

# Ali BaniAsad

## Curriculum Vitae

### Contact Information

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### EDUCATION

**M.S.** Aerospace Engineering  
*Sharif University of Technology*

September 2022 – December 2024 (Expected)

**B.S.** Aerospace Engineering  
*Sharif University of Technology*

September 2017 – May 2022

### RESEARCH INTERESTS

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

### PUBLICATIONS

#### Journal Papers

- **Ali BaniAsad**, Alireza Sharifi, Reza Pordal, Hadi Nobahhari. "Attitude Control of a 3-DoF Quadrotor Platform Using a Linear Quadratic Integral Differential Game Approach." *ISA Transactions*, [Elsevier](#), 2024.
- Alireza Sharifi, **Ali BaniAsad**. "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*, 2024 ([Submitted](#)).
- **Ali BaniAsad**, Hadi Nobahhari. "Robust Differential Game Reinforcement Learning with Soft Actor-Critic for Guidance in Low-Thrust Multi-Body Environments." *Journal of Guidance, Control, and Dynamics*, *AIAA*, 2024 (Active).
- **Ali BaniAsad**, Alireza Sharifi. "Enhancing AHRS Results with Deep Learning LSTM Networks and Soft Actor-Critic for Real-Time Attitude Estimation in GNSS-Denied Environments" *IEEE Transactions on instrumentation and measurement*, 2024 (Active).

#### Conference Papers

- Hadi Nobahhari, **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

Researcher at [CNAV Lab](#) [in](#) [GitHub](#) [YouTube](#)

May 2020 – Ongoing

*Head of Lab (Current), Researcher (Former)*

Tehran, Iran

Supervisors: Hadi Nobahari, PhD and Alireza Sharifi, PhD

- Integrated **embedded AI** with C programming to enhance **robotic control** system efficiency.
- Developed AI-driven navigation systems ([INS-AI](#), [AHRs-AI](#)) to enhance **precision**, **safety**.
- Employed **ROS** for inter-robot networking and swarm flight in **multi-agent** [Crazyflie](#) drones.

**Robust Reinforcement Learning Guidance** [GitHub](#)

August 2022 – November 2024 (Expected)

*Master's Thesis in Sharif University of Technology*

Tehran, Iran

Supervisors: Hadi Nobahari, PhD

- Investigated **Deep Reinforcement Learning** methods, comparing their performance with classical strategies, such as **MPC**, to identify strengths and weaknesses.
- Integrated **ROS** to test and validate robotic **Embedded RL** in **real-world** scenarios.
- Utilized **game theory** to develop **robust** and **safe multi-agent** RL algorithms.

**Game Theory-Based Control for a UAV** [GitHub](#) [YouTube](#)

February 2021 – September 2023

*Bachelor's Thesis in Sharif University of Technology*

Tehran, Iran

Supervisors: Hadi Nobahari, PhD

*Awarded the Best Undergraduate Thesis* [🏆](#)

- Developed a robust **quadrotor** control system using **differential game theory**.
- Employed **optimization** for **system identification**, enhancing control **reliability**.
- Tested the control strategy on a [3DoF setup](#), demonstrating the **game-theoretic** approach.

**Optimized Flocking of Autonomous Drones** [GitHub](#)

July 2023

*Project in Sharif University of Technology*

Tehran, Iran

Supervisors: Hadi Nobahari, PhD

- Optimized a swarm 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** [GitHub](#)

February 2023

*Project in Sharif University of Technology*

Tehran, Iran

Supervisors: Hadi Nobahari, PhD

- Implemented the [REMARK](#) algorithm for **multi-objective optimization** with **conflicting** objectives, allowing for the effective evaluation of trade-offs.

**Advanced Aircraft Trim Stability Analysis with DATCOM** [GitHub](#)

March 2022

*Project in Sharif University of Technology*

Tehran, Iran

Supervisors: Afshin Banazadeh, PhD

- Developed an advanced **UI** for DATCOM software, enhancing aircraft **stability analysis**.
- **Real-Time** visualization and **interactive** adjustments for aircraft performance **evaluation**.

**AIAA Regional Jet Design Competition** [GitHub](#)

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.

## TEACHING EXPERIENCE

### Teaching Assistant

- **Automatic Control** September 2021 – Present  
*Department of Aerospace Engineering, Sharif University of Technology*  
Instructors: Hadi Nobahari, PhD and Alireza Sharifi, PhD
- **Control Lab** September 2021 – Present  
*Department of Aerospace Engineering, Sharif University of Technology*  
Instructors: Hadi Nobahari, PhD and Alireza Sharifi, PhD
- **Dynamics** September 2021 – December 2023  
*Department of Aerospace Engineering, Sharif University of Technology*  
Instructors: Alireza Sharifi, PhD
- **Introduction to Aerospace Engineering** September 2021 – December 2023  
*Department of Aerospace Engineering, Sharif University of Technology*  
Instructors: Alireza Sharifi, PhD
- **Aircraft Design II** September 2021 – December 2021  
*Department of Aerospace Engineering, Sharif University of Technology*  
Instructors: Afshin Banazadeh PhD
- **Fundamentals of Programming (C/C++)** September 2018 – December 2018  
*Department of Computer Engineering, Sharif University of Technology*  
Instructor: Ms. Marjan Nikbin

### Volunteer Teaching

- **University Entrance Exam Preparation** September 2020 – December 2021  
*Virgol Charity, Local Community*  
Provided educational support to underprivileged children as part of a local charity initiative.

## AWARDS AND HONORS



**Iranian Aerospace Society's Best Undergraduate Thesis Award** 2023  
*Awarded for the exceptional undergraduate thesis titled "Control of a 3DOF Quadrotor Stand using a Linear-Quadratic-Integral Controller based on Differential Game Theory".*

**Ranked 23** 2022  
*Ranked 23 among more than thousands participants in the Nationwide University Entrance Exam for Aerospace Engineering.*

**Ranked Top 0.5%** 2017  
*Ranked Top 0.5% among 150,000 participants of Iran's Undergraduate University Entrance Exam*

**Member of NODET** 2010 – 2017  
*Recognized as an Exceptional Talent by Iran's National Elites Foundation, a National Organization Dedicated to the Development of Exceptionally Talented individuals (NODET).*

## TECHNICAL SKILLS

- **Programming Languages**
  - C/C++
  - Embedded C
  - MATLAB
  - Python 🐍
- **Tools and Platforms**
  - Git 
  - ROS
  - Terminal >\_
  - Linux 
  - Simulink
  - L<sup>A</sup>T<sub>E</sub>X
- **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

### University Courses

2017 – 2024

*Sharif University of Technology, Tehran, Iran*

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

- **Robotics:** [verify certificate](#)  
*Provided by University of Pennsylvania, Coursera*
  - Aerial Robotics
  - Computational Motion Planning
  - Mobility
  - Perception
  - Estimation and Learning
  - Capstone
- **Reinforcement Learning:** [verify certificate](#)  
*Provided by University of Alberta, Coursera*
  - Fundamentals of Reinforcement Learning
  - Sample-based Learning Methods
  - Prediction and Control with Function Approximation
  - A Complete Reinforcement Learning System
- **IBM AI Engineering:**  
*Provided by IBM, Coursera*
  - Machine Learning with Python
  - Introduction to Deep Learning and Neural Networks with Keras
  - Building Deep Learning Models with TensorFlow
  - Introduction to Neural Networks and PyTorch
  - Introduction to Computer Vision and Image Processing
  - AI Capstone Project with Deep Learning
- **Neural Networks and Deep Learning:** [verify certificate](#)  
*Provided by deeplearning.ai, Coursera*
- **Python Data Structures:** [verify certificate](#)  
*Provided by University of Michigan, Coursera*
- **Introduction to Embedded Machine Learning:** [verify certificate](#)  
*Provided by Edge Impulse, Coursera*
- **Game Theory:** [verify certificate](#)  
*Provided by Stanford University, Coursera*

## HOBBIES

- |                     |              |                 |
|---------------------|--------------|-----------------|
| • Violin 🎵          | • Coding 🖥️  | • Traveling ✈️  |
| • Classical Music 🎧 | • Swimming 🏊 | • Photography 📷 |
| • Reading 📖         | • Hiking 🏔️  | • Chess ♟️      |

## REFERENCES

- **Sharifi, Alireza, PhD**


Assistant Professor of Aerospace Engineering, Sharif University of Technology

Dr. Sharifi Supervised my work in the [CNAV Lab](#) for over three years, during which we collaborated on multiple projects. I served as both a researcher and a teaching assistant during this time.

–  [Faculty Page at Sharif University](#)

–  [ar.sharifi@sharif.edu](mailto:ar.sharifi@sharif.edu)

–  [Google Scholar Profile](#)

–  (+98)-21-6616-8115

- **Nobahari, Hadi, PhD**


*Professor of Aerospace Engineering, Sharif University of Technology*

I have worked with Dr. Nobahari for over four years, including on both my master's and bachelor's theses.

–  [Faculty Page at Sharif University](#)

–  [nobahari@sharif.edu](mailto:nobahari@sharif.edu)

–  [Google Scholar Profile](#)

–  (+98)-21-6616-4040

- **Banazadeh, Afshin, PhD**


*Professor of Aerospace Engineering, Sharif University of Technology*

I have taken several courses with Dr. Banazadeh, achieving excellent results. I developed a fully designed regional jet and created a GUI to facilitate and automate the design process. Additionally, I served as a teaching assistant for the "Airplane Design II" course for one year.

–  [Faculty Page at Sharif University](#)

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–  [Google Scholar Profile](#)

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