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VLSI Architecture Springer
Based on more than 30 years of research on differential theories of gratings, this book

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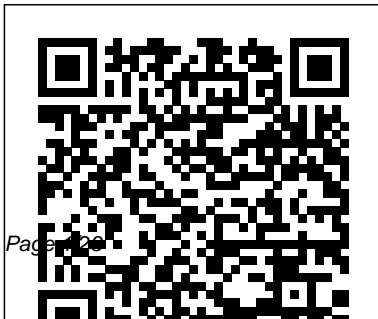
describes developments in differential theory for applications in spectroscopy, acoustics, X-ray instrumentation, optical communication, information processing, photolithography, high-power lasers, high-precision engineering, and astronomy. Introducing the Fast Fourier Factorization approach to improve the convergence of a truncated series, the book examines multilayers, stacked gratings, crossed gratings, photonic crystals, and isotropic and anisotropic materials; techniques and examples in grating design; and Maxwell equations in a truncated Fourier space.

Digital Signal Processing with Field Programmable Gate Arrays Springer Science & Business Media
Market_Desc: · Students in graduate level courses· Electrical Engineers· Computer Scientists· Computer Architecture Designers· Circuit Designers· Algorithm Designers· System Designers· Computer Programmers in the Multimedia and Wireless Communications Industries· VLSI System Designers Special Features: This example-packed resource provides invaluable professional training for a rapidly-expanding industry. · Presents a variety of approaches to analysis, estimation, and reduction of power consumption in order to help designers extend battery life.· Includes application-driven problems at the end of each chapter· Features six appendices covering shortest path algorithms used in retiming,

scheduling, and allocation techniques, as well as determining the iteration bound· The Author is a recognized expert in the field, having written several books, taught several graduate-level classes, and served on several IEEE boards About The Book: This book complements the other Digital Signaling Processing books in our list, which include an introductory treatment (Marven), a comprehensive handbook (Mitra), a professional reference (Kaloupsidis), and others which pertain to a specific topic such as noise control. This graduate level textbook will fill an important niche in a rapidly expanding market.

High-Performance Computing and Networking Wiley-IEEE Press
VISI signal processing components of portable systems in communications are described. System, equipment, and component designs for low power and small size critical to product success are described. Applications to the wireless network adn cellular communications are given.

Digital Design of Signal Processing Systems CRC Press
In the industry of manufacturing and design, one major constraint has been enhancing operating performance using less time. As technology continues to advance, manufacturers are looking for better methods in predicting the condition and residual lifetime of electronic devices in order to

save repair costs and their reputation. Intelligent systems are a solution for predicting the reliability of these components; however, there is a lack of research on the advancements of this smart technology within the manufacturing industry. AI Techniques for Reliability Prediction for Electronic Components provides emerging research exploring the theoretical and practical aspects of prediction methods using artificial intelligence and machine learning in the manufacturing field.

Featuring coverage on a broad range of topics such as data collection, fault tolerance, and health prognostics, this book is ideally designed for reliability engineers, electronic engineers, researchers, scientists, students, and faculty members seeking current research on the advancement of reliability analysis using AI.

Advances in Decision Sciences, Image Processing, Security and Computer Vision
Elsevier
This thesis introduces some formal techniques which can be used for synthesis of VLSI (very large scale integration) architectures for DSP (digital signal processing) algorithms. These techniques can be used to design architectures for single rate and single dimensional DSP, multirate and single-dimensional DSP, and single rate and multi-dimensional DSP. For single rate and single-dimensional DSP, we have developed a novel technique for exhaustively generating all retiming and scheduling solutions for the DSP algorithm. The significance of this contribution is twofold. First, it allows a circuit designer

to explore a large space of possible high level implementations for the algorithm, which allows the designer to make a good decision about the high level architectural details of the design. Second, this work explicitly shows the important interaction between retiming and scheduling in high level synthesis. While retiming and scheduling have been treated as separate problems in the past, our work uses a mathematical framework to show that retiming is a special case of scheduling. Also for single rate and single-dimensional DSP, we have developed techniques for computing the minimum number of registers required to implement a statically scheduled DSP program. Closed form expressions are derived for computing the minimum number of registers assuming various memory models with or without retiming the scheduled DFG. This is an important problem because memory typically occupies a large portion of the area of a DSP implementation (often over half of the area), and minimizing this area leads to more efficient designs. For multirate and single-dimensional DSP, we have developed a multirate folding technique which can be used to synthesize single rate architectures from multirate DSP algorithms. Prior to the development of this formal technique, the design of single rate.

OFDM Baseband Receiver Design for Wireless Communications John Wiley & Sons

Field programmable gate arrays (FPGAs) are an increasingly popular technology for implementing digital signal processing (DSP) systems. By allowing designers to create circuit

architectures developed for the specific applications, high levels of performance can be achieved for many DSP applications providing considerable improvements over conventional microprocessor and dedicated DSP processor solutions. The book addresses the key issue in this process specifically, the methods and tools needed for the design, optimization and implementation of DSP systems in programmable FPGA hardware. It presents a review of the leading-edge techniques in this field, analyzing advanced DSP-based design flows for both signal flow graph- (SFG-) based and dataflow-based implementation, system on chip (SoC) aspects, and future trends and challenges for FPGAs. The automation of the techniques for component architectural synthesis, computational models, and the reduction of energy consumption to help improve FPGA performance, are given in detail. Written from a system level design perspective and with a DSP focus, the authors present many practical application examples of complex DSP implementation, involving: high-performance computing e.g. matrix operations such as matrix multiplication; high-speed filtering including finite impulse response (FIR) filters and wave digital filters (WDFs); adaptive

filtering e.g. recursive least squares (RLS) filtering; transforms such as the fast Fourier transform (FFT). FPGA-based Implementation of Signal Processing Systems is an important reference for practising engineers and researchers working on the design and development of DSP systems for radio, telecommunication, information, audio-visual and security applications. Senior level electrical and computer engineering graduates taking courses in signal processing or digital signal processing shall also find this volume of interest.

Introduction to Biomass Energy Conversions
Springer Science & Business Media

Field-Programmable Gate Arrays (FPGAs) are revolutionizing digital signal processing as novel FPGA families are replacing ASICs and PDSPs for front-end digital signal processing algorithms. So the efficient implementation of these algorithms is critical and is the main goal of this book. It starts with an overview of today's FPGA technology, devices, and tools for designing state-of-the-art DSP systems. A case study in the first chapter is the basis for more than 30 design examples throughout. The following chapters deal with computer arithmetic concepts, theory and the implementation of FIR and IIR filters, multirate digital signal processing systems, DFT and FFT algorithms, and advanced algorithms with high future potential. Each chapter contains exercises. The VERILOG source code and a glossary are given in the appendices, while the accompanying CD-ROM

contains the examples in VHDL and Verilog code as well as the newest Altera "Baseline" software. This edition has a new chapter on adaptive filters, new sections on division and floating point arithmetics, an up-date to the current Altera software, and some new exercises.

VLSI Synthesis of DSP Kernels Prentice Hall International (UK) This book constitutes the proceedings of the First International Conference on Emerging Trends in Engineering (ICETE), held at University College of Engineering and organised by the Alumni Association, University College of Engineering, Osmania University, in Hyderabad, India on 22–23 March 2019. The proceedings of the ICETE are published in three volumes, covering seven areas: Biomedical, Civil, Computer Science, Electrical & Electronics, Electronics & Communication, Mechanical, and Mining Engineering. The 215 peer-reviewed papers from around the globe present the latest state-of-the-art research, and are useful to postgraduate students, researchers, academics and industry engineers working in the respective fields. Volume 1 presents papers on the theme "Advances in Decision Sciences, Image Processing, Security and Computer Vision – International Conference on Emerging Trends in Engineering (ICETE)". It includes state-of-the-art technical contributions in the area of biomedical and

computer science engineering, discussing sustainable developments in the field, such as instrumentation and innovation, signal and image processing, Internet of Things, cryptography and network security, data mining and machine learning.

Design Recipes for FPGAs: Using Verilog and VHDL Institute of Electrical & Electronics Engineers(IEEE) In two editions spanning more than a decade, The Electrical Engineering Handbook stands as the definitive reference to the multidisciplinary field of electrical engineering. Our knowledge continues to grow, and so does the Handbook. For the third edition, it has grown into a set of six books carefully focused on specialized areas or fields of study. Each one represents a concise yet definitive collection of key concepts, models, and equations in its respective domain, thoughtfully gathered for convenient access. Combined, they constitute the most comprehensive, authoritative resource available. Circuits, Signals, and Speech and Image Processing presents all of the basic information related to electric circuits and components, analysis of circuits, the use of the Laplace transform, as well as signal, speech, and image processing using filters and algorithms. It also examines emerging areas such as text to

speech synthesis, real-time processing, and embedded signal processing. Electronics, Power Electronics, Optoelectronics, Microwaves, Electromagnetics, and Radar delves into the fields of electronics, integrated circuits, power electronics, optoelectronics, electromagnetics, light waves, and radar, supplying all of the basic information required for a deep understanding of each area. It also devotes a section to electrical effects and devices and explores the emerging fields of microlithography and power electronics. Sensors, Nanoscience, Biomedical Engineering, and Instruments provides thorough coverage of sensors, materials and nanoscience, instruments and measurements, and biomedical systems and devices, including all of the basic information required to thoroughly understand each area. It explores the emerging fields of sensors, nanotechnologies, and biological effects. Broadcasting and Optical Communication Technology explores communications, information theory, and devices, covering all of the basic information needed for a thorough understanding of these areas. It also examines the emerging areas of adaptive estimation and optical communication. Computers, Software

Engineering, and Digital Devices examines digital and logical devices, displays, testing, software, and computers, presenting the fundamental concepts needed to ensure a thorough understanding of each field. It treats the emerging fields of programmable logic, hardware description languages, and parallel computing in detail. Systems, Controls, Embedded Systems, Energy, and Machines explores in detail the fields of energy devices, machines, and systems as well as control systems. It provides all of the fundamental concepts needed for thorough, in-depth understanding of each area and devotes special attention to the emerging area of embedded systems. Encompassing the work of the world's foremost experts in their respective specialties, The Electrical Engineering Handbook, Third Edition remains the most convenient, reliable source of information available. This edition features the latest developments, the broadest scope of coverage, and new material on nanotechnologies, fuel cells, embedded systems, and biometrics. The engineering community has relied on the Handbook for more than twelve years, and it will continue to be a platform to launch the next wave of advancements. The Handbook's latest

incarnation features a protective slipcase, which helps you stay organized without overwhelming your bookshelf. It is an attractive addition to any collection, and will help keep each volume of the Handbook as fresh as your latest research.

Digital Signal Processing for Multimedia Systems John Wiley & Sons

This text emphasizes the intricate relationship between adaptive filtering and signal analysis - highlighting stochastic processes, signal representations and properties, analytical tools, and implementation methods. This second edition includes new chapters on adaptive techniques in communications and rotation-based algorithms. It provides practical applications in information, estimation, and circuit theories.

Computer Principles and Design in Verilog HDL Institute of Electrical & Electronics Engineers(IEEE)

Designing VLSI systems represents a challenging task. It is a transfonnation among different specifications corresponding to different levels of design: abstraction, behavioral, stntctural and physical. The behavioral level describes the functionality of the design. It consists of two components; static and dynamic. The static component describes operations, whereas the dynamic component describes sequencing and timing. The structural level contains infonnation about components, control and connectivity. The physical level describes the constraints that should be imposed on the floor plan, the placement of components, and the geometry of the design. Constraints of

area, speed and power are also applied at this level. To implement such multilevel transfonnation, a design methodology should be devised, taking into consideration the constraints, limitations and properties of each level. The mapping process between any of these domains is non-isomorphic. A single behavioral component may be transfonned into more than one structural component. Design methodologies are the most recent evolution in the design automation era, which started off with the introduction and subsequent usage of module generation especially for regular structures such as PLA's and memories. A design methodology should offer an integrated design system rather than a set of separate unrelated routines and tools. A general outline of a desired integrated design system is as follows: * Decide on a certain unified framework for all design levels. * Derive a design method based on this framework. * Create a design environment to implement this design method.

Advanced Signal Processing Handbook CRC Press

Pipelined Lattice and Wave Digital Recursive Filters uses look-ahead transformation and constrained filter design approaches. It is also shown that pipelining often reduces the roundoff noise in a digital filter. The pipelined recursive lattice and wave digital filters presented are well suited where increasing speed and reducing area or power or roundoff noise are important. Examples are wireless and cellular codec applications, where low power consumption is important, and radar and video applications, where higher speed is important. The book presents pipelining of direct-form recursive digital filters and demonstrates the usefulness of these topologies in high-speed and low-power applications. It then discusses

fundamentals of scaling in the design of lattice and wave digital filters. Approaches to designing four different types of lattice digital filters are discussed, including basic, one-multiplier, normalized, and scaled normalized structures. The roundoff noise in these lattice filters is also studied. The book then presents approaches to the design of pipelined lattice digital filters for the same four types of structures, followed by pipelining of orthogonal double-rotation digital filters, which eliminate limit cycle problems. A discussion of pipelining of lattice wave digital filters follows, showing how linear phase, narrow-band, sharp-transition recursive filters can be implemented using this structure. This example is motivated by a difficult filter design problem in a wireless codec application. Finally, pipelining of ladder wave digital filters is discussed. Pipelined Lattice and Wave Digital Recursive Filters serves as an excellent reference and may be used as a text for advanced courses on the subject.

VLSI Signal Processing, VIII CRC Press
A critical step in the design of a DSP system is to identify for each of its components (DSP kernels) an implementation architecture that provides the desired degree of flexibility/programmability and optimises the area-delay-power parameters. The book covers the entire solution space comprising both hardware multiplier-based and multiplex-less architectures that offer varying degrees of programmability. For each of the implementation styles, several algorithmic and architectural transformations are proposed so as to

optimally implement weighted-sum based DSP kernels over the area-display-power space. VLSI Synthesis of DSP Kernels presents the following: Six different target implementation styles - Programmable DSP-based implementation; Programmable processors with no dedicated hardware multiplier; Implementation using hardware multiplier(s) and adder(s); Distributed Arithmetic (DA)-based implementation; Residue Number System (RNS)-based implementation; and Multiplier-less implementation (using adders and shifters) for fixed coefficient DSP kernels. For each of the implementation styles, description and analysis of several algorithmic and architectural transformations aimed at one or more of reduced area, higher performance and low power; Automated and semi-automated techniques for applying each of these transformations; and Classification of the transformations based on the properties that they exploit and their encapsulation in a design framework. A methodology that uses the framework to systematically explore the application of these transformations depending on the characteristics of the algorithm and the target implementation style. VLSI Synthesis of DSP Kernels is essential reading for designers of

both hardware- and software-based DSP systems, developers of IP modules for DSP applications, EDA tools developers, researchers and managers interested in getting a comprehensive overview of current trends and future challenges in optimal implementations of DSP kernels. It will also be suitable for graduate students specialising in the area of VLSI Digital Signal Processing. Arithmetic Circuits for DSP Applications Springer Science & Business Media The Second Edition of OFDM Baseband Receiver Design for Wirless Communications, this book expands on the earlier edition with enhanced coverage of MIMO techniques, additional baseband algorithms, and more IC design examples. The authors cover the full range of OFDM technology, from theories and algorithms to architectures and circuits. The book gives a concise yet comprehensive look at digital communication fundamentals before explaining signal processing algorithms in receivers. The authors give detailed treatment of hardware issues - from architecture to IC implementation. Links OFDM and MIMO theory with hardware implementation Enables the reader to transfer communication received concepts into hardware; design wireless receivers with acceptable implemntation loss; achieve low-power designs Covers the latest standards, such as

DVB-T2, WiMax, LTE and LTE-A Includes more baseband algorithms, like soft-decoding algorithms such as BCJR and SOVA Expanded treatment of channel models, detection algorithms and MIMO techniques Features concrete design examples of WiMAX systems and cognitive radio apllications Companion website with lecture slides for instructors Based on materials developed for a course in digital communication IC design, this book is ideal for graduate students and researchers in VLSI design, wireless communications, and communications signal processing. Practicing engineers working on algorithms or hardware for wireless communications devices will also find this to be a key reference. *Retiming, Folding and Register Minimization for DSP Synthesis* Springer Science & Business Media The past few years have seen a rapid growth in image processing and image communication technologies. New video services and multimedia applications are continuously being designed. Essential for all these applications are image and video compression techniques. The purpose of this book is to report on recent advances in VLSI architectures and their implementation for video signal processing applications with emphasis on video coding for bit rate reduction.Efficient VLSI implementation for video signal processing spans a broad range of disciplines involving algorithms, architectures, circuits, and systems. Recent progress in

VLSI architectures and implementations has resulted in the reduction in cost and size of video signal processing equipment and has made video applications more practical.The topics covered in this volume demonstrate the increasingly interdisciplinary nature of VLSI implementation of video signal processing applications, involving interactions between algorithms, VLSI architectures, circuit techniques, semiconductor technologies and CAD for microelectronics.

Digital Signal Processing for Multimedia Systems Springer Science & Business Media In DSP Architecture Design Essentials, authors Dejan Markovi? and Robert W. Brodersen cover a key subject for the successful realization of DSP algorithms for communications, multimedia, and healthcare applications. The book addresses the need for DSP architecture design that maps advanced DSP algorithms to hardware in the most power- and area-efficient way. The key feature of this text is a design methodology based on a high-level design model that leads to hardware implementation with minimum power and area. The methodology includes algorithm-level considerations such as automated word-length reduction and intrinsic data properties that can be leveraged to reduce hardware complexity. From a high-level data-flow graph model, an architecture exploration methodology based on linear programming is used to create an array of architectural solutions tailored to the underlying hardware technology. The book is supplemented with online material: bibliography, design examples, CAD tutorials and custom software.
Handbook of Signal

Processing Systems
Springer Science & Business Media
Digital signal processing lies at the heart of the communications revolution and is an essential element of key technologies such as mobile phones and the Internet. This book covers all the major topics in digital signal processing (DSP) design and analysis, supported by MatLab examples and other modelling techniques. The authors explain clearly and concisely why and how to use digital signal processing systems; how to approximate a desired transfer function characteristic using polynomials and ratio of polynomials; why an appropriate mapping of a transfer function on to a suitable structure is important for practical applications; and how to analyse, represent and explore the trade-off between time and frequency representation of signals. An ideal textbook for students, it will also be a useful reference for engineers working on the development of signal processing systems.

MARS: a High-level Synthesis Tool for Digital Signal Processing Architecture Design CRC Press
Digital Design of Signal Processing Systems discusses a spectrum of architectures and methods for effective implementation of algorithms in hardware (HW). Encompassing all

facets of the subject this book includes conversion of algorithms from floating-point to fixed-point format, parallel architectures for basic computational blocks, Verilog Hardware Description Language (HDL), SystemVerilog and coding guidelines for synthesis. The book also covers system level design of Multi Processor System on Chip (MPSoC); a consideration of different design methodologies including Network on Chip (NoC) and Kahn Process Network (KPN) based connectivity among processing elements. A special emphasis is placed on implementing streaming applications like a digital communication system in HW. Several novel architectures for implementing commonly used algorithms in signal processing are also revealed. With a comprehensive coverage of topics the book provides an appropriate mix of examples to illustrate the design methodology. Key Features: A practical guide to designing efficient digital systems, covering the complete spectrum of digital design from a digital signal processing perspective Provides a full account of HW building blocks and their architectures, while also elaborating effective use of embedded computational resources such as multipliers, adders and memories in FPGAs Covers a system level architecture using NoC and KPN for streaming applications, giving examples of structuring MATLAB code and its easy mapping in HW for these applications

Explains state machine based and Micro-Program architectures with comprehensive case studies for mapping complex applications The techniques and examples discussed in this book are used in the award winning products from the Center for Advanced Research in Engineering (CARE). Software Defined Radio, 10 Gigabit VoIP monitoring system and Digital Surveillance equipment has respectively won APICTA (Asia Pacific Information and Communication Alliance) awards in 2010 for their unique and effective designs. VLSI Signal Processing, IX Springer Science & Business Media Design Recipes for FPGAs: Using Verilog and VHDL provides a rich toolbox of design techniques and templates to solve practical, every-day problems using FPGAs. Using a modular structure, the book gives 'easy-to-find' design techniques and templates at all levels, together with functional code. Written in an informal and 'easy-to-grasp' style, it goes beyond the principles of FPGA s and hardware description languages to actually demonstrate how specific designs can be synthesized, simulated and downloaded onto an FPGA. This book's 'easy-to-find' structure begins with a design application to demonstrate the key building blocks of FPGA design and how to connect them, enabling the experienced FPGA

designer to quickly select the right design for their application, while providing the less experienced a 'road map' to solving their specific design problem. The book also provides advanced techniques to create 'real world' designs that fit the device required and which are fast and reliable to implement. This text will appeal to FPGA designers of all levels of experience. It is also an ideal resource for embedded system development engineers, hardware and software engineers, and undergraduates and postgraduates studying an embedded system which focuses on FPGA design. - A rich toolbox of practical FGPA design techniques at an engineer's finger tips - Easy-to-find structure that allows the engineer to quickly locate the information to solve their FGPA design problem, and obtain the level of detail and understanding needed Custom Memory Management Methodology John Wiley & Sons Digital Signal Processing for Communication Systems examines the plans for the future and the progress that has already been made, in the field of DSP and its applications to communication systems. The book pursues the progression from communication and information theory through to the implementation, evaluation and performance enhancing of

practical communication systems using DSP technology. Digital Signal Processing for Communication Systems looks at various types of coding and modulation techniques, describing different applications of Turbo-Codes, BCH codes and general block codes, pulse modulations, and combined modulation and coding in order to improve the overall system performance. The book examines DSP applications in measurements performed for channel characterisation, pursues the use of DSP for design of effective channel simulators, and discusses equalization and detection of various signal formats for different channels. A number of system design issues are presented where digital signal processing is involved, reporting on the successful implementation of the system components using DSP technology, and including the problems involved with implementation of some DSP algorithms. Digital Signal Processing for Communication Systems serves as an excellent resource for professionals and researchers who deal with digital signal processing for communication systems, and may serve as a text for advanced courses on the subject.