



2023 International Conference on Analog VLSI Circuits (AVIC 2023)

Sinaia, Romania, Oct. 11th – Oct. 13th, 2023

Program

Organised by



IEEE Solid-State Circuits Society Romania Chapter



IEEE Romania Section



Technical University of Cluj-Napoca, Romania



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Institute of Electrical Engineers of Japan

Message from General Co-Chairs

Since the International Conference on Analog VLSI Circuits (AVIC), formerly, IEEJ International Analog VLSI Workshop was first held at Ohio State University in 1997, AVIC has been held all over the world including Taiwan, Thailand, Ireland, France and Canada. Thanks to everyone's support for AVIC has gained 20+ years of history.

In this year, AVIC is co-located with the 46th edition of the IEEE annual conference- International Semiconductor Conference (CAS), in Romania. In AVIC we will discuss a wide range of analog themes based on theory and experience, including not only electronic circuits targeting integrated circuits, but also applications including discrete circuits, evaluation, manufacturing, data analysis, EDA and AI.

In order to overcome the current situation in which the supply of semiconductors cannot keep up with the demand, it is now important to design and develop more efficient semiconductors that take into account not only manufacturing but also design. Against this background, we sincerely hope that semiconductor designers and researchers from all over the world will gather in Romania to share various ideas and contribute to the further development of the semiconductor industry.

One of Romania's important assets is its mathematics school, recognized as one of the best in the world. The first International Mathematical Olympiad (IMO) was held in 1959 in Romania. Since then, Romania has often been among the top three countries in terms of the number of awards obtained. The Romanian school of mathematics is also recognized by the large number of mathematics professors, especially in the USA universities. Also in the USA work hundreds of Top specialists in microelectronics. Romania is also recognized with many tourist attractions, and it has a rich food culture such as pork and beef-based dishes.

Japan is famous anywhere in the world for its accuracy, fairness and high specialization in many fields such as electronics.

We hope that, through the AVIC 2023, everyone who attends this conference will have great cultural experiences and feel the best hospitality in Romania.



Dr. Stefan Marinca
Chairman of IEEE-SSCS Romania



Mr. Satoru Shingai
Canon Inc., Japan

Message from Technical Program Committee Chair

On behalf of the technical committee of the 2023 IEEEJ International Conference on Analog VLSI Circuits (AVIC 2023), we welcome you to Hotel Sinaia in Romania. This conference is main organized by IEEE Solid-State Circuits Society Romania Chapter and is sponsored by the Research Committee on Electronic Circuits of the Institute of Electrical Engineers of Japan (IEEEJ).

Our technical program this year consists of three analog-related sessions, which are “RF,” “Analog circuits 1, 2, 3.” The total number of papers is 11, including two invited talks.

On the first day, following the opening ceremony speech by Prof. Pat Cunneen, welcome message “Resistance to digital, resistive sensing, highly digital SAR ADC, delta-sigma DAC, and bitstream DAC.” On the second day, an invited talk will be presented by Prof. Arcadie Craican, Gheorghe Asachi Technical University of Iasi. Also, an invited talk “Analog and hybrid fast-transient-response LDOs able to handle a wide ranges of load currents and capacitors” will be presented by Prof. Marius Neag, Technical University of Cluj-Napoca.

The regular papers selected for this year represent the results of active research in the field of analog technology at IEEEJ, Technical Meeting on Electronic Circuits, and other conferences, and cover a wide range of interesting topics. For example, functional blocks using state-of-the-art technology devices, design methods based on model-based machine learning, and solving device or circuit nonlinearity issues in applied systems.

The AVIC 2023 Technical Program Committee, we would like to offer special thanks to the reviewers, the Technical Program members, the invited speakers for developing an outstanding technical program. We look forward to seeing you all in Romania, and let's create a new era after COVID-19 with our technology.



Prof. Dr. Toshihiko Hamasaki
Hiroshima Institute of Technology, Japan

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Chairman of IEEE-SSCS Romania, Romania
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Conference Time Table

Time: Eastern European Summer Time (UTC+3)

Wednesday October 11th	Thursday October 12th	Friday October 13th
8:50–10:00 CAS-AVIC Opening Ceremony		
10:00–13:00 AVIC Plenary Session	10:00–11:00 Regular Session 1	11:50–12:50 Regular Session 2
12:50–13:00 Photo “Remember CAS-AVIC2023”	11:20–12:20 Regular Session 2	12:50–13:00 Closing Ceremony (AVIC 2023)
13:00–14:00 Lunch	13:00–14:00 Lunch	13:00–14:00 Lunch
14:30–18:00 Trip to Sinaia 2000m	14:00–18:00 Trip to “Cantacuzino” Castle, Busteni	14:00–17:30 Poster Sessions (CAS)
		20:30– Banquet including Best Paper Award Ceremony

* AVIC 2023 is held concurrently with CAS 2023. Please see the [“CAS 2023 program overview”](#).

Plenary Session

Wednesday October 11th 10:00–13:00

Chairman: Prof. Toshihiko Hamasaki, Japan; Dr. Tom O’Dwyer, Ireland

Speaker Prof. Pat Cunneen, Analog Devices, Romania

Title From Green field to Global Semiconductor Producer –The Analog Devices Limerick Story–

Abstract With the ratification of the EU Chips Act which invests EUR 43b in the semiconductor sector, many countries including Romania are anxious to nurture and grow the industry from a relatively small base. This talk provides a real-world example of how Ireland attracted one of the major players in analog circuit design –Analog Devices– to establish its first European operation there. At the time Ireland was an agricultural economy with no expertise in semiconductors, but nonetheless the enterprise was successfully established, and would prove to be the catalyst which has turned Ireland into one of the major semiconductor powers in the EU today. The key challenges and success factors in the project are discussed in detail.



Biography Pat Cunneen joined Analog Devices in June 1976 as HR Manager as part of a small start-up team. While his Analog career spanned 26 years, his first 12 years was directly involved in the leadership of the Irish business including recruitment, people development and organisational culture. Subsequent AD roles included HR manager at the then largest AD site in Wilmington Massachusetts and later was appointed Director of HR for the newly created Worldwide Manufacturing Organisation. He has a B.Comm from UCD, an MBS from UL, was a Fellow of CIPD (UK), an Adjunct Professor of Strategic HR at the University of Limerick and has published 3 books.

Speaker Prof. Arcadie Cracan, Gheorghe Asachi Technical University of Iasi, Romania

Title Resistance to digital, resistive sensing, highly digital SAR ADC, delta-sigma DAC, and bitstream DAC

Abstract This work presents a highly digital successive approximation direct resistance to digital converter. To achieve a high level of digital domain circuitry, an oversampling delta-sigma digital to analog converter is used. The remaining analog domain circuitry consists of an integrator used as an error amplifier for which the output voltage is proportional to the difference between the measured and the approximated resistance and a comparator to detect the sign of the approximation error. To further reject high-frequency quantization noise, an up/down counter is utilized at the output of the comparator. The implemented resistance to digital converter achieves a 7-bits resolution and a 5-bits accuracy (as validated by simulation).



Biography Prof. Cracan has received his BSc in electronics engineering (2008) and his Ph D. in electronics and telecommunications engineering (2011) from Gheorghe Asachi Technical University of Iasi (TUIASI), Romania. In 2011 he joined the Fundamentals of Electronics department of TUIASI where he is assisting and lecturing courses in analog and digital circuits design and testing.. His research interests include analog sensors, analog signal processing, analog-to-digital and digital-to-analog conversion, radio-frequency circuits design, digital signal/image processing, power conversion systems. He is currently the Head of the Fundamentals of Electronics department at TUIASI and is a consultant for Infineon Romania in Iasi. Dr. Cracan has authored or coauthored over 30 international journal and conference proceedings papers. He is a member of the IEEE Solid-State Circuits Society and IEEE Education Society and serves as a reviewer for several MDPI journals.

Speaker Prof. Marius Neag, Technical University of Cluj-Napoca, Romania

Title Analog and hybrid fast-transient-response LDOs able to handle a wide ranges of load currents and capacitors

Abstract This invited talk is included in the following contents:

- (i) Brief presentation of the “Digitally Enhanced RF and Analog IC” Research Group at the Technical University of Cluj-Napoca
- (ii) Examples of University-Industry cooperation: the PartEnerIC and iDev4.0 projects
- (iii) Methodologies for systematic design of PMICs based on multi-physics simulators
- (iv) PMICs for automotive applications: SC DC-DC converter with High BW Power Mirror and Dual Supply Driver & Slew-Rate Booster and Frequency Compensation Circuit for Automotive LDOs
- (v) Novel approaches to the analysis and design of a class of Any-Load Fast LDOs



Biography Prof. Neag graduated the M.Eng. program on Applied Electronics at the Technical University of Cluj-Napoca (TUCN), Romania, in 1991 and was awarded the Ph D. degree by the University of Limerick, Ireland, in 1999. After several years working as a senior designer of RF, analog and mixed-signal ICs in Ireland, the UK and the US he returned to the academia. Since 2008 he is an Associate Professor with the TUCN, where he co-founded the “Digitally Enhanced RF and Analog IC” Research Group. He has co-authored over 30 articles published in prestigious journal papers and more than 100 papers presented at international scientific conferences, as well as 4 books on Analog IC design, as well as 3 international patents. Assoc. Prof. Neag has been an active IEEE member since 1994, with substantial contributions to several Societies and the IEEE Romania Section. He is currently the Vice-chair of both the Education Society and the Solid-State Circuits Society, Romania Section, and serves as Counselor of the IEEE Student Branch at the Technical University of Cluj-Napoca, a Student Branch he helped established in 2020. Since 2018 he is a member of the Committee for Microsystems Science and Technology of the Romanian Academy.

Regular Session

Wednesday October 12th 10:00–11:00

Session 1: RFs and Analog Circuit 1

Chairman: Prof. Nobukazu Takai, Japan; Dr. Stefan Marinca, Romania

(R-1) A zero temperature coefficient voltage reference: stability and versatility using 28nm FD-SOI technology

Maxime Guillot, Yann Deval, Hervé Lapuyade (Université de Bordeaux, France); Kawori Sekine, Kazuyuki Wada (Meiji University, Japan); François Rivet (Université de Bordeaux, France)*

(R-2) A walsh-based arbitrary waveform generator for 5G applications in 28nm FD-SOI CMOS technology

Pierre Ferrer, François Rivet, Hervé Lapuyade, Yann Deval (Université de Bordeaux, France)*

(R-3) Verification of element selection methods for multi-coil electric motor driving

Yoshiaki Ishikawa, Akira Yasuda (Hosei University, Japan)*

Thursday October 12th 11:20–12:20

Session 2: Analog Circuit 2

Chairman: Prof. Akira Yasuda, Japan; Prof. Marius Neag, Romania

(R-4) A method for OPamp sizing using model-based reinforcement learning

Kazuya Yamamoto, Nobukazu Takai (Kyoto Institute of Technology, Japan)*

(R-5) The improvement of SNDR by passive signal-residue summation with the switched capacitor integrator of the noise-shaping successive approximation register ADC

Sho Saito, Akira Hyogo, Tatsuji Matsuura, Ryoichi Miyauchi (Tokyo University of Science, Japan)*

(R-6) Proposal and application of equivalent MOSFET with different temperature coefficient of threshold voltage

Hiroshi Kobayashi, Kawori Sekine, Kazuyuki Wada (Meiji University); François Rivet, Hervé Lapuyade, Yann Deval (Université de Bordeaux, France)*

Friday October 13th 11:50–12:50

Session 3: Analog Circuit 3

Chairman: Dr. Yasuhiro Takahashi, Japan; Prof. François Rivet, France

(R-7) A Multi-bit $\Delta\Sigma$ down-converting ADC with even-harmonic mixer and mismatch shaper

Takumi Shibata, Kiichi Yamashita, Yuki Genkaku, Yasuhiro Sugimoto, Akira Yasuda (Hosei University, Japan)*

(R-8) Development of a sensor buoy equipped with a chlorophyll-a concentration measurement system using image spectrum analysis

Shunya Kosako, Toshihiko Hamasaki (Hiroshima Institute of Technology, Japan)*

(R-9) Analysis of the distortion characteristics of guitar amplifiers caused by different tube amplification factors

*Karin Sakamoto**, *Toshihiko Hamasaki (Hiroshima Institute of Technology, Japan)*

Note: * is a presenter.

