**A PhD Project:** Electromagnetic Interference Analysis and Modelling in Power Electronics Systems

**Introduction:**
Pulse width modulation (PWM) is a strategy which is used to control magnitude and/or frequency of output voltage in power electronic converters. It varies duty cycle of the converter switches at a switching frequency to achieve desired voltage and/or current waveform with minimum harmonics and ripples. Fast switching transients (which produce high dv/dt and di/dt) generated by power converters interact with parasitic capacitive and inductive couplings in different parts of power converters - including heatsink, cables and electric motors. These can cause many unwanted problems such as: grounding and leakage currents, shaft voltage and resultant bearing currents, conductive and radiated Electromagnetic Interference (EMI) and over voltages. Current and voltage harmonics at different frequency ranges are generated by Power Electronics systems both at load and grid sides which need to be suppressed by proper active and passive methods.

**Aims:**
The main objectives of this project are to model a three-phase diode rectifier in Simplorer with a DC choke inductor in Maxwell (3-D model in ANSYS) and analyse saturation effects under different load conditions. A correlation between high frequency noise source and high frequency model of an AC motor will be investigated based on 2-D model of an AC motor using Maxwell simulation (ANSYS). It is expected that the research team will build a prototype and perform some tests and measurements to compare with simulation results.

![A Power Converter for Motor Drive Applications](image1)

![Finite Element Simulation of an AC Motor](image2)

**Scholarship and Admission:**
A three (up to four) year full-time PhD scholarship is available at the University of Queensland which is open to all Australian and international students. Applicants should have a Master degree in Electrical Engineering with very good knowledge in Power Electronics. A preference is given to those applicants with experiences in 1) Finite Element simulation, 2) EMI modelling and knowledge and/or 3) Power Electronics design.

**General information:**
To gain entry to UQ, you will have to demonstrate an appropriate level of English language ability. At least 6.5 overall and a minimum of 6.0 in each sub-band of the IELTS or equivalent test. Some programs have higher English proficiency requirements. See each program page for more information. Other equivalent tests such as the TOEFL or PTE are also accepted, and other qualifications and experience may also be considered. Study Abroad and Incoming Exchange students are only required to meet a program's overall score requirement (e.g. 6.5 IELTS or 87 TOEFL or 64 PTE). Your application for the PhD program should be approved by the graduate school at the University of Queensland. Therefore, it is expected that you can provide all documents relevant to the admission process.

Applicants are invited to contact Prof Firuz Zare [f.zare@uq.edu.au] for more information.