

End-of-Year Summary

At the IEEE Control Systems Society (CSS) Board of Governors (BoG) meeting in June 2018, the members decided to remove the word “magazine” from the publication title *IEEE Control Systems Magazine* (CSM) and consistently adopt the name *IEEE Control Systems* across all CSS activities. The name change was actually implemented by the IEEE in 1991, and many (but not all) official IEEE documents refer to the magazine as *IEEE Control Systems*. As such, this BoG decision to drop the word magazine from all official documents, websites, and pagination corrects this inconsistency rather than continuing to ignore it. Dropping the word “magazine” from the title also better reflects the fact that the scholarly articles included are peer reviewed, just as they are in other CSS journals. The final details for implementing this change are currently being discussed with the IEEE Technical Activities Board.

CSM continues to do well. At the time of this writing in early August, there were approximately 31 feature article, “Applications of Control,” “Focus on Education,” and “Historical Perspectives” submissions in 2018. That total is similar to last year. However, since ten of those submissions were for the tribute to Bruce Francis, there has actually been a significant drop in articles submitted from past years. Note that the recently announced impact factor of 5.06 is similar to the 2017 result (5.196).



FIGURE 1 The *IEEE Control Systems Magazine* Editorial Board meeting at the 2018 American Control Conference (from left): Warren Dixon, Behcet Acikmese, Jonathan How, Antonella Ferrara, Yildiray Yildiz, Scott Bortoff, and J. Sean Humbert. Marco Pavone attended the meeting by phone.

To provide a window into the ongoing events in the CSS community, I have tried to maintain an average of two technical committee reports, two to three conference reports, one book review, and two to three “People in Control” interviews per issue. Finding authors for those reports/reviews and working with them to edit the documents takes a considerable amount of time and effort. I would like to thank Associate Editors Josh Isom and Scott Ploen and CSS Vice President of Technical Activities (and soon to be president-elect) Anuradha Annaswamy for their continued help in accomplishing those tasks.

CSM has a very strong team of associate editors and editorial staff members, and I greatly appreciate all of their hard work. Rolf Findeisen recently left the team, but Scott Bortoff has joined as a new technical associate editor (see page 15 of this issue for a detailed introduction). The magazine’s Editorial Board meeting was held at the 2018 American Control Conference in Milwaukee, Wisconsin (see Figure 1).

CSM now includes a “Women in Engineering” column, with the inaugural column, “IEEE, Control Systems

Society, and Women in Engineering in Ecuador,” appearing in the August 2018 issue [1]. Members interested in submitting articles for this column should contact organizer Linda Bushnell. A volunteer is still needed to coordinate the writing of a new “Student Chapter” column, so please e-mail me if you know of a good candidate for this position.

This past year saw the publication of a special section in the October 2018 issue, with ten contributions commemorating the life and impact of Bruce Francis. There was also a special issue on artificial pancreas systems in February and one on assistive robotics in this issue. I would like to thank the guest editors (Mathukumalli Vidyasagar, Ali Cinar, and Warren Dixon) for their significant efforts in helping to arrange the contributions for those issues. Special issues (and their accompanying introduction written by the guest editors) provide a unique opportunity to present a wide range of perspectives and results that can be of significant value to the community. Additional special issues are strongly encouraged, and I would particularly welcome participation from researchers in industry. Those interested in organizing a special

issue should e-mail me with their ideas and proposed list of authors.

The magazine's author's guide [2] and LaTeX style files [3] continue to evolve, so please be sure to use the current files. Authors are strongly requested to review these materials to confirm that potential submissions are well suited for the magazine and are appropriately written and formatted. Authors are encouraged to improve the tutorial nature of the article as much as possible. This includes providing a nontechnical sidebar (150–200 words) to serve as an article summary. The intent is that this will be broadly accessible and improve the tutorial value of the article. The summary should focus on the value, utility, or impact of the result(s) and definitely avoid technical jargon. Authors should also try to describe the contribution of the technology as clearly as possible in the initial section—why it's needed, gaps that it fills, where it might be used in industry, older methods it might replace, what sort of mathematical background

is needed, and what computer code/resources are available (or, alternatively, what programming you'd have to do to implement it).

Having recently coauthored several CSM articles, I appreciate that these guidelines can make it difficult to write a good feature. In particular, CSM articles are completely different than nearly all conference papers and tend to differ substantially from papers that might be submitted to CSS journals (for example, *IEEE Transactions on Automatic Control*, *IEEE Transactions on Control of Network Systems*, and *IEEE Transactions on Control Systems Technology*). However, CSM provides an ideal opportunity for researchers who have already written several technical conference and journal articles on a topic to provide a broad (and deep) overview of the overall challenges associated with an area, discuss and assess the available solutions, and then highlight the technical issues that remain. This opportunity is further enhanced by the

fact that all CSM articles are in color, have essentially no page limit (within reason), and reach the entire CSS community in print. I hope that more of you will accept the challenge to write a feature to educate the CSS community about your exciting work and results.

I hope that you are enjoying CSM and find the content to be useful. As always, I look forward to your feedback.

Jonathan P. How

REFERENCES

- [1] M. Falconi, "IEEE, Control Systems Society, and Women in Engineering in Ecuador," *IEEE Control Syst.*, vol. 38, no. 4, pp. 15–16, Aug. 2018.
- [2] J. P. How, J. VanAntwerp, R. Braatz, D. Bernstein, and T. Samad. IEEE Control System Magazine: Author guidelines for manuscript preparation. IEEE Control Systems Society. Accessed on: Aug. 5, 2016. [Online]. Available: http://ieeecss.org/sites/ieeecss.org/files/CSMAG_May2016.pdf
- [3] CSM LaTeX style file and template. IEEE Control Systems Society. Accessed on: Aug. 5, 2016. [Online]. Available: <http://ieeecss.org/sites/ieeecss.org/files/CSMLatex.zip>



Some Initial Impediments to Adoption of Control

Through the development of electronics and more sophisticated mechanical devices, we now have automatic control systems of great complexity, yet the basic principle of feedback control remains the same—whether it be used for the automatic control of an industrial process, a phase of our economy, a nuclear reactor, or the attitude of a space vehicle.

Our interest is in the fact that this principle and its application can be subjected to mathematical analysis. This was first demonstrated by a British physicist, Maxwell, in 1868 and independently by a Russian engineer, Vyshnegradskii, around 1876. They concerned themselves mainly with small errors, that is, small deviations from the performance desired, and they approximated the actual system by a linear one. They observed that an improper use of feedback could enhance the error instead of diminishing it and that the proper use of feedback involves an analysis of stability. Does the error tend to zero or not?

This same procedure of linear approximation and analysis of stability was the mathematical foundation for Minorsky's design of an automatic steering device for the battleship *New Mexico* in the early 1920's. The behavior he predicted on the basis of his simple mathematical model was then confirmed by observed fact. In one of those strange quirks of history, however, the U.S. Navy did not adopt automatic steering at that time for the simple reason that it might deprive helmsman of practice. The logic is similar to that of the British Admiralty when they first rejected the idea of using steam engines on warships on the grounds that sparks from the engines would burn holes in the sails.

—Jack K. Hale and Joseph P. Lasalle, "Differential equations: Linearity vs. nonlinearity," *SIAM Review*, vol. 5, no. 3, p. 266, July 1963. Winner of the 1965 Chauvenet Prize.