Editorial

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In general, an electric power system (EPS) deals with the generation, transmission, distribution and utilisation of electric energy. For the development and expansion of power system networks, stability, reinforcement, reliability, dependability, technical improvements, selection and dynamic response of the EPS are essential. However, the continuous growth of EPSs leads to increased complexity in the networks. Therefore, EPS analysis using conventional methods has become increasingly complex and time-consuming. As we know, necessity is the mother of invention; smart computational intelligence (CI) and intelligent optimisation methods are being developed with the help of sophisticated computer tools, and are applied to solve the aforementioned issues for large EPS. A number of problems in EPS cannot be resolved using traditional methods. Therefore, CI methods in EPS applications are being focused on extensively. Currently, the EPS has been embedded with different digital control systems and intelligent intelligence techniques in order to make it smarter. Moreover, smart grids for smart cities are an important topic in which reliable and efficient power supply is very important. Smart grids are electricity supply networks that use and handle digital communications equipment smartly for the detection of small parametric changes in the EPS. This can be achieved through the use of highly reliable, smart and intelligent techniques such as CI methods, soft computing techniques and optimisation algorithms. The main intent of this special issue is to cover both the theory and applications of various CI techniques applied to power system operation, control and protection. The issue will be helpful to promote original research articles on theoretical, experimental, and practical aspects of innovative and improved computational techniques applied to various domain of power engineering. In this special issue, five numbers of research articles are selected for publication through a rigorous double blind peer-review system. The title of these five research articles are such as: ‘A novel modified random walk grey wolf optimisation approach for non-smooth and non-convex economic load dispatch’, ‘XGBoost regression model-based electricity tariff plan recommendation in smart grid environment’, ‘Frequency regulation of hybrid power system using firefly algorithm’, ‘Speed control of battery and super-capacitor powered EV/HEV using PID and fuzzy logic controller’, and ‘Implementation of β-chaotic mapping to improved elephant herding optimisation to dynamic economic dispatch problem’.

Sahoo et al. presented an improved version of conventional grey wolf optimisation (GWO) technique to solve the economic load dispatch problem. The performance of the improved GWO is compared with the conventional GWO and other contemporary algorithms for demonstrating the superiority of the suggested one for the studied problem. Behera et al. have proposed an ensemble learning technique (XGBoost regression model) for electricity tariff plan recommendation. The obtained result of proposed approach considering different fabricated feature vectors has been compared with other contemporary machine learning model such as support vector regression (SVR), decision tree (DT), Bayesian ridge and KNN regression model. In this research, dataset shared in the project Smart Grid Smart City (SGSC), Australia is used for conducting experimental analysis. Gorripotu and Pilla presented a firefly algorithm (FA)-based cascaded PD-PID controller (PD-PIDF) for the hybrid power system to keep the frequency within the limits. Initially, a two-area hybrid power system is modelled, considering thermal and distributed power units in area-1, and hydrothermal units in area-2. The cascaded PD-PIDF controller parameter values are optimised using the integral time multiplied absolute error criterion. The proposed system is analysed under three different cases/conditions. The superiority of proposed controller is shown through a comparative analysis with state-of-the-art published paper. Tiwari et al. have studied the behaviour of the PID and fuzzy logic controller in order to control the speed of battery and super capacitor powered EV/HEV. Fuzzy logic controller-based drive scheme is found to be more suitable for achieving the fine speed control on comparing to the traditional PID controlled drive scheme. Fuzzy logic controller-based EV motor drives perform well during normal and abnormal working conditions including environmental parameter variation and high resistance fault condition on comparing to PID controller-based EV motor drive scheme. The battery bank is utilised as a power source for the conventional EV, but this paper proposed the combination of the battery bank (followed by the UBBC) and super-capacitor bank (followed by the BBBC) as a power source for HEV. Paramguru and Barik proposed an improved elephant herding optimisation technique mapped with a chaotic function for the solution of a dynamic economic dispatch problem (economic operation of conventional generators). Practical constraints like ramp rate limit, valve point loading effect and transmission losses are taken into account for the operation of the generators. The proposed technique is applied and compared for four test system to find the dominance over state-of-the-art techniques.

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