

Iou-Sheng (Danny) Chang

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Education

Johns Hopkins University, Laboratory for Computational Sensing and Robotics

Baltimore, MD, USA

M.S.E. IN ROBOTICS

Expected 2024

- **Research Internship MSE Degree Option** · Co-advised by Noah Medical and Mathias Unberath
- Relevant Coursework: Computer Integrated Surgery I & II; Computer Vision; Machine Perception; Algorithms for Sensor-based Robotics; Robot Devices, Kinematics, Dynamics, and Control; Applied Optimal Control; Artificial Intelligence

University of California - Los Angeles, Henry Samueli School of Engineering

Los Angeles, CA, USA

B.S. IN ELECTRICAL ENGINEERING

Sep. 2016 - Jun. 2019

- **Dean's Honors List** · Senior Capstone Project: Design of Robotic Systems · Technical Breadth Area: Engineering Science

Skills

Programming Languages/Software Python, C++, C, C#, Java, MATLAB, SIMULINK, Mathematica, Arduino, \LaTeX , Solidworks, AutoCAD

Technologies/Frameworks Linux, ROS, Git/Repo, PyTorch, TensorFlow, OpenCV, Scikit-learn, Gazebo, RViz, MoveIt!, JSON, HTML

Professional Experience

Noah Medical Inc.

San Carlos, CA, USA

RESEARCH INTERN, COMPUTER VISION AND MEDICAL IMAGING

May. 2023 - Present

- Enhanced C-Arm camera calibration accuracy by developing and implementing a closed-form solution for the camera intrinsic matrix using a 2-layered 3D calibration phantom, complemented with nonlinear refinement through the Levenberg-Marquardt algorithm.
- Increased augmented fluoroscopy success rate by 25% in the Galaxy System by enhancing Tomosynthesis board marker bead detection using a deep-learning approach, effectively overcoming CT-to-body divergence challenges with the TiLT⁺ technology.

Jochu Technology Co., Ltd.

Hsinchu, Taiwan

MECHATRONICS AND CONTROL ENGINEER

Jan. 2021 - Jul. 2022

- Led the controls and electronics team for a qualified MDR Class I and FDA Class II medical power mobility scooter project, including integration of sensor fusion utilizing Extended Kalman Filter, implementation of the Vehicle Control System, and design of electrical diagrams.
- Collaborated with partner company to design and implement the Obstacle Avoidance and Autopilot Control Algorithm for medical power wheelchair – WHILL Model M – designed by WHILL Inc.

Enhanced Handling Automation Technology Inc.

Taichung, Taiwan

AUTOMATION AND CONTROL ENGINEER | INTERNSHIP

May.- Dec. 2020 | Jul.- Sep. 2017

- Enhanced assembly line efficiency and reduced manufacturing lead time by 20% through designing optimal obstacle avoidance and collision-free paths for industrial articulated robotic manipulators using state estimation and RRT* motion planning algorithm.

Extracurricular Experience

Baja SAE | UCLA Bruin Racing

Los Angeles, CA, USA

ELECTRONIC CONTINUOUSLY VARIABLE TRANSMISSION (ECVT) CONTROL LEAD | [2018 ECVT] [2019 ECVT]

Sep. 2017 - Jun. 2019

- Designed, implemented, and validated digital feedback control system for the electromechanically actuated CVT (ECVT) in a Baja SAE competition (3rd ever electromechanical transmission in the 44-year history of the Baja competition).
- Executed system identification and control of full vehicle powertrain by step and chirp response using custom MATLAB scripts, and synthesized a finite-state machine and closed-loop control algorithm utilizing the nonlinear plant model of the system created in SIMULINK.

Project Experience

Transfer Learning in Semantic Segmentation | PYTHON, PYTORCH | [Report]

JHU Fall 2023

- Enhanced semantic segmentation performance – boosted pixel-wise accuracy from 66% to 81% and mean IoU from 61% to 78% – on a self-developed Baltimore City dataset by applying transfer learning to fine-tune the DeepLabv3+ MobileNet architecture.

Sampling-Based UR5 Robot Manipulator Navigation | C++, ROS, RVIZ, MOVEIT!

JHU Fall 2023

- Implemented RRT path planner with KD-tree nearest neighbor search for collision-free motion planning in complex environments.
- Implemented Park and Martin hand-eye calibration method, achieving sub-0.1mm accuracy for Robotiq end-effector in pick and place task.

Structure from Motion | PYTHON, OPENCV | [Report]

JHU Fall 2022

- Applied the Tomasi-Kanade Factorization method to reconstruct 3-D rigid structures from multi-viewpoint 2-D images utilizing OpenCV.
- Implemented Lowe's distance ratio test to control false feature matches effectively, achieving a 70% improvement in accuracy.

Deep Convolutional Neural Network, Adversarial Attacks and Defense | PYTHON / PYTORCH | [Report]

JHU Fall 2022

- Built the GoogLeNet architecture with Pytorch, trained and tested on CIFAR-10 Dataset, and received a 92.68% test accuracy.
- Implemented multiple adversarial attack methods (Fast Gradient Sign Method (FGSM), Noise, Semantic) on GoogLeNet, and applied Defensive Dilution as a defense strategy, maintaining a test accuracy of 89%.

Design of Robotic Systems | MATLAB / C++ / OPENCV | [Report] [Demo]

UCLA Spring 2019

- Built a Remote Control Facial Detection Snack Launching Robot by designing 3D printable mechanism, performing facial detection with OpenCV, deriving the mathematical launch/trajectory model, and implementing the control system in MATLAB.

Sampling-Based 2-Wheeled Paper Robot Motion Planning | MATLAB / C++ | [Report] [Demo]

UCLA Winter 2019

- Achieved optimal obstacle-free pathfinding and precise parallel parking for a 2-wheeled paper robot using RRT-based planner (RRT*), Markov Decision Process (MDP) model, and Kalman filter in MATLAB.