

Ομιλία του ερευνητή

Δρ. Ryan Hamerly (Τεχνολογικό Ινστιτούτο Μασαχουσέτης – MIT, USA)

Τρίτη 11 Οκτωβρίου 2022, 12.00 μμ

Κέντρο Διεπιστημονικής Έρευνας και Καινοτομίας (ΚΕ.Δ.Ε.Κ.), κτίριο Α, 3^{ος} όροφος

Η ερευνητική ομάδα Ασύρματων και Φωτονικών Συστημάτων και Δικτύων (WinPhos, <http://winphos.web.auth.gr/>) σας προσκαλούν στην ομιλία του ερευνητή από το Τεχνολογικό Ινστιτούτο της Μασαχουσέτης (MIT, USA) Dr. Ryan Hamerly την Τρίτη 11 Οκτωβρίου 2022 στο ΚΕΔΕΚ (κτίριο Α, 3^{ος} όροφος, Κέντρο Διεπιστημονικής Έρευνας και Καινοτομίας, Balkan Center, 10ο χλμ Θεσ/νίκης-Θέρμης) του Α.Π.Θ., η οποία θα εστιάσει στην πρόσφατη ερευνητική δουλειά του στην περιοχή των Φωτονικών Νευρωνικών Δικτύων.

Τίτλος ομιλίας: Computation by Photodetection: Scalable Photonic Deep Learning in the Output-Stationary Frame

Σύντομη περίληψη: One of the biggest challenges to photonic computing is the large chip area of optical components, which constrains the size of practical photonic processors. For example, it is very challenging to scale up silicon-photonic matrix multipliers beyond 64x64, which is still small by electronics standards. This talk focuses on our group's efforts to circumvent this challenge using an output-stationary dataflow, which makes use of the time dimension to reduce the required chip area from N^2 to N , effectively "squaring" the scalability of photonic systems. First, I report our group's experimental realization of the proposed photoelectric matrix-vector multiplier using an array of individually addressable, injection-locked VCSELs and 3D diffractive optical fan-out. This VCSEL architecture provides the ideal combination of compactness, speed, scalability, and low energy consumption to support large-scale deep learning in the data center. Second, I report on the demonstration of the Netcast protocol for optically accelerated edge computing, applicable in situations where data processing is performed on a power-constrained device with an optical link to a server. Using Netcast, where we realize DNN inference at 98.8% accuracy over an 86-km fiber with 3 THz of optical bandwidth at an optical energy consumption of 40 aJ/MAC.

Σύντομο βιογραφικό του ομιλητή: Ryan Hamerly was born in San Antonio, Texas in 1988. He graduated from Boulder High School in 2006 and received a B.S. degree from Caltech in 2010, working with Prof. Yanbei Chen on black hole mergers. In 2016 he received a Ph.D. degree in applied physics from Stanford, for work with Prof. Hideo Mabuchi on quantum control, nanophotonics, and nonlinear optics. In 2017 he was at the National Institute of Informatics (Tokyo), working with Prof. Yoshihisa Yamamoto on quantum annealing and optical computing concepts. He is currently an IC postdoctoral fellow at MIT with Prof. Dirk Englund. Website: <https://www.rle.mit.edu/qp/people/>