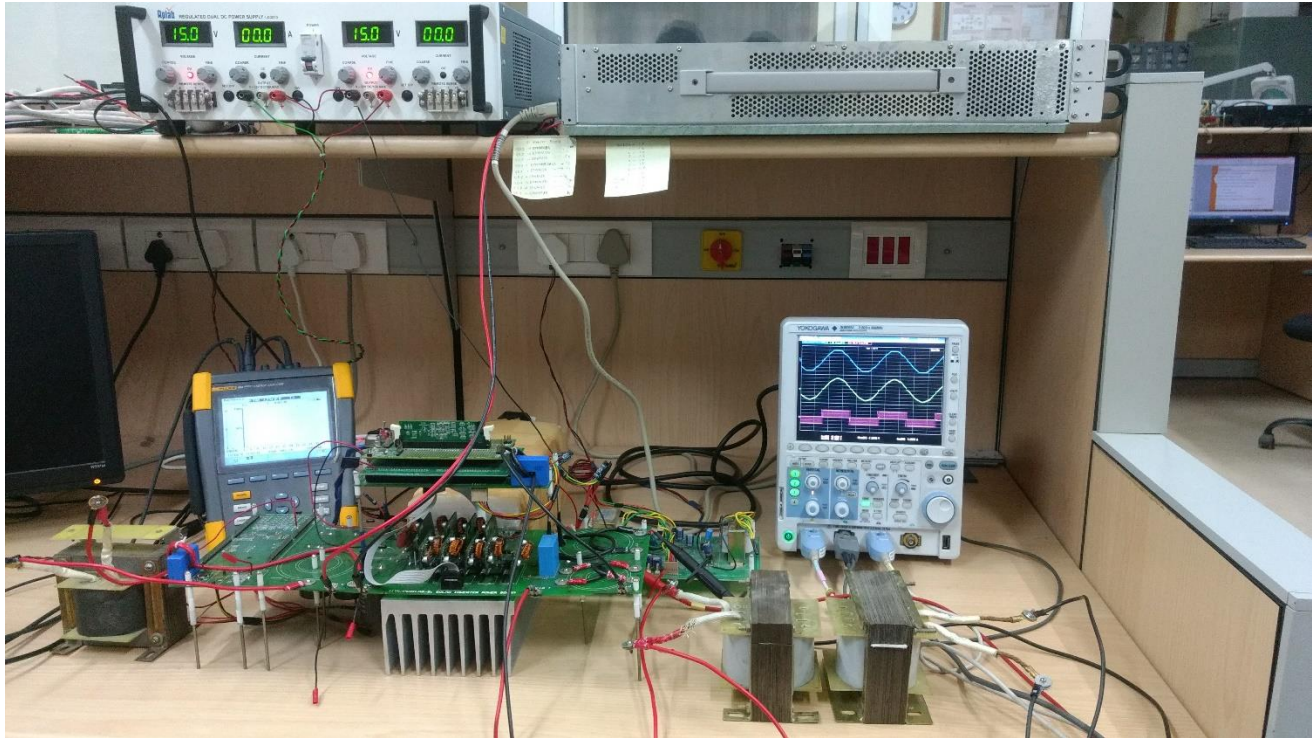


“Smart Power Electronic Converters for Renewable Integration”

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Renewable sources are probabilistic in nature. This increases uncertainty of power flow within the system and leads to challenges in maintaining uninterrupted power to loads. Storage elements could be connected to ensure continuous operation of the system. Dynamics associated with various storage elements and renewable sources could be significantly different from each other. Under such conditions interconnection issues are observed. Cumulative control of these elements within the system is challenging. Some of the key performance factors of such system are voltage regulation, frequency regulation, reactive power management, transient response and stability of system.

Moreover, power flow within micro-grid should be optimized to reduce losses and maximize the power extraction from renewable sources. In case of micro-grid interaction with the main grid, power exchange must be maintained close to the scheduled value to avoid penalties on unscheduled power exchange. Monitoring of each source, storage and load also plays significant role in such systems. Various control challenges could be addressed by utilizing a communication and monitoring system within the micro-grid.

Some of the aforementioned issues can be addressed by designing suitable smart power electronic converters (SPECs). These converters would not only ensure local control of voltage, current, power etc., but also participate in the micro-grid control to achieve optimal operation of the system.