
Sharif University of Technology

B.S. Aerospace Engineering — Sep. 2017 – May 2022
Sharif University of Technology

RESEARCH INTERESTS

- Reinforcement Learning
- Multi-Agent Systems
- Game Theory
- Robotics
- Automatic Control
- Embedded ML

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, doi: 10.1016/j.engappai.2025.111167.
- **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, doi: 10.1016/j.isatra.2024.03.005.

Conference Papers

- **A. BaniAsad** and H. Nobahari, "Robust DDPG Reinforcement Learning Differential Game Guidance in Low-Thrust, Multi-Body Dynamical Environments," in *Proc. of 23rd International Conference of Iranian Aerospace Society*, 2025 (Proceedings entry) (Project Repo (Code, Report, and Presentation) on GitHub).
- M. Amirpour, **A. BaniAsad**, and H. Nobahari, "Reinforcement Learning-Based Controller Design for a Suspended Ball Plant," in *Proc. of 23rd International Conference of Iranian Aerospace Society*, 2025 (Proceedings entry) (Report).
- 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 (ICRoM)*, 2022, pp. 578-583, doi: 10.1109/ICRoM57054.2022.10025263.

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 [eess.SY], 2025. (preprint)

RESEARCH EXPERIENCE

Embedded RL Control for Robots Aug. 2022 – Apr. 2025
Master's Thesis in Sharif University of Technology Tehran, Iran
Supervisors: Nobahari Hadi, PhD

- Designed zero-sum, disturbance-augmented training that kept policies stable under 10× worst-case perturbations.
- Built 15 k LOC RL control stack (DDPG, TD3, SAC, PPO) in PyTorch/TensorFlow+Gym for embedded robots.
- Optimized neural network models through quantization techniques to enhance performance for constrained hardware with limited CPU/memory resources.
- Validated robustness on Gymnasium locomotion tasks—Ant, Humanoid, HalfCheetah, Walker2d.
- Ported the system to a C++/Python ROS 2 hardware-in-the-loop node for on-board testing.
- Open-sourced full code, LaTeX report, and Jupyter demos to enable one-command reproduction for future researchers.

Researcher at CNAV Lab May 2020 – Feb. 2025
Head of Lab (Current), Researcher (Former) Tehran, Iran
Supervisors: Nobahari Hadi, PhD and Sharifi Alireza, PhD

- Led projects on embedded AI in C, reinforcement learning, and ROS for robotic control systems.
- Designed RL algorithms to enhance roboticnavigation, decision-making, and adaptability.
- 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.
  - Cut navigation drift to $<0.1\%$ of the Kalman-INS error during 100 s GPS outages.
  - Generalized across ship, ROV, and car datasets, outperforming conventional methods out of domain.

Game Theory-Based Control for 3-DoF Platform Feb. 2021 – Sep. 2023
Bachelor's Thesis in Sharif University of Technology Tehran, Iran
Supervisors: Nobahari Hadi, PhD
Awarded the Best Undergraduate Thesis

- Modeled a 3-DoF setup in Simulink and identified dynamics for parameter estimation.
- Controlled a 3-DoF quadcopter stand using differential game theory and Nash equilibrium for robust control.
- Implemented the controller through a MATLAB/Simulink–to–C pipeline for real-time hardware tests.
- Benchmarked against ADRC and DOBC, achieving superior disturbance rejection and robustness.

Coordination of Multi-Agent Autonomous Systems July 2023
Project in Sharif University of Technology Tehran, Iran
Supervisors: Nobahari Hadi, PhD

- Optimized a multi-agent model for communication delays and obstacle avoidance.
- Implemented and validated the model with Simulink simulations and HIL testing using embedded C on a microcontroller, ensuring robustness and reliability.

Multi-Objective Heuristic Optimization Feb. 2023
Project in Sharif University of Technology Tehran, Iran
Supervisors: Nobahari Hadi, PhD

- Implemented the REMARK algorithm for multi-objective optimization with conflicting objectives, allowing for the effective evaluation of trade-offs.
- Utilized heuristic methods to achieve high approximations of the Pareto Set, balancing multiple objectives for optimal decision-making.

Advanced Aircraft Trim Stability Analysis Mar. 2022
Project in Sharif University of Technology Tehran, Iran
Supervisors: Afshin Banazadeh, PhD

- Developed an advanced user interface software, enhancing aircraft stability analysis.
- Provided real-time interactive adjustments for aircraft performance evaluation.

AIAA Regional Jet Design Competition [Poster of the Aircraft] June 2021
Project in Sharif University of Technology Tehran, Iran
Supervisors: Afshin Banazadeh, PhD

- Led regional jet design, integrating disciplines for performance and industry standards.
- Developed a project report and presentation, highlighting design choices and simulation results, leading to a successful team presentation.
- Applied computer modeling for aerodynamic, structural, and performance analysis.
- Developed an automated design cycle that allowed for seamless updates across all stages.

TEACHING EXPERIENCE

Section Leader — Stanford University Apr. 2025 – June 2025

- Code in Place (CS106A) verify
- Mentor 10 international learners in Python.

Teaching Assistant — Sharif University of Technology Sep. 2018 – Present

- Automatic Control (2021 – Present)
- Control Lab (2022 – Present)
- Dynamics (Jan. 2023 – Dec. 2023)
- Aircraft Design II (Fall 2021)
- Fundamentals of Programming (C/C++) (Fall 2018)

Community Outreach Sep. 2020 – Dec. 2021

- University Entrance-Exam Preparation, Virgol Charity.

AWARDS AND HONORS

- Best Undergraduate Thesis — Iranian Aerospace Society 2023
  "Control of a 3-DOF Quadrotor Stand via LQI & Differential Game Theory"
- National M.Sc. Entrance Exam (Aerospace) — Rank 23 / 1 000+ 2022
- National B.Sc. Entrance Exam — Top 0.5 % of 150 000 2017
- NODET — National Organization for Development of Exceptional Talents 2010–2017

TECHNICAL SKILLS

- **Programming Languages:**
  - C/C++
  - Embedded C
  - MATLAB
  - Python
- **Tools and OS:**
  - Git
  - ROS
  - Terminal
  - Linux
  - Simulink
  - LaTeX
- **Libraries/Frameworks:**
  - **Machine Learning Libraries:**
    PyTorch, TensorFlow, Keras, Scikit-learn, OpenCV, OpenAI Gym, JAX
  - **Data Analysis and Visualization Libraries:**
    Matplotlib, NumPy, Pandas, Seaborn, Plotly
  - **Simulation Tools:** Gazebo, MuJoCo
- **Languages:** Farsi (Native), English (Full Professional Proficiency)
  The TOEFL iBT score is 96 (Reading: 26, Listening: 27, Speaking: 22, Writing: 21)

NOTABLE COURSES

Selected University Courses 2017–2024

- **Programming & Numerics**: Basic C Programming (20/20), Numerical Calculations (20/20)
- **Math & Statistics**: Engineering Mathematics (19.8/20), Probability & Statistics (20/20)
- **Control Systems**: Automatic Control (18.1), 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**: B.Sc. Thesis (20/20)

Online Courses 2017–2024

- **Robotics Specialization** — Univ. of Pennsylvania (6 courses) verify
- **Reinforcement Learning Specialization** — Univ. of Alberta (4 courses) verify
- **AI Engineering Pro-Cert** — IBM (6 courses)
- **Accelerated Computing with CUDA Python** — NVIDIA
- **Neural Networks & Deep Learning** — deeplearning.ai verify
- **Python Data Structures** — Univ. of Michigan verify
- **Intro to Embedded Machine Learning** — Edge Impulse verify
- **Game Theory** — Stanford University verify