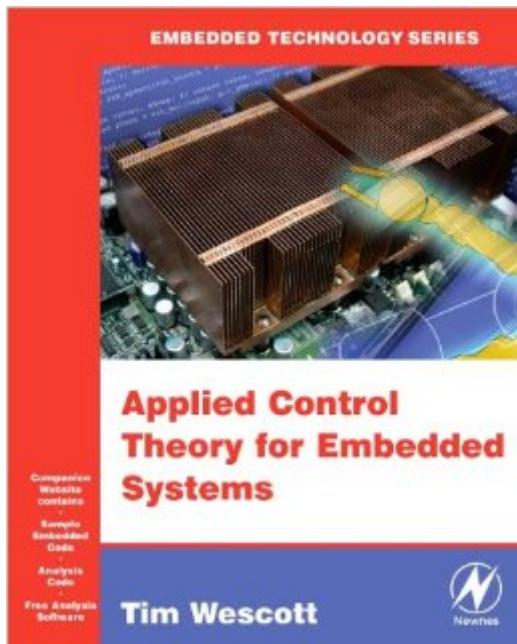


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# Applied Control Theory For Embedded Systems (Embedded Technology)



## Synopsis

Many embedded engineers and programmers who need to implement basic process or motion control as part of a product design do not have formal training or experience in control system theory. Although some projects require advanced and very sophisticated control systems expertise, the majority of embedded control problems can be solved without resorting to heavy math and complicated control theory. However, existing texts on the subject are highly mathematical and theoretical and do not offer practical examples for embedded designers. This book is different; it presents mathematical background with sufficient rigor for an engineering text, but it concentrates on providing practical application examples that can be used to design working systems, without needing to fully understand the math and high-level theory operating behind the scenes. The author, an engineer with many years of experience in the application of control system theory to embedded designs, offers a concise presentation of the basics of control theory as it pertains to an embedded environment. \* Practical, down-to-earth guide teaches engineers to apply practical control theorems without needing to employ rigorous math \* Covers the latest concepts in control systems with embedded digital controllers \* The accompanying companion website contains source code and real-world application examples to help users create fully working systems

## Book Information

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## Customer Reviews

Applied Control Theory is, first and foremost, not a substitute for years of formal education about control systems. With that out of the way, it's a very solid primer/reference for those of us who aren't control engineers, but have occasional control problems that need analysis. It's pretty light on math and formal proofs; you break it out when you've got a problem and a deadline and need to wrap it up so that you can get to the 15 other things on your open issues list. In part, it's a book length expansion of Wescott's earlier article, PID without a Ph.D, available at [...] . If you like his writing there, you'll like it here. It's a good reference for engineers who know it but need to occasionally brush back up. It's a good learning guide for programmers who don't know engineering but find themselves suddenly expected to do control theory. It is, however, a lousy book for an engineer to lend to one of his programmers; they tend to scarper off with it, and then you don't have your copy anymore.

Seemed a bit fast paced with the math (I made it through ordinary differential equations in college), but generally well presented. My main beef is that there are few real world examples with any level of detail. And, although "The Companion Website" is touted here, in the book, on the Author's website, and the publisher's website, no URL could be found. And, when following the "resources" link on the publisher's site I found "Online content is coming soon"... for a book published in 2006. The code examples are few and play loosely with variable types in C. His self defined data type, `fr_type`, is mixed with `ints` in several places. The reason this matters is that `fr_types` (which are also `ints` at their core) are scaled very differently than a simple `int`, and he doesn't provide any complete example of how the functions that mix these types are used (most importantly the function `sat_mul()`). And, in fact, at least one of the code examples (for the function `PID_update()`) is broken by inspection, and was clearly never compiled (ie. reference is made to `p->_state`, and `p` has no member with this name). Kinda leaves you hanging. I guess, bottom line, I would have been hesitant about using the word "Applied" in the title. PS. Be sure to download the Errata sheet from the publisher's web site as there are quite a fair number of errors in the book.

I have had a long career as an electronics engineer working on projects such as the Voyager space exploration project, the Space Shuttle, and various aircraft and missile systems. I found the practical viewpoint approach in this book to be very well done. It is a great refresher in control theory if you have been away from it for a while and a great introduction if you haven't been exposed to it before. It is not an exhaustive treatment of the theory but a great way to understand the basics enough to tackle a microcomputer implementation of a control system and be able to analyze its behavior. It is

not heavy on the math but does require at least some knowledge of calculus and differential equations. I have always found practical books such as these much more useful than purely theoretical ones for actually getting things done and I am glad to have found this one. Well done! I've had this book for years but was negligent in reviewing it - shame on me.

A few years ago I was faced with an embedded project to implement a servo motor system that was geared to a mechanical mechanism. The job at hand was to drive the servo motor based upon inputs from some MEMS sensors so as to keep the mechanism in a specific orientation. At first the problems with implementation seemed rather daunting. Along comes Mr Wescott's book and I found the path to break down the control problem to a practical series of steps to implementation. This helpful guide allowed me to get a prototype system working without having to first go and acquire a Masters in Mathematics and Control Systems theory. My trusty BSEEE degree was enough!!Michael Karas

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