

YAJING SHEN

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BIOGRAPHY

Prof. **Yajing Shen** received his PhD in 2012 from Fukuda Lab at Nagoya University, Japan. He is currently an Associate Professor in the Department of Electronic & Computer Engineering and served as the Director of the Center for Smart Manufacturing at The Hong Kong University of Science and Technology (HKUST), Hong Kong, China. Before joining HKUST, he worked as a Postdoc (2012-2013) at Nagoya University, Japan; Assistant Professor (2013-2019) and Associate Professor (2019-2022) at The City University of Hong Kong (CityU), Hong Kong, China.

Prof. **Shen's** primary research interests include miniature intelligent robotic systems, particularly in bioinspired miniature robotics, micro/nano robotic manipulation system, and human-robot interaction. He has published over 200 peer-reviewed journal and conference papers, including in top multidisciplinary journals such as *Science Robotics* (2), *Nature Communications* (4), *PNAS* (1), as well as leading specialized robotic journals like *IEEE Trans on Robotics* (4) and major international conference such as *ICRA*, *IROS*. His work has garnered widespread attention from international media, including Associated Press, Thomson Reuters, AAAS, CCTV, TVB, etc.

In addition to fundamental research, Prof. **Shen** also made significant achievements in technology transfer for commercialization. He holds 23 patents, some of which have successfully transitioned to market applications. His robotic techniques have greatly improved efficiency and productivity in industry, and the commercialized equipment received the “Hong Kong Awards for Industries: Equipment and Machinery Design Certificate of Merit” in 2018. Notably, his recent achievement “Agile Executive Terminal for Robots” has opened new avenues for intelligent robotic manipulation and interaction, garnering recognition from venture capitalists and industrial partners. The initiative was also granted funding under the “Raise+” scheme, a project from Hong Kong Government aimed at technology transfer, with maximum support of 100,000,000 HKD. As a result of these accomplishments, he was selected as a Fellow of the HKUST Founders’ Club and recognized as The Hong Kong Young Scientist of Entrepreneur by the Hong Kong InnoX Academy.

Prof. **Shen** is a Senior Member of IEEE, and serves as Vice-Chair of the IEEE Hong Kong Magnetism Chapter and Co-Chair of IEEE Nano Technology Council Nano-Biomedicine Technical Committee. He is also an Executive Member of several organizations in China, including the China Automation Society Robotic Technical Committee, China Micro-nano Robot Society, China Coexisting-Cooperative-Cognitive Robot Society, and China Instrument Sensory Society. Currently, he serves on the editorial boards of several journals, including *Engineering* (Ranked 2/307 in the General Engineering field), *Frontiers in Robotics and AI*, *Robot Learning*, *Sensors*, and so on. Additionally, he was an Associate Editor for the flagship robotic journal *IEEE Trans on Robotics* from 2019 to 2022.

As a university educator, Prof. **Shen** strive not only to teach UG/PG courses but also to ignite students’ interest, foster critical thinking, and cultivate their ability for self-learning and innovation. To broaden students’ knowledge, he has developed several interdisciplinary courses, such as “Micro/Nano Technology for Biomedical Engineering” and “Bioinspired Robotics: From Nature to Engineering”. He has supervised 12 PhD students, 11 of whom are continuously pursuing academic careers at TOP universities, with 3 receiving the “NSFC Excellent Young Scientists Overseas” award (formerly Young Thousand Talents Program) shortly after graduation.

Prof. **Shen** has received several prestigious awards, including the Best Manipulation Paper Award at the IEEE International Conference on Robotics and Automation (*ICRA*), the IEEE Robotics and Automation Society Japan Chapter Young Award, the Early Career Award from Hong Kong UGC, the Big-on-Small Award at MARSS, and 2018 China Top 10 scientific and technological progress in robotics. He was also honored as an IEEE Distinguished lecturer in 2019 and received the Outstanding

Supervisor Award in 2020. Notably, in 2019, he was awarded the “National Excellent Young Scientist Fund (Hong Kong & Macau)” for his work on micro/nano robot, the only awardee in the field of robotics.

EMPLOYMENT & EDUCATION

The Hong Kong University of Science and Technology *Sept 2022 - Present*
Associate Professor, Department of Electronic & Computer Engineering

City University of Hong Kong *Jun 2013 - Aug 2022*
Associate Professor, Department of Biomedical Engineering, 2019-22
Assistant Professor, Department of Mechanical & Biomedical Engineering, 2013-19

Nagoya University *Oct 2008 - Mar 2013*
Postdoc, Micro-nano System Engineering, 2012-13
PhD (*Supervisor: Toshio Fukuda*), Micro-nano System Engineering, 2008-12

Xi'an Jiaotong University *Sept 2001 - Apr 2008*
Master, Mechanical and Automation Engineering, 2005-08
Bachelor, Mechanical and Automation Engineering, 2001-05

TEN REPRESENTATIVE WORKS

Meaning of notation: (1) for my HKUST student; (2) for my non-HKUST student; (3) for my post-doc/RA; and (4) for my former supervisor. The co-authors (numbered with 2) are my PhD students officially enrolled at CityU. They joined me at HKUST after I began my career here in 2022 and have been conducting research in my lab ever since.

1. R. Tan (2, 3), X. Yang (2, 3), H. Lu (2), **Y. Shen***, “One-step formation of polymorphous sperm-like microswimmers by vortex turbulence-assisted microfluidics”, *Nature Communications*, 15, 4761, 2024. ([Editors' highlights](#)) [[html](#)]
2. Y. Yang (2), **Y. Shen***, “A liquid metal-based module emulating the intelligent preying logic of flytrap”, *Nature Communications*, 15, 3398, 2024. [[html](#)]
3. L. Yang (2, 3), T. Zhang (2), H. Huang (2), H. Ren (2), W. Shang*, **Y. Shen***, “An on-wall-rotating strategy for effective upstream motion of untethered millirobot: principle, design and demonstration”, *IEEE Transactions on Robotics*, 39 (3): 2419-2428, 2023. [[html](#)]
4. X. Yang (2), R. Tan (2), H. Lu (2), T. Fukuda (4), **Y. Shen***, “Milli-scale cellular robots that can reconfigure morphologies and behaviors simultaneously”, *Nature Communications*, 13 (1), 1-11, 2022. [[html](#)]
5. P. Wang (2), M. A. R. Azad, X. Yang (2), P. Martelli, K.Y. Cheung, J. Shi*, **Y. Shen***, “Self-adaptive and efficient propulsion of Ray sperms at different viscosities enabled by heterogeneous dual helices”, *PNAS*, 118(23), 2021. [[html](#)]
6. Y. Yan (2), Z. Hu, Z. Yang, W. Yuan, C. Song, J. Pan*, **Y. Shen***, “Bio-inspired soft tactile sensor with self-decoupling and super-resolutive ability”, *Science Robotics*, 6(51), 2021. ([highlighted by Science through video](#))[[html](#)]
7. X. Yang (2), W. Shang, H. Lu (2), Y. Liu (2), L. Yang (2), R. Tan (2), X. Wu*, **Y. Shen***, “An agglutinate magnetic spray transforms inanimate objects into millirobots for biomedical applications”, *Science Robotics*, 5(48), 2020. ([featured by CCTV](#))[[html](#)]
8. H. Lu (2), M. Zhang (3), Y. Yang (2), Q. Huang, T. Fukuda (4), Z. Wang*, **Y. Shen***, “A bioinspired multilegged millirobot that functions in both dry and wet conditions”, *Nature Communications*, 9(3944), 2018. ([top 5 most read Nature Communications articles in physics in 2018](#); [top 10 progress in Robotic in China in 2018](#)) [[html](#)]

9. H. Lu (2), W. Shang, H. Xie*, **Y. Shen***, “Ultrahigh Precise Rotational Positioning under Microscope: Nanorobotic System, Modeling, Control and Applications”, *IEEE Transactions on Robotics*, 34(2), pp. 497-507, 2018. [\[html\]](#)
10. **Y. Shen***, W. Wan (2), H. Lu (2), T. Fukuda (4), and W. Shang, “Automatic Sample Alignment under Microscopy for 360° Imaging Based on the Nanorobotic Manipulation System”, *IEEE Transactions on Robotics*, 33(1), pp. 220-226, 2017. [\[html\]](#)

PUBLICATIONS (SELECTED)

Meaning of notation: (1) for my HKUST student; (2) for my non-HKUST student; (3) for my post-doc/RA; and (4) for my former supervisor. The co-authors (numbered with 2) are my PhD students officially enrolled at CityU. They joined me at HKUST after I began my career here in 2022 and have been conducting research in my lab ever since.

Journal

1. R. Tan (2, 3), X. Yang (2, 3), H. Lu (2), **Y. Shen***, “One-step formation of polymorphous sperm-like microswimmers by vortex turbulence-assisted microfluidics”, *Nature Communications*, 15, 4761, 2024. [\[html\]](#)
2. Y. Yang (2), **Y. Shen***, “A liquid metal-based module emulating the intelligent preying logic of flytrap”, *Nature Communications*, 15, 3398, 2024. [\[html\]](#)
3. T. Zhang (2), H. Ren (2), G. Li (2), P. Wang (2), W. Shang, **Y. Shen***, “High-Precise Metallic Helical Microstructure Fabrication by Rotational Nanorobotic Manipulation System With Tilted Mandrel Compensation”, *IEEE/ASME Transactions on Mechatronics*, 29 (1): 214-223, 2024. [\[html\]](#)
4. L. Yang (2, 3), T. Zhang (2), H. Huang (2), H. Ren (2), W. Shang*, **Y. Shen***, “An on-wall-rotating strategy for effective upstream motion of untethered millirobot: principle, design and demonstration”, *IEEE Transactions on Robotics*, 39 (3): 2419-2428, 2023. [\[html\]](#)
5. J. Miao (2), T. Zhang (2), G. Li (2), D. Guo (2), S. Sun (2), R. Tan (2), J. Shi, **Y. Shen***, “Flagellar/Ciliary Intrinsic Driven Mechanism Inspired All-in-One Tubular Robotic Actuator”, *Engineering*, 23, 170-180, 2023. [\[html\]](#)
6. S. Sun (2), J. Miao (2), R. Tan (2), T. Zhang (2), G. Li (2), **Y. Shen***, “Asymmetric Soft-Structure Functional Surface for Intelligent Liquids’ Distinction, Transportation, and Reaction Mixer”, *Advanced Functional Materials*, 33(1), 2209769, 2023. [\[html\]](#)
7. T. Zhang (2), G. Li (2), X. Yang (2), H. Ren (2), D. Guo (2), H. Wang, K. Chan, Z. Ye, T. Zhao, C. Zhang, W. Shang*, **Y. Shen***, “A Fast Soft Continuum Catheter Robot Manufacturing Strategy Based on Heterogeneous Modular Magnetic Units”, *Micromachines*, 14(5), 911, 2023. [\[html\]](#)
8. J. Miao (2), S. Sun (2), T. Zhang (2), G. Li (2), H. Ren (2), **Y. Shen***, “Natural Cilia and Pine Needles Combinedly Inspired Asymmetric Pillar Actuators for All-Space Liquid Transport and Self-Regulated Robotic Locomotion”, *ACS Applied Materials & Interfaces*, 14 (44), 50296-50307, 2022. [\[html\]](#)
9. H. Huang (2), Y. Feng (2), X. Yang (2), **Y. Shen***, “Natural gum-based electronic ink with waterproofing self-healing and easy-cleaning properties for directly on-skin electronics”, *Biosensors and Bioelectronics*, 214, 114547, 2022. [\[html\]](#)
10. Y. Tang (2), T. Zhang (2), H. Ren (2), W. Zhang (2), G. Li (2), D. Guo (2), L. Yang (2), R. Tan (2), **Y. Shen***, “Highly sensitive spherical cap structure-based iontronic pressure sensors by a mold-free fabrication approach”, *Smart Materials and Structures*, 31 (9), 095030, 2022. [\[html\]](#)
11. X. Yang (2), R. Tan (2), H. Lu (2), T. Fukuda (4), **Y. Shen***, “Milli-scale cellular robots that can reconfigure morphologies and behaviors simultaneously”, *Nature Communications*, 13 (1), 1-11, 2022. [\[html\]](#)

12. L. Yang (2), J. Miao (2), G. Li (2), H. Ren (2), T. Zhang (2), D. Guo (2), Y. Tang (2), W. Shang*, **Y. Shen***, “Soft Tunable Gelatin Robot with Insect-like Claw for Grasping, Transportation, and Delivery”, *ACS Applied Polymer Materials*, 4(8), 5431, 2022. [\[html\]](#)
13. J. Miao (2), T. Zhang (2), G. Li (2), W. Shang, **Y. Shen***, “Magnetic artificial cilia carpets for transport, mixing, and directional diffusion”, *Advanced Engineering Materials*, 24 (7), 2101399, 2022. [\[html\]](#)
14. Y. Yang (2), X. Li, **Y. Shen***, “Electrode Array-Free Tactile Sensor for Addressable Force Sensing Assisted by a Neural Network”, *ACS Applied Polymer Materials*, 4(6), 4551–4557, 2022. [\[html\]](#)
15. W. Shang, H. Lu (2), Y. Yang (2), **Y. Shen***, “7-DoFs Rotation-Thrust Microrobotic Control for Low-Invasive Cell Pierce via Impedance Compensation”, *IEEE/ASME Transactions on Mechatronics*, 2022. [\[html\]](#)
16. R. Tan (2), X. Yang (2), H. Lu (2), L. Yang (2), T. Zhang (2), J. Miao (2), Y. Feng (2), **Y. Shen***, “Nanofiber-based biodegradable millirobot with controllable anchoring and adaptive stepwise release functions”, *Matter*, 5(4), 1277-1295, 2022. [\[html\]](#)
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19. Y. Yan (2), Z. Hu, **Y. Shen***, J. Pan*, “Surface Texture Recognition by Deep Learning-Enhanced Tactile Sensing”, *Advanced Intelligent Systems*, 4(1), 2100076, 2022. [\[html\]](#)
20. D. Guo (2), G. Li (2), J. Miao (2), **Y. Shen***, “A smartphone-based calibration-free portable urinalysis device”, *Journal of Central South University*, 28(12), 3829-3837, 2021. [\[html\]](#)
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25. Y. Yang (2), **Y. Shen***, “Light-driven carbon-based materials: principle, robotization, and applications” *Advanced Optical Materials*, 2100035, 2021. [\[html\]](#)
26. X. Yang (2), R. Tan (2), H. Lu (2), **Y. Shen***, “Starfish inspired milli soft robot with omnidirectional adaptive locomotion ability”, *IEEE Robotics and Automation Letters*, 6(2), 3325-3332, 2021. [\[html\]](#)
27. T. Zhang (2), L. Yang (2), X. Yang (2), R. Tan (2), H. Lu (2)* and **Y. Shen***, “Millimeter-Scale Soft Continuum Robots for Large-Angle and High-Precision Manipulation by Hybrid Actuation”. *Advanced Intelligent Systems*, 3(2), 2000189, 2021. [\[html\]](#)
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30. X. Yang (2), W. Shang, H. Lu (2), Y. Liu (3), L. Yang (2), R. Tan (2), X. Wu*, **Y. Shen***, “An agglutinate magnetic spray transforms inanimate objects into millirobots for biomedical applications”, *Science Robotics*, 5(48), 2020. [\[html\]](#)
31. H. Lu (2), Y. Hong (2), Y. Yang (2), Z. Yang*, and **Y. Shen***, “Battery-less soft millirobot that can move, sense, and communicate remotely by coupling magnetic and piezoelectric effects”, *Advanced Science*, 7(13), 2000069, 2020. [\[html\]](#)
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33. Y. Yang (2), Y. Liu (3), and **Y. Shen***, “Plasmonic-Assisted Graphene Oxide Films with Enhanced Photothermal Actuation for Soft Robots”, *Advanced Functional Materials*, p1910172, 2020. [\[html\]](#)
34. P. Wang (2), H. Lu (2), **Y. Shen***, “Flexible 3D Helix Fabrication by In-situ SEM Micro Manipulation System”, *IEEE Transactions on Industrial Electronics*, 67(7), 5565-5574, 2019. [\[html\]](#)
35. Y. Liu (2), G. Li (2), H. Lu (2), Y. Yang (2), Z. Liu, W. Shang*, **Y. Shen***, “Magnetically Actuated Heterogeneous Microcapsule-Robot for the Construction of 3D Bioartificial Architectures”, *ACS applied materials & interfaces*, 11(29), 25664-25673, 2019. [\[html\]](#)
36. Y. Liu (3), C. Wu (2), H. Lu (2), Y. Yang (2), W. Li, and **Y. Shen***, “Programmable higher-order biofabrication of self-locking microencapsulation”, *Biofabrication*, 11(3), 035019, 2019. [\[html\]](#)
37. H. Lu (2), Y. Yang (2), X. Lin, P. Shi, and **Y. Shen***, “Low-Invasive Cell Injection based on Rotational Microrobot”, *Advanced Biosystems*, 3(7), 1800274, 2019. [\[html\]](#)
38. W. Ding, Y. Zhang, H. Lu (2), W. Wan (2), and **Y. Shen***, “Automatic 3D Reconstruction of SEM images based on Nano-robotic Manipulation and Epipolar Plane Images”, *Ultramicroscopy*, 200, 149-159, 2019. [\[html\]](#)
39. Y. Wen, H. Lu (2), **Y. Shen***, and H. Xie*, “Nanorobotic Manipulation System for 360° Characterization Atomic Force Microscopy”, *IEEE Transactions on Industrial Electronics*, 67(4), 2916-2924, 2019. [\[html\]](#)
40. P. Wang (2), D. Li (2), S. Shen (3), and **Y. Shen***, “Automatic Microwaveguide Coupling Based on Hybrid Position and Light Intensity Feedback”, *IEEE/ASME Transactions on Mechatronics*, 24(3), 1166-1175, 2019. [\[html\]](#)
41. Y. Yang (2), D. Li (2), and **Y. Shen***, “Inchworm-Inspired Soft Robot With Light-Actuated Locomotion”, *IEEE Robotics and Automation Letters*, 4(2), 1647-1652, 2019. [\[html\]](#)
42. Y. Yang (2), M. Zhang (3), D. Li (2), and **Y. Shen***, “Graphene-Based Light-Driven Soft Robot with Snake-Inspired Concertina and Serpentine Locomotion”, *Advanced Materials Technologies*, 4(1), 1800366, 2019. [\[html\]](#)
43. H. Lu (2), Y. Wen, H. Zhang, H. Xie*, and **Y. Shen***, “360° multiparametric imaging atomic force microscopy: A method for three-dimensional nanomechanical mapping”, *Ultramicroscopy*, 196, 83-87, 2019. [\[html\]](#)
44. H. Lu (2), Y. Liu (2), Y. Yang (2), X. Yang (2), R. Tan (2), **Y. Shen***, “Self-assembly magnetic chain unit for bulk biomaterial actuation”, *IEEE Robotics and Automation Letters*, 4(2), 262-268, 2018. [\[html\]](#)
45. Y. Liu (2), Y. Liu (2), **Y. Shen***, “Nano-assembly and welding of gold nanorods based on DNA origami and plasmon-induced laser irradiation”, *International Journal of Intelligent Robotics and Applications*, 2(4), 445-453, 2018. [\[html\]](#)

46. H. Lu (2), M. Zhang (3), Y. Yang (2), Q. Huang, T. Fukuda (4), Z. Wang*, **Y. Shen***, “A bioinspired multilegged millirobot that functions in both dry and wet conditions”, *Nature Communications*, 9(3944), 2018. [\[html\]](#)
47. W. Wan (2), Y. Liu (2), H. Lu (2), and **Y. Shen***, “Investigation of the Nonaxisymmetric Bending Property of Pollen Tubes via a Rotary Nanorobotic System”, *IEEE Transactions on Nanotechnology*, 18, 139-143, 2018. [\[html\]](#)
48. H. Lu (2), P. Wang (2), R. Tan (2), X. Yang (2), **Y. Shen***, “Nanorobotic System for Precise In Situ Three-Dimensional Manufacture of Helical Microstructures”, *IEEE Robotics and Automation Letters*, 3(4), 2846-2853, 2018. [\[html\]](#)
49. P. Wang (2), S. Shen (3), H. Lu (2), **Y. Shen***, “Precise Watch-Hand Alignment Under Disturbance Condition by Microrobotic System”, *IEEE Transactions on Automation Science and Engineering*, 16(1), 278-285, 2018. [\[html\]](#)
50. H. Lu (2), Y. Liu (2), Y. Yang (2), P. Wang (2), **Y. Shen***, “Specimen’s plane misaligned installation solution based on charge fluctuation inside SEM”, *Applied Physics Letters*, 112(14), 2018. [\[html\]](#)
51. H. Lu (2), W. Shang, H. Xie*, **Y. Shen***, “Ultrahigh Precise Rotational Positioning under Microscope: Nanorobotic System, Modeling, Control and Applications”, *IEEE Transactions on Robotics*, 34(2), pp. 497-507, 2018. [\[html\]](#)
52. D. Li (2), Y. Liu (2), Y. Yang (2), **Y. Shen***, “A fast and powerful swimming microrobot with serrate-tail enhanced propulsion interface”, *Nanoscale*, 10 (42), 19673-19677, 2018. [\[html\]](#)
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54. P. Wang (2), H. Lu (2), S. Shen (3), W. Shang, J. Wang, and **Y. Shen***, “Micro-robotic Manipulation at Time-varying Air-liquid Interface for High-precise Watch-hand Alignment”, *IEEE/ASME Transactions on Mechatronics*, 22 (6), 2017. [\[html\]](#)
55. **Y. Shen***, W. Wan (2), H. Lu (2), T. Fukuda (4), and W. Shang, “Automatic Sample Alignment under Microscopy for 360° Imaging Based on the Nanorobotic Manipulation System”, *IEEE Transactions on Robotics*, 33(1), pp. 220-226, 2017. [\[html\]](#)
56. Y. Liu (3), C. Wu, H. Lai, Y. Liu, W. Li, and **Y. Shen***, “Three-dimensional calcium alginate hydrogel assembly via tiopc-based light-induced controllable electrodeposition”, *Micromachines*, 8(6), 192, 2017. [\[html\]](#)
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59. W. Shang, D. Li (2), H. Lu (2), T. Fukuda (4), and **Y. Shen***, “Less-invasive non-embedded cell cutting by nanomanipulation and vibrating nanoknife”, *Applied Physics Letters*, 110(4), 2017. [\[html\]](#)
60. G. Dai (3), B. Wang, S. Xu, Y. Lu*, and **Y. Shen***, “Side-to-Side Cold Welding for Controllable Nanogap Formation from ‘dumbbell’ Ultrathin Gold Nanorods”, *ACS Applied Materials and Interfaces*, 8(21), 13506-13511, 2016. [\[html\]](#)
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68. **Y. Shen***, M. Nakajima, Z. Yang, S. Kojima, M. Homma, and T. Fukuda (4), “Design and characterization of nanoknife with buffering beam for insitu single-cell cutting”, *Nanotechnology*, 22(30), 305701, 2011. [\[html\]](#)
69. **Y. Shen***, M. Nakajima, M. Ridzuan Ahmad, S. Kojima, M. Homma, and T. Fukuda (4), “Effect of ambient humidity on the strength of the adhesion force of single yeast cell inside environmental-SEM”, *Ultramicroscopy*, Article vol. 111, no. 8, pp. 1176-1183, 2011. [\[html\]](#)
70. **Y. Shen***, M. Nakajima, S. Kojima, M. Homma, M. Kojima, and T. Fukuda (4), “Single cell adhesion force measurement for cell viability identification using an AFM cantilever-based micro putter”, *Measurement Science and Technology*, 22(11), 2011. [\[html\]](#)
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Conference

1. J. Dong (1), T. Zhang (2), Z. Ling (1), **Y. Shen***, “Magnetic Nanorobot-Assisted Precision Diagnosis in Branch atheromatous disease”, *International Conference on Manipulation, Automation and Robotics at Small Scales (MARSS)*, 2024.
2. Z. Ling (1), X. Yang (2, 3), D. Guo (2) and **Y. Shen***, “High-Performance Tactile Sensor-Based Aligning Error State Estimation for FPC Pegging”, *IEEE International Conference on Advanced Robotics and Its Social Impacts (ARSO)*, 2024.
3. H. Zhao (1), **Y. Shen***, “Magnetically driven millirobot with tissue anchoring ability for drug delivery”, *IEEE International Conference on Advanced Robotics and Its Social Impacts (ARSO)*, 2024.
4. H. Ra (1), G. Li (2), **Y. Shen***, “A chameleon-inspired flexible tactile sensor”, *IEEE International Conference on Advanced Robotics and Its Social Impacts (ARSO)*, 2024.
5. H. Lu (2), W. Wan (2), **Y. Shen***, “Nanorobotic manipulation system for in-situ micro/nano torsion test”, in *International Conference on Complex Medical Engineering (ICME)*, 2017. (Best Paper Finalist) [\[html\]](#)

6. **Y. Shen***, M. Nakajima, S. Kojima, M. Homma, Y. Ode, and T. Fukuda (4), “Characterization of oscillating nano knife for single cell cutting by nanorobotic manipulation system inside ESEM”, in *IEEE International Conference on Robotics and Automation (ICRA)*, 2011. (Best Manipulation Paper Award) [\[html\]](#)
7. **Y. Shen***, M. Nakajima, M. Ahmad, S. Kojima, M. Homma, and T. Fukuda (4), “In-situ single cell manipulation via nanorobotic manipulation system inside E-SEM”, in *IEEE International Conference on Micro-NanoMechatronics and Human Science (MHS)*, 2009. (Best Paper Award) [\[html\]](#)

Book/Book Chapter

1. R. Tan (2, 3), X. Yang (2, 3), **Y. Shen**, “Minimalist milliscale robot construction by M-spray”, *Untethered Small-Scale Robots for Biomedical Applications*, 2023. [\[html\]](#)
2. T. Fukuda (4), M. Nakajima, M. Takeuchi, Y. Hasegawa, T. Yue, C. Hu, M. Ahmad and **Y. Shen**, “Chapter 12: 3D System Cell Engineering Using Micro-Nano Robotics”, *The Encyclopedia of Medical Robotics*, 2018. [\[html\]](#)
3. **Y. Shen**, “In Situ Nano Characterization of Yeast Cells using ESEM and FIB”, *Advanced Microscopy in Mycology*, 2015. [\[html\]](#)
4. **Y. Shen**, T. Fukdua (4), “Nanomanipulation of Biocells”, *Encyclopedia of Nanotechnology*, 2015. [\[html\]](#)

Patent

1. **Y. Shen**, X. Yang, Z. Ling, “Object Property Estimation and Manipulation Based on Multi-Finger Tactile Information”, US 63/620,146, Filed, Jan 11, 2024.
2. **Y. Shen**, X. Yang, “Bioinspired sensing unit with decoupled force and temperature sensing ability”, US 63/589,989, Filed, Oct 12, 2023.
3. **Y. Shen**, “Artificial Skin-based Phygital System for the Cohesion of Human, Robot, and Virtual World”, US 63/507,737, Filed, Jun 13, 2023.
4. **Y. Shen**, “Flexible mechanochromic tactile sensor and a method of distributed tactile measurement using the sensor”, US 63/478,499, Filed, Jan 4, 2023.
5. **Y. Shen**, “Low-cost tactile sensor based on artificial magnetic pillar for robotic tactile sensing”, US 63/478,501, Filed, Jan 4, 2023.
6. **Y. Shen**, “An entirely biodegradable spiny milli-ball robot (SMB-bot) for oral macromolecule drug delivery”, US 63/478,497, Filed, Jan 4, 2023.
7. **Y. Shen**, X. Yang, “Method for converting inanimate object to small-scale robot on-demand”, US20220184360A1, Filed, Dec 13, 2021.
8. **Y. Shen**, J. Shi, P. Wang, X. Yang, “Underwater vehicle with front-rear distributed drive”, US11772761B2, Granted, Oct 3, 2023.
9. **Y. Shen**, J. Shi, P. Wang, X. Yang, “Hetero-stiffness robotic device”, US11685491B2, Granted, Jun 27, 2023.
10. **Y. Shen**, Y. Yan, J. Pan, “Electromechanical sensor and a method of sensing an object or a tactile input using the sensor”, US11668554B2, Granted, Jun 6, 2023.
11. **Y. Shen**, H. Lu, “System and method for ankle rehabilitation”, US 11471359B2, Granted, Oct. 18, 2022.
12. **Y. Shen**, X. Yang, H. Lu, “Soft body robotic device”, US 011361893B2, Granted, Jun 14, 2022.
13. **Y. Shen**, G. Dai, W. Wan, “Substrate for a three-dimensional cell culture, its preparation and use”, US 011280017B2, Granted, Mar 22, 2022.

14. **Y. Shen**, H. Lu, “Method for use in optical imaging, a system for using in optical imaging and an optical system”, US 011079584B2, Granted, Aug 3, 2021.
15. **Y. Shen**, W. Wan, L. Zhang, “System and method for manipulating an object for imaging”, US20170176733A1, Granted, Mar 20, 2018.
16. **Y. Shen**, “Used for the backend drive devices, control systems, methods, and robots of the robot”, CN 2023103351206, Filed, Mar 31, 2023.
17. **Y. Shen**, “Probe, probe robot, catheter robot, robotic system, and detection system”, CN 2023103351155, Filed, Mar 31, 2023.
18. **Y. Shen**, Z. Wang, L. Wang, Y. Yang, M. Zhang, “Preparation of 3D Structural Materials Based on Graphene Oxide and Composite Shells”, CN 110624125B, Granted, Mar 4, 2022.
19. **Y. Shen**, H. Lu, “Rotary device and method for single cell injection”, CN 108504538B, Granted, Jun 18, 2021.
20. **Y. Shen**, H. Lu, “In situ loading and characterization device for micro-nano material”, CN 108572106B, Granted, July 10, 2020.
21. **Y. Shen**, H. Lu, “Sample stage, imaging instrument and their adjustment method”, CN 108020252B, Granted, Mar 6, 2020.
22. **Y. Shen**, L. Zhang, “A high frequency fatigue testing and a micro morphology imaging device”, CN 105738229B, Granted, Nov 9, 2018.
23. **Y. Shen**, L. Zhang, W. Wan, “An in-situ twisting and imaging device for micro/nano material”, CN 105606459B, Granted, July 13, 2018.

EXTERNAL GRANT

- **Raise+** (Project #RAI/23/1/002A), “Agile Executive Terminal for Robots”, **TBD** (a maximum of 100,000,000 HKD), 2024-.
- **GRF** (Project #16217424), “Adaptive soft continuum millirobot with customized multi-sectional magnetization by magnetic spray”, 1,134,931 HKD, July 2024.
- **GRF** (Project #16217824), “The fabrication and control of microrobots with catalytic degradation and in-situ oxygen release capabilities”, 1,134,931 HKD (**Co-PI, The PI is my Lab's RAP**), July 2024.
- **NSFC-GRF Joint Research Scheme** (Project #N_HKUST638/23), “Research on millimeter scale continuum robot and probe for endoscopic laser surgery”, 1,233,750 HKD, Jan 2024.
- **MTR - Mass Transit Railway Corporation Joint Fund** (Project #MTR22EG01-H), “Robotic-Based Inspection of MTR Station Equipment and Structures”, 763,000 HKD (**Co-PI**), Dec 2023.
- **GDNSF - Guangdong Natural Science Foundation** (Project #N_GDST24EG02), “Intelligent rehabilitation medical robot based on multi-mode sensing and interactive control”, 430,600 HKD out of 2,000,000 RMB (**Co-PI**), Nov 2023.
- **GRF** (Project #16203923), “Circular Halbach Array Film based Force Decoupling Theory and Soft Tensile Sensor Development for Robotic Applications”, 1,122,534 HKD, July 2023.
- **GRF** (Project #9043167), “Nanofiber-based Biodegradable Multi-legged Millirobot”, 1,139,146 HKD, July 2021.
- **Shenzhen - Hong Kong - Macau Key Research Fund** (Project #SGDX2020110309300301), “Research on submillimeter continuum robot for lung end bronchial examination”, 1,000,000 RMB, July 2021.
- **Shenzhen Key Research Fund** (Project #JCYJ20200109114827177), “Research on bionic micro peristaltic robot”, 600,000 RMB out of 2,000,000 RMB (**Co-PI**), July 2021.

- **GRF** (Project #7005209), “Microrobotic System for High-Precise Micro Helical Structure Fabrication”, 858,000 HKD, July 2020.
- **NSFC Excellent Young Scientist Fund** (Project #9240017), “Micro/Nano Robotics”, 1,430,000 HKD, Dec 2019.
- **Contract Research** (Project #9231349), “Study on the magnetic properties of the 2D material for flexible devices”, 116,780 HKD, April 2019.
- **NSFC-Shenzhen Union Key Project** (Project #5219103), “Nano scale energy field operating robot for nano electrode array development for neural interface”, 1,000,000 RMB out of 3,000,000 RMB (**Co-PI**), Dec 2018.
- **Donation Project** (Project #20180723162127787), “Research and development of digital medical equipment”, 50,000 RMB, Aug 2018.
- **NSFC** (Project #61773326), “Key techniques of micronano robot for cancer study”, 640,000 RMB, Jan 2018.
- **Shenzhen Key Research Fund** (Project #JCYJ20170413140519030), “Research on Chitosan Graphene Oxide Hemostatic Sponge and Its Hemostatic Mechanism”, 2,000,000 RMB (**Co-PI**), July 2017.
- **GRF** (Project #9042521), “Micro Rotatable Robotic System for Low Invasive Cell Injection”, 443,950 HKD, July 2017.
- **National Key Laboratory Fund** (Project #2017 KM012), “Micro/nano robotic system for micro/nano manipulation, manufacturing and measurement”, 40,000 RMB, July 2017.
- **Shenzhen Key Research Fund** (Project #JCYJ20160329150236426), “Cancer cell diagnosis based on micro/nano robotic system”, 2,000,000 RMB, July 2016.
- **GRF** (Project #9042382), “Nano Robot for In-situ Torsion Testing inside SEM”, 675,647 HKD, July 2016.
- **ITF** (Project #9440144), “Development of an Intelligent Gait Training Robot for Hemiplegic Rehabilitation”, 1,386,900 HKD, Oct 2015.
- **Donation Project** (Project #9220081), “Automation of Alignment & Gluing of Tiny Metallic Parts by Robot”, 950,000 HKD, Oct 2015.
- **GRF** (Project #9042218), “Automated 3D Cell Patterning by Optically-induced Micro Manipulation and Fabrication”, 695,854 HKD, July 2015.
- **NSFC Young** (Project #61403323), “A new method for single cell mechanical property characterization at sub-cellular level based on nano-manipulation and measurement”, 250,000 RMB, Jan 2015.
- **ECS** (Project #9048004), “High-flexible Nanorobot Platform for Pollen Tube Local Mechanical Characterization from Full Orientation”, 931,737 HKD, July 2014.

EXTERNAL SERVICE

- Senior Member of IEEE, IEEE Distinguished Lecturer; Vice-Chair of IEEE Hong Kong Magnetics Chapter (2023 - present), Co-Chair of the IEEE Nano Technology Council Nano-Biomedicine TC (2022 - present), etc; Executive Council of China Micro-nano Robotic Society, China Micro-nano Fabrication Society, China Instrument Sensor Society, China Coexisting-Cooperative-Cognitive Robotic Society, China Automation Society Robotic TC, etc.
- Associate Editor of IEEE Trans on Robotics (2019-2022); Editor Board Member of Engineering, Frontiers in Robotics and AI, Robot Learning, Sensors, Scientific Reports, IEEE RAL, IEEE ICRA/IROS, etc; Guest Editor of Micromachines, Journal of Sensors, Microscopy Research, IEEE

Trans. on Nanotechnology (SI: Micro-Nano robot), International Journal of Advanced Robotic Systems, Journal of Central South University, etc.

- General Chair of IEEE ARSO 2024, Program Co-Chair of IEEE RAAI 2021, Program Co-Chair of IEEE ICMA 2021, Regional Program Chair of IEEE RCAR 2021, Program co-chair of IEEE ICMA 2020, Local chair of IEEE IROS 2019, Program chair of IEEE RCAR 2018, Program co-chair of IEEE Cyber 2017, Industry forum co-chair of IEEE Nano 2017, Committee member of IEEE 3M-NANO, MARSS for many years, etc.
- Plenary/Keynote/Invited Speaker in AIS 2024, ISAF 2024, CAA 2023, MARSS 2023, SoftRob 2023, ICARM 2023, FEIM 2023, iCanX 2023, IFETC 2022, MRB 2020, ICASE 2020, SoftRob 2019, NANO 2019, MARSS 2019, MRS 2018, ICNME 2017, MRB 2017, CYBER 2016, NEMS 2015, ICIDC 2015, etc.
- Reviewer of Nature, Science, Science Robotics, Sciences Advances, Nature Communications, Nature Machine Intelligence, Advanced Materials, IEEE Transactions on Robotics, IEEE/ASME Transactions on Mechatronics, IEEE Transactions on Industry electronics, IEEE Transactions on Automation Science and Engineering, IEEE Transactions on Nanotechnology, International conference (e.g., ICRA, IROS, Robio, Cyber, etc), etc.

AWARDS & HONORS

- **Second Prize of Scientific and Technological Progress**, Chinese Association of Automation *2024*
- **Hong Kong Young Scientist of Entrepreneur**, Hong Kong InnoX Academy *2023*
- **Fellow of HKUST Founders' Club**, The Hong Kong University of Science and Technology *2023*
- **Best UROP Mini-conference Paper Award**, The Hong Kong University of Science and Technology *2023*
- **Outstanding Supervisor Award**, City University of Hong Kong *2020*
- **Excellent Young Scientist (Hong Kong & Macau)**, National Science Foundation of China *2019*
- **IEEE Distinguished Lecturer**, in Robotics and Automation Society *2019*
- **China Top 10 scientific and technological progress in robotics in 2018**, Industry Annual Meeting of China Robot Society *2019*
- **Big-on-Small Award**, International Conference on Manipulation, Automation and Robotics at Small Scale (1 person/year worldwide in the field of micro/nano robotics) *2018*
- **Third Prize**, The 3rd Underwater Robot Competition (as supervisor) *2018*
- **Best Paper Finalist Award**, International Conference on Complex Medical Engineering *2017*
- **Second Prize**, The 10th International Underwater Robot Competition (as supervisor) *2017*
- **Early Career Award**, University Grants Committee of Hong Kong *2014*
- **Best Manipulation Paper Award**, International Conference on Robotics and Automation (Flagship robotic conference, one paper/year, Top 0.5%) *2011*
- **Japan Chapter Young Award**, IEEE Robotics and Automation Society, IEEE (5-10 people/year in Japan) *2011*
- **Best Paper Award**, International Symposium on Micro-Nano Mechatronics and Human Science (one paper/year, TOP 2%) *2009*

GRADUATES

LI Gen , PhD	<i>2024</i>
ZHANG Tieshan , PhD	<i>2024</i>
YANG Liu , PhD (Excellent Young Scientists Overseas in 2023)	<i>2022</i>
TAN Rong , PhD	<i>2022</i>
HUANG Han , PhD	<i>2022</i>
YANG Xiong , PhD (Excellent Young Scientists Overseas in 2023)	<i>2022</i>
YAN Youcan , PhD	<i>2022</i>
WANG Shudong , PhD	<i>2021</i>
YANG Yuanyuan , PhD	<i>2020</i>
WANG Panbin , PhD	<i>2019</i>
LIU Yanting , PhD	<i>2019</i>
LI Dengfeng , PhD	<i>2019</i>
LU Haojian , PhD (Excellent Young Scientists Overseas in 2020)	<i>2019</i>
WAN Wenfeng , PhD	<i>2017</i>