Songyang Han

Applied Scientist
Amazon AWS AI Labs, Santa Clara, CA, USA
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songyanghan Google Scholar

Education

University of Connecticut (UCONN), Storrs, USA
PhD in Computer Science and Engineering, Supervisor: Prof. Fei Miao
Aug. 2018 - May 2023
GPA: 4.0/4.0
Core Courses: Algorithms, Formal Methods, Machine Learning, Advanced Computer Network, Optimal & Model Predictive Control, Deep Reinforcement Learning, Cryptography

Shanghai Jiao Tong University (SJTU), Shanghai, China
(University of Michigan-SJTU Joint Institute)
M.S. in Electrical and Computer Engineering, Supervisor: Prof. Chengbin Ma
Sep. 2015 - Mar. 2018
GPA: 3.96/4.0, Ranking: 1/20
Core Courses: Game Theory, Data Mining, Engineering Optimization, Methods of Applied Mathematics I, Probability and Random Process, Mechatronic Systems Design, New Energy System

Nanjing University (NJU), Nanjing, China
B.Eng. in Automation
Sep. 2011 - Jun. 2015
GPA: 4.44/5.0, Ranking: 1/34
Core Courses: Principles of Automatic Control, Modern Cybernetics, Operations Research, C++, Data Structure, Database, Computer Vision, Computer Network, Signals and Systems, Digital Signal Processing, Circuit Analysis, Analog Circuit, Digital Circuit, Principles of Microcomputer

Research Experience

Applied Scientist II, Amazon AWS AI Labs
Sep. 2024 - Present

- Amazon Q Developer and CodeWhisperer; LLMs for Coding @AWS AI Labs.
- 2025: Post-training, reinforcement learning of LLM foundation models, agentic AI
- 2024: Our project, Amazon Q Developer code review, is announced by AWS CEO Matt Garman at AWS re:Invent 2024.

Research Scientist, Sony AI America
Aug. 2023 - Sep. 2024

- Worked in the Reinforcement Learning group led by Peter Stone and Peter Wurman.
- A revolutionary superhuman racing AI agent that has mastered the highly realistic game of Gran Turismo, to race against and elevate the gaming experience of GT drivers.

Applied Scientist Intern, Amazon
May 2023 - Aug. 2023

- Mentored by Apaar Sadhwani
- Developed machine learning-driven solutions to efficiently handle time-series data characterized by sparse observations.

Research Assistant, University of Connecticut
Supervisor: Prof. Fei Miao

Aug. 2018 - May 2023
Key areas: multi-agent reinforcement learning (MARL), safe MARL, robust MARL, game theory

- Designed algorithms to leverage the extended sensing capabilities of connected autonomous vehicles (CAVs) through information sharing.
- Analyzed quantum key distribution protocols using game theory to enhance noise tolerance and secure communication rates.
- Developed an integrated information sharing and multi-agent reinforcement learning framework for CAV behavior planning to improve traffic efficiency and safety.
- Explored the fundamental properties of robust MARL under adversarial state perturbations, defining and proving the existence of robust agent policies.
- Created a stable and efficient reward reallocation algorithm to promote cooperation among self-interested agents in MARL.

Research Intern, Baidu USA Apollo team
May 2020 - Dec. 2020

- Mentored by Shiyu Song
- Single and multi-agent RL, distributed learning, algorithm architecture and interface, and a prototype design.
- Built a prototype platform for training and testing RL algorithms for autonomous vehicles on the Apollo platform and AWS.

Research Assistant, Dynamic Systems Control Laboratory, UM-SJTU Joint Institute
Supervisor: Prof. Chengbin Ma
Sep. 2015 - Mar. 2018
Key areas: game theory, optimization, microgrid energy management, electric vehicle

- Developed a flexible energy management approach to handle weather and sizing uncertainties in isolated microgrids.
- Designed and fabricated high-efficiency bidirectional DC/DC converters for energy management validation in a downsized system.
- Built a hardware testbed to study reconfigurable energy systems.

Team Leader, Nippon Chemi-Con Corporation Japan
Dec. 2016 - Apr. 2017
Enhanced the energy management approach of a hybrid energy storage system in a novel topology, improving system efficiency without special alternators like MAZDA i-ELoop.

Team Leader, National Undergraduate Training Programs for Innovation and Entrepreneurship
May 2013 - Dec. 2014
Integrated a camera and structured light to model a feather in 3D, successfully extracting feather strokes using image processing methods like Hough transform.

Publications

Journal Publications

[1] Sanbao Su, **Songyang Han**, Yiming Li, Zhili Zhang, Chen Feng, Caiwen Ding, Fei Miao. *Collaborative Multi-Object Tracking with Conformal Uncertainty Propagation.* In IEEE Robotics and Automation Letters (RA-L), January 2024.

[2] **Songyang Han**, Sanbao Su, Sihong He, Shuo Han, Haizhao Wang, Fei Miao. *What is the Solution for State-Adversarial Multi-Agent Reinforcement Learning?* In Transactions on Machine Learning Research (TMLR), January 2024.

[3] **Songyang Han**, Shanglin Zhou, Jiangwei Wang, Lynn Pepin, Caiwen Ding, Jie Fu, Fei Miao. *A Multi-Agent Reinforcement Learning Approach For Safe and Efficient Behavior Planning Of Con-*

nected Autonomous Vehicles. In IEEE Transactions on Intelligent Transportation Systems, December 2023.

[4] Jiangwei Wang, Lili Su, **Songyang Han**, Dongjin Song, Fei Miao. *Towards Safe Autonomy in Hybrid Traffic: Detecting Unpredictable Abnormal Behaviors of Human Drivers via Information Sharing.* In ACM Transactions on Cyber-Physical Systems (TCPS), June 2023.

[5] Sihong He, **Songyang Han**, Sanbao Su, Shuo Han, Shaofeng Zou, and Fei Miao. *Robust Multi-Agent Reinforcement Learning Considering State Uncertainties.* In Transactions on Machine Learning Research (TMLR), May 2023.

[6] Yukun Yuan, Meiyi Ma, **Songyang Han**, Desheng Zhang, Fei Miao, John Stankovic, Shan Lin. *DeResolver: A Decentralized Negotiation and Conflict Resolution Framework for Smart City Services.* In ACM Transactions on Cyber-Physical Systems (TCPS), 2022.

[7] **Songyang Han**, Walter O. Krawec, Fei Miao. *A Game Theoretic Security Framework for Quantum Cryptography: Performance Analysis and Application.* Quantum Information Processing, 19.10 (2020): 1-24.

[8] Shuangke Liu, Ming Liu, **Songyang Han**, Xinen Zhu, Chengbin Ma. *Tunable Class-E2 DC-DC Converter with High Efficiency and Stable Output Power for 6.78 MHz Wireless Power Transfer.* IEEE Transactions on Power Electronics, 33.8 (2018): 6877-6886.

Preprints

[1] Lizhi Wang, Lynn Pepin, Jiangwei Wang, **Songyang Han**, Pranav Pishawikar, Amir Herzberg, Peng Zhang, Fei Miao. *Botnets breaking transformers: Localization of power botnet attacks against the distribution grid.* (Under review, available on arXiv: 2203.10158, 2022)

[2] **Songyang Han**, Apaar Sadhwani, Tushar Agarwal, Hamid Badiozamani, Tiago Etiene, Jing Zhu, Aarthi Raveendran, William Smart. *Real-time Human Presence Estimation For Indoor Robots.* (Under review)

Conference Publications

[1] Jiangwei Wang, Shuo Yang, Ziyan An, **Songyang Han**, Zhili Zhang, Rahul Mangharam, Meiyi Ma, Fei Miao. *Multi-Agent Reinforcement Learning Guided by Signal Temporal Logic Specifications.* In 2025 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), Hangzhou, China, Oct. 2025. (Accepted)

[2] **Songyang Han**, Sanbao Su, Sihong He, Shuo Han, Haizhao Wang, Fei Miao. *What is the Solution for State-Adversarial Multi-Agent Reinforcement Learning?* In the Frontiers4LCD Workshop at the International Conference on Machine Learning (ICML), 2023, Hawaii, USA, July 2023.

[3] Sihong He, **Songyang Han**, Sanbao Su, Shuo Han, Shaofeng Zou, and Fei Miao. *Robust Multi-Agent Reinforcement Learning Considering State Uncertainties* in the AI4ABM workshop at the 11th International Conference on Learning Representations (ICLR), Kigali, Rwanda, May 2023.

[4] **Songyang Han**, Shanglin Zhou, Lynn Pepin, Jiangwei Wang, Caiwen Ding, Fei Miao. *Shared Information-Based Safe And Efficient Behavior Planning For Connected Autonomous Vehicles.* In the DCAA workshop at the 37th AAAI Conference on Artificial Intelligence, Washington, DC, USA, Feb. 2023. (**Best paper award**)

[5] Sanbao Su, Yiming Li, Sihong He, **Songyang Han**, Chen Feng, Caiwen Ding, Fei Miao. *Uncertainty Quantification of Collaborative Detection for Self-Driving.* In 2023 IEEE International Conference on Robotics and Automation (ICRA), London, UK, May 2023.

[6] Zhili Zhang, **Songyang Han**, Jiangwei Wang, Fei Miao. *Spatial-Temporal-Aware Safe Multi-Agent Reinforcement Learning of Connected Autonomous Vehicles in Challenging Scenarios.* In 2023 IEEE International Conference on Robotics and Automation (ICRA), London, UK, May 2023.

[7] Jiangwei Wang, Lili Su, **Songyang Han**, Dongjin Song, Fei Miao. *Towards Safe Autonomy in Hybrid Traffic: The Power of Information Sharing in Detecting Abnormal Human Drivers Behaviors.* In the AI4TS workshop at the 31st International Joint Conference On Artificial Intelligence (IJCAI), Messe Wien, Vienna, Austria, 2022.

[8] **Songyang Han**, He Wang, Sanbao Su, Yuanyuan Shi, Fei Miao. *Stable and Efficient Shapley Value-Based Reward Reallocation for Multi-Agent Reinforcement Learning of Autonomous Vehicles.* In 2022 IEEE International Conference on Robotics and Automation (ICRA), Philadelphia, USA, May 2022.

[9] Yukun Yuan, Meiyi Ma, **Songyang Han**, Desheng Zhang, Fei Miao, John Stankovic, Shan Lin. *DeResolver: A Decentralized Negotiation and Conflict Resolution Framework for Smart City Services.* In 12th ACM/IEEE International Conference on Cyber-Physical Systems (ICCPS), Nashville, USA, May 2021. (**Best paper award**)

[10] **Songyang Han**, Jie Fu, Fei Miao. *Exploiting Beneficial Information Sharing Among Autonomous Vehicles.* In 2019 IEEE 58th Conference on Decision and Control (CDC), Nice, France, Dec. 2019.

[11] Amro Alsabbagh, Dongxiang Yan, **Songyang Han**, Yandong Wang, Chengbin Ma. *Behaviour-based distributed energy management for charging EVs in photovoltaic charging station.* In 2018 IEEE International Conference on Industrial Electronics for Sustainable Energy Systems (IESES), Hamilton, New Zealand, Jan. 2018.

[12] Amro Alsabbagh, He Yin, **Songyang Han**, Chengbin Ma. *Two-stage distributed energy management for islanded DC microgrid with EV parking lot.* In 2017 43rd Annual Conference of the IEEE Industrial Electronics Society (IECON), Beijing, China, Oct. 2017.

[13] **Songyang Han**, He Yin, Amro Alsabbagh, Chengbin Ma. *A Flexible Distributed Approach to Energy Management of an Isolated Microgrid.* In 2017 IEEE 26th International Symposium on Industrial Electronics (ISIE), Edinburgh, Scotland, June 2017.

[14] Yandong Wang, He Yin, **Songyang Han**, Amro Alsabbagh, Chengbin Ma. *A novel switched capacitor circuit for battery cell balancing speed improvement.* In 2017 IEEE 26th International Symposium on Industrial Electronics (ISIE), Edinburgh, Scotland, June 2017.

[15] **Songyang Han**, Xianzhong Zhou, Chunlin Chen. *Path Planning for Multi-robot Systems Using PSO and Critical Path Schedule Method.* In 2016 IEEE 13th International Conference on Networking, Sensing and Control (ICNSC), Mexico City, Mexico, April 2016.

Skills

- **Programming:** Python, C/C++, MATLAB, LabVIEW, SQL
- **Tools:** Pytorch, LaTeX, Linux, Git, CARLA, NI myRIO, NI CompactRIO, Arduino, PIC, Altium Designer, Multisim, AutoCAD

Honors & Awards

- Predoctoral Research Fellowship, University of Connecticut, May 2023
- **Best Paper Award**, DCAA workshop, 37th AAAI Conference, Feb. 2023
- GE Fellowship of Excellence, University of Connecticut, Aug. 2022
- Predoctoral Research Fellowship, University of Connecticut, May 2022
- First Place Award, 8th Annual Graduate Poster Competition, University of Connecticut, Mar. 2022
- Predoctoral Research Fellowship, University of Connecticut, May 2021
- **Best Paper Award**, 12th ACM/IEEE International Conference on Cyber-Physical Systems, May 2021
- Cigna Graduate Fellowship, University of Connecticut, Aug. 2020
- Predoctoral Research Fellowship, University of Connecticut, May 2020
- Postgraduate Academic Excellence Scholarship, Shanghai Jiao Tong University, Oct. 2016
- Guanghua Scholarship, Shanghai Jiao Tong University, Dec. 2015
- Outstanding Graduates of Nanjing University, May 2015
- National Endeavor Fellowship (3 times), Nanjing University, Dec. 2012-Dec. 2014

- Outstanding Winner of Educational Robot Competition in China, Chinese Association for Artificial Intelligence, Nov. 2014
- Meritorious Winner of 2014 MCM, Consortium for Mathematics and Its Applications, May 2014
- Outstanding Students of Nanjing University (2 times), Nanjing University, Nov. 2012-Nov. 2013

Service Experience

Reviewer

- IEEE Transactions on Industrial Informatics
- IEEE Transactions on Neural Networks and Learning Systems
- IEEE Transactions on Automation Science and Engineering
- IEEE Transactions on Cybernetics
- IEEE Transactions on Artificial Intelligence
- Transactions on Machine Learning Research (TMLR)
- The 43rd Annual Conference of the IEEE Industrial Electronics Society (IECON 2017)
- The 58th Conference on Decision and Control (CDC 2019)
- The 2020 American Control Conference (ACC 2020)
- The 59th Conference on Decision and Control (CDC 2020)
- The 2021 American Control Conference (ACC 2021)
- 2020 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2020)
- 2021 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2021)
- 2022 IEEE International Conference on Robotics and Automation (ICRA 2022)
- 2023 IEEE International Conference on Robotics and Automation (ICRA 2023)
- The 60th Conference on Decision and Control (CDC 2023)
- The 14th ACM/IEEE International Conference on Cyber-Physical Systems (ICCPS 2023)
- 2024 IEEE International Conference on Robotics and Automation (ICRA 2024)
- 2024 Conference on Neural Information Processing Systems (NeurIPS 2024)
- 2025 IEEE International Conference on Robotics and Automation (ICRA 2025)
- The 63rd Annual Meeting of the Association for Computational Linguistics (ACL 2025)

Program Committee

- The 38th Annual AAAI Conference on Artificial Intelligence (AAAI 2024)

Invited Talks

- Department of Computer Science, University of Maryland, College Park, Feb. 2023
- Institute For Data, Systems, And Society (IDSS), Massachusetts Institute of Technology, May 2023