Amir Mehdi Soufi Enayati

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Education

University of Victoria/University of British Columbia BC, Canada (Sep. 2020 - Sep. 2025)
Ph.D. in Mechanical Engineering - Robotics (GPA 4/4)

Sharif University of Technology Tehran, Iran (Sep. 2016 - Aug. 2018)
M.Sc. in Mechanical Engineering - Control Systems (GPA 4/4)

Sharif University of Technology Tehran, Iran (Sep. 2012 - Aug. 2016)
B.Sc. in Mechanical Engineering (GPA 3.97/4)

Research Interests

Reinforcement Learning | **Representation Learning** | **Deep Generative Models** | **Simulation & Modeling**
Robot Design & Control | **Mechanical Design** | **Design Optimization** | **Intelligent Manufacturing**

Research Experience

Transformer-Encoder-Decoder for Zero-shot Adaptation in Robot Manipulation (Work In Progress)
Developing a Transformer-based task inference model for a context-conditioned meta-RL method. Designed for cross-modality generalization to unseen manipulation tasks with non-parametric variations. The Bayes-adaptive exploration is improved with the Transformer's capability to handle long sequences.

Architecture-Adaptive Guided Diffusion for Robot Path Planning (Work In Progress)
Developing a guided conditional diffusion model for generalized path generation in the high-dimensional planning space of robot manipulators. The model adapts to unseen environments and robot kinematic architecture by encoding scene point clouds and Control Barrier Function (CBF) loss for guidance.

Implicit Behavior Cloning for Robot Motion Planning (Published in IEEE T-RO)
Designed a generative framework combining implicit behavior cloning and dynamic movement primitives (DMPs) to guide RL with human demonstrations. Resulted in stable training and enhanced generalization in sparse-reward robotic settings.

Safe Reinforcement Learning via Meta-Gradient Hyperparameter Tuning (IROS 2024)
Developed a deployable RL agent capable of tuning safety thresholds and exploration temperature during training. Designed and validated an end-to-end training and evaluation pipeline integrating dynamic risk thresholds on a physical robot setup.

Sim2Real with Real-Time Physical Simulation (Published in IEEE T-AI)
Introduced a novel domain randomization technique using intrinsic computational stochasticity of real-time simulations to diversify RL training in simulation. Improved Sim2Real performance and robustness in robotic manipulation.

Sample-efficient RL using Symmetry-Guided Demonstrations (Submitted to Springer NCAA)
Augmented off-policy learning by generating structured demonstration data using classical control in symmetric workspaces. Incorporated demonstrations into the loss function using behavior cloning to accelerate convergence.

Reformulation and Taxonomy of Adaptive Robotics (Published in Elsevier Neurocomputing)
Presented a unified formulation for adaptive robotic behavior using robust MDPs, formulating meta-learning, parameter adaptation, and task-inference methods under a generic theoretical framework.

High-Fidelity Simulation Platform for Industrial Robotics (Published in IEEE RA-L)
Embedded real-time robot dynamics in a digital twin for industrial environments, enabling closed-loop hardware-in-the-loop simulation using OPC UA communication for validation of control strategies.

Work Experience

▷ **University of Victoria** BC, Canada (Sep. 2021 - Present)
- **Research Assistant: Advanced Control & Intelligent Systems Lab (ACIS)**
- **Co-Instructor:** Applied Machine Learning for Mechanical Engineering (Graduate Level)
- **Teaching Assistant:** Robotics, Dynamics, Control Theory and Systems I, Automatic Control, Advanced Control Systems

▷ **University of British Columbia** BC, Canada (Sep. 2020 - Sep. 2021)
- **Research Assistant:** Advanced Control & Intelligent Systems Lab (ACIS)
- **Teaching Assistant:** Modern Control

▷ **Durali System Design & Automation (DSDA)** Tehran, Iran (Mar. 2016 - Mar. 2020)
- **Mechanical Design Lead:** Stage Automation Project; system engineering, design, manufacturing, and commissioning of automated machinery of the amphitheater - renovation of the equipment and control system of the biggest Iranian theater "City Theater of Tehran".
- **Automation Engineer:** Hydropower Plant Hydraulic Governor; electrical panel design, HMI programming, electrical wiring, and commissioning of electro-hydraulic power plant governer units.

▷ **S. Rezaei Research Center (SRRC)** Tehran, Iran (May 2015 - Dec. 2015)
- **Mechanical Engineering Internship:** Electric Motorcycle Competition; design and prototyping of an electric motorcycle for the *5th Iranian Machine Design Competition* - winning the "Best Design" Award.

Publications

▷ **Journal Papers**

- Z. Zhang, J. Hong, **A. M. S. Enayati**, and H. Najjaran. Using Implicit Behavior Cloning and Dynamic Movement Primitive to Facilitate Reinforcement Learning for Robot Motion Planning, in **IEEE Transactions on Robotics** (Link).
- **A. M. S. Enayati**, R. Dershan, Z. Zhang, D. Richert, and H. Najjaran. Facilitating Sim-to-Real by Intrinsic Stochasticity of Real-Time Simulation in Reinforcement Learning for Robot Manipulation, in **IEEE Transactions on AI** (Link).
- **A. M. S. Enayati**, Z. Zhang, H. Najjaran. A Methodical Interpretation of Adaptive Robotics: Study and Reformulation, in **Neurocomputing, 2022** (Link).
- **A. M. S. Enayati**, Z. Zhang, K. Gupta, H. Najjaran. Exploiting Symmetry and Heuristic Demonstrations in Off-policy Reinforcement Learning for Robotic Manipulation, submitted to **Springer Neural Computing & Applications** (Link).
- Z. Zhang, R. Dershan, **A. M. S. Enayati**, M. Yaghoubi, D. Richert, H. Najjaran. A High-Fidelity Simulation Platform for Industrial Manufacturing by Incorporating Robotic Dynamics into an Industrial Simulation Tool, in **IEEE RA-L** (Link).
- H. Shayestehpour, K. Nassiri Nazif, **A. M. S. Enayati**, M. S. Saidi. Proposing a high-efficiency dielectrophoretic system for separation of dead and live cells, in **Scientia Iranica** (Link).

▷ **Conference Papers**

- Y. Karpichev, T. Charter, J. Hong, **A. M. S. Enayati**, H. Honari, M. G. Tamizi, and H. Najjaran. Extended Reality for Enhanced Human-Robot Collaboration: a Human-in-the-Loop Approach, in **IEEE ROMAN 2024** (Link).
- H. Honari, **A. M. S. Enayati**, M. G. Tamizi, and H. Najjaran. Meta SAC-Lag: Towards Deployable Safe Reinforcement Learning via MetaGradient-based Hyperparameter Tuning, in **IEEE IROS 2024** (Link).
- N. Mahdian, M. Jani, **A. M. S. Enayati**, and H. Najjaran. Ego-Motion Aware Target Prediction Module for Robust Multi-Object Tracking, in **arXiv** (Link).
- J. Sol, **A. M. S. Enayati**, and H. Najjaran. Visual Deformation Detection Using Soft Material Simulation for Pre-training of Condition Assessment Models, in **IEEE CASE 2024** (Link).
- A. M. Nasrabadi, A. R. Eslaminia, **A. M. S. Enayati**, L. Alibiglou and S. Behzadipour, Optimal Sensor Configuration for Activity Recognition during Whole-body Exercises, in **IEEE ICRoM 2019**, (Link).

Patents

Testing mechanical overspeed protection systems
M. Durali, M. H. Heydari, **A. M. S. Enayati**, S. M. Hosseini. *US Patent No. 2024/0003264 A1*, 2024

Controlling acoustics of a performance space
M. Durali, M. A. Soleimani, F. F. Shabani, A. Habibollahi, A. Sohbatloo, **A. M. S. Enayati**. *US Patent No. 2019/0292774 A1*, 2019

Honors & Awards

Faculty of Graduate Studies Travel Grant ($600)	University of Victoria (2024)
Faculty of Graduate Studies Scholarship ($12000)	University of Victoria (2021)
International Four-Year Doctoral Partial Tuition Award ($16000)	University of British Columbia (2020)
Graduate Deans Entrance Scholarship ($5000)	University of British Columbia (2020)
Best Master Thesis for Technical Contributions Award	Sharif University of Technology (2018)
Best Electric Motorbike Design	5th Iranian Machine Design Contest (2015)
Member of Iran's National Elites Foundation	Iranian National Elites Foundation (2012)
Rank 10th in the Physics & Mathematics Subroutine	National University Entrance Exam (2012)
Silver Medalist	IPhO: Iran Physics Olympiad (2011)

Skills

Programming:	Python (PyTorch, TensorFlow, Scikit-learn, HuggingFace, PyBullet), MATLAB & Simulink, C++
Machine Learning:	Transformers, LSTMs, (Variational) Autoencoders, Reinforcement Learning, Diffusion Models
Engineering Tools:	CAD (SolidWorks, CATIA, AutoCAD), FEA (ABAQUS), PLC/HMI (TIA Portal), Electrical Planning (EPLAN), Embedded Systems (AVR, Keil)
Soft Skills:	Scientific Writing, Team Collaboration, Teaching & Mentorship
Communication:	English (Fluent), French (B1), Persian (Native)

References

Available upon request.