# HANG YUAN

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## EDUCATION

**Xi'an Jiaotong-Liverpool University (XJTLU)** Suzhou, China
*Bachelor of Engineering in Mechatronics and Robotic Systems* *Expected: Jun. 2024*
**University of Liverpool (UoL)** Liverpool, United Kingdom
*Bachelor of Engineering in Mechatronics and Robotic Systems* *Expected: Jun. 2024*

- TOEFL iBT Test: 100/120; Duolingo English Test: 140/160; GRE General Test: 327 + 4.5

## PUBLICATIONS

**Peer-Reviewed Journal Papers:**

1. **H. Yuan**, W. Yuan *et al*., Microfluidic-Assisted *Caenorhabditis elegans* Sorting: Current Status and Future Prospects. *Cyborg and Bionic Systems*, *4*, 0011, Apr. 2023. [Cover paper]
2. J. Zhang†, S. Liu†, **H. Yuan**† *et al*., Deep Learning for Microfluidic-Assisted *Caenorhabditis elegans* Multi-Parameter Identification Using YOLOv7. *Micromachines*, *14*, 1339, Jun. 2023. † denotes equal contributions.
3. W. Yuan, **H. Yuan** *et al*., A SERS nanocellulose-paper-based analytical device for ultrasensitive detection of Alzheimer's disease. *Analytica Chimica Acta*, *1301*, 342447, May 2024.
4. W. Yuan, **H. Yuan** *et al*., Facile Microembossing Process for Microchannel Fabrication for Nanocellulose-Paper-Based Microfluidics. *ACS Applied Materials & Interfaces*, *15*(5), 6420-6430, Jan. 2023.
5. W. Yuan, **H. Yuan** *et al*., Microembossing: A Convenient Process for Fabricating Microchannels on Nanocellulose Paper-Based Microfluidics. *Journal of Visualized Experiments*, *200*, e65965, Oct. 2023.
6. J. Zhu, **H. Yuan** *et al*., The Impact of Short Videos on Student Performance in an Online-Flipped College Engineering Course. *Humanities and Social Sciences Communications*, *9*, 327, Sep. 2022.
7. W. Yuan†, K. Jiao†, **H. Yuan** *et al.*, MOFs/Heterojunction Structures for Surface-enhanced Raman Scattering with Enhanced Sensitivity and Tailorability. *ACS Applied Materials & Interfaces*, Apr. 2024. [Cover Paper] (Pending publication) † denotes equal contributions.
8. P. Song, P. Ou, Y. Wang, **H. Yuan** *et al*., An Ultrasensitive FET Biosensor Based on Vertically Aligned $MoS_2$ Nanolayers with Abundant Surface Active Sites. *Analytica Chimica Acta*, *1252*, 341036, Apr. 2023.
9. L. Wang, L. He, F. Liu, **H. Yuan** *et al*., Mechanical Characterization of Multifunctional Metal-Coated Polymer Lattice Structures. *Materials*, *17*(3), 741, Feb. 2024.
10. K. Jiao, W. Cao, W. Yuan, **H. Yuan** *et al*., Cellulose Nanostructures as Tunable Substrates for Nanocellulose-Metal Hybrid Flexible Composites. *ChemPlusChem*, *2024*, e202300704, Feb. 2024.
11. S. Duan, T. Cai, F. Liu, Y. Li, **H. Yuan** *et al*., Automatic offline-capable smartphone paper-

based microfluidic device for efficient Alzheimer's disease detection. *Analytica Chimica Acta*, Apr. 2024. (Pending publication)

**Peer-Reviewed Conference Papers:**

1. **H. Yuan**, W. Zhang, A Novel Hedgehog-Inspired Pin-Array Robot Hand with Multiple Magnetic Pins for Adaptive Grasping. *12th International Conference on Intelligent Robotics and Applications (ICIRA)*, *5*(12), 684-695, Shenyang, China, Aug. 8-11, 2019.
2. S. Duan, R. Yong, **H. Yuan** *et al*., Automated Offline Smartphone-Assisted Microfluidic Paper-Based Analytical Device for Biomarker Detection of Alzheimer's Disease. *46th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC 2024)*, Orlando, U.S.A., Jul. 15-19, 2024. (Pending publication)
3. J. Sun, S. Duan, R. Yong, **H. Yuan** *et al*., An automated microfluidic paper-based analytical device for chemiluminescence immunoassay. *EMBC 2024*, Orlando, U.S.A., Jul. 15-19, 2024. (Pending publication)
4. L. Wang, Z. Zhang, M. Chen, J. Xie, F. Liu, **H. Yuan** *et al.*, Machine Learning-Based Fatigue Life Evaluation of the Pump Spindle Assembly with Parametrized Geometry. *ASME 2023 International Mechanical Engineering Congress & Exposition (IMECE)*, *87684*, V011T12A022, New Orleans, USA, Oct. 29-Nov. 2, 2023.

## CONFERENCE PARTICIPATION

1. **H. Yuan** *et al*., A Centrifugation-Assisted Lateral Flow Assay Platform for Bioassay Sensitivity and Visualization Enhancement. 45*th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC 2023)*, Sydney, Australia, Jul. 24-27, 2023. [Poster]
2. W. Yuan, **H. Yuan** *et al*., Highly-integrated SERS-Based Immunoassay NanoPADs for Early Diagnosis of Alzheimer's Disease. *EMBC 2023*, Sydney, Australia, Jul. 24-27, 2023. [Poster]
3. S. Liu, Y. Li, **H. Yuan** *et al*., A Bio-inspired Lateral Flow Assay for Improving the Sensitivity of Low Volume Samples. *19th International Meeting on Chemical Sensors (IMCS 2023)*, Changchun, China, Aug. 4-8, 2023. [Oral]
4. S. Duan, T. Cai, F. Liu, **H. Yuan** *et al*., An Offline Deep Learning-Assisted Automated Paper-Based Microfluidic Platform. *27th International Conference on Miniaturized Systems for Chemistry and Life Sciences (μTAS 2023)*, Katowice, Poland, Oct. 15-19, 2023. [Poster]

## GRANTED PATENTS

1. **H. Yuan**, W. Zhang, A Cluster-Tube Self-Adaptive Robot Hand with Controllable Force for Rapid Grasping, CN109571539B[P], 2023. [Invention patent]
2. **H. Yuan**, A Parallel and Magnetic-Driven Robot Hand with Linkage Mechanisms, CN109531610B[P], 2023. [Invention patent]
3. **H. Yuan**, A Hedgehog-Inspired Magnetic-Driven Self-Adaptive Pin-Array Robot Hand, CN109397278B[P], 2023. [Invention patent]
4. P. Song, S. Duan, E.G. Lim, T. Cai, **H. Yuan**, C. Zhao, A Smartphone-Based Automated Paper-Based Microfluidic System, CN116338159B[P], 2024. [Invention patent]
5. **H. Yuan**, W. Zhang, A Cluster-Tube Self-Adaptive Robot Hand with Controllable Force for Rapid Grasping, CN209533441U[P], 2019. [Utility model patent]
6. **H. Yuan**, A Hedgehog-Inspired Magnetic-Driven Self-Adaptive Pin-Array Robot Hand,

CN209190774U[P], 2019. [Utility model patent]

7. **H. Yuan**, A Parallel and Magnetic-Driven Robot Hand with Linkage Mechanisms, CN209453584U[P], 2019. [Utility model patent]

## RESEARCH EXPERIENCES

**Research Leader**, XJTLU *Supervisor: Dr. Pengfei Song, XJTLU*

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

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

**Research Leader**, XJTLU *Supervisor: Dr. Pengfei Song, XJTLU*

**Microfluidic-Assisted *Caenorhabditis elegans* (*C. elegans*) Sorting** Jul. 2022 - Jun. 2023

- Provided a review about *C. elegans* sorting featured by organizations *AAAS & EurekAlert!*.
- Developed a deep learning model using YOLOv7 to automatically detect and measure multiple phenotypes of *C. elegans* in microfluidic chips (*e.g.*, size and movement speed).

**Research Assistant**, XJTLU

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

**Nanocellulose Paper (nanopaper)-Based Microfluidic Platform** Jul. 2022 - Present

- Developed a facile microembossing process using plastic micro-molds to fabricate microchannels on nanopaper efficiently.
- Detected glial fibrillary acidic protein in human plasma using SERS on nanopaper-based analytical devices, enabling high-sensitive preclinical detection of Alzheimer's disease.

**Mechanical Engineer & Investment Manager**, XJTLU

*Supervisors: Prof. Cezhou Zhao, XJTLU & Dr. Chun Zhao, XJTLU*

**Competitive Combat Robots** Oct. 2020 - Oct. 2022

- Designed and fabricated mechanical components for robots, including the launching and mobility mechanisms, using several materials (*e.g.*, carbon fiber, resin, and nylon).

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

**Self-Adaptive Robot Hands** Jan. 2018 - Aug. 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 EXPERIENCES

**Student lecturer**, XJTLU Optional Course Mar. 2021 - Mar. 2022

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

**Student lecturer**, XJTLU-Affiliated School Sep. 2021 - Aug. 2022

- Lectured high school student class of about 50 students; provided extracurricular courses.

## SKILLS

**Computer Skills & Software:**

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

## SELECTED HONORS & AWARDS

- Final Year Project Best Student Poster (School-wide top 1), XJTLU 2024
- Outstanding Student (University-wide top 0.1%), Jiangsu Province, China 2024
- Excellent Student Cadre (University-wide top 0.1%), Jiangsu Province, China 2022
- Outstanding Student (School-wide top 5%), XJTLU 2022 & 2023
- Two $1^{st}$ Prizes of 2022 RoboMaster University Championship in the $21^{st}$ National University Robot Competition *National Achievement & Robot Combat Award* 2022-2023
- The $1^{st}$ Prize of RoboWork China Engineering Robotics Competition 2021-2022

## SERVICE & ACTIVITIES

- **Executive Director**, Yuanhe Technology (Changzhou) *Co., Ltd.* 2022-Present
- **Academic Buddy**, XJTLU 2021-2022
- **President & Liaison Minister**, XJTLU Sagittarius Astronomy Club 2021-2022