CONG, QINGZHENG

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EDUCATION BACKGROUND

Durham University, the UK 09/2019-07/2022

- **Bachelor of Engineering**
- **Program:** General Engineering, Mechanical Engineering
- **Compulsory modules:** Electrical Engineering, Electronics Engineering Design, Engineering Mathematics, Solid Mechanics, and Structures, Electronic and Electrical Systems, Thermodynamics and Fluid Mechanics, Engineering Practice, Mathematics for Engineers and Scientists, Material, Turbomachinery, etc.

University of Bristol, the UK 09/2022-09/2023

- **Master of Science** Distinction
- **Program:** Biorobotics
- **Compulsory modules:** Biosystem and Bio robotics (71), Introduction to Artificial Intelligence (78), Bio-Inspired Artificial Intelligence (70), Robotics Research Technology and Methods (70), Robotics Systems (76), Computation and the Brain (81), Dissertation (78), soft robotics (65).

PUBLICATIONS

TacFR-Gripper: A Reconfigurable Fin Ray-Based Compliant Robotic Gripper with Tactile Skin for In-Hand Manipulation

Accepted for publication. Authors: [Qingzheng Cong, Wen fan, Dandan Zhang].

- A 5-DoF Fin Ray-based soft robotic gripper utilizing the 3D printing technique is developed, which incorporates a four-bar mechanism for precise finger movement control and features a reconfigurable mechanism in the palm. This design enables dexterous in-hand manipulation with support from extensive degrees of freedom, allowing for adaptable interaction with a variety of objects.
- A novel approach for tactile data interpretation using a Graph Neural Network (GNN) is introduced, which enhances the efficiency of processing complex tactile information. This innovation advances robotic tactile perception, enabling more reliable and efficient grasping capabilities.

Design and Benchmarking of A Multi-Modality Sensor for Robotic Manipulation with GAN-Based Cross-Modality Interpretation

Accepted for publication. Authors: [Dandan Zhang, Wen Fan, Jialin Lin, Haoran Li, Qingzheng Cong, Weiru Liu, Nathan Lepora, SHAN LUO].

- The innovative ViTacTip sensor a multi-modality fusion device is designed. This sensor excels in gathering both tactile information and visual details like colors and patterns of the objects it interacts with, showcasing its versatile data acquisition capabilities.
- A Generative Adversarial Network (GAN) -based methodology is incorporated to the sensor to enhance modality switching between visual and tactile sensing: This strategy is highly effective

in mitigating the challenges of varying ambient light and enhances the visualization of contact stimulus.
- Comparative studies were conducted between Vitactip, Tactip for tactile sensor benchmarking.

In-vivo Cargo Delivery of Magnetically Micro-robot: A Review
Accepted for publication. Authors: [Jialin Lin, Qingzheng Cong, Dandan Zhang].
- A review of magnetically actuated micro-scale robots (MMRs) for cargo delivery in the aspects of structural design, cargo loading and releasing methods, and tracking and navigation is carried out.

PROJECT EXPERIENCE

Hi-Fi Audio Isolation Platform Design Activity 11/2020-02/2021
- Led the simulation, testing, and optimization of a particle damper.
- Collaborated with a team of five, achieving First-Class Honours (1:1) in the project.

Reduction of vibration in dynamic systems driven by stochastic forces 10/2021-04/2022
- Replicated and validated the stochastic Newmark method for building vibration.
- Modeling and comparing the performance difference between MR damper and conventional damper in high-rise buildings under the influence of earthquakes and hurricane.

Robot Dexterous Hand for In-Hand Manipulation 12/2022-9/2023
- Designed a soft and reconfigurable robotic hand incorporated with a Graphic Neural Network to achieve intricate in-hand manipulation.
- Using Human-robot shared control to extend the robot's capabilities.

Tactile sensor's calibration and data collection platform 12/2023-3/2024
- A compact and low-cost platform is developed allowing various tactile sensors to collect a great amount of tactile data including the shear/contact force, displacement and tactile image information.

Performance Evaluation for Vision-Based Tactile Sensors 8/2024- present
- Proposed evaluation pipelines for assessing VBTS performance in areas such as spatial resolution, force and localization regression, hysteresis sensitivity, and response time.

RESEARCH ENGAGEMENT

The 5th UK Robot Manipulation Workshop, Poster Presentation, [TacFR A Reconfigurable Fin Ray-Based Compliant Robotic Gripper with Tactile Skin for In-Hand Manipulation] 12 January 2024

Imperial Lates [Immersive robotic manipulation] 14 March 2024

IX Open Day [Tactile gripper demonstration] 21 June 2024

OTHER INFORMATION

- Programming languages: Python, C/C++
- Software Proficiency: SolidWorks, Ansys, MS Office Suite, MATLAB, LTspice, ROS, Kicad