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A traffic light diagnostic inspired by neuromorphic system.

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Neuroscience has found that humans' instantaneous capability of perceiving colours is not only because of a simple sensing process but also as the result of "decision making process". While the first process relies only on the unique colour-dependent receptor in the retina, the latter process involves with how the optical-nerve signal is process throughout its "chaotic" journey from the retina to the brain. Recently, a new paradigm in Artificial Neural Network (ANN) called Reservoir Computer (RC) has been reported. The RC, unlike other kind of ANN approaches, embraces chaotic signal propagation in its kernel layer and feedback system in its read-out layer, mimicking how brain process information.

In this talk, we propose a real-time diagnostic tool inspired by the RC. We will show a possible route of implementing such RNN as an integrated photonic system to perform a bespoke discrimination task. The discrimination is achieved by recognising the unique temporal signal signature arising from the chaotic photonic kernel in the presence of different analyte. This is noted that the new discrimination approach reported is performed directly on the temporal signal, in contrast to the conventional spectral fingerprinting.

Biography

Sendy Phang is an assistant professor in electromagnetics engineering in the George Green Institute for Electromagnetics Research, The University of Nottingham, UK since 2019. He received the BEng (with honours) in engineering physics from the Bandung Institute of Technology, Bandung, Indonesia, in 2010, the MSc in electromagnetic and the PhD in electrical and electronic engineering from the University of Nottingham, UK, in 2011 and 2016, respectively. He was the recipients of the 2017 Young Scientist Award presented by the URSI General Assembly. His recent research interests are in ultrafast optical sensing enabled by an all-optical information processing device based on metamaterial, parity-time quantum-mechanics and neuromorphic systems.

KEYNOTE SPEAKER