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IMPROVED COMMAND AND DATA HANDLING SYSTEM FOR THE DELFI-N3XT NANOSATELLITE

Abstract

The Delfi-C^3 nanosatellite successor, Delfi-n3Xt, is currently under development at Delft University of Technology. This three-unit CubeSat platform has been improved through the implementation of a high-speed downlink, three-axis stabilization and a single-point-of-failure free implementation of batteries in the electrical power system. Failure of the batteries will therefore not lead to failure of the primary mission as has, in the past, been the case with many other nanosatellite missions.

In this paper the functional analysis of the command and data handling system (CDHS) of Delfi-C^3 and the improved CDHS architecture of are presented with a comparison of functions and performance of both CHDSs. The main design drivers for the CDHS of Delfi-C^3 were the available technology and the absence of batteries. These design drivers enforced specific hardware components which, however, resulted in undesired behaviour during integration and testing. In particular low-speed devices on the bus were suppressing the performance of the CDHS and the high-speed systems of Delfi-C^3. Most issues were mitigated through software implementations.

Delfi-n3Xt requires a higher performance since much more data will be produced, stored and sent down with a high-speed downlink. The CDHS architecture of Delfi-n3Xt has been based on the Delfi-C^3 CDHS since it has to be operational in the event of battery failure. The CDHS architecture has been improved and extended so that it is capable of operating with low-speed devices in combination with high-speed processing and low-cost scientific data storage.