UnB On-Board Computer Prototype for CubeSats

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Abstract
Immersed in a global process of capacity building and knowledge improvement that aims to achieve autonomy and independence in the implementation of small satellite missions, researchers from the University of Brasilia (UnB) are studying the feasibility of a 3U CubeSat satellite mission, as a technological demonstrator. At UnB some studies have been underway for several years with the aim of independently creating and offering solutions for these small future missions.

This work aims to present the results of a research obtained so far and dedicated at the construction of an On-Board Computer (OBC) for this kind of future mission. During the OBC development the co-design methodology was used, which allowed the development of hardware and software at the same time. During the design of the theoretical model, the microcontroller and other devices were chosen to compose the OBC hardware. For the embedded software the FreeRTOS was defined as the operative system. During the tests in protoboard it was possible to verify: the microcontroller's consumption, the operational modes of the embedded software, the data acquisition and archiving, etcetera and these results are here showed.

Far from being concluded this research project, however it is worth presenting what has been achieved and realized so far. We arrived at the conclusion that the use of the TI MSP432 is a great choice for low-power and intermediate performance scenarios. The use of FreeRTOS as a real-time operative system requires only little memory to the systems, as well as the use of watchdog utilization at software level has been ratified. Some requirements established in the project have not yet been met due to the complexity of the project and the limited time available. All these points will be taken up again, developed and deepened during the project to arrive at the completion of this UnB On-board Computer prototype for CubeSats.

Key-words: CubeSat Mission, On-Board Computer (OBC), Nanosatellite.