National Institute of Technology Rourkela

Departmental Seminar

Seminar Title	: Machine Learning based Battery State-of-Health Prediction using Capacity Fade and Resistance Growth
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Venue	: EE Seminar Room (EE-205)
Date and Time	: 21 Jun 2024 (3:00 PM)
Abstract	: 1. Nowadays, Li-ion batteries (LiBs) serve as the key power source in various applications such as electronic devices, smart grid systems, electric vehicles (EVs), etc. Therefore, precise state-of-health (SOH) and end-of-life (EOL) prediction of LiBs are very much essential for their dependable and secure functioning, which can be achieved either by using a data-driven or a model-based approach. For model-based approaches, the prerequisite is a precise battery model without which there can be a possibility of inaccuracies in the predictions, unlike data-driven approaches which are model free. This paper proposes a data-driven approach for the SOH prediction of LiBs based on both the capacity fading and internal resistance growth information. Accordingly, three different machine learning (ML) methods i.e., Gaussian process regression (GPR), Long short-term memory (LSTM), and Random Forest (RF) have been implemented for the SOH predictions. Thereafter, a comparative analysis has been also carried out among the aforementioned methods in order to quantify the prediction accuracies. Based on the comparisons it has been observed that in the case of RF, the percentage relative error (RE) in the prediction is within 1.36% for capacity degradation and within 0.68% for internal resistance growth information which is the lowest among all the three methods corresponding to the 85th cycle with 50% of the data considered for training and the remaining data for testing purpose.