# KOHNO LAB.

## Mimic and Analyze the Brain

Department of Informatics and Electronics
LIMMS/CNRS-IIS (IRL2820) International Collaborative Research Center

Neuromimetic Systems

Department of Electrical Engineering and Information Systems,
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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.**
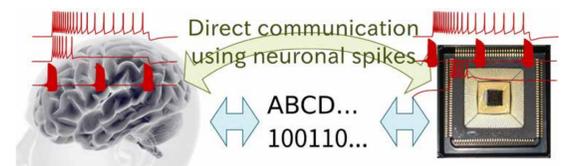


**Efficient learning with small amount of data similarly to the brain.**

**Applicable to neuro-prosthesis**

**Analog neuromimetic circuits designed using nonlinear mathematics theory.**

### Ultralow-power
**7nW / neuron
2pW / synapse
0.25μm CMOS process
Power supply voltage 1V**

**Supports important brain cells
7 types of cells including:
Regular Spiking cells
Fast Spiking cells
Elliptic Bursting cells**
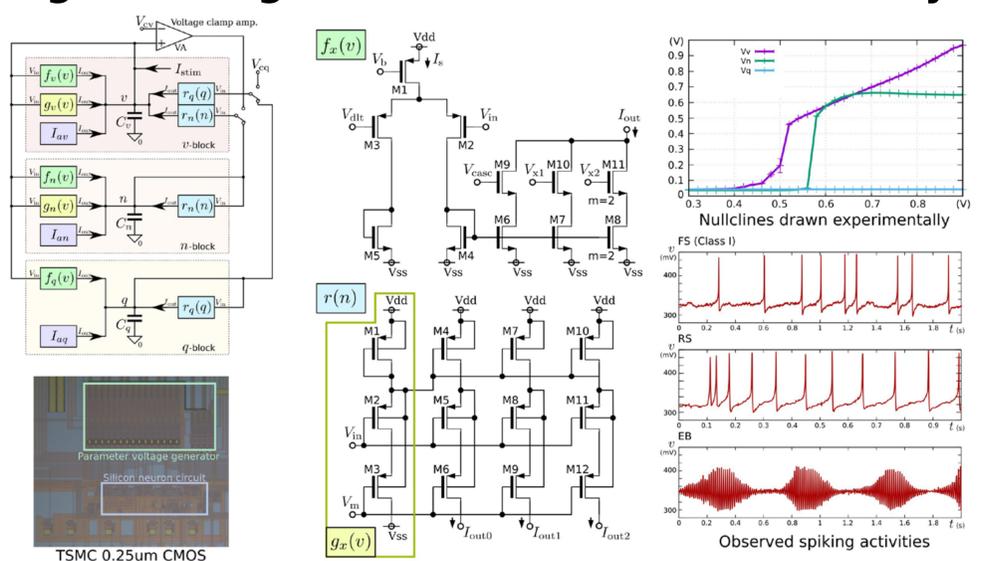


**Towards reproduction of information processing in the brain**

**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"**



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