
Progress Seminar

Seminar Title	: H-infinity Filter based Co-estimation of the State of Charge and Energy of a Li-ion Battery followed by its State of Health Assessment
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Venue	: EE-401
Date and Time	: 20 Feb 2025 (4:30 pm)
Abstract	: Lithium-ion batteries(LIBs) are essential in electronics and electric vehicles. The effective management of these batteries in modern applications requires an accurate estimation of the State of Charge (SoC) and State of Energy (SoE). This work mainly focuses on the co-estimation of SoC and SoE using the H-infinity filter(HIF) algorithm considering uncertainties in their initial states. In the present work, a new approach is developed to establish a relationship between SoE and SoC based on its SoC-OCV characteristics corresponding to different SoC levels. To validate the aging effect, a comparison has been made between the actual SoE obtained from the Watt-hour method and the proposed SoE obtained from SoC versus OCV characteristics. Thereafter, the effect of aging has been also studied on the battery SoE. Furthermore, a comparative analysis has been done to demonstrate the robustness of the proposed HIF based framework with the traditional Kalman filtering (KF) approach, by considering various uncertainties such as input uncertainty, parameter uncertainty and non-standard noise uncertainty. This approach allows for a comprehensive evaluation of battery performance and longevity, providing valuable insights into its degradation patterns. The simulation results clearly indicate that the proposed HIF framework outperforms the KF approach in presence of uncertain conditions.