Qidi Fang

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EDUCATION

Tufts University **GPA: 3.9/4.0**

Master of Science in Computer Engineering *Sep. 2023 - Present*

- **Core Courses:** Reinforcement Learning (A), Human-robot Interaction (A), Probabilistic Robotic (A), Computer Vision (A).

Hangzhou Dianzi University **GPA: 3.3/4.0**

Bachelor of Engineering in Computer Science and Technology *Sep. 2018 - Jul. 2022*

PUBLICATIONS

Fang, Q., Yu, H., Fang, S., Huang, J., Chen, Q., Aronson, R. M., & Short, E. S. (under review). CHARM: Considering Human Attributes for Reinforcement Modeling. ICRA 2025.

Fang, S., Yu, H., **Fang, Q.**, Aronson, R. M., & Short, E. S. (under review). Demonstration Sidetracks: Categorizing Systematic Non-Optimality in Human Demonstrations. ICRA 2025.

Yu, H., **Fang, Q.**, Fang, S., Aronson, R. M., & Short, E. S. How Much Progress Did I Make? An Unexplored Human Feedback Signal for Teaching Robots. RO-MAN 2024.

RESEARCH EXPERIENCE

Assistive Agent and Behavior Learning LAB **Tufts, USA**

Research Assistant *Sep. 2023 - Present*

Advisor:Prof. Elaine Schaertl Short

CHARM: Considering Human Attributes for Reinforcement Modeling

The intuition of my work is that incorporating human characteristics(HC) into simulated feedback oracles can more accurately reflect real human responses, which has the potential to reduce the lab-to-real-world discrepancy in robot learning. ***Submitted to ICRA 2025.***

- Developed CHARM (Considering Human Attributes for Reinforcement Modeling), an oracle generation method that incorporates human characteristics to simulate both scalar feedback and feedback delay.
- Designed a questionnaire to capture six key human attributes believed to influence feedback patterns.
- Conducted two rounds of studies with 46 participants across three long-horizon tasks—nut assembly, coffee preparation, and pick-and-place—using a custom-designed GUI.
- Demonstrated that integrating human characteristics significantly improved feedback prediction accuracy compared to baseline oracles.

Demonstration Sidetracks: Categorizing Systematic Non-Optimality in Human Demonstrations

The intuition of this work is that non-optimal behaviors in non-expert demonstrations are not random but follow systematic patterns, which we call demonstration sidetracks. By identifying and categorizing these patterns, we aim to improve models of non-expert behavior, providing new

insights for improving Learning from Demonstration (LfD) algorithms and reducing discrepancies between lab-based and real-world training data. ***Submitted to ICRA 2025.***

- Investigated and characterized patterns in non-expert demonstrations, showing that non-optimal behaviors follow structured, task-related patterns rather than random noise.
- Analyzed data from a public space study with 40 participants performing a long-horizon task, annotating non-optimal behaviors using a custom-designed GUI and cross-validation process.
- Proposed and defined five categories of demonstration sidetracks: Exploration, Mistake, Alignment, Pause, and One-dimensional Control.
- Demonstrated that demonstration sidetracks are temporally and spatially correlated with task requirements.

Progress Did I Make? An Unexplored Human Feedback Signal for Teaching Robots

The intuition of this work is that using progress as a teaching signal provides valuable information beyond traditional ratings or rankings. It effectively captures task completion, indicates performance, and remains robust to unproductive behaviors without increasing workload. Progress is more consistent across noisy demonstrations, making it ideal for combining with human feedback for robot learning. **Accepted by RO-MAN 2024.**

- Characterized and tested the novel teaching signal "progress" to capture task completion in robot learning.
- Conducted two online studies with 76 crowd-sourced participants and one public space study with 40 non-expert participants to validate the effectiveness of progress.
- Demonstrated that progress is an effective and consistent measure for evaluating non-expert demonstrations, showing its robustness even in sub-optimal, multi-policy settings.
- Released a dataset of 40 non-expert demonstrations from a public space study involving a long-horizon ice cream topping task, contributing to more realistic LfD (Learning from Demonstration) datasets.

Reinforcement Learning & Robot Learning LAB **SJTU, China**

Research Assistant *May. 2023 - Aug. 2023*

Advisor: Prof. Yue Gao

A Comfort-based pHRI Model in a Sex-legged Robotic Guide Dog

The intuition of this project is that the relative spatial positioning between guide dogs and their handlers follows identifiable patterns, which can be replicated in robotic guide dogs to improve comfort and safety. By analyzing these spatial patterns, we aimed to design a model that adapts based on real-world feedback from experiments.

- Proposed a physical Human-Robot Interaction (pHRI) models to represent spatial patterns based on data analysis on guide dog woking videoes.
- Validated and refined the model through public experiments with a robotic guide dog guiding blindfolded participants.
- Deployed the YOLOv5 on Nvidia Xavier NX for human detection, established a ROS workspace for inter-device data transportation, and an joystic-based experiment control and recording environment.Git Repo.

INTERNSHIP EXPERIENCE

Computer Vision Algorithm Engineer **Beijing, China**

TSINGTELLINK Co., Ltd. *Dec. 2022 - Mar. 2023*

- Leveraged a multimodal vehicle-to-everything (V2X) dataset by testing early fusion, late fusion, and class-merge techniques with the PointPillars and CenterPoint algorithms for 3D object detection of cars, trucks, and pedestrians.
- Won the Third Prize (6/500) in Tsinghua AIR-Baidu Apollo Vehicle-Infrastructure Cooperative Autonomous Driving Algorithm Challenge.

SKILLS

- **Technologies:** Git, Pytorch, ROS, Gazebo, Robosuite, Mojuco.
- **Languages:** Python, C++, Java.
- **English Proficiency:** IELTS: 7.0, GRE: 322.