YA-CHUAN (SOPHIE) HSU

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RESEARCH INTERESTS

Human-aware robot behavior planning researcher focused on **real-time** collaboration in human-occupied environments, combining reinforcement learning (RL), uncertainty-aware planning, and human-factor models to produce robot behaviors that are safe, legible, and deployable on robots.

EDUCATION

University of Southern California (USC) Aug. 2020 - Dec. 2025 (expected)
Ph.D. Computer Science, Advisor: Stefanos Nikolaidis Los Angeles, CA, US

Texas A&M University (TAMU) Dec. 2019
M.S. Computer Science and Engineering, Advisor: Dylan A. Shell College Station, TX, US

National Taiwan University of Science and Technology (NTUST) Jun. 2017
B.S. ECE Undergraduate Honors Program Taipei, Taiwan

EXPERIENCE

Toyota Research Institute May. 2024 - Aug. 2024
Research Intern, Human Interactive Driving Team

- Developed a **language-based assistive notification** system for time-sensitive settings by modeling human reaction time to language via **LLMs**, enabling **RL-based** training of sequential decision-making agents

Interactive and Collaborative Autonomous Robotics Lab, USC Aug. 2020 - present
Research Assistant

- Red-teaming vision–language–action (VLA) policies by generating diverse, adversarial prompts and deploying them on the **Kinova Jaco arm** for tabletop manipulation
- Developed a language-based human–robot communication pipeline that leverages VAE-encoded messages and RL to collaborate with LLM agents
- **Generated diverse evaluation environments** by integrating generative adversarial networks (GANs) with quality-diversity algorithms, covering diverse policy behaviors and identifying low-performance configurations
- Developed a **hierarchical** Partially Observable Markov Decision Process (POMDP) framework that enables **real-time** human-aware robotic planning in **long-horizon collaborative** tasks
- Modeled human observation-induced knowledge gaps and deployed robots that explicitly accounted for human perceptual limitations in human-robot collaboration VR kitchen scenarios, reducing task errors (Github)

Distributed AI Robotics Lab, TAMU Mar. 2019 - Jul. 2020
Graduate Research Assistant

- Developed and validated **real-time pedestrian-aware autonomous driving** policies by encoding pedestrian road-crossing intentions in POMDP

Texas A&M Transportation Institution Sep. 2017 - Feb. 2019
Graduate Research Assistant

- **Deployed** pedestrian-aware behavior planners using ROS on an **actual Ford Lincoln MKZ autonomous vehicle platform**, deploying theoretical human-machine interaction models to real-world (Project Report)

SKILLS

- **AI/Robotics**: MDP/POMDP, RL, Generative Models, Transformer models, ROS/ROS2
- **Software engineering**: Python/PyTorch, C/C++, Git, Linux

PUBLICATIONS

[C5] **Ya-Chuan Hsu**, Jonathan DeCastro, Andrew Silva, Guy Rosman. "Timing the Message: Language-Based Notifications for Time-Critical Assistive Settings". *Under Submission*

[C4] **Ya-Chuan Hsu**, Michael Defranco, Rutvik Patel, Stefanos Nikolaidis. "Integrating Field of View in Human-Aware Collaborative Planning". *IEEE International Conference on Robotics & Automation (ICRA) 2025*

[P2] **Ya-Chuan Hsu**, Anna-Maria Velentza, Stefanos Nikolaidis. "Design of Communication Methods for Buoyancy Assisted Lightweight Legged Unit". *Workshop on Trends in Socially Assistive Robotics at RO-MAN 2024*

[C3] Varun Bhatt, Heramb Nemlekar, Matthew C. Fontaine, Bryon Tjanaka, Hejia Zhang, **Ya-Chuan Hsu**, Stefanos Nikolaidis. "Surrogate Assisted Generation of Human-Robot Interaction Scenarios". *Conference on Robot Learning (CoRL) 2023*

[P1] **Ya-Chuan Hsu**, Matthew C. Fontaine, Sam Earle, Maria Edwards, Julian Togelius, Stefanos Nikolaidis. "Generating Diverse Indoor Furniture Arrangements". *ACM SIGGRAPH 2022 Posters*

[C2] Matthew C. Fontaine*, **Ya-Chuan Hsu***, Yulun Zhang*, Bryon Tjanaka, Stefanos Nikolaidis. "On the Importance of Environments in Human-Robot". *Robotics: Science and Systems (RSS) 2021.*

[C1] **Ya-Chuan Hsu**, Swaminathan Gopalswamy, Srikanth Saripalli, Dylan A Shell IROS. "Implicit Coordination via Uncertainty-Aware Plans: A POMDP Treatment of Vehicle-Pedestrian Interaction". *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) 2020*

TEACHING

CSCI 104: Data Structures (Undergrad Level)	Fall 2025
CSCI 545: Introduction to Robotics (Master's Level)	Fall 2021, 2023, 2024
CSCI 641/699: Computational Human-Robot interaction (PhD Level)	Spring 2023, 2024
CSCI 360: Introduction to Artificial Intelligence (Undergrad Level)	Fall 2022
CSCI 170: Discrete Methods in Computer Science (Undergrad Level)	Spring 2021

SERVICES

Women in Engineering (WiE) Mentorship Program: mentor engineering students through the program
Reviewer: THRI 2025 2024 2023 2021, IJRR 2024, ICRA 2025, HRI 2025 2022 (LBR) 2021, RSS 2025 2021

STUDENT MENTORSHIP

Misha Fu (Undergrad, USC)	Current
Siddharth Srikanth (Undergrad, USC)	Current
Rutvik Patel (Masters, USC)	ICRA 2025 Submission
Michael Defranco (Masters, USC)	ICRA 2025 Submission