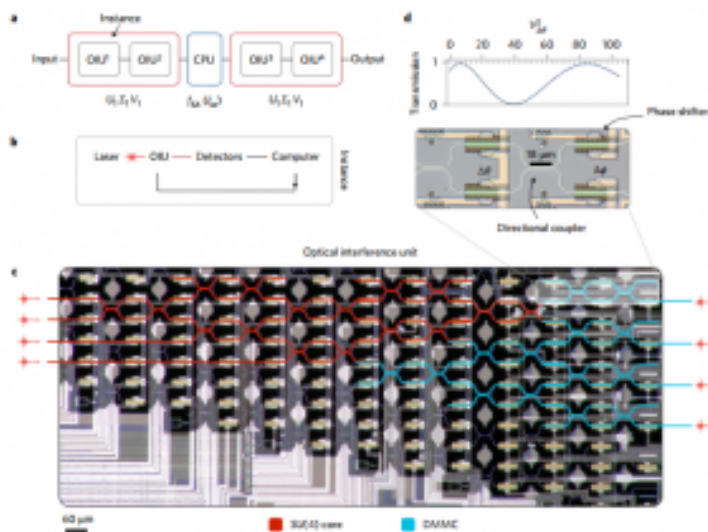


# Deep learning with coherent nanophotonic circuits



Artificial neural networks are computational network models inspired by signal processing in the brain. These models have dramatically improved performance for many machine-learning tasks, including speech and image recognition. However, today's computing hardware is inefficient at implementing neural networks, in large part because much of it was designed for von Neumann computing schemes. Significant effort has been made towards developing electronic architectures tuned to implement artificial neural networks that exhibit improved computational speed and accuracy. Here, they propose a new architecture for a fully optical neural network that, in principle, could offer an enhancement in computational speed and power efficiency over state-of-the-art electronics for conventional inference tasks. They experimentally demonstrate the essential part of the concept using a programmable nanophotonic processor featuring a cascaded array of 56 programmable Mach-Zehnder interferometers in a silicon photonic integrated circuit and show its utility for vowel recognition.

Source: <https://www.nature.com/nphoton/journal/v11/n7/abs/nphot>

[on.2017.93.html](#)

**Related paper:** Yichen Shen et al., Deep learning with coherent nanophotonic circuits, Nature Photonics 11, 441–446 (2017)