IEEE SOLID-STATE CIRCUITS SOCIETY

Where ICs are in IEEE

September 2019

UPCOMING SSCS WEBINAR

Ultra-Low-Power Integrated Circuits and Physiochemical Sensors for Next-Generation "Unawearables"

Presenter: Prof. Patrick Mercier, University of California, San Diego
Wednesday, October 30th, 2:00 PM ET

Abstract: Wearable devices hold considerable promise to diagnose, monitor, and treat various medical conditions and/or track the real-time status of athletes. However, most current generation wearable devices only monitor a limited number of physical and electrophysiological parameters that are, in many cases, only peripherally related to many health conditions or fitness enterprises. Furthermore, many such wearable devices are large, bulky, and rigid, thereby precluding seamless integration into daily life. Addressing these issues requires: 1) development of new sensor technologies that provide more actionable data in thin, flexible form factors; 2) engineering of supporting electronic infrastructure to condition, digitize, and wirelessly communicate data in an extremely energy efficient manner; and 3) new data analytics to process and understand newly generated data streams. This presentation will discuss emerging sensor technologies that can non-invasively monitor physiochemistry (e.g., glucose, blood alcohol concentration, and lactate) in thin, flexible, and energy-efficiency wearable devices, alongside a brief look at what kind of analytics are necessary to parse and understand this data. We will also cover integrated circuit building blocks and architectures that make acquisition and telemetry of sensed information so energy-efficient that that they can be easily powered from new local energy sources (e.g., wearable glucose biofuel cells). Such net-zero-power operation will ultimately enable devices that are completely autonomous and invisible to the user, to the point where users are virtually unaware of their wearable devices after placement, in other words, they are "unawearable" devices.

Bio: Patrick Mercier is an Associate Professor of Electrical and Computer Engineering and co-founder/co-director of the Center for Wearable Sensors at UC San Diego. He received his B.Sc. degree from the University of Alberta, Canada, in 2006, and the S.M. and Ph.D. degrees from MIT in 2008 and 2012, respectively. Prof. Mercier has received numerous awards, including the NSF CAREER Award in 2018, the Biocom Catalyst Award in 2017, the UCSD Academic Senate Distinguished Teaching Award in 2016, the DARPA Young Faculty Award in 2015, the Beckman Young Investigator Award in 2015, The Hellman Fellowship Award in 2014, the International Solid-State Circuits Conference (ISSCC) Jack Kilby Award in 2010, amongst others. He has published over 110 peer-reviewed papers in venues such as Nature Biotechnology, Nature Communications, ISSCC (13 papers in the last six years), Advanced Science, and others. He is an Associate Editor of the IEEE Transactions on Biomedical Circuits and Systems and the IEEE Solid-State Circuits Letters, is a member of the ISSCC, CICC, and VLSI Technical Program Committees, and has co-edited two books: Power Management Integrated Circuits (CRC Press, 2016), and Ultra-Low-Power Short-Range Radios (Springer, 2015). His research interests include the design of energy-efficient mixed-signal systems, RF circuits, power converters, and sensor interfaces for wearable, medical, and mobile applications.

CLICK HERE TO REGISTER

NEWS

Apply Now: ISSCC Rising Stars 2020

The **IEEE SSCS Women in Circuits** together with **ISSCC** will be sponsoring the first "Rising Stars 2020" for young professionals and students.

The Rising Stars 2020 is an educational workshop for graduate and undergraduate students, and young professionals who have graduated within the last two years, and are interested in learning how to excel at academic and industry careers in computer science, computer and electrical engineering.

20 rising stars in academia and industry will be selected to attend a special dinner, keynote from a high-profile already "Risen Star", and mentoring session. There will be a pre-dinner event introduction and welcome, networking, and poster event for the selected 20 rising stars where leading figures in the solid-state circuits community will be available for an intimate question and answer session.

Application Information: Applicants must be undergraduate, graduate, and young professionals who have graduated within the last two years at the time of the workshop or they must have obtained their last degree no earlier than 2018 and currently do not hold a faculty position.

All applications must be submitted by October 24, 2019 . Notification of acceptance will be sent out by November 12, 2019.

Click here for application instructions and more information.

SSCS Contests for Students

Calling all students! SSCS is pleased to announce the launch of two contests open to undergraduate and graduate students. Prizes are valued up to $2K.

CIRCUITS VIDEO CONTEST

Create a fun short (5-10 minute) video that explains circuits for high school students. Tell a story about a circuits concept. Videos should motivate a real-world application of circuits. Undergraduate and graduate students who are currently enrolled in a college or university may enter. Win up to $2K towards entering an SSCS-sponsored conference. **Click here for more information** on contest eligibility, how to enter, and more. **Submission Deadline: December 15, 2019**

2019-2020 SSCS STUDENT HOODIE DESIGN CONTEST

Design a hoodie that illustrates how integrated circuits power the artificial intelligence era. How do solid-state circuits play a role in the era of artificial intelligence? The winning design will be made into a hoodie (a hooded sweatshirt) and be distributed to all SSCS Student and Graduate Student members at ISSCC 2020. The contest is open only to IEEE SSCS Student and Graduate Student members. One grand prize winner will be selected and awarded $500 in cash prize and reimbursement to a 2020 SSCS sponsored conference of their choice. Two finalists will receive reimbursement to a 2020 SSCS sponsored conference. **Click here for more information**. **Submission Deadline: November 14, 2019.**

Vote Now in the SSCS Election

The SSCS election for Members-at-Large for 2020-2022 is now in progress. We hope you will take the time to exercise your vote and help choose the future direction of the Society.

Click here for voting instructions and to view the candidate slate.

If you are eligible to vote, then you should've received an email with voting instructions.

The voting period will be from September 12 - October 24.

NEW - SSCS Open Access Journal

The IEEE Solid-State Circuits Society (SSCS) is launching a new gold fully open access journal, IEEE Open Journal of Solid-State Circuits, spanning the full scope of the SSCS' fields of interest. The new journal, which will be fully compliant with funder mandates, including Plan S, will begin accepting submissions in fall 2019 and publish its first articles in early 2020.

An Independent editorial board will drive SSCS' commitment to publish high-quality articles including cutting-edge studies and breakthroughs in integrated circuits. The new journal will

follow IEEE's established high standard of peer review, drawing on experts in the field to continue to publish the most highly cited content in field of interests.

The journal will be led by Jan Craninckx, imec, Leuven, Belgium.

For more information, please visit **open.ieee.org** or complete the **form** to receive an email when the journal will begin accepting submissions.

NEW! Get your SSCS Membership Certificate

Steps to download and print your certificate

1). **Log into Collabratec**
2). Click your name in the top right of the screen and select "Member Certificates" from the drop-down menu
3). From the "Member Certificates" page, click on the "Download PDF" link to the right of "IEEE Solid-State Circuits Society Membership"
4). Open the PDF and print it

IEEE Learning Network

The IEEE Learning Network (ILN) is an engineer's place to find IEEE continuing education. The ILN makes it easier for SSCS members to find the IEEE online learning content that you seek. Start learning today!

PUBLICATIONS

The latest in SSCS Flagship Publications...

IEEE Journal of Solid-State Circuits

Vol. 54, Issue 9, September 2019

Introduction to the Special Section on the 2018 IEEE BCICTS Conference **Shahriar Shahramian**
Analysis and Design of Wideband I/Q CMOS 100-200 Gb/s Modulators

Hasan Al-Rubaye ; Gabriel M. Rebeiz

Design of a 55-nm SiGe BiCMOS 5-bit Time-Interleaved Flash ADC for 64-Gbd 16-QAM Fiberoptics Applications
Alireza Zandieh ; Peter Schvan ; Sorin P. Voinigescu

Broadband 240-GHz Radar for Non-Destructive Testing of Composite Materials
Thomas Merkle ; Dominik Meier ; Sandrine Wagner ; Axel Tessmann ; Michael Kuri ; Hermann Massler ; Arnulf Leuther

A Three-Stage 18.5-24-GHz GaN-on-SiC 4 W 40% Efficient MMIC PA
Maxwell Robert Duffy ; Gregor Lasser ; Guillermo Nevett ; Michael Roberg ; Zoya Popović

20-nm In0.8 Ga0.2 As MOSHEMT MMIC Technology on Silicon
Axel Tessmann ; Arnulf Leuther ; Felix Heinz ; Frank Bernhardt ; Laurenz John ; Hermann Massler

A Fully Integrated 384-Element, 16-Tile, W -Band Phased Array With Self-Alignment and Self-Test
Shahriar Shahramian ; Michael J. Holyoak ; Amit Singh ; Yves Baeyens

A 115-135-GHz 8PSK Receiver Using Multi-Phase RF-Correlation-Based Direct-Demodulation Method
Hossein Mohammadnezhad ; Huan Wang ; Andreia Cathelin ; Payam Heydari

A 0.34-THz Wideband Wide-Angle 2-D Steering Phased Array in 0.13- Î¼ m SiGe BiCMOS
Hossein Jalili ; Omeed Momeni

A 4-GHz Low-Power, Multi-User Approximate Zero-IF FM-UWB Transceiver for IoT
Vladimir Kopta ; Christian C. Enz

RF Filter Synthesis Based on Passively Coupled N-Path Resonators
Pingyue Song ; Hossein Hashemi

A 1-2 GHz Computational-Locking ADPLL With Sub-20-Cycle Locktime Across PVT Variation
Fahim ur Rahman ; Greg Taylor ; Visvesh Sathe

A 320-fs RMS Jitter and - 75-dBc Reference-Spur Ring-DCO-Based Digital PLL Using an Optimal-Threshold TDC
Taeho Seong ; Yongsun Lee ; Seyeon Yoo ; Jaehyouk Choi

Analysis and Correction of Noise Injection Due to Parallel-Output-Misalignment (POM) Effects in Ring-Type Time-to-Digital Converters (TDCs)
Tuoxin Wang ; John W. M. Rogers ; Krste Mitric

A 1-V 175-u W 94.6-dB SNDR 25-kHz Bandwidth Delta-Sigma Modulator Using Segmented Integration Techniques
Sheng-Hui Liao ; Jieh-Tsorng Wu

A 9.1-ENOB 6-mW 10-Bit 500-MS/s Pipelined-SAR ADC With Current-Mode Residue Processing in 28-nm CMOS
Kyoung-Jun Moon ; Dong-Shin Jo ; Wan Kim ; Michael Choi ; Hyung-Jong Ko ; Seung-Tak Ryu

Study and Design of a Fast Start-Up Crystal Oscillator Using Precise Dithered Injection and Active Inductance
Alireza Karimi-Bidhendi ; Haoran Pu ; Payam Heydari

Single-Chip 3072-Element-Channel Transceiver/128-Subarray-Channel 2-D Array IC With Analog RX and All-Digital TX Beamformer for Echocardiography
Yutaka Igarashi ; Shinya Kajiyama ; Yusaku Katsube ; Takuma Nishimoto ; Tatsuo Nakagawa ; Yasuyuki Okuma ; Yohei Nakamura ; Takahide Terada ; Taizo Yamawaki ; Toru Yazaki ; Yoshihiro Hayashi ; Kazuhiro Amino ; Takuya Kaneko ; Hiroki Tanaka

A 1.17-Megapixel CMOS Image Sensor With 1.5 A/D Conversions per Digital CDS Pixel Readout and Four In-Pixel Gain Steps
Øyvind Janbu ; Robert Johansson ; Tore Martinussen ; Johannes Solhusvik

A Reconfigurable Cross-Connected Wireless-Power Transceiver for Bidirectional Device-to-Device Wireless Charging
Fangyu Mao ; Yan Lu ; Rui P. Martins

Analysis and Design of a Multi-Step Bias-Flip Rectifier for Piezoelectric Energy

Harvesting Sundeep Javvaji ; Vipul Singhal ; Vinod Menezes ; Rajat Chauhan ; Shanthi Pavan
Design of Sub-Gigahertz Reconfigurable RF Energy Harvester From â^'22 to 4 dBm With 99.8% Peak MPPT Power Efficiency Zizhen Zeng ; Shanpu Shen ; Xiaopeng Zhong ; Xing Li ; Chi-Ying Tsui ; Amine Bermak ; Ross Murch ; Edgar Sánchez-Sinencio
Self-Convergent Trimming SRAM True Random Number Generation With In-Cell Storage Po-Shao Yeh ; Chih-An Yang ; Yi-Hong Chang ; Yue-Der Chih ; Chrong-Jung Lin ; Ya-Chin King
Reconfigurable Clock Networks for Wide Voltage Scaling Longyang Lin ; Saurabh Jain ; Massimo Alioto

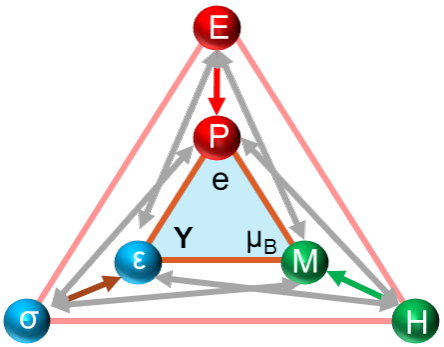
IEEE Solid-State Circuits Letters

Issue 8, August 2019

A 6-140-nW 11 Hz-8.2-kHz DVFS RISC-V Microprocessor Using Scalable Dynamic Leakage-Suppression Logic Daniel S. Truesdell ; Jacob Breiholz ; Sumanth Kamineni ; Ningxi Liu ; Albert Magyar ; Benton H. Calhoun

IEEE Journal on Exploratory Solid-State Computational Devices and Circuits

Issue 2, Part 1 - December 2019



Nonvolatile Spintronic Memory Cells for Neural Networks Andrew W. Stephan ; Qiuwen Lou ; Michael T. Niemier ; Xiaobo Sharon Hu ; Steven J. Koester

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

For paper submission details, click HERE.

EDUCATION

October 2019 Distinguished Lectures

SSCS San Diego	Mixed-Signal Technologies for Ultra-Wide Band Signal Processing Systems	October 3, 2019	Qualcomm San Diego **For more information, click here.**
SSCS Lehigh Valley	Continuous-Time Sigma-Delta ADCs for Receiver Application - Presented by Maurits Ortmanns	October 7, 2019	Lehigh University **For more information, click here.**
SSCS Princeton/Central NJ	Talk Title: TBD - Presented by Maurits Ortmanns	October 8, 2019	Princeton University **For more information, click here.**
SSCS/EDS New York	Talk Title TBD - Presented by Maurits Ortmanns	October 9, 2019	Columbia University **For more information, click here.**

CALL FOR PAPERS

2020 VLSI-DAT: Call for Papers

2020 International Symposium on VLSI Design, Automation, and Test

April 20-23, 2020

Hsinchu, Taiwan

www.expo.itri.org.tw/2020vlsidat

The International Symposium on VLSI Technology, Systems and Applications (VLSI-TSA symposium) held once every two years, gathers experts from all over the world. Scientists and engineers discuss and present the state-of-the-art technology R&D and macro development of the industry's future. It is considered the most important event in Taiwan's semiconductor industry and highly anticipated by local companies. Taking advantage of the information learned during the conference, the symposium hopes to create new opportunities for Taiwan's semiconductor industry. The VLSI-TSA symposium is becoming more significant since Taiwan not only occupies a prominent position in the global semiconductor industry, but also is increasingly competitive globally in IC design technology and communications information products.

The VLSI-DAT symposium is proud to create a platform for technical exchanges and communications shared by experts from all over the world. The purpose is to bring together scientists and engineers actively engaged in research, development, and manufacturing on VLSI Design, Automation and Test to discuss current progress in this field.

Original, unpublished papers on all aspects of VLSI Design, Automation, and Test are solicited, including but not limited to:

ANALOG DESIGN	DIGITAL DESIGN	EDA	TEST
RF, Analog and Mixed Signal Circuits	Digital Circuits and ASICs	Logic and Behavioral Synthesis	Test Generation and Compression
Sensors and Interface Circuits	CPU, DSP and Multicore Architectures	Physical Design and Verification	Design-for-Testability and BIST
Memory Circuits and Systems	Multimedia Processing Designs	Design for Manufacturability	RF, Analog and Mixed-Signal Test
Biomedical Circuits	Communication Designs	Power/Thermal Estimation and Optimization	Memory Test
Energy-Harvesting and Power Circuits	Hardware Security and Trust	Design Verification	SOC and System Level Test
Ultra Low-Power Circuits and Systems	Designs for Edge Computing	Modeling and Simulation	Silicon Debug and Diagnosis
Memristive and Neuromorphic Circuits	Designs for Machine Learning	Electronic System Level Design	3D IC and Interposer-Based IC Test
Security Circuits for IoT and AI	SOC and NOC Architectures	Hardware/Software Co-Design	Yield and Reliability Enhancement
	Embedded System and Software	Machine Learning for EDA	On-Chip Monitoring
	System-in-Package Designs	Analog EDA	Test Data Mining and Learning
		EDA for Microfluidic Biochips	Test Standards

Important Dates:
Paper Submission Deadline: Oct. 15, 2019
Notification of Paper Acceptance: Dec. 31, 2019
Final Paper Submission Deadline: Jan. 31, 2020
Author Registration Deadline: Feb. 29, 2020

Click here for more information

Call for Papers: CICC 2020

IEEE Custom Integrated Circuits Conference

March 22 - 25, 2019

Boston, MA

http://ieee-cicc.org/

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.

There are 3 days of Technical Sessions that include lecture presentations addressing state of the art developments in integrated circuit design. The Educational Sessions are a full day of tutorials instructed by recognized invited speakers. The Panels, and Forums are presented throughout the conference to enrich the learning experience of the attendees. The Panel Discussions and Forums are presented by leaders from the IC industry. CICC includes an Exhibits Hall that is open in the evenings where Semiconductor manufacturers, software tool suppliers, silicon IP providers, design-service houses, and technical book publishers offer displays and demonstrations of their products. CICC is sponsored by the IEEE Solid-State Circuits Society and technically co-sponsored by the IEEE Electron Devices Society.

Submission of original and unpublished work is being solicited in the following areas:

- **Analog Circuits and Techniques** for areas such as communications, biomedical, aerospace, automotive, energy, environment, analog computing and security applications, ranging from building blocks to silicon sensors, interfaces, and novel clock generation architectures.

- **Data Converters** including but not limited to A/D, D/A, time-to-digital, frequency-to-digital and analog to information converters of all types enabled by new techniques, architectures, or technologies.

- **Design Foundations** for novel digital, analog, mixed-signal, and memory circuit techniques for present and emerging applications (deep learning, autonomous vehicles, IoT, security, quantum computing). Modeling and simulation of advanced CMOS (FinFET, UTTB-SOI) and beyond-CMOS devices (MEMS, GaN, Non-Volatile Memories, STT) to improve design quality, efficiency, and reliability. Design for manufacturing, test, aging, security, and reliability (novel DFT circuits, system-level testing). High-level system modeling, digital/analog design infrastructure, and verification and emulation for complex SoCs.

- **Digital Circuits, SoCs, and Systems** solicit hardware-based papers in technologies that enhance integrated systems including processors, accelerators, memory systems, with applications in artificial intelligence, security, autonomous transportation, cloud computing, sensing, and communication.

- **Emerging Technologies, Systems, and Applications** solicit hardware focused papers in the technologies of tomorrow extending from new device to system integration and applications with focus on, but not limited to:

    - **Next-generation technology and sensors** including devices, integration, and packaging including nano-primitives, non-silicon based technology, and advanced assembly. Sensor interfaces for MEMS, mm-wave/THz, flexible, printed, large-area and organic electronics, electronic-photonic co-design, and silicon photonics.
    - **Biomedical circuits, systems, and applications** including neural interfaces, microarrays, lab-on-a-chip, bio-inspired circuits, implantable and/or wearable systems, closed-loop systems with sensing and actuation, medical imaging, and other biosensors including biomedical signal processing SoCs.

- **Power Management** circuits and design techniques including DCDC converters, control and management circuits, linear regulators, wireless power transfer, and other methods for improvements in overall system efficiency and performance.

- **Wireless Transceivers and RF/mm-Wave Circuits and Systems** for low-power, energy-efficient and high performance wireless links, biomedical and sensing networks, IoT applications, cellular connectivity including M2M applications (LTE-M, NB-IoT), emerging broadband and MIMO networks (5G, WLAN), vehicle-to-vehicle (V2V), millimeter-wave & THz systems (radar, sensing and imaging), frequency synthesis and LO generation.

- **Wireline and Optical Communications Circuits and Systems** for electrical and optical communications, including serial links for intra-chip and chip-to-chip interconnections, high-speed memory and graphics interfaces, backplanes, long-haul, and power line communications; novel I/O circuits for advancing data rates, improving power efficiency, and supporting extended voltage applications; clocking techniques including PLLs and CDRs; components such as equalizers, high-speed ADC-RX/DAC-TX, silicon photonic and optical interface circuitry.

Important Dates:
Paper Submission Deadline: November 1, 2019
Paper Acceptance Notification: January 31, 2020

Click here for more information

Call for Tutorial Proposals: AICAS 2020

2nd IEEE Conference on Artificial Intelligence Circuits and Systems

March 23rd - 25th, 2020

Genova, Italy

www.aicas2020.eu

The objective of the AICAS 2020 Tutorial Program is to provide participants with an inspiring and informative selection of tutorials that reflect current topics in AI circuits and systems related research and development.

Tutorials will cover a one to three-hour period with ten minutes at the end for questions. They will be held in the morning before the technical sessions.

We encourage submissions of tutorial proposals on the topics including but not limited to:

- Circuits and systems for AI
- Deep learning/machine learning/AI algorithms
- Tools/Platforms for AI
- Architecture for AI computing
- Edge and cloud AI computing platforms
- Hardware accelerators
- Neuromorphic processors and computing
- Hardware/software co-design and design automation for AI systems
- Advanced neural network design
- Emerging applications: Deep learning for Internet-of-Things
- Emerging applications of AI: Medical AI
- Emerging applications of AI: Autonomous Vehicle
- Emerging applications of AI: Smart Factory and Environment
- Emerging applications of AI: Robotics

Prospective organizers of tutorial program should submit proposals to the Tutorial Chair indicating: Title of the tutorial, Area of the tutorial (refer to the above topics), Presenter(s) and their CV, Target audience and prerequisite knowledge of audience, 300 words abstract (for inclusion on webpage and in registration materials), Full description (1-2 pages to be used for evaluation),Keywords, Detailed contact information of all presenters (and indication of the main contact person).

Contact tutorial chair, email: tutorials@aicas2020.eu

Deadline for Proposals: November 10th, 2019

The regular papers (4 pages) and live demo (1 page) submission deadline for AICAS 2020 has been extended by one week to Monday, October 7th midnight CET (GMT+1, central European time). Submission instructions can be found at: https://aicas2020.eu/submissions.

CONFERENCES

Upcoming 2019 SSCS-Sponsored Conferences

2019 IEEE Biomedical Circuits and Systems Conference (BioCAS) Nara, Japan	**October 17 - 19, 2019**
2019 IEEE BiCMOS and Compound Semiconductor Integrated Circuits and Technology Symposium (BCICTS) Nashville, Tennessee	**November 3 - 6, 2019**
2019 IEEE Asian Solid-State Circuits Conference (A-SSCC) Macau, China	**November 4 - 6, 2019**

SSCS-Sponsored Conferences: Proceedings

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

2018

2018 IEEE International Solid-State Circuits Conference (ISSCC)
2018 IEEE Custom Integrated Circuits Conference (CICC)
2018 IEEE Symposium on VLSI Circuits (VLSI)
2018 IEEE 44th European Solid-State Circuits Conference (ESSCIRC)
2018 IEEE Asian Solid-State Circuits Conference (A-SSCC)

2019

2019 IEEE International Solid-State Circuits Conference (ISSCC)
2019 IEEE Custom Integrated Circuits Conference (CICC)

For Society news and happenings, check out the Summer 2019 issue of the Solid-State Circuits Magazine.

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