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Advanced Circuits and Systems

From Theory to Emerging Applications

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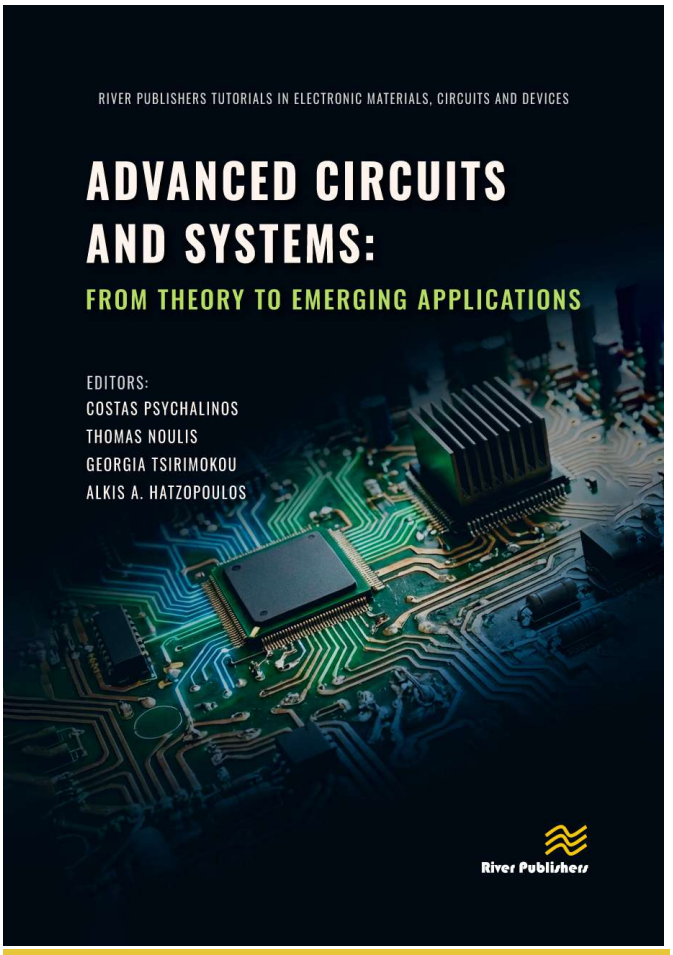

Circuit design is not only relevant for electrical engineering. It can also be applied to interdisciplinary projects that require electrical input, output, or control, such as robotics, biomedical devices, renewable energy, and smart systems. Through interdisciplinary projects, the designer must understand the project goals and requirements, as well as the roles of other team members. Therefore, communication with collaborators is essential, as is the use of common standards and tools to ensure compatibility. In the framework of this CASS Seasonal School call, a 2-day school on “Interdisciplinary Applications of Circuits and Systems” was organized during October 16-17, in the Conference and Cultural Center of the University of Patras, Greece. At this educational event, basic and advanced issues on design methodologies targeting on interdisciplinary applications were presented, including the following: circuits and systems in biology/biomedicine, in agriculture, in cryptography, in control systems, in chaos, in RF applications, in Internet of Things (IoT) systems, in quantum computing, as well as the employment of artificial intelligence and machine learning techniques for designing circuits.

In this book the following are introduced:

- Chaotic oscillators and their real-world applications, the basic principles of the PID controllers followed by application design examples
- Applications of circuits in agriculture, the employment of artificial intelligence (AI) and machine learning (ML) techniques for design
- The design challenges and innovative solutions for energy harvesting for wearable and implantable devices
- Medical and health applications of biosensing circuits and systems
- Cryptographic hardware and embedded systems
- Computer vision and deep learning techniques for electronic circuit inspection
- Cryo-CMOS integrated circuits for scalable quantum computing
- Energy-efficient analog circuits and systems for emerging RF applications.

TABLE OF CONTENTS

- Chaotic Oscillators and ?heir Real-world Applications
- Practical PID and Fractional-order Controllers: Circuit Realizations with FOMCON
- The Application of Circuits and Systems in Agriculture
- Employment of Artificial Intelligence and Machine Learning Techniques for Designing Circuits
- Energy Harvesting for Wearable and Implantable Devices: Design Challenges and Innovative Solutions
- Medical and Health Applications of Biosensing Circuits and Systems
- Cryptographic Hardware and Embedded Systems
- Computer Vision and Deep Learning for Electronic Circuit Inspection
- Cryo-CMOS ICs for Scalable Quantum Computing
- Energy-efficient Analog Circuits and Systems for Emerging RF Applications

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KEYWORDS:
Circuits and systems, chaotic circuits, controllers, agriculture applications, biomedical applications, machine learning in circuit design, artificial intelligence in circuit design, cryptographic circuits, RF circuits, cryogenic circuits, memristors, energy harvesting circuits

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