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LUNAR EXPLORATION ORBITER PROGRAM

Abstract

Purpose: Orbiter2Moon program is demonstration of applying frugal and efficient engineering methods catering to the specifics of a Moon Mission to make it more cost-effective, reduce turn-around time and to produce minimal space debris. The program has been designed by a six-year-old startup to build a Nano satellite within a period of eight months by a group of fresh graduates under the guidance of experts using COTS components. Learnings from multiple strategies devised over the course has been beneficial for the development of Orbieter2Moon program

Methodology: The methodology used by us to design the nanosat resonates our purpose.

1.MILO (Miniature Indus Lunar Orbiter) is designed to carry an optical payload of 1U size, weighing less than a kilogram has all support subsystems based on mission requirements such as Avionics, GNC/ADCS, communication and power with independent deployment mechanism dedicated to this design. weights 3.5 kilogram as the nanosat will be launched onboard a lander mission to Moon. The structural design approach of the orbiter is modular catering to all the subsystem requirements and launch vehicle vibration loads.

2. It includes solar panels, sun sensor, S- Band transmitter, S- Band antenna, 3 reaction wheels, star sensor, IMU (Inertial Measurement Unit), OBC (On Board Computer) systems supporting optical payload

3. Nanosat designed without receiver; with omnidirectional patch antenna and the orbit is chosen as such it experiences negligible eclipse which gives an advantage for Attitude planning completely autonomous while in orbit and disturbances will be counter acted by small reaction wheels. Attitude would be tracked continuously based on the initial input from umbilical from the mother spacecraft.

4. Orbit selected is a self-decaying orbit around the Moon allowing the Orbiter to crash after its design life.

Results: Results indicates the orbiter will have a controlled mission life of 100 days maximum taking disturbances due to gravity gradient and solar radiation pressure into account and it has a possibility to out perform and it will gradually decay and crash into Moon.

Conclusion: We managed to design a structural frame of L cross sectional members of Aluminum(Al-2014-T6) material around 300 gm for the orbiter which will rigidly support all the components. Designed as such a way that can interface with various kinds of 1U sized payloads without altering the support system components. Its structure need not be redesigned every time, a new payload can be attached and can be used for next mission.