Local market platform for electric microgrids

Summary

A PhD position supervised by Tallinn University of Technology and Aalto University on the topic of local electricity markets. The aim of this research is to increase economic feasibility of microgrids and prosumers through increased participation in ancillary service markets and enabling prosumers to provide electricity grid services.

Research field:	Electrical Power Engineering and Mechatronics
Supervisors:	Tarmo Korõtko
	Matti Lehtonen
Availability:	This position is available.
Offered by:	School of Engineering
	Department of Electrical Power Engineering and Mechatronics
Application deadline:	Applications are accepted between May 03, 2021 00:00 and May 31, 2021 23:59 (Europe/Zurich)

Description

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To foster innovation in the electric power domain, microgrids need to become economically beneficial. To make participation in microgrids attractive for prosumers and obtain favourable conditions from the larger electricity grid, microgrids need to also address their needs. The provision of ancillary grid services enables grid companies to limit capital investments and operational costs and introduces new revenue streams to microgrids. Prosumers are interested to access electricity grid services for active enegagement in managing their operations and economic performance.

Microgrids with mixed ownership of assets require dedicated methods for their optimal dispatch. A recognized approach to manage high-level operation of prosumers, while maintaining the ability to optimize microgrid operations, is through the use of a peer-to-platform market mechanism. Local markets for microgrids are an actual research topic, but market mechanisms commonly enable trading a single commodity. The use of a local electricity market platform enables to implement different markets for prosumers, while enabling the microgrid operator to maintain a holistic view of microgrid operations.

The main objective is to increase economic feasibility of microgrids and individual prosumers by optimizing microgrid economic performance through participation in ancillary service markets and providing prosumers access to electricity grid services.

The main research tasks for reaching the defined objective are:

- State of art analysis on economic aspects of microgrid operation, ancillary electricity markets, microgrid economic optimization methods and existing local market mechanisms applicable to electric microgrids.
- Research, development, mathematical modelling and experimental verification of microgrid economic optimization method considering participation in ancillary service markets.
- Research, development, mathematical modelling and experimental verification of microgrid local market platform.

The applicants should fulfill the following requirements
Education: Master degree from last 3 years (Cum Laude is considered as a plus)

Knowledge and experience
Documented proof of knowledge (e.g. passed curriculum, certificates etc.) in the following domains:

- Electric power systems / electric microgrids / electricity distribution networks
- Mathematical optimization / mathematical programming / algorithm development
- Basics of economics / electricity markets

Software skills:

- Matlab (Familiarity with AI toolboxes is considered as a plus)
- Python / C++ / C# / Java

- MS Office Software

Language skills: English (Estonian is considered as a plus).

Other: (co-)authored scientific papers published in Q1 or Q2 journals are considered as a plus.

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