Smart Battery Controller with Fault Tolerance

VANDERBILT UNIVERSITY
CTTC Center for Technology Transfer & Commercialization

Summary

Vanderbilt researchers have developed a smart controller that intelligently reconfigures a battery bank to both extend the overall discharge time and provide fault tolerance.

Addressed Need

Battery banks are used to store and deliver high power to various applications. These systems are a critical component of today's electric cars and have little tolerance for failure. Unfortunately, the individual batteries that are used in battery banks are still prone to failure for a multitude of reasons. Existing battery management systems often include a single system controller and a large number of backup batteries for fault tolerance that can make them undesirable for applications that require minimum space or weight distribution. The smart battery system described here uses fewer batteries for fault tolerance, has a modular architecture, and is optimized for maximum operation time and number of cycles.

Technology Development Status

The smart battery system is currently undergoing testing and initial results have shown a 40% increase in operation time per cycle compared to a static battery configuration. Further, using the system with existing battery banks only requires minimal hardware and wiring changes.

Unique Features

The dynamic battery controller provides:

- Extended operation time (**up to 40% longer**)
- Increased number of cycles
- Isolation of faulty batteries
- Self-disconnect to discharge/charge circuit

Intellectual Property Status

A patent application has been filed.

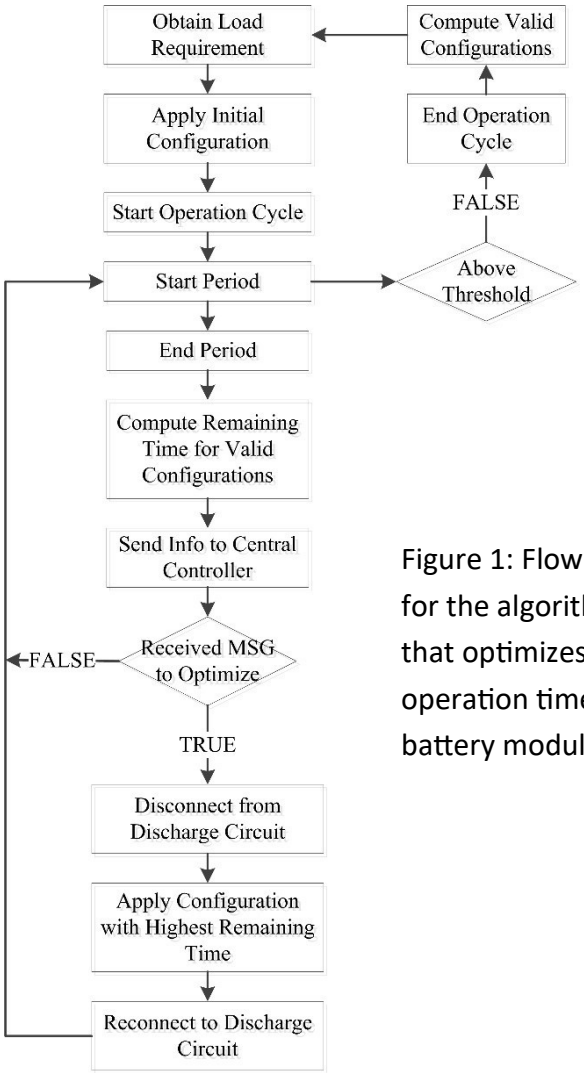

Figure 1: Flow chart for the algorithm that optimizes the operation time of the battery module.

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VU REFERENCE: VU 17149

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