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Tuen-Yue Tsui

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Research Vision

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

Keywords: Planning • Reasoning • World Models • Neural Symbolic AI • Cognitive Science

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** for *Actions as Causal-Effect Events*. Early demo available at link.
- Proposed **a new action representation** enabling one-shot imitation learning and compositional manipulation.
- Built a large, unscripted **random-interaction** dataset by allowing policies guided by Fisher information to freely interact with objects.
- Developed **a bottom-up option discovery method** via a VAE, finding causal effect events from random interaction dataset in the form of options.

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 Lab, Newton, Genesis, Linux, Git, Docker, Slurm

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