

Common AI is predicting a result by arranging data to fit a pattern with fix algoritms via sequential processing of serial layers.

We do not predict, but we know because we learn on our own using the own body how to bundle information into useful knowledge, by self-learning and connecting it with the existing one into different areas, depending on the own experience during life.

AUTONOMY is the greatest feature and innovation of our AI technology, for the body, the mind and the knowledge.

Tipalo is developing its own AI technology in VHDL for FPGA. The goal is a **digital brain with an Artificial Nervous System as real-time fully autonomous AI using a body with sensors, actuators and organs**, aka embodied AI.

The neuron capacity of the brain is fixed, only the amount of synapses can be increased, which store knowledge, before birth as predefined genetic inheritance and after birth as accumulated knowledge. This implies no code, because the synapses represent the software. The brain is based on spiking neural nets, which are organized in distinct groups, enabling interactive algorithms.

Neural nets are creating by connectivity higher forms of organization called **knowledge areas** where each consists of:

- a. **SLM**, Self-Learning Mechanism
- b. **LOG**, as temporary Short-Term Memory
- c. **SAM**, Self-Associating Memory for permanent storage and retrieval.

We have classified intelligence in 3 levels by capacity, density and biological equivalent:

L1, 1 M neurons and min. 16 synapses/neuron, corresponds to insects, e.g. honey bee

L2, 1 G neurons and 256 synapses/neuron, corresponds of mammals / fishes / birds

L3, 10 G neurons and 1024 synapses/neuron, corresponds to primates

Achievements:

1. **Neural processor**, as soft IP in VHDL to process in parallel a spiking neural net, tested as simulation with ModelSim
2. **ANS architecture L1**, as knowledge areas required + bidirectional drivers for every typa of sensors, actuators and organs
3. **ANS with general structure**, can use and configure knowledge areas on demand, while quantifying and connecting information