Architecture and status as of December 2019 of educational OUFTI-2 CubeSat featuring D-STAR amateur-radio communications and test of a new multilayer shield against space radiations.

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We describe the current status and the architecture of the educational OUFTI-2 1U CubeSat. This satellite is a successor to the OUFTI-1 satellite. A thorough analysis of the possible reasons of failure of OUFTI-1 led to a significant re-design.

The primary mission of both satellites is identical, namely a home-made space repeater for D-STAR amateur radiocommunications. The freeing-up of some space on-board, in major part due to a new design philosophy for the on-board processor, allowed us to embark new secondary payloads: one for testing the performance of a new type of electronics-shielding, multilayer material with small size & weight that can protect electronic systems against space radiations, and that is well suited for small satellites, and the other – designed by high-school students – to perform inertial measurements.

Another difference between OUFTI-2 and its predecessor resides in its OBC. OUFTI-1 featured a pair of redundant MSP430-based electronic boards, one commercial and one homemade. A very likely reason for the failure of OUFTI-1 lies in the use of these redundant processors/boards and a possible continuous handover from one to the other. Therefore, significant attention was devoted to make the OBC more robust. At one point, in October 2017, the opportunity arose to use the Digital Programmable Controller (DPC) from Thales Alenia Space, Belgium. A main feature of the DPC is the fact that it is very highly resistant to space radiation. It also features 3 separate core processors, each with a distinct function.

The current status of the satellite is as follows. The design of the BCN, COMM, EPS and OBC is complete. The four electronic boards are at various stage of completion, and prototypes have been built. The architecture of the OBC software is essentially complete but still in development.

Preference for presentation: Poster

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