Yiqi Lyu

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EDUCATION

Carnegie Mellon University   Pittsburgh, PA

Master of Science in Mechanical Engineering   Aug 2021 - May 2023

GPA: 3.91/4.00

Relevant Courses: Trustworthy AI Autonomy, Introduction to Machine Learning, Computer Vision, Modern Control Theory and Design, Advanced Control System Integration, Robot Dynamics and Analysis.

Audited Courses: Deep Reinforcement Learning, Deep Learning

Huazhong University of Science and Technology   Wuhan, China

Bachelor of Engineering in Mechanical Design, Manufacturing and Automation   Sep 2015 - Jun 2019

EXPERIENCE

Safe AI Lab, Carnegie Mellon University   Pittsburgh, PA

Research Assistant   Jun 2023 – Present

- Developed generalizable decision-making on robot arms with skill-based policy and energy function.
- Achieved quadrupedal robot mobility via behavior cloning.
- Enhanced smoothness and performance in autonomous driving with residual policy learning.
- Contributed to the morphological design of the Unitree GO1 robot.
- Designed and fabricated customized parts for demonstration with the 3D printer.
- Engineered Python environment wrappers for robot arms including Kinova Gen3 and Ufactory xArm7.
- Assisted in editing the book *Trustworthy Intelligence Autonomy*.

Wuhan Institute of Physics and Mathematics, Chinese Academy of Science   Wuhan, China

Research Assistant   Aug 2020 – Jan 2021

- Designed, fabricated, and assembled a precision air spindle platform for machining optical microcavities.
- Achieved surface roughness of under 10 microns in microcavity made by delicate materials.
- Assisted in frequency stabilization of laser system with PID closed-loop control.

PROJECTS

Skill-based Generalizable Robot Manipulation   Sep 2023 – Present

- Collected expert data on robosuite simulator with rule-based controllers such as A* and RRT.
- Achieve 98% success rate with a skill-based imitation learning policy generalizable to randomly initialized scenarios with task-specific skills inferred by energy-based function.
- Deployed model in real-world dynamic environment with Kinova Gen3 and Ufactory xArm7.
- Improved safety in human interrupting scenarios.

Quadrupedal Robot Mobility   Jun 2023 – Aug 2023

- Leveraged MPC controller to complete tasks and collected data for offline training on MuJoCo.
- Implemented Behavior Cloning algorithm for Unitree quadrupedal robot mobility.

Autonomous Driving Experiment on Carla Simulator   Apr 2023 – May 2023
- Detect objects on roads in adversarial environment with YOLO-v5 and Faster-RCNN algorithm.
- Reduced collision rate by 20% with SAC algorithm in safety-critical scenarios of AV.

Image Identification   Apr 2023 – May 2023
- Achieved 95% accuracy by developing PyTorch-based MLP and 98% accuracy by retraining ResNet-50 for image identification on NIST36 and CIFAR-10 datasets.

Tumbler Robot Balancing   Oct 2022 – Dec 2022
- Implemented MPC control and made a tumbler robot to stand upright in a team of five.
- Built model in Simulink and validated the performance of LQR and MPC controller.
- Smoothen angular movement of the robot with input shaping.

Signal Detection in Noisy Environments   Nov 2022
- Performed phase-sensitive detection with photoresistor in Arduino platform to detect modulated light signal when signal-to-noise ratio is lower than 7dB.

Automatic Transporting Robot   Apr 2018 – Jun 2018
- Collaborated with teammates and developed a robot for transporting objects automatically.
- Implemented programmable logic controller and design program to coordinate movements of a pneumatic clamp and motors.

RESEARCH INTEREST

Data-driven approaches for safe, robust, and generalizable robot control.

Multi-task learning (LLM, Meta Learning, Continual Learning).

Human-robot interaction.

Autonomy.

PUBLICATION

Mechanical Evidence for the Phylogenetic Origin of the Red Panda's False Thumb as an Adaptation to Arboreal Locomotion. *arXiv preprint arXiv:2305.05086*.

Optimization and Analysis of Hemispheric Resonator Gyroscope. (Undergraduate Thesis)

AWARDS & HONORS

Excellent Chinese Youth Volunteer (2017)

Outstanding Minister of Huazhong University of Science and Technology Funding Committee (2016)

Top Score in County in the National College Entrance Examination (Gaokao) (2015)

SKILLS

Programming Language: Python, C++, MATLAB

Algorithms: PyTorch, OpenCV, OpenAI Gym, Numpy, Pandas,

Control: LQR, MPC, Kalman Filter, ROS, Arduino

Mechanics: CAD/CAE, FEA, PLC

ENGLISH PROFICIENCY

GRE: 330   Duolingo: 135   TOEFL: 102