

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.[†], Liu, S.[†], **Yuan, H.**[†] *et al.* Deep Learning for Microfluidic-Assisted *Caenorhabditis elegans* Multi-Parameter Identification Using YOLOv7. *Micromachines*, 14, 1339, Jun. 2023. [†] 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.
5. Zhu, J., **Yuan, H.** *et al.* The Impact of Short Videos on Student Performance in an Online-Flipped College Engineering Course. *Humanities and Social Sciences Communications*, 9, 327, Sept. 2022.
6. Song, P., Ou, P., Wang, Y., **Yuan, H.** *et al.* An Ultrasensitive FET Biosensor Based on Vertically Aligned MoS₂ Nanolayers with Abundant Surface Active Sites. *Analytica Chimica Acta*, 1252, 341036, Apr. 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. *12th International Conference on Intelligent Robotics and Applications (ICIRA)*, Shenyang, China, Aug. 8-11 2019.
2. Wang, L., Zhang, Z., Chen, M., Xie, J., Liu, F., **Yuan, H.** *et al.* Machine Learning-Based Fatigue Life Evaluation of the Pump Spindle Assembly with Parametrized Geometry. *ASME 2023 International Mechanical Engineering Congress & Exposition (IMECE)*, New Orleans, USA, Oct. 29-Nov. 2 2023.

CONFERENCE PARTICIPATION

1. **Yuan H.** *et al.* A Centrifugation-Assisted Lateral Flow Assay Platform for Bioassay

- Sensitivity and Visualization Enhancement. 45th 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. 45th 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. 19th International Meeting on Chemical Sensors (IMCS 2023), Changchun, China, Aug. 4-8, 2023. [Oral]
 4. Duan, S., Cai, T., Liu, F., **Yuan, H.** *et al.* An Offline Deep Learning-Assisted Automated Paper-Based Microfluidic Platform. 27th International Conference on Miniaturized Systems for Chemistry and Life Sciences (μ TAS 2023), Katowice, Poland, Oct. 15-19, 2023. [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

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.

Mechanical Engineer & Investment Manager, XJTLU

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

Competitive Combat Robots

October 2020 - October 2022

- Designed and fabricated mechanical components for robots, including the launching and mobility mechanisms, using several materials (e.g., carbon fiber, resin, and nylon).
- Authored proposals for companies to support team operations; funded ¥ 60,000.

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.

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)

SELECTED HONORS & AWARDS

- Excellent Student Cadre (University-wide top 0.1%), Jiangsu Province, China 2022
- Outstanding Student (School-wide top 5%), XJTLU 2022
- Two 1st Prizes of 2022 RoboMaster University Championship in the 21st National University Robot Competition *National Achievement & Robot Combat Award* 2022-2023
- The 1st 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
- **Vice President**, XJTLU Tea Club 2020-2021