IGOSat Project

Internship Proposal - Spring 2019
Flight Software Engineering for IGOSat : Command and Data Handling

Skills, Keywords: embedded software, space engineering, real time OS, FreeRTOS, C programming language, debugging, software engineering, system programming and testing, ECSS

Level Wanted : 4th year, master degree, programming experience **Duration :** 4 to 6 months **Stipend : >** 500 € / month
Contacts : benhizia@apc.in2p3.fr , halloin@apc.in2p3.fr, colin.gonzalez@apc.in2p3.fr

Project Description :

The Laboratory of Excellence (LabEx) UnivEarthS, set up by laboratories AIM (Astrophysique et Interations Multi-Echelles), APC (AstroParticule et Cosmologie) and IPGP (Institut de Physique du Globe de Paris) from Paris Diderot University, is carrying carrying transverse projects between those 3 laboratories.

Using the strong involvement of those laboratories in numerous space experiments and instrumentation, an educational nanosatellite project has begun in 2013, with the financial and technical support from CNES (Centre National d'Etudes Spatiales) and the Space Campus of Paris Diderot University.

More specifically, the project is to develop a scientific 3U CubeSat, and launch it in 2019. The satellite will carry 2 payloads, one to study the Ionosphere and one to study the radiation belt.

Internship description :

The purpose of the internship is to work on the integration of the flight software parts related to communication with the ground segment, to be embedded in the satellite. Several parts of the main flight software are currently being developed and tested, as well as the payload software and the AOCS software. Several functional tests have to be done after integration on the OnBoard Computer.

The development of the flight software process is slow as it evolves at the pace of the satellite elaboration itself. We've chosen a modular approach to write the software applications of the platform and the payloads. This choice makes it possible to start programming even if the system is not completely defined. However this implies that we'll need to assemble all the pieces of software and be sure that they still perform as expected. This is not a given as we have real time constraints amongst other. The integration process will have to verify that the real time constraints, concurrent execution and memory management do not introduce bugs in the software applications.
It is good to note that we use several tools to produce software and sometimes generate programs, i.e. Matlab Simulink. Therefore feeling comfortable with new tools quickly is a real plus !

Within a team of students, engineers and scientists, the student need to be able to work autonomously as well as part of a team, have a sense of rigor especially in writing presentation, and already a global vision of information transmission.

This internship is a good opportunity to address numerous points of space engineering.

reference: André Emile Heunis (2014), Design and Implementation of Generic Flight Software for a Cubsat, Nikitas Chronas (2016), Master Thesis of the Onboard Computer Software and command control satellite software (UPSat).