Editorial

Signal Processing and Analysis of Electrical Circuit

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1. Introduction

The analysis of electrical circuits is an essential task in the evaluation of electrical systems. Electrical circuits are made up of interconnections of various elements, such as resistors, inductors, transformers, capacitors, semiconductor diodes, transistors and operational amplifiers. Electrical signals, acoustic and vibrations carry useful information. They are known as diagnostic signals. Electrical circuits are used for equipment, circuit protection, circuit control, computers, electronics, electrical engineering, cars, planes and trains.

The analysis of signals is also essential. It is used for electrical engineering, sound recognition, speaker recognition, fault diagnosis, image processing, fast Fourier transform (FFT), wireless communication, control systems, process control, genomics, economy, seismology, feature extraction and digital filtering.

2. The Present Special Issue

This special issue with 34 published articles shows the significance of the topic "Signal Processing and Analysis of Electrical Circuit". The topic gained noticeable attention in recent time. The accepted articles are categorized into four different areas:

Signal processing and analysis methods of electrical circuits;

Electrical measurement technology;

Applications of signal processing of electrical equipment;

Fault diagnosis of electrical circuits;

The paper [1] describes the fault diagnosis of a commutator motor using signal processing methods and acoustic signals. Five commutator motors were analyzed: a healthy commutator motor, a commutator motor with a broken rotor coil, a commutator motor with shorted stator coils, a commutator motor with a broken tooth on sprocket and a commutator motor with a damaged gear train. Feature extraction method MSAF-15-MULTIEXPANDED-8-GROUPS (Method of Selection of Amplitudes of Frequency Multiexpanded 8 Groups) was introduced [1]. Processing and feature extraction of an underwater acoustic signal was shown in the paper [2]. The authors proposed a feature extraction method for an underwater acoustic signal. It was based on VMD (variational mode decomposition), DCO (duffing chaotic oscillator) and KPE (kind of permutation entropy) [2]. The next paper [3] presented two models (HOCTVL1 model and SAHOCTVL1 model) for solving the problem of image deblurring under impulse noise. The proposed models are good for recovering the corrupted images [3].

A multispectral backscattered light recorder of insects' wingbeats was presented in the paper [4]. The proposed device extracted a signal of the wingbeat event and color characterization of the insect.

The authors of the paper analyzed the following insects: the bee (*Apis mellifera*) and the wasp (*Polistes gallicus*) [4]. A 13-bit 3 MS/s asynchronous SAR ADC with a passive resistor was described [5]. Passive resistors were adopted by the described delay cell. A delay error was less than 5 percent [5]. A miniaturized frequency standard comparator based on FPGA was presented. The noise floor of the analyzed comparator was better than $7.50 * 10^{-12}$ (1/s) [6]. A low-ripple switched-capacitor DC–DC Converter with parallel low-dropout regulator was proposed. The converter used a four-bit DCpM control and parallel low-dropout regulator [7]. A fuzzy logic system was proposed for the assessment of stator winding short-circuit faults in induction motors. The proposed approach achieved a positive classification rate of 98% [8]. A capacitance-to-time converter-based electronic interface was designed. The proposed interface is suitable for on-chip integration with sensors of force, humidity, position etc. [9]. The self-calibrating dynamic comparator was developed. The presented approach reduced the input offset by 10× [10]. There are also other interesting articles in the presented special issue. The proposed approaches and devices can be improved and used for the electrical systems in the future.

The proposed topics are essential for industry. Signal processing and analysis of diagnostic signals are used for fault diagnosis and monitoring systems [11–26]. Signal processing and image processing methods are used for many applications, for example medical applications [27–36]. Switched-Capacitor DC–DC converters are also an interesting topic of research [37–41].

3. Concluding Remarks

Acceleration of the development of electrical systems, signal processing methods and circuits is a fact. Electronics applications related to electrical circuits and signal processing methods have gained noticeable attention in recent time. The methods of signal processing and electrical circuits are widely used by engineers and scientists all over the world.

The presented papers have made a contribution to electronics. The presented applications can be used in the industry. The presented approaches require further improvements for industry and other applications.

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