47th SYMPOSIUM ON SAFETY, QUALITY AND KNOWLEDGE MANAGEMENT IN SPACE ACTIVITIES (D5)
Ensuring quality and safety in a cost constrained environment: which trade-off? (1)

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LOW COST, SYSTEMATIC SOFTWARE AND HARDWARE PROCESSES INCLUDING ON BOARD COMPUTER IN LOOP SIMULATION AND HARDWARE IN LOOP SIMULATIONS

Abstract

Students from the Indian Institute of Technology Bombay (IITB) are currently in the process of building a fully functional nano-satellite named "Pratham", in collaboration with the Indian Space Research Organization. There are two main boards on Pratham viz. On Board Computing board which hosts the core controller of the satellite, and the Power Board which distributes power to various loads on the satellite.

The requirement imposed by ISRO on the success rate of electronic circuit boards in student satellite is 99The testing procedures are categorized as hardware testing and software testing. The paper will discuss the standard procedures followed mainly in Hardware testing of the aforementioned Electronic Circuit Boards involved in the making of Pratham. Step by step process for the hardware testing is used. In this paper, the software testing is done by 'On-board In Loop Simulation (OILS)' where atmospheric and gravity conditions are simulated using standard methods while GPS, magnetometer readings are simulated by serial port. This testing will give confidence about software with just extra hardware of data acquiring computer. Sensors, actuators are calibrates using 'Hardware In Loop Simulation (HILS)'

There are various sensors viz. GPS, Magnetometer, Magnetorquer and Sun-sensor used which give input to the OBC board. The setup used in testing these sensors/actuators along with OBC board and their results will also be included.

The testing procedures in both the circuit boards are broken down into various levels with level 0 as fabrication and soldering precautions set by ISRO while final level as integrated testing of entire circuit board. A generalized and systematic troubleshooting procedure for Electronic Circuit Boards will be included as well.