Mehran Attar

Ph.D. Research Scientist

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Professional links: LinkedIn | GoogleScholar | GitHub

Summary

Ph.D. Researcher with experience in machine learning, cybersecurity, and control systems engineering. Adept at conducting cutting-edge research in data-driven methods for cyber-physical systems security, with a strong focus on safety and performance under network attacks. Skilled in programming languages (Python, C, MATLAB) and machine learning and deep learning tools (Scikit-learn, PyTorch), with a passion for solving complex problems through data-driven methods and advanced control techniques.

Professional Experiences

Industrial Experiences

- **Machine Learning Researcher** — Jan. 2024 - Present
  Ericsson Canada — *Montreal, Canada*
  - Develop quantum-inspired algorithms to solve constrained optimization problems
  - Develop a Signed Particle Formulation of Quantum Mechanics to enhance the parallelization computation capacity of Deep Neural Networks (DNNs) training process.
  - Design data-driven control architectures to preserve the safety and security of constrained cyber-physical systems using QiML-based methods

- **Cyber Security Researcher** — Sep. 2020 - Present
  PreCySe — *Montreal, Canada*
  - Design and implementation of data-driven algorithms for the safety and security of naval vessels (project for Department of National Defence, Canada) link

- **Applied Machine Learning Enginneer** — April 2017 - Aug. 2021
  MAPNA Group — *Karaj, Iran*
  - Anomaly detection in wind turbine SCADA data using machine learning techniques.
  - Develop time series models to predict maintenance needs and forecast potential failures in wind turbines
  - Integration of SCADA data with CMS data to design a comprehensive anomaly detection system.
    turbines

- **Control Systems Engineer** — April 2017 - Sep. 2018
  MAPNA Group — *Karaj, Iran*
  - Design and implementation of a wind turbine simulator equipped with DFIG generator

Academic Experiences

- **Research Assistant** — Sep. 2020 - Present
  Cyber-Physical Systems Security Research Group — *Montreal, Canada*
  - Develop data-driven methods for the safety and security of constrained cyber-physical systems (Ph.D. research)

- **Research Assistant** — Nov. 2015 - April 2017
  Intelligent Control Systems Lab — *Tarbiat Modares University, Tehran, Iran*
  - Dynamical Modeling of Quadruped Robot Using Artificial Intelligence Models methods based on SCADA data
  - Design and Implementation a Controller for Quadruped Robot (TMUBOT)

Software Skills

- **Programming Languages**: Python - C - MATLAB
- **Operating Systems**: Linux - Windows
- **Data Science Libraries**: Pandas - Numpy - Scipy
- **Plotting Libraries**: Matplotlib - Plotly
- **Documentation Tools**: LaTeX - MS Office
- **Version Control**: Git - GitHub

- **Machine Learning & Deep Learning Libraries**: Scikit-learn - Pytorch
- **Database**: Pyspark

Education

- **Ph.D. in Information and Systems Engineering** — Sep. 2020 - Dec. 2024
  Institute for Information Systems Engineering, Concordia University — *Montreal, Canada*
- **M.Sc. in Electrical Engineering, Control Systems** — Sep. 2014 - March 2017
  School of Electrical and Computer Engineering, Tarbiat Modares University — *Tehran, Iran*
- **B.Sc. in Electrical Engineering, Control Systems** — Sep. 2009 - Feb. 2011
  School of Electrical Engineering, Sharif University of Technology — *Tehran, Iran*
- **B.Sc. in Electrical Engineering, Control Systems** — Jan. 2008 - July 2013
  School of Electrical Engineering, Hamedan University of Technology — *Hamedan, Iran*

Honors and Awards

- **Tuition Award of Excellence** — Sep. 2020
  Scholarship Prize — *Concordia University, Montreal, Canada*
- **Ranked 3rd among all graduated students** — March 2017
  M.Sc. Graduated Student — *Tarbiat Modares University, Tehran, Iran*
- **Semi-Finalist** — Dec. 2004
  National Chemistry Olympiad — *Tehran, Iran*

Fields of Interest

- **Computer Science**
  Applied Machine Learning
  Applied Deep Learning
  Reinforcement Learning
- **Control Theory**
  Automatic Control
  Data-Driven Control
  Convex Optimization
- **Industrial Applications**
  Wind Turbines
  Cyber-Physical Systems
  Robotics

Journal publications

[1] **Mehran Attar** and Walter Lucia, "A Data-Driven Safety Preserving Control Architecture for Constrained Cyber-Physical Systems," accepted to publish in International Journal of Robust and Nonlinear Control, 2024. link

[2] **Mehran Attar** and Walter Lucia, "Data-Driven Robust Backward Reachable Sets for Set-Theoretic Model Predictive Control," IEEE Control System Letters (L-CSS), 2023. link

[3] **Mehran Attar**, Walter Lucia, "An Active Detection Strategy Based on Dimensionality Reduction for False Data Injection Attacks in Cyber-Physical Systems," IEEE Transactions on Control of Network Systems, 2023. link

[4] **Mehran Attar**, Navid Dini, and Vahid Johari Majd, "Analysis and Design of a Time-Varying Linear Extended State Observer for a Class of Nonlinear Systems with Unknown Dynamics Using Spectral Lyapunov Function," Journal of Intelligent and Robotic Systems, vol. 94, pages 405-421, 2018. link

[5] **Mehran Attar**, Mohammadreza Dabirian, "Reinforcement Learning for Learning of Dynamical Systems in Uncertain Environment: A Tutorial," arXiv preprint arXiv: 1905.07727, 2019. link

Conference Proceedings

[1] **Mehran Attar**, Navid Dini, Farid Edrisi and V.j.Majd, "Estimation of Decentralized Unknown Dynamics for a 2DOF Manipulator Using a Time-Varying Extended State Observer" The 4th International Conference on Robotics and Mechatronics (ICROM 2016), Oct 2016, University of Tehran, Tehran, Iran. link

[2] Farid Edrisi, Vahid Johari Majd, **Mehran Attar**, and Navid Dini, "Modifying the Attitude of Quadruped Robot Body against Disturbances via Data," The 4th International Conference on Robotics and Mechatronics (ICROM 2016), Oct 2016, University of Tehran, Tehran, Iran. link

[3] Navid Dini, Vahid Johari Majd, Farid Edrisi and **Mehran Attar**, "Estimation of External Forces Acting on the Legs of a Quadruped Robot using Two Nonlinear Disturbance Observers," The 4th International Conference on Robotics and Mechatronics (ICROM 2016), Oct 2016, University of Tehran, Tehran, Iran. link