SPACE SYSTEMS SYMPOSIUM (D1)
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Author: Mr. Bheema Rajulu
N.M.I.T. Bangalore, India

Prof. Sankar Dasiga
N.M.I.T. Bangalore, India
Prof. Basavarajaiah s
SIT, Tumkur, India
Mr. Yathin S K
NMAMIT Mangalore, India
Mr. Shivaprasad Kamath
NMAMIT Mangalore, India
Mr. Vikhyath Kumar
NMAMIT Mangalore, India
Ms. Shruthi Nagabhushana
N.M.I.T. Bangalore, India
Mr. Nakul Rao
N.M.A.M.I.T, Nitte, India
Mr. Nischal Rao
N.M.A.M.I.T, Nitte, India

ON-BOARD COMPUTER FOR TWIN NANO SATELLITE MISSION - STUDSAT-2A/2B

Abstract

STUDSAT-2 is a STUdent SATellite program which aims to build Nano Twin satellites each weighing approx. 10 kg with the dimensions of 30 x 30 x 20 cm3 with an objective of demonstrating Inter-Satellite Communication for the purpose of improving temporal resolution for remote sensing applications. Payload, Attitude determination and control systems, Electronic power system, Command and data handling, Inter Satellite link, Structure, Communication are the major subsystems involved in STUDSAT-2. OBC is the brain of satellite. The On Board Computer (OBC) for STUDSAT-2 is ARM based Cortex –M4 microcontroller with DSP and FPU instructions combined to 168 MHz performance. This paper elaborates the performance and the features of the chosen processor with Functional, Operational and Interface Requirements protocols. The overall system architecture and requirements of the subsystems is accomplished by the low cost real-time operating system (RTOS) which support various types of peripheral interfaces, telemetry storage and data processing. The various peripherals for the CDH system consist of a set of memories, a microcontroller supervisor IC and temperature sensors at various locations of the satellite. Three different types of memories are used for different applications. For storing and retrieving the OS code in case of malfunction a radiation resistant Read Only Memory is used. A Read/Write Non-Volatile Radiation Resistant Memory is used for storing the telemetry data. And for storing the images from the CMOS image sensor a fast and lard read/write memory is used. The controller will be supervised by a watchdog timer to catch runaway programs by resetting the controller. Our idea of making socket connection that connects the entire sub modules of the satellite is presented in this paper. This socket could contain all I/O ports from the processor, different power lines etc.The I/O Board provides serial peripheral interface (SPI), I2C, USART, ADC etc. to communicate with submodules of

other sub-systems.The DCMI is used to interface the payload and collect the science data.