Huao Li

Engineering Excellence Postdoctoral Fellow
Laboratory for Information and Decision Systems (LIDS)
Department of Aeronautics and Astronautics
Massachusetts Institute of Technology (MIT)
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Research Interests

Human-AI Teamwork: co-adaption, interpretable communication, trust calibration;
Multi-agent Systems: multi-agent reinforcement learning, embodied LLM agents;
Human-robot Interaction: human-in-the-loop robot learning, cognitive modeling;
Societal AI: explainability, value alignment, normative reasoning

Education

University of Pittsburgh **Pittsburgh, PA**
Ph.D. in Intelligent Systems Aug. 2019 – Aug. 2025
Thesis: A Computational Framework for Efficient Human-agent Teamwork
Committee members: Michael Lewis, Na Du, Daqing He, Katia Sycara (CMU)

University of Pittsburgh **Pittsburgh, PA**
M.Sc. in Information Science Aug. 2017 – May 2019
Thesis: A Computational Model of Human Trust in Supervisory Control of Robotic Swarms

Zhejiang University **Hangzhou, China**
B.Sc. in Applied Psychology Sep. 2013 – June 2017
Thesis: The Influence of Pictorial Realism on the Comprehension of Safety Briefing Cards

Research Experience

Massachusetts Institute of Technology **Cambridge, MA**
Postdoc Fellow, Laboratory for Information and Decision Systems Sep. 2025 – present
Advisor: Chuchu Fan
Focus: Socially intelligent LLM agents and Bayesian active learning for human-robot collaboration.

Carnegie Mellon University **Pittsburgh, PA**
Research Assistant, Robotics Institute Aug. 2017 – Aug. 2025
Advisors: Katia Sycara and Michael Lewis
Focus: Adaptive human-AI teamwork via deep reinforcement learning and theory of mind modeling.

Honda Research Institute USA **Ann Arbor, MI**
Research Scientist Intern Jan. 2024 – Aug. 2024
Focus: Language-grounded multi-agent RL for human-interpretable communication.

Zhejiang University **Hangzhou, China**
Research Assistant, Department of Psychology and Behavioral Sciences Dec. 2015 – June 2017
Advisor: Zaifeng Gao
Focus: Working memory in motion perception and human factors in driver distraction.

Alibaba Group **Hangzhou, China**
User Experience Researcher Intern Dec. 2015 – Aug. 2016
Focus: Cross-cultural user testing of AliExpress.com.

Honors & Awards

- MIT Postdoctoral Fellowship for Engineering Excellence 2025-2027
- Spotlight Paper, *Conference on Robot Learning* 2026
- Best Paper Award, *GenAI-HRI Workshop at Robotics: Science and Systems* 2025
- Best Paper Award, *AAAI/ACM Conference on Artificial Intelligence, Ethics, and Society* 2018

Funded Projects

Social Intrinsic Rewards for Interaction-Based LLM Alignment — **NSF ACCESS**
PI, Led research and proposal development — 2026/07–2027/07

Autonomous Field Inspection with Physical AI — **GE Vernova**
PI: Chuchu Fan (MIT) — 2025/09–2027/09
Co-I, Led human–robot interaction research; contributed to proposal and on-site robot demo

Exploratory Models of Human-AI Teams — **DARPA**
PIs: Katia Sycara (CMU), Stefanos Nikolaidis (USC) — 2024/04–2026/04
Co-I, Led human–agent teamwork research and contributed to DARPA milestone presentations

Robust Collaborative AI — **ONR**
PIs: Katia Sycara (CMU), Sherry Tongshuang Wu (CMU) — 2023/06–2027/06
Co-I, Led human–AI evaluation

Strengthening Teamwork for Robust Operations in Novel Groups — **ARL**
PIs: Katia Sycara (CMU), Michael Lewis (Pitt), Julie Shah (MIT) — 2019/10–2022/09
Co-I, Led adaptive algorithm development and contributed to proposal

A Robust and Adaptive Agent that Support High Performance Teams — **DARPA**
PIs: Katia Sycara (CMU), Michael Lewis (Pitt) — 2019/06–2023/05
Co-I, Led team modeling research; contributed to proposal and DARPA PI-meeting presentations

Trustworthy Human Interaction with Robotic Swarms — **AFOSR**
PIs: Katia Sycara (CMU), Michael Lewis (Pitt) — 2018/10–2021/09
Co-I, Led human–robot interaction research

Selected Publications

Book Chapter

[B1] Michael Lewis, **Huao Li**, and Katia Sycara (2021). Deep learning, transparency, and trust in human robot teamwork. *Trust in Human-Robot Interaction*.

Peer Reviewed Journal Papers

[J1] Lesong Jia, Kiran Shridhar Alva, **Huao Li**, Werner Hager, Lucia Romero, Timothy Albert Butler, and Michael Lewis (2026). Understanding Situation Awareness in Multi-UAV Supervision: Effects of Environmental Complexity, Interface Design, and Human–AI Differences. *International Journal of Human–Computer Interaction* **(IJHCI)**.

[J2] Seth Karten, Mycal Tucker, **Huao Li**, Siva Kailas, Michael Lewis, and Katia Sycara (2023). Interpretable Learned Emergent Communication for Human–Agent Teams. *IEEE Transactions on Cognitive and Developmental Systems* **(IEEE T-CDS)**.

[J3] **Huao Li**, Tianwei Ni, Siddharth Agrawal, Fan Jia, Suhas Raja, Yikang Gui, Dana Hughes, Michael Lewis, and Katia Sycara (2021). Individualized Mutual Adaptation in Human-Agent Teams. *IEEE Transactions on Human-Machine Systems* **(IEEE T-HMS)**.

[J4] Changjoo Nam, Phillip Walker, **Huao Li**, Michael Lewis, and Katia Sycara (2020). Models of trust in human control of swarms with varied levels of autonomy. *IEEE Transactions on Human-Machine Systems* **(IEEE T-HMS)**. **124 citations**.

Peer Reviewed Conference Papers

[C1] **Huao Li**, Carson Sobolewski, Augustinos D Saravanos, Tan Yew Teck, John Karigiannis, and Chuchu Fan (2026). Bayesian Active Learning for Intent Disambiguation in Interactive Robot Planning. *Conference on Robot Learning* **(CoRL)**. **Spotlight (Top 4%)**.

[C2] Benjamin Li, Shuyang Shi, Lucia Romero, **Huao Li**, Yaqi Xie, Woojun Kim, Stefanos Nikolaidis, Charles Lewis, Katia Sycara, and Simon Stepputtis (2025). Adaptively coordinating with novel partners via learned latent strategies. *Conference on Neural Information Processing Systems* **(NeurIPS)**.

[C3] **Huao Li**, Hossein Nourkhiz Mahjoub, Behdad Chalaki, Vaishnav Tadiparthi, Kwonjoon Lee, Ehsan Moradi-Pari, Michael Lewis, and Katia P. Sycara (2024). Language Grounded Multi-agent Reinforcement Learning with Human-interpretable Communication. *Conference on Neural Information Processing Systems* **(NeurIPS)**. **59 citations**.

[C4] Xuehang Guo, **Huao Li**, Anfeng Peng, Lesong Jia, Brandon Rishi, and Michael Lewis (2024). Determining human perceptual envelope in fixed wing UAV surveillance. *IEEE International Conference on Human-Machine Systems* **(ICHMS)**.

[C5] **Huao Li**, Yu Quan Chong, Simon Stepputtis, Joseph Campbell, Dana Hughes, Michael Lewis, and Katia Sycara (2023). Theory of Mind for Multi-Agent Collaboration via Large Language Models. *Conference on Empirical Methods in Natural Language Processing* **(EMNLP)**. **397 citations**.

[C6] **Huao Li**, Yao Fan, Keyang Zheng, Michael Lewis, and Katia Sycara (2023). Personalized Decision Supports based on Theory of Mind Modeling and Explainable Reinforcement Learning. *IEEE International Conference on Systems, Man, and Cybernetics* **(SMC)**.

[C7] Seth Karten, Siva Kailas, **Huao Li**, and Katia Sycara (2023). On the Role of Emergent Communication for Social Learning in Multi-Agent Reinforcement Learning. *International Conference on Autonomous Agents and Multiagent Systems* **(AAMAS)**.

[C8] Dana Hughes, **Huao Li**, Max Chis, Ini Oguntola, Simon Stepputtis, Keyang Zheng, Joseph Campbell, Katia Sycara, and Michael Lewis (2023). A Framework for Intervention Based Team Support in Time Critical Tasks. *IEEE International Conference on Systems, Man, and Cybernetics* **(SMC)**.

[C9] **Huao Li**, Maximillian Chis, Keyang Zheng, Michael Lewis, Dana Hughes, and Katia Sycara (2023). Sentiment Analysis of Artificial Advisors in Search and Rescue Tasks. *Human Factors and Ergonomics Society Annual Meeting* **(HFES)**.

[C10] **Huao Li**, Ini Oguntola, Dana Hughes, Michael Lewis, and Katia Sycara (2022). Theory of Mind Modeling in Search and Rescue Teams. *IEEE International Conference on Robot and Human Interactive Communication* **(RO-MAN)**.

[C11] Mycal Tucker, **Huao Li**, Siddharth Agrawal, Dana Hughes, Katia Sycara, Michael Lewis, and Julie A. Shah (2021). Emergent Discrete Communication in Semantic Spaces. *Conference on Neural Information Processing Systems* **(NeurIPS)**. **56 citations**.

[C12] Ankur Deka, Wenhao Luo, **Huao Li**, Michael Lewis, and Katia Sycara (2021). Hiding Leader's Identity in Leader-Follower Navigation through Multi-Agent Reinforcement Learning. *IEEE/RSJ International Conference on Intelligent Robots and Systems* **(IROS)**.

[C13] **Huao Li**, Keyang Zheng, Michael Lewis, Dana Hughes, and Katia Sycara (2021). Human Theory of Mind Inference in Search and Rescue Tasks. *Human Factors and Ergonomics Society Annual Meeting* **(HFES)**.

[C14] **Huao Li**, Michael Lewis, and Katia Sycara (2020). A Kalman estimation model of human trust in supervisory control of robotic swarms. *Human Factors and Ergonomics Society Annual Meeting* **(HFES)**.

[C15] **Huao Li**, Tianwei Ni, Siddharth Agrawal, Dana Hughes, and Katia Sycara (2020). Team Synchronization and Individual Contributions in Coop-Space Fortress. *Human Factors and Ergonomics Society Annual Meeting* **(HFES)**.

[C16] Katia Sycara, Dana Hughes, **Huao Li**, Michael Lewis, and Nina Lauharatanahirun (2020). Adaptation in Human-Autonomy Teamwork. *IEEE International Conference on Human-Machine Systems* **(ICHMS)**.

[C17] **Huao Li**, Stephanie Milani, Vigneshram Krishnamoorthy, Michael Lewis, and Katia Sycara (2019). Perceptions of domestic robots' normative behavior across cultures. *AAAI/ACM Conference on AI, Ethics, and Society* **(AIES)**.

[C18] **Huao Li**, Jaeho Bang, Sasanka Nagavalli, Changjoo Nam, Michael Lewis, and Katia Sycara (2018). Human Interaction Through an Optimal Sequencer to Control Robotic Swarms. *IEEE International Conference on Systems, Man, and Cybernetics* **(SMC)**.

[C19] Rahul Iyer, Yuezhang Li, **Huao Li**, Michael Lewis, Ramitha Sundar, and Katia Sycara (2018). Transparency and explanation in deep reinforcement learning neural networks. *AAAI/ACM Conference on AI, Ethics, and Society* **(AIES)**. **Best Paper Award**. **262 citations**.

[C20] Changjoo Nam, **Huao Li**, Shen Li, Michael Lewis, and Katia Sycara (2018). Trust of humans in supervisory control of swarm robots with varied levels of autonomy. *IEEE International Conference on Systems, Man, and Cybernetics* **(SMC)**.

Manuscripts under preparation

[U1] **Huao Li**, Michael Lewis, and Katia Sycara (2026). LG-TOM: Language Grounded Theory of Mind Modeling for Multi-agent Communication. Under review.

[U2] Lucia Romero, Shuyang Shi, Benjamin Li, **Huao Li**, Woojun Kim, Joseph Campbell, Stefanos Nikolaidis, Katia P. Sycara, Simon Stepputtis, and Michael Lewis (2026). ChefBench: A Benchmark for Human-Agent Collaboration in Overcooked. Under review.

Workshop Papers and Abstracts

[W1] Benjamin Li, Shuyang Shi, Lucia Romero, **Huao Li**, Yaqi Xie, Woojun Kim, Stefanos Nikolaidis, Michael Lewis, Katia Sycara, and Simon Stepputtis (2025). Modeling Latent Partner Strategies for Adaptive Zero-Shot Human-Agent Collaboration. *Generative AI for Human-Robot Interaction Workshop at Robotics: Science and Systems* **(GenAI-HRI at RSS)**. **Best Paper Award**.

[W2] **Huao Li**, Long Le, Max Chis, Keyang Zheng, Dana Hughes, Michael Lewis, and Katia Sycara (2021). Sequential theory of mind modeling in team search and rescue tasks. *AAAI Fall Symposium on Computational Theory of Mind for Human-Machine Teams* **(AAAI Symposium)**.

[W3] **Huao Li**, Dana Hughes, Michael Lewis, and Katia Sycara (2020). Individual adaptation in teamwork. *Annual Meeting of the Cognitive Science Society* **(CogSci)**. Abstract.

[W4] Vidhi Jain, Rohit Jena, **Huao Li**, Tejus Gupta, Dana Hughes, Michael Lewis, and Katia Sycara (2020). Predicting human strategies in simulated search and rescue task. *Artificial Intelligence for Humanitarian Assistance and Disaster Response Workshop at Neural Information Processing Systems* **(AI-HADR at NeurIPS)**.

Mentoring

Leonardo Paschoal Bartoccini — **MIT RSI Program**
High school student — Summer 2026
Research Topic: Value-based intrinsic rewards for cooperation in sequential social dilemmas

Dami Thomas — **MIT UROP**
Undergraduate student at MIT — Fall 2025
Research Topic: Safe multi-agent control for autonomous field inspection robots

Owen Burns — **CMU RISS Program**
Undergraduate student at University of Central Florida — Summer 2024
Research Topic: Human-in-the-loop formal planning and symbolic plan alignment

Lucia Romero — **University of Pittsburgh**
MSIS student at University of Pittsburgh — 2024–2025
Research Topic: A benchmark for human-agent collaboration in Overcooked
Resulted in 1 *AAAI '27* submission.

Xuehang Guo — **University of Pittsburgh**
MSIS student at University of Pittsburgh — 2023–2024
Research Topic: Situation awareness in multi-UAV supervision
Resulted in 1 *IEEE ICHMS '24* publication.

Max Chis — **University of Pittsburgh**
MSIS student at University of Pittsburgh — 2022–2023
Research Topic: Team interventions in time-critical search and rescue
Resulted in 1 *HFES '23* publication.

Seth Karten — **Carnegie Mellon University**
MS student in Robotics at Carnegie Mellon University — 2021–2023
Research Topic: Emergent communication for social learning in agent teams
Resulted in 1 *AAMAS '23* and 1 *IEEE T-CDS '23* publication.

Long Le — **CMU RISS Program**
Undergraduate student at UMass Amherst — Summer 2021
Research Topic: Theory of mind and multi-agent RL for team search and rescue
Resulted in 1 *AAAI Symposium '21* publication.

Suhas Raja — **CMU RISS Program**
Undergraduate student at UT Austin — Summer 2020
Research Topic: Adaptive agents for individualized human-agent teamwork
Resulted in 1 *IEEE T-HMS '21* publication.

Stephanie Milani — **CMU RISS Program**
Undergraduate student at UMBC — Summer 2018
Research Topic: Reinforcement learning in norm-rich environments
Resulted in 1 *AIES '19* publication.

Teaching

Kaufman Teaching Certificate Program — **MIT**
Participant — Spring 2026

INFSCI 2300 Human Information Processing — **University of Pittsburgh**
Teaching Assistant — Fall 2024

INFSCI 2935 Human Robot Interaction — **University of Pittsburgh**
Teaching Assistant — Fall 2022, Fall 2023

Professional Services

- *MIT LIDS Student Conference 2026* — Co-chair
- *MIT LIDS Postdoc Nexus Meeting* — Committee
- SCI Faculty search committee, University of Pittsburgh — Student Representative
- *Behaviour & Information Technology, Scientific Reports, IJCHI, T-HMS, PLOS One* — Journal Reviewer
- *ICML, ICLR, NeurIPS, AAAI, EMNLP, ICRA, IROS, SMC, HFES* — Conference Reviewer
- *ICLR* — Area Chair

References

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Prof. Katia Sycara — sycara@andrew.cmu.edu
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5000 Forbes Avenue, Newell-Simon Hall 1602D
Pittsburgh, PA 15213-3890, USA