Forslag til prosjekt-/masteroppgave ved NTNU for studieåret 2019/2020

Forslagsstiller: SINTEF Digital / SINTEF Energi

Temaområde/WP i CINELDI:
WP5: Fleksible ressurser i kraftsystemet

Forslag til oppgavetittel: Model Predictive Control of flexible resources in smart distribution grids

Oppgavetekst:
Model Predictive Control (MPC), sometimes also referred to as rolling or receding horizon, is a well-known control approach used in process industries. The main reason of its success is the ability to control optimally a process/system while satisfying a set of constraints within a future horizon. Recently, MPC is being applied to new areas thanks to the improvements of its optimisation algorithms and increased computational power availability. One of these areas is power systems.

The topic of this specialization project and master thesis is the application of MPC in smart distribution grids to control flexible resources such as electrical vehicles, stationary energy storage systems or flexible loads. The main question one would like to answer is how MPC can be used to control in an optimal manner a set of flexible resources integrated in a distribution grid. What types of MPC approach (such as decentralised, distributed, hierarchical) could be used and their advantages and disadvantages. In detail the specialization project and master thesis work should include the following activities:

- Learn and research about smart grids focusing on distribution grids and flexible resources;
- make literature review of MPC for smart distribution grids;
- define and describe the typical flexible loads and their models for a distribution grid;
- design an MPC algorithm for a smart distribution grid with accessible flexible resources;
- implement the algorithm above and simulate a distribution grid (MATLAB/Simulink, DER-CAM+, or other tools could be used).

Muligheter for sommerjobb i tilknytning til prosjekt-/ og masteroppgave
Ikke aktuelt.

Fagbakgrunn som kreves for oppgaven:
Elkraftteknologi og/eller reguleringsteknikk/kybernetikk (gjerne med MPC implementasjon erfaring)

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