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ESAT, the educational satellite

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The Universidad Politécnica de Madrid (UPM) started in the academic year 2009/10 educational innovation activities in space engineering. The implementation of several topics in the Conceive - Design - Implement - Operate (CDIO) syllabus was pursued, mainly focused on the next topics: Hardware and software integration, Test, Verification, Validation and Certification.

With this objective the use of demonstrator satellites was included in the practical lessons. The development of a self-designed demonstrator satellite was started leading to the ESAT's birth.

ESAT has been created and developed by Theia Space, an initiative born at the Spanish User Support and Operations Center (E-USOC) which belongs to the UPM and is one of ESA's delegated centers for the operation of scientific payloads onboard the International Space Station.

ESAT is an educational satellite designed for hands-on learning for all education levels: STEM education, university studies and professional training. It is a 10x10x10 cm nanosatellite based on the successful CubeSat standard and weighing less than 1 kg.

ESAT has the typical spacecraft subsystems: Electrical Power, Command and Data Handling, Attitude Determination and Control and Structure.

The user can choose to focus and work on each subsystem independently or to practice with the fully integrated satellite. ESAT features a Wi-Fi communication system allowing the connection with a PC, where the ESAT GUI based on COSMOS SW allows an easy operation of the satellite.

ESAT is perfectly fitted to train on design, manufacture, integration, validation and operation of satellites.

It has been developed with the open source philosophy and the users are able to expand its functionalities. ESAT allows to integrate and test new user developments, both SW and HW. For the HW developments the user has access to all the lines in the satellite, including power and communication lines and analog and GPIO lines.

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