

The Embedded Muse 153

Editor: Jack Ganssle (jack@ganssle.com)

January 8, 2008

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EDITOR: Jack Ganssle, jack@ganssle.com

CONTENTS:

- Editor's Notes
- Book Review
- Open Spaces, Continued
- Tools and Tips
- Jobs!
- Joke for the Week
- About The Embedded Muse

Editor's Notes

Did you know it IS possible to create accurate schedules? Or that most projects consume 50% of the development time in debug and test, and that it's not hard to slash that number drastically? Or that we know how to manage the quantitative relationship between complexity and bugs? Learn this and far more at my Better Firmware Faster class, presented at your facility. See <http://www.ganssle.com/classes.htm> .

For the first time, I'll be conducting a public version of this class in Denmark in April. For more information see <http://www.ganssleindk.dk/> .

Embedded Systems Design magazine (nee Embedded Systems Programming) is now 20 years old. Turns out there are some copies of issue number one, though they are jealously guarded. I ran into Rich Nass, the Editor-In-Chief, at a meeting in Santa Barbara last month. He was on his way north to return the magazine's only copy of the issue, as it was too valuable to entrust to the postal service! Maybe there are more extant copies of the Magna Carta. The staff scanned the issue and allowed me to post it here: <http://ganssle.com/misc/firstesp.pdf> . Be warned: that's a 50 MB file.

Talking about ancient history, the product that started the entire microprocessor revolution, the 4004, has its own site: <http://www.4004.com/> . This has some amazing links, including the schematics of the device itself (to the transistor level), which takes

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only 3 pages! The reconstructed source code of the Basicom calculator is there as well, I'm sure much better documented than originally. The square root algorithm is fascinating.

John Johnson sent a link to this fun and very educational FPGA site:
<http://www.fpga4fun.com/> .

Finally, Happy New Year to all and best wishes for a prosperous, safe, and fun 2008.

Book Review

Jan Axelson has carved herself a niche providing complete information on a number of different communications schemes. Her Serial Port Complete is The Standard Reference on the subject, and is now available in a second edition.

Though PCs generally don't come with an RS-232 port anymore, there are still a tremendous number of embedded apps that use these interfaces, so the subject remains important. But she has greatly enhanced the book with examples in C as well as the Basic used in the first edition. And there's complete examples for the .Net environment as well, along with information about doing serial over wireless and using USB virtual COM ports.

If you've been in this industry for a good long while, perhaps earning some gray hair and an ulcer in the pursuit of embedded ones and zeroes... you probably still get mixed up about serial protocols. Is a "one" a negative or positive level in RS-232? In what order are the bits transmitted? What pin is what on a DCE versus DTE device?

The book starts off with a description of the asynchronous protocol used by RS-232, and then moves on to the PC's serial port structure.

For the embedded person, though, the interesting stuff starts with a useful overview of PIC serial ports, again accompanied by code. Axelson goes on to give a complete look at the characteristics and use of RS-232 for connecting two devices - include the usually ignored problem of powering a device from the RS-232 port. She gives great advice about building isolated connections and on debugging problems

If you've ever built systems that communicate via RS-232 you know how difficult it can be to get things working properly. Axelson goes over both the problem of communications between an embedded system and the PC, and between networks of embedded systems.

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RS-485 is still going strong in a lot of applications, and Jan covers that subject completely, both from the hardware and software perspective. If you're using 485 this book is worthwhile just for those two chapters.

Jan's book is about as complete a reference as you'll find on serial communications using RS-232 and RS-485. The code could save you some time; the reference material surely will.

Open Spaces, Continued

Tom Mazowiesky had some comments on open spaces

“A comment on the 'Open Space' - A few years ago Ben Rich wrote of his experience as an engineer working for Kelly Johnson of the Lockheed 'Skunk Works', titled 'Skunk Works: a personal Memoir of My Years of Lockheed'. His story of development of the U2, the SR-71 and the F-117A Stealth fighter are great reading.

“He described his office working conditions basically as being crammed into the available space. While working on the SR-71, he removed a door separating his office and the adjacent office to allow another engineer and himself to update a drawing at the same time. These offices were located next to the shop floor, and engineers were expected to spend a portion of the day on the shop floor. They also left their doors open to anyone on the shop floor for questions and ideas. As we all move to the new global marketplace, I worry about our ability to engineer great products when the engineers are separated by thousands of miles from their creations. I've always gotten a kick out of seeing product literally go out the back door, and I wonder how we will keep that going in the new environment. Engineers are human, and while we all joke about how analytical and nerdy we are, we still put our emotions into the job and the products we design. Something is lost if we are removed from the factory floor.

“Personally I've always liked to have a quiet space when working on certain things, but I've also worked in open spaces, and they can be very productive as well. I think a lot has to do with the people who occupy the space, rather than the space itself. The managers who create good teams of dedicated people will always perform well, because those people understand the problem and have learned how to solve them in the past.”

Tools and Tips

In Muse 152 Paul Carpenter sent in a font to create timing diagrams (<http://www.pcserviceselectronics.co.uk/fonts/>).

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Dave Kellogg followed up with this: "This Timing font allows you to easily draw timing diagrams in Word, etc.

"To install the Timing font, I simply copied the "timing.ttf" file to my "C:\Windows\Fonts" directory. If you have problems, see "Install a new font on your computer" at "<http://office.microsoft.com/en-us/word/HA010947421033.aspx?pid=CL100636481033>".

"Print out a copy of "Timing Font Crib Sheet.gif" to see the Timing font's keystrokes. The key mapping is well thought out.

"To use the Timing font in Word (on a PC with the font installed), simply change the font to "Timing", and use the keys (shown the crib sheet) to draw the waveform. Like any font, you can change its size, bold it, color it, high-light it, etc. The Timing font's characters are fixed width.

"To make sure that the Timing font is properly displayed on different computers without the Timing font installed (in Word or PowerPoint), embed the Timing font directly in the document. This will increase your document's file size by about 15K.

1. On the Tools menu, click Options, and then click the Save tab.
2. Under Save options, select the Embed TrueType fonts check box. Do >>NOT<< select the "Embed characters in use only" box.

"The timing font must be embedded for each document (i.e., it is not a permanent setting in Word). When the recipient opens the document, the Timing font is >>NOT<< installed on the recipient's computer.

"On PCs without the Timing font installed, a Word document containing the embedded Timing font will not show the "Timing" font as available in the Font drop-down box. However, it is possible to edit and create additional timing diagrams by using the Format Painter to clone the Timing font from some existing Timing font. So in effect the Timing font is available."

Jobs!

Let me know if you're hiring firmware or embedded designers. No recruiters please, and I reserve the right to edit ads to fit the format and intents of this newsletter.

Our Oregon company delivers grid-tied solar inverters from 1kW to 500kW with integrated monitoring solutions to the exploding solar photovoltaic industry.

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Sophisticated software, firmware, and hardware contribute to a first class inverter product. PV inverters require extensive product qualification from both a regulatory and reliability perspective.

We are looking for a Software/Firmware Engineer that can support product development through embedded firmware development and support test through LabVIEW test automation as needed.

For additional information and a full job description, please email amcdonald@bendcable.com

GoAhead, headquartered in downtown Bellevue, Washington, is the leading high availability middleware provider on the market. GoAhead is seeking a Software Developer to join its technical team. This position designs, develops, documents, and tests software for a variety of operating systems. Essential duties include but are not limited to:

- Specifies, designs, implements and tests embedded management software.
- Writes and presents key engineering documents including procedures, specifications, design, test and user documents.
- Consults with other engineering staff to evaluate operational and performance requirements of overall build.
- Builds web-based user interfaces for new and existing products.
- Acts as mentor to more junior developers and motivates and encourages contributions towards a successful team effort.
- Act as an information resource for company products and provide informal training to more junior developers and other positions within company as needed.
- Provides support to marketing, sales, client services and customers concerning design and maintenance of software products.

Qualifications include a BS degree and 4 or more years experience designing and implementing sophisticated software systems; a thorough understanding of state-of-the-art tools and technologies for software design and development; excellent proficiency in C language with exposure to C++ and/or Java language; a thorough working knowledge of Linux operating systems; and experience developing and debugging with the GNU tool chain. Experience with the design and implementation of telecom network elements or embedded Linux projects is highly desirable. Please submit your resume to jobs@goahead.com.

Xilinx is looking for an Embedded Software Engineer. Design and develop device drivers and board support packages in various embedded Operating System environments, including Linux and VxWorks. Help define and drive an open source Linux vision and

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strategy for Xilinx device driver support. Establish and grow relationships with internal marketing and development groups, 3rd party Linux vendors, and open source Linux contacts to help realize the Linux vision and strategy. During driver development, work with hardware engineers and create hardware/software integration test applications. Advise management and marketing on future projects and product timelines and schedules. Communicate with marketing on priorities and requirements, support customers, and write technical documentation. Work location in Albuquerque NM, San Jose CA, or Longmont CO. Please send resume to abq_epd_jobs@xilinx.com.

Required Position Qualifications

- * BSCS / BSCE / BSEE
- * 5+ years of work-related experience designing and developing embedded software
- * 3+ years of experience developing device drivers in a Linux environment
- * Understanding of software development process and life cycle
- * Understanding of object oriented concepts
- * Excellent communication (verbal and written) and teamwork skills

Desired Position Qualifications

- * MSCS / MSCE / MSEE
- * Experience with the Linux open source community and mailing lists
- * Xilinx Embedded Development Kit (EDK) knowledge and experience

Schweitzer Engineering Labs (SEL) seeks a motivated, creative, problem solver with a B.S. in Electrical Engineering, Computer Science or equivalent for our Software Engineer position. The qualified applicant will have experience with real-time firmware design and C assembly languages. If you have demonstrated successful experience in applying your firmware/software design skills and enjoy graphical user interface applications in Windows environments then we invite you to join our technical team. Please visit our website at www.selinc.com/careers.

Calsense is looking for a Senior Embedded Software Engineer. We specialize in systems that help cities, school districts, and others conserve water. Our product line currently includes high-end irrigation controllers, handheld remotes, and a Windows-based software suite that allows our customers to centrally manage their system. And guess what - our products really work. Our customers love us and we work very hard to keep it that way. Our product can be found in over 20 states. We have 35 employees and growing. Our offices are located in Carlsbad, CA.

Key responsibilities will be to design, code, test, and document real-time embedded software for new and existing products. You'll participate in all phases of development. Help formulate new product feature ideas by working with Company principals,

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employees and customers, contributing to overall future product design. You will work closely with hardware engineer porting current product to a wholly new ARM based - VGA platform. You'll help back our industry renowned product support group and gain further understanding of product needs.

Required:

- BSEE or BSCS from an accredited college or university.
- 5-7+ yrs embedded C and EC++ development.
- Strong knowledge of digital electronics. Must be able to read schematics and data sheets and work directly with hardware.
- Must be able to operate an oscilloscope and debugger.
- Deep understanding of interrupts, and multithreaded preemptive operations. Minimum two or more projects developed with an RTOS.
- Experience with multiple processor families (Coldfire, ARM)
- Outstanding aptitude for clean, intuitive UI work. Show us your previous UI work. Experience with GUI libraries.
- Demonstrated ability to analyze and articulate technical problems

Benefits:

- A Private Office
- Seeing your work put to use in a product people understand
- Medical Insurance
- 401(k) retirement plan with company matching
- Education

Visit our web site www.calsense.com. To apply send your resume with a cover letter to Bob Destremps at engineering-jobs@calsense.com.

Joke for the Week

Rick Miu sent in the following:

"To be or not to be... that is the question."

The answer is `0xff` since:

`0x2b | ~0x2b = 0xff`

About The Embedded Muse

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The Embedded Muse is an occasional newsletter sent via email by Jack Ganssle. Send complaints, comments, and contributions to him at jack@ganssle.com.

To subscribe, send a message to majordomo@ganssle.com, with the words "subscribe embedded *your-email-address*" in the body. To unsubscribe, change the message to "unsubscribe embedded *your-email-address*". BUT - please use YOUR email address in place of "email-address".

The Embedded Muse is supported by The Ganssle Group, whose mission is to help embedded folks get better products to market faster. We offer seminars at your site offering hard-hitting ideas - and action - you can take now to ***improve firmware quality and decrease development time***. Contact us at info@ganssle.com for more information.

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