Roundtable: What advice would you give to a newly minted design engineer?

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Billie Johnson, ON Semiconductor, www.onsemi.com [1]
Sharpen your responsiveness and flexibility so you can constantly work smarter and faster. Social media has created a culture accustomed to instant information. Customers expect solutions sooner. Whether it's a swift design completion or timely communication and status updates, the imprecise "I'll get back to you" won't cut it. In addition, market demand changes quickly and so must the methodologies that support it. As you work through your first designs, realize that some of your solutions and practices will follow you to the next, but you'll be starting anew in many aspects.Proving what you know to your management and co-workers won't be nearly as valuable as showing that you can learn and adapt.

David Norton,TDK-Lambda Americas Inc, www.us.tdk-lambda.com [2]
I would give a new Engineer the same advice as I gave my son when he started his Engineering education: "Look to the future of the industry." The smart grid expansion is essential for the health of the US economy and will be a long term project, stretching over many years. Power transmission and generation requires

strong math skills and I believe that many younger Engineers have looked at digital electronics instead, only to find those jobs outsourced to lower cost countries. Many of the skilled power engineers are aging baby boomers and will be facing retirement soon; those Engineers will need younger replacements. Since our power infrastructure is US based, there will be less chance of those jobs going overseas.

Don Knowles, N2Power, www.n2power.com [3]

Unless you're an expert, leave power supply design to specialists. Today's ICs make it appear easy to design a power supply for your next product. Many claim to deliver sophisticated controls and algorithms for power factor correction (PFC), enhancing efficiency, transient response and load/line performance, while minimizing EMI. Further, the vendors of these ICs offer reference designs and development tools that can, at first glance, make the supply design almost trivial. These fall into two categories. In the first, you get a detailed reference design for a specific supply (such as 375W, 48VDC), which includes a schematic, PCB layout, and BOM. In the second category, you use the vendor tools to define what you need in specifications, and then it returns with the appropriate IC(s), passive components, schematic, layout, and performance curves.However, creating a fully qualified design that meets all of the performance and regulatory specifications, particularly when the end product is to be used around the world, is not straightforward. Amongst many challenges are designing and sourcing components, managing the supply chain, designing for international markets which don't necessarily use 120Vac as the grid voltage (and may not even have a 'clean' grid), creating a test plan, designing a thermal management system (even efficient power supplies generate heat), and, last but not least, navigating the regulatory and standards jungle, which is a constantly moving target. Ever-tighter regulations cover safety, EMI, efficiency, and power factor correction. The documentation alone runs into hundreds of pages. Buying an off-the-shelf or customized standard power supply is nearly always the most tech-savvy and economical way forward.

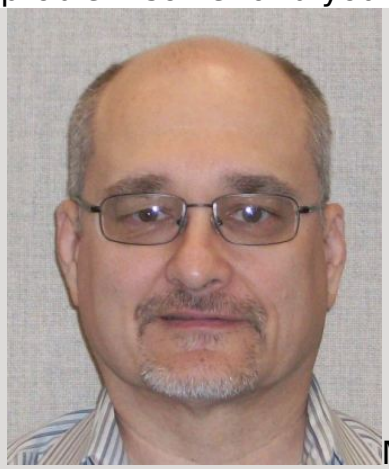
George Arnott, Telit Location Solutions, www.telit.com

With a healthy number of electronic designs set to include a position awareness feature, it is very important that new design engineers avoid the temptation of laying down some generic application note on the tired GPS receiver. A newer, more effective alternative is unfortunately not too well known particularly if you are not exactly inside the navigation electronics space. I am talking about the new GLONASS system based on a larger and newer technology constellation of global positioning satellites launched and run by the Russian government and which became fully operational in late 2011. There are a number of real advantages to using GLONASS, or as most designers are doing, a COMBO receiver which can work both GPS and GLONASS for maximum reliability and performance. Your resulting design will be substantially more robust and perform better in situations that typically challenge GPS-only designs such as urban canyons. Besides, because the GLONASS system runs from a larger constellation of newer technology satellites, your design will produce a position fix much faster; a critical factor particularly if your design is for location & recovery applications. Designing with this type of a COMBO receiver will get you incredibly better position accuracy making the difference between a fix that places you at the intersection of Main and First, to placing you at the southeast corner of Main and First.

Dave Van Ess, Cypress Semiconductor, www.cypress.com [4]

First, I would like to say welcome. Very rarely are people offered a job where they get to learn for a living. You are about to enter your apprenticeship and it may be overwhelming. Scientists, after receiving their undergrad degrees, go off to learn their trade pretty much alone. Engineers get to learn their trade in a group. Get to know these guys. There will be tens, maybe hundreds, of years of experience. In

turn, you can show them how a smartphone works. The best advice I can give is a story I heard about Wernher von Braun. When he first came to the America he went to work with the army to design rockets. When he saw their work he suggested they read his paper on the design of a single stage rocket. They got the paper, devoured it and immediately built their rocket. They were quite upset that, when launched, the rocket spun out of control and crashed. Von Braun suggested that they should have read his follow up paper about instability in the design of a single stage rocket. You don't have to invent everything from scratch. At the start of a new project you should ask: how has this been done before? What was good about it? What needed improvement? Is there a new technology that makes some other solution attractive? And as tempting as it is, resist trying something just because it is new and it will look good on your resume. If you want to write your own real time operating system, do it as a hobby. Get yourself a reputation of being a solid problem solver and you should be in demand for your whole career.


Michael Bandel, ECN Reader

Never forget that there are two worlds: the theoretical and the real. The theoretical world provides an imperfect way of accounting for all of the variability encountered with any real world implementation of a solution to a problem. This also extends to the differences between book learning and actual on-the-job experience. Books are a reservoir of knowledge, but experience is the ultimate reservoir of manipulating that knowledge into practical accomplishments. Try to always respect and focus on learning the specifics you need to acquire from your elders—though they may be mired in some pretty inane preconceptions about the non-work related world. People with the experiences of interest are undoubtedly your greatest resource if your goal is to be in their engineering shoes someday. Lastly, try to learn and appropriately value the technical assets and deficits or yourself and your colleagues. People working together fit like a puzzle. Try to recognize where you can be of the most value yourself, based upon your abilities and skill set; and, try to recognize the abilities and skill sets associated with others you interact.

Ian Dunn, Future Technology Devices International,www.ftdichip.com [5]

Listen to more experienced engineering staff, in reality you know next to nothing when you leave academia - all you've shown is that you have the ability to learn, so don't get carried away by your ego. Technology changes rapidly, keep up to date by reading and networking. Attending conferences/trades shows, reading articles in magazines, etc. all have value. In particular, stay fully informed of what your competitors are doing.Remain honest, or else you will lose your fellow engineers' trust. Never plagiarize.You should pick a speciality or two and concentrate your efforts there rather than trying to be a jack of all trades. If you are a hardware engineer, then develop some software skills. Likewise, software engineers should make sure they are able to understand the basics of the hardware side. Recognize the contributions from all engineering departments (software, firmware, applications, sales, etc.). Learn to appreciate the need for marketing. Work hard, you are setting your own reputation. Do not make all the mistakes yourself, learn from others mistakes and experiences in similar projects. You will learn more from co-workers. Find mentors to guide you. The collective success of the team is more important than your ego.

Tom Brockman, ECN Reader

Concentrate on portable skills, get good at understanding the root cause of problems, not so much memorizing the stuff professors grade on. Prepare for a lifetime of learning, not just continued education. More importantly, learn from your mistakes. When a project goes perfectly the first time you never know if you are good or just lucky. All products today have firmware involved somewhere in the chain, whether it is in the product itself or in the testing so get comfortable with programming, it isn't going away. Also, good engineers NEVER quit. Even when defeat seems inevitable, they struggle on. Last, but not the least, engineering should be a life style and not something you turn off at 5:00 o'clock when you leave work (assuming you get to leave on time once in a while). Whether

you continue after hours as a ham, hobbyist, or mentor, good engineers have it on their brain 24/7 and cannot, nor want to, turn it off.

Jim Aralis, Microsemi, www.microsemi.com [6]
First of all, congratulations on choosing an exciting profession and one of the lucky people who has the opportunity to enjoy every day of your career. To be as productive and successful as possible, you must take an active role in managing your career. This means continuing to learn, trying new things, and asking for hard assignments to help build your capabilities and reputation in both positive and adverse situations. A can-do attitude is important, whereas self-promotion and credit-seeking will most likely be self-defeating in the long-run. You'll make mistakes – own up to them, learn from them, and don't make them again. Learn from your peers and superiors and find a mentor to help guide your career. As you progress in your career, return the favor and become a mentor to new engineers – be patient with those who are worth the trouble and walk away from those who don't. Now let's talk office politics. Don't be so foolish as to believe they won't affect you at some point. My advice – don't participate because it simply is not conducive to your career. When teams win, companies win and everyone benefits. Lastly, have fun. The act of design is creative and it never gets old, even if we do.

Allan Neville, Murata Power Solutions, www.murata.com [7]
Be curious. Engineering can be an exciting field if you are curious and embrace the changes and challenges new technology and applications can bring. By staying curious you will remain sharp and creative and more open to new tasks and ideas. In order to maintain your curiosity, work for a company that challenges you technically and intellectually. And find one that shares the same values as you. It's okay to move around either within your company or to go somewhere different to find the right fit. And once you've found a home that meets your criteria, be sure to

foster your role there. For example, if Biology 101 was not your calling but you still want to help others, engineering within the medical field could be a great match. Or if you want to help the environment by more than recycling your bottles and cans, look into Smart Energy engineering opportunities. If you choose an area of focus that meshes with your ideals, you are more likely to enjoy the work and encourage your curiosity. Curiosity is an important asset to have as an engineer. If you stay curious, your engineering career will be long and rewarding.

Jason Rhode, Cirrus Logic, www.cirrus.com [8]

Here are a few important high-level things needed to get your career off on the right track.You must find a job that you really enjoy. Whether you realize it or not, this means a job where you will work very hard in pursuit of creating something worthwhile. It is only possible to immerse yourself in your work for long if you enjoy it. If you are able to do this at your first job, you will grow in ways that will serve you well your entire career.To grow fast, you need to learn to leverage what others have learned before you. This means finding mentors, reading a lot, networking with a purpose, and many other means of standing on the shoulders of those who have gone before you.Learn how to give a compelling presentation to a group and to write a convincing argument. Organizations like Toastmasters can help you with the former, and your 11th grade English teacher probably tried to do the latter. Think of every major communication as a five- paragraph essay. Like everything else, being good at something requires deliberate practice.Congratulations on choosing a career in which there are actually useful jobs available where you can contribute in a positive way to the economy as well as your own financial state. Engineering is an amazing platform I hope your career is as interesting and unexpected as mine. Dream big.

Alix Paultre, GlobTek, Inc., www.globtek.com [9]

The way to designing a better product involves understanding how the latest core technologies integrate into subsystems, and how those subsystems integrate to create a complete product. One must not only “get” what a technology does; one must understand how the tech enables a given device’s functionality and how to integrate that functionality into a larger system. The time when a device was lauded for performing one task well is past. Today’s consumer wants not only the web-enabled core functionality to operate everywhere, anytime, and anyplace, they also want all peripheral functionality (GPS, camera, multimedia, gaming) to be seamless as well, not just operating as a stand-alone app or device, but also as a part of the larger system. This massive convergence of hardware functionality and software has already made an indelible impact on our world. We are all now comfortable with smartphones, and our children think nothing of the fact that they are carrying a combination radio transceiver, still camera, video studio, audio recorder, and gaming system (among a list of other functionalities) in a pocket-sized case that also contains a computer an order of magnitude more powerful than the Cray 1 supercomputer. This integration of functionality will continue to dominate design and the products and systems created to address the constantly-advancing enabling technologies. Considering the number of American Baby Boomers going into retirement, let’s look at geriatric assisted-living applications, a market area that will continue to grow and expand for the foreseeable future. Let’s look into the household of a challenged retired person in the very near future. Their wake-up is monitored by a smart bed that sends body temperature, sleep patterns, and possibly even sweat chemistry to the household’s AI (to be sent on to the Doctor’s AI if results are out of parameter), which is also communicating with the toilet and scale to send a comprehensive snapshot of the subject’s health to a medical services provider.The person may be wearing several pieces of medical hardware that is also beaming telemetry. Considering that one can now get Bluetooth-enabled hearing aids that let you also use them with your phone, medical “infotainment” devices may be available that further integrate paralleled functions of a household. Another example would be a security system that also performed patient activity monitoring to alert for falls, wandering, and other physical issues. Each of these product examples involves integrating Cloud-based wireless, board-level, and inter-device communications hardware and software protocols as well as a power management methodology that includes storage, charging, and safety and thermal management. Darwinian philosophy points out that the competition does not always go to the fastest and strongest, but to the one who can best adapt to change. This also applies to the electronics world, where success is based more on the performance of the system than that of any one of its parts. The most powerful amplifier in the world doesn’t help if you do not deploy it in a fashion that allows you to use that power (putting it in a package that allows heat to derate it, for example) properly. The better you understand how the various systems fit together (or not) the better the products you design, and the more successful you will be.

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