Jiaying Fang

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Education

- **Stanford University** *09 2023 - 06 2025*
  Master of Science in Electrical Engineering Stanford, California
  GPA: 4.18/4.00 Specialization: Robotics, Machine Learning, and Signal Processing
- **Hong Kong Polytechnic University** *09 2019 - 06 2023*
  Bachelor of Engineering (Honours) in Electronic and Information Engineering Kowloon, Hong Kong
  Minor in Applied Mathematics
  GPA: 4.01/4.00 Specialization: Robotics and Signal Processing
- **McGill University** *01 2022 - 08 2022*
  Exchange Semester Montreal, Canada
  GPA: 4.00/4.00

Experience

- **Interactive Perception and Robot Learning Lab, Stanford University** *02 2024 - Present*
  Graduate Research Assistant Stanford, California
  - **Supervisor:** Prof. Jeannette Bohg
  - Designing and implementing a cross-embodiment scheme to zero-shot transfer a policy trained on videos of humans performing a task to a robot. To be submitted in January 2025, aiming for **RSS 2025**.
  - Evaluated Reinforcement Learning methods on robotics tasks that require fast reactive motions in Mujoco. This project is funded by **Toyota Research Institute**.
  - Conducted joint torque feedback analysis on a large-scale robotics dataset - **DROID dataset**. Presented important rules of haptic data collection in future large-scale distributed robotics dataset at Stanford cross-labs robotics meeting. [**Slides**]

- **Intuitive Surgical** *06 2024 - 09 2024*
  Machine Learning Intern Sunnyvale, California
  - Designed and implemented an end-to-end deep learning-based 3D gaze estimation algorithm. The algorithm is robust to head motions, and it improves the gaze estimation performance by **84.5%**.
  - Generated more than **100k** synthetic images with suitable domain randomization in Blender for gaze estimation training.
  - Designed real-world gaze estimation data collection pipeline and conducted data collection. Conducted detailed analysis and visualization of the dataset.
  - Implemented a semi-auto labeling tool for pupil localization and segmentation using SAM2.

- **Collaborative Haptics and Robotics in Medicine Lab, Stanford University** *09 2023 - 01 2024*
  Graduate Research Assistant Stanford, California
  - **Supervisor**: Prof. Allison Okamura
  - Designed and Implemented a force-aware autonomous tissue manipulation model using imitation learning with da-Vinci Research Kit (**dVRK**). The task completion rate of autonomous tissue retraction increased **50%** with haptic sensing.
  - To be submitted to **RAL** around December 2024.
  - Presented force-aware autonomous surgery at Stanford Human-Centered Artificial Intelligence Conference 2024. [**Poster**]

- **China Telecom AI** *06 2023 - 08 2023*
  Computer Vision Algorithm Intern Beijing, China
  - Co-led the team in the **ICCV'23** Open Fine-Grained Activity Detection Challenge. [**Challenge**]
  - Won third place on the video activity recognition track and second place on the video activity detection track.

- **Prof. Mak's Lab, Hong Kong Polytechnic University** *09 2022 - 03 2023*
  Undergraduate Research Assistant Kowloon, Hong Kong
  - **Supervisor:** Prof. Man-Wai Mak

- Implemented deep speaker embedding for speaker verification with a domain loss to alleviate the languages mismatch problem.
- The performance of the ECAPA-TDNN (pre-trained using the English dataset) on the unlabelled Chinese dataset has **improved by 10%** with the MMD-based domain loss. Won the **Honours Project - Technical Excellence Award**. [**Report**][**Code**]

- **Dynamics, Estimation, and Control in Aerospace and Robotics Lab, McGill University** *06 2022 - 08 2022*
  Undergraduate Research Assistant Montreal, Canada
  - **Supervisor:** Prof. James Forbes
  - Designed a finite-horizon LQR control of UGV for path tracking.
  - Robot Operating System was used during implementation. The state of UGV was represented as an element of direct Euclidean isometries, **SE(2)**. [**Report**]

- **Autonomous Systems Lab, Hong Kong Polytechnic University** *05 2021 - 10 2021*
  Undergraduate Research Assistant Kowloon, Hong Kong
  - **Supervisor:** Prof. Yuxiang Sun
  - Developed a deep learning-based integration of monocular visual odometry and multi-object tracking.
  - Deployed deep optical-flow estimation for localization and 3D object detection models for 3D multi-object tracking.

PROJECTS

- **Learning a Deep RL Policy for Automated Needle Manipulation on Surgical Robots** *03 2024 - 06 2024*
  Stanford University [**Report**][**Code**]
  - Developed a **deep reinforcement learning** policy for needle reaching, tracking and picking in surgical RL environment.
  - Evaluated the performance of vision-based and state-based RL policy.
  - Designed and implemented a two-stage vision-based needle manipulation RL policy, which converges within **50k** steps, while other end-to-end policies struggle to converge even in 80k steps.

- **Force-Aware Adaptation: What can we do if the force sensor is unavailable?** *09 2023 - 12 2023*
  Stanford University [**Report**][**Slides**]
  - Developed a system that learns and distills the force/torque information during training, then deploys the policy when the force/torque sensor is not available.
  - Implemented a **Teacher-Student** system for **haptic feedback** distillation.
  - The adapted policy can reach a **70%** success rate even when the force/torque sensor is unavailable. Without the two-stage distillation system, the succcess rate is only 20%.

- **Automatic Path Following, Loading, and Unloading Mobile Cart** *01 2023 - 06 2023*
  Hong Kong Polytechnic University [**Slides**]
  - Worked with students from Mechanical Engineering Department together to build this group project. We built from scratch an **automatic mobile cart**.
  - Designed the system block diagram of this mobile cart.
  - Implemented the path following control and extraction of odometry information from encoder. Evaluated the result in Gazebo before roll-out in real world.

PUBLICATIONS AND POSTERS

[1] Alaa Eldin Abdelaal, **Jiaying Fang**, Tim N. Reinhart, Jacob A. Mejia, Tony Z. Zhao, Chelsea Finn, Jeannette Bohg, and Allison M. Okamura. (2024). **Towards Force-Aware Autonomous Robotic Surgery**. (Manuscript in preparation).

[Poster. 1] Alaa Eldin Abdelaal, **Jiaying Fang**, Tim N. Reinhart, Jacob A. Mejia, Tony Z. Zhao, Chelsea Finn, Jeannette Bohg, and Allison M. Okamura. (2024). **Force-based Robot Learning from Demonstration for Soft Tissue Manipulation**. In *Stanford Human-Centered Artificial Intelligence at Five Conference*.

Skills

- **Programming Languages:** Python, Java, C++, C, MATLAB, R
- **Operating Platforms** Linux (Ubuntu), Raspberry Pi, STM32, Arduino
- **Software Tools:** PyTorch, TensorFlow, Jax, ROS, dVRK, Pandas, Matplotlib, Scikit-learn, Neo4j, Git, Docker, LaTeX, Blender, Mujoco, Gazebo, AutoCAD, SolidWorks
- **Hardware Skills:** 3D Printing, Circuit Design, Prototyping

Honors and Awards

- **Honour Project - Technical Excellence Award** *06 2023*
  Hong Kong Polytechnic University [**Link**]
  - This award aims to recognize final-year students who excel in their Honours Project.
  - Sole recipient of the award in 2022/23.
- **Outstanding Student Award of Faculty of Engineering** *12 2022*
  Hong Kong Polytechnic University [**Link**]
  - A prestigious annual honor awarded to a **single** distinguished final-year undergraduate student within the Faculty of Engineering, Hong Kong Polytechnic University.
  - This award aims to award full-time final-year students who excel in both academic and non-academic pursuits during their studies.
  - Media coverage: [**HK01**]
- **Scholarship on Outstanding Performance** *12 2021*
  H.K.S.A.R. Government [**Link**]
  - This award aims to recognize outstanding local and non-local students studying Hong Kong.
  - The scholarship is $80,000 HKD a year.
- **Dr. Wong Tit-Shing Student Exchange Scholarship** *08 2021*
- **Professor Leung Tin-pui Memorial Scholarship** *05 2021*

Leadership & Volunteer Experience

- **Academic Mentor to Junior Undergraduates** *10 2021 - 12 2021*
  Hong Kong Polytechnic University
  - Provided guidance and academic support to junior students in engineering.
- **Mentor for Underrepresented Middle-School Students in Hong Kong and Africa** *12 2020 - 03 2021*
  Hong Kong Polytechnic University
  - Taught online classes about new technologies to underrepresented students in Hong Kong and Africa.

Professional Service

- **Reviewer of 2024 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)**

Languages

Languages: English (Proficiency level), Mandarin (Proficiency level), Cantonese (Limited)