Power Engineering: High Voltage, Power Electronics and Power Systems

High Voltage Engineering, Insulation, Lightning and Protection

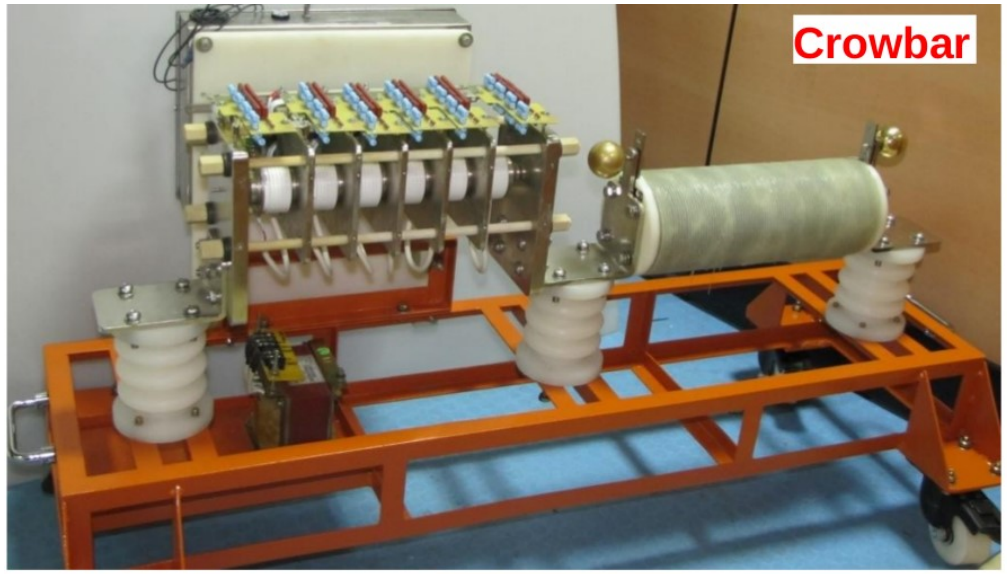
Design of lightning protection scheme (towers) for satellite launch pad-II

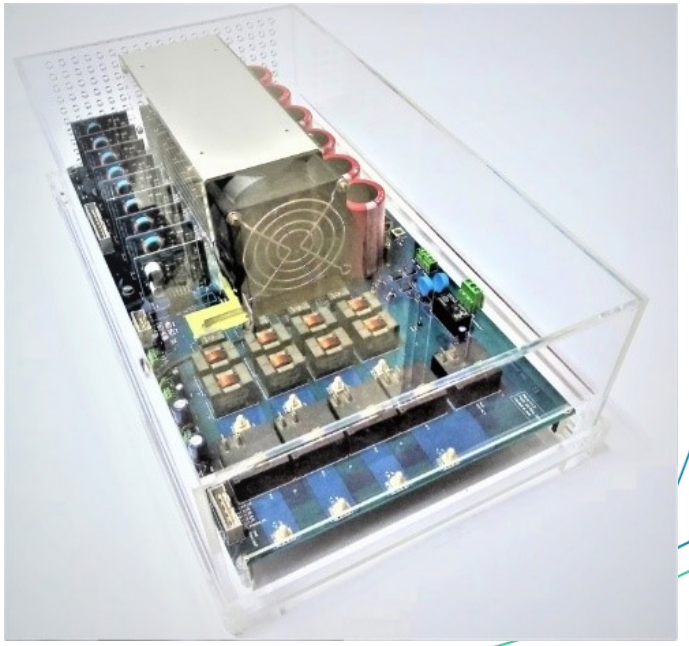
Aircraft model subject to "lightning like" situation

Lightning modelling and protection schemes for fighter aircrafts

Insulator strings in transmission lines: pollution effects

Power Electronic Converters for Various Applications



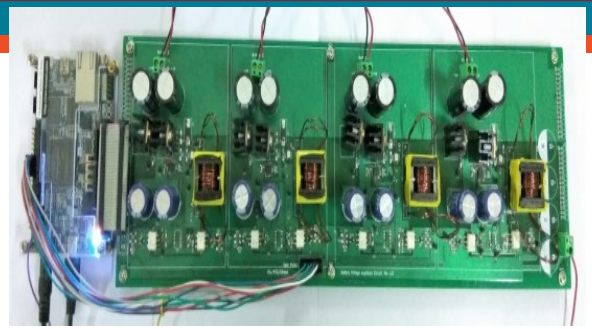


Clockwise from top left:

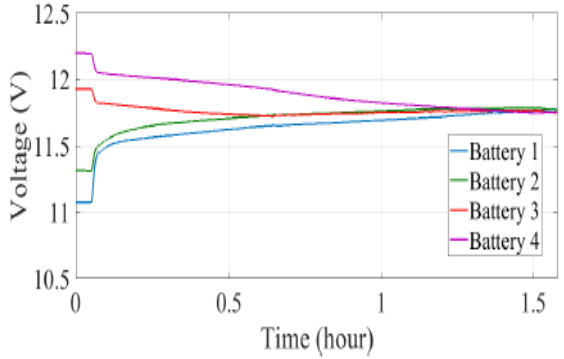
- Crowbar protection scheme for high voltage power supply
- Traction converter for electric vehicles
- Power converter platform for R&D (**from student work to a matured product**)

Extensive design and development by students to prepare their research platform

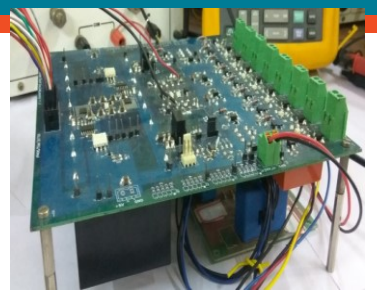
Power Electronic Technologies for Micro-Grid, Renewables and Storage



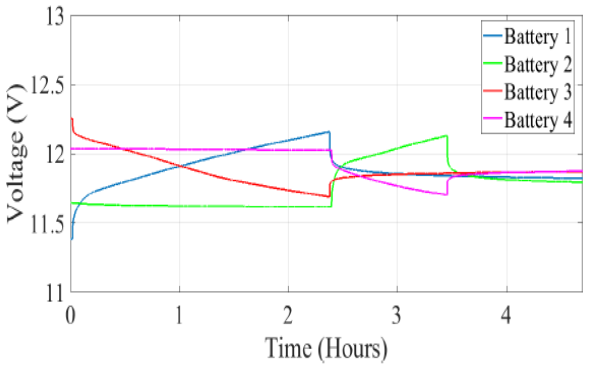
High performance cell equalizer



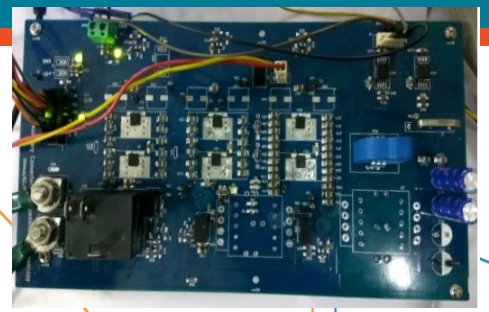
Simultaneous battery cell equalization



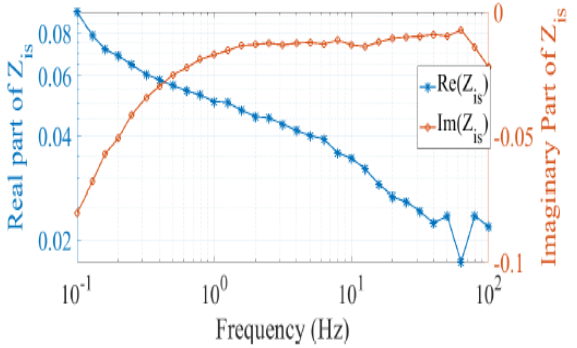
Relay based part count cell equalizer



Sequential battery cell equalization



Battery impedance measurement

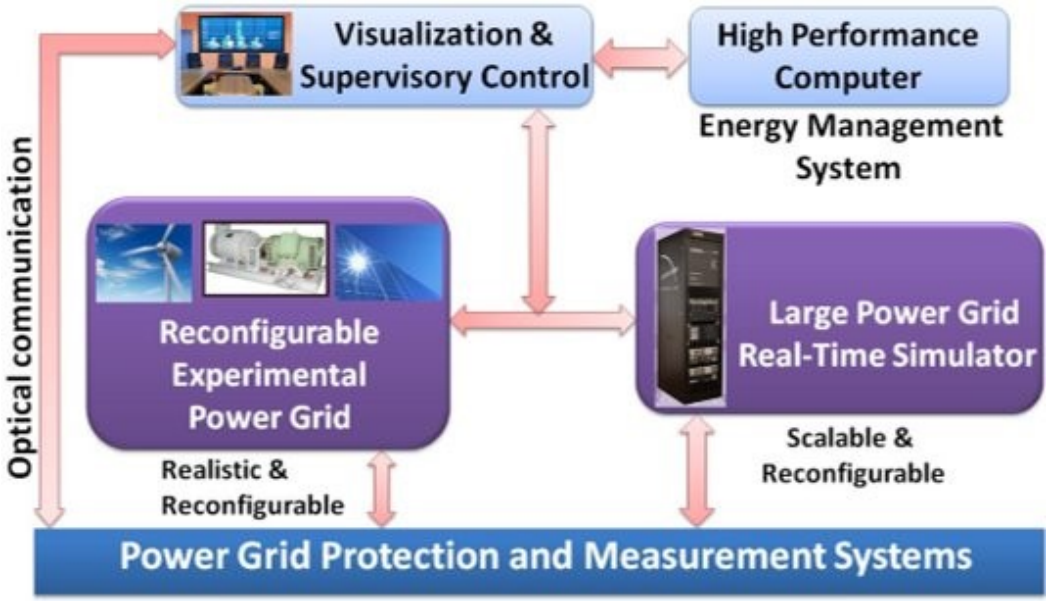


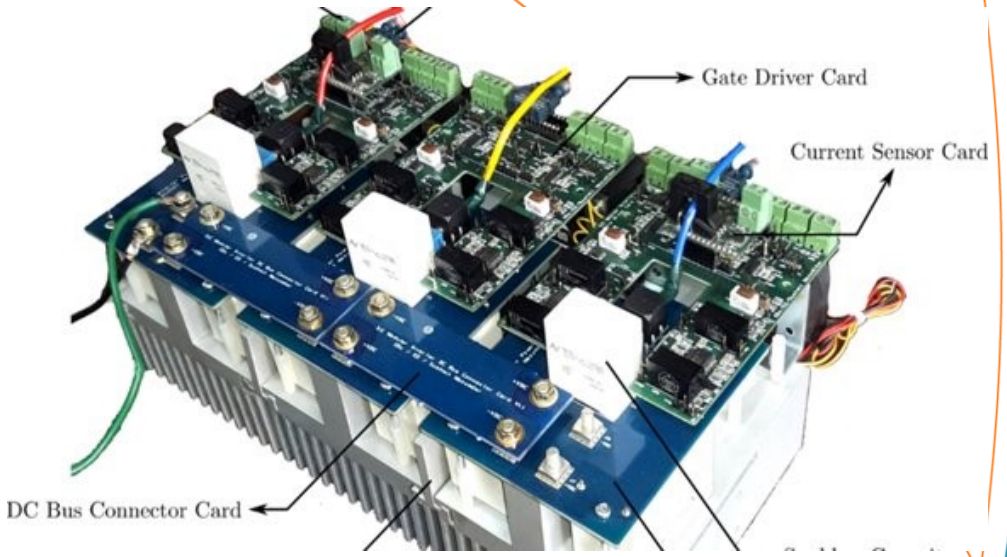
Measured impedance with auxiliary converter

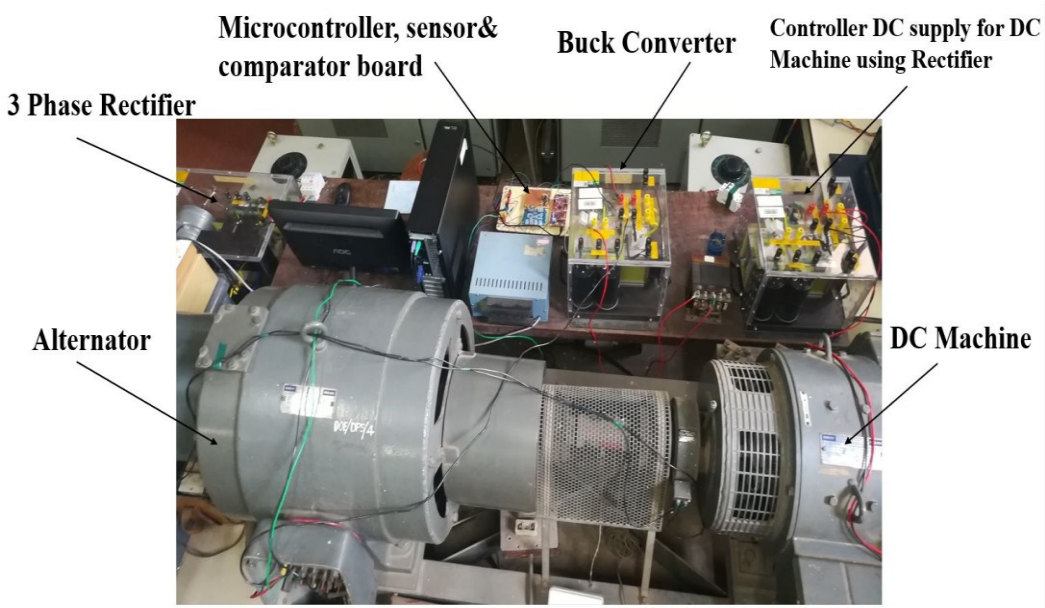
- 4-quadrant power converter platforms, 3-30kW power level, with advanced protection
- Battery health enhancement technologies for advanced batteries and hybrid ultracapacitors

- Active phase conversion technology with high efficiency
- Reconfigurable battery-grid tie inverter solar PV + energy storage
- High frequency isolated converters for PV systems with compact high voltage output

Reconfigurable Laboratory-Scale Experimental Power Grid

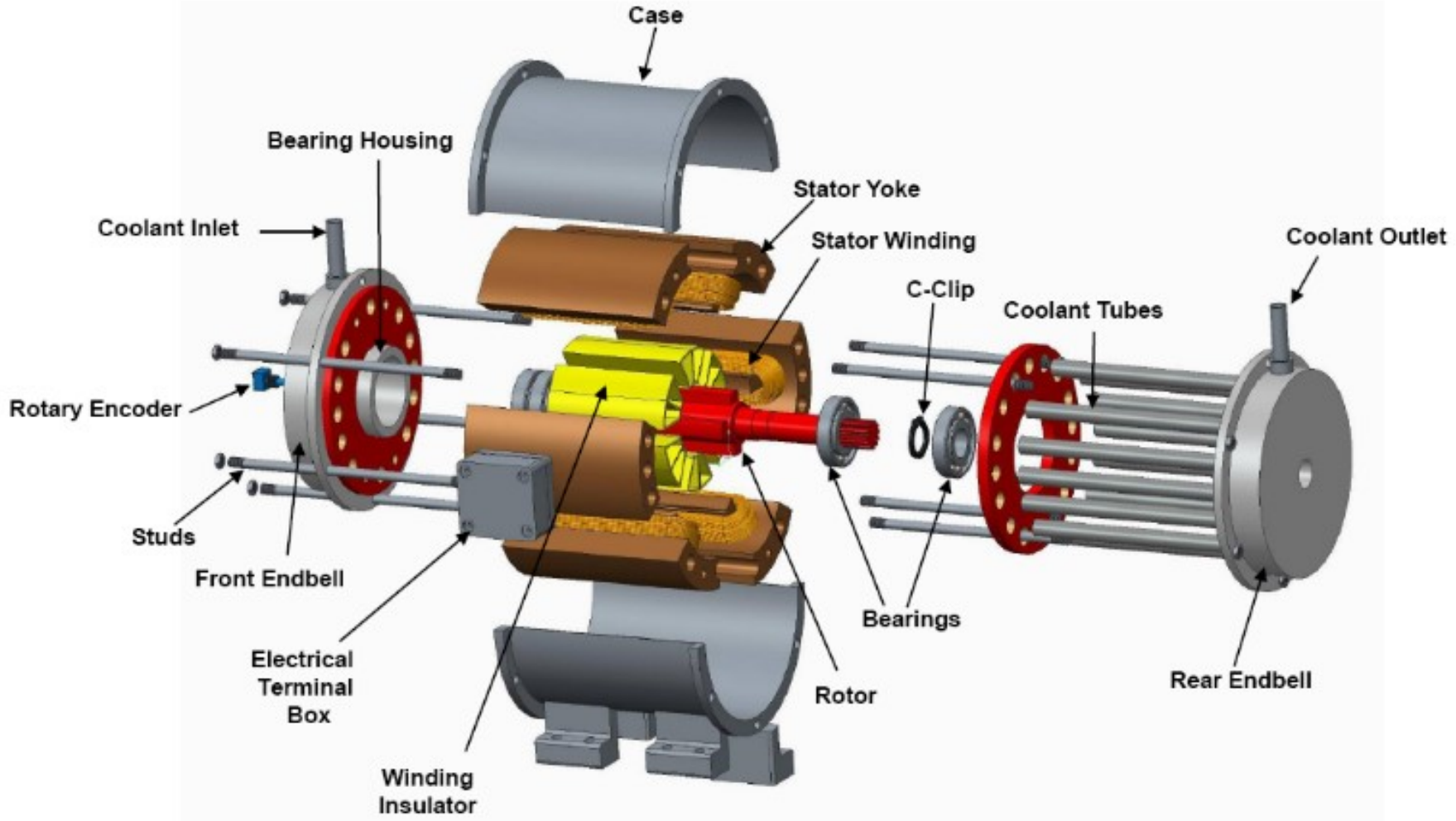






- Laboratory-scale power grid
- Generating stations emulated using machines, power converters and control
- Transmission lines emulated using power converters
- Reconfigurable substations / connections
- Real-time simulator interfaced
- Energy management: high-performance computing

Advanced and Special Electric Machines



Active research collaboration between electrical and mechanical engineers towards high-power-density and high-speed electric machines and electromagnetic bearings