ISSCC 2024
ICs for a Better World
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INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS
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Plenary Talks

Semiconductor Industry: Present & Future

Kevin Zhang
Senior Vice President,
Business Development & Overseas Operations Office
Taiwan Semiconductor Manufacturing Company

Racing Down the Slopes of Moore's Law

Bram Nauta
Professor & Head IC Design Group,
University of Twente

Computing in the Era of Generative AI

Jonah Alben
Senior Vice President, GPU Engineering
NVIDIA

Fueling Semiconductor Innovation and Entrepreneurship in the Next Decade

Lip-Bu Tan
Chairman of Walden International,
Founding Managing partner of Walden Catalyst Ventures,
Senior Advisor & former CEO Cadence Design

Tutorials

Process-Scalable Low-Power Amplifiers
Minkyu Je, *KAIST, Daejeon, Korea*

Fundamentals of Power Management Systems: Constraints and Solutions
Frank Praemassing, *Infineon Technologies Austria, Villach, Austria*

Fundamentals of Continuous-Time ADCs
Shanthi Pavan, *IIT Madras, Chennai, India*

Domain-Specific Accelerators: From Hardware to Systems
Sophia Shao, *UC Berkeley, Berkeley, CA*

Fundamentals of Digital and Digitally-Assisted Linear Voltage Regulators
Arijit Raychowdhury, *Georgia Institute of Technology, Atlanta, GA*

3D Flash Memory from Technology to the System: Past, Present and Future Developments
Violante Moschiano, *Intel Italia, Rome, Italy*

Calibration Techniques in PLLs
Salvatore Levantino, *Politecnico di Milano, Milano, Italy*

Fundamentals of Transceivers for Communication and Sensing
Giuseppe Gramegna, *imec, Leuven, Belgium*

Fundamentals of Circuit Design for 2.5D/3D Integration
Kenny C. H. Hsieh, *TSMC, Hsinchu, Taiwan*

Recent Circuit Advances for Resilience to Side-Channel Attacks
Shreyas Sen, *Purdue University, West Lafayette, IN*

Forums

Efficient Chiplets and Die-to-Die Communications

Energy-efficient AI-computing Systems for Large-language Models

Digitally Enhanced Analog Circuits: Trends & State-of-the-art Designs

Intelligent Sensing

Recent Developments in High-Performance Frequency Synthesis Circuits and Systems

Toward Next Generation of Highly Integrated Electrical and Optical Transceivers

Student Activities

Student Research Preview (SRP): Short Presentations w/ Poster Session
Silkroad Award: Scholarships awarded for Far-East full-time students

Invited Industry Track

The industry track will highlight recent, innovative products and present product-level challenges and solutions for ML and other special-purpose processors across edge, cloud, and automotive platforms.

Innovation Sessions

To promote continued innovation, there will be an invited session by renowned experts in their respective fields on topics beyond conventional areas covered in solid-state circuits with potential to open up new avenues for IC R&D. This special session (organized by Technology Directions) will cover four exciting topics ranging from soft machines to meta materials to linear/nonlinear photonics. Regular paper submissions on innovative work outside of traditional focus areas, with potential impact on the solid-state circuits society, are highly encouraged.

Evening Events

Career Trajectories: Sharing our Paths to Success
Are you a student or early-career professional trying to determine the best path for your future? Join us for an engaging panel discussion on career trajectories. Our panelists, distinguished experts from academia and industry, will share their personal experiences, challenges, and successes in their respective fields. They will shed light on the similarities, differences, and unique aspects of pursuing careers in academia and industry.

Mixed-Foundry Chiplets: Opportunity and Challenges
One of the advantages of chiplets is the ability to integrate chiplets developed using different manufacturing processes to realize an SoC with optimal performance and cost. An I/O chip, for instance, could be built by one foundry while the core processor could be built by another foundry. Those chips can then be integrated on a package. With this, there's a potential for mixing and matching chiplets made by different foundries. To make this happen, many challenges need to be overcome for the industry, including the usage of standardized interface between chiplets, and verification of SoC using chiplets implemented by different design flows, foundry processes and reliability standards. In this panel, experts across industry, research organization and academia will explore paths for mixed-foundry chiplet ecosystem to facilitate the productization of complex system-on-chiplet.

Generative AI for Chip Design
With the emergence of machine learning and generative AI, many types of jobs are being transformed by GPT-based tools. Large Language Models are starting to be used for education and can be used to contribute to publications, and AI is being embedded into EDA tools. Join this evening panel with experts from industry and academia to discuss how generative AI or AI in general will change IC design.

The Legacy of Gordon Moore
Moore's Law has propelled the semiconductor industry for decades transforming the world through advancements in digital electronics, and to some extent, analog and RF electronics. These advancements have fueled other engineering fields such as artificial intelligence, biomedical engineering and quantum engineering. In this session, we will have a fireside chat with semiconductor and IC design luminaries celebrating the life and legacy of Gordon Moore, discussing the impact of Moore's law on our industry, and venturing into the next chapter of Moore's law in the context of upcoming IC ecosystems.

Demonstration Sessions

Technical Sessions

Short Course

Machine Learning Hardware: Considerations and Accelerator Approaches

Introduction to Machine Learning Applications and Hardware-Aware Optimizations
Ranghajaran Venkatesan, *Nvidia*

Architecture and Design Approaches to ML Hardware Acceleration: Performance Compute Environment
Leland Chang, *IBM Research*

Architecture and Design Approaches to ML Hardware Acceleration: Edge and Mobile Environments
Marian Verhelst, *KU Leuven*

Emerging ML Accelerator Approaches: In-memory Computing Architectures
Naresh Shanbhag, *UIUC*

In Person Event

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