# FULONG LI

Ph.D., IEEE Member
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## RESEARCH AREAS AND SKILLS

**Research Interests:**

**Power Electronics Converters**

*Design Level*

- AI-assisted optimal design of DC/DC converters (buck, boost, DAB, LLC), including modelling, simulation, and experimental validation.
- Thermal and electrical characterisation of IGBT and SiC/GaN MOSFETs.
- High-bandwidth current sensing techniques for SiC/GaN applications (PCB Rogowski coils, shunt-based methods).

*Control Level*

- Closed-loop control of DC/DC converters, including double-loop and passivity-based control strategies.
- Impedance-based analysis and stability assessment of power converters and their integration within DC microgrid systems.

**DC Systems**

- Control strategies for small-to-medium scale DC distributed systems with multiple converters in series and/or parallel configurations.
- Energy management strategies for battery systems within DC networks.
- Adaptive power control for photovoltaic (PV) sources in DC systems, including MPPT and self-adaptive MPPT techniques.
- Optimal power scheduling and coordination of distributed energy resources within DC microgrids.

**Software Skills:**

- Modelling & Analysis: MATLAB, PLECS, PSIM, SaberRD, SPICE, SIMetrix, COMSOL
- Optimisation Tools: GAMS, Yalmip
- PCB Design: Altium Designer, DesignSpark PCB
- Mechanical Design: SolidWorks, 3D printing workflows
- Control & Embedded Systems: Analog control circuits, DSP-based control implementation
- Hardware Implementation: Soldering, prototyping, laboratory testing and debugging
- Programming: C, C++, Python
- Supportive Tools: Microsoft Office, LaTeX, Visio, Mendeley, etc.

**Language Skills:**

- Chinese – Native speaker
- English – Full professional proficiency

## EXPERIENCE

**April 2022 — September 2025**
Power Electronics Engineer, Compound Semiconductor Applications (CSA) Catapult, UK.

- Technical lead for an ANN-based SiC MOSFET modelling project in collaboration with Cardiff University and Sumitomo Heavy Industries.
- Conducted multi-objective optimisation research for power converters, including passive component and switching device review, transistor loss modelling, objective function definition, and AI-assisted model training.
- Designed and simulated 10 kW LLC and DAB converters for data centre power systems.
- Technical lead for a 3MW fuel cell hybrid marine powertrain project, responsible for system architecture design, modelling, and energy management strategy.
- Reviewed state-of-the-art high-voltage SiC device technologies (3.3 kV) and 10 kV / 500 kW solid-state transformer architectures, covering design origin, control strategies, and application scenarios. Ensured delivery of all associated project milestones.
- Developed high-bandwidth current measurement devices for SiC converters, including PCB Rogowski coils and PCB embedded magnetic core current transformers.
- Designed and commissioned a comprehensive test rig for SiC and GaN device characterisation, supporting:
  - H3TRB (High Humidity, High Temperature, High Voltage Reverse Bias) testing
  - Insulation testing
  - Double Pulse Testing (DPT)
  - Thermal impedance measurement
  - Temperature cycling for SiC/GaN devices and power modules

**October 2019 — April 2022**
Research Associate, Loughborough University, UK.

- Developed a hierarchical control scheme with communication support for low-voltage plug-and-play DC microgrids, including converter-level control, system coordination, EMS design, and experimental validation on a DC microgrid testbench.
- Implemented DSP-based primary control for DC/DC converters, including double-loop voltage control, feedforward compensation for transient enhancement, MPPT control for PV systems, and SoC-based control for battery storage units.
- Configured DC bus signalling protocols to coordinate multiple distributed energy sources connected to a common DC bus, enabling power sharing under droop and master–slave control structures.
- Designed and developed online monitoring tools for DC microgrid operation, supporting real-time data acquisition, system performance optimisation, and energy management strategies for large-scale DC communities.

**April 2016 — September 2019**
Ph.D., Aston University, UK.

- Ph.D. project: Research, Demonstration and Commercialisation of DC Microgrid Technologies (RDC2MT).
- Developed a 500 W DC microgrid testbench, including system construction, converter control design, and real-time experimental validation.
- Collaborated with international universities and research institutes on stability analysis, control strategies, and DC microgrid operation.

**April 2019 — July 2019**
Visiting Ph.D. Student, University of Waterloo, Canada.

- Supervised by Prof. Claudio A. Cañizares (IEEE Fellow).
- Developed EMS (Energy Management System) optimisation strategies for DC microgrids using GAMS.
- Improved battery degradation modelling within the EMS optimisation framework.

**March 2018 — April 2018**
Visiting Ph.D. Student, Zhejiang University, China.

- Supervised by Prof. Wuhua Li.
- Conducted testing and operation of a 50 kW DC microgrid platform.
- Modified primary control strategies to enhance system stability and dynamic performance.

**July 2017 — August 2017**
Visiting Ph.D. Student, DC Systems BV, The Netherlands.

- Evaluated human safety issues related to DC electric shock and investigated DC protection strategies.

**October 2016 — March 2019**
Teaching Assistant / Lab Assistant, Aston University, UK.

- Delivered postgraduate tutorials in power electronics.
- Supported laboratory sessions for undergraduate and master's students in power electronics and circuit analysis.
- Assisted students with simulation tools including MATLAB/Simulink, SIMetrix, and LabVIEW.

## EDUCATION

**Aston University, UK** *April 2016 — September 2019*
Ph.D. in Power Electronics
Thesis: *Control Strategies for Low Voltage DC Microgrids*
Supervisor: Dr. Zhengyu Lin (Reader, IEEE Senior Member)

**Yangzhou University, China** *September 2011 — July 2015*
B.Sc. in Energy and Power Engineering
Thesis: *Wireless Power Transmission for Underwater Applications*
Supervisor: Prof. Wei Jiang (IEEE Member)

## PROFESSIONAL MEMBERSHIPS AND COMMUNITIES

- IEEE Member.
- IEEE Young Professionals.

- Smart Grid Community, IEEE.
- IEEE Industrial Electronics Society Membership.
- IEEE Power & Energy Society Membership

## AWARDS AND RECOGNITION

- Best Paper Award, IEEE PEAC 2022, Guangzhou, China
- IEEE SYPA Winner (Best Paper), ISIE 2019, Vancouver, Canada (Further reading)
- IEEE Student Travel Grant Winner, ICDCM 2019, Matsue, Japan
- IEEE Student Travel Grant Winner, ECCE 2018, Portland, USA
- Ph.D. Studentship, Aston University, UK
- Distinguished Undergraduate of Yangzhou University, China
- Distinguished Undergraduate Thesis, Yangzhou University, China
- Distinguished Undergraduate Thesis, Jiangsu Province, China
- Second Prize, China Undergraduate Mathematical Contest in Modelling

## PROFESSIONAL SERVICES

- Technical Committee Member and Reviewer, IEEE Transportation Electrification Conference and Expo, Asia-Pacific (ITEC Asia-Pacific 2022), Haining, China.
- Guest Editor, Special Issue "Smart Power Grid Low Carbon Energy Systems: Current Trends and New Perspectives", *Energies*, 2022.
- Peer Reviewer for journals including IEEE Access, IET Power Electronics, and *Energies*.
- Technical Committee Member, Asia Conference on Electrical, Power and Computer Engineering (EPCE 2022), Shanghai, China.
- Peer Reviewer, IEEE International Power Electronics and Application Symposium (PEAS 2021), Virtual Conference.
- Peer Reviewer, IEEE IECON 2021, Virtual Conference.
- Scientific & Technical Committee Member, 4th International Conference on Electrical Engineering and Green Energy (CEEGE 2021), Munich, Germany.

## INVITED TALKS

- **Modelling, characterisation, integration, and validation of compound semiconductor applications**
  Invited talk, UK–China Workshop and YESS Programme on Electrical Technology and Energy Equipment, 7 October 2023.
- **Overview of DC Microgrids Stability**
  Invited talk, Online Seminar with Shanghai University, China, 10 December 2020.
- **Energy Management System Design for DC Buildings**
  Presentation, 3rd RDC2MT Project Workshop, Loughborough University, UK, 23 October 2019.
- **DC Microgrid Control and Stability**
  Invited talk, 12th Mediterranean Conference on Information Systems (MCIS), Ionian University, Corfu, Greece, 30 September 2018.

- **DC Microgrid Prototyping**
  Presentation, 2nd RDC2MT Project Workshop, TU Delft, Netherlands, 7 June 2018.
- **Capacitive Grounding for DC Microgrids**
  Presentation, 1st RDC2MT Project Workshop, TU Delft, Netherlands, 7 September 2017.

## PROJECT EXPERIENCE SUMMARY

### Industrial / Catapult R&D Projects

- **Project: Cardiff University — SHI — CSA Catapult Joint Development**
  Technical lead on ANN-based SiC MOSFET modelling; coordinated dataset creation, feature extraction, and model training pipelines.
- **Project: Power Electronics Multi-Objective Optimisation Productisation**
  Developed multi-objective optimisation methods for power-converter design, including passive component selection, device loss modelling, and AI-driven optimisation formulation.
- **Project: 3MW Safe Installation and Operation of a Fuel Cell System and Hybrid Powertrain in Offshore CTV (SinO-OFH).**
  Work Package (WP) lead for thermal behaviour prediction of a fuel-cell engine room under varying marine operating conditions.
- **Project: Siemens IGBT Characterisation**
  Conducted large-scale Double Pulse Testing (DPT) for Siemens IGBT modules to generate high-quality datasets for ANN-based modelling.
- **Project: 3MW Marinised Fuel Cell System and Powertrain**
  Technical lead responsible for system architecture definition, modelling, and development of the energy management strategy.
- **Project: Pre-packaged Power Devices for PCB Embedded Power Electronics (P3EP)**
  - Temperature cycling of PCB-embedded GaN devices
  - Double Pulse Testing (DPT)
  - Thermal impedance measurement
  - H3TRB (High Humidity, High Temperature, High Voltage Reverse Bias) testing
- **Project: ELIPS (Enhanced Liquid-cooled Power Supplies)**
  Designed and simulated 10 kW LLC and DAB converters for data-centre applications; developed PCB Rogowski coil and PCB current transformer for SiC converter current sensing.
- **Project: @FutureBEV (Accelerated Technologies for Future Battery Electric Vehicles)**
  Conducted insulation testing and H3TRB reliability testing for SiC/GaN devices.
- **Project: ASSiST (Advanced SiC-based Solid State Transformer)**
  Reviewed 3.3 kV SiC devices and 10 kV / 500 kW SST architectures, covering device origins, converter design, control strategies, and applications; conducted H3TRB testing for SiC modules; delivered all project milestones.

### PhD and Early Research Projects

- **Research, Demonstration and Commercialisation of DC Microgrid Technologies (RDC2MT)**
  Worked on DC microgrid testbench construction (500W per module), converter control design, stability analysis, and international collaboration with universities and research institutes.

- **Plug-and-play Low Voltage DC Microgrid for Cheap and Clean Energy**
  Designed control and EMS strategies for plug-and-play LVDC microgrids; developed protocols for multi-source coordination.
- **Failure Diagnosis of Emergency Light (with McGEOCH Technology)**
  Identified root causes of emergency-light failure in marine applications through testing and analysis.

## PUBLICATIONS

**Journal Papers:**

1. **Li, F.**, Lin, Z., Xu, H., Wang, F.: "Comprehensive local control design for eliminating line resistance effect on power sharing degradation in DC microgrids". IET Power Electron. 15, 11–22, 2022.
2. **F. Li** and Z. Lin, "Novel Passive Controller Design for Enhancing Boost Converter Stability in DC Microgrid Applications", in IEEE Journal of Emerging and Selected Topics in Power Electronics, vol. 9, no. 6, pp. 6901-6911, Dec. 2021, doi: 10.1109/JESTPE.2021.3070234.
3. M. Alshareef, Z. Lin, **F. Li** and F. Wang, "A grid interface current control strategy for DC microgrids", in CES Transactions on Electrical Machines and Systems, vol. 5, no. 3, pp. 249-256, Sept. 2021, doi: 10.30941/CESTEMS.2021.00028.
4. **F. Li**, Z. Lin, Z. Qian, J. Wu and W. Jiang, "A Dual-Window DC Bus Interacting Method for DC Microgrids Hierarchical Control Scheme", in IEEE Transactions on Sustainable Energy, vol. 11, no. 2, pp. 652-661, April 2020, doi: 10.1109/TSTE.2019.2900617.

**Books and Book Chapters:**

1. Zhengyu Lin, **Fulong Li**, Fei Wang, "DC networks", Reference Module in Materials Science and Materials Engineering, Elsevier, 2022.

**Conference Papers:**

1. **F. Li**, Z. Lin, H. Xu, R. Wang: "Review of DC Bus Signalling Control Methods in DC Microgrids", 2022 IEEE International Power Electronics and Application Conference and Exposition (PEAC), Guangzhou,Guangdong, China, 2022, pp. 1286-1291, doi: 10.1109/PEAC56338.2022.9959577.
2. W. Shang, R. Wang, Z. Lin, **F. Li** and J. Wu, "An Integrated Communication Method for LED Intelligent Dimming System with Switching Ripple Communication", 2021 IEEE 1st International Power Electronics and Application Symposium (PEAS), Shanghai, China, 2021, pp. 1-8, doi: 10.1109/PEAS53589.2021.9628525.
3. **F. Li**, H. Xu and Z. Lin, "Reconstructed Droop Control for Peer Current Sharing of Battery Storage in DC Microgrids", 2021 IEEE Fourth International Conference on DC Microgrids (ICDCM), Arlington, VA, USA, 2021, pp. 1-5, doi: 10.1109/ICDCM50975.2021.9504641.
4. **F. Li**, C. A. Cañizares, Z. Lin, "Energy Management System for DC Microgrids Considering Battery Degradation", 2020 IEEE Power & Energy Society General Meeting (PESGM), Montreal, QC, Canada, 2020, pp. 1-5, doi: 10.1109/PESGM41954.2020.9281580.
5. **F. Li**, H. Xu and Z. Lin, "Multifunctional Control Design for Modular Plug-and-play Battery Storage in DC Microgrids", 2020 IEEE 29th International Symposium on Industrial Electronics (ISIE), Delft, Netherlands, 2020, pp. 1147-1152, doi: 10.1109/ISIE45063.2020.9152414.
6. **F. Li**, Z. Lin, J. Wu and W. Li, "Virtual Negative Cable Resistance for Power Sharing Accuracy Enhancement in DC Microgrids", 2019 IEEE 28th International Symposium on Industrial Electronics (ISIE), Vancouver, BC, Canada, 2019, pp. 2539-2544, doi: 10.1109/ISIE.2019.8781426.

7. **F. Li**, Z. Lin, J. Wu and A. Chen, "Terminal Capacitor Compensation Based Stability Design for DC Microgrids", 2019 IEEE Third International Conference on DC Microgrids (ICDCM), Matsue, Japan, 2019, pp. 1-5, doi: 10.1109/ICDCM45535.2019.9232923.

8. **F. Li**, Z. Lin, W. Cao, A. Chen and J. Wu, "A Low-pass Filter Method to Suppress the Voltage Variations Caused by Introducing Droop Control in DC Microgrids", 2018 IEEE Energy Conversion Congress and Exposition (ECCE), Portland, OR, USA, 2018, pp. 1151-1155, doi: 10.1109/ECCE.2018.8557455.

9. **F. Li**, Z. Lin, Z. Qian and J. Wu, "Active DC bus signaling control method for coordinating multiple energy storage devices in DC microgrid", 2017 IEEE Second International Conference on DC Microgrids (ICDCM), Nuremburg, Germany, 2017, pp. 221-226, doi: 10.1109/ICDCM.2017.8001048.

10. **F. Li**, M. Alshareef, Z. Lin and W. Jiang, "A modified MPPT algorithm with integrated active power control for PV-battery systems", 2016 IEEE International Conference on Renewable Energy Research and Applications (ICRERA), Birmingham, UK, 2016, pp. 742-746, doi: 10.1109/ICRERA.2016.7884432.

11. W. Jiang, J. Lu, **F. Li**, S. Hashimoto and Z. Lin, "A non-intrusive magnetic energy scavanger for renewable power generation state monitoring", 2016 IEEE International Conference on Renewable Energy Research and Applications (ICRERA), Birmingham, UK, 2016, pp. 562-566, doi: 10.1109/ICRERA.2016.7884397.