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IN-FLIGHT VERIFICATION OF CCSDS BASED ON-BOARD REAL-TIME VIDEO COMPRESSION

Abstract

This paper presents an optimised hardware implementation of an on-board real-time video compression system for space missions based on the CCSDS 122.0-B-1 standard. High-resolution spectral and imaging missions are permanently requiring increasing data transfer rates in order to handle this huge amount of data. Highly efficient data compression techniques belong to the key features of video and imaging applications in space missions. To meet real-time compression performance, a hardware implementation on a FPGA was developed. This hardware implementation has also significant advantages in the power consumption compared to a software-based solution. The CCSDS 122.0-B-1 standard uses a Discrete Wavelet Transformation and a Bit Plane Encoder to compress the image information. An in-flight demonstration of this compression system was recently performed on the REXUS 7/8 mission by using a low-power Spartan-3 FPGA. Further, the implementation and test results are compared to other state-of-the-art compression standards.