

Macro Language For Pic Microcontrollers

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

One of the most thorough introductions available to the world's most popular microcontroller!

The Microchip PIC family of microcontrollers is the most popular series of microcontrollers in the world. However, no microcontroller is of any use without software to make it perform useful functions. This comprehensive reference focuses on designing with Microchip's mid-range PIC line using MBASIC, a powerful but easy to learn programming language. It illustrates MBASIC's abilities through a series of design examples, beginning with simple PIC-based projects and proceeding through more advanced designs. Unlike other references however, it also covers essential hardware and software design fundamentals of the PIC microcontroller series, including programming in assembly language when needed to supplement the capabilities of MBASIC. Details of hardware/software interfacing to the PIC are also provided. **BENEFIT TO THE READER:** This book provides one of the most thorough introductions available to the world's most popular microcontroller, with numerous hardware and software working design examples which engineers, students and hobbyists can directly apply to their design work and studies. Using MBASIC, it is possible to develop working programs for the PIC in a much shorter time frame than when using assembly language. Offers a complete introduction to programming the most popular microcontroller in the world, using the MBASIC compiler from a company that is committed to supporting the book both through purchases and promotion Provides numerous real-world design examples, all carefully tested

MASTER PIC MICROCONTROLLER TECHNOLOGY AND ADD POWER TO YOUR NEXT PROJECT! Tap into the latest advancements in PIC technology with the fully revamped Third Edition of McGraw-Hill's Programming and Customizing the PIC Microcontroller. Long known as the subject's definitive text, this indispensable volume comes packed with more than 600 illustrations, and provides comprehensive, easy-to-understand coverage of the PIC microcontroller's hardware and software schemes. With 100 experiments, projects, and libraries, you get a firm grasp of PICs, how they work, and the ins-and-outs of their most dynamic applications. Written by renowned technology guru Myke Predko, this updated edition features a streamlined, more accessible format, and delivers: Concentration on the three major PIC families, to help you fully understand the synergy between the Assembly, BASIC, and C programming languages Coverage of the latest program development tools A refresher in electronics and programming, as well as reference material, to minimize the searching you will have to do **WHAT'S INSIDE!** Setting up your own PIC microcontroller development lab PIC MCU basics PIC microcontroller interfacing capabilities, software development, and applications Useful tables and data Basic electronics Digital electronics BASIC reference C reference 16-bit numbers Useful circuits and routines that will help you get your applications up and running quickly

Programming 8-bit PIC Microcontrollers in C

PIC16F1847 Microcontroller-Based Programmable Logic Controller

PIC Microcontrollers

Programming in C

Embedded C Programming

Sophisticated networking and communications capabilities that were previously the sole domain of mainframes, PCs, and workstations are now becoming mandatory in the realm of smaller embedded microcontrollers. However, documentation, standards, and design information is scattered among many sources and is difficult to find. In this practical book, popular columnist and embedded designer Fred Eady is your guide and advisor. He pulls together all the necessary design background and details and shows you how to use today's affordable microcontrollers for powerful communications and networking applications such as local area networks and embedded internet. Using working code examples and schematics, Eady steers you through the basics using two popular microcontroller families, PIC and Atmel. Included are a wealth of detailed design examples for: · RS-232 firmware and hardware · Microcontroller USARTs · The I2C bus · Ethernet implementation · Embedded internet implementation · Wireless links Sample source code is provided and thoroughly explained for all the application examples. The accompanying CD-ROM contains the example code as well as a searchable ebook version of the text, to help you get up to speed quickly. You could spend days or even weeks pulling together all the information that Eady has assembled in this one indispensable

reference. * The only source that pulls together difficult-to-find design information, and teaches step-by-step how to use it to create powerful networking applications * Includes fully functional examples of microcontroller hardware and firmware * Companion cd-rom includes all schematics and code utilized in the book

Programmable logic controllers (PLCs) have been used extensively and are offered in terms of functions, program memories, and the number of inputs/outputs (I/Os), ranging from a few to thousands. With a focus on how to design and implement a PLC, this volume explains hardware and associated basic concepts of PLC. Authors have used PIC16F1847 microcontroller with: 8192 words of Flash program memory, 1024 bytes of SRAM data memory, 256 bytes of EEPROM data memory, the maximum operating speed of 32 MHz, 16-level deep hardware stack, an enhanced instruction set consisting of 49 single-word instructions. Flowcharts are provided to help the understanding of macros (instructions). Aimed at researchers and graduate students in electrical engineering, power electronics, robotics and automation, sensors, this book: Explains how to design and use a PIC16F1847 microcontroller-based PLC. Provides easy to use software structures written by using the PIC Assembly programming language. Describes a PLC from a designer's perspective. Explains the basic hardware and basic software structures of the PIC16F1847 based PLC. Focuses on concepts like Contact and Relay Based Macros, Flip-Flop Macros, Timer Macros, Counter Macros and Comparison Macros.

The use of microcontroller based solutions to everyday design problems in electronics, is the most important development in the field since the introduction of the microprocessor itself. The PIC family is established as the number one microcontroller at an introductory level. Assuming no prior knowledge of microprocessors, Martin Bates provides a comprehensive introduction to microprocessor systems and applications covering all the basic principles of microelectronics. Using the latest Windows development software MPLAB, the author goes on to introduce microelectronic systems through the most popular PIC devices currently used for project work, both in schools and colleges, as well as undergraduate university courses. Students of introductory level microelectronics, including microprocessor / microcontroller systems courses, introductory embedded systems design and control electronics, will find this highly illustrated text covers all their requirements for working with the PIC. Part A covers the essential principles, concentrating on a systems approach. The PIC itself is covered in Part B, step by step, leading to demonstration programmes using labels, subroutines, timer and interrupts. Part C then shows how applications may be developed using the latest Windows software, and some hardware prototyping methods. The new edition is suitable for a range of students and PIC enthusiasts, from beginner to first and second year undergraduate level. In the UK, the book is of specific relevance to AVCE, as well as BTEC National and Higher National programmes in electronic engineering. · A comprehensive introductory text in microelectronic systems, written round the leading chip for project work · Uses the latest Windows development software, MPLAB, and the most popular types of PIC, for accessible and low-cost practical work · Focuses on the 16F84 as the starting point for introducing the basic architecture of the PIC, but also covers newer chips in the 16F8X range, and 8-pin mini-PICs

A true beginner's guide of the popular PIC microcontroller, including 12 projects to build.

Microcontroller Education

Programming and Customizing the PIC Microcontroller

Hardware and Basic Concepts

From USB to RTOS with the PIC 18F Series

Embedded Systems Programming

New in the second edition: MPLAB X support and MPLAB C for the PIC24F v3 and later libraries I2CTM interface 100% assembly free solutions Improved video, PAL/NTSC Improved audio, RIFF files decoding PIC24F GA1, GA2, GB1 and GB2 support Most readers will associate Microchip's name with the ubiquitous 8-bit PIC microcontrollers but it is the new 16-bit PIC24F family that is truly stealing the scene. Orders of magnitude increases of performance, memory size and the rich peripheral set make programming these devices in C a must. This new guide by Microchip insider Lucio Di Jasio teaches readers everything they need to know about the architecture of these new chips: How to program them, how to test them, and how to debug them. Di Jasio's common-sense, practical, hands-on approach starts out with basic functions and guides the reader step-by-step through even the most sophisticated programming scenarios. Experienced PIC users, including embedded engineers, programmers, designers, and SW and HW engineers, and new comers alike will benefit from the text's many thorough examples, which demonstrate how to nimbly sidestep common obstacles and take full advantage of the many new features. ! A Microchip insider introduces you to 16-bit PIC programming the easy way! Condenses typical introductory "fluff" focusing instead on examples and exercises that show how to solve common, real-world design problems quickly Includes handy checklists to help readers perform the most common programming and debugging tasks Microcontrollers are present in many new and existing electronic products, and the PIC microcontroller is a leading processor in the embedded applications market. Students and development engineers need to be able to design new products using microcontrollers, and this book explains from first principles how to use the universal development language C to create new PIC based systems, as well as the associated hardware interfacing principles. The book includes many source code listings, circuit schematics and hardware block diagrams. It describes the internal hardware of 8-bit PIC microcontroller, outlines the development systems available to write and test C programs, and shows how to use CCS C to create PIC firmware. In addition, simple interfacing principles are explained, a demonstration program for the PIC mechatronics development board provided and some typical applications outlined. *Focuses on the C programming language which is by far the most popular for microcontrollers (MCUs) *Features Proteus VSMg the most complete microcontroller simulator on the market, along with CCS PCM C compiler, both are highly compatible with Microchip tools *Extensive downloadable content including fully worked examples

The project-based cookbook approach of this book guides the reader through programming, interfacing, development work and circuit design using two of the most popular microcontroller families.

Focusing on the line of high-performance microcontrollers offered by Microchip, Microcontrollers: High-Performance Systems and Programming discusses the practical factors that make the high-performance PIC series a better choice than their mid-range predecessors for most systems. However, one consideration in favor of the mid-range devices is the abundance of published application circuits and code samples. This book fills that gap. Possibility of programming high-performance microcontrollers in a high-level language (C language) Source code compatibility with PIC16 microcontrollers, which facilitates code migration from mid-range to PIC18 devices Pin compatibility of some PIC18 devices with their PIC16 predecessors, making the reuse of PIC16 controllers in circuits originally designed for mid-range hardware possible Designed to be functional and hands-on, this book

provides sample circuits with their corresponding programs. It clearly depicts and labels the circuits, in a way that is easy to follow and reuse. Each circuit includes a parts list of the resources and components required for its fabrication. The book matches sample programs to the individual circuits, discusses general programming techniques, and includes appendices with useful information.

PIC Microcontroller Projects in C

PIC Microcontroller Project Book

The Microchip PIC

High-Performance Systems and Programming

Exploring the PIC32

Design Engineering Manual offers a practical guide to the key principles of design engineering. It features a compilation of extracts from several books within the range of Design Engineering books in the Elsevier collection. The book is organized into 11 sections. Beginning with a review of the processes of product development and design, the book goes on to describe systematic ways of choosing materials and processes. It details the properties of modern metallic alloys including commercial steels, cast irons, superalloys, titanium alloys, structural intermetallic compounds, and aluminum alloys. The book explains the human/system interface; procedures to assess the risks associated with job and task characteristics; and environmental factors that may be encountered at work and affect behavior. Product liability and safety rules are discussed. The final section on design techniques introduces the design process from an inventors perspective to a more formal model called total design. It also deals with the behavior of plastics that influence the application of practical and complex engineering equations and analysis in the design of products. Provides a single-source of critical information to the design engineer, saving time and therefore money on a particular design project Presents both the fundamentals and advanced topics and also the latest information in key aspects of the design process Examines all aspects of the design process in one concise and accessible volume

The Newnes Know It All Series takes the best of what our authors have written over the past few years and creates a one-stop reference for engineers involved in markets from communications to embedded systems and everywhere in between. PIC design and development a natural fit for this reference series as it is one of the most popular microcontrollers in the world and we have several superbly authored books on the subject. This material ranges from the basics to more advanced topics. There is also a very strong project basis to this learning. The average embedded engineer working with this microcontroller will be able to have any question answered by this compilation. He/she will also be able to work through real-life problems via the projects contained in the book. The Newnes Know It All Series presentation of theory, hard fact, and project-based direction will be a continual aid in helping the engineer to innovate in the workplace. Section I. An Introduction to PIC Microcontrollers Chapter 1. The PIC Microcontroller Family Chapter 2. Introducing the PIC 16 Series and the 16F84A Chapter 3. Parallel Ports, Power Supply and the Clock Oscillator Section II. Programming PIC Microcontrollers using Assembly Language Chapter 4. Starting to Program—An Introduction to Assembler Chapter 5. Building Assembler Programs Chapter 6. Further Programming Techniques Chapter 7. Prototype Hardware Chapter 8. More PIC Applications and Devices Chapter 9. The PIC 1250x Series (8-pin PIC microcontrollers) Chapter 10. Intermediate Operations using the PIC 12F675 Chapter 11. Using Inputs Chapter 12. Keypad Scanning Chapter 13. Program Examples Section III. Programming PIC Microcontrollers using PicBasic Chapter 14. PicBasic and PicBasic Pro Programming Chapter 15. Simple PIC Projects Chapter 16. Moving On with the 16F876 Chapter 17. Communication Section IV. Programming PIC Microcontrollers using MBasic Chapter 18. MBasic Compiler and Development Boards Chapter 19. The Basics—Output Chapter 20. The Basics—Digital Input Chapter 21. Introductory Stepper Motors Chapter 22. Digital Temperature Sensors and Real-Time Clocks Chapter 23. Infrared Remote Controls Section V. Programming PIC Microcontrollers using C Chapter 24. Getting Started Chapter 25. Programming Loops Chapter 26. More Loops Chapter 27. NUMB3RS Chapter 28. Interrupts Chapter 29. Taking a Look under the Hood Over 900 pages of practical, hands-on content in one book! Huge market - as of November 2006

Microchip Technology Inc., a leading provider of microcontroller and analog semiconductors, produced its 5 BILLIONth PIC microcontroller Several points of view, giving the reader a complete 360 of this microcontroller

This book is a thoroughly practical way to explore the 8051 and discover C programming through project work. Through graded projects, Dogan Ibrahim introduces the reader to the fundamentals of microelectronics, the 8051 family, programming in C, and the use of a C compiler. The specific device used for examples is the AT89C2051 - a small, economical chip with re-writable memory, readily available from the major component suppliers. A working knowledge of microcontrollers, and how to program them, is essential for all students of electronics. In this rapidly expanding field many students and professionals at all levels need to get up to speed with practical microcontroller applications. Their rapid fall in price has made microcontrollers the most exciting and accessible new development in electronics for years - rendering them equally popular with engineers, electronics hobbyists and teachers looking for a fresh range of projects. Microcontroller Projects in C for the 8051 is an ideal resource for self-study as well as providing an interesting, enjoyable and easily mastered alternative to more theoretical textbooks. Practical projects that enable students and practitioners to get up and running straight away with 8051 microcontrollers A hands-on introduction to practical C programming A wealth of project ideas for students and enthusiasts

From cell phones and television remote controls to automobile engines and spacecraft, microcontrollers are everywhere. Programming these prolific devices is a much more involved and integrated task than it is for general-purpose microprocessors; microcontroller programmers must be fluent in application development, systems programming, and I/O operation as well as memory management and system timing. Using the popular and pervasive mid-range 8-bit Microchip PIC® as an archetype, Microcontroller Programming offers a self-contained presentation of the multidisciplinary tools needed to design and implement modern embedded systems and microcontrollers. The authors begin with basic electronics, number systems, and data concepts followed by digital logic, arithmetic, conversions, circuits, and circuit components to build a firm

background in the computer science and electronics fundamentals involved in programming microcontrollers. For the remainder of the book, they focus on PIC architecture and programming tools and work systematically through programming various functions, modules, and devices. Helpful appendices supply the full mid-range PIC instruction set as well as additional programming solutions, a guide to resistor color codes, and a concise method for building custom circuit boards. Providing just the right mix of theory and practical guidance, *Microcontroller Programming: The Microchip PIC®* is the ideal tool for any amateur or professional designing and implementing stand-alone systems for a wide variety of applications.

Learning to Fly the PIC 24

Designing Embedded Systems with PIC Microcontrollers

Programming and Customizing PICmicro (R) Microcontrollers

An Introduction to Microelectronics

Programming the PIC Microcontroller with MBASIC

*Just months after the introduction of the new generation of 32-bit PIC microcontrollers, a Microchip insider and acclaimed author takes you by hand at the exploration of the PIC32 *Includes handy checklists to help readers perform the most common programming and debugging tasks The new 32-bit microcontrollers bring the promise of more speed and more performance while offering an unprecedented level of compatibility with existing 8 and 16-bit PIC microcontrollers. In sixteen engaging chapters, using a parallel track to his previous title dedicated to 16-bit programming, the author puts all these claims to test while offering a gradual introduction to the development and debugging of embedded control applications in C. Author Lucio Di Jasio, a PIC and embedded control expert, offers unique insight into the new 32-bit architecture while developing a number of projects of growing complexity. Experienced PIC users and newcomers to the field alike will benefit from the text 's many thorough examples which demonstrate how to nimbly side-step common obstacles, solve real-world design problems efficiently and optimize code using the new PIC32 features and peripheral set. You will learn about: *basic timing and I/O operation *debugging methods with the MPLAB SIM *simulator and ICD tools *multitasking using the PIC32 interrupts *all the new hardware peripherals

*how to control LCD displays *experimenting with the Explorer16 board and *the PIC32 Starter Kit *accessing mass-storage media *generating audio and video signals *and more! TABLE OF

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Maestro! 32-bit microcontrollers are becoming the technology of choice for high performance embedded control applications including portable media players, cell phones, and GPS receivers. Learn to use the C programming language for advanced embedded control designs and/or learn to migrate your applications from previous 8 and 16-bit architectures.

John Iovine has created his next masterwork with *PIC Projects for Non-Programmers*. Engineers and hobbyists new to the PIC who want to create something today will find a valuable resource in this book. By working through the accessible projects in this book, readers will use a symbolic compiler that allows them to create ' code ' via flowcharts immediately, getting their projects up and running quickly! The ability to create applications with the PIC from day one makes this a real page turner and a highly satisfying introduction to microcontrollers for both novices and readers who need to build their skills. Gets readers up and running fast with a quick review of basics and then onto ten tried-and-tested projects No languages to learn: Simply drag and drop the icons, plug in the settings and the PIC will respond to the commands Step by step guide to using Flowcode 4

Microcontroller education has experienced tremendous change in recent years. This book attempts to keep pace with the most recent technology while holding an opposing attitude to the No Need to Reinvent the Wheel philosophy. The choice strategies are in agreement with the employment of today's flexible and low-cost Do-It-Yourself (DYI) microcontroller hardware, along with an embedded C programming approach able to be adapted by different hardware and software development platforms. Modern embedded C compilers employ built-in features for keeping programs short and manageable and, hence, speeding up the development process. However, those features eliminate the reusability of the source code among diverse systems. The recommended programming approach relies on the motto Code More to Learn Even More, and directs the reader toward a low-level accessibility of the microcontroller device. The examples addressed herein are designed to meet the demands of Electrical & Electronic Engineering discipline, where the microcontroller learning processes definitely bear the major responsibility. The programming strategies are in line with the two virtues of C programming language, that is, the adaptability of the source code and the low-level accessibility of the hardware system. Some accompanying material of the book can be found at <http://bit.ly/mcu-files>.

Learn how to use microcontrollers without all the frills and math. This book uses a practical approach to show you how to develop embedded systems with 8 bit PIC microcontrollers using the XC8 compiler. It's your complete guide to understanding modern PIC microcontrollers. Are you tired of copying and pasting code into your embedded projects? Do you want to write your own code from scratch for microcontrollers and understand what your code is doing? Do you want to move beyond the Arduino? Then *Programming PIC Microcontrollers with XC8* is for you! Written for those who want more than an Arduino, but less than the more complex microcontrollers on the market, PIC microcontrollers are the next logical step in your journey. You'll also see the advantage that MPLAB X offers by running on Windows, MAC and Linux environments. You don't need to be a command line expert to work with PIC microcontrollers, so you can focus less on setting up your environment and more on your application. What You ' ll Learn Set up the MPLAB X and XC8 compilers for microcontroller development Use GPIO and PPS Review EUSART and Software UART communications Use the eXtreme Low Power (XLP) options of PIC microcontrollers Explore wireless communications with WiFi and Bluetooth Who This Book Is For Those with some basic electronic device and some electronic equipment and knowledge. This book assumes knowledge of the C programming language and basic knowledge of digital electronics though a basic overview is given for both. A complete newcomer can follow along, but this book is heavy on code, schematics and images and focuses less on the theoretical aspects of using microcontrollers. This book is also targeted to students wanting a

practical overview of microcontrollers outside of the classroom.

Do it Yourself, Reinvent the Wheel, Code to Learn

Microcontrollers

Programming 16-Bit PIC Microcontrollers in C

Principles and Applications

The Essential PIC18® Microcontroller

Microchip's PIC microcontroller is rapidly becoming the microcontroller of choice throughout the world. This hands-on tutorial and disk provide everything electronic designers, engineers, and advanced hobbyists need to tap the power of this invaluable chip: the most complete description of PIC available; over 30 experiments and ten complete PIC application projects; a full set of DOS and Windows PIC development tools; reusable source code; and a complete PIC application program that can easily be tailored to the reader's needs.

Electronics explained in one volume, using both theoretical and practical applications. Mike Tooley provides all the information required to get to grips with the fundamentals of electronics, detailing the underpinning knowledge necessary to appreciate the operation of a wide range of electronic circuits, including amplifiers, logic circuits, power supplies and oscillators. The 5th edition includes an additional chapter showing how a wide range of useful electronic applications can be developed in conjunction with the increasingly popular Arduino microcontroller, as well as a new section on batteries for use in electronic equipment and some additional/updated student assignments. The book's content is matched to the latest pre-degree level courses (from Level 2 up to, and including, Foundation Degree and HND), making this an invaluable reference text for all study levels, and its broad coverage is combined with practical case studies based in real-world engineering contexts. In addition, each chapter includes a practical investigation designed to reinforce learning and provide a basis for further practical work. A companion website at <http://www.key2electronics.com> offers the reader a set of spreadsheet design tools that can be used to simplify circuit calculations, as well as circuit models and templates that will enable virtual simulation of circuits in the book. These are accompanied by online self-test multiple choice questions for each chapter with automatic marking, to enable students to continually monitor their own progress and understanding. A bank of online questions for lecturers to set as assignments is also available.

This book is a fully updated and revised compendium of PIC programming information. Comprehensive coverage of the PICMicros' hardware architecture and software schemes will complement the host of experiments and projects making this a true, "Learn as you go" tutorial. New sections on basic electronics and basic programming have been added for less sophisticated users along with 10 new projects and 20 new experiments. New pedagogical features have also been added such as "Programmers Tips" and "Hardware Fast FAQs". Key Features: * Printed Circuit Board for a PICMicro programmer included with the book! This programmer will have the capability to program all the PICMicros used by the application. * Twice as many projects including a PICMicro based Webserver * Twenty new "Experiments" to help the user better understand how the PICMicro works. * An introduction to Electronics and Programming in the Appendices along with engineering formulas and PICMicro web references.

The Art of Assembly Language Programming Using PICmicro® Technology: Core Fundamentals thoroughly covers assembly language used in programming the PIC Microcontroller (MCU). Using the minimal instruction set characteristic of all PICmicro® products, the author elaborates on how to execute loops, control timing and disassemble code from C mnemonics. Detailed memory maps assist the reader with tricky areas of code, and appendices on basic math supplement reader background. In-depth coverage is further provided on paging techniques that are unique to PICmicro® 16C57. This book is written for a broad range of skill levels, and is relevant for both the beginner and skilled C-embedded programmer. In addition, a supplemental appendix provides advice on working with consultants, in general, and on selecting an appropriate consultant within the microchip design consultant program. With this book, users you will learn the symbols and terminology used by programmers and engineers in microprocessor applications, how to program using assembly language through examples and applications, how to program a microchip microprocessor, how to select the processor with minimal memory, and more. Teaches how to start writing simple code, e.g., PICmicro® 10FXXX and 12FXXX Offers unique and novel approaches on how to add your personal touch using PICmicro® 'bread and butter' enhanced mid-range 16FXXX and 18FXXX processors Teaches new coding and math knowledge to help build skillsets Shows how to dramatically reduce product cost by achieving 100% control Demonstrates how to gain optimization over C programming, reduce code space, tighten up timing loops, reduce the size of microcontrollers required, and lower overall product cost

The Quintessential PIC® Microcontroller

Basic to Advanced

Advanced PIC Microcontroller Projects in C

Fundamentals and Applications

PIC Microcontrollers: Know It All

Written specifically for readers with no prior knowledge of computing, electronics, or logic design. Uses real-world hardware and software products to illustrate the material, and includes numerous fully worked examples and self-assessment questions.

For the first time in a single reference, this book provides the beginner with a coherent and logical introduction to the hardware and software of the PIC32, bringing together key material from the PIC32 Reference Manual, Data Sheets, XC32 C Compiler User's Guide, Assembler and Linker Guide, MIPS32 CPU manuals, and Harmony documentation. This book also trains you to use the Microchip documentation, allowing better life-long learning of the PIC32. The philosophy is to get you started quickly, but to emphasize fundamentals and to eliminate "magic steps" that prevent a deep understanding of how the software you write connects to the hardware. Applications focus on mechatronics: microcontroller-controlled electromechanical systems incorporating sensors and actuators. To support a learn-by-doing approach, you can follow the examples throughout the book using the sample code and your PIC32 development board. The exercises at the end of each chapter help you put your new skills to practice. Coverage includes: A practical introduction to the C programming language Getting up and running quickly with the PIC32 An exploration of the hardware architecture of the PIC32 and differences among PIC32 families Fundamentals of embedded computing with the PIC32, including the build process, time- and memory-efficient programming, and interrupts A peripheral reference, with extensive sample code covering digital input and output, counter/timers, PWM, analog input, input capture, watchdog timer, and communication by the parallel master port, SPI, I2C, CAN, USB, and UART An introduction to the Microchip Harmony programming framework Essential topics in mechatronics, including interfacing sensors to the PIC32, digital signal processing, theory of operation and control of brushed DC motors, motor sizing

and gearing, and other actuators such as stepper motors, RC servos, and brushless DC motors For more information on the book, and to download free sample code, please visit <http://www.nu32.org> Extensive, freely downloadable sample code for the NU32 development board incorporating the PIC32MX795F512H microcontroller Free online instructional videos to support many of the chapters

This book provides a hands-on introductory course on concepts of C programming using a PIC® microcontroller and CCS C compiler. Through a project-based approach, this book provides an easy to understand method of learning the correct and efficient practices to program a PIC® microcontroller in C language. Principles of C programming are introduced gradually, building on skill sets and knowledge. Early chapters emphasize the understanding of C language through experience and exercises, while the latter half of the book covers the PIC® microcontroller, its peripherals, and how to use those peripherals from within C in great detail. This book demonstrates the programming methodology and tools used by most professionals in embedded design, and will enable you to apply your knowledge and programming skills for any real-life application. Providing a step-by-step guide to the subject matter, this book will encourage you to alter, expand, and customize code for use in your own projects. A complete introduction to C programming using PIC microcontrollers, with a focus on real-world applications, programming methodology and tools Each chapter includes C code project examples, tables, graphs, charts, references, photographs, schematic diagrams, flow charts and compiler compatibility notes to channel your knowledge into real-world examples Online materials include presentation slides, extended tests, exercises, quizzes and answers, real-world case studies, videos and weblinks

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.

PIC Projects for Non-Programmers

Interfacing PIC Microcontrollers

Embedded Computing and Mechatronics with the PIC32 Microcontroller

Core Fundamentals

Embedded Design by Interactive Simulation

Microcontroller education has experienced tremendous change in recent years. This book attempts to keep pace with the most recent technology while holding an opposing attitude to the No Need to Reinvent the Wheel philosophy. The choice strategies are in agreement with the employment of today's flexible and low-cost Do-It-Yourself (DYI) microcontroller hardware, along with an embedded C programming approach able to be adapted by different hardware and software development platforms. Modern embedded C compilers employ built-in features for keeping programs short and manageable and, hence, speeding up the development process. However, those features eliminate the reusability of the source code among diverse systems. The recommended programming approach relies on the motto Code More to Learn Even More, and directs the reader toward a low-level accessibility of the microcontroller device. The examples addressed herein are designed to meet the demands of Electrical & Electronic Engineering discipline, where the microcontroller learning processes definitely bear the major responsibility. The programming strategies are in line with the two virtues of C programming language, that is, the adaptability of the source code and the low-level accessibility of the hardware system.

Martin P. Bates

This book is ideal for the engineer, technician, hobbyist and student who have knowledge of the basic principles of PIC microcontrollers and want to develop more advanced applications using the 18F series. The architecture of the PIC 18FXXX series as well as typical oscillator, reset, memory, and input-output circuits is completely detailed. After giving an introduction to programming in C, the book describes the project development cycle in full, giving details of the process of editing, compilation, error handling, programming and the use of specific development tools. The bulk of the book gives full details of tried and tested hands-on projects, such as the 12C BUS, USB BUS, CAN BUS, SPI BUS and real-time operating systems. A clear introduction to the PIC 18FXXX microcontroller's architecture 20 projects, including developing wireless and sensor network applications, using I2C BUS, USB BUS, CAN BUS and the SPI BUS, which give the block and circuit diagram, program description in PDL, program listing and program description Numerous examples of using developmental tools: simulators, in-circuit debuggers (especially ICD2) and emulators

Microprocessors are the key component of the infrastructure of our 21st-century electronic- and digital information-based society. More than four billion are sold each year for use in 'intelligent' electronic devices; ranging from smart egg-timer through to aircraft management systems. Most of these processor devices appear in the form of highly-integrated microcontrollers, which comprise a core microprocessor together with memory and analog/digital peripheral ports. By using simple cores, these single-chip computers are the cost- and size-effective means of adding the brains to previous dumb widgets; such as the credit card. Using the same winning format as the successful Springer guide, The Quintessential PIC® Microcontroller, this down-to-earth new textbook/guide has been completely rewritten based on the more powerful PIC18 enhanced-range Microchip MCU family. Throughout the book, commercial hardware and software products are used to illustrate the material, as readers are provided real-world in-depth guidance on the design, construction and programming of small, embedded microcontroller-based systems. Suitable for stand-alone usage, the text does not require a prerequisite deep understanding of digital systems. Topics and features: uses an in-depth bottom-up approach to the topic of microcontroller design using the Microchip enhanced-range PIC18® microcontroller family as the exemplar; includes fully worked examples and self-assessment questions, with additional support material available on an associated website; provides a standalone module on foundation topics in digital, logic and computer architecture for microcontroller engineering; discusses the hardware aspects of interfacing and interrupt handling, with an emphasis on the integration of hardware and software; covers parallel and serial input/output, timing, analog, and EEPROM data-handling techniques; presents a practical build-and-program case study, as well as illustrating simple testing strategies. This useful text/reference book will be of great value to industrial engineers, hobbyists and people in academia. Students of Electronic

Engineering and Computer Science, at both undergraduate and postgraduate level, will also find this an ideal textbook, with many helpful learning tools. Dr. Sid Katzen is Associate to the School of Engineering, University of Ulster at Jordanstown, Northern Ireland.

Programming 32-bit Microcontrollers in C
with Interactive Hardware Simulation

Networking and Internetworking with Microcontrollers

Programming PIC Microcontrollers with XC8

Microcontroller Projects in C for the 8051

This guide by Microchip insider Lucio Di Jasio teaches readers everything they need to know about the architecture of these new chips: how to program them, how to test them, and how to debug them.

Interfacing PIC Microcontrollers, 2nd Edition is a great introductory text for those starting out in this field and as a source reference for more experienced engineers. Martin Bates has drawn upon 20 years of experience of teaching microprocessor systems to produce a book containing an excellent balance of theory and practice with numerous working examples throughout. It provides comprehensive coverage of basic microcontroller system interfacing using the latest interactive software, Proteus VSM, which allows real-time simulation of microcontroller based designs and supports the development of new applications from initial concept to final testing and deployment. Comprehensive introduction to interfacing 8-bit PIC microcontrollers Designs updated for current software versions MPLAB v8 & Proteus VSM v8 Additional applications in wireless communications, intelligent sensors and more

Microcontrollers exist in a wide variety of models with varying structures and numerous application opportunities. Despite this diversity, it is possible to find consistencies in the architecture of most microcontrollers. Microcontrollers: Fundamentals and Applications with PIC focuses on these common elements to describe the fundamentals of microcontroller design and programming. Using clear, concise language and a top-bottom approach, the book describes the parts that make up a microcontroller, how they work, and how they interact with each other. It also explains how to program medium-end PICs using assembler language. Examines analog as well as digital signals This volume describes the structure and resources of general microcontrollers as well as PIC microcontrollers, with a special focus on medium-end devices. The authors discuss memory organization and structure, and the assembler language used for programming medium-end PIC microcontrollers. They also explore how microcontrollers can acquire, process, and generate digital signals, explaining available techniques to deal with parallel input or output, peripherals, resources for real-time use, interrupts, and the specific characteristics of serial data interfaces in PIC microcontrollers. Finally, the book describes the acquisition and generation of analog signals either using resources inside the chip or by connecting peripheral circuits. Provides hands-on clarification Using practical examples and applications to supplement each topic, this volume provides the tools to thoroughly grasp the architecture and programming of microcontrollers. It avoids overly specific details so readers are quickly led toward design implementation. After mastering the material in this text, they will understand how to efficiently use PIC microcontrollers in a design process.

Extensively revised and updated to encompass the latest developments in the PIC 18FXXX series, this book demonstrates how to develop a range of microcontroller applications through a project-based approach. After giving an introduction to programming in C using the popular mikroC Pro for PIC and MPLAB XC8 languages, this book describes the project development cycle in full. The book walks you through fully tried and tested hands-on projects, including many new, advanced topics such as Ethernet programming, digital signal processing, and RFid technology. This book is ideal for engineers, technicians, hobbyists and students who have knowledge of the basic principles of PIC microcontrollers and want to develop more advanced applications using the PIC18F series. This book Includes over fifty projects which are divided into three categories: Basic, Intermediate, and Advanced. New projects in this edition: Logic probe Custom LCD font design Hi/Lo game Generating various waveforms in real-time Ultrasonic height measurement Frequency counter Reaction timer GPS projects Closed-loop ON/OFF temperature control Bluetooth projects (master and slave) RFid projects Clock using Real-time-clock (RTC) chip RTC alarm project Graphics LCD (GLCD) projects Barometer+thermometer+altimeter project Plotting temperature on GLCD Ethernet web browser based control Ethernet UDP based control Digital signal processing (Low Pass Filter design) Automotive LIN bus project Automotive CAN bus project Multitasking projects (using both cooperative and Round-robin scheduling) Unipolar stepper motor projects Bipolar stepper motor projects Closed-loop ON/OFF DC motor control A clear introduction to the PIC 18FXXX microcontroller's architecture Covers developing wireless and sensor network applications, SD card projects, and multi-tasking; all demonstrated with the block and circuit diagram, program description in PDL, program listing, and program description Includes more than 50 basic, intermediate, and advanced projects

Electronic Circuits

Techniques and Applications of C and PIC MCUS

Design Engineering Manual

The Art of Assembly Language Programming Using PIC® Technology

Microcontroller Cookbook