

Are you stimulated by challenging biological problems? Do you wish to work in a truly interdisciplinary environment? Do you want to deploy your math skills to discover the secrets of living cells? Consider applying for a PhD position at the **Control Theory and Systems Biology Group** (www.bsse.ethz.ch/ctsb) of the Department of Biosystems Science and Engineering (D-BSSE), ETH Zurich in Basel. Applications are invited for the project: An Advanced Stochastic Filtering Framework for the Analysis of Multiscale Biochemical Reaction Networks.

Computational Systems Biology PhD Position at D-BSSE

Recent advances in microscopy techniques have enabled researchers to look into the activity of individual live biological cells by using fluorescent reporters. This single-cell imaging data is becoming increasingly available but there is a distinct shortage of theoretical and computational tools for quantitatively extracting information about intracellular networks from such data. This problem is difficult due to the complexity of intracellular networks and the stochastic nature of their dynamics. The aim of this project is to systematically overcome these challenges and develop tools that can provide accurate information about the internal states of cells from their imaging data. In particular we will develop novel filtering approaches for probabilistically estimating the "hidden" states of cells from their measured trajectory data. The cell activity will be described with stochastic models that incorporate multiscale features of the dynamics. We shall construct systematic methods to exploit these multiscale features and to efficiently extract information from the observed single-cell trajectories. We shall also provide robust software implementations of our methods allowing users to easily apply these methods on their models. These methods will provide researchers state-of-the-art tools for understanding the dynamic behavior of multiscale stochastic reaction networks using single-cell imaging data. These tools are expected to be broadly applicable and immensely useful for researchers working in systems and synthetic biology.

The successful candidate is expected to conduct original research within the scope of this project with the aim of obtaining a PhD degree. The research will be supervised by Dr. Ankit Gupta and Prof. Mustafa Khammash, and it might involve collaborations with other groups at ETH Zurich and also externally. Apart from research the candidate is also expected to contribute to teaching activities. ETH Zurich provides a wonderful platform to PhD candidates to develop professionally and personally, with multiple training opportunities and access to world class research facilities.

The successful candidate must have an undergraduate and preferably a Masters degree in engineering, mathematics, statistics or physics. The candidate should be able to demonstrate, through coursework or projects, expertise in one or more of the following areas: probability theory and stochastic processes; dynamical systems and control; signal processing; estimation and detection theory. Prior experience with reaction network models in biology is desirable but not mandatory. A substantial part of the research project will be computational in nature and hence applicants with good programming skills will be preferred. Opportunities exist for collaborating with experimental scientists to test the proposed theoretical methods.

We look forward to receiving your online application with the following documents: A cover letter explaining why you are interested in this position and why you would be a good fit for this position, a curriculum vitae (CV), transcripts (grade sheets) from your Bachelor and Master degrees and optionally, your most relevant publication or your Master thesis via the following link: <https://emea2.softfactors.com/job-opening/rgum-vfbTDx5gw4O2cJP0u5#/?lang=en>. Please apply exclusively via the online application portal. Applications sent by email or post will not be considered. Last date for receiving applications is September 1, 2019 or until the position is filled. The position is expected to start on November 1, 2019.

Further information about D-BSSE can be found on our website www.bsse.ethz.ch. For more information about this position, please contact Dr. Ankit Gupta (ankit.gupta@bsse.ethz.ch) or Prof. Mustafa Khammash (mustafa.khammash@bsse.ethz.ch) (no applications by email).

