National Institute of Technology Rourkela

Registration Seminar

Seminar Title	: Elecro-Thermal Model Based Predictive Control for Optimal Lithium-ion Battery Charging
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Venue	: EE-401
Date and Time	: 08 Sep 2025 (11:15 am)
Abstract	: Electric vehicles (EVs), consumer electronics, and other battery-operated applications extensively use lithium-ion batteries (LiBs). A constant current constant voltage (CCCV) charging profile is used in the majority of these applications as a standard charging procedure. However, this approach falls short in addressing LiB&rsquos state of health (SoH), which is crucial for extending its lifespan. During the CC charging phase, the battery temperature may increase manifold beyond the safety levels if the charging current is relatively high. It may eventually deteriorate LiB&rsquos overall SoH by accelerating the side reactions. In order to address the issues with CCCV, this paper proposes a model predictive control (MPC) based optimal charging procedure to improve the LiB&rsquos SoH by monitoring its temperature rise and extending its overall runtime. Compared to CCCV charging, MPC-based charging reduces the capacity loss and solid-electrolyte interphase (SEI) layer&rsquos resistance by 18.25% and 2.83%, respectively, which leads to an improvement of 2.34% in SoH value.