Invention and Innovation in Control, Across the Globe

My column once again comes due while I'm out of the office, and once again I'm penning it in flight… The 47th IEEE Conference on Decision and Control (CDC), the flagship event of our Society, just concluded in Cancún, Mexico. Looking ahead, the 48th version in the series will be held December 16–18 2009 in Shanghai as the first CDC in China!

A thought recurs every CDC: There are two models for research and development in engineering that often seem mutually incompatible, and it's hard but important to get them aligned. The CDC epitomizes one of these models. The typical CDC author and presenter is a prospector for theoretical gold, a seeker of theorems and lemmas to add to our collective knowledge bank. Control is, in my view, among the most theoretical and mathematical of engineering disciplines, and CDC is the preeminent conference in all aspects of control theory. A specific practical application may not be the target for this type of research, but fundamental theoretical innovations can have broad impact on science and society.

"Innovation," however, is almost code speak today for the alternative to the theory-driven model of R&D. A search for industry/professional business books on amazon.com with this word in the title (okay, so I just started this column in the air!) generated over 700 hits. Many of these books propose answers to the following question: How should companies manage their R&D activities to maximize business benefit? Prescriptions offered differ significantly, but they tend to have a common theme. You shouldn't start with gaps in theoretical underpinnings but rather by gaining greater insight into application needs—through, for example, market analyses, "voice of customer" interviews, and "six sigma" exercises.

Continuing CSS's global outreach, the Society's Board of Governors approved our first conference in India. The 2013 Multi-Conference on Systems and Control (MSC) will be held in Hyderabad under the chairmanship of M. Vidyasagar (on right, with CSS President Tariq Samad). The occasion for this photograph is the awards reception at CDC 2008 … see the text of the column for the explanation.

Methodologies of innovation are not within the CSS scope, but successful applications of control that result from such methodologies certainly are. The major focus of the other conference that the Society is the sole sponsor of, namely, the Multi-Conference on Systems and Control (MSC), is in fact on advanced applications. Incidentally, the 2009 MSC will also be a geographical first for CSS—the venue is St. Petersburg, Russia and the dates are July 8–10, during the White Nights.

I have been on both sides of the invention-versus-innovation debate and, cop-out resolution though this may be, I am now quite convinced that we need both models. Without the lone scientist, working away in the lab in isolation from market forces, the revolutionary discovery that can spark a new industry or new field of research won't happen. At the same time, the world will always need a better mousetrap (or mouse, in this day of genetic engineering and digital input devices?). What is important, though, is to know your risk/reward profile and your intellectual and economic objectives. It's on this basis that decisions on low- versus high-risk and long- versus short-term R&D can

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be made. And it's such a considered, rational balance between pure and applied research that all too often is lost in the rhetoric.

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In addition to the conference proceedings proper, several CSS meetings are also held at CDC. Notably, the Society's Board of Governors (BoG) usually meets the day before the official start of the conference. It's at the BoG meeting that we approve appointments for various CSS positions, new conference venues and chairs, and initiatives related to CSS operations in general. The year 2008 has been one of change for CSS, and a busy year for BoG, in one significant respect: transitions in our editorial operations are underway *en masse*! Here is what's new:

- *IEEE Transactions on Automatic Control*: Panos Antsaklis (University of Notre Dame) has been appointed editor elect. Roberto Tempo will retire as editor, technical notes and correspondence in early 2009, and Panos will assume editor-in-chief responsibilities from Christos Cassandras later this year.
- *IEEE Transactions on Control Systems Technology*: Frank Doyle is retiring from this position and will be replaced by Thomas Parisini (University of Trieste, Italy). Thomas is currently the chair of the CSS Conference Editorial Board. This transition is expected to happen during the summer of this year.
- *Conference Editorial Board*: Alessandro Astolfi (Imperial College London) will replace Thomas as the Conference Editorial Board chair, also during summer 2009.
- *Electronic Publications and e-letter*: Magnus Egerstedt (Georgia Institute of Technology) is the new editor for electronic publications and e-letter, taking over the role from Pradeep Misra.

I know I speak for the CSS Executive Committee in expressing my delight at these new appointments. We're fortunate to be replacing one outstanding set of volunteers with another! Indeed, the caliber of volunteers we continue to attract for our publications, conferences, technical and membership committees, and other operations is truly one of the distinctive strengths of CSS and perhaps the single biggest reason we're as successful an organization as we are.

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The IEEE CDC also hosts the annual CSS Awards Ceremony where we recognize achievements in control science and engineering and in CSS operations. We do our best to publicize the award process and the associated solicitation for nominations, but there's always a nagging concern that deserving contributions may go unheralded because nominators and nominations are lacking … and hence this reminder.

The Society sponsors five permanent annual awards that I want to bring to your attention in particular:

- IEEE Control Systems Magazine Outstanding Paper Award
- IEEE Transactions on Control Systems Technology Outstanding Paper Award
- George S. Axelby Outstanding Paper Award (the best paper award for the *IEEE Transactions on Automatic Control*)
- Control Systems Technology Award
- Antonio Ruberti Young Researcher Prize.

We encourage nominations for all of these CSS-level awards from our members. Nominations are due by May 15, so when you read this column there should be sufficient time to nominate a publication, technology development, or record of accomplishment that you consider worthy. More information on the awards and the nomination processes can be found on our Web site at http://www.ieeecss.org.

These are not the only awards of interest … In association with MSC 2009 we will again be offering the "Industry Award for Excellence in Translational Control Research" (nominations also solicited and due by June 20, see http://conf.physcon.ru/msc09/indaward.html) and CSS has endowed the uber-prestigious IEEE Control Systems Field Award, the latest recipient of which is standing next to me in the photograph.

Tariq Samad

Fore

Beginning in the 1660s the Royal Society was the venue for several experiments and discussions on falling and projected bodies in air and water, Hooke being a chief figure. In 1661, for example, experiments on recoil were carried out in the courtyard of Gresham College. In January 1669 the Society tried to investigate the proportion between air resistance and speed of a body by means of pendular oscillations. The investigators found that there was no direct proportionality, since resistance decreased more rapidly than speed, though it was not clear what the exact proportion was. In January 1671 Hooke performed the experiment of simultaneously dropping and projecting two balls from a window, convincing most of those present that they touched the ground at the same time.

—*Thinking with Objects: The Transformation of Mechanics in the Seventeenth Century*, by Domenico Bertoloni Meli, Johns Hopkins University Press, 2006, p. 203.