LIDONG YANG

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ERB 320, William M.W. Mong Engineering Building ◇ CUHK
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EDUCATION

The Chinese University of Hong Kong, Hong Kong *August 2016 – June 2020*
Ph.D in Mechanical and Automation Engineering GPA: 3.855/4.0
Department of Mechanical and Automation Engineering
Supervisor: Li ZHANG

Harbin Institute of Technology, Harbin, China *September 2010 - July 2014*
B. Eng in Mechanical Engineering. GPA: 86/100
Honors School (英才学院)

RESEARCH DIRECTIONS

· Development of magnetic microrobotics systems
· Automated magnetic manipulation
· Medical robotics
· Motion control in microrobotics
· Microrobots for biomedical applications

WORK EXPERIENCES

The Chinese University of Hong Kong, Hong Kong *Start from August 2020*
Post-Doctoral Fellow
Department of Mechanical and Automation Engineering

Harbin Institute of Technology, Harbin, China *September 2014 - July 2016*
PhD student in Robotics
State Key Laboratory of Robotics and Systems

HONORS AND AWARDS

· **Best Student Paper Award** at 2020 IEEE International Conference on Automation Science and Engineering (CASE 2020) *2020*
· **Toshio Fukuda Best Paper Award in Mechatronics** at 2020 IEEE International Conference on Advanced Robotics and Mechatronics (ICARM) *2020*
· Third prize-BICES-The 3rd International Construction Machinery and Special Vehicles Design Contest *2015*
· First-class scholarship for postgraduate students *2014*
· First Prize in the 7th Bionic Robot Design Contest of Harbin Institute of Technology *2012*
· Second prize for 'Yuan-Zhejun' College Students technology Innovation Fund of Mechatronics Engineering school of HIT *2012*
· Second-class scholarship for undergraduate students (6 times) (Top 10%) *2010 - 2014*

PROFESSIONAL ACTIVITIES

Conference Presentations

· CASE (**Best paper award presentation**), Hong Kong SAR, China *August 2020*
· ICRA, Paris, France *June 2020*
· ICRA, Montreal, Canada *May 2019*
· AIM, Hong Kong SAR, China *July 2019*
· IROS, Madrid, Spain *October 2018*

Editorship and Conference Committee Members

· Topic editor of **Micromachines** *2021*
· Associate editor of **18th International Conference on Ubiquitous Robots (UR 2021)** *2021*
· Guest associate editor of **Frontiers in Robotics and AI** *2020*
· Session co-chair of **IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2018)** *2018*

Technical Reviewers

· IEEE Robotics and Automation Letters
· IEEE Transactions on Automation Science and Engineering
· IEEE Sensors Journal
· Journal of micro-bio robotics
· Automatica
· Sensors
· Electronics
· IEEE International Conference on Robotics and Automation (ICRA)
· IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)

TEACHING EXPERIENCES

· **Complex Analysis and Differential Equations for Engineers(ENGG2420D), CUHK** *Sep. 2016 - Dec. 2016*
Teaching Assistant with Dr. Yiyang LI
· **Engineering Design and Applications(MAEG 3920), CUHK** *Jan. 2017 - Apr. 2017*
Teaching Assistant with Prof. Li ZHANG
· **Introduction to Control Systems(MAEG3050), CUHK** *Sep. 2017 - Dec. 2017*
Teaching Assistant with Prof. Yeung YAM
· **Introduction to Robot Design(MAEG1010), CUHK** *Jan. 2018 - Apr. 2018*
Teaching Assistant with Dr. Yiyang LI
· **Computer-integrated Manufacturing(MAEG4010), CUHK** *Sep. 2018 - Dec. 2018*
Teaching Assistant with Dr. Yiyang LI
· **Introduction to Power Electronics (ELEG3207), CUHK** *Jan. 2019 - Apr. 2019*
Teaching Assistant with Dr. Dongkun HAN

SELECTED PUBLICATIONS

($^{\#}$ denotes co-first authorship)

Monograph

1. L. Zhang, J. Yu, and **L. Yang**, Micro- and Nanorobots: From Individual to Swarm (in Chinese), Science Press (科学出版社), 2020.

Journal Papers

1. **L. Yang**, Z. Yang, J. Jiang, X. Du and L. Zhang, A Magnetic Manipulation System with Parallel Mobile Electromagnetic Coils, In revision.
2. Q. Wang$^{\#}$, **L. Yang**$^{\#}$ and L. Zhang, Micromanipulation Using Reconfigurable Self-Assembled Magnetic Droplets with Needle Guidance, *IEEE Transactions on Automation Science and Engineering (TASE)*, (Regular Paper), 2021, Accepted.
3. Z. Yang$^{\#}$, **L. Yang**$^{\#}$ and L. Zhang, Autonomous Navigation of Magnetic Microrobots in A Large Workspace Using Mobile-Coil System, *IEEE/ASME Transactions on Mechatronics (TMECH)* (Regular Paper), 2021, Accepted.

4. J. Jiang[#], **L. Yang**[#] and L. Zhang, Closed-Loop Control of a Helmholtz Coil System for Accurate Actuation of Magnetic Microrobot Swarms, *IEEE Robotics and Automation Letters (RA-L)*, vol. 6, no. 2, 2021.

5. **L. Yang** and L. Zhang, Motion Control in Magnetic Microrobotics: From Individual and Multiple to Swarm, *Annual Review of Control, Robotics and Autonomous Systems*, vol. 4, 2021.

6. **L. Yang**, Y. Zhang, Q. Wang and L. Zhang, An Automated Microrobotic Platform for Rapid Detection of C. diff Toxins, *IEEE Transactions on Biomedical Engineering (TBME)* (Regular Paper), vol. 67, no. 5, pp. 1517-1527, May 2020. (**Featured article**)

7. **L. Yang**, J. Yu and L. Zhang, Statistics-Based Automated Control for a Swarm of Paramagnetic Nanoparticles in 2-D Space, *IEEE Transactions on Robotics (TRO)* (Regular Paper), vol. 36, no. 1, pp. 254-270, Feb. 2020.

8. **L. Yang**, Y. Zhang, Q. Wang, K. Chan and L. Zhang, Automated Control of Magnetic Spore-Based Microrobot Using Fluorescence Imaging for Targeted Delivery With Cellular Resolution, *IEEE Transactions on Automation Science and Engineering (TASE)* (Regular Paper), vol. 17, no. 1, pp. 490-501, Jan. 2020.

9. **L. Yang**, E. Yu, C. Vong and L. Zhang, Discrete-Time Optimal Control of Electromagnetic Coil Systems for Generation of Dynamic Magnetic Fields With High Accuracy, *IEEE/ASME Transactions on Mechatronics (TMECH)* (Regular Paper), vol. 24, no. 3, pp. 1208-1219, Jun. 2019.

10. **L. Yang**[#], Q. Wang[#] and L. Zhang, Model-Free Trajectory Tracking Control of Two-Particle Magnetic Microrobot, *IEEE Transactions on Nanotechnology (TNANO)*, vol. 17, no. 4, pp. 697-700, Jul. 2018.

11. **L. Yang**, Q. Wang, C. Vong and L. Zhang, A Miniature Flexible-Link Magnetic Swimming Robot With Two Vibration Modes: Design, Modeling and Characterization, *IEEE Robotics and Automation Letters (RA-L)*, vol. 2, no. 4, pp. 2024-2031, Oct. 2017.

12. J. Yu, **L. Yang** and L. Zhang, Pattern Generation and Motion Control of A Vortex-like Paramagnetic Nanoparticle Swarm, *International Journal of Robotics Research (IJRR)*, vol. 37, Issue 8, 912-930, 2018.

13. Z. Yang, **L. Yang**, M. Zhang, Q. Wang, C. Yu, L. Zhang, Magnetic Control of a Steerable Guidewire Under Ultrasound Guidance Using Mobile Electromagnets, *IEEE Robotics and Automation Letters (RA-L)*, 2021, Accepted.

14. Z. Yang, **L. Yang** and L. Zhang, 3D Visual Servoing of Miniature Magnetic Swimmers Using Parallel Mobile Coils, *IEEE Transactions on Medical Robotics and Bionics (TMRB)* (Regular Paper), vol. 2, no. 4, pp. 608-618, Nov. 2020.

15. Q. Wang, **L. Yang**, J. Yu, W. Chiu, Y. Zheng and L. Zhang, Real-time Magnetic Navigation of A Rotating Colloidal Microswarm Under Ultrasound Guidance, *IEEE Transactions on Biomedical Engineering (TBME)* (Regular Paper), doi: 10.1 109/TBME.2020.2987045.

16. Q. Wang, **L. Yang**, B. Wang, E. Yu, J. Yu and L. Zhang, Collective Behavior of Reconfigurable Magnetic Droplets via Dynamic Self-Assembly, *ACS Applied Materials & Interfaces*, vol. 11, no. 1, 1630-1637, 2019.

17. X. Du, M. Zhang, J. Yu, **L. Yang**, P. Chiu and L. Zhang, Design of A Magnetic Actuation System Based on Multiple Mobile Electromagnetic Coils with Enhanced Flexibility, *IEEE/ASME Transactions on Mechatronics (TMECH)* (Regular Paper), 2020.

18. Q. Wang, J. Yu, K. Yuan, **L. Yang** and L. Zhang, Disassembly and Spreading of Magnetic Nanoparticle Clusters on Uneven Surfaces, *Applied Materials Today*, vol. 18, 100489, 2020.

19. Y. Zhang, L. Zhang, **L. Yang**, C. Vong, K. Chan, W. Wu, T. Kwong, N. Lo, M. Ip, S. Wong, J. Sung, P. Chiu and L. Zhang, Real-Time Tracking of Fluorescent Magnetic Spore-Based Microrobots for Remote Detection of C. diff Toxins, *Science Advances*, vol. 5, no. 1, eaau9650, 2019.

20. B. Wang, F. Ji, J. Yu, **L. Yang**, Q. Wang, L. Zhang, Bubble-Assisted Three-Dimensional Ensemble of Nanomotors for Improved Catalytic Performance, *iScience*, vol 20, 760-771, 2019.

21. B. Wang, K. Chan, J. Yu, Q. Wang, **L. Yang**, P. Chiu, L. Zhang, Reconfigurable Swarms of Ferromagnetic Colloids for Enhanced Local Hyperthermia, *Advanced Functional Materials*, vol. 28, 1705802, 2018.

22. Q. Wang, **L. Yang**, J. Yu, L. Zhang, Characterizing Dynamic Behaviors of Three-Particle Paramagnetic Microswimmer near A Solid Surface, *Robotics and Biomimetics*, Vol. 4, Issue 4, 2017.

Conference Papers

1. **L. Yang** and L. Zhang, Large-Workspace and High-Resolution Magnetic Microrobot Navigation Using Global-Local Path Planning and Eye-in-Hand Visual Servoing, *2020 IEEE International Conference on Automation Science and Engineering (CASE)*, pp. 876-881, 2020.

2. **L. Yang**$^{\#}$, J. Yu$^{\#}$, and L. Zhang, A Mobile Paramagnetic Nanoparticle Swarm with Automatic Shape Deformation Control, *In Proceedings of 2020 IEEE International Conference on Robotics and Automation (ICRA)*, pp. 9230-9236, 2020.

3. **L. Yang** and L. Zhang, Optimal Control of a 3-axis Helmholtz Coils System for Generation of Dynamic Magnetic Field Waveforms with High Accuracy, *In Proceedings of 2019 IEEE/ASME International Conference on Advanced Intelligent Mechatronics (AIM)*, pp. 1193-1198, Hong Kong, China, Jul. 8-12, 2019.

4. **L. Yang**, Y. Zhang, L. Zhang, Autonomous Detection of C. diff Toxins in Clinical Stool Using A Magnetic Microrobotic System, *In Proceedings of 2019 Hamlyn Symposium on Medical Robotics*, pp. 37-38, London, United Kingdom, Jun. 23-26, 2019.

5. **L. Yang**, X. Du, E. Yu, D. Jin and L. Zhang, DeltaMag: An Electromagnetic Manipulation System with Parallel Mobile Coils, *In Proceedings of 2019 IEEE International Conference on Robotics and Automation (ICRA)*, pp. 9814-9820, Montreal, Canada, May 20-24, 2019.

6. **L. Yang**, Y. Zhang, C. Vong and L. Zhang, Automated Control of Multifunctional Magnetic Spores Using Fluorescence Imaging for Microrobotic Cargo Delivery, *In Proceedings of 2018 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, pp. 6180-6185, Madrid, Spain, Oct. 1-5, 2018.

7. Z. Yang, **L. Yang**, and L. Zhang, Eye-in-Hand 3D Visual Servoing of Helical Swimmers Using Parallel Mobile Coils, *In Proceedings of 2020 IEEE International Conference on Robotics and Automation (ICRA)*, pp. 9223-9229, Paris, France, May 31-Jun. 4, 2020.

8. J. Jiang, **L. Yang** and L. Zhang, Closed-Loop Control of a Helmholtz Coils System for 3-D Magnetic Field Generation with High Precision, *2020 IEEE International Conference on Advanced Robotics and Mechatronics (ARM)*, pp. 495-500, 2020.

9. X. Du, **L. Yang**, J. Yu, K. Chan, W. Chiu, and L. Zhang, RoboMag: A Magnetic Actuation System Based on Mobile Electromagnetic Coils With Tunable Working Space, *2020 IEEE International Conference on Advanced Robotics and Mechatronics (ARM)*, pp. 125-131, 2020.

10. Q. Wang, **L. Yang**, J. Yu, C. Vong, P. Chiu and L. Zhang, Magnetic Navigation of a Rotating Colloidal Swarm Using Ultrasound Images, *2018 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, pp. 5380-5385, Madrid, Spain, Oct. 1-5, 2018.

11. Q. Wang, **L. Yang**, J. Yu and L. Zhang, Characterizing Dynamic Swimming Behaviors of Three-Particle Magnetic Microswimmer near A Solid Surface, *2017 IEEE International Conference on Robotics and Biomimetics (ROBIO)*, pp. 1442-1447, Macau, China, Dec. 5-8, 2017.

Patents

1. L. Zhang, **L. Yang**, and M. Zhang, Parallel-Mobile-Coil Mechanism for Magnetic Manipulation in Large Workspace, *U.S. Provisional Patent*, field on 17/06/2020 (App. no.: 63/040,057).
2. L. Zhang, **L. Yang**, E. Yu, and C. Vong, Methods and Systems for Controlling Electromagnetic Field Generators, *U.S. Non-Provisional Patent*, US 2019/0295756, Published on 26/09/2019.
3. L. Zhang, Y. Zhang, **L. Yang**, K. Chan, L. Zhang, and K. Wu, Spore-Based Bio-Hybrid Microrobots and The Automated Detection System for Bacterial Toxins, *U.S. Non-Provisional Patent*, US 2020/0131556, Published on 30/04/2020.
4. L. Zhang, X. Du, K. Chan, **L. Yang**, and M. Zhang, Design and Control Method for Mobile-Electromagnetic-Coil-Based Magnetic Actuation Systems, *U.S. Non-Provisional Patent*, Submitted.