

K.J. Ray Liu, *Editor-in-Chief*

## Signal Processing Inside?

If I asked someone in the signal processing profession whether signal processing was pervasive and ubiquitous, the answer would be a strong Yes!—even if that person were an electrical engineer or a computer scientist. Signal processing can be found everywhere: in radar systems, submarines, and GPS as well as CAT/MRI scanners, HDTV, and cellular phones.

If I asked the average citizen what signal processing is, chances are they would have no idea. The public has some idea of what computers, networking, and information technology are, but not signal processing! What is the problem?

Signal processing is used to deal with devices and components of systems, with the main mission of increasing the system's efficiency and cost-effective implementation. Inventing algorithms that accomplish these tasks is a big part of our work.

In the early days of slow, limited-memory hardware, signal processing engineers developed many fast algorithms. When VLSI implementation became possible, real-time implementation of signal processing architecture on silicon revolutionized many technology sectors, including wireless communications and multimedia. Signal processing has played, and continues to play, a major role in many information technology revolutions.

Yet, no one can see the signal processing that makes a cellular phone work, delivers beautiful HDTV video, or tracks the target

for a missile to hit; instead they see the phone, TV, and that the missile works. In a nutshell, no one knows there is *signal processing inside!*

Faced with a similar problem of invisibility, the computer chip manufacturing giant Intel created an advertising campaign called “Intel Inside.” The chemical manufacturer BASF runs a similar advertising program for the same reason. Their latest slogan? “Invisible Contribution. Visible Success.”

We face a similar problem. We are “Signal Processing Inside.” Our exposure as a key technology is limited, preventing our community from receiving the visibility and recognition it deserves. Its importance as a technical field is often overlooked, slowing down our momentum and hindering further development.

Our U.S. colleagues may remember a National Science Foundation program called “Signal Processing Systems.” It was swallowed, for lack of a better word, by computer science and is now part of the Formal and Mathematical Foundation program. Congratulations signal processors! We can call ourselves applied mathematicians now! Even though we may qualify for this honor, I believe we deserve more and are better off being called engineers.

What can we do? Well, if you ask ten people, you will get ten answers. Most of them focus on campaigns like Intel's and BASF's: increasing public relations, advertising, and lobbying. But do we have the resources? Computers are well known by the public not because of

the IEEE Computer Society and ACM, but because of IBM, Dell, and Microsoft spending lots of money to make sure people know about them. Similarly, communications and networking have promoters like AT&T, Lucent, and Cisco. But who do we have as champions? Perhaps we have to help ourselves!

On second thought, “Signal Processing Inside” might not be so bad. Our humble evolving path has led us in many new and exciting directions such as networking, bioinformatics, security, and spoken language. None of these really fits the traditional definition of signal processing. To be more precise, we are encountering *information* processing in addition to our traditional role of processing raw signals. Can we take this as an opportunity to transform ourselves and reinvent our own identity? Perhaps. Crises also provide us with new challenges that can be steered and turned into opportunities.

When you have a moment, think about our identity and future in signal processing. Then you will find that you have signal processing inside!



A handwritten signature of K.J. Ray Liu in black ink. The signature is stylized and cursive, appearing to read 'Ray Liu'.

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