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This book is a collection of selected research papers presented at the International Conference on Innovations in Electrical and Electronics Engineering (ICIEEE 2019), which was organized by the Guru Nanak Institutions, Ibrahimpatnam, Hyderabad, Telangana, India, on July 26–27, 2019. The book highlights the latest developments in electrical and electronics engineering, especially in the areas of power systems, power electronics, control systems, electrical machinery, and renewable energy. The solutions discussed here will encourage and inspire researchers, industry professionals, and policymakers to put these methods into practice. This book gathers high-quality research papers presented at the First International Conference, ICSC 2019, organised by THDC Institute of Hydropower Engineering and Technology, Tehri, India, from 20 to 21 April 2019. The book is divided into two major sections – Intelligent Computing and Smart Communication. Some of the areas covered are Parallel and Distributed Systems, Web Services, Databases and Data Mining Applications, Feature Selection and Feature Extraction, High-Performance Data Mining Algorithms, Knowledge Discovery, Communication Protocols and Architectures, High-

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speed Communication, High-Voltage Insulation Technologies, Fault Detection and Protection, Power System Analysis, Embedded Systems, Architectures, Electronics in Renewable Energy, CAD for VLSI, Green Electronics, Signal and Image Processing, Pattern Recognition and Analysis, Multi-Resolution Analysis and Wavelets, 3D and Stereo Imaging, and Neural Networks.

Synthesis of Computational Structures for Analog Signal Processing focuses on analysis and design of analog signal processing circuits. The author presents a multitude of design techniques for improving the performances of analog signal processing circuits, and proposes specific implementation strategies that can be used in CMOS technology. The author's discussion proceeds from the perspective of signal processing as it relates to analog. Included are coverage of low-power design, portable equipment, wireless nano-sensors and medical implantable devices. The material is especially appropriate for researchers and specialists in the area of analog and mixed-signal CMOS VLSI design, as well as postgraduate or Ph.D. students working on analog microelectronics. Research and application of impedance network converters are very popular in recent years, but it still lacks of understanding of and guidelines of impedance networks application, therefore, there is quiet a large potential market about impedance

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networks converters. This book can serve as a teaching material for graduates and guidelines for engineers as designing an impedance source converter. The main purpose of this book is to understand impedance networks of nonlinear switch circuits and impedance networks matching, which will further put forward understanding of all power converters in view of impedance networks. Taking the impedance network matchings into account leads to a set of criteria for designing an impedance source converter, which is to replace the traditional tedious, manual and experience-dependent design methods.

This book presents a system-level analysis of inductive wireless power transfer (WPT) links. The basic requirements, design parameters, and utility of key building blocks used in inductive WPT links are presented, followed by detailed theoretical analysis, design, and optimization procedure, while considering practical aspects for various application domains. Readers are provided with fundamental, yet easy to follow guidelines to help them design high-efficiency inductive links, based on a set of application-specific target specifications. The authors discuss a wide variety of recently proposed approaches to achieve the maximum efficiency point, such as the use of additional resonant coils, matching networks, modulation of the load quality factor (Q-modulation), and adjustable DC-DC

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converters. Additionally, the attainability of the maximum efficiency point together with output voltage regulation is addressed in a closed-loop power control mechanism. Numerous examples, including MATLAB/Octave calculation scripts and LTspice simulation files, are presented throughout the book. This enables readers to check their own results and test variations, facilitating a thorough understanding of the concepts discussed. The book concludes with real examples demonstrating the practical application of topics discussed. Covers both introductory and advanced levels of theory and practice, providing readers with required knowledge and tools to carry on from simple to advanced wireless power transfer concepts and system designs; Provides theoretical foundation throughout the book to address different design aspects; Presents numerous examples throughout the book to complement the analysis and designs; Includes supplementary material (numerical and circuit simulation files) that provide a "hands-on" experience for the reader; Uses real examples to demonstrate the practical application of topics discussed.

Reference Data for Engineers is the most respected, reliable, and indispensable reference tool for technical professionals around the globe. Written by professionals for professionals, this book is a complete reference for engineers, covering a broad

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range of topics. It is the combined effort of 96 engineers, scientists, educators, and other recognized specialists in the fields of electronics, radio, computer, and communications technology. By providing an abundance of information on essential, need-to-know topics without heavy emphasis on complicated mathematics, Reference Data for Engineers is an absolute "must-have" for every engineer who requires comprehensive electrical, electronics, and communications data at his or her fingertips. Featured in the Ninth Edition is updated coverage on intellectual property and patents, probability and design, antennas, power electronics, rectifiers, power supplies, and properties of materials. Useful information on units, constants and conversion factors, active filter design, antennas, integrated circuits, surface acoustic wave design, and digital signal processing is also included. The Ninth Edition also offers new knowledge in the fields of satellite technology, space communication, microwave science, telecommunication, global positioning systems, frequency data, and radar. * Widely acclaimed as the most practical reference ever published for a wide range of electronics and computer professionals, from technicians through post-graduate engineers. * Provides a great way to learn or review the basics of various technologies, with a minimum of tables, equations, and other heavy math.

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This book provides a comprehensive treatment of CMOS circuits for passive wireless microsystems. Major topics include: an overview of passive wireless microsystems, design challenges of passive wireless microsystems, fundamental issues of ultra-low power wireless communications, radio-frequency power harvesting, ultra-low power modulators and demodulators, ultra-low power temperature-compensated current and voltage references, clock generation and remote calibration, and advanced design techniques for ultra low-power analog signal processing.

This volume presents selected papers from the 2nd International Conference on Optical and Wireless Technologies, conducted from 10th to 11th February, 2018. It focuses on extending the limits of currently used systems encompassing optical and wireless domains, and explores novel research on wireless and optical techniques and systems, describing practical implementation activities, results and issues. The book will serve as a valuable reference resource for academics and researchers across the globe.

This volume comprises select proceedings of ETAEERE-2016. The volume offers state-of-the-art chapters on energy management systems (EMS), renewable energy resources, micro-generation, green communications architectures and frameworks, green computing and education as well as energy-aware process optimization. The contents covers a wide variety of topics and aspects including management of

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renewable energy systems and environmental challenges. The contents of this volume will be useful to researchers and practicing engineers working in the areas of smart grids and renewable energy generation, distribution, and management.

This book gathers selected research papers presented at the International Conference on Power, Control and Communication Infrastructure 2019 (ICPCCI 2019), organized by the Institute of Infrastructure, Technology, Research and Management (IITRAM), Ahmedabad, Gujarat, India, on July 4–5, 2019. It presents the latest advances, trends and challenges in control system technologies and infrastructures. The book addresses a range of solutions to the problems faced by engineers and researchers to design and develop controllers for emerging areas like smart grid, integration of renewable energy, automated highway systems, haptics, unmanned aerial vehicles, sensor networks, robotics, formation control and many more. The solutions discussed in this book encourage and inspire researchers, industry professionals and policymakers to put these methods into practice.

This book shows in a comprehensive presentation how Bond Graph methodology can support model-based control, model-based fault diagnosis, fault accommodation, and failure prognosis by reviewing the state-of-the-art, presenting a hybrid integrated approach to Bond Graph model-based fault diagnosis and failure prognosis, and by providing a review of software that can be used for these tasks. The structured text illustrates on numerous small examples how the computational

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structure superimposed on an acausal bond graph can be exploited to check for control properties such as structural observability and control lability, perform parameter estimation and fault detection and isolation, provide discrete values of an unknown degradation trend at sample points, and develop an inverse model for fault accommodation. The comprehensive presentation also covers failure prognosis based on continuous state estimation by means of filters or time series forecasting. This book has been written for students specializing in the overlap of engineering and computer science as well as for researchers, and for engineers in industry working with modelling, simulation, control, fault diagnosis, and failure prognosis in various application fields and who might be interested to see how bond graph modelling can support their work. Presents a hybrid model-based, data-driven approach to failure prognosis Highlights synergies and relations between fault diagnosis and failure prognostic Discusses the importance of fault diagnosis and failure prognostic in various fields This step-by-step guide provides the reader with a detailed and thorough introduction to practical antenna design and model implementation In this book, Hubregt J. Visser provides an introduction to the fundamentals of antenna design and the implementation of design models. A variety of antennas for wireless applications and communications systems are explained, and the real-life use of the antennas is demonstrated through extensive use of application examples. The author includes discussions on the design process of several antennas, such as intravascular MR Antennas, PCB

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antennas, RFID antennas, rectennas etc. Furthermore, emphasis is placed on Computer Aided Design (CAD) using approximated models. Key Features Includes coverage on intravascular MR Antennas, PCB antennas, RFID antennas, rectennas, etc Comprehensively details the application areas, modeling, analysis, and validation processes for individual antennas Discusses the use of equivalent dipole antennas, equivalent transmission line networks and electrostatics Introduces many antennas and models that have not been covered in previous publications (such as MRI Antennas, for example) This book will be of interest to microwave and antenna engineers. Graduate and post-graduate antennas students studying BSc and MSc courses, as well as research assistants will also find this book insightful.

"While integrated circuit (IC) power management has been an eternal topic for chip designers, inductor based DC-DC converters have been dominant in the field for years. However, because of the natures of inductors: large electro-magnetic interference, high coupling noise, and difficult silicon fabrication process, they are not favorable to on-chip solutions. Switched-capacitor (SC) DC-DC converters, which adopt capacitors for their energy storage components, have become increasingly popular among both the academia and the industry, because, apparently, they avoid the drawbacks of the inductor counterparts, and can be directly implemented on-chip without additional fabrication process. In this paper, we will investigate one of the most famous SC voltage doubler topologies, which is known as 'Favrat Cell'. By designing a chip, which converts 1.5 V voltage

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input to 2.5 V voltage output at 1 mA current load, we will walk through the details of a SC DC-DC converter design, including the switch cell, timing system, regulation loop and efficiency analysis. The design uses two 200 pF pumping capacitors and a 400 pF output capacitor in On-Semi half-micron technology. Four-way interleaved phase structure is adopted to reduce the output voltage ripple. The gate-drive strategy of the switches has been improved to further reduce the reverse current injections during transitions. A new high-ratio voltage booster topology based on the cross-coupled topology has been introduced and will be discussed in comparison with the Dickson charge pump topology."--Abstract.

The desire to use railguns in defense applications has elevated the level of concentration in all areas of the railgun system. Necessary in any railgun is a large amount of electric power to deliver the required force to the projectile. One popular source of power is high voltage capacitor banks. The NPS Railgun Lab employs a fully functioning railgun with capacitor banks as power supplies. A reliable and safe charging supply for these capacitor banks is desirable and investigated in this paper. Construction and testing of a power supply charger is compared to simulation results. The power supply charger consists of a Voltage Source Inverter (VSI) connected to a high voltage boost transformer; the output of the transformer is connected to a voltage doubler rectifier; the output of the rectifier charges the high voltage capacitor to 9 kV in two minutes. The power supply controller is an FPGA (Field Programmable Gate

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Array) with embedded control to ensure the safe operation of the power supply.

This book contains extended and revised versions of the best papers presented at the 19th IFIP WG 10.5/IEEE International Conference on Very Large Scale Integration, VLSI-SoC 2011, held in Hong Kong, China, in October 2011. The 10 papers included in the book were carefully reviewed and selected from the 45 full papers and 16 special session papers presented at the conference. The papers cover a wide range of topics in VLSI technology and advanced research. They address the current trend toward increasing chip integration and technology process advancements bringing about stimulating new challenges both at the physical and system-design levels, as well as in the test of these systems.

The book focuses on the integration of intelligent communication systems, control systems, and devices related to all aspects of engineering and sciences. It contains high-quality research papers presented at the 2nd international conference, ICICCD 2017, organized by the Department of Electronics, Instrumentation and Control Engineering of University of Petroleum and Energy Studies, Dehradun on 15 and 16 April, 2017. The volume broadly covers recent advances of intelligent communication, intelligent control and intelligent devices. The work presented in this book is original research work, findings and practical development experiences of researchers, academicians, scientists and industrial practitioners.

This book describes a new concept for analyzing

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RF/microwave circuits, which includes RF/microwave antennas. The book is unique in its emphasis on practical and innovative microwave RF engineering applications. The analysis is based on nonlinear dynamics and chaos models and shows comprehensive benefits and results. All conceptual RF microwave circuits and antennas are innovative and can be broadly implemented in engineering applications. Given the dynamics of RF microwave circuits and antennas, they are suitable for use in a broad range of applications. The book presents analytical methods for microwave RF antennas and circuit analysis, concrete examples, and geometric examples. The analysis is developed systematically, starting with basic differential equations and their bifurcations, and subsequently moving on to fixed point analysis, limit cycles and their bifurcations. Engineering applications include microwave RF circuits and antennas in a variety of topological structures, RFID ICs and antennas, microstrips, circulators, cylindrical RF network antennas, Tunnel Diodes (TDs), bipolar transistors, field effect transistors (FETs), IMPATT amplifiers, Small Signal (SS) amplifiers, Bias-T circuits, PIN diode circuits, power amplifiers, oscillators, resonators, filters, N-turn antennas, dual spiral coil antennas, helix antennas, linear dipole and slot arrays, and hybrid translinear circuits. In each chapter, the concept is developed from the basic assumptions up to the final engineering outcomes. The scientific background is explained at basic and advanced levels and closely integrated with mathematical theory. The book also includes a wealth of examples, making it ideal

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for intermediate graduate level studies. It is aimed at electrical and electronic engineers, RF and microwave engineers, students and researchers in physics, and will also greatly benefit all engineers who have had no formal instruction in nonlinear dynamics, but who now desire to bridge the gap between innovative microwave RF circuits and antennas and advanced mathematical analysis methods.

This book provides various design techniques for switched-capacitor on-chip high-voltage generators, including charge pump circuits, regulators, level shifters, references, and oscillators. Readers will see these techniques applied to system design in order to address the challenge of how the on-chip high-voltage generator is designed for Flash memories, LCD drivers, and other semiconductor devices to optimize the entire circuit area and power efficiency with a low voltage supply, while minimizing the cost.

This book provides a detailed analysis of all aspects of capacitive DC-DC converter design: topology selection, control loop design and noise mitigation. Readers will benefit from the authors' systematic overview that starts from the ground up, in-depth circuit analysis and a thorough review of recently proposed techniques and design methodologies. Not only design techniques are discussed, but also implementation in CMOS is shown, by pinpointing the technological opportunities of CMOS and demonstrating the implementation based on four state-of-the-art prototypes.

This book consists of peer-reviewed papers presented at the First International Conference on Intelligent

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Computing in Control and Communication (ICCC 2020). It comprises interesting topics in the field of applications of control engineering, communication and computing technology. As the current world is witnessing the use of various intelligent techniques for their independent problem solving, so this book may have a wide importance for all range of researchers and scholars.

The book serves as a reference for researchers, professionals and students from across electrical, electronic and computer engineering disciplines.

This book focuses on the latest emerging technologies in electric vehicles (EV), and their economic and environmental impact. The topics covered include different types of EV such as hybrid electrical vehicle (HEV), battery electrical vehicle (BEV), fuel cell electrical vehicle (FCEV), plug-in hybrid electrical vehicle (PHEV). Theoretical background and practical examples of conventional electrical machines, advanced electrical machines, battery energy sources, on-board charging and off-board charging techniques, and optimization methods are presented here. This book can be useful for students, researchers and practitioners interested in different problems and challenges associated with electric vehicles.

This book provides readers specializing in ultra-low power supply design for self-powered applications an invaluable reference on reconfigurable switched capacitor power converters. Readers will benefit from a comprehensive introduction to the design of robust power supplies for energy harvesting and self-

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power applications, focusing on the use of reconfigurable switched capacitor based DC-DC converters, which is ideal for such applications. Coverage includes all aspects of switched capacitor power supply designs, from fundamentals, to reconfigurable power stages, and sophisticated controller designs.

This research book volume offers an important learning opportunity with insights into a variety of emerging electronic circuit aspects, such as new materials, energy harvesting architectures, and compressive sensing technique. Advanced circuit technologies are extremely powerful and developed rapidly. They change industry. They change lives. And we know they can change the world. The exhibition on these new and exciting topics will benefit readers in related fields.

Chip-integrated power management solutions are a must for ultra-low power systems. This enables not only the optimization of innovative sensor applications. It is also essential for integration and miniaturization of energy harvesting supply strategies of portable and autonomous monitoring systems. The book particularly addresses interfaces for energy harvesting, which are the key element to connect micro transducers to energy storage elements. Main features of the book are: - A comprehensive technology and application review, basics on transducer mechanics, fundamental circuit

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and control design, prototyping and testing, up to sensor system supply and applications. - Novel interfacing concepts - including active rectifiers, MPPT methods for efficient tracking of DC as well as AC sources, and a fully-integrated charge pump for efficient maximum AC power tracking at sub-100W ultra-low power levels. The chips achieve one of widest presented operational voltage range in standard CMOS technology: 0.44V to over 4.1V. - Two special chapters on analog circuit design – it studies benefits and obstacles on implemented chip prototypes with three goals: ultra- low power, wide supply voltage range, and integration with standard technologies. Alternative design approaches are pursued using bulk-input transistor stages in forward-bias operation for amplifiers, modulators, and references. - Comprehensive Appendix – with additional fundamental analysis, design and scaling guidelines, circuit implementation tables and dimensions, schematics, source code listings, bill of material, etc. The discussed prototypes and given design guidelines are tested with real vibration transducer devices. The intended readership is graduate students in advanced courses, academics and lecturers, R&D engineers.

The book discusses data and energy integrated communication networking technologies, including the latest research contributions in this promising area. It firstly provides an overview of data and

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energy integrated communication networks (DEINs) and introduces the key techniques for enabling integrated wireless energy transfer (WET) and wireless information transfer (WIT) in the radio frequency (RF) band. It then describes the ubiquitous architecture of DEINs and demonstrates the typical DEIN system and investigates the core issues in both the physical layer and the medium-access-control (MAC) layer in order to coordinate both the WIT and WET in the same RF band. Lastly, the book addresses a number of emerging research topics in the field of DEINs. It promotes joint efforts from both academia and industry to push DEIN a step closer to practical implementation. It is also a valuable resource for students interested in studying cutting-edge techniques in this field.

This book discusses in detail the CMOS implementation of energy harvesting. The authors describe an integrated, indoor light energy harvesting system, based on a controller circuit that dynamically and automatically adjusts its operation to meet the actual light circumstances of the environment where the system is placed. The system is intended to power a sensor node, enabling an autonomous wireless sensor network (WSN). Although designed to cope with indoor light levels, the system is also able to work with higher levels, making it an all-round light energy harvesting system. The discussion includes experimental data

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obtained from an integrated manufactured prototype, which in conjunction with a photovoltaic (PV) cell, serves as a proof of concept of the desired energy harvesting system.

This book presents peer-reviewed articles from the 6th International Conference on Wireless Technologies, Embedded and Intelligent Systems (WITS 2020), held at Fez, Morocco. It presents original research results, new ideas and practical lessons learnt that touch on all aspects of wireless technologies, embedded and intelligent systems. WITS is an international conference that serves researchers, scholars, professionals, students and academicians looking to foster both working relationships and gain access to the latest research results. Topics covered include Telecoms & Wireless Networking Electronics & Multimedia Embedded & Intelligent Systems Renewable Energies.

CMOS Processors and Memories addresses the-state-of-the-art in integrated circuit design in the context of emerging computing systems. New design opportunities in memories and processor are discussed. Emerging materials that can take system performance beyond standard CMOS, like carbon nanotubes, graphene, ferroelectrics and tunnel junctions are explored. CMOS Processors and Memories is divided into two parts: processors and memories. In the first part we start with high performance, low power processor design, followed

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by a chapter on multi-core processing. They both represent state-of-the-art concepts in current computing industry. The third chapter deals with asynchronous design that still carries lots of promise for future computing needs. At the end we present a “hardware design space exploration” methodology for implementing and analyzing the hardware for the Bayesian inference framework. This particular methodology involves: analyzing the computational cost and exploring candidate hardware components, proposing various custom architectures using both traditional CMOS and hybrid nanotechnology CMOL. The first part concludes with hybrid CMOS-Nano architectures. The second, memory part covers state-of-the-art SRAM, DRAM, and flash memories as well as emerging device concepts. Semiconductor memory is a good example of the full custom design that applies various analog and logic circuits to utilize the memory cell’s device physics. Critical physical effects that include tunneling, hot electron injection, charge trapping (Flash memory) are discussed in detail. Emerging memories like FRAM, PRAM and ReRAM that depend on magnetization, electron spin alignment, ferroelectric effect, built-in potential well, quantum effects, and thermal melting are also described. CMOS Processors and Memories is a must for anyone serious about circuit design for future computing technologies. The book is written by top notch international experts in

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industry and academia. It can be used in graduate course curriculum.

This volume contains papers from two symposia: State of the Art Program on Compound Semiconductors 45 and Wide Bandgap Semiconductor Materials and Devices VII.

This book presents a collection of peer-reviewed articles from the 7th International Conference on Microelectronics, Circuits, and Systems Micro 2020.

The volume covers the latest development and emerging research topics of material sciences, devices, microelectronics, circuits, nanotechnology, system design and testing, simulation, sensors, photovoltaics, optoelectronics, and its different applications. This book also deals with several tools and techniques to match the theme of the conference. It will be a valuable resource for researchers, professionals, Ph.D. scholars, undergraduate and postgraduate students working in Electronics, Microelectronics, Electrical, and Computer Engineering.

Integrated Audio Amplifiers in BCD Technology is the first book to describe the design at Audio Amplifiers using a Bipolar CMOS DMOS (BCD) process. It shows how the combination of the 3 processes, made available by advances in process technology, gives rise to the design of more robust and powerful audio amplifiers which can be more easily implemented in digital and mixed-signal

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circuits. Integrated Audio Amplifiers in BCD Technology starts with an introduction to audio amplifiers which includes a comparison of amplifier classes, general design considerations and a list of specifications for integrated audio power amplifiers. This is followed by an extensive discussion of the properties of DMOS transistors which are the key components in BCD technologies. Then the theory and the design of chargepump circuits is considered. In most BCD technologies only n-type DMOS transistors are available. Therefore a boosted supply voltage is required to achieve rail-to-rail output capability which can be generated with a chargepump. The new solutions that are found can also be used for many applications where DC-DC conversion with low output ripple is needed. Finally the design of audio power amplifier in BCD technology is discussed. The design concentrates on a new quiescent control circuit with very high ratio between quiescent current and maximum output current and on the output stage topologies. The problem of controlling the DMOS output transistors over a wide range of currents either saturated or non saturated requires a completely new design of the driving circuits that utilize of the special properties of the DMOS transistor. Integrated Audio Amplifiers in BCD Technology is essential reading for practising analog design engineers and researchers in the field. It is also suitable as a text for an advanced

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course on the subject. With a foreword by Ed van Tuijl.

The book is a collection of high-quality peer-reviewed research papers presented in the Proceedings of International Conference on Power Electronics and Renewable Energy Systems (ICPERES 2014) held at Rajalakshmi Engineering College, Chennai, India. These research papers provide the latest developments in the broad area of Power Electronics and Renewable Energy. The book discusses wide variety of industrial, engineering and scientific applications of the emerging techniques. It presents invited papers from the inventors/originators of new applications and advanced technologies.

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