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【20】Neuromorphic Intelligence: spiking neural network and on-line learning circuits for brain-inspired technologies

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For many practical tasks that involve real-time processing of sensory data and closed-loop interactions with the environment, conventional and artificial intelligence technologies cannot match the performance of biological ones.
One of the reasons for this gap is that neural computation in biological systems is organized in a way that is very different from the way it is implemented in today's deep networks.
In biological neural systems computation is tightly linked to the properties of their computational embodiment, to the physics of their computing elements and to their temporal dynamics.
A promising approach that closely emulates principles of computation of animal brains is that of neuromorphic intelligence.
In this talk I will show how this approach can provide useful tools for investigating computational models of neural processing while at the same time offering a technology that can complement standard AI approaches for low-power sensory processing at the edge.
I'll present examples of analog circuits that faithfully reproduce the dynamics of real neurons and synapses, including plasticity and learning. I'll demonstrate how the circuits presented can be used to carry out robust computation, in real-world applications, despite their variability and heterogeneity.

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