Internship Proposal – 4/6 months

Title: Electronic Interface board for the Passivation of the IonSat platform

Context of the internship

The Space Center of École Polytechnique (CSEP), created in 2010, proposes and supervises space projects for École Polytechnique students. CSEP coordinates and brings together, through its projects, students, teacher-researchers, industrialists and French and European space agencies. It is financially and operationally supported by the education patronage program *Espace, Science et Défis du Spatial* led by Professor Pascal Chabert.

IonSat is a 6U nanosatellite project equipped with an electric propulsion engine, dedicated to demonstrating the feasibility of nanosatellite missions in Very Low Earth Orbit. With a strong educational vocation, the project is currently led by several students and supported by numerous space actors: start-up (ThrustMe), industries (Thalès Alenia Space), agencies (CNES, Onera).

Internship description

As an Electronics Design Intern at CSEP, your primary responsibility will be to design an innovative interface board for power lines within the IonSat satellite and interfacing different subsystems within it. This board will act as a central hub, facilitating the efficient distribution of power from the onboard power system to different satellite components while also enabling seamless communication between subsystems. Due to the increasing risk posed on satellites from space debris, requirements are now being implemented into satellites to be launched in the future to prevent release of additional debris. One of the key requirements is the electrical passivation of satellites at end of mission (EoM) in order to prevent the break-up of satellites due to the stored energy in the power subsystem.

Key Responsibilities:

- Collaborate with CSEP and CNES engineers to design the passivation circuit to be integrated on the interface board. This circuit, of primary importance, allows the disconnection of the satellite from the solar panels at EOL.
- Collaborate with CSEP engineers to understand the specific requirements of the interface board.
- Design the schematic and layout of the interface board using industry-standard Electronic Design Automation (EDA) tools.

- Ensure the board design complies with space-grade specifications, considering factors such as radiation hardening, thermal management, and electromagnetic compatibility.
- Select appropriate components and connectors for the board, ensuring compatibility and reliability in space conditions.
- Knowledge of electronics and ability to work with measurement instruments (multimeter, oscilloscope, signal generator, power supplies, vector network analyzer, etc.).
- Electrical parameters measurement: Current, Power, efficiencies.
- Work closely with the broader IonSat team to integrate the interface board into the satellite's overall architecture.
- Test and validate the functionality of the board through simulations and practical experiments.
- Collaborate with other interns and team members to share insights and contribute to the overall success of the project.

Preferred profile:
- Enrolled in a relevant engineering or electronics program at university level.
- Strong understanding of electronics design principles, circuit analysis, and PCB layout.
- Proficiency in using EDA software (such as Altium Designer or KiCad) for schematic capture and PCB design.
- Familiarity with space-grade components, radiation hardening techniques, and aerospace design standards is a plus.
- Problem-solving skills and attention to detail in ensuring the reliability of the board design.
- Good soldering skills are a plus.
- Effective communication skills to collaborate with team members and present design concepts.

Behavioural Requirements

- Self Motivation and autonomy
- Communication and teamwork

Internship duration: 4-6 months, from April/May 2024
If you are interested, send your CV and a cover letter, clearly indicating your motivation and availability dates.

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