

# YINGJIAN ZHUGE

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## 🎓 EDUCATION

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### 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

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### 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

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### 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

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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, The 6th Innov. & Entr. Summ., ShanghaiTech Univ.;
2022-2023	Merit Student of ShanghaiTech University;
2022	Popular Science Golden Star Award, The 5th Innov. & Entr. Summ., ShanghaiTech Univ.;
2022	Excellent Popular Sci. Popularization Award, The 5th Innov. & Entr. Summ., ShanghaiTech Univ.;
2020	Academic Excellent Award, Zhejiang Univ.;
2020	Zhejiang University Scholarship-Third Prize, Zhejiang Univ.;

## PUBLICATIONS

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### 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

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

## PROFESSIONAL SERVICES

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<b>Membership</b>	Student Member IEEE	2023 - Present
	Student Member CPSS	2021 - Present
<b>Reviewer</b>	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