SEMINAR ANNOUNCEMENT

DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING
COLLEGE OF DESIGN AND ENGINEERING
Website: https://cde.nus.edu.sg/ece

Area: Power and Energy Systems

Host: Associate Professor Panda, Sanjib Kumar

Guest lecture

TOPIC	:	**Solid-State-Transformers and Machine-Learning Aided Optimal Design**
SPEAKER	:	**Dr. Jaydeep Saha** **Research Fellow** **Electrical Machines and Drives Laboratory** **Department of Electrical and Computer Engineering** **National University of Singapore**
DATE	:	**Tuesday, 14 Feb 2023**
TIME	:	**7.00PM to 9.00PM**
VENUE	:	**Block E1-06-03** **College of Design and Engineering, NUS**

ABSTRACT

Solid-state transformer (SST) is an emerging power electronic technology, also referred to as power electronic transformers, energy routers, etc., which is a cascaded combination of power converter cells with medium-frequency isolation. SSTs are used to interface a medium-voltage (MV) network (e.g. the utility distribution grid) with a low-voltage (LV) network (e.g. a microgrid). It has been shown in recent literature that for MVAC-LVDC applications (e.g. where solar energy or battery integration is required), SSTs have proven to be a competitive technology.

The lecture will start off with a brief introduction of the SST technology and its potential in future smart-grid paradigm. Subsequently, a multi-objective optimal design strategy for the grid-connected SST technology will be discussed, that aims to empower power electronics engineers with limited computational resources to accurately determine optimal SST designs. Here, a hybrid (analytical+numerical) model based local optimization strategy, followed by a global optimization strategy using limited number of optimal datasets fed to low data-hungry machine-learning algorithms will be explained which aim to reduce the overall computational burden. Apart from design optimization results for a realistic 22 kV, 1 MVA SST, scaled-down laboratory-level experimental measurements and subsequent validation for a 1.5 kV, 15 kVA SST's design shows the merits of the discussed strategy.

BIOGRAPHY

Dr. Jaydeep Saha received his B. Tech. degree in Electrical and Electronics Engineering from the National Institute of Technology, Warangal, India, in 2017, and Ph.D. degree from the Department of Electrical and Computer Engineering, National University of Singapore, Singapore. He is currently working as a Research Fellow at National University of Singapore, Singapore. His primary research interests include high-efficiency and high-power-density grid-interfaced power electronic converters, matrix-converter-based isolated bidirectional converter topologies, power electronics design optimization, and solid-state-transformer architectures and their control. He has 30 published papers in top-tier journals and conference proceedings, 1 book and 1 filed patent. He has received the Thesis Award by Springer Nature in 2022 for outstanding doctoral research contributions. He has served as reviewers for IEEE journals and as session chair/tutorial speaker at flagship IEEE conferences.