

NGS RESEARCH OPPORTUNITY

Singapore Institute for Neurotechnology
(www.sinapseinstitute.org)

The Singapore Institute for Neurotechnology (SINAPSE) brings together engineers and scientists to focus on bio-inspired solutions to important engineering problems.

Neuromorphic Tactile Perception

Ph.D. Research Description

Tactile sensory information is perceived as our skin interacts with objects of the external world. The skin has an incredibly rich set of sensors, which transduce mechanical strains in the skin into patterns of neural spikes in the nerve fibers that convey the primary sensory information to the central nervous system. Tactile perception is crucial in areas where vision and other sensing methods cannot function properly or reliably.

The neuromorphic tactile group focuses on the development of novel tactile sensors, bio-inspired sampling techniques that allow high-speed, sparse acquisition from large-scale tactile arrays, etc. Spike based encoding of stimuli propagates data across multiple temporal scales that are used for the development of efficient signal processing algorithms. Neuromorphic tactile perception is applicable to many areas such as multi-sensory perception, prosthetic control, somatosensory feedback, underwater object recognition and human machine interaction.

We are looking for highly motivated individuals to do research in the areas of Neuromorphic Tactile Perception. The fundamental question we want to answer is: How is primary sensory information received and processed at various processing stages within the hierarchically organized brain systems for touch-related information.

During the course of this PhD research topic you will gain expertise in several of the key areas that interest you the most.

- Sensor fabrication
- Fabrication of scalable arrays of high density
- Sampling and compression techniques
- Circuit design and embedded systems
- Feature extraction and learning algorithms (spiking neural networks, convolutional neural networks, extreme learning machines)
- Fault tolerant system architectures and algorithms

Candidates are encouraged to look up what the list of keywords mean and their relevance to tactile perception.

The National University of Singapore is one of the top 25 universities in the world, 6th worldwide (1st in Asia) in Electrical & Electronic Engineering and offers internationally competitive compensation. Source: 2014 QS World University Rankings.

To apply, please contact Prof. Nitish Thakor (Director of SINAPSE) at sinapsedirector@gmail.com or Dr. Sunil Kukreja (Head, Neuromorphic Engineering & Robotics) at sunilkukreja.sinapse@gmail.com.

Centre for Life Sciences

28 Medical Drive #05-COR, Singapore, 117456 Tel: (65) 6601 3406 Fax: (65) 6873 3905

Website: www.sinapseinstitute.org

Company Registration No: 200604346E