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SYMPOSIUM ON TECHNOLOGICAL REQUIREMENTS FOR FUTURE SPACE ASTRONOMY AND SOLAR-SYSTEM SCIENCE MISSIONS (A7)
Technology Needs for Future Missions, Platforms (3)

Author: Mr. William Hidber
Universidad Nacional Autónoma de México (UNAM), Mexico, hidber@comunidad.unam.mx

Dr. Gustavo Adolfo Medina Tanco
Universidad Nacional Autónoma de México (UNAM), Mexico, gmtanco@nucleares.unam.mx
Ms. Ximena Luna
Universidad Nacional Autónoma de México (UNAM), Mexico, xime.luna491@gmail.com

HOUSEKEEPING ARCHITECTURE DESIGN BASED ON RECONFIGURABLE LOGIC DEVICES FOR USE IN THE K-EUSO TELESCOPE

Abstract

K(KLIPVE)-EUSO is a new type of observatory which will use the Earth's atmosphere as a detector of ultra-high energy particles from outer space. K-EUSO observes the brief flashes of light (fluorescence) produced by particles from deep space collided with the Earth's atmosphere. This telescope will be installed in the MRM-1 Russian module of the International Space Station which orbit the Earth every 90 minutes at an altitude of approximately 400km. This system is being designed in collaboration with 12 countries and 60 institutions, where Mexico is responsible for the design, validation and implementation of housekeeping subsystem for monitoring the on-board electronics. The system must operate under exposed LEO conditions and ensure optimum performance for a minimum of three years, and accommodate specific technical requirements (mechanical, electrical, mass consumption, volume, radiation doze, etc) in as much a low cost as possible design scenario, including COTS wherever possible. This paper presents a housekeeping design based on a hierarchical architecture, consistent with the mission technical and financial requirements. Because of the large number of subsystems that are required to monitor and the constant evolution in monitoring schemes, the instrument proposed is based on a reconfigurable logic design where the hardware upgrade does not involve high complexity in terms of available physical hardware. Two designs of implementation are proposed, fully described and compared, one based on FPGA and other on SoC-FPGA. Simulation results and laboratory test are also presented.