

Bao Zhao

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EDUCATION

University of California, Los Angeles (UCLA)

Los Angeles, USA

Doctor of Philosophy in Mechanical Engineering

2020- 2024

ShanghaiTech University (ShanghaiTech)

Shanghai, China

Master of Science in Electronic Engineering

2017- 2020

GPA: 3.45/4.00

Awards: Academic Scholarship

Harbin Engineering University (HEU)

Harbin, China

Bachelor of Engineering in Marine Engineering

2013- 2017

GPA: 3.35/4.00, Top 10%

Awards: The First Prize Scholarship; Excellent Student Award

RESEARCH

Bio-Inspired Robot Fish

Shanghai, China

Supported by the grants from ShanghaiTech University

Oct. 2019- Now

- Explored the feasibility of the piezoelectric material actuated soft robotic fish. Designed an integrated solution for realizing the **two-dimensional movements**.

Increaseing the Nonlinear Energy Harvesting Bandwidth

Shanghai, China

Supported by the grants from NSFC and ShanghaiTech University

Mar. 2019- Oct. 2019

- Analyzed the **influence of phase-variable topologies on the hysteresis frequency range of non-linear systems**, proposed a potential way to **tune nonlinear dynamics** with circuit solutions.

Bidirectional Energy Conversion Circuit

Shanghai, China

Collaborated with The Chinese University of Hong Kong (CUHK)

Jul. 2018- Apr. 2019

- Designed the **bidirectional energy conversion circuit** for the dual functions of energy harvesters and actuators **for the first time**. Achieved **controllable orbit jumps** in monostable and bistable systems.

Circuit Solutions towards Broadband Piezoelectric Energy Harvesting

Shanghai, China

Supported by the grants from NSFC and ShanghaiTech University

Sept. 2017- Jun. 2018

- Analyzed the **impedance models** and their **electromechanical dynamics** of different phase-variable circuits for broadband energy harvesting. Specifically, proposed the **Phase-variable parallel synchronized triple bias-flip interface circuit**.

PUBLICATIONS

Journal Papers

- C. Chen, **B. Zhao**, J. Liang, "Revisit of Synchronized Electric Charge Extraction in Piezoelectric Energy Harvesting by Using Impedance Modeling," **Smart Materials and Structures**, 2019. [\[Link\]](#)
- **B. Zhao**, J. Wang, J. Liang, and W.-H. Liao, "A Dual-effect Solution for Broadband Piezoelectric Energy Harvesting" **Applied Physics Letters**, 2020. [\[Link\]](#)
- J. Wang, **B. Zhao**, W.-H. Liao, and J. Liang, "New insight into piezoelectric energy harvesting with mechanical and electrical nonlinearities" **Smart Materials and Structures**, 2020. [\[Link\]](#)

- **B. Zhao**, J. Liang, " Circuit Solutions towards Broadband Piezoelectric Energy Harvesting: An Impedance Analysis," **IEEE/ASME Transactions on Mechatronics**, In Review.
- **B. Zhao**, K. Zhao, J. Liang, Z. Chen, and X. Wang, "Series Synchronized Triple Bias-Flip Circuit: Maximizing the Usage of Single Storage Capacitor for Piezoelectric Energy Harvesting Enhancement" **IEEE Transactions on Power Electronics**, In Preparation.
- **B. Zhao**, J. Wang, J. Liang, and W.-H. Liao, "A New Control Strategy for S3BF Piezoelectric Interface Circuit towards Time-Sharing Energy Harvesting and Vibration Excitation" **IEEE Transactions on Industrial Electronics**, In Preparation.

Conference Papers

- **B. Zhao**, J. Wang, J. Liang, and W.-H. Liao, "A bidirectional energy conversion circuit for piezoelectric energy harvesting and vibration exciting purposes," in **SPIE SS/NDE 2019**, Denver, CO, USA. [\[Link\]](#), [\[Demo\]](#)
- **B. Zhao**, J. Liang, and K. Zhao, "Phase-Variable Control of Parallel Synchronized Triple Bias-Flips Interface Circuit towards Broadband Piezoelectric Energy Harvesting," in **IEEE ISCAS 2018**, Florence, Italy. [\[Link\]](#)
- **B. Zhao** and J. Liang, "On the circuit solutions towards broadband and high-capability piezoelectric energy harvesting systems," in **SPIE SS/NDE 2018**, Denver, CO, USA. [\[Link\]](#)
- J. Wang, **B. Zhao**, J. Liang, and W.-H. Liao, "Orbit jumps of monostable energy harvesters by a bidirectional energy conversion circuit," in **ASME IDETC/CIE 2019**, Anaheim, CA, USA. [\[Link\]](#)
- G. Hu, **B. Zhao**, L. Tang, J. Liang, and Raj Das, "Optimization of cantilevered piezoelectric energy harvester with standard DC interface circuit," in **ISMA 2018**, Leuven, Belgium. [\[Link\]](#)

Copyright

- **Bao Zhao**, "Temperature and Humidity Online Monitor for Smart Home Applications," China Software Copyright, No. 2016SR237779.

PROFESSIONAL EXPERIENCE

Teaching Assistant

Microelectromechanical Systems (MEMS)

Mechanical Vibration and Noise

Spring 2019 @ ShanghaiTech

Fall 2016 @ HEU

Research Assistant

Institute of Vibration and Noise

Sept. 2016- May 2017 @ HEU

Assistant Engineer

China Shipbuilding Industry Group Co., Ltd.

May 2016- Sept. 2016 @Dalian, China

SKILLS

- Standardized tests: TOEFL: 103; GRE: 322 (Verbal:154, Quantitative:168)
- Programming: Extensive knowledge of Matlab, Python, C/C++, and embedded systems.
- Academics: Outstanding in electrical and mechanical theories, especially mechatronics and modal analysis. Experienced in CADENCE, PSIM, ANSYS, AutoCAD, SolidWorks, COMSOL, and Adobe Softwares.

AWARDS & ACHIEVEMENTS

- The First Prize Scholarship (HEU) *twice*
- Academic Scholarship (ShanghaiTech) *twice*
- Excellent Students (HEU, ShanghaiTech) *2016, 2019*
- Honorable Mention in Mathematical Contest in Modeling *2014*
- The Second Prize in Astronomical Competition of the Three Northeast Provinces *2014*