Job advertisement

Zoological Institute, TU Braunschweig
Division for Cellular and Molecular Neurobiology
(Köster Lab)

PhD Position in Computational Neuroscience (f/m/d)
funded position for 3 years

Background: The human brain consists of 86×10^9 neurons, whereas the zebrafish larval brain only contains approximately 10^5. Despite its smaller size, the basic neuronal architecture or *bauplan* of the zebrafish brain is largely comparable to its human counterpart. Moreover, not only are the basic building blocks and neural circuitry evolutionary conserved, but in addition larval zebrafish are small and transparent, thereby offering a unique opportunity to observe neuronal activity with high resolution microscopy. Indeed, the zebrafish was the first vertebrate organism in which neuronal activity throughout the whole brain has been recorded in real time (Ahrens *et al.*, 2013). Although we can now literally see a fish thinking, the obtained data sets are large and require computational methods to gain fundamental insights into the activity patterns of neural networks and their mutual interplay (Haesemeyer *et al.*, 2019).

Project: We are looking for an enthusiastic PhD student to analyze, model, and possibly predict neural activity. In the PhD project, the candidate will analyze activity patterns of nerve cells throughout the entire brain obtained by advanced imaging techniques such as light sheet microscopy. This requires, first, the identification and segmentation of signals and their 3D-reconstruction over time, and, second, the registration of individual brains and their corresponding activity patterns onto a reference brain in order to compare different data sets.

To this end, **you will develop** deep learning approaches within a Python framework. Since the imaging datasets are usually large (in the terabyte range), GPU-based methods to accelerate data processing routines will be implemented together with existing frameworks such as advanced normalization tools (ANTs). In addition, the candidate should be interested in working in an interdisciplinary and cutting-edge research area together with engineers, biologists, and data scientists.

The **goal** of the PhD project is to analyze and quantify neuronal activity patterns across the entire brain in response to externally provided stimuli mapped onto a reference brain. This will provide fundamental insights into brain function in health and disease and may ultimately also lead to novel and better treatments of neuropsychiatric disorders such as depression, anxiety, and drug addiction.

You should have a very good knowledge in **coding** (in particular Python) and **computation** in general. Ideally, you already have experience in the implementation of deep learning techniques and the simulation and modeling of neuronal networks. Prior knowledge in biology or microscopy is not necessary, but a keen interest in neuroscience is encouraged. You will work in an international team together with neurobiologists and microfluidic engineers; thus solid conversation skills in English is required.

The PhD position is offered in the Köster Lab at the Zoological Institute (https://www.tu-braunschweig.de/en/zoology) in Braunschweig, Germany. The **preferred starting date is the 01.07.2020, and the duration is 3 years.** The position is part-time suitable, but should be

occupied 100% and is aimed to lead to a PhD degree as Dr. rer. nat. at the Life Sciences Faculty of the Technical University (TU) of Braunschweig.

The payment is made according to task assignment and fulfillment of personal requirements to salary group EG 13 TV-L, 65% (approximately: 2.000 €/month net). Applicants from non-EU countries may have to successfully complete a visa process before hiring can take place and are welcomed to apply.

The TU Braunschweig aims to increase the share of women in academic positions. Applications from female candidates are very welcome. Where candidates have equal qualifications, preference will be given to female applicants. Candidates with handicaps will be preferred if equally qualified. Please enclose a proof when applying for the position.

Applications: should be sent by e-mail to Reinhard Köster (r.koester@tu-bs.de), and must contain the following documents.

- Motivation Letter including contact information for two references
- Curriculum Vitae including complete address, phone number, email address, educational background, language skills, and work experience
- copies of bachelor and master degrees and transcript of grades in original language and in English or German translation
- additional documents should be provided on request

All documents should be in the PDF format; preferably, please provide the entire application in a single file. Personal data and documents relating to the application process will be stored electronically. Please note that application costs cannot be refunded. **Deadline for applications: until position is filled.**

For any questions, please contact: Dr. Jakob von Trotha or Prof. Reinhard Köster
Email: j.von-trotha@tu-braunschweig.de, r.koester@tu-bs.de

Further reading:

Ahrens, M.B., Orger, M.B., Robson, D.N., Li, J.M., & Keller, P.J. (2013) Whole-brain functional imaging at cellular resolution using light-sheet microscopy. *Nat Meth*, **10**, 413–420.

Haesemeyer, M., Schier, A.F., & Engert, F. (2019) Convergent Temperature Representations in Artificial and Biological Neural Networks. *Neuron*, **103**, 1123–1134.e1126.