

RUNHAN HUANG

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EDUCATION

Tsinghua University, Yao Class

Bachelor of Science in Computer Science (GPA: 3.87 / 4.00)

September 2022 - Now

Beijing

EXPERIENCE

MARS Lab, IIS & Shanghai Qizhi Institute

Research Assistant

- Advised by **Prof. Hang Zhao**, working on **Robot Locomotion**

June 2024 – Feb 2025

Beijing

Du Lab, Kempner Institute, Harvard University

Visiting Researcher

- Advised by **Prof. Yilun Du**, working on **Diffusion Planning**

March 2025 – September 2025

MA, USA

Seed VLM Group, Bytedance Inc.

Research Intern

- Working on **Vision-Language-Action** Foundation Models

Oct 2025 – Now

Beijing, China

PUBLICATIONS

- [P1] **Runhan Huang**, Haldun Balim, Heng Yang, Yilun Du. “Flexible Locomotion Learning with Diffusion Model Predictive Control,” *ArXiv*, 2025.
- [P2] **Runhan Huang***, Shaoting Zhu*, Yilun Du, Hang Zhao. “MoELoco: Mixture of Experts for Multitask Locomotion,” *IROS*, 2025.
- [P3] Shaoting Zhu*, Linzhan Mou*, Derun Li, Baijun Ye, **Runhan Huang**, Hang Zhao. “VR-Robo: A Real-to-Sim-to-Real Framework for Visual Robot Navigation and Locomotion,” *RA-L*, 2025.
- [P4] Shaoting Zhu, **Runhan Huang**, Linzhan Mou, Hang Zhao. “Robust Robot Walker: Learning Agile Locomotion over Tiny Traps,” *ICRA*, 2025.

RESEARCH EXPERIENCE

Flexible Locomotion Learning with Diffusion Model Predictive Control | ArXiv 2025

- Reinterpret diffusion models as generative priors for MPC, using reward updates, constraint projection, and candidate ranking
- Introduce a reward-weighted denoising method to finetune the diffusion planner, improving locomotion performance
- Develop real-time diffusion planning techniques such as asynchronous execution and early caching; demonstrate zero-shot transfer on a Unitree Go2 quadruped

MoELoco: Mixture of Experts for Multitask Locomotion | IROS 2025

- Develop a multitask locomotion framework using a mixture-of-experts (MoE) architecture.
- Enhance sample efficiency and skill compositionality for reinforcement learning across multiple locomotion tasks.
- Project leader; contributed to model design, training infrastructure, evaluation and real-world deployment.

VR-Robo: A Real-to-Sim-to-Real Framework for Visual Robot Navigation and Locomotion | RA-L 2025

- Build a digital-twin simulation pipeline using 3D Gaussian Splatting for photo-realistic rendering.
- Propose an RGB-based sim-to-real transfer policy framework for navigation and locomotion.
- Participate in low-level locomotion training and real world experiment

Robust Robot Walker: Learning Agile Locomotion over Tiny Traps | ICRA 2025

- Design a proprioception-only locomotion policy that generalizes to terrains with small obstacles (“tiny traps”).
- Introduce a two-stage reinforcement learning training framework and a novel benchmark for tiny-trap traversal.
- Co-lead benchmark design, policy training, evaluation and real-robot deployment.

PROJECTS

Automatic offside detection system | *Computer Vision Course Project*

- Design an automatic soccer offside detection pipeline.
- Construct a high-quality soccer offside dataset
- Develop an automatic soccer offside detection system by training deep learning models and applying computer vision methods

An LLM application : Situation Puzzle Game | *Deep Learning Course Project*

- Develop a webpage application : Situation Puzzle Game (also known as "Turtle Soup")
- Build an application webpage using streamlit and LLM APIs.
- Conduct detailed prompt engineering.

Implicitly Exploit the Modularity in Multimodal Large Language Models | *Multimodal Machine Learning Course Project*

- Propose a new gradient update strategy for visual instruction tuning
- Train a LVLM based on phi-2 model, achieving good performance

Humanoid Perceptive Locomotion | *Intelligent System and Robotics Course Project*

- Construct a two-stage teacher–student locomotion learning paradigm with PPO and DAGger, enabling a humanoid robot to traverse challenging terrain
- Demonstrate robust stair, slope, and gap traversal in simulation using only depth image and proprioception

Long Horizon Mobile Manipulation with Curiosity Enhanced Reinforcement Learning | *Embodied AI Course Project*

- Build a long-horizon mobile manipulation RL pipeline in ManiSkill, coupling navigation and articulated-object manipulation with a clean evaluation workflow
- Introduce a hash-based curiosity reward to mitigate local minima and drive novelty-seeking exploration across task stages
- Apply Leaky PPO to improve stability and sample efficiency, further boosting learning performance

Multi-agent Navigation with Vision Language Model | *Practical Research Training Project*

- Build a city-scale multi-agent navigation dataset combining Google Street View, autonomous driving data, and 3D Gaussian Splatting reconstructions, enriched with landmark, orientation, and action annotations to directly supervise spatial reasoning skills.
- Design a dual benchmarking protocol spanning static VQA-style prediction and 3DGS-based simulation, providing a comprehensive assessment of perception, planning, and coordination
- Benchmark the state-of-the-art VLMs, showing that current models fall significantly short, motivating new research on embodied multi-agent intelligence

SKILLS

Programming: C, C++, Python, Pytorch, ROS, ROS2

Robotics related software/hardware experience: isaacgym, Unitree A1, Unitree Go2

Key Course Taken: C/C++ Programming (A+), Calculus (A), Linear Algebra (A), General Physics (A+), Algebra and Computation (A+), Algorithm Design, Probability and Statistic, Machine Learning, Deep Learning, Multimodal Machine Learning (A+), Computer Vision (A), Theoretical Computer Science, Reinforcement Learning, Autonomous Driving (A+), Advanced Computer Graphics (A), Practical Research Training (A)

EXTRACURRICULAR EXPERIENCE

IIS Soccer Team

Captain

- Led a soccer team and managed the soccer club of IIS.

Jan 2024 – Now

Beijing