BCBT 2014 Summer School

Progress Report

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School experience and contribution:

A better understanding of the neural process in somatosensory system is an essential requirement in order to develop prosthesis with tactile sensing capabilities for restoring the sense of touch experience. My main research interest lies in the development and construction of electronic and bio-hybrid artificial tactile sensors with neuromorphic output. The main result that I have achieved in my project is to compute the neuromorphic behavior from MEMS based 3-axis tactile sensor [1] using modified version of Izhikevich algorithm [2]. The final goal of my PhD program is to develop an artificial tactile system helping to restore the sense of touch in amputee and also inducing tactile sensation in robots.

BCBT two weeks Summer School offered me a good opportunity to take a look on different aspect of the amazing world of brain cognitive system. This summer school dealt with a wide range of topics starting from biological exploration to the software and hardware simulations of artificial neural networks, all of which I really enjoyed.

I found particularly interesting the discussion about how the brain is an ever-evolving organ, with a continuous evolution within our life and beyond it, and also the issue of how the speech ability and social interactions give us an unique opportunity for the growth and the reinforcement of our neural connections.

The talks on technology, binding in with biology were more focused on my field of interest and study. They exposed interesting ideas such as the parallel between electronic microcircuit (like FPGA) and the brain’s neural organization. The interconnection of the “Small World” and “Rich Club” network models was also discussed in the frame of considering the brain as working in a system of routing and switching, where neurons can be hubs. There were also some methods presented to quantify the complexity of biological networks taking into account that the system is stochastic, variable and nonlinear.

One of the most interesting talks was “How the hippocampus, basal ganglia and cortex work together to control behavior” from John Lisman, describing how this cooperation creating “mind travels” has a particular importance in spatial exploration. I also found tutorials to be very interesting and informative, especially “SpiNNaker architecture” and “Brain Architecture IQR/DAC”. SpiNNaker architecture is more related to my field of research and offered me a better overview on the world of the hardware simulated neural network.

All in all, BCBT Summer School was an unforgettable experience that helped me to learn new concepts in the field of Neuroscience and to understand better the connection of this modern science with other fields of work.
References:
