

Better Firmware... *Faster!*

Do you *consistently* produce bug-free firmware on schedule? *If not . . . what are you doing about it?*

A one-day
seminar
presented at your
company

For Firmware Developers

This seminar will teach you new ways to build higher quality products in half the time.

Presented by
Jack Ganssle,
technical editor of
Embedded.com, author
of 6 books and over
1000 articles

More information at
www.ganssle.com

80% of all embedded systems are delivered late...

Sure, you can put in more hours. Be a hero. But *working harder is not a sustainable way to meet schedules.* We'll show you how to plug productivity leaks. How to manage creeping featurism. And ways to balance the conflicting forces of schedules, quality and functionality.

... yet it's not hard to double development productivity

Firmware is the most expensive thing in the universe, yet we do little to control its costs. Most teams deliver late, take the heat for missing the deadline, and start the next project having learned nothing from the last. Strangely, experience correlates poorly with fast development. We'll give you the information you need to build code more efficiently, gleaned from thousands of embedded projects around the world.

Bugs are the #1 cause of late projects...

New code generally has 50 to 100 bugs per thousand lines. Traditional debugging is the *slowest* way to find bugs. We'll teach you better techniques proven to be up to 20 times more efficient. You will learn about simple tools that find the nightmarish real-time problems unique to embedded systems.

... followed by poor scheduling

Though capricious schedules assigned without regard for the workload are common, even developers who make an honest effort usually fail. We'll show you how to decompose a product into schedulable units, and how to use killer techniques like Wideband Delphi to create more accurate estimates.

Learn From The Industry's Guru

Spend a day with Jack Ganssle, well-known author of the most popular books on embedded systems, technical editor of Embedded.com, and designer of over 100 embedded products. You'll learn new ways to produce projects fast without sacrificing quality. This seminar is the only training event that shows you practical solutions that you can implement immediately. We'll cover technical issues – like how to write embedded drivers and isolate performance problems – as well as practical process ideas, including how to manage your people and projects. Contact us to learn how we can award each of the attendees 0.7 Continuing Education Units.

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Seminar Leader



Jack Ganssle has written over 1000 articles in *Embedded Systems Design*, *EDN*, and other magazines. His books, **The Art of Programming Embedded Systems**, **The Art of Developing Embedded Systems**, **The Embedded Systems Dictionary**, **The Firmware Handbook**, and **Embedded Systems, World Class Designs** are the industry's standard reference works.

Jack lectures internationally. He founded three electronics companies, including one of the largest embedded tool providers. His extensive product development experience forged his unique approach to building better firmware faster.

Jack has helped over 700 companies and thousands of developers improve their firmware and consistently deliver better products on-time and on-budget.

Course Outline

Languages

- C, C++ or Java?
- Code reuse—a myth? How can you benefit?
- Controlling stacks and heaps.

Structuring Embedded Systems

- *Manage* features . . . Or miss the schedule!
- Using multiple CPUs.
- Five design schemes for faster development.

Overcoming Deadline Madness

- Negotiate realistic deadlines . . . Or deliver late.
- Scheduling—the science versus the art.
- Overcoming the biggest productivity busters

Stamp Out Bugs!

- How to use proactive debugging to find bugs fast.
- *Managing* bugs to get good code fast.
- Quick code inspections that keep the schedule on-track.
- Cool ways to find hardware/software glitches.

Managing Real-Time Code

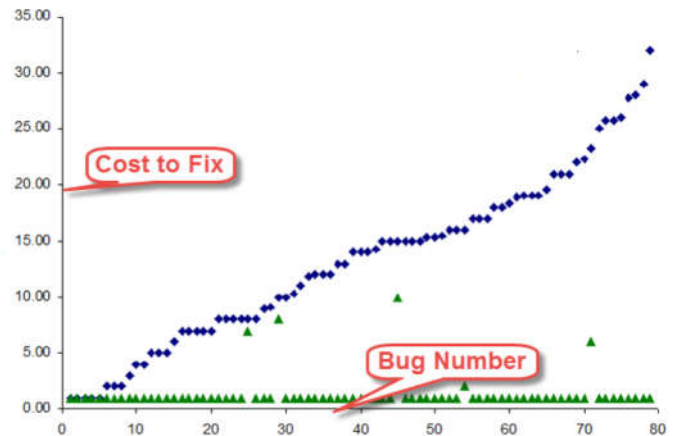
- Designing *predictable* real-time code.
- Managing reentrancy.
- Troubleshooting and eliminating *erratic crashes*.
- Build better interrupt handlers.

Interfacing to Hardware

- How fast signals cause firmware grief.
- Building peripheral drivers faster.
- Inexpensive performance analyzers.

How to Learn from Failures . . . And Successes

- Embedded disasters, and *what we must learn*.
- Using postmortems to accelerate product delivery.
- Seven step plan to firmware success.



The green bugs were caught using a proactive debugging approach described in the course; the blue bugs were fixed much more expensively using traditional techniques.

Why Take This Course?

Frustrated with schedule slippages? Bugs driving you batty? Product quality sub-par? **Can you afford not to take this class?**

We'll teach you how to get your products to market faster with fewer defects. Our recommendations are *practical, useful today, and tightly focused* on embedded system development. Don't expect to hear another clever but ultimately discarded software methodology. You'll also take home a 150-page handbook with algorithms, ideas and solutions to common embedded problems.

Thanks for the terrific seminar here at ALSTROM yesterday!
It got rave reviews from a pretty tough crowd.

Cheryl Saks, ALSTROM

Here is what some
of our attendees
have said:

Thanks for a valuable, pragmatic, and informative lesson in embedded systems design. All the attendees thought it was well worth their time.

Craig DeFilippo, Pitney Bowes

I just wanted to thank you again for the great class last week. With no exceptions, all of the feedback from the participants was extremely positive. We look forward to incorporating many of the suggestions and observations into making our work here more efficient and higher quality.

Carol Bateman, INDesign LLC

Here are just a few of the companies where Jack has presented this seminar:

Intel, HP, ST Microsystems, TI, Atmel, Sony-Ericsson, Northrup Grumman, Dell, Altera, TRW, NSA, Bayer, Seagate, Whirlpool, Cutler Hammer, Symbol, Visteon, Honeywell, GE, Kodak, Western Digital, Teledyne, Bosch, Ball Aerospace.

Did you know that...

- ... doubling the size of the code results in much more than twice the work?*** In this seminar you'll learn ways unique to embedded systems to partition your firmware to keep schedules from skyrocketing out of control.
- ... you can reduce bugs by an order of magnitude before starting debugging?*** Most firmware starts off with a 5-10% error rate – 500 or more bugs in a little 10k LOC program. Imagine the schedule impact finding all of those! Learn straightforward solutions that don't require revolutionizing the engineering department.
- ... you can create a predictable real-time design?*** This class will show you how to measure the system's performance, manage reentrancy, and implement ISRs with the least amount of pain. You'll even study real timing data for common C constructs on various CPUs.
- ... a 20% reduction in processor loading slashes development time?*** Learn to keep loading low while simplifying overall system design.
- ... reuse is usually a waste of time?*** Most companies fail miserably at it. Though promoted as the solution to the software crisis, real reuse is much tougher than advertised. You'll learn the ingredients of successful reuse.

What are you doing to upgrade your skills? What are you doing to help your engineers succeed?
[Do you consistently produce quality firmware on schedule? If not . . . what are you doing about it?](#)

Contact us for info on how we can bring this seminar to your company.

e-mail: info@ganssle.com or call us at 410-504-6660.