

Mohsen Sombolestan

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Education

- **University of Southern California** Los Angeles, CA
Ph.D. in Mechanical Engineering (Robotics) 2021 - present
 - **GPA:** 4.0/4.0
 - **Advisor:** Quan T. Nguyen
- **Isfahan University of Technology** Isfahan, Iran
M.Sc. in Mechanical Engineering (Robotics) 2017 - 2020
 - **GPA:** 4.0/4.0
 - **Thesis:** Real-time Haptic Rendering for Deformable Objects based on Machine Learning
- **Sharif University of Technology** Tehran, Iran
B.Sc. in Mechanical Engineering 2013 - 2017
 - **GPA:** 3.71/4.0
 - **Thesis:** Optimal Path-Planning for Mobile Robots based on Machine Learning

Research Interests

- Robotics
- Model Predictive Control
- Legged Locomotion and Manipulation
- Reinforcement Learning

Publications

- [1] **M. Sombolestan** and Q. Nguyen, “Adaptive Force-Based Control of Dynamic Legged Locomotion Over Uneven Terrain,” *IEEE Transactions on Robotics*, pp. 1–16, 2024. DOI: [10.1109/TR0.2024.3381554](https://doi.org/10.1109/TR0.2024.3381554).
- [2] **M. Sombolestan** and Q. Nguyen, “Hierarchical Adaptive Control for Collaborative Manipulation of a Rigid Object by Quadrupedal Robots,” in *2023 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, IEEE, Oct. 2023. DOI: [10.1109/IROS55552.2023.10341700](https://doi.org/10.1109/IROS55552.2023.10341700).
- [3] **M. Sombolestan** and Q. Nguyen, “Hierarchical Adaptive Loco-manipulation Control for Quadruped Robots,” in *2023 IEEE International Conference on Robotics and Automation (ICRA)*, IEEE, May 2023, pp. 12 156–12 162. DOI: [10.1109/ICRA48891.2023.10160523](https://doi.org/10.1109/ICRA48891.2023.10160523).
- [4] **M. Sombolestan**, Y. Chen, and Q. Nguyen, “Adaptive Force-based Control for Legged Robots,” in *2021 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, IEEE, Sep. 2021, pp. 7440–7447. DOI: [10.1109/IROS51168.2021.9636393](https://doi.org/10.1109/IROS51168.2021.9636393).

- [5] **S. M. Sombolestan**, A. Rasooli, and S. Khodaygan, “Optimal path-planning for mobile robots to find a hidden target in an unknown environment based on machine learning,” *Journal of Ambient Intelligence and Humanized Computing*, May 2019. DOI: [10.1007/s12652-018-0777-4](https://doi.org/10.1007/s12652-018-0777-4).

Honors

- Ranked **1st** among more than 140 mechanical engineering students in Master Degree 2020
- Ranked **268th** among 260000 participants in Iranian University Entrance Exam (Konkur) 2013
- One of the finalist team in Mathematics [A-lympiad](#) competition, Amsterdam, Netherlands 2012

Work Experiences

- **Field AI** Mission Vijeo, CA
Ph.D. Research Intern Summer 2023
 - Designing and implementing a vision-based locomotion controller for Unitree quadruped robots utilizing nonlinear model predictive control (NMPC). The aim was to facilitate stair climbing and enhance navigation through complex terrains found in construction sites.
- **Dr. Robot Co.** Tehran, Iran
Control Engineer 2016 - 2017
 - Contributed as a member of the technical team for the [ROMA](#) robot project, an innovative humanoid robot designed specifically for the fashion industry to captivate customer attention.

Research Experiences

- **Dynamic Robotics & Control Lab ([DRCL](#))** Los Angeles, CA
Graduate Research Assistant - Supervised by Dr. Q. T. Nguyen 2020 - present
 - Focused on enhancing legged robot dynamic locomotion in real-world environments by combining adaptive control with model predictive control (MPC) to address uncertainties.
 - Leveraging the quadruped robot’s body for manipulating unknown objects through introducing an adaptive loco-manipulation controller and extending it for a team of robots for collaborative manipulation tasks.
 - I possess valuable expertise in developing and implementing controllers for Unitree quadruped robots (A1, Go1, and AlienGo) both in physical hardware and simulation environments.
- **Isfahan University of Technology** Isfahan, Iran
Research Assistant - Supervised by Dr. M. Danesh 2018 - 2019
 - Designing a model-free control system for continuum manipulators based on an adaptive neural network. The simulations conducted in MATLAB and the results maintain the capability of the proposed algorithm.
- **Center of Excellence in Design, Robotics, and Automation ([CEDRA](#))** Tehran, Iran
Research Assistant - Supervised by Dr. A. Meghdari 2016 - 2017
 - Designing and manufacturing [ROMA](#) an autonomous *Robotic Mannequin* for fashion industry. The robot can imitate the human’s posture when interacting with customers.

Software and Programming Skills

- Programming and Markup Languages:
 - **Professional:** C++, Python, MATLAB
 - **Have Experience with:** TensorFlow, Keras
- Technical Software and Simulators:
 - **Professional:** ROS, Gazebo, Simulink
 - **Have Experience with:** Pybullet, MuJoCo
- Optimization Packages:
 - **Professional:** OCS2, OSQP, qpOASES

Teaching Assistant Experiences

- **University of Southern California**
 - Robot Dynamics and Control [AME 556] Spring 2023 & 2024
- **Isfahan University of Technology**
 - Dynamic Fall 2018
 - Automatic Control Fall 2018
 - Strength of Materials II Spring 2018

Professional Services

Reviewed papers for:

- ICRA (2023, 2024)
- IROS (2022, 2023)
- RA-L (2023)