

41st STUDENT CONFERENCE (E2)
Student Team Competition (3)

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3STAR CUBESAT FOR THE GEOID MISSION

Abstract

The 3STAR mission has been thought to be part of an ESA program, named GEOID, offered by the Educational Office. The GEOID (GENSO Experimental Orbital Initial Demonstration) initiative wants to promote space activity within European Universities by settling an orbiting constellation of Cubesats to be operated by the GENSO (Global Educational Network for Satellite Operations) ground stations network. Each university involved in the program has to build its own satellite and ground control station. The satellite shall be compatible with all the other elements of the GEOID mission (other satellites, sensors, and the GENSO network). The GEOID initiative is expected to be the communication backbone of the initial version of the HUMSAT system. The main goal of HUMSAT is to use the constellation of satellites and GENSO ground stations to provide support for humanitarian initiatives, especially in developing areas. The HUMSAT project is aiming at providing a wide range of applications such as climate change monitoring, remote disaster tracking or public health communications. The 3STAR educational project will be developed by a multidisciplinary team of students from several engineering departments of Politecnico di Torino. The AeroSpace Systems Engineering Team (ASSET) of the Department of Aerospace Engineering, has been carrying out programs on small space platforms for many years. In the last decade, the team has focused the attention on the development of satellites for educational and research purposes. The first program was the PiCPoT nano-satellite, which ended in 2006. The heritage of PiCPoT has been reaped by the e-st@r program, which has been selected by the ESA Education Office as one of the university Cubesats on the Vega maiden flight. From the technical point of view

the 3STAR mission consists of a 3U Cubesat orbiting the Earth and acting as a data-relay platform and a space-based test bed for an Earth remote sensing experiment. A dedicated ground control station is also included in the mission. The service module of 3STAR is derived from the e-st@r cubesat. The satellite carries a HumSat payload consisting basically of a UHF transceiver, one antenna, and one data storage device. As additional payload, the cubesat serves an experiment named P-GRESSION (Payload for GnsS REmote Sensing and Signal detectION). The approach to the design is based upon a modular structure development. The paper will describe the 3STAR mission into the details highlighting the methods employed to develop the program as well as the first results obtained.