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Beginning a Special Year for Our Society

First, I would like to wish you and your loved ones a nice new year filled with health and happiness. The last few years have been challenging for various reasons: the COVID-19 pandemic, climatic events, and the war in Ukraine, to name a few. It seems impossible to be able to stop the megalomania and madness of some human beings. It also seems difficult to reverse climate changes brought on by habits that we would have to radically change and industrial lobbying focused solely on profits at whatever cost. I fear that based on all of the disasters we have been experiencing, no one sound person can challenge the climate changes taking place around the world.

I believe that each of us is convinced of the need for urgency and action so as to slow down this trend. I believe that each of us can contribute by changing behaviors in our everyday lives when using transportation, phones, and computers and also by eliminating fashionable but completely useless gadgets. I also believe that, as scientists, and I have already had the opportunity to talk about this in previous editorials, we must contribute more and design our research to be compatible with the future of our planet, as suggested in [1]. And I am happy that this point of view is shared by more and more scientists, and especially, by the IEEE Signal Processing Society (SPS) and its president [2].

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It is already the beginning of my third year as the *IEEE Signal Processing Magazine* (*SPM*) editor-in-chief (EIC). It is a great honor and always a pleasure to read in advance the articles that will be published in each issue and to prepare an editorial. The editorial is a way to send a message, and very frequently, I share it before publication with some friends in the hopes of gaining their feedback. Many thanks to Athina Petropulu, Tulay Adali, Pierre Comon, Olivier Michel, Jocelyn Chanussot, and Séverine Louvel. As you can imagine, the EIC alone cannot create the magazine; the main task is to encourage scientists to submit high-quality proposals or feature articles, special issues, columns, and forum pages and to select the best proposals for full submission. This task is a daily background task for all of the members of the editorial board (EB), which is possible since the EB, like the magazine, covers all of the SPS domains, including both methods and applications.

The team of area editors, the associate editors, and the senior members (SMs) of the EB are actually the linchpin of the magazine, and this editorial allows me to thank them for their great efforts and contributions. The first circle of the EB is the team of area editors that includes Laure Blanc-Féraud, Emil Björnson, Behnaz Ghoraani, Rodrigo Guido, Vicky Zhao, and Xiaoxiang Zhu, and I know how hard they work every day for *SPM*. The second circle is composed of the SMs; their term is usually three years, but many of them accept extended terms of one or two years. In 2022, 15 SMs completed their terms and moved on to other responsibilities. I thank them and wish them great success in their new activities. I welcome the new recently nominated SMs, and thank them for agreeing to join the EB, and I hope that they will enjoy immensely their new role with *SPM*.

The entire reviewing process, essential for the quality of the articles, is done through ScholarOne. The reviewers clearly constitute the pedestal of the process, but I would like to mention Rebecca Wollman for her essential role in efficiently helping EB members and reviewers navigate ScholarOne. As you see in each new issue, *SPM* is a fully edited magazine, and if you have been an *SPM* author, you know the metamorphosis that beautifies your final Tex or Word files. The editorial work as well as the choice of illustrations for the covers and the openers for the feature and theme articles is overseen by journals production manager Sharon Turk in conjunction with the graphics and editing teams. I thank her for her friendly and helpful assistance to me. Many thanks to the whole team; it is really a pleasure to work with these professionals and a great satisfaction to discover each new *SPM* issue.

2023: A special year for SPS

The year 2023 is a special year for SPS; it is its 75th anniversary! An additional issue will be published in June 2023 to commemorate this milestone. This special issue will be comprised of a series

of articles that discuss the rapid evolution of our scientific domain and of SPS. But throughout the year, in addition to this special issue, the SPS anniversary could be the opportunity to pay homage to the pioneers in our domain, like Fourier, Widrow, Shannon, Tuckey, and Cooley, to name only a few. If you want to contribute to such articles for *SPM* 2023 issues, don't hesitate to contact me.

In this issue

This 2023 January issue contains 10 articles that constitute the first part of an *SPM* special issue on physics-driven machine learning for computational imaging. In addition to the overview that you will find in the "Guest Editorial," [A1] I would like to make a few comments. Computational imaging and machine learning are domains that have experienced rapid development over the last 30 years, mainly due to critical advances, both in sensing technology and in computer development. While the first ICASSP conference was held in 1976, with a focus on speech processing and a few sessions on general signal processing, image processing was a nonexistent topic. At ICASSP 1978, only four articles among 209 focused on image or video processing, and at ICASSP 1980, among 32 sessions, only one was about image processing. The first ICIP conference, IEEE's flagship conference dedicated to image processing, was held in 1994, fewer than 30 years ago! Computational imaging is an even younger topic, with the first issue of *IEEE Transactions on Computational Imaging* issued in 2015.

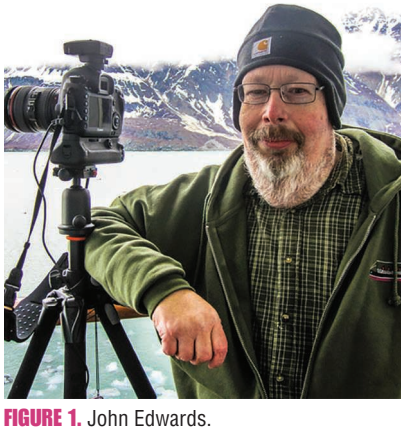

FIGURE 1. John Edwards.

FIGURE 2. Poster from the 1969 IEEE Convention and Exhibition.

Machine learning, and especially deep learning, are now highly fashionable tools, and too many people give in to the temptation to use freely and user-friendly toolboxes to blindly process data. Historically, signal and image processing is basically close to the physical layer and the sensors recording the data, with the experts widely identifying themselves as electrical/electronic engineers. Following this spirit, the articles of this special issue promote prior physical knowledge for making machine learning more intelligent; more efficient and robust; and also more frugal. As a matter of fact, incorporating physical knowledge and models in the deep learning architecture can only ease the learning part. The more we know—and we should not forget about what we know about our systems and processes—the less there is to learn.

In addition to the articles in the special issue, I would like to highlight the three columns in this issue. Alan Oppenheim is a great scientist and a pioneer in digital signal processing. In the "Perspectives" column titled, "The Magical Art of Technical Presentations" [A2], you will discover that he is also a fan of magic and learn how this hobby impacted his lectures and conferences. Even if he says, "The role of a magician is to make simple things appear mysterious. The role of a teacher is to make mysterious things appear simple," the parallel between magic exhibitions and scientific talks is very interesting and should inspire your future lectures or communications.

Fourier analysis is a fundamental and common tool in our domain. It is usually computed by minimizing a mean-square error, i.e., based on an L2 norm. In the "Lecture Notes" column by A. Roonizi [A3], you will find out what happens when coefficients are computed based on an L1 norm.

In a "Special Reports" column, John Edwards [A4] presents recent projects in which signal processing helped replicate, augment, or interpret human senses. This column is his last one for *SPM*, and I would like to pay tribute to John (see Figure 1) as an outstanding technology journalist who regularly contributes to *SPM*. Since 2011, he has written 67 *SPM* column articles, covering all areas in signal and image processing and its application.

> In recent e-mail exchanges, John stated IEEE played a major role in forming my career. Way back in March 1969 I attended the IEEE International Convention and Exhibition in New York. I was 14 years old and spent two days with my slightly older friend exploring all the exhibits. The convention opened a new world for me. I left feeling that technology was my future. (See Figure 2).

In 1983, John contributed a few columns to the CompuServe Information Service, which offered electronic mail capabilities and technical support to personal computer users. In addition to his columns in *SPM*, John has contributed to many journals and magazines including, to name a few, *The New York Times*, *The Washington Post*, *CFO Magazine*, *Network Computing*, and *RFID Journal*. He is also the author of four books. You can discover more

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SPS encourages the development of K–12 outreach efforts that can bring the awareness of signal processing to all students, including those who belong to groups that are underrepresented in science, technology, engineering, and mathematics fields regionally and/or globally.

Digital strategies for education

A strategic goal of the SPS is to offer continuing education short courses. The courses started at ICASSP 2022 and were more in-depth than tutorials, providing a deep and multisided understanding of a topic. Professional development certificates for training hours are provided upon completion of the course and quiz. The Education Board created an Education Center Editorial Board comprised of three cluster groups according to topics and categories to act as a peer-review body to vet content and provide a stamp of approval and validation of future content/course material. They are working toward establishing an SPS academy or portal for continuing education.

The Education Board started working with Interface Guru to develop an education portal. The exercise identified our user population and its potential needs, with a focus on education prior to creation of the portal. This is an exciting project that will span all of our areas: education, publications, conferences, and membership. The next steps are as follows: curation of content in the Resource Center to identify related topics, creation of related course bundle packages for professional development certificates, creation of the SPS Education Academy/SPS Education Zone and development of a dedicated site/portal/presence on the SPS main site.

The SPS Education Webinar program grew significantly in 2022, when we offered a total of 55 webinars. Some webinars are author solicitations/invitations based on IEEE *Xplore* article analytics, and some are arranged by the various TCs and SPS initiatives. In 2022, webinars were organized by the Computational Imaging TC, Information Forensics and Security TC, Bio Imaging and Signal Processing, and SPS Data Science Initiative [Data sciEnce on GrAphS (DEGAS) Webinar].

The SPS Scholarship

The IEEE SPS Scholarship Initiative is being established to generate excitement and interest in the fields of interest of the SPS. The program aims to support industry needs for more signal processing expertise by providing financial support to undergraduate and graduate students committed to pursuing signal processing education, and subsequently, careers. The scholarship is meant for qualifying undergraduate and graduate students worldwide.

The intent is not only to support potential signal processing students but generate interest and awareness among employers in industry, government, and academia about the value of investing in signal processing students and potential employees as assets to their companies, organizations, and institutions.

Ethics

We are working on developing ethics guidelines for the Society's publications, which are important because there are security and privacy concerns in the many areas that the Society works, e.g., images, biometric data and datasets, and also reproducibility concerns in the research we produce. A committee has been created, including the chairs or representatives of SPS technical committees, and other SPS members, who will work to develop the Society's own ethics guidelines.

I am excited to work with all SPS volunteers this year toward making all these initiatives a success and would like to invite you to support our efforts.

Acknowledgment

I would like to acknowledge the help of the following individuals who provided input to this article: Richard Baseil, Petros Boufounos, Peter Vouras, and Alle-Jan van der Veen.

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FROM THE EDITOR *(continued from page 4)*

about him and his publications on his webpage: https://techjohnedwards.com.

He confided in me, "It has been an honor and a privilege to contribute to *IEEE Signal Processing Magazine*." It has been a great pleasure and a good fortune for *SPM*. Thank you so much, John!

Appendix: Related articles

[A1] B. Wen, S. Ravishankar, Z. Zhao, R. Giryes, and J. Chul Ye, "Physics-driven machine learning for computational imaging," [From the Guest Editors], *IEEE Signal Process. Mag.*, vol. 40, no. 1, pp. 26–28, Jan. 2023, doi: 10.1109/MSP.2022.3222888.

[A2] J. Acevedo and A. Oppenheim, "The magical art of technical presentations," [Perspectives], *IEEE Signal Process. Mag.*, vol. 40, no. 1, pp. 15–21, Jan. 2023, doi: 10.1109/MSP.2022.3200449.

[A3] A. K. Roonizi, "Fourier analysis: A new computing approach," [Lecture Notes], *IEEE Signal Process. Mag.*, vol. 40, no. 1, pp. 182–190, Jan. 2023, doi: 10.1109/MSP.2022.320386.

[A4] J. Edwards, "Signal processing comes to the senses," [Special Reports], *IEEE Signal Process. Mag.*, vol. 40, no. 1, pp. 22–25, Jan. 2023, doi: 10.1109/MSP.2022.3202327.

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[1] R. Couillet, D. Trystram, and T. Ménissier, "The submerged part of the AI-Ceberg [Perspectives]," *IEEE Signal Process. Mag.*, vol. 39, no. 5, pp. 10–17, Sep. 2022, doi: 10.1109/MSP.2022.3182938.

[2] A. Petropulu, "Starting the ethics discussion in our community [President's Message]," *IEEE Signal Process. Mag.*, vol. 39, no. 6, pp. 4–5, Nov. 2022, doi: 10.1109/MSP.2022.3198299.

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