Qianhuang Li

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EDUCATION

Columbia University, ROAM Lab, New York, NY   **Expected Jan. 2023**
Master of Science in Mechanical Engineering, Robotics
GPA: 4.1/4.0
Relevant Coursework: Robot Learning, AI, ML, Reinforcement Learning, Computational Aspect of Robotics

Huazhong University of Science and Technology (HUST), Wuhan, CN   **Jun. 2021**
Bachelor of Science in Mechanical Design, Manufacturing, and Automation(Honor class)
GPA: 3.72/4.0
Relevant Coursework: Machine Design, Software Programming, Robotics, Dynamics and Control

University of California, Santa Barbara, Santa Barbara, CA   **Jun. 2022**
Relevant Research: Robot Haptic Perception, Rehabilitation Soft Robot Glove, Control Method for Reaction
Wheel-based 3D Inverted Pendulum

RESEARCH EXPERIENCE

Sampling-based Exploration for Reinforcement Learning of Dexterous Manipulation   Dec. 2022- Present
Supervisor: Matei Ciocarlie (CU)
- Assisted in implementing reinforcement learning algorithm part of the dexterous hand; Added signal filters in IsaacGym simulator to mimic real model physical signals.
- Tested domain randomization in simulators to prevent effects of model deviations; Fine-tuned the reward functions in the simulator and accurated physical models.
- Implemented algorithm from manipulation to pose-reaching goal; Utilized rapidly exploring random tree (RRT) for quicker state space search.
- Collected contact data from curriculum learning for further analysis.

Fast-moving Bipedal Robot with Gait Optimization   **Sept. 2022- Dec.2022**
Supervisor: Hod Lipson (CU)
- Designed and built a parallel legged robot controlled with LePotato; Trained a model to represent the inverse kinematics in Mujoco.
- Designed a elliptical gait and developed gait pose using the IK model in the Mujoco simulator.
- Implemented stochastic search algorithm and PPO algorithm for gait optimization; Fine-Tuned physical model parameters to increase the robot's movement speed by 3.7 times.

Indoor Mapping Slam Robot Project   **Sept. 2020- Sept. 2021**
Supervisor: Shuting Wang, Ling Ling (HUST)
- Confirmed pre-work research direction through literature research from interdisciplinary perspectives, including information architecture and function division.
- Completed modeling work for robot's appearance and designed the interface; utilized 3D-modeling RTAB-MAP to render robot surroundings using Kinect.
- Confirmed physical production and complete testing; completed the defense, physical display, and live demonstration of the robot.

RFID and face modeling smart supermarket   **Sept. 2020- Aug. 2021**

Supervisor: Bo Tao (HUST)
- Reproduced the essential functions of face recognition using python and improved its versatility.
- Assisted in completing the organic combination of face modeling and 3D printing/RFID.
- Assisted team members to complete feature point recognition of face modeling.
- Completed the RFID scanning accuracy experiment of goods; participated in team brainstorming and improved the original product.

PROJECT EXPERIENCE

Robotic Pick-Place Task Based on Visual Affordance Model   **Feb.2023- May.2023**
Supervisor: Shuran Song (CU)
- Implemented object recognition/obstacle avoidance and pick-place tasks in PyBullet with multiple objects.
- Built the Mini-U-net architecture to learn the grasping pose of gripper from the pictures; Trained the model for grasp process using probability distribution provided by the Gaussian heat map.
- Added Gaussian blur processing to the grasping point and data augmentation processing on the image to make the model more robust.

Learning Robot Motion Control with MPC Demonstration   **Feb.2023-May.2023**
Supervisor: Matei Ciocarlie (CU)
- Utilized different control methods to complete the 2-link robor arm control task learning for a MPC teacher agent to reach available goal in 2D space.
- Compiled the MLP network using velocity and position input for torque output.
- Implemented the DQN and PPO algorithm for the robot arm for more precise goal-reaching poses.

Evolutionary Soft Robots   **Sept.2022- Dec.2022**
Supervisor: Hod Lipson (CU)
- Compiled the program to evolve robots with a variable morphology in the customized physical simulator by using the evolutionary algorithm.
- Built and parameterized mass-spring physics simulator by using C++ and OpenGL.
- Changed the morphology and physical constants of the robot using evolutionary algorithm for a fastest moving speed.

INTERNSHIP EXPERIENCE

Hubei Defon Heat Exchanger Co., Ltd   **Dec. 2019- Feb. 2020**
Internship as assistant engineer
- Collaborate with engineers to restructure heater exchanger physical model
- Conducted simulations of heat exchanger operation in ships using Ansys for product safety testing.

EXTRACURRICULAR ACTIVITIES

Debate   **Captain of debate team at HUST**
Volleyball   **Captain of the volleyball team at HUST**
Robocon   **Participated in the 2018 and 2019 Asia-Pacific Robocon competition**

TECHNICAL SKILLS

ProgrammingLanguages: Python, C++, Linux(Ubuntu)
Libraries: ROS, Python Libraries suchas PyTorch, PyBullet, StableBaselines3, OpenCV
DevTools: PyCharm, Git, VScode, Colaboratory
CadDesign: SolidWorks, AutoDesk, OpenSCAD