

## HANG YUAN

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Google Scholar: <https://scholar.google.com/citations?user=xaBXiK8AAAAJ&hl=zh-CN>

## EDUCATION

### Xi'an Jiaotong-Liverpool University (XJTLU)

Suzhou, China

*Bachelor of Engineering, Mechatronics and Robotics Systems* 09.2020-07.2024 (expected)

### University of Liverpool (UoL)

Liverpool, United Kingdom

*Bachelor of Engineering, Mechatronics and Robotics Systems* 09.2020-07.2024 (expected)

- Weighted Average Mark: 66/100 (British marking criteria)
- GRE General Test: 327 (Verbal: 160; Quantitative: 167) + 4.5 (Analytical Writing)

## PUBLICATIONS

### Peer-Reviewed Journal Papers:

- [1] Yuan, H., Yuan, W. *et al.* (2023) Microfluidic-Assisted *Caenorhabditis elegans* Sorting: Current Status and Future Prospects. *Cyborg and Bionic Systems*, 4, 0011. [DOI: 10.34133/cbsystems.0011](https://doi.org/10.34133/cbsystems.0011). [Cover paper]
- [2] Zhang, J.<sup>†</sup>, Liu, S.<sup>†</sup>, Yuan, H.<sup>†</sup> *et al.* (2023) Deep Learning for Microfluidic-Assisted *Caenorhabditis elegans* Multi-Parameter Identification Using YOLOv7. *Micromachines*, 14, 1339. [DOI: 10.3390/mi14071339](https://doi.org/10.3390/mi14071339).
- [3] Yuan, W., Yuan, H. *et al.* (2023) Facile Microembossing Process for Microchannel Fabrication for Nanocellulose-Paper-Based Microfluidics. *ACS Applied Materials & Interfaces*, 15(5), 6420-6430. [DOI: 10.1021/acsami.2c19354](https://doi.org/10.1021/acsami.2c19354).
- [4] Yuan, W., Yuan, H. *et al.* (2023) Microembossing: A Convenient Process for Fabricating Microchannels on Nanocellulose Paper-Based Microfluidics. *Journal of Visualized Experiments*, 200, e65965. [DOI: 10.3791/65965](https://doi.org/10.3791/65965).

### Peer-Reviewed Conference Papers:

- [5] Yuan H., Zhang W. (2019) A Novel Hedgehog-Inspired Pin-Array Robot Hand with Multiple Magnetic Pins for Adaptive Grasping. In: Yu H. *et al.* (eds.) *12<sup>th</sup> International Conference on Intelligent Robotics and Applications (ICIRA), Proceedings 5(12)*, 684-695. [DOI: 10.1007/978-3-030-27541-9\\_56](https://doi.org/10.1007/978-3-030-27541-9_56).

<sup>†</sup> denotes equal contributions.

## CONFERENCE PARTICIPATION

- [1] Yuan H. *et al.* (2023) A Centrifugation-Assisted Lateral Flow Assay Platform for Bioassay Sensitivity and Visualization Enhancement. *45<sup>th</sup> Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC)*, Sydney, Australia, Jul. 24-27. [Poster]
- [2] Yuan, W., Yuan H. *et al.* (2023) Highly-integrated SERS-Based Immunoassay NanoPADs for Early Diagnosis of Alzheimer's Disease. *45<sup>th</sup> Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC)*, Sydney, Australia, Jul. 24-27. [Poster]

- [3] Liu, S., Li, Y., **Yuan, H.** *et al.* (2023) A Bio-inspired Lateral Flow Assay for Improving the Sensitivity of Low Volume Samples. *19<sup>th</sup> International Meeting on Chemical Sensors (IMCS 2023)*, Changchun, China, Aug. 4-8. [Oral]
- [4] Duan, S., Cai, T., Liu, F., **Yuan, H.** *et al.* (2023) An Offline Deep Learning-Assisted Automated Paper-Based Microfluidic Platform. *27<sup>th</sup> International Conference on Miniaturized Systems for Chemistry and Life Sciences ( $\mu$ TAS 2023)*, Katowice, Poland, Oct. 15-19. [Poster]

## GRANTED PATENTS

- [1] **Yuan H.** A Hedgehog-Inspired Magnetic-Driven Self-Adaptive Pin-Array Robot Hand, CN109397278B[P], 2023. [Invention patent]
- [2] **Yuan H.**, Zhang W. A Cluster-Tube Self-Adaptive Robot Hand with Controllable Force for Rapid Grasping, CN209533441U[P], 2019. [Utility model patent]
- [3] **Yuan H.** A Hedgehog-Inspired Magnetic-Driven Self-Adaptive Pin-Array Robot Hand, CN209190774U[P], 2019. [Utility model patent]
- [4] **Yuan H.** A Parallel and Magnetic-Driven Robot Hand with Linkage Mechanisms, CN209453584U[P], 2019. [Utility model patent]

## RESEARCH EXPERIENCE

**Research Leader**, XJTLU Intelligent Microsystems Laboratory

**Centrifugation-Assisted Lateral Flow Assay (CLFA) Platform**

01.2022-Present

*Supervisor: Dr. Pengfei Song, XJTLU*

- Addressed the limited sensitivity and uncontrollable incubation time of traditional LFA.
- Developed a CLFA platform that offers adjustable rotation speeds and enables smartphone-based quantitative bioassay detection, displaying results on the custom-designed UI and mobile application.
- Developed a bio-inspired microfluidic channel to enhance the bioassay sensitivity of LFA.
- Outcomes: two posters and one oral presentation (Conference Participation [1, 3, 4]).

**Microfluidic-Assisted *Caenorhabditis elegans* (*C. elegans*) Sorting** 07.2022-06.2023

- Provided a review of the up-to-date microfluidic-assisted *C. elegans* sorting developments, and featured by the renowned organizations *AAAS & EurekAlert!*.
- Developed a deep learning model using YOLOv7 to automatically detect and recognize *C. elegans* in microfluidic chips, enabling efficient identification and measurement of multiple phenotypes (e.g., size and movement speed).
- Outcomes: two peer-reviewed journal papers (Publications [1, 2]).

**Assistant Research Leader**, XJTLU Intelligent Microsystems Laboratory

**Nanocellulose-Paper-Based Microfluidic Platform**

07.2022-Present

*Supervisors: Prof. Xinyu Liu, University of Toronto & Dr. Pengfei Song, XJTLU*

- Developed a facile microembossing process using plastic micro-molds to efficiently fabricate microchannels on nanocellulose paper (nanopaper), optimizing the pattern parameters and saving time.
- Developed fundamental microfluidic devices and functional nanopaper-based analytical devices (NanoPADs).
- Detected untreated glial fibrillary acidic protein (GFAP) in human plasma without pretreatment using SERS on NanoPADs, enabling highly sensitive early screening of

Alzheimer's disease.

- Outcomes: two peer-reviewed journal papers (Publications [3, 4]) and one poster (Conference Participation [2]).

**Visiting Student**, Tsinghua Key Laboratory of Advanced Materials Processing Technology

**Self-Adaptive Robot Hands**

01.2018-08.2019

*Supervisor: Dr. Wenzeng Zhang, Tsinghua University*

- Developed a hedgehog-inspired pin-array robot hand with multiple magnetic pins for adaptive grasping.
- Outcomes: four granted patents (Granted patents [1-4]), and one peer-reviewed conference paper (Publications [5]).

## TEACHING EXPERIENCE

**Student lecturer**, XJTLU Optional Course

03.2021-03.2022

- Lectured undergraduate class of about 50 students; demonstrated mechanical design and robot hand techniques.

**Student lecturer**, XJTLU-Affiliated School

09.2021-08.2022

- Lectured high school student class of about 50 students; provided extracurricular courses, including robotics, 3D printing, tea culture, and astronomy.

## HONORS & SELECTED AWARDS

- Excellent Student Cadre (University-wide top 0.1%), Jiangsu Province, China 2022-2023
- Outstanding Student (School-wide top 5%), XJTLU 2021-2022
- Excellent Student Cadre (University-wide top 1%), XJTLU 2020-2021
- The 1<sup>st</sup> Prize of 2022 RoboMaster University Championship in the 21<sup>st</sup> National University Robot Competition *National Regional* 2022-2023
- The 1<sup>st</sup> Prize of 2022 RoboMaster University Championship in the 21<sup>st</sup> National University Robot Competition *Standard Robot Strength Award* 2022-2023
- The 1<sup>st</sup> Prize of RoboWork China Engineering Robotics Competition 2021-2022

## SKILLS

### **Computer Skills & Software:**

- *Programming*: C, Arduino, MATLAB
- *CAD/CAE*: SolidWorks, AutoCAD, ANSYS (workbench), Rhino
- *Graphic design*: Adobe Illustrator, Adobe Premiere, Adobe Photoshop, KeyShot, Origin

### **Experimental Skills:**

- *Fabrication*: 3D printing, wax printing, laser cutting
- *Immunoassays*: Enzyme-linked immunosorbent assay (ELISA), Lateral flow assay (LFA)
- *Chemical synthesis*: AuNPs, AgNPs, Bottlebrush elastomers
- *Characterization*: UV-vis, FTIR, SEM, SERS, XRD

**Language**: Mandarin (Native), English (English-only instruction)