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SIGDA - The Resource for EDA Professionals

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SIGDA News

1. Taiwan to Capture 70 Percent of 2024 Global Foundry Market

The global foundry is set to grow steadily in 2024, with market leader TSMC and the Taiwan region being the beneficiaries, according to market analyst TrendForce.

2. Modular Open Edge Platform Scales AI Applications

Intel has announced its new Edge Platform, a modular, open software platform enabling enterprises to develop, deploy, run, secure, and manage edge and AI applications at scale with cloud-like simplicity. Together, these capabilities will accelerate enterprise time-to-scale deployment, contributing to improved total cost of ownership (TCO).

3. AI Models to Take 15% of Growing Smartphone Market in 2024

Demand for AI applications will help drive the smartphone market in 2024 but at the same time, rising prices will inhibit some people from replacing their phones, according to International Data Corp.

4. Samsung Goes 12-High with HBM3E 36Gbyte DRAM

Samsung Electronics has developed the HBM3E 12H, a 12-stack HBM3E DRAM with a memory capacity of 36Gbytes.

5. SK Hynix Has 'Sold Out' of HBM DRAMs for 2024

SK Hynix has sold out of DRAMs in the stacked high-bandwidth memory (HBM) format that is used in AI processors for the data center for the whole of 2024, according to a senior executive.

Messages from the EiCs

Dear ACM/SIGDA members,

We are excited to present to you March 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

6. IMEC Claims High-NA EUV Patterning Is Ready to Make Chips

Research institute IMEC is set to present progress on high-numerical aperture extreme ultraviolet (high-NA EUV) lithography that it says shows a readiness to make chips at its lab shared with ASML.

7. Fujitsu Unveils AI Applications to Tame 5G+ Complexity

Fujitsu Network Communications has introduced Virtuora® IA, a collection of network applications powered by AI that use network-focused machine learning (ML) models and inherent telecommunications expertise to significantly improve mobile network operators' (MNOs) network performance with drastically simplified operations.

8. Toshiba Europe Shows 400Gbit/s QKD Quantum Network

Toshiba Europe has teamed with Orange for a long-distance quantum network operating alongside existing telecoms fiber.

What is

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What is DNA Storage?

Bingzhe Li
Assistant Professor,
Department of Computer Science,
University of Texas at Dallas

The vast expansion of data has correspondingly increased the need for storage solutions. Predictions by the International Data Corporation (IDC) suggest that global digital data could amount to 175 Zettabytes by 2025. To meet these storage demands, new devices like Shingled Magnetic Recording (SMR) [1] and Interlaced Magnetic Recording (IMR) [2] have been introduced. Despite these innovations, storage media growth lags behind the pace of digital data generation. Recently, DNA storage [3, 4] has emerged as a potential solution to this problem, thanks to its durability and high storage density, making it an ideal option for long-term data archiving.

In the field of DNA storage, data is transcribed into DNA sequences using the four primary nucleotides - adenine (A), thymine (T), guanine (G), and cytosine (C) - to represent binary information. Theoretically, DNA can encode data at a density of 2 bits/nucleotide. Nevertheless, biological limitations necessitate careful consideration in the encoding process, as certain nucleotide patterns, such as long homopolymers (e.g., AAAAA), may increase error rates. To achieve high-density encoding while accounting for these biological constraints, specialized encoding methods are employed. An instance of such an approach is the DP-DNA method, which utilizes a hybrid encoding strategy tailored to the pattern of the incoming data to optimize the storage density of DNA [5].

For data retrieval in DNA storage, a random-access approach is utilized, leveraging the Polymerase Chain Reaction (PCR) to optimize the cost-efficiency of reading DNA data. In this system, each DNA molecule is appended with a unique primer pair - short DNA oligonucleotides ranging from 18 to 25 nucleotides in length - that serve as molecular indices. To access specific data, the corresponding primers must be located. Subsequently, the targeted DNA molecule is amplified and sequenced through PCR, enabling the retrieval of the desired data strand without the need to sequence the entire DNA content within the tube. A challenge with this random-access method is the limited number of unique primers available, which restricts DNA storage capacity due to possible interference between primer sequences and the data-encoding DNA strands. This interference complicates the differentiation and retrieval of specific DNA data strands. To address this issue, a collision-aware encoding strategy has been proposed to effectively expand the pool of usable primers, thereby enhancing the overall capacity of DNA-based data storage [6].

Additionally, DNA storage systems can be tailored to match the unique attributes of specific applications, thereby improving capacity and reliability. For example, when applied to image data, DNA storage solutions can be optimized to enhance encoding density or robustness by capitalizing on the inherent fault tolerance and the particular encoding characteristics of images [7, 8].

In summary, DNA storage is a promising solution for long-term data archiving, capable of accommodating vast amounts of information. Despite its potential, DNA storage is still at its beginning stage, and numerous research challenges, such as data preservation, error correction coding, and microfluidic system development, remain to be addressed and thoroughly investigated.

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

ISVLSI'24 – IEEE Computer Society Annual Symposium on VLSI
Knoxville, TN
Deadline: Mar. 4, 2024
July 1-3, 2024
http://www.ieee-isvlsi.org

ISLPED'24 – ACM/IEEE Int'l Symposium on Low Power Electronics and Design
Newport Beach, CA
Deadline: Mar. 11, 2024 (Abstracts due: Mar. 4, 2024)
Aug. 5-7, 2024
http://www.islped.org

ESWEEK'24 - Embedded Systems Week
Raleigh, NC
Deadline: Mar. 31, 2024 (Abstracts due: Mar. 24, 2024)
Sept. 29 - Oct. 4, 2024
http://www.esweek.org

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[1] Fenggang Wu, Bingzhe Li, and David HC Du. "Fluidsmr: Adaptive management for hybrid smr drives." ACM Transactions on Storage (TOS) 17, no. 4 (2021): 1-30.

[2] Fenggang Wu, Bingzhe Li, Baoquan Zhang, Zhichao Cao, Jim Diehl, Hao Wen, and David HC Du. "Tracklace: Data management for interlaced magnetic recording." IEEE Transactions on Computers 70, no. 3 (2020): 347-358.

[3] Bingzhe Li, Nae Young Song, Li Ou, and David HC Du. "Can We Store the Whole World's Data in DNA Storage?." In 12th USENIX Workshop on Hot Topics in Storage and File Systems (HotStorage 20). 2020.

[4] Yixun Wei, Bingzhe Li, and David HC Du. "Dna storage: A promising large scale archival storage?." arXiv preprint arXiv:2204.01870 (2022).

[5] Li, Bingzhe, Li Ou, Bo Yuan, and David HC Du. "DP-DNA: A Digital Pattern-Aware DNA Encoding Scheme to Improve Encoding Density of DNA Storage." In 2023 31st International Symposium on Modeling, Analysis, and Simulation of Computer and Telecommunication Systems (MASCOTS), pp. 1-8. IEEE, 2023.

[6] Bingzhe Li, Li Ou, and David Du. "Img-dna: approximate dna storage for images." In Proceedings of the 14th ACM International Conference on Systems and Storage, pp. 1-9. 2021.

[7] Yi Li, David HC Du, Li Ou, and Bingzhe Li. "HL-DNA: A Hybrid Lossy/Lossless Encoding Scheme to Enhance DNA Storage Density and Robustness for Images." In 2022 IEEE 40th International Conference on Computer Design (ICCD), pp. 434-442. IEEE, 2022.

[8] Yixun Wei, Bingzhe Li, and David Du. “An Encoding Scheme to Enlarge Practical DNA Storage Capacity by Reducing Primer-Payload Collisions.” In 2024 ACM International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS), 2024.

SIGDA Awards

1. **Best Paper Award @ ASP-DAC 2024**

https://www.aspdac.com/awardarchive/paper.html

- **FineMap: A Fine-grained GPU-parallel LUT Mapping Engine**

  Tianji Liu, Chinese University of Hong Kong, Hong Kong
  Lei Chen, Huawei Noah's Ark Lab, Hong Kong SAR, Hong Kong
  Xing Li, Huawei Noah's Ark Lab, Hong Kong SAR, Hong Kong
  Mingxuan Yuan, Huawei Noah's Ark Lab, Hong Kong SAR, Hong Kong
  Evangeline F. Y. Young, Chinese Univ. of Hong Kong, Hong Kong

PACT'24 - Int'l Conference on Parallel Architectures and Compilation Techniques
Long Beach, CA
Deadline: Mar. 27, 2024 (Abstracts due: Mar. 22, 2024)
Oct. 13-16, 2024
http://www.pactconf.org

IWLS'24 - International Workshop on Logic & Synthesis
ETH Zurich, Zurich, Switzerland
Deadline: Apr. 5, 2024 (Abstracts due: Mar. 29, 2024)
June 6-7, 2024
https://www.iwls.org

VLSI-SoC’24 – IFIP/IEEE Int’l Conference on Very Large Scale Integration
Tanger, Morocco
Deadline: Apr. 8, 2024 (Abstracts due: Apr. 1, 2024)
Oct. 6-9, 2024
http://www.vlsi-soc.com

MICRO’24 – IEEE/ACM Int'l Symposium on Microarchitecture
Austin, Texas
Deadline: Apr. 18, 2024 (Abstracts due: Apr. 11, 2024)
Nov. 2-6, 2024
http://www.microarch.org/micro57

ICCAD’24 – IEEE/ACM Int’l Conference on Computer-Aided Design
New York
Deadline: May 5, 2024 (Abstracts due: Apr. 28, 2024)
Oct/Nov, 2024
https://iccad.com/

MLCAD'24 - ACM/IEEE Workshop on Machine Learning for CAD
Snowbird, Utah
Deadline: May 18, 2024
Sep. 9-11, 2024
https://mlcad-workshop.org/

- **SPIRAL: Signal-Power Integrity Co-Analysis for High-Speed Inter-Chiplet Serial Links Validation**

  Xiao Dong, Zhejiang University, China
  Songyu Sun, Zhejiang University, China
  Yangfan Jiang, Zhejiang University, China
  Jingtong Hu, University of Pittsburgh, USA
  Dawei Gao, Zhejiang Univ./Zhejiang ICsprout Semiconductor, China
  Cheng Zhuo, Zhejiang Univ./Key Laboratory of Collaborative Sensing and Autonomous Unmanned Systems of Zhejiang Province, China

2. University LSI Design Contest Awards @ ASP-DAC 2024

https://www.aspdac.com/awardarchive/design.html

Grand Prize

- **A 740μW Real-Time Speech Enhancement Processor Using Band Optimization and Multiplier-Less PE Arrays for Hearing Assistive Devices**

  Sungjin Park, Seoul National Univ., Republic of Korea
  Sunwoo Lee, Seoul National Univ., Republic of Korea
  Jeongwoo Park, Sungkyunkwan Univ., Republic of Korea
  Hyeong-Seok Choi, Supertone, Republic of Korea
  Dongsuk Jeon, Seoul National Univ., Republic of Korea

- **Implementation of a High-throughput and Accurate Gaussian-TinyYOLOv3 Hardware Accelerator**

  Juntae Park, Subin Ki, Hyun Kim, Seoul National Univ. of Science and Tech., Republic of Korea

3. 10-Year Retrospective Most Influential Paper Award @ ASP-DAC 2024

https://www.aspdac.com/awardarchive/mip.html

- **Training Itself: Mixed-Signal Training Acceleration for Memristor-Based Neural Network**

  Boxun Li, Yuzhi Wang, Yu Wang, Yiran Chen, Huazhong Yang

SAT'24 - International Conference on Theory and Applications of Satisfiability Testing
Pune, India
Full paper submission: March 15, 2024 AoE
Abstract submission: March 8, 2024 AoE
August 21-24, 2024
http://satisfiability.org/SAT24

Upcoming Conferences

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, 2024
http://www.isqed.org

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

SIGDA Partner Journal

ACM Transactions on Design Automation of Electronic Systems, TODAES, would like to give thanks to Dr. X. Sharon Hu for her contributions as Editor-in-Chief and welcomes Dr. Jiang Hu as its new Editor-in-Chief for the term of February 1, 2024 to January 31, 2027. Dr. Jiang Hu is a Professor of Electrical & Computer Engineering at Texas A & M University.

ACM 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.

Technical Activities

1. Innatera Productizes SNN Accelerator As 'Neuromorphic Microcontroller'

Neuromorphic chip startup Innatera recently productized its spiking neural network accelerator in the form of a "neuromorphic microcontroller," designed for always-on sensing applications in consumer electronics and the IoT…

2. Keysight and NVIDIA to Demo 6G Neural Receiver Design Flow at MWC 2024

Keysight Technologies Inc. has collaborated with NVIDIA to create a complete design flow for training and validating neural receivers that will

May 6-9, 2024
http://www.hostsymposium.org

FCCM' 24 - IEEE International Symposium On Field-Programmable Custom Computing Machines
Orlando, FL
May 5-8, 2024
https://www.fccm.org/

MDTS'24 – IEEE Microelectronics Design & Test Symposium
Albany, NY
May 13-15, 2024
http://natw.ieee.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

GLSVLSI'24 – ACM Great Lakes Symposium on VLSI
Tampa Bay Area, FL
June 12-14, 2024
http://www.glsvlsi.org

DAC'24 – Design Automation Conference
San Francisco, CA
June 23-27, 2024
http://www.dac.com/

be shown at Mobile World Congress Barcelona 2024. To be presented at Keysight's booth, Hall 5 Stand 5E12, the demonstration will feature an Open RAN testbed that has been augmented by a multi-user MIMO neural receiver…

3. Taiwan's 5-Bit Superconducting Quantum Computer Goes Online

Academia Sinica has achieved a significant milestone in the field of computing with the successful development of a 5-bit superconducting quantum computer in Taiwan, marking a notable advancement in quantum technology. This accomplishment positions Taiwan as a key contributor to quantum computing research and development on the global stage…

4. Graphene Transistor Could Revolutionize Semiconductor Industry

Researchers at the Georgia Institute of Technology said the graphene semiconductor they have developed is compatible with standard microelectronic processing methods, a fundamental requirement for any viable alternative to silicon…

Job Positions

1. University of California San Diego, US

Job Title: Associate/Full Professor of Computer Engineering

Description: The UC San Diego Department of Electrical and Computer Engineering (ECE) invites applications for multiple tenured faculty positions at the Associate or Full Professor rank in our dynamic and rapidly growing department. The department is looking for exceptional candidates in all areas of Electrical and Computer Engineering. We are particularly seeking faculty passionate about working with graduate students and training the next generation of researchers. We are looking for applicants with outstanding research credentials. Successful applicants are expected to lead vigorous research program and will be required to teach university students. More information can be found at http://www.ece.ucsd.edu.

2. University of Nottingham, UK

Job Title: Postdoctoral Position in Computer Science

Description: Applications are invited from Home and International students for up to 10 fully-funded PhD studentships offered by the School of Computer Science at the University of Nottingham, starting on 1st

October 2024. The topics for the studentships are open, but your research proposal should relate to the interests of one of the School's research groups: Cyber-physical Health and Assistive Robotics Technologies; Computational Optimisation and Learning Lab; Computer Vision Lab; Cyber Security; Functional Programming; Intelligent Modelling and Analysis; Mixed Reality Lab; Lab for Uncertainty in Data and Decision Making; Visualisation and Computer Graphics. The studentships available are fully funded for 3.5 years and include a stipend of (minimum) £18,622 per year and tuition fees. For more information, please refer to https://facultyvacancies.com/postdoctoral-position-in-computer-science,i37973.html.

3. University of Queensland, Australia

Job Title: Research Fellow in Computer Science

Description: The purpose of the position is to support and manage research associated with the Dementia and Neuro Mental Health Research Unit (DNMHRU), at the University of Queensland Centre for Clinical Research. The DNMHRU aims to find novel solutions to improve diagnosis, treatment and care, and enhance quality of life for individuals living with neurodegenerative conditions such as dementia and Parkinson's disease. This includes technological innovations (e.g. virtual reality, artificial intelligence, telehealth) supported by tailored digital platforms and mobile applications to improve diagnosis and enhance remote delivery of interventions for wider outreach. Key responsibilities will include: Design and conduct human-centred/participatory design processes that engage a wide range of stakeholders; Support the development and implementation of technology platforms; Produces quality research outputs consistent with discipline norms by publishing or exhibiting in high quality outlets; Work with colleagues in the development of joint research projects and applications for competitive research funding support; Contribute to progressing towards transfer of knowledge, technology and practices to research end users through translation, including commercialisation of UQ intellectual property; Develop a coherent research program and an emerging research profile; Contribute to the effective supervision of Honours and Higher Degree by Research students (as appropriate). For more information, please refer to https://facultyvacancies.com/research-fellow-in-computer-science,i37964.html.

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