

# Ali BaniAsad

## Curriculum Vitae

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### EDUCATION

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

**B.S. Aerospace Engineering** Sep. 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

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  $10\times$  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, 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 sLSTM-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 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 *

- 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 🔗

*Project in Sharif University of Technology*

Supervisors: Nobahari Hadi, PhD

July 2023

Tehran, Iran

- 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 🔗

*Project in Sharif University of Technology*

Supervisors: Nobahari Hadi, PhD

Feb. 2023

Tehran, Iran

- 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 🔗

*Project in Sharif University of Technology*

Supervisors: Afshin Banazadeh, PhD

Mar. 2022

Tehran, Iran

- 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 🔗

*Project in Sharif University of Technology* [[Poster of the Aircraft](#)]

Supervisors: Afshin Banazadeh, PhD

June 2021

Tehran, Iran

- 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
  - $\text{\LaTeX}$
- **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](#)