

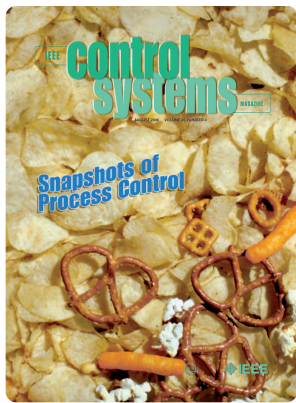
Hidden Things

In systems and control, we often bemoan the fact that much of our technology is hidden from public view. Our end products—system design and embedded control code—are mostly intangible. Indeed, some areas of engineering seem to benefit from the clearly visible aspects of their achievements. Massive bridges and tall buildings benefit from the aesthetics of creative architecture, while high-performance sports cars are the fruit of artists as much as engineers.

But the truth of the matter is that most of what all engineers do is hidden. What I mean is this: If you look carefully at a manufactured device—from the toaster in your kitchen to a typical bridge you drive over—you can see numerous components, and every one of those components was consciously chosen. A component might have been available off the shelf, or it might have been a custom part. In either case, the designer of the device followed some procedure or process to choose or design that component. A support bracket may be the product of analysis that trades off weight, strength, volume, cost, durability, and other aspects, and this analysis can range from back-of-the-envelope calculations to extensive computer modeling. Likewise, a power supply must satisfy a host of specifications ranging from heat dissipation to ripple. Is the supporting analysis hidden to the casual observer? You bet.

If the design of a bracket or power supply, the bread and butter of MEs and EEs, is difficult to picture, how involved is the production of something even less obvious, such as, say, the laminate coating on my desk top? The screen of a plasma television? Medicines?

Systems and control technology is part of the hidden nature of what engineers produce. That observation was the subject of a conversation involving Wayne Bequette, Karlene Hoo, and myself at the 2004 American Control Conference in Boston. If even control engineers do not appreciate the processes that produce everyday items, how can we expect the public to appreciate what we do? This special issue was conceived to address this question.



Although all engineers engage in processes that produce items of value, this issue of *IEEE Control Systems Magazine* is about processes that transform materials. We take for granted the fact that trees are transformed into paper, but that does not mean we know how it is done. We also know that potato chips come from potatoes, but it's not easy to imagine how the entire process is carried out. Sure, the potatoes are probably sliced and then cooked in a liquid, but that simplistic view omits a lot of essential detail. The goal of this issue is to expose those innumerable steps, developed and honed by engineers to produce value and wealth, so that our community can better understand the process control in material processes.

In this issue, we publish five feature articles on process control connected by the fact that all of the articles involve biological material. A later issue will complement this issue with additional articles on both biological and nonbiological materials.

Besides the usual lineup of your favorite columns (book reviews, interviews, conference reports, and much more), this issue also includes some items of special interest. We have an "Applications of Control" column on welding, a process of immense technological importance, as well as a fascinating personal account of student life in Moscow.

Finally, a few words about future plans. We have several special issues in the works, and these projects are exciting to see develop from conception to publication. If you have any interest in developing a special issue, please do not hesitate to contact me. There are important emerging areas in systems and control, and all that is needed is an organizer willing to create a vision for a special issue that can inform the community about trends and progress.

We also plan pretty far ahead for special events. For 2010, we are planning at least two special issues on Kalman filtering, including tutorials, history, and applications. If you are interested in any aspect of this topic, please contact me. As usual, your contributions—short or long—are welcome on any aspect of control technology. We publish full-color articles with never a page charge. See you in October.

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