BCAM Internship: Analysis and automatic detection of cardiorespiratory parameters using wearable devices during high-intensity exercise

The following BCAM Internship position is open at BCAM – Basque Center for Applied Mathematics, an interdisciplinary research center located in Bilbao, Basque Country – Spain.

The interested applicants can apply via the following webpage: https://joboffers.bcamath.org/

INTERNSHIP OFFER	
Research topic:	Analysis and automatic detection of cardiorespiratory parameters using wearable devices during high-intensity exercise
Research line:	Mathematical Design, Modeling and Simulations (MATHDES)
Research topic description:	Continuous monitoring of biosignals via wearable sensors has quickly expanded in the medical and wellness fields. At rest, automatic detection of vital parameters is generally accurate. However, in conditions of high-intensity exercise, such as in running, cycling, or football, sudden physiological changes occur to the signals, compromising the robustness of standard algorithms. In this context, the European-funded project SWEATHEART aims to create an energy-efficient embedded wearable system to continuously monitor the cardiorespiratory effects of exercise-induced phenomena in elite athletes. Within SWEATHEART, we propose a work to determine athletes' cardiorespiratory parameters, which are essential for coaches and sports scientists to evaluate fitness levels, customize training intensities, and track progress effectively. Traditionally, some of these parameters are identified manually by experts through careful examination of gas exchange measurements obtained during maximal exercise testing. This process, reliant on expert judgment and experience, can be inherently subjective and cumbersome, both for the equipment used and the parameter detection process. Thus, the work seeks to develop automatic methods for

	determining the cardiorespiratory parameters through the assessment of biomedical signals and related features acquired via wearable and portable devices during real-world highly intense physical activities. The student will gain insights into the growing sector of wearable biomedical devices, the necessary steps of a practical scientific experiment, and the various relevant aspects of the data science field.
Required skills:	Basic signal processing and programming skills (Phyton), Mathlab.
Keywords:	Biomedical signal processing, sports monitoring
Supervisor:	Elisabetta De Giovanni
Academic background:	Bachelor or Master Degree (completed or near to be finished) in Biomedical Engineering or related fields
Duration and dates:	3 months; from 1st November 2025 to 31st January 2026 (flexible depending on the intern circumstances)
Conditions:	• **Living in the Basque Country:** - Graduate students: net salary of 300 € monthly - Master´s degree students/ PhD students: net salary of 350 € monthly • **Living in Spain:** - Graduate students: net salary of 500 € monthly + up to 150 € for travel expenses - Master´s degree students/ PhD students: net salary of 600 € monthly + up to 150 € expenses for travel. • **Living outside Spain:** -No remuneration. -Accommodation is covered by BCAM. -Diets: 37,40€ per diem. -Travel expenses are covered and to be reimbursed: ○ Up to 300 €, if the intern comes from the EU ○ Up to 1000 €, if the intern comes from outside of the EU (to be checked on each country)
Application deadline:	31st October, 2025