SoC-Temperature-Based Power Sharing Algorithm for Battery Racks in Grid Ancillary Services

The state-of-charge (SoC) and operating temperature severely affect the battery pack's lifetime. This thesis aims to improve a real-time SoC-temperature balance power-sharing algorithm for the battery racks to optimize battery life. The control scheme takes into account both SoC disparity and temperature deviation simultaneously to calculate the active power set-points for battery energy storage system (BESS) units. This thesis will build upon the previous work [1] and quantify the weights for temperature and SoC deviation from the mean values.

Recently, there has been a trend towards extracting the battery state of health (SoH) and sharing power proportionally. However, SoH estimation is data-intensive. Furthermore, the previous usage pattern of second-life batteries is not available, making it difficult to utilize them for grid services.

The proposed algorithm shall serve as an alternative to state-of-health (SoH) based power-sharing algorithms. This method can be particularly useful for second-life batteries, which often exhibit significant heterogeneity in age, internal resistance, and capacity, necessitating a generic yet robust control strategy for optimal utilization and minimizing degradation.

Requirements:

1. Background in Electrical Engineering.

2. Knowledge of Simulink/Typhoon HIL.

3. Willingness to learn and team player.

If you are interested in this topic or have any questions regarding the subject matter, please don't hesitate to reach out.

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