Mo Saeidi

Robotics & Control Engineer

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Robotics engineer with expertise in control systems, reinforcement learning, and computer vision, applying theoretical knowledge to solve complex real-world challenges. Demonstrated capacity for integrating hardware and software systems through innovative research in autonomous navigation, sensor fusion, and human-robot interaction. Seeking to contribute technical proficiency in machine learning and control theory to advance cutting-edge robotics applications while continuously expanding knowledge across interdisciplinary domains.

Education

M.Sc. in Automation and Control Engineering

Polytechnic University of Milan (POLIMI), Italy   *2023 – Present*

GPA: 27.11/30

Thesis: Learning Policies from Human Demonstrations for Testing Optimization

MERLIN Laboratory Researcher   *October 2024 – Present*

Developing an extension to OMPL motion planners implemented in MoveIt for programming by demonstration of UR5e robot. Implementing learning algorithms to interpret human demonstrations captured via Thrustmaster Airbus joystick for intuitive robot programming in ROS1 environment.

B.Sc. in Mechanical Engineering

KNTU University, Tehran, Iran   *2017 – 2022*

GPA: 3.88/4.0

Top 3% of graduates

Professional Experience

Researcher, AIRLAB Drone Team - POLIMI

April 2023 – July 2024   *Milan, Italy*

Engineered advanced planning and navigation algorithms for multi-agent drone systems utilizing ROS1/ROS2 frameworks, enhancing coordination capabilities in complex environments.

Integrated and calibrated ZED2 stereo camera with laser altimeter systems to enable lightweight point cloud generation, achieving efficient real-time obstacle detection with minimal computational overhead.

Led algorithmic development for the Leonardo Drone Contest 2023, implementing exploration strategies that achieved 95% target detection rate in challenging indoor environments.

Systematically refined path planning and obstacle avoidance algorithms through iterative testing and optimization, resulting in 40% reduction in collision incidents during autonomous operation.

Researcher, FALCO Project - AEA Association - POLIMI

December 2023 – July 2024   *Milan, Italy*

Architected flight controllers incorporating Visual-Inertial Odometry techniques for robust navigation in GPS-denied environments, enabling reliable autonomous operation in challenging conditions.

Formulated and implemented disturbance compensation algorithms that improved stability of heavy-lift drones by 30%, allowing for secure transportation of sensitive payloads.

Developed cost-effective camera-based navigation solutions that reduced hardware expenditure by 50% while maintaining navigation accuracy within operational requirements.

Facilitated interdisciplinary collaboration between mechanical, electrical, and software engineering teams to ensure seamless integration of control systems with mechanical designs.

Research Assistant, Mechatronics Laboratory - KNTU

2021 – 2022   *Tehran, Iran*

Designed and implemented Autonomous Emergency Braking (AEB) system utilizing computer vision algorithms for object detection and classification in dynamic traffic scenarios.

Achieved 92% accuracy in monocular depth estimation for obstacle detection through novel algorithmic approaches, enabling reliable distance calculation with single-camera setups.

Methodically collected and labeled over 10,000 images for chess piece detection project, creating a comprehensive dataset that enabled high-accuracy machine learning model training.

Applied and benchmarked YOLO, Fast R-CNN, and SSD algorithms for real-time object recognition, identifying optimal approaches for various operational constraints.

Research Assistant, Vibration and Control Laboratory - KNTU

2019 – 2022   *Tehran, Iran*

Engineered neural network-based fault diagnosis systems achieving 95% accuracy in mechanical systems, enabling predictive maintenance capabilities for critical industrial equipment.

Developed and implemented control algorithms for 3-axis CNC systems that improved operational performance by 25% through optimized motion planning and execution.

Conceptualized and prototyped an innovative accelerometer system using fluid surface monitoring via image processing, providing a cost-effective alternative to conventional sensors.

Published three journal articles and two conference papers on control systems and pattern recognition, contributing to the academic knowledge base in these domains.

Junior Graphic Designer (Volunteer), Student Science Community - KNTU

2018 – 2020   *Tehran, Iran*

Designed professional promotional materials including posters, banners, and digital media for student events, theater gatherings, and academic sessions using Adobe Illustrator and Photoshop.

Created consistent visual identity elements across various university events while adapting designs to specific audience demographics and event themes.

Projects

ARTO (Automated Robotics for Testing Optimization)

2023 – Present

Developing a comprehensive learning from demonstration framework for UR5e industrial robot programming to streamline complex task specification for non-technical operators.

Implementing and adapting RRT algorithms with specialized cost functions to accurately interpret human intention, bridging the gap between intuitive demonstration and precise robotic execution.

Formulating optimization techniques for robotic trajectories while maintaining singularity avoidance to ensure robust performance across the robot's workspace.

Engineering solutions that reduce programming time for complex trajectories by an estimated 65%, significantly improving industrial workflow efficiency.

Reinforcement Learning for Robot Path Planning

2023

Developed reinforcement learning-based planning algorithm for static obstacle avoidance with custom reward functions that balance efficiency, safety, and path smoothness objectives.

Implemented preprocessing pipeline to transform voxelized obstacle data through convolutional neural networks before feeding to reinforcement learning neural network for enhanced feature extraction.

Formulated manipulability metrics to avoid singularities during continuous movement, ensuring stable control throughout the robot's operational envelope.

Conducted systematic comparison of multiple reinforcement learning algorithms for continuous action spaces to identify optimal approaches for robotic manipulation tasks.

Hand Pose Estimation with IMU Sensor Fusion

2022

Integrated network of three MPU6050 accelerometers strategically positioned across hand joints to capture comprehensive motion tracking data with minimal sensor footprint.

Developed quaternion estimation algorithms that effectively fused gravity and rotational acceleration data to determine precise spatial orientation despite sensor noise.

Implemented optimization-based pose estimation techniques adhering to kinematic hand constraints to ensure biologically plausible joint configurations.

Engineered a 7-DOF hand model addressing the 6-DOF correspondence problem through constrained optimization techniques for accurate finger position tracking.

Computer-Aided Manufacturing Optimization

2021

Developed comprehensive optimization methodology for CNC machining processes using Fusion 360, minimizing both tool wear and production time while maintaining specified quality requirements.

Conducted detailed analysis of manufacturing manuals to identify optimal tooling configurations based on material properties, part geometry, and finishing requirements.

Systematically optimized fixture positions and machining sequences to reduce setup time while ensuring geometric tolerances were consistently achieved.

Implemented cost optimization strategies that balanced material utilization, tool life, and production efficiency to achieve maximum economic benefit.

HVAC System Modeling and Control

2020

Applied system identification techniques to characterize HVAC dynamics, successfully identifying heat transfer coefficients and ambient temperature variables through constrained optimization approaches.

Implemented Model Predictive Control (MPC) using MATLAB's fmincon optimizer with Sequential Quadratic Programming to satisfy complex operational constraints while minimizing energy consumption.

Developed parallel identification approaches comparing traditional ODE modeling with neural network techniques, creating a robust basis for controller design.

Fine-tuned control and prediction horizons to balance computational efficiency with performance, achieving precise temperature regulation while minimizing control effort.

Structural Vibration Analysis

2019

Conducted finite element analysis to identify critical vibration modes in bridge structures subjected to dynamic train loading conditions using advanced MATLAB tools.

Systematically redesigned structural elements to reduce vibration amplitudes below specified thresholds while optimizing material usage through iterative simulation and analysis.

Implemented vibration mitigation strategies constrained by material availability and maximum allowable displacement parameters.

Performed sensitivity analysis to identify key structural parameters that most significantly influenced vibration characteristics, enabling targeted design modifications.

Technical Skills

Robotics & Control	Software & Programming	Design & Analysis
ROS/ROS2	Python	SolidWorks
Motion Planning	C/C++	CATIA
Trajectory Optimization	MATLAB/Simulink	Fusion 360
Human-Robot Interaction	CasADi	ANSYS
Model Predictive Control	TensorFlow/PyTorch	Fluent
Nonlinear Control	Linux/Git	COMSOL
Optimal Control	Data Analysis (R, Pandas)	Mujoco
Sensor Fusion	Computer Vision (OpenCV)	Adobe Illustrator/Photoshop
Kalman Filtering	Embedded Systems	Raspberry Pi/Jetson/Arduino

Achievements

Second Place, National Egg Drop Competition *2018*
Led a team of 4 students to design an impact-resistant enclosure, placing 2nd among 40 teams from universities across Iran.

Publications

2023: "Nonlinear Tracking Control Algorithm for Dynamical Output Systems Manipulated by the Hardly Constrained Oscillatory Actuator," *Structural Control and Health Monitoring.* DOI: 10.1155/2023/3799011

2022: "Synthetic Lyapunov stabilization technique for designing actuation-constrained multi-input multi-output control systems," *Journal of the Franklin Institute.* DOI: 10.1016/j.jfranklin.2021.12.022

2022: "Constrained Control of Moving Base Robotic System with Cooperative Arms," *30th Annual International Conference of the Iranian Association of Mechanical Engineers*, Tehran, Iran.

2022: "Pattern Recognition of Unbalanced Rigid Rotor Bearing Forces," *Amirkabir Journal of Mechanical Engineering*, 54(12), pp. 3591-3606. Link

2022: "Pattern Recognition of Unbalanced Rigid Rotor Bearing Forces," *18th National Conference and 7th International Conference on Manufacturing Engineering in Iran (ICME 2022).*

Certificates

Neural Networks and Deep Learning – deeplearning.ai
Machine Learning – coursera.org
Reinforcement Learning – coursera.org

Languages

Persian (Native)
English (C2, TOEFL: 113)
Azerbaijani (B1)
Italian (A2)