

## Dr. Junrui LIANG (梁俊睿)

Address: Room 1D-310.D, SIST Building 1, 393 Middle Huaxia Road  
Pudong District, Shanghai 201210, China

Phone: +86-21-20685268

Email: [liangjr@shanghaitech.edu.cn](mailto:liangjr@shanghaitech.edu.cn)

Website: <http://metal.shanghaitech.edu.cn>



### Educations

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- Ph.D. in Mechanical and Automation Engineering* (Advisor: Prof. Wei-Hsin Liao)  
Department of Mechanical and Automation Engineering Aug. 2007 – Sep. 2010  
The Chinese University of Hong Kong Hong Kong  
Thesis title: *A systematic investigation on piezoelectric energy harvesting with emphasis on interface circuits*
- M.S. in Precision Instrument and Machinery* (Advisor: Prof. Chunyu Zhao)  
School of Electronics, Information and Electrical Engineering Sep. 2004 – Mar. 2007  
Shanghai Jiao Tong University Shanghai, China  
Thesis title: *A research on class-E amplifier principle and its application on transcutaneous power link*
- B.S. in Instrumentation Engineering* (Advisor: Prof. Cai Ping)  
School of Electronics, Information and Electrical Engineering Sep. 2000 – Jul. 2004  
Shanghai Jiao Tong University Shanghai, China  
Thesis title: *Correlation technology based velocity detecting device*

### Working Experiences

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- Assistant Professor*  
School of Information Science and Technology Nov. 2013 – present  
ShanghaiTech University Shanghai, China
- Visiting Scholar* (Host faculty member: Prof. Seth R. Sanders)  
Department of Electrical Engineering and Computer Sciences Jul. 2015 – Jan. 2016  
University of California, Berkeley California, USA
- Visiting Scholar* (Host faculty member: Prof. Wei-Hsin Liao)  
Department of Mechanical and Automation Engineering Jun. 2015 – Jul. 2015  
The Chinese University of Hong Kong Hong Kong
- Postdoctoral Researcher* (Advisor: Prof. Henry S.-H. Chung)  
Centre for Smart Energy Conversion and Utilization Research Jan. 2013 – Oct. 2013  
City University of Hong Kong Hong Kong
- Postdoctoral Researcher* (Advisor: Prof. Wei-Hsin Liao)  
Department of Mechanical and Automation Engineering Oct. 2010 – Dec. 2012  
The Chinese University of Hong Kong Hong Kong

### Teaching Experiences

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- Instructor*  
Introduction to Embedded Systems (undergraduate) Fall 2018, Spring 2017,  
& Fall 2016 @ ShanghaiTech

Embedded Systems Project (undergraduate)	Summer 2017 @ ShanghaiTech
Industrial Survey (undergraduate)	Summer 2016 @ ShanghaiTech
Renewable Energy Systems (graduate)	Spring 2018, Spring 2016, Fall 2016, & Spring 2015 @ ShanghaiTech
Introduction to Information Science and Technology (undergraduate, co-instructor)	Spring 2015 @ ShanghaiTech
Analog Integrated Circuits (graduate)	Spring 2014 & Fall 2014 @ ShanghaiTech
Technical Writing in English (graduate, co-instructor)	Fall 2013 @ ShanghaiTech

#### *Teaching Assistant*

Engineering Profession (undergraduate)	Fall 2009 @ CUHK
Smart Materials and Structures (graduate)	Spring 2009 @ CUHK
Introduction to Control Systems (undergraduate)	Fall 2008 @ CUHK
Manufacturing Technology (undergraduate)	Spring 2008 @ CUHK
Introduction to Control Systems (undergraduate)	Fall 2007 @ CUHK

### **Honors and Awards**

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- 1st Runner-up in IEEE Industrial Electronics Society (IES) Inter Chapter Paper Competition 2019 Oct. 2019
- Excellent Research Award 2018, School of Information Science and Technology ShanghaiTech University Jan. 2019
- Third Award and Nominee Award, The First Innovation and Entrepreneurship Competition, ShanghaiTech University Dec. 2018
- Excellent Final Year Project (FYP) Supervisor, Tongji University Jun. 2015
- Postgraduate Research Output Award 2010, The Chinese University of Hong Kong (only one postgraduate student, who produced the best research output within every past year, might be nominated by the Dean of each Faculty) Dec. 2011
- Best Information Paper Award, 2010 IEEE International Conference on Information and Automation Jun. 2010
- Best Paper Award in Automation, 2009 IEEE International Conference on Information and Automation Jun. 2009
- Best Student Contributions Award, the 19th International Conference on Adaptive Structures and Technologies Dec. 2008
- Honor for the 9th Shanghai 21st Century Mechatronic Final Year Project Contest May 2004
- Excellent Student Award, Shanghai Jiao Tong University Nov. 2003
- Second Prize in Shanghai Region, 2003 National Electronic Design Contest Nov. 2003
- Academic Scholarship 2003, Shanghai Jiao Tong University Sep. 2003
- Excellent League Member, Shanghai Jiao Tong University May 2002

### **Research Interests**

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- *Everlasting power solutions for distributed IoT devices*
- *Simulation and design algorithms for power & energy circuits and systems*
- *Joint dynamics of electromechanical coupling systems*

- *Mechatronics and electromechanical power conversion*
- *Human factored IoT solutions*

## List of Publications

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*Journal Papers* (\* corresponding author, underline: supervised students/postdoc)

- J25 Bao Zhao, Jiahua Wang, **Junrui Liang\***, and Wei-Hsin Liao, "A dual-effect solution for broadband piezoelectric energy harvesting," *Applied Physics Letters*, vol. 116, no. 6, p. 063901, 2020.
- J24 Jiahua Wang, Bao Zhao, Wei-Hsin Liao\*, and **Junrui Liang**, "New insight into piezoelectric energy harvesting with mechanical and electrical nonlinearities," *Smart Materials and Structures*, in press, doi: 10.1088/1361-665X/ab7543.
- J23 Rong He, Peng Zhao, Minfan Fu\*, Yu Liu, Haoyu Wang, and **Junrui Liang**, "Decomposition and synthesis of high-order compensated inductive power transfer systems for improved output controllability," *IEEE Transactions on Microwave Theory and Techniques*, vol. 67, no. 11, pp. 4514-4523, 2019.
- J22 Chen Chen, Bao Zhao, and **Junrui Liang\***, "Revisit of synchronized electric charge extraction (SECE) in piezoelectric energy harvesting by using impedance modeling," *Smart Materials and Structures*, vol. 28, no. 10, art. no. 105053, 2019.
- J21 Kangqi Fan\*, Meiling Cai, Fei Wang, Lihua Tang, **Junrui Liang**, Yipeng Wu, Hengheng Qua, and Qinxue Tan, "A string-suspended and driven rotor for efficient ultra-low frequency mechanical energy harvesting," *Energy Conversion and Management*, vol. 198, p. 111820, Oct. 2019.
- J20 Guobiao Hu, Lihua Tang\*, **Junrui Liang**, and Raj Das, "Modelling of a cantilevered energy harvester with partial piezoelectric coverage and shunted to practical interface circuits", *Journal of Intelligent Material Systems and Structures*, in press.
- J19 Yabin Liao\* and **Junrui Liang**, "Unified modeling, analysis and comparison of piezoelectric vibration energy harvesters", *Mechanical Systems and Signal Processing*, vol. 123, pp. 403-425, 2019.
- J18 Haili Liu, Rui Hua, Yang Lu, Ya Wang\*, Emre Salman, **Junrui Liang**, "Boosting the efficiency of a footstep piezoelectric-stack energy harvester by using the synchronized switch technology", *Journal of Intelligent Material Systems and Structures*, vol. 30, no. 6, pp 813-822, 2019.
- J17 **Junrui Liang\***, Yuheng Zhao, and Kang Zhao, "Synchronized triple bias-flip interface circuit for piezoelectric energy harvesting enhancement," *IEEE Transactions on Power Electronics*, vol. 34, no. 1, pp. 275-286, 2019.
- J16 Tao Huang, Siwei Yang, Peng He\*, Jing Sun, Shuai Zhang, Dongdong Li, Yan Meng, Jiushun Zhou, Huixia Tang, **Junrui Liang\***, Guqiao Ding\*, and Xiaoming Xie, "Phase separation induced PVDF/graphene coating on fabrics towards flexible piezoelectric sensors," *ACS Applied Materials & Interfaces*, vol. 10, no. 36, pp. 30732–30740, 2018.
- J15 Yabin Liao\* and **Junrui Liang**, "Maximum power, optimal load, and impedance analysis of piezoelectric vibration energy harvesters," *Smart Materials and Structures*, vol. 27, no. 7, art. no. 075053, 2018.
- J14 Liya Zhao, Lihua Tang\*, **Junrui Liang**, and Yaowen Yang, "Synergy of wind energy harvesting and synchronized switch harvesting interface circuit," *IEEE/ASME Transactions on Mechatronics*, vol. 22, no. 2, pp. 1093-1103, 2017.

- J13 **Junrui Liang\***, “Synchronized bias-flip interface circuits for piezoelectric energy harvesting enhancement: a general model and prospects,” *Journal of Intelligent Material Systems and Structures*, pp. 339–356, no. 3, vol. 28, 2017.
- J12 Haili Liu, **Junrui Liang\***, and Cong Ge, “A mechatronic power boosting design for piezoelectric generators,” *Applied Physics Letters*, vol. 107, no. 14, art. no. 141902, 2015.
- J11 **Junrui Liang\***, Henry Shu-Hung Chung, and Wei-Hsin Liao, “Dielectric loss against piezoelectric power harvesting,” *Smart Materials and Structures*, vol. 23, no. 9, art. no. 092001, 2014.
- J10 **Junrui Liang** and Wei-Hsin Liao\*, “Impedance modeling and analysis for piezoelectric energy harvesting systems,” *IEEE/ASME Transactions on Mechatronics*, vol. 17, no. 6, pp. 1145-1157, 2012.
- J09 **Junrui Liang** and Wei-Hsin Liao\*, “Improved design and analysis of self-powered synchronized switch interface circuit for piezoelectric energy harvesting systems,” *IEEE Transactions on Industrial Electronics*, vol. 59, no. 4, pp. 1950–1960, 2012. (Ranked Highly Cited Paper as of March/April 2019 by Web of Science)
- J08 **Junrui Liang** and Wei-Hsin Liao\*, “Impedance network for power optimization in piezoelectric energy harvesting systems,” *HKIE Transactions*, vol. 18, no. 4, Dec. 2011. (Shortlisted paper for the *HKIE Outstanding Paper Award for Young Engineers/Researchers 2011*)
- J07 **Junrui Liang\*** and Wei-Hsin Liao, “Steady-state simulation and optimization of class-E power amplifiers with extended impedance method,” *IEEE Transactions on Circuit and System I: Regular Papers*, vol. 58, no. 6, pp. 1433–1445, 2012.
- J06 **Junrui Liang** and Wei-Hsin Liao\*, “On the influence of transducer internal loss in piezoelectric energy harvesting with SSHI interface,” *Journal of Intelligent Material Systems and Structures*, vol. 22, no. 5, pp. 503–512, 2011.
- J05 Tianliang Yang, **Junrui Liang**, Chunyu Zhao, and Dayue Chen\*, “Analysis and design of Class-E power amplifiers at any duty ratio in frequency domain,” *Analog Integrated Circuits and Signal*, vol. 67, no. 2, pp. 149–156, 2011.
- J04 **Junrui Liang** and Wei-Hsin Liao\*, “Energy flow in piezoelectric energy harvesting systems,” *Smart Materials and Structures*, vol. 20, no. 1, art. no. 015005 (11 pages), 2011. (One of the top 20 most cited articles published by *Smart Materials and Structures* in 2011)
- J03 **Junrui Liang** and Wei-Hsin Liao\*, “Piezoelectric energy harvesting and dissipation on structural damping,” *Journal of Intelligent Material Systems and Structures*, vol. 20, no. 5, pp. 515–527, 2009.
- J02 Yulong Zhu, **Junrui Liang**, Haoran Bi, and Ping Cai\*, “The design and development of teaching apparatus for correlation velocity measurement technique,” *Experiment Science and Technology* (in Chinese), no. 11, pp. 17–18, 2007.
- J01 **Junrui Liang** and Chunyu Zhao\*, “A design of transcutaneous power link circuit,” *Application of Electronic Technique* (in Chinese), no. 4, pp. 87–89, 2007.

Conference Papers (\* corresponding author)

- C43 Xin Li 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)
- C42 Zhen Li, Zhiyuan Chen\*, Qiping Wan, Qin Kuai, **Junrui Liang**, Philip K.T. Mok, and Xiaoyang Zeng, “An Energy harvesting system with reconfigurable piezoelectric energy harvester array for IoT applications,” *Proceedings of the 2020 IEEE International Symposium on Circuits and Systems*, Sevilla, Spain, May 17-20 2020. (ISCAS 2020)

- C41 Shaochen Xi, Weimin Li, Jianping Guo\*, and **Junrui Liang**, “A self-powered piezoelectric energy harvesting interface circuit based on adaptive SSHI with fully integrated switch control,” *Proceedings of the 2020 IEEE International Symposium on Circuits and Systems*, Sevilla, Spain, May 17-20 2020. (ISCAS 2020)
- C40 Li Teng, **Junrui Liang\***, and Zhiyuan Chen, “Multiple charge extractions with bias-flip interface circuit for piezoelectric energy harvesting” *Proceedings of the 2020 IEEE International Symposium on Circuits and Systems*, Sevilla, Spain, May 17-20 2020. (ISCAS 2020)
- C39 Xin Li and **Junrui Liang\***, “Implementation and energy analysis of a transient motion powered IoT sensor node” *Proceedings of SPIE Conference 11376-67, Active and Passive Smart Structures and Integrated Systems*, Anaheim, USA, April 26-30, 2020. (SPIE SS/NDE 2020)
- C38 Guobiao Hu, Lihua Tang\*, **Junrui Liang**, Raj Das, “A tapered beam piezoelectric energy harvester with extended tip mass and shunted to P-SSHI interface” *Proceedings of SPIE Conference 11376-5, Active and Passive Smart Structures and Integrated Systems*, Anaheim, USA, April 26-30, 2020. (SPIE SS/NDE 2020)
- C37 Shiyang Wang, Junrui Liang, Haoyu Wang, and Minfan Fu\*, “An Induced Voltage Source Model for Capacitive Power Transfer,” *IEEE Applied Power Electronics Conference and Exposition*, New Orleans, LA, USA, Mar. 15-19, 2020. (APEC 2020)
- C36 Jiahua Wang, Bao Zhao, **Junrui Liang**, and Wei-Hsin Liao\*, “Orbit jumps of monostable energy harvesters by a bidirectional energy conversion circuit” *Proceedings of the ASME 2019 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*, Anaheim, CA, USA, August 18-21, 2019. (IDETC/CIE2019)
- C35 Kang Zhao and **Junrui Liang\***, “Series synchronized triple bias-flip (S-S3BF) interface circuit for piezoelectric energy harvesting,” *Proceedings of the 2019 IEEE International Symposium on Circuits and Systems*, Sapporo, Japan, May 2019. (ISCAS 2019)
- C34 Yiming Gao and **Junrui Liang\***, “Harmonic electromechanical modeling of vibration energy harvesting systems using extended impedance method,” *The 2nd International Conference on Modeling in Mechanics and Materials*, Suzhou, China, March 29-31, 2019. (CMMM 2019)
- C33 Bao Zhao, Jiahua Wang, **Junrui Liang\***, and Wei-Hsin Liao, “Controllable orbit jumps in bistable energy harvesters by using a bidirectional energy conversion circuit,” *Proceedings of SPIE Conference 10967, Active and Passive Smart Structures and Integrated Systems*, Denver, USA, March 3-7, 2019. (SPIE SS/NDE 2019)
- C32 Hong Tang and **Junrui Liang\***, “Improvement of the equivalent impedance model for electromagnetic energy harvesting system,” *Proceedings of SPIE Conference 10967, Active and Passive Smart Structures and Integrated Systems*, Denver, USA, March 3-7, 2019. (SPIE SS/NDE 2019)
- C31 Yabin Liao\* and **Junrui Liang**, “Generalized modeling and analysis of piezoelectric vibration energy harvesters,” *Proceedings of SPIE Conference 10967, Active and Passive Smart Structures and Integrated Systems*, Denver, USA, March 3-7, 2019. (SPIE SS/NDE 2019)
- C30 Shiyang Wang, Chen Chen, and **Junrui Liang\***, “Piezoelectric energy harvesting enhancement by using a bidirectional buck-boost converter,” *Proceeding of the 29<sup>th</sup> International Conference on Adaptive Structures and Technologies*, Seoul, Korea, Oct. 2018. (ICAST 2018)
- C29 Junlong Wang and **Junrui Liang\***, “Energy harvesting from horizontal and vertical backpack movements during walking,” *Proceedings of the 2018 IEEE/ASME International*

- Conference on Advanced Intelligent Mechatronics*, Auckland, New Zealand, Jul. 2018. (AIM 2018)
- C28 Guobiao Hu, Bao Zhao, Lihua Tang\*, **Junrui Liang**, and Raj Das, "Optimization of cantilevered piezoelectric energy harvester with standard DC interface circuit," *ISMA International Conference on Noise and Vibration Engineering*, Leuven, Belgium, Sept. 2018. (ISMA 2018)
- C27 Bao Zhao, **Junrui Liang\***, and Kang Zhao, "Phase-variable parallel synchronized triple bias flips (PV-P-S3BF) interface circuit towards broadband piezoelectric energy harvesting," *Proceedings of the 2017 IEEE International Symposium on Circuits and Systems*, Florence, Italy, May 2018. (ISCAS 2018)
- C26 **Junrui Liang\***, "An improvement on extended impedance method towards efficient design and analysis of high-frequency class-E resonant inverters," *IPEC-Niigata 2018 - ECCE Asia*, Niigata, Japan, May 20-24 2018. (ECCE Asia 2018)
- C25 Bao Zhao and **Junrui Liang\***, "On the circuit solutions towards broadband and high-capability piezoelectric energy harvesting systems," *Proceedings of SPIE Conference 10595, Active and Passive Smart Structures and Integrated Systems*, Denver, USA, March 4-8, 2018. (SPIE SS/NDE 2018)
- C24 Kang Zhao, **Junrui Liang\***, and Chen Chen, "Synchronized seven bias-flip (S7BF) interface circuit: a new power conditioning solution for piezoelectric energy harvesting enhancement," *The 43rd Annual Conference of the IEEE Industrial Electronics Society*, Beijing, China, Oct. 29 – Nov. 1, 2017. (IECON 2017)
- C23 **Junrui Liang\*** and Chenbin Zhou, "使用双参数可调同步开关功率调理电路提升压电俘能器发电效能, 拓展发电频宽 (Enhancing the piezoelectric energy harvesting capability and broadening the harvesting bandwidth by using a dual-parameter tunable synchronized switch power conditioning circuit)," *中国力学大会 (The Chinese Congress on Theoretical and Applied Mechanics)*, Beijing, China, Aug. 13-16, 2017.
- C22 **Junrui Liang\*** and Shuai Zhang, "An efficient steady-state simulation of class-e resonant inverter considering MOSFET parasitic components by using extended impedance method," *International Future Energy Electronics Conference 2017 – ECCE Asia*, Kaohsiung, Taiwan, Jun. 2017. (ECCE Asia 2017)
- C21 Kang Zhao, Yuheng Zhao, and **Junrui Liang\***, "Live Demonstration of A vibration-powered Bluetooth wireless sensor node with running PFC power conditioning," *Proceedings of the 2017 IEEE International Symposium on Circuits and Systems*, Baltimore, USA, May 2017. (ISCAS 2017)
- C20 Kang Zhao, Yuheng Zhao, and **Junrui Liang\***, "A vibration-powered Bluetooth wireless sensor node with running PFC power conditioning," *Proceedings of the 2017 IEEE International Symposium on Circuits and Systems*, Baltimore, USA, May 2017. (ISCAS 2017)
- C19 Chen Chen and **Junrui Liang\***, "Impedance analysis of piezoelectric energy harvesting system using synchronized charge extraction interface circuit," *Proceedings of SPIE Conference 10164, Active and Passive Smart Structures and Integrated Systems*, Portland, USA, Mar. 2017. (SPIE SS/NDE 2017)
- C18 **Junrui Liang\***, Cong Ge, and Yi-Chung Shu, "Impedance modeling of electromagnetic energy harvesting system using full-wave bridge rectifier," *Proceedings of SPIE Conference 10164, Active and Passive Smart Structures and Integrated Systems*, Portland, USA, Mar. 2017. (SPIE SS/NDE 2017)
- C17 Yuheng Zhao and **Junrui Liang\***, "Parallel synchronized triple bias-flip circuit for piezoelectric energy harvesting enhancement: operation principle and experimental



- validation," *Proceedings of the IEEE Energy Conversion Congress & Expo*, Milwaukee, USA, Sept. 2016. (ECCE 2016)
- C16 **Junrui Liang\***, "Design of class-E power amplifier with nonlinear components by using extended impedance method," *Proceedings of the 2016 IEEE International Symposium on Circuits and Systems*, pp. 437-440, Montreal, Canada, May 2016. (ISCAS 2016)
- C15 Haili Liu, Cong Ge, **Junrui Liang\***, "A comparative study on the self-powered mechatronic and electronic synchronized switch interfaces for piezoelectric energy harvesting systems," *Proc. SPIE Conference 9799, Active and Passive Smart Structures and Integrated Systems 2016*, 97991Q, Las Vegas, USA, Mar. 2016. (SPIE SS/NDE 2016)
- C14 Yuheng Zhao, Chenbin Zhou, and **Junrui Liang\***, "Implementation of synchronized triple bias-flip interface circuit towards higher piezoelectric energy harvesting capability," *Proceedings of the 26th International Conference on Adaptive Structures and Technologies*, Kobe, Japan, Oct. 2015. (ICAST 2015)
- C13 Haili Liu, Cong Ge, **Junrui Liang\***, "A mechanical solution of self-powered SSHI interface for piezoelectric energy harvesting systems," *Proc. SPIE Conference 9431, Active and Passive Smart Structures and Integrated Systems 2015*, 94310E, San Diego, USA, Mar. 2015. (SPIE SS/NDE 2015)
- C12 Liya Zhao, **Junrui Liang**, Lihua Tang\*, Yaowen Yang, and Haili Liu, "Enhancement of galloping-based wind energy harvesting by synchronized switching interface circuits," *Proc. SPIE Conference 9431, Active and Passive Smart Structures and Integrated Systems 2015*, 94311G, San Diego, USA, March 2015. (SPIE SS/NDE 2015)
- C11 Haili Liu and **Junrui Liang\***, "Design of a class-E inverter for piezoelectric ultrasound generation against load variation," *Proceedings of 2014 Symposium on Piezoelectricity, Acoustic Waves, and Device Applications*, pp. 118-121, Beijing, China, Oct. 2014. (SPAWDA 2014)
- C10 **Junrui Liang\***, "Synchronized triple bias-flips harvesting circuit: a new solution for piezoelectric energy harvesting enhancement," *Proceedings of the 25<sup>th</sup> International Conference on Adaptive Structures and Technologies*, The Hague, The Netherland, Oct. 2014. (ICAST 2014)
- C09 **Junrui Liang\***, Shuo Shi, and Wei-Hsin Liao, "On the counteractive effect of dielectric loss in piezoelectric energy harvesting," *Proc. SPIE Conference 9057, Active and Passive Smart Structures and Integrated Systems 2014*, 90571F, San Diego, USA, Mar. 2014. (SPIE SS/NDE 2014)
- C08 **Junrui Liang\*** and Henry Shu-Hung Chung, "Best voltage bias-flipping strategy towards maximum piezoelectric power generation," *Journal of Physics: Conference Series*, vol. 476, p. 012025, London, UK, Dec. 2013. (PowerMEMS 2013)
- C07 **Junrui Liang** and Wei-Hsin Liao\*, "Impedance analysis for piezoelectric energy harvesting devices under displacement and force excitations," *Proceedings of 2010 IEEE International Conference on Information and Automation*, pp. 42–47, Harbin, China, Jun. 2010. (ICIA 2010)  
*(Best Information Paper Award)*
- C06 **Junrui Liang** and Wei-Hsin Liao\*, "Impedance matching for improving piezoelectric energy harvesting systems," *Proc. SPIE Conference 7643, Active and Passive Smart Structures and Integrated Systems 2010*, 76430K, San Diego, USA, Mar. 2010. (SPIE SS/NDE 2010) *(One of the most frequently downloaded papers from the SPIE Digital Library, as of 9 Sep. 2010)*
- C05 **Junrui Liang** and Wei-Hsin Liao\*, "On the influence of dielectric loss in piezoelectric energy harvesting with SSHI interface," *Proceedings of the 20<sup>th</sup> International Conference*

*on Adaptive Structures and Technologies*, pp. 872–883, Hong Kong, Oct. 2009. (ICAST 2009)

- C04 **Junrui Liang** and Wei-Hsin Liao\*, “An improved self-powered switching interface for piezoelectric energy harvesting,” *Proceedings of 2009 IEEE International Conference on Information and Automation*, pp. 945–950, Zhuhai/Macau, China, Jun. 2009. (ICIA 2009) (*Best Paper Award in Automation*)
- C03 **Junrui Liang\*** and Wei-Hsin Liao, “Simulation and optimization of class-E power amplifiers with extended impedance method,” *Proceedings of 2009 IEEE International Symposium on Circuits and Systems*, pp. 2493–2496, Taipei, Taiwan, May 2009. (ISCAS 2009)
- C02 **Junrui Liang** and Wei-Hsin Liao\*, “On the energy flow in piezoelectric energy harvesting with SSHI interface,” *Proceedings of the 19<sup>th</sup> International Conference on Adaptive Structures and Technologies*, 11 pages, Ascona, Switzerland, Oct. 2008. (ICAST 2008) (*Best Student Contributions Award*)
- C01 **Junrui Liang** and Wei-Hsin Liao\*, “Energy harvesting and dissipation with piezoelectric materials,” *Proceedings of 2008 IEEE International Conference on Information and Automation*, pp. 446–451, Zhangjiajie, China, Jun. 2008. (ICIA 2008)

## Patents

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- P02 **Junrui Liang**, Haili Liu, Cong Ge, “A mechanical displacement extremes detecting switch and its application in vibration energy harvesting,” China Patent, 2016/10/25, Grant No. CN106953542B.
- P01 **Junrui Liang**, Yuheng Zhao, “Synchronized multiple bias-flip circuit for kinetic energy harvesting,” China Patent, 2016/10/25, Grant No. CN106411178B.

## Invited/Seminar Talks

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- T32 *Cyber-Electromechanical Synergy towards Motion-Powered IoT Devices*  
Seminar talk at Beijing Institute of Nanoenergy and Nanosystems,  
Chinese Academy of Sciences, Beijing, China Jan. 13 2020
- T31 *Cyber-Electromechanical Synergy towards Motion-Powered IoT Devices*  
Technical talk at Department of Precision Instrument,  
Tsinghua University, Beijing, China Jan. 13 2020
- T30 *Piezoelectric energy harvesting circuit designs and their dynamics analysis*  
Invited talk at the 17th National Nonlinear Vibration and the 14th National Nonlinear  
Dynamics and Kinetic Stability Conference (NVND 2019), Nanjing, China May 12, 2019
- T29 *On the mechanical, electrical, and material constraints against the piezoelectric energy  
harvesting improvement*  
Invited talk at 2019 IEEE 14th International Conference on Nano/Micro Engineered and  
Molecular Systems (NEMS 2019), Bangkok, Thailand Apr. 13, 2019
- T28 *Energy harvesting from vibrations towards self-powered dispersive WSNs*  
Invited talk at The Symposium on Embedded Networked Systems and Internet of Things  
(ENSIOT 2019), Shanghai, China Feb. 22, 2019
- T27 *Piezoelectric energy harvesting power conditioning circuits: the history and future*  
Distinguished Lecture at State Key Laboratory of ASIC and System  
Fudan University Dec. 4, 2018
- T26 *Piezoelectric energy harvesting power conditioning circuits: the history and future*  
Technical talk at Department of Electronic and Information Engineering  
Hong Kong Polytechnic University Nov. 5, 2018



- T25 *Multi-level bi-directional power conversion circuits for energy harvesting improvement*  
Invited talk in the 1st International Conference on Vibration and Energy Harvesting  
Application, Shenzhen, China Nov. 3, 2018
- T24 *Introduction to the research work of METAL group at ShanghaiTech University*  
Technical talk at Korea Advanced Institute of Science and Technology (KAIST)  
Oct. 1, 2018
- T23 *Power electronics design towards high-capability and broadband piezoelectric energy  
harvesting systems*  
Seminar talk at Department of Mechanical and Automation Engineering,  
The Chinese University of Hong Kong Aug. 14 2018
- T22 *Recent research progress of piezoelectric energy harvesting circuits*  
Invited talk at International Workshop on the Frontier Technology of Energy Harvesting  
Organized by School of Mechanical Engineering, Xi'an Jiao Tong University Jun. 11, 2018
- T21 *High capability and broadband piezoelectric energy harvester: design principle and  
research prospective*  
Seminar talk at School of Mechanical and Automotive Engineering,  
Hefei University of Technologies Jun. 7, 2018
- T20 *Multiple bias-flip designs towards piezoelectric energy harvesting enhancement*  
AMSV Distinguished Lecture at State Key Laboratory of Analog and Mixed-Signal VLSI,  
University of Macau Jan. 29, 2018
- T19 *Kinetic energy harvesting systems: the electromechanical joint modeling and transboundary  
integration*  
Seminar talk at Department of Electrical and Electronic Engineering,  
Southern University of Science and Technology (SUSTech) Aug. 21, 2017
- T18 *Advanced power conditioning circuits towards piezoelectric energy harvesting enhancement*  
Invited talk at IEEE 3M-NANO International Conference, Shanghai Aug. 10, 2017
- T17 *Innovative power electronic designs towards piezoelectric energy harvesting enhancements*  
Seminar talk at Institute of Applied Mechanics,  
National Taiwan University Jun. 8, 2017
- T16 *Innovative power electronic designs for piezoelectric energy harvesting systems*  
Seminar talk at College of Electronic Science and Technology,  
Shenzhen University May 12, 2017
- T15 *The electromechanical joint modeling and transboundary integration of kinetic energy  
harvesting systems*  
Seminar talk at School of Mechanical Engineering, Xi'an Jiao Tong University May 3, 2017  
/ State Key Laboratory for Manufacturing System Engineering
- T14 *Innovative power electronic designs for piezoelectric energy harvesting systems*  
Seminar talk at School of Mechano-Electronic Engineering,  
Xidian University May 2, 2017
- T13 *Pursuing higher kinetic energy harvesting capability towards future self-powered  
electronics*  
Seminar talk at Department of Mechanical and Biomedical Engineering,  
City University of Hong Kong Jan. 23, 2017
- T12 *Piezoelectric energy harvesting interface circuits: from maximum harvesting theory to novel  
circuit implementation*  
Seminar talk at the School of Electronics and Information Technology,  
Sun Yat-Sen University Jul. 04, 2016

- T11 *Power conditioning designs for piezoelectric energy harvesting systems: their structural effect, practical implementations, & future development*  
Seminar talk at the University of Michigan - Shanghai Jiao Tong University Apr. 25, 2016  
Joint Institute, Shanghai Jiao Tong University
- T10 *Piezoelectric energy harvesting technology and its power conditioning designs*  
Seminar talk at Department of Electrical Engineering and Computer Science, Dec. 08, 2015  
University of California, Berkeley, CA, USA
- T09 *Power conditioning designs for piezoelectric energy harvesting: their structural effect, practical implementations, & maximum harvesting capability*  
Seminar talk at Department of Mechanical Engineering, Nov. 12, 2015  
University of Connecticut, CT, USA
- T08 *Bias-flip interface circuits for piezoelectric energy harvesting enhancement: their structural effects, practical implementations, and maximum harvesting capability*  
Seminar talk at Department of Mechanical Engineering, Nov. 10, 2015  
Stony Brook University, NY, USA
- T07 *Power conversion circuit analysis by extending the vision of impedance*  
Seminar talk at the School of Instrument Science and Opto-electronics Dec. 26, 2014  
Engineering, Hefei University of Technology
- T06 *Piezoelectric energy harvesting systems: integrated analysis and circuit development*  
Seminar talk at Department of Precision Machinery and Precision Dec. 26, 2014  
Instrumentation, University of Science and Technology of China
- T05 *Power conversion analysis and optimization by extending the vision of impedance*  
Seminar talk at Department of Mechanical and Automation Engineering, Aug. 12, 2014  
The Chinese University of Hong Kong
- T04 *Power conversion circuit analysis by extending the vision of impedance*  
Seminar talk at Department of Instrument Science and Engineering, May 23, 2014  
Shanghai Jiao Tong University
- T03 *Piezoelectric energy harvesting: integrated analysis and circuitry improvement*  
Seminar talk at State key laboratory of mechanics and control of mechanical April 22, 2014  
structures, Nanjing Aeronautics and Astronautics University
- T02 *Future power solutions for distributed and mobile electronics*  
Open Day Seminar, ShanghaiTech University April 07, 2014
- T01 *Power conversion circuit analysis by extending the vision of impedance*  
Seminar Series, School of Information Science and Technology, Mar. 04, 2014  
ShanghaiTech University

## Research Grants / Projects

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- P04 *Open Project Fund* by Shanghai Key Laboratory of Mechanics in Energy Engineering supporting the research entitled “Multiple Harmonics Analysis and Optimization of Kinetic Energy Harvesting System based on Extended Impedance Method”, from 2020/01 to 2020/12, CNY 50,000.
- P03 *Collaboration Agreement* with Huada Semiconductor Co. Ltd. (华大半导体) supporting the research entitled “Vibration Energy Harvesting Integrated Circuit Development,” from 2018/05-2023/05, supporting the IC tape-out cost.
- P02 *Young Scientists Fund* by National Natural Science Foundation of China (NSFC) supporting the research entitled “A study on the maximum harvesting capability of piezoelectric energy harvesting circuit”, from 2015/01 to 2017/12, CNY 270,000.

P01 *Faculty Start-up Fund* by ShanghaiTech University, supporting the research entitled “Hybrid vibration energy harvesting system: holistic modeling and optimization” from 2013/11 to 2016/10, CNY 2,000,000.

## Research Team / Student Supervision

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### *Research Assistant*

Mr. Jingying CHEN

### *Graduate students*

2017: Bao ZHAO, Hong TANG, Xin LI (PhD candidate), Li TENG (PhD candidate)

2018: Kangfu LIU, Yiming GAO, Yongji GAO (PhD student)

2019: Linglong GAO (PhD student), Yichao LIU

### *Final year project students (undergraduate)*

2014: Cong GE

2015: Kang ZHAO (excellent FYP Award in Tongji University), Haiqing DONG, Chen CHEN

2017: Hong TANG

2018: Yichi ZHANG, Chaoqi WANG, Kangfu LIU, Yiming GAO

2019: Yichao LIU, Linglong GAO, Yang ZHANG, Shijie SHEN, Junda LIU, Guang YANG, Minjie WU

2020: Ruifang LIU, Xincheng WANG, Jiacong QIU, Zhiliang CHEN, Yue XIN

### *Undergraduate mentorship*

2014: Keyu YAN, Wentao LV, Junyi FENG, Haizhou FANG, Yichi ZHANG, Jianian LI

2015: Jiatong YU, Yao ZHANG, Yifei XU, Xiangchen ZENG, Jingyi HUANG

2016: Yuzhu JIN, Lu YAO, Xincheng WANG, Haoyu LIU, Ziyuan HU, Minjie SONG, Chengzhang HE

2017: Tianli TAO, Zhiyuan GAO, Zhifeng TANG, Xu CAI, Haochuan WANG, Haoyun CHEN

2018: Yiyao ZHU, Jiangting XIA, Chuang MAN, Xinyi WAN, Binzhe YUAN, Lintao LAN, Dongxun LUO, Yiyang ZHANG

2019: Chengtian GAO, Chenxu LIANG, Ke YE, Ruoyu CHU, Yinuo ZHENG, Shiqi GAO, Zhenbang LI, Shengshen HOU

### *Alumni*

Mr. Shuai ZHANG (Master Student 2016-2019)

Mr. Kang ZHAO (Master Student 2015-2018)

Mr. Chen CHEN (Master Student 2015-2018)

Mr. Junlong Wang (Master Student 2014-2018)

Mr. Davide LO CASTRO (Visiting Student 2017, from Polytechnic University of Milan)

Mr. Haokun GUO (Visiting Student 2017, from Southeast University, China)

Mr. Cong GE (Master Student 2014-2017)

Mr. Chenbin ZHOU (Master Student 2014-2017)

Mr. Yuheng ZHAO (Master Student 2014-2017)

Dr. Haili LIU (Postdoctoral Fellow 2014-2016)

Mr. Lijun TU (Lab Manager 2015-2016)

## School / University Services

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- *Chair* of school-level Resource Management Committee (July 2018 – present)
- *Co-chair* of school-level committees Curriculum and Teaching Committee (Apr. 2017 – June 2018)

- *Member* of school-level Academic Affairs Committee (Sept. 2014 – June 2018) / Public Relation Committee (Sept. 2014 – Aug. 2016) / Research Management Committee (Jan. 2016 – June 2018) / Staff Search Committee (Sept. 2016 – Apr. 2017)
- *Member* of university-level Curriculum and Teaching Committee (Apr. 2017 – present)

## Professional Activities and Services

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- *Associate Editor* of *IET Circuits, Devices & Systems*, an SCI indexed journal (March 2018-now)
- *General Chair* of International Conference on Vibration and Energy Harvesting Applications (VEH) 2019, ShanghaiTech University, Shanghai, China
- *Program Chair* of ShanghaiTech Workshop on Emerging Devices, Circuits and Systems (SWEDCS) 2018
- *Technical Committee Member* of Power and Energy Circuits and Systems (PECAS) in IEEE Circuits and Systems Society (2016-now) / Energy Harvesting Technical Committee (EHTC) in Adaptive Structures and Material Systems Branch, ASME Aerospace Division (2016-now)
- *Technical Program Committee Member* of SPIE Smart Structures/NDE conference (2016-now) / International Conference on Vibration and Energy Harvesting Applications (2018-now)
- *Local Organizing Committee Member* of the 23<sup>rd</sup> IEEE International Conference on Industrial Technology, Shanghai, 2022.
- *Review Committee Member* (RCM) of IEEE International Symposium on Circuits and Systems (ISCAS) (2018-now)
- *Special Session Organizer* in The International Power Electronics Conference (IPEC - ECCE ASIA) 2018 / IEEE International Symposium on Circuits and Systems (ISCAS) 2018 / IEEE/ASME International Conference on Advanced Intelligent Mechatronics (AIM) 2018
- *Session Chair* in The 2nd International Conference on Modeling in Mechanics and Materials 2019 / IEEE 3M-NANO International Conference 2017 / IEEE International Symposium on Circuits and Systems (ISCAS) 2017, 2018, 2020 / SPIE Smart Structures + Nondestructive Evaluation Conference 2014, 2015, 2016 / International Conference on Adaptive Structures and Technologies (ICAST) 2015 / International Power Electronics Conference (IPEC-ECCE Asia) 2018 / IEEE/ASME International Conference on Advanced Intelligent Mechatronics (AIM) 2018 / International Conference on Vibration and Energy Harvesting Applications (VEH) 2018
- *Member* of Institute of Electrical and Electronics Engineers (IEEE) / American Society of Mechanical Engineers (ASME) / China Power Supply Society (CPSS) / Society of Photo-Optical Instrumentation Engineers (SPIE) / IEEE Shanghai Section IES (Industrial Electronics Society) Chapter
- *Reviewer* of : (**Journals**) IEEE Transactions on Circuit and System I: Regular Papers IEEE Transactions on Circuit and System II: Express Briefs / IEEE Transactions on Industrial Electronics / IEEE Transactions on Power Electronics / IEEE Transactions on Very Large Scale Integration (VLSI) Systems / Electronics Letters / IEEE/ASME Transactions on Mechatronics / IEEE Transactions on Automation Science and Engineering / IEEE Transactions on Control Systems Technology / IEEE Transactions on Automation Science and Engineering / IEEE Transactions on Industry Applications / IEEE Industry Applications Magazine / IEEE Internet of Things Journal / IEEE Sensors Journal / IEEE Access / Applied Physics Letters / Journal of Intelligent Material Systems and Structures / Smart Materials and Structures / Mechanical Systems and Signal Processing / Sensors & Actuators: A. Physical / Journal of Micromechanics and Microengineering / Microsystems & Nanoengineering / Micro & Nano Letters / Microelectronics Journal / Journal of Modern Power Systems and Clean Energy / IET Circuits, Devices & Systems / IET Electric Power Applications / International Journal of Energy Research / International Journal of Circuit Theory and Applications / Journal of Semiconductors (半导体学报) / Acta Physica Sinica (物理学报) / SCIENCE CHINA Information Sciences (中国科学: 信息科学) / Energy Conversion and Management / International Journal of Smart and Nano Materials / Recent Patents on Electrical & Electronic Engineering / Journal of Low Power Electronics and Applications (MDPI) / Energies (MDPI) / Entropy (MDPI) / Sensors (MDPI) /

Actuators (MDPI) / Vibration (MDPI) / Technologies (MDPI) / Micromachines (MDPI) / Sustainability (MDPI) / Latin American Journal of Solids and Structures; (Conferences) IEEE International Symposium on Circuits and Systems (ISCAS) / IEEE Energy Conversion Congress and Exposition (ECCE) / IEEE Energy Conversion Congress and Exposition Asia (ECCE Asia) / Annual Conference of the IEEE Industrial Electronics Society (IECON) / IEEE International Conference on NEW Circuits and Systems (NEWCAS) / IEEE International Conference on Control and Automation (ICCA) / IEEE/ASME International Conference on Advanced Intelligent Mechatronics (AIM) / ASME International Design Engineering Technical Conferences & Computers and Information in Engineering Conference (IDETC/CIE)