

Milad Alipour Shahraki

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RESEARCH INTERESTS

Nonlinear and Optimal Control · Safety-Critical Control and Constrained Optimization · Adaptive and Learning-Based Control · Artificial Intelligence and Machine Learning

EDUCATION

Ph.D. in Electrical Engineering | *Northeastern University, Boston, MA* Sep. 2022 – Present
Faculty Advisor: Dr. Laurent Lessard
Current GPA: 4.00 / 4.00

M.Sc. in Mechanical Engineering | *University of Isfahan, Isfahan, Iran* Sep. 2017 – Jan. 2020
Thesis: Fractional-Order Sliding Mode Control of Flexible Spacecraft
Faculty Advisors: Dr. Maryam Malekzadeh and Dr. Alireza Ariaei
CGPA: 3.88 / 4.00 (*Ranked 1st in class*)

B.Sc. in Mechanical Engineering | *Fasa University, Fars, Iran* Sep. 2013 – Jul. 2017
Thesis: Control Under External Disturbance Using Disturbance Observers
Faculty Advisor: Dr. Mohamadreza Homayounzade
CGPA: 3.59 / 4.00 (*Ranked 1st in class*)

RESEARCH EXPERIENCE

Research Assistant | *Lessard's Research Group, Northeastern University* Sep. 2022 – Present

- Developed a two-stage constrained near-optimal control framework combining offline HJB solutions with online CBF-constrained quadratic programs, decoupling performance from safety enforcement
- Designed CLF-QP and CBF-based controllers for agile spacecraft attitude control under reaction wheel input and state constraints

Research Assistant | *Mechatronics Lab, University of Isfahan* Sep. 2017 – Jan. 2020

- Designed adaptive fractional-order nonsingular terminal sliding mode controllers for rigid and flexible spacecraft attitude control under actuator saturation and external disturbances
- Proved practical fixed-time stability via Lyapunov analysis and validated controllers experimentally on a spacecraft attitude control simulator

Research Assistant | *Homayounzade's Research Group, Fasa University* Jul. 2016 – Jul. 2017

- Developed an adaptive output feedback trajectory tracking controller for unmanned surface vessels with velocity observer and disturbance estimator, requiring only position and orientation measurements

PUBLICATIONS

Journal Papers

- Milad Alipour Shahraki** and Laurent Lessard, "Near-Optimal Constrained Feedback Control of Nonlinear Systems via Approximate HJB and Control Barrier Functions," *Submitted to IEEE Control Systems Letters*, 2026. DOI: 10.48550/arXiv.2603.16114
- Milad Alipour Shahraki**, Maryam Malekzadeh, and Alireza Ariaei, "Practical fractional-order nonsingular terminal sliding mode control of spacecraft," *ISA Transactions*, 2022. DOI: 10.1016/j.isatra.2021.10.022
- Milad Alipour Shahraki**, Maryam Malekzadeh, and Alireza Ariaei, "Active fractional-order sliding mode control of flexible spacecraft under actuators saturation," *Journal of Sound and Vibration*, 2022. DOI: 10.1016/j.jsv.2022.117110
- Mohamadreza Homayounzade, and **Milad Alipour Shahraki**, "Output feedback adaptive control of dynamically positioned surface vessels: a disturbance observer-based control approach," *International Journal of Robotics and Automation*, vol. 34, no. 4, 2019. DOI: 10.2316/J.2019.206-5572

Conference Papers

- Milad Alipour Shahraki** and Laurent Lessard, "Spacecraft Attitude Control Under Reaction Wheel Constraints Using Control Lyapunov and Control Barrier Functions," *2025 American Control Conference (ACC)*, pp. 947–952, IEEE, 2025. DOI: 10.23919/ACC63710.2025.11108025

PROFESSIONAL ACTIVITIES AND SERVICE

Journal Reviewer

- IEEE Transactions on Automatic Control
- IEEE Transactions on Systems, Man, and Cybernetics: Systems
- IEEE/ASME Transactions on Mechatronics
- IEEE Control Systems Letters
- Automatica
- ISA Transactions
- Aerospace Science and Technology
- Control Engineering Practice

Conference Reviewer

- Learning for Dynamics and Control Conference (L4DC)
- IEEE Conference on Decision and Control (CDC)

AWARDS AND HONORS

University of Isfahan

- Faculty of Engineering scholarship as an *Exceptional Talent Student* for all semesters
- Ranked 1st in the class of Mechanical Engineering
- Exempted from the National Ph.D. Entrance Exam (*Exceptional Talents Ph.D. Admission Offer*: offered to the top 3 M.Sc. students with the highest GPAs)

Fasa University

- Faculty of Engineering scholarship as an *Exceptional Talent Student* for all semesters
- Ranked 1st in the class of Mechanical Engineering
- Exempted from the National M.Sc. Entrance Exam (*Exceptional Talents M.Sc. Admission Offer*: offered to the top 3 B.Sc. students with the highest GPAs)

SKILLS AND LANGUAGES

Languages

English (Fluent; TOEFL iBT: 104) · Persian (Native)

Software

Python, Julia, MATLAB and Simulink, \LaTeX , C++, Microsoft Office, LabVIEW, SolidWorks, AutoCAD, Adobe Photoshop

TEACHING EXPERIENCE

Teaching Assistant | *Fundamentals of Linear Systems*

Instructor: Dr. Mohammad Fanaei

Northeastern University, 2026

Teaching Assistant | *Mathematical Methods for Mechanical Engineers*

Instructor: Dr. Umit Coskun

Northeastern University, 2025

Teaching Assistant | *Engineering Mechanics: Statics – Industrial Drawing*

Instructor: Dr. Reza Vaghefi

Fasa University, 2015

Further information and references are available upon request.