

NIKOLAY LYAN

Aerospace Engineer & PhD Student — Reinforcement Learning for UAV Autonomy & GNC
nikolay@uzay-muhendisi.com | [+90 543 880 89 36](tel:+905438808936) | [linkedin.com/in/kolyalyan](https://www.linkedin.com/in/kolyalyan) | uzay-muhendisi.com

SUMMARY

Aerospace engineer and PhD student at Istanbul Technical University (ITU) specializing in reinforcement learning-based control, GNC, and high-fidelity digital twins for autonomous aerial systems. First author of two AIAA SciTech papers (2024 & 2026). Developed a MuJoCo-based 6-DoF digital twin and PPO autopilot achieving **<3.5 m RMS waypoint-tracking error** across unseen simulation missions. Hands-on background includes onboard UAV autonomy software, ground control station development, and aerodynamic analysis.

KEY HIGHLIGHTS

- **2× First-Author AIAA SciTech Papers** — AI/RL Control of Hybrid Airships (2024 & 2026).
- **High-Fidelity Simulation:** Developed PPO-based Autopilot achieving <3.5 m RMS waypoint-tracking error in MuJoCo 6-DoF simulation across unseen missions.
- **IMechE UAS Challenge 2018:** Overall Grand Champion — developed onboard autonomy & GCS software.

TECHNICAL SKILLS

- **AI / RL:** PPO, GAE, reward shaping, actor-critic methods, Stable-Baselines3, PyTorch, Optuna.
- **GNC / Dynamics:** 6-DoF rigid-body dynamics, waypoint tracking, flight dynamics, actuator constraints, state estimation, Kalman/EKF concepts.
- **Simulation:** MuJoCo, MATLAB/Simulink, physics-based simulation, digital twin development, aerodynamic and propulsion modeling.
- **Aerospace Tools:** ANSYS Fluent, ANSYS Mechanical, XFLR5, Fusion 360, CATIA, SolidWorks, Inventor.
- **Programming:** Python, C/C++, MATLAB, Linux, Git.
- **Languages:** Russian (Native), Turkish (Bilingual), English (Advanced Technical).

RESEARCH & PROFESSIONAL EXPERIENCE

Doctoral Researcher — UAV Swarm Coordination | *Istanbul Technical University (ITU)* Jan 2026 – Present

Current PhD research, building on single-agent control work:

- Extending single-agent RL flight control toward safe, scalable coordination of physically heterogeneous UAV swarms (multirotor, fixed-wing, and hybrid-lift platforms).
- Investigating constrained multi-agent RL (CMDP / Lagrangian methods) and graph-attention policies for class-asymmetric observation and action spaces, with sim-to-real robustness via dynamics randomization.

Graduate Researcher — RL & GNC for Hybrid-Lift UAVs | *ITU Model-Based Design and Control Lab*

- Developed a high-fidelity 6-DoF MuJoCo digital twin of a hybrid-lift airship integrating rigid-body dynamics, aerostatic buoyancy, semi-empirical lifting-hull aerodynamics, measured rotor thrust/torque maps, and tilt-servo dynamics. 2022 – Present
- Formulated autonomous waypoint tracking as a finite-horizon MDP and trained a unified PPO autopilot achieving **<3.5 m RMS and <6.1 m peak position error** across unseen missions while maintaining stable attitude and respecting actuator limits.
- Designed and optimized the full PPO/GAE training pipeline, including reward shaping, 6D continuous attitude representation, actuator-limit handling, and Optuna-based hyperparameter tuning.
- Created the initial modular AI-based control architecture for the airfoil-shaped hybrid airship concept.

Research Engineer — Additive Manufacturing | FSMVÜ ALUTEAM

2023 – 2024

- Developed production proposals and process planning for additive manufacturing operations.

Independent Aerospace Engineering Consultant | Remote / Upwork

2020 – Present

- Delivered client projects involving UAV concept design, CAD modeling, CFD/FEA support, Python automation, and manufacturability-oriented mechanical design using Fusion 360, SolidWorks, and ANSYS.
- Contributed to cargo-drone prototype mechanical design with a focus on manufacturability and production constraints.

UAV Autonomy & Aerodynamics Lead | ITU Team HEDEF (APIS ARGE TAKIMI)

2016 – 2020

- *Award*: IMechE UAS Challenge 2018 — Overall Grand Champion / 1st Place.
- Developed onboard autonomy software for real-time image acquisition, command processing, autonomous target localization, and GPS geolocation.
- Built ground control station (GCS) tools for interactive flight planning, payload-drop planning, and real-time UAV tracking.
- Configured secure UAV–GCS communication links and telemetry systems.
- Conducted aerodynamic analysis of UAV airframes using XFLR5 and ANSYS Fluent; developed a Python tool for direct airfoil import into Autodesk Fusion 360.

Student Intern — Thermal-Control Systems | JSC Baïterek, Baikonur Cosmodrome

Summer 2019

- Analyzed thermal-control systems and digitized legacy Soviet engineering diagrams.

EDUCATION

- **PhD, Aeronautical and Astronautical Engineering** | Istanbul Technical University | Jan 2026 – Present
- **MSc, Aeronautical and Astronautical Engineering** | Istanbul Technical University | 2022 – 2025
 - *Thesis*: Reinforcement-Learning Control of a Hybrid Airship Using a High-Fidelity Digital Twin (defended June 2025).
- **BSc, Astronautical Engineering** | Istanbul Technical University | 2016 – 2022

PUBLICATIONS

1. **N. Lyan**, I. Bayezit. "Reinforcement-Learning Control of a Hybrid Airship Using a High-Fidelity Digital Twin." AIAA SciTech Forum 2026, Orlando FL. DOI: [10.2514/6.2026-2401](https://doi.org/10.2514/6.2026-2401)
2. **N. Lyan**, I. Bayezit. "AI-Based Control of a Novel Airfoil-Shaped Quadrotor Hybrid Airship." AIAA SciTech Forum 2024, Orlando FL. DOI: [10.2514/6.2024-0281](https://doi.org/10.2514/6.2024-0281)