

ASTRE : a student-directed space association building a 2U Cubesat and an Open Source ground segment

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Abstract— ASTRE is a student association created in Toulouse, France, to develop students' interest for space science and technology. The association is currently developing two different projects.

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I. ASTRE, A STUDENT ASSOCIATION FOR SPACE SCIENCE

The Students Space Association of Toulouse (ASTRE) is a student-directed and space-oriented association, supported by university teachers and staff members. Its main objective is to develop students' interest for space science and technology. This is reached by developing engineering projects and enabling students to participate in international and national workshops and conferences. Today, 25 students from four different engineering schools of Toulouse participate in ASTRE activities.

ASTRE vocation is to give to the maximum of Toulouse students the possibility to participate in projects linked to space technologies. Toulouse is the aerospace capital in France with several huge space companies. Yet, most of Toulouse engineering schools do not have space-oriented courses so the association is a unique opportunity for motivated students to learn more about this field. ASTRE students are encouraged to participate in space-related activities and to attend conferences about spatial news and spatial science and technology.

Students can find in ASTRE the support that they need to dare to discover the spatial field, which is often seen as complicated and inaccessible. The association members can also be provided with financial aids in order to participate in rewarding activities for their future.

In the last year, 30% of ASTRE members have participated in international workshops and conferences. Each time, back in France, participants share their experiences and new knowledge with the rest of the members. This sharing philosophy is the main axis of the association, making possible to reach the educational objectives and moving forward.

A part from participating in international events, ASTRE members are encouraged to participate in space-related events in Toulouse, France, where the association is based.

One membership condition is to be engaged in one of our long-term projects. We are currently working in two different projects and we are starting a third one in October 2019. All the projects developed by ASTRE are oriented towards education, innovation and Open Source.

II. TOLOSAT

Tolosat is a 2U CubeSat with a double mission developed in collaboration with Club CubeSat Supaero. The main objectives of the mission are to measure Earth gravity field variation from GNSS tracking and to send and receive telemetry via the IRIDIUM constellation.

There is a group of 38 students from five different universities working in TOLOSAT. Those students are organized in nine groups, one for each engineering field, and come from different engineering backgrounds. In each group, students from different studying levels work together and share their knowledges following ASTRE's work philosophy. TOLOSAT members are helped by experts when they need it but there any teacher is leading the project, as we want our CubeSat to be a spacecraft fully made by students.

Every year we have the pleasure to welcome new students in TOLOSAT team. New members have a training period with old members that have already worked in the project. Experienced members teach to the new ones the required concepts to follow the mission without starting from zero every year. This method ensures the continuity of the project even if the group changes every year.

The project started in January 2018; we ended phase A in June 2019 after a Preliminary Design Review and we are starting phase B in September 2019. The estimated launch date is 2022.

III. ASTRE'NOGS

ASTRENOGS team is building a UHF/VFH ground station to receive data from satellites. The project takes part of the

European Nanostar program aiming to develop Open Source ground stations in Southwest Europe.

Currently, 5 students are working on this project since September with an engineer of ISAE-Supaero to help them. At the end, the station will be part of the SatNOGS open source network of ground stations. We are proud to contribute to this new kind of network, accessible to all the scientific community and using affordable tools and resources.

Plus, we are trying to create a detailed documentation on our project, to help and encourage future students to try the SatNOGS experience. ASTRENOGS project is totally in line with all the objectives of ASTRE and will be completed in December 2019.

IV. ASTRE PLANS FOR THE FUTURE

The association aims to develop new activities thanks to opportunities brought about by university teacher projects and students ideas. ASTRE has been created two years ago and meets a real success among Toulouse university students. Hence, the association is planning to continue growing during the following years.

ASTRE receives more and more application forms from students that are willing to work in one of our projects. However, we have now more applications than posts to offer to students. Thus, we are starting a new project this year, in order to reach more students from our city and give them the opportunity to take part in a space related project.

This new project is it going to be a sounding balloon mission and it will be finished by June 2020. We are also open to new proposals and ideas for new short or long-term projects.

V. SPONSORS AND NETWORK

We have lots of ambition and ideas of projects for our association. Unfortunately, we can't meet our goal without the help of people and companies. There is multiple ways to support us. All our sponsors are named at every event, it give them lot of exposure, especially among students

Another important point for ASTRE is the network. This year we want to develop even more ASTRE's network consisting of passionate of spatial. In a first time to share news among students. But also to develop a strong link with companies and professionals, especially within the area of Toulouse for technical advices and internship opportunities.