

Yuzhou(Joe) Chen

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Interests: Foundation Models (VLAs, VLMs, LLMs), End-to-end Planning, Generative Models, Diffusion Models

WORK EXPERIENCE

- **Magna International Inc.** 10.2025 – Present | Troy, MI
Robotics & AI Software Intern – Diffusion Policy Development | Consistency Models, Imitation Learning
 - **Large Behavior Model:** Integrated CLIP and SigLIP2 for multimodal encoding and adopted DiT as a Flow Matching decoder, achieving **100%** task success in specific manipulation tasks.
 - **DiT Optimization:** Enhanced DiT with RMSNorm, RoPE, and SwiGLU for stable training and improved generalization; incorporated EMA-based self-distillation using Consistency Models.
 - **Motion Optimization:** Implemented intra- and inter-chunk linear interpolation and blending to enhance motion smoothness in dexterous manipulation.
 - **Token Quantization:** Applying Token Merging (ToMe) and KV-cache for efficient inference; distilling the model into a Diffusion CNN (DiC) to achieve a **50%** reduction in model size.
 - **Architecture Benchmarking:** Benchmarking DiT based architecture with different conditioning strategies, including PixArt- α , MMDiT, and DiT-Air, to evaluate performance and scalability across tasks.
- **Magna International Inc.** 08.2025 – Present | Troy, MI
Robotics & AI Software Intern – VLA Development | ROS2, VLA, Imitation Learning, Natural Language Processing
 - **DROID-like Setup:** Configured a ROS environment for 3 cameras and Franka Panda for VLA fine-tune purpose; implemented Cartesian and joint state controllers for precise manipulation.
 - **VLA Deployment:** Fine-tuned π_0 -Base, π_0 -FAST, π_0 -DROID, $\pi_{0.5}$ and SmolVLA-Base; deployed OpenPi on Franka Panda(DROID and DROID-like setup) and ALOHA1.
 - **Dagger Optimized VLA:** Fine-tuned and deployed SmolVLA on ALOHA1; integrated Dagger and state machine for failure correction, reached **94%** success rate in Sim.
 - **VLA Inference Acceleration:** Implemented temporal action-chunk interpolation and blending to mitigate inference latency, achieving smoother action execution.
- **Magna International Inc.** 05.2025 – Present | Troy, MI
Robotics AI Software Intern – ACT-ALOHA Development | Sim2Real, RLHF, CLIP, Imitation Learning, MuJoCo
 - **Multi-task Learning:** Added a CLIP encoder for text understanding and applied FiLM for condition injection, enabling multi-task learning while preserve single task success rate.
 - **Sim2Real Transfer:** Improved sim-to-real performance by freezing early layers of the vision backbone.
 - **Multi-backbone Feature Fusion:** Benchmarked vision backbones among ResNet, SigLIPv2, DINOv3, and SAMv2; concatenated features with aligned patch sizes to enrich visual representation and feature diversity.
 - **Vision Augmentation:** Applied separate vision backbones, data augmentation and cosine learning rate with warmup, improving success rate by **32%** on ALOHA1.
 - **Training Optimization:** Applied weight decay and ramped up KL weight to capture more latent information, achieved **100%** success rate in Sim.
 - **Reinforcement Learning with Human Feedback:** Designed a weighted training loss based on human feedback to produce smoother motions, improving task success rate by **12%** on ALOHA1.
- **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.

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

SKILLS

- **Programming Languages:** Python, C++, HTML/CSS, C, SQL, MATLAB, JavaScript, Arduino
- **MLOps & Software Tools:** Deep Learning Frameworks (PyTorch, JAX, GPyTorch, TensorFlow), Data Science Libraries (NumPy, Pandas, matplotlib, scikit-learn), Cloud & DevOps (Docker, AWS EC2/S3, Git)
- **Computer Science:** Computer Architecture, CUDA, GPU Management, Linux, Shell
- **Robotics:** Real(Franka Panda, ALOHA, Mbot), Teleoperation(ALOHA, GELLO, Space mouse)
- **Engineering Tools:** ANSYS, Abaqus, SolidWorks, UG NX, CATIA, AutoCAD, Mathematica, 3D Printing

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 the 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:** 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.
- **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.