

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

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

Workstream 3 –Summer Project

Project title: Hierarchical Control Technology of DC Microgrid Cluster

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

The coordination of clustered microgrids (MGs) needs to be achieved in a seamless manner to tackle generation-load mismatch among MGs. A hierarchical control strategy based on PI controllers for local and global layers has been proposed in the literature to coordinate DC MGs in a cluster. However, this control strategy may not be able to resist significant load disturbances and unexpected generated powers due to the sporadic nature of the renewable energy resources. These issues are inevitable because both layers are highly dependent on Proportional-Integral (PI) controllers who cannot fully overcome the abovementioned obstacles. Therefore, the student is expected to develop an algorithm to enhance the performance of the global layer by optimising its PI parameters. Simulation studies will be conducted to show the effectiveness of the proposed algorithm.

Specific requirements:

- BE(Hons) - Electrical and Electronic Engineering (EEE) student- Third (second Pro) or Fourth (Third Pro) year.
- Good knowledge of power system grids and power electronics
- Experience with programming languages, e.g. MATLAB
- Familiarity with power system simulation tools e.g. PowerFactory DIgSILENT, 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) – Tek Lie; Jeremy Watson

Based in: AUT