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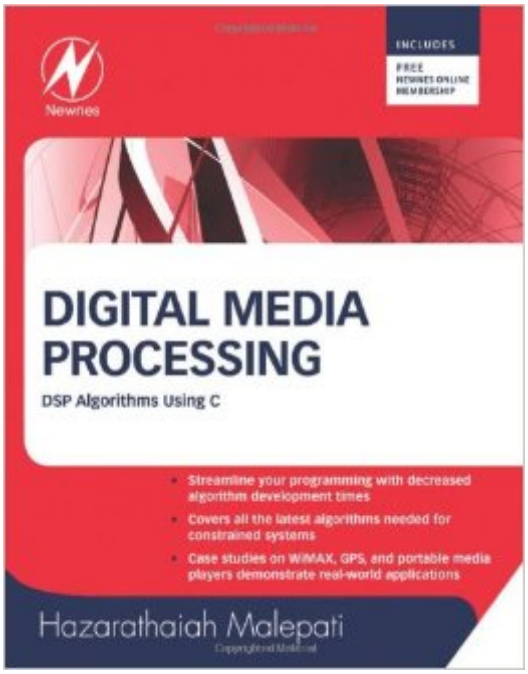
Digital Media Processing: DSP Algorithms Using C



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Synopsis

Multimedia processing demands efficient programming in order to optimize functionality. Data, image, audio, and video processing, some or all of which are present in all electronic devices today, are complex programming environments. Optimized algorithms (step-by-step directions) are difficult to create but can make all the difference when developing a new application.This book discusses the most current algorithms available that will maximize your programming keeping in mind the memory and real-time constraints of the architecture with which you are working. A wide range of algorithms is covered detailing basic and advanced multimedia implementations, along with, cryptography, compression, and data error correction. The general implementation concepts can be integrated into many architectures that you find yourself working with on a specific project. Analog Devices' BlackFin technology is used for examples throughout the book. *Discusses how to decrease algorithm development times to streamline your programming*Covers all the latest algorithms needed for contrained systems*Includes case studies on WiMAX, GPS, and portable media players

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Customer Reviews

This book provides broad coverage of digital signal processing and image processing and related subjects, within the context of embedded systems development.The book itself includes 15 chapters and an index, and provides links to 2 more chapters and 3 appendices online. The print chapters

are divided thus:- Introduction (1 chapter)- Data security / Encryption (1 chapter)- Error Detection / Error Correcting Codes (2 chapters)- Data Compression (1 chapter)- Digital signal processing (5 chapters, including 2 specifically on speech and audio)- Digital Communications (1 chapter)- Image processing (4 chapters, including 2 specifically on video)The online material covers embedded systems programming, and uses the Blackfin architecture as its reference.The writing is practical, answering enough questions to promote understanding and allow implementation, but avoids needless detail on theory. Algorithms are written to economize compute time. Subjects which are somewhat off of the DSP/image processing path (encryption, for instance) are well covered and current. I like the use of C for code examples, since these will be immediately useful for embedded developers, and should be readily translatable to other languages if necessary.

Digital Media Processing provides a broad overview of DSP algorithms from many different disciplines. I liked how the author provided implementations of each algorithm written in the C programming language. The examples are easy to understand, and well written. I also enjoyed how the examples and some embedded programming principles were explained using a Blackfin DSP from Analog Devices, although sometimes it did feel like an advertisement. I guess this was to be expected since the author is employed by Analog Devices. My main criticism of the text is that it only provides an overview of many topics. Having experience in the industry, the text left something to be desired. Some of the included topics are data security and encryption, error detection, data compression, and signal processing.Overall, I thought this book provides a good overview of each topic and would highly recommend this book to entry-level engineers wanting to learn about DSP Algorithms. I would not recommend this book for engineers with extensive experience in the industry. You would be better off purchasing a book about the specific topic in which you are interested

The job of an embedded programmer covers a lot more ground than it once did. Whether it’s a general-purpose processor with math capabilities or a math processor with general-purpose abilities, one programmer may now do the job previously done by a complete team. This means that--after writing the display subroutines and the knob subroutines and the ISRs--the engineer now has DSP ahead. This is a great book to help get there.While targeted toward the popular Blackfin series, this book is not so restricted that it can’t be helpful with a ARM or a SHARC. It presents a number of perennial problems (filters, transforms, etc) in such a way that you have the tools to reduce the problem toward your particular platform. The very first example is the basic dot-product.

Author Malepati codes and recodes the solution, more and more specifically to the target processor. Along the way is a discussion of memory architecture, number of multiply/accumulates, parallelism and so on. A good engineer will be able to apply this sort of thinking to any processor.The bulk of the book deals with all sorts of applications, from data compression to image processing to communications to error correction. Some elementary calculus is required, but the reader will not face page upon page of equations. There's an elegant description of the Fourier Transform, beginning with the DCT and moving finally to the FFT. At each casting of the problem, we find ourselves getting closer to the machine that runs the math. Only at the very end do we see source code. At that point, the engineer is ready for whatever architecture is at hand.There aren't that many books that successfully bridge the gap between theory and practice. There are cookbooks that give inefficient source code and there are books that bury the user in math. Malepati finds a nice place that helps the user understand the problem and cast it towards the particular iron that will run the solution.

Let me just say I struggle with the pseudo-code. I wish there was the C/C++ code before all the bit manipulaton. However, the explanations and example for CRC and BCH was impressive. I actually understand this a bit clearer now. Thanks Mr Malepati

Digital Media Processing, DSP Algorithms Using C by Hazarathaiah Malepati is a very well presented technical compendium of materials relevant to the efficient implementation of computer techniques for audio, video and other media. The author is an employee of Analog Devices and this text features examples using Analog Devices' BlackFin processor. This is a particularly fruitful choice in that media processing often relies on embedded processors such as the BlackFin. The choice of the C programming language and in particular the programming style make for a very readable and understandable code.A wide range of relevant algorithms are covered with sufficient conceptual background to be quite useful to the professional software engineer. Among the topics covered in some depth are data security, error correction, compression, signal and image processing, speech and audio processing and video processing. There is little mention of game related issues such as speech recognition, depth sensing, game physics and so forth. Perhaps a subsequent text by this author will cover some of these topics.The presentation is thoughtful and complete. All of the material is presented in a way that a professional or diligent student will be able to follow and successfully implement the algorithms. The analysis of computational cost is particularly relevant for the professional software engineer. I recommend this text highly.

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