Yuzhou Chen

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Work Experience

- **Physics-Guided Grasp Learning for On-Hand Deformable Objects** *11.2024 – Present* | **Ann Arbor, MI**
  Research Assistant in University of Michigan | Python, PyTorch, NumPy, IsaacLab, Transformer, 3D Reconstruction
  - **Tactile-Enhanced Occlusion-Aware Perception**: Fused BubbleTouch tactile signals with point clouds reconstructed from multi-view images to handle occlusions, integrating semantic segmentation for grasp planning.
  - **Multimodal Deformable Physics Learning**: Developed a transformer-based model to learn deformable physics by aligning deformation parameters with point cloud-based shape changes under external forces.
  - **Grasp Pose Evaluation via Predicted Deformation**: Evaluated multiple grasp pose candidates by simulating post-contact deformations using learned physics models. Selected the most stable grasping strategy.
- **Dalian Yaming Auto Parts Co., Ltd.** *06.2021 – 09.2021* | **Dalian, China**
  Computer Vision Intern | Python, OpenCV, NumPy, YOLO
  - **AI-Driven Defect Detection**: Developed a computer vision-based crack detection system for automotive fuel pipelines, leveraging deep learning models such as YOLO to improve accuracy and reduce false positives.
  - **Image Processing & Pattern Recognition**: Enhanced defect identification using advanced image processing techniques, 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 and reducing manual inspection costs by 20%.

Skills

- **Programming Languages**: Python, C++, HTML/CSS, C, SQL, MATLAB, JavaScript, Arduino
- **MLOps and Software Tools**: Deep Learning Frameworks (PyTorch, GPyTorch, TensorFlow), Data Science Libraries (NumPy, Pandas, OpenCV, matplotlib, scikit-learn), Robotics & Simulation (ROS, IsaacLab), Reinforcement Learning Tools (Gym, Stable-Baselines3), Cloud & DevOps (Docker, AWS EC2/S3, Git)
- **Machine Learning and Optimization**: NLP (LLM, Transformer, BERT, GPT), Generative Models (GANs, VAE, Diffusion Models), Probabilistic Models (GMM, GP), Computer Vision (SoTA models: SAM, DUST3R, Mask3D)

Education

- **University of Michigan-Ann Arbor** **Ann Arbor, MI**
  M.S. in Electrical and Computer Engineering(Machine Learning), GPA: 3.73/4.0 *08.2022 – 05.2025*
  M.S.E. in Mechanical Engineering(Robotics and Mechatronics), GPA: 3.73/4.0
  - **Courses**: Machine Learning, Robot Learning, Deep Learning in CV, Data Structure and Algorithms, Web System
- **Jilin University** **Changchun, China**
  B.E. in Mechanical Engineering, GPA: 87.1/100 *08.2018 – 06.2022*

Project Experience

- **Learning-Based Motion Planning and Control for Robotics** *01.2025 – Present*
  Python, PyTorch, GPyTorch, PyBullet, NumPy, Gym, Stable-Baselines3 | VAE, GP, MPPI, Reinforcement Learning
  - **Image-Driven Latent Representation Learning**: Developed a Variational Autoencoder (VAE) to encode environment images into a structured latent space, enabling future state prediction for image-driven motion planning.
  - **GP-Based Dynamics Modeling and MPPI Control**: Utilized Gaussian Processes (GP) to model system dynamics and applied Model Predictive Path Integral (MPPI) for trajectory optimization, tuning hyperparameters.
  - **Reinforcement Learning for Object Manipulation**: Trained PPO policies using Stable-Baselines3 for object pushing and obstacle-aware navigation with optimized reward functions.
- **Vehicle Trajectory Prediction using Graph Convolutional Networks** *01.2021 – 04.2021*
  Python, PyTorch, NumPy, Pandas | GCN, Reinforcement Learning
  - **Graph Neural Networks**: Developed GaiaNet, a Graph Convolutional Network (GCN)-based model for vehicle trajectory prediction, integrating temporal and 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.
  - **Model Optimization**: Enhanced prediction accuracy by incorporating relative speed, vehicle type, and a two-layer GNN for improved message passing and spatiotemporal forecasting.
  - **Application in Autonomous Driving**: Explored integration with reinforcement learning (RL) controllers to inform motion planning for autonomous vehicles.