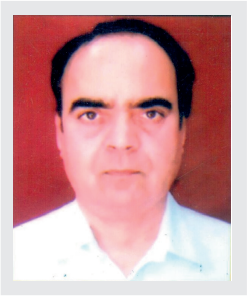
Foreword about Professor Raj Senani from the Division of Electronics and Communication Engineering, Netaji Subhas Institute of Technology, Dwarka, New Delhi, Dalibor Biolek a member of the International Scientific Editorial Board of "Advances in Electrical and Electronic Engineering" journal and the Professor at University of Defence and Brno University of Technology, and Professor Data Ram Bhaskar from the Department of Electronics & Communication Engineering at Delhi Technological University, India



Raj Senani

Raj Senani was born in 1950 at Budaun, UP, India. He received B.Sc. from Lucknow University, B.Sc. Engineering from Harcourt Butler Technological Institute, Kanpur, M.E. (Honors) from Motilal Nehru National Institute of Technology (MNNIT), Allahabad and Ph.D. in Electrical Engineering (EE) from University of Allahabad, India. He served as a Lecturer (1975–1986) and then a Reader (1987–1988) at EE Department of MNNIT, Allahabad after which he moved to Netaji Subhas Institute of Technology (NSIT), New Delhi, in 1988 as an Assistant Professor in the Department of Electronics and Communication Engineering (ECE) where he became a full Professor in 1990. Apart from teaching courses in Analog Integrated Circuits and Signal Processing, he has published over 150 papers and three research monographs in these areas. He served as the Editor-in-Chief of IETE Journal of Education during 2012–2017 and has been functioning as an Associate Editor of Circuits, Systems and Signal Processing since 2003. Besides serving as Head and Dean of various Departments during 1990–2014, he served as the Director of NSIT, New Delhi, during 1996–1997, 2003-2004 and lastly, during 2008–2014. Even after his superannuation on 31st March, 2015, he has been continuing as a Professor in ECE Division of NSIT and in addition, has also been functioning as an Adjunct Professor for National Institute of Technology (NIT), Patna. Professor Senani is a Senior Member of IEEE (Institute of Electrical and Electronics Engineers), was elected Fellow of National Academy of Sciences India (NASI) in 2008 and is the recipient of 25th Khwarizmi International Award for 2012.

Dalibor Biolek

Dalibor Biolek was born in 1959 in Ostrava. He received the M.Sc. degree in Electrical Engineering from Brno University of Technology, Czech Republic, in 1983, and the Ph.D. degree in Electronics from the Military Academy Brno, Czech Republic, in 1989, focusing on algorithms of the symbolic and numerical computer analysis of electronic circuits with a view to linear continuous-time and switched filters. He is currently with the Department of Electrical Engineering, University of Defence Brno (UDB), and with the Department of Microelectronics, Brno University of Technology (BUT), Czech Republic. His scientific activity is directed to the areas of general circuit theory, frequency filters, memristors and other mem-systems, and modeling and simulation of electronic systems. He has published several hundred papers, which have been cited more than 2000 times on the Web of Science, and is the author of four books on circuit analysis and simulation. At present, he is Professor at BUT and UDB in the field of Theoretical Electrical Engineering. Prof. Biolek is a Senior Member of the CAS/COM Czech National Group of IEEE. He also serves as an Associate Editor of Electronics Letters and as a member of the Editorial Boards of several other journals.

Data Ram Bhaskar

Data Ram Bhaskar was born in 1951 at Ganjdundwara, Etah, India. He received B.Sc. from Agra University, B.Tech. from Indian Institute of Technology (IIT), Kanpur, M.Tech. from IIT, Delhi and Ph.D. from University of Delhi. Dr. Bhaskar held the positions of Assistant Engineer in DESU (1981–1984), Lecturer (1984–1990) and Senior Lecturer (1990–1995) at the Electrical Engineering Department of Delhi College of Engineering, Kashmere Gate, Delhi-110006 and Reader in ECE Department of Jamia Millia Islamia (1995–2002). He became a full Professor in January 2002 and has served as the Head of the Department of Electronics & Communication Engineering during 2002–2005. Since August 2016, he is working as Professor, Department of ECE, Delhi Technological University, India. Professor Bhaskar's teaching and research interests are in the areas of Analog Integrated Circuits and Signal Processing, Communication Systems and Electronic Instrumentation. He has authored/co-authored 89 research papers in various International journals, 4 book chapters and 3 research monographs published by Springer. He has acted/has been acting as a Reviewer for several international journals. Professor Bhaskar is a Senior Member of IEEE and was an Editor of IETE Journal of Education (India) during 2012–2017. His biography is included in a number of international biographical directories.

Dear readers,

The Advances in Electrical and Electronic Engineering (AEEE) journal publishes papers from a research area that has for some time been experiencing its golden age: The original concept of electrical engineering and electronics is going to be more closely associated with the materials science, physics, chemistry, and also progressive directions of signal processing in order to solve, from the multidisciplinary point of view, up-to-date problems of the semiconductor and computer industries, nanoelectronics, but also bio-inspired electronics and telecommunication systems utilizing recent results in the theory of chaos, Cellular Neural Networks (CNN), and Cellular Automata (CA). The theoretical foundations of this modern process have their roots in the nineteen seventies and eighties when the ideas of the memristor, Chua's circuits, periodical table of fundamental electrical elements, Integral Manifold, Double Scroll, and CNN came to light. Currently, the progressive concepts of The edge of chaos and The principle of Local Activity are the origin of all nonlinear phenomena published in the literature under the generic title complexity. They will become increasingly important as researchers learn to apply them to real-world problems, inclusive of explaining such extreme events as hurricanes, earthquakes, tsunamis, stock market crashes, etc. Since 2002, these genuine pearls of the theory of nonlinear dynamical systems have gradually been linked with Wolfram's new kind of science in order to complete it with a rigorous mathematical background. Such a beautiful cross-fade of science, art, and creativity has also its tangible results- new kinds of cellular automata, revolutionary computer memories, CNNs for real-time solutions of extremely complicated problems, etc.

We sincerely believe that such current hot topics of the area covered by the AEEE journal attract not only readers but also potential authors of high-quality papers. The latter is a necessary condition for the journal to be considered highly influential in these fields.

This Theme Issue is focused on the areas related to the classical background of the above- the analog signal processing/generation circuits. Tremendous advances in digital circuits and systems, necessitated by the ever shrinking device size, the continuously reducing DC power supply voltages and the requirement of low power drainage from the battery (particularly for portable electronic systems), have continued to create new challenges to analog designers to come up with appropriate new circuits and techniques to enable the unavoidable and indispensable analog parts of complete systems to be placed along with the digital circuits on the same chip to be integrated in Complementary Metal Oxide Semiconductor (CMOS) technology.

Way back in 1975, due to the unsuitability of the op-amp-RC filters for fully-integrated implementations because of large tolerances of integrated resistors, a challenge was thrown to analog researchers/designers to come up with the technique of realizing fully-integratable analog filters in CMOS technology. This gave rise to the CMOS-compatible switched-capacitor circuits which were soon followed by externally-linear-internally-nonlinear MOSFET-C networks which offered the advantage of being fully-differential in nature thereby offering good common-mode noise immunity and did not suffer from the drawbacks of discrete-time MOS-SC networks such as the effects of aliasing, clock feed through and others.

After 1985 or so, electronically-controllable OTA-C and gm-C circuits were shown to be highly suitable for IC implementation in both bipolar and CMOS technologies. Although Current-mode circuits were already in vogue since the introduction of Second generation Current Conveyors (CCII), the demonstration of the realisability of CCII+ and CCII- both with Operational Mirrored Amplifier (OMA) formulations by Wilson in 1984–85, followed by the introduction of AD844 by Analog Devices around 1987 (though designed by Barrie Gilbert much earlier) and the subsequent commercial availability of many other CC ICs such CCII01 from LTP Electronics and PA630 designed by Wadsworth and released by Phototronics Ltd., Canada in 1989, brought the CC-based circuits and current-mode circuits on a more practical footing.

It is interesting to note that AD844 which is, architecturally, a CCII+ along with an on-chip voltage buffer, was disguised as a `60 MHz 2000 V/μs Monolithic op-amp'! It was due to the external accessibility of the Z-terminal of the CCII+ as an external pin due to which the AD844, now popularly being referred as Current Feedback Op-Amp (CFOA), found particular favour of analog designers/researchers when it was discovered that it could be employed not only as a versatile four terminal building block in its own right but can also be usefully employed in realizing CCII+, CCII-, voltage/current buffers, Four-Terminal-Floating-Nullors (FTFN) and a number of other building blocks such as the Operational Transresistance Amplifier (OTRA), the Current Differencing Buffered Amplifier (CDBA) and several others. The Current Differencing Transconductance Amplifier (CDTA) introduced by Biolek in 2003, was a new versatile building block in the same league which has also been welcomed widely by the researchers around the world.

Concurrently, during nineties, log-domain and dynamic translinear circuits pioneered by Adams, Seevinck, Frey and others, attracted considerable attention as prominent class of Externally Linear Internally Nonlinear (ELIN) circuits capable of offering electronically-tunable analog signal processing and signal generation circuits suitable for implementation in Bipolar technology. MOS translinear circuits (with MOSFETs operating in weak inversion) and the square-root domain circuits (based on MOSFETs operating in saturation) soon followed as potential candidates for designing and implementing analog functional circuits in CMOS technology.

In 2008, the time was ripe to take a stock of numerous analog circuit building blocks which had been proposed from time to time by different researchers along with their bipolar/CMOS hardware implementations and a host of their applications. Consequently, Biolek, Senani, Biolkova and Kolka presented the classification, review and new proposals of various Active Building Blocks (ABB) in a paper published in Radioengineering Journal (vol. 17, no. 4, pp. 15–32, December 2008). A number of new building blocks formulated in the quoted paper such as Current Conveyor Transconductance Amplifiers (CCTA), Voltage-Differencing-Buffered-Amplifier (VDBA), Voltage Differencing Current Conveyor (VDCC), Current-Differencing-Current-Conveyor (CCDC), Voltage-Differencing-Transconductance-Amplifier (VDTA), multiple output Current Follower Transconductance Amplifier (CFTA), Current Differencing Differential Input Transconductance Amplifier (CDDITA) and others have been widely investigated by the researchers around the world since then while some others are still waiting to be explored! An expected outcome of this research may eventually be that in near future, some of these new building blocks may become practical realities if some IC manufacturers take up the task of making them available as off-the-shelf ICs.

This issue is a collection of selected articles related to realization of biquad filters, sinusoidal oscillators, analog multipliers, waveform generators using modern electronic circuit building blocks.

Saatale and Amiri, in their paper, have proposed a four-quadrant analog multiplier circuit suitable for implementation in CMOS technology which offers high accuracy and high linearity coupled with body effect free operation. The performance of the circuit has been verified by HSPICE simulation using 0.18 μm technology.

Stability analysis of switched inductor based quadratic boost DC-DC converter has been carried out by Jayachandran and Krishnaswamy. The effectiveness and adaptability of SLQB converter has been demonstrated through simulation results of the proposed and some earlier known converters.

Pushkar has come up with two new sinusoidal oscillator configurations using a new active element namely the 'Voltage Differencing Inverting Buffered Amplifier' (VDIBA). The proposed oscillators offer a number of interesting features such as employment of a minimum number of passive components along with independent electronic control of both condition of oscillation and frequency of oscillation.

In the next paper, Oruganty, Gilhotra, Pandey and Pandey have proposed a method to generate various types of linear voltage transfer curves using OTRAs. A few application examples and their simulation results using CADENCE tools have also been provided.

Jani and Ojha have proposed a CMOS inverter-based Schmitt trigger with adjustable hysteresis. The hysteresis width is shown to be controllable by varying bias voltage and performance of the circuit has been shown to be comparable/superior to other earlier known designs.

Biolek and Vavra in their paper have proposed a CDTA implementation based upon two commercially available ICs and have demonstrated its efficacy in biquad filter application realized with single CDTA.

Gupta and Arora have proposed a realization of current mode universal filter and a dual-mode single resistance controlled quadrature oscillator employing VDCC and only grounded passive elements.

In the last paper of this special section, Singh, Gupta and Senani have proposed a new OTRA-based multifunction inverse filter configuration which is capable of realizing low pass filter, high pass filter and band pass filter using only two OTRAs and five passive elements. This paper represents the first application of OTRAs in realizing inverse filters.

In view of the above, we appreciate that the above researchers have taken advantage of the situation to make meaningful contributions in the exciting area of analog integrated circuits and signal processing and have chosen the journal Advances in Electrical and Electronic Engineering as a place for dissemination of their new research results.