

# HANG YUAN

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## EDUCATION

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

Suzhou, China

*Bachelor of Engineering in Mechatronics and Robotic Systems*

*Expected: June 2024*

**University of Liverpool (UoL)**

Liverpool, United Kingdom

*Bachelor of Engineering in Mechatronics and Robotic Systems*

*Expected: June 2024*

- Weighted Average Mark: 66/100 (British marking criteria)
- Duolingo English Test: 140/160; GRE General Test: 327 + 4.5 (Analytical Writing)

## PUBLICATIONS

### Peer-Reviewed Journal Papers:

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

### Peer-Reviewed Conference Papers:

1. **Yuan H.**, Zhang W. A Novel Hedgehog-Inspired Pin-Array Robot Hand with Multiple Magnetic Pins for Adaptive Grasping. *12<sup>th</sup> International Conference on Intelligent Robotics and Applications (ICIRA)*, Shenyang, China, Aug. 8-11 2019.

## CONFERENCE PARTICIPATION

1. **Yuan H.** *et al.* 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 2023)*, Sydney, Australia, Jul. 24-27, 2023. [Poster]
2. Yuan, W., **Yuan H.** *et al.* 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 2023)*, Sydney, Australia, Jul. 24-27, 2023. [Poster]
3. Liu, S., Li, Y., **Yuan, H.** *et al.* 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, 2023. [Oral]

## 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

*Supervisor: Dr. Pengfei Song, XJTLU*

**Centrifugation-Assisted Lateral Flow Assay (CLFA) Platform** January 2022 - Present

- Developed a CLFA platform with adjustable rotation speeds, enabling smartphone-based quantitative bioassay detection and overcoming limitations of traditional LFA.
- Developed a bio-inspired microfluidic channel to enhance the bioassay sensitivity of LFA.

**Research Leader**, XJTLU

*Supervisor: Dr. Pengfei Song, XJTLU*

**Microfluidic-Assisted *Caenorhabditis elegans* (*C. elegans*) Sorting** July 2022 - June 2023

- Provided a review about *C. elegans* sorting featured by 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).

**Research Assistant**, XJTLU

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

**Nanocellulose-Paper-Based Microfluidic Platform**

July 2022 - Present

- Developed a facile microembossing process using plastic micro-molds to efficiently fabricate microchannels on nanocellulose paper (nanopaper).
- Detected untreated glial fibrillary acidic protein (GFAP) in human plasma without pretreatment using SERS on functional nanopaper-based analytical devices (NanoPADs), enabling highly sensitive early screening of Alzheimer's disease.

**Visiting Student**, Tsinghua University *Supervisor: Dr. Wenzeng Zhang, Tsinghua University*

**Self-Adaptive Robot Hands**

January 2018 - August 2019

- Developed a hedgehog-inspired pin-array robot hand with multiple magnetic pins for adaptive grasping, efficiently adjusting to diverse object shapes and sizes.

## TEACHING EXPERIENCE

**Student lecturer**, XJTLU Optional Course

March 2021 - March 2022

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

**Student lecturer**, XJTLU-Affiliated School

September 2021 - August 2022

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

## SELECTED HONORS & AWARDS

- Excellent Student Cadre (University-wide top 0.1%), Jiangsu Province, China 2022
- Outstanding Student (School-wide top 5%), XJTLU 2022
- Two 1<sup>st</sup> Prizes of 2022 RoboMaster University Championship in the 21<sup>st</sup> National University Robot Competition *National Achievement & Robot Combat 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)

## REFERENCES

- Pengfei Song, Ph. D., Assistant Professor [Pengfei.Song@xjtlu.edu.cn](mailto: Pengfei.Song@xjtlu.edu.cn)  
Department of Mechatronics and Robotics, Xi'an Jiaotong-Liverpool University  
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- Min Chen, Ph. D., Senior Associate Professor [Min.Chen@xjtlu.edu.cn](mailto: Min.Chen@xjtlu.edu.cn)  
Department of Mechatronics and Robotics, Xi'an Jiaotong-Liverpool University  
111 Ren'ai Road, Suzhou, Jiangsu, China 215123 0086-512-81880471
- Xinyu Liu, Ph.D., Professor [xyliu@mie.utoronto.ca](mailto: xyliu@mie.utoronto.ca)  
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5 King's College Road, Toronto, Ontario, Canada M5S 3G8 001-416-978-3040
- Wenzeng Zhang, Ph.D., Associate Professor [wenzeng@tsinghua.edu.cn](mailto: wenzeng@tsinghua.edu.cn)  
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