

Kohno LAB.

[Brain-compatible AI]



Department of Informatics and Electronics

Neuromimetic Systems

Dpt. Electrical Engineering and Information Systems, Graduate School of Engineering

Dpt. Mathematical Informatics, Graduate School of Information Science and Technology <https://www.neumis.iis.u-tokyo.ac.jp>

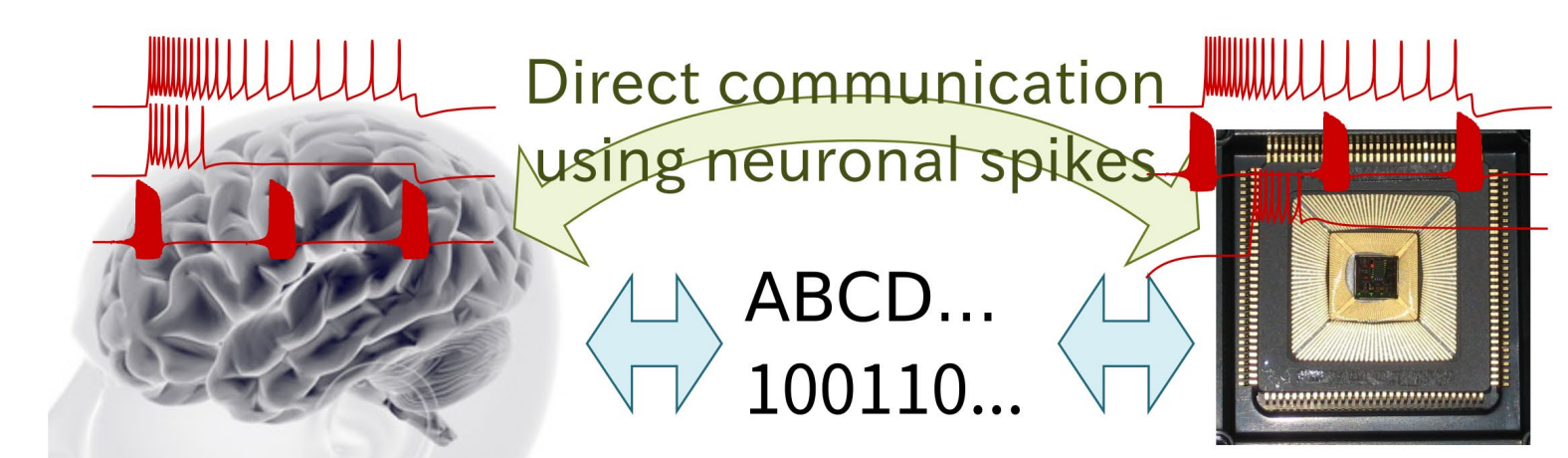
Silicon Neuronal Networks

~Electronic circuit copies the nervous system~

Silicon neuronal network is electronic circuit composed of electronic circuit versions of neuronal cells and synapses. It reproduces electro-physiological activities in the nervous system in real-time or faster.

Final goal is to realize “Brain-compatible AI”

Capable of direct communication with the brain without symbols or languages. Efficiently deal non-linguistic information: sensations and sense.



Efficient learning with small amount of data similarly to the brain.

Applicable to neuro-prosthesis

Analog neuromimetic circuits designed using nonlinear mathematics theory.

Ultralow-power

7nW / neuron

2pW / synapse

0.25 μ m CMOS process

Power supply voltage 1V

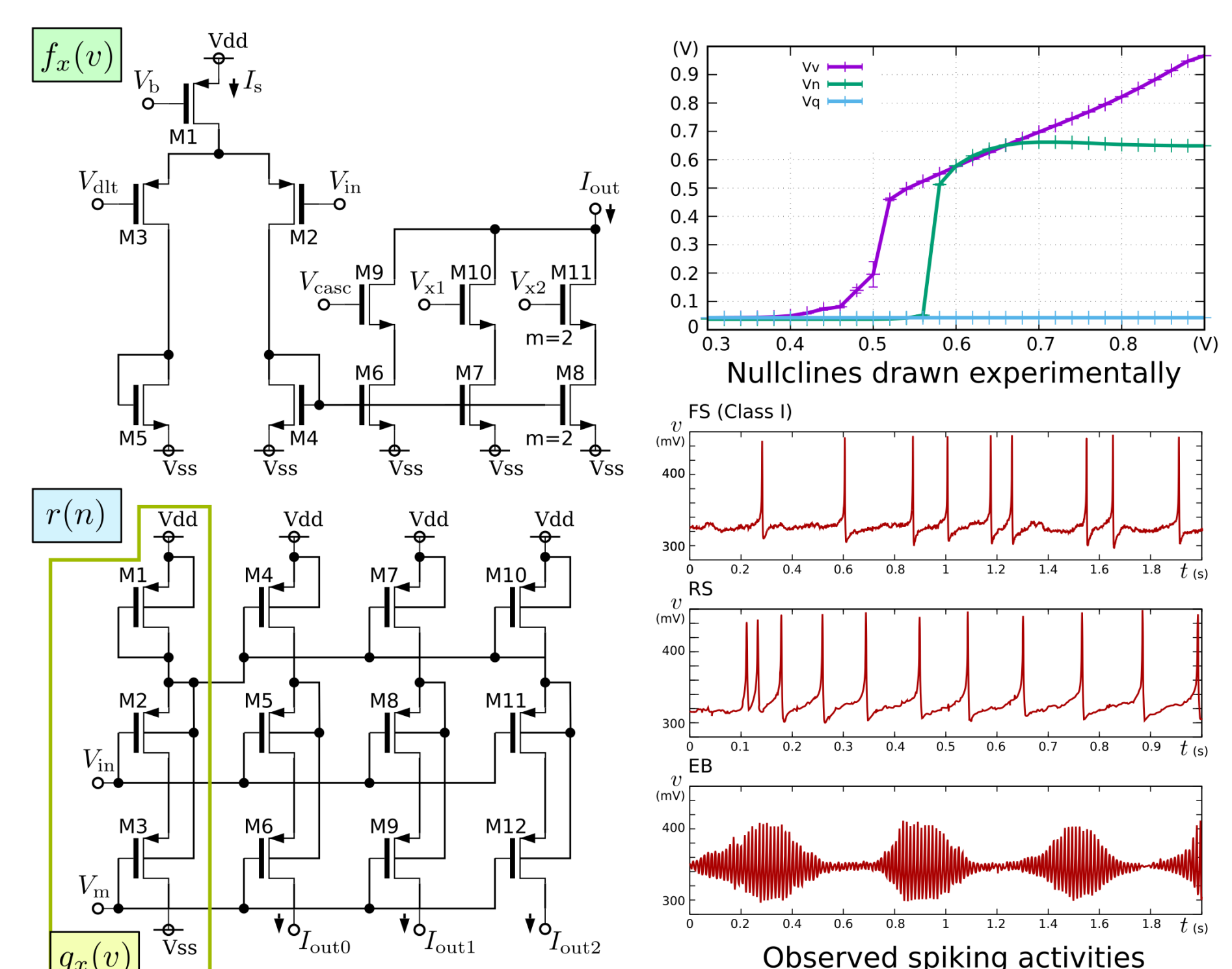
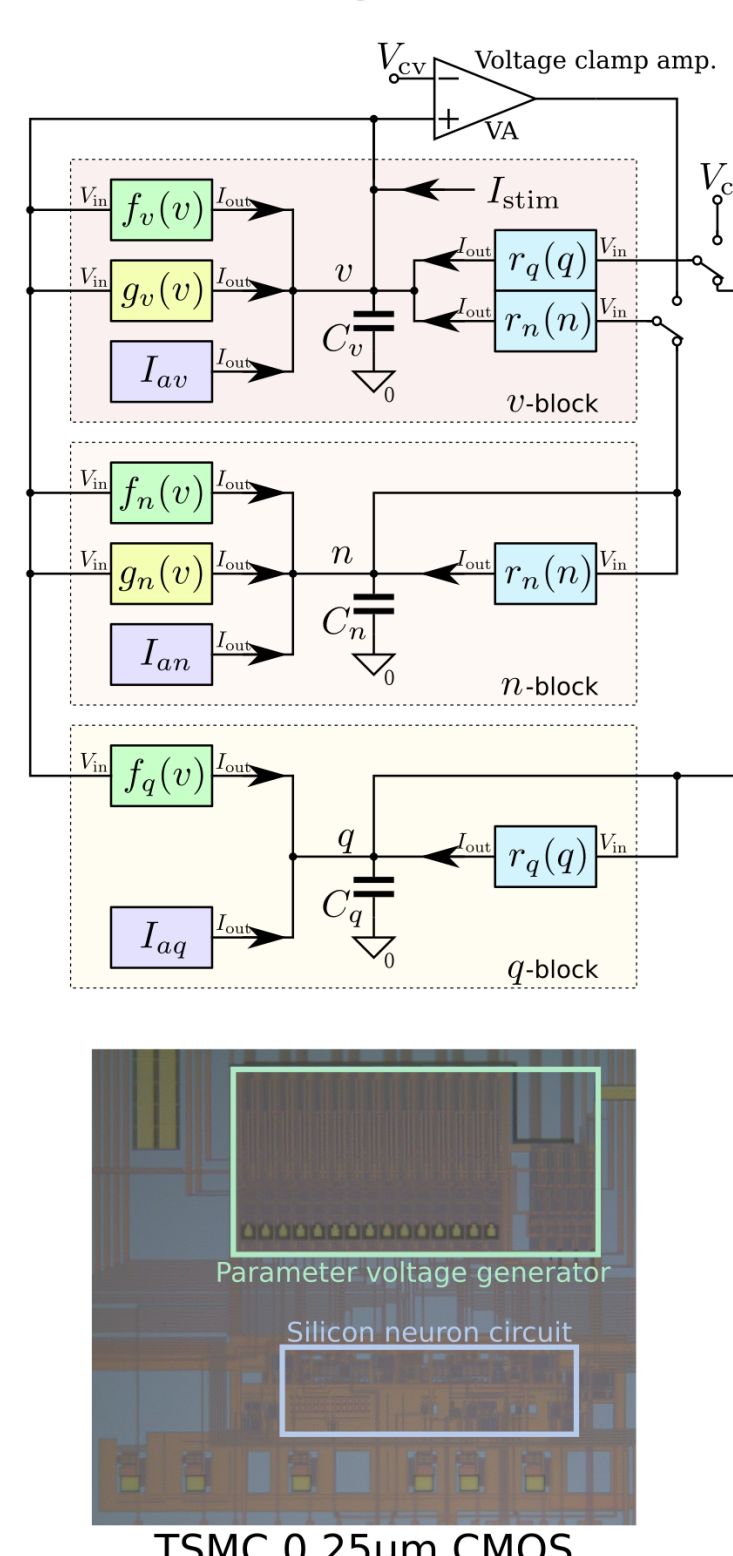
Supports important brain cells

7 types of cells including:

Regular Spiking cells

Fast Spiking cells

Elliptic Bursting cells



Towards reproduction of information processing in the brain

Biologically realistic models that differ from machine learning models such as deep learning.

Spatio-temporal pattern detection from noisy spike trains by single layer network with lateral inhibition (proposed by Masquelier)

“Autonomously finding needles in haystack”

