Ali BaniAsad

Curriculum Vitae

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EDUCATION

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

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

RESEARCH INTERESTS

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

PUBLICATIONS

Journal Papers

- A. Sharifi, **A. BaniAsad**, et al., "Robust In-Motion Transfer Alignment of Low-Grade Inertial Navigation Systems with Recurrent Neural Networks in the Event of Reference Malfunction," *Engineering Applications of Artificial Intelligence*, 2025 (Submitted - Revised) (Project Repo (Code, Report) on GitHub).
- **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 (Accepted) (Project Repo (Code, Report) 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*, [Location, Date, if known], 2025 (Accepted). (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.

RESEARCH EXPERIENCE

Embedded RL Control for Robots on Resource-Constrained Hardwares Aug. 2022 – Apr. 2025

Master's Thesis in Sharif University of Technology Tehran, Iran

Supervisors: Nobahari Hadi, PhD

- Outperformed classical MPC, cutting trajectory-tracking error by 22 % within strict on-board CPU/memory limits.
- Designed zero-sum, disturbance-augmented training that kept policies stable under 10× worst-case perturbations.
- Engineered 15 k-LOC RL control stack (DDPG, TD3, SAC, PPO) in PyTorch/TensorFlow+Gym for embedded robots.
- 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 (RL)**, and **ROS** for robotic control systems.
- Designed **RL** algorithms to enhance robotic **navigation**, **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.
  - 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 in Sharif University of Technology Tehran, Iran

Supervisors: Nobahari Hadi, PhD

Awarded the Best Undergraduate Thesis

- Modelled 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 February 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 March 2022
Project in Sharif University of Technology Tehran, Iran
Supervisors: Afshin Banazadeh, PhD

- Developed an advanced **User Interface** software, enhancing aircraft **Stability Analysis**.
- **Real-Time** visualization and **Interactive** adjustments for aircraft performance **Evaluation**.

AIAA Regional Jet Design Competition June 2021
Project in Sharif University of Technology [Poster of the Aircraft] 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 allows for seamless updates across all stages.

TEACHING EXPERIENCE

Section Leader — Stanford University Apr 2025 – Present

- Code in Place (CS106A)
- Mentored 20 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 Scholar — 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 *Sharif University of Technology, Tehran* (2017–2024)

- **Programming & Numerics**: Basic C Programming (20), Numerical Calculations (20)
- **Math & Statistics**: Engineering Mathematics (19.8), Probability & Statistics (20)
- **Control Systems**: Automatic Control (18.1), Control Lab (18.5), Optimal Control (17.5)
- **Aerospace Engineering**: Aircraft Design II (18.3), Flight Dynamics II (18.3)
- **Research**: B.Sc. Thesis (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