1. Record Nr. UNINA9910974279503321

Autore	Oshana Robert
Titolo	DSP software development techniques for embedded and real-time systems / / by Robert Oshana
Pubbl/distr/stampa	Amsterdam ; ; Boston, : Elsevier/Newnes, c2006
ISBN	9786611006815 9781281006813 1281006815 9780080491196 0080491197
Edizione	[1st edition]
Descrizione fisica	1 online resource (600 p.)
Collana	Embedded technology series
Disciplina	621.382/2 22 621.3822
Soggetti	Signal processing - Digital techniques Embedded computer systems Computer software - Development
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Front cover; Title page; Table of Contents; Acknowledgments; Introduction: Why Use a DSP?; What is Digital Signal Processing; 1 Introduction to Digital Signal Processing; A Brief History of Digital Signal Processing; Advantages of DSP; DSP Systems; Analog-to-Digital Conversion; Digital-to-Analog Conversion; Applications for DSPs; Low-Cost DSP Applications; Power Efficient DSP Applications; High Performance DSP Applications; Conclusion; References; Introduction; Real-Time Systems; 2 Overview of Embedded Systems and Real-Time Systems; Hard Real-Time and Soft Real-Time Systems DSP Systems are Hard Real-TimeEfficient Execution and the Execution Environment; Challenges in Real-Time System Design; Response Time; Recovering from Failures; Distributed and Multiprocessor Architectures; Embedded Systems; Summary; Embedded Systems; 3 Overview of Embedded Systems Development Life Cycle Using DSP; The Embedded System Life Cycle Using DSP; Step 1-Examine the Overall Needs of the System; Step 2-Select the Hardware Components Required for the

System; Hardware Gates; Software-Programmable; General-Purpose Processors; Microcontrollers; FPGA Solutions; Digital Signal Processors A General Signal Processing SolutionDSP Acceleration Decisions; Step 3-Understand DSP Basics and Architecture; Models of DSP Processing; Input/Output Options; Calculating DSP Performance; DSP Software; DSP Frameworks; Definition of an Algorithm; 4 Overview of Digital Signal Processing Algorithms; DSP Systems; Analog-to-Digital Conversion; An Audio Example; The Nyquist Criteria; Aliasing; Anti-Aliasing Filter; Sample Rate and Processor Speed; A to D Converters; Digital-to-Analog Conversion; Multirate Applications; Summary of Sampling; Introduction to Filters; Summary of Filter Types
Finite Impulse Response (FIR) FiltersFIR Filters as Moving Averages; A Simple FIR; Generalizing the Idea; Hardware Implementation (or Flow Diagram); Basic Software Implementation; FIR Filter Characteristics; Adaptive FIR Filter; Designing and Implementing FIRs Filters; Basic FIR Optimizations for DSP Devices; Summary of FIR Filters; Infinite Impulse Response Filters; IIR As a Difference Equation; IIR As a Transfer Function; IIR Filter Design; IIR Trade-Offs; DSP Architecture Optimization for Filter Implementation; Fast Fourier Transforms; Time vs. Frequency
The Discrete Fourier Transform (DFT)The Fast Fourier Transform (FFT); The Butterfly Structure; Forms of the FFT Algorithm; FFT Implementation Issues; Summary; Fast, Specialized Arithmetic; 5 DSP Architectures; High Bandwidth Memory Architectures; Data and Instruction Memories; Memory Options; High Speed Registers; Memory Interleaving; Bank Switching; Caches for DSPs; Execution Time Predictability; Direct Memory Access (DMA); DMA Example; Pipelined Processing; Limitations; Resource Conflicts; Pipeline Control; Specialized Instructions and Address Modes; Circular Addressing Bit-Reversed Addressing

Sommario/riassunto

Today's embedded and real-time systems contain a mix of processor types: off-the-shelf microcontrollers, digital signal processors (DSPs), and custom processors. The decreasing cost of DSPs has made these sophisticated chips very attractive for a number of embedded and real-time applications, including automotive, telecommunications, medical imaging, and many others-including even some games and home appliances. However, developing embedded and real-time DSP applications is a complex task influenced by many parameters and issues. This introduction to DSP software development for embedd