

# Majid Mazouchi, Ph.D.

[majid.mazouchi@gmail.com](mailto:majid.mazouchi@gmail.com) | +1-517-730-7389 | Novi, MI  
[LinkedIn](#) | [Google Scholar](#) | [GitHub](#) | U.S. Permanent Resident

## Summary

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**Senior Application Software Engineer** specializing in **control systems engineering** and **machine learning and AI applications**. Demonstrated success at **Mercedes-Benz R&D** delivering **series-production innovations** in electric motor control and leading **cross-functional AI initiatives**, including **automated documentation pipelines** and the **NN Flux Predictor** for real-time motor flux estimation. Strong foundation in **reinforcement learning, neural networks**, and **control systems**, backed by **25+ publications**, multiple **patent disclosures**, and recognition for **innovation, accountability, and collaboration**.

## Professional Experience

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**Mercedes-Benz Research & Development North America, Inc.** *Dec 2023 – Present*  
*Senior application software Engineer - Electric Motor Control Team*

- Led development of **Adaptive Harmonic Current Suppression (AHCS)**. Owned end-to-end feature development, from algorithm design to software integration, calibration, and system validation (HiL/Dyno/Vehicle).
- Enhanced **current regulation ring** (S-shape ramping, PI gain compensation) improving robustness and efficiency.
- Managed **WarpDrive Project**: RAG GUI Documentation Assistant and **NN Flux Predictor** deployed on **Infineon TriCore** (validated in HiL). Owned end-to-end feature development, from algorithm design to software integration, calibration, and system validation.
- Collaborated with the University of Alabama on PINN-based flux prediction modeling for Interior Permanent Magnet motors.
- Filed **patent disclosures** for AHCS innovation and NN Flux Predictor.

**Michigan State University** *May 2019 – Dec 2023*  
*Postdoctoral Research Associate - Depts. of Mechanical & Electrical Engineering*

- Developed **learning-based MPC active suspension system** using Gaussian Process regression; validated in CarSim & HiL.
- Partnered with Ford Motor Company on *Risk-Averse RL Planner* and *Conflict-Aware Safe RL Framework*.
- Conducted research on **safe, adaptive, and distributed control** for multi-agent systems.

## Education

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**Ferdowsi University of Mashhad** *2011 – 2018*  
Ph.D. Electrical Engineering (Control)

**Ferdowsi University of Mashhad** *2007 – 2010*  
M.Sc. Electrical Engineering (Control)

**K. N. Toosi University of Technology** *2002 – 2007*  
B.Sc. Electrical Engineering (Control)

## Technical Skills

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- **Model-Based Development:** Simulink, TargetLink, Stateflow, Simscape, Plecs, CarSim, CANoe, CANape
- **Prototyping & Validation:** dSPACE, RT Box, HiL/Dyno Testing, Rapid Prototyping
- **Programming:** MATLAB, Python, C, C++
- **AI/ML for Control:** Reinforcement Learning, Neural Networks, Gaussian Process Regression, PINNs

## Selected Publications

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- **Journal Paper (Published):** Mazouchi, M., Nagesh Rao, S., and Modares, H., 2021. A Risk-Averse Preview-based Q-Learning Algorithm: Application to Highway Driving of Autonomous Vehicles. *IEEE Transactions on Control Systems Technology*. (Supported by Ford Motor Company) [[Link to paper](#)]
- **Journal Paper (Published):** Mazouchi, M., Nagesh Rao, S., and Modares, H., 2021. Conflict-aware safe reinforcement learning: A meta-cognitive learning framework. *IEEE/CAA Journal of Automatica Sinica*. (Supported by Ford Motor Company) [[Link to paper](#)]
- **Journal Paper (Published):** Mazouchi, M., Nagesh Rao, S., and Modares, H., 2021. Finite-time Koopman Identifier: A Unified Batch-online Learning Framework for Joint Learning of Koopman Structure and Parameters. *JMLR*. (Supported by Ford Motor Company) [[Link to paper](#)]
- **Journal Paper (Published):** Mazouchi, M., Yang, Y., and Modares, H., 2021. Data-driven dynamic multiobjective optimal control: An aspiration-satisfying reinforcement learning approach. *IEEE Transactions on Neural Networks and Learning Systems*. (Supported by MSU) [[Link to paper](#)]
- **Journal Paper (Published):** Mazouchi, M., Tatari, F., Kiumarsi, B., and Modares, H., 2021. Fully-Heterogeneous Containment Control of a Network of Leader-Follower Systems. *IEEE Transactions on Automatic Control*. (Supported by MSU) [[Link to paper](#)]
- **Conference Paper (Published):** Han, Y., Mazouchi, M., Nagesh Rao, S., and Modares, H., 2021. A One-shot Convex Optimization Approach to Risk-Averse Q-Learning. *60th IEEE Conference on Decision and Control (CDC)*. (Supported by Ford Motor Company) [[Link to paper](#)]
- **Conference Paper (Published):** Mazouchi, M., Nagesh Rao, S., and Modares, H., 2021. Automating Vehicles by Risk-Averse Preview-based Q-Learning Algorithm. *6th IFAC ICONS*. (Best Paper Award) (Supported by Ford Motor Company) [[Link to paper](#)]

## Honors & Recognition

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- Patent Disclosures: Adaptive Harmonic Current Suppression (2024); Motor Flux Predictor (2025)
- Best Paper Award IFAC ICONS 2022
- Guest Associate Editor, *Frontiers in Control Engineering*
- Recognized at Mercedes-Benz R&D North America for accountability, innovation, and teamwork (2025)