

1 August 2021, Vol. 51, No. 8

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Comments from the Editors

Dear ACM/SIGDA members,

We are excited to present to you August 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 and hot research topics to technical news and activities from our community. Get involved and contact us if you want to contribute an article or announcement.

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

Happy reading!

[Debjit Sinha](#), Keni Qiu, Editors-in-Chief, SIGDA E-News

To renew your ACM SIGDA membership, please visit <http://www.acm.org/renew> or call between the hours of 8:30am to 4:30pm EST at +1-212-626-0500 (Global), or 1-800-342-6626 (US and Canada). For any questions, contact acmhelp@acm.org.

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SIGDA News

(1) "Google and Nvidia Tie in MLPerf; Graphcore and Habana Debut"

[\[https://www.eetimes.com/google-and-nvidia-tie-in-mlperf-graphcore-and-habana-deb...\]](https://www.eetimes.com/google-and-nvidia-tie-in-mlperf-graphcore-and-habana-deb...)

Google and Nvidia tied for first place in the fourth round of MLPerf Training benchmark scores, each winning four of the eight benchmarks in the closed division with their large-scale AI accelerator systems.

(2) "U.S. Crash Order Will Help Build an AV Safety Database"

[\[https://www.eetimes.com/u-s-crash-order-will-help-build-an-av-safety-database/\]](https://www.eetimes.com/u-s-crash-order-will-help-build-an-av-safety-database/)

In late June, the U.S. National Highway Transportation Safety Administration (NHTSA) surprised the industry with an order requiring mandatory reporting of crashes involving ADAS vehicles classified as SAE L2 technology. The order includes autonomous vehicles or automated driving system (ADS) vehicles in the agency' s terminology or SAE L3, L4 and L5.

(3) "Resilient Grid Promoted to Meet Surging Power Demand"

[\[https://www.eetimes.com/resilient-grid-promoted-to-meet-surging-power-demand/\]](https://www.eetimes.com/resilient-grid-promoted-to-meet-surging-power-demand/)

As the U.S. power grid groans under the weight of surging demand and distributed energy generation, technology and perhaps infrastructure funds to pay for transmission line upgrades may be in the pipeline.

(4) "Multitasking, Sensors Drive Smartphone Memory Requirements"

[\[https://www.eetimes.com/multitasking-sensors-drive-smartphone-memory-requirement...\]](https://www.eetimes.com/multitasking-sensors-drive-smartphone-memory-requirement...)

Smartphone memory and storage requirements continue to be driven forward by 5G networking, but it' s not the only trend putting pressure on mobile DRAM and flash.

(5) "SoftBank Will Go International with Satellite Strategy"

[\[https://www.eetimes.com/softbank-will-go-international-with-satellite-strategy/\]](https://www.eetimes.com/softbank-will-go-international-with-satellite-strategy/)

Japanese Mobile Network Operator (MNO) SoftBank Corp is hanging some of its future on services that are delivered from space and can serve customers far beyond its home market of Japan.

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"What is" Column

What is Quantum Deep Learning?

Weiwen Jiang
Assistant Professor
Electrical and Computer Engineering Department
George Mason University

We are now witnessing the emergence of actual quantum processors, such as the superconducting-based ones from IBM and Google, the photonics-based ones from Xanadu, and the ion trap-based ones from IonQ and Sandia National Lab. An imminent question comes out: what will be the killer application of quantum computing to show the quantum advantage?

Quantum Deep Learning (QDL) has recently arisen to be considered as one of such applications and successfully attracted wide attention from academics and industry. Like the deep neural-network accelerator designed by GPU, FPGA, and AISC, QDL aims to bring a brand-new player — Quantum Computer — to the game of accelerating deep learning tasks.

So, what is QDL? There are typically two implementations of quantum neural networks: (1) variational quantum circuit (VQC) [6-7], which utilizes the quantum gates with tunable parameters to mimic the neural computation; and (2) neural network quantum accelerator (NNQA) [5,8-10], which maps a trained network to a quantum circuit and accelerate the computation process using the quantum gates.

The advantage of VQC is the high degree of entanglement/correlation of inputs which cannot be easily implemented by classical computers so that it has the potential to explore some unknown features by using classical computing. However, it also brings the challenge to train the network. Due to the limited qubits' number and high noise of the near-term quantum computer, directly training network on a quantum computer is not scalable and unstable, while the high complexity makes it hard to train the parameters on a classical computer. What's more, all operations of the quantum gate are linear operations, it is difficult to implement non-linearity in VQC, which makes it questionable on the expression power of VQC for arbitrary function (i.e., the universal approximability). On the other hand, NNQA has no trouble in training the model, but it is questionable whether the implementation can achieve a quantum advantage. The initial work [8] maps an input data item (say a pixel of an image) to one qubit, known as angle encoding, which leads the implementation to have at least the same complexity as the classical counterpart. Recently, [9-10] applies the amplitude encoding, which can map N input data to N amplitudes of quantum states in a quantum system with $\log N$ qubits. It provides the opportunity to achieve a quantum advantage if the computing complexity (i.e., quantum circuit length) can be $O(\log N)$. However, both works still have the $O(N)$ complexity for circuit length. Until recently, QuantumFlow proposes the co-design approach to optimize the quantum circuit, so that it can be reduced to $O(\log N)$, demonstrating the quantum advantage for the quantum neuron.

In summary, there are now having two ways, VQC and NNQA, to conduct deep learning tasks on quantum computers. Each of them has pros and cons. QuantumFlow in the NNQA category applies the EDA approaches and provides the initial work to show the quantum advantage for neuron implementation, but there still exist challenges to extend it to a deep version.

References

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- [6] Maria Schuld, Alex Bocharov, Krysta M Svore, and Nathan Wiebe. Circuit-centric quantum classifiers.Physical Review A, 101(3):032308, 2020.
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[9] Weiwen Jiang, Jinjun Xiong, and Yiyu Shi. When machine learning meets quantum computers: A case study. In 2021 26th Asia and South Pacific Design Automation Conference (ASP-DAC), pages 593–598. IEEE, 2021.

[10] Francesco Tacchino, Chiara Macchiavello, Dario Gerace, and Daniele Bajoni. An artificial neuron implemented on an actual quantum processor. npj Quantum Information, 5(1):1–8, 2019.

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Paper Submission Deadlines

FPGA' 22 – ACM/SIGDA Int' l Symposium on Field-Programmable Gate Arrays

Monterey, CA

Deadline: Sept 6, 2021

Feb 27-Mar 1, 2022

<http://www.isfpga.org>

ISSCC'22 – IEEE Int'l Solid-State Circuits Conference

San Francisco, CA

Deadline: Sept 8, 2021

Feb 20-24, 2022

<http://isscc.org>

DATE'22 - Design Automation and Test in Europe

Antwerp, Belgium, and online

Deadline: Sept 19, 2021 (Abstracts due: Sept 12, 2021)

Mar 14-23, 2022

<http://www.date-conference.com>

ISQED'22 - Int'l Symposium on Quality Electronic Design

California

Deadline: Sept 14, 2021

April, 2022

<http://www.isqed.org>

ISPD' 22 – ACM Int' l Symposium on Physical Design

Banff, Alberta, Canada

Deadline: Oct 8, 2021 (Abstracts due: Oct 1, 2021)

Mar 27-30, 2022

<http://www.ispd.cc>

2nd ROAD4NN Workshop: Research Open Automatic Design for Neural Networks

Co-located with the 58th Design Automation Conference (DAC 2021)

Deadline: August 8, 2021, 11:59 PM (Pacific Time)

San Francisco, CA, USA

December 5, 2021

<https://easychair.org/cfp/ROAD4NN2021>

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Upcoming Conferences and Symposia

ASYNC'21 – IEEE Int' l Symposium on Asynchronous Circuits and Systems
Virtual Conference
Sept 7-10, 2021
<http://asynsymposium.org>

IWBDA'21 - Int'l Workshop on Bio-Design Automation
Online
Sept 20-24, 2021
<http://www.iwbdaconf.org/2021>

PACT'21 - Int'l Conference on Parallel Architectures and Compilation Techniques
Virtual Conference
Sept 26-28, 2021
<http://www.pactconf.org>

VLSI-SoC' 21 – IFIP/IEEE Int' l Conference on Very Large Scale Integration
Virtual conference
Oct 4-8, 2021
<http://www.vlsi-soc.com>

BioCAS'21 – Biomedical Circuits and Systems Conference
Berlin, Germany
Oct 7-9, 2021
<https://2021.ieee-biocas.org/>

ESWEEK'21 - Embedded Systems Week (CASES, CODES+ISSS, and EMSOFT)
Virtual Conference
Oct 10-15, 2021
<http://www.esweek.org>

NOCS'21 – IEEE/ACM Int' l Symposium on Networks-on-Chip (co-located with ESWEEK 2021)
Virtual Conference
Oct 14-15, 2021
<https://nocs2021.github.io>

MICRO' 21 – IEEE/ACM Int'l Symposium on Microarchitecture
Athens, Greece
Oct 16-20, 2021
<http://www.microarch.org/micro54>

ICCD' 21 – IEEE Int' l Conference on Computer Design
Virtual Conference
Oct 24-27, 2021
<http://www.iccd-conf.com>

BodyNets'21 – Int' l Conference on Body Area Networks
Virtual Conference
Oct 25-26, 2021
<http://www.bodynets.org>

ICCAD' 21 – IEEE/ACM Int' l Conference on Computer-Aided Design
Virtual Conference
Nov 1-4, 2021
<http://www.iccad.com>

DAC' 21 – Design Automation Conference

San Francisco

Dec 5–9, 2021

<http://www.dac.com/>

FPT'21 - Int'l Conference on Field-Programmable Technology

Auckland, New Zealand

Dec 6-10, 2021

<http://icfpt.org>

DAForum'21 - SIGDA/IEEE CEDA Ph.D. Forum at DAC 2021

San Francisco, CA

Dec 6, 2021

<https://easychair.org/cfp/daforum21>

HOST'21 – IEEE Int' l Symposium on Hardware-Oriented Security and Trust

Washington DC

Dec 12-15, 2021

<http://www.hostsymposium.org>

HiPC'21 – IEEE Int'l Conference on High Performance Computing, Data, And Analytics

Bangalore, India

Dec 17-20, 2021

<http://www.hipc.org>

iSES' 21 – IEEE Int' l Symposium on Smart Electronic Systems

Jaipur, India

Dec 20-22, 2021

<http://www.ieee-ises.org>

ASP-DAC'22 - Asia and South Pacific Design Automation Conference

Virtual Conference

Jan 17-20, 2022

<http://www.aspdac.com>

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Call for Participation - Virtual Event by Synopsys and Global Foundries

Design a Time Interleaved ADC for 5G V2X Automotive Applications

August 30 - 31, 2021 | 9:00 a.m. - 3:00 p.m. PST

Join Synopsys and Global Foundries for a 2-day virtual event, composed of lecture and lab sessions where analog design engineers will learn about the design, and verification of an ADC for 5G V2X (Vehicle-to-Everything) application, using the Global Foundries 22 nm FDSOI technology.

This 2-day virtual event is led by Professor Mohammed Ismail and Professor Mohammad Alhawari from the WINCAS Center of Excellence at Wayne State University. This event will be composed of lecture and lab sessions where analog design engineers will learn about the design, and verification of an ADC for 5G V2X (Vehicle-to-everything) application, using the GLOBALFOUNDRIES (GF) 22 nm FDSOI technology. Attendees will participate in hands-on lab sessions to learn about specific challenges related to ADC design such as designing the track-and-hold and comparator circuits, effects of timing skew on Time-Interleaved (TI) ADCs, and accounting for effects of post-layout parasitics as well as aging and statistical variation.

Attendees will participate in hands-on lab sessions to learn about specific challenges related to the ADC design. The event agenda and registration: <https://www.synopsys.com/events/ADC-5G-automotive-applications.html?>

Taught by Esteemed Professors at Wayne State University:

(1) Mohammed Ismail,

Professor and Chair of ECE, the founding Director of the WINCAS Research Center.

Ismail is a prolific author and entrepreneur in the field of chip design and test and nanotechnology, spent over 25 years in academia and industry in the US and Europe. He is the Founder of the Ohio State University's Analog VLSI Lab, one of the foremost research entities in the fields of analog, mixed-signal, and RF integrated circuit.

(2) Mohammad Alhawari,

Assistant Professor, Electrical and Computer Engineering

Prior to joining Wayne State University, he was a Post-doctoral Research Fellow at Khalifa University from 2016 to 2018. He earned his Ph.D. from Khalifa University in 2016. Alhawari's work has appeared in high-impact publications such as IEEE Journal Solid-State Circuits and IEEE Transaction of Circuits and Systems.

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SIGDA Awards

Call for Nominations: SIGDA Pioneering Achievement Award

Deadline: Aug. 31, 2021

Presented by the ACM Special Interest Group on Design Automation.

Description: To honor a person for lifetime, outstanding contributions within the scope of electronic design automation, as evidenced by ideas pioneered in publications, industrial products, or other relevant contributions. The award is based on the impact of the contributions throughout the nominee's lifetime.

Background: The ACM Special Interest Group on Design Automation sponsors or co-sponsors the ACM Transactions on Design Automation of Electronic Systems Best Paper Award, the William McCalla Award for best paper at the International Conference on Computer-Aided Design, and the ACM/IEEE A. Richard Newton Technical Impact in Electronic Design Automation Award which is given to authors of a publication authored at least ten years earlier and that has had an outstanding contribution to the field of EDA. In addition, SIGDA sponsors the ACM Outstanding Ph.D. Dissertation Award in Electronic Design Automation which is given each year to a graduating Ph.D. student in recognition of his/her thesis contributions to advancement in the EDA field. The Pioneering Achievement Award complements these awards and is intended for contributors whose impact is typically recognized over a lifetime of outstanding achievements.

Eligibility: Open to researchers in the field of electronic design automation who have had outstanding contributions in the field during their lifetime. Current members of the Board of the ACM Special Interest Group on Design Automation, or members of the Award Selection Committee are ineligible for the award. The awardee is invited to give a lecture at a SIGDA-sponsored event.

Award Items: A plaque for the awardee, a citation, and \$1000 honorarium. The honorarium will be funded by the SIGDA annual budget.

Nominee Solicitation: The call for nominees will be published by email to members of SIGDA, on the web site of ACM's Special Interest Group on Design Automation, and in the SIGDA newsletter. The

nomination should be proposed by someone other than the nominee. The nomination materials should be emailed to SIGDA-Award@acm.org (Subject: ACM/SIGDA Pioneering Achievement Award). Nominations for the award should include:

A nomination letter that gives: a 100-word description of the nominee's contribution and its impact; a 750-word detailed description of up to 10 of the nominee's major products (papers, patents, software, etc.), the contributions embodied in those products, and their impact; a list of at most 10 citations to the major products discussed in the description.

Three letters of recommendation (not including the nominator or nominee).

Contact information of the nominator.

In addition to the evidence of impact, the nomination form will include biographical information (including education and employment), professional activities, publications, and recognition. Three endorsements attesting to the impact of the work may be included.

Award Committee: Selection will be made by the ACM Special Interest Group in Design Automation Executive Committee based on the recommendation of a Pioneer Award committee. The Committee will meet to review nominations, review the recommendations of the Pioneer Award Committee, and make a selection. After selection, the committee will contact the recipient to ensure that the award will be accepted and he or she will be able to deliver the talk at the SIGDA Annual Member Meeting and Dinner at ICCAD.

All standard conflict of interest regulations as stated in ACM policy will be applied (see <https://awards.acm.org/conflict-of-interest>). Any awards committee members will recuse themselves from consideration of any candidates where a conflict of interest may exist.

Schedule: The call for nominees will be published annually. The nomination deadline is Aug 31st. The award will be announced at one or more subsequent SIGDA events and the awardee will be invited to give a talk on his/her work at the SIGDA Annual Member Meeting and Dinner at ICCAD.

Selection/Basis for Judging: This award honors an individual who has made an outstanding technical contribution in the scope of electronic design automation throughout his or her lifetime. The award is based on the impact of the contributions as indicated above. Nominees from universities, industry, and government worldwide will be considered and encouraged. The award is not a best paper or initial original contribution award. Instead, it is intended for lifetime, outstanding contributions within the scope of electronic design automation, throughout the nominee's lifetime.

Presentation: The award will be presented annually at the SIGDA Annual Member Meeting and Dinner at ICCAD.

Publicity: In ACM/SIGDA publications and at conferences sponsored by ACM/SIGDA.

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Technical Activities

1. "Efabless & OpenROAD Advance Commercial Open Source Chip Design"
Efabless and the OpenROAD project are excited to announce combining their efforts to work closer together to advance and democratize chip design...
[\[https://www.edacafe.com/nbc/articles/1/1855152/Efabless-OpenROAD-Advance-Commerc...\]](https://www.edacafe.com/nbc/articles/1/1855152/Efabless-OpenROAD-Advance-Commerc...)
2. "The Next Wave of GaN and SiC"
At the recent PCIM Europe, several companies showed their latest innovations in GaN and SiC and offered insights on where WBG technology is headed...
[\[https://www.eetasia.com/the-next-wave-of-gan-and-sic/\]](https://www.eetasia.com/the-next-wave-of-gan-and-sic/)
3. "Silicon 100: Startups Worth Watching in 2021"

Roughly one-third of the companies in the Silicon 100 Class of 2021 are new to the list. Who made the cut this year?

<https://www.eetimes.eu/silicon-100-startups-worth-watching-in-2021/>

4. "EU Project Looks to Mimic Biological Neural-System Processing"

The brain processes information in a multitude of timescales, and the MeM-Scales project will explore this property...

<https://www.eetimes.eu/eu-project-looks-to-mimic-biological-neural-system-proces...>

Job Openings:

1. University of Southampton School of Engineering United Kingdom

Job Title: Lecturer/Associate Professor in Acoustics and Signal Processing

Description: We invite applications for the post of Lecturer or Associate Professor in the Signal Processing, Audio and Hearing research group at the Institute of Sound and Vibration Research (ISVR), University of Southampton. We are open to applicants from a broad range of disciplines from within the fields of Acoustic, Audio and Speech Signal Processing. The ISVR has been at the forefront of sound and vibration research and education since its inception nearly 60 years ago. We have built an international reputation through pioneering academic research, strong and enduring collaborations with industry, and generations of graduates who have spread throughout the acoustics profession. We have excellent experimental facilities including anechoic and reverberation chambers, a 6-axis motion simulator and multiple audio focused laboratories. In addition, we are currently making substantial investments to refurbish our research facilities and teaching laboratories for the next generation, and it is expected that you will contribute to help guide these critical developments. All applicants must include a Curriculum Vitae, a three-page research statement, which includes research vision and grant capture over the next five years and a one-page teaching statement highlighting the areas of interest and ideas for innovation in education. For informal enquiries, please contact Head of Department, Prof Stefan Bleeck s.bleeck@soton.ac.uk and/or Head of Group, Dr Jordan Cheer j.cheer@soton.ac.uk.

2. Computer Systems University of Chicago Department of Computer Science

Job Title: Assistant Clinical Professor

Description: The Department of Computer Science at the University of Chicago is seeking qualified applicants for the position of Assistant Clinical Professor of Computer Science to teach Systems classes in its Masters Program in Computer Science (MPCS, <https://masters.cs.uchicago.edu>). This full-time, benefits-eligible appointment is for an initial three-year term, with possibility of renewal. This is a teaching position with no research responsibilities, and a teaching load of six courses across three academic quarters of the year (Autumn, Winter, Spring). The Masters Program in Computer Science offers a comprehensive and professionally-oriented computer science education that combines the foundations of computer science with the applied and in-demand skills necessary for careers in technology. Our rigorous curriculum covers theory, programming, and applications and is targeted for students interested in tech careers in Software Engineering, Data Analytics, Product Management and Application Development. Courses are held for nine weeks during each academic quarter, with the tenth week for a final project or exam. Instruction is expected to be primarily in person, but may be remote due to the University's COVID-19-related health and safety protocols and associated requirements (once in-person instruction becomes the default mode of instruction, some classes may continue to use a remote or hybrid format). The person holding this position must be able to teach at least two of the following courses: Introduction to Computer Systems, Advanced Computer Systems, Networks, Operating Systems, Distributed Systems, Parallel Programming, Compilers, Computer Architecture, Introduction to Computer Security, or Functional Programming. Syllabi for past offerings of these classes can be found at <https://mpcs-courses.cs.uchicago.edu/> Depending on the applicant's background and interests, the person holding this position may also be asked to teach

other classes in the MPCCS.

3. University of Adelaide School of Computer Science

Job Title: Lecturer/Senior Lecturer - School of Computer Science

Description: Multiple positions available at continuing, convertible and fixed-term (2 years) academic appointments The School of Computer Science is seeking to recruit teaching and research academics, and/or education specialist academics, at Lecturer (Level B) or Senior Lecturer (Level C) in Computer Science, Information Technology and Software Engineering. This is an exciting opportunity to join a leading school of Computer Science in delivering first class education in CS, IT and SE and to contribute to the School' s world-class research reputation. The School was ranked in the top-50 in the world in the 2021 AWRU rankings, and has outstanding strength in a variety of areas, especially AI, Machine Learning, Computer Vision, Optimisation, Cybersecurity, VR and Mixed Reality. The Faculty of Engineering, Computer and Mathematical Sciences is a thriving centre of learning, teaching and research in a vast range of engineering disciplines, computer science - including machine learning, high-level mathematics and architecture, planning and landscape architecture. Many of its academic staff are world leaders in their fields and graduates are highly regarded by employers. Learn more at: ecms.adelaide.edu.au. Please ensure you submit a cover letter, resume, and upload a document that includes your responses to all of the selection criteria for the position as contained in the position description or selection criteria document.

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Circulation: 2,700

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