

## IDLab UGent – PhD Multi-Electrode Array based mechanistic neural modelling

### **Doctoral fellow for Multi-Electrode Array (MEA) based mechanistic neural modelling**

#### **About IDLab UGent**

[Ghent University](#) is a world of its own. Employing more than 15.000 people, it is actively involved in education and research, management and administration, as well as technical and social service provision on a daily basis. It is one of the largest, most exciting employers in the area and offers great career opportunities. With its 11 faculties and more than 85 departments offering state-of-the-art study programmes grounded in research in a wide range of academic fields, Ghent University is a logical choice for its staff and students.

Within the faculty of Engineering and Architecture, the [IDLab \(Internet technology and Data science Lab, UGent-imec\)](#) research group performs research on (1) [Connectivity](#) and (2) [Data Science & Artificial Intelligence](#). In these research areas we focus on (1) foundations, (2) System Design and (3) Applications. IDLab [collaborates](#) with many universities and research centres worldwide and jointly develops advanced technologies with industry (R&D centers from international companies, Flanders' top innovating large companies and SMEs, as well as numerous high-tech start-ups). In order to support the research, IDLab created a unique [research infrastructure](#) used in numerous national and international collaborations.

IDLab is also a core research group of [imec](#), the world-leading research and innovation hub in nanoelectronics and digital technologies. IDLab staff counts about 50 professors, 60 Post Doc researchers, 200 PhD researchers and 40 other staff members. These are spread over about 20 [research teams](#).

#### **Job description**

In vitro Multi-Electrode Arrays (MEAs) are a nonperturbative method used in neuroscience to measure the electrical activity of a network of cultured neurons. Such in vitro neuronal cell cultures have been developed primarily to allow the study of disease mechanisms and drug response in a controlled setting. However, they also open up avenues to explore the brain's mechanisms for information processing and learning, potentially inspiring novel paradigms that advance beyond traditional (silicon) computing.

This PhD position aims to understand and advance in vitro neural models by means of quantitative mechanistic models that capture the biological dynamics of neuronal cultures and enable principled inference from experimental data. Such computational models provide parameters with a clear biological interpretation as data summaries. Additionally, simulations from such models can be used to explore novel in vitro paradigms before implementing them.

More specifically, your main tasks will include:

- Support our ongoing research on mechanistic modelling and Bayesian parameter inference from in vitro neural models.
- Combine theory, simulation, and data-driven methods, this in close interaction with the researchers developing the in vitro cultures and models. You support the design of new experiments through model-based analysis and simulation.
- Discover appropriate mechanistic modelling paradigms to represent the in vitro cultures with enough detail to allow interpretation, always keeping in mind and working towards efficiency of execution of simulations based on

these models.

- Performing parameter estimation and uncertainty quantification using Bayesian inference techniques based on experimental and/or synthetic data.
- Investigating efficient data representations (embeddings) for raw data recordings from the in vitro systems (high dimensional both in spatial and temporal resolution).
- Disseminate the results through high quality publications, targeting top journals and international conferences.
- Work towards obtaining a doctoral degree.

## Your profile

- You hold (or will hold, at the time of joining our team) a Master's degree in Computer Science Engineering, Electrical Engineering, Biomedical Engineering, Applied Mathematics, or a related degree. You completed your Master's degree with first class performance as demonstrated through outstanding grades, Master thesis results and/or publications.
- You have a strong interest in modelling bio-inspired or biological systems and are committed to do research in an academic environment for a 4-year period in view of a PhD degree.
- You have a solid background in AI (machine learning, neural networks, reinforcement learning, dynamic modelling and/or Bayesian inference).
- You have experience in software development with solid knowledge of one or more programming languages relevant to the project (Python/PyTorch, C/C++, ...).
- Knowledge of (efficient) numerical simulation of differential equations is a plus.
- You have strong analytical skills and are well organized.
- You are an excellent communicator and a team player.
- You have a strong sense of responsibility and are also able to autonomously plan and perform research tasks. You respect the predetermined milestones in research projects.
- Your English is fluent, both in speaking and writing.
- Both young graduates and candidates with a short (industrial) experience are welcome.

## Our offer

- We offer a full-time position as a doctoral fellow, consisting of an initial period of 12 months, which - after a positive evaluation, will be extended to a total maximum of 48 months.
- Your contract will start on July 1st, 2026 at the earliest.
- The fellowship amount is 100% of the net salary of an AAP member in equal family circumstances. The individual fellowship amount is determined by Team Personnel Administration based on family status and seniority. A grant that meets the conditions and criteria of the regulations for doctoral fellowships is considered free of personal income tax. [Click here for more information about our salary scales](#)
- All Ghent University staff members enjoy a number of benefits, such as a wide range of training and education opportunities, 36 days of holiday leave (on an annual basis for a full-time job) supplemented by annual fixed bridge days, bicycle allowance and eco vouchers. [Click here for a complete overview of all the staff benefits.](#)

For more information about this vacancy, please contact prof. Kris Demuyneck ([Kris.Demuyneck@UGent.be](mailto:Kris.Demuyneck@UGent.be)) or dr. Aranka Steyaert ([Aranka.Steyaert@UGent.be](mailto:Aranka.Steyaert@UGent.be)) with as subject "Application: MEA-based mechanistic neural modelling"

Selected candidates will be contacted for an interview (remote interview possible for international applicants).

<https://idlab.ugent.be>

