

EDUCATION

- **Shanghai Jiao Tong University (SJTU)** Shanghai, China
• **Master of Engineering in Electrical Engineering** Sept. 2022 - Jan. 2025 (expected)
 - **GPA: 4.0/4.0**
 - **Core Courses:** Numerical Analysis (A), Nonlinear Control Theory and Application (A+), Power System Steady-state Analysis/Optimal Power Flow and Convex Optimization (in progress)
- **Huazhong University of Science and Technology (HUST)** Wuhan, China
• **Bachelor of Engineering in Electrical Engineering** Sept. 2018 - June. 2022
 - **GPA: 3.94/4.0 (Top 1%)**
 - **Core Courses:** Mathematical Analysis I/II (97), Probability Theory and Statistics (97), Mathematical Physics Equation (99), Complex Function (94), Introduction to Management (98), Principles of Economics (92)

RESEARCH FIELD

- MMC-based HVDC System with Wind Farm Integration, Grid Forming (GFM) Converter, VSC-HVDC Based Segmented System with Large Capacity Renewable Energy Integration

PUBLICATIONS AND PATENTS

- **Publications**
 - **Z. Li**, L. Liang, R. Yang, X. Cai, "The Virtual Admittance Control of Sending End Converter for Offshore Wind Farm Integration." Accepted by the 2023 IEEE Power Electronics for Distributed Generation Systems (PEDG).
 - X. Sun, Z. Liu, **Z. Li**, Q. Sun, A. Li, and D. Jiang, "Three-phase Motor Drive Topology with the Fault-tolerant Capability of Open-circuit on the Multiplexing Bridge," in 2021 IEEE Energy Conversion Congress and Exposition (ECCE), Oct. 2021, pp. 5043–5047. doi: 10.1109/ECCE47101.2021.9595370.
 - **Z. Li**, H. Yu, Z. Fang, X. Cai, R. Yang, "Research on Commutation Mechanism and Harmonic Suppression of Offshore Wind Farm Integration With DRU-VSC Hybrid Transmission System." Proceedings of the CSEE, submitted.
 - **Z. Li**, R. Yang, X. Cai, "Research on Virtual Admittance Control Strategy for Sending End Converter in VSC-HVDC system with Offshore Wind Farm Integration." Electric Power, submitted.
- **Issued Patents**
 - X. Sun, Z. Wang, **Z. Li**, et al. A Multi-Rotor UAV and Its Power System With Fault-Tolerant Capability[P]. Hubei Province: CN214799254U, 2021-11-19.
 - X. Sun, Z. Wang, **Z. Li**, et al. Topology and Modulation Method of Six-Phase Seven-Bridge Arm Series Winding Circuit with Reverse Winding[P]. Hubei Province: CN113078839A, 2021-07-06.
 - X. Sun, Z. Wang, **Z. Li**, et al. Phase Sequence and Modulation of Series Multiphase Winding With Minimum Current Stress of Bridge Arm[P]. Hubei Province: CN112910144B, 2022-02-15.

ACADEMIC PROJECTS

- **Research on Transient Frequency Support of Wind Farm and Multi-Terminal Flexible DC system - Delta Electronics, Inc.** Shanghai, China
Major Principal - Advised by Professor Xu Cai of SJTU Apr. 2023 - Present
 - To address the absence of the AC filter capacitor in traditional dual closed-loop control, the optimized control strategy was proposed to resolve the control instability problem and achieve the adaptive current limitation.
 - Conducted state-space modeling, parameter design, and small-signal stability analysis. The analysis demonstrated that the system could maintain a good dynamic response without instability under the value of 0.3 p.u. for virtual reactance and 0.1 p.u. for virtual resistance.
- **Key Technologies of Combined Offshore Wind Power Generation With Directly Coupled VSC-HVDC and Energy Storage - Contemporary Amperex Technology Co., Ltd.** Shanghai, China
Leader - Advised by Professor Xu Cai of SJTU Apr. 2022 - Present

- Modeled and simulated the VSC-HVDC transmission system for offshore wind power using PSCAD/EMTDC and MATLAB/Simulink. Established the offline simulation model library.
 - To address the issue of requiring significant resources and computational time for the simulation, developed a second-order MMC fast simulation model with energy storage interface using Fortran and scripting language based on PSCAD.

- Research and Application of Key Technologies in the Hybrid Converter for the Offshore Wind Power Grid Connection - China EPRI Science & Technology Co., Ltd.** Shanghai, China

Leader - Advised by Professor Xu Cai of SJTU Oct. 2022 - Apr. 2023

 - Studied the topology and operating mechanism of the DRU-HVDC-based offshore wind power hybrid delivery system.
 - Conducted hardware-in-the-loop (HIL) experiment on the RT-Lab platform to test the voltage and current stress of the system, effectively assisting the enterprise in relevant system design.
 - Performed harmonic analysis on the DRU-HVDC-based offshore wind power hybrid delivery system. Proposed a universal model based on the assumption of AC current source for uncontrolled rectifier mechanism analysis and the corresponding harmonic voltage suppression strategy.

- A High-Reliability Unmanned Aerial Vehicle (UAV) Power System with Fault-Tolerant Capability - “Challenge Cup” Extracurricular Academic Science and Technology Contest** Wuhan, China

Major Principal - Advised by Professor Dong Jiang of HUST Oct. 2020 - Nov. 2021

 - Developed a motor drive topology based on the series winding structure and the matched fault-tolerant algorithm for optimization. The constructed topology and algorithm increased the power density by more than 50%, and the five-phase motor was tested to operate stably even when two phases were lost.
 - Designed, modeled, and version iterated the motor base, the electronic speed controller (ESC) mounting fixture, and the motor test stand using SOLIDWORKS, to customize the design of batteries, the ESC, and the electronic control unit (ECU) for the UAV power system.

- A Power-Signal Wireless Transmission Device for CT Equipment - “Challenge Cup” Extracurricular Academic Science and Technology Contest** Wuhan, China

Major Principal - Advised by Professor Dong Jiang of HUST Mar. 2020 - Sept. 2020

 - Designed a power-signal wireless transmission system for CT equipment to achieve efficient wireless transmission of both signal and power, considering the magnetic circuit structure and the DSP-based high-frequency inverter.
 - Conducted simulation analysis of the resonant compensation circuits for the double LCC and the LCL-S ICPT systems.
 - Accomplished the circuit design of the signal modulation and demodulation unit based on the carrier modulation to achieve synchronous transmission of medical information.
 - Simulated the wireless transmission device using Ansoft Maxwell and JMAG. The impact of air gap size on the device's electromagnetic performance was studied, and the parameters were optimized. The effect of the parameter optimization was evaluated by the previously-built simulation model.

- Overhead Transmission Line Vibration Monitoring and Self-Powering Integrated System - College Students' Innovative Entrepreneurial Training Program** Wuhan, China

Leader - Advised by Professor Han Peng of HUST Dec. 2019 - Apr. 2020

 - Proposed an integrated system for the monitoring and the self-powering of overhead transmission lines.
 - Designed and modeled the vibration monitoring and vibration energy harvesting device using SOLIDWORKS. Completed the structural modeling and assembly design of multiple components.
 - Performed electromagnetic simulation during device operation and the multiphysics simulation considering the coupling between electromagnetic characteristics and mechanical motion using Ansoft Maxwell and COMSOL.
 - Set up the experimental platform, verified the collection of vibration energy and monitored the vibration state of the overhead transmission line.

COMPETITION

- **Operation Data Analysis and Equivalent Modeling of High-speed rail traction power supply system - The Electrician Mathematical Contest in Modeling** Wuhan, China
Team Leader May. 2021
 - Conducted spectral analysis on a substantial amount of measured three-phase voltage and current data from a traction substation. Analyzed the impact of the substation on the power grid during the entire period.
 - Designed two regeneration braking energy schemes and built system simulation models in MATLAB/Simulink. Conducted detailed modeling and quantitative analysis of the two schemes from economics, safety, and energy storage utilization. Calculated the system cost and full life cycle benefits of each scheme.
 - Used a sliding window-based load detection algorithm to extract and analyze characteristics of dynamic traction load waveforms based on time series. Established a dynamic traction load database using linear regression for prediction.
 - Established high-order mathematical models for the power grid, power electronic converters, and dynamic train loads to better approximate actual conditions.
- **Post-Disaster Response to Australian Wildfires Based on Drone Monitoring and Situational Awareness - MCM/ICM** Wuhan, China
Team Leader Feb. 2021
 - Built an economic model and a safety function to establish the comprehensive evaluation index. Employed Monte Carlo analysis to conduct 150,000 random fire experiments and the optimal drone procurement plan was obtained.
 - Utilized the grey prediction model to analyze the correlation between fire conditions and various factors. Predicted future fire conditions using historical data, showing that the established model has outstanding adaptability.
 - Established a grid model based on cellular automata. Proposed a relay drone cruising strategy based on the grid model to reduce the number of required drones, and introduced a credibility index to measure the time lag of information.

SKILLS

- **Language:** Mandarin (native speaker), English (fluent, CET-6: 577)
- **Programming:** C++, Python, Fortran, LaTeX, Markdown, HTML
- **Modeling and Simulation:** MATLAB/Simulink, PSCAD, Multisim, PSIM, Ansoft Maxwell, JMAG, COMSOL, SOLIDWORKS, AutoCAD, Inventor
- **Software Development** CCS, Keil, Altium Designer, GitHub, Personal Web Development
- **Others:** Photoshop (PS), Premiere (PR), MS Office Suite
- **Certificates:** National Computer Rank Examination Level 2: C++ Language Programming, National Computer Rank Examination Level 4: Network Engineer

AWARDS

- **Scholarships and Honors**
 - National Scholarship (Top 0.2% highest scholarship from Ministry of Education of China) 2019 & 2021
 - NR Electric Co., Ltd. Scholarship (Top 1%) 2021
 - Tellhow Sci-tech Co., Ltd. Scholarship (Top 1%) 2020
 - Outstanding Academic Performance Award (Top 1%) 2019
- **Competitions**
 - First Prize in the 17th "Challenge Cup" National College Students' Extracurricular Academic Science and Technology Competition (the most valuable college competition in China) 2021
 - First Prize in the Electrician Mathematical Contest in Modeling (Top 3%) 2021
 - Honorable Mention in MCM/ICM 2021
 - Second Prize in National Mathematics Competition for College Students 2019

EXTRACURRICULAR EXPERIENCE

- Volleyball (HUST men's volleyball team), Soccer (qualification of athletes for the provincial-level contest), Badminton (7 years of professional training), Go (third place in the national competition, amateur first dan), Fitness and Swimming (amateur interest)
- Conducted field research on new energy generation in Gansu province through government and corporate site visits, serving as the team leader for the project