

Editorial

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“To improve is to change, to be perfect is to change often”

—Winston S. Churchill

The year 2020 is almost here! As always, the PROCEEDINGS OF THE IEEE team looks forward to bringing to you the most exciting developments and emerging trends in electrical engineering and computer science through our lineup of next year’s special issues and articles.

Before diving into the details about these exciting topics, I would like to highlight some of the achievements of 2019. I started off 2019 as the new Editor-in-Chief of the PROCEEDINGS, and the journey so far has been quite fulfilling. I have thoroughly enjoyed working with the editorial board, authors, and the guest editors of the PROCEEDINGS who are truly the cornerstones for constructing the success of the journal. Thanks to their spectacular job, the PROCEEDINGS OF THE IEEE is truly the most exemplary journal of the IEEE in terms of the quality of content we bring to the readership.

The PROCEEDINGS strives for excellence in many ways, and bibliometrics is just one way to measure the journal’s success. For instance, according to the 2018 Journal Citation Reports (JCR) released in June 2019 by Clarivate Analytics, the PROCEEDINGS received an impact factor of 10.694 and an article influence score of 3.432, thus ranking no. 5 by impact factor and no. 4 by article influence score in the electrical and electronic engineering category. Things do not change much if one refers to Elsevier Scopus. The PROCEEDINGS’ Citescore indicator is 10.79, which corresponds to a ranking of 10 over 658 journals in the electrical and electronic engineering category in Scopus.

Apart from this, the usage for PROCEEDINGS articles continues to grow, indicating wide interest in the content published by the journal. The PROCEEDINGS is no doubt successful at what it does; however, without changing with the times, it is not possible to continue this success—changing often is the only way to maintain and improve the quality of the journal.

With this mind, I have initiated a number of changes for the PROCEEDINGS this year in conjunction with the editorial staff, some of which I have outlined in the following.

- 1) *Regular Paper Submission Process:* An essential component of the journal’s offerings is the regular papers on more focused topics, giving readers

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background and insight into emerging areas. In fact, it is quite evident that many of the recent regular papers published in the PROCEEDINGS are popular with our readers, both in terms of the number of downloads and in terms of received citations. It is, in fact, quite often the case that regular papers attract more attention than papers in a special issue.

While the published papers have been quite successful, the two-step submission process, where authors first upload a proposal, possibly followed by the full paper (if the proposal is accepted), was generating time delays and a strain on available review resources. Also, while ideas expressed in the proposal often appeared interesting, the full-length papers did not always meet reviewer expectations and were many times rejected in the end.

In an effort to increase the speed and efficiency, the PROCEEDINGS team revamped the regular paper process earlier this year to eliminate the need for a paper proposal. The authors are now allowed to submit full-length survey, review, and tutorial papers. The latter must, however, be accompanied by a fully detailed cover letter describing the importance of the subject and the qualification of the authors to cover the specific topic. The new process is expected to result in a more efficient and speedier outcome for regular papers.

- 2) *Seeking Top Quality Submissions:* Traditionally, most of the special issues published by the PROCEEDINGS come from ideas generated by the editorial board members during the annual board

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meeting. The board suggests both the topic for the issue as well as potential guest editors. The Editor-in-Chief and the managing editor work closely on these suggestions, prioritizing topics, finding replacement editors when required, and guiding guest editors on the development of the proposals. The PROCEEDINGS OF THE IEEE also receives unsolicited special issue proposals from time to time, but such proposals are currently quite limited in number. Although the current process works quite well, I would like to see more unsolicited proposals submitted to the PROCEEDINGS. I believe that casting a wider net is crucial to ensuring coverage of all trending topics as well as attracting top quality contributors we would not otherwise reach.

Also, even when a special issue topic is exciting and the prospective guest editors are top researchers in the area, the review process of a special issue proposal is still very time-consuming. I believe this is due to the variability of the information presented in the proposal and to this effect, and I have worked closely with the editorial staff to revise and improve the Special Issue Proposal form this year. The new form is available on the PROCEEDINGS website on the “[Preparing Your Special Issue Proposal](#)” page.

- 3) *Webinar Series*: In 2019, the PROCEEDINGS team hosted three free webinars to complement the special issue content. The first webinar on “High-Level Specification to High-Performance Code” was held in February 2019, the second on “Machine Ethics: The Design and Governance of Ethical AI and Autonomous Systems” was held in May, and the final one on “Electricity for All” was held in October 2019.

The main goal of the webinar series is to provide a platform for researchers around the globe to hear from—and interact with—leading experts in different fields. The recordings of the webinars are available on the [PROCEEDINGS OF THE IEEE Webinar Series](#) page.

- 4) *Newsletter*: If you are interested in keeping on top of the latest news about the PROCEEDINGS, please sign up for our quarterly newsletter at <https://engage.ieee.org/Proceedings-Newsletter-Sign-Up.html>. The newsletter contains article highlights, information on recent and upcoming special issues, editorial board highlights, and more.
- 5) *Social Media*: Another good way to keep up-to-date with the exciting news related to the PROCEEDINGS OF THE IEEE is to follow the PROCEEDINGS page on [Facebook](#), [LinkedIn](#), and [Twitter](#). Please do so now to avoid the risk of missing our latest scientific content.

I. UPCOMING SPECIAL ISSUES

Now, let us take a closer look at what we have planned for Volume 108 in 2020.

Special Issue Content: During 2020, we will be publishing special issues on a diverse range of topics from biomedical imaging to multienergy systems, with practical, fully referenced articles that will be of interest to researchers in electrical and computer engineering, and computer science.

A. Biomedical Imaging and Analysis in the Age of Sparsity, Big Data, and Deep Learning

Medical imaging of the human body using a range of modalities has revolutionized medicine over the past several decades and continues to grow at a rapid pace. More than ever, previously unknown information about biology and disease is being unveiled

at a range of spatiotemporal scales. While results and adoption of strategies related to the computational and quantitative analysis of the images have lagged behind image acquisition approaches, there is a heavy interest and explosion of activity in this area in recent years. This special issue aims to define and highlight what some of the “hot” newer ideas in biomedical imaging and analysis are, intending to shine a light on where the field might move in the next several decades ahead, focused on emphasizing where electrical engineers have been involved and could potentially have the most impact. These areas include image acquisition physics, image/signal processing, and image analysis, including pattern recognition and machine learning.

B. Active Nanophotonics

Nanophotonics is an internationally vibrant research field, which combines the latest research advances in enhanced light–matter interactions in nanoscale structures with advanced engineering tools, spanning over a broad range of applications from optical computing to sensing and detection. The use of nanostructures for generating, detecting, and manipulating light has been opening a plethora of new applications in terms of sensing, flat lenses, compact light sources, optical interconnects, and so on. At the same time, the current research in nanophotonics has been hindered by the impact of material loss, as light is squeezed in smaller and smaller structures, and enhanced light–matter interactions also imply enhanced material absorption. This special issue will cover the growing area of active nanophotonics, based on which nanoscale devices are integrated with active materials, enabling loss compensation, nanoscale lasers, and unusual optical responses. Active devices such as laser sources, photodetectors, and modulators also allow for active manipulation of light, not limited to passive operations like propagation of light through an optical waveguide or an optical fiber.

C. Self-Awareness for Autonomous Systems

Computational self-awareness is an emerging research field that studies systems, methods, techniques, and algorithms that enable an autonomous agent to sense its dynamic and uncertain environment to learn internal models of its environment, to reason about its own, and its environment's states, and to adapt its behavior and structure dynamically to the changing environment. Self-awareness in a computational context is founded on advanced methods and algorithms from different disciplines, including signal processing, machine learning, multiagent systems, control engineering, and decision making. This special issue will aim at comprehensively covering fundamentals of self-awareness, techniques for single agents and collective systems, as well as case studies.

D. Internet of Vehicles

This special issue will cover the recent developments in the area of the Internet of Vehicles (IoV), where the communication, computing, control, and caching functions of connected vehicles facilitate a wide spectrum of vehicular applications. The scope of the issue spans many related topics, including communication technology and network protocol design, optimization, and evaluation, vehicular social network, cloud/fog computing, big data and data analysis, software-defined IoV, application-driven designs, spatial-aerial integrated IoV, networking for electric vehicles and autonomous vehicles, IoV security and privacy, and test-bed and simulation tools, and more.

E. Nonsilicon, Non-von Neumann Computing—Part 2

The future of computing is at crossroads. The technology advances driving “Moore’s law” that have sustained the exponential growth of computing performance over the past several decades are slowing, and the roadmap for future advances is

uncertain. The phenomenal expansion of computing power has made computers ubiquitous, spawning a \$300 billion semiconductor industry, enabling unprecedented global economic growth, and transforming many aspects of society at large. Emerging technology needs will place further demands on computing, including the need to process a profusion of data from sensors, the internet, scientific experiments, social media, national security systems, and the financial world. Transmitting, storing, processing, and analyzing this data explosion with the requisite speed and performance may mandate a radical departure from the traditional computing paradigm, ranging from hardware to software to benchmarking, and may even involve rethinking the tasks that computing machines are designed to undertake. Recently, government, industry, and academia collectively recognized that addressing this critical technological problem requires a new, multidisciplinary research agenda for computing.

Thus, beyond Moore computing will be addressed in this issue by showcasing current research on new nonsilicon materials and substrates for building faster switching devices for more power-efficient computing, novel architectures inspired by the brain or models of physics as alternatives to the traditional von Neumann model of computation, as well as novel and emerging applications of domain-specific architectures. The special issue will touch upon important advances being made in this broad spectrum of research.

F. Multienergy Systems

This special issue is motivated by tremendous changes and opportunities in an integrated planning, operation, and modeling of the energy systems, including electric, natural gas, and district heating-cooling systems together with the demand side. The changes are motivated by recent hardware development, integration of renewables, and active consumer participation in the energy markets.

Widely available and flexible modern hardware creates an appetite for coordinated use of energy technologies. Massive penetration of wind and solar, along with active participation of consumers in energy management, are two other major enablers but also challenges to reliable and profitable operations. Major challenge is due to unprecedented (for the past reality of the 20th century) level of fluctuations and uncertainty that the integrated systems need to deal with. The challenges extend across multiple spatial (household to the country size) and temporal (subseconds to years) scales. The special issue will comprise articles on planning, design, and operation of multienergy systems as well as the interaction between different energy carriers.

G. Optimization for Data-Driven Learning and Control

Optimization methods are becoming increasingly popular because of their immediate applicability to emerging data-driven learning and control problems. Common to such data-driven, real-world problems are some key aspects including but not limited to very large size of data, privacy concerns, communication and computation constraints, geographically distributed data collection or availability, mobile agents and time-varying graphs, and complex, stochastic, and nonconvex problems. Different scientific communities have thus paid significant attention to various aspects within the design and analysis of optimization tools and methods for the purposes of learning and control over large-scale data. This special issue will include contributions from world-renowned experts in the areas of signal processing, control, optimization, and machine learning to provide a unified platform where modern state-of-the-art research ideas are brought together. The particular goal of this issue is to provide a comprehensive coverage of the state of the art in convex, nonconvex, and stochastic optimization methods that are used

heavily by signal processing, control, and machine learning communities. This issue will also have a strong focus on real-world applications, providing detailed examples and building intuition behind the analyses and results.

H. Open Media Compression and System Standards

Universal access to multimedia content and its provisioning is now a reality. It is easy to generate, distribute, share, and consume any media content, anywhere, anytime, on any device. Interestingly, most of these services adopt a streaming paradigm, are typically deployed over the open, unmanaged Internet, and account for most of today's Internet traffic. Current estimations expect tremendous growth in the global video traffic in the coming years and this will, in turn, lead to a need for growth in the users' bandwidth. At the same time, network applications will also grow and utilize the bandwidth provided, just like programs and their data expand to fill the memory available in a computer system. Most of the available bandwidth today is consumed by video applications and the amount of data is further increasing due to already established and emerging applications, e.g., ultrahigh definition, high dynamic range, or virtual, augmented, mixed realities, or immersive media applications in general.

In order to cope with this ever-demanding applications and services, efficient, open media compression, and system standards are inevitable.

The scope of this special issue proposal will comprise recent advances in media coding/compression techniques, specifically focusing on video, image, and audio for both traditional and immersive media content, including but not limited to omnidirectional/360°. In addition,

it will include articles on multimedia systems technologies as well as point cloud compression, and an article on new domains for compression/coding techniques such as genomic data.

I. Leading ICT Technologies for Smart Manufacturing

In the context of the fourth industrial revolution, the smart optimization of all the items in a manufacturing process (including concept generation, production, and product transaction) is becoming more and more important. The new smart, connected products, along with the massive usage of unstructured information coming from Internet of Things and Big Data, are demanding a whole new technology infrastructure within a company. This special issue intends to investigate the latest challenges and opportunities for the information and communication technology (ICT) field in the context of the fourth industrial revolution, across multiple sectors, and different industrial applications. Key topics of focus will be data analytics for optimized industrial processes, systems automation, integration and control in small factories, and smart virtualization for cyber-physical production systems.

J. Approximate Computing: From Devices to Systems

Approximate computing has been proposed as a novel paradigm for efficient and low power design at nanoscales. It generates results that are good enough rather than always fully accurate and is thus suitable for applications that have inherent error resilience such as multimedia, signal processing, machine learning, and pattern recognition. Many of these applications are based on statistical or probabilistic computation such that different approximations can be made

to better suit the desired objectives. It is, therefore, possible to achieve not only energy efficiency but also simpler design and lower latency while relaxing the accuracy requirement for these applications.

Although approximate computing has gained significant attention from both academic and industrial communities in the past decade, it still requires further efforts to make it a mainstream computing paradigm for energy-efficient and high-performance systems. This special issue aims to provide a state-of-the-art coverage of research in approximate computing by including research activities across device, circuit, architecture, and system levels. The articles will be specifically geared toward specialists as well as a wider readership and will cover current theoretical/experimental results, design methodologies, and applications developed in approximate computing.

II. REGULAR PAPERS

During 2020, the journal will continue to publish invited and contributed papers. The PROCEEDINGS team is pleased to bring to you tutorial and survey papers, which will provide insight into a broad range of areas and applications.

III. CONCLUSION

I hope that you find our lineup of special issues to be as exciting as we do. Going into our 108th year, the PROCEEDINGS team will continue to deliver excellent content and enhance our offerings. Last but not least, you can reach the PROCEEDING's office via email at proceedings@ieee.org or the Editor-in-Chief at gsetti@ieee.org as well as via our social media pages on [Facebook](#), [LinkedIn](#), and [Twitter](#). ■