

Shuijing Liu

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Education

University of Illinois at Urbana Champaign 2018 – Exp. May 2024

Doctor of Philosophy in Electrical Engineering (CGPA: 3.91/4.0)

Research interests: Learning-based robotics, human-robot interaction, machine learning, reinforcement learning.

University of Illinois at Urbana Champaign 2014 – 2018

Bachelor of Science in Computer Engineering, minor in Art and Design (CGPA: 3.86/4.0)

Industry Experience

Applied Scientist Internship, Robotics & AI, Amazon May 2022 – August 2022

Developed a deep Q-learning pipeline to grasp packages using a robot manipulator in simulation.

Research Scientist Internship, Bosch Center for Artificial Intelligence July 2023 – October 2023

Developing adversarial attacks and improving the robustness of autonomous vehicle planners

Research Projects

Unsupervised Driver Style Inference for Autonomous Navigation 2021

- Proposed a variational autoencoder + RNN network to learn a representation of driving styles from vehicle trajectories with no supervisions or labels using PyTorch.
- Used the learnt driving style representation to navigate a car through an uncontrolled T-intersection with RL.

Conversational Robot with Visual-Language Grounding for Assistive Navigation 2020 – Present

- Finetuned a CLIP model to map people's vocal instructions to desired destinations in indoor spaces.
- Design a system that can parse users' intents and hold conversations with users during navigation.
- Use SLAM and ROS Navigation Stack to plan paths that guide blind people to their desired destinations.

Robot Crowd Navigation 2019 – Present

- Proposed a graph neural network model for robot navigation in crowded environment with humans.
- Incorporated pedestrian trajectory prediction into the observation and reward function of RL navigation.
- Used PPO to train the GNN navigation policy with PyTorch, success rate increased by ~20%.
- Transferred the navigation policy from OpenAI Gym simulator to a real TurtleBot 2i.

Audio Instruction Following Robot 2021 – Present

- Built a representation that associates images and corresponding sound commands with contrastive loss.
- Used the representation to generate RL reward functions to train the instruction following robot.

Selected Publications

- 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. [\[arXiv\]](#) [\[Website\]](#) [\[Video\]](#) [\[Code\]](#)
- Learning to Navigate Intersections with Unsupervised Driver Trait Inference**
S. Liu, P. Chang, H. Chen, N. Chakraborty, and K. Driggs-Campbell.
In IEEE International Conference on Robotics and Automation (ICRA), 2022. [\[arXiv\]](#) [\[Website\]](#) [\[Video\]](#) [\[Code\]](#)
- 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. [\[Paper\]](#) [\[Website\]](#) [\[Code\]](#) [\[Video\]](#)
- 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.
(Oral) To appear in Conference on Robot Learning (CoRL), 2023. [\[Paper\]](#)
- 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.
To appear in Conference on Robot Learning (CoRL), 2023. [\[Paper\]](#)

Skills

Programming: Python, C++/C, ROS, Matlab, HTML, MySQL, PHP.

Software: PyTorch, Keras, Tensorflow, NumPy, SciPy, PyBullet, OpenAI Gym.

Others: OpenCV, Unity 3D, Quartus, good written and oral communication skills.