

IAF SPACE EDUCATION AND OUTREACH SYMPOSIUM (E1)  
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FUNCUBE, A LOW-COST SPACE SYSTEM TO TEACH FROM CONCEPT TO OPERATION

**Abstract**

Space Technology fever cannot be limited. Knowing Cubesats, students in secondary schools demand to replace their robotics researches with such system development. Easy to say, but it is not affordable for each school to run such project and of course, it could not be feasible to cover with no background in an educational year. This paper is about Funcube, a cubesat model for self-training system with a user manual to set it up. Funcube provides cubesat subsystems in the simplest possible way, using typical COTS, only to prepare a functional system with its interfaces similar to the real satellite, and the important note, to be Fun, not boring. So, using 3D printed elements with some electronics assembled inside, a cubesat with a simple mission is made ready that the students should integrate the subsystems and form the 1U cubesat. The process shall be done both in hardware and software level. In order to train and avoid wrong integration (and possible damages), there are two types of provisions. The first in hardware that presents unique interfaces for each element and the next in software that is guided through a pre-defined version of onboard software with a developed customized UI to help trainees communicate with the software but in a defined bunch of commands and actions. Funcube uses buzzers and LEDs, not usual in space systems, but used for more educational points and to make it more attractive. There is also a software to simulate Ground Control and user may send commands and receive data from the satellite based on the mission to experience satellite operation, as well. Funcube covers the educational requirements, derived by a team of educators with some years of experience in cubesat projects and organizing cubesat workshops and it is based on cubesat standards, owning its complete and helpful user manual, so it can be a very good hands-on for similar applications as easily and effective as possible. This capability enables Funcube to be used for a wide range of applications, not only for education, but also for the fun.