Amirhosein Vedadi

Robotics Researcher | Humanoid Robotics, Control & Robot Learning

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Portfolio GitHub LinkedIn
Google Scholar
Tehran, Iran | Open to relocation

Research Profile

Robotics researcher and technical founder with 8+ years of experience in humanoid robotics, including locomotion control, state estimation, SLAM, perception, embedded systems, and full-platform integration. Research work combines model-based robotics with machine learning and has produced peer-reviewed journal and conference publications, open-source implementations, and experiments on the Surena-V humanoid. Current work is beginning to explore reinforcement learning and autonomy for ILIA at 8Robotics.

Research Interests

Robot learning; learning-based and optimization-based control; humanoid locomotion and whole-body control; reinforcement learning and sim-to-real transfer; state estimation and sensor fusion; robot perception, SLAM, and embodied intelligence.

Education

M.Sc. in Dynamics & Control Engineering
University of Tehran
2019 - 2022
GPA: 16.00/20

Thesis: Real-time localization and configuration identification of a humanoid robot using machine vision. Developed invariant base-state estimation using IMU and forward kinematics, then integrated the odometry with RGB-D SLAM for humanoid localization and mapping.

Relevant coursework: Machine Learning, Neural Networks, Optimization, System Identification & State Estimation, Advanced Control Systems, Adaptive Control Systems.

B.Sc. in Mechanical Engineering
University of Tehran
2015 - 2019
GPA: 17.47/20

Final project: Redesign and restoration of a hydraulic robot for sewer-line inspection and maintenance.

Research & Technical Experience

Co-Founder & Chief Technology Officer | 8Robotics
May 2025 - Present
Tehran, Iran

- Lead research and engineering for ILIA, integrating custom electronics, firmware, ROS/DDS middleware, control, and AI into the first humanoid prototype.
- Initiated the team's first reinforcement-learning algorithm tests and direct current work on control and autonomy for an initial delivery application.
- Serve as primary technical lead for a lean multidisciplinary core team and contribute to mechanical architecture and experimental integration.

Research Associate / Dynamics & Control Team Lead | Center of Advanced Systems & Technologies (CAST)
2022 - Jun 2024
University of Tehran

- Led dynamics and control development for Surena-V, including locomotion, trajectory planning, state estimation, whole-body behavior, and physical experiments.
- Mentored junior researchers and BSc/MSc students and coordinated contributions across the humanoid robotics research portfolio.

Research Assistant | Center of Advanced Systems & Technologies (CAST)
Dec 2017 - 2022
University of Tehran

- Developed a Right-Invariant Extended Kalman Filter on $SE_4(3)$, fusing IMU and forward kinematics; demonstrated lower drift and faster convergence than a quaternion EKF.
- Evaluated RTAB-Map, ORB-SLAM3, and OpenVSLAM in humanoid walking experiments; ORB-SLAM3 achieved the best absolute trajectory error at 0.1073.
- Contributed to bipedal trajectory optimization, adaptive locomotion, perception, actuator development, robot assembly, and experimental validation.

Robotics & AI Engineer | Cheetah
Oct 2022 - Oct 2025
Tehran, Iran

- Developed real-time forward-collision warning and driver-monitoring systems using computer vision and deep learning.
- Worked on detection, tracking, monocular distance estimation, face/head analysis, CARLA validation, OBD-II communications, and embedded deployment.

Peer-Reviewed Publications

Journal article

Ghorbani, A.; Yousefi-Koma, A.; Vedadi, A. (2023). "Estimation and Early Prediction of Grip Force Based on sEMG Signals and Deep Recurrent Neural Networks." Journal of the Brazilian Society of Mechanical Sciences and Engineering.

Conference papers

Bazrafshani, M. A.; Yousefi-Koma, A.; Amani, A.; Maleki, B.; Batmani, S.; Dehestani Ardakani, A.; Taheri, S.; Yazdankhah, P.; Nozari, M.; Mozayyan, A.; Naeini, A.; Shafiee, M.; Vedadi, A. (2024). "Surena-V: A Humanoid Robot for Human-Robot Collaboration with Optimization-Based Control Architecture." IEEE-RAS International Conference on Humanoid Robots (Humanoids).

Vedadi, A.; Yousefi-Koma, A.; Shariat-Panahi, M.; Nozari, M. (2023). "Kinematic Base State Estimation for Humanoid Using Invariant Extended Kalman Filter." International Conference on Robotics and Mechatronics (ICRoM).

Vedadi, A.; Yousefi-Koma, A.; Yazdankhah, P.; Mozayyan, A. (2023). "Comparative Evaluation of RGB-D SLAM Methods for Humanoid Robot Localization and Mapping." International Conference on Robotics and Mechatronics (ICRoM).

Abdolahnezhad, P.; Yousefi-Koma, A.; Vedadi, A.; Sinaei, K.; Maleki, B.; Shafiee, M. (2022). "Online Bipedal Locomotion Adaptation for Stepping on Obstacles Using a Novel Foot Sensor." IEEE-RAS International Conference on Humanoid Robots (Humanoids).

Vedadi, A.; Sinaei, K.; Abdolahnezhad, P.; Sheikh Aboumasoudi, S.; Yousefi-Koma, A. (2021). "Bipedal Locomotion Optimization by Exploitation of the Full Dynamics in DCM Trajectory Planning." International Conference on Robotics and Mechatronics (ICRoM).

Taheri, S.; Yousefi-Koma, A.; Vedadi, A. (2023). "Robust Optimization-Based Push Recovery for High-Speed Walking with Three-Mass Inverted Pendulum Model." International Conference on Robotics and Mechatronics (ICRoM).

Selected Research Contributions

- Humanoid state estimation: public C++ implementation of the Lie-group InEKF used in the MSc research.
- Humanoid perception: RGB-D SLAM experiments and video comparing localization and mapping behavior during humanoid walking.
- Locomotion: public trajectory-optimization code and experimental contributions to Surena-V locomotion and balance research.

Teaching Experience

- Lead Teaching Assistant, Control Engineering, University of Tehran, 2020-2022.
- Teaching Assistant, System Identification & State Estimation, University of Tehran, 2021-2022.
- Instructor, Introduction to Neural Networks, OnAcademy24, 2024.

Technical Skills

Programming	C++, Python, MATLAB/Simulink, Bash, Git, Docker
Robotics & AI	ROS 1/2, DDS, PyTorch, TensorFlow, reinforcement learning, computer vision, SLAM, sensor fusion, state estimation
Simulation & Systems	Isaac Sim/Lab, Gazebo, PyBullet, Choreonoid, CARLA, firmware, embedded deployment, robot electronics

Honors & Languages

Honors: Full scholarships for B.Sc. and M.Sc. study at the University of Tehran. Languages: Persian (native); English (IELTS Academic 7.0, 2024: Listening 6.5, Reading 8.5, Writing 6.0, Speaking 6.0).