Special Interest Group on Design Automation
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SIGDA - The Resource for EDA Professionals

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SIGDA News

1. **GlobalFoundries Secures Next 10-year DoD Contract**

GlobalFoundries Inc. (Malta, NY) has been awarded a 10-year contract by the US Department of Defense with an upper limit of US$3.1 billion. The contract is intended to provide the DoD with an assured supply of chips made in a secure facility for use in aerospace and defense applications.

2. **Nvidia Set to Become Top Chip Company This Year**

Semiconductor Intelligence (SC-IQ) estimates Nvidia's total 2023 revenue will be about US$52.9 billion, ahead of Intel on US$51.6 billion and Samsung on US$45.4 billion.

3. **Micron Breaks Ground on US$2.75 Billion Indian Chip Packaging Fab**

Memory chip company Micron Technology Inc. (Boise, Idaho) has broken ground on a chip assembly and test facility in Sanand, Gujarat, India, that is set to cost US2.75 billion, according to local reports.

4. **Intel Tips Glass Substrate for Chiplet Packaging**

For its glass substrates, Intel uses the same 510mm by 515mm panel size that it already uses for organic substrates. These are then diced to the appropriate size to hold multiple chipsets for multi-die packaging. The company said that glass offers better flatness and thermal and mechanical stability compared with organic insulator substrates.

5. **TSMC in Talks about Chiplet Packaging in Arizona**

TSMC and the State of Arizona are discussing setting up advanced chip packaging facilities in the state, according to state governor Katie Hobbs.

Messages from the EiCs

Dear ACM/SIGDA members,

We are excited to present to you October 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

This would add to the plan for two wafer fabs now being constructed and equipped in Phoenix, Arizona.

6. Intel Backs Samsung's Novel DRAM Module form Factor

Memory chip market leader Samsung Electronics has received support from Intel for its Low Power Compression Attached Memory Module (LPCAMM) form factor for DRAMs.

7. TSMC Teams with Nvidia, Broadcom on Silicon Photonics

TSMC has formed a silicon photonics R&D team of 200 engineers to work with Nvidia Corp. and Broadcom to target AI in the datacentre, according to an Economic Daily News report.

8. China's Synchrotron EUV Lithography Light Source is No Sanctions Buster

Chinese researchers are exploring an old idea, using an electron accelerator as a light source for lithography. However, the argument that such a development could be used to bypass US export controls on extreme ultraviolet lithography equipment is misplaced. An electron synchrotron only provides an alternative light source for lithography, and the complexities of resisting, masking and directing, and focusing the light to produce nanometer details – so far mastered only by ASML Holding NV – would remain.

What is

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What are Synergies between Machine Learning and Computing Systems Design??

Advanced computing systems have long been enablers for breakthroughs in Artificial Intelligence (AI) and Machine Learning (ML) algorithms either through sheer computational power or form-factor miniaturization. However, as AI/ML algorithms become more complex and the size of datasets increase, existing computing platforms are no longer sufficient to bridge the gap between algorithmic innovation and hardware design. Large-scale datacenters have enabled complex algorithms to analyze and find patterns from massive amounts of raw data. Simultaneously, mainstream CPUs and GPUs have brought many of the lower complexity

algorithms to the masses. However, with the rising needs of advanced algorithms for large-scale data analysis and data-driven discovery, and significant growth in emerging applications from the edge to the cloud, we need low-cost, high-performance, energy-efficient, and reliable computing systems targeted for these applications.

Developing these application-specific hardware elements must become easy, inexpensive, and as seamless as developing application software to keep up with extremely rapid evolution of AI/ML algorithms and applications. Therefore, it is of high priority to create innovative design frameworks enabled by data analytics and machine learning that reduces the engineering cost and design time of application-specific hardware. A key challenge in design space exploration is the need to perform expensive computational simulations to evaluate the quality of designs in terms of objectives including performance, power, and area. ML algorithms can guide the search for high-quality designs by combining domain knowledge and data from past design evaluations [2, 3, 4, 5]. We can also use ML to create policies for on-chip dynamic resource management as a function of the application workloads running it. There are approaches based on exploratory learning [6] and supervised learning guided by learned models of power, performance, and temperature as a function of the key performance indicators [7, 8, 9].

At the same time, there is a need to continually advance the state-of-the-art in software algorithms and frameworks to better cope with data available to platforms at multiple scales of complexity: from small-scale Internet-of-Things (IoT) devices, handheld mobile devices, data-centric servers and workstations, to datacenters and supercomputers. Specifically, we need to design hardware-friendly ML algorithms to improve the execution efficiency of the hardware platform. For example, crossbar-aware pruning of deep models to improve the efficiency of resistive RAM based processing-in-memory platforms [10, 11]. Similarly, neural architecture searches to reduce the number of normalization layers in convolutional neural networks [12].

Through tight collaborative efforts between manycore system designers and ML experts [1], we can create a framework that espouses manycore system design knowledge and data-driven decision making. This interdisciplinary effort will greatly benefit both machine learning and manycore experts. This framework will allow us to create fully adaptive systems that are holistically optimized across the entire design stack. Manycore system designers will gain insights by understanding the rationale behind the ML-driven manycore design decisions, an example of “data-to-insight” for manycore design. Additionally, this design framework will significantly reduce the engineering effort and cost of designing manycore systems, enabling the commoditization and democratization of

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

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

FPGA'24 – ACM/SIGDA Int’l Symposium on Field-Programmable Gate Arrays
Monterey, CA
Deadline: Oct. 13, 2023
Abstracts due: Oct. 6, 2023
Mar. 3 - 5, 2024
http://www.isfpga.org

ISCAS'24 – IEEE Int'l Symposium on Circuits and Systems
Singapore
Deadline: Oct. 15, 2023
May 19-22, 2024
http://iscas2024.org

massive single-chip manycore systems, making high-performance, application-specific manycores readily available to the rapidly changing ML domain.

In summary, there are good synergies between machine learning and computing systems design as illustrated by the examples provided above. Future research should enable a virtuous cycle of ML techniques for advancing hardware designs spanning edge devices to cloud, which will empower further advances in ML (a.k.a. ML for ML).

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RTAS'24 - IEEE Real-Time and Embedded Technology and Applications Symposium
Hong Kong, China
Deadline: Oct. 31, 2023
May 13-16, 2024
http://2024.rtas.org

ACM Transactions on Design Automation of Electronic Systems Special Issue on EMBEDDED SYSTEM SOFTWARE/TOOLS
Deadline: Nov. 31, 2023
https://todaes.acm.org

Upcoming Conferences

VLSI-SoC'23 – IFIP/IEEE Int'l Conference on Very Large Scale Integration
Dubai, UAE
Oct. 16-18, 2023
http://www.vlsi-soc.com

BioCAS'23 – Biomedical Circuits and Systems Conference
Toronto, Canada
Oct. 19-21, 2023
https://2023.ieee-biocas.org/

PACT'23 - Int'l Conference on Parallel Architectures and Compilation Techniques
Vienna, Austria
Oct. 21-25, 2023
http://www.pactconf.org

MICRO'23 – IEEE/ACM Int'l Symposium on Microarchitecture
Toronto, Canada
Oct. 28 - Nov. 1, 2023
http://www.microarch.org/micro56

SIGDA Awards

1. **Best Paper Award @ SBCCI 2023**

   https://www.inf.ufrgs.br/site/noticia/pgmicro-recebe-best-paper-award-no-chip-in-rio-2023/

   - **Towards a Machine Learning based Method for Indirect Test Generation of Mixed-Signal Circuits**
     Allan F. G. Ferreira, Lucas Zilch, Vinícius Navarro, Marcelo Lubaszewski and Tiago Balen

2. **Best Paper Award @ MLCAD 2023**

   https://yuzhe630.github.io/publications.html

   - **ASAP: Accurate Synthesis Analysis and Prediction with Multi-task Learning**
     Yikang Ouyang - The Hong Kong University of Science and Technology (Guangzhou)
     Sicheng Li - Alibaba Group
     Dongsheng Zuo, Hanwei Fan, Yuzhe Ma - The Hong Kong University of Science and Technology (Guangzhou)

3. **Best Student Paper Award @ MLCAD 2023**

   https://cesg.tamu.edu/2023/09/21/best-student-paper-award/

   - **MMM: Machine Learning-Based Macro-Modeling for Linear Analog ICs and ADC/DACs**
     Yishuang Lin, Yaguang Li - Texas A&M University
     Meghna Madhusudan, Sachin Sapatnekar, Ramesh Harjani - University of Minnesota
     Jiang Hu - Texas A&M University

4. **TEST OF TIME AWARDS @ ESWEEK 2023**

   https://esweek.org/awards-2/

   CASES

   - **Predictable Programming on a Precision Timed Architecture**
     Ben Lickly (UC Berkeley), Isaac Liu (UC Berkeley), Sungjun Kim (Columbia University), Hiren D. Patel (UC Berkeley), Stephen A. Edwards (Columbia University), Edward A. Lee (UC Berkeley)

ICCAD'23 – IEEE/ACM Int'l Conference on Computer-Aided Design
San Francisco, CA
Oct 29 - Nov 2, 2023
https://iccad.com/

ICCD'23 – IEEE Int'l Conference on Computer Design
Washington DC, US
Nov. 6-8, 2023
http://www.iccd-conf.com

FPT'23 - Int'l Conference on Field-Programmable Technology
Yokohama, Japan
Dec. 11-14, 2023
http://icfpt.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
ITC Royal Bengal, Kolkata, India
Jan. 6-10, 2024
https://vlsid.org/

HiPEAC'24: Int'l Conference on High Performance Embedded

CODES+ISSS

- **Predator: A Predictable SDRAM Memory Controller**
  Benny Akesson (Eindhoven University of Technology), Kees Goossens (NXP Semiconductors Research & Delft University of Technology) and Markus Ringhofer (Graz University of Technology)

EMSOFT

- **Scheduling Multiple Independent Hard-Real-Time Jobs on a Heterogeneous Multiprocessor**

  Orlando Moreira (NXP Semiconductors), Frederico Valente (University of Aveiro) and Marco Bekooij (NXP Semiconductors)

5. BEST PAPER AWARDS @ ESWEEK 2023

https://esweek.org/awards-2/

CASES

- **ZPP: A Dynamic Technique to Eliminate Cache Pollution in NoC based MPSoCs**
  Dipika Deb and John Jose (Indian Institute of Technology, Guwahati)

CODES+ISSS

- **Florets for Chiplets: Data Flow-aware High-Performance and Energy-efficient Network-on-Interposer for CNN Inference Tasks**
  Harsh Sharma (Washington State University – Pullman), Lukas Pfromm (University of Wisconsin Madison, Madison), Rasit Onur Topaloglu (Topallabs), Jana Doppa (Washington State University – Pullman), Umit Ogras (University of Wisconsin Madison, Madison), Ananth Kalyanaraman and Partha Pratim Pande (Washington State University – Pullman)

EMSOFT

- **Equation-Directed Axiomatization of Lustre Semantics to Enable Optimized Code Validation**
  Lélio Brun (NII Tokyo Japan), Christophe Garion (ISAE Supaéro Toulouse France), Pierre-loic Garoche (ENAC Toulouse France) and Xavier Thirioux (ISAE Supaéro Toulouse France)

6. OUTSTANDING REVIEWERS AWARD @ ESWEEK 2023

https://esweek.org/awards-2/

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

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

CASES

Jeronimo Castrillon (TU Dresden, DE)
Krishna Nandivada (IIT Madras, IN)

CODES+ISSS

Francesco Regazzoni (University of Amsterdam, NL and
USI Lugano, CH)
Ryan Kim (Colorado State University, US)

EMSOFT

Taylor Johnson (Vandelbilt University, US)
Jean-Luc Scharbarg (IRIT, FR)

7. COMPETITIONS @ ESWEEK 2023

https://esweek.org/awards-2/

ACM SIGBED Student Research Competition (SRC) Awards

- **Undergraduate Category**

  Champion: Valen Yamamoto, UC Irvine

- **Graduate Category**

  Champion: Artem Klashtorny, University of Waterloo

  First Runner-up: Zain Ul Abideen, Tallinn University of Technology

  Second Runners-up: Dina Hussein, Washington State University; Xiaofan Yu, UCSD

Tiny and Fair ML Design Competition

- **Segmentation Track: Low-Power Computer Vision Challenge**

  First Place: ModelTC Team (Tsinghua University, CN, Max Planck Institute for Informatics, DE, and ModelTC, CN)
  Yiru Wang, Xin Jin, Zhiwei Dong,Yifan Pu, Yongqiang Yao, Bo Li, Ruihao Gong, Haoran Wang, Xianglong Liu, Gao Huang, Wei Wu

  Best Accuracy: AidgetRock Team (Midea Group, CN)
  Zifu Wan, Xinwang Chen, Ning Liu, Ziyi Zhang, Dongping Liu Ruijie Shan, Zhengping Che,Fachao Zhang, Xiaofeng Mou Jian Tang

  Best Execution Time: ENOT Team (ENOT.AI, LU)

Alexander Goncharenko, Max Chuprov, Andrey Sherbin Sergey Alyamkin, Ivan Malofeev

- **Classification Track: Fair and Intelligent Embedded System Challenge**

  First Place: Rutgers Efficient AI (University of Rochester, USA)
  Cheng Yang, Yang Sui, Jinqi Xiao, Junyi Zhou, Ge Wang, Bo Yuan

  Second Place: Sustainable Computing Laboratory (University of Notre Dame, University of Pittsburgh, Dos Pueblos High School, USA)
  Dewen Zeng, Zhenge Jia, Yuanbo Guo, Qingpeng Kong, Yawen Wu, Joy Xie, Jingtong Hu, Yiyu Shi

  Third Place: Intelligent and Robotic Systems (Sun Yat-sen University, CN)
  Jiantao Tan, Yi Zheng, Ruixuan Wang, Gang Chen

Embedded System Software Competition (ESSC)

- **ESP: An Open-Source Platform for the Design and Programming of Heterogeneous SoCs**
  Joseph Zuckerman, Maico Cassel dos Santos, Kuan-Lin Chiu, Guy Eichler, Biruk Seyoum, Gabriele Tombesi and Luca P. Carloni

- **HybroGen : A compiler for innovative interleaved execution and compilation scenarios**
  Henri-Pierre Charles, Maha Kooli, Bricout Thaddée and Lacour Benjamin

- **ZoneTrace: A Zone Monitoring Tool for F2FS on ZNS SSDs**
  Ping-Xiang Chen, Dongjoo Seo, Changhoon Sung, Jongheum Park, Minchul Lee and Nikil Dutt

8. Best Paper Award @ NOCS 2023

http://www.cs.columbia.edu/~luca/research/papersIndexByYear.shtml

- **SoCProbe: Compositional Post-Silicon Validation of Heterogeneous NoC-Based SoCs**
  G. Tombesi, J. Zuckerman, P. Mantovani, D. Giri, M. Cassel Dos Santos, T. Jia, David Brooks, G.-Y. Wei and L. P. Carloni

9. Computer-Aided Verification 2023 award

Shaz Qadeer, Madan Musuvathi, Jakob Rehof, Akash Lal, Thomas Reps

Citation: For the introduction of context-bounded analysis and its

application to systematic testing of concurrent programs.

Related publications:

1. Shaz Qadeer and Jakob Rehof. Context-Bounded Model Checking of Concurrent Software. In Proc. of TACAS'05. LNCS 3440. Edinburgh, UK, 2005.
2. Madan Musuvathi and Shaz Qadeer. Iterative Context Bounding for Systematic Testing of Multithreaded Programs. In Proc. of PLDI'07. San Diego (Ca), USA, 2007.
3. Akash Lal and Thomas Reps. Reducing concurrent analysis under a context bound to sequential analysis. Formal Methods in System Design 35.1 (2009): 73-97.

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.

CALL FOR PAPERS:

Special Issue on EMBEDDED SYSTEM SOFTWARE/TOOLS

TODAES special issue on embedded systems software/tools invites submissions focus on the following (nonexhaustive) topic areas:

• High level synthesis of embedded systems

- Electronic design automation tools
- Power, performance, area modeling tools
- Design space exploration
- Resource and thermal management for embedded systems
- Application-specific architectures
- Artificial intelligence on edge devices, IoT
- Hardware reliability and security

Submissions deadline: **November 31, 2023**

Technical Activities

1. Codasip Partners with Siemens to Deliver Trace Solution for Custom Processors

Codasip is now offering the Tessent Enhanced Trace Encoder solution from the Tessent Embedded Analytics product line at Siemens EDA with its customizable RISC-V cores. Through the joint solution, developers can efficiently trace and debug issues between silicon and software, and accurately understand real-time behaviors of even the most complex customized designs based on Codasip RISC-V processors…

2. Algorithm Helps Non-Experts Fine-Tune Personal Bots

A group of researchers developed a machine learning (ML) technique for controlling a personal robot that leads to better performance with lower data input. The technique helps a non-technical robot owner figure out why a bot failed in a task—and then correct it themselves instead of shipping it back to the factory…

3. QuickLogic and Xiphera Team Up on Post-Quantum Cryptography on eFPGAs

QuickLogic Corp. is partnering with Xiphera to implement its xQlave quantum-secure cryptographic IP cores on QuickLogic's eFPGA architecture. This partnership provides architects with a path towards securing their assets against the quantum threat, enabling them to stay one step ahead in the evolving landscape of cyber threats…

4. STMicroelectronics Enables Secure Connection of IoT Devices to Microsoft Azure IoT Hub

STMicroelectronics has released software that simplifies connecting IoT devices built using the latest high-performing STM32H5 microcontrollers (MCUs) to Microsoft Azure IoT Hub…

Job Positions

1. University of Chicago, US

Job Title: Professor of Computer Science

Description: The Department of Computer Science at the University of Chicago is seeking qualified applicants for the position of part-time Adjunct Professor (open rank) to teach in its Masters Program in Computer Science (MPCS, https://masters.cs.uchicago.edu), starting in the 2023/24 academic year. The search is open with respect to subfields, but we encourage applications from practitioners and educators in the fields of Computer Networks, Computer Security, Databases, and Artificial Intelligence. Selected candidates will be appointed as Adjunct Assistant Professor, Adjunct Associate Professor, or Adjunct Professor, depending on qualifications. Adjunct faculty are appointed to an initial one-year term, with possibility of renewal to terms of up to five years, and are typically expected to teach at least one course per academic year, but may teach up to four courses per academic year.For more information, please refer to https://facultyvacancies.com/professor-of-computer-science,i36580.html.

2. Thompson Rivers University, Canada

Job Title: Assistant/Associate Professor of Software Engineering

Description: The department is seeking to hire highly qualified individual for One (01) Tenure-Track Position at the rank of Assistant Professor \ Associate Professor beginning December 15, 2023. The successful candidate must possess a PhD in Computer or Software Engineering or an equivalent discipline from a recognized university, and the candidate's teaching and research experience must be within the core areas of Computer or Software Engineering. The candidate must have an undergraduate degree in an engineering discipline from a recognized university. Candidates should demonstrate expertise to teach the majority of the following courses in the areas of Software Engineering: Realtime System Design, Digital Communication, Control Systems, Digital System Desing (VLSI), Safety Critical Systems, Computer Architecture. For more information, please refer to https://facultyvacancies.com/assistantassociate-professor-of-software-engineering,i36205.html.

3. Hong Kong University of Science and Technology (Guangzhou), China

Job Title: Professor/Associate Professor/Assistant Professor in Data Science and Analytics Thrust

Description: The Data Science and Analytics (DSA) Thrust (https://dsa.hkust-gz.edu.cn/), an academic department under Information Hub, HKUST(GZ), now invites applications for multiple tenure-track and tenured faculty positions at all ranks (Assistant Professor/Associate Professor/Professor). DSA Thrust advances data science and analytics by unifying statistics, machine learning, optimization, and their related techniques. It also expands the applications of data science and analytics to solve real world problems and to benefit society. DSA Thrust welcomes applicants with research focus in the following areas, including but not limited to: Data-driven AI & Machine Learning, Statistical Learning and Modeling, Data Visualization and Infographics, Industrial and Business Analytics (Operations-Related Data Analytics, Business Intelligence, and Strategy, etc.), AI-driven Data Analytics, Sector-Specific Data Analytics (Healthcare, Finance, Insurance, Marketing, Manufacturing, Transportation, etc.), High-Performance Systems for Data Analytics, Machine Learning Systems, AI for Science. For more information, please refer to https://facultyvacancies.com/professorassociate-professorassistant-professor-in-data-science-and-analytics-thrust,i36607.html.

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