Biomedical signals

The analysis of biomedical signals for clinical studies and therapeutic applications can benefit from embedded devices that can process these signals locally and in real-time. An example is an analysis of intracranial EEG (iEEG) from epilepsy patients for the detection of High-Frequency Oscillations (HFO), which are a biomarker for epileptogenic brain tissue. Mixed-signal neuromorphic circuits offer the possibility of building compact and low-power neural network processing systems that can analyze data online in real-time.

Sharifshazileh et al. present a neuromorphic system that combines a neural recording headstage with a spiking neural network (SNN) processing core on the same die for processing intracranial EEG (iEEG), and show how it can reliably detect High-Frequency Oscillations (HFO), thereby achieving state-of-the-art accuracy, sensitivity, and specificity. This is the first feasibility study towards identifying relevant features in iEEG in real-time using mixed-signal neuromorphic computing technologies [1].

1)
Sharifshazileh M, Burelo K, Sarnthein J, Indiveri G. An electronic neuromorphic system for real-time detection of high frequency oscillations (HFO) in intracranial EEG. Nat Commun. 2021 May 25;12(1):3095. doi: 10.1038/s41467-021-23342-2. PMID: 34035249.