

SEMINAR ANNOUNCEMENT

DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING
COLLEGE OF DESIGN AND ENGINEERING

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Area: Power and Energy Systems

Host: Professor Dipti Srinivasan

Jointly organized by:

IEE Computational Intelligence Society,

IEEE Power & Energy Society,

Green Energy Management and Smart Grid Research Center

TOPIC	:	Short-term Solar Power Prediction Methodology by Learning from Satellite Measurements
SPEAKER	:	Mr. Cheng Lilin Graduate Student, Hohai University
DATE	:	Friday, 12 August 2022
TIME	:	1:30PM to 2:00PM (SG)
VENUE	:	Join Zoom Meeting: https://nus-sg.zoom.us/j/83298792126?pwd=RWQzemVVNkN6dkd0MIJSNzViakFEdz09 Meeting ID: 832 9879 2126 Passcode: 367954

ABSTRACT

The stochastic cloud cover on photovoltaic (PV) panels affects the solar power outputs, producing high instability in integrated power systems. It is effective to track cloud motion during short-term PV power forecasting based on satellite measurements, as extra costs of installing ground-based sky cameras can be saved. However, modeling cloud motion directly from satellite images is still a tough task, since temporal variations of these images are noisy and non-stationary. Hence, two novel end-to-end PV power forecasting models are introduced that can directly take satellite images as inputs. For the first model, inputs of stacked optical flow maps are imported, and multi-step-ahead PV forecasts can be outputted sequentially by shifting receptive attention to dynamic regions of interest (ROIs). For the second model, a pixel-sensitive graphical learning method is adopted. By simulating cloud motion using bi-directional extrapolation, a directed graph is generated representing the pixel values from multiple frames of historical images. The nodes and edges in the graph denote the ROI shapes and motion directions of satellite images. A spatial-temporal graph neural network is then developed to handle the graph. By comparing with conventional deep-learning-based methods, the proposed well-designed model architectures can improve the forecast accuracy by enhancing learning capabilities and reducing input redundancy.

BIOGRAPHY

Lilin Cheng is currently pursuing the Ph.D. degree in the electrical engineering of Hohai University, Nanjing, China. He received the B.S. degree from Nanjing Normal University, China in 2017, and the M.S. degree in the electrical engineering of Hohai University, Nanjing, China in 2020. His research interests include renewable energy integrated power systems, and artificial intelligence technologies for smart grids. He is also now preparing for a research visit to the Green Energy Management & Smart Grid Center in National University of Singapore.