

Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Simple Design Rules for Spike Neural Network Based General Purpose Networks ARNAB ROY, J. DAVID SCHAFFER, CRAIG LARAMEE, Binghamton University — It has been much lamented over the past decade that, although spiking neural networks (SNNs) have exciting proven computational properties, there are no design rules for assembling networks for specific purposes. Here we offer design approaches for creating three general purpose networks namely, a temporal pattern (serial channel) detector, sequence detector (parallel channel), and any specific mapping of input to output spike patterns on a serial channel. Central pattern generators are instances of this last design. These design rules are based on synchrony detection which SNNs do so well. Here we also introduce a modification to the basic SRM0 model which not only reduces the computational cost, but also enables us to develop these design rules. We discuss how these designs may be combined into fairly general spatio-temporal pattern detectors. Finally, by adding a capability for feature discovery/extraction, we envision an approach to learning spatio-temporal pattern classifiers.

Arnab Roy
Binghamton University

Date submitted: 10 Nov 2011

Electronic form version 1.4