IEEE JOURNAL ON
EMERGING AND SELECTED TOPICS IN CIRCUITS AND SYSTEMS

CALL for PAPERS
Towards Enhancing Reliability and Smart Sensing for Emerging High Renewable Penetrated Power Systems

Guest editors

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Scope and purpose

With the proliferation of renewable energy sources (RES) and their increased penetration into power systems, special care should be paid to complex dynamics and interactions among RES infrastructures. Furthermore, the seamless integration of physical infrastructures (power grid) and the controlling digital computing system (cyber) introduces further challenges in the context of reliability and sensing. This transition from the traditional power system to high renewable penetrated grid calls for further research and development at both circuit and system levels.

Conventional methodology targeted at the standalone operation does not thoroughly investigate such system evolution by either overemphasizing the infrastructures at circuit level regardless of the system integration or overlooking the evolutionary mining on huge-volume sensory data for further intelligent applications. Therefore, enhancing reliability and smart sensing for emerging high renewable penetrated power systems is worthy of study, such as

- **Reliability enhancement for high renewable penetrated power systems.** Modern grid includes the multi-infeed of RES, energy storage and synchronous generators, etc, causing the severe mutual interaction among infrastructures. In order to assess the system reliability, it is of importance to accurately describe such multi time-scale interacting dynamics. Moreover, unlike the DC-DC system and the simple AC system, the high renewable penetrated power systems are characterized in multi-infeed and multi-interaction. The conventional stability criteria become infeasible in front of such inherent Multiple-input Multiple-ouput (MIMO) feature and multi-port system topology. This special issue welcomes contributions on the application-oriented modeling and reliability analysis specifically according to different practical scenarios and specific incidents.
- **Smart sensing for advanced application of high renewable penetrated power systems.** Phasor measurement units (PMUs) are widely deployed to capture the dynamics of RES for the further operation. Sensing data processing for PMUs-centric datasets is highly demanding and critical to the high renewable penetrated power systems. The AI-powered solution can fully utilize the spatiotemporal measurement data and facilitate a full realization of situational awareness. This special issue encourages submission of novel work on smart sensing design for high renewable penetrated power system.

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- **Machine-learing approach for cyber-physical security of power system.** Specific physical relationships among physical measurements is the key to the success of the conventional attack detection techniques. State space models, such as Kalman filter, have been the predominant techniques used by the control community as a means of modeling dynamic systems. However, the biggest issue with the state space model-based attack detection is that, for complex cyber-physical system (CPS), the state space models may have difficulty in achieving the desired model accuracy. More recently, machine learning has been adopted for cyber-physical security applications and often outperforms state estimation-based methods in many CPS security applications. Therefore, this special issue invites novel works on the maching-learning approach towards cyber-physical security of high renewable penetrated power system.

Topics of interest

Topics of interest for this issue include, but are not limited to:

- Interacting behavior modeling for high penetrated renewable system.
- Stability analysis for multi-infeed high penetrated renewable system.
- Power electronics for high penetrated renewable system.
- Theory, methods and tools, and practical applications of cyber-theory to power system.
- Co-modeling technique for large-scale sensing-assisted high penetrated renewable system.
- Situation awareness based on PMU data.
- Learning-based PMU data processing for high penetrated renewable system.
- Maching-learning approach for cyber-physical security and big data issues of high renewable penetrated power systems.
- Machine-learning based control, dispatching, planning for high renewable penetrated power systems.
- Real-time hardware-in-loop Cosimulation of high renewable penetrated power systems and cyber-physical system.

Submission procedure

Prospective authors are invited to submit their papers following the instructions provided on the JETCAS website: https://mc.manuscriptcentral.com/jetcas. The submitted manuscripts should not have been previously published nor should they be currently under consideration for publication elsewhere.

Important dates

• Manuscript submissions due	30 September 2021
• First round of reviews completed	15 November 2021
• Revised manuscripts due	15 December 2021
• Second round of reviews completed	5 January 2022
• Final manuscripts due	2 Feb 2022

Request for information

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