Ali BaniAsad

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Education

Sharif University of Technology **Sep. 2022 – Nov 2024 (Expected)**
Master of Science in Aerospace Engineering *Tehran, Iran*

Sharif University of Technology **Sep. 2017 – May 2022**
Bachelor of Science in Aerospace Engineering, GPA: 3.72/4 (17.56/20) last 6 semesters *Tehran, Iran*

Research Interests

- Reinforcement Learning
- Optimal Control
- Artificial Intelligence
- Deep Learning
- Robotics
- Computer Vision
- Automatic Control
- Game Theory

Publications *[Google Scholar profile]*

- **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.
- 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.
- 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)

Research Experience

Researcher at CNAV Lab **May 2020 – Ongoing**
Head of Lab (Current), Researcher (Former) *Tehran, Iran*

- Led projects on **embedded AI** in C, **Reinforcement Learning (RL)**, and **ROS** for robotic control systems.
- Developed quadrotor tech and AI navigation, enhancing vehicle **precision** and **safety**.

Master's Thesis *[GitHub]* **August 2022 – November 2024 (Expected)**
Reinforcement Learning for Robotics in Complex Dynamical Systems *Tehran, Iran*

- Investigated various Reinforcement Learning methods and compared their performance to classic control strategies.
- Integrated ROS to implement and test real-world robotic systems, validating performance in practical scenarios.

Bachelor's Thesis *[GitHub]* **February 2021 – September 2023**
Game Theory-Based Control for a Quadrotor with Three Degrees of Freedom *Tehran, Iran*

- Controlled a quadcopter stand using differential game theory, employing Nash equilibrium for robust controller.
- Evaluated performance through Simulink simulations and practical implementation on a three degree of freedom setup.

Projects

Optimized Flocking of Autonomous Drones | *Embedded C, HIL, Optimization, Simulink, Swarm* **July 2023**

- Developed a UAV swarm model optimizing flocking under **real-world constraints** such as **delays** and **obstacles**.
- Implemented and validated the model with Simulink simulations and **HIL** testing using a **microcontroller**.

Multi-Objective Heuristic Optimization | *OOP, Optimization Algorithms, Python* **February 2023**

- Implemented the REMARK algorithm for **multi-objective** optimization with conflicting objectives.
- Utilized heuristic methods to achieve high approximations of the **Pareto set**, balancing trade-offs between objectives.

Advanced Aircraft Trim Stability Analysis with DATCOM | *Advanced UI, Aircraft Control, Python* **March 2022**

- Developed an advanced UI for Digital DATCOM software, **optimizing analysis** and enhancing design precision.

AIAA Regional Jet Design Competition | *Aircraft Design, Computer Modeling, MATLAB, Python* **June 2021**

- Fully designed a regional jet, encompassing coding, computer design, and simulations.

Awards and Honors

- Iranian Aerospace Society's **Best Undergraduate Thesis** Award.
- Ranked **Top 0.5%** in Nationwide Undergraduate Entrance Exam among more than 150,000 participants, 2017.

Technical Skills

Programming Languages: C/C++, Embedded C, MATLAB, Python
Tools and Platforms: Git, Linux, ROS, Simulink, Terminal, LaTeX
Libraries/Frameworks: Matplotlib, NumPy, Pandas, PyTorch, TensorFlow
Quantitative Skills: Reinforcement Learning, Robotics, Data Structures, Deep Learning, Embedded Machine Learning, Heuristic Optimization, Game Theory