Bio-inspired Information Processing: The Future of Artificial Intelligence?

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Information processing in biological nerve system is characterized by highly parallel, energy efficient and adaptive architectures in contrast to clock driven digital Turing machines. Even simple creatures outperform supercomputers when it comes to pattern recognition, failure tolerant systems and cognitive tasks. Fundamental building blocks leading to such remarkable properties are neurons as central processing units, which are (with variable strengths) interconnected by synapses to from a complex dynamical three dimensional network. The field of neuromorphic engineering aims to mimic such biological inspired information pathways by electronic circuitries. Up to today, this approach is hindered by an inadequate understanding how to link the information pathways on the local, synaptic and neuron level to the global functionality of the entire brain network. One of the central pillars in science (for example in solid state physics) the so-called “reductionism” smilingly reaches its limits and nourishes a longstanding conflict between natural science and spiritual science.

In the talk I will show restrictions of conventional IT and present alternative computing architectures, which are currently under investigations. The challenges and possible limitations of bio-inspired computing approaches will be discussed.