



Association for
Computing Machinery

NEWS RELEASE

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Wen-mei Hwu Receives the ACM-IEEE CS Eckert-Mauchly Award

NVIDIA Scientist Made Foundational Contributions to Three Generations of Processor Architectures

New York, NY, June 27, 2024 – ACM, the Association for Computing Machinery, today announced that Wen-mei W. Hwu, a Senior Distinguished Research Scientist at NVIDIA and Professor Emeritus at the University of Illinois Urbana-Champaign, is the recipient of the [ACM-IEEE CS Eckert-Mauchly Award](#). Hwu is recognized for pioneering and foundational contributions to the design and adoption of multiple generations of processor architectures. His fundamental and pioneering contributions have had a broad impact on three generations of processor architectures: superscalar, VLIW, and throughput-oriented manycore processors (GPUs).

Hwu was one of the original architects of the High-Performance Substrate (HPS) model that pioneered superscalar microarchitecture, introducing the concepts of dynamic scheduling, branch prediction, speculative execution, a post-decode cache, and in-order retirement. He co-authored the two original 1985 HPS papers, “[Critical Issues Regarding HPS, a High Performance Microarchitecture](#)” and “[HPS, A New Microarchitecture: Rationale and Introduction](#),” both of which received the inaugural MICRO Test-of-Time Award in 2014.

By 1987, the rapid increase in hardware execution resources created pressing needs for instruction-level parallelizing compilers. Hwu addressed the problem by constructing a revolutionary compiler infrastructure in his paper, “[IMPACT: An Architectural Framework for Multiple-Instruction Issue](#),” which demonstrated compilers can generate code with far more parallelism than most researchers thought possible. This paper also pioneered architecture support for control speculation and received the 2006 ISCA Most Influential Paper Award.

For his work on architecture support for ILP compilers, he received ACM SIGARCH’s first Maurice Wilkes award in 1998. He published foundational papers on superblock and hyperblock structures. The superblock is a pervasive compiler technique, adopted by major vendor compilers and the GNU C Compiler. In academia, the hyperblock work influenced many projects, most

notably the [TRIPS project at the University of Texas](#). In 1999, Hwu received the ACM Grace M. Hopper Award, “for the design and implementation of the IMPACT compiler.”

Since 2006, Hwu has focused on designing and deploying throughput-oriented heterogeneous parallel computing architectures. His team pioneered the programmer optimization principles in their [PPoPP 2008 paper](#) and the Pareto-optimal pruning of search space for auto-tuning in their CGO 2008 paper for GPUs. The CGO 2008 paper won the [2018 CGO Test-of-Time Award](#). These works not only enabled wide adoption of CUDA-enabled GPUs but also helped the NVIDIA architecture team to improve the programmability of several generations of GPUs. The four editions of the textbook by Hwu and David Kirk (former Chief Scientist of NVIDIA), [Programming Massively Parallel Processors](#), have sold more than 25,000 copies and the book has been translated into five languages.

Hwu’s contributions to education also include three offerings of the Coursera course on Heterogeneous Parallel Programming that were attended by more than 20,000 students, with 5,000 completing all exams and quizzes to receive a certificate. Hwu and Kirk are widely credited for their contributions in making the GPU the computing device of choice for the HPC/ML communities. Hwu’s architecture and compiler techniques have impacted billions of processors.

Biographical Background

Hwu is a Senior Distinguished Research Scientist and Senior Director of Research at NVIDIA. He is also Emeritus Professor and Sanders III Advanced Micro Devices, Inc., Endowed Chair Emeritus of ECE at the University of Illinois Urbana-Champaign. Hwu has published over 400 technical papers in major ACM/IEEE conferences and journals. With 29,715 citations, an h-index of 82, and an i-10 index of 281, Hwu is a leading computer architect in publications impact. Hwu received a PhD in Computer Science from the University of California, Berkeley, and a BS in Electrical Engineering from the National Taiwan University, Taiwan. His numerous honors include the IEEE Computer Society B.R. Rau Award, the IEEE Computer Society Charles Babbage Award, the ACM Grace Murray Hopper Award, and the ACM SIGARCH Maurice Wilkes Award. Hwu is an ACM Fellow and an IEEE Fellow.

Hwu will be formally recognized with the Eckert-Mauchly Award during an awards luncheon on Tuesday, July 2, at the [International Symposium on Computer Architecture \(ISCA 2024\)](#).

About the Eckert-Mauchly Award

ACM and IEEE Computer Society co-sponsor the [Eckert-Mauchly Award](#), which was initiated in 1979. It recognizes contributions to computer and digital systems architecture and comes with a \$5,000 prize. The award was named for John Presper Eckert and John William Mauchly, who collaborated on the design and construction of the Electronic Numerical Integrator and Computer (ENIAC), the pioneering large-scale electronic computing machine, which was completed in 1947.

About ACM

[ACM, the Association for Computing Machinery](#), is the world’s largest educational and scientific computing society, uniting computing educators, researchers, and professionals to inspire dialogue, share resources,

and address the field's challenges. ACM strengthens the computing profession's collective voice through strong leadership, promotion of the highest standards, and recognition of technical excellence. ACM supports the professional growth of its members by providing opportunities for life-long learning, career development, and professional networking.

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