Xin Li

+86 18916106107 | lixin1@shanghaitech.edu.cn | www.lixin.wiki | linkedin | github

Bibliography

Xin is now a Ph.D. candidate at University of Chinese Academy of Sciences, jointly trained with Nanyang Technological University, Singapore and ShanghaiTech University, China. He is also with the Shanghai Institute of Microsystem and Information Technology, Chinese Academy of Sciences. His research advisor is **Prof. Junrui Liang** and **Prof. Yaowen Yang**. With the vision of building an Internet of Moving Things free from batteries, less polluting, and sustainable, his research focused on designing effective, reliable, and scalable battery-free IoT solutions based on kinetic energy harvesting.

Educations

Nanyang Technological University — Singapore
Ph.D. (Joint Training) in Information and Communication Engineering — *Sept. 2021 – Present*
***Research advisor**: Prof. Yaowen Yang*

University of Chinese Academy of Sciences — Shanghai, China
Ph.D. in Information and Communication Engineering — *Sept. 2018 – Present*
***Research advisor**: Prof. Junrui Liang*

University of Chinese Academy of Sciences — Shanghai, China
M.Sc in Information and Communication Engineering — *Sept. 2017 – Jul. 2018*
***Research advisors**: Prof. Jianming Wei and Dr. Xiaoyuan Ma*

North University of China — Taiyuan, China
B.E. in Weapon System Engineering — *Sept. 2012 – Jul. 2016*
***Research advisor**: Prof. Qiang Li*

Research Honors

- **Best Paper** of the International Conference on Vibration and Energy Harvesting Applications (VEH) in 2021.
- **Best Student Hardware Competition Finalist** of the ASME Conference on Smart Materials, Adaptive Structures and Intelligent Systems (SMASIS) in 2020.
- **1st Runner Up** of the IEEE Industrial Electronics Society (IES) Inter-Chapter Paper Competition in 2019.
- **1st Place** at the ACM/IEEE International Conference on Embedded Wireless Systems and Networks (EWSN) Dependability Competition – Category "Data Collection" in 2019.
- **3rd Place** at the ACM/IEEE International Conference on Embedded Wireless Systems and Networks (EWSN) Dependability Competition in 2018.

Research Projects

Energy Informatization for Sustainable ICT — Dec. 2021 – Present
Tsinghua University and ShanghaiTech University — *Shanghai, China*
- Network resource allocation based on the fusion of energy flow and information flow under the condition of energy uncertainty.

KPID: a kinetic-powered IDentification system — Jan. 2021 – Present
Nanyang Technological University — *Singapore*
- Battery-free BLE mesh system.

ViPSN and ViPSN++: a vibration-powered IoT platform — Jan. 2019 – Jan.2020
ShanghaiTech University — *Shanghai, China*
- ViPSN: an open-source development platform specified for vibration-powered IoT devices.

- ViPSN-cam: a vibration-powered ubiquitous camera.
- ViPSN-gameboy: a transient-motion-powered gameboy.
- ViPSN-pluck: a transient-motion-powered motion detector.
- 1st Runner Up of the IEEE Industrial Electronics Society (IES) Inter-Chapter Paper Competition in 2019.
- Best Student Hardware Competition Finalist of the ASME Conference on Smart Materials, Adaptive Structures and Intelligent Systems (SMASIS) in 2020.
- Best Paper of the 3rd International Conference on Vibration and Energy Harvesting Applications (VEH) in 2021.

DeCot and DeCot++: dependable MAC protocols for IEEE 802.15.4 Mar. 2017 – Jan. 2019
Shanghai Advanced Research Institute, Chinese Academy of Sciences *Shanghai, China*

- Proposed a dependable concurrent transmission-based WSN to stand against interference.
- D-Cube: a large-scale wireless sensor network testbed.
- MoteScatter: a noise-modulation-based backscatter communication under harsh interference.
- 3rd place at the EWSN Dependability Competition in 2018.
- 1st place at the EWSN Dependability Competition – Category "Data Collection" in 2019.

Research Experiences

Assistant of Undergraduate Supervision (Prof. Junrui Liang) Jan. 2019 – Present
ShanghaiTech University *Shanghai, China*

- Mechanical backscatter tag using 2.4GHz RF signal (Yang Zhang, 2019)
- Energy harvesting insole design based on hydraulic generator (Shijie Shen, 2019)
- Design and implementation of modular intelligent IoT floor network (Ruifang Liu, 2020)
- ViPSN-Eink: a motion-powered E-ink HCI system (Yue Zhu, 2021)

Teaching Assistant of Embedded System (Prof. Junrui Liang) Mar. 2020 – Jul.2020
ShanghaiTech University *Shanghai, China*

- Assisted Prof. Liang in preparing homework solutions.
- Assisted in guiding course projects.
- Taught one lesson about battery-free IoT and ubiquitous computing.
- Q&A session.

Teaching Assistant of Computer Network (Prof. Zhice Yang) Sept. 2018 – Jan.2019
ShanghaiTech University *Shanghai, China*

- Assisted Prof. Yang in preparing homework solutions.
- Guided course projects.
- Q&A session.

Research Assistant in SeLab of CAS (Prof. Jianming Wei) Mar. 2017 – Sept. 2018
Shanghai Advanced Research Institute, Chinese Academy of Sciences *Shanghai, China*

- Built a network testbed for power-line-communication.
- Built a complete-system wireless personal area network platform.
- Participated in 973 sub-project and National Key R&D Program of China.

Publications

+Co-first author *Corresponding author

1. **Xin Li**, Guobiao Hu, Chaoyang Zhao, Yaowen Yang*, and Junrui Liang*, "A Paradigm Shift Battery-free Flexible Motion Sensing Solution Enabled by Triboelectric Nanogenerator and Backscatter Communication," Advanced Science, under review.

2. Qiang Liu, **Xin Li+**, Hao Zhang, Jing Ren, Shuo Yang, Leitao Cao, Junrui Liang*, Shengjie Ling*, "Self-powered IntelliSense Wildfire Detection and Alarm System Composed of Sustainable, Flame Retardant, and Self-healable Hydro-ionotronic Batteries," Nature Communications, under review.

3. **Xin Li**, Guobiao Hu, Yaowen Yang*, and Junrui Liang* "Dynamic Analysis of A Plucking Energy Harvester for Transient-motion-powered IoT Applications," IEEE/ASME Transactions on Mechatronics, under review. (**VEH 2021 Best Paper**)

4. **Xin Li**, Guobiao Hu, Zhenkun Guo, Junlei Wang, Yaowen Yang*, and Junrui Liang*, "Frequency Up-conversion based Vibration Energy Harvesting Technology: A Review (invited paper)," Symmetry, 2022.

5. Jianjun Wang*, Yalei Cao, Hongjun Xiang, Zhiwei Zhang, Junrui Liang, **Xin Li**, Deyun Ding, Teng Li, Lihua Tang, "A Piezoelectric Smart Backing Ring for High-performance Power Generation Subject to Train Induced Steel-spring Fulcrum Forces," Energy Conversion and Management, 2022.

6. **Xin Li**, Hong Tang, Guobiao Hu, Bao Zhao, and Junrui Liang*, "ViPSN-pluck: A Transient-motion-powered Motion Detector," IEEE Internet of Things Journal, 2021.

7. **Xin Li**, Li Teng, Hong Tang, Haoyu Wang, Yu Liu, Minfan Fu, and Junrui Liang*, "ViPSN: A Vibration-powered IoT Platform," IEEE Internet of Things Journal, 2021.

8. Junrui Liang*, **Xin Li**, and Hailiang Yang, "Kinetic Energy Harvesting toward Battery-free IoT: Opportunities and Challenges (invited paper)," ZTE Communications, 2021.

9. Guobiao Hu, Chaoyang Zhao, Yaowen Yang*, **Xin Li**, and Junrui Liang*, "Triboelectric Energy Harvesting Using An Origami-inspired Structure," Applied Energy, 2021.

10. Zhenkun Guo, Guobiao Hu, Jingchao Jiang, Liuding Yu, **Xin Li**, and Junrui Liang*, "Theoretical and Experimental Study of The Vibration Dynamics of A 3D-printed Sandwich Beam with Hourglass Lattice Truss Core (invited paper)," Frontiers in Mechanical Engineering, 2021.

11. Jinxi Zhang, Shaobo Gong, **Xin Li**, Junrui Liang, Zhonglin Wang*, and Kailiang Ren*, "A Wind-driven Poly (tetrafluoroethylene) Electret and Polylactide Polymer-based Hybrid Nanogenerator for Self-powered Temperature Detection System," Advanced Sustainable Systems, 2020.

12. Xiaoyuan Ma*, Peilin Zhang, **Xin Li**, Weisheng Tang, Jianming Wei*, and Oliver Theel, "DeCoT: A Dependable Concurrent Transmission-based Protocol for Wireless Sensor Network," IEEE Access, 2018.

13. **Xin Li**, "Opportunities of Motion-powered IoT Systems," Proceedings of the 2021 International Conference on Embedded Wireless Systems and Networks, Delft, Netherlands, 2021. (EWSN 2021)

14. **Xin Li**, Hong Tang, Guobiao Hu, and Junrui Liang*, "Live Demo of A Transient-motion-powered Human Motion Detector," Proceedings of the 2021 IEEE International Symposium on Circuits and Systems, Daegu, Korea, 2021. (ISCAS 2021)

15. **Xin Li**, Hong Tang, Bao Zhao, and Junrui Liang*, "System Design and Implementation of A Transient-motion-powered IoT Sensor Node," Proceedings of the ASME 2020 Conference on Smart Materials, Adaptive Structures and Intelligent Systems, Irvine, CA, USA, 2020. (SMASIS 2020) (**Finalist of Best Student Hardware Competition**)

16. **Xin Li**, Hong Tang, Yiyao Zhu, and Junrui Liang*, "Power Solution of A Vibration-powered Sensing Node," Proceedings of the 9th International Power Electronics and Motion Control Conference, Nanjing, China, 2020. (IPEMC - ECCE Asia 2020)

17. **Xin Li**, Hong Tang, Junrui Liang*, and Lihua Tang, "Exploring The Magnetic Plucking Motion towards A Transient-motion-powered IoT Sensor Node," Proceedings of SPIE Conference, Active and Passive Smart Structures and Integrated Systems IX, 2020. (SPIE SS/NDE 2020)

18. Xiaoyuan Ma, Peilin Zhang, Ye Liu, **Xin Li**, Weisheng Tang, Pei Tian, Jianming Wei, Lei Shu, and Oliver Theel, "Competition: Using DeCot+ to Collect Data under Interference," Proceedings of the 2019 International Conference on Embedded Wireless Systems and Networks, Beijing, China, 2019. (EWSN 2019) (**1st place of Dependability Competition**)

19. **Xin Li**, Xiaoyuan Ma*, Peilin Zhang, Pei Tian, and Jianming Wei*, "Escape or Exploit? A Noise-modulation-based Communication under Harsh Interference," Proceedings of the 7th International Workshop on Real-World Embedded Wireless Systems and Networks (RealWSN), in conjunction with the 16th ACM Conference on Embedded Networked Sensor Systems, Shenzhen, China, 2018. (SenSys 2018)

20. Xiaoyuan Ma*, Peilin Zhang, Weisheng Tang, **Xin Li**, Wangji He, Fuping Zhang, Jianming Wei*, and Oliver Theel, "Using Enhanced OF∋COIN to Monitor Multiple Concurrent Events under Adverse Conditions," Proceedings of the 2018 International Conference on Embedded Wireless Systems and Networks, Madrid, Spain, 2018. (EWSN 2018) (**3rd place of Dependability Competition**)