Ali BaniAsad

Curriculum Vitae

Contact Information
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EDUCATION

M.S. Aerospace Engineering — September 2022 – December 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 Nobahari. "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 (Submited).
- **Ali BaniAsad**, Hadi Nobahari. "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 Nobahari, **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: Nobahari Hadi, PhD and Sharifi Alireza, 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 coordination in **multi-agent** systems.

Robust and Safe Reinforcement Learning August 2022 – December 2024 (Expected)
Master's Thesis in Sharif University of Technology Tehran, Iran
Supervisors: Nobahari Hadi, PhD and Mohammad Noshad, 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 3DoF Setup February 2021 – September 2023
Bachelor's Thesis in Sharif University of Technology Tehran, Iran
Supervisors: Nobahari Hadi, PhD
Awarded the Best Undergraduate Thesis

- Developed a robust **robot** 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.

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.

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

- Developed an advanced **UI** 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: Nobahari Hadi, PhD and Sharifi Alireza, PhD

- **Control Lab** September 2021 – Present
  Department of Aerospace Engineering, Sharif University of Technology
  Instructors: Nobahari Hadi, PhD and Sharifi Alireza, PhD

- **Dynamics** September 2021 – December 2023
  Department of Aerospace Engineering, Sharif University of Technology
  Instructors: Sharifi Alireza, PhD

- **Introduction to Aerospace Engineering** September 2021 – December 2023
  Department of Aerospace Engineering, Sharif University of Technology
  Instructors: Sharifi Alireza, PhD

- **Aircraft Design II** September 2021 – December 2021
  Department of Aerospace Engineering, Sharif University of Technology
  Instructors: Banazadeh Afshin 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
  - 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

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

- **Noshad, Mohammad, PhD**
  Assistant Professor of Aerospace Engineering, Sharif University of Technology
  Dr. Noshad
  - -
  - moh@shyld.ai
  - Google Scholar Profile
  - +1 (669) 246-8140

- **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
  - 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
  - Google Scholar Profile
  - (+98)-21-6616-4040