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Editorial Director
Gary Breed
gary@highfrequencyelectronics.com
Tel: 608-437-9800
Fax: 608-437-9801

Publisher
Scott Spencer
scott@highfrequencyelectronics.com
Tel: 603-472-8261
Fax: 603-471-0716

Associate Publisher
Tim Burkhard
tim@highfrequencyelectronics.com
Tel: 707-544-9977
Fax: 707-544-9375

Associate Editor
Katie Landmark
katie@highfrequencyelectronics.com
Tel: 608-437-9800
Fax: 608-437-9801

Business Office
High Frequency Electronics
PO Box 10621
Bedford, NH 03110

Editorial and Production Office
High Frequency Electronics
104 S. Grove Street
Mount Horeb, WI 53572

Also Published Online at
www.highfrequencyelectronics.com

Subscription Services
Sue Ackerman
Tel: 651-292-0629
Fax: 651-292-1517
circulation@highfrequencyelectronics.com

Send subscription inquiries and address changes to the above contact person. You may send them by mail to the Business Office address above.

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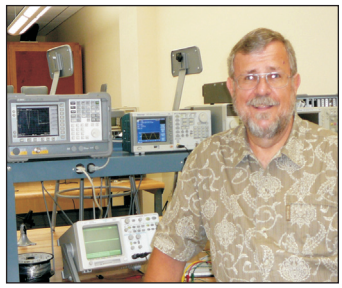
Re-Thinking How Products are Designed and Built

Gary Breed
Editorial Director



In this column, and on our Design Notes page, I've written about energy-efficient products a few times. It's one of my non-RF areas of interest, but it includes electronic technology. As "wireless everywhere" continues to grow, almost any electronic or electromechanical technology, including those used for energy efficiency, fit into the niche covered in these pages.

For example, in my home, I have been gradually replacing incandscent bulbs with LED lighting. It's still relatively expensive, but the performance level—mainly brightness and a pleasing color of the light—have rapidly improved over the past couple years. As I've kept abreast of LED advances, one of the comments I recently read stuck with me: LEDs won't reach their optimum price/performance level until houses and offices have electrical systems designed to support them, including several entirely new concepts for the construction trade:

- Complete LED lighting fixtures, not just replacements for screw-in incandescent bulbs or tubular fluorescent lights.
- Voltage and current ratings of lighting system wiring optimized for these low-voltage devices.
- On/off and dimming controls located in each fixture, controlled wirelessly with ZigBee™ or one of the other IEEE 802.15 technologies.

The last item on the above list makes LED fixtures part of an integrated household control system, expanding the traditional HVAC (heating, ventilation and air conditioning) to include lighting—along with power management and security, all communicating wirelessly on a network that can be accessed remotely for the residents' convenience, utilities' efficiency optimization, public safety communications and other functions that may not yet be conceived or developed.

You can see how one item, the LED lighting fixture, is capable of being linked to many other pieces of a larger system. Of course, an individual homeowner may opt for a less complex system, or may prefer to allow less control by outside entities. A stand-alone system can use an in-home con-

troller connected to a few key devices and appliances and still make a big difference in energy efficiency, comfort and convenience.

Any integrated approach must work from the ground up. When my own home was built six years ago, only a few of the construction tradesmen understood the core concepts of an energy efficient home—orientation on the site, control of air leakage, proper insulation, humidity control, air circulation, etc. Fortunately, most of the workers' bosses understood that these things would eventually become standard building practices, even if they were considered "advanced" at the time.

Expanding on the Lesson

Re-thinking building construction is one of the most visible examples of an evolving trend. The "plug-and-play" concept used in PC perpherals and accessories is another, where the device drivers are included on-board, not installed separately. I'd include many of the automotive industry's features as well, like tire pressure monitoring, GM's OnStar, or using GPS not just for navigation, but for monitoring speed, distance traveled, terrain type, elevation, etc.

In the electronics world, we are now getting Internet-ready TV sets and smartphones with far more capabilities than we imagined. Wireless audio and video distribution is becoming more easily available, and will eventually be integrated with other entertainment and communications when they all are able to support the necessary bandwidth.

The essence of this recent trend is the ability for us to employ devices, appliances—and even individual light fixtures—as part of a larger, integrated system with many new capabilities. Some of those new capabilities are powerful, such as energy management. Some are oriented to personal convenience like navigation systems, while others are entirely for our enjoyment and entertainment, such as multi-player gaming and flexible distribution of audio/video programming.

As designers, all of you need to remember that there is no such thing as "the way it's always been done." The way things have been done *recently* may seem established, but when you look at history, the status quo is a moving target. Your job is to take the best from the past and improve on it to create "the way it's going to be done *tomorrow*."