

HANG YUAN

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EDUCATION

Xi'an Jiaotong-Liverpool University (XJTLU), Suzhou, China | B.Eng. **2020-Current**
Year 3 | Major in Mechatronics and Robotics Systems (GPA: Top 15% ranking)

PUBLICATIONS

Journal:

- [1] **Yuan, H.**, Yuan, W., Duan, S. *et al.* (2023) Microfluidic-Assisted *Caenorhabditis elegans* Sorting: Current Status and Future Prospects. *Cyborg and Bionic Systems*, 4, 0011. <https://spj.science.org/doi/10.34133/cbsystems.0011>.
- [2] Zhang, J.[†], Liu, S.[†], **Yuan, H.**[†] *et al.* (2023) Deep Learning for Microfluidic-Assisted *Caenorhabditis elegans* Multi-Parameter Identification Using YOLOv7. *Micromachines*, 14, 1339. <https://doi.org/10.3390/mi14071339>.
- [3] Yuan, W., **Yuan, H.**, Jiao, K. *et al.* (2023) Facile Microembossing Process for Microchannel Fabrication for Nanocellulose-Paper-Based Microfluidics. *ACS Applied Materials & Interfaces*, 15(5), 6420-6430. <https://pubs.acs.org/doi/10.1021/acsami.2c19354>.
- [4] Zhu, J., **Yuan, H.**, Zhang, Q. *et al.* (2022) The Impact of Short Videos on Student Performance in an Online-Flipped College Engineering Course. *Humanities and Social Sciences Communications* 9, 327. <https://doi.org/10.1057/s41599-022-01355-6>.
- [5] Song, P., Ou, P., Wang, Y., **Yuan, H.** *et al.* (2023) An Ultrasensitive FET Biosensor Based on Vertically Aligned MoS₂ Nanolayers with Abundant Surface Active Sites. *Analytica Chimica Acta*, 341036. <https://www.sciencedirect.com/science/article/pii/S000326702300257X>.

Conference:

- [6] **Yuan H.**, Yong, R., Liu, S. *et al.* (2023) 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'23). [Poster]
- [7] **Yuan H.**, Zhang W. (2019) A Novel Hedgehog-Inspired Pin-Array Robot Hand with Multiple Magnetic Pins for Adaptive Grasping. In: Yu H. *et al.* (eds.) 12th International Conference on Intelligent Robotics and Applications (ICIRA), *Proceedings* 5(12), 684-695. https://doi.org/10.1007/978-3-030-27541-9_56.
- [8] Yuan, W., **Yuan H.**, Duan, S. *et al.* (2023) 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'23). [Poster]
- [9] Liu, S., Li, Y., **Yuan, H.** *et al.* (2023) A Bio-inspired Lateral Flow Assay for Improving the Sensitivity of Low Volume Samples. 19th International Meeting on Chemical Sensors (IMCS 2023). [Oral presentation]
- [10] Duan, S., Cai, T., Liu, F., **Yuan, H.** *et al.* (2023) An Offline Deep Learning-Assisted Automated Paper-Based Microfluidic Platform. 27th International Conference on Miniaturized Systems for Chemistry and Life Sciences (μ TAS 2023). [Poster]
- [11] Wang, L., Zhang, Z., Chen, M., Xie, J., Liu, F., **Yuan, H.** *et al.* (2023) Machine Learning-Based Fatigue Life Evaluation of the Pump Spindle Assembly with Parametrized Geometry. *ASME's International Mechanical Engineering Congress & Exposition (IMECE)* (accepted). [Full-length paper]

GRANTED PATENTS

- [1] **Yuan H.**, Zhang W. A Cluster-Tube Self-Adaptive Robot Hand with Controllable Force for Rapid Grasping, CN109571539A[P], 2019.

- [2] **Yuan H.** A Hedgehog-Inspired Magnetic-Driven Self-Adaptive Pin-Array Robot Hand, CN109397278A[P], 2019.
- [3] **Yuan H.** A Parallel and Magnetic-Driven Robot Hand with Linkage Mechanisms, CN109531610A[P], 2019.

RESEARCH EXPERIENCES

Centrifugation-Assisted Lateral Flow Assay (CLFA) Platform | Research Leader **01.2022-Current**

XJTLU Intelligent Microsystems Laboratory *Supervisor: Pengfei Song*

- Addressed the limited sensitivity and uncontrollable incubation time of traditional LFA.
- Developed a CLFA platform that offers adjustable rotation speeds and enables smartphone-based quantitative bioassay detection, displaying results on the custom-designed UI and mobile application.
- Developed a bio-inspired microfluidic channel to enhance the sensitivity of LFA in bioassays.
- Outcomes: two international conference papers (Publications [6, 9, 10]).

Microfluidic-Assisted *Caenorhabditis elegans* (*C. elegans*) Sorting | Research Leader **07.2022-06.2023**

XJTLU Intelligent Microsystems Laboratory *Supervisor: Pengfei Song*

- Provided a comprehensive review of the up-to-date microfluidic-assisted *C. elegans* sorting developments from several angles to suit researchers with different backgrounds.
- Accepted as a cover paper and featured by the renowned organization *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 journal papers (Publications [1, 2]).

Nanocellulose-Paper-Based Microfluidic Platform | Assistant Research Leader **07.2022-Current**

XJTLU Intelligent Microsystems Laboratory *Supervisor: Xinyu Liu & Pengfei Song*

- Developed a facile microembossing process using plastic micro-molds to efficiently fabricate microchannels on nanocellulose paper (nanopaper), optimizing the pattern parameters and saving time.
- Developed fundamental microfluidic devices and functional nanopaper-based analytical devices (NanoPADs).
- Performed colorimetric experiments and tested the droplet generation.
- Detected untreated glial fibrillary acidic protein (GFAP) in human plasma without pretreatment using SERS on NanoPADs, enabling highly sensitive early screening of Alzheimer's disease.
- Outcomes: one journal paper and one international conference paper (Publications [3, 8]).

Humanoid Robot and Fatigue Analysis | Research Assistant **05.2021-10.2021**

XJTLU Summer Undergraduate Research Fellowships (SURF) Project *Supervisor: Min Chen & Quan Zhang*

- Developed humanoid robots based on Raspberry Pi or Arduino, and programmed motion sequences.
- Assisted in the numerical and experimental analysis of a specific-sized spindle model to predict and compare fatigue life under various external loading conditions, validating the accuracy and reliability of the numerical simulation.
- Outcomes: national 1st prize and one international conference paper (Publication [11]).

ROBOMASTER National University Robot Competitions | Mechanical Engineer & Investment Manager

XJTLU Embedded Artificial Intelligence Hardware Universities-Enterprises Joint Key Laboratory **10.2020-10.2022**

Supervisor: Cezhou Zhao & Chun Zhao

- Designed mechanical components for an automated sentry robot, including the launching and mobility mechanisms, enabling the launch of 17mm projectiles and rapid disassembly from the track.
- Fabricated robots using appropriate materials (e.g., fiberglass, carbon fiber, resin, and nylon).
- Authored business proposals and secured enterprise sponsorships to support team funding and operations.
- Outcomes: national 1st, 2nd, and 3rd prizes and provincial 1st, 2nd, and 3rd prizes.

Self-Adaptive Robot Hands | Visiting Student **01.2018-08.2019**

Key Laboratory for Advanced Materials Processing Technology of Tsinghua University *Supervisor: Wenzeng Zhang*

- Developed a hedgehog-inspired pin-array robot hand with multiple magnetic pins for adaptive grasping.
- Developed a self-adaptive robot hand with controllable gripping force and a magnetic-driven robot hand for parallel

gripping, enabling quickly grasping objects with diverse shapes.

- Outcomes: three granted patents, and one international conference paper (Publication [7]).

HONOURS & AWARDS:

- Three 1st prizes, one 2nd prizes, and three 3rd prizes in national-level competitions 2021-2023
- Two 1st prizes, five 2nd prizes, and six 3rd prizes in provincial-level competitions 2021-2023
- Three 1st prizes in university-level competitions 2021-2023
- *Excellent Student Cadre (University-wide top 0.1%), Jiangsu Province* 2022-2023
- *Outstanding Student (School-wide top 5%), XJTLU* 2021-2022
- *Excellent Student Cadre & Outstanding Class Cadre (University-wide top 1%), XJTLU* 2020-2021
- *Entrepreneurship Star (University-wide top 1%), XJTLU* 2021-2022 & 2022-2023

TEACHING ACTIVITIES

Student lecturer, XJTLU Optional Course **03.2021-03.2022**

- Delivered lectures for the optional “Unlocking Robot Hands” course on mechanical design and robot hands.

Student Mentor, XJTLU-Affiliated school **09.2021-08.2022**

- Taught extracurricular courses to high school students, 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

Language: Mandarin (Native), English