Ziyin Xiong

Yuanpei College, Peking University
+86-182-9264-8935 | xiongziyin@stu.pku.edu.cn | https://ziyin-xiong.github.io/

Education

- **Major**, Artificial Intelligence, Tong class founded and led by Prof. Song-Chun Zhu *2020 - 2025*
- **Minor**, Economics, National School of Development at Peking University *2020 - 2025*
- **GPA**, overall: 3.616/4.0; latest academic year: 3.85, ranked 4^{th} in major *2020 - 2024*
- **Visiting at UC Berkeley**, GPA: 3.75/4 *2023*
- **Research Interest**, robot learning, robot vision, reinforcement learning *present*

Publications

- **Agent-Agnostic Visual Representation Boosts Zero-Shot Bimanual Manipulation Learning** *CVPR 2025 under review*
  Institute for Artificial Intelligence, Peking University **Website Link 1**
  - Authors: **Ziyin Xiong**, Yinghan Chen, Puhao Li, Yixin Zhu, Tengyu Liu, Siyuan Huang
  - Bimanual manipulation poses a major challenge in robotics due to its complexity. We propose **Ag2x2**, a novel framework that advances the autonomous acquisition of bimanual manipulation skills through agent-agnostic and coordination-aware visual representations that jointly encode object and hand motion patterns, eliminating the need for expert supervision. Ag2x2 achieves a 73.5% success rate across 13 bimanual tasks from Bi-DexHands and PerAct2, outperforming baselines by 1.7x and surpassing the success rate achieved with expert-engineered rewards.
  - Pretrained a ViT model on a human egocentric daily life dataset, processed to be agent-agnostic, using time-contrastive loss. Incorporated hand position data detected by HaMeR to compensate for the absence of hand information in the agent-agnostic transformation.
  - Developed a bimanual environment in IsaacGym. Designed a reward based solely on the visual similarity between the current observation and a goal image, leveraging PPO to train the policy.

- **Adaptive Energy Regularization for Autonomous Quadruped Gait Transition** *ICRA 2025 under review*
  Mechanical Systems Control Lab, University of California, Berkeley **Website Link 2**
  - Authors: Boyuan Liang*, Lingfeng Sun*, Xinghao Zhu*, Bike Zhang, **Ziyin Xiong**, Chenran Li, Koushil Sreenath, Masayoshi Tomizuka
  - Inspired by natural locomotion minimizing energy use, this work explores integrating a distance-averaged energy efficiency reward into reinforcement learning. Results show that this approach enables quadruped robots to autonomously adopt suitable gaits, like walking at low speeds and trotting at high speeds, without explicit gait regularization.

Manuscripts in Progress

- **AnyManip: Learning Diverse Robot Manipulation through Optical Flows** *Mar. 2024 - present*
  Beijing Institute for General Artificial Intelligence
  - Advisor: Dr, Siyuan Huang, Dr. Tengyu Liu
  - Built on the idea that optical flow, which reveals the motion dynamics of the end effector and objects, can guide robots in performing novel tasks in unfamiliar environments. Developed a two-stage model: an optical flow prediction module leveraging diffusion models, trained on diverse datasets, and a motion prediction module integrating RGB observations, optical flow, and proprioception. Achieved accurate flow prediction, action planning, and object manipulation.

- **LLM supervised dexterous manipulation** *Aug. 2024 - present*
  Institute for Artificial Intelligence, Peking University
  - Advisors: Prof. Yixin Zhu, Dr. Congyue Deng, Prof. Leonidas Guibas
  - Revealed that LLMs exhibit strong semantic understanding, allowing them to identify more suitable grasp poses in images that better align with task requirements. Utilized Reinforcement Learning from Human Feedback (RLHF), replacing traditional human calibration datasets with LLMs to train the reward model. Focused on enhancing robot manipulation by incorporating advanced semantic reasoning into the learning process.

Research Projects

- **Symmetry Regularization for Quadruped Locomotion** *Sept 2023 - Feb. 2024*
  Mechanical Systems Control Lab, University of California, Berkeley **Github Link 1**
  - Advisor: Prof. Masayoshi Tomizuka
  - In nature, quadruped animals achieve high-speed locomotion with stable, inertial, and energy-efficient postures. Inspired by these principles, this work aimed to enhance running velocities while ensuring stable robot locomotion by leveraging motion dynamics such as limb movement diagonal symmetry and time-reversal symmetry.
  - Built on Legged Gym, my implementation contributed to a significant improvement in maximum tracking velocity, surpassing the reported state-of-the-art speed of the Go1 robot in simulation.

• **Bi-DexHands: Bimanual Dexterous Manipulation via Reinforcement Learning** *Mar - May 2022*
Institute for Artificial Intelligence, Peking University **Website Link 3**

– Advisor: Prof. Yaodong Yang
– This project builds an environment in IsaacGym to provide a collection of bimanual dexterous manipulation tasks and reinforcement learning algorithms.
– Contributed to the manuscript by summarizing multiple reinforcement learning algorithms, detailing the parameters utilized in the experiments, and providing experimental setup description.

Engineering Experiences

• **Improvement of Peer Review System through Peer Prediction** *Jul - Nov 2022*
Center on Frontiers of Computing Studies, Peking University **Github Link 2**

– Advisors: Prof. Xiaotie Deng, Prof. Yuqing Kong
– Peer review is an ideal application of peer prediction, which gathers reliable information when direct verification is impossible. I applied a novel approach, using reviewers' predictions of others' responses to encourage honest feedback, enhancing the objectivity of paper evaluations.
– Developed a new question type based on the HotCRP peer review system, enabling reviewers to use a scroll bar to estimate others' scores. This data is used to adjust and improve review accuracy. Primarily responsible for back-end development in PHP and some front-end CSS design, working with PHP and JavaScript.

• **YPPF: Intelligent Campus System for Yuanpei College** *Dec 2021 - Feb 2022*
Yuanpei College, Peking University **Github Link 3**

– An online college service system developed by Yuanpei College students, offering a convenient platform for activity room reservations, interest groups, courses, and library services.
– Responsible for migrating and integrating the standalone activity room reservation system with the college YPPF website and enhancing the system's messaging functionality, working with Python.

Recognition and Service

• **APEC 2023 Volunteer**, responsible for Bilateral Meetings *2023*
• **Teaching Assistant**, Mathematical Foundation for Artificial Intelligence *2023*
• **Teaching Assistant**, Career Development and Planning *2022*
• **ACM Campus Competition**, third prize *2022*
• **Freshman Scholarship**, third prize *2020*
• **National College Entrance Exam**, Ranked 10/320000+ *2020*

Miscellaneous

• **Programming Languages**: C/C++(proficient), Python(proficient), PHP(intermediate), Rust(beginner)
• **Natural Languages**: Mandarin(native), English(proficient), Spanish(intermediate)
• **TOEFL**: Reading 30 / Listening 29 / Speaking 25 / Writing 27 / Total 111
• **GRE**: Verbal 156 / Quantitative 168 / Analytical Writing 4.0

Mentioned Links

• **Website Link 1**: https://ziyin-xiong.github.io/ag2x2.github.io/
• **Website Link 2**: https://sites.google.com/berkeley.edu/efficient-locomotion
• **Website Link 3**: https://pku-marl.github.io/DexterousHands/
• **Github Link 1**: https://github.com/ziyin-xiong/quadruped-robot-locomotion
• **Github Link 2**: https://github.com/ziyin-xiong/hotcrp
• **Github Link 3**: https://github.com/Yuanpei-Intelligence/YPPF