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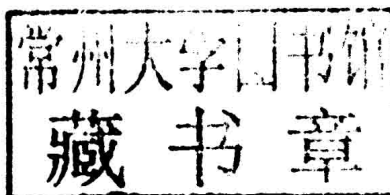


DESIGNING EMBEDDED SYSTEMS WITH 32-BIT PIC MICROCONTROLLERS AND MikroC

Dogan Ibrahim

Designing Embedded Systems with 32-Bit PIC Microcontrollers and MikroC

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PIC Microcontrollers and MikroC***

Preface

A microcontroller is a single-chip microprocessor system which contains data and program memory, serial and parallel I/O, timers, external and internal interrupts, all integrated into a single chip that can be purchased for as little as \$2.00. About 40% of microcontroller applications are in office automation, such as PCs, laser printers, fax machines, intelligent telephones, and so forth. About one-third of microcontrollers are found in consumer electronic goods. Products like CD players, hi-fi equipment, video games, washing machines, cookers and so on fall into this category. The communications market, automotive market, and the military share the rest of the application areas.

This book is written for advanced students, for practicing engineers, and for hobbyists who want to learn more about the programming and applications of 32-bit series of microcontrollers. The book has been written with the assumption that the reader has taken a course on digital logic design, and has been exposed to writing programs using at least one high-level programming language. Knowledge of the C programming language will be useful. Also, familiarity with at least one member of the PIC series of microcontrollers (e.g. PIC16 or PIC18) will be an advantage. The knowledge of assembly language programming is not required because all the projects in the book are based on using the C language.

Chapter 1 presents the basic features of microcontrollers and the important topic of numbering systems, and also describes how to convert between different number bases.

Chapter 2 provides a review of the PIC32 series of 32-bit microcontrollers. Various features of these microcontrollers are described in detail.

Chapter 3 provides a short tutorial on the C language and then examines the features of the mikroC Pro for PIC32 compiler used extensively in the book.

Chapter 4 is about the advanced features of the mikroC Pro for PIC32 language. Topics such as built-in functions and libraries are discussed in this chapter with examples.

Chapter 5 explores the various software and hardware development tools for the PIC32 series of 32-bit microcontrollers. Examples of various commercially available development kits are given in this chapter. Also, development tools such as simulators, emulators, and in-circuit debuggers are described with simple example projects.

Chapter 6 describes the use of program development tools such as flowcharts and the program description language.

Chapter 7 provides some simple projects using the PIC32 series of 32-bit microcontrollers and the mikroC Pro for PIC32 C language compiler. All the projects in this chapter are based on the PIC32MX460F512L 32-bit microcontroller, and all the projects have been tested and working. This chapter should be useful for those who are new to using the 32-bit microcontrollers, and for those who want to extend their knowledge of programming the PIC32 series of microcontrollers using the mikroC Pro for PIC32 language.

Chapter 8 covers more advanced projects such as digital filtering, using the PIC32 series of 32-bit microcontrollers. All the projects given in the book have been tested and are fully working. The block diagram, circuit diagram, full program listing, and operation of all the projects are described in detail.

Finally, the Appendix describes basic features of the popular MPLAB PIC32 C compiler, developed by Microchip Inc. for their 32-bit series of microcontrollers. An example application is also given to show how to use this compiler.

Dogan Ibrahim

London, 2012

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