Tuen-Yue Tsui

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Research Vision

My research interests lies in the intersection of *robotics*, *world models* and *physics-aware vision/graphics*, drawing on cognitive science for inspiration. My goal is to build **human-like cognitive systems** that enable **highly autonomous**, generalizable robot behavior.

Keywords: Embodied AI • World Models • Physics-aware Vision/Graphics • Cognitive Science • GenAI

Education

University of Pennsylvania   *Sept 2024 – Present*
MSE in Robotics

- ○ GPA: 4.0/4.0   Core Courses: Learning in Robotics, Machine Perception, Differential Geometry

Wuhan University   *Sept 2020 – Jun 2024*
BE in Artificial Intelligence

- ○ GPA: 3.75/4.0

Research Experience

GRASP Lab, University of Pennsylvania   *Philadelphia, USA*
Advisor: Lingjie Liu   *Sept 2024 – Present*

- ○ **Lead researcher** on *Intention-Aware Imitation Learning* for contact-rich tasks.
- ○ Built a large, unscripted **random-interaction** dataset by allowing curiosity-driven policies to freely interact with objects.
- ○ Proposed a **casual-effect-manifold** with an **MoE gated policy decoder** to disentangle intentions and executions; an early prototype reproduces locomotion policies in one shot (short demo on my website) with a sequence-wide FK deviation of **1.4 cm**.
- ○ Added a lightweight **learned world model** to enable end-to-end training.

Machine Vision & Robotics Laboratory, Wuhan University   *Wuhan, China*
Advisor: Qin Zou   *Sept 2022 – Jun 2024*

- ○ Resulted in a first-author preprint **NePF**, a fast single-stage inverse rendering framework (see Publications).

Publications

T.-Y. Tsui, Q. Zou. *NePF: Neural Photon Field for Single-Stage Inverse Rendering* (preprint, arXiv).   Nov 2023

Projects

Scalable Quadruped Imitation from Monocular Video   *github link*

- ○ **CV/CG + Robotics.** Retargeted quadruped motions from monocular videos via a learnable skeleton; removed MoCap/manual keypoints.

Minimum-Snap Trajectory Generation for Quadrotors   *github link*

- ○ **SLAM + Planning + Control.** Integrated VIO, SE(3) controller, and ray-casting–powered A* (**30×** faster: **22 s → 0.7 s**; **1st** on leaderboard) for path planning with a time-optimal snap solver.

Skills

Programming: C++, Python, C, MATLAB, SQL

Tools/Frameworks: ROS, PyTorch, JAX, Drake, Isaac Gym, Genesis, Linux, Git, Docker, Slurm

Languages: Cantonese (Native), Mandarin (Native), English (Full Professional)