

# HOSSEIN ABDI



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## Profile Summary

Ph.D. student in Computer Science (AI and Robotics) at The University of Manchester, with research interests in Optimization, Reinforcement Learning, Control Theory, and Robotics. Previously earned MSc and BSc degrees in Mechanical Engineering with a focus on Robotics and Control Theory from Sharif University of Technology.

## Education

### Ph.D. Student in Computer Science

2023-2027

- The University of Manchester, UK.
- Research Topic: Advanced Policy Optimization for Robot Control

### M.Sc. in Mechanical Engineering

2017-2019

- Sharif University of Technology, Tehran, Iran.
- Research Topic: Optimal-Swarm Control of Micro-Robots for Energy Saving

### B.Sc. in Mechanical Engineering

2012-2017

- Sharif University of Technology, Tehran, Iran.
- Research Topic: Dynamics-Based Control Policy for Quadruped Locomotion

### B.Sc. in Aerospace Engineering (2<sup>nd</sup> major)

2012-2017

- Sharif University of Technology, Tehran, Iran.

### High-School Diploma in Mathematics and Physics

2008-2012

- National Organization for Development of Exceptional Talents, Iran.

## Publication

**Abdi, Hossein**, Golnaz Raja, and Reza Ghabcheloo. "Safe control using vision-based control barrier function (V-CBF)." In IEEE International Conference on Robotics and Automation, pp. 782-788. IEEE, 2023.

**Abdi, Hossein**, Pan Zhao, Naira Hovakimyan, and Reza Ghabcheloo. "Model Predictive Control Barrier Functions: Guaranteed Safety with Reduced Conservatism and Shortened Horizon." In 2024 American Control Conference (ACC), pp. 1652-1657. IEEE, 2024.

Zhao, Pan, Reza Ghabcheloo, Yikun Cheng, **Hossein Abdi**, and Naira Hovakimyan. "Convex synthesis of control barrier functions under input constraints." IEEE Control Systems Letters 7 (2023): 3102-3107.

**Abdi, Hossein**, and Hossein Nejat Pishkenari. "Self-learning swimming of a three-disk microrobot in a viscous and stochastic environment using reinforcement learning." Engineering Applications of Artificial Intelligence 123 (2023): 106188.

**Abdi, Hossein**, Mingfei Sun, and Wei Pan. "Bayesian Natural Gradient Fine-Tuning of CLIP Models via Kalman Filtering." arXiv preprint arXiv:2511.01694 (2025).

**Abdi, Hossein**, Mingfei Sun, Andi Zhang, Samuel Kaski, and Wei Pan. "LoKO: Low-Rank Kalman Optimizer for Online Fine-Tuning of Large Models." arXiv preprint arXiv:2410.11551(2024).

Toukani, Naeim Ebrahimi, **Hossein Abdi**, Olli Koskelainen, and Reza Ghabcheloo. "Reactive safe path following for differential drive mobile robots using control barrier functions." In 2022 10th International Conference on Control, Mechatronics and Automation (ICCMA), pp. 60-65. IEEE, 2022.

**Abdi, Hossein**, and Hossein Nejat Pishkenari. "Controlled swarm motion of self-propelled microswimmers for energy saving." Journal of Micro-Bio Robotics 17, no. 1 (2021): 23-33.

**Abdi, Hossein**, and Hossein Nejat Pishkenari. "Optimal control of a high maneuverable micro-swimmer in low Reynolds number flow to reduce energy consumption." In 2019 7th International Conference on Robotics and Mechatronics (ICRoM), pp. 110-113. IEEE, 2019.

**Abdi, H.**, M. J. Shaker Arani, H. Salarieh, and M. M. Kakaei. "Dynamic modeling and Designing a dynamic based control algorithm for legged quadruped robot locomotion." Modares Mechanical Engineering 19, no. 11 (2019): 2635-2644.

## Honor and Award

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### Scholarship Awarded

2023

Recipient of the highly prestigious Dean's Doctoral Scholarship Award from The University of Manchester.

### Gold Medal in Olympiad

2017

Awarded the Gold Medal (First Rank) in the National Olympiad of Mechanical Engineering, a competition held among the top undergraduate students in Iran.

### Merit-Based Admission Offer

2017

Awarded a direct admission offer, exempt from the entrance exam, to the M.Sc. program in Mechanical Engineering at Sharif University of Technology in recognition of outstanding academic excellence.

### Top Rank in M.Sc. Entrance Exam

2017

Achieved 10<sup>th</sup> and 4<sup>th</sup> ranks in the nationwide entrance examinations for the M.Sc. Programs in Mechanical Engineering and Aerospace Engineering, respectively.

## Research Interest

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- Optimization
- Reinforcement Learning
- Control Theory
- Robotics

## Academic Experience

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### Visitor and Participant at ETH Zürich, Switzerland

2025

Visited ETH Zürich, Switzerland, and participated in the International Ph.D. School Program on Learning-Based Model Predictive Control, led by Prof. Melanie Zeilinger, at the Intelligent Control Systems Lab, Institute for Dynamic Systems and Control, Department of Mechanical and Process Engineering, Zurich, Switzerland.

### Researcher at Tampere University, Finland

2021-2023

Research on Safe RL and Learning-based Control of Mobile-Robots.

### Summer School in Saint Petersburg, Russia

2019

Topic: Modern Machine Learning.

Score: 10 out of 10 (A+)

National Research University (HSE), Saint Petersburg, Russia.

### Researcher at Sharif University of Technology, Iran

2019-2021

Research on RL in Microrobots at Micro Nano Robotics Laboratory, Department of Mechanical Engineering.

### International Conference Student Committee

2019

Volunteer in the student committee of the 7<sup>th</sup> RSI International Conference on Robotics and Mechatronics ICRoM'19 (IEEE), Sharif University of Technology, Tehran, Iran.

### Teaching Assistant

- Cognitive Robotics and Computer Vision, Machine Learning and the Physical World, Reasoning and Learning under Uncertainty, Introduction to AI, Introduction to Programming at The University of Manchester
- Robotics at Tampere University
- Dynamics, Dynamics of Machinery, Engineering Graphics, Thermodynamics at Sharif University of Technology

## Industrial Experience

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### Mechanical Engineer

2019-2020

Mechanical Engineer at NDT Ultrasonic Design Project.

### Control Engineer

2016-2017

Control Engineer for the Satellite Thermal Control System in a CubeSat Design and Fabrication project.

### Trainee

2015

Trainee in the MAPNA Turbine Engineering and Manufacturing Company (TUGA)

## Selected Courses

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- Learning-Based Model Predictive Control (ETH Zürich in-person course)
- Convex Optimization (Stanford online course)
- Deep Reinforcement Learning (UC Berkeley online course)
- Control Barrier Function (self-study)
- Intelligent Systems (M.Sc. course)
- Nonlinear Control (M.Sc. course)
- Advanced Control (M.Sc. course)
- Advanced Dynamics (M.Sc. course)
- Mechatronics (M.Sc. course)
- Robotics (B.Sc. course)

## Key Skills

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- **Programming Languages:** Python (PyTorch, TensorFlow) · C/C++ · MATLAB/Simulink · ROS (Linux) · Git · Docker · LaTeX
- **Engineering Tools:** Mathematica · Maple · SolidWorks · AutoCAD · CATIA · ANSYS · Fluent · COMSOL
- **Professional Ability:** Time Management · Independent Decision-Making · Collaborative Teamwork · Adaptability · Flexibility

## Language

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- **English:** Professional
- **Persian:** Native
- **Arabic:** Elementary

## Hobby and Activity

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Reading · Travel · Cycling · Following the News · Swimming · Soccer

## References

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### Dr. Wei Pan

- Ph.D. supervisor
- wei.pan@manchester.ac.uk

### Dr. Mingfei Sun

- Ph.D. co-supervisor
- mingfei.sun@manchester.ac.uk

### Prof. Reza Ghabcheloo

- Supervisor at Tampere University
- reza.ghabcheloo@tuni.fi

### Prof. Hossein Nejat Pishkenari

- M.Sc. supervisor
- nejat@sharif.edu