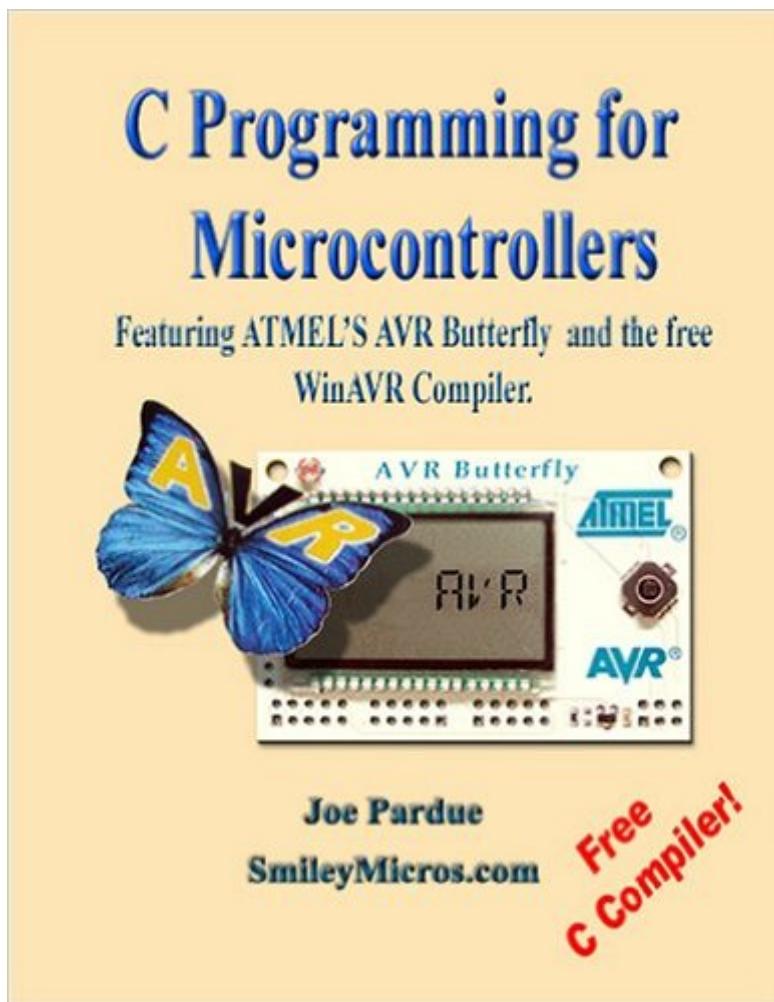


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# C Programming For Microcontrollers Featuring ATMEL's AVR Butterfly And The Free WinAVR Compiler



## Synopsis

Do you want a low cost way to learn C programming for microcontrollers? This book shows you how to use Atmel's \$19.99 AVR Butterfly board and the FREE WinAVR C compiler to make a very inexpensive system for using C to develop microcontroller projects. Students will find the thorough coverage of C explained in the context of microcontrollers to be an invaluable learning aide. Professionals, even those who already know C, will find many useful tested software and hardware examples that will speed their development work. Test drive the book by going to [www.smileymicros.com](http://www.smileymicros.com) and downloading the FREE 30 page pdf file: "Quick Start Guide for using the WinAVR Compiler with ATMEL's AVR Butterfly" which contains the first two chapters of the book and has all you need to get started with the AVR Butterfly and WinAVR. In addition to an in-depth coverage of C, the book has projects for:

- Port I/O reading switches and blinking LEDs
- UART communication with a PC
- Using interrupts, timers, and counters
- Pulse Width Modulation for LED brightness and motor speed control
- Creating a Real Time Clock
- Making music
- ADC: Analog to Digital Conversion
- DAC: Digital to Analog Conversion
- Voltage, light, and temperature measurement
- Making a slow Function Generator and Digital Oscilloscope
- LCD programming
- Writing a Finite State Machine

The author (an Electrical Engineer, Official Atmel AVR Consultant, and award winning writer) makes the sometimes-tedious job of learning C easier by often breaking the in-depth technical exposition with humor and anecdotes detailing his personal experience and misadventures.

## Book Information

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## Customer Reviews

I am writing this review from both the viewpoint as a student of electronics, and as a teacher of some 13 years experience.

**Pros:**

- \* Excellent value for money
- \* Excellent hardware available from author's website
- \* User-friendly style of writing
- \* Wide coverage of C - I am learning a lot
- \* CD ROM contains source code, data sheets, compiler, IDE and terminal software, software for downloading code
- \* Friendly and responsive answers to questions via email
- \* Wide range of topics covered

**Cons:**

- \* Sloppy editing - many typos and some fundamental errors
- \* Weakness in communicating concepts
- \* Needs to explain longer/detailed code/program examples step-by-step to fully explain concepts and so students grasp program functionality and AVR architecture clearly and confidently
- \* Has been rushed

Mr. Pardue has written an enjoyable book. His writing style makes it easy to get through somewhat technical subject matter. There are a range of fun and practical examples to experiment with. However, more detailed examples could be broken down further and explained, which from a pedagogical perspective would be more effective for students to fully grasp and feel confident with the inner workings of programming. If Mr. Pardue writes a sequel covering more advanced C programming and AVR microcontroller concepts, especially detailed assembly language programming and AVR architecture, and effectively explains detailed code examples and AVR architecture step-by-step I will definitely buy it. Possible features of the next book could include hardware hacking of the AVR Butterfly to access more ports, building circuits that take advantage of ICSP, robotics such as SONAR, infra-red communication, sound sensing, using other communication protocols like I2C etc, interfacing with compass sensor, interfacing with speech recognition and text-to-speech synthesis, interfacing with GPS, how to write and run different software other than the built-in code of the Butterfly (customised operating system), internet/networking.

This a fun book that is great for people that want to get started in embedded programming and design. And at a low introductory affordable price. This book, and the AVR Butterfly (~\$20 at Digikey) are the best bargain you can get for getting started in Embedded programming and development. Together (the book, the AVR Butterfly and miscellaneous parts) form a complete development kit. AVR must be selling the kit for a loss to introduce their products. Buy it before they change their minds. Although this is not a professional development kit, you will be able to do a lot. This is more like a cookbook to introduce you to the concepts and to enable to easily put a project together. After reading through this and putting together the projects you will have the basics to understand more advanced books and enable you to design more advanced projects. The one basic I thought the

author left out that was important to include, was the C programming type qualifier "volatile". Volatile before a variable tells the compiler that a variable can have its value altered by agencies other than the program. For example you would use this when you are reading from a hardware address that is set by an interface. Otherwise the compiler may optimize the variable as a constant and not actually read the value from the hardware address on repeat iterations. Code example: volatile int temp; Reads an 8 bit temperature code from a hardware address interfaced to a thermocouple. So now you have it. I found the book to be very readable, easy to understand and fun to read through. As prerequisites for this I would recommend: \* Familiarity with the C programming language. For beginners: I recommend the book "Practical C Programming". There are many fine books to choose from. \* Knowledge of very basic circuits, and how to solder wires. \* A very light knowledge of microprocessors. For beginners: I recommend the book "Programming Embedded Systems in C and C++", by Michael Barr. There are a few other good beginner books to choose from. For the beginner, this is a must have that will enable you to quickly get started and build introductory projects. If you are new to embedded programming and design I would highly recommend getting this book and the AVR butterfly.

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