Marie-Skłodowska-Curie Actions – Postdoctoral Fellowships 2024

INL Expression of Interest

Research Group Leader /Research Group name:	
João Piteira / Systems Engineering	
Scientist in charge:	
Name & surname	João Piteira / Accel Abarca
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Short description of the research group, including URL if applicable *(Strengths and scientific achievements (publications, patents, etc.), important infrastructure (up to 2000 characters with spaces)):*

The focus of Systems Engineering group is to bring nanotechnology developed at INL into form-factors compatible with applications in the areas of ICT, health, agri-food and environment. The high levels of integration and miniaturization required for such applications can be often achieved via custom-designed microelectronics solutions, in particular CMOS technologies that enable both high-performance and mainstream adoption of the resulting devices. Our mission is to use electronics and microelectronics combined with nanotechnology to solve challenges within the above areas designing and implementing hardware applications that are power, size and cost efficient.
Our aim is to develop complete solutions and systems, either portable or handheld that enable meaningful applications of advanced sensing and actuating technologies in everyday work and life environments. The target level of complexity is integration of these functions into "smart" system-on-chip (SoC) or System-in-Package (SiP) hardware devices such as:

- Advanced CMOS hybrid devices
- Smart system integration
- Ultralow power and autonomous wireless sensor networks

https://www.inl.int/research-groups/systems-engineering/

Project title:

Low power ADC for neural recording-stimulation

Project description *(up to 2000 characters with spaces):*

Integrated circuits are being used for searching a treatment of neurological diseases such as epilepsy by stimulating brain areas with the right electrical signals. One of the key aspects in implantable electronics is low power in order to not affect skin and/or deep brain implantation due to self-heating of the circuitry. Wireless communication is preferred between the implantable circuit and the outside world because of the lack of cables. It is well-known that digitizing an analog signal in the early stages of the read-out chain reduces the noise contribution of the analog chain, power, and is preferred for wireless communication.
In this project, the candidate will have the opportunity of:

- Design, fabricate, and testing ADCs in either 180 nm CMOS technology and/or 65 nm CMOS technology
- Explore low power ADC architectures such as noise shaping SAR ADC, and Delta-Sigma ADC
- Explore the feasibility of using the ADC comparator as the analog-front-end instead of using a dedicated analog stage
- Testing the ADC in a real application
- Publish results in top conferences such as ISCAS, ESSCIRC, ISSCC

Research fields *(You may choose more than one)*			
Chemistry (CHE)		Life Sciences (LIF)	
Economic Sciences (ECO)		Mathematics (MAT)	
Environment and Geosciences (ENV)		Physics (PHY)	X
Information Science and Engineering (ENG)	X	Social Sciences and Humanities (SOC)	

Expiration date for Expressions of Interest from postdoctoral fellows:	21st August 2024

Necessary documents to be submitted (in addition to the required CV and motivation letter):
List of relevant publications