Bosen Lian, Ph.D.

Contact

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Highlights

- Had more than 25 articles published or accepted in high-impact *learning-and-control* venues with several more under review. A book monograph is accepted to appear in *Springer* under *Advances in Industrial Control Series*.
- Taught *Control Systems*, *Robotics*, and *Distributed Decision and Control*.
- Co-advised 5 Ph.D. students.

Professional Experience

2023/8-Now **Tenure-Track Assistant Professor** in the Department of Electrical and Computer Engineering at Auburn University, Auburn, AL, USA

2021/12-2023/8 **Post-Doctoral Research Associate** at UT Arlington Research Institute, supervisors: Prof. Frank L. Lewis and Prof. Ali Davoudi

2022/1-2023/5 **Adjunct Professor** in the Department of Electrical Engineering at UT Arlington, Arlington, TX, USA

Education Background

2018/8-2021/12 University of Texas at Arlington, Arlington, Texas, USA

- **Ph. D. in Electrical Engineering**
- Supervisor: Prof. Frank L. Lewis, NAI/IEEE/IFAC/AAAS/EUAS/InstMC Fellow.

2015/9-2018/1 Northeastern University, Shenyang, Liaoning, China

- **M.S. in System Analysis and Integration**
- Supervisor: Prof. Qingling Zhang

2011/9-2015/7 North China University of Water Resources and Electric Power, Zhengzhou, Henan, China

- **B.S. in Statistics**

Research

-Books

[1] Lian, B., Xue, W., Lewis, F.L., Modares, H., and Kiumarsi, B. *Integral and Inverse Reinforcement Learning for Optimal Control Systems and Games*, Springer, Advances in Industrial Control Series, accepted to appear in October 2023.

-Selected Journal Articles

-Published-

[1] Lian, B., Xue, W., Lewis, F.L., and Chai, T. Inverse reinforcement learning for adversarial apprentice games, *IEEE Transactions on Neural Networks and Learning Systems*, 34(8), 4596-4609, 2023.

[2] Xue, W., Lian, B., Fan, J., Kolaric, P., Chai, T., and Lewis, F.L. Inverse reinforcement Q-learning through expert imitation for discrete-time systems, *IEEE Transactions on Neural Networks and Learning Systems*, 34(5), 2386-2399, 2023.

[3] Lian, B., Kartal, Y., Lewis, F.L., Mikulski, D.G., Hudas, G.R., Wan, Y., and Davoudi, A. Anomaly detection and correction of optimizing autonomous systems with inverse reinforcement learning, *IEEE Transactions on Cybernetics*, 53(7), 4555-4566 2023.

[4] Donge, V.S., Lian, B., Lewis, F.L., and Davoudi, A. Multi-agent graphical games with inverse reinforcement learning, *IEEE Transactions on Control of Network Systems*, 10(2), 841-852. 2023.

[5] Lian, B., Lewis, F.L., Hewer, G., Estabridis, K., and Chai, T. Online learning of minmax solutions for distributed estimation and tracking control of sensor networks in graphical games, *IEEE Transactions on Control of Network Systems*, 9(4), 1923-1936, 2022.

[6] Lian, B., Xue, W., Lewis, F.L., and Chai, T. Inverse reinforcement learning for multi-player noncooperative apprentice games, *Automatica*, 145 (2022): 110524.

[7] Lian, B., Xue, W., Lewis, F.L., and Chai, T. Robust inverse Q-learning for continuous-time linear systems in adversarial environments, *IEEE Transactions on Cybernetics*, 52(12), 13083-13095, 2022.

[8] Lian, B., Lewis, F.L., Hewer, G., Estabridis, K., and Chai, T. Robustness analysis of distributed Kalman filter for estimation in sensor networks, *IEEE Transactions on Cybernetic*, 52(11), 12479–12490, 2022.

[9] Lian, B., Yan, W., Zhang, Y., Liu, M, Lewis, F.L., and Chai, T. Distributed Kalman consensus filter for estimation with moving targets, *IEEE Transactions on Cybernetics*, 52(6), 5242-5254, 2022.

[10] Zhang, X., Lian, B., Lewis, F.L., Wan, Y., and Cheng, D. Directed graph clustering algorithms, topology, and weak links, *IEEE Transactions on Systems, Man, and Cybernetics: Systems*, 52(6), 3995-4009, 2022.

[11] Xue, W., Kolaric, P., Fan, J., Lian, B., Lewis, F.L., and Chai, T. Inverse reinforcement learning in tracking control based on inverse optimal control, *IEEE Transactions on Cybernetics*, 52(10), 10570-10581, 2022.

[12] Lian, B., Xue, W., Lewis, F.L., and Chai, T., Online inverse reinforcement learning for nonlinear systems with adversarial attacks, *International Journal of Robust Nonlinear Control*, 31(14), 6646-6667, 2021.

[13] Lian, B., Zhang, Q., and Li, J. Integrated sliding mode control and neural networks based packet disordering prediction for nonlinear networked control systems, *IEEE Transactions on Neural Networks and Learning Systems*, 30(8), 2324-2335, 2018.

-Accepted-

[1] Lian. B., Xue, W., Lewis, F.L., and Davoudi, A. Inverse Q-learning for discrete-time systems, *IEEE Transactions on Cybernetics* (conditionally accepted), Aug. 2023.

[2] Donge, V., Lian. B., Lewis, F.L., and Davoudi, A. Reinforcement learning for complex nonlinear systems, *IEEE Transactions on Cybernetics*, Aug. 2023.

[3] Lian. B., Xue, W., Xie, Y., Lewis, F.L., and Davoudi, A. Off-policy inverse Q-learning for discrete-time antagonistic unknown systems, *Automatica*, May. 2023.

[4] Donge, V., Lian. B., Lewis, F.L., and Davoudi, A. Accelerated reinforcement learning via dynamic mode decomposition, *IEEE Transactions on Control of Network Systems*, Feb. 2023.

[5] Xue, W., Lian, B., Fan, J., Chai, T., and Lewis, F.L. Inverse reinforcement learning for trajectory imitation using static output feedback control, *IEEE Transactions on Cybernetics*, Jan. 2023.

[6] Lian, B., Donge, V.S., Xue, W., Lewis, F.L., and Davoudi, A. Distributed minmax strategy for multiplayer games: stability, robustness, and algorithms, *IEEE Transactions on Neural Networks and Learning Systems*, Nov. 2022.

[7] Lian, B., Xue, W., Donge, V.S., Lewis, F.L., and Davoudi, A. Data-driven inverse reinforcement learning control for linear multiplayer games, *IEEE Transactions on Neural Networks and Learning Systems*, Oct. 2022.

-Under Review-

[1] Xue, W., Lian. B., Fan, J., Chai, T., and Lewis, F.L. Inverse H_∞ control using inverse reinforcement learning, *IEEE Transactions on Neural Networks and Learning Systems*, Aug. 2023.

[2] Donge, V., Lian. B., Lewis, F.L., and Davoudi, A. Efficient reward shaping for multiagent systems, *IEEE Transactions on Control of Network Systems*, Aug. 2023.

[3] Lian B., Koru A.T., Xue W., Lewis F.L., Davoudi A. Distributed dynamic cluster formation for consensus of multiagent systems, *IEEE Transactions on Automatic Control*, Apr. 2023.

[4] Lian. B., Xue, W., Lewis, F.L., and Davoudi, A. Nash-minmax strategy for multiplayer multiagent graphical games with reinforcement learning, *IEEE Transactions on Control of Network Systems*, Sep. 2022.

[5] Lian. B., Xue, W., Kolaric, P., Lewis, F.L., and Davoudi, A. Inverse value iteration and Q-learning: algorithms and stability, *IEEE Transactions on Automatic Control*, Dec. 2021.

-Conference Proceedings Published-

[1] Lian. B., Wan, Y., Zhang, Y., Liu, M., Lewis, F.L., Abad, A., Setter, T., Short, D., and Chai, T. Distributed consensus-based Kalman filtering for estimation with multiple moving targets, *in 58th IEEE Conference on Decision and Control,* Nice, France, 2019. Invited Session.

[2] Lian. B., Xue, W., Lewis, F.L., Chai, T., and Davoudi, A. Inverse reinforcement learning for multi-player apprentice games in continuous-time nonlinear systems, *in 60th IEEE Conference on Decision and Control*, Austin, USA, 2021. Invited Session.

[3] Lian. B., Dong, V.S., Lewis, F.L., Chai, T., and Davoudi, A. Inverse reinforcement learning control for linear multiplayer games, *in 61th IEEE Conference on Decision and Control*, Cancún, Mexico, 2022. Invited Session.

Research Projects: Contributing Lead Research Associate

2020/6-2023/6 Army Research Office Grant W911NF-20-1-013, Graphical Games and Distributed Reinforcement Learning Control in Human- networked Multi-group Societies, **PI:** Frank L. Lewis, Yan Wan, and Ali Davoudi.

2018/6-2022/5 Office of Naval Research Grant N00014-18-1-2221, Optimal Design for Assured Performance of Interactive Multibody Systems: Guaranteed Controls for Multi-pursuers, Estimation, Optimal Learning, Scalable Uncertainty Sampling, and Time-critical Communication, **PI:** Frank L. Lewis and Yan Wan.

2018/9-2021/8 National Science Foundation Grant 1839804, EAGER: Real-Time: Collaborative Research: Unified Theory of Model-based and Data-driven Real-time Optimization and Control for Uncertain Networked Systems, **PI:** Frank L. Lewis, Yan Wan, and Ali Davoudi.

2019/2-2019/12 Lockheed Martin Advanced Technology Labs, Heterogeneous Autonomous Networks for Sensor Optimizing Locomotion, Research Contract, **PI:** Frank L. Lewis and Yan Wan.

Ph.D. Student Co-advisor

2023/1-2023/5 Erin Butler* for Dr. Yijing Xie

2021/1-2023/8 Vrushabh S. Donge* for Prof. Ali Davoudi

2019/8-2021/8 Wenqian Xue† (Northeastern University) for Prof. Frank L. Lewis

2019/8-2020/8 Zhe Chen† (Shanghai Jiaotong University) for Prof. Frank L. Lewis

2018/8-2019/8 Xiao Zhang† (Shandong University) for Prof. Frank L. Lewis

*-Ph.D. student at UT Arlington, †-visiting Ph.D. student.

Teaching Experiences

2023 Fall ELEC 3500 Control Systems, Assistant Professor, Auburn University

2023 Spring EE 5325/4315 Robotics, Adjunct Professor, UT Arlington

2022 Fall EE 5330 Distributed Decision and Control, Adjunct Professor, UT Arlington

2022 Spring EE 5325/4315 Robotics, Adjunct Professor, UT Arlington

Awards

2022/4 N. M. Stelmakh Outstanding Student Research Award Finalist, EE Department of UT Arlington

2018/1 Liaoning Province Outstanding Dissertation, awarded for the master dissertation at Northeastern University, Department of Education of Liaoning Province

2017/1 National Scholarship, awarded for top 1% academic performance at Northeastern University, Ministry of Education of China

2015/1-2016/1 First Prize Scholarship, awarded for top 5% academic performance, Northeastern University

2011/9-2014/9 First Prize Scholarship, awarded for top 5% academic performance, North China University of Water Resources and Electric Power

Selected Peer Review Services

Automatica
IEEE Control System Letters
IEEE Open Journal of Control Systems
IEEE Transactions on Automatic Control
IEEE Transactions on Cybernetics
IEEE Transactions on Control of Network Systems
IEEE Transactions on Industrial Electronics
IEEE/ASME Transactions on Mechatronics

IEEE Transactions on Neural Networks and Learning Systems
IEEE Transactions on Systems, Man, and Cybernetics: Systems
IEEE American Control Conference
IEEE Conference on Decision and Control