Ian Chuang

https://ian-chuang.github.io/
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Education

University of California, Davis Davis, California
Bachelor of Science, Computer Science and Engineering (September 2020 – Expected June 2024)
GPA: **4.0**
Relevant Coursework: Computer Vision, Machine Learning, Circuits, Embedded Systems, Software Engineering, Operating Systems, Data Structures, Classical Physics, Differential Equations

Awards and Honors

Regents Scholarship, University of California, Davis (2020 – Present)

University Honors Program, University of California, Davis (2020 – 2021)

Dean's Honors List, University of California, Davis (2020 – Present)

Greenfield Labs Summer Intern Hackathon Winner, Ford Motor Company (2022)

Research Experience

University of California, Davis, Mechanical and Aerospace Engineering Davis, California
Undergraduate Research Assistant, HRVIP Lab and HOME STRI (September 2022 – Present)
Advisor: Dr. Stephen K. Robinson

- Developed ROS Docker workspace for dual UR5e robot arms, Robotiq 2F-85 Gripper, and OnRobot RG2-FT gripper with Gazebo simulation and Compliance and Force Control.
- Developed robotic actions to control UR5e arm with explainable behavior trees for Human-Robot Interaction study, featuring compliant trajectory control, April Tag perception, and GUI.
- Created robotic demos of inspection and manipulation tasks for NASA HOME Annual Review.

University of California, Davis, Mechanical and Aerospace Engineering Davis, California
Undergraduate Research Assistant, LARA and AHMCT (March 2022 – Present)
Advisor: Dr. Iman Soltani

- Created ROS environment for dual Aubo i5 robot arms and DH AG95 Gripper.
- Developed Mujoco simulation for Aubo i5 arm and facilitating real robot control for sim2real pick-and-place experiments with model reconstruction.
- Developed autonomous steering algorithm and conducted data collection and online tests for novel hierarchical meta-learning navigation system using few-shot waypoint detection.

University of California, Davis, Mechanical and Aerospace Engineering Davis, California
Undergraduate Research Assistant (April 2022 – June 2022)
Advisor: Dr. Bahram Ravani

- Programmed ViperX 300 robot arm in ROS for mixed-reality pick-and-place tasks using an iPad for human-computer interaction experiment.

Work Experience

University of California, Davis, Mechanical and Aerospace Engineering Davis, California
Research Intern, Laboratory for AI, Robotics, and Automation (July 2023 – September 2023)

- Continued research under the guidance of Dr. Iman Soltani during the summer.

Ford Motor Company Palo Alto, California
AI/ML Robotics Intern, Research and Advanced Engineering (June 2022 – September 2022)

- Supported Driver Assist Technologies on Computer Vision system to autonomously detect and track an object for vehicle alignment and parking.
- Researched and developed 3D Pose Estimation model to get 6DOF pose of object from fisheye camera.
- Extensive work with OpenCV, TensorFlow, Python, and C++, integrating perception pipeline on vehicle.
- Received Ford Recognition Award from manager and mentor for outstanding performance.

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 a strong emphasis on practical, real-world applications.

Technical Skills

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

Publications

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

Memmesheimer, V.; Chuang, I.; Ravani, B.; Ebert, A. "Mixed Reality Handheld Displays for Robot Control: A Comparative Study." (pending)

Presentations

Hwang, L.; Chuang, I.; Ravani, B.; Robinson, S. “Autonomous Detection and Retrieval of [redacted],” Habitats Optimized for Missions of Exploration Annual Review, Boulder, CO, June 2023. (oral)

Chuang, I.; Barkouki, T.; Robinson, S. “Force Controlled Robotic Manipulation for Peeling and Separating Nonrigid Magnetic Build Plate,” Undergraduate Research, Scholarship & Creative Activities Conference, Davis, CA, April 2023. (poster)

Chuang, I.; Gliesman, A.; Ravindran, A.; Jain, J. “3D Pose Estimation of [redacted] for Automated Vehicle Alignment,” 2022 Ford Motor Company’s 3rd Artificial Intelligence & Machine Learning Conference, Dearborn, MI, September 2022. (poster)

Projects

ROS Workspace for UR5e Robots in HRVIP Lab and HOMESTRI: https://github.com/tammerb/HOMESTRI-UR5e-Robotiq2f85/tree/minimal

Explainable Behavior Tree ROS Environment: https://github.com/ian-chuang/HOMESTRI-Explanation-BTs

ROS Environment for Aubo Robots in LARA Lab: https://github.com/ian-chuang/LARA_AUBOi5_AG95

ROS driver for OnRobot RG2-FT Gripper: https://github.com/ian-chuang/OnRobot-RG2FT-ROS

Mujoco Simulation of Aubo i5 and UR5e with operational space control: https://github.com/ian-chuang/Manipulator-Mujoco

Full list here: https://github.com/ian-chuang

References

Dr. Stephen K. Robinson, stephen.k.robinson@ucdavis.edu

Dr. Iman Soltani, isoltani@ucdavis.edu

Andrew Gliesman, agliesm1@ford.com