Institute of Microelectronics of Barcelona IMB-CNM CSIC

The **IMB-CNM** is the largest institute in Spain dedicated to the research and development of Micro and Nano Technologies and Microsystems and with unique capabilities in silicon technology. It belongs to CSIC since its foundation in 1985 and is distinguished as a María de Maeztu Unit of Excellence.

IMB-CNM aims to contribute to the advancement of knowledge and to the economic and social development of society, as well as to the training of researchers and engineers and to the advice to public and private entities.

The research activities of IMB-CNM are dedicated to Micro/Nano Integrated Systems: miniaturized electronic systems which include sensing and/or actuating capabilities in addition to electronic information processing, power management and external interfaces.

The IMB-CNM is located on the Autonomous University of Barcelona (UAB) Campus and contains the largest clean room facilities in Spain with full capability to process its own CMOS technologies and laboratories.

Project Type: TFG/TFM

Project Title: Total Aquatic Process Monitoring and Control with Edge-AI Electrochemical Perception.

Research Group: Integrated Circuits and Systems Group (ICAS)

Project Description:

- Integrated microanalytical systems are poised to enable ubiquitous (bio)chemical fluid assessment, and to have a revolutionary impact on the prevention of key health and sustainability threats of our time. In these systems, the use of electrochemical sensor arrays stands out due to their capability to generate multivariate data from liquid samples, enlarging the number of chemical properties that can be determined simultaneously. To manufacture the arrays, microsensors fabricated in semiconductor technologies offer advantages such as miniaturization, robustness, mass fabrication, and ease of integration with electronic circuits for embedded artificial intelligence, making them particularly suitable for advanced monitoring at the point of interest.
- In this project, you will collaborate with a multidisciplinary team with expertise in neuroscience, computer science, chemistry, biology and microelectronics to deliver innovative intelligent solutions for total aquatic process monitoring and control.
- Your specific objective will be to develop deep neural network algorithms to fuse dynamic microsensor readings so as to monitor, predict, evaluate, and control critical parameters in real aquaculture settings. The neural networks will be deployed on FPGA to run at the edge.

Work Plan:

- Develop DNN implementations to achieve high performance on neuromorphic hardware architectures (use of e.g. conversion tools and quantization-aware training).
- Explore few-shot and online learning of new scenarios/sensors.
- Deploy the network on an FPGA running at the Edge.
- Characterize performance in terms of accuracy, latency, and power.

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Candidate desired studies:

- ✓ MSc in Semiconductor Engineering and Microelectronic Design
- ✓ MSc in Research and Innovation in Computer-Based Science and Engineering
- ✓ MSc in Telecommunications Engineering
- ✓ BSc in Industrial Electronics and Automation Engineering
- ✓ BSc in Computer Engineering
- ✓ MSc in Innovation and Research in Informatics

Application Process:

Before applying, please **check with your TFG/TFM program supervisor,** as he/she may already be coordinating with us to assign the project.

If there is no such coordination**, complete this form and send your CV and a motivation letter** to **Talent@imb-cnm.csic.es**, with the **subject: "TFG/TFM at IMB-CNM"**

Your CV will be forwarded to the Researcher leading the project who will contact you directly if interested.

Check our website for more information about the IMB-CNM and our research activities

https://www.imb-cnm.csic.es/en

Take the next step in your research career with us!

*By applying, you accept our data protection policy.

**IMB-CNM (CSIC) adheres to the European Charter and Code of Conduct for Researchers, ensuring full alignment with their principles and requirements, including equal opportunity, transparency, merit and ability, caring for an open, fair, and excellence-based hiring processes.

IMB-CNM holds the HR Excellence in Research award, which acknowledges CSIC's commitment to continuous improvement in HR strategies for researchers.

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