Control of Battery Storage System for Enhanced Power Tracking

A battery storage system consists of 3 main components: energy management system, inverter, and battery. The energy management system calculates power set points for the inverter based on the application, which is done in a time interval of less than 1 second. However, it is possible that a commercially available battery system is not fast enough to safely track the references from the energy management system. The mismatch between the inverter power and references can result in a jittering output and potential economic losses. Unfortunately, most commercial inverters are black-box systems, making it impossible for users to make adjustments.
In this thesis, the power tracking inertia of a standard, black-box inverter system will be studied. Different control algorithms will be investigated and evaluated for enhancing the power tracking capabilities of the overall system. The developed control algorithm will be verified in MATLAB/SIMULINK environment and CoSES laboratory.

Tasks:

- Literature review of battery storage system general structure.
- Build a simulation environment in MATLAB/SIMLINK.
- Modeling the dynamics of battery storage system power response.
- Apply different control algorithms to enhance the overall power tracking.
- Analyze the results and draw conclusion on the most suitable algorithms.
- Implement the resulted algorithm in CoSES labortoray.

Requirements:

- Background in Electrical Engineering.
- Strong background in control theory.
- Experiences with inverter system and system identification are preferable.
- Strong programming skills.
- Good team-player and an attitude to learn and explore new approaches.

Contact:
Song, Ruihao ruihao.song@tum.de
Vedran Perić vedran.peric@tum.de
Alexander Hirnet a.hirnet@sonnen.de