IEEE SOLID-STATE CIRCUITS SOCIETY™
IC Innovation

## October 2020

# UPCOMING SSCS WEBINAR

## Continuous-Time Pipelined ADC for Wide-Bandwidth Wireless Receivers

**Presenter: Hajime Shibata**
**Friday, November 20, 2020**
**11:00 AM EST**

**ABSTRACT:**
The design space of analog-to-digital converters (ADC) can be classified by two orthogonal axes - one representing the different ADC architectures such as SAR, pipeline, and ΔΣ; the other mapping the underlying circuits as discrete-time and continuous-time configurations. For ΔΣ ADCs, both discrete- and continuous-time design topologies have been explored extensively. With continuous-time implementations excelling in power efficiency and bandwidth, continuous-time ΔΣ ADCs have been widely used in a variety of applications including wireless communication systems. One then might ask - if continuous-time ΔΣ ADCs offer multiple key benefits over discrete-time counterparts, does the same rationale apply to other ADC architectures such as pipelined ADCs? This webinar attempts to answer this question. We first present how a continuous-time pipelined ADC can be derived from a discrete-time equivalent. We then cover the pros and cons of the continuous-time pipelined ADC against discrete-time pipelined and continuous-time ΔΣ ADCs. We also present the implementation examples in 28nm and 16nm CMOS technologies. We will conclude the talk with a discussion of future research directions.

BIOGRAPHY
Hajime Shibata (S'99-M'02-SM'19) received B.E. and M.E. degrees in electrical engineering from the University of Electro-Communications, Tokyo, Japan, in 1997 and 1999, respectively, and the Ph.D. degree from Tokyo Institute of Technology in 2002. Since 2002, he has been with Analog Devices, where he has been working on continuous-time ΔΣ and continuous-time pipelined analog-to-digital converter designs. Dr. Shibata was a co-recipient of the Beatrice Winner Award at ISSCC 2006. He has served as an Associate Editor of IEEE Transactions on Circuits and Systems II from 2017 to 2019.

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# NEWS

## IEEE SSC Society AdCom Election Ends November 2nd!


The IEEE Solid-State Circuits Society election of Members-at-Large to the Administrative Committee is ending soon.

We hope you will take the time to exercise your vote and help choose the future direction of the society. Learn more about the candidates or vote today.

## Webinars for Young Excellence (WYE) Program Presents

**Do's and Don'ts of Writing a Good Paper -- Recommendations from a former Editor in Chief**

**Presenter: Bram Nauta**
**Friday, November 13, 2020**
**10:30 AM EST**

### Abstract:

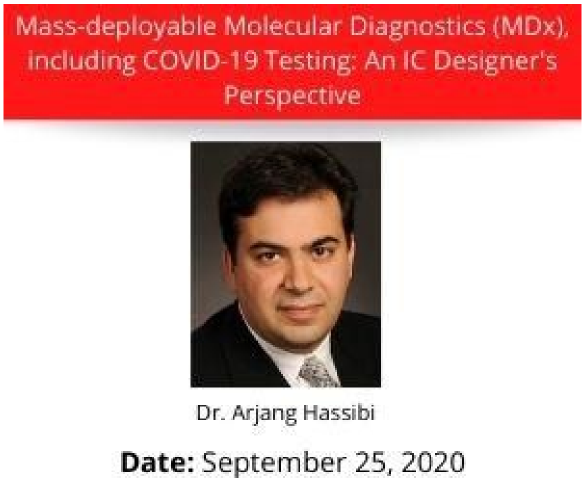
Congratulations! Your chip finally works and now you want to write a paper about it. Now you wonder: "Where to start? What will be my title? Shall I put a lot of measured numbers in the title, or make it fancy marketing style? What should the introduction be about? What should I present as measurements? Which numbers are important to show? How to compare to state of art?" These are questions that arise when writing your paper. And when finally done, it comes back with a lot of reviewer's comments. Some are mild while some may trash your hard work below ground level. How to deal with that? How can you smoothly bend the critics to something positive in your paper? And if the reviewer did not understand what you actually meant to say, what can you do to fix this? How to understand the viewpoints of the reviewers?

This lecture is about the Do's and Don'ts of writing a paper with focus on the IEEE Solid-State Circuits Society's publications. Also, there will be room for questions & discussions.

### About the speaker:

Professor Bram Nauta leads the IC Design group at the university of Twente, Enschede, The Netherlands. Has been the editor in chief of IEEE Journal of solid-state circuits (2007-2010). Moreover, he was active in the technical program committees of various SSCS conferences like ESSCIRC, VLSI Symposium on Circuits, ESSCIRC and ISSCC. For the latter conference he served as technical program committee chair in 2013. Bram also served as the president of the IEEE Solid-State Circuits Society (2018-2019). In his various roles he has experienced most sides of the publication process.

**Register Today**




## Webinar Available on the SSCS YouTube Channel

## ABSTRACT:

In the past year, the outbreak of COVID-19 has affected many lives globally. The suboptimal response to the pandemic revealed systematic deficiencies and gaps in our modern healthcare system. One specific area with consequential shortcomings was the diagnosis of infection and the pathogen, particularly the absence (or delayed deployment) of precision tests where and when needed. In this talk, we will discuss and review highly customized IC technologies, broadly defined, that have the potential to address this unmet need, specifically integrated biosensors and CMOS biochip systems. First, we will review the system-level requirements of molecular diagnostics (MDx) systems and explain how they identify the unique DNA/RNA sequences of the pathogen (e.g., COVID-19 one-hour PCR test) to detect infections while achieving appropriate clinical specificity and selectivity. Next, we will discuss in detail methods by which we can design and implement MDx sensors using IC technologies. We will provide specific examples, tradeoff analysis, and manufacturing options for realizing a true CMOS MDx biochip. At the end, we will list key challenges and potential opportunities in this field.

To view the webinar visit the **SSCS YouTube.**

## Stay Connected to IEEE *Xplore* When Working Remotely

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## Stay up-to-date with Learning with the SSCS Education Program


The **SSCS Education Program** provides Society members with free access to a wide range of quality educational content related to integrated circuits including tutorials, short courses, webinars, and eBooks.

- **Tutorials and Short Courses:** SSCS members have access to free tutorials and short courses from past years of ISSCC. Renowned experts in the field talk about new and ongoing developments in integrated circuits. **Click here to access.**
- **Webinars:** Monthly webinars are held for free for SSCS members on topics ranging from Analog/RF and future microprocessors to new biomedical applications. **Register for an upcoming webinar** or **view past webinars**
- **eBooks:** SSCS has two books available for download - **IC Design Insights** - a selection of tutorial and invited presentations given at CICC 2017 and **Low Power Circuit Design Using Advanced CMOS Technology** - part of the Tutorials in Circuits and Systems series.
- **CONFedu Series:** The CONFedu series features short 10-minute talks from SSCS sponsored conferences including ISSCC, CICC, ESSCIRC, and VLSI. **Click here to access.**
- **SSCSx Lecture Series:** The first series of lectures is five parts and is presented by Prof. Behzad Razavi on Noise. **Click here to access.**

**Educational credits (PDH's and CEU's) are available at a low cost for select products.**

**SSCS Educational content can be accessed via the SSCS Resource Center and the SSCS YouTube Channel. The material is free for Society members.**

# EDUCATION

## Upcoming 2020 Distinguished Lectures

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| **SSCS Central Illinois Chapter Virtual DL - Dr. Keith Bowman 11/09/2020** | **Talk Title: Adaptive and Resilient Circuits for Processors** | **VIRTUAL - Click here for more information** |

# CONFERENCES

## Upcoming 2020 SSCS-Sponsored Conferences

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| **2020 European Solid-State Circuits Conference/2020 European Solid-State Device Research Conference**<br>Grenoble, France | **Rescheduled to September 2021.** |
| **2020 IEEE Biomedical Circuits and Systems Conference (BioCAS)**<br>Berlin, Germany | **Rescheduled for October 2021** |
| **2020 IEEE BiCMOS and Compound Semiconductor Integrated Circuits and Technology Symposium (BCICTS)**<br>Monterey, California | **Nov 8 - 11, 2020** |
| **2020 IEEE Asian Solid-State Circuits Conference (A-SSCC)**<br>Hiroshima, Japan | **Nov. 9 - 11, 2020** |
| **2021 Radio Frequency Integrated Circuits Symposium** | **June. 6 - 8, 2021** |

## SSCS-Sponsored Conferences: Proceedings

**Click the links below to access the latest SSCS-Sponsored conference proceedings.**

**2019**
**2019 IEEE International Solid-State Circuits Conference (ISSCC)**
**2019 IEEE Custom Integrated Circuits Conference (CICC)**
**2019 IEEE Symposium on VLSI Circuits**
**2019 IEEE 45th European Solid-State Circuits Conference (ESSCIRC)**
**2019 IEEE Asian Solid-State Circuits Conference (A-SSCC)**

**2020**
**2020 IEEE International Solid-State Circuits Conference (ISSCC)**
**2020 IEEE Custom Integrated Circuits Conference (CICC)**

# PUBLICATIONS

## Submit Your Research to 2021 IEEE Custom Integrated Circuits Conference (CICC)

The IEEE Custom Integrated Circuits Conference is a premier conference devoted to IC development. The conference program is a blend of oral presentations, exhibits, panels and forums. The conference sessions present original first published technical work and innovative circuit techniques that tackle practical problems. CICC is the conference to find out how to solve design problems, improve circuit design techniques, get exposure to new technology areas, and network with peers, authors and industry experts. CICC 2021 will be held as a virtual conference with no author travel required.

**Abstract and Summary Submission Deadline**
Technical Session Papers:
11:59pm PST 3 November 2020
Industry Session Papers:
11:59pm PST 11 December 2020

The Selected Tracks for the 2021 CICC Conference

- Analog Circuits and Techniques
- Data Converters
- Design Foundations
- Power Management
- Wireless Transceivers and RF/mm-Wave Circuits and Systems
- Digital Circuits, SoCs, and Systems
- Biomedical Circuits,Systems and Applications
- Wireline and Optical Communications Circuits and Systems

To learn more about submitting visit the CICC website.

# The latest in SSCS Flagship Publications...


## IEEE Journal of Solid-State Circuits

**Vol. 55, Issue 11, November 2020**

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|---|
| **An Energy-Efficient Time-Domain Incremental Zoom Capacitance-to-Digital Converter**<br>**Xiyuan Tang; Shaolan Li; Xiangxing Yang; Linxiao Shen; Wenda Zhao; Randall P. Williams; Jiaxin Liu; Zhichao Tan; Neal A. Hall; David Z. Pan; Nan Sun** |
| **Breaking the Performance Tradeoffs in N-Path Mixer-First Receivers Using a Second-Order Baseband Noise-Canceling TIA**<br>**Prateek Kumar Sharma; Nagarjuna Nallam** |
| **A Low-Power VGA Vision Sensor With Embedded Event Detection for Outdoor Edge Applications**<br>**Yu Zou; Massimo Gottardi; Michela Lecca; Matteo Perenzoni** |
| **A 5.2-Mpixel 88.4-dB DR 12-in CMOS X-Ray Detector With 16-bit Column-Parallel Continuous-Time Incremental ΔΣ ADCs**<br>**Sangwoo Lee; Jinwoong Jeong; Taewoong Kim; Chanmin Park; Taewoo Kim; Youngcheol Chae** |

## IEEE Solid-State Circuits Letters

## Volume 3 - 2020

Straeussnigg ; Andreas Wiesbauer ; Luis Hernandez

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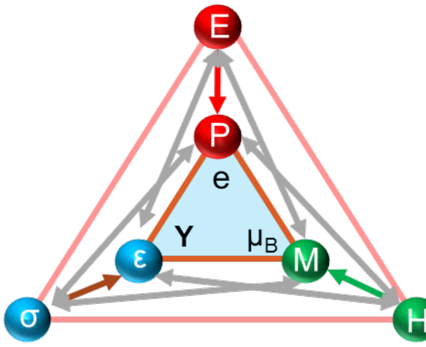
| **A Fully-Synthesizable Fractional-N Injection-Locked PLL for Digital Clocking with Triangle/Sawtooth Spread-Spectrum Modulation Capability in 5-nm CMOS**<br>Bangan Liu ; Yuncheng Zhang ; Junjun Qiu ; Hongye Huang ; Zheng Sun ; Dingxin Xu ; Haosheng Zhang ; Yun Wang ; Jian Pang ; Zheng Li ; Xi Fu ; Atsushi Shirane ; Hitoshi Kurosu ; Yoshinori Nakane ; Shunichiro Masaki ; Kenichi Okada |
| **A 3.2-GHz Quadrature Error Corrector for DRAM Transmitters, Using Replica Serializers and Pulse-Shrinking Delay Lines**<br>Hyeongjun Ko ; Changho Hyun ; Joo-Hyung Chae ; Gi-Moon Hong ; Suhwan Kim |
| **Design and Packaging of a Robust 120-GHz OOK Receiver Used in a Short-Range Dielectric Fiber Link**<br>Simon Ooms ; Patrick Reynaert |
| **610-GHz Fourth Harmonic Signal Reactively Generated in a CMOS Voltage Controlled Oscillator Using Differentially Pumped Varactors**<br>Zhe Chen ; Zhiyu Chen ; Wooyeol Choi ; Kenneth K. O |
| **An Implantable Body Channel Communication System With 3.7-pJ/b Reception and 34-pJ/b Transmission Efficiencies**<br>Beomjin Yuk ; Byeongseol Kim ; Sanggeon Park ; Yeowool Huh ; Joonsung Bae |
| **Design of a Boost DC-DC Converter With 82-mV Startup Voltage and Fully Built-in Startup Circuits for Harvesting Thermoelectric Energy**<br>Jhe-Jia Jhang ; Hung-Hsien Wu ; Tien Hsu ; Chia-Ling Wei |
| **A 2T-MONOS Embedded Flash Macro With 65-nm SOTB Technology Achieving 0.15-pJ/bit Read Energy With 80-MHz Access for IoT Applications**<br>Ken Matsubara ; Tsutomu Nagasawa ; Yoshinobu Kaneda ; Hidenori Mitani ; Takashi Iwase ; Yasunobu Aoki ; Kohei Hashimoto ; Toshiaki Morioka ; Keiichi Maekawa ; Takashi Ito ; Hiroyuki Kondo ; Takashi Kono |

## IEEE Journal on Exploratory Solid-State Computational Devices and Circuits




## Volume 6: 2020 - June

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| **Hybrid-Phase-Transition FET Devices for Logic Computation**<br>Manuel Jiménez ; Juan Núñez ; María José Avedillo |
| **Benchmarking and Optimization of Spintronic Memory Arrays**<br>Yu-Ching Liao ; Chenyun Pan ; Azad Naeemi |
| **Special Topic on Exploratory Devices and Circuits for Compute-in-Memory**<br>Shimeng Yu |
| **Accurate Inference With Inaccurate RRAM Devices: A Joint Algorithm-Design Solution**<br>Gouranga Charan ; Abinash Mohanty ; Xiaocong Du ; Gokul Krishnan ; Rajiv V. Joshi ; Yu Cao |

## Early Access Articles

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| **Accurate Inference with Inaccurate RRAM Devices: A Joint Algorithm-Design Solution**<br>Gouranga Charan ; Abinash Mohanty ; Xiaocong Du ; Gokul Krishnan ; Rajiv V. Joshi ; Yu Cao |
| **A DNA Read Alignment Accelerator based on Computational RAM**<br>Zamshed I. Chowdhury ; Masoud Zabihi ; S. Karen Khatamifard ; Zhengyang Zhao ; Salonik Resch ; Meisam Razaviyayn ; Jian-Ping Wang ; Sachin S. Sapatnekar ; Ulya R. Karpuzcu |

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| **Analyzing the Effects of Interconnect Parasitics in the STT CRAM In-memory Computational Platform**<br>Masoud Zabihi ; Arvind K. Sharma ; Meghna G. Mankalale ; Zamshed I. Chowdhury ; Zhengyang Zhao ; Salonik Resch ; Ulya R. Karpuzcu ; Jian-Ping Wang ; Sachin S. Sapatnekar |
| **Short-Term Long-Term Compute-In-Memory Architecture: A Hybrid Spin/CMOS Approach Supporting Intrinsic Consolidation**<br>Shadi Sheikhfaal ; Ronald F. DeMara |
| **Energy-Efficient Moderate Precision Time-Domain Mixed-Signal Vector-by-Matrix Multiplier Exploiting 1T-1R Arrays**<br>Shubham Sahay ; Mohammad Bavandpour ; Mohammad Reza Mahmoodi ; Dmitri Strukov |

**JxCDC papers listed in order of popularity can be found online HERE.**

**For paper submission details, click HERE.**

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**For Society news and happenings, check out the Summer 2020 issue of the Solid-State Circuits Magazine.**

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