

## Academic Background

- 04/2017— Present** Ph.D student in **Power Electric Engineering**, Department of Energy & Environment, **Chalmers University of Technology**  
**Supervisor:** Prof. Yujing Liu
- 05/2015 — 03/2017** Lecturer in **Electrical Engineering**, School of Engineering, Huzhou University
- 09/2012 — 04/2015** M.S. in **Power Electronics and Power Drives**, College of Automation Engineering, **Nanjing University of Aeronautics and Astronautics**  
**Supervisor:** A.P. Haihong Qin
- 09/2008 — 06/2012** B.S. in **Automation**, School of Computer and Information Engineering, **Hohai University**



## Research Experience

### ● Completed Research Projects

- 2017—2019** **Cost-effective drivetrains for fuel cell powered EVs**  
(Founded by Swedish Electromobility Center)
- DC/DC converter topologies
  - Energy buffer devices, type and capacity, batteries and super-capacitors
  - DC-link voltage and its quality
  - Inverter and electric motor: distributed drives or integrated drives
  - Optimized system design (fuel cell tank, fuel cell stacks, drivetrains) for a specific vehicle.
- 2018—2018** **Floating voltage fuel cell drive system**  
(Founded by Swedish Energy Agency)
- The purpose of the project is to contribute to more compact and more cost-effective fuel cell drive systems for vehicles. This is done by developing a system where the DC voltage between the fuel cell and the motor converter is allowed to vary. In a system of this type, a lower power fuel cell can be used and a DC / DC converter removed. For the engine to still have sufficient power, the battery is replaced with a super capacitor. According to the applicant, the cost of a drive system with the new solution can be reduced by up to SEK 50,000 while reducing the weight by 20 kg.
- 2016—2018** **Participating in the study on the key technology and application of li-ion powered battery module design**  
(Research Team Member, funded by Zhejiang Public Welfare Technology Application Research Project of China)
- Online detection of battery running state parameters

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- Evaluation methodology for battery state of charge
  - Modular integration and distributed management technology for high power battery stack
- 2015—2017**      **Conducting research on an energy feedback device for elevators and system energy efficiency evaluation**  
(Principle Investigator, funded by Huzhou Public Welfare Technology Application Research Project of China)
- Design an energy storage device with a super capacitor, which can release the energy when the traction machine operates as generator and store the energy when the traction machine operates as motor.
  - Study the energy optimization control method of the super capacitor.
  - Modeling and measuring the energy consumption of the elevator and designing the efficiency evaluation methodology of the elevator.
- 2014—2015**      **Conducted design and research on the control system of electromechanical actuator for flight vehicles**  
( Principle Investigator, Aircraft design, manufacture and control for graduate student collaborative training project )
- Designed the motor drive based on DSP 2812.
  - Studied the rotor position detection of the electromechanical actuator based on the Hall sensors.
  - Designed the inertia identification method of the electromechanical actuator and load torque observer to achieve anti-load disturbance control.
- 2013—2014**      **Participated in the development of a permanent magnet synchronous motor drive in washing machine**  
( Principle Investigator, Enterprise cooperation project )
- Aiming at achieving low cost operation, STM 32F103RC was selected as the controller, and two phase orthogonal Halls were utilized to estimate the rotor position; a single shunt was utilized to accurately detect the phase current.
  - Completed the motor drive, which includes the software design and the hardware design.
- 2012—2013**      **Conducted research on the intelligent solid state power transformer model of Wide Band Gap based on SiC device**  
( Research Team Member, Funded by the Innovation Experiment Competition Project of Graduate Students )
- Designed and simulated intermediate level DAB.
  - Analyzed and documented small signal modeling of the closed loop and signed the adaptive PI controller
- 06/2012—12/2012**      **Participated in the design of Fly-back converter with 30W**  
( Principle investigator )
- Designed a Fly-back power supply unit based on Top-switch.
  - Analyzed and documented the small signal modeling and designed the parameters of the closed-loop.

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- 2010—2011**      **Investigated the sharp wave suppression of high frequency transformer in the application of LED lighting technology**  
( Principle investigator, funded by the Innovative Training Program )
- Developing a workable hypothesis to solve the problem of heat dissipation, light glare and uneven brightness of LEDs, and lamp shade was also designed.
  - Designed a drive circuit with constant current to drive the LED.
- 2009—2010**      **Researched the inductively coupled plasma source with high efficiency and high power**
- Explored the applicability of an inductively coupled plasma source of low energy consumption and high power electromagnetic coupling drive technology.

## ● **Ongoing Research Projects**

- 2020-2024**      **Development of high reliability motor drives for next generation propulsion applications (DORNA)**

## **Publications**

### ● **Papers**

- **Qian Xun**, Yujing Liu, Xiaoliang Huang, “Intelligent power allocation with load disturbance compensator in fuel cell/supercapacitor system for vehicle application,” *IEEE Transportation Electrification Conference and Expo (ITEC)*, Chicago, USA, Jun. 23-26, 2020.
- **Qian Xun**, Yujing Liu, Nan Zhao, “Energy efficiency comparison of hybrid powertrain systems for fuel-cell-based electric vehicles,” *IEEE Transportation Electrification Conference and Expo (ITEC)*, Chicago, USA, Jun. 23-26, 2020.
- **Qian Xun**, Yujing Liu, “Evaluation of fluctuating voltage topology with fuel cells and supercapacitors for automotive applications,” *International Journal of Energy Research*, 2019, pp. 1-13.
- Xiaorui Guo, **Qian Xun**, Zuxin, Li, Shuxin Du, “Silicon carbide converters and MEMS devices for high-temperature power electronics: a critical review,” *Micromachines*, 2019, vol. 10, no. 6, pp. 406-430.
- **Qian Xun**, Yujing Liu, Jian Zha, “Modelling and simulation of fuel cell/supercapacitor passive hybrid vehicle system,” *11<sup>th</sup> Annual Energy Conversion Congress and Exposition*, Baltimore, MD. Sep. 29-Oct.3, 2019.
- **Qian Xun**, Yujing Liu, “Commutation torque-ripple minimization for brushless DC motor based on Quasi-Z-source inverter,” *XXIIIrd International Conference on Electric Machine*, 2018, 3-6, Sep. Alexandropoulos, Greece, 2018.
- **Qian Xun**, Yujing Liu, Elna Holmberg, “A comparative study of fuel cell electric vehicle hybridization with battery or supercapacitor,” *International Symposium on Power Electronics, Electrical Drives, Automation and Motion*, 2018, 20- 22, Jun. Amalfi, Italy, 2018.
- **Qian Xun**, Xiaorui Guo, Boyang Xun, et al, “A three-phase current reconstruction technique using a single current sensor based on active vector pulse insertion,” *International Journal of Power Electronics*, 2018, 9 (1): 13-28.

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- **Qian Xun**, Boyang Xun, Zuxin Li, et al, “Application of SiC power electronic devices in secondary power source for aircraft,” *Renewable & Sustainable Energy Reviews*, 2017, 70(2): 1336-1342.
- **Qian Xun**, Peiliang Wang, Zhiduan Cai, et al. “Hall rotor position estimation method and its error compensation,” *Transactions of China Electrotechnical Society*, 2017, 32(6): 145-155.
- **Qian Xun**, Peiliang Wang, Zuxin Li, et al, “PMSM parameters identification based on recursive least square method,” *Transactions of China Electrotechnical Society*, 2016, 31(17): 161-169.
- **Qian Xun**, Haihong Qin, Hansong Li, et al, “Research on rotor position estimation scheme based on two phase orthogonal hall effect position sensors,” *Transactions of China Electrotechnical Society*, 2016, 31(3): 81-88.
- **Qian Xun**, Peiliang Wang, Zhiduan Cai, et al, “The anti-load disturbance control strategy of PMSM based on the load torque observer,” *Advanced Technology of Electrical Engineering and Energy*, 2016, 35(5): 36-41, 54.
- **Qian Xun**, Peiliang Wang, Lidi Quan, et al, “Research on control strategy of super capacitor energy storage system in traction elevator,” in *Proc. International Conference on Engineering Science and Management*, 13-14 Aug. 2016.
- **Qian Xun**, Xiaorui guo, Haihong Qin, et al, “Research on the application of flux-weakening control in PMSM with wide range speed variation,” in *Proc. 2017 International Conference on Smart Grid and Electrical Automation*, 27-28, May. 2017.
- **Qian Xun**, Peiliang Wang, Lidi Quan, et al, “Voltage balancing strategy based on cooperative control for super capacitor,” *Power Electronics*, 2017, 51(2): 112-116.
- **Qian Xun**, Yong Wu, Peiliang Wang, et al, “Starting control strategy of brushless DC motor based on Hall rotor position sensor,” *China Measurement & Test*, 2016, 42(8): 118-122.
- **Qian Xun**, Peiliang Wang, Zhiduan Cai, “Power parameter prediction model for industrial waste gas purification device based on PSO-LSSVM algorithm,” *Chinese Journal of Environmental Engineering*, 2016, 10(4): 601-607.
- **Qian Xun**, Haihong Qin, Yafei Ma, et al, “Research of six phase fault tolerant permanent magnet motor simulation based on optimal torque control,” *Journal of Power Supply*, 2015, 13 (1): 28-35.

## ● **Patents**

- **Qian Xun**, Peiliang Wang, Zhiduan Cai, et al. “A method for reducing interaction influence between inductive motor load and the electric driver,” CN Patent, Application No.: 201710224795.8, Grant No.: CN107257220B, Aug. 27, 2019.
- Haihong Qin, **Qian Xun**, Xin Nie, et al. “Motor Rotor Position and Angle Obtaining Method,” CN Patent, Application No.: 201410270719.7, Grant No.: CN104079218B, July. 20, 2016.

## Personal Skills

- Highly experienced in areas related to Hall rotor position estimation, phase current reconstruction using a single shunt for low cost application, and motor anti-disturbance control.
- Highly experienced and adept in electrical experiments and independent development, as well as analysis and verification of experimental results.
- Highly proficient and experienced in embedded design, such as DSP 2812 and STM 32 for motor control.

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- Adept in design and simulation tools, such as ANSYS, Saber, PSpice, Simulink and PSCAD.
- Expertise in office software, such as Word, PowerPoint, Excel and Visio.
- Excellent writing and oral communication skills.

## Scholarships & Awards

<b>2014—2015</b>	Outstanding Master Thesis - NUAA
<b>2013—2014</b>	Special Scholarship for Graduate students - NUAA
<b>2012—2013</b>	“EAST” power electronic enterprise grants - NUAA
<b>2011—2012</b>	Accepted without entrance examination as postgraduate of NUAA, Academic Excellence Scholarship, Spiritual Civilization Scholarship, and Outstanding Student of HHU
<b>2010—2011</b>	National Scholarship, Academic Excellence Scholarship of HHU, awarded Second-Prize in the seventh Jiangsu College Students' Physics and Experimental Science Technology Innovation
<b>2009—2010</b>	The Second Prize in the third National College Students' Energy Conservation and Emission Reduction Social Practice, Academic Excellence Scholarship, Science and Technology Innovation Scholarship, Spiritual Civilization Scholarship, Outstanding Student, and the Third Prize in the College Physics Contest of HHU
<b>2008—2009</b>	National Motivational Scholarship, Academic Excellence Scholarship, and the Third Prize in the Mathematics Contest of HHU

## Research Interests

Energy optimization control for energy storage system, motor anti-disturbance control, parameter identification, rotor position estimation and more electric aircraft research

## Others

Deputy secretary in class party branch of NUAA, Class commissary in charge of studies and Deputy secretary of secretariat general in Science and Technology Association of HHU

## Referee

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