automotive powertrains (for example, air/fuel ratio control, idle speed control, electronic transmissions, and hybrid and fuel-cell vehicles), as well as vehicle control systems (examples include antilock braking systems, traction control, vehicle stability control, and active suspensions) and intelligent transportation systems (such as active safety, collision avoidance, platoons, and automated steering). Most recently, *Process Control for Sheet Metal Stamping* (Springer, 2014) is a research monograph, coauthored with Yongsoeb Lim and Ravi Venugopal, that presents both theory and experimental results for a MIMO adaptive controller for stamping complex parts from hard-to-form materials without tearing, wrinkling, or spring back.

Q. What are some of your interests and activities outside of your professional career?

Galip*:* My wife and I enjoy traveling and have been to the Galapagos, the Serengeti, Denali, the Great Barrier Reef, Cappadocia, and many other wonderful destinations. I work out regularly, including jogging, yoga, and strength training. I play golf whenever I can and enjoy canoeing, hiking, biking, and fishing. I love reading adventure/spy novels and just finished reading *Inferno* by Dan Brown. I have been interested in poetry since high school and especially in translating poetry from Turkish into English. Here is a favorite verse from a poem by the Turkish poet Nazim Hikmet:

To live single and free, like a tree
But in brotherhood like a forest
This is our longing …

Q. Thank you for your comments.

Galip*:* Thanks for this opportunity. I really enjoy *IEEE Control Systems Magazine*. It has inspired the controls community in ASME to start the new *ASME Dynamic Systems and Control Magazine*, which goes to ASME members and is now in its second year of publication.

IEEE Control Systems Award Acceptance Speech

I am honored and very grateful to be given the IEEE Control Systems Award. I accept it with the understanding that everything I've done, I've done with others. Coauthors for sure, but also many colleagues. If I did anything, I was just the one who articulated the ideas the loudest.

Following what is now a tradition, I'll say a little bit about my trajectory.

I grew up in a mathematics-free household; my parents were both English professors. By the time I was two, they had already realized that there was something very wrong with me, that I didn't think like them at all. They were very concerned. Until I was 16, they held out hope that I'd snap out of it. I didn't, but by that point, according to my mother, they were used to me. She also told me much later that although she'd have preferred that I'd gone into a legitimate field, she was OK with my choice.

I did pure math at Berkeley when I was young and then continued at Harvard with Andy Gleason. At the same time I also did super-practical electrical engineering, rock and roll sound, as a stage hand, and then as a sound engineer (monitor and house mixer) on many tours. I learned a lot, and yes, it was fun. It was not boring. At that time I didn't realize that math and EE were related; I was pretty clueless (that will be a theme here). So I had a very strange background, a lot of math and super practical EE.


Stephen Boyd.

I went to Berkeley for graduate school in math. In my first year I accidently stumbled into some inspiring classes in EE by Chua, Desoer, Sastry (a child professor then), Varaiya, Wong, and others. A light went off in my head: mathematics and EE were actually related! This changed my trajectory: I transferred to EECS in my second year. In the next few years I met a bunch of people in control who had a strong influence on me: (fellow student) John Doyle, Manfred Morari, Petar Kokotovic, Vidyasagar, George Zames, and others. Alberto Sangiovanni, from whom I took a course on optimization, had a really big influence on me; I was incredibly impressed to see how mathematics and algorithms came together to create some really useful stuff. (In this case, create the electronic design automation industry.)

I left Berkeley and started teaching at Stanford in 1985. In the early days at Stanford I was lucky enough to have some wonderful students, like my book coauthors Craig Barratt (*Linear Controller Design*) and Laurent El Ghaoui, Ragu Balakrishnan, and Eric Feron (*Linear Matrix Inequalities*). I remember reading many papers from the Soviet Union (in translation) by Arkadi Nemirovsky, Yuri Nesterov, Boris Polyak, and others, which, to say the least, had a profound effect on me. At that time I thought I'd never meet these

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people in person, but I did, maybe ten years later.

My group wrote software for controller design and made it available (along with papers) via anonymous FTP. (HTTP was still in the future.) I distinctly remember Ragu telling me about this so-called Web thing, and I also distinctly remember being skeptical. Not immediately, we put up a Web site with papers and code.

In my middle years at Stanford I worked closely with Lieven Vandenberghe and Michael Grant and many others. We wrote papers and software for solving LMIs (or SDPs), and Clive Wu wrote SDPSOL, a parser-solver for SDPs, and put all of it online. Lieven and I created our course and book on convex optimization, and we taught it together the first year; he continued teaching the course at UCLA. Michael Grant created CVX, which was only intended to be something for rapid prototyping. I'd like to say that we knew then that it would be very valuable and useful, but that's not the case; we really didn't know.

With students and colleagues, I made a few forays into (academic) foreign territories, like circuit design. This really made my circuit designer colleagues nervous because people like me are not supposed to know about circuit design. It's fascinating to me that you hear about the same challenges over and over again: nonlinearities, parameter variation, unmodeled effects, and the critical need for robust design. (Often, but not always, these are expressed in some local dialect.)

In my last five years at Stanford we've had a culture change that I'm very proud of (although it's not clear what role I had in bringing it about). We now have a set of classes, including machine learning, statistics, scientific computing, convex optimization, linear systems, and others, taken by a very large core set of graduate students from many departments and programs. The convex optimization class is now over 250 graduate students, from 25 or so departments. And it's not the largest class: The introductory machine learning class is three times bigger.

Teaching is storytelling, and the story behind the research is important.

It wasn't this way 15 years ago. If you were in circuit design (say), you'd take Circuits I, II, and III. In Statistics, you'd take the Ph.D. core sequence. In Control, you'd take a set of three or four core graduate courses in control and estimation. Now all these students, and many others, take a wide variety of classes. And we don't even have to tell them to any more—the culture has changed, and it's self-perpetuating. It's a much richer, and more exciting, world when the students see mathematics used not just in their own specialty, whatever that is, but also in many others.

I've now been at Stanford 28 years, which strongly suggests lack of imagination on my part. When I first went to Stanford I assumed I'd come back to Berkeley. But I quickly became very attached to Stanford, for many reasons, including my colleagues and friends Gene Franklin, Tom Kailath, Tom Cover, and others in statistics and computer science.

It turns out it's a great environment to be embedded in Silicon Valley, and that's especially the case if your interests tend toward theoretical. The essential idea is that a few kids (that is, 20–30-year-olds) can change the world, or at least an industry. Or indeed, create a new industry. Of course that culture exists in other places too. And in fact it's moving out of Silicon Valley since the recent trend among the young digitally hip is to live in cool places like New York or San Francisco, instead of boring places like Palo Alto or Mountain View.

You feel Silicon Valley all around you at Stanford. You walk into a big class, and sure, 25 of the students want to hear the detailed subtleties of the mathematics; but 250 others really want to know what you can do with what you're teaching them.

For me teaching *is* research. Teaching is storytelling, and the *story* behind the research is important. The story should be simple and compelling, with substance, and maybe a few subplots. And it should bring people in, not keep people away, for example, by using some esoteric field-specific dialect or acronyms, or assuming that the reader has fully absorbed all details of the last few papers.

Research with a good story spreads. But it works the other way too: Once you get to the point where the idea and story are simple, the next research step pretty much jumps out at you. So good teaching leads directly to good research.

If you follow this theme of outreach beyond the classroom, you come to the idea of making research and teaching materials available to the world. I'm very proud that my group has always done this. I'd like to say that this was completely thought out, but that's a lie. Anyway, in retrospect, it was a really good idea, and I'm very glad we did it. It's fairly obvious that the Web is now a medium for scholarly communication. (Your dean, however, may not know this.)

I've been in control now for about 30 years. Yes, my attendance at control conferences hasn't been perfect lately. But it is my intellectual home, it's where I grew up, and where I've made a huge number of very good life-long friends. And I'm extremely proud to be a part of it.

My final and most important thanks go to my wife Anna, who is here today, and has been by my side (figuratively, not literally) for more than 25 years now. We have had wonderful adventures together, most importantly, raising our two great kids.

Thank you again.

Stephen P. Boyd