

Failure Detection for Over-Discharged Li-Ion Batteries

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Abstract

Li-ion batteries are high density, slow loss of charge when not in use and no memory effect. Vast research on Li-ion batteries has been focusing on increasing the energy density, durability, and cost. Due to its advantages it has been widely used in consumer electronics and electric vehicles. Apart from its advantages, safety is a major concern for Li-ion batteries. The Li-ion safety issues have been widely publicized due to devastating incidents with laptop and cell phone batteries. Despite of much research towards the safety of Li-ion battery, it remains as a major concern related to Li-Ion batteries. A failure of Li-ion battery may result in thermal runaway. Li-ion battery failure may be due to overcharge, over-discharge, short circuits, particles poisoning, mechanical or thermal damage [1, 2]. Short circuit, overcharge, and over-discharge are the most common electrical abuses a battery suffers.

This poster presents preliminary results for the failure signatures of over-discharged Li-ion batteries, and proposes a rule-based method and a probabilistic method for failure detection. The two methods Rule-based method and Probabilistic method are verified using experimental results for a Li-ion battery. The proposed methods were successfully implemented in a real-time system for failure detection and early warning.