

DEEPLIGHT 1st Press Release

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Synergizing plasmonics and photonic integrated memories to revolutionize DeepLearning accelerators through GSRT-funded DeepLight project

DeepLight (*Photonic Neuromorphic Hardware for Deep Learning Applications over Light-enabled Integrated Systems*) is a new ambitious 3-year research project funded by the Greek General Secretariat for Research and Technology (GSRT), that launched on December 2019 and aims to **transform photonics into a highly efficient Deep Learning-(DL) enabling integrated technology** that can operate at >10GHz clock frequencies with sub-pJ/bit energy efficiency values and to **deploy Deep Learning algorithms optimally adapted to the idiosyncrasy of the executing photonic neuromorphic hardware** through a holistic hardware-software co-design approach.

DeepLight is motivated by the successful implementation and state-of-the-art performance of DL-based algorithms in several challenging tasks, ranging from self-driving cars, to medical diagnosis and research, **that came however with a significant drawback i.e. tremendous amounts of computing power is needed for training and deploying DL models.**

This is exactly where **DeepLight** steps-in, in order to invest in photonics **towards offering a radically new DL-enabling platform that targets to outperform current electronic and photonic DL hardware prototypes**, as evident in the accompanying figure, where a comparison of DeepLight technology with current neuromorphic platforms is illustrated.

Based on its detailed and thorough implementation plan DeepLight has identified and targets the following individual objectives ,that will enable for the first time, the deployment of state-of-the-art photonics technology into a powerful neuro-photonic machine.

Objectives

- i. Design, deploy and experimentally demonstrate neuromorphic hardware based on plasmo-photonic building blocks.
- ii. Accelerate photonic neuromorphic architectures via WDM and IQ modulation
- iii. Establish the theoretical framework and develop deep learning algorithms over photonic neuro-hardware

The project is scheduled to run for three years bringing together the neuromorphic and optical memories expertise of Aristotle University of Thessaloniki - AUTH (GR) and the high-performing photonic building blocks of Centre National de la Recherche Scientifique -CNRS (FR) towards developing functional neuro-photonic machines.

For more information please visit :

DeepLight project website : <http://deeplight.eu/>

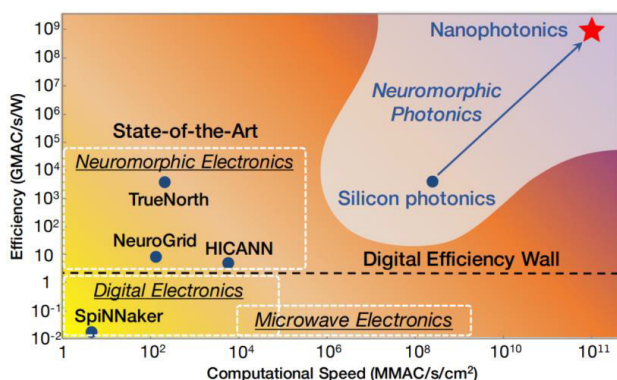


Fig. 1. Comparison of neuromorphic hardware platforms [M.A. Nahmias et al., "Neuromorphic Photonics," *Optics & Photonics News* 29(1), 34-41 (2018)]. On the top-right DeepLight expected performance.

ACKNOWLEDGMENTS

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| Program | Hellenic Foundation for Research and Innovation (HFRI) and the General Secretariat for Research and Technology (GSRT) 3-year project |
| Duration | 36 Months |
| Budget | Overall Cost: € 189905,76 |

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