Ian Chuang

Education

University of California, Davis, Davis, CA, USA — September 2020 - Expected June 2024
Bachelor of Science, Computer Science and Engineering
GPA: 4.0/4.0
Relevant Coursework: Computer Vision, Machine Learning, Circuits, Embedded Systems, Software Engineering, Operating Systems, Data Structures, Classical Physics, Differential Equations

Research Experience

UC Davis, Mechanical & Aerospace Engineering, Davis, CA — September 2022 - Present
Research Assistant, Human/Robotics/Vehicle Integration and Performance Lab
Advisor: Dr. Stephen K. Robinson

- Developed ROS Docker workspace for dual UR5e robot arms with Gazebo simulation and compliance and force control.
- Programmed and customized ROS Drivers for OnRobot RG2-FT and Robotiq 2F-85 Gripper.
- Developed robotic actions to control UR5e arm with explainable behavior trees for human-robot interaction study, featuring compliant trajectory control, AprilTag perception, and GUI.
- Created robotic video demos for and performed oral presentation at 2023 NASA Habitats Optimized for Missions of Exploration (HOME) Annual Review.

UC Davis, Mechanical & Aerospace Engineering, Davis, CA — March 2022 - Present
Research Assistant, Laboratory for AI, Robotics and Automation
Advisor: Dr. Iman Soltani

- Created ROS environment for dual Aubo i5 robot arms and DH AG95 Gripper.
- Programmed ROS Drivers for DH AG95 gripper and KWR75 force torque sensor.
- Developed Mujoco simulation of Aubo i5 arm with operational space control.
- Facilitating in-sim and real robot control for real2sim2real model-based RL project.
- Created Mujoco simulation and programming ROS control for 5-fingered, 18DOF robot hand.
- Developed autonomous steering model and conducted data collection and online tests for hierarchical meta-learning navigation system using few-shot waypoint detection.

UC Davis, Mechanical & Aerospace Engineering, Davis, CA — April 2022 - June 2022
Research Assistant
Advisor: Dr. Bahram Ravani

- Programmed ViperX 300 robot arm in ROS for mixed-reality teleoperation with iPad for human-computer interaction experiment.

Work Experience

UC Davis, Mechanical & Aerospace Engineering, Davis, CA — July 2023 - September 2023
Student Research Intern, Laboratory for AI, Robotics and Automation

- Continued research with Prof. Iman Soltani during the summer, working on autonomous navigation project and model-based RL project.

Ford Motor Company, Ford Greenfield Labs, Palo Alto, CA — June 2022 - September 2022
AI/ML Robotics Intern, Research and Advanced Engineering

- Supported Driver Assist Technologies on computer vision system to detect and track an object for autonomous vehicle alignment and parking.
- Developed 3D Pose Estimation model to get 6DOF pose of object from fisheye camera.
- Successfully demoed perception pipeline and autonomous parking on a Ford Mustang Mach-E to top Ford executives.
- Extensive work with OpenCV, TensorFlow, Python, and C++.
- Submitted poster of work to Ford's 3rd Artificial Intelligence & Machine Learning Conference.
- Won 1st place at intern hackathon for developing a driver attentiveness monitoring system.
- Received Ford Recognition Award from manager and mentor for outstanding performance.

Publications

A. Ghafourian, Z. CuiZhu, D. Shi, **I. Chuang**, F. Charette, R. Sachdeva, and I. Soltani, "Hierarchical end-to-end autonomous navigation through few-shot waypoint detection." (Under Review at IEEE Robotics and Automation Letters).

T. Barkouki, **I. Chuang**, and S. Robinson, "Designing and evaluating explanation generation using behavior trees for projection-level XAI." (Under Review at HRI 2024 Late-Breaking Reports)

V. M. Memmesheimer, **I. Chuang**, B. Ravani, and A. Ebert, "Mixed reality handheld displays for robot control: A comparative study." (Under Review at AHFE 2024 - 15th International Conference on Applied Human Factors and Ergonomics).

Presentations

I. Chuang, "Force controlled robotic manipulation for peeling and separating nonrigid magnetic build plate." Undergraduate Research, Scholarship & Creative Activities Conference, 2023. (Poster Presentation).

Awards & Honors

Regents Scholarship, University of California, Davis - $30,000 — 2020 - Present

University Honors Program, University of California, Davis — 2020 - 2021

Dean's Honors List, University of California, Davis — 2020 - Present

1st Place at GFL Intern Hackathon, Ford Motor Company — 2022

Research Interests

My research at UC Davis has encompassed the development of ROS drivers, controllers, and simulation tools for various robotic components and manipulators. These efforts have been directed towards creating a comprehensive framework to support a wide array of robot learning, behavior tree, and flexible manipulation experiments and tasks. This, along with my perception work at Ford, has fueled my interest in contact-rich robotic manipulation in unstructured environments, with an emphasis on robot learning and practical, real-world applications.

Skills

Python, C++, ROS, PyTorch, TensorFlow, OpenCV, ros_control, MoveIt, Gazebo, Mujoco, URDF, MJCF, Fusion 360, 3D Printing, Raspberry Pi, Docker, Unity, JavaScript, ReactJS

Projects

HOMESTRI-UR: ROS Workspace for UR5e Robots in HRVIP Lab and HOMESTRI

HOMESTRI-Explanation-BTs: Explainable Behavior Tree ROS Environment

LARA-Aubo-Robot: ROS Environment for Aubo i5 Robots in LARA

OnRobot-RG2FT-ROS: ROS driver for OnRobot RG2-FT Gripper

Manipulator-Mujoco: Mujoco Simulation of Aubo i5 and UR5e with operational space control

See the full list here: https://github.com/ian-chuang/

References

Dr. Stephen K. Robinson
Professor at UC Davis, **Email:** stephen.k.robinson@ucdavis.edu, **Tel:** +1 (530) 754-9295.

Dr. Iman Soltani
Assistant Professor at UC Davis, **Email:** isoltani@ucdavis.edu, **Tel:** +1 (530) 752-3375.

Andrew Gliesman
ADAS Autonomy Engineer at Ford, **Email:** agliesm1@ford.com, **Tel:** +1 (313) 268-9039.