

Battery Monitoring System for Sri Lankan Solar Installations with Predictive Maintenance

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The utilization of Lithium-ion (Li-ion) batteries has witnessed a substantial surge in recent years, owing to their extended lifespan, elevated energy density, heightened power density, and environmental advantages. However, the operation of these batteries is susceptible to various internal and external faults, presenting potential performance issues and severe consequences, including thermal runaway, fires, or explosions. In response, fault diagnosis assumes a pivotal role within the battery management system (BMS), tasked with early fault detection and the implementation of control actions to mitigate adverse effects. This imperative function ensures the secure and dependable operation of Li-ion battery systems. Prior to the early detection of faults, it is crucial to gather comprehensive data, studying how batteries behave under various conditions. This paper thoroughly examines battery monitoring and data acquisition, covering vital methods and equipment crucial for creating a battery data monitoring system. Moreover, it delves into presenting battery data via a mobile application to improve user experience, making real-time battery monitoring more accessible. In essence, this research plays a crucial role in filling a significant gap in battery data monitoring systems. It particularly emphasizes the development of fault prediction systems, a pivotal aspect within our broader research area. Importantly, this research contributes to the utility of gathering battery data, fostering the creation of more sophisticated and reliable fault prediction models.

Keywords: *Lithium-Ion batteries; Battery management system; mobile application; battery monitoring*