IEEE SOLID-STATE CIRCUITS SOCIETY

Where ICs are in IEEE

September 2017

NEWS

Upcoming Webinar

CMOS Transceiver Circuits for Short-Reach Optical Communication

Presented by Professor Tony Chan Carusone

Monday, October 23rd @ 12 PM ET

Professional Development Hours can be requested for this webinar

CLICK HERE TO REGISTER!

This webinar was prerecorded. Prof. Chan Carusone will be available during the presentation to answer questions regarding content, formulas, or theories. Please follow the link to register for the webinar which is free and open to all SSCS members.

Abstract: Optical links 1 - 100 metres in length require low cost, low power consumption and small size. Vertical cavity surface emitting lasers (VCSELs) can be arrayed inexpensively and can be directly modulated,

avoiding the need for separate optical modulator components. VCSELs coupled to multimode fiber offer a compact and inexpensive optoelectronic assembly, and are predominant for short reach optical communication. The key challenge for the transmitter circuit in such systems is to modulate single-ended VCSEL currents up to about 10mA at 25+Gb/s while maintaining bias voltages of approximately 2V across the VCSELs, and contending with inherent laser nonlinearity. At the receiver, a key challenge is to provide adequate sensitivity using photodiodes with wide (50um) aperture and, hence, large capacitance. Current commercial transceiver circuits are realized in SiGe BiCMOS, which is advantageous at both the transmitter and receiver, but CMOS offers the potential for higher levels of integration and lower power consumption. Our research efforts on low-power CMOS VCSEL drivers and optical receivers will be presented, including 65nm & 28nm CMOS designs.

Bio: Tony Chan Carusone has been a professor in the Department of Electrical and Computer Engineering at the University of Toronto since 2001. He has co-authored a total of 6 best paper award winners at the Custom Integrated Circuits Conference, Compound Semiconductor I.C. Symposium, and European Solid-State Circuits Conference. He has served as Editor-in-Chief of the IEEE Transactions on Circuits and Systems II: Express Briefs, and as a member of several technical program committees. He currently serves on the editorial board of the IEEE Journal of Solid-State Circuits, and on the technical program committee for ISSCC. Prof. ChanCarusone is a regular consultant to industry, and an author of the textbook "Analog Integrated Circuit Design".

2018 - 2020 SSCS Member-at-Large Election

For election of members to the SSCS Administrative Committee for a three-year term (1 January 2018 - 31 December 2020).

To view the candidates on the slate and read their bios, **click here**.

The election is now and open closes on October 27, 2017 at 4 PM (ET). If you are eligible to vote, you should have received an email. Voting can be done online. **PLEASE CLICK HERE TO VOTE**. You can also follow the link in the email. If you would like to have a paper ballot mailed to you, please email your name, address, and member number and reference the SSCS election ballot to **ieee-sscsvote@ieee.org** or call 732-562-3904.

If you have any questions, please contact **ieee-sscsvote@ieee.org** or 732-562-3904.

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For more information on IEEE Senior Member Grade, please **click here**. If you have any questions or concerns, or need assistance obtaining references, email **sscs-membership@ieee.org**.

The next Senior Member review panel is in November. Become a Senior Member now!

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SSCS Resource Center

NEW! SSCS Members, IEEE Members, and Non-Members can now earn Professional Development Hours (PDH's) and Continuing Education Units (CEU's) for our CONFx series.

In an effort to increase member benefits, SSCS has created the SSCS Resource Center. This informational hub will house technical information such as past webinar videos and slides, ISSCC tutorials and short courses, and more.

Top 3 Downloaded Products on the SSCS Resource Center:

1). Demystifying Linear Time Varying Circuits by Shanthi Pavan

2). Enabling and Exploiting Machine Learning in Ultra-low-power Devices by Naveen Verma

3). Bringing Flexibility to Ultra Low Energy IoE Circuits and Systems by Edith Beigne

Click here to visit the SSCS Resource Center.

Earn Continuing Education Hours

Have you attended an SSCS webinar? Attendees of upcoming and past webinars have the opportunity to earn professional development hours. Certificates of completion are offered to participants who view a webinar. A certificate of completion confirms one hour of professional development. After you attend the webinar, you may request a certificate of completion by completing the form **HERE**.

EDUCATION

Upcoming Distinguished Lecturer Events in October

	SPEAKER	CHAPTER	TOPIC
October 2	Harish Krishnaswamy	SSCS Singapore	Integrated Non-reciprocal Components Based on Linear Time-varying Circuits For more information, please click here
October 3	Vivek De	SSCS/MTT/ED Penang Joint Chapter	TBD For more information, please click here
October 3 - October 6	Yong Ping Xu, Vivek De, Harish Krishnaswamy, Jerald Yoo	SSCS/MTT/ED Penang Joint Chapter	High-Performance MEMS Oscillating Accelerometers Circuit Building Blocks for Hardware Security Full Duplex Wireless: From Integrated Circuits to Networks Design Strategies for wearable sensor interface circuits - from electrodes to signal processing For more information, please click here
October 9	Sorin Voinigescu	SSCS Germany	TBD For more information, please click here
October 11	Yong Ping Xu & Nick Van Helleputte	SSCS Central Texas	TBD For more information, please click here
October 11	Pieter Harpe	University of Michigan	Ultra-low power analog front-end design

			For more information, please click here
October 13	Pieter Harpe	Northeastern University	Ultra-low power analog front-end design For more information, please click here
October 13	Sorin Voinigescu	SSCS Romania	TBD For more information, please click here
October 16	David Stoppa	SSCS Indonesia	CMOS Sensors and Readout Circuits for Three-Dimensional Imaging For more information, please click here
October 17	Sven Mattisson	SSCS/CAS Greece Joint Chapter	From Bluetooth...to 5G For more information, please click here
October 20	Pieter Harpe	SSCS Utah	Basics of low-power SAR ADCs Advanced SAR ADCs - efficiency, accuracy, calibration, and references For more information, please click here
October 26	Yong Ping Xu	SSCS Sinapore	High Performance MEMS Inertial Sensors For more information, please click here
October 30	Azita Emami	SSCS Central Texas	TBD For more information, please click here
October 30 - November 2	Edith Beigne & Ken Stevens	SSCS Argentina	TBD For more information, please click here

For more information on upcoming Distinguished Lecturer Tours, CLICK HERE.

CONFERENCES

Upcoming Conferences

2017 IEEE Biomedical Circuits and Systems Conference (BioCAS) Italy	**October 19 - 21, 2017**
2017 IEEE Bipolar/BiCMOS Circuits and Technology Meeting - BCTM Florida	**October 19 - 21, 2017**
2017 IEEE Asian Solid-State Circuits Conference (A-SSCC) Korea (South)	**November 6 - 8, 2017**
2018 International Solid-State Circuits Conference (ISSCC) San Francisco, CA	**February 11 - 15, 2018**
2018 IEEE Custom Integrated Circuits Conference (CICC) San Diego, CA	**April 8 - 11, 2018**

Young Professionals in Space

Young Professionals in Space is an event planned by the IEEE Young Professionals (YP) Affinity Group from 24th to 26th November 2017 at the Sterlings Mac Hotel, Bengaluru, India.

Young Professionals in Space (YPS) is an initiative to bring scientists, practitioners, engineers, and leaders of the space industry and agencies under one roof. Join us for discussion on recent research breakthroughs, technical advancements, existing opportunities, and emerging space technologies. This three-day program brings in scientists, experts, engineers and researchers from different disciplines of space technology and engineering. This event addresses the wild west of space applications, startups in space, a hands-on space bootcamp cube satellite development, and many other events.

Click here to register!

CALL FOR PAPERS

2018 IEEE Custom Integrated Circuits Conference (CICC) - Call for Papers

IEEE CICC 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 2018 welcomes submissions of original and unpublished work on:

- **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.
- **Power Management** circuits and design techniques including DC-DC converters, control and management circuits, linear regulators, wireless power transfer, and other methods for

improvements in overall system efficiency and performance.

- **Data Converters** of all types enabled by new techniques, architectures, or technologies.
- **Wireless Transceivers and RF/mm-Wave Circuits** 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.
- **Design Foundations**
  - High-level system modeling, digital design infrastructure, and mixed-mode (analog-digital) verification for complex SOCs. Novel digital architectures for emerging applications. Design methodologies for functional safety.
  - Modeling and simulation of advanced CMOS and power devices to improve design quality, efficiency, and reliability. Design methodologies for emerging applications (deep learning, automobile, IoT, security), and design for manufacture, test, aging and reliability (novel DFT circuits, system-level testing).
- **Emerging Technologies, Systems, and Applications** - Emerging technologies solicit hardware focused papers in the technologies of tomorrow extending from new device and memory technology to system integration, applications and packaging with focus on, but not limited to:
  - **Hardware-based artificial intelligence and security**. Hardware designs for emerging algorithms, hardware security, hardware and energy-efficient artificial intelligence, machine learning, deep learning accelerators. Applications include autonomous transportation and cloud computing.
  - **Next-generation devices, technology, integration and packaging** including nano-primitives, non-silicon based technology, MEMS, emerging memories, non-traditional circuits, mm-wave/THz passives and integration, flexible, printed, large-area and organic electronics. system in package, 2.5D, 3D and monolithic 3DIC, multi-die heterogeneous integration, silicon photonic interconnects and packaging, advanced assembly and bonding, embedded cooling technologies,
  - **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.

Paper Submission Information: The deadline for submission of technical papers is November 6, 2017. Authors of accepted papers will be notified via email by January 16, 2018. Top-rated papers are eligible for publication in a special issue of IEEE Journal of Solid-State Circuits.

For more information on paper submission, visit **www.ieee-cicc.org.**

RFIC 2018: IEEE Radio Frequency Integrated Circuits Symposium - Call for Papers

The 2018 IEEE Radio Frequency Integrated Circuits Symposium (RFIC 2018) will be held in Philadelphia, PA, USA on June 10-12, 2018. For latest information, please visit **rfic-ieee.org**.

The conference is soliciting papers describing original work in RFIC circuits, systems engineering, design methodology, RF modeling and CAD simulation, RFIC technologies, devices, fabrication, testing, reliability, packaging and modules to support RF applications in areas such as, but not limited to:

- **Wireless Cellular and Connectivity:** 2G/3G/4G/5G (sub-6GHz), LTE, WWAN, WLAN, BT, GPS, FM,UWB

- **Low Power Transceivers:** RFID, NFC, Zigbee, 802.15.4, WPAN, WBAN, Biomedical, Sensor Nodes, IR-UWB, Wake-up Receivers
- **Receiver Sub-Systems and Circuits:** LNAs, Mixers, VGAs, phase shifters, switches, Integrated FEM, amplifiers, filters, demodulators
- **Mixed-Signal RF and Data Converters:** RF and baseband converters(ADC/DAC),Sub-sampling/Over-sampling Circuits
- **Reconfigurable and Tunable Front-Ends:** SDR/Cognitive Radio,Wideband/Multi-band Front-Ends,Interference Cancellation, Full-Duplex, Adaptive Front-Ends
- **Transmitter Sub-Systems and Power Amplifiers:** Power Amplifiers, Drivers, modulators, digital transmitters, Advanced TX circuits, linearization and efficiency enhancement techniques
- **Oscillators:** VCOs, injection-locking frequency dividers/multipliers
- **Frequency Synthesis:** PLLs, DLLs, MDLLS, DDS, LO drivers, frequency dividers
- **Device Technologies, Packaging, Modeling, and Testing:** CMOS, SOI, FinFet, SiGe, GaAs, GaN, MEMS, Integrated Passives, Photonic, Emerging Devices, Reliability, Packaging, Modeling and Testing, EM Modeling/Co-Simulation, Built-in-Self-Test (BIST)
- **Millimeter-and SubMillimeter Wave Systems:** >20GHzSoCs/SiPs for wireless communication (5Gmm-Wave, WiGig, 802.11ay), phased-arrays, imaging, radar, remote sensing
- **High-Speed Data Transceivers:** Wireline, Optical Transceivers, and CDRs for High-Speed Data links

NEW THIS YEAR - A double-blind review process will be used to ensure anonymity for both authors and reviewers.

Electronic Submission Deadlines- Technical Paper Summaries in PDF Format are due 12 January 2018, Final Manuscripts for the Digest and USB are due 22 March 2018.

Submissions must be made at **rfic-ieee.org**.

2018 Symposium on VLSI Circuits: Call for Papers

The 2018 Symposium on VLSI Circuits will be held at the Hilton Hawaiian Village, Honolulu, Hawaii, USA on Monday, June 18, 2018 to Friday, June 22, 2018. Short courses will be held on June 18, the technical sessions will be held on June 19, June 20, and June 21, and the forum will be held on June 22.

The Circuits Symposium is seeking papers and placing special emphasis on several innovative system focus areas. Paper submissions are encouraged in the following areas:

- Machine and deep learning
- Internet of Things
- Industrial electronics
- Big Data management and analytics
- Robotics and autonomous transportation

In addition, submissions are welcomed in all of the following circuits areas:

- Processors, architectures, and SoCs
- Digital circuits, signal integrity, and IOs
- Memory circuits, architectures, and interfaces
- Biomedical circuits
- Sensors,imagers, and display circuits
- Power conversion circuits
- Analog, amplifier and filter circuits
- Wireless receivers and transmitters
- Data converters
- Frequency generation and clock circuits
- Wireline receivers and transmitters

Submission Due Date: Monday, January 29, 2018 @ 23:59 PST.

The symposia website is the central resource for additional information, including details on paper submissions - **http://vlsisymposium.org**

PUBLICATIONS

IEEE Author Center

The IEEE Author Center is now live. The **IEEE Author Center** is a standalone site for journal authors that provides a one-stop shop to learn about publishing with IEEE. This comprehensive source of up-to-date content is written from the author's perspective in simple, engaging language and is easily viewed in mobile. The content is organized to follow the author's path through the publishing process, from writing the article through to post-publication.

The latest in SSCS Flagship Publications...

IEEE Journal of Solid-State Circuits

Vol. 52, Issue 10, October 2017

Introducing Our Sister Publication: IEEE Solid-State Circuits Letters John R. Long ; Jan Craninckx ; Behzad Razavi
Introduction to the Special Section on the 2016 Asian Solid-State Circuits Conference (A-SSCC 2016) Deog-Kyoon Jeong ; Jaeha Kim
A Low-Noise Area-Efficient Chopped VCO-Based CTDSM for Sensor Applications in 40-nm CMOS Chih-Chan Tu ; Yu-Kai Wang ; Tsung-Hsien Lin
Multiple-Loop Design Technique for High-Performance Low-Dropout Regulator Quoc-Hoang Duong ; Huy-Hieu Nguyen ; Jeong-Woon Kong ; Hyun-Seok Shin ; Yu-Seok Ko ; Hwa-Yeol Yu ; Yong-Hee Lee ; Chun-Hyeon Bea ; Ho-Jin Park
Triple-Mode, Hybrid-Storage, Energy Harvesting Power Management Unit: Achieving High Efficiency Against Harvesting and Load Power Variabilities Jiangyi Li ; Jae-sun Seo ; Ioannis Kymissis ; Mingoo Seok
A 10-b 800-MS/s Time-Interleaved SAR ADC With Fast Variance-Based Timing-Skew Calibration Jeonggoo Song ; Kareem Ragab ; Xiyuan Tang ; Nan Sun
60-dB SNDR 100-MS/s SAR ADCs With Threshold Reconfigurable Reference Error Calibration Chi-Hang Chan ; Yan Zhu ; Cheng Li ; Wai-Hong Zhang ; Iok-Meng Ho ; Lai Wei ; Seng-Pan U ; Rui Paulo Martins
Reprogrammable Redundancy for SRAM-Based Cache Vmin Reduction in a 28-nm RISC-V Processor Brian Zimmer ; Pi-Feng Chiu ; Borivoje Nikolić ; Krste Asanović
A 41.3/26.7 pJ per Neuron Weight RBM Processor Supporting On-Chip Learning/Inference for IoT Applications Chang-Hung Tsai ; Wan-Ju Yu ; Wing Hung Wong ; Chen-Yi Lee
A 79-GHz 2 Ã- 2 MIMO PMCW Radar SoC in 28-nm CMOS Davide Guermandi ; Qixian Shi ; Andy Dewilde ; Veerle Derudder ; Ubaid Ahmad ;

Annachiara Spagnolo ; Ilja Ocket

A 1.9-mW 750-kb/s 2.4-GHz F-OOK Transmitter With Symmetric FM Template and High-Point Modulation PLL
Yining Zhang ; Ranran Zhou ; Woogeun Rhee ; Zhihua Wang

A 7.9-GHz Transformer-Feedback Quadrature Oscillator With a Noise-Shifting Coupling Network
Bingwei Jiang ; Howard C. Luong

Fractional-N DPLL-Based Low-Power Clocking Architecture for 1-14 Gb/s Multi-Standard Transmitter
Masum Hossain ; Waleed El-Halwagy ; AKM Delwar Hossain ; Aurangozeb

A 32.75-Gb/s Voltage-Mode Transmitter With Three-Tap FFE in 16-nm CMOS
Kok Lim Chan ; Kee Hian Tan ; Yohan Frans ; Jay Im ; Parag Upadhyaya ; Siok Wei Lim ; Arianne Roldan ; Nakul Na

A Neuromorphic Chip Optimized for Deep Learning and CMOS Technology With Time-Domain Analog and Digital Mixed-Signal Processing
Daisuke Miyashita ; Shouhei Kousai ; Tomoya Suzuki ; Jun Deguchi

A 1.1-mW Ground Effect-Resilient Body-Coupled Communication Transceiver With Pseudo OFDM for Head and Body Area Network
Wala Saadeh ; Muhammad Awais Bin Altaf ; Haneen Alsuradi ; Jerald Yoo

Energy-Efficient Reconfigurable SRAM: Reducing Read Power Through Data Statistics
Chuhong Duan ; Andreas J. Gotterba ; Mahmut E. Sinangil ; Anantha P. Chandrakasan

A 2-GS/s 8-bit Time-Interleaved SAR ADC for Millimeter-Wave Pulsed Radar Baseband SoC
Takuji Miki ; Toshiaki Ozeki ; Jun-ichi Naka

A 170-GHz Fully Integrated Single-Chip FMCW Imaging Radar with 3-D Imaging Capability
Ali Mostajeran ; Andreia Cathelin ; Ehsan Afshari

A 48-MHz Differential Crystal Oscillator With 168-fs Jitter in 28-nm CMOS
Yashar Rajavi ; Mohammad Mahdi Ghahramani ; Alireza Khalili ; Amirpouya Kavousian ; Beomsup Kim ; Michael P. Flynn

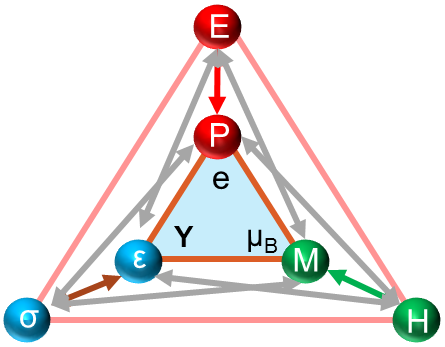
An Inductorless Bias-Flip Rectifier for Piezoelectric Energy Harvesting
Sijun Du ; Ashwin A. Seshia

An Efficient Buck/Buck-Boost Reconfigurable LED Driver Employing SIN2 Reference
Kunhee Cho ; Ranjit Gharpurey

A 65-nm ReRAM-Enabled Nonvolatile Processor With Time-Space Domain Adaption and Self-Write-Termination Achieving >4Ãƒâ€" Faster Clock Frequency and >6Ãƒâ€" Higher Restore Speed
Zhibo Wang ; Yongpan Liu ; Albert Lee ; Fang Su ; Chieh-Pu Lo ; Zhe Yuan ; Jinyang Li ; Chien-Chen Lin ; Wei-Hao Chen ; Hsiao-Yun Chiu ; Wei-En Lin ; Ya-Chin King ; Chrong-Jung Lin ; Pedram Khalili Amiri ; Kang-Lung Wang ; Meng-Fan Chang ; Huazhong Yang

IEEE Journal on Exploratory Solid-State Computational Devices and Circuits

2017 Highlights



An Energy-Efficient Digital ReRAM-Crossbar-Based CNN With Bitwise Parallelism *Leibin Ni ; Zichuan Liu ; Hao Yu ; Rajiv V. Joshi*
Nonboolean Pattern Recognition Using Chains of Coupled CMOS Oscillators as Discriminant Circuits Vahnood Pourahmad ; Sasikanth Manipatruni ; Dmitri Nikonov ; Ian Young ; Ehsan Afshari
Compact Modeling of Distributed Effects in 2-D Vertical Tunnel FETs and Their Impact on DC and RF Performances Jie Min ; Peter M. Asbeck
Nonvolatile Spintronic Memory Array Performance Benchmarking Based on Three-Terminal Memory Cell Chenyun Pan ; Azad Naeemi
CoMET: Composite-Input Magnetoelectric- Based Logic Technology *Meghna G. Mankalale ; Zhaoxin Liang ; Zhengyang Zhao ; Chris H. Kim ; Jian-Ping Wang ; Sachin S. Sapatnekar*
Electrical-Spin Transduction for CMOS-Spintronic Interface and Long-Range Interconnects *Rouhollah Mousavi Iraei ; Sasikanth Manipatruni ; Dmitri E. Nikonov ; Ian A. Young ; Azad Naeemi*

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

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

Seeking News

Please send any chapter news or happenings (Distinguished Lecturer visits, events hosted by your SSCS chapter, awards received by members, etc) to Abira Sengupta, SSCS Magazine News Editor, for inclusion in an upcoming issue of the magazine. Please email - **Abira.Sengupta@ieee.org**. We look forward to receiving your news articles!

For more chapter news, check out the Summer 2017 issue of the Solid-State Circuits Magazine.

FEEDBACK

Let us know what you think! Please **email us** to send us your comments about the newsletter, what you would like to see included each month, or any other comments.

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