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. DOI: 10.34133/cbsystems.0011. [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. DOI: 10.3390/mi14071339. † 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. DOI: 10.1021/acsami.2c19354.
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. DOI: 10.3791/65965.
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. DOI: 10.1057/s41599-022-01355-6.
6. Song, P., Ou, P., Wang, Y., **Yuan, H.** *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. DOI: 10.1016/j.aca.2023.341036.

Peer-Reviewed Conference Papers:

7. **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. DOI: 10.1007/978-3-030-27541-9_56.
8. 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 (μTAS 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 — Suzhou, China
Centrifugation-Assisted Lateral Flow Assay (CLFA) Platform — January 2022 - Present
Supervisor: Dr. Pengfei Song, XJTLU

- Developed a CLFA platform with adjustable rotation speeds, enabling smartphone-based quantitative bioassay detection and overcoming the limited sensitivity and uncontrollable incubation time of traditional LFA.
- 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]).

Research Leader, XJTLU — Suzhou, China
Microfluidic-Assisted *Caenorhabditis elegans* (*C. elegans*) Sorting — July 2022 - June 2023
Supervisor: Dr. Pengfei Song, XJTLU

- 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).
- Outcomes: two peer-reviewed journal papers (Publications [1, 2]).

Research Assistant, XJTLU Suzhou, China
Nanocellulose-Paper-Based Microfluidic Platform July 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).
- 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.
- Outcomes: two peer-reviewed journal papers (Publications [3, 4]) and one poster (Conference Participation [2]).

Research Assistant, XJTLU Suzhou, China
Humanoid Robot and Fatigue Analysis May 2021 - October 2021
Supervisors: Dr. Min Chen, XJTLU & Dr. Quan Zhang, XJTLU

- Developed humanoid robots based on Raspberry Pi, and programmed motion sequences.
- Assisted in analyzing a specific-sized spindle model to predict its fatigue life under various external loading conditions, validating numerical simulations.
- Outcomes: national 1^{st} prize and one peer-reviewed conference paper (Publications [8]).

Mechanical Engineer & Investment Manager, XJTLU Suzhou, China
Competitive Combat Robots October 2020 - October 2022
Supervisors: Prof. Cezhou Zhao, XJTLU & Dr. Chun Zhao, XJTLU

- 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.
- Outcomes: national 1^{st}, 2^{nd}, and 3^{rd} prizes and provincial 1^{st}, 2^{nd}, and 3^{rd} prizes.

Visiting Student, Tsinghua University Beijing, China
Self-Adaptive Robot Hands January 2018 - August 2019
Supervisor: Dr. Wenzeng Zhang, Tsinghua University

- Developed a hedgehog-inspired pin-array robot hand with multiple magnetic pins for adaptive grasping, efficiently adjusting to diverse object shapes and sizes.
- Outcomes: four granted patents (Granted patents [1-4]), and one peer-reviewed conference paper (Publications [7]).

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)

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.

HONORS

- Excellent Student Cadre (University-wide top 0.1%), Jiangsu Province, China 2022
- Entrepreneurship Star (University-wide top 1%), XJTLU 2022 & 2023
- Outstanding Student (School-wide top 5%), XJTLU 2022
- Excellent Student Cadre (University-wide top 1%), XJTLU 2021

SELECTED AWARDS

- The 1^{st} Prize of 2022 RoboMaster University Championship in the 21^{st} National University Robot Competition *National Regional* 2022-2023
- The 1^{st} Prize of 2022 RoboMaster University Championship in the 21^{st} National University Robot Competition *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
- **Liaison Minister**, XJTLU G-Master Robot Club 2021-2022
- **Vice President**, XJTLU Tea Club 2020-2021