

Yuzhou(Joe) Chen

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Interests: Robotic Foundation Models (VLA, VLM), End-to-End Planning, Deep reinforcement learning

WORK EXPERIENCE

- Magna International Inc.** 06.2025 – Present | Troy, MI
 - Robotics AI Software Intern | Franka Panda, ROS, ACT, VLA*
 - **DROID-like Setup:** Configured a ROS environment for 3 cameras and Franka Panda; implemented Cartesian and joint state controllers for precise manipulation.
 - **Torque Awareness Imitation Learning:** Deployed ACT on Franka Panda using torque as inputs, increasing task success rate by **18%**.
 - **VLA Model Fine-tuning and Deployment:** Fine-tuned OpenPi using human demonstration data collected in the DROID-like environment.
- Magna International Inc.** 05.2025 – Present | Troy, MI
 - Robotics AI Software Intern | ALOHA Setup, Sim2Real, RLHF, VLA, ACT, CLIP*
 - **Multi-task Learning:** Enhanced the ACT model by integrating a CLIP encoder, enabling ALOHA to perform **3** distinct tasks.
 - **Sim2Real Transfer:** Improved sim-to-real generalization by freezing early layers of the vision backbone.
 - **Data Augmentation:** Applied data augmentation in sim and real, boosting success rate by **12%**; applied domain randomization in sim for better generalization.
 - **Reinforcement Learning with Human Feedback (RLHF):** Designed a weighted training loss based on human feedback to produce smoother motions, improving task success rate by **6%**.
 - **VLA Model Deployment:** Fine-tuned and deployed OpenPi and SmolVLA on the ALOHA1 setup.
- University of Michigan Robotics Department** 11.2024 – 04.2025 | Ann Arbor, MI
 - Research Assistant | Tactile fusion, 3D Reconstruction, Segmentation, Physics learning, Grasp planning*
 - **Tactile-Enhanced Perception:** Fused tactile signals with point clouds reconstructed from multi-view images, integrating semantic segmentation for grasp planning.
 - **Multimodal Deformable Physics Learning:** Developed a transformer to learn deformable physics from point cloud shape changes under external forces.
 - **Grasp Pose Evaluator:** Evaluated grasping candidates by simulating post-contact deformations using learned physics models. Selected the most stable grasp.
- Dalian Yaming Auto Parts Co., Ltd.** 06.2021 – 09.2021 | Dalian, China
 - Computer Vision Intern | YOLO*
 - **Defect Detection:** Developed a crack detection system for automotive fuel pipelines, leveraging YOLO to improve accuracy and reduce false positives.
 - **YOLO Development:** Enhanced YOLO architecture for better feature extraction; applied data augmentation techniques, increasing detection rate by **8%**
 - **Image Processing:** Enhanced defect identification with image processing, including noise reduction, edge detection, and morphological transformations.
 - **Industrial IoT & Automation:** Integrated a 5G-enabled industrial vision system for real-time defect analysis, enabling automated quality control by **21%**.

SKILLS

- **Programming Languages:** Python, C++, HTML/CSS, C, SQL, MATLAB, JavaScript, Arduino
- **MLOps & Software Tools:** Deep Learning Frameworks (PyTorch, GPyTorch, TensorFlow, JAX), Data Science Libraries (NumPy, Pandas, OpenCV, matplotlib, scikit-learn), Robotics (ROS, IsaacLab, MuJoCo), Cloud & DevOps (Docker, AWS EC2/S3, Git)
- **Engineering & Simulation Tools:** ANSYS, Abaqus, SolidWorks, UG NX, CATIA, AutoCAD, Mathematica

EDUCATION

- University of Michigan-Ann Arbor** Ann Arbor, MI
 - M.S. in Electrical and Computer Engineering(Machine Learning), GPA: 3.76/4.0* 08.2022 – 05.2025
 - M.S.E. in Mechanical Engineering(Robotics and Mechatronics), GPA: 3.76/4.0*
 - **Courses:** Robot Learning, Robotic Manipulation, Data Structure and Algorithms, Machine Learning
- Jilin University** Changchun, China
 - B.E. in Mechanical Engineering, GPA: 87.1/100* 08.2018 – 06.2022

SELECTED PROJECT EXPERIENCE

- **Learning Multi-Body Pushing with Bayesian Optimization for MPPI Control** 07.2024 — 10.2024
Python, PyTorch, GPyTorch, PyBullet, NumPy, Gym, Stable-Baselines3 | GP, MPPI, Bayesian Optimization, RL
 - **Multi-Body Dynamics Learning:** Trained a ResNet on 1000 simulated trajectories, enabling indirectly pushing.
 - **Bayesian Optimization for MPPI:** Applied Gaussian Process (GP)-based Bayesian Optimization (BO-EI, BO-UCB) to tune MPPI hyperparameters, improving success rate by **60%**, while reducing average steps by **30%**.
 - **Obstacle Awareness Motion Planning:** Integrated the learned dynamics into an MPPI controller, outperforming CMA-ES baselines.
 - **Reinforcement Learning Baselines:** Trained PPO and diffusion policies in Stable-Baselines3 as learning-based baselines for comparison with MPPI.
- **Perception and Motion Planning in Simulated Airplane Cabins** 03.2024 – 06.2024
Python, PyTorch, IsaacLab | 3D Reconstruction, Point Cloud Segmentation
 - **Environment Setup:** Configured an airplane cabin simulation in IsaacLab and deployed dual-camera perception.
 - **Multi-View Segmentation and Reconstruction:** Applied EdgeSAM for instance segmentation from multi-view images and reconstructed segmented objects using Mast3R.
 - **Full-Scene Reconstruction and Segmentation Benchmarking:** Reconstructed the environment using Mast3R and compared point cloud segmentation performance across PointNet++, OneFormer3D, and Mask3D.
- **Perception, Reasoning, and Control for Autonomous Robot** 11.2023 – 02.2024
C, C++, Python, ROS | PID, SLAM, A Search*
 - **Control:** Designed high level PID controllers with low-pass filtering for smooth and safe autonomous navigation.
 - **Perception and Mapping:** Implemented particle filter SLAM with occupancy grids and Bresenham's algorithm, localizing robot pose using odometry, LiDAR, and Monte Carlo localization.
 - **Planning and Pathfinding:** Developed Brushfire algorithm for exploration and A* search for path planning, constructing efficient navigation paths in unknown environments.
- **Autonomy Development for 5-DOF Robotic Arm** 08.2022 – 10.2023
Python, NumPy, OpenCV, ROS | Object Detection, Forward Kinematics, Inverse Kinematics
 - **Sensing and Perception:** Calibrated Realsense L515 3D camera and implemented AprilTag and block detection in OpenCV for autonomous block classification and stacking.
 - **Reasoning and Acting:** Applied inverse kinematics to compute block stacking poses; implemented interpolation with path smoothing.
 - **System Integration:** Programmed a 5-DOF RX200 arm for autonomous stacking tasks via ROS-based message passing between camera, state, and control stations.
- **Vehicle Trajectory Prediction using Graph Convolutional Networks** 01.2021 – 04.2021
Python, PyTorch, NumPy, Pandas | GCN
 - **Graph Neural Networks:** Developed Graph Convolutional Network (GCN)-based model for vehicle trajectory prediction, integrating spatial dependencies of traffic agents.
 - **Dataset Processing:** Trained and tested the model on the Apollo Scape dataset, constructing a graph-based traffic representation where nodes represent vehicles/pedestrians, and edges encode their interactions.
- **Improved Multi-Elevator System for Invalid Waiting Time Reduction** 08.2019 – 01.2020
Python, OpenCV | Computer Vision
 - **Human-Computer Interface Optimization:** Redesigned the elevator interaction flow, reducing invalid passenger waiting time by **13%**.
 - **Computer Vision and Machine Learning:** Processed camera images with OpenCV and applied machine learning to accurately count passengers via color-threshold extraction.
 - **Passenger Flow Optimization:** Integrated real-time passenger detection to improve elevator scheduling efficiency.
- **Self-Adjusting Device for Underwater Robot Diving Depth Control** 04.2019 – 08.2019
Arduino, CAD, CATIA | Control System
 - **Closed-Loop Depth Control:** Designed a self-adjusting negative-feedback control system for stable underwater diving depth.
 - **Mechanical and Circuit Optimization:** Simplified the electronic circuit to extend service life and optimized screw motion stability via a tunable limit spring.
 - **Microcontroller Programming:** Programmed the AUV microcontroller to enable 6-DoF motion control.