Xiangyu **CHEN**

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EDUCATION

the Hong Kong University of Science and Technology (Guangzhou) Sep. 2025 - Jun. 2027
Master of Philosophy (General)

Liverpool John Moores University, UK Sep. 2019 - Jun. 2023
BEng Electrical and Electronic Engineering (First Class Honour)

RESEARCH INTERESTS

Embodied AI, Manipulation, VLA, Tactile, Mapping and Navigation

PUBLICATIONS

- **GaussianGrasper: 3D Language Gaussian Splatting for Open-vocabulary Robotic Grasping**
  Yuhang Zheng, **Xiangyu Chen**, Yupeng Zheng, Songen Gu, Runyi Yang, Bu Jin, Pengfei Li, Chengliang Zhong, Zengmao Wang, Lina Liu, Chao Yang, Dawei Wang, Zhen Chen, Xiaoxiao Long, Meiqing Wang
  RAL, 2024
- **Block-Map-Based Localization in Large-Scale Environment**
  Yixiao Feng, Zhou Jiang, Yongliang Shi, Yunlong Feng, **Xiangyu Chen**, Hao Zhao, Guyue Zhou.
  ICRA, 2024

RESEARCH EXPERIENCE

AIR Innovation Center, Tsinghua University *Shanghai, China*

Research Intern | Advisor: **Prof. Yilun Chen** and **Prof. Wenchao Ding** *Dec 2024 - present*

- **The First Prize in Google DeepMind & ICRA 2025 WBCD Challenge (Team Leader)**
  Introduction: : This challenge is jointly organized by Google DeepMind and ICRA, aiming to propose efficient data collection strategies and exploring the benchmark of bimanual manipulation in real-world scenarios, with evaluation metrics including execution speed, system reliability, and policy implementation.
  Bimanual Manipulation System Implementation: : Design a mobile manipulation system to efficiently collect real data and robustly perform tabletop manipulation and mobile tasks. Dual-arm can do tasks including unfold tablecloth, open the lid, place the pizza and close the lid tasks while mobile. Designed grippers can grasp cups and open boxes, etc.
  Data Collection: Benchmark data collection methods, such as teleoperations (e.g., VR and hand-held grippers) and learning from videos methods, propose methods suitable for collecting data in real scenarios.
  Design Hierarchical Bimanual Manipulation Policy for Dining Room Service: Propose Bimanual Manipulation Models (VLA) to execute long-horizon, complex and fine mobile manipulation tasks in real-world dining room service scenarios, with focus on designing models that can mitigate compounding errors and improve robustness against dynamic interference.
- **Champion in ManiSkill-ViTac 2025 Track 2**
  Introduction: The competition evaluated robots manipulation capabilities in complex environments, requiring them to determine object shapes and select correct insertion slots by integrating tactile and visual sensory inputs.
  Methods: The solution combined tactile encoders with 3D point cloud encoding, enhanced by positional embeddings, and employed a conditional diffusion policy for robust multi-modal action planning.
  Contribution: Implement sim2real transfer in real-world experiments, process tactile sensor data.

EncoSmart Technology (Beijing) Co., LTD. *Beijing, China*

Research Intern | Advisors: **Prof. Xiaoxiao Long** *Nov 2023 – Feb 2024, Jul 2024 – Dec 2024*

- **GaussianGrasper: 3D Language Gaussian Splatting for Robotic Grasping**
  3D Reconstruction based Manipulation Design: proposed a method utilizes 3D Gaussian Splatting to explicitly represent the scene as a collection of Gaussian primitives. The method takes fewer views RGB-D to solve the inconsistency issue between geometry and semantic information in vision-based manipulation, as well as the inability to dynamically update the scenes.
  Data Collection: Hand-eye calibration of robotic arm and camera is performed to improve the accuracy of multi-view point cloud fusion during data collection
  Method Design: Using visual language models (VLMs) to achieve scene understanding and object grounding, and employ Grasp Models (AnyGrasp) to generate the 6-Dof pose for grasping.
  Experiment: Design strategies to operate robotic arm and gripper, enabling long-horizon and continuous manipulation, as well as update scenes.

GAIRLAB, City University of Hong Kong *Hong Kong, China*

Research Intern | Advisors: **Prof. Peng Yin** *Mar 2024 – June 2024*

- **Mobile Manipulation Policy based on Imitation Learning**

  Learning-based Mobile Manipulation System Design: Proposed robot policies based on the ACT network for mobile manipulation to improve the robustness in performing long-horizon and fine manipulation tasks.
  Data Collection: data collection by using whole-body teleoperation system.
  Method Design: Increase the degrees of freedom of whole-body control to 17 and optimize the control strategy through position control and object-centered coordinate relationships to address the high task failure rate.
  Navigation Module Design: Focus on learning-based navigation method and how to leverage VLMs to improve the indoor visual navigation efficiency and localization accuracy.

AIR, Tsinghua University *Beijing, China*

Research Intern @ **DISCOVER Lab** | Advisor: **Prof. Guyue Zhou**, **Dr. Yongliang Shi** and **Prof. Jiangtao Gong** *Sep 2021 – Nov.2023*

- **Block-Map-Based Localization in Large-Scale Environment** Sep 2021 – Nov.2023

  Block Maps Localization System Design: Proposed a subgraph localization system based on generating block maps and corresponding switching strategies. The method can address the issue of easy loss of robot localization, improving localization accuracy by at least 3 times while increasing computational speed by 150.
  Perception Module Design: Used multi-line LiDAR and LIO-SAM algorithms to create maps in large-scale scenes. Used C++ and PCL point cloud library to downsample point clouds for removing ground points.
  Navigation Module Design: Using the A* algorithm and TEB algorithm as planners to enable robots to achieve dynamics obstacle avoidance. These planners assist robots in conducting localization experiments.
- **Multi-Agent Swarm Formation Navigation Algorithms** May 2022 - Feb 2023

  Multi-Agent Navigation Strategies: Proposed multi-agent collaboration system is proposed to improve work efficiency through cooperation of multiple robots. localization accuracy by at least 3 times while increasing computational speed by 150.
  Method Design: Develop Leader-follower, artificial potential field and pure pursuit algorithms to enable robots to flexibly achieve single-agent and multi-agent collaborative obstacle avoidance.
  Sim2Real Pipeline: Use Gazebo and Isaac Sim simulators to test algorithms in simulation, then algorithms are fine-tuned and deployed to the real robots to ensure the desired instantaneity and robustness for multi-agent obstacle avoidance.
- **Obstacle Avoidance Algorithm for Indoor Racing Unmanned Vehicles** May 2022 - Feb 2023

  Motivation and hardware: We aim to develop navigation system that can improve the robot's localization and real-time obstacle avoidance robustness in corridor and glass environments. The hardware includes single-line Lidar, IMU and depth camera, with differential drive model as the kinematic model.
  SLAM Experiment: We benchmark the performance of Lidar-based SLAM (Gmapping, Cartographer) algorithms and vision-based SLAM algorithms (Rtabmap, ORB_SLAM) and design a multi-sensor fusion algorithm utilizing particle filtering, extended Kalman filtering and graph optimization to improve real-time localization accuracy during motion.
  Navigation Experiment & Results: We benchmarked path planning algorithms based on graph search and sampling methods. Experiments revealed that using the A* algorithm and TEB algorithm as planners outperformed other methods in avoiding static and dynamic obstacles during long-horizon navigation, with robots successfully avoiding all tested obstacles
- **End-to-end Visual Navigation based on Reinforcement Learning** Jun 2021 - Sep 2021

  Motivation: We explored the performance of end-to-end vision-based navigation for robots, drawing inspiration from the end-to-end approach used in autonomous driving.
  Pipeline Design: We used a CNN network as the backbone for feature extraction and collected camera data and control data in a simulator to create the dataset. After fine-tuning, the system was deployed on a robot for real-world experiments. Results showed that the system successfully completed all obstacle avoidance tasks during the day, but many tasks failed at night due to factors such as low lighting.

Honors & Awards

International

2025 **Champion**, ICRA 2025 What Bimanuals Can Do (WBCD) Challenge *Atlanta, U.S.A*

2025 **Champion**, ManiSkill-ViTac 2025: Challenge on Manipulation Skill Learning With Vision and Tactile Sensing *Beijing, China*

Domestic

2023 **City Special Prize**, "Unbounded·2023 Shanghai International Student - (Nationalized University Students) Innovation and Entrepreneurship Competition" *Shanghai, China*

2017 **First Prize (National Level)**, 2017 International Youth Innovation Design Competition China Region *Beijing, China*

Skills

Robotics Technology	ROS1/2
Software Technology	C/C++, Python, MATLAB, OpenCV, Linux and Git, PyTorch
Hardware Technology	Embedded Development (STM32, ESP32), SolidWorks, PCB Design
Language Proficiency	Mandarin (Native), English (Working Proficiency)