YA-CHUAN (SOPHIE) HSU

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RESEARCH INTERESTS

Human-aware embodied AI 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 agent behaviors that are safe, legible, and deployable on embodied agents.

EDUCATION

University of Southern California (USC) Aug. 2020 - May 2026 (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++, Git, Linux

PUBLICATIONS

[C6] Siddharth Srikanth, Freddie Liang, **Ya-Chuan Hsu**, Varun Bhatt, Shihan Zhao, Henry Chen, Bryon Tjanaka, Minjune Hwang, Akanksha Saran, Daniel Seita, Aaquib Tabrez, Stefanos Nikolaidis. "Red-Teaming Vision-Language-Action Models via Quality Diversity Prompt Generation for Robust Robot Policies". *Under Submission*

[C5] **Ya-Chuan Hsu**, Jonathan DeCastro, Andrew Silva, Guy Rosman. "Timing the Message: Language-Based Notifications for Time-Critical Assistive Settings". *International Conference on Autonomous Agents and Multiagent Systems (AAMAS) 2026*

[P3] Siddharth Srikanth, Varun Bhatt, Darius Mahjoob, **Ya-Chuan Hsu**, Aaquib Tabrez, Stefanos Nikolaidis. "Semantic Encoders Enable Robust Communication-Aware Reinforcement Learning Policies". *Workshop on Theory of Mind for AI at AAAI 2026*

[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 545: Introduction to Robotics (Master's Level)	Fall 2021, 2022, 2023, 2025
CSCI 104: Data Structures (Undergrad Level)	Fall 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: AAAI 2025 THRI 2025 2024 2023 2021, IJRR 2024, ICRA 2025, HRI 2025 2022 2021, RSS 2025 2021

STUDENT MENTORSHIP

Misha Fu (Undergrad, USC)	Current
Siddharth Srikanth (Undergrad, USC)	Current; Paper under submission
Rutvik Patel (Masters, USC)	ICRA 2025 submission
Michael Defranco (Masters, USC)	ICRA 2025 submission