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 (Control) — *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
- Reinforcement Learning
- Control Theory
- Adaptive Control

Publications

[1] **M. Sombolestan** and Q. Nguyen, *Adaptive Force-Based Control of Dynamic Legged Locomotion over Uneven Terrain*, Jul. 2023. [Online]. Available: http://arxiv.org/abs/2307.04030.

[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.

[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. DOI: 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. DOI: 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.

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
- Qualified as **Very Good** in Mathematics A-lympiad, Amsterdam, Netherlands 2012

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.
- **Dr. Robot Co. & 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.

Work Experience

- **Field AI** Mission Vijeo, CA
  Ph.D. Intern *Summer 2023*
  - Developing a vision-based locomotion controller for quadruped robots that employs nonlinear model predictive control (NMPC) to enable stair climbing and effective navigation through challenging terrains within construction sites.
- **Dr. Robot Co.** Tehran, Iran
  Mechanical Designer *2016 - 2017*
  - Member of the mechanical designer team in Roma robot project

Teaching Assistant Experiences

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

- **Isfahan University of Technology**
  - Dynamic — Fall 2018
  - Automatic Control — Fall 2018
  - Strength of Materials II — Spring 2018

Software and Programming Skills

- Programming and Markup Languages:
  - **Expert**: C++, Python, LaTeX
  - **Familiar**: C, Fortran
- Technical Software:
  - **Expert**: ROS/Gazebo, MATLAB/Simulink
  - **Familiar**: Pybullet, TensorFlow, Keras

Selected Courses

- Linear Systems Theory
- Foundation for Manufacturing Automation
- Control of Robotic Systems
- Intelligent Control
- Mechanics of Robotic Systems
- Optimum Design