🎓 EDUCATION

City University of Hong Kong (CityU)   Sep-2021~Apr-2022
School of Energy and Environment – Postdoctoral Fellow

Research Team from: Chunhua Liu (Associate Professor)
Research Interests: Design, Optimization, Multi-Physical-Domain Analysis, Control Algorithm for Highly Dense Aircraft Propulsion Electric Motors, Cooling Laws of Motor Systems with Thermal Experiment.

City University of Hong Kong (CityU)   Sep-2018~Aug-2021
School of Energy and Environment -- PhD

(GPA: 3.9/4.3)   Supervisor: Chunhua Liu (Associate Professor)
Research Interests: Design and Control of Permanent Magnet Machines for Aircraft Propulsion, Design and Control of High-Speed and Multi-Phase Motors, Design and Control of In-wheel Motors and Traction Motors for Modern New Energy Vehicle, Renewable Energy Generation and Conversion Devices, Multi-Physical-Domain Modelling, NVH Analysis and Test for PM Machines.

Harbin Institute of Technology (HIT)   Sep-2016~Jul-2018
Electrical Engineering and Automation -- Master of Engineering

(GPA: 86.78/100; Ranking: 1/169)   Supervisor: Feng Chai (Professor)
Research Interests: Modern PM Machine Design, Automotive In-wheel Motor Design, Modular and Fault-Tolerant Design, Multi-Physics Modelling and NVH Analysis.

Harbin Institute of Technology (HIT)   Sep-2012~Jul-2016
Electrical Engineering and Automation -- Bachelor of Engineering

(GPA: 92.22/100; Ranking: 10/283)
Major courses: Electric Circuit, Electric Machinery, Motor Design and CAD, Small & Special Electric Machinery, Motor Drive Systems and Control, Mechanics, C Programming Language.

🧑‍🔬 RESEARCH & WORKING EXPERIENCE

Development of Multimode Axial-Flux Double-rotor Motor Drive System for Hybrid Unmanned Aerial Vehicle (NSFC 52077186) -- *Participant*   Jan-2021~Dec-2024

Abstract: Hybrid electric unmanned aerial vehicles (HE-UAVs) have redefined the propulsion structure of UAVs. By combing the fuel energy and electric energy together, the HE-UAVs can accomplish multiple operations and long endurance, which has significant research values for enlarging the application scenarios of UAVs. Focusing on the problem that existing hybrid propulsion systems are unsuitable for the complex flight tasks of UAVs, a novel high-power-density integrated axial double-rotor machine drive system with multiple operation modes is proposed.
Responsible for: Double-rotor propulsion motor design and control, multi-physics design optimization, and prototype experiments.

Shenzhen Tiemeizhong Technology Co., Ltd -- *Motor R&D Engineer*   Jul-2020~Jan-2022

Introduction: The company's R&D team consists of several returnee doctors, senior engineers and authoritative technical consultants in the industry. The main business includes high-performance high-density motor design and customization of measurement and control platform, power electronics and wireless charging system for new energy vehicles, new energy systems and smart microgrid equipment.
Responsible for: The motor R&D engineer is mainly responsible for the design, analysis, algorithm implementation, measurement, control platform construction, and motor testing of novel, high-performance, series electric motors and control systems involved in the company's projects.

Development of a New Integrated Motor Drive System based on Wide-Bandgap Power Semiconductor Devices (Shenzhen-Hong Kong Innovation Circle Category D Project for Hong Kong Institutions SGDX2019081623101559) – *Participant*   Jan-2020~Dec-2022

Abstract: To develop an integrated motor drive system based on wide-bandgap power semiconductor devices. Motor-drive-control systems with highly dense and compact structure and high power density can be constructed and implemented to wide practical applications, like robotics, servo systems, etc.
Responsible for: Electric motor design, integration concerns, and prototype experiments.

Development of New Wireless Electric Machines (Shenzhen Basic Research Grant JCYJ20180307123918658) – *Participant*   Jan-2019~Dec-2021

Zaixin Song

PERSONAL DETAILS

Birth Date: Sep-1994
Nationality: Chinese
Education: PhD
Graduate from: HIT, CityU
Profession: Electric Machine and Control
Phone: (+86)15998551871
Email: songzaixin@163.com
        zaixin.song@my.cityu.edu.hk
Address: Room 801A, 8/F, Nam Shan Building, Sham Shui Po, Kowloon, Hong Kong, China

SKILLS

PROFESSIONAL

➢ CAD
- AutoCAD
- Solidworks
- Creo
- SpaceClaim

➢ CAE of Electric Motors
- ANSYS Maxwell
- JMAG
- Altair Flux
- ANSYS MotorCAD
- Matlab-Simulink
- Twin Builder
- ANSYS Mechanical APDL
- Fluent

ENGLISH

IELTS—6.5
CET6—572

PROGRAMMING

C, C++, Java, Python, Matlab

Abstract: This project pioneers the proposal of a new type of wireless motor drive, combined with corresponding control strategies, to realize the remote drive of industrial machines. Wireless motor drive adopts a structure that combines wireless power transfer and electric motor design. The transmitting coil is coupled with different receiving coils based on the principle of time-division multiplexing, and the receiving coil forms electromagnetic field inside the motor. Both energy conversion and, on the transmitter coil side the physical isolation control can be achieved through position sensors or current sensors. Proposed wireless motor drive has the merits of high reliability, high portability, and physical isolation, which expands its application the range to certain industrial remote-control scenes.
Responsible for: Design of wireless motor drive, topology design of receiving coils on the stator.

Design of an Effective Integrated Motor Drive System with Wide-Bandgap Power Devices (CityU Applied Research Grant ARG 9667214) -- *Participant*   **Mar-2020~Feb-2022**

Abstract: To further improve the performance and integration of motor drive system, the Electrical Energy and Power Technology (EEPT) group, at City University of Hong Kong, has developed two new types of integrated motor drive (IMD) systems based on the conventional power devices, which particularly combine the motor and drive together. Compared with the existing motor drive, the first type of motor drive has the better torque density and the second type has the better power density. By combining the power drive with the well-designed motor together, the new IMD systems have achieved the better performances than most matured existing ones under the same power level and size.
Responsible for: Design optimization of integrated motor drive, first- and second-round prototype fabrication, experiments, and performance evaluation.

Development of Hybrid-Structure Double-Stator PM Machines for Ship Electric Propulsion (NSFC 51677159) -- *Participant*   **Sep-2018**

Abstract: To develop a novel type of double-stator PM machine with hybrid-structure, which has compact structure and low-speed large-torque output. It will be suitable for ship electric propulsion.
Responsible for: Electromagnetic design and prototype experiments.

High Speed PM Motors for Magnetic Suspension -- *Participant*   **May-2017**

Abstract: To achieve the specific performance indicators proposed by the Xi'an Aerospace Precision Electrical and Mechanical Research Institute (16th Aerospace Institute), the high-speed PM motors with 100kW/30000rpm for magnetic suspension are designed synthetically from such aspects as electronics, magnetics, thermotics and mechanics.
Responsible for: Mechanical strength examinations of the high-speed motors.

Modular Permanent Magnet In-wheel Motor for Electric Armored Vehicles – *Participant*   **Jul-2016**

Abstract: Electric vehicles need to adapt to complicated road conditions; thus, reliability and fault tolerance are very important. Modular PM in-wheel motors are required and analyzed through electromagnetic, mechanical, thermal and fault tolerant performance.
Responsible for: Electromagnetic and fault-tolerant design, vibration analysis, and prototype experiments.

👨‍🔬 RESEARCH OUTPUT

ORCID: https://orcid.org/0000-0002-0599-3350
Google Scholar: https://scholar.google.com.sg/citations?user=UG4AS6wAAAAJ&hl=en
Research Gate: https://www.researchgate.net/profile/Zaixin_Song
Elsevier Scopus:
https://www.scopus.com/authid/detail.uri?origin=resultslist&authorId=57193017589&zone=
CityU Scholar: https://scholars.cityu.edu.hk/en/persons/zaixin-song(05e9fe51-3392-4162-af58-a1600e3519f5).html

Selected Publications:

1. **Z. Song**, C. Liu* and H. Zhao, "Exact Multi-Physics Modelling and Experimental Validation of Spoke-Type Permanent Magnet Brushless Machines," IEEE Transactions on Power Electronics, doi: 10.1109/TPEL.2021.3069922. (**SCI, IF: 6.373**)
2. **Z Song**, C Liu*, S. Liu, et al. "Active Harmonic Suppression of Low-Reactance Multi-phase Slotless Permanent Magnet Synchronous Machines," IEEE Journal of Emerging and Selected Topics in Power Electronics, doi: 10.1109/JESTPE.2021.3050353. (**SCI, IF: 4.728**)
3. C. Liu*, K. T. Chau, C. H. T. Lee and **Z. Song**, "A Critical Review of Advanced Electric Machines and Control Strategies for Electric Vehicles," *Proceedings of the IEEE*, doi: 10.1109/JPROC.2020.3041417. (**SCI, IF: 10.252**)
4. **Z. Song**, C. Liu*, K. Feng, H. Zhao and J. Yu, "Field Prediction and Validation of a Slotless Segmented-Halbach Permanent Magnet Synchronous Machine for More Electric Aircraft," in IEEE Transactions on Transportation Electrification, vol. 6, no. 4, pp. 1577-1591, Dec. 2020, doi:

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PROGRAMMING

C, C++, Java, Python, Matlab

10.1109/TTE.2020.2982733. **(SCI, IF: 5.444)**

5. **Z Song**, C Liu*, H Zhao, "Investigation on Magnetic Force of a Flux-Modulated Double-Rotor Permanent Magnet Synchronous Machine for Hybrid Electric Vehicle," IEEE Transactions on Transportation Electrification, vol. 5, no. 4, pp. 1383-1394, Dec. 2019. **(SCI, IF: 5.444)**

Patent & Knowledge Transfer:

1. 李龙，梁俊强，刘许洋，**宋再新**. 一种永磁无刷力矩电动机半开放式强迫风冷散热结构. 中国. (Retrieved, Public Code: CN112531972A, Date: 19/03/2021)

2. 李龙，梁俊强，刘许洋，**宋再新**. 一种适用于双定子永磁无刷力矩电动机的绕组结构. 中国. (Retrieved, Public Code: CN112532003A, Date: 19/03/2021)

3. 李龙，梁俊强，刘许洋，**宋再新**. 一种永磁无刷直流电机的连轴位置反馈结构. 中国. (Accepted)

4. 李龙，梁俊强，刘许洋，**宋再新**. 一种无刷马达用内部磁位置反馈结构. 中国. (Accepted)

5. 李龙，梁俊强，刘许洋，**宋再新**. 一种内埋式复合永磁体式双定子无刷电动机拓扑结构. 中国. (Accepted)

6. 李龙，梁俊强，刘许洋，**宋再新**. 一种适用于无刷马达的定子全方位紧固结构. 中国. (Accepted)

7. 李龙，梁俊强，刘许洋，**宋再新**. 无刷电机(PMM-S01). 中国. (Retrieved, Public Code: 306628832S, Date: 22/06/2021)

8. 李龙，梁俊强，刘许洋，**宋再新**. 无刷电机(PMM-R01). 中国. (Retrieved, Public Code: 306695049S, Date: 20/07/2021)

9. 李龙，梁俊强，刘许洋，**宋再新**. 无刷电机(PMM-RW02). 中国. (Retrieved, Public Code: 306721444S, Date: 30/07/2021)

10. 李龙，梁俊强，刘许洋，**宋再新**. 新型永磁电机(PMM-SW02). 中国. (Accepted)

🏆 AWARDS

CityU 2019-2020 Chow Yei Ching School of Graduate Studies Scholarships	Sep-2020
CityU 2019-2020 Outstanding Academic Performance Award	Sep-2020
CityU 2018-2019 Outstanding Academic Performance Award	Sep-2019
CityU 2018-2019 Research Tuition Scholarships for Research Degree Students	Sep-2019
First-class Scholarship for Postgraduates	Sep-2016
Second-class Scholarship for Outstanding Postgraduates	Sep-2016
Outstanding Degree Thesis in HIT	Jul-2016
Outstanding Student Award in HIT	Dec-2013
National Scholarship for Undergraduates	Nov-2013

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