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Features



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4 Lighting Up On-Chip Communications with Photonics: Design Tradeoffs for Optical NoC Architectures

Edoardo Fusella and Alessandro Cilardo

Photonic on-chip interconnects are today considered a major pathway to face the insatiable performance demand of manycore computers within tight power constraints. This article provides a broad overview of the opportunities and challenges posed at the architecture level by this new interconnect paradigm. In fact, silicon Photonics introduces many new design tradeoffs, having no electronic equivalent, involving aspects such as wavelength selectivity, physical constraints, and spectral parallelism. As highlighted throughout the paper, getting a cross-cutting understanding of these tradeoffs is essential for harnessing the full potential of on-chip Photonics.

15 Emerging Memristor-Based Logic Circuit Design Approaches: A Review

Ioannis Vourkas and Georgios Ch. Sirakoulis

This article is a comprehensive review of the state-of-the-art of memristor-based logic circuit design concepts of the recent literature. Amongst all the identified circuit design approaches, those discussed here are all based on collective memristive dynamics and share a number of common characteristics which facilitate their comparison. The focus is on the evolution of the memristor-based logic circuit design strategies from the early proposed sequential stateful logic up to most recently published design schemes which support parallel processing of the applied input signals. The main operational properties of all the selected computational concepts are presented in an accessible manner, aiming to serve as an informative cornerstone for students and scientists who wish to get involved in emerging memristive logic circuit research and development.

31 Operational Design Considerations for Retinal Prostheses

Erich W. Schmid and Wolfgang Fink

Three critical improvements resulting from computer simulations for present day and future retinal vision implants are proposed and discussed: (1) A time profile for the stimulation current that leads predominantly to transversal stimulation of nerve cells; (2) auxiliary electric currents for electric field shaping with a time profile chosen such that these currents have small probability to cause stimulation; and (3) a local area scanning procedure that results in high pixel density for image/percept formation, except for losses at the boundary of an electrode array.

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45 Recent Developments in Speech Enhancement in the Short-Time Fourier Transform Domain

Mahdi Parchami, Wei-Ping Zhu, Benoit Champagne, and Eric Plourde

In this paper, we present an overview on the topic of noise reduction in the short-time Fourier transform (STFT) domain. First, we briefly review the conventional literature in the single- and multi-channel cases separately. In the single-channel scenario, we focus on the spectral subtractive methods, Wiener filter based methods, speech amplitude estimators and estimators of the complex STFT coefficients. In the multi-channel scenario, we investigate in short a selection of key beamforming approaches as well as conventional post-filtering methods. Next, a detailed survey of the most recent advances in the STFT-based noise reduction methods is provided. This includes STSA estimators with super-Gaussian priors, noise power spectral density (PSD) estimation, estimation methods in the modulation domain, estimation of spectral phase and noise PSD matrix estimation for multi-channel applications. Finally, we summarize the presented material and draw important conclusions on each of the investigated topics.

Scope: Insofar as the technical articles presented in the proposed magazine, the plan is to cover the subject areas represented by the Society's transactions, including: analog, passive, switch capacitor, and digital filters; electronic circuits, networks, graph theory, and RF communication circuits; system theory; discrete, IC, and VLSI circuit design; multidimensional circuits and systems; large-scale systems and power networks; nonlinear circuits and systems, wavelets, filter banks, and applications; neural networks; and signal processing. Content will also cover the areas represented by the Society technical committees: analog signal processing, cellular neural networks, and array computing, circuits and systems for communications, computer-aided network design, digital signal processing, multimedia systems and applications, neural systems and applications, nonlinear circuits and systems, power systems and power electronics and circuits, sensors and micromachining, visual signal processing and communication, and VLSI systems and applications. Lastly, the magazine will cover the interests represented by the widespread conference activity of the IEEE Circuits and Systems Society. In addition to the technical articles, which may be seen as the centerpiece of the start-up plan, we plan also to cover Society administrative activities, as for instance the meetings of the Board of Governors, Society People, as for instance the stories of award winners-fellows, medalists, and so forth, and Places reached by the Society, including readable reports from the Society's conferences around the world.



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