

# Mohsen Sombolestan

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[Linkedin](#)

## Education

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- **University of Southern California** Los Angeles, CA  
*Ph.D. in Mechanical Engineering (Robotics)* Aug 2021 - May 2025 (expected)
  - **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

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

## Publications

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- [1] **M. Sombolestan** and Q. Nguyen, “Hierarchical Adaptive Motion Planning with Nonlinear Model Predictive Control for Safety-Critical Collaborative Loco-Manipulation,” *Under review, The International Journal of Robotics and Research (IJRR)*, Nov. 2024. [Online]. Available: <https://arxiv.org/abs/2411.10699v1>.
- [2] **M. Sombolestan** and Q. Nguyen, “Safety-critical Motion Planning for Collaborative Legged Loco-Manipulation over Discrete Terrain,” *Submitted to IEEE International Conference on Robotics and Automation (ICRA)*, Sep. 2024. [Online]. Available: <https://arxiv.org/abs/2410.11023v1>.
- [3] **M. Sombolestan** and Q. Nguyen, “Adaptive-Force-Based Control of Dynamic Legged Locomotion Over Uneven Terrain,” *IEEE Transactions on Robotics*, Mar. 2024. DOI: [10.1109/TR0.2024.3381554](https://doi.org/10.1109/TR0.2024.3381554).
- [4] **M. Sombolestan** and Q. Nguyen, “Hierarchical Adaptive Control for Collaborative Manipulation of a Rigid Object by Quadrupedal Robots,” in *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Oct. 2023. DOI: [10.1109/IROS55552.2023.10341700](https://doi.org/10.1109/IROS55552.2023.10341700).

- [5] **M. Sombolestan** and Q. Nguyen, “Hierarchical Adaptive Loco-manipulation Control for Quadruped Robots,” in *IEEE International Conference on Robotics and Automation (ICRA)*, May 2023. DOI: [10.1109/ICRA48891.2023.10160523](https://doi.org/10.1109/ICRA48891.2023.10160523).
- [6] **M. Sombolestan**, Y. Chen, and Q. Nguyen, “Adaptive Force-based Control for Legged Robots,” in *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2021. DOI: [10.1109/IROS51168.2021.9636393](https://doi.org/10.1109/IROS51168.2021.9636393).
- [7] **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*, 2019. DOI: [10.1007/s12652-018-0777-4](https://doi.org/10.1007/s12652-018-0777-4).

## Talks & Presentations

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- “Hierarchical Adaptive Control for Legged Locomotion and Manipulation,” *USC Robotics Seminars (UROS)*, April, 2024.
- “Utilizing Adaptive Control techniques for Legged Locomotion and Manipulation,” *Southern California Control Workshop*, March, 2023.
- “Adaptive Loco-manipulation Control for Quadruped Robots,” *Southern California Robotics Symposium*, September, 2022.

## Honors

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- 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

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- **Field AI** Mission Vijeo, CA  
*Ph.D. Research Intern* Mar 2023 - Oct 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  
*Robotics 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

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- **Dynamic Robotics & Control Lab ([DRCL](#))** Los Angeles, CA  
*Graduate Research Assistant - Supervised by Dr. Q. T. Nguyen* Apr 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 the approach to a team of robots for collaborative manipulation tasks.
- I have hands-on experience in designing and implementing controllers for Unitree quadruped robots (A1, Go1, and AlienGo) as well as our custom bipedal robot, [HECTOR](#), both in physical hardware and simulation environments.

- **Center of Excellence in Design, Robotics, and Automation (CEDRA)**      Tehran, Iran  
*Research Assistant - Supervised by Dr. A. Meghdari*      2016 - 2017
  - Develop the [ROMA](#), autonomous *Robotic Mannequin* for the fashion industry. This robot is designed to replicate human postures while interacting with customers.

## Software and Programming Skills

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- Programming and Markup Languages:
  - **Professional:** C++, Python, MATLAB
  - **Have Experience with:** Jax, PyTorch
- Technical Software and Simulators:
  - **Professional:** ROS, Gazebo, MuJoCo, Simulink
  - **Have Experience with:** Brax, Pybullet
- Optimization Packages:
  - **Professional:** OCS2, OSQP, qpOASES
- Software Development:
  - Check out my [GitHub](#) profile to explore open-source code related to my research.

## Teaching Assistant Experiences

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- **University of Southern California**
  - Robot Dynamics and Control [AME 556]      Spring 2023 & 2024

## Professional Services

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Papers reviewed for:

- ICRA (2023, 2024, 2025)
- IROS (2022, 2023)
- RA-L (2023, 2024)