Centre Nacional de Microelectrònica IMB

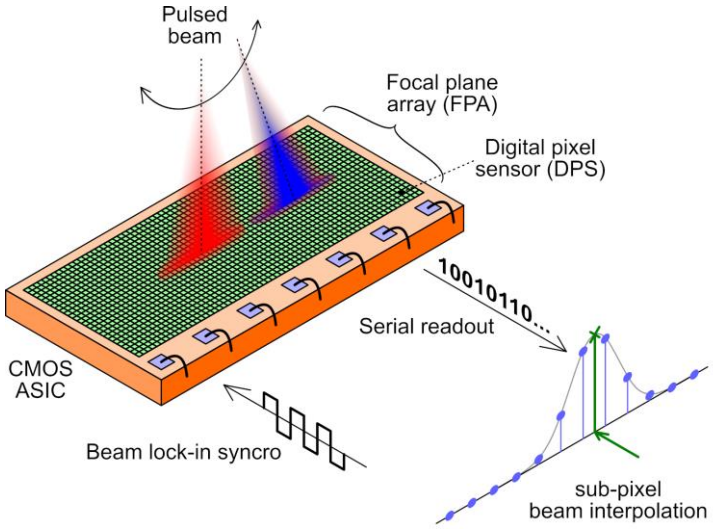
CSIC
CONSEJO SUPERIOR DE INVESTIGACIONES CIENTÍFICAS

Master Thesis (with possibility of PhD Thesis)
at the Integrated Circuits and Systems (ICAS) research group of IMB-CNM(CSIC)

Implantable Lock-In Imager in 180-nm CMOS Technology for the Continuous Monitoring of Perivascular Adipose Tissue

Description

One of the leading causes of death worldwide are cardiovascular diseases and there is a strong scientific interest in studying the contribution of obesity as a major risk factor. This work will design an implantable application-specific integrated circuit (ASIC) for the in-vivo monitoring of the perivascular adipose tissue in patients under cardiovascular treatment. The ASIC will provide valuable information about the tissue composition and thickness in continuous time through the optical measurement of a beam intensity and its XY position. For this purpose, the chip will include a focal plane array of digital pixel sensors (DPS), each containing not only its own optical photodiode but also a dedicated in-pixel A/D data converter. Furthermore, the array of DPS cells will be synchronized with the incoming pulsed beam to allow low-noise lock-in read-out. This work will focus on the design of the DPS cell in 180-nm CMOS technology with special efforts on low-noise performance and compact pixel pitch.



Background and skills

- Electronic engineering or any similar curriculum covering the following topics: CMOS technology basics, photodiode devices, analog and mixed-signal CMOS circuit design.
- Knowledge of EDA tools and HDLs for full-custom IC design.
- Capability of working as a team.
- Good spoken and written English.

Tasks

The student will design the analog and mixed-signal parts of the DPS circuit in a given 180-nm 1.8-V CMOS technology following the full-custom IC design methodology through Cadence EDA tools. Apart from low-noise operation and compact pixel area, the DPS schematic and layout design will be optimized for its robustness against process-supply-temperature (PVT) variations. All the above tasks will be performed in the IMB-CNM lab facilities at the UAB Bellaterra Campus.

Contact Dr. Francesc Serra Graells paco.serra@imb-cnm.csic.es
Dr. Xavier Muñoz Berbel xavier.munoz@imb-cnm.csic.es