RUI HENG YANG

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Researcher in embodied AI working on real-time world action models for robotic manipulation. Previously worked on training-free guidance methods for diffusion policies for collision avoidance in cluttered real-world environments. Research published at ICRA, IROS, ICML, and NeurIPS.

WORK EXPERIENCE

Embodied AI Researcher — Noah's Ark Laboratory January 2024 – Present

- Co-first-authored **Faster-WAM**, a world action model with a single-layer action expert that reads every layer of the video backbone through a novel docking interface. Achieved real-time inference latency of **52 ms** per action chunk (19 Hz). Remained competitive with existing WAMs in success rate while completing real-robot tasks **1.1–4.5× faster**.
- Co-authored **RoboDyna**, a latency-aware benchmark for dual-arm manipulation in physically realistic dynamic scenes, with 30 tasks, 3,500 expert demonstrations, and synchronized and asynchronous evaluation protocols for VLA and WAM policies. **NeurIPS 2026 Workshop.**
- Co-first-authored **CAPE**, a diffusion-based motion planner that avoids collisions without retraining, trained only on point-to-point trajectories collected in obstacle-free environments. At inference, it re-noises the unexecuted part of the plan into a context-aware prior and refines it with collision guidance, expanding the trajectory distribution toward collision-free modes. Improved success rate over MPD from **38% to 94%** in simulation and from **0/5 to 4/5** in a cluttered real-world task. **ICRA 2026. Patent filed.**
- Co-first-authored **RA-DP**, a diffusion policy with training-free, high-frequency replanning. An action queue emits a replanned action at every denoising step, while guidance injects obstacle information without retraining. Raised replanning frequency on MetaWorld from **16 Hz to 82 Hz** over DP3, and obstacle-avoidance success over guided DP from **15% to 63%** (static) and 10% to 45% (moving). **IROS 2025. Patent filed.**

Research Intern — Samsung AI Center (SAIC) May 2023 – December 2023

Supervisors: *Dr. Jimmy Li, Dr. François Hogan, Prof. Florian Shkurti, Prof. Gregory Dudek*

- Developed a generalized image compositing pipeline leveraging *DINO-ViT* for keypoint selection and feature correspondence, enabling instruction-guided background replacement via Stable Diffusion inpainting.
- Designed a tactile data collection pipeline integrating a Franka Emika arm with an RFT60-HA01 force-torque sensor and Finger-STS tactile sensor, and developed a novel force estimation algorithm combining inverse finite element methods with neural networks for precise, data-efficient force estimation.

Research Intern — Noah's Ark Laboratory May 2020 – August 2022

Supervisor: *Prof. Vahid Partovi Nia*

- Co-authored **DenseShift**, a low-bit power-of-two (shift) quantization method whose zero-free shifting mechanism brings multiplication-free networks to accuracy competitive with full precision on vision and speech tasks, while running **1.6× faster** than existing methods. Implemented the benchmarking and evaluation pipelines across image classification, object detection, semantic segmentation, and spoken language understanding. **ICCV 2023.**

SELECTED PUBLICATIONS

1. Liheng Ma*, **Rui Heng Yang***, et al. Faster-WAM: Do World Action Models Need Deep Action Modules? Under review at ICLR 2027.
2. Zhiyuan Li, **Rui Heng Yang**, et al. Benchmarking Robotic Manipulation under Physically Realistic Dynamics. NeurIPS 2026 Workshop on Robot Learning with World Models.
3. Amir Rasouli, Yangzheng Wu, Zhiyuan Li, **Rui Heng Yang**, et al. How VLAs (Really) Work In Open-World Environments. IROS 2026.
4. **Rui Heng Yang***, Xuan Zhao*, et al. CAPE: Context-Aware Diffusion Policy Via Proximal Mode Expansion for Collision Avoidance. ICRA 2026.
5. Sajjad Pakdamansavoji, Mozhgan Pourkeshavarz, Adam Sigal, Zhiyuan Li, **Rui Heng Yang**, et al. Improving Robotic Manipulation Robustness via NICE Scene Surgery. ICRA 2026.
6. Mateo Clemente*, Leo Maxime Brunswic*, **Rui Heng Yang**, et al. Two-Steps Diffusion Policy for Robotic Manipulation via Genetic Denoising. NeurIPS 2025.
7. Xi Ye*, **Rui Heng Yang***, et al. RA-DP: Rapid Adaptive Diffusion Policy for Training-Free High-frequency Robotics Replanning. IROS 2025.
8. Leo Maxime Brunswic, Mateo Clemente, **Rui Heng Yang**, et al. Ergodic Generative Flows. ICML 2025.
9. Xinlin Li, Bang Liu, **Rui Heng Yang**, et al. DenseShift: Towards Accurate and Efficient Low-Bit Power-of-Two Quantization. ICCV 2023.

* denotes equal contribution

PATENTS

1. **Rui Heng Yang**, Leo Maxime Brunswic, Mark Chiu, et al. Methods and System for Effective Guidance Application in Fast-Generative Methods. Filed, 2026.
2. Yuhan Che, Yajun Gao, Xuan Zhao, **Rui Heng Yang**, et al. Dynamic Obstacle Avoidance Method for Closed-loop Embodied Manipulation. Filed, 2026.
3. Leo Maxime Brunswic, Mateo Clemente, **Rui Heng Yang**, et al. Efficient and Modular Flow-Matching Policy via Deconditioning. Filed, 2025.
4. Xuan Zhao, **Rui Heng Yang**, Sajjad Pakdamansavoji, et al. Predictive Failure Detection for Guided Diffusion Policy Adaptation to Uncertain Environments. Filed, 2025.
5. Xuan Zhao, **Rui Heng Yang**, Leo Maxime Brunswic, et al. Body-Aware Collision-free Motion Planning for Object Manipulation. Filed, 2025.
6. **Rui Heng Yang**, Amir Rasouli, and Yinchuan Li. Methods and System for Real-Time Guided Diffusion Policy. Filed, 2025.

EDUCATION

Master of Science in Applied Computing — University of Toronto Toronto, ON
Artificial Intelligence - ***GPA**: 4.0/4.0* *December 2023*

- **Lead Teaching Assistant for CSC110 & CSC111:** Foundations of Computer Science

Honours B.Sc. in Computer Science — McGill University Montreal, QC
First Class Honours, Internship Program - ***GPA**: 3.86/4.0* *Graduated May 2022*

SKILLS

Technical Skills	Python, PyTorch, NumPy, OpenCV, ROS/ROS2, Docker, Git
Languages	English (Native), French (Native), Mandarin (Native)