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EMBEDDED C PROGRAMMING

Techniques and Applications
of C and PIC MCUS

Mark Siegesmund

Embedded C Programming ***Techniques and Applications of C and*** ***PIC[®] MCUS***

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Embedded C Programming

Introduction

Microcontrollers are computers on a chip. When they power up they start running a program from internal program memory, also called ROM for read only memory, or Flash. Microcomputers are found in appliances, toys, automobiles, and computer peripherals, such as a keyboard or mouse, and are finding their way in as support electronics for almost everything electronic from battery chargers to RADAR systems.

The Microchip PIC[®] microcontrollers have become the most popular choice for new designs based on their high speed, of up to 70 million instructions per second as of this writing; low cost, some under \$1; and large number of interfaces like USB, Ethernet, and analog signals.

The C programming language, originally developed by AT&T Labs by authors Brian Kernighan and Dennis Ritchie, known as K&R C, became an international standard by ANSI in 1989, known as C89. A new standard derived from C defined the C++ language and was released in 1998. C++ has some complex language elements that make it impractical for use on a microcontroller as opposed to a desktop PC. C is the most commonly used language for programming microcontrollers.

C is in a category of computer languages called high order languages. High order languages use a tool called a compiler to convert the C text files to a machine readable file.

The first part of this book emphasizes the C language. Previous experience with a programming language will help but is not required. Formal definitions of the language elements are used and all areas of the language that apply to microcontrollers are covered in detail. Starting with Chapter 15, this book covers the PIC[®] microcontroller, its peripherals, and how to use those peripherals from C in detail. Prior knowledge of basic electronics to interface to hardware devices will help, but is not required to understand this book.

There are variations in the C language extensions between compiler vendors and between microcontroller families. Throughout the book are indications where there may be compatibility issues between compilers and/or processors. Each chapter will also supply hints for good programming practices, including documentation. Exercises and quizzes are provided

for each chapter to help solidify the concepts learned. This book uses examples ready to compile using the CCS C compiler. It is the most popular compiler for the Microchip PIC[®] processors.

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