IEEE Technical Seminar

Jointly organised by IEEE Northern Australia Power & Energy Society Chapter and Section

Tuesday, 5th September 2023, 1:00 PM at

Join in person: A3-003, Cairns Nguma-bada campus, James Cook University

Join via Zoom: https://jcu.zoom.us/j/83958147345?pwd=aEFhblNyWGl1L1BGVGZrTkVlSVR6UT09 Password: 952280

Speaker: Assoc Prof Nirmal Nair

Auckland University, New Zealand

Effective Fault-ride through and Smart Load-shedding schemes for Secure Renewable Grid Integration

ABSTRACT: Integrating wind renewable into traditional grids started accelerating in early 2000's followed by large solar farms much recently. Conventional generation are all synchronous based technology while the renewable farms that are not based on traditional machines were treated with simplistic models for grid security planning, analysis and operation. Nirmal has contributed towards proposing and validating realistic and effective large-scale wind farm models. In 2008 NZ was about 70% renewable with primarily synchronous generation from hydro and geothermal and approximate model was fine but with increasing contribution more realistic coherency-based model proposed was found useful. Special contribution also extends to development of two separate grid ride through characteristics for New Zealand as its power systems have two island networks separated by HVDC lines particularly relevant now with around 88% renewable NZ grid and having separate allowable frequency bands.

These contributions on ride-through and load-shedding schemes as applied to NZ grid has informed wind farm ride-through grid codes and extended reserves design by NZ Electricity Authority. NZ relevant IEEE publications, CIGRE reports, inputs to NZ Electricity Engineer's Association guides and mentoring PhDs, Masters and undergraduates in this area has enabled new technical skills and capabilities to the workforce.

Biography: Dr. Nair received his BE in Electrical Engineering from Maharaja Sayajirao University (M.S.U), Baroda, India. He completed his ME in Electrical Engineering with a specialization in High Voltage Engineering from the Indian Institute of Science (IISc), Bangalore, India. After a decade of professional engineering and lecturing in India he moved to the United States where he completed his PhD in Electrical Engineering at Texas A&M University. Since 2004 he has been based in New Zealand. He has held several professional, teaching and research positions in India, USA, and in New Zealand. His expertise involves smart grids, power system analysis, protective relaying & optimization in the context of electricity markets and integration of DG/renewable sources into electricity networks. His research interests span power systems in the context of protective relaying, electricity markets, voltage security, blackouts and resilience. His current focus is towards integration of distributed/renewable energy sources to the electricity system with emphasis on protection (IEC 61850, SPS, WAPS), energy markets (block-chain), innovations (Micro-grid, Storage, EV & PV integration, cyber-resilience, digital twins, machine learning and AI), low-carbon transitions and energy policy. He serves in various capacities for IEEE New Zealand North Section, IEEE Power and Energy Society, and CIGRE New Zealand National Committee. He is actively engaged towards the University of Auckland's outreach with power system stakeholders, internationally and in New Zealand across various sectors (generators, distributors, retailers, metering, transmission system operator, regulatory bodies, consultancies, vendors, Electricity Engineering Association, etc). His work has led to 290+ peer-reviewed papers and invited presentations at major IEEE and CIGRE conferences. He has co-authored five books, two book chapters and inventor on two patents on power system relaying and automation and contributions towards several IEEE Standards in various capacities.

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