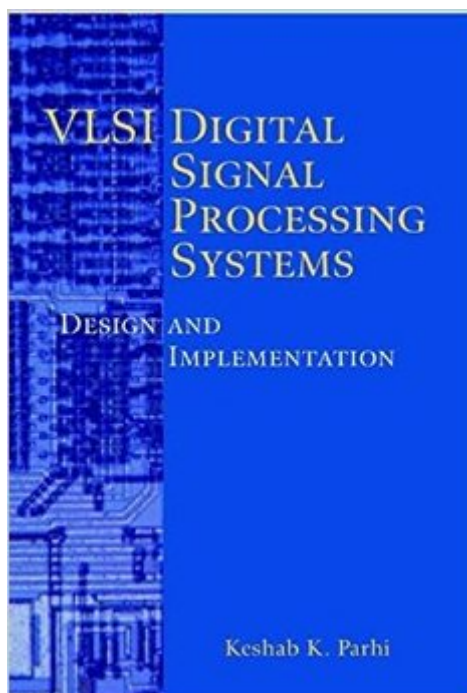# VLSI Digital Signal Processing Systems: Design And Implementation

Synopsis

Digital audio, speech recognition, cable modems, radar, high-definition television-these are but a few of the modern computer and communications applications relying on digital signal processing (DSP) and the attendant application-specific integrated circuits (ASICs). As information-age industries constantly reinvent ASIC chips for lower power consumption and higher efficiency, there is a growing need for designers who are current and fluent in VLSI design methodologies for DSP. Enter VLSI Digital Signal Processing Systems-a unique, comprehensive guide to performance optimization techniques in VLSI signal processing. Based on Keshab Parhi's highly respected and popular graduate-level courses, this volume is destined to become the standard text and reference in the field. This text integrates VLSI architecture theory and algorithms, addresses various architectures at the implementation level, and presents several approaches to analysis, estimation, and reduction of power consumption. Throughout this book, Dr. Parhi explains how to design high-speed, low-area, and low-power VLSI systems for a broad range of DSP applications. He covers pipelining extensively as well as numerous other techniques, from parallel processing to scaling and roundoff noise computation. Readers are shown how to apply all techniques to improve implementations of several DSP algorithms, using both ASICs and off-the-shelf programmable digital signal processors. The book features hundreds of graphs illustrating the various DSP algorithms, examples based on digital filters and transforms clarifying key concepts, and interesting end-of-chapter exercises that help match techniques with applications. In addition, the abundance of readily available techniques makes this an extremely useful resource for designers of DSP systems in wired, wireless, or multimedia communications. The material can be easily adopted in new courses on either VLSI digital signal processing architectures or high-performance VLSI system design. An invaluable reference and practical guide to VLSI digital signal processing. A tremendous source of optimization techniques indispensable in modern VLSI signal processing, VLSI Digital Signal Processing Systems promises to become the standard in the field. It offers a rich training ground for students of VLSI design for digital signal processing and provides immediate access to state-of-the-art, proven techniques for designers of DSP applications-in wired, wireless, or multimedia communications. Topics include: * Transformations for high speed using pipelining, retiming, and parallel processing techniques * Power reduction transformations for supply voltage reduction as well as for strength or capacitance reduction * Area reduction using folding techniques * Strategies for arithmetic implementation * Synchronous, wave, and asynchronous pipelining * Design of programmable DSPs. An Instructor's Manual presenting detailed solutions to all the problems in the book is available from the Wiley editorial department.

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Customer Reviews

If you're a communications system architect or designer, this is a required text for the efficient implementation of modern DSP algorithms.Having the text for a few months, a group of us have already applied techniques offered in the text in VHDL.The first chapters cover pipelining, parallel processing, retiming, folding and unfolding theory. These chapters are necessary to really understand DSP optimization concepts. I have not found another text where these concepts are discussed.The text is positioned well between a pure analytic text, and a "cookbook." Some personal effort is required to code a technique, but this shouldn't be difficult for someone using MATLAB. Once modeled and simulated, the implementer should be able to translate the high level code into VHDL, Verilog, or a programmable DSP such as the TI TMS320 in "C."Personally, I found Dr. Prahi's discussion of fixed point quantization by canonic signed digit format very useful.An example problem is provided with each technique to enhance understanding.

This is an excellent book, written by one of the authorities in the field. It offers detailed design techniques that will help the system designer explore the 3-dimension design space and achieve optimizations in all or either of: area, time, energy consumption. The use of specific examples illustrates the techniques, while complicated backround information is well-organized in the Appendices. I used the book as a recommended text book in my 1-semester "VLSI Signal

Processing" graduate-level class and the students really loved it. It covers all availble techniques, from the simplest to the most advanced ones, with full explanation of the theory, with complete and detailed implementation steps for a wide range of signal processing algorithms.Since the book does not deal with the design at the physical level, but with transformations of the processing algorithms so that their VLSI implementations will satisfy certain criteria of optimality, it is not absolutely mandatory that the reader has already taken courses in VLSI design, although this could help appreciate the benefits offered by the techniques detailed in the book. The exercises found at the end of each chapter help the reader apply the learned techniques in all kinds of applications. I am convinced that the thoroughness and the high standards accomplished by the author in the writing of this book will help establish it as the leading text or reference book for several years to come.

This is a good book on VLSI DSP system design. I still hope the author could talk something more about implementation, especially VLSI circuit design. It seems this book covers too much about theory instead of design and implementation.

I spent a lot of money on this book and was very disappointed. The book is marginal at best and did nothing to help me implement a real world DSP algorithm. More University propaganda to confuse students. Its really a shame that professors get paid to make things more confusing than necessary. Ive been writing HDL code for over 12 years and given the rave reviews of this book thought it might add to my library. It did not. It is very poorly organized and the DSP explanations are weak and confusing. If you really want to understand how to implement a DSP algorithm using an HDL (verilog/vhdl), save your money and purchase the best DSP book available by Richard Lyons. There is no better DSP book out there, and you will never see it used by a professor. Perhaps the Steve Smith Guide to DSP book or free online version (gotta love the guy for that). Then go out and and get a free student copy of ModelSim or ActiveHDL, buy yourself a burger, start writing some code based off tutorials, and thank me for not letting you waste your money on this book. And of course if you end up doing this for a career, support your EDA tool vendors!

This is not something I need in a book: Too much information and not all of them are needed. What is the user guide of synthesis tool, place and route tool for? If I need them, I will look for those tools' documents, not this book.Also, where is ASIC? Nearly half of the book is user guide and FPGA project. Remain are some recall theories and RTL coding guideline.More than that, although the theories and RTL guideline are good (more then good, actually) but the testbench is disappointed.

We cannot control inputs and review outputs manually, there must be some way to check output and only report result if the model does not behave like what expected.In conclusion, if we need concept of design and RTL code, then we can use the first half of the book; if we need FPGA projects, then some last chapters can help us; if we need some thing about ASIC example, forget it.

Though being a beginner in VLSI systems,this book helped me get the grip in subjects I considered extremely difficult to grasp.It is well written,with many real-life examples and offers the reader wide range of knowledge . I think it is not only useful but absolutely indispensable for students and professional engineers alike .

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