Mohammad Sarbaz

Electrical and Mechanical Engineering-Ph.D.

Norman, Oklahoma, USA mohammad.sarbaz@ou.edu (405) 600 28 64 Mohammad Sarbaz

Summary

Ph.D. candidate specializing in optimal control design with extensive experience in Deep Learning, Reinforcement Learning, Trajectory Planning, Motion Planing, Model Predictive Control, Robust Control, Distributed Systems, and Robotic Systems. Skilled in developing Intelligent Control algorithms for Electrical Systems, Aircraft and Unmanned Aerial Vehicles (UAVs). Expert in applying Machine Learning methods including Deep Learning and Reinforcement Learning to Control Systems and enhancing the design of Learning-Based Control strategies for Complex and Uncertain Systems.

Skills

- Advanced knowledge of Nonlinear Control, Optimal Control, Model Predictive Control, Distributed Systems.
- Proficient in developing Machine Learning Algorithms including Deep Learning, Reinforcement Learning for Learning-Based Control Systems.
- Experienced with Robotic Systems, Version Control (e.g., Git), and Software such as ROS and Vicon.
- Skilled in Programming (e.g., C++, Python, MATLAB, Simulink) and Learning frameworks (e.g., PyTorch, TensorFlow).

Education

Ph.D. **Mechanical Engineering**, University of Oklahoma, Oklahoma, USA. Aug 2022 Present
- **Major:** Control Systems
- **Thesis:** Learning-Based Min-Max Differential Dynamic Programming.

M.S. **Electrical and Electronic Engineering**, Shahed University, Tehran. Aug 2017 Jan 2020
- **Major:** Control Systems
- **Thesis:** Model Predictive Control Design for Fuzzy Large-Scale Systems

B.S. **Electrical and Electronic Engineering**, Azad University, Tehran. Aug 2012 Jan 2016
- **Major:** Control Systems
- **Thesis:** PID Control Design for Nonlinear System Ball and Beam

Professional Experience

Research Assistant, University of Oklahoma, Oklahoma, USA, Aug 2022 Present
- Worked in Control and Robotic Lab as researcher and conducted various projects in Machine Learning and Control.
- Tested and validated various control algorithmsincluding DDP, MPC, and RL-based methodson UAV platforms using Vicon motion capture and onboard sensors, demonstrating strong experimental control capabilities.
- Designed Optimal Control for Robotic Systems using Nonzero-Sum Differential Dynamic Programming algorithm.
- Developed Intelligent Optimal Control for Stochastic Dynamics via Reinforcement Learning algorithms.
- Formulated Observer-Based Min-Max Differential Dynamic Programming for Output Feedback Systems.
- Proposed Distributed Optimal Control using Min-Max Differential Dynamic Programming for Large-Scale Systems.
- Implemented Data-Driven Min-Max Differential Dynamic Programming for Nonlinear Systems with Machine Learning.

Research Assistant, Shahed University, Tehran, Iran, Aug 2017-Jan 2020
- Designed Model Predictive Control for Interval Type-2 Fuzzy Large-Scale Systems.
- Established Adaptive Optimal Control for Nonlinear systems using Deep Learning method.

Teaching Assistant, Shahed University, Tehran, Iran, Aug 2017-Jan 2020
- Taught concepts of Intelligent Control and Machine Learning to graduate and undergraduate students.

Research Assistant, Azad University, Tehran, Iran, Aug 2012-Jan 2016
- Applied PID control to Nonlinear System Ball and Beam with Fixed Equilibrium Point.

Teaching Assistant, Azad University, Tehran, Iran, Aug 2012-Jan 2016
- Taught concepts of Neural Networks and Control to undergraduate students and implemented on Electrical Systems.

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Publications

Journals

- **Sarbaz, Mohammad**, and Wei Sun. *"Data-Driven Stochastic Game Theoretic Differential Dynamic Programming".* International Journal of Robust and Nonlinear Control (2025) : 1-13. doi.org/10.1002/rnc.7984
- **Sarbaz, Mohammad**, and Wei Sun. *"Sliding mode observer-based min-max differential dynamic programming for output feedback differential games".* International Journal of Control (2025) : 1-16. doi.org/10.1080/00207179.2025.2479191
- **Sarbaz, Mohammad**. *"Model Predictive Control for Interval Type-2 Fuzzy Systems with Unknown Time-Varying Delay in States and Input Vector".* International Journal of Uncertainty, Fuzziness and Knowledge-Based Systems 32, no. 03 (2024): 385-401. doi.org/10.1142/S0218488524500156
- **Sarbaz, Mohammad**, and Wei Sun. "Min-max adaptive dynamic programming for zero-sum differential games." International Journal of Control (2024): 1-10. doi.org/10.1080/00207179.2024.2309194
- Jokar, Mojtaba Asadi, Iman Zamani, Mohammad Manthouri, and **Mohammad Sarbaz**. "A novel robust extended dissipativity state feedback control system design for interval type-2 fuzzy Takagi-Sugeno large-scale systems." Automatika 64, no. 3 (2023): 642-657. doi.org/10.1080/00051144.2023.2203552
- Zamani, Iman, Mohsen Shafieirad, Mohammad Manthouri, **Mohammad Sarbaz**, and Asier Ibeas. "Nonlinear Pseudo State-Feedback Controller Design for Affine Fuzzy Large-Scale Systems with H_∞ Performance." International Journal of Fuzzy Systems 25, no. 1 (2023): 80-95. doi.org/10.1007/s40815-022-01296-x
- **Sarbaz, Mohammad**, Mohammad Manthouri, and Iman Zamani. "LMI-Based Robust Fuzzy Model Predictive Control of Discrete-Time Fuzzy Takagi-Sugeno Large-Scale Systems Based on Hierarchical Optimization and H_∞ Performance." International Journal of Uncertainty, Fuzziness and Knowledge-Based Systems 30, no. 04 (2022): 649-679. doi.org/10.1142/S0218488522500179
- **Sarbaz, Mohammad**, Iman Zamani, Mohammad Manthouri, and Asier Ibeas. "Hierarchical optimization-based model predictive control for a class of discrete fuzzy large-scale systems considering time-varying delays and disturbances." International Journal of Fuzzy Systems 24, no. 4 (2022): 2107-2130. doi.org/10.1007/s40815-021-01217-4
- **Sarbaz, Mohammad**, Iman Zamani, Mohammad Manthouri, and Asier Ibeas. "Decentralized robust interval type-2 fuzzy model predictive control for TakagiSugeno large-scale systems." Automatika 63, no. 1 (2022): 49-63. doi.org/10.1080/00051144.2021.2003113

Conferences

- **Sarbaz, Mohammad**, MohammadReza Soltanian, Mohammad Manthouri, and Iman Zamani. "Adaptive optimal control of chaotic system using backstepping neural network concept." In 2022 8th international conference on control, instrumentation and automation (ICCIA), pp. 1-5. IEEE, 2022. 10.1109/ICCIA54998.2022.9737157
- **Sarbaz, Mohammad**, Mohammad Manthouri, and Iman Zamani. "Rough neural network and adaptive feedback linearization control based on Lyapunov function." In 2021 7th International Conference on Control, Instrumentation and Automation (ICCIA), pp. 1-5. IEEE, 2021. 10.1109/ICCIA52082.2021.9403609
- **Sarbaz, Mohammad**, Iman Zamani, and Mohammad Manthouri. "Fuzzy model predictive control contrived for type-2 large-scale process based on hierarchical scheme." In 2020 28th Iranian Conference on Electrical Engineering (ICEE), pp. 1-6. IEEE, 2020. 10.1109/ICEE50131.2020.9261080

Under Reviews

- **Sarbaz, Mohammad**, and Wei Sun. "Data-Driven Min-Max Differential Dynamic Programming for Nonlinear Systems." (Submitted to "Journal of Guidance Control and Dynamics").
- **Sarbaz, Mohammad**, and Wei Sun. "Distributed Min-Max Differential Dynamic Programming for Large-Scale Systems with Mismatched Interconnections." (Submitted to "Nonlinear Dynamic").
- **Sarbaz, Mohammad**, and Wei Sun. "Continuous Time Differential Dynamic Programming for Nonzero-Sum Differential Games." (Submitted to "International Journal of Robust and Nonlinear Control").
- **Sarbaz, Mohammad**, and Wei Sun. "Chance Constraint Game-Theoretic Differential Dynamic Programming for Safe Trajectory Optimization Under Uncertainties." (Submitted to "Autonomous Robotics").

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Research Interests

- Optimal Control
- Robust Control
- Model Predictive Control
- Stochastic Dynamics
- Differential Games
- Supervised Machine Learning
- Unsupervised Machine Learning
- Reinforcement Learning

Certificates

- Supervised and Unsupervised Machine Learning Algorithms (2024)
- Deep Learning and Advanced Learning Algorithms (2024)
- Unsupervised Learning, Recommenders, Reinforcement Learning (2024)

Journal Reviews

- The IEEE Transactions on Automatic Control
- Nonlinear Dynamics
- International Journal of Control
- International Journal of Fuzzy Logic and Intelligent Systems

Honours and Awards

- Ranked 600 Among 40,000 Participants in M.Sc Electrical Engineering Nationwide University Entrance Exam.
- Member of National Elite Foundation.
- Distinguished Student in Masters Degree.
- Full Time Graduate Research Assistant Grant for Ph.D.
- 2023 Vinola D Scott Mem Scholarship.
- 2023-2025 Farzaneh Family Scholarship.
- The Full Tuition Waiver Scholarship for Masters Degree.
- Ranked 1st among 15 students in the Electrical Engineering program at M.Sc., Shahed University, Tehran, Iran (2020).

Language

English: Professional

Turkish: Professional

Persian: Native

References

Prof. Wei Sun, School of Aerospace and Mechanical Engineering, University of Oklahoma, Norman, Oklahoma, USA.
Email: wsun@ou.edu.
Prof. Mohammad Manthouri, Electrical and Electronic Engineering Department, Shahed University, Tehran, Iran.
Email: mmanthouri@shahed.ac.ir.
Prof. Iman Zamani, Electrical and Electronic Engineering Department, Shahed University, Tehran, Iran.
Email: zamaniiman@shahed.ac.ir.