

Electrical Engineering Research Topics

This volume presents the selected papers of the First International Conference on Fundamental Research in Electrical Engineering, held at Khwarazmi University, Tehran, Iran in July, 2017. The selected papers cover the whole spectrum of the main four fields of Electrical Engineering (Electronic, Telecommunications, Control, and Power Engineering).

This book brings together important contributions and state-of-the-art research results in the rapidly advancing area of symbolic analysis of analog circuits. It is also of interest to those working in analog CAD. The book is an excellent reference, providing insights into some of the most important issues in the symbolic analysis of analog circuits.

Power System Small Signal Stability Analysis and Control presents a detailed analysis of the problem of severe outages due to the sustained growth of small signal oscillations in modern interconnected power systems. The ever-expanding nature of power systems and the rapid upgrade to smart grid technologies call for the implementation of robust and optimal controls. Power systems that are forced to operate close to their stability limit have resulted in the use of control devices by utility companies to improve the performance of the transmission system against commonly occurring power system disturbances. This book demonstrates how the application of power system damping controllers such as Power System Stabilizers (PSSs) and Flexible Alternating Current Transmission System (FACTS) controllers—namely Static Var Compensator (SVC) and Thyristor Controlled Series Compensator (TCSC)—can guard against system disruptions. Power System Small Signal Stability Analysis and Control examines the signal stability problem, providing an overview and analysis of the concepts and of the controllers used to mitigate it. Detailed mathematical derivations, illustrated case studies, the application of soft computation techniques, designs of robust controllers, and end-of-chapter exercises make it a useful resource to researchers, practicing engineers, and post-graduates in electrical engineering. Examines the power system small signal stability problem and various ways to mitigate it Offers a new and simple method of finding the optimal location of PSS in a multi-machine power system Provides relevant exercises to further illustrate chapter-specific content

This book presents current research in the field of electrical engineering. Topics discussed include voltage stabilisation using a storage capacitor; AC bridge circuitry for the capacitive position sensor inside the superconducting linear motor system; ferromagnetism in semiconductors doped with non-magnetic elements; spin transfer torque effect and its applications; fundamentals of half-metallic full-Heusler alloys; electronics, spintronics and orbitronics and electric motor drives for battery, hybrid and fuel cell vehicles.

This book includes the original, peer-reviewed research papers from the 9th Frontier Academic Forum of Electrical Engineering (FAFEE 2020), held in Xi'an, China, in August 2020. It gathers the latest research, innovations, and applications in the fields of Electrical Engineering. The topics it covers including electrical materials and equipment, electrical energy storage and device, power electronics and drives, new energy electric power system equipment, IntelliSense and intelligent equipment, biological electromagnetism and its applications, and insulation and discharge computation for power equipment. Given its scope, the book benefits all researchers, engineers, and graduate students who want to learn about cutting-edge advances in Electrical Engineering.

Explores state-of-the-art software architectures and platforms used to support distributed and mobile e-learning systems.

New Scientist magazine was launched in 1956 "for all those men and women who are interested in scientific discovery, and in its industrial, commercial and social consequences". The brand's mission is no different today - for its consumers, New Scientist reports, explores and interprets the results of human endeavour set in the context of society and culture.

The electric power delivery system that carries electricity from large central generators to customers could be severely damaged by a small number of well-informed attackers. The system is inherently vulnerable because transmission lines may span hundreds of miles, and many key facilities are unguarded. This vulnerability is exacerbated by the fact that the power grid, most of which was originally designed to meet the needs of individual vertically integrated utilities, is being used to move power between regions to support the needs of competitive markets for power generation. Primarily because of ambiguities introduced as a result of recent restricting the of the industry and cost pressures from consumers and regulators, investment to strengthen and upgrade the grid has lagged, with the result that many parts of the bulk high-voltage system are heavily stressed.

Electric systems are not designed to withstand or quickly recover from damage inflicted simultaneously on multiple components. Such an attack could be carried out by knowledgeable attackers with little risk of detection or interdiction. Further well-planned and coordinated attacks by terrorists could leave the electric power system in a large region of the country at least partially disabled for a very long time. Although there are many examples of terrorist and military attacks on power systems elsewhere in the world, at the time of this study international terrorists have shown limited interest in attacking the U.S. power grid. However, that should not be a basis for complacency. Because all parts of the economy, as well as human health and welfare, depend on electricity, the results could be devastating. Terrorism and the Electric Power Delivery System focuses on measures that could make the power delivery system less vulnerable to attacks, restore power faster after an attack, and make critical services less vulnerable while the delivery of conventional electric power has been disrupted.

This book presents spectrum sharing efforts between cellular systems and radars. The book addresses coexistence algorithms for radar and communication systems. Topics include radar and cellular system models; spectrum sharing with small radar systems; spectrum sharing with large radar systems; radar spectrum sharing with coordinated multipoint systems (CoMP); and spectrum sharing with overlapped MIMO radars. The primary audience is the radar and wireless communication community, specifically people

in industry, academia, and research whose focus is on spectrum sharing. The topics are of interest for both communication and signal processing technical groups. In addition, students can use MATLAB code to enhance their learning experience.

This volume includes extended and revised versions of a set of selected papers from the International Conference on Electric and Electronics (EEIC 2011) , held on June 20-22 , 2011, which is jointly organized by Nanchang University, Springer, and IEEE IAS Nanchang Chapter. The objective of EEIC 2011 Volume 2 is to provide a major interdisciplinary forum for the presentation of new approaches from Electrical engineering and controls, to foster integration of the latest developments in scientific research. 133 related topic papers were selected into this volume. All the papers were reviewed by 2 program committee members and selected by the volume editor Prof. Min Zhu. We hope every participant can have a good opportunity to exchange their research ideas and results and to discuss the state of the art in the areas of the Electrical engineering and controls.

EECon 2021 solicits research papers describing significant and innovative research contributions to all fields of electrical engineering We invite submissions on a wide range of research topics in Electrical Engineering Topics of interest include, but are not limited to Power Quality and Reliability Power Systems Stability and Power Systems Control Electrical Machines, Power Electronics and Control Drives Renewable Energy Systems and Battery Technologies Smart Technologies and Electric Transportation Conventional Energy Technologies Power Systems Economics High voltage and Nano Technology Control & Automation Robotics and intelligent Systems

Power converters and electric machines represent essential components in all fields of electrical engineering. In fact, we are heading towards a future where energy will be more and more electrical: electrical vehicles, electrical motors, renewables, storage systems are now widespread. The ongoing energy transition poses new challenges for interfacing and integrating different power systems. The constraints of space, weight, reliability, performance, and autonomy for the electric system have increased the attention of scientific research in order to find more and more appropriate technological solutions. In this context, power converters and electric machines assume a key role in enabling higher performance of electrical power conversion. Consequently, the design and control of power converters and electric machines shall be developed accordingly to the requirements of the specific application, thus leading to more specialized solutions, with the aim of enhancing the reliability, fault tolerance, and flexibility of the next generation power systems. "The objective of the book is to introduce and bring together well-known circuit design aspects, as well as to cover up-to-date outcomes of theoretical studies in decision-making, biologically-inspired, and artificial intelligent learning techniques"--Provided by publisher.

The second edition of this popular engineering reference book, previously titles Newnes Electrical Engineer's Handbook, provides a basic understanding of the underlying theory and operation of the major classes of electrical equipment. With coverage including the key principles of electrical engineering and the design and operation of electrical equipment, the book uses clear descriptions and logical presentation of data to explain electrical power and its applications. Each chapter is written by leading professionals and academics, and many sections conclude with a summary of key standards. The new edition is updated in line with recent advances in EMC, power quality and the structure and operation of power systems, making Newnes Electrical Power Engineer's Handbook an invaluable guide for today's electrical power engineer. · A unique, concise reference book with contributions from eminent professionals in the field · Provides straightforward and practical explanations, plus key information needed by engineers on a day-to-day basis · Includes a summary of key standards at the end of each chapter

Electrical engineering is a protean profession. Today the field embraces many disciplines that seem far removed from its roots in the telegraph, telephone, electric lamps, motors, and generators. To a remarkable extent, this chronicle of change and growth at a single institution is a capsule history of the discipline and profession of electrical engineering as it developed worldwide. Even when MIT was not leading the way, the department was usually quick to adapt to changing needs, goals, curricula, and research programs. What has remained constant throughout is the dynamic interaction of teaching and research, flexibility of administration, the interconnections with industrial progress and national priorities. The book's text and many photographs introduce readers to the renowned teachers and researchers who are still well known in engineering circles, among them: Vannevar Bush, Harold Hazen, Edward Bowles, Gordon Brown, Harold Edgerton, Ernst Guillemin, Arthur von Hippel, and Jay Forrester. The book covers the department's major areas of activity - electrical power systems, servomechanisms, circuit theory, communication theory, radar and microwaves (developed first at the famed Radiation Laboratory during World War II), insulation and dielectrics, electronics, acoustics, and computation. This rich history of accomplishments shows moreover that years before "Computer Science" was added to the department's name such pioneering results in computation and control as Vannevar Bush's Differential Analyzer, early cybernetic devices and numerically controlled servomechanisms, the Whirlwind computer, and the evolution of time-sharing computation had already been achieved. Karl Wildes has been associated with the Department of Electrical Engineering and Computer Science since the 1920s, and is now Professor Emeritus. Nilo Lindgren, an electrical engineering graduate of MIT and professional scientific and technical journalist for many years, is at present affiliated with the Electric Power Research Institute in Palo Alto, California.

The book includes the best extended papers which were selected from the 3rd International Conference of Electrical and Information Technologies (ICEIT 2017, Morocco). The book spans two inter-related research domains which shaped modern societies, solved many of their development problems, and contributed to their unprecedented economic growth and social welfare. Selected papers are based on original and high quality research. They were peer reviewed by experts in the field. They are grouped into five parts. Part I deals with Power System and Electronics topics that include Power Electronics & Energy Conversion, Actuators & Micro/Nanotechnology, etc. Part II relates to Control Systems and their applications. Part III concerns the topic of Information Technology that basically includes Smart Grid, Information Security, Cloud Computing Distributed, Big Data, etc. Part IV discusses Telecommunications and Vehicular Technologies topics that include, Green Networking and Communications, Wireless Ad-hoc and Sensor Networks, etc. Part V covers Green Applications and Interdisciplinary topics, that include intelligent and Green Technologies for Transportation Systems, Smart Cities, etc. This book offers a good opportunity for young researchers, novice scholars and whole academic sphere to explore new trends in Electrical and information Technologies.

The rapid growth of the electronic products market has created an increasing need for affordable, reliable, high-speed and high-density multi-layer printed circuit boards (PCBs). This book presents the technologies, algorithms, and methodologies for engineers and others developing the next generation of electronic products. A vision of the future in advanced electronics Advanced Routing of Electronic Modules provides both fundamental theory and advanced technologies for improving routing. Beginning chapters discuss approaches to approximate a minimum rectilinear Steiner tree from a minimum spanning tree and introduce ways to avoid obstacles for routing simple multi-terminal nets sequentially in a workspace. Timing delay, clock skew, and noise control requirements in signal integrity are described as well as computer-aided approaches to managing these requirements in high-speed PCB/MCM routing. Later chapters present the two-layer wiring problem, rip-up and reroute approaches, and parallel routing, including global routing, boundary crossing placement, and detailed maze routing in hardware acceleration. Data structures, data management, and algorithms for parallel routing in a multiple-processor hardware systems are also covered.

Electricity is an integral part of life in modern society. It is one form of energy and can be transported and converted into other forms. Throughout the world electricity is used to light homes and streets, cook meals, power computers and run industrial plants. Electricity is so integrated with our way of living that electricity consumption per person is used to measure the levels of economic development of countries. Any disruptions to electricity supply or blackouts will lead to huge financial loss and threats to lives well-being in the community. Electrical engineering is the profession and study of generating, transmitting, controlling and using electrical energy. It offers a wide range of exciting opportunities to those looking for a fulfilling, challenging and professional career. Electrical engineers are the designers of modern electrical machinery, power systems, transportation and communication systems. They work in various sectors of the community as well including the building industry, the manufacturing industry, the construction industry, consultancy services, technology development, education services as well as government. In these volumes, the essential aspects and fundamentals of electrical engineering are presented. In depth knowledge of various areas of electrical engineering are disseminated by learned scholars in their fields. It is hoped that readers will find all the writings comprehensive, informative and interesting. It is further hoped that these fundamentals will assist the readers to study advanced topics in electrical engineering. If the readers are electrical engineers themselves, it is hoped that the articles will broaden their horizon in electrical engineering and provide them with the necessary knowledge to further their profession as electrical engineers.

An autonomous faculty of the TU Wien for only forty years, Electrical Engineering and Information Technology are nevertheless among the most important foundations of technical development since the 19th century. Areas of research are numerous and broad – starting with the “classics” like Energy Technologies and Telecommunications, research turned to the fields of System and Automation Technologies, Micro- and Nanoelectronics, and Photonics, all highly complex disciplines that have established themselves as essential to modern society.

Transportation systems play a major role in the reduction of energy consumptions and environmental impact all over the world. The significant amount of energy of transport systems forces the adoption of new solutions to ensure their performance with energy-saving and reduced environmental impact. In this context, technologies and materials, devices and systems, design methods, and management techniques, related to the electrical power systems for transportation are continuously improving thanks to research activities. The main common challenge in all the applications concerns the adoption of innovative solutions that can improve existing transportation systems in terms of efficiency and sustainability.

Master electric circuits, machines, devices, and power electronics hands on-without expensive equipment. In LabVIEW for Electric Circuits, Machines, Drives, and Laboratories Dr. Nesimi Ertugrul uses custom-written LabVIEW Virtual Instruments to illuminate the analysis and operation of a wide range of AC and DC circuits, electrical machines, and drives-including high-voltage/current/power applications covered in no other book. Includes detailed background, VI panels, lab practices, hardware information, and self-study questions - everything you need to achieve true mastery.

This book offers a design research methodology intended to improve the quality of design research- its academic credibility, industrial significance and societal contribution by enabling more thorough, efficient and effective procedures.

The First International Conference on Advancement of Computer, Communication and Electrical Technology focuses on key technologies and recent progress in computer vision, information technology applications, VLSI, signal processing, power electronics & drives, and application of sensors & transducers, etc. Topics in this conference include: Computer Science This conference encompassed relevant topics in computer science such as computer vision & intelligent system, networking theory, and application of information technology. Communication Engineering To enhance the theory & technology of communication engineering, ACCET 2016 highlighted the state-of-the-art research work in the field of VLSI, optical communication, and signal processing of various data formatting. Research work in the field of microwave engineering, cognitive radio and networks are also included. Electrical Technology The state-of-the-art research topic in the field of electrical & instrumentation engineering is included in this conference such as power system stability & protection, non-conventional energy resources, electrical drives, and biomedical engineering. Research work in the area of optimization and application in control, measurement & instrumentation are included as well.

Organic electronics is one of the most exciting emerging areas of materials science. It is a highly interdisciplinary research area involving scientists and engineers who develop organic molecules with interesting properties for a variety of applications in technical industries (e.g. circuitry, energy harvesting/storage, etc.) and medical applications (e.g. bioelectronics for sensors, tissue scaffolds for tissue engineering, etc.). This Research Topic collects articles that report advances in chemistry (e.g. design and synthesis of molecules with various molecular weights and structures); physical chemistry and chemical physics, and computational/theoretical research (e.g. to push the boundaries of our

understanding); chemical engineering (e.g. design, prototyping and manufacturing devices); materials scientists and technologists to explore different markets for the technologies employing such materials, the organic bioelectronics field and green/sustainable electronics.

While technological advancements have been critical in allowing researchers to obtain more and better quality data about cellular processes and signals, the design and practical application of computational models of genomic regulation continues to be a challenge. Emerging Research in the Analysis and Modeling of Gene Regulatory Networks presents a compilation of recent and emerging research topics addressing the design and use of technology in the study and simulation of genomic regulation. Exploring both theoretical and practical topics, this publication is an essential reference source for students, professionals, and researchers working in the fields of genomics, molecular biology, bioinformatics, and drug development.

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More than ten years have passed since the untimely death of King-Sun Fu, one of the great pioneers in the field of pattern recognition. It was he, more than any other single individual, who nurtured the field during its formative years, and set the tone and tempo for others to follow. This book is dedicated to his memory. This book contains 11 chapters by authors who knew King-Sun Fu and in varying degrees interacted with him. The articles span the field of pattern recognition in its current state, and cover such diverse topics as neural nets, covariance propagation, genetic selection, shape description, characteristic views for 3D modeling, face recognition, speech recognition, and machine translation. In tone they vary from the highly theoretical to the applied. Their presentation here is a testimonial, by his former colleagues and friends, to the pioneer who did so much to bring pattern recognition to its position as a recognized discipline world-wide.

This new and significant book concentrates on brain mapping which is a set of neuroscience techniques predicated on the mapping of (biological) quantities or properties onto spatial representations of the (human or non-human) brain resulting in maps. All neuroimaging can be considered part of brain mapping. Brain mapping can be conceived as a higher form of neuroimaging, producing brain images supplemented by the result of additional (imaging or non-imaging) data processing or analysis, such as maps projecting (measures of) behaviour onto brain regions (see fMRI). Brain mapping techniques are constantly evolving, and rely on the development and refinement of image acquisition, representation, analysis, visualisation and interpretation techniques. Functional and structural neuroimaging are at the core of the mapping aspect of brain mapping.

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