

IEEE Power & Energy Society Distinguished Lecturer

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Wind Generation and its Grid Connection

5:00 pm, Thursday 7 April 2016

Abstract

Traditionally, induction generators are employed for wind farms which are mainly onshore. However there are many limitation of these generators and they are unable to meet the grid code requirements without employing other enabling technologies. In recent years controllable renewable energy generators such as doubly-fed induction generators (DFIG) and full power converter (FPC) connected generators were emerged which are now being used extensively in onshore and offshore wind farms. With the increased size of the wind turbines, the gearless multi-pole induction generators are capturing the market interest. Many wind farm manufactures are now producing up to 5 MW of multi-pole permanent magnet wind turbines having as high as 84 poles.

Due to the variable nature of the wind power output, utilities are imposing stringent grid connection codes. These grid codes specify the mandatory technical requirements that a large synchronous generator should fulfil for efficient, safe and economic operation of the power system. In addition to these mandatory requirements, power plants are expected to provide additional support to maintain a second-by-second power balance while maintaining the required level of quality and guaranteeing the security of the system. With the increased penetration of wind power, the larger wind power plants are also now being expected to participate in the mandatory and additional services that the large synchronous generators are offering.

In this presentation the basic principles of wind generation are discussed followed by different technologies used for wind turbines. The grid code requirement of countries which has a large penetration of wind is presented and the measures taken by wind farm manufacturers to fulfil the grid code requirements are exemplified. Enabling technologies for wind farm connections such as SVC, STATCOM and VSC-HVDCs are also introduced.



Distinguished Lecture Biography



Janaka Ekanayake is Professor and Head of the Department of Electrical and Electronic Engineering, University of Peradeniya, Sri Lanka. He is also a visiting professor at the Institute of Energy at Cardiff University, United Kingdom. Prior to that, until end of October 2012, he was a Senior Research Fellow/Reader at Cardiff University.

He is a Senior Member of the IEEE, a Fellow of the IET (UK) and a Fellow of the Institute of Engineers Sri Lanka (IESL).

Prof. Ekanayake is an expert on wind power generation and its connection to the grid, and on modern power systems. He has co-authored five books, including: *Distributed Generation* (IET); *Electric Power System*; *Wind Energy Generation: Modelling and Control*; and *Smart Grid: Technology and Applications* (Wiley). His forthcoming book, *Modern Power System Protection*, is due to be published by Wiley in January 2017. He has also published more than 150 journal and conference papers.

His professional involvements include, a member of the editorial board of IEEE Transaction on Energy Conversion (2007 to date), IET Journal of Renewable Energy (2015 to date) and Journal of Wind Energy (2013 to date). He is involved in many Asian Development Bank funded energy efficiency, renewable energy and smart grid related consultancy assignments. He has contributed to write wind connection codes for Sri Lanka and Vietnam.

Venue

Room G31
Old Main Building
The University of New South Wales
Anzac Parade / Barker Street
Kensington, NSW

Please refer attached map.

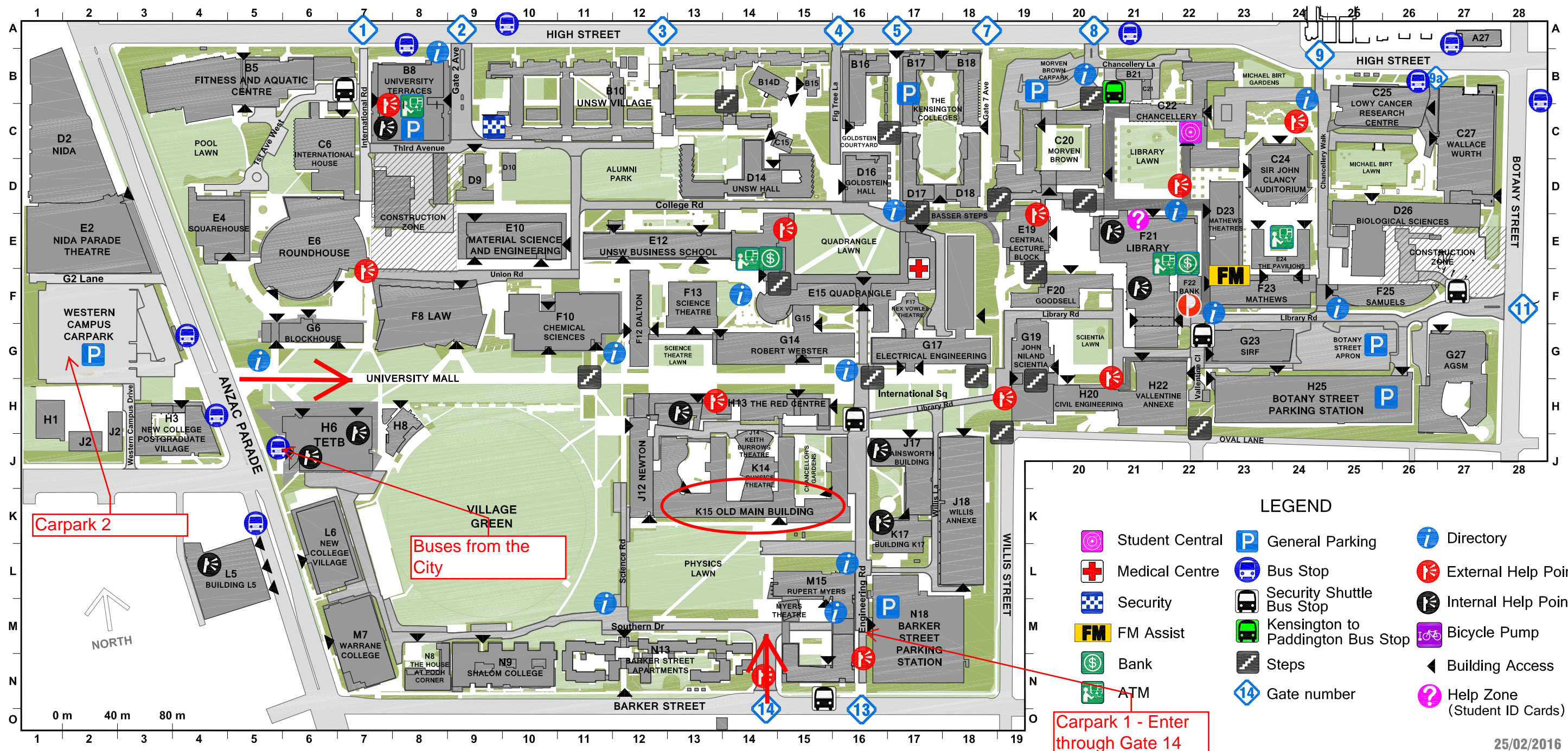
The nearest car parking is in Car Park N18 off Barker Street (charges apply).

Registration

Attendees may register for the event at <https://meetings.vtools.ieee.org/m/38867>



Kensington Campus



Buildings		Material Science and Engineering		University Regiment		Faculty Offices		New South Global Theatre		Facilities Management		Religious Centre	
AGSM	G27	Mathews	E10	UNSW Business School	H1	Arts and Social Sciences	C20	Old Main Theatres (Room 112)	G14	FM Assist ID Cards & Parking	F23	Research Services	E4
Ainsworth Building	J17	Mathews Arcade	F23		E12	Built Environment	H13	Parade Theatres	K15	Foundation Studies Permits	F23	Security	M15
Biological Sciences	D26	Morven Brown	E24a			Engineering	K17	Physics Theatre	K14	Freehills Law Library	L5	Sports Association	B10
Blockhouse	G6	Newton	C20	Barker Apartments	N13	Law	F8	Red Centre Theatre	H13	Future Students Office	F20	Squash Courts	B7
Building D10	D10	NIDA	J12	Basser College	D17	Medicine	C27	Rex Vowles Theatre	F17	Graduate Research School	M15	Swimming Pool	B4
Building L5, 223 Anzac Parade	L5	Old Main	K15	Colombo House	B16	Science	F12	Ritchie Theatre	G19	Help Zone (Student ID Cards)	F21	The Learning Centre	C22
Chancellery	C22	Pavilions	E24	Creston College	A25	UNSW Business School	E12	Rupert Myers Theatre	M15	Human Resources	C22	University Health Services	E15
Chemical Sciences	F10	Quadrangle	E15	Fig Tree Hall	B18	Theatres		Webster Theatres	G15	Institute of Languages	L5	UNSW Bookshop	E15
Civil Engineering	H20	Red Centre	H13	Goldstein College	B17	AGSM Theatres	G27	Science Theatre	F13	IT Service Desk	F21	UNSW International Student Centre	H13
Colombo House	B16	Robert Webster	G14	Goldstein Hall	D16	Allens Arthur Robinson	F8		C18	Learning & Teaching Unit @UNSW	F21	UNSW Residential Communities	B17
Computer Science	K17	Roundhouse	E6	International House	C6	Central Lecture Block	E19		C22	Library	F21	UNSW Scholarships	F21
Dalton	F12	Rupert Myers	M15	New College	L6	Chemical Sciences Theatres	F10		C22	Lifestyle Clinic	A27	UNSW Fitness and Aquatic Centre	B5
Dangerous Goods Store	F17A	Sam Cracknell Pavilion	H8	New College Postgrad. Village	H3	Civil Engineering (Room G1)	H20		D17	Mail Centre	F23	UNSW Student Central	C22
Electrical Engineering	G17	Samuels	F25	Philip Baxter College	D18	Clancy Auditorium	C24		E15	Marketing Development	C22	Venues and Events	F23
Golf House, 38 Botany Street	A27	Samuels	G23	Shalom College	N9	Colombo Theatres	B16		E15	New South Innovations	M15		
John Goodsell	F20	Squarehouse	E4	Warrane College	M7	Fig Tree Theatre	B14d		E4	Nura Gili - Balnaves Place	G17		
John Niland Scientia	G19	Tyree Energy Technologies	H6	University Terraces	B8	Gonski Levy Theatre	F8		F21	Optometry Clinic	M15	Kangas House, 52 Barker St	O14
Law	F8	Valentine Annexe	H22	UNSW Hall	D14	IO Myers Studio	J14		E15	Physiotherapy Clinic	B8	House at Pooh Corner	N8
Library	F21	Wallace Wurth	C27	UNSW Village	B10	Keith Burrows Theatre	F8		F20	Post Office	F22	Tigger's Honeypot, 22 Botany St	BS22
Lowy Cancer Research Centre	C25	Willis Annexe	J18	UNSW Residential Communities	B17	Law Theatres	E15		F20	Print Centre	F23	Owl's House, 9 Kennedy St	KS9
						Macauley Theatre	D23						
						Mathews Theatres							