Xin Li

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BIBLIOGRAPHY

Xin is now a Ph.D. candidate at ShanghaiTech University, China, and jointly trained with Nanyang Technological University, Singapore. He is also with the Shanghai Institute of Microsystem and Information Technology, Chinese Academy of Sciences, and University of Chinese Academy of Sciences. His research interests include kinetic energy harvesting, intermittent computing, ubiquitous computing, and battery-free IoT. His research advisor is Prof. **Junrui Liang**.

EDUCATIONS

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

ShanghaiTech University/University of Chinese Academy of Sciences   Shanghai, China
Ph.D. in Electronic and Information Engineering   *Sep. 2018 – Present*
Research advisor*: Prof. Junrui Liang*

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

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

RESEARCH HONORS

– Best Paper of the 3rd 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 International Conference on Embedded Wireless Systems and Networks (EWSN) Dependability Competition – Category "Data Collection" in 2019.

– 3rd place at the International Conference on Embedded Wireless Systems and Networks (EWSN) Dependability Competition in 2018.

PUBLICATIONS

1. **Xin Li**, Guobiao Hu, and Junrui Liang*, "Dynamics Analysis of a Transient Plucking Energy Harvester," IEEE/ASME Transactions on Mechatronics, under review.

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

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

4. 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 (Special Issue invited paper)," Frontiers in Mechanical Engineering, 2021.

5. **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, vol. 8, no. 3, pp. 1728-1739, 2021.

6. 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, Dec. 2020.

7. 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, vol. 6, pp. 73130–73146, Oct. 2018.

8. **Xin Li**, "Opportunities of Motion-powered IoT Systems," Proceedings of the 2021 International Conference on Embedded Wireless Systems and Networks, Delft, Netherlands, Feb 17-19, 2021. (EWSN 2021)

9. **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, May 23-26, 2021. (ISCAS 2021)

10. **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, September 14–16, 2020. (SMASIS 2020) (**Finalist of Best Student Hardware Competition**)

11. **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, May 31-June 3, 2020. (IPEMC - ECCE Asia 2020)

12. **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 11376, Active and Passive Smart Structures and Integrated Systems IX, 113761U, April 22, 2020. (SPIE SS/NDE 2020)

13. 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, pp. 290–291. (EWSN 2019) (**1st place of Dependability Competition**)

14. **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 2018), in conjunction with the 16th ACM Conference on Embedded Networked Sensor Systems (SenSys 2018), Shenzhen, China, 2018, pp. 31–36.

15. 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, pp. 211–212. (EWSN 2018) (**3rd place of Dependability Competition**)

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 – Sep. 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.

RESEARCH PROJECTS

KPID: a kinetic-powered IDentification system Jan. 2021 – Present
ShanghaiTech University *Shanghai, China*
- Based on potential energy pre-charging, which is a unique feature of kinetic energy harvesting compared to solar, RF, etc., we are building the world's first battery-free IoT node that can be integrated into the BLE Mesh ecosystem.

ViPSN+: battery-free IoT systems based on ViPSN Sep. 2019 – Present
ShanghaiTech University *Shanghai, China*
- ViPSN-Cam: a vibration-powered ubiquitous camera
- ViPSN-Eink: a motion-powered E-ink human–computer interaction (HCI) system

ViPSN-pluck: a transient-motion-powered motion detector Oct. 2019 – Nov. 2020
ShanghaiTech University *Shanghai, China*
- Represented a pioneer work to harvest energy from transient motions.
- Provided a robust energy harvesting solution via a proper mechanical modulation strategy, i.e., potential energy pre-charging, to support the execution of systemlevel tasks.
- Employed a novel sensing architecture for motion detector, based on cyber-electro-mechanically synergistic co-design.
- 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.

ViPSN: a vibration-powered IoT platform Jan. 2019 – Jan.2020
ShanghaiTech University *Shanghai, China*
- First open-source development platform specified for vibration-powered IoT devices.
- Proposed a reliable energy management solution.
- 1st Runner Up of the IEEE Industrial Electronics Society (IES) Inter-Chapter Paper Competition in 2019.

D-Cube: a wireless sensor network testbed Mar. 2017 – Mar. 2018
Shanghai Advanced Research Institute, Chinese Academy of Sciences *Shanghai, China*
- D-Cube is a large-scale IoT platform serving smart city.
- I built the original version of D-Cube by myself, including hardware, software, and network designs.

DeCot and DeCot+: Dependable MAC protocol for IEEE 802.15.4 Mar. 2017 – Sep. 2018
Shanghai Advanced Research Institute, Chinese Academy of Sciences *Shanghai, China*
- Proposed a dependable Concurrent Transmission-based WSN to stand against interference.
- 1st place at the EWSN Dependability Competition – Category "Data Collection" in 2019.
- 3rd place at the EWSN Dependability Competition in 2018.

MoteScatter: a noise-modulation-based backscatter communication Mar. 2017 – Feb. 2018
ShanghaiTech University, Shanghai Advanced Research Institute *Shanghai, China*
- Proposed a reliable approach to communicate under interference via exploiting interference.
- **Only one course project (CS210, SIST of ShanghaiTech) published at an international conference.**