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Applications of Robotics in Industry Using Advanced Mechanisms Proceedings of International Conference on Robotics and Its Industrial Applications 2019 Springer Nature This book shares important findings on the application of robotics in industry using advanced mechanisms, including software and hardware. It presents a collection of recent trends and research on various advanced computing paradigms such as soft computing, robotics, smart automation, power control, and uncertainty analysis. The book constitutes the proceedings of the 1st International Conference on Application of Robotics in Industry using Advanced Mechanisms (ARIAM2019), which offered a platform for sharing original research findings, presenting innovative ideas and applications, and comparing notes on various aspects of robotics. The contributions highlight the latest research and industrial applications of robotics, and discuss approaches to improving the smooth functioning of industries. Moreover, they focus on designing solutions for complex engineering problems and designing system components or processes to meet specific needs, with due considerations for public health and safety, including cultural, societal, and environmental considerations. Taken together, they offer a valuable resource for researchers, scientists, engineers, professionals and students alike. **Model Predictive Control of High Power Converters and Industrial Drives John Wiley & Sons** In this original book on model predictive control (MPC) for power electronics, the focus is put on high-power applications with multilevel converters operating at switching frequencies well below 1 kHz, such as medium-voltage drives and modular multi-level converters. Consisting of two main parts, the first offers a detailed review of three-

phase power electronics, electrical machines, carrier-based pulse width modulation, optimized pulse patterns, state-of-the art converter control methods and the principle of MPC. The second part is an in-depth treatment of MPC methods that fully exploit the performance potential of high-power converters. These control methods combine the fast control responses of deadbeat control with the optimal steady-state performance of optimized pulse patterns by resolving the antagonism between the two. MPC is expected to evolve into the control method of choice for power electronic systems operating at low pulse numbers with multiple coupled variables and tight operating constraints it. Model Predictive Control of High Power Converters and Industrial Drives will enable to reader to learn how to increase the power capability of the converter, lower the current distortions, reduce the filter size, achieve very fast transient responses and ensure the reliable operation within safe operating area constraints. Targeted at power electronic practitioners working on control-related aspects as well as control engineers, the material is intuitively accessible, and the mathematical formulations are augmented by illustrations, simple examples and a book companion website featuring animations. Readers benefit from a concise and comprehensive treatment of MPC for industrial power electronics, enabling them to understand, implement and advance the field of high-performance MPC schemes.

Real-Time Simulation Technologies: Principles, Methodologies, and Applications CRC Press Real-Time Simulation Technologies: Principles, Methodologies, and Applications is an edited compilation of work that explores fundamental concepts and basic techniques of real-time simulation for complex and diverse systems across a broad spectrum. Useful for both new entrants and experienced experts in the field, this book integrates coverage of detailed theory, acclaimed methodological approaches, entrenched technologies, and high-value applications of real-time simulation—all from the unique perspectives of renowned international contributors. Because it offers an accurate and otherwise unattainable assessment of how a system will behave over a particular time frame, real-time simulation is increasingly critical to the optimization of dynamic processes and adaptive systems in a variety of enterprises. These range in scope from the maintenance of the national power grid, to space exploration, to the development of virtual reality programs and cyber-physical systems. This book outlines how, for these and other undertakings, engineers must assimilate real-time data with computational tools for rapid decision making under uncertainty. Clarifying the central concepts behind real-time simulation tools and techniques, this one-of-a-kind resource: Discusses the state of the art, important challenges, and high-impact developments in simulation technologies Provides a basis for the study of real-time simulation as a fundamental and foundational technology Helps readers develop and refine principles that are applicable across a wide variety of application domains As science moves toward more advanced technologies, unconventional design approaches, and unproven regions of the design space, simulation tools are increasingly critical to successful design and operation of technical systems in a growing number of application domains. This must-have resource presents detailed coverage of real-time simulation for system design, parallel and distributed simulations, industry tools, and a large set of applications.

Advanced Energy Storage Technologies and Their Applications (AESA) MDPI This book is a printed edition of the Special Issue

"Advanced Energy Storage Technologies and Their Applications (AESAs)" that was published in Energies **FPGAs Fundamentals, Advanced Features, and Applications in Industrial Electronics CRC Press** Field Programmable Gate Arrays (FPGAs) are currently recognized as the most suitable platform for the implementation of complex digital systems targeting an increasing number of industrial electronics applications. They cover a huge variety of application areas, such as: aerospace, food industry, art, industrial automation, automotive, biomedicine, process control, military, logistics, power electronics, chemistry, sensor networks, robotics, ultrasound, security, and artificial vision. This book first presents the basic architectures of the devices to familiarize the reader with the fundamentals of FPGAs before identifying and discussing new resources that extend the ability of the devices to solve problems in new application domains. Design methodologies are discussed and application examples are included for some of these domains, e.g., mechatronics, robotics, and power systems. **Advances in Neural Networks - ISSN 2009 6th International Symposium on Neural Networks, ISSN 2009 Wuhan, China, May 26-29, 2009 Proceedings, Part III Springer** This book and its companion volumes, LNCS vols. 5551, 5552 and 5553, constitute the proceedings of the 6th International Symposium on Neural Networks (ISSN 2009), held during May 26-29, 2009 in Wuhan, China. Over the past few years, ISSN has matured into a well-established premier international symposium on neural networks and related fields, with a successful sequence of ISSN symposia held in Dalian (2004), Chongqing (2005), Chengdu (2006), Nanjing (2007), and Beijing (2008). Following the tradition of the ISSN series, ISSN 2009 provided a high-level international forum for scientists, engineers, and educators to present state-of-the-art research in neural networks and related fields, and also to discuss with international colleagues on the major opportunities and challenges for future neural network research. Over the past decades, the neural network community has witnessed tremendous efforts and developments in all aspects of neural network research, including theoretical foundations, architectures and network organizations, modeling and simulation, empirical study, as well as a wide range of applications across different domains. The recent developments of science and technology, including neuroscience, computer science, cognitive science, nano-technologies and engineering design, among others, have provided significant new understandings and technological solutions to move the neural network research toward the development of complex, large-scale, and networked brain-like intelligent systems. This long-term goal can only be achieved with the continuous efforts of the community to seriously investigate different issues of the neural networks and related fields. **Reconfigurable Embedded Control Systems: Applications for Flexibility and Agility Applications for Flexibility and Agility IGI Global** "This book addresses the development of reconfigurable embedded control systems and describes various problems in this important research area, which include static and dynamic (manual or automatic) reconfigurations, multi-agent architectures, modeling and verification, component-based approaches, architecture description languages, distributed reconfigurable architectures, real-time and low power scheduling, execution models, and the implementation of such systems"-- **100 Power Tips for FPGA Designers Evgeni Stavinov High-Speed Devices and Circuits with THz Applications CRC Press** Presenting the cutting-edge results of new device developments and

circuit implementations, *High-Speed Devices and Circuits with THz Applications* covers the recent advancements of nano devices for terahertz (THz) applications and the latest high-speed data rate connectivity technologies from system design to integrated circuit (IC) design, providing relevant standard activities and technical specifications. Featuring the contributions of leading experts from industry and academia, this pivotal work: Discusses THz sensing and imaging devices based on nano devices and materials Describes silicon on insulator (SOI) multigate nanowire field-effect transistors (FETs) Explains the theory underpinning nanoscale nanowire metal-oxide-semiconductor field-effect transistors (MOSFETs), simulation methods, and their results Explores the physics of the silicon-germanium (SiGe) heterojunction bipolar transistor (HBT), as well as commercially available SiGe HBT devices and their applications Details aspects of THz IC design using standard silicon (Si) complementary metal-oxide-semiconductor (CMOS) devices, including experimental setups for measurements, detection methods, and more An essential text for the future of high-frequency engineering, *High-Speed Devices and Circuits with THz Applications* offers valuable insight into emerging technologies and product possibilities that are attractive in terms of mass production and compatibility with current manufacturing facilities. **Image Processing Using FPGAs MDPI** This book presents a selection of papers representing current research on using field programmable gate arrays (FPGAs) for realising image processing algorithms. These papers are reprints of papers selected for a Special Issue of the Journal of Imaging on image processing using FPGAs. A diverse range of topics is covered, including parallel soft processors, memory management, image filters, segmentation, clustering, image analysis, and image compression. Applications include traffic sign recognition for autonomous driving, cell detection for histopathology, and video compression. Collectively, they represent the current state-of-the-art on image processing using FPGAs. **Power Electronics Handbook Butterworth-Heinemann** *Power Electronics Handbook, Fourth Edition*, brings together over 100 years of combined experience in the specialist areas of power engineering to offer a fully revised and updated expert guide to total power solutions. Designed to provide the best technical and most commercially viable solutions available, this handbook undertakes any or all aspects of a project requiring specialist design, installation, commissioning and maintenance services. Comprising a complete revision throughout and enhanced chapters on semiconductor diodes and transistors and thyristors, this volume includes renewable resource content useful for the new generation of engineering professionals. This market leading reference has new chapters covering electric traction theory and motors and wide band gap (WBG) materials and devices. With this book in hand, engineers will be able to execute design, analysis and evaluation of assigned projects using sound engineering principles and adhering to the business policies and product/program requirements. Includes a list of leading international academic and professional contributors Offers practical concepts and developments for laboratory test plans Includes new technical chapters on electric vehicle charging and traction theory and motors Includes renewable resource content useful for the new generation of engineering professionals **ELECTRIMACS 2019 Selected Papers - Volume 2 Springer Nature** This book collects a selection of papers presented at ELECTRIMACS 2019 - The 13th international conference of the IMACS TC1 Committee, held in Salerno,

Italy, on 21st-23rd May 2019. The conference papers deal with modelling, simulation, analysis, control, power management, design optimization, identification and diagnostics in electrical power engineering. The main application fields include electric machines and electromagnetic devices, power electronics, transportation systems, smart grids, electric and hybrid vehicles, renewable energy systems, energy storage, batteries, supercapacitors and fuel cells, wireless power transfer. The contributions included in Volume 2 are particularly focussed on methodological aspects, modelling and applied mathematics in the field of electrical engineering. **FPGAs Fundamentals, Advanced Features, and Applications in Industrial Electronics CRC Press** Field Programmable Gate Arrays (FPGAs) are currently recognized as the most suitable platform for the implementation of complex digital systems targeting an increasing number of industrial electronics applications. They cover a huge variety of application areas, such as: aerospace, food industry, art, industrial automation, automotive, biomedicine, process control, military, logistics, power electronics, chemistry, sensor networks, robotics, ultrasound, security, and artificial vision. This book first presents the basic architectures of the devices to familiarize the reader with the fundamentals of FPGAs before identifying and discussing new resources that extend the ability of the devices to solve problems in new application domains. Design methodologies are discussed and application examples are included for some of these domains, e.g., mechatronics, robotics, and power systems. **Electrical & Electronics Abstracts HCI International 2022 Posters 24th International Conference on Human-Computer Interaction, HCII 2022, Virtual Event, June 26 - July 1, 2022, Proceedings, Part I Springer Nature** The four-volume set CCIS 1580, CCIS 1581, CCIS 1582, and CCIS 1583 contains the extended abstracts of the posters presented during the 24th International Conference on Human-Computer Interaction, HCII 2022, which was held virtually in June - July 2022. The total of 1276 papers and 275 posters included in the 40 HCII 2021 proceedings volumes was carefully reviewed and selected from 5583 submissions. The posters presented in these four volumes are organized in topical sections as follows: Part I: user experience design and evaluation; visual design and visualization; data, information and knowledge; interacting with AI; universal access, accessibility and design for aging. Part II: multimodal and natural interaction; perception, cognition, emotion and psychophysiological monitoring; human motion modelling and monitoring; IoT and intelligent living environments. Part III: learning technologies; HCI, cultural heritage and art; eGovernment and eBusiness; digital commerce and the customer experience; social media and the metaverse. Part IV: virtual and augmented reality; autonomous vehicles and urban mobility; product and robot design; HCI and wellbeing; HCI and cybersecurity. **Mechatronics 2017 Recent Technological and Scientific Advances Springer** This book presents nearly 90 carefully selected contributions at the 12th International Conference Mechatronics, which took place in Brno, Czech Republic on 6-8 September 2017. Reflecting the most progressive and constantly changing areas of mechatronics, these proceedings includes papers concerning modeling and simulation, automatic control, robotics, sensors and actuators, electrical machines, and energy harvesting. It not only offers inspiration, but also deepens readers' interdisciplinary and integrated understanding of modern engineering. The book is intended for experts in the integration of

electronic, mechanical, control and computer sciences. **Proceedings of the 3rd International Conference on Electrical and Information Technologies for Rail Transportation (EITRT) 2017 Electrical Traction Springer** The proceedings collect the latest research trends, methods and experimental results in the field of electrical and information technologies for rail transportation. The topics cover novel traction drive technologies of rail transportation, safety technology of rail transportation system, rail transportation information technology, rail transportation operational management technology, rail transportation cutting-edge theory and technology etc. The proceedings can be a valuable reference work for researchers and graduate students working in rail transportation, electrical engineering and information technologies. **FPGA-based Implementation of Signal Processing Systems John Wiley & Sons** Revised edition of: FPGA-based implementation of signal processing systems / Roger Woods ... [et al.]. 2008. **Three-phase AC-AC Power Converters Based on Matrix Converter Topology Matrix-reactance frequency converters concept Springer Science & Business Media** AC voltage frequency changes is one of the most important functions of solid state power converters. The most desirable features in frequency converters are the ability to generate load voltages with arbitrary amplitude and frequency, sinusoidal currents and voltages waveforms; the possibility of providing unity power factor for any load; and, finally, a simple and compact power circuit. Over the past decades, a number of different frequency converter topologies have appeared in the literature, but only the converters with either a voltage or current DC link are commonly used in industrial applications. Improvements in power semiconductor switches over recent years have resulted in the development of many structures of AC-AC converters without DC electric energy storage. Such converters are an alternative solution for frequently recommended systems with DC energy storage and are characterized by a lower price, smaller size and longer lifetime. Most of the these topologies are based on the structure of the matrix converter. Three-Phase AC-AC Power Converters Based On Matrix Converter Topology: Matrix-reactance frequency converters concept presents a review of power frequency converters, with special attention paid to converters without DC energy storage. Particular attention is paid to nine new converters named matrix-reactance frequency converters which have been developed by the author and the team of researchers from Institute of Electrical Engineering at the University of Zielona Góra. The topologies of the presented matrix-reactance frequency converters are based on a three-phase unipolar buck-boost matrix-reactance chopper with source or load switches arranged as in a matrix converter. This kind of approach makes it possible to obtain an output voltage greater than the input one (similar to that in a matrix-reactance chopper) and a frequency conversion (similar to that in a matrix converter). Written for researchers and Ph.D. students working in the field of power electronics converters and drive systems, Three-Phase AC-AC Power Converters Based On Matrix Converter Topology: Matrix-reactance frequency converters concept will also be valuable to power electronics converter designers and users; R&D centers; and readers needing industry solutions in variable speed drive systems, such as automation and aviation. **FPGA Architecture Survey and Challenges Now Publishers Inc** FPGA Architecture: Survey and Challenges reviews the historical development of programmable logic devices, the fundamental

programming technologies that the programmability is built on, and then describes the basic understandings gleaned from research on architectures. It is an invaluable reference for engineers and computer scientists. It is also an excellent primer for senior or graduate-level students in electrical engineering or computer science.

Emerging Technology and Architecture for Big-data Analytics Springer This book describes the current state of the art in big-data analytics, from a technology and hardware architecture perspective. The presentation is designed to be accessible to a broad audience, with general knowledge of hardware design and some interest in big-data analytics. Coverage includes emerging technology and devices for data-analytics, circuit design for data-analytics, and architecture and algorithms to support data-analytics. Readers will benefit from the realistic context used by the authors, which demonstrates what works, what doesn't work, and what are the fundamental problems, solutions, upcoming challenges and opportunities. Provides a single-source reference to hardware architectures for big-data analytics; Covers various levels of big-data analytics hardware design abstraction and flow, from device, to circuits and systems; Demonstrates how non-volatile memory (NVM) based hardware platforms can be a viable solution to existing challenges in hardware architecture for big-data analytics.

Design for Embedded Image Processing on FPGAs John Wiley & Sons Dr Donald Bailey starts with introductory material considering the problem of embedded image processing, and how some of the issues may be solved using parallel hardware solutions. Field programmable gate arrays (FPGAs) are introduced as a technology that provides flexible, fine-grained hardware that can readily exploit parallelism within many image processing algorithms. A brief review of FPGA programming languages provides the link between a software mindset normally associated with image processing algorithms, and the hardware mindset required for efficient utilization of a parallel hardware design. The design process for implementing an image processing algorithm on an FPGA is compared with that for a conventional software implementation, with the key differences highlighted. Particular attention is given to the techniques for mapping an algorithm onto an FPGA implementation, considering timing, memory bandwidth and resource constraints, and efficient hardware computational techniques. Extensive coverage is given of a range of low and intermediate level image processing operations, discussing efficient implementations and how these may vary according to the application. The techniques are illustrated with several example applications or case studies from projects or applications he has been involved with. Issues such as interfacing between the FPGA and peripheral devices are covered briefly, as is designing the system in such a way that it can be more readily debugged and tuned. Provides a bridge between algorithms and hardware Demonstrates how to avoid many of the potential pitfalls Offers practical recommendations and solutions Illustrates several real-world applications and case studies Allows those with software backgrounds to understand efficient hardware implementation Design for Embedded Image Processing on FPGAs is ideal for researchers and engineers in the vision or image processing industry, who are looking at smart sensors, machine vision, and robotic vision, as well as FPGA developers and application engineers. The book can also be used by graduate students studying imaging systems, computer engineering, digital design, circuit design, or computer science. It can also be used as supplementary text

for courses in advanced digital design, algorithm and hardware implementation, and digital signal processing and applications.

Companion website for the book: www.wiley.com/go/bailey/fpga

CompTIA Security + Guide to Network Security Fundamentals Cengage Learning This best-selling guide provides a complete, practical, and thoroughly up-to-date introduction to network and computer security. COMPTIA SECURITY+ GUIDE TO NETWORK SECURITY FUNDAMENTALS, Seventh Edition, maps to the new CompTIA Security+ SY0-601 Certification Exam, providing comprehensive coverage of all domain objectives to help readers prepare for professional certification and career success. Important Notice: Media content referenced within the product description or the product text may not be available in the ebook version.

Mine Ventilation Proceedings of the 18th North American Mine Ventilation Symposium, 12-17 June, 2021, Rapid City, South Dakota, USA CRC Press This volume contains the proceedings of the 18th North American Mine Ventilation Symposium held, on a virtual platform, June 12-17, 2021. This symposium was organized by South Dakota Mines, Rapid City, South Dakota, in collaboration with the Underground Ventilation Committee (UVC) of the Society for Mining, Metallurgy & Exploration (SME). The Mine Ventilation Symposium series has always been a premier forum for ventilation experts, practitioners, educators, students, regulators, and manufacturers from around the world to exchange knowledge, ideas, and opinions. This volume features fifty-seven selected technical papers in a wide range of topics including: auxiliary ventilation, case studies of mine ventilation, computational fluid dynamics applications in mine ventilation, diesel particulate control, electric machinery in mine ventilation, mine cooling and refrigeration, mine dust monitoring and control, mine fans, mine fires and explosion prevention, mine gases, mine heat, mine management and organization of ventilation, mine ventilation and automation, occupational health and safety in mine ventilation, renewable/alternative energy in mine ventilation, ventilation monitoring and measurement, ventilation network analysis and optimization, and ventilation planning and design.

TS-7300 Demonstration Kit 1.0 Reference Manual Getting Started with 20-sim Index to Theses with Abstracts Accepted for Higher Degrees by the Universities of Great Britain and Ireland and the Council for National Academic Awards Theses on any subject submitted by the academic libraries in the UK and Ireland.

Embedded Systems Design with FPGAs Springer Science & Business Media This book presents the methodologies and for embedded systems design, using field programmable gate array (FPGA) devices, for the most modern applications. Coverage includes state-of-the-art research from academia and industry on a wide range of topics, including applications, advanced electronic design automation (EDA), novel system architectures, embedded processors, arithmetic, and dynamic reconfiguration.

6GN for Future Wireless Networks 4th EAI International Conference, 6GN 2021, Huizhou, China, October 30-31, 2021, Proceedings Springer Nature Asia Electronics Industry AEI Proceedings of the International Congress on High Speed Photography and Photonics Proceedings of the ... International Conference on Microelectronics Chaotic Secure Communication Principles and Technologies Walter de Gruyter GmbH & Co KG The monograph begins with a systematic introduction of chaos and chaos synchronization, and then extends to the methodologies and

technologies in secure communication system design and implementation. The author combines theoretical frameworks with empirical studies, making the book a practical reference for both academics and industrial engineers. **Reconfigurable Computing The Theory and Practice of FPGA-Based Computation Elsevier** Reconfigurable Computing marks a revolutionary and hot topic that bridges the gap between the separate worlds of hardware and software design—the key feature of reconfigurable computing is its groundbreaking ability to perform computations in hardware to increase performance while retaining the flexibility of a software solution. Reconfigurable computers serve as affordable, fast, and accurate tools for developing designs ranging from single chip architectures to multi-chip and embedded systems. Scott Hauck and Andre DeHon have assembled a group of the key experts in the fields of both hardware and software computing to provide an introduction to the entire range of issues relating to reconfigurable computing. FPGAs (field programmable gate arrays) act as the “computing vehicles to implement this powerful technology. Readers will be guided into adopting a completely new way of handling existing design concerns and be able to make use of the vast opportunities possible with reconfigurable logic in this rapidly evolving field. Designed for both hardware and software programmers Views of reconfigurable programming beyond standard programming languages Broad set of case studies demonstrating how to use FPGAs in novel and efficient ways **Make: FPGAs Turning Software into Hardware with Eight Fun and Easy DIY Projects Maker Media, Inc.** What if you could use software to design hardware? Not just any hardware—imagine specifying the behavior of a complex parallel computer, sending it to a chip, and having it run on that chip—all without any manufacturing? With Field-Programmable Gate Arrays (FPGAs), you can design such a machine with your mouse and keyboard. When you deploy it to the FPGA, it immediately takes on the behavior that you defined. Want to create something that behaves like a display driver integrated circuit? How about a CPU with an instruction set you dreamed up? Or your very own Bitcoin miner You can do all this with FPGAs. Because you're not writing programs—rather, you're designing a chip whose sole purpose is to do what you tell it—it's faster than anything you can do in code. With Make: FPGAs, you'll learn how to break down problems into something that can be solved on an FPGA, design the logic that will run on your FPGA, and hook up electronic components to create finished projects. **EDN FPGA Prototyping by Verilog Examples Xilinx Spartan-3 Version John Wiley & Sons** FPGA Prototyping Using Verilog Examples will provide you with a hands-on introduction to Verilog synthesis and FPGA programming through a “learn by doing” approach. By following the clear, easy-to-understand templates for code development and the numerous practical examples, you can quickly develop and simulate a sophisticated digital circuit, realize it on a prototyping device, and verify the operation of its physical implementation. This introductory text that will provide you with a solid foundation, instill confidence with rigorous examples for complex systems and prepare you for future development tasks. **Designing with FPGAs and CPLDs CRC Press** * Choose the right programmable logic devices and development tools * Understand the design, verification, and testing issues * Plan schedules and allocate resources efficiently Choose the right programmable logic devices with this guide to the technology **Algorithms and Architectures for Real-**

Time Control 1998 Pergamon The 5th IFAC Workshop on Algorithms and Architectures for Real-Time Control (AARTC '98) was organized under the auspices of the IFAC Technical Committee. This Committee is concerned with the use of emerging software and hardware developments in real-time control. The AARTC '98 Technical Programme consisted of seventeen sessions, covering major areas of software, hardware and applications for real-time control, namely robotics, modeling and control, software design tools and methodologies, industrial process control and manufacturing systems, parallel and distributed systems, non-linear control systems, neural networks, parallel and distributed algorithms for real-time signal processing and control, transport applications, algorithms, fault tolerant systems and fuzzy control. The contributions were selected from a large number of high-quality full draft papers and late breaking paper contributions presenting very recent research work.

FPGA Design Automation A Survey Now Publishers Inc FPGA Design Automation: A Survey is an up-to-date comprehensive survey/tutorial of FPGA design automation, with an emphasis on the recent developments within the past 5 to 10 years. The focus is on the theory and techniques that have been, or most likely will be, reduced to practice. It covers all major steps in FPGA design flow: routing and placement, circuit clustering, technology mapping and architecture-specific optimization, physical synthesis, RT-level and behavior-level synthesis, and power optimization. FPGA Design Automation: A Survey can be used as both a guide for beginners who are embarking on research in this relatively young yet exciting area, and a useful reference for established researchers in this field.

Programmable Integrated Photonics This book provides the first comprehensive, up-to-date and self-contained introduction to the emergent field of Programmable Integrated Photonics (PIP). It covers both theoretical and practical aspects, ranging from basic technologies and the building of photonic component blocks, to design alternatives and principles of complex programmable photonic circuits, their limiting factors, techniques for characterization and performance monitoring/control, and their salient applications both in the classical as well as in the quantum information fields. The book concentrates and focuses mainly on the distinctive features of programmable photonics, as compared to more traditional ASPIC approaches. After some years during which the Application Specific Photonic Integrated Circuit (ASPIC) paradigm completely dominated the field of integrated optics, there has been an increasing interest in PIP. The rising interest in PIP is justified by the surge in a number of emerging applications that call for true flexibility and reconfigurability, as well as low-cost, compact, and low-power consuming devices. Programmable Integrated Photonics is a new paradigm that aims at designing common integrated optical hardware configurations, which by suitable programming, can implement a variety of functionalities. These in turn can be exploited as basic operations in many application fields. Programmability enables, by means of external control signals, both chip reconfiguration for multifunction operation, as well as chip stabilization against non-ideal operations due to fluctuations in environmental conditions and fabrication errors. Programming also allows for the activation of parts of the chip, which are not essential for the implementation of a given functionality, but can be of help in reducing noise levels through the diversion of undesired reflections.