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Título	Neuromorphic Circuits using Network-on-Chip
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Title: “Neuromorphic Circuits using Network-on-Chip"

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The human brain has about 10^{11} neurons, and each one can have more than 10^{4} synaptic connections with others neurons [1]. As it is the most inspiring and powerful computing machine we know at present, it is normal to try breaking the code. We believe its computer capacity comes from a three level complexity: (a) the number of adaptable cells, the neurons; (b) the capability of configurable connections, the synapses; and (c) the waveform that is at the same time robust against noise and capable to encode information, the spike or action potential.

In terms of the waveform, the literature presents various spike models, each one with a respective biological plausibility and computational complexity. The Izhikevich’s Simple Model (ISM) [2] offers one of the best compromises between waveform quality and computational cost at the moment. It is composed of a system of two ordinary differential equations of the first order that can be easily digitalized. In terms of capability of configuring connections and number of cells, it is important to find an architecture that can provide reconfigurable connections, scalability, and computational power, at the same time. NoC (Network-on-Chips) seem to fill all these requirements.

It is used different topologies and devices where the NoC is implemented (software, FPGA, ASICS, and others). Our approach use a mesh topology and is implemented using FPGAs.

REFERENCES

[1] E. M. Izhikevich, “Neural Excitability, Spiking and Bursting,” International Journal of Bifurcations and Chaos, vol. 10, no. 6, pp. 1171–1266, 2000.

[2] ——, “Simple model of spiking neurons,” IEEE, vol. 14, pp. 1569– 1572, 2003.