Holistic Design Optimisation of Power Electronic Converters

Type of award PhD Research Studentship

Department Electrical Energy Management Group

Scholarship Details Minimum £15,609 p.a. subject to eligibility status and confirmation of award.

Duration 3.5 years

Eligibility Home/EU (UK settled status) with permanent UK residency

Start Date From March 2022

PhD Topic Background/Description

What does it take to design a high performance, ultra-compact power electronic systems needed by the growing electric vehicle sector? Or maximise the efficiency of renewable micro-grid converters while minimising their cost?

How can we utilise the full potential of state-of-the-art wide bandgap (WBG) devices that are currently revolutionising the power electronics industry? To do this, engineers need a holistic design tool that optimises every element of a power electronics system. Smart automated software is needed to ensure that the systems needed work together to produce the optimal design.

This PhD will focus on developing the software tools needed to holistically optimise power electronic converters. It will involve modelling all the core electrical, thermal, and mechanical components in a power converter; developing system models and optimisation routines; and designing, building and benchmarking power electronic hardware and software. The tools that will be developed will utilise the latest power electronic topologies and components to produce state-of-the-art power electronic converters.

A PhD study offers a unique opportunity to develop in-depth skills and knowledge that will provide a springboard for further career progression. You will be part of the Bristol Electrical Energy Management (EEMG) research group (bristol.ac.uk/engineering/research/em/), a multi-disciplinary team of academic researchers at the University of Bristol. EEMG have extensive expertise in power electronics modelling, design, and manufacture.

Further Particulars

Candidate Requirements

Applicants must hold/achieve a minimum of a Masters degree (or international equivalent) in Electrical or Electronic Engineering or a related discipline and with knowledge of Power Electronics or Electronic Devices. Applicants without a Masters qualification may be considered on an exceptional basis, provided...
they hold a first-class undergraduate degree. Please note, acceptance will also depend on evidence of readiness to pursue a research degree.

Basic skills and knowledge required:

- **Essential:** Excellent analytical skills and experimental acumen
- **Desirable:** A background or basic understanding in one or more of the following.
  - Power electronic devices and topologies
  - SPICE-based circuit simulation or similar
  - Circuit design and construction including component selection, PCB design and soldering skills
  - Programming skills (MATLAB, C/C++)

**Scholarship Details**
Stipend at the UKRI minimum stipend level will also cover tuition fees at the UK student rate. Funding is subject to eligibility status and confirmation of award.

To be treated as a home student, candidates must meet one of these criteria:

- be a UK national (meeting residency requirements)
- have settled status
- have pre-settled status (meeting residency requirements)
- have indefinite leave to remain or enter.

It may be possible to fund an international fee status as part of the EPSRC’s open eligibility allocation. You should be aware that there is typically strong competition within the university to make use of this flexibility.

**Informal enquiries**
For questions about the **research** topic please contact Dr Ian Laird at Ian.Laird@bristol.ac.uk

For questions about **eligibility and the application** process please contact SCEEM Postgraduate Research Admissions sceem-pgr-admissions@bristol.ac.uk

**Application Details**
Prior to submitting your application, please contact the academic listed to discuss your research proposal and see if it aligns with their current research. No indication of an offer can be made until we receive your completed application.

To apply for this studentship, submit a PhD application using our [online application system][1] [www.bristol.ac.uk/pg-howtoapply]

Please ensure that in the Funding section you tick “I would like to be considered for a funding award from the Electrical Engineering Department” and specify the title of the studentship in the ‘free text’ box below along with the name of the supervisor. Interested candidates should apply as soon as possible.