Architecture of the Future Low-Carbon, Resilient, Electrical Power System

Future Architecture of the Network (FAN) – Te Whatunga Hiko

Workstream 3 – Proposed Summer Project

Project title: Robust Control of DC-DC Converters

Relevant Workstream(s): WS 3
This project is focussed on Workstream 3 (WS3).

To enable proliferation of DC grids within AC grids by addressing technologies and control mechanisms for different forms of power electronic converters.

Project Description

One of the main issues in designing control mechanisms for power electronic converters is that the converter must operate in a wide range of conditions, e.g. different grid strengths, load, etc. One potential method to address this is robust control, where the converter controller is designed to operate stably under a range of conditions.

The student will be informed by the work of two previous data-driven control summer projects in 2023/2024 and 2024/2025 and design a robust controller for various converter topologies (e.g. DC-DC dual-active-bridge converters). Comparisons between different approaches will be performed, e.g. comparing robust control to adaptive data-driven control in a realistic power system.

Specific requirements:

- BE(Hons) - Electrical and Electronic Engineering (EEE) student- Third (second Pro) or Fourth (Third Pro) year.
- Good knowledge of power systems and power electronics
- Experience with programming languages, e.g. MATLAB
- Familiarity with power system simulation tools e.g. Simulink Electrical, PSCAD/EMTDC
- Excellent academic track record
- High proficiency in written and spoken English
- Enthusiastic applicants (any nationality) that want to make a positive impact in the world and can work in a collaborative environment.

Potential Supervisor(s) –Jeremy Watson, Tek Lie

Based in: University of Canterbury