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CONTROL AND OPERATION LOGIC FOR MEMS TELESCOPE FOR EXTREME LIGHTNING

Abstract

The scientific goal of MTEL (MEMS Telescope for Extreme Lightning) is a global observation of Transient Luminous Events (TLEs) from space, especially in the nadir direction. The control of the payload MTEL in orbit is so complex that it is wise to divide the control and operation logic into several units according to their functionality and build the logic unit by unit. The major functionality units among total 14 units are system control unit, trigger processing unit, instrument control unit and data processing unit. The instrument control unit includes photo-detector gain control logic, MEMS mirror control logic, and monitoring control logic, and the data processing control unit includes memory control logic, event header generator logic, and the interface to onboard computer. The system control unit called SCL (System Control Logic) is in charge of all types of controls, data acquisition, and handling of science and monitoring data of MTEL. Transitions between instrument states are carried out by the appropriate transition commands. SCL interprets the transition commands and send them to each functional unit, and each unit executes the commands. The whole control and operation logic is implemented in one FPGA chip to minimize the power consumption and avoid the complicate interface.