

Faculty of Engineering

Summer Research Program 2023-2024

Project Title: Optimal Design of Electric Distribution System for Hydrogen Electrolyser

Supervisor(s): Hassan Haes Alhelou

Department: ECSE

Email: Hassan.haesalhelou@monash.edu

Website profile of project supervisor:

<https://research.monash.edu/en/persons/hassan-haes-alhelou>

Objective

The project aims to design an optimal electric distribution system used to feed the hydrogen electrolyzer including the design of power converters, transformers, cables, etc. The project is expected to determine the optimal topology of power converters, distribution grid, and the optimal voltage and power level to operate the system with high efficiency.

Project Details

The project is designed to work on the following tasks:

- M1- Develop and propose a comprehensive optimization problem for optimally design the EDS considering all elements, e.g. power converters, rectifiers, transformers, STATCOM, with consideration of different possible topologies and structures of power electronic part and the whole EDS. It is worth mentioning that the problem will be built to be fixable for adding or removing items in the future.
- M2- Develop an advanced and effective optimization method to solve the developed optimization problem.
- M3- Evaluate and recommend the optimal voltage for power converters (e.g. 33kV or 66kV; we will consider other voltage levels if required), considering electrical losses, fault level, reliability, and cost.
- M4- Evaluate and recommend the optimal solution for reactive power compensation, considering cost and different technologies.

Prerequisites

Good hands on optimisation and/or power system simulation tools:
PSCAD/Matlab/Digsilent/Python

Additional Information

Applicants may be required to attend an interview