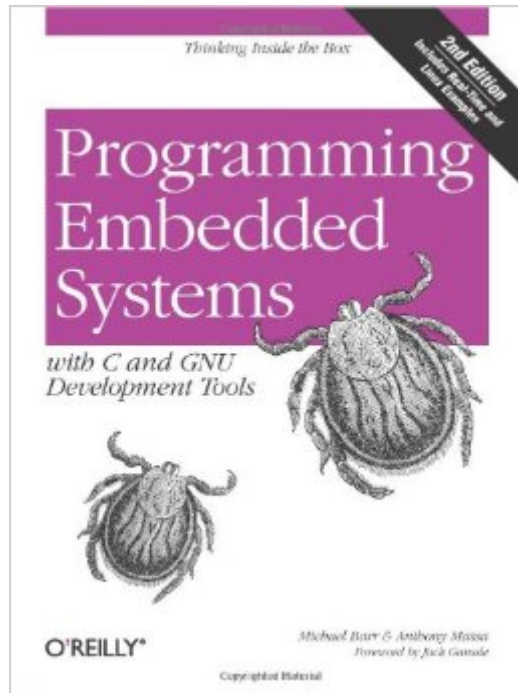


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# Programming Embedded Systems: With C And GNU Development Tools, 2nd Edition



## Synopsis

If you have programming experience and a familiarity with C--the dominant language in embedded systems--*Programming Embedded Systems, Second Edition* is exactly what you need to get started with embedded software. This software is ubiquitous, hidden away inside our watches, DVD players, mobile phones, anti-lock 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 have been nearly impossible to create without embedded software. The first edition of *Programming Embedded Systems* taught the subject to tens of thousands of people around the world and is now considered the bible of embedded programming. This second edition has been updated to cover all the latest hardware designs and development methodologies. The techniques and code examples presented here are directly applicable to real-world embedded software projects of all sorts. Examples use the free GNU software programming tools, the eCos and Linux operating systems, and a low-cost hardware platform specially developed for this book. If you obtain these tools along with *Programming Embedded Systems, Second Edition*, you'll have a full environment for exploring embedded systems in depth. But even if you work with different hardware and software, the principles covered in this book apply. Whether you are new to embedded systems or have done embedded work before, you'll benefit from the topics in this book, which include:

- How building and loading programs differ from desktop or server computers
- Basic debugging techniques--a critical skill when working with minimally endowed embedded systems
- Handling different types of memory
- Interrupts, and the monitoring and control of on-chip and external peripherals
- Determining whether you have real-time requirements, and whether your operating system and application can meet those requirements
- Task synchronization with real-time operating systems and embedded Linux
- Optimizing embedded software for size, speed, and power consumption
- Working examples for eCos and embedded Linux

So whether you're writing your first embedded program, designing the latest generation of hand-held whatchamacalits, or managing the people who do, this book is for you. *Programming Embedded Systems* will help you develop the knowledge and skills you need to achieve proficiency with embedded software. Praise for the first edition: "This lively and readable book is the perfect introduction for those venturing into embedded systems software development for the first time. It provides in one place all the important topics necessary to orient programmers to the embedded development process."--Lindsey Vereen, Editor-in-Chief, *Embedded Systems Programming*

## Book Information

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## Customer Reviews

This book gives an excellent overview of programming embedded systems. It provides numerous examples of real-world hands-on embedded programming. I'd recommend that you have experience in C. Experience with operating systems concepts (such as interrupt service routines) would also be helpful. Unlike usual programming books, you won't be able to pick up the book, download something, and start working. You'll need to have an embedded system that you can use. The authors use a system from Arcom that will run you about \$300. I've not used it and was very wary about it when I first started reading, but as I read through the various examples I gained a great appreciation for the system. It looks like a great way to gain hands-on experience with embedded programming. Before getting this book I read through the Lego Mindstorm NXT documentation and felt very lost. I didn't understand the symbols on the schematics and they used strange acronyms (like I2C and PWM). I also have an Iguanaworks USB infrared transceiver. I bought it to use in a MythTV system I am building. This book has enabled me to understand the schematics of both the Mindstorm and the transceiver as well as the documentation of both systems. I now feel ready to do my own embedded systems programming. That said, I did not like everything in this book. They gloss over areas that I felt would have helped me (such as how to use a JTAG adapter and how to create an interrupt service routine under Linux). There are areas where the writing does not flow well and is redundant. The book switched from using an embedded x86 processor in the first edition to using an ARM processor in the second and there are still references to the old processor. Even with its faults I am glad I got this book.

This book is the much needed update to the book on embedded systems also published by O'Reilly. This book assumes that the reader already has some programming experience and is at least familiar with the syntax of the C language. It also helps if you have some familiarity with basic data structures, such as linked lists. The book does not assume that you have a great deal of knowledge about computer hardware, but it does expect that you are willing to learn a little bit about hardware along the way. This is, after all, a part of the job of an embedded programmer. The book contains 14 chapters and 5 appendixes. The chapters can be divided into two parts. The first part consists of Chapters 1 through 5 and is intended mainly for newcomers to embedded systems. These chapters should be read in their entirety and in the order that they appear. This will bring you up to speed quickly and introduce you to the basics of embedded software development. After completing Chapter 5, you will be ready to develop small pieces of embedded software on your own. The second part of the book consists of Chapters 6 through 14 and discusses advanced topics that are of interest to inexperienced and experienced embedded programmers alike. These chapters are mostly self-contained and can be read in any order. In addition, Chapters 6 through 12 contain example programs that might be useful to you on a future embedded software project. Throughout the book, the authors strike a balance between specific examples and general information. Minor details have been eliminated making the book more readable, at least in my opinion. You will gain the most from the book if you view the examples primarily as tools for understanding important concepts.

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