

Editorial

Continuing the Tradition of Excellence in 2010 and Beyond

THE IEEE TRANSACTIONS ON AUTOMATIC CONTROL has been publishing important research results in the field of Systems and Control for over 50 years and it is an internationally recognized flagship publication in the field.

As your new Editor-in-Chief I am looking forward to leading the TRANSACTIONS in 2010 and beyond, through its next editorial cycle, maintaining its tradition of excellence and at the same time introducing modest changes, I hope for the better.

It is a great privilege and a unique honor to be offered the position of the Editor-in-Chief of the IEEE TRANSACTIONS ON AUTOMATIC CONTROL, for which I am grateful. It is also a heavy responsibility, but I hope with your help I will be able to meet successfully the new challenges. I am fortunate because I am following in the footsteps of leaders in the field who, thankfully, decided to take on additional responsibilities, leading this journal over the past half century, and helping it navigate successfully through the challenges of many changes in our technological civilization. I am delighted to report that our journal, TAC, is in great shape, thanks to the efforts of all past and present editors, reviewers, and the leadership of all my predecessors.

In particular, I would like to thank my immediate predecessor, Christos G. Cassandras, whose inspiring thoroughness, promptness, organizational skills, and thoughtfulness have put an imprint on the journal and have set a very challenging example to follow. This past year and a half I have been working closely with Christos to bring in and implement important editorial changes you may have noticed. In April, the position of Editor of Technical Notes and Correspondence ceased to exist together with the positions of the Associate Editors at Large that were established in the 1980s. Instead, since April 2009, we have in place Senior Editors; there are six at the moment and the new system appears to be working very well. Since January 2009, I have held the title of Editor-Elect and have been in charge of the Technical Notes. The previous Editor of Technical Notes, Roberto Tempo made my job so much easier, and I would like to thank him sincerely for it. Roberto, who is very well organized, thorough and prompt, has been extremely helpful in all aspects of the operations over many months and his help has been very much appreciated. Since January 2008, TAC has been using a fully web-based system (TACO) for submitting and reviewing papers, similar to the paperplaza conference system. This relatively new software, the separate older and newer databases, and the new editorial structures implied substantial changes in the day-to-day running of the

Transactions that necessitated the introduction of operational changes this past year.

I have been trying to decide why TAC has been so successful over so many years. There are some very good journals out there, which are happy to publish research results in Systems and Control theory. What is it that makes TAC different?

A major reason, I think, is the quality and commitment of our editors together with the fact that the reviewers and editors are willing to work closely with the authors over several reviewing cycles to improve not only the exposition of results, but the research results themselves. Every paper that has been published in TAC has gone through rigorous and vigorous reviewing. The authors have benefited from the comments of the reviewers and associate editors and have improved their papers. It is rare indeed for a paper to be accepted without any revisions. It is more common for a paper to be revised two, three or more times before it is published, making sure that the concerns raised by the reviewers and associate editor are adequately addressed. The fact that the authors are working together with the reviewers and the editors has certainly raised the standards and has been immensely important to the field. Yes, there are some abuses of the system where authors do not spend adequate time improving their manuscript and deliberately use the review process to improve their paper, but these cases are rather rare and overall the benefits much outweigh the drawbacks.

On the other hand, it is sometimes felt that the papers presented in the TRANSACTIONS do not have broad enough appeal, that they are mainly written for internal consumption, or that they serve mostly the authors in their professional endeavors. There have been many, many discussions in the past about the types of papers the IEEE TRANSACTIONS ON AUTOMATIC CONTROL should publish and whether the papers should have stronger connections to applications. Regarding applications, there are certainly other journals that emphasize applications, one actually published by our own IEEE Control Systems Society, the IEEE TRANSACTIONS ON CONTROL SYSTEMS TECHNOLOGY. However, although TAC may not be the main forum for application papers, it is of great importance when we craft our research results to be aware both of their role in applications, if any, and the possible connections that may exist with other fields. This awareness can only enhance the impact of our research advances in the Systems and Control area and other fields, which is very desirable; many other disciplines have emphasized this point, and it has served them very well. There are many needs in diverse fields ranging from biology to social sciences that would benefit significantly by research that helps understand systems and control issues in the context of these disciplines, leading perhaps to novel fundamental results in our own discipline as well. I believe there are many research

opportunities out there in many fields, where success would not only make a difference in those fields, but would also establish new research directions and rejuvenate our field. There are, of course, current ongoing research efforts building bridges with other fields, but there are not nearly enough of them ready for publication in TAC, and so most of the published papers in TAC are high-quality studies along well-established, well-researched directions. We need to build our research endeavors so they have a greater impact on society. We need to adapt to changing needs. I am stating this being fully aware that TAC papers influence the field; changes in TAC invariably will affect the whole field of Systems and Control.

My own research experience started in linear feedback systems using polynomial matrix descriptions and moved to intelligent control theory, to discrete event systems using Petri nets, to hybrid systems and to networked, and cyber-physical systems. From my own experience I can tell you that control is everywhere and we are called to address problems from physics, chemistry and biology to economics and psychology. As the models become more complex and go beyond linear or nonlinear ordinary differential equations, problems with new mathematical challenges arise that are very interesting, indeed. Feedback transcends models, and we need to broaden our horizons. These are the problems we should be looking into and not spending all of our considerable abilities digging ever deeper into well-understood topics. In the past such shifts in research directions have been caused primarily by funding shifts—particularly in the USA, but increasingly so in Europe and Asia. However, there have also been influential papers that captured the imagination of researchers and gained a following and generated new research directions; this may be because people became both excited by the problem and also felt that there were still open questions that they themselves could address—recent examples that come to mind include consensus, quantization and bit rate for stability studies in networked control systems. I firmly believe that a source of exciting new problems can be found between disciplines and that this is something we should keep in mind and actively pursue in our research.

At the IEEE TRANSACTIONS ON AUTOMATIC CONTROL we will certainly continue to publish rigorous mathematical papers. But I should emphasize that correctness and mathematical rigor are necessary but not sufficient for publication. Novelty, theoretical significance and potential impact are also necessary and I encourage all of you, when submitting a paper to TAC, to try to explain the significance of your proposed results in concise terms, putting them in an appropriate context. Judging such novelty, theoretical significance, and potential impact is not always easy. It requires significant broad knowledge of the field, and it

may use some subjective criteria as well. In a way it is easier to judge technical correctness, which although it requires deep knowledge in a particular topic, is generally based on clearer criteria.

At the IEEE TRANSACTIONS ON AUTOMATIC CONTROL the submission numbers have increased significantly in recent years. We need to become more selective and not spend as much time on providing several resubmission opportunities and offering extensive feedback to authors of papers that clearly do not meet our technical correctness, novelty, theoretical importance, and potential impact criteria. We do plan to be selective at an early stage of the reviewing process, by emphasizing more the requirements for novelty, theoretical significance, and impact. As a matter of fact we do this already to a certain extent for both Full Papers and Technical Notes, but we plan to introduce some further changes. For every Technical Note submitted we will make a first-stage quick decision whether to proceed with a full review or not. This decision cannot be appealed. We will implement this by engaging the editorial board that includes Senior and Associate Editors and the Editor-in-Chief.

It is, then, very important for the authors to provide sufficient justification early on in their papers, perhaps in the abstract and introduction, why a particular problem is studied, to explain the importance of the treated topic, and clearly to put it into context, so the reader can understand and appreciate its novelty, significance, and potential impact.

Throughout my professional career I have been a firm believer first in the Quest for Autonomy as a powerful driving force in engineered systems over the centuries, and in Feedback as the best mechanism to achieve autonomy, witnessed by feedback's ubiquitous presence in all natural and human made systems. I have been including these themes in my talks for many years. In our chosen field of Systems and Control we should go beyond emphasizing exclusively only certain types of models and mathematical techniques. We need to see the bigger picture, to realize that there are many ways to describe the phenomena we want to control, involving for example logic in addition to differential equations, as in hybrid systems, and expanding our horizons and our field. And this will happen if in our theoretical research we are also motivated by application needs and not only by mathematical challenges. We have very much to offer, and we should work towards realizing this potential.

I understand that changes do not happen overnight and I am looking forward to working with you all, the authors, the reviewers, and the editors. Thank you for giving me this opportunity.

PANOS ANTSAKLIS, *Editor-in-Chief*
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Panos Antsaklis (S'74–M'76–SM'86–F'91) received the Diploma of Mechanical and Electrical Engineering from the National Technical University of Athens, Athens, Greece, and the M.S. and Ph.D. degrees from Brown University, Providence, RI.

He is the H. Clifford and Evelyn A. Brosey Professor of Electrical Engineering, Concurrent Professor of Computer Science and Engineering at the University of Notre Dame, Notre Dame, IN, where he also served as the Director of the Center for Applied Mathematics for six years. He has co-authored two research monographs on discrete event systems, two graduate textbooks on Linear Systems, and has co-edited six books on Intelligent Autonomous Control, Hybrid Systems, and Networked Embedded Control Systems. His research addresses problems of control and automation and examines ways to design control systems that will exhibit high degree of autonomy. His recent research focuses on networked embedded systems and addresses problems in the interdisciplinary research area of control, computing and communication networks, and on hybrid and discrete event dynamical systems.

Dr. Antsaklis received the IEEE Third Millennium Medal, the Brown Engineering Alumni Medal of Brown University, in 2006, and is the recipient of several teaching awards at the University of Notre Dame. He has been plenary and keynote speaker in a number of conferences and research workshops. He has served as Associate Editor and Associate Editor At Large of the IEEE TRANSACTIONS ON AUTOMATIC CONTROL and has held editorial positions in several other journals. He has been Guest Editor of several special issues in journals, including special issues on Hybrid and Networked Control Systems in the IEEE TRANSACTIONS ON AUTOMATIC CONTROL and the IEEE PROCEEDINGS. He is an IEEE Distinguished Member of the Control Systems Society. He was the 1997 President of the IEEE Control Systems Society, and he served as General Chair and Program Chair of the CDC and as Program Chair of the European Control Conference. He currently serves as the President of the Mediterranean Control Association. He is the Chair of the Scientific Advisory Board of the Max-Planck-Institut für Dynamik Komplexer Technischer Systeme, Magdeburg, Germany, and from 2006 to 2007 he was member of the subcommittee on Networking and Information Technology of the U.S. President's Council of Advisors for Science and Technology (PCAST).