How do animals build strategies to smartly explore their environment?

Job Description: Software Engineer for controlling high speed acquisition systems, applying deep learning to image analysis, and signal processing for the study of the neural code underlying the selection of behavioral sequences. This project relies on an algorithm developed by the Wyart lab to automatically segment action sequences in the exploratory behavior.

The engineer will work in the Wyart lab, which is located in the **Paris Brain Institute** within the Pitié-Salpêtrière hospital campus. The lab investigates the circuit mechanisms underlying sensory feedback during locomotion and postural control in the brain and spinal cord. The lab carries approaches at the interface between biophysics and neuroscience. The Wyart lab develops original experimental setups relying on diverse imaging methods such as 2 photon imaging, light-sheet microscopy, spinning disk microscopy or dynamic full field optical coherence tomography. The Wyart lab pioneered the use of optogenetics in combination with in vivo electrophysiology for synaptic connectivity mapping. Synchronous imaging and behavioral experiments lead to very large data sets, which require the development of automated approaches for data extraction, visualization, analysis and modelling.

Skills in data acquisition systems, image processing, deep learning or modelling

The engineer will develop image analysis and data processing programs to extract relevant information from live imaging of neuronal activity, in vivo electrophysiological recordings and behavioral experiments. The engineer will work for the benefit of multiple projects involving image and signal analysis, deep learning and modelling.

Tasks - The engineer will work on two projects:
1- Build a pipeline to process neuronal imaging from whole brain population recordings. This will be an opportunity to gain skills in signal processing, image analysis, registration in the brain atlas and deep learning.
2- Develop code to analyze sequences of movements: the engineer will dive into an existing algorithm for sequence identification and take initiative to develop large scale analysis and visualization of stereotyped sequences. This will be an opportunity to gain skills in modeling, statistics and machine learning.

International training and collaborations

The engineer will contribute to a novel effort of extracting and modelling sequences in the chemotaxis behavior in collaboration with the theorist Massimo Vergassola (IBENS, Paris) and the expert in causality analysis between neuronal activity and behavior Moritz Grosse-Wentrup (U Wien, Vienna, Austria). The position is secured for 3 years and will be associated with intensive training and collaborations within a European Training Network. This affiliation will ensure that the engineer to be recruited will benefit from the optimal training adapted to her/his current expertise and all needs for completing the projects.

In order to promote international applications and mobility, we will consider only applications from software engineers who:
- have skills in control systems, data acquisition, image processing or modelling,
- are international (spent less than 12 months in France in the last 3 years)
- are at early stage of their career (applicants should *not* have a PhD).

The Wyart lab shows commitment to a diverse workforce: we identify and promote the most talented and diverse individuals. Our program aims to mentor minorities in order to enhance diversity in science.

Timing: Position should be filled by Nov 1, 2020.

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