

# HANG YUAN

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## EDUCATION

**Michigan State University (MSU)**

*Ph.D. student in Biomedical Engineering*

East Lansing, U.S.A.

*From: Aug. 2024*

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

*B.Eng. in Mechatronics and Robotic Systems (First Class (Honours))*

Suzhou, China

*Sep. 2020 - Jun. 2024*

**University of Liverpool (UoL)**

Liverpool, United Kingdom

*B.Eng. in Mechatronics and Robotic Systems (First Class (Honours))*

*Sep. 2020 - Jun. 2024*

## PUBLICATIONS

### Peer-Reviewed Journal Papers:

1. **H. Yuan**<sup>†</sup>, R. Yong<sup>†</sup>, W. Yuan<sup>†</sup> *et al.*, Centrifugation-assisted lateral flow assay platform: enhancing bioassay sensitivity with active flow control. *Microsystems & Nanoengineering*, 11, 101, May 2025. <sup>†</sup> denotes equal contributions.
2. **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]
3. **H. Yuan**, W. Yuan *et al.*, Navigating the uncertainty: the impact of a student-centered final year project allocation mechanism on student performance. *Humanities and Social Sciences Communications*, 11, 776, Jun. 2024.
4. J. Zhang<sup>†</sup>, S. Liu<sup>†</sup>, **H. Yuan**<sup>†</sup> *et al.*, Deep Learning for Microfluidic-Assisted *Caenorhabditis elegans* Multi-Parameter Identification Using YOLOv7. *Micromachines*, 14, 1339, Jun. 2023.
5. 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.
6. 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.
7. 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.
8. 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.
9. W. Yuan<sup>†</sup>, K. Jiao<sup>†</sup>, **H. Yuan** *et al.*, MOFs/Heterojunction Structures for Surface-enhanced Raman Scattering with Enhanced Sensitivity and Tailorability. *ACS Applied Materials & Interfaces*, 16(20), 26374-26385, Apr. 2024. [Cover Paper]
10. M. Lu<sup>†</sup>, W. Yuan<sup>†</sup>, R. Yong, **H. Yuan** *et al.*, Facile Laser Cutting Process for Nanocellulose-Paper-Based Microfluidic Microchannel Fabrication. *IEEE Sensors Journal*, 25, 4, Feb.

2025.

11. P. Song, P. Ou, Y. Wang, **H. Yuan et al.**, An Ultrasensitive FET Biosensor Based on Vertically Aligned MoS<sub>2</sub> Nanolayers with Abundant Surface Active Sites. *Analytica Chimica Acta*, 1252, 341036, Apr. 2023.
12. 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.
13. 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.
14. S. Duan, T. Cai, F. Liu, Y. Li, **H. Yuan et al.**, Automatic offline-capable smartphone paper-based microfluidic device for efficient biomarker detection of Alzheimer's disease. *Analytica Chimica Acta*, 1308, 342575, Apr. 2024.

#### Peer-Reviewed Conference Papers:

1. **H. Yuan**, W. Zhang, 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)*, 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. *46<sup>th</sup> Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC'24)*, Orlando, U.S.A., Jul. 15-19, 2024.
3. J. Sun, S. Duan, R. Yong, **H. Yuan et al.**, An Automated Microfluidic Paper-Based Analytical Device for Chemiluminescence Immunoassay. *EMBC'24*, Orlando, U.S.A., Jul. 15-19, 2024.
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**<sup>†</sup>, R. Yong<sup>†</sup> *et al.*, A Centrifugation-Assisted Lateral Flow Assay Platform for Bioassay Sensitivity and Visualization Enhancement. *EMBC'23*, Sydney, Australia, Jul. 24-27, 2023. [Poster] <sup>†</sup> denotes equal contributions.
2. W. Yuan, **H. Yuan et al.**, Highly-integrated SERS-Based Immunoassay NanoPADs for Early Diagnosis of Alzheimer's Disease. *EMBC'23*, Sydney, Australia, Jul. 24-27, 2023. [Poster]
3. R. Yong<sup>†</sup>, W. Yuan<sup>†</sup>, **H. Yuan et al.**, Nanocellulose-Paper-Based Analytical Devices with MOFs/Heterojunction Structures for Multiplex SERS Detection. *EMBC'24*, Orlando, U.S.A., Jul. 15-19, 2024. [Poster]
4. S. Liu, Y. Li, **H. Yuan 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]
5. S. Duan, T. Cai, F. Liu, **H. Yuan et al.**, 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, 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 Assistant, MSU**

*Supervisor: Dr. Jinxing Li, MSU*

**Dual-Microbe Biomaterials**

Aug. 2024 - Present

**Research Assistant, XJTLU**

*Supervisor: Dr. Pengfei Song, XJTLU*

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

Jan. 2022 - Jul. 2024

- Developed a CLFA platform with adjustable rotation speeds, enabling smartphone-based quantitative bioassay and active sample flow control.

**Research Assistant, 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 - Jul. 2024

- Developed a facile microembossing process using plastic micro-molds to fabricate microchannels at micrometer-scale on nanopaper efficiently.
- Detected glial fibrillary acidic protein in artificial plasma using SERS on nanopaper-based analytical devices, enabling high-sensitive biomarker 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

**Student lecturer**, XJTLU-Affiliated School

Sep. 2021 - Aug. 2022

## SKILLS

### Computer Skills & Software:

- *Programming*: C, Arduino, MATLAB
- *CAD/CAE*: SolidWorks, Blender, AutoCAD, ANSYS (workbench)
- *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)
- *Microbiology*: Fungal and bacterial cultures
- *Chemical synthesis*: AuNPs, AgNPs, Liquid crystal elastomers
- *Characterization*: UV-vis, FTIR, SEM, EDX, SERS, XRD, Confocal microscope

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

## SELECTED HONORS & AWARDS

- The IET Prize, The Institution of Engineering and Technology 2024
- Excellent Undergraduate Final Year Project Award, Jiangsu Province, China 2024
- Best Performance in Final Year Project (School-wide top 1), XJTLU 2024
- 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
- The 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

## SERVICE & ACTIVITIES

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