Battery Pack State Estimation

Supervisors:

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Context of the work

Recently, a great interest has been placed on renewable energies and electric transportation as cornerstones for the development of a sustainable future society. Both aspects require batteries to make them operationally profitable. Nevertheless, batteries are expensive and bulky since they are conservatively designed to ensure safety and longevity. Such conservatism can be avoided by using a *battery-management system* (BMS), which controls the battery in the most efficient way and makes it more affordable.

Figure 1 shows a battery pack representation (i.e. series/parallel arrangement of battery cells) along with its BMS. Thanks to the switches this battery pack can take different configurations or topologies. The aim of this project is to estimate the state of the battery pack (notably the state of charge of the individual cells). This will allow spotting potentially weak cells in the battery pack and disconnecting them. The challenge is to achieve this goal with a limited number of current, voltage and temperature sensors deployed throughout the battery pack.

A battery pack simulator is available in MATLAB and it will serve as a starting point for the master thesis project. Validation of the method will also be performed on an experimental test bench that resembles a typical battery pack.

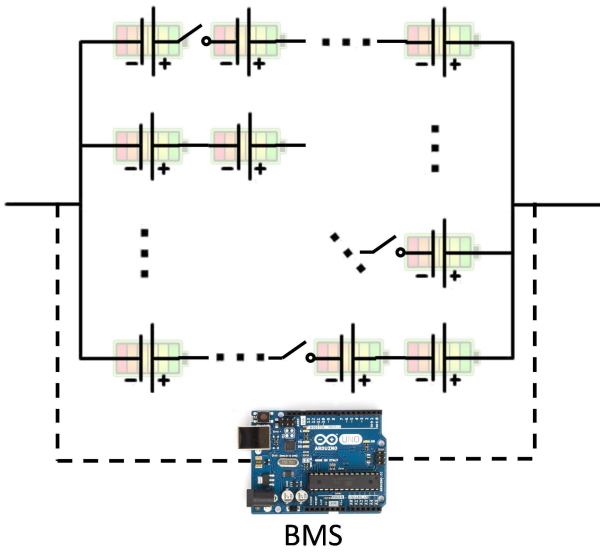

Figure 1 Battery pack comprised by series/parallel battery cells arrangement with a BMS monitoring/controlling the system.