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Departmental Seminar

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Seminar Title	: A Hybrid DE-PS Optimized PD-FOTID Based Power Management for DC Mi
Speaker	: Ananya Pritilagna Biswal (520ee3018)
Supervisor	: Prof. Krishna Roy
Venue	: Seminar Room (EE-205)
Date and Time	: 23 Jul 2025 (4:00 PM)
Abstract	: The rising demand for renewable sources helps tackle the energy crisis. The microgrid is fed from a photovoltaic (PV), biomass gasifier (BMG), pico hydro (PH), and battery storage. This article proposes a control strategy for power management in a DC microgrid and residential load. An energy storage device is also installed to ensure an uninterrupted power supply to the load, irrespective of dynamic changes in the system. A dual-loop control technique controls the battery storage system (BSS). A new proportional-derivative fractional order tilt integral derivative (PD-FOTID) control is implemented for the outer voltage loop control of the DC link voltage. The control parameters are tuned by a hybrid differential evolution-pattern search (hDE-PS) multimodal algorithm. The battery reference current is generated from the error signal tuning of the DC link voltage. The inner current loop of BSS is controlled by sliding mode control (SMC). The combined control scheme is capable of disturbance rejection, robustness, and stability of the system. The DC grid voltage is maintained at 120 V despite any disturbances occurring in the system. Various modes of active power control are also discussed in this article. The MATLAB/Simulink platform validates and tests the system's effectiveness.