Best reviewers:

1. Dr. Ning Qi, Columbia University (nq2176@columbia.edu). Recommended by Wei Wei and Yue Chen.
2. Prof. Amin Kargarian, Louisiana State University (kargarian@lsu.edu). Recommended by Florin Capitanescu.
3. Dr. Ángel Paredes Parrilla, University of Málaga (angelparedes@uma.es). Recommended by Tarek AlSkaif.
4. Dr. Ying Zhang, Oklahoma State University (y.zhang@okstate.edu). Recommended by Bo Chen.
5. Dr. Yang Shen, Hunan University, China (shenyang96@hnu.edu.cn). Recommended by Yuhua Du.

Best papers:

1. Y. Cui, Z. Hu and X. Duan, "Optimal Pricing of Public Electric Vehicle Charging Stations Considering Operations of Coupled Transportation and Power Systems," in IEEE Transactions on Smart Grid, vol. 12, no. 4, pp. 3278-3288, July 2021, doi: 10.1109/TSG.2021.3053026.
   Corresponding author: Zechun Hu (zechhu@tsinghua.edu.cn).
   Justification: This paper is recognised as an innovative and valuable contribution to the field, focusing on the critical interaction between the rapid adoption of electric vehicles (EVs), power distribution networks, and urban transportation systems. It introduces an effective pricing strategy for public EV charging stations by integrating the operations of power grids and transportation systems. The research tackles a cutting-edge topic in the context of growing EV use. The methodology, involving a well-designed model and an iterative solution algorithm, is efficient, widely applicable, and has been influential in similar studies.

2. D. Cao et al., "Physics-Informed Graphical Representation-Enabled Deep Reinforcement Learning for Robust Distribution System Voltage Control," in IEEE Transactions on Smart Grid, vol. 15, no. 1, pp. 233-246, Jan. 2024, doi: 10.1109/TSG.2023.3267069.
   Corresponding author: Weihao Hu (whu@uestc.edu.cn)
   Justification: This paper presents a cutting-edge approach to voltage control in power distribution systems by combining advanced machine learning tools with physics-informed methods. It addresses the practical challenges of partial observability and data anomalies, introducing a graphical representation-enabled deep reinforcement learning method. The methodology integrates global graph attention networks and deep auto-encoders, creating a robust system capable of operating effectively despite sensor errors and imperfect data. The paper stands out by bridging the gap between deep learning and power system applications, balancing contributions from both fields. Unlike traditional methods that rely on optimisation over physics-based models, this work adopts a graphical learning approach, significantly enhancing control performance. Using a graph-based surrogate model for training and a physics-informed framework improves robustness and reduces dependency on precise physical parameters. The research offers a reproducible and practical solution to a critical problem in smart grid technology. It enables more accurate and adaptive voltage control in dynamic environments, contributing to grid stability and reliability.

3. L. Yan, X. Chen, J. Zhou, Y. Chen and J. Wen, "Deep Reinforcement Learning for Continuous Electric Vehicles Charging Control With Dynamic User Behaviors," in IEEE Transactions on Smart Grid, vol. 12, no. 6, pp. 5124-5134, Nov. 2021, doi: 10.1109/TSG.2021.3098298.

Corresponding author: Xia Chen (cxhust@foxmail.com)
Justification: This paper introduces a novel approach to scheduling electric vehicle (EV) charging by incorporating driver behaviours, preferences, and concerns like range anxiety into a quantitative model. It formulates the problem as a Markov Decision Process (MDP). It employs a hybrid supervised learning and reinforcement learning framework, including a refined deep reinforcement learning algorithm based on the soft actor-critic method. This approach achieves superior control performance compared to standard methods and provides a rigorous solution to the dynamic challenges of EV charging in real-world scenarios. The paper effectively integrates behavioural uncertainties, electricity pricing, and user-centric models, offering enhanced control accuracy and flexibility for dynamic environments. Its insights into managing energy usage and customer satisfaction contribute to the practical implementation of smart grids and renewable energy integration in urban systems.

4. Z. Li, Y. Xu, P. Wang and G. Xiao, "Restoration of a Multi-Energy Distribution System With Joint District Network Reconfiguration via Distributed Stochastic Programming," in IEEE Transactions on Smart Grid, vol. 15, no. 3, pp. 2667-2680, May 2024, doi: 10.1109/TSG.2023.3317780.
   Corresponding author: Yan Xu (eeyanxu@gmail.com)
   Justification: This paper presents a novel and practical approach to enhancing the resilience of multi-energy distribution systems, addressing challenges posed by extreme weather events and the integration of renewable energy sources. It introduces a distributed stochastic programming model for system restoration, optimising reliability and operational efficiency while minimising recovery times during disruptions. By leveraging the reconfigurable properties of district power and thermal networks, the method provides a cost-effective solution to redistribute energy loads and improve system flexibility. The study reduces computational complexity by decomposing the large-scale restoration problem into smaller, manageable sub-problems, making the approach tractable for real-world applications. The work offers a significant advancement over existing methods and makes a valuable contribution to the field of multi-energy system resilience and efficiency.

5. A. Presekal, A. Ştefanov, V. S. Rajkumar and P. Palensky, "Attack Graph Model for Cyber-Physical Power Systems Using Hybrid Deep Learning," in IEEE Transactions on Smart Grid, vol. 14, no. 5, pp. 4007-4020, Sept. 2023, doi: 10.1109/TSG.2023.3237011.
   Corresponding author: Alfan Presekal (A.Presekal@tudelft.nl)
   Justification: This paper explores the use of a hybrid deep learning model within a novel framework called Cyber Resilient Grid to enhance power grid resilience against cyberattacks. The approach integrates software-defined networking with anomaly detection, communication throughput analysis, and an innovative attack graph model to provide real-time situational awareness of cyber threats. It achieves impressive accuracy and can detect and localise attacks in operational technology (OT) networks, including substations and control centres, outperforming existing state-of-the-art methods. The research highlights significant potential for graph neural networks in cyber-physical system state estimation and demonstrates strong performance in anomaly detection and localisation tasks.

Ranking criteria:

The SE first selected the six most cited papers published in 2021, 2022 and 2023. The list of 18 papers was sent to the AEs, who nominated five papers from the list. The first-ranked paper in each nomination received five points, the second four and so on. The scores were then added, and the papers were ranked based on the total number of points.

AEs who submitted scores:

- Yujian Ye
- Ferdinanda Ponci
- Wei Wei
- Can Huang
- Tarek Alskaif
- Zhouyang Ren
- Quan Zhou
- Yue Chen
- Hui Liu
- Qun Zhou Sun
- Yingmeng Xiang
- Lantao Xing
- Wenchao Meng
- Meng Wang
- Feng Liu
- Liang Yu
- Ruilong Deng
- Nian Liu
- Jose Carlos Vieira
- Guo Chen
- José Manuel Arroyo Sánchez
- Yuhua Du
- Zhaohao Ding