EARTH OBSERVATION SYMPOSIUM (B1)
Earth Observation Data Management Systems (4)

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DESIGN OF A TELECOMMUNICATION, COMMAND AND DATA HANDLING SYSTEM (TCDH)
FOR A REMOTE SENSING MISSION

Abstract

This work is about the design of a Telecommunication, Command and Data Handling System (TCDH) for a remote sensing mission with space applications and is implemented in the CONDOR UNAM-MAI Satellite Project that is being developed by a scientific and technological cooperation agreement between Mexico and the Russian Federation. The TCDH is the central control system onboard of a remote sensing satellite mission and executes processes like: control, acquisition, storage and transmission of images data to Earth according to the standards of space systems. The CONDOR project requirement is to acquire images of Earth's surface with a 20 meters/pixel optical resolution. This design is based on the following technologies:

* The Field Programmable Gate Array (FPGA), which are selected because they are a flexible, reconfigurable and with high density logic resources hardware's platform in order to implement high performance architectures for digital signal processing, and fault tolerance techniques to maintain the needs of the mission. This technology exploits the hardware description features such as parallelism and scalability. FPGAs allow optimizing the size, cost and power, which makes them ideal devices for use in space systems.

* Software Defined Radio (SDR) in order to develop a flexible telecommunication system on board that allow the programmability and adaptability in order to use efficiently the resource like power and radio spectrum, to adapt to the conditions of the transmission channel, to allow the update in flight for new standards of wireless communication to increase their capabilities, reducing the obsolesce and risk associated a fixed architectures.

The TCDH was designed using the codesign (hardware/software) in an SRAM based FPGA following the ESA's standards about space systems (ECSS) and fault tolerance techniques in order to mitigate the effects produced by Single Event Upsets particularly. Finally, this work seeks to develop low cost space technology that is situated in the state of art in order to contribute with the space development of Mexico.