IEEE Industrial Electronics Magazine, founder and the chairman of the technical committee on Renewable Energy Systems, co-chairman of the International Symposium on Industrial Electronics (ISIE 2010), IES vice-president responsible of the publications. He has received the IES 2009 Early Career Award, the IES 2011 Anthony J. Hornfeck Service Award and the 2011 Industrial Electronics Magazine best paper award. He is senior member of IES AdCom. He has been elevated to the IEEE fellow grade in 2013. In 2014, he received "The Dr. Bimal Bose Energy Systems Awards" and was amongst the highly cited researchers, "The world's most influential scientific minds", by Thomson Reuters. He was also involved with managerial responsibilities in the Center of Reliable Power Electronics (COR-PE) at Aalborg University.

Constantine D. Vournas is currently a professor in the Electrical Energy Systems Laboratory, School of Electrical and Computer Engineering, NTUA. He has published more than 150 papers in international journals and conferences and has co-authored the book "Voltage Stability of Electric Power Systems". He is an active member of several IEEE and CIGRE task forces and co-author of many CIGRE reports. Prof. Vournas organized the 4th Bulk Power System Dynamics and Control Symposium with the theme of "Restructuring" (1998) and served as the chairman of the International Institute for Research and Education in Power System Dynamics (IREP). He was a member of the organizing committee of Athens Power Tech (1993) which initiated a series of Power Tech Conferences that later became the main IEEE Power Conference in Europe. He is currently the secretary of the Power System Dynamic Performance committee (PSDP) of IEEE/PES and also chair of the Dynamic Security Assessment Working Group of the same committee.

Giampaolo Buticchi is a post-doctoral researcher at the chair of power electronics of Kiel university. Over 70 technical papers (22 of them in international peer-reviewed ISI journals, like IEEE Transactions or IET) are published by him. In 2014 he received the "Alexander Von Humboldt" fellowship for post-doctoral researchers. He also won the "Best Paper Award" of International Symposium on Linear Drives for Industry Applications (LDIA 2013). Currently, he is involved in several international projects and is the teacher / co-teacher of different modules in Kiel university.

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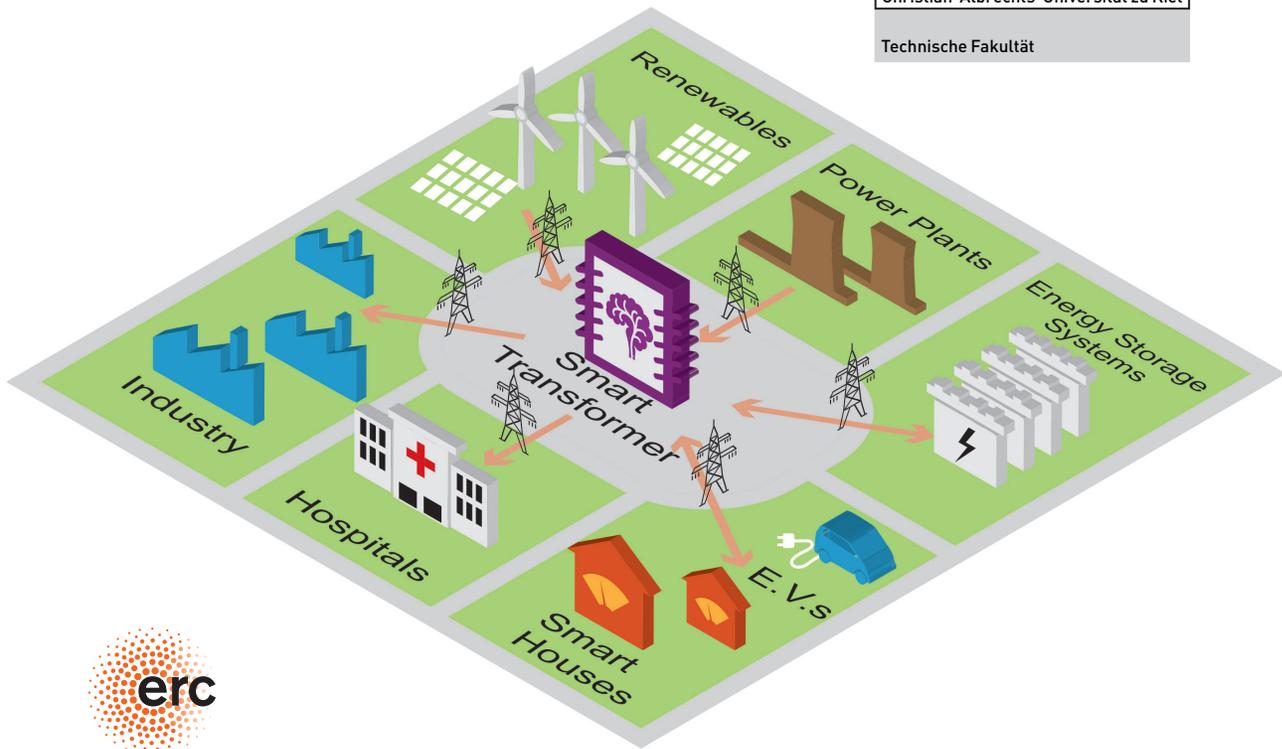
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European Research Council
Established by the European Commission

Industrial/Ph.D. Course in The Smart Transformer

Impact on the Electric Grid and Technology Challenges

Feb 22-24, 2017

Technische Fakultät

Description of the course

The increasing connection of renewables and new loads is challenging the distribution grids. The Smart Transformer (ST), a power electronics-based transformer, can provide ancillary services to the distribution grids to support the grid management, in addition to the voltage adaptation. The Smart Transformer is a natural connection point for hybrid (AC and DC) grids both at MV and LV levels.

The course starts with an introduction of the basic concepts of power systems and smart grids. The Smart Transformer is defined and the topologies and controllers are explored. Current challenges in hybrid grids are presented and proposed solutions are described. New services enabled with the Smart Transformer technology, for instance load identification in LV grids and voltage support in MV grids, are explained in the last part of the course.

This course consists of two main parts, lectures (50%) and lab experiences (50%). The lab participants not only will learn about the modeling and control of Smart Transformer, but they will test the new control possibilities through lab experiences. The proposed lab tests will be performed in a ST-fed microgrid by means of Control-Hardware-In-Loop (CHIL) and Power-Hardware-In-Loop (PHIL) evaluation. Since the lab vacancies are quite limited, it is also possible to register only for the theoretical part.

Fee

€ 800 (€ 400*) for PhD students and € 1100 (€ 550*) for participants from industry. Lunches, refreshments, a get-together dinner, and VAT are included in the price.
*Only for theoretical part

Registration

For registration please send an email to Ms. Terasa (terasa@eek-sh.de) before November 18, 2016. Afterwards you will receive an approval email containing necessary information and required documents. The registration should be completed before **December 5, 2016.**

Credits

2.0 (Theory) + 2.0 (Practical) ECTS

Accommodation

The participants should arrange their own accommodation. A list of available hotels and guest houses will be provided upon request.

Further information

For more information about the administration and registration please contact:
Ms.Cristina Terasa
EEK.SH - Competence Centre Renewable Energies and Climate Protection Schleswig-Holstein
c/o FuE - Zentrum FH Kiel GmbH
Schwentinestr. 24, 24149 Kiel, Germany
Phone: +49 431 218 4432, E-Mail: terasa@eek-sh.de

For more information about the course contents please contact:
Mr. Shahab Asadollah
Kiel University, Chair of power electronics
Kaiserstraße 2, 24143, Kiel, Germany
Phone +49 431 880-6106, E-mail: sha@tf.uni-kiel.de

Location

Lectures: Building D, Room: Aquarium,
Laboratory: Building B, Lab of Power Electronics,
Faculty of Engineering at Kiel University,
Kaiserstraße 2, 24143, Kiel, Germany.

Language

English

Prerequisites

Control and power electronics basics are recommended for the lectures and exercises.

Literature

[1] M. Liserre, G. Buticchi, M. Andresen, G. De Carne, L. Ferreira Costa, Z. Zou; "The Smart Transformer: Impact on the Electric Grid and Technology Challenges", IEEE Industrial Electronics Magazine, Vol.10, pp.46-58, June 2016
[2] L. Ferreira Costa, G. Buticchi, M. Liserre; "Comparison of basic power cells for quad-active-bridge DC-DC converter in smart transformer", 17th European Conference on Power Electronics and Applications (EPE´15 ECCE-Europe), pp.1-10, September 2015
[3] G. De Carne, M. Liserre, C. Vournas, "On-line load sensitivity identification in LV distribution grids", IEEE Transactions on Power Systems, June 2016
[4] http://www.heart.tf.uni-kiel.de/en/home

Course program:
Feb 22, 2017, 08.30-17.30
Lec.0 Course introduction
Lec.1 Basics of power systems and smart grids
Lec.2 Active/reactive power, frequency and voltage regulation
Lec.3 Power system stability issues
Lec.4 Smart Transformer definition, control and communication
Lec.5 Smart Transformer topologies: an overview on architectures and power converters stages
Lab.1 Intro of PSCAD, RTDS and microgrid setup

Feb 23, 2017, 08.30-17.30
Lec.6 Control of the Smart Transformer
Lec.7 Synchronization issues in microgrids
Lec.8 Parallel converters and microgrids control
Lec.9 DC/DC converters for DC microgrids management
Lab.2 DG challenges in LV grids, control of ST, ST-fed microgrids, DAB and QAB technologies

Feb 24, 2017, 08.30-17.30
Lec.10 LV Grid identification
Lec.11 Voltage/frequency control of LV Grid
Lec.12 MV grid voltage regulation
Lec.13 ST ancillary services for MV grid
Lab.3 Reverse power flow limitation experiment in microgrid, PHIL: Stability analysis, on-line load identification and ST voltage support in MV grid.

Program may be subject to amendment

Lecturers
Prof. Marco Liserre, Kiel University, Germany
Prof. Constantine D. Vournas, National Technical University of Athens, Greece
Dr. Giampaolo Buticchi, Kiel University, Germany

Marco Liserre is the head of the chair of power electronics at the Kiel university. He has published more than 230 technical papers (80 of them in international peer-reviewed journals and magazines), and three chapters of a book (Grid Converters for Photovoltaic and Wind Power Systems, ISBN-10: 0-470-05751-3 – IEEE-Wiley, also translated in Chinese). He has been associate professor at Bari Polytechnic (Italy) and professor in reliable power electronics at Aalborg university (Denmark). He is associate editor of many IEEE journals. He has been founder and editor-in-chief of the