Preface

Recent Advances in Electrical & Electronic Engineering publishes review and research articles, guest edited thematic issues, and reviews in patents on electrical and electronic engineering and applications. The journal also covers research in fast emerging applications of electrical power supply, electrical systems, power transmission, electromagnetism, motor control process and technologies involved and related to electrical and electronic engineering.

In this issue, I am very pleased to introduce some of the recent research advances in electrical systems, power control, circuit designs and video processing. Taking this opportunity, I would like to thank all the authors, reviewers and the editorials of the journal for their professional dedication and commitments.

1. Blackout Mitigation of Voltage Stability Constrained Transmission Corridors through Controlled Series Resistors.

Existing power systems normally operate at heavily loaded conditions and often face a surge in load demand. In spite of the implementation of the state of the art preventive measures, blackout prompted interruption in the energy supply is an enduring issue. Typically, the voltage collapse is evaded by severing a critically loaded line, which has severe repercussions including oscillatory transients and stability hindrances, which can eventually lead to a voltage collapse. This work presents a viable solution for the on-line alleviation of voltage stability constrained transmission corridors to avoid the blackout without interrupting or severing any load line. The proposed method is implemented by the insertion of a resistive impedance in the most affected and critical line to damp out power oscillations and to avoid repetitive operation and cascaded effects leading to the system collapse.

2. Fuzzy Pole Placement for Speed Control in D.C. Motor.

In this paper, a fuzzy pole placement control approach is proposed to control the speed of D.C. motors. State feedback gain is tuned by fuzzy logic. In conventional pole placement control, constant gain is considered to insert the poles of the system in the desired place. Therefore, unnecessary effort is applied to the system, and the system implementation becomes costly. In contrast, by fuzzy pole placement control, poles of the system are altered gradually based on the performance of the system and are settled in the desired point causing the system to show apposite performance.

3. Open-Circuit Fault Detection for IGBTs Based on Leg Voltage Approach in SVM-DTC of PMSM.

In this study, a new model-based fault detection and isolation (FDI) strategy for IGBTs open circuit faults detection and diagnosis in voltage source inverter (VSI) is proposed. The method is based on the bridge leg pole voltage, with an additional simple circuit; the diagnostic method detects and effectively identifies single and multiple open-circuit faults of inverter IGBTs. Also, a fault compensation strategy is suggested by using the information of the model-based FDI stage composed of a four-leg inverter in which the fourth inverter leg is used as hardware redundancy.

4. No-load Magnetic Field Analysis of the U-shaped Ironless Permanent Magnet Synchronous Linear Motor.

Due to the influence of core breaking, the traditional iron core linear motor has the end-effect of lateral and vertical sides, which makes the output of the thrust line fluctuate greatly. The ironless permanent magnet synchronous linear motor has the advantages of zero slot effect, simple structure and flexible control. The study was based on the analysis of air gap magnetic field of ironless permanent magnet synchronous linear motor problems using two kinds of analytical methods, namely equivalent magnetic potential method and the equivalent magnetizing current method, and the finite element analysis of the magnetic field using the finite element method.

5. Pedestrian Tracking Utilizing Scale Invariant Feature Transform and Particle Filter.

Pedestrians are the main road users in transportation system. They are more vulnerable than the other road users at the time of traffic accidents, thus receiving much attention of the researchers around the world by developing corresponding countermeasures. A pedestrian is not easy to be tracked accurately because of the change of illumination conditions and the occlusion of human body using traditional tracking algorithms. To improve the effectiveness of pedestrian tracking, particle filter (PF) is utilized to track the pedestrian, detected using the histograms of oriented gradient (HOG) features. Then scale invariant feature transform (SIFT) features are employed to represent the region of interest for image sequences.

6. DC-DC Converter with Bipolar Output and its Use for Connection of a Distributed Generation System to a Bipolar DC Grid.

This work describes the methodology and the basic procedure developed for the patent entitled DC-DC Converter with Bipolar Output and its Use for Connection of a Distributed Generation System to a Bipolar DC Grid. The invention relates to a DC-DC converter capable of generating bipolar voltage with a suitable novel topology for distributed generation connection to a DC bipolar grid. The proposed topology uses only a power switch, unlike other DC-DC converters which employ two or four switches. Thus the complexity of the converter is reduced. The DC-DC converter with bipolar output has an input for connection to a monopolar DC source and a bipolar output voltage with a positive terminal and a negative terminal. The DC-DC converter can be applied to bipolar DC grids because it allows the connection of a monopolar DC source to such networks.

7. Diagnosability of Alternating Group Graphs with Missing Edges.

Many multiprocessor systems have interconnection networks as underlying topologies and an interconnection network is usually represented by a graph where nodes represent processors and links represent communication links between processors. The diagnosability of the system plays an important role in measuring the fault tolerance of the interconnection network. The alternating group graph has many favorable properties such as vertex and edge symmetry, recursive structure, high connectivity, small diameter and average distance, etc., which make it favorable as a network topology for the system. In this paper, the authors studied the diagnosis of a dimensional alternating group graph under the MM* model. They proved that the model has strong local diagnosability property, and keeps this strong property even if there are missing edges in it.

8. Thermal Unit Commitment Problem along with Wind Power Generation by Considering Generator Outages.

The increasing concern of global climate change and the promotion of renewable energy sources, primarily wind generation, have reduced the power generation from conventional plants that has led to the reduction in pollutant emission. The exploitation of wind power generation is rising throughout the world. The objective of Unit Commitment (UC) is to identify the optimal generation scheme of the committed units such that the overall generation cost is reduced, when subjected to a variety of constraints at each time interval. The optimum generation planning in electrical power system is difficult, since UC Problem has many variables and system and unit constraints of thermal generating units. Nowadays, it is essential to include reliability analysis of the power system in operation strategy of the generating units. Here, the generator failure and malfunction are considered in UC problem formulation. This paper presents a meta-heuristic algorithm to determine the thermal generation schedule with the consideration of wind energy system. A novel evolutionary algorithm known as Grey Wolf Optimization (GWO) algorithm is applied to solve the UC problem.

9. Fault Feature Extraction of Single-Channel Signal from Gearbox Based on EEMD and CICA.

Single-channel observed signal analysis based on independent component analysis (ICA) models belongs to the extremely underdetermined blind source separation (BBS) problem. In order to extract the fault feature hidden in the single-channel measured signal from multi-stage gearbox, a joint approach of fault feature extraction based on ensemble empirical mode decomposition (EEMD) and constrained independent component analysis (CICA) is proposed. The single-channel vibration fault signal is decomposed into several intrinsic mode functions (IMFs) by EEMD, which can overcome the shortcomings of classical empirical mode decomposition (EMD). By computing the kurtosis and correlation coefficients of each IMF, we can select some suitable IMFs to construct a newly observed vector combined with the original signal, which meets the requirement of CICA algorithm.

10. Design of an Ultra-wideband Transition from Double-sided Microstrip to Parallel-strip line for Balanced-type Antenna.

This paper presents the design and implementation of an ultra-wideband transition from double-sided micro-strip to parallel-strip line which is usually used as balanced antenna feed. This transmission is composed of a near-optimum taper of metal on the top layer and exponential taper of ground on the bottom layer. The transmissions were simulated and optimized by CST Microwave Studio and then they were fabricated. Finally, the results of simulations and measurements were compared.

11. Design and Implementation of Smart Home Gateway Based on 433MHz Radio-Frequency Communication.

In view of the lack of centralized control of traditional home appliances, this paper presents an intelligent gateway based on the Linux embedded operating system as the software platform and the ARM9 processor S3C2440 as the hardware development platform to solve this problem. The intelligent gateway is equipped with Wi-Fi, CC1101, Ethernet card and other functional modules, and is based on the 433MHz radio-frequency protocol stack and the Linux operating system kernel. We establish the platform of the remote control through the cloud server, so the users can log on the client to achieve smart home remote monitoring.

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