A Non Isolated Interleaved Boost Converter For High

Photovoltaic (PV) energy generation is an excellent example of large-scale electric power generation through various parallel arrangements of small voltage-generating solar cells or modules. However, PV generation systems require power electronic converters system to satisfy the need for real-time applications or to balance the demand for power from electric. Therefore, a DC-DC power converter is a vital constituent in the intermediate conversion stage of PV power. This book presents a comprehensive review of various non-isolated DC-DC power converters. Non-isolated DC-DC converters for renewable energy system (RES) application presented in this book 1st edition through a detailed original investigation, obtained numerical/experimental results, and guided the scope to design new families of converters: DC-DC multistage power converter topologies, Multistage "X-Y converter family", Nx IMBC (Nx Interleaved Multilevel Boost Converter), Cockcroft Walton (CW) Voltage Multiplier-Based Multistage/Multilevel Power Converter (CW-VM-MPC) converter topologies, and Z-source and quasi Z-source. Above solutions are discussed to show how they can achieve the maximum voltage conversion gain ratio by adapting the passive/active component within the circuits. For assessment, we have recommended novel power converters through their functionality and designs, tested and verified by numerical software. Further, the hardware prototype implementation is carried out through a flexible digital processor. Both numerical and experimental results always shown as expected close agreement with primary theoretical hypotheses. This book offers guidelines and recommendation for future development with the DC-DC converters for RES applications based on cost-effective, and reliable solutions.

The why, what and how of the electric vehicle powertrain Empowers engineering professionals and students with the knowledge and skills required to engineer electric vehicle powertrain architectures, energy storage systems, power electronics converters and electric drives. The modern electric powertrain is relatively new for the automotive industry, and engineers are challenged with designing affordable, efficient and high-performance electric powertrains as the industry undergoes a technological evolution. Co-authored by two electric vehicle (EV) engineers with decades of experience designing and putting into production all of the powertrain technologies presented, this book provides readers with the hands-on knowledge, skills and expertise they need to rise to that challenge. This four-part practical guide provides a comprehensive review of battery, hybrid and fuel cell EV systems and the associated energy sources, power electronics, machines, and drives. The first part of the book begins with a historical overview of electromobility and the related environmental impacts motivating the development of the electric powertrain. Vehicular requirements for electromechanical propulsion are then presented. Battery electric vehicles (BEV), fuel cell electric vehicles (FCEV), and conventional and hybrid electric vehicles (HEV) are then described, contrasted and compared for vehicle propulsion. The second part of the book features in-depth analysis of the electric powertrain traction machines, with a particular focus on the induction machine and the surface- and interior-permanent magnet ac machines. The brushed dc machine is also considered due to its ease of operation and understanding, and its historical place, especially as the traction machine on NASA's Mars rovers. The third part of the book features the theory and applications for the propulsion, charging, accessory, and auxiliary power electronics converters. Chapters are presented on isolated and non-isolated dc-dc converters, traction inverters, and battery charging. The fourth part presents the introductory and applied electromagnetism required as a foundation throughout the book. • Introduces and holistically integrates the key EV powertrain technologies. • Provides a comprehensive overview of existing and emerging automotive solutions. • Provides experience-based expertise for vehicular and powertrain system and sub-system level study, design, and optimization. • Presents many examples of powertrain technologies from leading manufacturers. • Discusses the dc traction machines of the Mars rovers, the ultimate EVs from NASA. • Investigates the environmental motivating factors and impacts of electromobility. • Presents a structured university teaching stream from introductory undergraduate to postgraduate. • Includes real-world problems and assignments of use to design engineers, researchers, and students alike. • Features a companion website with numerous references, problems, solutions, and practical assignments. • Includes introductory material throughout the book for the general scientific reader. • Contains essential reading for government regulators and policy makers. Electric Powertrain: Energy Systems, Power Electronics and Drives for Hybrid, Electric and Fuel Cell Vehicles is an important professional resource for practitioners and researchers in the battery, hybrid, and fuel cell EV transportation industry. The book is a structured holistic textbook for the teaching of the fundamental theories and applications of energy sources, power electronics, and electric machines and drives to engineering undergraduate and postgraduate students. Textbook Structure and Suggested Teaching Curriculum This is primarily an engineering textbook covering the automotive powertrain, energy storage and energy conversion, power electronics, and electrical machines. A significant additional focus is placed on the engineering design, the energy for transportation, and the related environmental impacts. This textbook is an educational tool for practicing engineers and others, such as transportation policy planners and regulators. The modern automobile is used as the vehicle upon which to base the theory and applications, which makes the book a useful educational reference for our industry colleagues, from chemists to engineers. This material is also written to be of interest to the general reader, who may have little or no interest in the power electronics and machines. Introductory science, mathematics, and an inquiring mind suffice for some chapters. The general reader can read the introduction to each of the chapters and move to the next as soon as the material gets too advanced for him or her. Part I Vehicles and Energy Sources Chapter 1 Electromobility and the Environment Chapter 2 Vehicle Dynamics Chapter 3 Batteries Chapter 4 Fuel Cells Chapter 5 Conventional and Hybrid Powertrains Part II Electrical Machines Chapter 6 Introduction to Traction Machines Chapter 7 The Brushed DC Machine Chapter 8 Induction Machines Chapter 9 Surface-permanent-magnet AC Machines Chapter 10: Interior-permanent-magnet AC Machines Part III Power Electronics Chapter 11 DC-DC Converters Chapter 12 Isolated DC-DC Converters

Chapter 13 Traction Drives and Three-phase Inverters Chapter 14 Battery Charging Chapter 15 Control of the Electric Drive Part IV Basics Chapter 16 Introduction to Electromagnetism, Ferromagnetism, and Electromechanical Energy Conversion The first third of the book (Chapters 1 to 6), plus parts of Chapters 14 and 16, can be taught to the general science or engineering student in the second or third year. It covers the introductory automotive material using basic concepts from mechanical, electrical, environmental, and electrochemical engineering. Chapter 14 on electrical charging and Chapter 16 on electromagnetism can also be used as a general introduction to electrical engineering. The basics of electromagnetism, ferromagnetism and electromechanical energy conversion (Chapter 16) and dc machines (Chapter 7) can be taught to second year (sophomore) engineering students who have completed introductory electrical circuits and physics. The third year (junior) students typically have covered ac circuit analysis, and so they can cover ac machines, such as the induction machine (Chapter 8) and the surface permanent-magnet ac machine (Chapter 9). As the students typically have studied control theory, they can investigate the control of the speed and torque loops of the motor drive (Chapter 15). Power electronics, featuring non-isolated buck and boost converters (Chapter 11), can also be introduced in the third year. The final-year (senior) students can then go on to cover the more advanced technologies of the interior-permanent-magnet ac machine (Chapter 10). Isolated power converters (Chapter 12), such as the full-bridge and resonant converters, inverters (Chapter 13), and power-factor-corrected battery chargers (Chapter 14), are covered in the power electronics section. This material can also be covered at the introductory postgraduate level. Various homework, simulation, and research exercises are presented throughout the textbook. The reader is encouraged to attempt these exercises as part of the learning experience. Instructors are encouraged to contact the author, John Hayes, direct to discuss course content or structure.

This book comprises select peer-reviewed papers from the International Conference on Emerging Trends in Electromechanical Technologies & Management (TEMT) 2019. The focus is on current research in interdisciplinary areas of mechanical, electrical, electronics and information technologies, and their management from design to market. The book covers a wide range of topics such as computer integrated manufacturing, additive manufacturing, materials science and engineering, simulation and modelling, finite element analysis, operations and supply chain management, decision sciences, business analytics, project management, and sustainable freight transportation. The book will be of interest to researchers and practitioners of various disciplines, in particular mechanical and industrial engineering.

"In most solar energy systems, the output voltage of a photovoltaic panel is usually between 20 to 40 Vdc. In order to interface the panels to a 400 Vdc bus, a high voltage gain dc-dc converter is required. This thesis starts with analyzing and simulating several topologies that have been already introduced for this application. The voltage gain and efficiency are investigated analytically. A hardware prototype of one of the existing topologies, the interleaved boost converter with voltage multiplier cell, has been developed. Finally, a new topology with a higher voltage transfer ratio is proposed and its experimental results are compared with former topologies. Simulations are used to verify the design and predict the performance of each topology"--Abstract, page iii.

The 2014 Asia-Pacific Electronics and Electrical Engineering Conference (EEEC 2014) was held on December 27-28, 2014 in Shanghai, China. EEEC has provided a platform for researchers, engineers, academicians as well as industrial professionals from all over the world to present their research results and development activities in Electroni

Due to the increasing world population, energy consumption is steadily climbing, and there is a demand to provide solutions for sustainable and renewable energy production, such as wind turbines and photovoltaics. Power electronics are being used to interface renewable sources in order to maximize the energy yield, as well as smoothly integrate them within the grid. In many cases, power electronics are able to ensure a large amount of energy saving in pumps, compressors, and ventilation systems. This book explains the operations behind different renewable generation technologies in order to better prepare the reader for practical applications. Multiple chapters are included on the state-of-the-art and possible technology developments within the next 15 years. The book provides a comprehensive overview of the current renewable energy technology in terms of system configuration, power circuit usage, and control. It contains two design examples for small wind turbine system and PV power system, respectively, which are useful for real-life installation, as well as many computer simulation models.

Like most industries around the world, the energy industry has also made, and continues to make, a long march toward "green" energy. The science has come a long way since the 1970s, and renewable energy and other green technologies are becoming more and more common, replacing fossil fuels. It is, however, still a struggle, both in terms of energy sources keeping up with demand, and the development of useful technologies in this area. To maintain the supply for electrical energy, researchers, engineers and other professionals in industry are continuously exploring new eco-friendly energy technologies and power electronics, such as solar, wind, tidal, wave, bioenergy, and fuel cells. These technologies have changed the concepts of thermal, hydro and nuclear energy resources by the adaption of power electronics advancement and revolutionary development in lower manufacturing cost for semiconductors with long time reliability. The latest developments in renewable resources have proved their potential to boost the economy of any country. Green energy technology has not only proved the concept of clean energy but also reduces the dependencies on fossil fuel for electricity generation through smart power electronics integration. Also, endless resources have more potential to cope with the requirements of smart building and smart city concepts. A valuable reference for engineers, scientists, chemists, and students, this volume is applicable to many different fields, across many different industries, at all levels. It is a must-have for any library.

This is a reprint in book form of the Energies MDPI Journal Special Issue , entitled "Energy Storage Systems and Power Conversion Electronics for E-Transportation and Smart Grid". The Special Issue was managed by two Guest Editors from Italy and Norway: Professor Sergio Saponara from the University of Pisa and Professor Lucian MIHET-POPA from Østfold University College, in close cooperation with

the Editors from Energies. The papers published in this SI are related to the emerging trends in energy storage and power conversion electronic circuits and systems, with a specific focus on transportation electrification, and on the evolution from the electric grid to a smart grid. An extensive exploitation of renewable energy sources is foreseen for the smart grid, as well as a close integration with the energy storage and recharging systems of the electrified transportation era. Innovations at the levels of both algorithmic and hardware (i.e., power converters, electric drives, electronic control units (ECU), energy storage modules and charging stations) are proposed. Research and technology transfer activities in energy storage systems, such as batteries and super/ultra-capacitors, are essential for the success of electric transportation, and to foster the use of renewable energy sources. Energy storage systems are the key technology to solve these issues, and to increase the adoption of renewable energy sources in the smart grid.

This book comprises select proceedings of the international conference ETAEERE 2020, and focuses on contemporary issues in energy management and energy efficiency in the context of power systems. The contents cover modeling, simulation and optimization based studies on topics like medium voltage BTB system, cost optimization of a ring frame unit in textile industry, rectenna for RF energy harvesting, ecology and energy dimension in infrastructural designs, study of AGC in two area hydro thermal power system, energy-efficient and reliable depth-based routing protocol for underwater wireless sensor network, and power line communication. This book can be beneficial for students, researchers as well as industry professionals. .

The IEEE ICECCT 2019 aims to offer a great opportunity to bring together professors, researchers and scholars around the globe a great platform to deliver the latest innovative research results and the most recent developments and trends in Electrical, Electronics and Computer Engineering and Technology fields The conference will feature invited talks from eminent personalities all around the world, pre conference tutorial workshops and referred paper presentations The vision of IEEE ICECCT 2019 is to promote foster communication among researchers and practitioners working in a wide variety of the above areas in Engineering and Technology

This book contains revised and extended research articles written by prominent researchers, selected from presentations at the International MultiConference of Engineers and Computer Scientists (IMECS 2018) held in Hong Kong, 14-16 March, 2018. Topics covered include engineering physics, communications systems, control theory, automation, engineering mathematics, scientific computing, electrical engineering, and industrial applications. The book gives a snapshot of selected advances in engineering technologies and their applications, and will serve as a useful reference for researchers and graduate students in these fields.

The Industrial Electronics Handbook, Second Edition combines traditional and newer, more specialized knowledge that will help industrial electronics engineers develop practical solutions for the design and implementation of high-power applications. Embracing the broad technological scope of the field, this collection explores fundamental areas, including analog and digital circuits, electronics, electromagnetic machines, signal processing, and industrial control and communications systems. It also facilitates the use of intelligent systems—such as neural networks, fuzzy systems, and evolutionary methods—in terms of a hierarchical structure that makes factory control and supervision more efficient by addressing the needs of all production components. Enhancing its value, this fully updated collection presents research and global trends as published in the IEEE Transactions on Industrial Electronics Journal, one of the largest and most respected publications in the field. Power Electronics and Motor Drives facilitates a necessary shift from low-power electronics to the high-power varieties used to control electromechanical systems and other industrial applications. This volume of the handbook: Focuses on special high-power semiconductor devices Describes various electrical machines and motors, their principles of operation, and their limitations Covers power conversion and the high-efficiency devices that perform the necessary switchover between AC and DC Explores very specialized electronic circuits for the efficient control of electric motors Details other applications of power electronics, aside from electric motors—including lighting, renewable energy conversion, and automotive electronics Addresses power electronics used in very-high-power electrical systems to transmit energy Other volumes in the set: Fundamentals of Industrial Electronics Control and Mechatronics Industrial Communication Systems Intelligent Systems

The book presents the analysis and control of numerous DC-DC converters widely used in several applications such as standalone, grid integration, and motor drives-based renewable energy systems. The book provides extensive simulation and practical analysis of recent and advanced DC-DC power converter topologies. This self-contained book contributes to DC-DC converters design, control techniques, and industrial as well as domestic applications of renewable energy systems. This volume will be useful for undergraduate/postgraduate students, energy planners, designers, system analysis, and system governors.

The 2016 International Conference on Civil, Architecture and Environmental Engineering (ICCAE 2016), November 4-6, 2016, Taipei, Taiwan, is organized by China University of Technology and Taiwan Society of Construction Engineers, aimed to bring together professors, researchers, scholars and industrial pioneers from all over the world. ICCAE 2016 is the premier forum for the presentation and exchange of experience, progress and research results in the field of theoretical and industrial experience. The conference consists of contributions promoting the exchange of ideas between researchers and educators all over the world.

New converter topologies and control Resonant converters Matrix converters Multi level converters Converters for special applications Power supplies and energy storage systems Power quality and EMI EMC issues and solutions Power electronics in power systems Power electronics for renewable energy, distributed generation and micro grids Modelling, simulation and control of power converters Power semiconductor devices Integration, packaging and thermal management Wireless power transmission Pulsed power Biomedical power electronics Fault management and reliability of power converters Education in power electronics Design and optimization of electrical machines Adjustable speed drives Special electrical machines and drives Condition monitoring and diagnosis of electrical machines Sensors and observers for electrical drives Drives for traction propulsion systems Marine and submarine drives Mechatronics, motion control and robotics

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.

The proceedings present a selection of refereed papers presented at the 1st International Conference on Electronic Engineering and Renewable Energy (ICEERE 2018) held during 15-17 April 2018, Saidi, Morocco. The contributions from electrical engineers and experts highlight key issues and developments essential to the multifaceted field of electrical engineering systems and seek to address multidisciplinary challenges in Information and Communication Technologies. The book has a special focus on energy challenges for developing the Euro-Mediterranean regions through new renewable energy technologies in the agricultural and rural areas. The book is intended for academia, including graduate students, experienced researchers and industrial practitioners working in the fields of Electronic Engineering and Renewable Energy.

This book comprises the select proceedings of the ETAEERE 2016 conference. The book aims to shed light on different systems

or machines along with their complex operation, behaviors, and linear–nonlinear relationship in different environments. It covers problems of multivariable control systems and provides the necessary background for performing research in the field of control and automation. Aimed at helping readers understand the classical and modern design of different intelligent automated systems, the book presents coverage on the control of linear and nonlinear systems, intelligent systems, stochastic control, knowledge-based systems applications, fault diagnosis and tolerant control, real-time control applications, etc. The contents of this volume will prove useful to researchers and professionals alike.

A thoroughly revised third edition of this widely praised, bestselling textbook presents a comprehensive systems-level perspective of electric and hybrid vehicles with emphasis on technical aspects, mathematical relationships and basic design guidelines. The emerging technologies of electric vehicles require the dedication of current and future engineers, so the target audience for the book is the young professionals and students in engineering eager to learn about the area. The book is concise and clear, its mathematics are kept to a necessary minimum and it contains a well-balanced set of contents of the complex technology. Engineers of multiple disciplines can either get a broader overview or explore in depth a particular aspect of electric or hybrid vehicles. Additions in the third edition include simulation-based design analysis of electric and hybrid vehicles and their powertrain components, particularly that of traction inverters, electric machines and motor drives. The technology trends to incorporate wide bandgap power electronics and reduced rare-earth permanent magnet electric machines in the powertrain components have been highlighted. Charging stations are a critical component for the electric vehicle infrastructure, and hence, a chapter on vehicle interactions with the power grid has been added. Autonomous driving is another emerging technology, and a chapter is included describing the autonomous driving system architecture and the hardware and software needs for such systems. The platform has been set in this book for system-level simulations to develop models using various softwares used in academia and industry, such as MATLAB®/Simulink, PLECS, PSIM, Motor-CAD and Altair Flux. Examples and simulation results are provided in this edition using these software tools. The third edition is a timely revision and contribution to the field of electric vehicles that has reached recently notable markets in a more and more environmentally sensitive world.

This book is a collection of research articles and critical review articles, describing the overall approach to energy management. The book emphasizes the technical issues that drive energy efficiency in context of power systems. This book contains case studies with and without solutions on modelling, simulation and optimization techniques. It covers some innovative topics such as medium voltage (MV) back-to-back (BTB) system, cost optimization of a ring frame unit in textile industry, rectenna for radio frequency (RF) energy harvesting, ecology and energy dimension in infrastructural designs, 2.4 kW three-phase inverter for aircraft application, study of automatic generation control (AGC) in a two area hydrothermal power system, energy-efficient and reliable depth-based routing protocol for underwater wireless sensor network, and power line communication using LabVIEW. This book is primarily targeted at researchers and senior graduate students, but is also highly useful for the industry professional and scientists.

This book presents select proceedings of International Conference on Energy, Material Sciences and Mechanical Engineering (EMSME) 2020, held at National Institute of Technology Delhi. Various topics covered in this book include clean materials, solar energy systems, wind energy systems, power optimization, grid integration of renewable energy, smart energy storage technologies, artificial intelligence in solar and wind system, analysis of clean energy material in environment, converter topology, modelling and simulation. This book will be useful for researchers and professionals working in the areas of solar material science, electrical engineering, and energy technologies.

The book discusses the latest developments and outlines future trends in the fields of microelectronics, electromagnetics and telecommunication. It contains original research works presented at the International Conference on Microelectronics, Electromagnetics and Telecommunication (ICMEET 2018), organised by GVP College of Engineering (A), Andhra Pradesh, India. The respective papers were written by scientists, research scholars and practitioners from leading universities, engineering colleges and R&D institutes from all over the world, and share the latest breakthroughs in and promising solutions to the most important issues facing today's society.

Microgrid technology is an emerging area, and it has numerous advantages over the conventional power grid. A microgrid is defined as Distributed Energy Resources (DER) and interconnected loads with clearly defined electrical boundaries that act as a single controllable entity concerning the grid. Microgrid technology enables the connection and disconnection of the system from the grid. That is, the microgrid can operate both in grid-connected and islanded modes of operation. Microgrid technologies are an important part of the evolving landscape of energy and power systems. Many aspects of microgrids are discussed in this volume, including, in the early chapters of the book, the various types of energy storage systems, power and energy management for microgrids, power electronics interface for AC & DC microgrids, battery management systems for microgrid applications, power system analysis for microgrids, and many others. The middle section of the book presents the power quality problems in microgrid systems and its mitigations, gives an overview of various power quality problems and its solutions, describes the PSO algorithm based UPQC controller for power quality enhancement, describes the power quality enhancement and grid support through a solar energy conversion system, presents the fuzzy logic-based power quality assessments, and covers various power quality indices. The final chapters in the book present the recent advancements in the microgrids, applications of Internet of Things (IoT) for microgrids, the application of artificial intelligent techniques, modeling of green energy smart meter for microgrids, communication networks for microgrids, and other aspects of microgrid technologies. Valuable as a learning tool for beginners in this area as well as a daily reference for engineers and scientists working in the area of microgrids, this is a must-have for any library.

This two-volume work contains the papers presented at the 2016 International Conference on Civil, Architecture and Environmental Engineering (ICCAE 2016) that was held on 4-6 November 2016 in Taipei, Taiwan. The meeting was organized by China University of Technology and Taiwan Society of Construction Engineers and brought together professors, researchers, scholars and industrial pioneers from all over the world. ICCAE 2016 is an important forum for the presentation of new research developments, exchange of ideas and experience and covers the following subject areas: Structural Science & Architecture Engineering, Building Materials & Materials Science, Construction Equipment & Mechanical Science, Environmental Science & Environmental Engineering, Computer Simulation & Computer and Electrical Engineering.

This book provides innovative ideas on achieving sustainable development and using green technologies to conserve our ecosystem. Innovation is the successful exploitation of a new idea. Through innovation, we can achieve MORE while using LESS. Innovations in science & technology will not only help mankind as a whole, but also contribute to the economic growth of individual countries. It is essential that the global problem of environmental degradation be addressed immediately, and thus, we need to rethink the concept of sustainable development. Indeed, new environmentally friendly technologies are fundamental to attaining sustainable development. The book shares a wealth of innovative green technological ideas on how to preserve and improve the quality of the environment, and how to establish a more resource-efficient and sustainable society. The book provides an interdisciplinary approach to addressing various technical issues and

capitalizing on advances in computing & optimization for scientific & technological development, smart information, communication, bio-monitoring, smart cities, food quality assessment, waste management, environmental aspects, alternative energies, sustainable infrastructure development, etc. In short, it offers valuable information and insights for budding engineers, researchers, upcoming young minds and industry professionals, promoting awareness for recent advances in the various fields mentioned above.

The high demand of energy efficiency has led to the development power converter topologies and control system designs within the field of power electronics. Recent advances of interleaved boost converters have showed improved features between the power conversion topologies in several aspects, including power quality, efficiency, sustainability and reliability. Interleaved boost converter with multi-phase technique for PV system is an attractive area for distributed power generation. During load variation or power supply changes due to the weather changes the output voltage requires a robust control to maintain stable and perform robustness. Connecting converters in series and parallel have the advantages of modularity, scalability, reliability, distributed location of capacitors which make it favorable in industrial applications. In this dissertation, a design of æ-synthesis controller is proposed to address the design specification of multi-phase interleaved boost converter at several power applications. This thesis contributes to the ongoing research on the IBC topology by proposing the modeling, applications uses and control techniques to the stability challenges. The research proposes a new strategy of robust control applied to a non-isolated DC/DC interleaved boost converter with a high step voltage ratio as multi-phase, multi-stage which is favorable for PV applications. The proposed controller is designed based on æ-synthesis technique to approach a high regulated output voltage, better efficiency, gain a fast regulation response against disturbance and load variation with a better dynamic performance and achieve robustness. The controller has been simulated using MATLAB/Simulink software and validated through experimental results which show the effectiveness and the robustness.

This two-volume book presents the outcomes of the 8th International Conference on Soft Computing for Problem Solving, SocProS 2018. This conference was a joint technical collaboration between the Soft Computing Research Society, Liverpool Hope University (UK), and Vellore Institute of Technology (India), and brought together researchers, engineers and practitioners to discuss thought-provoking developments and challenges in order to select potential future directions. The book highlights the latest advances and innovations in the interdisciplinary areas of soft computing, including original research papers on algorithms (artificial immune systems, artificial neural networks, genetic algorithms, genetic programming, and particle swarm optimization) and applications (control systems, data mining and clustering, finance, weather forecasting, game theory, business and forecasting applications). It offers a valuable resource for both young and experienced researchers dealing with complex and intricate real-world problems that are difficult to solve using traditional methods.

Bulletin of Electrical Engineering and Informatics is a peer-reviewed journal that publishes material on all aspects of electrical, electronics, instrumentation, control, telecommunication, computer engineering, information technology and informatics from the global world.

Fault detection, control, and forecasting have a vital role in renewable energy systems (Photovoltaics (PV) and wind turbines (WTs)) to improve their productivity, ef?ciency, and safety, and to avoid expensive maintenance. For instance, the main crucial and challenging issue in solar and wind energy production is the volatility of intermittent power generation due mainly to weather conditions. This fact usually limits the integration of PV systems and WTs into the power grid. Hence, accurately forecasting power generation in PV and WTs is of great importance for daily/hourly efficient management of power grid production, delivery, and storage, as well as for decision-making on the energy market. Also, accurate and prompt fault detection and diagnosis strategies are required to improve efficiencies of renewable energy systems, avoid the high cost of maintenance, and reduce risks of fire hazards, which could affect both personnel and installed equipment. This book intends to provide the reader with advanced statistical modeling, forecasting, and fault detection techniques in renewable energy systems.

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.

This book outlines issues related to massive integration of electric and plug-in hybrid electric vehicles into power grids. Electricity is becoming the preferred energy vector for the next new generation of road vehicles. It is widely acknowledged that road vehicles based on full electric or hybrid drives can mitigate problems related to fossil fuel dependence. This book explains the emerging and understanding of storage systems for electric and plug-in hybrid vehicles. The recharging stations for these types of vehicles might represent a great advantage for the electric grid by facilitating integration of renewable and distributed energy production. This book presents a broad review from analyzing current literature to on-going research projects about the new power technologies related to the various charging architectures for electric and plug-in hybrid vehicles. Specifically focusing on DC fast charging operations, as well as, grid-connected power converters and the full range of energy storage systems. These key components are analyzed for distributed generation and charging system integration into micro-grids. The authors demonstrate that these storage systems represent effective interfaces for the control and management of renewable and sustainable distributed energy resources. New standards and applications are emerging from micro-grid pilot projects around the world and case studies demonstrate the convenience and feasibility of distributed energy management. The material in this unique volume discusses potential avenues for further research toward achieving more reliable, more secure and cleaner energy.

The increasing demand for electronic devices for private and industrial purposes lead designers and researchers to explore new electronic devices and circuits that can perform several tasks efficiently with low IC area and low power consumption. In addition, the increasing demand for portable devices intensifies the call from industry to design sensor elements, an efficient storage cell, and large capacity memory elements. Several industry-related issues have also forced a redesign of basic electronic components for certain specific applications. The researchers, designers, and students working in the area of electronic devices, circuits, and materials sometimesneed standard examples with certain specifications. This breakthrough work presents this knowledge of standard electronic device and circuit design analysis, including advanced technologies and materials. This outstanding new volume presents the basic concepts and

fundamentals behind devices, circuits, and systems. It is a valuable reference for the veteran engineer and a learning tool for the student, the practicing engineer, or an engineer from another field crossing over into electrical engineering. It is a must-have for any library.

The second IEEE Kansas Power & Energy Conference (KPEC 2021) will be held in Manhattan, Kansas, USA on April 19 20, 2021 KPEC is a professionally driven international event in the Power and Energy conversion domain KPEC will feature both industry driven and application oriented technical sessions, as well as expositions The conference will consolidate the thoughts of young academic minds with the industrial leaders and experts for interactive and multidisciplinary discussions These discussions will cover the latest trends and advances in the energy conversion technology

Written by experts, this book is based on recent research findings in high-frequency isolated bidirectional DC-DC converters with wide voltage range. It presents advanced power control methods and new isolated bidirectional DC-DC topologies to improve the performance of isolated bidirectional converters. Providing valuable insights, advanced methods and practical design guides on the DC-DC conversion that can be considered in applications such as microgrid, bidirectional EV chargers, and solid state transformers, it is a valuable resource for researchers, scientists, and engineers in the field of isolated bidirectional DC-DC converters.

DC/DC conversion techniques have undergone rapid development in recent decades. With the pioneering work of authors Fang Lin Luo and Hong Ye, DC/DC converters have now been sorted into their six generations, and by a rough count, over 800 different topologies currently exist, with more being developed each year. Advanced DC/DC Converters, Second Edition offers a concise, practical presentation of DC/DC converters, summarizes the spectrum of conversion technologies, and presents new ideas and more than 200 new topologies. Beginning with background material on DC/DC conversion, the book later discusses both voltage lift and super-lift converters. It then proceeds through each generation, including the groundbreaking sixth generation—converters developed by the authors that can be cascaded for high voltage transfer gain. This new edition updates every chapter and offers three new chapters. The introduction of the super-lift technique is an outstanding achievement in DC/DC conversion technology, and the ultra-lift technique and hybrid split-capacitor/inductor applied in Super-Lift Luo-Converters are introduced in Chapters 7 and 8. In Chapter 9, the authors have theoretically defined a new concept, Energy Factor (EF), researched the relations between EF and the mathematical modelling for power DC/DC converters, and demonstrated the modeling method for two converters. More than 320 figures, 60 tables, and 500 formulae allow the reader to more easily grasp the overall structure of advanced DC/DC converters, provide fast access to precise data, and help them to quickly determine the values of their own circuit components.