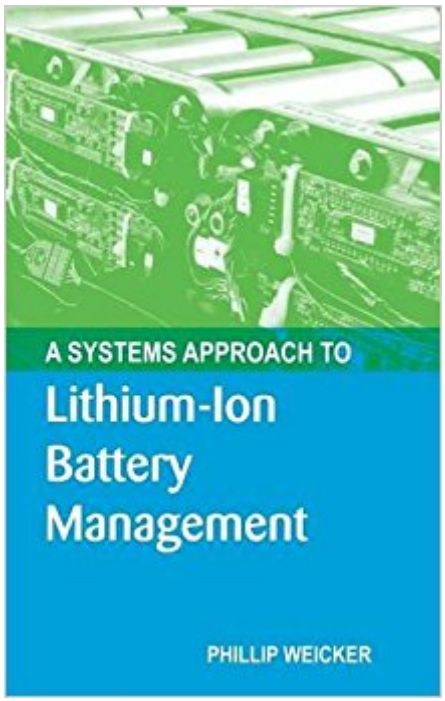
A Systems Approach To Lithium-Ion Battery Management (Power Engineering)



Synopsis

The advent of lithium ion batteries has brought a significant shift in the area of large format battery systems. This title discusses battery management system (BMS) technology for large format lithium-ion battery packs from a systems perspective. It provides an update on BMS technology, covering software, hardware, integration, testing, and safety.

Book Information

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Customer Reviews

Phil Weicker has spent over ten years as a pioneer in the area of electric vehicle propulsion and energy storage technology. He earned his Master's degree in computational electromagnetics from McGill University, Montreal, Quebec, Canada.

Extremely clear, well written and helps connect the dots for understanding how larger-scale battery systems work. A must read for professionals seeking to implement battery management systems in their product line.

This is an outstanding book indeed, for those needing an effective battery management system. Author Phillip Weicker, has done a great job of writing a book that contains a description of the characteristics of different types of battery systems that are expected to be a safe and reliable source of energy, that deliver the high performance that battery cells and chemistries have to

offer.Author Weicker, begins with a description of how lithium-ion batteries operate by the same electrochemical fundamentals as all batteries; but, a few important distinctions are important to consider in the development of battery management systems for lithium-ion based systems. Next, the author explains how large-format systems may be created using small-capacity cells such as the common cylindrical 18650 and 26650, or any other types of cells. In addition, he defines the black-box as describing all of the interfaces that the battery management system will have with both the battery cells; additional battery components, such as sensors and contactors; and, the host applications. The author also states that it may be possible to implement the simplest systems using a selection of definite-purpose integrated circuits, but this architecture is more commonplace with smaller systems operating at lower voltages intended for consumer electronics applications. Then, he continues by explaining why a number of battery voltages could be measured within a large-format system, including individual cells, groups, or modules of cells, all the way up to the entire series-connected string. The author then addresses why in many systems, contactor control is a vital function that must be implemented with diligence. Next, he covers important decisions that the battery management system must make are the rate of charge to optimize the utility of the system life of the batteries, overall efficiency, other factors, and when to terminate charging. In addition, the author cautions that battery management system designers should be aware of important differences in the safety aspects of ac and dc high-voltage systems. He also presents an overview of the network technologies commonly used; as well as, the types of information that are usually transferred via a communications bus. Then, the author discusses the reasons for having a representative equivalent circuit model and a number of methods to construct these models. Next, he focuses on possible approaches for identifying an appropriate model for obtaining values for the parameters to accurately represent the battery cells. Then, the author continues by explaining why in many applications, the power limit algorithm is potentially even more important than the state of change calculation. The author then addresses why in order to maintain battery performance over a long service life in a large-format battery system, it is usually necessary to implement a charge balancing strategy to account for differences in cell performance. Finally, he explains how more complicated modeling tools will be able to be implemented in battery management systems of the future.With each new wave of battery improvements, battery management systems will need to keep up with the changes described in this book. In addition, this book also explains how the field of large-format battery systems is only the beginning; and, many new developments await in the area of battery management systems.

This book is the best single document summarizing the technical aspects of building a safe and reliable large format battery pack that I have come across. The author does a great job of breaking down the challenges involved in designing a management system around a physical battery. Most engineers without prior battery experience will discover these issues on their own through trial and error as they design a BMS, but you can save yourself a lot of time (and money) by reading this book before getting started.

Very good BMS system summary that provides a perfect reference for a head-start. Includes everything you need to know about a battery management system and that is why I recommended it for newbies as well as professionals.

Very well written book that goes over the fundamentals of Lithium Ion batteries and what goes into a battery management system. If your looking to design your own BMS, this serves as an excellent guide. It is very clear and easy to understand even for beginners.

Battery Power When the Grid Goes Down Occupational Safety Management and Engineering (Prentice Hall international series in industrial & systems engineering)