Like Father, Like Son


In past generations it was customary for a family trade or business to be passed down from one generation to the next. Sons apprenticed with fathers, and businesses with names like "Kelly & Sons, Plumbers" were common. Nowadays, both daughters and sons have diverse opportunities, and it's rare to see offspring working in the same profession as their parents. That's why father and son Ted and Dan Davison, both faculty members specializing in control, are so unusual. Ted Davison is professor of electrical engineering at the University of Toronto, and Dan is assistant professor of electrical engineering at the University of Waterloo. *CSM* spoke with Ted and Dan to find out how their common interests developed.

CSM: *Ted, were you surprised that Dan followed in your footsteps as a faculty member in the control systems area?*

Ted: I don't think I was surprised, but I was certainly pleased. As far as I'm aware, my wife and I tried not to influence our children one way or the other in terms of specific areas of study. Instead, we encouraged them to appreciate and enjoy whatever they found to be of interest. Since I personally have found the control area to be a highly exciting and satisfying domain of study, I was not really surprised by Dan's decision.

CSM: *Dan, when did you first develop an interest in your father's area of research?*

Dan: I've always liked building things, playing with Lego and Mechano for countless hours when I was younger. Most of the contraptions I made had moving parts and, looking back, elements of control. I remember using a Mechano crane to build a Lego building—a nonlinear constrained control problem! Therefore, it was natural for me to pursue engineering studies as an undergraduate student. However, I was by no means immediately drawn to the control field. The greatest appeal of control to me, as a fourth-year undergraduate student pondering graduate school, was that I wouldn't be boxed into one particular branch of engineering such as electrical, aerospace, chemical, or whatever. I still like that feature of the control systems field!

CSM: *From your different perspectives, where do think the control field is headed?*

Dan: From my perspective, the "heyday" of control was during the space race, especially in the 1960s. I'm amazed how often I come up with an idea that I'm sure is new and interesting, only to discover later on that this very topic was addressed a decade before I was born! No doubt, huge progress was made in those early decades. Yet, I see many control problems for which existing theory is not applicable, so I would say that there is still much to be done. In the future, I see control engineering going back to its roots, increasingly driven by applications instead of theory for theory's sake.

Ted: Most interesting, since the time I was Dan's age, I also felt that most of the exciting research was done! In the 1960s and early 1970s, we had the Maximum Principle, Bellman's Dynamic Programming, the Kalman Filter, Lyapunov stability...all of which had already appeared. In my view, it seemed at this point that nothing new of great interest could possibly arise! Some 40 years later, I now feel that the field is just at its infancy and we're just beginning! I agree with Dan that the new areas of control will be application focused; there are numerous new application areas that will rely critically on new developments in the control systems area, and this in turn will motivate the development of new theory. To give an example, one of the few long-term solutions for the world energy problem is energy production using fusion. It turns out that the single most outstanding problem to solve in making fusion practical is a control problem, namely, stabilization of the plasma instabilities.

In this issue of *IEEE Control Systems Magazine* we inaugurate a new column, highlighting the people whose careers are devoted to control systems technology. Our community is comprised of engineers, instructors, researchers, and students who continually advance our field by applying and developing new ideas and techniques. This column recognizes these people not just as contributors to control systems technology but as individuals who bring unique perspectives to the field. We hope that you will look forward to this column every month. If you happen to know of interesting control folks, send me an e-mail (dsbaero@umich.edu)—*The Editor*

CSM: *Have the two of you undertaken any joint research?*

Dan and Ted: As a matter of fact, yes. Over the last year we've been looking at a controller design problem where the focus is on shaping the transient response. The objective is to reduce those ugly "overshoots" and "wiggles" that often arise using traditional optimal control methods. We have joint journal and conference papers that discuss the problem.

CSM: *Thanks for taking the time to talk with us, and best of luck in your research!*

Cousins in Control

When Vít Babuška registered for SYSID03 in Rotterdam, The Netherlands, in August, he was told that "We just registered someone with that family name." Soon, Vít was to meet Robert Babuška, another conference attendee. A long lost cousin? Perhaps.

Vít Babuška is a research engineer with General Dynamics Advanced Information Systems working at the Air Force Research Lab in Albuquerque, New Mexico, U.S.A. Vít received his Ph.D. in aerospace engineering at The University of Texas at Austin in 1993 and subsequently worked on numerous control-related problems in space systems. Currently, he is working on the control of flexible structures for space applications. His recent work on structural identification led him to the SYSID03 conference on system identification. Vít, it turns out, is the son of Ivo M. Babuška, a renowned expert on finite element methods at The University of Texas at Austin.

Robert Babuška, the "Babuška" who registered before Vít at SYSID03, is a professor at the Delft University of Technology in the Faculty of Mechanical Engineering, where he specializes in fuzzy modeling and control and fault detection. Robert studied control at the Czech Technical University in Prague and received his Ph.D. in 1997 at the Delft University of Technology. For Robert, the trip to Rotterdam was a routine train ride from Delft. He had no inkling of what would happen on the first day of the conference.

Vít and Robert were vaguely aware of each other's existence through spam e-mails they had both received over the years. A quick check of the Babuška family tree showed that they shared the same great-great-great-great grandfather (Josef, 1767–1840, a shopkeeper). Indeed, they are fifth cousins! Vít's family left Prague, Czechoslovakia, when he was just five in 1968, while Robert left the Czech Republic at age 25 in 1992. As soon as Vít and Robert met on the first day of SYSID03, they started chatting away in Czech, oblivious to the technical talk around them. It was an unusual sight, even at an international conference.

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difficult they are likely to go unsolved for the foreseeable future. In these cases, it's useful to remember that we are engineers: Mathematics and optimal or complete solutions are nice, but the best solution is the one that provides a satisfactory, timely, and reliable result at a reasonable cost. Sometimes our community can lose sight of this goal, and when theory substantially overshoots what is necessary for the application at hand, that line of inquiry may be at risk of dying back. Perspective is important, and my perspective is that there are so many opportunities for individuals skilled in systems and control to make contributions in exciting and new fields that there is little risk that our field will stagnate.

CSM: *Do you have any final remarks for our readers?*

Birdwell: I hope that our Society will evolve into both a real, and, through the new digital technologies, a virtual community that allows all of its members to interact and cooperate on significant problems in both applications and theory, providing growth in our field of knowledge and personal growth for our members. Our Society has the opportunity to become a flagship organization for collaboration across organizations and political boundaries, and I suspect that this path is necessary if the CSS and the IEEE are to remain vibrant organizations. However, I don't have all the answers, or even very many of them, and I want to encourage your readers to contact me with your comments and suggestions. I can be reached at d.birdwell@ieee.org.

CSM: *Thank you, Prof. Birdwell, for taking the time for this interview. We look forward to reading your "President's Message" columns next year.*