



Séminaire Professor S. J. Ben Yoo
Vendredi 21 septembre 2018 à 11h00
Salle réunion du LSI - bat 83-2034
Ecole polytechnique - Batiment 83

Computing Beyond Moore's Law with Nanophotonics

We discuss a new computing paradigm enabled by embedded attojoule nanophotonics in both von Neumann and non von Neumann computing. The combined system expects to perform energy-efficiently with high-throughput for most workloads. For von Neumann computing, we will embed attojoule nanophotonics integrated with nanoelectronics in CPUs and memories to provide ultra-high throughput, minimal access latency, and low power dissipation that remains independent of capacity and distance. The computing systems exploit modular integration of energy-efficient 3D-electronic-photonic-ICs (3D EPICs) and their interconnections through all-to-all, contention-less, and arbitration-free wavelength routing in cyclic Arrayed-Waveguide-Grating-Routers (AWGRs). For non von Neumann computing, we are investigating attojoule nanophotonic neurons in photonic neural networks to enable extremely energy-efficient neuromorphic computing. In one estimate, 100x improvements in energy-efficiency compared to IBM's TrueNorth neuromorphic processors can be possible. Integration and scaling of the combined computing system, and efforts behind simulations and benchmarking will also be discussed.

Pause
café à
10h30

ABOUT THE SPEAKER: S. J. Ben Yoo is a Distinguished Professor at the University of California at Davis (UC Davis). His research at UC Davis includes 2D/3D photonic integration for future computing, communication, imaging, and navigation systems, micro/nano systems integration, and the future Internet. Prior to joining UC Davis in 1999, he was a Senior Research Scientist at Bellcore, leading technical efforts in integrated photonics, optical networking, and systems integration. His research activities at Bellcore included the next-generation Internet, reconfigurable multiwavelength optical networks (MONET), wavelength interchanging cross connects, wavelength converters, vertical-cavity lasers, and high-speed modulators. He led the MONET testbed experimentation efforts, and participated in ATD/MONET systems integration and a number of standardization activities. Prior to joining Bellcore in 1991, he conducted research on nonlinear optical processes in quantum wells, a four-wave-mixing study of relaxation mechanisms in dye molecules, and ultrafast diffusion-driven photodetectors at Stanford University (BS'84, MS'86, PhD'91, Stanford University). Prof. Yoo is Fellow of IEEE, OSA, NIAC and a recipient of the DARPA Award for Sustained Excellence (1997), the Bellcore CEO Award (1998), the Mid-Career Research Faculty Award (2004 UC Davis), and the Senior Research Faculty Award (2011 UC Davis)



Professor S. J. Ben Yoo
University of California



Department of Electrical and Computer Engineering, Mail Code 1915,
Davis, California 95616
Email: sbyoo@ucdavis.edu
home page: <http://sierra.ece.ucdavis.edu>