Ali BaniAsad

Curriculum Vitae

Contact Information
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EDUCATION

M.S. Aerospace Engineering — September 2022 – November 2024 (Expected)
Sharif University of Technology

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

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 (Impact Factor: 6.3).
- 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." *IEEE*, 2024 (Active)
- **Ali BaniAsad**, Hadi Nobahhari. "Robust Differential Game Reinforcement Learning with Soft Actor-Critic for Guidance in Low-Thrust Multi-Body Environments." *AIAA*, 2024 (Active)
- **Ali BaniAsad**, Alireza Sharifi. "Enhancing AHRS Results with Deep Learning LSTM Networks for Real-Time Attitude Estimation in GNSS-Denied Environments." *Engineering Applications of Artificial Intelligence*, 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 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 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 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 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 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 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 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.

SELECTED AWARDS AND HONORS

Ranked 23 2017

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

Iranian Aerospace Society's Best Undergraduate Thesis Award 2022

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 Top 0.5% 2017

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

TECHNICAL SKILLS

- **Programming Languages**
  - C/C++
  - Embedded C
  - MATLAB
  - Python
- **Tools and Platforms**
  - Git
  - ROS
  - Terminal
  - Linux
  - Simulink
  - LaTeX
- **Libraries/Frameworks:**
  - **Machine Learning Libraries:** PyTorch, TensorFlow, Keras, Scikit-learn, OpenAI Gym, JAX
  - **Data Analysis and Visualization Libraries:** Matplotlib, NumPy, Pandas, OpenCV
  - **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)

Online Courses 2017 – 2024

- **Robotics:** verify certificate
  Provided by University of Pennsylvania, Courser
  - 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
- Classical Music
- Reading
- Coding
- Swimming
- Hiking
- Traveling
- Photography
- 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
  - Google Scholar Profile
  - ar.sharifi@sharif.edu
  - (+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
  - Google Scholar Profile
  - nobahari@sharif.edu
  - (+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
  - Google Scholar Profile
  - banazadeh@sharif.edu
  - (+98)-21-6616-8108