

# Séminaire

**Vendredi 01 juin**

11 heures

Salle Pierre Grivet (Salle 44) du C2N site Orsay

**Mostafa Rahimiazghadi**

*James Cook University, Townsville, Australie*

## “Learning in Spiking and Artificial Neural Networks Implemented Using Digital, Analog, and Memristive Devices”

### **Abstract:**

Synaptic plasticity is believed to play an essential role in learning and memory in the brain. Perhaps the most popular synaptic plasticity rule (learning algorithm) among neuromorphic engineers is the Spike Timing Dependent Plasticity (STDP). This talk will cover the design and implementation of a number of STDP and Triplet STDP electronic circuits using different hardware approaches, including analog, digital, and memristors. All these implementations are able to completely and with a minimal error replicate the outcome of a wide range of biological experiments. The talk will discuss the use of a number of these implementations in a spiking neural architecture comprising of different types of neurons to perform cognitive tasks such as pattern classification and unsupervised character recognition.

Furthermore, the talk will show some results for the hardware implementation of limited-precision non-spiking artificial neural networks on Field Programmable Gate Arrays (FPGA) for the classic benchmark of handwritten digits, MNIST. It also discusses the use of limited-precision neural classifiers in an agriculture robot currently being developed at James Cook University, Australia.

### **Speaker:**

Mostafa Rahimi Azghadi completed his PhD in Electrical & Electronic Engineering at The University of Adelaide, Australia, earning the Doctoral Research Medal in July 2014. He was a visiting PhD student in the Neuromorphic Cognitive System group, in the Institute of Neuroinformatics, University and ETH Zurich, Switzerland.

Since 2016, Mostafa is a lecturer (assistant professor) at the College of Science and Engineering, James Cook University, Townsville, Australia, where he researches neuromorphic engineering and brain-inspired learning. Dr. Rahimi was a recipient of several national and international awards and scholarships such as Queensland Young Tall Poppy Science Award in 2017. In 2018, Mostafa founded Neural Inspired Computing and Engineering (NICE) lab at James Cook University. He serves as an associate editor of IEEE Access and is a review editor of Frontiers in Neuromorphic Engineering.