Shuijing Liu

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Research Interests

My goal is to enable robots to move beyond tool-like roles and collaborate with us as partners. To build **human-robot partnership**, my research is centered around in-the-wild learning and deployment of robots that **communicate** with humans, **collaborate** alongside humans, and **continually adapt** to changes in human environments. In the future, I aim to establish a fundamental human-centered robot learning paradigm that empowers capable and socially aware robot partners in everyday life. Thus, I'm interested in expanding robot capabilities in collaborative tasks, learning from data that reflects human values, and designing communication interfaces in a user-centric way.

Education

University of Illinois at Urbana-Champaign 2018 – 2024

Ph.D. in Electrical and Computer Engineering

Advisor: Katherine Driggs-Campbell

Thesis: Learning Structured Interaction Models for Robot Navigation in Human Environments

University of Illinois at Urbana-Champaign 2014 – 2018

B.S. in Computer Engineering, minor in Art and Design (Graduated with the Highest Honor)

Appointments

The University of Texas at Austin 08/2024 – current

Postdoctoral scholar with Yuke Zhu, Peter Stone, and Joydeep Biswas

Municorn.ai 02/2025 – current

Artificial Intelligence Advisory Board

Honors and Awards

- RSS Pioneers 2025
  "30 world's top early-career researchers in robotics."
- Best Paper Award at ICRA 2025 Workshop on Advances in Social Navigation 2025
- Early Career Scholars Postdoctoral Fellowship at UT Austin 2025
- Rising Stars in EECS 2024
  "70 the world's top researchers in EECS."
- Best Student Paper Award Finalist at CoRL 2023 2023
- Best poster award at the IROS 2023 Last-Mile Robotics Workshop 2023
- Conference Travel Award, ECE department at UIUC 2022
- Honorable mention for TechSAge Stretch Robot Pitch Competition 2021
- Lauren Kelley Memorial Scholarship 2017 – 2018
- Professor N. Narayana Rao Scholarship 2016
- Oakley Scholarship 2015
- Dean's List, ECE department at UIUC 2014 – 2016

Publications

*, † indicate equal contributions

Journal

1. **HEIGHT: Heterogeneous Interaction Graph Transformer for Robot Navigation in Crowded and Constrained Environments**
   S. Liu, H. Xia*, F. C. Pouria*, K. Hong, N. Chakraborty, Z. Hu, J. Biswas, and K. Driggs-Campbell.
   In IEEE Transactions on Automation Science and Engineering (T-ASE), 2025.
   (Best Paper Award at ICRA 2025 Workshop on Advances in Social Navigation: Planning, HRI and Beyond)
2. **Developing Wayfinding Robotic Support for Older Persons with Vision Impairments**
   S. A. Olatunji, M. A. Bayles, **S. Liu,** A. Hasan, K. Driggs-Campbell, and W. A. Rogers.
   In Assistive Technology, 2025.
3. **DRAGON: A Dialogue-Based Robot for Assistive Navigation with Visual Language Grounding**
   S. Liu, A. Hasan, K. Hong, R. Wang, P. Chang, Z. Mizrachi, J. Lin, D. L. McPherson, W. A. Rogers, and K. Driggs-Campbell.
   In Robotics and Automation Letters (RA-L), 2024.

Conference

1. **Casper: Inferring Diverse Intents for Assistive Teleoperation with Vision Language Models**
   H. Liu, R. Shah, **S. Liu**, Y. Cui, Y. Bisk, R. Martín-Martín, and Y. Zhu.
   In Conference on Robot Learning (CoRL), 2025.
2. **SocialNav-SUB: Benchmarking VLMs for Scene Understanding in Social Robot Navigation**
   M. J. Munje, C. Tang, **S. Liu**, Z. Hu, Y. Zhu, J. Cui, G. Warnell, J. Biswas, and P. Stone.
   In Conference on Robot Learning (CoRL), 2025.
3. **ComposableNav: Composable Instruction-Following Navigation in Dynamic Environments via Diffusion**
   Z. Hu, C. Tang, A. Liu, Y. Zhu, M. J. Munje, **S. Liu**, Y. Li, G. Warnell, P. Stone, and J. Biswas.
   In Conference on Robot Learning (CoRL), 2025.
4. **Tool-as-Interface: Learning Robot Policies from Observing Human Tool Use**
   H. Chen, C. Zhu, **S. Liu**, Y. Li, and K. Driggs-Campbell.
   In Conference on Robot Learning (CoRL), 2025.
   (Best Paper Award at ICRA 2025 Workshop on Foundation Models and Neural-Symbolic AI for Robotics)
5. **Learning Coordinated Bimanual Manipulation Policies using State Diffusion and Inverse Dynamics Models**
   H. Chen, J. Xu*, L. Sheng*, T. Ji, **S. Liu**, Y. Li, and K. Driggs-Campbell.
   In International Conference on Robotics and Automation (ICRA), 2025.
6. **Predicting Object Interactions with Behavior Primitives: An Application in Stowing Tasks**
   H. Chen, Y. Niu, K. Hong, **S. Liu,** Y. Wang, Y. Li, and K. Driggs-Campbell.
   Best Paper/Student Paper Award Finalist in Conference on Robot Learning (CoRL), 2023.
7. **A Data-Efficient Visual-Audio Representation with Intuitive Fine-tuning for Voice-Controlled Robots**
   P. Chang, **S. Liu,** T. Ji, N. Chakraborty, K. Hong, and K. Driggs-Campbell.
   In Conference on Robot Learning (CoRL), 2023.
8. **Structural Attention-Based Recurrent Variational Autoencoder for Highway Vehicle Anomaly Detection**
   N. Chakraborty, **S. Liu*,** A. Hasan*, T. Ji*, W. Liang, D. L. McPherson, and K. Driggs-Campbell.
   In International Conference on Autonomous Agents and Multiagent Systems (AAMAS), 2023.

9. **Intention Aware Robot Crowd Navigation with Attention-Based Interaction Graph**
   S. Liu, P. Chang, Z. Huang, N. Chakraborty, W. Liang, J. Geng, and K. Driggs-Campbell.
   In IEEE International Conference on Robotics and Automation (ICRA), 2023.
   (Best Poster Award at the IROS 2023 Last-Mile Robotics Workshop)
10. **Occlusion-Aware Crowd Navigation Using People as Sensors**
    Y. J. Mun, M. Itkina, **S. Liu,** and K. Driggs-Campbell.
    In IEEE International Conference on Robotics and Automation (ICRA), 2023.
11. **Learning Visual-Audio Representations for Voice-Controlled Robots**
    P. Chang, **S. Liu,** and K. Driggs-Campbell.
    In IEEE International Conference on Robotics and Automation (ICRA), 2023.
12. **Learning to Navigate Intersections with Unsupervised Driver Trait Inference**
    S. Liu, P. Chang, H. Chen, N. Chakraborty, and K. Driggs-Campbell.
    In International Conference on Robotics and Automation (ICRA), 2022.
13. **Off Environment Evaluation Using Convex Risk Minimization**
    P. Katdare, **S. Liu,** and K. Driggs-Campbell.
    In International Conference on Robotics and Automation (ICRA), 2022.
14. **Combining Model-Based Controllers and Generative Adversarial Imitation Learning for Traffic Simulation**
    H. Chen, T. Ji, **S. Liu,** and K. Driggs-Campbell.
    In IEEE International Conference on Intelligent Transportation Systems (ITSC), 2022.
15. **An Interdisciplinary Approach: Potential for Robotic Support to Address Wayfinding Barriers Among Persons with Visual Impairments**
    M. A. Bayles, T. Kadylak, **S. Liu,** A. Hasan, W. Liang, K. Hong, K. Driggs-Campbell, and W. A. Rogers
    In Human Factors and Ergonomics Society Annual Meeting (HFES), 2022.
16. **Decentralized Structural-RNN for Robot Crowd Navigation with Deep Reinforcement Learning**
    S. Liu*, P. Chang*, W. Liang†, N. Chakraborty†, and K. Driggs-Campbell.
    In IEEE International Conference on Robotics and Automation (ICRA), 2021.
17. **Robot Sound Interpretation: Combining Sight and Sound in Learning-based Control**
    P Chang, **S Liu,** H Chen, and K Driggs-Campbell.
    In IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2020.
18. **Robust Deep Reinforcement Learning with Adversarial Attacks**
    A. Pattanaik, Z. Tang*, **S. Liu*,** G. Bommannan, and G. Chowdhary.
    In International Conference on Autonomous Agents and Multiagent Systems (AAMAS, Extended Abstract), 2018.

Preprints

1. **MimicDroid: In-Context Learning for Humanoid Robot Manipulation from Human Play Videos**
   R. Shah, **S. Liu***, Q. Wang*, Z. Jiang*, S. Kumar, M. Seo, R. Martín-Martín, and Y. Zhu.
   Under review, 2025.
2. **Beyond Canes and Guide Dogs: A Review of 40 Years of Robotics for Wayfinding, Navigating, and Orienting Assistance for People with Visual Impairments**
   J. Pohovey, M. Lusardi*, A. Hasan*, **S. Liu**†, A. Schreiber†, S. A. Olatunji, W. A. Rogers, and K Driggs-Campbell.
   Under review, 2025.
3. **Gotta Scoop 'Em All: Sim-and-Real Co-Training of Graph-based Neural Dynamics for Long-Horizon Scooping**
   K. Hong, H. Chen*, R. Wang*, K. Wang*, M. Zhang, **S. Liu**, Y. Zhu, Y. Li, K. Driggs-Campbell.
   Under review, 2025.

Invited Talks

- **From Tools to Partners: In-the-Wild Learning and Deployment of Human-Centered Robotics**
  University of Southern California, 2025.
  University of California, Los Angles, 2025.
- **Structured Interaction Models Enables Human-Robot Coexistence in the Wild**
  University of Utah, 2025.
- **Learning Structured Interaction Models for Robot Navigation in Human Environments**
  RobotiXX Lab, George Mason University, 2024.
  Stanford Intelligent Systems Laboratory (SISL), Stanford University, 2024.
  Learning Agents Research Group (LARG), UT Austin, 2024.
- **Robot Learning to Interact in Human Spaces**
  UT Austin Robot Perception and Learning Lab, 2024.
  Stanford Vision and Learning Lab (SVL), 2024.
- **A Dialogue-Based Robot for Assistive Navigation with Visual Language Grounding**
  CSL Student Conference, 2024.
- **Intelligent Robot Crowd Navigation**
  Shuzihuanyu Lecture Series, 2023.
- **Pedestrian Trajectory Prediction Meets Social Robot Navigation**
  Robotics Seminar at Illinois, 2022.
- **Robot Learning Through Interactions with Humans**
  Robotics Seminar at Illinois, 2021.

Funding

- **NSF Science and Technology Centers: Integrative Partnerships** 2025
  Co-writer (Main PI: Joydeep Biswas, Grant total: Up to $6 million/year)
- **CSL Travel Support** 2022

Academic Service

Program committee

- Co-organizer of ICLR 2025 Workshop on Human-AI Coevolution
- Co-organizer of ICRA 2026 Workshop on Bridging the Gap between Robot Learning and Human-Robot Interaction

Students mentored

- Ph.D. and Master students
  - Haonan Chen: Ph.D. Electrical and Computer Engineering, UIUC → postdoctoral scholar at Harvard University.
  - Huihan Liu, Ph.D. Computer Science, UT Austin.
  - Rutav Shah, Ph.D. Computer Science, UT Austin.
  - Zichao Hu, Ph.D. Computer Science, UT Austin.
  - Michael Munje, Ph.D. Computer Science, UT Austin.
  - Kaiwen Hong: Ph.D. Electrical and Computer Engineering, UIUC.
  - Neeloy Chakraborty: Ph.D. Electrical and Computer Engineering, UIUC.
  - Eric (Weihang) Liang: M.S. Electrical and Computer Engineering, UIUC → Tesla.
- Undergraduate students
  - Michael (Pengen) Zhang, B.S. Computer Science, UT Austin.

- Masamu Oshita, B.S. Computer Science 2027 in UT Austin.
- Simon (Haochen) Xia: B.S. Computer Engineering 2026 in UIUC.
- Jerry (Ruoxuan) Wang: B.S. Computer Engineering 2024 in UIUC → M.S. student at University of Pennsylvania.
- Justin Lin: B.S. Computer Engineering 2023 in UIUC.
- Zachary Mizrachi: B.S. Computer Engineering 2024 in UIUC.

Reviews

- Journal reviews
  - IEEE Transactions on Robotics (T-RO)
  - IEEE Robotics and Automation Letters (RA-L)
  - SAGE International Journal of Robotics Research (IJRR)
  - IEEE Transactions on Artificial Intelligence (TAI)
  - IEEE Transactions on Network Science and Engineering (TNSE)
  - IEEE Transactions on Human-Machine Systems (THMS)
- Conference reviews
  - Robotics: Science and Systems (RSS)
  - IEEE International Conference on Robotics and Automation (ICRA)
  - IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)
  - Conference on Robot Learning (CoRL)
  - IEEE-RAS International Conference on Humanoid Robots (Humanoids)
  - AAAI Conference on Artificial Intelligence (AAAI)

Other service

- Mentor in Robotics: Science and Systems (RSS) Pathway Program 2025
- Ph.D. Admission Committee at UT Austin 2024
- Volunteer at IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) 2023

Teaching

Guest Lecturer

- CS 343H: Artificial Intelligence: Honors (Fall 2024)

Graduate Teaching Assistant

- ECE 598: Human-Centered Robotics (Fall 2020)
- ECE 470: Introduction to Robotics (Fall 2019 - Spring 2020)
- ECE 120: Introduction to Computing (Fall 2018 - Spring 2019)

Undergraduate Teaching Assistant

- ECE 110: Introduction to Electronics (Fall 2016 - Spring 2018)

Industry Experience

- Research Scientist Internship, Bosch Center for Artificial Intelligence 2023
- Applied Scientist Internship, Robotics & AI, Amazon 2022

References

- Katherine Driggs-Campbell

Associate Professor of Electrical and Computer Engineering at UIUC
Email: krdc@illinois.edu

- Yuke Zhu
  Associate Professor of Computer Science at UT Austin
  Email: yukez@cs.utexas.edu
- Nancy M. Amato
  Abel Bliss Professor of Engineering and Director of the Siebel School of Computing and Data Science at UIUC
  Email: namato@illinois.edu
- Peter Stone
  Truchard Foundation Chair of Computer Science at UT Austin
  Email: meganrefletters@gmail.com
- Joydeep Biswas
  Associate Professor of Computer Science at UT Austin
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