Yingjian Zhuge

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Education

ShanghaiTech University **Shanghai, China**
Ph.D. Electronic Science and Technology *2021 - Present*

Advisor: **Prof. Haoyu Wang**

Core courses: Energy Storage Devices and Systems (A+), Analog Integrated Circuits II (A), Modeling and Control of Power Electronic Converters (A), Digital Integrated Circuits II (A+), Advanced Power Conversion Techniques (A)

Research interests: Pulsed power techniques, High-voltage pulse generator

Specialized courses GPA: 4/4

Zhejiang University **Zhejiang, China**
B.E. Electrical Engineering and its Automation *2017 - 2021*

Core courses: Electric Circuit and Electronic Technology I (3.9), Electric Circuit and Electronic Technology II (4.0), Design of Electronic System (3.9), Linear Control System Analysis and Design (4.0)

Overall GPA: 3.76/4

Research Experiences

Experimental Platform Design and Construction for IPX in PJMIF Device Nov. 2024 - Present

- Built a capacitor testing platform, including the design of subsystems such as a complete control system, diagnostic system, charging and discharging system, and transmission system.
- Developed a general-purpose switch testing platform and completed the design and construction of a multi-functional switch and its subsystems.
- Independently designed and developed measurement components such as magnetic probes, high-voltage probes, and Rogowski coils to meet practical application requirements.
- Participated in the design and construction of the complete IPX platform, contributing to the proof-of-concept of Plasma Jet Magneto-Inertial Fusion (PJMIF).

Development of High-Voltage Nanosecond Pulse Generator for PJMIF 2024.01 - 2025.02

- Proposed a novel LTD transformer stacking structure to achieve pulse voltage stacking.
- Completed the design of a synchronous trigger circuit and shielding to prevent interference with circuit operation in a plasma environment.
- Developed a 20-stage LTD system for the electrical triggering test of the multi-functional spark switch.

Overview of High-Voltage Pulse Generators Jan. 2023 - Jul. 2023

- Review existing pulse generator topologies and make a comprehensive comparisons to analyze each features and limitations.
- Describe the future development trends and challenges in different applications.
- Give the inspiration to derive new topologies to address specific requirement.

High-voltage nanosecond pulse generator for Single chamber spark switch Apr. 2022 - Nov. 2022

- Propose a modified Marx circuit with auxiliary triggering topology based on avalanche transistors to generate high-voltage pulses.
- Analyze and design the modified Marx circuit with wide operation range.
- A hardware prototype is designed and tested to trigger three-electrode spark gap switch in PJMIF system. When operating under 1200V DC voltage input, the amplitude of pulse is 5.04kV, with a rise time of 12.4ns, and a FWHM of 12.6ns.

Machine learning-enabled battery state estimation Mar. 2022 - Sept. 2022

- Report state-of-the-art research progress in machine learning-enabled methods for SOC and SOH estimations.

- Make comprehensive comparisons to show merits and demerits of each method.
- Disclose the challenges and research opportunities on future SOC and SOH estimations.

TEACHING AND VOLUNTEER EXPERIENCES

1. Teaching Assistant

SI100B Introduction to Information Science and Technology — Feb. 2023 - Jun. 2023

- Prepare, grade, and guide homework;
- Software guidance and homework tips in tutorial class;
- Communicate with students to solve their problems, and help them to improve;
- Update and maintain course website.

2. Volunteer

Shanghai International Marathon, Shanghai — 2023
CiPES Open Day, CiPES, ShanghaiTech University — 2023
ASSIST 2022, ShanghaiTech University — 2022

SELECTED HONORS & AWARDS

2024 Finalist Award, 2nd Power Electronics Creative Competition, China Power Supply Society;
2023-2024 Merit Student of ShanghaiTech University;
2023 Merit Teaching Assistant, ShanghaiTech Univ.;
2023 Excellent Popular Sci. Popularization Award, 6th Innov. & Entr. Conf., ShanghaiTech Univ.;
2022-2023 Merit Student of ShanghaiTech University;
2022 Popular Science Golden Star Award, 6th Innov. & Entr. Conf., ShanghaiTech Univ.;
2022 Excellent Popular Sci. Popularization Award, 6th Innov. & Entr. Conf., ShanghaiTech Univ.;
2020 Academic Excellent Award, Zhejiang Univ.;
2020 Zhejiang University Scholarship-Third Prize, Zhejiang Univ.;

PUBLICATIONS

1. Journal

[J1] **Y. Zhuge**, J. Liang, M. Fu, T. Long and H. Wang*, "Comprehensive Overview of Power Electronics Intensive Solutions for High-Voltage Pulse Generators," in *IEEE Open Journal of Power Electronics*, vol. 5, pp. 1-20, 2024.

2. Conference

[C1] **Y. Zhuge**, H. Yang, and H. Wang*, "Overview of machine learning-enabled battery state estimation methods," in *Proc. IEEE Appl. Power Electron. Conf. Expo. (APEC)*, Orlando, FL, Mar. 2023.

[C2] **Y. Zhuge**, Y. C. Thio, and H. Wang*, "Avalanche transistor-based nanosecond pulse generator in plasma-jet-driven magneto-inertial fusion systems," in *Proc. IEEE Appl. Power Electron. Conf. Expo. (APEC)*, Orlando, FL, Mar. 2023.

PROFESSIONAL SKILLS

Language CET-6, Academic reading and writing
Software PSIM, Matlab, LTspice, Candence, SIMetrix/SIMPLIS, Visio
Hardware 8051 Microcontrollers, MSP430F5529, Raspberry Pi 3 Model B+
Equipment Oscilloscope, Electronic Source/Load, Impedance Analyzer, Power Devices Analyzer

PROFESSIONAL SERVICES

Membership	Student Member IEEE	2023 - Present
	Student Member CPSS	2021 - Present
Reviewer	IEEE Transaction on Industrial Electronics	2022 - Present
	IEEE Transaction on Power Electronics	2022 - present
	IEEE Transactions on Transportation Electrification	2022 - present
	IEEE Appl. Power Electron. Conf. Expo. (APEC)	2022-present