PhD position in Mathematical Modelling of biological systems and Uncertainty Quantification

A digital twin is a representation of a physical object through data, multi-scale probabilistic simulations, and mathematical equations. It can be connected to the real world via physical sensors (e.g., temperature sensors) and can support the design and engineering of a product or enables predictions about the development of a physical object. By feeding sensory data into the digital twin the physical and the virtual world are bridged. One of the fundamental challenges in using the digital twin consists in handling of uncertainties. Uncertainties can enter mathematical models and experimental measurements in various ways. The study of the behavior of parameterized non-linear dynamic models is often impeded by lack of knowledge of a subset of parameters (uncertainty) and/or non-uniqueness (variability) of another subset of the parameters. A core topic in the field of uncertainty quantification is the question how uncertainties in model inputs are propagated to uncertainties in model outputs. Quantification of the output of the digital twin and reacting to new data by updating the digital twin resulting into improved predictions is a challenging topic.

This Ph.D. position on Uncertainty Quantification is in the context of Predictive Food Modelling or Predictive Food Microbiology. Gene expression is a fundamentally noisy process, giving rise to a significant cell-to-cell variability at the phenotype level. The phenotypic noise is manifested in a wide range of microbial traits. Heterogeneous behavior of individual cells is observed at the growth, survival and inactivation responses and should be considered in the context of Predictive Food Microbiology. The Ph.D. project will be embedded in a larger project in which we aim to build a transparency cloud solution for the food supply chain that gathers the detailed data on each product unit on its way to the consumer and to use this data to improve the current food safety processes.

Requirements
For this position we request a solid background in mathematics and physics and an understanding of and interest in molecular biology.
In particular:
Experience in doing research in a multi-disciplinary team
Experience in systems biology, mathematical biology, dynamic systems
True interest in biological problems
Strong interest in combining different scientific disciplines to develop new insights and skills
Excellent command of the English language
Good programming skills (e.g., C, C++, Python, Matlab, etc.)

We offer
We offer a position with the possibility to obtain a Ph.D. at the University of Freiburg. Gross salary will be based on TVL-E13 55 %.
We are

*Freiburg University*

The Fleck group for Spatial Systems Biology is part of the Freiburg Center for Data Analysis and Modelling (FDM). Our research focus is on the analysis of dynamic biological networks. The position will be located at Freiburg University at the FDM.

Interested?
Please send a letter of motivation and a CV to: christian.fleck@fdm.uni-freiburg.de.

Additional information
For more information about this position, please contact Christian Fleck who heads the Spatial Systems Biology Group at the FDM and is Head of R&D at tsenso GmbH (christian.fleck@fdm.uni-freiburg.de).