

## Microcontroller Based System Design

This book provides a thorough introduction to the Texas Instruments MSP430 microcontroller. The MSP430 is a 16-bit reduced instruction set (RISC) processor that features ultra low power consumption and integrated digital and analog hardware. Variants of the MSP430 microcontroller have been in production since 1993. This provides for a host of MSP430 products including evaluation boards, compilers, and documentation. A thorough introduction to the MSP430 line of microcontrollers, programming techniques, and interface concepts are provided along with considerable tutorial information with many illustrated examples. Each chapter provides laboratory exercises to apply what has been presented in the chapter. The book is intended for an upper level undergraduate course in microcontrollers or mechatronics but may also be used as a reference for capstone design projects. Also, practicing engineers already familiar with another microcontroller, who require a quick tutorial on the microcontroller, will find this book very useful.

For a second microprocessor course for students enrolled in Electrical/Computer Engineering Microcontroller courses. Designed for a senior- or graduate-level embedded systems design course, Embedded Systems Design and Applications with the 68HC12 introduces readers to unique issues associated with designing, testing, integrating, and implementing microcontroller/microprocessor-based embedded systems. This comprehensive and well-organized text discusses the fundamentals of electronic communication, such as devices and analog and digital circuits, which are so essential for an understanding of digital electronics. Professor Santiram Kal, with his wealth of knowledge and his years of teaching experience, compresses, within the covers of a single volume, all the aspects of electronics - both analog and digital - encompassing devices such as microprocessors, microcontrollers, fibre optics, and photonics. In so doing, he has struck a fine balance between analog and digital electronics. A distinguishing feature of the book is that it gives case studies in modern applications of electronics, including information technology, that is, DBMS, multimedia, computer networks, Internet, and optical communication. Worked-out examples, interspersed throughout the text, and the large number of diagrams should enable the student to have a better grasp of the subject. Besides, exercises, given at the end of each chapter, will sharpen the student's mind in self-study. These student-friendly features are intended to enhance the value of the text and make it both useful and interesting.

Now in its 2nd edition, this textbook has been updated on a new development board from STMicroelectronics - the Arm Cortex-M0+ based Nucleo-F091RC. Designed to be used in a one- or two-semester introductory course on embedded systems.

Embedded systems are today, widely deployed in just about every piece of machinery from toasters to spacecraft. Embedded system designers face many challenges. They are asked to produce increasingly complex systems using the latest technologies, but these technologies are changing faster than ever. They are asked to produce better quality designs with a shorter time-to-market. They are asked to implement increasingly complex functionality but more importantly to satisfy numerous other constraints. To achieve the current goals of design, the designer must be aware with such design constraints and more importantly, the factors that have a direct effect on them. One of the challenges facing embedded system designers is the selection of the optimum processor for the application in hand; single-purpose, general-purpose or application specific. Microcontrollers are one member of the family of the application specific processors. The book concentrates on the use of microcontroller as the embedded system's processor, and how to use it in many embedded system applications. The book covers both the hardware and software aspects needed to design using microcontroller. The book is ideal for undergraduate

students and also the engineers that are working in the field of digital system design.

\*Provides practical guidance and essential theory making it ideal for engineers facing a design challenge or students devising a project

\*Includes real-world design guides for implementing a microcontroller-based control systems \*Requires only basic mathematical and engineering background as the use of microcontrollers is introduced from first principles Engineers involved in the use of microcontrollers in measurement and control systems will find this book an essential practical guide, providing design principles and application case studies backed up with sufficient control theory and electronics to develop their own systems. It will also prove invaluable for students and experimenters seeking real-world project work involving the use of a microcontroller. Unlike the many introductory books on microcontrollers Dogan Ibrahim has used his engineering experience to write a book based on real-world applications. A basic mathematical and engineering background is assumed, but the use of microcontrollers is introduced from first principles. Microcontroller-Based Temperature Monitoring and Control is an essential and practical guide for all engineers involved in the use of microcontrollers in measurement and control systems. The book provides design principles and application case studies backed up with sufficient control theory and electronics to develop your own systems. It will also prove invaluable for students and experimenters seeking real-world project work involving the use of a microcontroller. Techniques for the application of microcontroller-based control systems are backed up with the basic theory and mathematics used in these designs, and various digital control techniques are discussed with reference to digital sample theory. The first part of the book covers temperature sensors and their use in measurement, and includes the latest non-invasive and digital sensor types. The second part covers sampling procedures, control systems and the application of digital control algorithms using a microcontroller. The final chapter describes a complete microcontroller-based temperature control system, including a full software listing for the programming of the controller.

Mixed-Signal Embedded Microcontrollers are commonly used in integrating analog components needed to control non-digital electronic systems. They are used in automatically controlled devices and products, such as automobile engine control systems, wireless remote controllers, office machines, home appliances, power tools, and toys. Microcontrollers make it economical to digitally control even more devices and processes by reducing the size and cost, compared to a design that uses a separate microprocessor, memory, and input/output devices. In many undergraduate and post-graduate courses, teaching of mixed-signal microcontrollers and their use for project work has become compulsory. Students face a lot of difficulties when they have to interface a microcontroller with the electronics they deal with. This book addresses some issues of interfacing the microcontrollers and describes some project implementations with the Silicon Lab C8051F020 mixed-signal microcontroller. The intended readers are college and university students specializing in electronics, computer systems engineering, electrical and electronics engineering; researchers involved with electronics based system, practitioners, technicians and in general anybody interested in microcontrollers based projects.

Single and Multi-Chip Microcontroller Interfacing teaches the principles of designing and programming microcontrollers that will be used in a wide variety of electronic and mechanical devices, machines and systems. Applications are wide, ranging from controlling an automobile to measuring, controlling and displaying your home's temperature. The book utilizes the new Motorola 68Hc12 microcontroller as the primary example throughout. This new microprocessor is the latest development in mid-level 16-bit microcontrollers that will be used world wide due to its low cost and ease of programming. The book features the most popular programming languages--C and C++--in describing basic and advanced techniques. The 68Hc12 will replace many of the existing 8-bit microprocessors currently used in applications and teaching. First book available on the new Motorola 68HC12 microcontroller Thorough discussion of C and C++ programming of I/O ports and

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synchronization mechanisms Concrete discussion of applications of the popular, readily available, inexpensive and well-designed 68HC12 Many examples and over 200 problems at the end of each chapters Separate sections describing object-oriented interfacing This book is ideal for professional engineers as well as students in university courses in micro-processors/microcontrollers in departments of electrical engineering, computer engineering or computer science; It is also appropriate for advanced technical school courses. The book will also be a valuable professional reference for electrical engineers and mechanical engineers in industry working with the design of electronic and electromechanical devices and systems

This book will help the technician, engineer and user understand the microcontroller-based systems along with the most common problems and their solutions. This book covers design, specification, programming, installation, configuration and of course troubleshooting. · An engineer's guide to the design, applications and troubleshooting of microcontroller-based systems · The introductory chapters on embedded microcontroller architecture and programming are written at the right level with an applications focus for practicing engineers · A highly topical book with a wide readership involved with product design and industrial processes including control systems

Microprocessors and Microcomputer-Based System Design, Second Edition, builds on the concepts of the first edition. It discusses the basics of microprocessors, various 32-bit microprocessors, the 8085 microprocessor, the fundamentals of peripheral interfacing, and Intel and Motorola microprocessors. This edition includes new topics such as floating-point arithmetic, Program Array Logic, and flash memories. It covers the popular Intel 80486/80960 and Motorola 68040 as well as the Pentium and PowerPC microprocessors. The final chapter presents system design concepts, applying the design principles covered in previous chapters to sample problems.

This book presents high-quality research in the field of 3D imaging technology. The second edition of International Conference on 3D Imaging Technology (3DDIT-MSP&DL) continues the good traditions already established by the first 3DIT conference (IC3DIT2019) to provide a wide scientific forum for researchers, academia and practitioners to exchange newest ideas and recent achievements in all aspects of image processing and analysis, together with their contemporary applications. The conference proceedings are published in 2 volumes. The main topics of the papers comprise famous trends as: 3D image representation, 3D image technology, 3D images and graphics, and computing and 3D information technology. In these proceedings, special attention is paid at the 3D tensor image representation, the 3D content generation technologies, big data analysis, and also deep learning, artificial intelligence, the 3D image analysis and video understanding, the 3D virtual and augmented reality, and many related areas. The first volume contains papers in 3D image processing, transforms and technologies. The second volume is about computing and information technologies, computer images and graphics and related applications. The two volumes of the book cover a wide area of the aspects of the contemporary multidimensional imaging and the related future trends from data acquisition to real-world applications based on various techniques and theoretical approaches.

This book is about the Arduino microcontroller and the Arduino concept. The visionary Arduino team of Massimo Banzi, David

Cuartielles, Tom Igoe, Gianluca Martino, and David Mellis launched a new innovation in microcontroller hardware in 2005, the concept of open source hardware. Their approach was to openly share details of microcontroller-based hardware design platforms to stimulate the sharing of ideas and promote innovation. This concept has been popular in the software world for many years. This book is intended for a wide variety of audiences including students of the fine arts, middle and senior high school students, engineering design students, and practicing scientists and engineers. To meet this wide audience, the book has been divided into sections to satisfy the need of each reader. The book contains many software and hardware examples to assist the reader in developing a wide variety of systems. The book covers two different Arduino products: the Arduino UNO R3 equipped with the Atmel ATmega328 and the Arduino Mega 2560 equipped with the Atmel ATmega2560. The third edition has been updated with the latest on these two processing boards, changes to the Arduino Development Environment and multiple extended examples. This book highlights recent research on intelligent systems and nature-inspired computing. It presents 130 selected papers from the 19th International Conference on Intelligent Systems Design and Applications (ISDA 2020), which was held online. The ISDA is a premier conference in the field of computational intelligence, and the latest installment brought together researchers, engineers and practitioners whose work involves intelligent systems and their applications in industry. Including contributions by authors from 40 countries, the book offers a valuable reference guide for all researchers, students and practitioners in the fields of Computer Science and Engineering.

\* Hardware/Software Partitioning \* Cross-Platform Development \* Firmware Debugging \* Performance Analysis \* Testing & Integration Get into embedded systems programming with a clear understanding of the development cycle and the specialized aspects of

This book provides an introduction to embedded system designing using MC-51 and ARM. The author has tried to cover the theoretical as well as the programming aspects in an embedded system design. Several 8051 assembly language programs along with the description of the algorithm are given in the book, which helps the students to understand the programs and enable them to develop programs their own.

Embedded software is in almost every electronic device in use today. There is software hidden away inside our watches, DVD players, mobile phones, antilock brakes, and even a few toasters. The military uses embedded software to guide missiles, detect enemy aircraft, and pilot UAVs. Communication satellites, deep-space probes, and many medical instruments would've been nearly impossible to create without it. Someone has to write all that software, and there are tens of thousands of electrical engineers, computer scientists, and other professionals who actually do.

This book is designed for the first undergraduate course in Mechatronics. It details the basic principles of analysis, design and control of modern mechatronic systems. Key features Latest Technological developments Microprocessor and Microcontroller-based control systems Soft computing technology for intelligent and feedback control scheme and diagnostics methodologies Component-based system design Case Studies on Autonomous Guided Vehicle [AGV]

Conveyor-based material handling systems High speed spindle systems Useful tips, tricks, judgement and heuristics  
Relative merits and demerits of different techniques explained.

The book focuses on 8051 microcontrollers and prepares the students for system development using the 8051 as well as 68HC11, 80x96 and lately popular ARM family microcontrollers. A key feature is the clear explanation of the use of RTOS, software building blocks, interrupt handling mechanism, timers, IDE and interfacing circuits. Apart from the general architecture of the microcontrollers, it also covers programming, interfacing and system design aspects.

This textbook provides practicing scientists and engineers an advanced treatment of the Atmel AVR microcontroller. This book is intended as a follow on to a previously published book, titled "Atmel AVR Microcontroller Primer: Programming and Interfacing." Some of the content from this earlier text is retained for completeness. This book will emphasize advanced programming and interfacing skills. We focus on system level design consisting of several interacting microcontroller subsystems. The first chapter discusses the system design process. Our approach is to provide the skills to quickly get up to speed to operate the internationally popular Atmel AVR microcontroller line by developing systems level design skills. We use the Atmel ATmega164 as a representative sample of the AVR line. The knowledge you gain on this microcontroller can be easily translated to every other microcontroller in the AVR line. In succeeding chapters, we cover the main subsystems aboard the microcontroller, providing a short theory section followed by a description of the related microcontroller subsystem with accompanying software for the subsystem. We then provide advanced examples exercising some of the features discussed. In all examples, we use the C programming language. The code provided can be readily adapted to the wide variety of compilers available for the Atmel AVR microcontroller line. We also include a chapter describing how to interface the microcontroller to a wide variety of input and output devices. The book concludes with several detailed system level design examples employing the Atmel AVR microcontroller.

This textbook provides practicing scientists and engineers an advanced treatment of the Atmel AVR microcontroller. This book is intended as a follow-on to a previously published book, titled Atmel AVR Microcontroller Primer: Programming and Interfacing. Some of the content from this earlier text is retained for completeness. This book will emphasize advanced programming and interfacing skills. We focus on system level design consisting of several interacting microcontroller subsystems. The first chapter discusses the system design process. Our approach is to provide the skills to quickly get up to speed to operate the internationally popular Atmel AVR microcontroller line by developing systems level design skills. We use the Atmel ATmega164 as a representative sample of the AVR line. The knowledge you gain on this microcontroller can be easily translated to every other microcontroller in the AVR line. In succeeding chapters, we cover the main subsystems aboard the microcontroller, providing a short theory section followed by a description of the

related microcontroller subsystem with accompanying software for the subsystem. We then provide advanced examples exercising some of the features discussed. In all examples, we use the C programming language. The code provided can be readily adapted to the wide variety of compilers available for the Atmel AVR microcontroller line. We also include a chapter describing how to interface the microcontroller to a wide variety of input and output devices. The book concludes with several detailed system level design examples employing the Atmel AVR microcontroller. Table of Contents: Embedded Systems Design / Atmel AVR Architecture Overview / Serial Communication Subsystem / Analog to Digital Conversion (ADC) / Interrupt Subsystem / Timing Subsystem / Atmel AVR Operating Parameters and Interfacing / System Level Design

Second in the series, Practical Aspects of Embedded System Design using Microcontrollers emphasizes the same philosophy of “Learning by Doing” and “Hands on Approach” with the application oriented case studies developed around the PIC16F877 and AT 89S52, today’s most popular microcontrollers. Readers with an academic and theoretical understanding of embedded microcontroller systems are introduced to the practical and industry oriented Embedded System design. When kick starting a project in the laboratory a reader will be able to benefit experimenting with the ready made designs and ‘C’ programs. One can also go about carving a big dream project by treating the designs and programs presented in this book as building blocks. Practical Aspects of Embedded System Design using Microcontrollers is yet another valuable addition and guides the developers to achieve shorter product development times with the use of microcontrollers in the days of increased software complexity. Going through the text and experimenting with the programs in a laboratory will definitely empower the potential reader, having more or less programming or electronics experience, to build embedded systems using microcontrollers around the home, office, store, etc. Practical Aspects of Embedded System Design using Microcontrollers will serve as a good reference for the academic community as well as industry professionals and overcome the fear of the newbies in this field of immense global importance. A presentation of developments in microcontroller technology, providing lucid instructions on its many and varied applications. It focuses on the popular eight-bit microcontroller, the 8051, and the 83C552. The text outlines a systematic methodology for small-scale, control-dominated embedded systems, and is accompanied by a disk of all the example problems included in the book.

This book provides a thorough introduction to the Texas Instruments MSP432™ microcontroller. The MSP432 is a 32-bit processor with the ARM Cortex M4F architecture and a built-in floating point unit. At the core, the MSP432 features a 32-bit ARM Cortex-M4F CPU, a RISC-architecture processing unit that includes a built-in DSP engine and a floating point unit. As an extension of the ultra-low-power MSP microcontroller family, the MSP432 features ultra-low power

consumption and integrated digital and analog hardware peripherals. The MSP432 is a new member to the MSP family. It provides for a seamless transition to applications requiring 32-bit processing at an operating frequency of up to 48 MHz. The processor may be programmed at a variety of levels with different programming languages including the user-friendly Energia rapid prototyping platform, in assembly language, and in C. A number of C programming options are also available to developers, starting with register-level access code where developers can directly configure the device's registers, to Driver Library, which provides a standardized set of application program interfaces (APIs) that enable software developers to quickly manipulate various peripherals available on the device. Even higher abstraction layers are also available, such as the extremely user-friendly Energia platform, that enables even beginners to quickly prototype an application on MSP432. The MSP432 LaunchPad is supported by a host of technical data, application notes, training modules, and software examples. All are encapsulated inside one handy package called MSPWare, available as both a stand-alone download package as well as on the TI Cloud development site: [dev.ti.com](http://dev.ti.com) The features of the MSP432 may be extended with a full line of BoosterPack plug-in modules. The MSP432 is also supported by a variety of third party modular sensors and software compiler companies. In the back, a thorough introduction to the MSP432 line of microcontrollers, programming techniques, and interface concepts are provided along with considerable tutorial information with many illustrated examples. Each chapter provides laboratory exercises to apply what has been presented in the chapter. The book is intended for an upper level undergraduate course in microcontrollers or mechatronics but may also be used as a reference for capstone design projects. Practicing engineers already familiar with another microcontroller, who require a quick tutorial on the microcontroller, will also find this book very useful. Finally, middle school and high school students will find the MSP432 highly approachable via the Energia rapid prototyping system.

This work presents a systematic and comprehensive overview to the theory and applications of mechatronic processes, emphasizing the adaptation and incorporation of this important tool in fulfilling desired performance and quality requirements. The authors address the core technologies needed for the design and development of the mechatronic product, cover design approaches, discuss related mechatronic product design aspects, and detail mechatronic product application examples.

"This book attempts to close the gap between science and technology in the field of roadside backbones for VCNs"--Provided by publisher.

Microcontroller-Based Temperature Monitoring and Control is an essential and practical guide for all engineers involved in the use of microcontrollers in measurement and control systems. The book provides design principles and application

case studies backed up with sufficient control theory and electronics to develop your own systems. It will also prove invaluable for students and experimenters seeking real-world project work involving the use of a microcontroller. Techniques for the application of microcontroller-based control systems are backed up with the basic theory and mathematics used in these designs, and various digital control techniques are discussed with reference to digital sample theory. The first part of the book covers temperature sensors and their use in measurement, and includes the latest non-invasive and digital sensor types. The second part covers sampling procedures, control systems and the application of digital control algorithms using a microcontroller. The final chapter describes a complete microcontroller-based temperature control system, including a full software listing for the programming of the controller. \*Provides practical guidance and essential theory making it ideal for engineers facing a design challenge or students devising a project \*Includes real-world design guides for implementing a microcontroller-based control systems \*Requires only basic mathematical and engineering background as the use of microcontrollers is introduced from first principles

This textbook aims to provide learners with an understanding of embedded systems built around Arm Cortex-M processor cores, a popular CPU architecture often used in modern low-power SoCs that target IoT applications. Readers will be introduced to the basic principles of an embedded system from a high-level hardware and software perspective and will then be taken through the fundamentals of microcontroller architectures and SoC-based designs. Along the way, key topics such as chip design, the features and benefits of Arm's Cortex-M processor architectures (including TrustZone, CMSIS and AMBA), interconnects, peripherals and memory management are discussed. The material covered in this book can be considered as key background for any student intending to major in computer engineering and is suitable for use in an undergraduate course on digital design.

First published in 2009, this book has already received several awards. Tuccille reveals how the Gallos, a secretive family with political and organized crime connections, rose from near poverty after Prohibition to conquer the multibillion-dollar U.S. wine market.

Embedded Systems with PIC Microcontrollers: Principles and Applications is a hands-on introduction to the principles and practice of embedded system design using the PIC microcontroller. Packed with helpful examples and illustrations, the book provides an in-depth treatment of microcontroller design as well as programming in both assembly language and C, along with advanced topics such as techniques of connectivity and networking and real-time operating systems. In this one book students get all they need to know to be highly proficient at embedded systems design. This text combines embedded systems principles with applications, using the 16F84A, 16F873A and the 18F242 PIC microcontrollers.

Students learn how to apply the principles using a multitude of sample designs and design ideas, including a robot in the

form of an autonomous guide vehicle. Coverage between software and hardware is fully balanced, with full presentation given to microcontroller design and software programming, using both assembler and C. The book is accompanied by a companion website containing copies of all programs and software tools used in the text and a 'student' version of the C compiler. This textbook will be ideal for introductory courses and lab-based courses on embedded systems, microprocessors using the PIC microcontroller, as well as more advanced courses which use the 18F series and teach C programming in an embedded environment. Engineers in industry and informed hobbyists will also find this book a valuable resource when designing and implementing both simple and sophisticated embedded systems using the PIC microcontroller. \*Gain the knowledge and skills required for developing today's embedded systems, through use of the PIC microcontroller. \*Explore in detail the 16F84A, 16F873A and 18F242 microcontrollers as examples of the wider PIC family. \*Learn how to program in Assembler and C. \*Work through sample designs and design ideas, including a robot in the form of an autonomous guided vehicle. \*Accompanied by a CD-ROM containing copies of all programs and software tools used in the text and a 'student' version of the C compiler.

The new generation of 32-bit PIC microcontrollers can be used to solve the increasingly complex embedded system design challenges faced by engineers today. This book teaches the basics of 32-bit C programming, including an introduction to the PIC 32-bit C compiler. It includes a full description of the architecture of 32-bit PICs and their applications, along with coverage of the relevant development and debugging tools. Through a series of fully realized example projects, Dogan Ibrahim demonstrates how engineers can harness the power of this new technology to optimize their embedded designs. With this book you will learn: The advantages of 32-bit PICs The basics of 32-bit PIC programming The detail of the architecture of 32-bit PICs How to interpret the Microchip data sheets and draw out their key points How to use the built-in peripheral interface devices, including SD cards, CAN and USB interfacing How to use 32-bit debugging tools such as the ICD3 in-circuit debugger, mikroCD in-circuit debugger, and Real Ice emulator Helps engineers to get up and running quickly with full coverage of architecture, programming and development tools Logical, application-oriented structure, progressing through a project development cycle from basic operation to real-world applications Includes practical working examples with block diagrams, circuit diagrams, flowcharts, full software listings an in-depth description of each operation

MICROCONTROLLER BASED SYSTEM DESIGN. Digital System Design - Use of Microcontroller River Publishers  
Recent advancements in technology have led to significant improvements in designing various electronic systems. This provides a wide range of different components that can be utilized across numerous applications. Microcontroller System Design Using PIC18F Processors provides comprehensive discussions on strategies and techniques for optimizing

microprocessor-based electronic system development and examines methods for acquiring improved software and hardware skills. Highlighting innovative concepts across a range of topics, such as serial peripheral interfaces, addressing modes, and asynchronous communications, this book is an ideal information source for professionals, researchers, academics, engineers, practitioners, and programmers.

Fast and Effective Embedded Systems Design is a fast-moving introduction to embedded system design, applying the innovative ARM mbed and its web-based development environment. Each chapter introduces a major topic in embedded systems, and proceeds as a series of practical experiments, adopting a "learning through doing" strategy. Minimal background knowledge is needed. C/C++ programming is applied, with a step-by-step approach which allows the novice to get coding quickly. Once the basics are covered, the book progresses to some "hot" embedded issues - intelligent instrumentation, networked systems, closed loop control, and digital signal processing. Written by two experts in the field, this book reflects on the experimental results, develops and matches theory to practice, evaluates the strengths and weaknesses of the technology or technique introduced, and considers applications and the wider context. Numerous exercises and end of chapter questions are included. A hands-on introduction to the field of embedded systems, with a focus on fast prototyping Key embedded system concepts covered through simple and effective experimentation Amazing breadth of coverage, from simple digital i/o, to advanced networking and control Applies the most accessible tools available in the embedded world Supported by mbed and book web sites, containing FAQs and all code examples Deep insights into ARM technology, and aspects of microcontroller architecture Instructor support available, including power point slides, and solutions to questions and exercises

This book provides the students with a solid foundation in the technology of microprocessors and microcontrollers, their principles and applications. It comprehensively presents the material necessary for understanding the internal architecture as well as system design aspects of Intel's legendary 8085 and 8086 microprocessors and Intel's 8051 and 8096 microcontrollers. The book throughout maintains an appropriate balance between the basic concepts and the skill sets needed for system design. Besides, the book lucidly explains the hardware architecture, the instruction set and programming, support chips, peripheral interfacing, and cites several relevant examples to help the readers develop a complete understanding of industrial application projects. Several system design case studies are included to reinforce the concepts discussed. With exhaustive coverage provided and practical approach emphasized, the book would be indispensable to undergraduate students of Electrical and Electronics, Electronics and Communication, and Electronics and Instrumentation Engineering. It can be used for a variety of courses in Microprocessors, Microcontrollers, and Embedded System Design.

Combines the theory and the practice of applied digital control This book presents the theory and application of microcontroller based automatic control systems. Microcontrollers are single-chip computers which can be used to control real-time systems. Low-cost, single chip and easy to program, they have traditionally been programmed using the assembly language of the target processor. Recent developments in this field mean that it is now possible to program these devices using high-level languages such as BASIC, PASCAL, or C. As a result, very complex control algorithms can be developed and implemented on the microcontrollers. Presenting a detailed treatment of how microcontrollers can be programmed and used in digital control applications, this book: \* Introduces the basic principles of the theory of digital control systems. \* Provides several working examples of real working mechanical, electrical and fluid systems. \* Covers the implementation of control algorithms using microcontrollers. \* Examines the advantages and disadvantages of various realization techniques. \* Describes the

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use of MATLAB in the analysis and design of control systems. \* Explains the sampling process, z-transforms, and the time response of discrete-time systems in detail. Practising engineers in industry involved with the design and implementation of computer control systems will find Microcontroller Based Applied Digital Control an invaluable resource. In addition, researchers and students in control engineering and electrical engineering will find this book an excellent research tool.

Embedded Systems Design with Platform FPGAs introduces professional engineers and students alike to system development using Platform FPGAs. The focus is on embedded systems but it also serves as a general guide to building custom computing systems. The text describes the fundamental technology in terms of hardware, software, and a set of principles to guide the development of Platform FPGA systems. The goal is to show how to systematically and creatively apply these principles to the construction of application-specific embedded system architectures. There is a strong focus on using free and open source software to increase productivity. Each chapter is organized into two parts. The white pages describe concepts, principles, and general knowledge. The gray pages provide a technical rendition of the main issues of the chapter and show the concepts applied in practice. This includes step-by-step details for a specific development board and tool chain so that the reader can carry out the same steps on their own. Rather than try to demonstrate the concepts on a broad set of tools and boards, the text uses a single set of tools (Xilinx Platform Studio, Linux, and GNU) throughout and uses a single developer board (Xilinx ML-510) for the examples. Explains how to use the Platform FPGA to meet complex design requirements and improve product performance Presents both fundamental concepts together with pragmatic, step-by-step instructions for building a system on a Platform FPGA Includes detailed case studies, extended real-world examples, and lab exercises

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