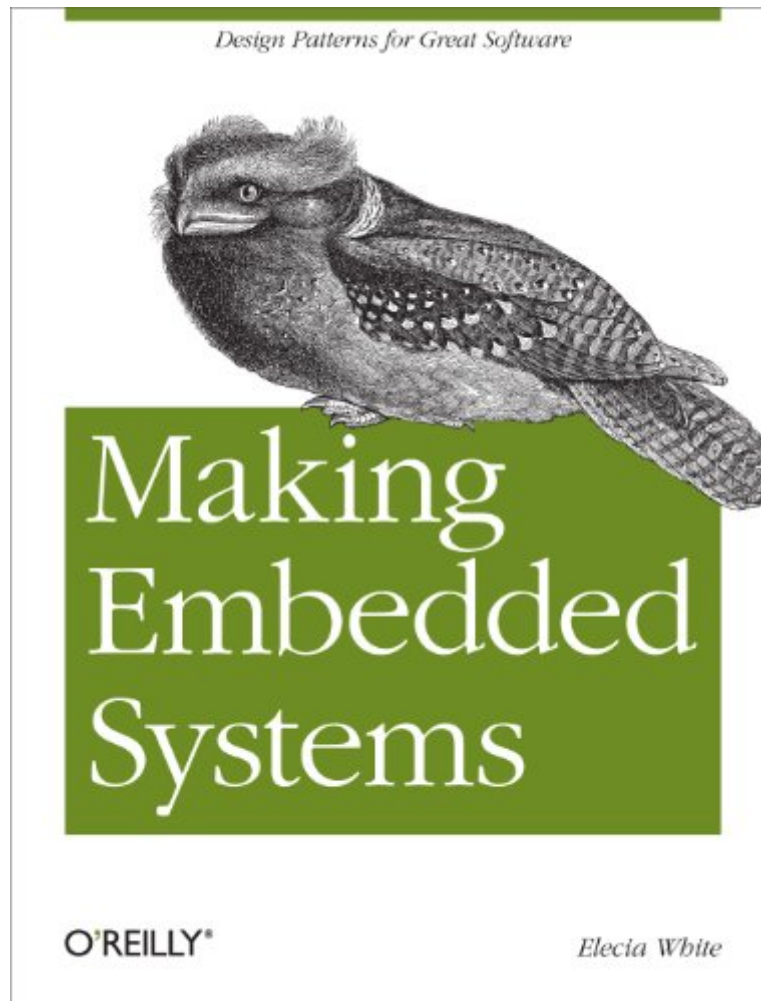# Making Embedded Systems: Design Patterns For Great Software

Synopsis

Interested in developing embedded systems? Since they donâ ™t tolerate inefficiency, these systems require a disciplined approach to programming. This easy-to-read guide helps you cultivate a host of good development practices, based on classic software design patterns and new patterns unique to embedded programming. Learn how to build system architecture for processors, not operating systems, and discover specific techniques for dealing with hardware difficulties and manufacturing requirements.Written by an expert whoâ ™s created embedded systems ranging from urban surveillance and DNA scanners to childrenâ ™s toys, this book is ideal for intermediate and experienced programmers, no matter what platform you use.Optimize your system to reduce cost and increase performanceDevelop an architecture that makes your software robust in resource-constrained environmentsExplore sensors, motors, and other I/O devicesDo more with less: reduce RAM consumption, code space, processor cycles, and power consumptionLearn how to update embedded code directly in the processorDiscover how to implement complex mathematics on small processorsUnderstand what interviewers look for when you apply for an embedded systems job"Making Embedded Systems is the book for a C programmer who wants to enter the fun (and lucrative) world of embedded systems. Itâ ™s very well writtenâ ”entertaining, evenâ ”and filled with clear illustrations."â ”Jack Ganssle, author and embedded system expert.

Book Information

File Size: 3544 KB

Print Length: 330 pages

Simultaneous Device Usage: Unlimited

Publisher: O'Reilly Media; 1 edition (October 25, 2011)

Publication Date: October 25, 2011

Sold by:Â Digital Services LLC

Language: English

ASIN: B005ZTO0LG

Text-to-Speech: Enabled

X-Ray: Enabled

Word Wise: Not Enabled

Lending: Not Enabled

Enhanced Typesetting: Not Enabled

Best Sellers Rank: #133,870 Paid in Kindle Store (See Top 100 Paid in Kindle Store)   #12

inÂ Books > Computers & Technology > Hardware & DIY > Microprocessors & System Design > Embedded Systems   #457 inÂ Kindle Store > Kindle eBooks > Computers & Technology > Programming   #1963 inÂ Books > Computers & Technology > Programming

Customer Reviews

I was extremely interested in reading this book, partly because it falls in my area of expertise, or at least I thought from the title that it would, and partly because I frequently find gaps in my knowledge base that books like this can fill. On this second point I could not have asked for a better volume. The breadth and depth of the examples and explanations gave me a greater understanding of many of the nuances of embedded systems programming than I had to begin with. The book is well-written and very well organized, and could easily be used as a textbook.My only regret with the book initially was that it focuses solely on the interface between hardware and software, and does not cover embedded operating systems at all. At first I found this disappointing, and I still think some options could be discussed in an appendix, but I understand that is not the purpose of the book - and quite honestly, I learned so much from it that I can see why the author chose not to include that discussion.I can't emphasize enough the value of gap-filling knowledge with a book like this.I would highly recommend this book to anyone learning embedded systems programming who needs to know why an operating system is (or isn't) a good idea for a given project or hardware solution. You should know this stuff before attempting to choose an operating system, which I think is the author's point, and it is very well made.Disclaimer - I received a review copy of the book.

I have done embedded product development for many years, and I write about my craft under the pen name "Chip Overclock". I read a _lot_, and most of what I read is non-fiction. I have an extensive technical library filling several bookcases. But it is extraordinarily rare for me to read a technical book cover to cover. Yet that's exactly what I did with this book by Elecia White. Making Embedded Systems won't make you an expert embedded developer. Only hard work and experience will do that. But it is the best and broadest and most practical introduction to the art and science of how I've made my living for decades that I have ever come across. And I learned a lot from it too, which gives you a hint as to how technically diverse this field is. If you are wondering if embedded development is the career path for you, or if you want a book you can give a colleague as an introduction, or if (like me) you dream of going back to teaching embedded systems design, thiÂ is the book I would recommend.

This is an excellent overview and collection of advice from a veteran, Elicia White, in software development for embedded systems. It is intended for a software developer who is a novice at at the design of resource-constrained embedded systems, and in the integration of hardware components in system design. Ms. White says that it is primarily intended for the development of raw metal micro-controller systems without an operating system, but in my judgement it provides many useful development heuristics that would also serve in the development of more sophisticated software for systems running Linux, an RTOS or Embedded Windows.Certainly, as indicated in the title(semi-)formal "Design Patterns" are fully described for various characteristics of embedded development, e.g. state machines, and IOCTL-like generic control of input output peripherals; however, I would say that the most valuable contribution this book makes is in explaining the design integration of hardware components and basic EE-technologies to a software developer who has not yet experienced the design of a sophisticated embedded system. Such vital topics to the newbie embedded developer as reading a datasheet, timing diagram, or schematic are presented in an easily understandable fashion (an example datasheet is humorously provided for a dinosaur-based IO subsystem and fully analyzed). The design documentation necessary for a successful embedded project is also fully described.This is a most necessary guidebook for a software developer involved in any hardware constrained micro-controller project; it would also be extremely useful to the hobbyist who seeks to move beyond simple Arduino-based physical computing projects.--Ira Laefsky, MSE/MBA IT Consultant & Researcherformerly on the Senior Consulting Staff of Arthur D. Little, Inc. and Digital Equipment Corporation

I've read half a dozen "Embedded Systems" books over the last several years and this one is the only one I'd recommend to anyone. Most books like this are long on concept but don't actually leave the reader more or less able to actually design a system themselves. I'm a fairly experienced Embedded Engineer ostensibly screening this book to pass on to junior colleagues, but found myself learning plenty!This book is concise and very readable but manages to be complete and non-patronizing at the same time. It's primarily aimed at Software Engineers designing for Embedded Systems, but gives a good enough balance that it's equally suited to the Hardware Engineer looking to make their system as software-friendly as possible. I think the thing that impressed me most was that White was so candid about the limitations of the approaches presented. The text leads the reader to understanding the problems and how to go about solving them without trying to present an exhaustive list of "if x then Y" style solutions.The only slight problem I have is that the section on floating point numbers doesn't, IMO, give enough information

about IEEE754 floating point compared to the 'fake floating point' implementation discussed. There's one throw-away comment regarding the inadvisability of splitting the fake FP out in to its own library as you run the risk of re-inventing normal floating point, but it's not made explicit what the important implementation differences are that allow you to maintain the performance improvements touted.

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