

Online State-of-Health Assessment for Battery Management Systems

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This paper appears in: Instrumentation and Measurement, IEEE Transactions on

Issue Date: June 2011

Volume: 60 Issue:6

On page(s): 1997 - 2006

ISSN: 0018-9456

INSPEC Accession Number: 11976059

Digital Object Identifier: 10.1109/TIM.2011.2115630

Date of Publication: 17 March 2011

Date of Current Version: 10 May 2011

Sponsored by: IEEE Instrumentation and Measurement Society

ABSTRACT

Battery-powered embedded systems have known a rapid evolution in recent years, as nickel-metal hydride (Ni-MH) battery technology has enabled important reductions in size and proportional increases in total capacity over the older nickel-cadmium (Ni-Cd) and lead-acid battery types. This paper addresses the problem of state-of-health (SoH) estimation and prediction for use in resource-constrained Ni-MH-battery-powered embedded systems. We propose a novel SoH prediction methodology, presenting both a theoretical analysis of the estimation algorithm and the detailed description of hardware and software implementation. Two versions of estimation algorithms are proposed, along with the analysis of their performances in terms of prediction accuracy and required processing power, as the SoH prediction is designed to run online, being part of an embedded battery management system.

INDEX TERMS

- **IEEE terms**

Algorithm design and analysis , Batteries , Battery charge measurement , Current measurement , Discharges , Estimation , System-on-a-chip

- **INSPEC**

- **Controlled Indexing**

battery chargers , battery management systems , nickel compounds , secondary cells

- **Non Controlled Indexing**

battery management systems , battery-powered embedded systems , estimation algorithms , nickel-metal hydride battery technology , online state-of-health assessment

- **Author Keywords**

Battery management , battery-powered device , nickel-metal hydride (Ni-MH) , state-of-health (SoH) prediction