

31st IAA SYMPOSIUM ON SMALL SATELLITE MISSIONS (B4)
Small Spacecraft for Deep-Space Exploration (8)

Author: Dr. Hang Zhou
Shanghai Jiao Tong University, China

Dr. YiXin Huang
Shanghai Jiao Tong University, China

Dr. hang wu
China

Mr. XIN CAO
Shanghai Jiao Tong University, China

Prof. Shufan Wu
Shanghai Jiaotong University, China

Prof.Dr. Qamarul Islam
Pakistan

MODULAR INTEGRATED ELECTRONIC SYSTEM DESIGN FOR LUNAR EXPLORATION
CUBESAT

Abstract

Through the great success of NASA's MarCO CubeSat which successfully returned real-time information about the landing of the lander on Mars, the feasibility of CubeSat used in the field of deep space exploration is verified. Inspired by this success, we developed the lightest deep space exploration micro-nano satellite weighing 6.5kg, which successfully participated in Chang 'e lunar exploration mission of China. It is used to monitor the orbiter's status in real time and verify the miniaturized X-band communication technology. This paper focuses on the modular design scheme of the CubeSat's integrated electronic system. The integrated electronic system is composed of power control and distribution unit (PCDU), two onboard computers with mutual cold backup, attitude control computer, active thermal control computer, and image processing unit. The PCDU adopts DET topology structure and the energy balance scheme of CubeSat is designed in detail. At last, the total energy can be balanced in one operation orbit. Onboard computers are responsible for the whole satellite task process management, telemetry and remote control processing. And the active thermal control computer is responsible for the active thermal control of the Earth-moon transfer stage. The attitude control computer is responsible for attitude control and orbit determination, as well as position search of orbiter, Earth and moon. The image processing unit is mainly responsible for automatically processing and screening the photos. Each module of the integrated electronic system is connected by PC104 bus and fully uses commercial off the shelf (COTS) technologies scheme.