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 Mathias Unberath and Noah Medical
- 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#, Unity, 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*
Computer Vision and Medical Imaging Research Intern *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.

Project Experience

Virtual Reality Evaluation of Pelvic Standard View Variability | Python, Unity, C#, VR, Networks | [ARCADE Lab] *JHU Spring 2024*
- Developing a VR environment with tutorials for novice users, enabling data collection of standard pelvic views from diverse patient models.
- Implementing scalable, cloud-based hosting to support multi-user access and to enable centralized simulation control.
- Developing a verification test for accurate acquisition of X-ray anatomical standard views, enhancing diagnostic simulation reliability.

Transfer Learning in Semantic Segmentation | Python, PyTorch | [Report] *JHU Spring 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 Spring 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 using PyTorch, trained and tested on CIFAR-10 Dataset, and attained a 92.68% test accuracy.
- Implemented multiple adversarial attack methods (FGSM, Noise, Semantic), and used Defensive Dilution to secure an 89% test accuracy.

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.

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.