Open Post-Doc Position at CNRS-LIRMM, Montpellier, France

Title: Neuromorphic Devices and Architectures for Oscillatory Neural Networks

Description: Neuro-inspired computing employs technologies that enable brain-inspired computing hardware for more efficient and adaptive intelligent systems. By mimicking the human brain and nervous system, these computing architectures are excellent candidates for solving complex and large-scale associative learning problems. In this work, we will investigate neuro-inspired computing architecture where information is encoded in the phase of coupled oscillating neurons or oscillatory neural networks (ONN). The oscillating devices will be based on metal-insulator transition (MIT) devices to represent an artificial neuron. The coupling devices between oscillators will be based on 2D material memristor to represent an artificial synapse.

The objective of this work is to investigate the full potential of ONN circuits and architectures. In particular, understanding of the interplay between MIT devices and coupling strengths via 2D memristors on phase synchronization, phase difference and scalability to build large-scale ONN architectures. We will also investigate MIT device and 2D memristor process variations and impact on ONN architecture performance and power efficiency. Ultimately, we will investigate and assess the application of associate learning problems such as pattern recognition on ONN architecture.

The position will be conducted in the framework of the European H2020 NEURONN project in collaboration with several academic and industrial partners.

Qualification: Excellent and self-motivated candidates with a PhD degree in Electrical Engineering, Computer Engineering, Applied Physics, or Engineering Physics. Experience with design, simulation of circuits and architectures using EDA CAD tools (schematic, layout, spice simulation). Previous experience with chaotic circuits and/or memristor modelling is desired but not mandatory.

Start Date: as soon as possible. Duration: 12 Months with possible extension

Location: LIRMM, Bat.4, 161 rue Ada, Montpellier, France

Language: English is mandatory with fluency in both speaking and writing. French is not mandatory.

Application: Online at CNRS Recruitment Website or email to Dr. A. Todri-Sanial.

Contacts:
Dr. Aida Todri-Sanial, CNRS-LIRMM, Email: aida.todri@lirmm.fr
Dr. Stefania Carapezzi, CNRS-LIRMM, Email: stefania.carapezzi@lirmm.fr