Programa de Doctorado Interuniversitario en "Sistemas de Energía Eléctrica"

Convenio de colaboración entre las universidades de Sevilla, País Vasco, Málaga y Politécnica de Cataluña para llevar a cabo, conjuntamente, la organización y desarrollo de las enseñanzas de doctorado en "Sistemas de Energía Eléctrica"

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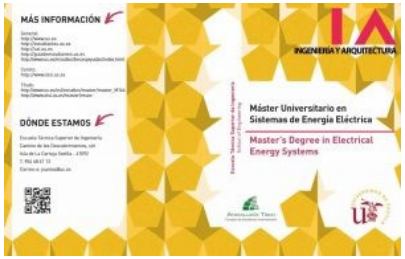
Máster Universitario en "Sistemas de Energía Eléctrica"



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Power & Energy Society®
Capítulo Español

Panel Session

"Model-based and data-driven tools for smart grids"

Moderator: J.M. Maza-Ortega

Prof. Antonio Gómez-Expósito
Prof. Ali Abur
Prof. Nando Ochoa

Departamento de Ingeniería Eléctrica
Escuela Técnica Superior de Ingeniería
Camino de los Descubrimientos s/n
41092 Sevilla (España)
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PANEL SESSION

"MODEL-BASED AND DATA-DRIVEN TOOLS FOR SMART GRIDS"

ORGANIZAN:

Cátedra Endesa de la Universidad de Sevilla

&

Cápitulo Español de IEEE Power & Energy Society

Día: 6 de junio de 2023

Hora: 17:00 h.

Salón de Grados de la
ETS de Ingeniería
Universidad de Sevilla

Title: Towards Full Observability and Controllability of Smart Distribution Grids.

Prof. Antonio Gómez-Expósito

Professor at the Department of Electrical Engineering, University of Seville

University of Seville

Abstract:

Distribution systems face a number of significant challenges in their transition to a decarbonized electricity sector, which can only be overcome if they are operated in much the same way transmission systems have been controlled over the past 60 years. This short introduction analyzes the sources of information being currently deployed at this level, as well as the flexibility which can be potentially provided by prosumers and distributed power electronic devices.

Bio:

Antonio Gomez-Exposito is the Endesa Chair Professor at the Department of Electrical Engineering, University of Seville, Spain, which he chaired for twelve years. He is a Fellow of the IEEE and past editor of IEEE Transactions on Power Systems. Currently, he serves as Vice Editor-in-Chief of the Journal of Modern Power Systems and Clean Energy. He received the IEEE/PES Outstanding Power Engineering Educator Award (2019), and the Research and Technology Transfer Award, granted by the Government of Andalusia (2011). He promoted the start-up Ingelectus (2012), and was with the Board of Managers of the Spanish TSO (REE) since 2018 to 2020.

Title: A Comprehensive Look at Three-Phase Power Grid Monitoring.

[Prof. Ali Abur]

Professor, Electrical and Computer Engineering
Northeastem Director, CURENT

Northeastem University, Boston, MA
(EE.UU.)

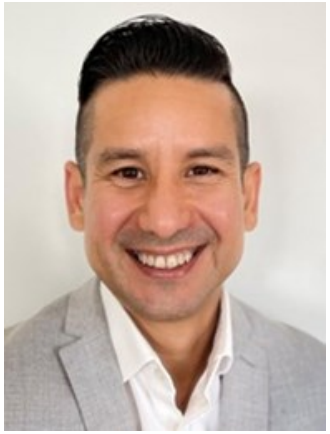
Abstract:

This talk will revisit the power grid monitoring problem with a focus on three-phase networks operating under un-balanced operating conditions. Such conditions are becoming more commonplace as the low voltage networks are populated by distributed renewable energy sources, non-conventional loads, bulk power storage systems, and demand side management tools. We will start by considering the basic state estimation problem formulation to illustrate issues which may lead to convergence to multiple solutions which will be addressed by an alternative formulation. Next we will consider the lack of observability and suggest some practical remedies to boost redundancy in order to recover observability by exploiting availability of different types of low quality measurements with slow scan rates. The talk will also cover detection and identification of errors in network model for systems containing lines with non-symmetrical tower configurations. The issue of scalability and robustness of the state estimation algorithms will also be discussed and proposed alternative solutions will be presented.

Bio:

Ali Abur received his B.S. degree at Orta Doğu Teknik Üniversitesi, Ankara, Turkey and M.S. and Ph.D. degrees from The Ohio State University. He joined the Department of Electrical Engineering at Texas A&M University where he worked as a Professor between 1985 and 2005. In 2005, he moved to the Department of Electrical and Computer Engineering at Northeastern University in Boston where he served as the department chair until 2013. He is a Fellow of the IEEE and past editor of IEEE Transactions on Power Systems. He received the IEEE/PES Outstanding Power Engineering Educator Award (2014). Since 2023, he is a member of the US National Academy of Engineering.

Title: Distribution network assessment using a model-less approach.



Prof. Nando Ochoa Pizzali

Professor Of Smart Grids And Power Systems
Electrical and Electronic Engineering

University Of Melbourne (Australia)

Abstract:

Distribution companies, who manage the poles and wires, struggle to have accurate and up-to-date electrical models of their residential areas, known as low voltage (LV) networks. And without electrical models, it is hard to assess how much their networks are capable of hosting distributed energy resources (DER) such as solar PV or electric vehicles; particularly when voltages are likely to be a major issue. Similarly, if distribution companies want to orchestrate/coordinate DER, the calculation of set points or limits (such as operating envelopes) require quantifying the voltage effects from different exports or imports.

Taking advantage of historical smart meter data, this talk will demonstrate that is possible to capture the physics of three-phase LV networks and create an electrical model-free approach to calculate voltages which, in turn, allows the calculation of DER Hosting Capacity and enables DER Orchestration. Using Neural Networks, the nonlinear relationships among the historical data (demand and voltages) and the corresponding LV networks can be captured. This approach can make it possible for distribution companies to bypass the time-consuming process of producing LV network models and, instead, carry out accurate, extremely fast voltage calculations for any type of what-if scenarios involving residential solar PV, batteries, electric vehicles, etc.

Bio:

Luis(Nando) Ochoa is a Professor of Smart Grids and Power Systems at The University of Melbourne, Australia. He is an IEEE PES Distinguished Lecturer, an Editorial Board Member of the IEEE Power and Energy Magazine, and an IEEE Senior Member. His expertise in network integration of distributed energy resources (DER) and smart grids as well as his extensive portfolio of industrial and academic projects have led to 210+ research papers, 80+ technical reports, and two patents. From 2011 to 2021, he was full and part-time with The University of Manchester, UK. From 2007 to 2010 he was a Research Fellow in Energy Systems at the University of Edinburgh, UK. He holds a Bachelor's degree in Mechanical and Electrical Engineering from UNI (Peru), and a Research MSc and a PhD in Electrical Power Engineering, both from UNESP Ilha Solteira (Brazil).