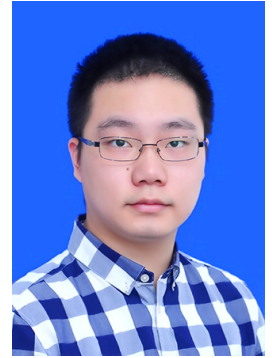



# Curriculum Vitae

## SUN Chuan (孙川)





 **Gender:** Male


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 **Google Scholar:** <https://scholar.google.com/citations?user=HqYtgXwAAAAJ&hl=en>

## Education

- 2019.09 - 2023.09     **Ph.D. in Power Electronics, The Hong Kong Polytechnic University (PolyU), Hong Kong SAR, China.**  
World University Rankings: QS (65), THE (79), USNEWS (100), ARWU (151-200).  
Research Area: Advanced Modulation and Control Strategies for DC-DC Converters.  
Thesis Title: Optimized transient modulation and control strategies for bidirectional dual-active-bridge DC-DC converters.  
Supervisor: Dr. LOO Ka-Hong, Associate Professor of Department of Electrical and Electronic Engineering, Assistant Dean of Faculty of Engineering.  
Grade Point Average (GPA): 3.69/4.3
- 2015.09 - 2017.08     **M.Sc. in Information Technology, The Macau University of Science and Technology (M.U.S.T.), Macau SAR, China.**  
World University Rankings: QS (505), THE (201-250), USNEWS (1002), ARWU (401-500).  
Research Area: High-Frequency Converter Topology, Control and Applications.  
Thesis Title: Optimized Modulation Strategies for Fast Transient Response in Dual-Active-Bridge DC-DC Converter.  
Supervisor: Prof. Xiaodong Li, Assistant Dean of Faculty of Innovation Engineering, Program Director of School of Computer Science and Engineering.  
Grade Point Average (GPA): 3.64/4
- 2011.09 - 2015.07     **B.Eng. in Electronic and Information Engineering** (state-level characteristic discipline & national first-class undergraduate major), **North University of China (NUC), Taiyuan, China.**  
World University Rankings: USNEWS (1758).  
The major "Information and Communication Engineering" ranked B in the fourth round of discipline evaluation by the Ministry of Education.  
Weighted Average Mark: 86.8/100 (ranked in the top seven percent of the class)

## Employment

- 2024.01 - 2024.03     ♦ **Assistant Research Fellow**  
College of Electrical Engineering, Sichuan University  
Research Areas: 1) Topology, modeling, modulation, and control techniques of resonant converters; 2) AC/DC hybrid multi-port power router; 3) wireless power transfer technology; 4) power supplies for special industrial environments; 5) bi-directional energy storage inverters.
- 2023.10 - 2023.12     ♦ **Research Associate**  
College of Electrical Engineering, Sichuan University
- 2017.09 - 2018.06     ♦ **Power Electronics Engineer**  
Hangzhou Livoltek Power Co., Ltd.  
Major Job Responsibility: Multiple-loop digital control design and programming based on TI TMS320x28xx DSP for power conversion systems, modeling simulation, hardware validation and problem debugging.

## Publications

As the first or corresponding author, Dr. Sun published 6 SCI journal papers (including 3 top-tier journal papers), 2 EI conference papers. As the first inventor, Dr. Sun holds 1 U.S. Patent and 1 Australia Innovation Patent, respectively. As a co-author, Dr. Sun published 13 SCI journal papers and 2 EI conference papers. Currently, he has also prepared several papers to be submitted to IEEE trans journals.

- [1] Sun, C., Jiang, X., Liu, J., Cao, L., Yang, Y., Loo, K. H., ‘A unified design approach of optimal transient single-phase-shift modulation for non-resonant dual-active-bridge converter with complete transient dc-offset elimination,’ *IEEE Transactions on Power Electronics*, vol. 37, no. 11, pp. 13 217–13 237, 2022, **Top Journal**, SCI (JCR Q1), IF=6.7.
- [2] Sun, C., Jiang, X., Cao, L., Loo, K. H., ‘Total suppression of high-frequency transient oscillations in dual-active-bridge series-resonant converter by trajectory-switching modulation,’ *IEEE Transactions on Power Electronics*, vol. 37, no. 6, pp. 6511–6529, 2022, **Top Journal**, SCI (JCR Q1), IF=6.7.
- [3] Sun, C., Liu, J., Jiang, X., ‘Generalized multiphase-shift transient modulation for dual-active-bridge series-resonant converter,’ *IEEE Transactions on Power Electronics*, vol. 38, no. 7, pp. 8291–8309, 2023, **Top Journal**, SCI (JCR Q1), IF=6.7.
- [4] Sun, C., Li, X., ‘Fast transient modulation for a step load change in a dual-active-bridge converter with extended-phase-shift control,’ *Energies*, vol. 11, no. 6, p. 1569, 2018, SCI (JCR Q3), IF=3.2.
- [5] Sun, C., Li, X., Zhou, S.-Z., ‘Transient current control for a step load change in a dual-active-bridge converter,’ *Electronics Letters*, vol. 54, no. 22, pp. 1290–1292, 2018, SCI (JCR Q4), IF=1.1.
- [6] Hu, S., Sun, C., Ding, R., Li, X., ‘Sinusoidal-ripple-current charging modulation for semi-dual-active-bridge ac-dc converter with full soft switching and power factor correction,’ *IEEE Transactions on Circuits and Systems II: Express Briefs*, vol. 71, no. 1, pp. 326–330, 2024, **Corresponding Author**, SCI (JCR Q2), IF=4.4.

- [7] **Sun, C.**, Li, X., ‘Instantaneous current balance modulation for fast transient response in a dual-active-bridge converter,’ in *2018 IEEE International Power Electronics and Application Conference and Exposition (PEAC)*, EI Conference Paper, IEEE, 2018, pp. 1–6.
- [8] **Sun, C.**, Chen, G., Chen, X., Loo, K.-H., Hu, S., Li, X., ‘A six-degree-of-freedom trajectory-switching modulation framework for triple-phase-shift-modulated dual-active-bridge converters,’ in *The 10th International Power Electronics and Motion Control Conference-ECCE Asia (IPEMC 2024-ECCE Asia)*, EI Conference Paper, IEEE, 2024, pp. 1–6.
- [9] **Sun, C.**, Li, X., *System and method for controlling a converter circuit*, US Patent No.:10,658,936 B2, May 2020.
- [10] **Sun, C.**, Li, X., *System and method for controlling a converter circuit*, Australian Innovation Patent No.:2017100494, May 2017.
- [11] Liu, J., Wong, C. S., **Sun, C.**, Xu, F., Jiang, X., Loo, K. H., ‘Software-reconfigurable multistage constant current wireless battery charging based on multiharmonic power transmission,’ *IEEE Transactions on Power Electronics*, vol. 38, no. 4, pp. 5586–5597, 2023, Top Journal, SCI (JCR Q1), IF=6.7.
- [12] Jiang, X., **Sun, C.**, Cao, L., Liu, J., Law, N.-F., Loo, K., ‘Peer-to-peer energy trading in energy local area network considering decentralized energy routing,’ *Sustainable Energy, Grids and Networks*, p. 100 994, 2023, SCI (JCR Q1), IF=5.4, ISSN: 2352-4677.
- [13] Jiang, X., **Sun, C.**, Cao, L., Liu, J., Law, N.-F., Loo, K., ‘Decentralized local energy trading with cooperative energy routing in energy local area network,’ *International Journal of Electrical Power & Energy Systems*, vol. 152, p. 109 209, 2023, SCI (JCR Q1), IF=5.2, ISSN: 0142-0615.
- [14] Li, Y., Wang, R., Zhong, L., ‘Analysis and design of a high-frequency isolated dual-transformer dc-dc resonant converter,’ *Electronics*, vol. 12, no. 1, 2023, SCI (JCR Q3), IF=2.9, ISSN: 2079-9292.
- [15] Liu, J., Xu, F., **Sun, C.**, Loo, K. H., ‘A compact single-phase ac-dc wireless power transfer converter with active power factor correction,’ *IEEE Transactions on Industrial Electronics*, vol. 70, no. 4, pp. 3685–3696, 2023, Top Journal, SCI (JCR Q1), IF=7.7.
- [16] Liu, J., Xu, F., **Sun, C.**, Loo, K. H., ‘A soft-switched power-factor-corrected single-phase bidirectional ac-dc wireless power transfer converter with an integrated power stage,’ *IEEE Transactions on Power Electronics*, vol. 37, no. 8, pp. 10 029–10 044, 2022, Top Journal, SCI (JCR Q1), IF=6.7.
- [17] Jiang, X., **Sun, C.**, Cao, L., Law, N.-F., Loo, K., ‘Semi-decentralized energy routing algorithm for minimum-loss transmission in community energy internet,’ *International Journal of Electrical Power & Energy Systems*, vol. 135, p. 107 547, 2022, SCI (JCR Q1), IF=5.2.
- [18] Jiang, X., **Sun, C.**, Cao, L., Ngai-Fong, L., Loo, K. H., ‘Peer-to-peer energy trading with energy path conflict management in energy local area network,’ *IEEE Transactions on Smart Grid*, vol. 13, no. 3, pp. 2269–2278, 2022, Top Journal, SCI (JCR Q1), IF=9.6.
- [19] Tang, Y., Li, X., Zhou, S.-Z., **Sun, C.**, Chen, G., ‘Comprehensive study of fast load modulation with volt-second balance in a dual-active-bridge converter,’ *IET Power Electronics*, vol. 12, no. 6, pp. 1357–1367, 2019, SCI (JCR Q3), IF=2.0.
- [20] Zhang, Y., Li, X., **Sun, C.**, He, Z., ‘Improved step load response of a dual-active-bridge dc-dc converter,’ *Electronics*, vol. 7, no. 9, p. 185, 2018, SCI (JCR Q3), IF=2.9.

- [21] Wang, R., Li, Y., **Sun, C.**, ‘Analysis and verification of a half-dual bridge resonant converter with voltage match modulation,’ *Electronics*, vol. 11, no. 17, p. 2675, 2022, SCI (JCR Q3), IF=2.9.
- [22] Li, X., Hu, S., **Sun, C.**, Zhang, Y.-F., ‘Asymmetric-double-sided modulation for fast load transition in a semi-dual-active-bridge converter,’ *IET Power Electronics*, vol. 10, no. 13, pp. 1698–1704, 2017, SCI (JCR Q3), IF=2.0.
- [23] Lin, S.-T., Li, X., **Sun, C.**, Tang, Y., ‘Fast transient control for power adjustment in a dual-active-bridge converter,’ *Electronics Letters*, vol. 53, no. 16, pp. 1130–1132, 2017, SCI (JCR Q4), IF=1.1.
- [24] Jiang, X., **Sun, C.**, Cao, L., Law, N.-F., Loo, K. H., ‘Review and comparative study of energy routing algorithms for energy internet,’ in *2021 IEEE 5th Conference on Energy Internet and Energy System Integration (EI2)*, EI Conference Paper, 2021, pp. 567–572.
- [25] Zhou, S.-Z., **Sun, C.**, Hu, S., Chen, G., Li, X., ‘Improved load transient response of a dual-active-bridge converter,’ in *2018 International Power Electronics Conference (IPEC-Niigata 2018-ECCE Asia)*, EI Conference Paper, IEEE, 2018, pp. 370–374.

## **A Research**

### ◆ **Introduction to Achievements:**

Dual-active-bridge (DAB) DC-DC converters have a wide range of applications in emerging power electronics scenarios, e.g., energy storage systems. In order to improve the dynamic performance of DAB converters, most existing research only focuses on developing more advanced control technologies, but largely ignores the impact of transient phase-shift modulation on the closed-loop-controlled converter system. Dr. Sun has been dedicated to researching how to improve the dynamic performance of DAB converters for a long time. In the authoritative academic journal TPEL in the field of power electronics, he was one of the first researchers to propose sensorless transient trajectory modulation strategies to completely suppress high-frequency oscillations and DC offsets in the waveform; he originated the new idea and method of “co-optimization of control and modulation” to DAB converters, which simultaneously optimized the PWM generator and model-predictive controller, effectively eliminating the transient DC offsets in transformers and inductors, and further accelerating the system’s response speed, truly achieving the optimal dynamic response. These studies can minimize the transient current stress and settling time of DAB converters during load changes, greatly improving the stability and safety of equipment operation, and having significant academic and engineering values.

### ◆ **Research Interests:**

*Power Electronics and Energy Conversion, New Energy Generation and Energy Storage, Advanced Control Technology*

With the proposal of the national “dual carbon” goals, industries related to new energy have entered a period of rapid development. Power electronics technology is a key supporting technology for achieving safe, stable, efficient, and flexible operation of new-energy resources. Although researchers have conducted some research on new-energy generation and distribution systems, existing electric energy conversion systems still lack sufficient conversion efficiency, control flexibility, and intelligence. Based on academic and engineering experience in related fields, I will continue to devote myself to researching novel control and modulation technologies to overcome the performance bottlenecks of existing power converters, and carry out industry university research cooperation to develop the next generation of high-end intelligent power equipment with advantages in conversion efficiency, power density, power quality, control performance, and other aspects.

## Career Planning

- ◇ **1) Research:** Actively integrating into the overall scientific research planning and layout of the faculty, and exploring cutting-edge researches. **2) Fund and project application:** Actively seeking fund and project supports from all levels. **3) Teaching:** To complete teaching tasks with quality and quantity, update teaching concepts and methods with the times, and promote the organic integration of teaching and research. **4) Exchange and Cooperation:** Widely engage in academic exchanges and cooperation with domestic and foreign scholars to improve the research level and perspective. **5) Work Attitude:** hardworking, sincere communication, unity and cooperation, handling personal relationships with students, colleagues, and leaders well.

## Project Experience

- 2022.03 - 2025.02    ◇ **High-Power-Density High-Efficiency On-Board Electric Vehicle Charger Based on Thermally Enhanced Silicon Carbide Power Module and Advanced Power Conversion Technologies**  
This research was supported by Innovation and Technology Fund (ITF) of Hong Kong Innovation And Technology Commission (No. MRP/019/21X).  
As a student participant.  
Responsibilities: Research on DC-DC stage converter, hardware and simulation verification, and paper writing.
- 2017.12 - 2019.12    ◇ **Transient Modulation of a Dual-Active-Bridge Converter under Multiple Phase-Shift Control**  
This research was supported by Science and Technology Development Fund (FDCT) of Macau (No. 060/2017/A).  
As a student participant.  
Responsibilities: Theoretical derivation, simulation verification, hardware design, PCB layout, and implementation of digital control algorithm using DSP.
- 2015.08 - 2018.08    ◇ **A New Dual Asymmetric Pulse Width Modulation Scheme for Full-Bridge DC/DC Converters**  
This research was supported by Science and Technology Development Fund (FDCT) of Macau (No. 004/2015/A1).  
As a student participant. Responsibilities: Implementation of digital control algorithm using DSP, test, and verification.
- 2017.09 - 2018.06    ◇ **A 5.5kW Bidirectional Energy Storage Solar Inverter, A 3kW Linear Current-Controlled Current Source**  
Enterprise Projects.  
As a Participant.  
Responsibilities: DSP-based multiple-loop digital control design, embedded software debugging, test, and verification.

## Prizes and Scholarships

- 2016     ◇ **National Finals Individual Third Prize (Chuan Sun)**  
          **National Finals Team Second Prize**  
          *The 11th China Graduate Electronics Design Contest, China.*
- 2017     ◇ **South China Division Team First Prize**  
          *The 12th China Graduate Electronics Design Contest, China.*
- 2013     ◇ **The Second Prize of Shanxi Province**  
          *National Undergraduate Electronics Design Contest, China.*
- 2017     ◇ **Second-Class Excellent Research Award**  
          *Macau University of Science and Technology, Macau.*
- 2013     ◇ **Excellent League Member**  
          ◇ **Second Grade Scholarship**  
          *North University of China, Taiyuan, China.*

## Certification

- 2012     ◇ **National Computer Rank Examination Certificate (Grade 2 - Programming Language C).** Certified by the Ministry of Education of China.
- 2013     ◇ **National Computer Rank Examination Certificate (Grade 3 - Network Technique).** Certified by the Ministry of Education of China.
- 2016     ◇ **Certificate of a Seminar Continuing Professional Development (CPD) Course - Design, Installation, Test and Maintenance of Active Harmonic Filter System (APF).** Certified by the Society of Operations Engineers (Macau Region).




## Skills

- Electronics Design     ◇ Strong product development expertise and problem solving ability in power electronics including circuit design, implementation of digital control on power electronic system, test and verification.
- Microcontrollers        ◇ Familiar with the embedded programming and control design for a variety of microcontroller platforms, e.g. TI C2000 DSP, STM32 32-bit ARM Cortex MCUs, Cypress PSoC MCUs, MSP430, ATMEL AVR, MCS-51 and Arduino, etc.
- Software Tools         ◇ Familiar with PSIM, PLECS, Saber, Simulink, OrCAD PSpice, Multisim, LTspice, Tina-TI, Proteus, Altium Designer, MATLAB, Mathcad and Mathematica, etc.
- Languages**           ◇ Native Language: Mandarin Chinese (Class II Grade A).  
                              English Proficiency:  
                              IELTS (International English Language Testing System): Overall Score: 6.5 (Listening 6.0, Reading 7.0, Writing 7.0, Speaking 5.5).  
                              CET-6 (National College English Test Band 6): 456.  
                              CET-4 (National College English Test Band 4): 498.



## Membership of Professional Bodies

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- ◇ **Student Member**, Institute of Electrical and Electronics Engineers (**IEEE**) 
- ◇ **Student Member**, The IEEE Power Electronics Society (**IEEE PELS**) 
- ◇ **Student Member**, China Power Supply Society (**CPSS**) 
- ◇ Dr. Sun serves as a reviewer for various international SCI journals, e.g., IEEE Transactions on Power Electronics, IEEE Transactions on Industrial Electronics, IEEE Transactions on Transportation Electrification, IEEE Journal of Emerging and Selected Topics in Power Electronics, and IET Power Electronics.