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Applied TechnologiesSmart GridsComputer Applications for Communication, Networking, and Digital ContentsMicrogrid Architectures, Control and Protection MethodsInvestigating Performance and Reliability of Process Bus Networks for Digital Protective RelayingSmart GridPractical Guidance for Defining a Smart Grid Modernization StrategyThe Unified Software Development ProcessHigh Voltage Protection for TelecommunicationsIEC 61850-Based Smart SubstationsEvolution of Smart GridsSubstation AutomationAdvanced Communication and Control Methods for Future SmartgridsCyber Security4th International Conference, Power System Protection and Automation, 21-22 November 2007, New Delhi, IndiaSynchronized Phasor Measurements and Their Applications3rd International Conference, Power System Protection and Automation, 17-18 November, 2004, New Delhi, IndiaData Communications, Computer Networks and Open SystemsSmart Grid Infrastructure & NetworkingCyber and Electromagnetic Threats in Modern Relay Protection2002 IEEE Power Engineering Society Summer MeetingIEC 61850 DemystifiedOrchestrating and Automating Security for the Internet of ThingsUtility Communication Networks and ServicesCommunication and Networking in Smart GridsPractical Modern SCADA ProtocolsElectricity Supply Systems of the FutureAdvances in Computing, Communication and ControlAdvances in Computing, Communication and ControlSubstation Automation SystemsIoT FundamentalsWater and Energy InternationalSecuring Cyber-Physical SystemsGas Insulated SubstationsEthernetTransportation and Power Grid in Smart Cities2017 4th International Conference on Power, Control and Embedded Systems (ICPCES)Advanced Technologies, Systems, and Applications IIICommunications, Signal Processing, and SystemsProceedings of the Second International Scientific Conference "Intelligent Information Technologies for Industry" (IITI'17)

Applied Technologies

SCADA systems are at the heart of the modern industrial enterprise. In a market that is crowded with high-level monographs and reference guides, more practical information for professional engineers is required. This book gives them the knowledge to design their next SCADA system more effectively.

Smart Grids

This first volume of the three-volume set (CCIS 1193, CCIS 1194, and CCIS 1195) constitutes the refereed proceedings of the First International Conference on Applied Technologies, ICAT 2019, held in Quito, Ecuador, in December 2019. The 124 full papers were carefully reviewed and selected from 328 submissions. The papers are organized according to the following topics: technology trends; computing; intelligent systems; machine vision; security; communication; electronics; e-learning; e-government; e-participation.

Computer Applications for Communication, Networking, and Digital Contents

There is growing concern that new engineers, planners, and field technicians are

not aware of the danger and reliability issues surrounding proper protection of telecommunications circuits. Using a practical, hands-on approach, High Voltage Protection for Telecommunications combines all the essential information and key issues into one book. Designed for professional training and self-study, the text will help guide managers, engineers, planners, and technicians through the process of planning, designing, installing, and maintaining safe and reliable data and voice communications circuits that are exposed to High Voltage events.

Microgrid Architectures, Control and Protection Methods

Investigating Performance and Reliability of Process Bus Networks for Digital Protective Relaying

This book presents intuitive explanations of the principles of microgrids, including their structure and operation and their applications. It also discusses the latest research on microgrid control and protection technologies and the essentials of microgrids as well as enhanced communication systems. The book provides solutions to microgrid operation and planning issues using various methodologies including planning and modelling; AC and DC hybrid microgrids; energy storage systems in microgrids; and optimal microgrid operational planning. Written by specialists, it is filled in innovative solutions and research related to microgrid operation, making it a valuable resource for those interested in developing updated approaches in electric power analysis, design and operational strategies. Thanks to its in-depth explanations and clear, three-part structure, it is useful for electrical engineering students, researchers and technicians.

Smart Grid

This CIGRE green book begins by addressing the specification and provision of communication services in the context of operational applications for electrical power utilities, before subsequently providing guidelines on the deployment or transformation of networks to deliver these specific communication services. Lastly, it demonstrates how these networks and their services can be monitored, operated, and maintained to ensure that the requisite high level of service quality is consistently achieved.

Practical Guidance for Defining a Smart Grid Modernization Strategy

This volume constitutes the refereed proceedings of the International Conferences, FGCN and DCA 2012, held as part of the Future Generation Information Technology Conference, FGIT 2012, Kangwondo, Korea, in December 2012. The papers presented were carefully reviewed and selected from numerous submissions and focus on the various aspects of future generation communication and networking, and digital contents and applications.

The Unified Software Development Process

What exactly is smart grid? Why is it receiving so much attention? What are utilities, vendors, and regulators doing about it? Answering these questions and more, Smart Grids: Infrastructure, Technology, and Solutions gives readers a clearer understanding of the drivers and infrastructure of one of the most talked-about topics in the electric utility market—smart grid. This book brings together the knowledge and views of a vast array of experts and leaders in their respective fields. Key Features Describes the impetus for change in the electric utility industry Discusses the business drivers, benefits, and market outlook of the smart grid initiative Examines the technical framework of enabling technologies and smart solutions Identifies the role of technology developments and coordinated standards in smart grid, including various initiatives and organizations helping to drive the smart grid effort Presents both current technologies and forward-looking ideas on new technologies Discusses barriers and critical factors for a successful smart grid from a utility, regulatory, and consumer perspective Summarizes recent smart grid initiatives around the world Discusses the outlook of the drivers and technologies for the next-generation smart grid Smart grid is defined not in terms of what it is, but what it achieves and the benefits it brings to the utility, consumer, society, and environment. Exploring the current situation and future challenges, the book provides a global perspective on how the smart grid integrates twenty-first-century technology with the twentieth-century power grid. CRC Press Authors Speak Stuart Borlase speaks about his book. Watch the video

High Voltage Protection for Telecommunications

Cyber and Electromagnetic Threats in Modern Relay Protection provides a detailed overview of the vulnerabilities of digital protection relays to natural and intentional destructive impacts, including cyber attacks and electromagnetic intrusions. From lightning strikes, electromagnetic fields generated by operating equipment, and issues with control cable shielding to modern technical tools that realize intentional destructive impacts remotely, this first-of-its-kind text covers the latest cyber and electromagnetic threats to digital protection relays. Emphasizing the importance of relay protection to the infrastructure of a country, this book: Explains how technological advances in the power industry, like the smart grid, can create dangerous vulnerabilities Discusses traditional passive means of protection, such as screened cabinets, filters, cables, special materials, and covers Describes advanced protective solutions based on hardware methods Cyber and Electromagnetic Threats in Modern Relay Protection is a valuable reference for engineers involved in the design, development, and use of relay protection. It is also beneficial for scientists, researchers, and students of vocational schools and technical universities.

IEC 61850-Based Smart Substations

This book brings together papers presented at the 2017 International Conference on Communications, Signal Processing, and Systems (ICCSP 2017), which was held on July 14–17, 2017 in Harbin, China. Presenting the latest developments and discussing the interactions and links between these multidisciplinary fields, the book spans topics ranging from communications, signal processing and systems. It is aimed at undergraduate and graduate electrical engineering, computer science and mathematics students, researchers and engineers from academia and industry

as well as government employees.

Evolution of Smart Grids

Substation Automation Systems: Design and Implementation aims to close the gap created by fast changing technologies impacting on a series of legacy principles related to how substation secondary systems are conceived and implemented. It is intended to help those who have to define and implement SAS, whilst also conforming to the current industry best practice standards. Key features: Project-oriented approach to all practical aspects of SAS design and project development. Uniquely focusses on the rapidly changing control aspect of substation design, using novel communication technologies and IEDs (Intelligent Electronic Devices). Covers the complete chain of SAS components and related equipment instead of purely concentrating on intelligent electronic devices and communication networks. Discusses control and monitoring facilities for auxiliary power systems. Contributes significantly to the understanding of the standard IEC 61850, which is viewed as a "black box" for a significant number of professionals around the world. Explains standard IEC 61850 – Communication networks and systems for power utility automation – to support all new systems networked to perform control, monitoring, automation, metering and protection functions. Written for practical application, this book is a valuable resource for professionals operating within different SAS project stages including the: specification process; contracting process; design and engineering process; integration process; testing process and the operation and maintenance process.

Substation Automation

The objective of the book is to fill a knowledge gap by covering the topic of substation automation by a team of authors, with academic and industry backgrounds. Understanding substation automation concepts and practical solutions requires knowledge in vastly diverse areas, such as primary and secondary equipment, computers, communications, fiber optic sensors, signal processing, and general information technology not generally taught in a power curricula but taught as independent subjects. At the same time, utility practice dictates how substation automation designs may be laid out and deployed. To design such a system one also requires knowledge about existing standards for data exchange, as well as test methods for evaluation of solutions. This book is designed to meet the educational needs of undergraduate and graduate power majors, as well as to serve as a reference to professionals who need to know about substation automation because of fast changing technology expertise needed in their careers. To meet the wide range of interests and needs, the book covers diverse aspects of substation automation, allowing instructors to select the best combination of chapters to meet their specific educational needs.

Advanced Communication and Control Methods for Future Smartgrids

With the increasing worldwide trend in population migration into urban centers, we are beginning to see the emergence of the kinds of mega-cities which were once

the stuff of science fiction. It is clear to most urban planners and developers that accommodating the needs of the tens of millions of inhabitants of those megalopolises in an orderly and uninterrupted manner will require the seamless integration of and real-time monitoring and response services for public utilities and transportation systems. Part speculative look into the future of the world's urban centers, part technical blueprint, this visionary book helps lay the groundwork for the communication networks and services on which tomorrow's "smart cities" will run. Written by a uniquely well-qualified author team, this book provides detailed insights into the technical requirements for the wireless sensor and actuator networks required to make smart cities a reality.

Cyber Security

Appropriate for researchers, practitioners, and students alike, Communication and Networking in Smart Grids presents state-of-the-art approaches and novel technologies for communication networks in smart grids. It explains how contemporary grid networks are developed and deployed and presents a collection of cutting-edge advances to help improve cu

4th International Conference, Power System Protection and Automation, 21-22 November 2007, New Delhi, India

To reduce the cost of complex and long copper wiring, as well as to achieve flexibility in signal communications, IEC 61850 part 9-2 proposes a process bus communication network between process level switchyard equipments, and bay level protection and control (P & C) Intelligent Electronic Devices (IEDs). After successful implementation of Ethernet networks for IEC 61850 standard part 8-1 (station bus) at several substations worldwide, major manufacturers are currently working on the development of interoperable products for the IEC 61850-9-2 based process bus. The major technical challenges for applying Ethernet networks at process level include: 1) the performance of time critical messages for protection applications; 2) impacts of process bus Ethernet networks on the reliability of substation protection systems. This work starts with the performance analysis in terms of time critical Sampled Value (SV) messages loss and/or delay over the IEC 61850-9-2 process bus networks of a typical substation. Unlike GOOSE, the SV message is not repeated several times, and therefore, there is no assurance that each SV message will be received from the process bus network at protection IEDs. Therefore, the detailed modeling of IEC 61850 based substation protection devices, communication protocols, and packet format is carried out using an industry-trusted simulation tool OPNET, to study and quantify number of SV loss and delay over the process bus. The impact of SV loss/delay on digital substation protection systems is evident, and recognized by several manufacturers. Therefore, a sample value estimation algorithm is developed in order to enhance the performance of digital substation protection functions by estimating the lost and delayed sampled values. The error of estimation is evaluated in detail considering several scenarios of power system relaying. The work is further carried out to investigate the possible impact of SV loss/delay on protection functions, and test the proposed SV estimation algorithm using the hardware setup. Therefore, a state-of-the-art process bus laboratory with the protection IEDs and merging unit playback

simulator using industrial computers on the QNX hard-real-time platform, is developed for a typical IEC 61850-9-2 based process bus network. Moreover, the proposed SV estimation algorithm is implemented as a part of bus differential and transmission line distance protection IEDs, and it is tested using the developed experimental setup for various SV loss/delay scenarios and power system fault conditions. In addition to the performance analysis, this work also focuses on the reliability aspects of protection systems with process bus communication network. To study the impact of process bus communication on reliability indices of a substation protection function, the detailed reliability modeling and analysis is carried out for a typical substation layout. First of all, reliability analysis is done using Reliability Block Diagrams (RBD) considering various practical process bus architectures, as well as, time synchronization techniques. After obtaining important failure rates from the RBD, an extended Markov model is proposed to analyze the reliability indices of protection systems, such as, protection unavailability, abnormal unavailability, and loss of security. It is shown with the proposed Markov model that the implementation of sampled value estimation improves the reliability indices of a protection system.

Synchronized Phasor Measurements and Their Applications

This book provides an account of the field of synchronized Phasor Measurement technology, its beginning, its technology and its principal applications. It covers wide Area Measurements (WAM) and their applications. The measurements are done using GPS systems and eventually will replace the existing technology. The authors created the field about twenty years ago and most of the installations planned or now in existence around the world are based on their work.

3rd International Conference, Power System Protection and Automation, 17-18 November, 2004, New Delhi, India

Practical Guidance for Defi ning a Smart Grid Modernization Strategy: The Case of Distribution guides stakeholders on how utilities can defi ne their own smart grid vision, identify priorities, and structure investment plans. While most of these strategic aspects apply to any area of the electricity grid, the book focuses on distribution. The guidance includes key building blocks for modernizing the distribution grid and provides examples of grid modernization projects. This revised edition also includes key communication system requirements to support a well-functioning grid. The concept of the smart grid is relevant to all grids. What varies are the magnitude and type of the incremental steps toward modernization for achieving a specifi c smart grid vision. A utility that is at a relatively low level of grid modernization may leapfrog one or more levels of modernization to achieve some of the benefi ts of the highest levels of grid modernization. Smart grids impact electric distribution systems signifi cantly. In developing countries, modernizing the distribution grid promises to benefi t the operation of electric distribution utilities in many and various ways. These benefi ts include improved operational effi ciency (such as reduced losses and lower energy consumption), reduced peak demand, improved service reliability, and ability to accommodate distributed generating resources without adversely impacting overall power quality. Practical Guidance for Defi ning a Smart Grid Modernization Strategy

concludes by describing funding and regulatory issues that may need to be taken into account when developing smart grid plans. The World Bank Studies series is available for free download online through the Open Knowledge Repository (https://openknowledge.worldbank.org).

Data Communications, Computer Networks and Open Systems

Today, billions of devices are Internet-connected, IoT standards and protocols are stabilizing, and technical professionals must increasingly solve real problems with IoT technologies. Now, five leading Cisco IoT experts present the first comprehensive, practical reference for making IoT work. IoT Fundamentals brings together knowledge previously available only in white papers, standards documents, and other hard-to-find sources—or nowhere at all. The authors begin with a high-level overview of IoT and introduce key concepts needed to successfully design IoT solutions. Next, they walk through each key technology, protocol, and technical building block that combine into complete IoT solutions. Building on these essentials, they present several detailed use cases, including manufacturing, energy, utilities, smart+connected cities, transportation, mining, and public safety. Whatever your role or existing infrastructure, you'll gain deep insight what IoT applications can do, and what it takes to deliver them. Fully covers the principles and components of next-generation wireless networks built with Cisco IOT solutions such as IEEE 802.11 (Wi-Fi), IEEE 802.15.4-2015 (Mesh), and LoRaWAN Brings together real-world tips, insights, and best practices for designing and implementing next-generation wireless networks Presents start-to-finish configuration examples for common deployment scenarios Reflects the extensive first-hand experience of Cisco experts

Smart Grid Infrastructure & Networking

This book introduces innovative and interdisciplinary applications of advanced technologies. Featuring the papers from the 10th DAYS OF BHAAAS (Bosnian-Herzegovinian American Academy of Arts and Sciences) held in Jahorina, Bosnia and Herzegovina on June 21–24, 2018, it discusses a wide variety of engineering and scientific applications of the different techniques. Researchers from academic and industry present their work and ideas, techniques and applications in the field of power systems, mechanical engineering, computer modelling and simulations, civil engineering, robotics and biomedical engineering, information and communication technologies, computer science and applied mathematics.

Cyber and Electromagnetic Threats in Modern Relay Protection

Think about someone taking control of your car while you're driving. Or, someone hacking into a drone and taking control. Both of these things have been done, and both are attacks against cyber-physical systems (CPS). Securing Cyber-Physical Systems explores the cybersecurity needed for CPS, with a focus on results of research and real-world deployment experiences. It addresses CPS across multiple sectors of industry. CPS emerged from traditional engineered systems in the areas of power and energy, automotive, healthcare, and aerospace. By introducing pervasive communication support in those systems, CPS made the systems more

flexible, high-performing, and responsive. In general, these systems are mission-critical—their availability and correct operation is essential. This book focuses on the security of such mission-critical systems. Securing Cyber-Physical Systems brings together engineering and IT experts who have been dealing separately with these issues. The contributed chapters in this book cover a broad range of CPS security topics, including: Securing modern electrical power systems Using moving target defense (MTD) techniques to secure CPS Securing wireless sensor networks (WSNs) used for critical infrastructures Mechanisms to improve cybersecurity and privacy in transportation CPS Anticipated cyberattacks and defense approaches for next-generation autonomous vehicles Security issues, vulnerabilities, and challenges in the Internet of Things Machine-to-machine (M2M) communication security Security of industrial control systems Designing "trojan-resilient" integrated circuits While CPS security techniques are constantly evolving, this book captures the latest advancements from many different fields. It should be a valuable resource for both professionals and students working in network, web, computer, or embedded system security.

2002 IEEE Power Engineering Society Summer Meeting

Comprehensive reference covering all aspects of gas insulated substations including basic principles, technology, use & application, design, specification, testing and ownership issues This book provides an overview on the particular development steps of gas insulated high-voltage switchgear, and is based on the information given with the editor's tutorial. The theory is kept low only as much as it is needed to understand gas insulated technology, with the main focus of the book being on delivering practical application knowledge. It discusses some introductory and advanced aspects in the meaning of applications. The start of the book presents the theory of Gas Insulated Technology, and outlines reliability, design, safety, grounding and bonding, and factors for choosing GIS. The third chapter presents the technology, covering the following in detail: manufacturing, specification, instrument transformers, Gas Insulated Bus, and the assembly process. Next, the book goes into control and monitoring, which covers local control cabinet, bay controller, control schemes, and digital communication. Testing is explained in the middle of the book before installation and energization. Importantly, operation and maintenance is discussed. This chapter includes information on repair, extensions, retrofit or upgrade, and overloading. Finally applications are covered along with concepts of layout, typical layouts, mixed technology substations, and then other topics such as life cycle assessment, environmental impact, and project management. A one-stop, complete reference text on gas insulated substations (GIS), large-capacity and long-distance electricity transmission, which are of increasing importance in the power industry today Details advanced and basic material, accessible for both existing GIS users and those planning to adopt the technology Discusses both the practical and theoretical aspects of GIS Written by acknowledged GIS experts who have been involved in the development of the technology from the start

IEC 61850 Demystified

This book bridges the divide between the fields of power systems engineering and computer communication through the new field of power system information

theory. Written by an expert with vast experience in the field, this book explores the smart grid from generation to consumption, both as it is planned today and how it will evolve tomorrow. The book focuses upon what differentiates the smart grid from the "traditional" power grid as it has been known for the last century. Furthermore, the author provides the reader with a fundamental understanding of both power systems and communication networking. It shows the complexity and operational requirements of the evolving power grid, the so-called "smart grid," to the communication networking engineer; and similarly, it shows the complexity and operational requirements for communications to the power systems engineer. The book is divided into three parts. Part One discusses the basic operation of the electric power grid, covering fundamental knowledge that is assumed in Parts Two and Three. Part Two introduces communications and networking, which are critical enablers for the smart grid. It also considers how communication and networking will evolve as technology develops. This lays the foundation for Part Three, which utilizes communication within the power grid. Part Three draws heavily upon both the embedded intelligence within the power grid and current research, anticipating how and where computational intelligence will be implemented within the smart grid. Each part is divided into chapters and each chapter has a set of questions useful for exercising the readers' understanding of the material in that chapter. Key Features: Bridges the gap between power systems and communications experts Addresses the smart grid from generation to consumption, both as it is planned today and how it will likely evolve tomorrow Explores the smart grid from the perspective of traditional power systems as well as from communications Discusses power systems, communications, and machine learning that all define the smart grid It introduces the new field of power system information theory

Orchestrating and Automating Security for the Internet of Things

Written in an easy to understand style, this book provides a comprehensive overview of the physical-cyber security of Industrial Control Systems benefitting the computer science and automation engineers, students and industrial cyber security agencies in obtaining essential understanding of the ICS cyber security from concepts to realization. The Book Ø Covers ICS networks, including zone based architecture and its deployment for product delivery and other Industrial services. Ø Discusses SCADA networking with required cryptography and secure industrial communications. Ø Furnishes information about industrial cyber security standards presently used. Ø Explores defence-in-depth strategy of ICS from conceptualisation to materialisation. Ø Provides many real-world documented examples of attacks against industrial control systems and mitigation techniques. Ø Is a suitable material for Computer Science and Automation engineering students to learn the fundamentals of industrial cyber security.

Utility Communication Networks and Services

Proliferation of distributed generation and the increased ability to monitor different parts of the electrical grid offer unprecedented opportunities for consumers and grid operators. Energy can be generated near the consumption points, which decreases transmission burdens and novel control schemes can be utilized to

operate the grid closer to its limits. In other words, the same infrastructure can be used at higher capacities thanks to increased efficiency. Also, new players are integrated into this grid such as smart meters with local control capabilities, electric vehicles that can act as mobile storage devices, and smart inverters that can provide auxiliary support. To achieve stable and safe operation, it is necessary to observe and coordinate all of these components in the smartgrid.

Communication and Networking in Smart Grids

Practical Modern SCADA Protocols

This comprehensive overview of 61850 standard/protocol focuses on implementation, taking the reader through the development and concepts of IEC 61850. This includes the initial work by General Motors (Manufacturing Automation Protocol), EPRI (UCA 1.0 and UCA 2.0), IEEE (TR 1550), and IEC 61850. The standard is a significant piece of many IIoT (industrial internet of things) strategies for substation communication. The book discusses and documents the basic research and theory of guaranteed multicast done for IEC 61850 GOOSE as well as the shift from variable technology to object oriented technology. The layering principles, as well as the structure, of IEC 61850 are discussed in detail as well as the actual communication profiles that have been created to support substation/distribution automation, distributed energy resources, and synchrophasors. Real applications will be discussed as well as the future direction of the standard. The author is a technical co-editor of IEC 61850 standard and a leader in US implementations, having been involved with the technology from its inception.

Electricity Supply Systems of the Future

Master powerful techniques and approaches for securing IoT systems of all kinds–current and emerging Internet of Things (IoT) technology adoption is accelerating, but IoT presents complex new security challenges. Fortunately, IoT standards and standardized architectures are emerging to help technical professionals systematically harden their IoT environments. In Orchestrating and Automating Security for the Internet of Things, three Cisco experts show how to safeguard current and future IoT systems by delivering security through new NFV and SDN architectures and related IoT security standards. The authors first review the current state of IoT networks and architectures, identifying key security risks associated with nonstandardized early deployments and showing how early adopters have attempted to respond. Next, they introduce more mature architectures built around NFV and SDN. You'll discover why these lend themselves well to IoT and IoT security, and master advanced approaches for protecting them. Finally, the authors preview future approaches to improving IoT security and present real-world use case examples. This is an indispensable resource for all technical and security professionals, business security and risk managers, and consultants who are responsible for systems that incorporate or utilize IoT devices, or expect to be responsible for them. · Understand the challenges involved in securing current IoT networks and architectures · Master IoT security

fundamentals, standards, and modern best practices · Systematically plan for IoT security · Leverage Software-Defined Networking (SDN) and Network Function Virtualization (NFV) to harden IoT networks · Deploy the advanced IoT platform, and use MANO to manage and orchestrate virtualized network functions · Implement platform security services including identity, authentication, authorization, and accounting · Detect threats and protect data in IoT environments · Secure IoT in the context of remote access and VPNs · Safeguard the IoT platform itself · Explore use cases ranging from smart cities and advanced energy systems to the connected car · Preview evolving concepts that will shape the future of IoT security

Advances in Computing, Communication and Control

Advances in Computing, Communication and Control

This volume of Advances in Intelligent Systems and Computing highlights key scientific achievements and innovations in all areas of automation, informatization, computer science, and artificial intelligence. It gathers papers presented at the IITI 2017, the Second International Conference on Intelligent Information Technologies for Industry, which was held in Varna, Bulgaria on September 14–16, 2017. The conference was jointly co-organized by Technical University of Varna (Bulgaria), Technical University of Sofia (Bulgaria), VSB Technical University of Ostrava (Czech Republic) and Rostov State Transport University (Russia). The IITI 2017 brought together international researchers and industrial practitioners interested in the development and implementation of modern technologies for automation, informatization, computer science, artificial intelligence, transport and power electrical engineering. In addition to advancing both fundamental research and innovative applications, the conference is intended to establish a new dissemination platform and an international network of researchers in these fields.

Substation Automation Systems

Power Electronics & Drives, Power Conditioning, Renewable Energy, Control System and Applications, Signal Processing, VLSI, Industrial Instrumentation, Communication, Embedded Systems and Computational Intelligence

IoT Fundamentals

IEC 61850-Based Smart Substations: Principles, Testing, Operation and Maintenance systematically presents principles, testing approaches, and the operation and maintenance technologies of such substations from the perspective of real-world application. The book consists of chapters that cover a review of IEC 61850 based smart substations, substation configuration technology, principles and testing technologies for the smart substation, process bus, substation level, time setting and synchronization, and cybersecurity. It gives detailed information on testing processes and approaches, operation and maintenance technologies, and insights gained through practical experience. As IEC 61850 based smart substations have played a significant role in smart grids, realizing information

sharing and device interoperation, this book provides a timely resource on the topics at hand. Contributes to the overall understanding of standard IEC 61850, analyzing principles and features Introduces best practices derived from hundreds of smart substation engineering applications Summarizes current research and insights gained from practical experience in the testing, operation and maintenance of smart substation projects in China Gives systematic and detailed information on testing technology Introduces novel technologies for next-generation substations

Water and Energy International

Securing Cyber-Physical Systems

This SpringerBrief explores the opportunities and challenges posed by the smart grid. The evolution of the smart grid should allow consumers to directly communicate with their utility provider. However, complex issues such as architecture with legacy support, varying demand response and load management, varying price of power, and so forth can lead to various decision making challenges. It is essential to identify the scope and challenges of the smart grid in a comprehensive manner so as to ensure efficient delivery of sustainable, economic, and secure electricity supplies. This book provides an overview of the smart grid and its key advances in architecture, distribution management, demand-side response and load balancing, smart automation, electric storage, power loss minimization and security. Readers interested in a basic knowledge of electric grid and communication networks will find Evolution of Smart Grids useful. Readers who want more insight on smart grid research will also find this book a valuable resource.

Gas Insulated Substations

Ethernet has been the core networking technology since the early 1980s, and is used by every high-tech business. While the basic protocols have changed little, new options such as Fast Ethernet and Gigabit Ethernet have increased the complexity of the topic. Ethernet: The Definitive Guide provides everything you need to know to set up and manage an Ethernet network. Ethernet: The Definitive Guide includes details about the IEEE 802.3 standard and its protocols, and is separated into five parts: Introduction to Ethernet provides a tour of basic Ethernet theory and operation, including a description of Ethernet frames, operation of the Media Access Control (MAC) protocol, full-duplex mode, and Auto-Negotiation. Ethernet Media Systems is the heart of the book. This section shows you how to build media-specific Ethernet networks, from a basic 10BASE-T Ethernet offering 10 Mbps over twisted-pair cables, to an advanced 1000BASE-X Gigabit Ethernet system, providing up to 1 Gbps of data transfer over fiber optic cables. Building Your Ethernet System teaches you how to build twisted-pair and fiber optic media segments, as well as how to expand the reach of your local area network using repeaters and switching hubs. Performance and Troubleshooting is divided into two chapters. The first describes the performance of a given Ethernet channel, as well as the performance of the entire network system. The second chapter includes a

tutorial on troubleshooting techniques and describes the kinds of problems; network administrators are likely to encounter. The last part of the book, Appendixes, includes a complete glossary of terms used throughout the book, a resource list, descriptions of thick and thin coax-based Ethernet systems, and a guide to AUI equipment installation and configuration. Ethernet: The Definitive Guide is the one essential source of information for network administrators who need to build and manage scalable local area networks.

Ethernet

This book constitutes the refereed proceedings of the International Conference on Advances in Computing Communications and Control, ICAC3 2011, held in Mumbai, India, in January 2011. The 84 revised full papers presented were carefully reviewed and selected from 309 submissions. The papers address issues such as AI, artificial neural networks, computer graphics, data warehousing and mining, distributed computing, geo information and statistical computing, learning algorithms, system security, virtual reality, cloud computing, service oriented architecture, semantic web, coding techniques, modeling and simulation of communication systems, network architecture, network protocols, optical fiber/microwave communication, satellite communication, speech/image processing, wired and wireless communication, cooperative control, and nonlinear control, process control and instrumentation, industrial automation, controls in aerospace, robotics, and power systems.

Transportation and Power Grid in Smart Cities

This book offers a vision of the future of electricity supply systems and CIGRE's views on the know-how that will be needed to manage the transition toward them. A variety of factors are driving a transition of electricity supply systems to new supply models, in particular the increasing use of renewable sources, environmental factors and developments in ICT technologies. These factors suggest that there are two possible models for power network development, and that those models are not necessarily exclusive: 1. An increasing importance of large networks for bulk transmission capable of interconnecting load regions and large centralized renewable generation resources, including offshore and of providing more interconnections between the various countries and energy markets. 2. An emergence of clusters of small, largely self-contained distribution networks, which include decentralized local generation, energy storage and active customer participation, intelligently managed so that they operate as active networks providing local active and reactive support. The electricity supply systems of the future will likely include a combination of the above two models, since additional bulk connections and active distribution networks are needed in order to reach ambitious environmental, economic and security-reliability targets. This concise yet comprehensive reference resource on technological developments for future electrical systems has been written and reviewed by experts and the Chairs of the sixteen Study Committees that form the Technical Council of CIGRE.

2017 4th International Conference on Power, Control and Embedded Systems (ICPCES)

A complete guide to smart grid networking and communications for energy engineers With contributions from more than 30 experts, Smart Grid Infrastructure & Networking describes cutting-edge technologies for connecting the electrical power infrastructure to modern, computerized communications networks. The book offers essential information on standardization, applications, protocols, automation, architecture, and management. Key topics such as bidirectional communication, automation, renewable energy integration, wireless sensor networks, and more are discussed in this practical, comprehensive resource. COVERAGE INCLUDES: * Demand-side energy management * The modernization of distribution automation featuring intelligent FDIR and volt-var optimization Advanced asset management * Wide-area early warning systems * The integration of renewable energy sources into smart grids * The microgrid in the electric system transformation * Enhancing the integration of renewables in radial distribution networks through smart links * Voltage-based control of DG units and active loads in smart microgrids * Electric vehicles in a smart grid environment * Low-voltage, DC grid–powered LED lighting system with smart ambient sensor control for energy conservation in green building * Multiple distributed smart microgrids with a self-autonomous, energy harvesting wireless sensor network * Wireless sensor networks for consumer applications in the smart grid * ZigBee-based wireless monitoring and control system for smart grids

Advanced Technologies, Systems, and Applications III

Communications, Signal Processing, and Systems

Proceedings of the Second International Scientific Conference "Intelligent Information Technologies for Industry" (IITI'17)

This book constitutes the refereed proceedings of the International Conference on Advances in Computing Communications and Control, ICAC3 2011, held in Mumbai, India, in January 2011. The 84 revised full papers presented were carefully reviewed and selected from 309 submissions. The papers address issues such as AI, artificial neural networks, computer graphics, data warehousing and mining, distributed computing, geo information and statistical computing, learning algorithms, system security, virtual reality, cloud computing, service oriented architecture, semantic web, coding techniques, modeling and simulation of communication systems, network architecture, network protocols, optical fiber/microwave communication, satellite communication, speech/image processing, wired and wireless communication, cooperative control, and nonlinear control, process control and instrumentation, industrial automation, controls in aerospace, robotics, and power systems.

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