

XIANG ZHANG

Walter Light Hall, Room 108 (ePower Center), 9 Union Street, Queen's University, Kingston, ON K7L 3N6

✉ xiang.zhang@queensu.ca ◊ [xiangzhangpe.github.io](https://github.com/xiangzhangpe) ☎ +1 (343) 989-5489

EDUCATION

-
- Queen's University, Dept. Electrical and Computer Engineering** *Jan 2021 - Present*
Master of Applied Science, Advisors: Dr. Praveen Jain and Dr. Shangzhi Pan
GPA: 4.00 / 4.00
- Wuhan University, School of Electrical Engineering and Automation** *Sep 2016 - Jun 2020*
Bachelors of Electrical Engineering, Advisor: Dr. Meng Huang
GPA: 89.33 / 100, Rank 27/304, Graduation with honor
- Mcmaster University, Dept. Electrical and Computer Engineering** *Jun 2019 - Nov 2019*
International Exchange Student
One of 30 selected students across all undergraduates in Wuhan University funded by CSC

PUBLICATIONS & AWARDS

Publicaitons

1. **[Draft] X. Zhang**, S. Pan, and P. Jain, "Multiphase symmetrical coupled resonant converter: Enhanced current balancing and Rotation phase-shedding Control" Submitted to IEEE Transactions on Power Electronics.
2. **[Draft] X. Zhang**, S. Pan, and P. Jain, "Current sharing in multi-phase/multi-module converters: a technical review" prepared to be submitted to IEEE Transactions on Power Electronics.
3. **[trans TPEL] X. Zhang**, S. Pan, and P. Jain, "A Discrete Coupled Multiphase Interleaved LLC Converter With Symmetrical Components Analysis," IEEE Transactions on Power Electronics, vol. 38, no. 11, pp. 14150–14165, Nov. 2023, doi: [10.1109/TPEL.2023.3279822](https://doi.org/10.1109/TPEL.2023.3279822).
4. **[ECCE' 2023] X. Zhang**, S. Pan, P. Jain, "Discrete Symmetrical Coupled Inductor Structure and its Matrix-type Implementation for DC-DC Converter," in 2023 IEEE Energy Conversion Congress and Exposition, Nashville, TN, 2023.
5. **X. Zhang**, T. Li, S. Peng, C. Hu, R. Sun, and M. Huang, "Control system of Internet of Things energy router," Chinese Patent, CN209608395U, Nov. 08, 2019.

Scholarships

- NSERC Graduate Research Fellowship of Queen's university (\$23000/year, 2021-2023)
- Graduate Fellowship of Mitacs Globalink, Canada (\$15000, 2022)
- Outstanding undergraduate intern scholarship awarded by China Scholarship Council (\$5400, 2019)
- Scholarship of Academic Excellence of Wuhan University (Once a year, 2017-2020)

Awards

- Prize for Outstanding Undergraduate Thesis of Wuhan University(15%)
- First Prize in 2019 "The Challenge Cup Academic Competition" in Hubei Province (10%)

RESEARCH EXPERIENCE

Discrete Symmetrical Coupled Magnetics application in Multi-phase Interleaved LLC Converters
Advisors: Dr. Praveen Jain, Dr. Shangzhi Pan *May 2022 - May 2023*

- Innovatively introduced the symmetrical components theory into high frequency resonant converters to explain the current sharing behavior of the mulitphase system, expanding the coupled magnetics application to all odd-phase interleaved resoannt converters, providing an assessment tool of current balancing ability by sequence impedance;
- Proposed a magnetics coupling structure that inherently balances the current in the multiphase interleaved LLC converter, reducing the current sharing error from 40-60% to 2-5% in multiphase system;
- Implemented a complete control architecture that incorporates both enhanced current balancing algorithm and phase-shedding operation, further reduce the current sharing error from 2-5% to 0.3-0.5% level.

Precise Digital Control for Multiphase Resonant Converter with Adaptive Voltage Positioning

Advisors: *Dr. Praveen Jain, Dr. Shangzhi Pan*

May 2021 - May 2022

- Investigated the mechanism of charge bang-bang control, state trajectory control in resonant converters, constructed a detailed time-series model of CLL and LLC resonant tank, with VHDL based control algorithm;
- Expanded the adaptive voltage positioning techniques from multi-phase buck to multi-phase resonant converter.

Modular Design of low-power Iot Smart Switch System

Advisor: *Dr. Meng huang*

Nov 2019 - May 2020

- Designed a smart switch system with integrated flyback regulators, aiming for the smart home lighting application;
- Implemented a output voltage positioning using the programmed current controller with a feedback optocoupler;
- Constrained energy loss to mW criteria by deploying burst-mode control to providing intermittent operation;
- Installed replaceable Bluetooth modules to the system to achieve IoT versatile operational commands.

Power System Dynamic Database

Advisor: *Dr. Tang Chi*

Jun 2019 - Nov 2019

- Organized and Reprocessed the dynamic data from online technical reports and government official documents referring bulk electrical system in Ontario to simplify the structure of Ontario power grids;
- Designed an adaptive online database to sort, store and modify the changing data in Mysql;
- Coded a users' interface program to export information from the database to PSS/E using python and SQL;
- Verified the dynamic model under system disturbance and proposed an optimum generation planning for the current Ontario power grid in PSS/E software.

Controlling Strategy for DC Micro-grid with Multi-port Converter

Advisor: *Dr. Meng huang*

Jan 2018 - Jul 2019

- Modeled and analyzed the stability of the system with rapidly changing load and nonlinear load, hardware verification are implemented with single DC bus with paralleled DC-AC inverters and DC-DC converters, and ARM-FPGA co-processor;
- Tested Droop and P&O and MPPT control strategies for cascaded converters under islanded and grid-tied mode;
- Compiled control strategies based on C language with high-speed ADC with a DMA controller, ameliorated the system by attaching a communication platform to the microgrid, under Modbus protocol.

WORK EXPERIENCE

SPARQ SYSTEMS Inc, 945 Princess Street, Kingston, ON, K7L 0E9

Testing Engineer

Aug 2022 - Jun 2023

- Managed the massive production burning test design and setup for the industrial Quad-2000 micro inverter;
- Overseas coordinator for factory manufacture, user manual, datasheet proofreading and translation.

TEACHING & SERVICE

Journal Reviewer

IEEE Transactions on Power Electronics.

Teaching Assistant

ELEC371: Microprocessor Interfacing and Embedded Systems, Queensu, 2022;
APSC200: Engineering Design and Practice II, Queensu, 2021.

Community

Undergraduate summer exchange intern with Wuhan University and Cambridge University (Language, Culture & Society Track), 2017; Debate club leader in School of Electrical and Automation Engineering, Wuhan University, 2016-2018; Representative of external affairs in students' union, Wuhan University, 2017-2018.

SKILLS & OTHERS

Programming Skills

Excellent in C/C++, Proficient in Python, VHDL/Verilog, SQL, and JavaScript.

Hardware Skills

TI C2000 DSP, STM32 M3/4, Altera/Xilinx FPGA, Zynq, Arduino.

Software Skills

Matalab, Simulink, LabVIEW, PSIM, SIMPLIS, LTSPICE, PLECS, PSS/E, PSCAD, Altium Designer, PSS/E, ANSYS Maxwell, SolidWorks.

Research Interests

Resonant Converter, Symmetrical Coupled Magnetic, High precision digital Control.

Language Capability

TOEFL 108(S22), GRE 323/ V154(64%)/ Q169(95%)/ Aw 3.5(39%).