Shuijing Liu

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Research Interests

My vision is to enable robots to move beyond tool-like roles and instead collaborate with us as partners. Toward this vision, my research treats humans, the end-users and beneficiaries of robots, as essential stakeholders in **robot learning**. My work is centered around learning and deployment of **human-centered robotics** that infer and support human needs in the open world, operate robustly alongside human crowds, and adapt efficiently through natural interactions with humans.

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 Inc 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.

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: pstone@cs.utexas.edu
- Joydeep Biswas
  Associate Professor of Computer Science at UT Austin
  Email: joydeepb@cs.utexas.edu