



## Special Interest Group on Design Automation **ACM/SIGDA E-NEWSLETTER**, Vol. 53, No. 12

### SIGDA - The Resource for EDA Professionals

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# SIGDA News

#### 1. [Intel to Place US\\$14 Billion Orders with TSMC, Says Report](#)

Over the next two years Intel will place orders worth US\$14 billion with foundry TSMC according to Taiwan-based semiconductor analyst Andrew Lu, reported on China's WeChat platform.

#### 2. [ARM Adds Helium to M52 Core for AIoT, FuSa](#)

ARM has launched its smallest microcontroller core with Helium DSP and custom extensions to boost machine learning at the edge.

#### 3. [Europe Continues Its Domination of Solar Challenge – Full Results](#)

Belgian Solar Team Innoptus has won the Bridgestone World Solar Challenge title for the second time, continuing the European domination of the event.

#### 4. [UK Distribution Looks to Decline in 2024 from Overstocking](#)

The UK distribution market is looking at single-digit growth in 2024 after higher-than-expected figures in 2023 and inventory.

#### 5. [AI Boost for More Accurate Digital Twin Development](#)

Siemens Digital Industries Software has developed an AI-based Simulation Predictor and Reduced Order Modeling software to boost the development of digital twin technology.

#### 6. [5G Global Mobile Data Traffic Set to Triple in Six Years](#)

Ericsson estimates that almost one-in-five of all global mobile subscriptions will be 5G subscriptions by the end of 2023, as the growth

# Messages from the EiCs

Dear ACM/SIGDA members,

We are excited to present to you December E-Newsletter. We encourage you to invite your students and colleagues to be a part of the SIGDA newsletter.

The newsletter covers a wide range of information from the upcoming conferences to technical news and activities of our community. Get involved and contact us if you want to contribute articles or announcements.

The newsletter is evolving. Please let us know what you think.

Happy reading!

*Debjit Sinha, Keni Qiu,*  
Editors-in-Chief,  
SIGDA E-News

proves resilient despite continued economic challenges and geopolitical unrest in some markets.

#### 7. [Wi-Fi 7 on Fast Track to Go Live in 2024](#)

According to the latest free cross-industry report by the Wireless Broadband Alliance, Wi-Fi 6, 6E, and 7 top the list of wireless technologies that network operators, ISPs, device and chipset vendors, enterprises, and other companies plan to deploy by the end of 2024 — ahead of CBRS, DAS, and private 4G/5G.

#### 8. [Magnetic Graphene for Low-Power Electronics](#)

National University of Singapore (NUS) physicists have developed a concept to induce and directly quantify spin splitting in two-dimensional materials.

## What is

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## What is Optical Neural Network?

In the post-Moore's era, conventional electronic computers face challenges in supporting parallel and energy-hungry artificial intelligence (AI) workloads. Optical computing, specifically Optical Neural Networks (ONNs), emerges as a promising analog hardware platform that offers sub-nanosecond latency, high energy efficiency, and high parallelism through the use of optics [1-3]. ONNs have gained significant attention for their potential to revolutionize machine intelligence across various domains, such as data centers, automotive, security and defense, smart sensing, and edge intelligence. Industry players, including start-ups like Lightmatter and Lightelligence, are actively pursuing photonic computing and interconnect solutions. Electronic design automation (EDA) vendors and foundries are backing the development of photonic hardware with EDA toolkits, process-design kits and chip manufacturing services.

So, what is ONN? There are two main approaches to implementing ONNs. The first one is free-space optics, utilizing lenses and spatial light modulators to transform incident light waves. This approach offers

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AE for Awards

ultra-high parallelism but often results in bulky systems. The second approach is based on photonic integrated circuits (PICs), where micrometer-scale optical components are fabricated on a chip. The integrated ONNs, especially based on silicon photonics, have gained significant attention for their integrability with CMOS electronics. In PICs, information is first encoded onto laser beams, and then linear operations and activation functions can be achieved through light modulation, interference, and photodetection. Fundamentally different from computing using electrons, optics can carry more information using different magnitudes and phases and propagate through the same computing units at the speed of light simultaneously using multiple wavelengths, polarizations, or modes. A configured photonic system can remain passive with near-zero static power, generating no Ohmic heat.

Optical AI has emerged as a rapidly growing field. Various integrated ONN designs have been explored, including coherent photonic tensor cores based on Mach-Zehnder interferometers (MZIs) [1], phase shifters [5,6], and metalens [7], and multi-wavelength incoherent designs using micro-ring resonators [4,11], frequency microcomb [8], and phase change materials [9,10]. Each design has its unique characteristics and trade-offs in footprint, speed, power, reconfigurability, endurance, and noise sensitivity that make it suitable for specific use cases.

However, ONNs encounter technological challenges in the scalability issue due to the large device footprint, robustness concerns, nontrivial reconfiguration and control complexity, and integration-related challenges. Besides the advancement in device and manufacturing, hardware/algorithm co-design methodologies have been explored to optimize their performance and capabilities across device, circuit, architecture, and algorithms levels. Specialized circuit topology and customized devices have been proposed to construct hardware-efficient ONNs, e.g., butterfly-style ONNs [5,6] and multi-operand optical neurons [11]. Various hardware-aware optimization techniques, including noise-aware training, device quantization, and circuit pruning, have been introduced to mitigate the noise robustness issues [5,11]. Customized in-situ training algorithms are developed to extend the capability of optical computing from inference to training, which potentially enables scalable on-chip learning on the edge [12,13].

Optical interconnect technology complements optical computing, enabling more efficient communication in large-scale systems. It holds potential for applications such as 3-D heterogeneous integration (3DHI) and high-performance computing (HPC). Recent demonstrations include Google's Tensor Processing Unit (TPU)-v4 [14], which utilizes optical circuit switches to interconnect 4096 chips. Other examples include Lightmatter's Passage, a wafer-scale interconnect for chiplet processors, and Lightelligence's optical network-on-chip AI processors. The integration of optical computing and interconnect has the capability to unleash the full power of optics.

**Xun Jiao,**

AE for What is

**Muhammad Shafique,**

AE for What is

**Rajsaktish Sankaranarayanan,**

AE for Researcher spotlight

**Xin Zhao,**

AE for Paper submission

**Ying Wang,**

AE for Technical activities

**Jiaqi Zhang,**

AE for Technical activities

# Paper Deadlines

## **FCCM' 24 - IEEE International Symposium On Field-Programmable Custom Computing Machines**

Orlando, FL

Deadline: Jan. 15, 2024

Abstracts due: Jan. 9, 2024

May 5-8, 2024

<https://www.fccm.org/>

## **MDTS'24 – IEEE Microelectronics Design & Test Symposium**

Albany, NY

Deadline: Feb. 15, 2023

Tentative Date: May 13-15, 2024

<http://natw.ieee.org>

## **DAC'24 – Design Automation Conference**

San Francisco, CA

Research Paper Deadline:

Nov. 20, 2023

Abstracts due: Nov. 13, 2023

Engineering Tracks Deadline:

Jan. 16, 2024

In summary, optical neural networks show transformative potential in future computing platforms. Yet, there are still key technological challenges that need to be addressed, which calls for collaborative efforts between academia and industry, with fundamental advances in both hardware and software.

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June 23-27, 2024  
<http://www.dac.com/>

# Upcoming Conferences

## **FPT'23 - Int'l Conference on Field-Programmable Technology**

Yokohama, Japan  
Dec. 11-14, 2023  
<http://icfpt.org>

## **ISED'23 – Int'l Conference on Intelligent Systems and Embedded Design**

Uttarakhand, India  
Dec. 15-17, 2023  
<http://isedconf.org>

## **HiPC'23 – IEEE Int'l Conference on High Performance Computing, Data, And Analytics**

Goa, India  
Dec. 18-21, 2023  
<http://www.hipc.org>

## **iSES'23 – IEEE Int'l Symposium on Smart Electronic Systems**

Ahmedabad, India  
Dec. 18-20, 2023  
<http://www.ieee-ises.org>

## **ASP-DAC'24 - Asia and South Pacific Design Automation Conference**

Incheon Songdo Convensia, South Korea  
Jan. 22-25, 2024  
<http://www.aspdac.com>

## **VLSID'24 – International Conference on VLSI Design & International Conference on Embedded Systems**

# SIGDA Awards

## 1. 2023 IEEE CEDA Ernest S. Kuh Early Career Award @ ICCAD 2023

<https://iccad.com/award-winners/iccad-2023-award-winners>

Pierluigi Nuzzo (University of Southern California)

“For outstanding contribution to high-assurance design of cyberphysical systems using contract-based methodology.”

## 2. 2023 IEEE CEDA Outstanding Service Recognition @ ICCAD 2023

<https://iccad.com/award-winners/iccad-2023-award-winners>

Tulika Mitra (National University of Singapore)

“For outstanding service to the EDA community as ICCAD General Chair in 2022”

## 3. IEEE/ACM William J. McCalla ICCAD Best Paper Award @ ICCAD 2023

<https://iccad.com/award-winners/iccad-2023-award-winners>

### Front End Category

Striving for Both Quality and Speed: Logic Synthesis for Practical Garbled Circuits

Mingfei Yu (Integrated Systems Laboratory, EPFL)  
Giovanni De Micheli (Integrated Systems Laboratory, EPFL)

### Back End Category

Improving Realistic Worst-Case Performance of NVCiM DNN Accelerators through Training with Right-Censored Gaussian Noise

Zheyu Yan (University of Notre Dame)  
Yifan Qin (University of Notre Dame)  
Wujie Wen (North Carolina State University)  
X. Sharon Hu (University of Notre Dame),  
Yiyu Shi (University of Notre Dame)

ITC Royal Bengal, Kolkata, India  
Jan. 6-10, 2024  
<https://vlsid.org/>

## HiPEAC'24: Int'l Conference on High Performance Embedded Architectures & Compilers

Munich, Germany  
Jan. 17-19, 2024  
<https://www.hipeac.net/2024/munich/>

## ISSCC'24 – IEEE Int'l Solid-State Circuits Conference

San Francisco, CA  
Feb. 18-22, 2024  
<http://isscc.org>

## FPGA'24 – ACM/SIGDA Int'l Symposium on Field-Programmable Gate Arrays

Monterey, CA  
Mar. 3 - 5, 2024  
<http://www.isfpga.org>

## ISPD'24 – ACM Int'l Symposium on Physical Design

Taipei, Taiwan  
Mar. 12-15, 2024  
<http://www.ispd.cc>

## DATE'24 - Design Automation and Test in Europe

Valencia, Spain  
Mar. 25-27, 2024  
<http://www.date-conference.com>

## ISQED'24 - Int'l Symposium on Quality Electronic Design

San Francisco, CA  
Apr. 3-5, 2023  
<http://www.isqed.org>

## HOST'24 – IEEE Int'l Symposium on Hardware-Oriented Security and Trust

Washington DC  
Deadline (winter submission):  
Dec. 18, 2023  
Abstracts due: Dec. 11, 2023

**4. 2023 William J. McCalla ICCAD Ten Year Retrospective Most Influential Paper Award @ ICCAD 2023**

<https://iccad.com/award-winners/iccad-2023-award-winners>

Reduction and IR-drop Compensations Techniques for Reliable Neuromorphic Computing Systems

Beiye Liu (University of Pittsburgh)  
Hai Li (University of Pittsburgh)  
Yiran Chen (University of Pittsburgh)  
Xin Li (Carnegie Mellon University)  
Tingwen Huang (Texas A&M University)  
Qing Wu (Air Force Research Laboratory)  
Mark Barnell (Air Force Research Laboratory)

Published in 2014 IEEE/ACM International Conference on Computer-Aided Design (ICCAD), pp. 63-70. IEEE, 2014.

**5. 2023 IEEE/ACM ICCAD Inaugural Best Reviewer Award @ ICCAD 2023**

<https://iccad.com/award-winners/iccad-2023-award-winners>

Stephan Held (University of Bonn)  
Mahmut Kandemir (Penn State University)  
Yibo Lin (Peking University)  
Georgios Zervakis (University of Patras)

May, 2024  
<http://www.hostsymposium.org>

**RTAS'24 - IEEE Real-Time and Embedded Technology and Applications Symposium**

Hong Kong, China  
May 13-16, 2024  
<http://2024.rtas.org>

**ISCAS'24 – IEEE Int'l Symposium on Circuits and Systems**

Singapore  
May 19-22, 2024  
<http://iscas2024.org>

# SIGDA Partner Journal

**ACM Transactions on Design Automation of Electronic Systems, TODAES**, publishes innovative work documenting significant research and development advances on the specification, design, analysis, simulation, testing, and evaluation of electronic systems, emphasizing a computer science/engineering orientation. Design automation for machine learning/AI and machine learning/AI for design automation are very much welcomed.

If you are an active researcher in the design and design automation field and would like to be part of the TODAES review board, please fill out the following [reviewer form](#). TODAES recognizes those reviewers that provide timely and high-quality reviews through the [Distinguished Review Board](#). TODAES also recognizes papers and outstanding junior researchers

through [best paper](#) and [rookie of the year](#) award. Authors can send their paper submissions on the [manuscript portal](#).

TODAES welcomes special issue proposals from leading researchers/practitioners. Such proposals should be emailed to Joerg Henkel, Senior Associate Editor, at [joerg.henkel@kit.edu](mailto:joerg.henkel@kit.edu).

# Technical Activities

## 1. [Bringing Tiny Chiplets To Embedded SoCs](#)

ZeroASIC has developed a technology platform to bring chiplets to embedded system design, as a time-efficient alternative to designing and manufacturing custom application-specific ICs (ASICs). The platform is based on swappable pre-fabbed 2 x 2 mm chiplets on an active silicon interposer, which customers can design for themselves in a matter of minutes using ZeroASIC's online EDA tool...

## 2. [Neuchips Demos Recommendation Accelerator for LLM Inference](#)

Taiwanese AI accelerator maker Neuchips is now targeting LLM inference with its AI accelerator chip, originally designed for recommendation workloads, Ken Lau, the company's new CEO, told EE Times. YounLong Lin, the previous CEO, is now the company's chairman...

## 3. [Nvidia Trains LLM on Chip Design](#)

Nvidia has trained its NeMo large language model (LLM) on internal data to help chip designers with tasks related to chip design, including answering general questions about chip design, summarizing bug documentation, and writing scripts for EDA tools. Nvidia's chief scientist, Bill Dally, presented the LLM, dubbed ChipNeMo, in his keynote presentation at the recent International Conference on Computer-Aided Design...

## 4. [Qualcomm Transforms Smartphones to Genius-Phones](#)

Qualcomm's Snapdragon 8 Gen 3 mobile SoC is purpose-built for on-device generative AI...

# Job Positions

## 1. Research Center Julich, Germany

**Job Title:** PhD Positions in Electrical Engineering

**Description:** We are working on scalable electronic architectures based on semiconductor spin quantum bits (qubits) to make the vision of a universal quantum computer reality. For scaling up the number of qubits into the millions, it is crucial to move parts of the control electronics closer to the qubits. To achieve this, we design and implement cryogenic integrated circuits for qubit control and readout in state-of-the-art CMOS technologies. Since qubits are extremely sensitive and operate in temperatures at low millikelvin levels, the requirements on power consumption, noise and area are severe. For this reason, it is necessary to develop new and groundbreaking architectures and circuit topologies. Modeling electronics and their interfaces to qubits in this challenging environment is an essential part of this. Abstract behavioral modeling of mixed-signal and digital integrated circuits; System-level integrated circuit design; Combined simulation of electronics and existing quantum mechanical models of qubits; Scalability analysis and comparison of different electronic architectures and integrated circuit topologies; Formulating detailed specifications for scalable integrated circuits from combined electronics and quantum mechanical models. For more information, please refer to <https://facultyvacancies.com/phd-positions-in-electrical-engineering.i37150.html>.

## 2. University of Toronto, Canada

**Job Title:** Associate Professor of Computer Science

**Description:** The Department of Computer Science in the Faculty of Arts & Science at the University of Toronto invites applications for a full-time tenure stream position in the area of computer science. The appointment will be at the rank of Associate Professor or Professor with an anticipated start date of July 1, 2024, or shortly thereafter. Candidates must have earned a PhD degree in Computer Science or a related area with a clearly demonstrated record of excellence in research and teaching. We seek candidates whose research and teaching interests complement and enhance our existing departmental strengths. The University of Toronto is an international leader in Computer Science research and education. Candidates will have an established international reputation and will be expected to sustain and lead innovative and independent research, to maintain an outstanding, competitive, and externally funded research program, to contribute to the enrichment of both undergraduate and graduate programs in the department; and to participate in service and leadership within the academic community. Candidates must provide



evidence of excellence in research which can be demonstrated by a record of sustained high-impact contributions and publications in top-ranked and field relevant journals, the submitted research statement, presentations at significant conferences, awards and accolades, and other noteworthy activities that contribute to the visibility and prominence of the discipline, as well as strong endorsements by referees of top international stature. Candidates will also be expected to demonstrate evidence of excellence in teaching at the undergraduate and graduate levels through teaching accomplishments, the teaching dossier submitted as part of the application (with required materials outlined below), as well as strong letters of reference. Professional or lived experiences that enhance the ability to teach a diverse student body are highly valued. For more information, please refer to <https://facultyvacancies.com/associate-professor-of-computer-science.i37018.html>.

### 3. RMIT University Vietnam, Vietnam

**Job Title:** Assistant Professor of Computer Engineering

**Description:** The School of Science & Technology at RMIT Vietnam is associated with the STEM College of RMIT University Melbourne, delivering the College's award programs and developing research in the field(s) of science, engineering and health. Programs currently taught on the Vietnam campus include the Bachelor of Information Technology, Bachelor of Engineering (Electrical and Electronics), Bachelor of Engineering (Software Engineering), Bachelor of Engineering (Robotics & Mechatronics) and the Doctor of Philosophy (Engineering) (Electrical and Electronic Engineering). The position of teaching assistant will be specifically for Electrical & Electronic Engineering classes. The teaching assistant will work with faculty members and students to provide teaching support and teaching-related activities. This position will improve students' problem-solving skills and develop their expertise to excel in their future careers. The specific tasks of this position are semester-based and course-based. The details are often discussed and agreed before the semester starts. For more information, please refer to <https://facultyvacancies.com/assistant-professor-of-computer-engineering.i37003.html>.

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