

SMALL SATELLITE MISSIONS SYMPOSIUM (B4)
Design and Technology for Nano-Sats and Cube-Sats (6B)

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A SINGLE MICROCONTROLLER BASED ON-BOARD COMPUTER DESIGN FOR A NANO
SATELLITE**Abstract**

This paper deals with the design of a single microcontroller for controlling all the functionalities of a nano satellite. The nano-satellite under in house development at SRM University Chennai, India, incorporates a near-IR spectrometer as payload for detection of green house gases, CO₂ and H₂O. The On-Board Computer which is based on a star architecture will control all the subsystems of the satellite using a single controller. The ATMEL AT91SAM7SE512 micro controller, a commercial of the shelf product which is used in many embedded system applications is selected for space applications to perform the onboard functions. This 32-bit micro-controller would be operating at 40 MHz and would be interfaced with various subsystems and processing their tasks. The various tasks of the microcontroller include (i) data storage for the payload data, (ii) controlling the power subsystem using this microcontroller, (iii) switching on and off of various loads based on the modes of operation of satellite, on Board processing of telecommands and telemetry data. (iv) payload data and telemetry data transmission in form of packets through an in house development and (v) the satellite attitude controlled using control algorithm and GPS position determination . The paper provides a lucid way of designing an On Board Computer using a single microcontroller taking into consideration the various modules of nano satellite. Simulations and tests are performed on this design to find the reliability of using the design in a nano satellite bus.