XUSHENG LUO

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WORK EXPERIENCE

Carnegie Mellon University *April 2023 – Present*
Postdoctoral Fellow Pittsburgh, USA

Dajiang Software Technology Co., Ltd *Jan. 2021 – Feb. 2023*
Autonomous Driving Engineer Shenzhen, China

EDUCATION

Duke University, USA
Ph.D. in Mechanical Engineering & Materials Science *Aug. 2017 – Dec. 2020*
M.S. in Mechanical Engineering & Materials Science *Aug. 2017 – May 2020*
Advisor: Michael M. Zavlanos

Harbin Institute of Technology, China
M.S. in Aeronautical and Astronautical Science and Technology *Aug. 2015 – June 2017*
B.S. in Flight Vehicle Design and Engineering *Sep. 2011 – June 2015*

PUBLICATIONS

* indicates equal contribution.

Articles Under Review or About to Submit

[1] **Xusheng Luo**, Changliu Liu, "Simultaneous task allocation and planning for multi-robots under hierarchical temporal logic specifications". *arXiv:2401.04003*, 2024 (*IEEE Transactions on Robotics*, revise and resubmit).

[2] Shaojun Xu*, **Xusheng Luo***, Yutong Huang, Letian Leng, Ruixuan Liu, Changliu Liu, "Scaling Up Natural Language Understanding for Multi-Robots Through the Lens of Hierarchy". (*2024 Conference on Robot Learning (CoRL)*, under review)

[3] **Xusheng Luo**, Tianhao Wei, Simin Liu, Ziwei Wang, Luis Mattei-Mendez, Taylor Loper, Joshua Neighbor, Casidhe Hutchison, Changliu Liu, "Certifying Robustness of Learning-Based Keypoint Detection and Pose Estimation Methods". (*ACM Transaction on Cyber-Physical Systems*, under review)

[4] Tianhao Wei, Luca Marzari, Kai Yun, Hanjiang Hu, Peizhi Niu, **Xusheng Luo** and Changliu Liu. "ModelVerification.jl: a Comprehensive Toolbox for Formally Verifying Deep Neural Networks". *arXiv preprint arXiv:2407.01639*, 2024.

[5] Ruixuan Liu, Alan Chen, **Xusheng Luo** and Changliu Liu. "Simulation-aided Learning from Demonstration for Robotic LEGO Construction". *arXiv preprint arXiv:2309.11010*, 2023.

Refereed Journal Publications

[6] **Xusheng Luo**, Shaojun Xu, Ruixuan Liu and Changliu Liu. "Decomposition-based Hierarchical Task Allocation and Planning for Multi-Robots under Hierarchical Temporal Logic Specifications". *IEEE Robotics and Automation Letters*, 2024.

[7] **Xusheng Luo**, Yiannis Kantaros, and Michael M Zavlanos. "An abstraction-free method for multirobot temporal logic optimal control synthesis". *IEEE Transactions on Robotics*, 37(5):1487–1507, 2021.

[8] **Xusheng Luo** and Michael M Zavlanos. "Temporal logic task allocation in heterogeneous multi-robot systems". *IEEE Transactions on Robotics*, 38(6):3602-3621, 2022.

[9] **Xusheng Luo**, Miroslav Pajic, and Michael M. Zavlanos. "An optimal graph-search method for secure state estimation". *Automatica* 123 (2021): 109323.

Refereed Conference Proceedings

[10] Shiqi Sun, Yan Zhang, **Xusheng Luo**, Panagiotis Vlantis, Miroslav Pajic, and Michael M. Zavlanos. "Formal Verification of Stochastic Systems with ReLU Neural Network Controller". *IEEE 39th International Conference on Robotics and Automation (ICRA)*, Philadelphia, USA, 2022.

[11] Yijie Zhou, Yan Zhang, **Xusheng Luo**, and Michael M. Zavlanos. "Human-in-the-loop robot planning with non-contextual bandit feedback". In *2021 60th IEEE Conference on Decision and Control (CDC)*, pp. 2848-2853. IEEE, 2021

[12] **Xusheng Luo***, Yan Zhang*, and Michael M. Zavlanos. "Socially-aware robot planning via bandit human feedback". In *2020 ACM/IEEE 11th International Conference on Cyber-Physical Systems (ICCPS)*, pp. 216-225. IEEE, 2020.

[13] Le, Duc M., **Xusheng Luo**, Leila J. Bridgeman, Michael M. Zavlanos, and Warren E. Dixon. "Single-agent indirect herding of multiple targets using metric temporal logic switching". In *2020 59th IEEE Conference on Decision and Control (CDC)*, pp. 1398-1403. IEEE, 2020.

[14] **Xusheng Luo**, and Michael M. Zavlanos. "Transfer planning for temporal logic tasks". In *2019 IEEE 58th Conference on Decision and Control (CDC)*, pp. 5306-5311. IEEE, 2019.

Refereed Workshop Publications

[15] **Xusheng Luo***, Shaojun Xu* and Changliu Liu. "Obtaining Hierarchy from Human Instructions: an LLMs-based Approach". Workshop on *Learning Effective Abstractions for Planning (LEAP), Conference on Robot Learning (CoRL)*, 2023.

[16] **Xusheng Luo**, Shaojun Xu, Ruixuan Liu and Changliu Liu. "Robotic Planning under Hierarchical Temporal Logic Specifications". Workshop on *Formal Methods Techniques in Robotics Systems: Design and Control, IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2023.

AWARDS AND HONORS

- CPS Rising Stars Workshop (45/220, featuring outstanding PhD students and postdocs interested in pursuing academic careers in Cyber-Physical Systems (CPS) related areas) *2024*
- Student Travel Grant for the IEEE 59th Conference on Decision and Control *2020*
- Outstanding Graduate (Gold Medal) of Harbin Institute of Technology *2017*
- The Samsung Scholarship *2016*
- Summer School Scholarship at Technion in Israel *2016*
- National Scholarship for Encouragement (twice) *2012, 2014*

TALKS

Refereed Conference and Workshop Presentations

- Integrating Autonomy with Formal Methods
  – Workshop on *2024 CPS Rising Stars* *May. 2024*
- Obtaining Hierarchy from Human Instructions: an LLMs-based Approach
  – Workshop on *Learning Effective Abstractions for Planning, Conference on Robot Learning (CoRL)* *Nov. 2023*
- Robotic Planning under Hierarchical Temporal Logic Specifications
  – Workshop on *Formal Methods Techniques in Robotics Systems: Design and Control, IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)* *Oct. 2023*
- Socially-aware Robot Planning via Bandit Human Feedback.
  – In *2020 ACM/IEEE 11th International Conference on Cyber-Physical Systems (ICCPS)* *April 2020*

- Transfer Planning for Temporal Logic Tasks.
  – In *2019 IEEE 58th Conference on Decision and Control (CDC)* *Dec. 2019*

Invited Talks

- Scalable Control Synthesis for Multi-Robot Systems under Temporal Logic Specifications
  – *Intelligent Control Lab* at CMU *Nov. 2022*
  – *Reliable Autonomous System Lab* at MIT *Aug. 2021*

PROFESSIONAL SERVICE AND VOLUNTEERING

Paper Review

- *Journals:* IEEE Transactions on Robotics (T-RO), IEEE Transactions on Control of Network Systems (T-CNS), IEEE Transactions on Automation Science and Engineering (T-ASE), IEEE Control Systems Letters (L-CSS).
- *Conferences:* IEEE International Conference on Robotics and Automation (ICRA), American Control Conference (ACC), IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), ACM/IEEE International Conference on Cyber-Physical Systems (ICCPS), IEEE International Conference on Ubiquitous Robots (UR).

Affiliations

- Institute of Electrical and Electronics Engineers (IEEE)

TEACHING EXPERIENCE

Guest Lecturer

- On the Application of Formal Methods to Robotics
  – In Course "Provably Safe Robotics" taught by Dr. Changliu Liu *Spring 2024*