National Institute of Technology Rourkela

Departmental Seminar

Seminar Title	: MPC-Based Control of Dual Active Bridge Converter for DC-Link Voltage Stabilization in PV-Battery DC Microgrids
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Venue	: Seminar Room (EE-205)
Date and Time	: 17 Jul 2025 (4:30 PM)
Abstract	: The integration of photovoltaic (PV) and battery energy storage systems in DC microgrids is the challenge of having a stable DC-link voltage based on power generation variability and dynamic load changes. Mitigating that, this paper presents a Model Predictive Control (MPC) technique to stabilize the DC-link voltage via a Dual Active Bridge (DAB) converter. In addition, a Single-Ended Primary Inductor Converter (SEPIC) is utilized for maximum power point tracking (MPPT) of the solar PV system with improved voltage conversion flexibility compared to conventional boost converters. The SEPIC converter effectively taps the maximum power deliverable from the PV system, and the DAB converter effectively handles bidirectional power flow between the PV system, battery, and DC bus, thus ensuring voltage stability. The MPC algorithm predicts system dynamics in real time and selects optimal control policies considering system constraints and minimizing voltage deviations. The validation of effectiveness is done through Simulation results of the proposed MPC-based control strategy in maintaining stable DC-link voltage and in PV-battery-based DC microgrids.