

28th IAA SYMPOSIUM ON SMALL SATELLITE MISSIONS (B4)  
Generic Technologies for Nano/Pico Platforms (6B)

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FREE-MAES: AN EMBEDDED LIBRARY FOR FAULT-RESILIENT SOFTWARE DEVELOPMENT  
IN CUBESATS

**Abstract**

Small satellites are enabling new markets and opportunities for the development of space missions. The increased number of missions using constellations and miniaturized spacecraft such as nano and picosatellites requires new technologies that can decrease the development cost and time of implementing such projects. Also, the reliability of highly automated operations used in modern space systems requires the software onboard to be highly dependable and safe. The main problem of developing satellites onboard software with current software tools is the increment of its implementations complexity. For that reason this work proposes the development of a software methodology and its artifacts for the implementation of fault-tolerant software for cubesats. It implements a meta-model that integrates native features for fault resilient software aboard. The implementation of the software library was carried out using commercial-off-the-shelf software and hardware components, which make it suitable for its easy integration within the development flow of software for Cubesat missions. Preliminary results demonstrate that the impact in the use of resources is equal than current state of the art, while reducing the development time by about 15%. Also, the implemented approach is able to natively support fault-tolerant features, especially for telemetry collection and sensor management onboard cubesat mission scenarios used for testing. This work can be adopted and expanded by any organization working with pico-nano satellites.