

# Hao REN



☎ Phone: +86 15700758956

✉ Email: [renhao\\_hnu@163.com](mailto:renhao_hnu@163.com)

🌐 Homepage: <https://renhaosiat.github.io/>

Department of Electronic and Computer Engineering, HKUST

**Research Interest:** Robotics, Tactile sensing and perception, Bio-inspired robots

## EDUCATION & WORK EXPERIENCE

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**The Hong Kong University of Science and Technology (QS Ranking: 44)** 2022.10 – Present

*Postdoc Research Fellow(2025.07-Present), Visiting Student (2022.10-2025.07)*

Department of Electronic and Computer Engineering & Cheng Kar-Shun Robotics Institute

Supervisor: [Yajing SHEN](#)

**City University of Hong Kong (QS Ranking: 63)** 2021.09 – 2025.07

*PhD in Mechanical Engineering (GPA:3.82/4.0)*

Department of Mechanical Engineering & Department of Biomedical Engineering

Supervisor: [Yajing SHEN](#)

**University of Chinese Academy of Sciences (CAS)** 2018.09 – 2021.07

*Master in Control Engineering (Ranking:2/120, Outstanding Graduate)*

Shenzhen Institute of Advanced Technology

Supervisor: [Xinyu WU](#) & [Wanfeng SHANG](#)

**Hunan University (985, 211)** 2014.09 – 2018.07

*Bachelor in Electrical Engineering and Automation (Ranking:6/236, Outstanding Graduate)*

College of Electrical and Information Engineering

Mentor: [Fuhai LI](#), [Zhikang SHUAI](#), Lu Fang, Haoming Chen

## PUBLICATIONS

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- [1] **Hao Ren**, Liu Yang, Hong-yuan Chang, Tieshan Zhang, Gen Li, Xiong Yang, Yifeng Tang, Wanfeng Shang, and Yajing Shen\*. "A robust and omnidirectional-sensitive electronic antenna for tactile-induced perception." *Nature Communications*, 2025. (Q1 TOP, IF: 15.7, Ranking: 10/135 in MULTIDISCIPLINARY SCIENCES) [*Impact > 86% articles in similar age (217693 total), Consulted by academic institutions and industry leaders, including TU Delft, Peng Cheng Laboratory, SUSTech, Haier Smart Home, and InDentClean HealthTech*]
- [2] **Hao Ren**<sup>#</sup>, Jiale Wang<sup>#</sup>, Liu Yang, Tieshan Zhang, Gen Li, Yifeng Tang, Tak Nok Douglas Yu, and Yajing Shen\*. "A portable wireless spirometer device for long-term pulmonary function monitoring and training." *Biosensors and Bioelectronics*, 2025. (Q1 TOP, IF: 10.5, Ranking: 3/79 in BIOPHYSICS) [*Reported by CCTV, TVB, WenWei Po, Ming Po, in cooperation with hospital for clinical verification*]
- [3] Tieshan Zhang<sup>#</sup>, **Hao Ren**<sup>#</sup>, Gen Li, Panbing Wang, Wanfeng Shang, and Yajing Shen\*. "High-precision metallic helical microstructure fabrication by rotational nanorobotic manipulation system with tilted mandrel compensation." *IEEE/ASME Transactions on Mechatronics*, 2023. (Q1 TOP, IF: 7.3, Ranking: 8/183 in ENGINEERING, MECHANICAL)
- [4] Wanfeng Shang (Supervisor), **Hao Ren**, Zhengkun Yi, Tiantian Xu, and Xinyu Wu\*. "High precision PCB soldering with pin springback compensation by robotic micromanipulation." *IEEE/ASME Transactions on Mechatronics*, 2022. (Q1 TOP, IF: 7.3, Ranking: 8/183 in ENGINEERING, MECHANICAL) [*First author excluding supervisor*]
- [5] Wanfeng Shang (Supervisor), **Hao Ren**, Mingjian Zhu, Tiantian Xu, and Xinyu Wu\*. "Dual rotating microsphere using robotic feedforward compensation control of cooperative flexible

- micropipettes." *IEEE Transactions on Automation Science and Engineering*, 2020. (Q1, IF: 6.4, Ranking: 14/89 in AUTOMATION & CONTROL SYSTEMS) [*First author excluding supervisor*]
- [6] **Hao Ren**, Wanfeng Shang, Niannian Li, and Xinyu Wu\*. "A fast parameterized gait planning method for a lower-limb exoskeleton robot." *International Journal of Advanced Robotic Systems*, 2020. (Q3, IF: 2.1)
- [7] Xiong Yang, **Hao Ren**, Dong Guo, Zhengrong Ling, Tieshan Zhang, Gen Li, Yifeng Tang, Yajing Shen\*. "A Soft Tactile Unit with Three-Dimensional Force and Temperature Mathematical Decoupling Ability for Robots." *Engineering*, 2025. (Q1, IF: 11.6, Ranking: 3/175 in ENGINEERING, MULTIDISCIPLINARY) [*Journal of Chinese Academy of Engineering*]
- [8] Tieshan Zhang<sup>#</sup>, Gen Li<sup>#</sup>, **Hao Ren**, Liu Yang, Xiong Yang, Rong Tan, Yifeng Tang, Dong Guo, Haoxiang Zhao, Wanfeng Shang, Yajing Shen\*. "Sub-millimeter fiberoptic robot with integrated maneuvering, imaging, and biomedical operation abilities." *Nature Communications*, 2024. (Q1 TOP, IF: 15.7, Ranking: 10/135 in MULTIDISCIPLINARY SCIENCES)
- [9] Yifeng Tang, Gen Li, Tieshan Zhang, **Hao Ren**, Xiong Yang, Liu Yang, Dong Guo, and Yajing Shen\*. "Digital channel-enabled distributed force decoding via small datasets for hand-centric interactions." *Science Advances*, 2025. (Q1 TOP, IF: 12.5, Ranking: 12/135 in MULTIDISCIPLINARY SCIENCES)
- [10] Liu Yang<sup>#</sup>, Tieshan Zhang<sup>#</sup>, Han Huang, **Hao Ren**, Wanfeng Shang, and Yajing Shen\*. "An on-wall-rotating strategy for effective upstream motion of untethered millirobot: Principle, design, and demonstration." *IEEE Transactions on Robotics*, 2023. (Q1 TOP, IF: 10.5, Ranking: 5/48 in ROBOTICS)

### Conference paper:

- [11] **Hao Ren**, Jiale Wang, Liu Yang, Tieshan Zhang, Gen Li, Yifeng Tang, Tak Nok Douglas Yu, and Yajing Shen. "A portable wireless spirometer device for long-term pulmonary function monitoring and training." *2025 IEEE International Conference on Robotics and Biomimetics (ROBIO)*
- [12] **Hao Ren**, Xinyu Wu, and Wanfeng Shang. "Robotic micromanipulation for active pin alignment in electronic soldering industry." In *2021 IEEE International Conference on Robotics and Automation (ICRA)*
- [13] **Hao Ren**, Wanfeng Shang, Niannian Li, and Xinyu Wu. "Multi-objective Gait Optimization of Lower-limb Exoskeleton Robot." In *2020 IEEE International Conference on Real-time Computing and Robotics (RCAR)*
- [14] **Hao Ren**, Du-Xin Liu, Niannian Li, Yong He, Zefeng Yan, and Xinyu Wu. "On-line dynamic gait generation model for wearable robot with user's motion intention." In *2018 IEEE International Conference on Information and Automation (ICIA)*, [*Best Student Paper Shortlist*]

### PATENTS

- [1] Wanfeng Shang, **Hao REN**, Xinyu Wu, et al. "Method, device, equipment and medium for determining parameters of automatic soldering process" CN112935442A
- [2] Wanfeng Shang, Xinyu Wu, **Hao REN**, et al. "Correction methods, devices, equipment and storage media for component pins" CN112975947B
- [3] Wanfeng Shang, Xinyu Wu, **Hao REN**, et al. "Online soft soldering visual servo control method and system" CN111069728A

### PROJECTS & FUNDS

- [1] **Research, Academic and Industry Sectors One-plus Scheme (RAIS+)**, "Agile Executive Terminal for Robots", 30,000,000 HKD, 2024, *Member*
- [2] **NSFC/RGC Joint Research Fund** (Project N\_HKUST638/23), "Research on millimeter scale continuum robot and probe for endoscopic laser surgery", 1,000,000 RMB, 2023, *Core Member*
- [3] **Shenzhen - Hong Kong - Macau Key Research Fund** (Project SGDX2020110309300301), "Research on submillimeter continuum robot for lung end bronchial examination", 1,000,000 RMB, 2021, *Core Member*

## AWARDS

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First Prize, China Robot Competition in 2016	Top 1% granted
Second Prize, World Robot Contest in 2017	Top 5% granted
National Scholarship for Graduate Student in 2020	Top 0.2% granted
Beijing Outstanding Graduate Student in 2021	Top 1% granted
The president scholarship of SIAT, Chinese Academy of Sciences in 2020	Top 0.5% granted
National Scholarship for Undergraduate Student in 2020	Top 1% granted
Hunan Province Outstanding Undergraduate in Innovation and Entrepreneurship	Top 0.4% granted
Top <b>10</b> Excellent Student/Group of Hunan University in 2016	Top 0.3% granted
Third Prize, China Physics Tournament in 2015	Top 10% granted

## TEACHING

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### BME2036 Engineering Computing

*City University of Hong Kong*

Teaching students to formulate mathematical models of engineering problems on MATLAB and carry out the theoretical computation. 2023-24 Semester A

### Final-year Project of Undergraduate Students

*Hong Kong University of Science and Technology*

Co-supervising undergraduate students to carry out final-year projects for graduation in

[1] *AI-powered artificial lateral line system for hydrodynamics perception* 2025-26 Semester

[2] *Smart capsule robot for simultaneous wireless imaging and therapy [2nd Award]* 2023-24 Semester

### Undergraduate Research Opportunities Series

*Hong Kong University of Science and Technology*

Co-supervising undergraduate students to carry out research projects in

[1] *Interface of A portable spirometer based on a bioinspired flexible airflow sensor* 2024-25 Summer

[2] *Bioinspired tactile sensor development and its AI-powered robotic application* 2023-24 Fall

[3] *AI-assisted Intelligent toothbrushing behaviors monitoring and assessment system* 2023-24 Spring

## ACADEMIC SERVICES

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[1] As **session chair** of “Sensors and Wearable Electronics” in IEEE International Conference on Robotics and Biomimetics (ROBIO), Bangkok, Thailand

[2] As **co-peer reviewer (with supervisors) for top-tier international journals**: Science Robotics, Nature Communications, IEEE Transactions on Robotics, Advanced Science, Advanced Intelligent Systems,

[3] As **independent peer reviewer** for international journals and conferences:

- IEEE Robotics & Automation Magazine ×1
- IEEE/ASME Transactions on Mechatronics ×1
- IEEE Transactions on Industrial Informatics ×1
- IEEE Transactions on Automation Science and Engineering ×1
- IEEE Robotics and Automation Letters ×2
- IEEE Conference on Robotics and Automation ×2
- IEEE International Conference on Robotics and Biomimetics ×3
- IEEE International Conference on Real-time Computing and Robotics ×3

# 任 豪

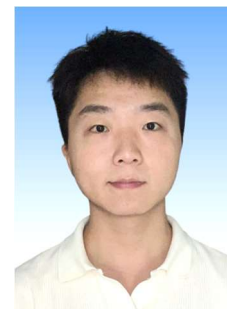
☎ 电话: +86 15700758956

✉ 邮箱: [renhao\\_hnu@163.com](mailto:renhao_hnu@163.com)

👤 个人主页: <https://renhaosiat.github.io/>

香港科技大学, 电子与计算机工程系

研究方向: 机器人, 机器人触觉传感及感知算法, 仿生机器人



## 教育及工作经历

香港科技大学 (QS 排名 44)

2022.10 – 至今

博士后研究员(2025.07-至今), 访问学生(2022.10 -2025.07)

电子与计算机工程系 & 机器人研究所

导师: [申亚京](#)

香港城市大学 (QS 排名 63)

2021.09 – 2025.07

机械工程博士学位 (GPA: 3.82/4.0)

工学院机械工程学系 & 工学院生物医学工程学系

导师: [申亚京](#)

中国科学院大学 (中科院)

2018.09 – 2021.07

控制工程硕士学位 (排名: 2/120, 优秀毕业生)

深圳先进技术研究院

导师: [吴新宇](#) & [尚万峰](#)

湖南大学 (985, 211)

2014.09 – 2018.07

电气工程及其自动化学士学位 (排名: 6/236, 优秀毕业生)

电气与信息工程学院

指导老师: [黎福海](#), [帅智康](#), 方璐, 陈浩民

## 论文发表

- [1] **Hao Ren**, Liu Yang, Hong-yuan Chang, Tieshan Zhang, Gen Li, Xiong Yang, Yifeng Tang, Wanfeng Shang, and Yajing Shen\*. "A robust and omnidirectional-sensitive electronic antenna for tactile-induced perception." *Nature Communications*, 2025. (一区 TOP, IF: 15.7, Ranking: 10/135 in MULTIDISCIPLINARY SCIENCES) [影响力超越同周期 86% 的文章 (共计 217693 篇), 收到代尔夫特理工大学, 鹏城实验室, 南方科技大学, 海尔智能家居事业部, 英特科伶健康科技等研究单位和工业界的合作咨询]
- [2] **Hao Ren**#, Jiale Wang#, Liu Yang, Tieshan Zhang, Gen Li, Yifeng Tang, Tak Nok Douglas Yu, and Yajing Shen\*. "A portable wireless spirometer device for long-term pulmonary function monitoring and training." *Biosensors and Bioelectronics*, 2025. (一区 TOP, IF: 10.5, Ranking: 3/79 in BIOPHYSICS) [被央视频, TVB, 明报, 文汇报等媒体报道, 正与医院合作进行临床效果验证]
- [3] Tieshan Zhang#, **Hao Ren**#, Gen Li, Panbing Wang, Wanfeng Shang, and Yajing Shen\*. "High-precise metallic helical microstructure fabrication by rotational nanorobotic manipulation system with tilted mandrel compensation." *IEEE/ASME Transactions on Mechatronics*, 2023. (一区 TOP, IF: 7.3, Ranking: 8/183 in ENGINEERING, MECHANICAL)
- [4] Wanfeng Shang (Supervisor), **Hao Ren**, Zhengkun Yi, Tiantian Xu, and Xinyu Wu\*. "High precision PCB soldering with pin springback compensation by robotic micromanipulation." *IEEE/ASME Transactions*

on *Mechatronics*, 2022. (一区 TOP, IF: 7.3, Ranking: 8/183 in ENGINEERING, MECHANICAL) [除导师外第一作者]

- [5] Wanfeng Shang (Supervisor), Hao Ren, Mingjian Zhu, Tiantian Xu, and Xinyu Wu\*. "Dual rotating microsphere using robotic feedforward compensation control of cooperative flexible micropipettes." *IEEE Transactions on Automation Science and Engineering*, 2020. (Q1, IF: 6.4, Ranking: 14/89 in AUTOMATION & CONTROL SYSTEMS) [除导师外第一作者]
- [6] Hao Ren, Wanfeng Shang, Niannian Li, and Xinyu Wu\*. "A fast parameterized gait planning method for a lower-limb exoskeleton robot." *International Journal of Advanced Robotic Systems*, 2020. (Q3, IF: 2.1)
- [7] Xiong Yang, Hao Ren, Dong Guo, Zhengrong Ling, Tieshan Zhang, Gen Li, Yifeng Tang, Yajing Shen\*. "A Soft Tactile Unit with Three-Dimensional Force and Temperature Mathematical Decoupling Ability for Robots." *Engineering*, 2025. (Q1, IF: 11.6, Ranking: 3/175 in ENGINEERING, MULTIDISCIPLINARY)
- [8] Tieshan Zhang<sup>#</sup>, Gen Li<sup>#</sup>, Hao Ren, Liu Yang, Xiong Yang, Rong Tan, Yifeng Tang, Dong Guo, Haoxiang Zhao, Wanfeng Shang, Yajing Shen\*. "Sub-millimeter fiberoptic robot with integrated maneuvering, imaging, and biomedical operation abilities." *Nature Communications*, 2024. (一区 TOP, IF: 15.7, Ranking: 10/135 in MULTIDISCIPLINARY SCIENCES)
- [9] Yifeng Tang, Gen Li, Tieshan Zhang, Hao Ren, Xiong Yang, Liu Yang, Dong Guo, and Yajing Shen\*. "Digital channel-enabled distributed force decoding via small datasets for hand-centric interactions." *Science Advances*, 2025. (一区 TOP, IF: 12.5, Ranking: 12/135 in MULTIDISCIPLINARY SCIENCES)
- [10] Liu Yang<sup>#</sup>, Tieshan Zhang<sup>#</sup>, Han Huang, Hao Ren, Wanfeng Shang, and Yajing Shen\*. "An on-wall-rotating strategy for effective upstream motion of untethered millirobot: Principle, design, and demonstration." *IEEE Transactions on Robotics*, 2023. (一区 TOP, IF: 10.5, Ranking: 5/48 in ROBOTICS)

## 会议论文:

- [11] Hao Ren, Jiale Wang, Liu Yang, Tieshan Zhang, Gen Li, Yifeng Tang, Tak Nok Douglas Yu, and Yajing Shen. "A portable wireless spirometer device for long-term pulmonary function monitoring and training." *2025 IEEE International Conference on Robotics and Biomimetics (ROBIO)*
- [12] Hao Ren, Xinyu Wu, and Wanfeng Shang. "Robotic micromanipulation for active pin alignment in electronic soldering industry." In *2021 IEEE International Conference on Robotics and Automation (ICRA)*
- [13] Hao Ren, Du-Xin Liu, Niannian Li, Yong He, Zefeng Yan, and Xinyu Wu. "On-line dynamic gait generation model for wearable robot with user's motion intention." In *2018 IEEE International Conference on Information and Automation (ICIA)* [最佳学生论文提名]

## 发明专利

- [1] 尚万峰, 任豪, 吴新宇, 等. "自动焊接工艺参数的确定方法、装置、设备以及介质" CN112935442A
- [2] 尚万峰, 吴新宇, 任豪, 等. "在线软钎焊视觉伺服控制方法及系统" CN111069728A
- [3] 尚万峰, 吴新宇, 任豪, 等. "元器件引脚的矫正方法、装置、设备及存储介质" CN112975947B

## 项目经历

- [1] 香港产学研 1+计划 (RAISe+), "智能机器人执行终端", 30,000,000 港币, 2024, 成员
- [2] 国自然/香港政府联合研究基金 (Project N\_HKUST638/23), "用于内窥镜激光手术的毫米尺度连续体机器人及末端探头研究", 1,000,000 RMB, 2023, 核心成员
- [3] 深港科技计划 C 类 (Project SGDX2020110309300301), "用于肺部末端支气管检查的亚毫米连续体机器人研究", 1,000,000 RMB, 2021, 核心成员



获奖经历

中国机器人大赛一等奖 (2016)	前 1%
世界机器人大赛二等奖(2017)	前 5%
研究生国家奖学金 (2020)	前 0.2%
北京市优秀毕业生 (2021)	前 1%
中国科学院深圳先进技术研究院院长奖学金特别奖 (2020)	前 0.5%
本科生国家奖学金 (2016)	前 1%
湖南省创新创业优秀毕业生 (2018)	前 0.4%
湖南大学十佳学子/团体 (2016)	前 0.3%
全国大学生物理竞赛三等奖 (2015)	前 10%

教学经历

<b>BME2036 工程计算</b>	香港城市大学
负责工程计算课程实验课程，教授学生使用 Matlab 进行工程计算问题的构建以及求解	2023-24 秋季学期
<b>本科生毕业设计</b>	香港科技大学
指导学生进行毕业设计的实验设计，数据采集以及模型分析	
[1] 基于仿生人工测线的水下机器人水流动力学感知	2025-26 学年
[2] 具备实时成像与原位治疗的智能胶囊机器人 [二等奖]	2023-24 学年
<b>本科生科研训练计划</b>	香港科技大学
指导学有余力的本科生参与科研项目实践	
[1] 针对便携式肺功能评测系统的交互式界面开发	2024-25 暑期
[2] 仿生触觉传感器设计及触觉感知算法研究	2023-24 秋季学期
[3] AI 辅助的智能刷牙习惯监测与评估系统开发	2023-24 春季学期

学术服务

- [1] 担任学术会议分会场主席：“Sensors and Wearable Electronics” in IEEE International Conference on Robotics and Biomimetics (ROBIO), Bangkok, Thailand
- [2] 担任顶级期刊审稿人 (协助导师): Science Robotics, Nature Communications, IEEE Transactions on Robotics, Advanced Science, Advanced Intelligent Systems,
- [3] 独立担任国际期刊与会议审稿人：
- IEEE Robotics & Automation Magazine ×1
  - IEEE/ASME Transactions on Mechatronics ×1
  - IEEE Transactions on Industrial Informatics ×1
  - IEEE Transactions on Automation Science and Engineering ×1
  - IEEE Robotics and Automation Letters ×2
  - IEEE Conference on Robotics and Automation ×2
  - IEEE International Conference on Robotics and Biomimetics ×3
  - IEEE International Conference on Real-time Computing and Robotics ×3