

# CAREERS

## Where the Jobs Are

Defense is booming, and demand is rising in analog circuit design, power management, and automated design

BY SCOTT KARIYA

**T**he economic doldrums that officially began in March 2001 may well linger into 2003. Though the jobless rate for U.S. electrical and electronics engineers is down from its all-time peak of 4.8 percent in the second quarter of 2002, it's still painfully far from the mere 1.3 percent it was two years ago. And according to outplacement firm Challenger, Gray & Christmas (Chicago), the telecom and computer industries—home to many EEs—were first and second, respectively, in job cuts in 2002.

Still, there are bright spots. The defense sector continues to fire on many cylinders, and that translates into hiring in areas such as intelligence technologies, defenses against chemical, biological, and nuclear weapons; and new battlefield systems such as smart bombs, unmanned air vehicles, and communications links. The U.S. government showered the Defense Department with more than US \$355 billion for fiscal year 2003, which translates into abundant job postings on the Web sites of defense contractors like Lockheed Martin, TRW, and others.

Even in a few of last year's sputtering industries, demand exists for EEs. The semiconductor industry, for one, expects better revenues than in tepid 2002. CEOs from the electronics and related industries, at a gathering at November's Electronica Fair in Munich, forecast 5–20 percent growth, up from last year's low single digits. Their optimism is based on an expected revival of the PC market, as well as expansion of wireless and automotive sales.

Among the areas where engineers are in short supply: analog and mixed-signal circuit design, power management, and automated design tools. [Another field where engineers can make their mark—technical support—is covered in "Who Ya

Gonna Call?," p. 94. An article on getting certified in information security is available online at <http://www.spectrum.ieee.org/careers/careerstemplate.jsp?ArticleId=e010303>.]

### "Yesterday's" technology still hot

One of the most sustained demands for EEs is in analog and mixed-signal design. Analog? Isn't that obsolete? The fact is, the more computerized the world becomes, the greater the need for interfaces between the analog and digital: cellphones need to convert voices to digital pulses and vice versa, video cameras

need to change images into bytes, while monitors reverse the transaction. A quick check of job postings for EEs at Monster.com and other job boards confirms this. At press time, analog and mixed-signal companies like Semtech, Silicon Laboratories, Goal Semiconductor, and Maxim had all posted multiple ads for experienced analog design engineers.

"There's always been a shortage of hardware design engineers, people who do circuit design at the transistor level," observes Bruce A. Wooley, chair of the electrical engineering department at Stanford University and former chair of

the IEEE Solid-State Circuits Society. "They are needed for digital, analog, and mixed-signal chips, such as I/O circuits for large digital processors—it's basically an analog design problem."

Though demand for analog types has steadily risen, supply has not. Often cast as yesterday's technology, analog circuit design has failed to attract EE students and younger engineers. It's also demanding. Mark van der Walde, director of the IC business unit at Power Technology Associates (Sharon, Mass.), a recruiting firm that places analog, power, and motion-control engineers, explains: "What differentiates a top engineer from an average engineer is the ability to design all the unique analog building blocks of, say, a power chip from scratch. Such analog building



blocks might include a band-gap reference circuit, a gate driver, or a comparator. A really top engineer doesn't rely on a circuit simulator to tell him how a circuit functions."

Bart Kramer, a recruiter for Silicon Laboratories (Austin, Texas), which develops analog and mixed-signal chips, agrees. The key to his company's success, he says, lies in "design engineers who are well grounded in fundamentals—they design elegant solutions."

### Power management demand

The near ubiquity of battery-operated mobile electronics—cellphones, PDAs, laptops, MP3 players—is proving a boon for power management engineers. "The trend toward miniaturization calls for power efficiency. You've got to get smarter at delivering the power, as little as possible and just when needed," says Reno Rosetti, director of corporate strategy for computing at Fairchild Semiconductor (South Portland, Maine). That extends from CPUs, where heat dissipation is the key issue, down to systems on a chip, which can't tolerate more than 1 or 2 V. "Power management is the hottest area in the industry right now," Rosetti says, pun intended.

"There are simply not enough good power engineers to go around," reports Rich Cardarella, president of Power Technology Associates. "The schools haven't produced them, maybe because they thought there weren't jobs or it wasn't appealing to the students. But I predict there will be consistent demand."

In the current economy, some companies that need power management engineers can't afford to hire them. Nevertheless, Rosetti and Cardarella agree that EEs with an advanced degree and five years' experience in analog circuitry are a hot commodity. In fact, Cardarella notes, some of his clients are hiring analog engineers and moving them into power management.

### Design tool designers in demand

Hiring also remains strong at many of the companies that build tools for the semiconductor industry. Take electronic design automation (EDA), which creates software for designing ICs and other semiconductor components.

"We're looking for a variety of EEs, from BSEEs with four years experience to Ph.D.s," reports David Egan, senior director of worldwide staffing at Synopsys Inc. (Mountain View, Calif.), a leading EDA company. Synopsys looks for three kinds of experience: design creation, comprising physical synthesis and physical design; design verification, anchored by simulation; and design integrity, focusing on testing, timing verification, system-on-a-chip issues, and intellectual property. EE hiring at Synopsys, Egan adds, is increasingly global, with half the planned hires expected to work outside the United States, at one of Synopsys' offices in China, India, Taiwan, or South Korea. Several years ago, 70 percent of new hires worked in the United States.

At EDA leader Cadence Design Systems Inc. (San Jose, Calif.), there are 140 or so openings worldwide, according to Paul Trevisan, group director of corporate staffing. Cadence is taking advantage of the current job market to hire experienced engineers, rather than recent grads. But filling those openings, even in this employer's market, is tough. "We're looking for people who've done some traditional IC design but also have a bent for developing software. That's a unique skill set."

### Military sector going strong

Cadence is not the only firm looking for a blend of hardware and software skills. Greg Shelton, vice president of engineering and technology at Raytheon Co.

(Lexington, Mass.), says, "We hire a lot of EEs to do software development, so they will have a hardware/software view when doing our systems-level work." People with that kind of background "tend to [become] team leaders," he adds. "They really understand the architecture, understand how systems will fail, understand how the whole system comes together from an engineering perspective."

Like many defense contractors these days, Raytheon is hiring—2000–3000 engineers this year, about 30 percent of them in electrical engineering. EEs at Raytheon might find themselves working on MUOS (short for Mobile User Objective System), a 20-year,

\$6 billion U.S. Navy project to provide UHF communications linked by satellite. When completed, MUOS will enable real-time communications to and from any place on earth, whether in dense jungle or in adverse weather.

Raytheon is also the systems integrator for electronics on the DD(X), the Navy's next-generation combat ship. The company is building the vessel's dual-frequency radar suite, a solid-state communication system, an anti-submarine- and mine-

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warfare system, a vertical-launch missile system, and the overall computer system. (Be aware, though, that many of the openings at Raytheon and other defense contractors require U.S. citizenship and security clearances.)

Leonard J. Hawkins, vice president of engineering for BAE Systems—Integrated Systems (Reston, Va.), looks for computer modeling, simulation, and visualization experience, as well as expertise in computer systems architecture. BAE has several large contracts to do imagery and geospatial work for the U.S. National Imagery and Mapping Agency (Bethesda, Md.).

Another beneficiary of Pentagon largesse is Lockheed Mar-

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