QIYUAN QIAO

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LG-02, Haking Wong Building, the University of Hong Kong

EDUCATION

The University of Hong Kong   Sep. 2023 - Present
Ph.D in Computer Science   *Hong Kong*

The University of Hong Kong   Sep. 2022 - Jul. 2023
M.Sc in Mechanical Engineering; Overall GPA: 3.48/4.3   *Hong Kong*

Zhejiang University   Sep. 2018 - Jun. 2022
B.Eng in Mechatronics Engineering; Overall GPA: 3.32/4.0   *Hangzhou*

PUBLICATION

Q. Qiao, Y. Wang, X. Fan, P. Lu, "Lasso Gripper: A String Shooting-Retracting Mechanism for Shape-Adaptive Grasping", submitted to IEEE International Conference on Robotics and Automation 2025.

Q. Qiao, F. Lin, H. Zhao, P. Lu, "TORM: Transparent Objects Reconstruction and Manipulation with Multi-View Segmentation", submitted to IEEE Robotics and Automation Letters.

Q. Qiao, "A cable-driven flexible manipulator", CN Patent ZL202222658004.1, China National Intellectual Property Administration, Oct. 2022

CURRENT RESEARCH

Lasso Gripper: A String Shooting-Retracting Mechanism for Shape-Adaptive Grasping
Advisor: Prof. Peng Lu, The University of Hong Kong   *Hong Kong*

· Proposed a self-supporting string loop mechanism for grasping. Designed the mechanical structure for string shooting and retracting.

· Developed a dynamic model to estimate the string's curve, providing a foundation for the kinematic analysis of the workspace and evaluating the grasping performance.

· Mounted the Lasso Gripper on a UAV to realize the autonomous large-scale dynamic grasping.

TORM: Transparent Objects Reconstruction and Manipulation with Multi-View Segmentation
Advisor: Prof. Peng Lu, The University of Hong Kong   *Hong Kong*

· Introduced a self-supervised deep marching tetrahedra 3D fitting method constrained by multi-view semantic segmentation masks, addressing challenges in accurate 3D reconstruction of transparent objects.

· Utilized GraspNet for grasping tasks and validated the quality of 3D reconstruction through its integration with the proposed method.

· Designed a novel loss function curve to prevent the deep marching tetrahedra from crossing the constrain boundaries during the 3D shape approximation.

RESEARCH EXPERIENCE

Development of Smart Service Robots: Facial Expression Recognition   Sep. 2022 - Jul. 2023
Advisor: Prof. Peng Lu, The University of Hong Kong   *Hong Kong*

· Proposed novel facial expression recognition approach using pyramid cross-fusion transformer network and generative adversary network for frontal face generation, and expression map fusion.

· Collected 7,724 multi-angle facial expression images from 20 subjects for network training, while constructing the hardware equipment.

Drivable Region and Road Anomaly Detection Based on Visual Perception Oct. 2021 - May 2022
Advisor: Prof. Jian Chen, Zhejiang University   *Hangzhou*

- Developed innovative appearance and geometric models for road image analysis, accounting for environmental light and low-texture road images
- Proposed a road segmentation method based on probability distribution, using a likelihood function to calculate road segmentation points with improved accuracy.
- Identified road potholes by transforming disparity information into depth information relative to the camera.

Reliability Analysis Based on High Dimensional Importance Sampling and its Application in Operation and Maintenance of Wind Turbine Mar. 2020 - May 2021
Advisor: Prof. Weifei Hu, Zhejiang University   *Hangzhou*

- Developed a new high-dimensional Importance Sampling method which can build surrogate models more accurately with fewer samples.
- Applied our new sampling method to predict failure probability of the wind turbine blade, and to adjust the operation and maintenance strategy of the wind turbine optimization problem.

ENGINEERING PROJECTS

Course Project, Mechatronics System Jul. 2021 - Aug. 2021
Participant; Instructor: Prof. Liang Hu   *Hangzhou*

- Designed a self-adjusting shutter system for indoor brightness control, including the mechanical mechanism modeled in SolidWorks with an innovative rope control structure.
- Developed the PCB circuit for illumination feedback control using Protel.

Engineering Training Competition of Zhejiang University Aug. 2020 - Sep. 2020
Participant   *Hangzhou*

- Developed a robot car with tracking and grabbing capabilities, featuring a Proportional-Integral-Derivative controller for closed-loop speed on Arduino and object recognition in grasping operations using OpenCV.
- Fabricated the supportive board and robot arm through laser cutting, and created the manipulator with 3D printing techniques.

Course Project, Numerical Methods in Engineering Feb. 2020 - Jun. 2020
Group Leader; Instructor: Prof. Yanpeng Cao   *Hangzhou*

- Implemented a campus path planning system based on the Dijkstra algorithm.
- Modeled and analyzed the mechanical state of a traditional Chinese folk acrobatics – *Chest Crushing Stone* with finite element analysis.

CORPORATE INTERNSHIP

TCL Industrial Research Institute Jun. 2023 - Aug. 2023
SLAM algorithm internship   *Shenzhen*

- Deployed a Cartographer-based LiDAR 2D Simultaneous Localization And Mapping (SLAM) algorithm on logistics vehicles in TCL's Guangzhou CSOT screen panel factory.
- Enhanced loop closure detection in SLAM by incorporating a sliding window with progressively smaller dimensions, reducing relocalization error from 5 cm to 2 cm.

AWARD & GRANTS

Grants for the Key Scientific Research Project of Zhejiang University Student Research Training Program, Mar. 2020

Outstanding Volunteer, the Fifth Chinese "Internet Plus" College Students Innovation and Entrepreneurship Competition, Zhejiang University, Nov. 2019

Grants for Excellent Project of Zhejiang University Student Quality Training Program, Apr. 2019