

Amir Hamedi

Machine Learning Engineer | Reinforcement Learning Researcher | Process Systems & Control Engineer

hamedia@mcmaster.ca | 3658830628 | Ontario, Canada
amirhamedi.me | LinkedIn | GitHub | Google Scholar

Summary

Machine learning, process systems, and control engineer specializing in reinforcement learning for nonlinear process systems, developing deep-RL, safe-RL, and data-driven methods for control, optimization, and fault detection across simulation, Aspen Dynamics, and laboratory hardware. Published and ongoing work spans MPC-pretrained RL, multi-channel RL assistance, stability-aware control, and TD3-based experimental pH control.

Technical Expertise

Reinforcement Learning

- **Deep RL:** Value-based, actor-critic, and policy-optimization methods for discrete and continuous control, including DQN, TD3, TD7, and SAC.
- **Learning Strategies:** Behavioral cloning and imitation learning, reward design, advanced experience replay, and offline-to-online learning.
- **Safety & Deployment:** Safe RL, Lyapunov-guided action filtering, control-informed pretraining, and measured-data laboratory controller integration.

Machine Learning

- **Deep Learning:** Architectures spanning convolutional, recurrent, attention-based, and sequence-modeling methods.
- **Data-Driven Modeling:** Time-series modeling, physics-informed neural networks (PINNs), and deep generative models including GANs.
- **Statistical & Applied ML:** PCA, PLS, autoencoders, clustering, classical machine learning, and LLM applications.

Control & Optimization

- **Methods:** Linear and nonlinear control, model predictive control, linear and nonlinear optimization, and metaheuristic optimization.
- **Process Systems:** Process modeling and simulation, process monitoring, fault detection, and diagnosis for distillation, polymerization, and pH systems.

Software & Platforms

- **Tools:** Python, PyTorch, MATLAB/Simulink, Aspen Plus/Dynamics, Pyomo/IPOPT, SQL, Power BI, Tableau, Minitab, Git, and LaTeX; laboratory automation and hardware integration.

Education

PhD Process Systems Engineering

2022 - Expected Jan 2027

McMaster University

- Thesis: Data-Driven Control and Fault Detection for Complex Process Systems

MSc Process Design Engineering

2018 - 2021

University of Tehran

- Thesis: Data-Driven Modeling and Metaheuristic Optimization of a Residual Fluid Catalytic Cracking Process

BSc Chemical Engineering

2012 - 2017

Iran University of Science and Technology

- Thesis: Design of a municipal-waste leachate treatment plant

Technical Experience

Graduate Researcher and PhD Candidate

2022 - Present

McMaster University / Chemical Engineering

MPC-Pretrained Reinforcement Learning

Linde

- Built an MPC-pretrained TD3 workflow with behavioral cloning and mixed replay, reducing final steady-state error by 76-98% in reported simulations compared with established control methods.

Multi-Channel RL-Assisted MPC

Linde

- Designed DQN and TD3 agents for four assistance channels with safe-RL gating, enabling faster controller response and online adaptation to operational changes compared with traditional control methods.

Stability-Aware Reinforcement Learning

Linde

- Developed a Lyapunov-guided safety layer that filters TD3 actions through a one-step certificate, significantly improving setpoint tracking across the tested scenarios.

BioSMB pH Control

Sartorius

- Applied a pretrained TD3 controller in the BioSMB laboratory, improving the handling of process uncertainty and varying operating scenarios relative to established laboratory and literature techniques.

Distillation Flooding Detection and Control

Imperial Oil

- Developed a hybrid distillation-column modeling and control framework using simplified data-driven hydraulics, preventing flooding in simulation while requiring fewer column measurements.

Financial Data and AI-Assisted Portfolio Platform

- Developed a financial data and AI-assisted categorization platform that integrates multi-source holdings into a unified, auditable portfolio dashboard and is building toward an AI-assisted portfolio manager.

Leadership, Service & Recognition

- **Engineering Council Member** 2025 - Present — McMaster Engineering Graduate Society. Represent Chemical Engineering graduate students, support communication between students and faculty, and contribute to reviewing graduate-student submissions for EGS awards.
- **2024 CSChE Best Poster Presentation** 2024 — CSChE Student Poster Presentation Competition. Presented "A Study on Distillation Columns Investigating Generative Adversarial Networks for Fault Detection and Diagnosis in Chemical Processes."
- **Teaching Assistant** 2023 - 2026 — McMaster University. Supported Process Control, Transport Phenomena, and Reactor Design through tutorials, grading, student consultation, and examination support.
- **Summer Student Mentoring and Supervision** Mentored and supervised summer students in research activities over four years.

Selected Publications

8 publications & manuscripts | 30+ citations

1. Amir Hossein Hamed, Hesam Hassanpour, Ankur Kumar, Atharva Vijay Suryavanshi, Prashant Mhaskar "A Practical MPC-Pretrained Reinforcement Learning Framework for Complex Process Systems." *Industrial & Engineering Chemistry Research*, 2026. doi:10.1021/acs.iecr.6c00277
2. Amir Hossein Hamed, Hesam Hassanpour, Ankur Kumar, Atharva Vijay Suryavanshi, Prashant Mhaskar "Critic-Based Supervisory Gating for Multi-Channel Reinforcement Learning-Assisted Model Predictive Control." *Computers & Chemical Engineering*, Under Review, 2026.
3. Amir Hossein Hamed, Ankur Kumar, Atharva Vijay Suryavanshi, Prashant Mhaskar "Practical Stability Net Based Reinforcement Learning Control from Step-Test Data." *Optimal Control Applications and Methods*, Under Review, 2026.