

presentation. All the accepted demonstration videos have been posted online, and viewers can click through them and post comments, providing interaction between the authors and virtual attendees.

### “Friday Forum” (17 June)

The symposia program included a virtual forum session (formerly known as the “Friday Forum”), which involved a series of presentations focusing on technologies and circuits for edge intelligence, led by experts in the field who helped guide participants through discussions concerning the contributions of technology and the circuits needed to drive the future of advanced edge computing.

### Workshops (16 and 17 June)

Held before the main symposia technical sessions began, these workshops provided additional learning opportunities for participants. The topic titles included the following:

- “Know Where You Are Going: Metrology in the New Age of Semiconductor Manufacturing”
- “Analog Computing Technologies and Circuits for Efficient Machine Learning Hardware”
- “Quantum Computing: Maximizing the Impact of the Semiconductor Industry.”

The two symposia have been held together since 1987, providing an opportunity for the world’s top device technologists and circuit and system designers to exchange

leading-edge research on microelectronics technology, with alternating venues between Hawaii and Japan. A single registration enabled participants to attend both events.

### Sponsoring Organizations

The Symposium on VLSI Technology is sponsored by the IEEE Electron Devices Society and the Japan Society of Applied Physics, in cooperation with the IEEE Solid-State Circuits Society (SSCS). The Symposium on VLSI Circuits is sponsored by the SSCS and the Japan Society of Applied Physics, in cooperation with the Institute of Electronics, Information, and Communication Engineers.

—Deidre Artis and Bill Bowhill

## Highlights of CICC 2020

### The First SSCS Virtual Conference

The 41st annual IEEE Custom IC Conference (CICC 2020) was held virtually between 22 and 25 March 2020. *Virtually* is probably the key word. For the first time in its history, the IEEE Solid-State Circuits Society

(SSCS) and its affiliates gathered from the safety of homes and offices, with attendees keeping a safe social distance from their colleagues, thanks to the worldwide spread of the Internet. No flights were taken, and no hotel rooms were booked. Due to the inevitable time zone differences, some attendees even cou-

rageously joined sessions in their nightwear, long after normal working hours, to participate in the live Q&A sessions.

In this new setting, our community succeeded in getting together to share cutting-edge updates, from ultralow-power wireless transceivers to neural network acceleration,

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**nW Receivers – Processing Gain**

20-40dB S = -50dBm  $V_{min} = 1-10mV$  5-15dB

Passive Xform → Passive ED → A → C → BB Proc Gain

- BB processing gain and timing reference
- BB gain ~ length of correlation
  - Ultimately limited by integrated jitter of timing reference
- Direct trade-off between jitter <math>\leftrightarrow</math> power

University of Michigan Wireless Integrated Circuits and Systems Group 42

An invited paper on low-power receivers for IoT applications, by David Wentzloff, University of Michigan.

**VENTURE CAPITAL 101**

Types of capital:

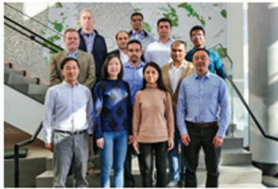
- Corporate VCs
- Financial VCs
- Family/Private Offices
- Venture Debt

What to look for:

- Stage specific
- Domain specific
- Ability to lead & follow on
- Fund size/check size
- Board requirements
- Partner experience
- Strategic reach

An industry presentation during the Journey of a Start-Up forum discussed venture capital funding.

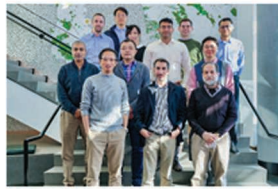
# CICC 2020 Technical Committees



Wireless



Wireline



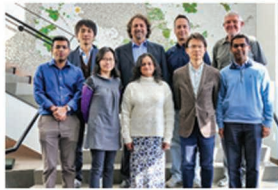
Data Converters



Digital Circuits, SoCs, and Systems



Power Management



Design Foundations



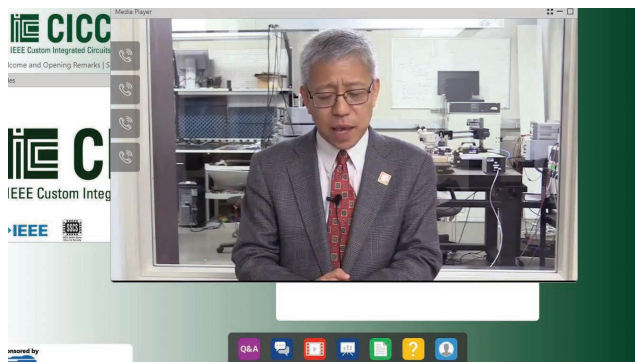
Analog Circuits



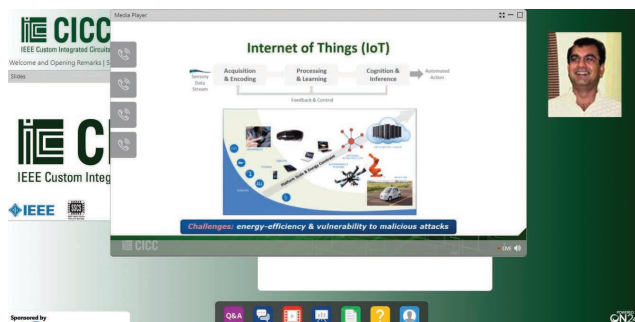
Emerging Technologies, Systems, and Applications



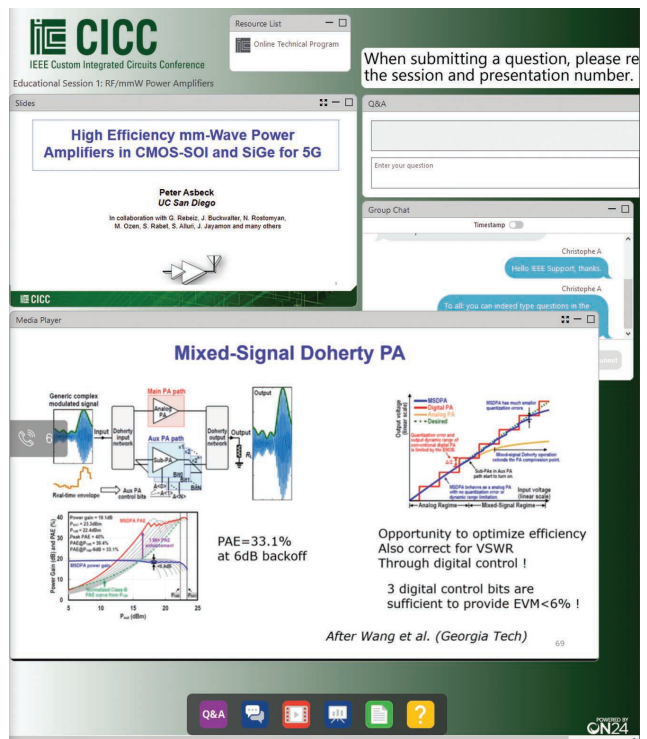
The eight technical subcommittees in charge of the CICC 2020 conference program. SoCs: systems on chip. (Source: Abira Sengupta; used with permission.)



Kenneth O, SSCS president, makes introductory remarks from his lab in Dallas. (Source: Abira Sengupta; used with permission.)



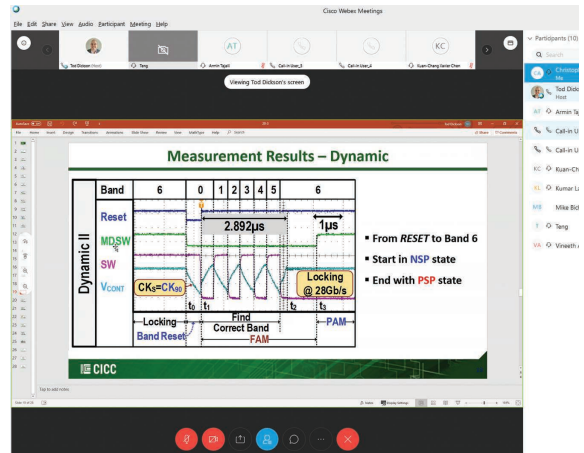
Dr. Vivek De, Intel, gave the opening keynote talk on attack-resistant, energy-efficient system-on-chip technology for a smart and secure Internet of Things (IoT).



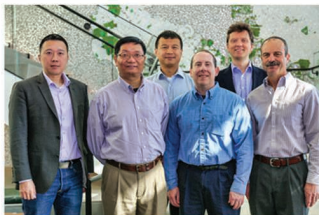
An educational session on millimeter-wave (mm-wave) power amplifiers (PAs). ENOB: effective number of bits; VSWR: voltage standing-wave ratio; dBm: decibels with reference to 1 mW. MSDPA: mixed-signal Doherty PA; PAE: power-added efficiency; EVM: error vector magnitude. (Source: Abira Sengupta; used with permission.)



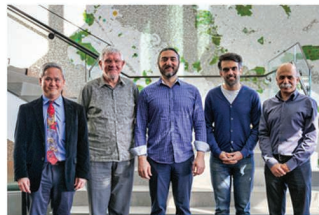
Prof. Lawrence Larson, dean of the School of Engineering, Brown University, answers live questions after his luncheon keynote, "Microelectronics for Brain-Computer Interface Applications."



Online author interviews enabled smaller-group informal chats. (Source: Abira Sengupta; used with permission.)



Steering Committee



Organizational Committee Chairs



IEEE CICC conference staff



The CICC 2020 Steering Committee, chairs of the organizational subcommittees, and conference staff. (Source: Abira Sengupta; used with permission.)

and from high-power voltage converters to new data converter architectures. As in previous years, one full day of educational sessions, with four tracks of four tutorials each, was accessible to all conference registrants. No additional fee is ever required, encouraging our conference attendees, young and old, to deepen and broaden their fundamental understanding of our technologies.

### Adapting to Changes

Our semiconductor industry is exciting, as it quickly and regularly evolves. So does our conference. With continuing mergers and acquisitions among the large firms, which aggregates small, innovative teams into

larger ones, and with the rising cost of fine-node tapeouts, industry submissions to CICC 2020 decreased. To facilitate renewed submissions from our industry members, CICC 2021 will explore an easier paper submission format that is compatible with other SSCS conferences and develop an industry track to enable pioneering engineers to share brand-new circuit architectures while not necessarily being burdened with a detailed online technical article that can be scrutinized by competitors.

Despite the switch to an online venue one month before the conference, CICC 2020 attendees adapted quickly to the new format and joined the event in large numbers. Even though participation was down

from last year's in-person conference in Austin, Texas, CICC 2020 attracted 317 attendees.

### Great Support From Our Technical Community

The SSCS leadership was quick to identify global changes, as it started to make amendments to the International Solid-State Circuits Conference in February. Based on that experience, the SSCS warned the CICC organizing team early, and the whole CICC Technical Program Committee (TPC) worked diligently to turn around the format of the conference. Authors recorded their presentations, which, we were told, improved the overall presentation quality and enabled contributors to focus on important pieces of information and avoid running beyond their time allotments. The IEEE Meetings, Conference, and Events team in New Jersey helped prepare an online ON24 portal for the four concurrent tracks. And, with the exception of the customary sound and late-start glitches here or there, most sessions were pristinely streamed. New this year, author interviews facilitated more informal discussions with a smaller group of conference attendees. The format did not replace the cocktail party reception, but it was a welcome substitute.

We gratefully acknowledge our generous industry sponsors, including Silicon Labs (platinum level); MaxLinear and FutureWei Technologies

(gold level); and Analog Devices, Texas Instruments, Intel, TSMC, Cisco, Cirrus Logic, and SiFive (silver level). We also extend our appreciation to the Catalyst Foundation, Mentor Graphics, and ARM (bronze level) for their continuous support of CICC. Finally, this short-notice change of format would not have been possible without the support of our nimble TPC and the IEEE conference staff, in particular, John Teehan, Danielle Corrigan, Brett Houseal, and David Stankiewicz. Many thanks to all of them.

### Some Good Can Come Out of Difficult Situations

The conference sponsors supported CICC throughout the pandemic. Thanks to their financial backing and the hard work of the IEEE conference staff who negotiated the hotel cancellation costs, CICC 2020 was able to

provide full refunds for all student registrations. To better serve our audience, CICC 2020 also showcased the improvements we have made in the distribution of conference materials, including the new appearance of the website, the web-based technical program and schedule, and the presentation slides and poster templates. A new CICC app is also ready and will be launched for CICC 2021. We will continue to support young-generation newcomers with student education and travel grants.

The 42nd edition of the conference, CICC 2021, is in the planning stages and will be held in Austin, Texas, in April 2021, potentially with a virtual component, depending on how the global health situation evolves. The paper submission deadline for CICC 2021 is scheduled in early November

2020, and acceptance notifications will be sent to authors by mid-January 2021. We look forward to seeing many of you at the conference next year.

—*Christophe Antoine and  
Samuel M. Palermo,*  
TPC chairs

—*Fa Foster Dai,*  
conference chair

—*Hua Wang,*  
general chair

—*Kimo Tam,*  
treasurer

—*Alessandro Piovaccari  
and Don Thelen,*  
Steering Committee members

**SSC**

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