CSUM | CENTRE SPATIAL DE L'UNIVERSITÉ DE MONTPELLIER

FONDATION VANALLEN UNIVERSITÉ DE MONTPELLIER

Internship offer

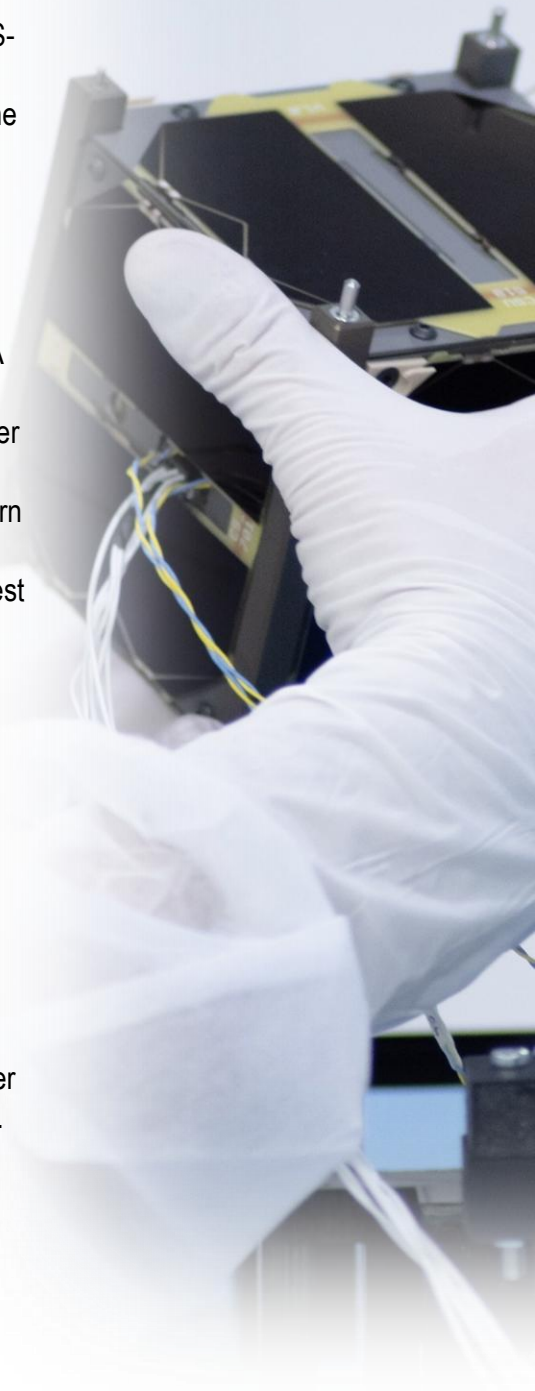
cometes

FRANCE 2030

OBC Hardware Architecture Study Based on NanoXplore Components

Context

The University Space Center of Montpellier (CSUM) is the French leader in the development and operation of nanosatellites developed by students. It has acquired in-depth competences in the field of design, manufacturing, testing and operation of nanosatellites and their subsystems, as well as in the area of space project management and product assurance in the framework of university space projects. The CSUM has an AIT (Assembly Integration and Test) Facility, a CDF (Concurrent Design Facility) and both UHF and S-band Ground Stations. The CSUM develops its own 1U to 12U CubeSat nanosatellite platforms with the support of the Van Allen Foundation and the French and European space agencies.



Internship description

Objectives: CSUM is currently in Phase B of the development of a 12U platform designed to accommodate complex payloads from our partners. A team of interns will help finalize the preliminary design of the platform, building on the lessons learned from CSUM's numerous missions. This offer focuses on the architecture study of a future On-Board Computer (OBC) based on European radiation-hardened NanoXplore components. The intern will compare the different architecture options in terms of performance, reliability, cost and component traceability, and will propose the solution best suited to the platform.

Main activities related to your mission:

- Define the OBC requirements for the 12U platform.
- Study the NanoXplore product range (JEDEC versions).
- Compare the possible OBC architectures:
  - NG-ULTRA SoC JEDEC with its embedded processor,
  - ULTRA300 FPGA JEDEC with a soft-core processor implemented,
  - ULTRA300 FPGA JEDEC combined with an external microcontroller.
- Assess each option in terms of reliability, radiation tolerance, power consumption, cost, component traceability and development effort.
- Propose and justify the most suitable architecture for the CSUM OBC.

- Develop VHDL modules as needed, such as integrating a soft-core SoC or creating missing interfaces (e.g. CAN controller).
- Validate the developed modules in simulation and on an evaluation board.
- Write the trade-off report and the technical documentation.
- Present the work in the project design reviews.

Level: 2nd year of Master Degree or equivalent.

Duration: 4 to 6 months

Skills (it is not mandatory to have all of them)

- Knowledge of digital electronics and FPGA architectures.
- Proficiency in VHDL and simulation tools (ModelSim, GHDL or similar).
- Knowledge of embedded processors and SoC architectures (ARM, RISC-V or similar).
- Knowledge of communication buses and protocols (CAN, SPI, I2C, UART or similar).
- Interest in space electronics, reliability and radiation effects.
- Experience using a version control system (Git or similar).
- English – minimum: able to hold a technical discussion with experts and write documentation.
- Ability to produce clear technical reports and presentations.

Location : Centre Spatial Universitaire de Montpellier, Campus Saint-Priest, Montpellier, France.

Stipend: 4.50 euros/worked hours for duration between 308 and 924 hours, 35 hours/week.

Preferred starting date: March 2027

Supervisor: Sara VEGA MARTINEZ, sara.vega-martinez@umontpellier.fr

How to Apply?: https://csum.umontpellier.fr/emplois-stages/

(Use the form to submit your CV and cover letter)