

Project Study / IDP

Forecasting the Frequency Containment Reserve (FCR) Market in Germany

Background

Coulomb GmbH and The Mobility House GmbH jointly operate a pool of stationary battery storages in the frequency containment reserve (FCR) market in Germany. FCR is used to balance very short-term variations in the electricity grid (5 Sec.-15 Min.) and is the power product with the shortest response times within all balancing and wholesale power market products in Germany. The battery storages generate / absorb energy automatically depending on grid frequency deviations, which are caused by over- or undersupply of the entire system.

Research Questions

To improve the operation of our battery storage, we aim at developing a forecast of the FCR-operation and therewith the grid frequency. The forecast should be deduced with a Deep-Learning algorithm, which includes possible influences such as previous frequency deviations and wholesale power electricity prices.

The task can be structured in three steps

- Data processing (historic grid frequency, temporal and calendar information such as hour of the day, weekday, etc., historic electricity prices (Intraday), . . .)
- Implementation
 - Development of suitable Deep-Learning Models in TensorFlow/Python
 - Identification of the strongest influence parameters / addition of new parameters if necessary
 - Training of the Neural Network and validation of different model structures
- Evaluation of the quality of the developed forecast and sensitivity analysis

The research work should be carried out mainly at the premises of *The Mobility House GmbH*. Regular presence in the office will facilitate communication and supervision and at the same time provides valuable insights to the operation of the battery storage pool. The Mobility House has the possibility to offer a remuneration based on a "Minjob".

Qualified applicants are invited to send their electronic application to cem@wi.tum.de.