Hangxin Liu

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EDUCATION

University of California, Los Angeles — **Los Angeles, CA**
Ph.D. in Computer Science, Computer Vision concentration — 04/2018 – 06/2021
M.S. in Mechanical Engineering, Robotics concentration — 09/2016 – 03/2018

Virginia Polytechnic Institute & State University (Virginia Tech) — **Blacksburg, VA**
B. S. in Mechanical Engineering, Robotics concentration — 08/2012 – 05/2016
B. S. in Computer Science, Scientific Computing concentration — 01/2014 – 05/2016
Magna Cum Laude, Honors Scholar

Shanghai Jiao Tong University (University of Michigan-SJTU Joint Institute**)** — **Shanghai, China**
Exchange Student (Mechanical Engineering) — 05/2014 – 08/2014

APPOINTMENTS

Beijing Institute for General Artificial Intelligence
Research Scientist in Robotics — 04/2021 – present
- Leading the Robotics lab (PhD and MS level)

Center for Vision, Cognition, Learning, and Autonomy — **UCLA**
Graduate Student Researcher, Advisor: Dr. Song-Chun Zhu — 09/2016 – 03/2021
- ONR N00014-19-1-2153: Scene Understanding for Robot Autonomy & DURIP N00014-20-1-2812: A Cognitive Robot Platform for Scene Understanding and Expeditionary Maneuver
- DARPA XAI N66001-17-2-4029: Learning and Communicating Explainable Representations for Analytics and Autonomy
- ONR MURI N00014-16-1-2007: Understanding Scenes and Events through Joint Parsing, Cognitive Reasoning and Lifelong Learning
- DARPA SIMPLEX N66001-15-C-4035: Learning Homogeneous Knowledge Representation from Heterogeneous Data for Quantitative and Qualitative Reasoning in Autonomy

Computational Multi-physics Systems (CMS) Laboratory — **Virginia Tech**
Undergraduate/Graduate Research Assistant, Advisor: Dr. Tomonari Furukawa — 01/2015 – 09/2016
- Worked on a probabilistic approach for Non-Line-Of-Sight visual/ acoustical target estimation and tested on human and mobile sensor platform (NSF-EAGER-1554961).
- Developed an infrastructural traffic monitoring system using Arduino, laser ranger finders, IR image senor with Raspberry Pi.
- Led a student software team to implement way-point control on a drive-by-wire goftcart using Robot Operating System (ROS) with Sick LiDAR, IMU, GPS, and RGB-D sensors.
- Worked on motion tracking and feature detection using non-stationary camera that enabled UAV to locate, track and land on a moving ground vehicle for the Mohamed Bin Zayed International Robotics Challenge (MBZIRC 2017).

PUBLICATIONS

Journal Paper (* indicates joint first authors, ✉ indicates corresponding authors)

[J6] Z. Zhang*, Z. Jiao*, W. Wang, Y. Zhu, S.-C. Zhu, **H. Liu**✉, "Understanding Physical Effects for Effective Tool-use," IEEE Robotics and Automation Letters (RA-L), 2022

[J5] Y. Su, Y. Jiang, Y. Zhu, **H. Liu**✉, "Objects Gathering with Tethered Robot Duo," IEEE Robotics and Automation Letters (RA-L), 2022, DOI: 10.1109/LRA.2022.3141828

[J4] **H. Liu**, Y. Zhu, S.-C. Zhu, "Patching Interpretable And-Or Graph Knowledge Representation using Augmented Reality," Applied AI Letters (DARPA XAI Special Issue), 2021, DOI: 10.1002/ail2.43

[J3] Y. Zhu, T. Gao, L. Fan, S. Huang, M. Edmonds, **H. Liu**, F. Gao, C. Zhang, S. Qi, Y.N. Wu, J.B. Tenenbaum, S.-C. Zhu, "Dark, Beyond Deep: A Paradigm Shift to Cognitive AI with Human-like Commonsense," Engineering, 2020, DOI: 10.1016/j.eng.2020.01.011

[J2] M. Edmonds*, F. Gao*, **H. Liu***, X. Xie*, S. Qi, B. Rothrock, Y. Zhu, Y.N. Wu, H. Lu, S.-C. Zhu, "A Tale of Two Explanations: Enhancing Human Trust by Explaining Robot Behavior," Science Robotics, 2019, DOI: 10.1126/scirobotics.aay4663

[J1] Y. Tian, **H. Liu.** and T. Furukawa, "Reliable Infrastructural Urban Traffic Monitoring Via Lidar and Camera Fusion," SAE International Journal of Passenger Cars-Electronic and Electrical Systems, 10(2017-01-0083), pp.173-180, 2017, DOI: 10.4271/2017-01-0083.

Conference Paper (* indicates joint first authors)

[C20] Z. Jiao, Y. Niu, Z. Zhang, S.-C. Zhu, Y. Zhu, **H. Liu**, "Planning Sequential Tasks on Contact Graph," IEEE/RSJ International Conference on Intelligent Robots and Systems (*IROS*), 2022

[C19] Y. Su*, C. Chu*, M. Wang, J. Li, L. Yang, Y. Zhu, **H. Liu**, "Downwash-aware Control Allocation for Over-actuated UAV Platforms," IEEE/RSJ International Conference on Intelligent Robots and Systems (*IROS*), 2022

[C18] Z. Jiao*, Z. Zhang*, W. Wang, D. Han, S.-C. Zhu, Y. Zhu, **H. Liu**, "Efficient Task Planning for Mobile Manipulation: a Virtual Kinematic Chain Perspective," IEEE/RSJ International Conference on Intelligent Robots and Systems (*IROS*), 2021

[C17] Z. Jiao*, Z. Zhang*, X. Jiang, D. Han, S.-C. Zhu, Y. Zhu, **H. Liu**, "Consolidating Kinematic Models to Promote Coordinated Mobile Manipulations," IEEE/RSJ International Conference on Intelligent Robots and Systems (*IROS*), 2021

[C16] M. Han*, Z. Zhang*, Z. Jiao, X. Xie, Y. Zhu, S.-C. Zhu, **H. Liu**, "Reconstructing Interactive Scenes by Panoptic Mapping and CAD Model Alignments," IEEE International Conference on Robotics and Automation (*ICRA*), 2021

[C15] S. Qiu*, **H. Liu***, Z. Zhang, Y. Zhu, S.-C. Zhu, "Human-Robot Interaction in a Shared Augmented Reality Workspace," IEEE/RSJ International Conference on Intelligent Robots and Systems (*IROS*), 2020

[C14] M. Wang, Y. Su, **H. Liu**, Y. Xu, "WalkingBot: Modular Interactive Legged Robot with Automated Structure Interpretation and Motion Planning," IEEE International Conference on Robot and Human Interactive Communication (*RO-MAN*), 2020

[C13] Z. Zhang, **H. Liu**, Z. Jiao, Y. Zhu, S.-C. Zhu, "Congestion-aware Evacuation Routing using Augmented Reality Devices," IEEE International Conference on Robotics and Automation (*ICRA*), 2020

[C12] T. Yuan, **H. Liu**, L. Fan, Z. Zheng, T. Gao, Y. Zhu, S.-C. Zhu, "Joint Inference of States, Robot Knowledge, and Human (False-)Beliefs," IEEE International Conference on Robotics and Automation (*ICRA*), 2020

[C11] X. Xie, **H. Liu**, Z. Zhang, Y. Qiu, F. Gao, S. Qi, Y. Zhu, S.-C. Zhu, "VRGym: A Virtual Testbed for Physical and Interactive AI," 2nd ACM Turing Celebration Conference - China (ACM TURC), 2019

[C10] **H. Liu***, Z. Zhang*, Xu Xie, Y. Zhu, Y. Liu, Y. Wang, S.-C. Zhu, "High-Fidelity Grasping in Virtual Reality using a Glove-based System," IEEE International Conference on Robotics and Automation (*ICRA*), 2019

[C9] **H. Liu***, Z. Zhang*, Y. Zhu, S.-C. Zhu, "Self-Supervised Incremental Learning for Sound Source Localization in Complex Indoor Environment," IEEE International Conference on Robotics and Automation (*ICRA*), 2019

[C8] **H. Liu**, C. Zhang, Y. Zhu, C. Jiang, S.-C. Zhu, "Mirroring without Overimitation: Learning Functionally Equivalent Manipulation Actions," 33rd AAAI Conference on Artificial Intelligence (*AAAI*), 2019

[C7] **H. Liu***, Y. Zhang*, W. Si, X. Xie, Y. Zhu, S.-C. Zhu, "Interactive Robot Knowledge Patching using Augmented Reality," IEEE International Conference on Robotics and Automation (*ICRA*), 2018

[C6] X. Xie*, **H. Liu***, M. Edmonds, F. Gao, S. Qi, Y. Zhu, B. Rothrock, S.-C. Zhu, "Unsupervised Learning of Hierarchical Models for Hand-Object Interactions," IEEE International Conference on Robotics and Automation (*ICRA*), 2018

[C5] M. Edmonds*, F.Gao*, X. Xie, **H. Liu**, S. Qi, Y. Zhu, B. Rothrock, S.-C. Zhu, "Feeling the Force: Integrating Force and Pose for Fluent Discovery through Imitation Learning to Open Medicine Bottles ," IEEE/RSJ International Conference on Intelligent Robots and Systems (*IROS*), 2017

[C4] **H. Liu***, X. Xie*, M. Millar*, M. Edmonds, F.Gao, Y. Zhu, V. Santos, B. Rothrock, S.-C. Zhu, "A Glove-based System for Studying Hand-Object Manipulation via Joint Pose and Force Sensing," IEEE/RSJ International Conference on Intelligent Robots and Systems (*IROS*), 2017

[C3] K. Takami**, H. Liu**, T. Furukawa, M. Kumon, G. Dissanayake, "Non-Field-of-View Sound Source Localization Using Diffraction and Reflection Signal," IEEE/RSJ International Conference on Intelligent Robots and Systems (*IROS*), 2016

[C2] **H. Liu**, Y. Tian, T. Furukawa, "Design of Highly Reliable Infrastructural Traffic Monitoring Using Laser and Vision Sensors," ASME IDETC/CIE, 2016

[C1] K. Takami, **H. Liu**, T. Furukawa, M. Kumon, G. Dissanayake, "Recursive Bayesian Estimation of NFOV Target Using Diffraction and Reflection Signals," ISIF International Conference on Information Fusion, 2016

HONORS & AWARDS

- ACM TURC Conference Best Paper Award 2019
- ICRA 2019 Conference Travel Award 2019
- ICRA 2018 Conference Travel Award 2018
- Pratt Engineering Scholarship ($5000 each academic year) from Collage of Engineering 2013 – 2016
- Dean's Scholarship ($3000) from Collage of Engineering Spring 2013
- 6 × Dean's List with Distinction, 2 × Dean's List 2012 – 2016
- University Honor Student at Virginia Tech. Summer 2014 – Spring 2016

PROFESSIONAL SERVICE

Journal Reviewer: IEEE RA-L, Applied AI Letters, IEEE Transactions on Circuits and Systems for Video Technology
Conference Reviewer: ICRA (2022, 2020, 2019), IROS (2022, 2020, 2019), RO-MAN (2020)

LANGUAGES & SKILLS

Language: Chinese Mandarin and Cantonese: Native
English: Full professional proficiency

Skills: Computer Languages: Java, C/C++, Python
Operating Systems: Windows, Linux
Software: Robot Operating System (ROS), MATLAB, Eclipse
CAD: AutoDesk Inventor, Solidworks

MEMBERSHIPS & AFFILIATION

- Student Member of IEEE and RAS. 06/2017
- Member of **Phi Beta Kappa** Honor Society. 04/2016
- Student Member of ASME. 01/2016
- Member of **Tau Beta Pi** National Engineering Honor Society. 04/2014