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VLSI community seeks new breakthroughs in semiconductor technology and circuits to realize a united and connected world

Program unveiled for 2019 Symposia on VLSI Technology & Circuits. With the theme of “Pushing the Limits of Semiconductors for a United and Connected World,” the Symposia include Sunday workshops, short courses, focus sessions, panel discussions, demo session and Friday forum

The 2019 Symposia on VLSI Technology & Circuits have announced their technical program, which this year highlights the theme “Pushing the Limits of Semiconductors for a United and Connected World.” Semiconductors have transformed our society by connecting humans, machines and information. Additional breakthroughs are needed to further cultivate these interactions and to create a real united and connected world.

A week-long, fully overlapped program of VLSI Technology & Circuits will deliver a unique perspective on many of the key trends in the industry - artificial intelligence, machine learning, autonomous driving, security, advanced sensors, and new computing technology and systems. All these topics and many more will be discussed in the context of advanced technology development, innovative circuit and system design, and applications.

Plenary Sessions (June 11 & 12)

This year, the Symposia will hold two plenary sessions on Tuesday and Wednesday morning. The Tuesday plenary session features “*Virtual Cyborg: Beyond Human Limits*” by Masahiko Inami, Professor in The University of Tokyo; and “*Managing Moore's Inflection: DARPA's Electronics Resurgence Initiative*” by William Chappell, Director of the Microsystems Technology Office in DARPA.

The Wednesday plenary session includes “*Computational and Technology Directions for Augmented Reality Systems*” by Sha Rabbii, VP and Head of Silicon in Facebook; and “*Si Platform for Developing Spin-based Quantum Computing*” by Seigo Tarucha, Professor in The University of Tokyo and RIKEN Center for Emergent Matter Science.

Focus Sessions (June 11, 12 & 13):

As part of the Symposia’s close integration of Technology and Circuits, a series of joint focus sessions will be held to present contributed papers from the Technology and Circuits Symposia where the integration of Technology and Circuits is key. These focus sessions are scheduled on June 12 and 13 and they will cover topics such as “New Computing,” “IoT and Sensor,” “Technology and System for AI,” and “The Future of Memory.”

In addition to the joint focus sessions, there will be two Technology focus sessions on June 11 highlighting recent advances on “Quantum Computing,” and “3D Integration and Packaging.”

Sunday Workshops (June 9)

This year, for the first time, VLSI symposium will hold 3 Workshops on Sunday, June 9th evening (7pm – 10pm). These workshops will discuss both research and application topics not well covered in the technical program of the main symposium.

Workshop 1 – “Impact of Atomic Layer Processing and Selective Area Patterning on Device Fabrication and Performance”: Highlight new capability in the field of Atomic Layer Etching, Atomic Layer Deposition and Selective Area Patterning which are of interest to the semiconductor device community for the enablement of future device fabrication technology.

Workshop 2 – “Two Dimensional Materials and Applications”: Outline the state of the art for 2D materials going from growth and process steps to devices and modeling. Speakers will discuss how 2D materials could provide a path towards very aggressive transistor and interconnect scaling. Other possible applications of 2D materials such as optoelectronics and heat transport are also in scope.

Workshop 3 – “Low Thermal Budget Dopant Activation for Sequential-3D Integration”: Aims at sharing and gaining expertise on junction design, while considering the thermal constraints associated to sequential 3D integration. Researchers from various fields including process, integration, simulation and theory will gather to review all the strategies used or may be potentially used for low-temperature junction design: laser and microwave annealing, solid phase epitaxy regrowth, in situ doped epitaxy.

Full Day Short Courses (June 10):

Short Course 1 – “*CMOS Technology Enablers for Pushing the Limits of Semiconductors: Materials to Packaging*” will cover a range of topics, including CMOS technology for FinFET, emerging interconnects, advanced process technology for scaling, DTCO in 2019, 3D integration, emerging logic devices, and 3D NAND Flash.

Short Course 2 – “*Advanced 5G circuits, systems and applications*” will cover recent advances in 5G wireless circuits and designs, including advanced RF transceivers, clock generation, filters, and beamforming circuits. It will also discuss Built-In-Self-Test (BIST), packaging and technology integrations, and various applications for the upcoming 5G generation era.

Short Course 3 – “*Opportunities and Challenges at the intersection of Security and AI*”: As AI has enjoyed rapid progress in recent years, its security implications have also attracted increased attention. This short course will address the circuit design opportunities and challenges of cryptography and entropy generation, side channel attack resiliency, AI computing architecture and hardware, and nonvolatile circuits and memories for AI edge application at the intersection of security and AI.

Demonstration Session (June 10):

The third edition of the VLSI Demo session will be held immediately after the short course on June-10. This session will showcase system-level demos of some of the most excellent papers to be presented during the week in both circuit and technology. There will be system-level demos showcasing key applications, table-top real-time demonstration or visual illustration of

technological concepts and analyses. The Demo session will be combined with a joint reception to give attendees a great opportunity for technical discussion and interaction with authors.

Evening Panel Discussions (June 10 & 11):

A joint panel discussion, bringing together leading experts from Technology & Circuits will be held June 10 to answer the question, “*The semiconductor industry at a tipping point: what’s next?*”

The field that has transformed the world and we have annually gathered to celebrate its metamorphosis. Economics no longer inexorably points down Moore’s curve, price per gate has leveled or is rising. The leading edge nodes have become the territory of the very few companies that dare to use them. Simultaneously, the number of startups has shrunk by orders of magnitude. So where are we going? Together with the audience, a panel of experts with backgrounds ranging from academia, industry association, and companies from start-ups to established will attempt to provide some insights into our future.

The Technology evening panel discussion held on June 11 will examine “*What Will the Foundries of the Future Do?*”

Conventional process node scaling has been extremely successful for many decades, but the challenges below 5 nm may require us to question our assumptions about the foundries of the future if we want the semiconductor industry to thrive in the next decade:

- Is EUV enough for patterning requirements? What is a key stopper?
- How long can FinFET/nanowire/nanosheet push the silicon MOSFET? Will something different be required?
- How specifically can “More-than-Moore” provide value beyond scaling?
- How much new performance can 3D chiplets provide?
- Are there opportunities for other fab styles? Minimal fab vs. giga fab?

In this panel, we will discuss technology challenges and opportunities as well as new deliverable values to market, in order to provide perspective on the foundries of the future.

The question to be addressed by the Circuits evening panel discussion, also held on June 11, is “*Technologies We Will See Coming Out of the Tokyo Olympics and Beyond*”

The upcoming Olympic Games in Tokyo will feature not only the world’s best athletes, but also the world’s newest technologies. Many new and exciting technologies will be previewed for the world to see, including 5G, IoT, AI, autonomous vehicles, AR/VR, sensors, and security. The panel will feature technologists who will give us a look behind these new technologies to the innovative circuits that make them possible.” (Note that this panel is not affiliated with the Tokyo Olympics)

Thursday Luncheon (June 13)

Semiconductor technology brings new innovations even in the area of entertainment. You may remember the augmented reality (AR) effect at the closing ceremony of Rio de Janeiro Olympic Games. The Thursday Luncheon talk is “Developing Visual Systems for Entertainment and Art” by Yuya Hanai, Rhizomatiks, who developed the AR system at the Olympic ceremony.

Friday Forum (June 14):

Following its successful launch as an official part of the Symposia program last year in Honolulu, the 2019 VLSI Symposia will feature a Friday Forum focused on “Enabling technologies for autonomous driving.” This will be a full-day series of presentations focusing on how technology and circuit designers engage in and drive the future of autonomous driving, a subject area that continues to evolve as an impactful driver of the integrated systems. The Friday Forum will summarize the state-of-the-art in future driver assistance and autonomous driving technologies, including advanced sensor and processor technologies, as well as highlighting the evolution of machine learning and the envision of smart mobility society.

Young Professionals and Students Micro-Mentoring Session (June 11):

The Young Professionals and Students Micro-mentoring and Career Coaching session is designed to give students, faculty, and engineers within 15 years of their first degree the opportunity to meet and discuss with leading experts from industry and academia in a friendly setting with food and beverages, where mentors share their experiences and mentees can ask questions on career, publishing, leadership and more. This event is complimentary.

Diversity Luncheon (June 11):

The Diversity Luncheon on Tuesday will feature interactive talks and panel discussions on how to increase diversity in the device and circuits community, followed by a networking lunch. This event is complimentary and open to all conference attendees.

Sponsoring Organizations

The Symposium on VLSI Technology is sponsored by the Japan Society of Applied Physics and the IEEE Electron Devices Society, in cooperation with the IEEE Solid State Circuits Society.

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Further Information and Registration

Visit: <http://www.vlsisymposium.org>.

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