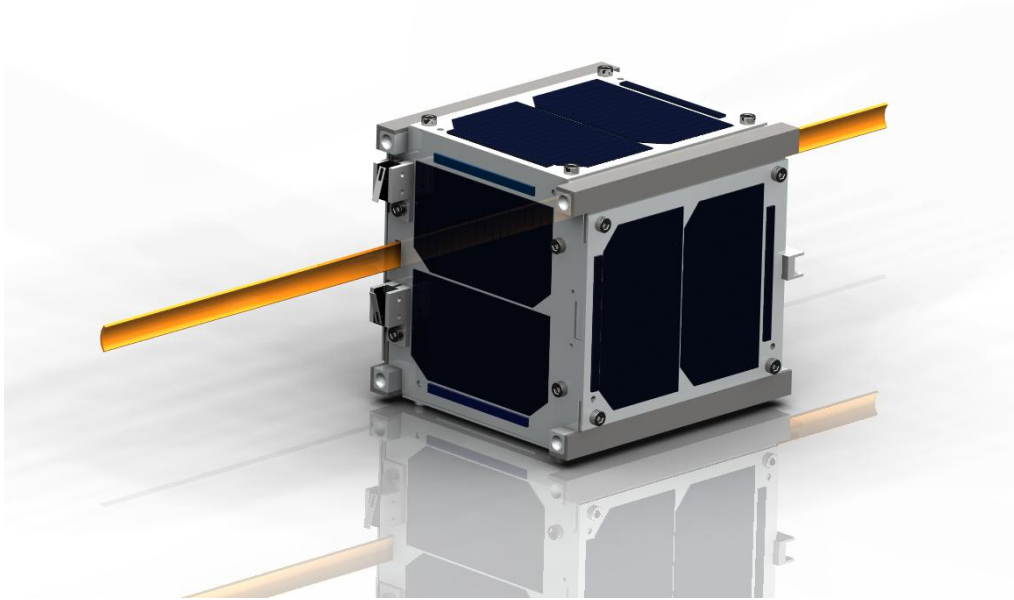
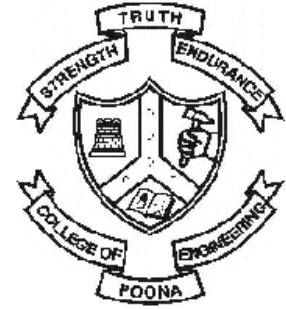


COEP SATELLITE INITIATIVE



MISSION SWAYAM

Specifications:

Standard: 1-U Cubesat

Dimensions: 10 cm x 10 cm x 11.35 cm

Mass: 1 kg

Mainframe: Technological Demonstration of Passive Attitude Stabilization

Payload: Store and Forward Messaging (Total 18,00,000 messaging capacity)

Mission Objectives:

- 1) To demonstrate Passive Attitude Control System
- 2) To provide point to point messaging services to the HAM Community
- 3) UHF channel performance evaluation

The planned orbit for Mission Swayam is a Polar Sun Synchronous Low Earth Orbit
Expected life: 6 months.

Subsystems:

1) Attitude Control System

- **First Indian Satellite** with Passive Magnetic Attitude Control System
- 2 axis stabilization
- Permanent Magnet rod:

Material	AlNiCo-5 Cast
No. of Rods	1
Length	55 mm
Diameter	3 mm
Mass	2.838 gm
Magnetic moment	0.32 Am ²

- Hysteresis rods:

Material	Hy-Mu-80
No. of Rods	4 (2 rods per axis)
Length	80 mm
Diameter	1 mm
Mass	0.5 gm

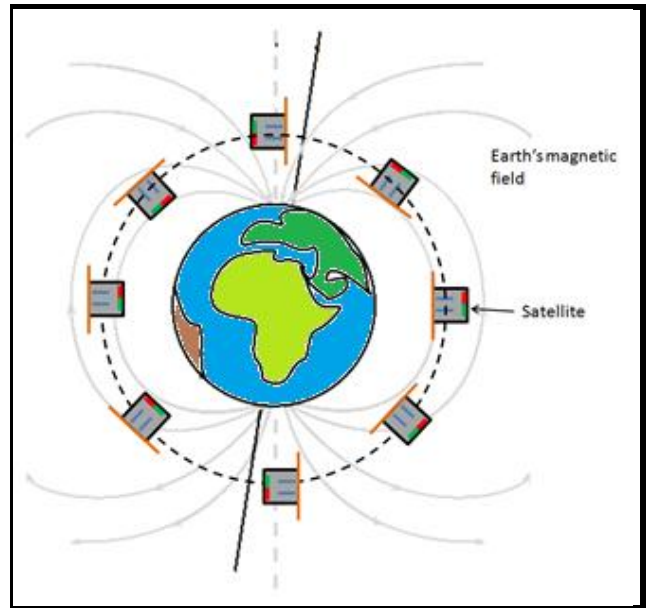
- Stabilization detection using a MEMS Gyroscope
- Gyroscope resolution 0.001 dps on each axis with an FSR of ± 31.25 dps

2) Communication System



- Stabilization Parameters:

Expected Damping Time	15-20 Days
Expected Residual Angle	5 Degrees



- Half Duplex Store and Forward Messaging System for the general HAM community.
- Uplink and Downlink Frequency: **437.025 MHz**
- Modulation: **BFSK**
- Autonomous **CW beacon** every 90 seconds
- **Satellite:** Dipole antenna for communication
On-Board feedback and Telecommand for antenna deployment.
Power Output: **1W**
- **Ground Station:** Array of 2 circularly polarized Yagi-Uda Antennas.
Power Output: **25W**

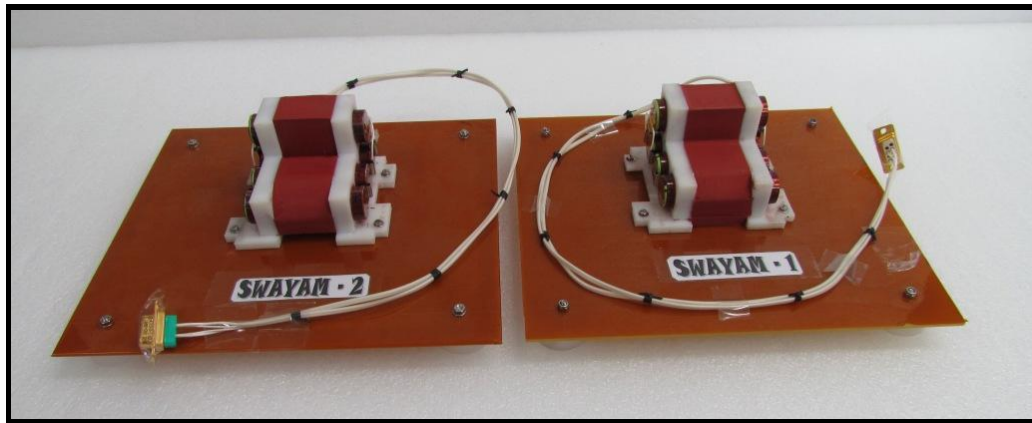
3) On Board Computer

- **ARM7TDMI** based Microcontroller
- Foreground background interrupt driven system
- Responsible for data handling and housekeeping
- Custom network layer protocol 'COEP Satellite Protocol'
- **2 GB** On board SD Card Storage



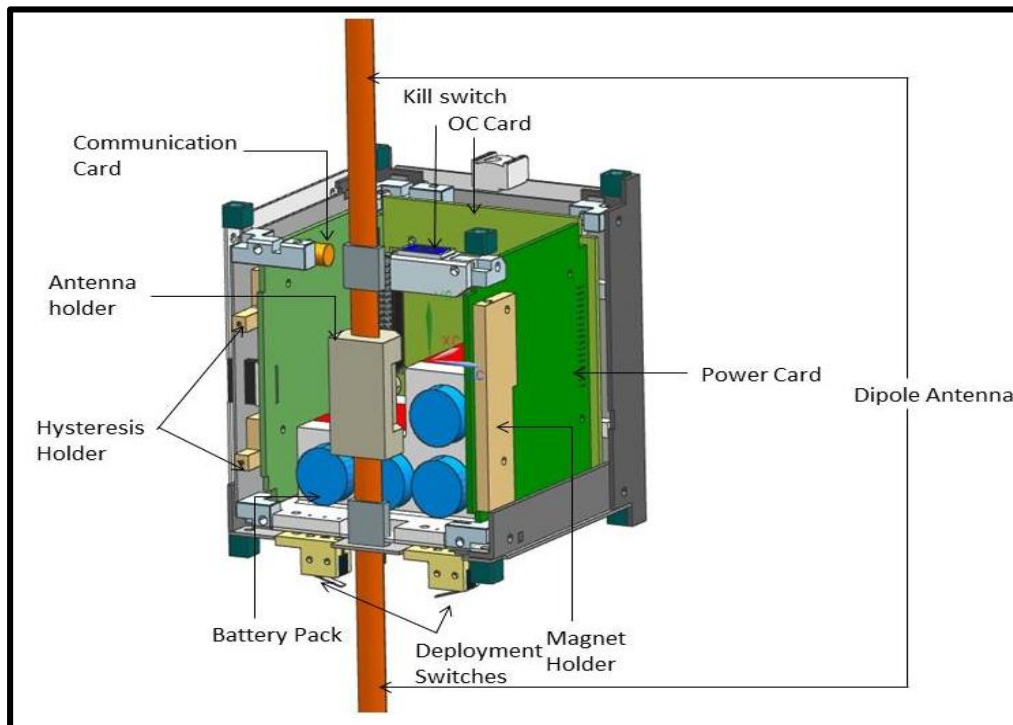
4) Power

- Satellite bus of **3.3 V** for all on board electronics.
- Fully Analog Power System.
- Power conditioning and Load protection circuits



- Solar panel and Lithium Ion battery based power system
- 1S-4P 4.2 V battery pack
Total capacity: **13.6 A-hr.**
- Housekeeping sensors to relay vital information regarding voltage, current and temperature.

5) Structure

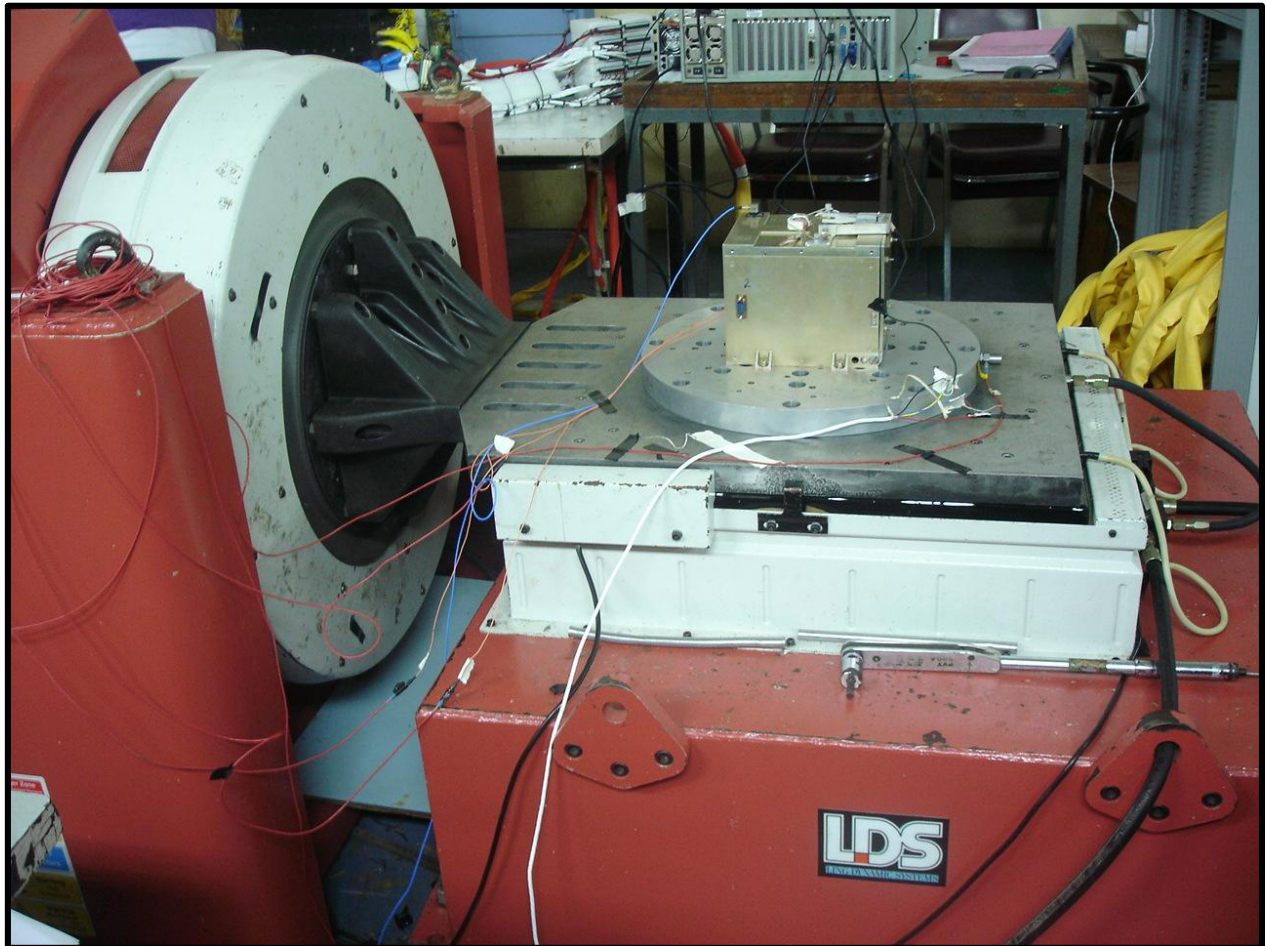


- Internal U shaped PCB decking.
- **Passive thermal control** system
Required temperature: **0° to 50° C**
- Nylon Nichrome antenna deployment mechanism.

Environmental tests on QM completed on May 2014:

Following Environmental Tests were successfully completed on the Qualification Model (QM) of Swayam:

- 1) Vibration at VSSC (with INLS ejection system)
- 2) Hot and Cold at ISAC
- 3) Thermo-Vacuum at ISAC



CDR successfully completed on 17th September 2014:

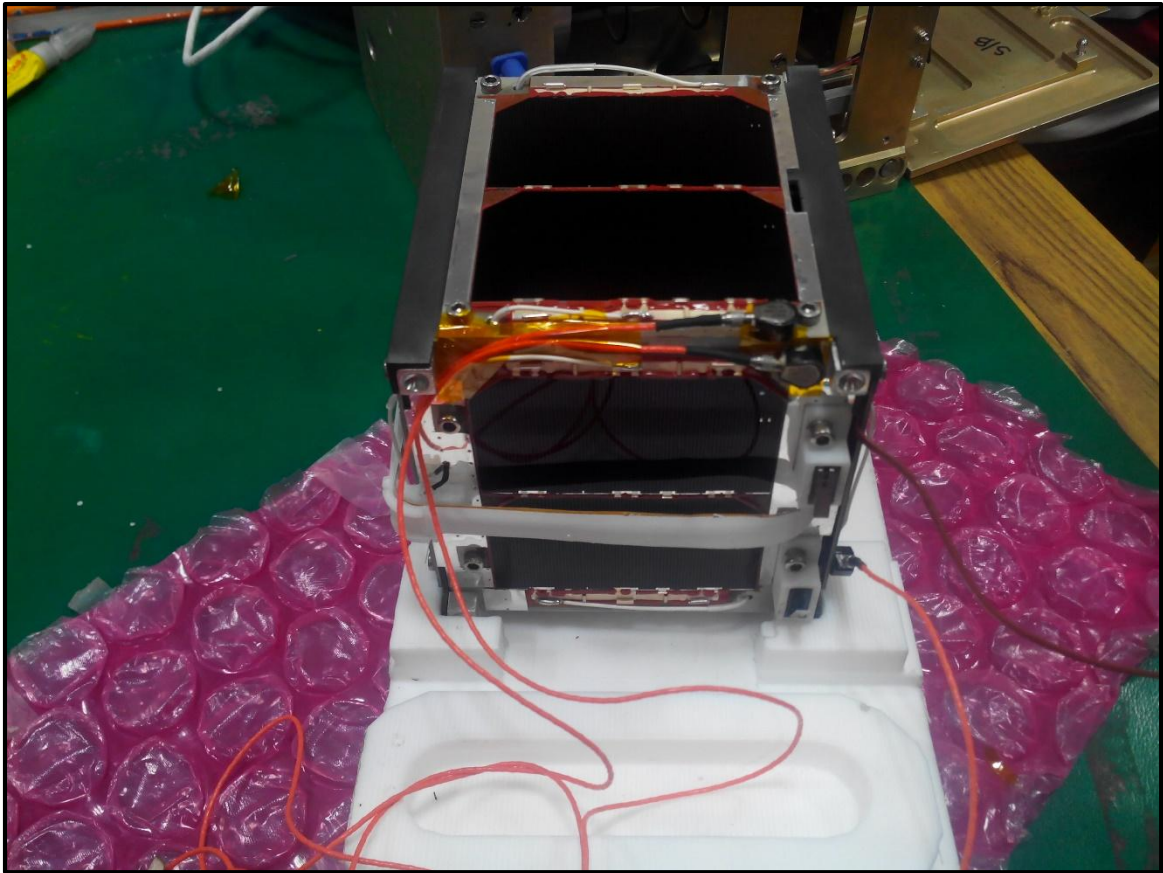
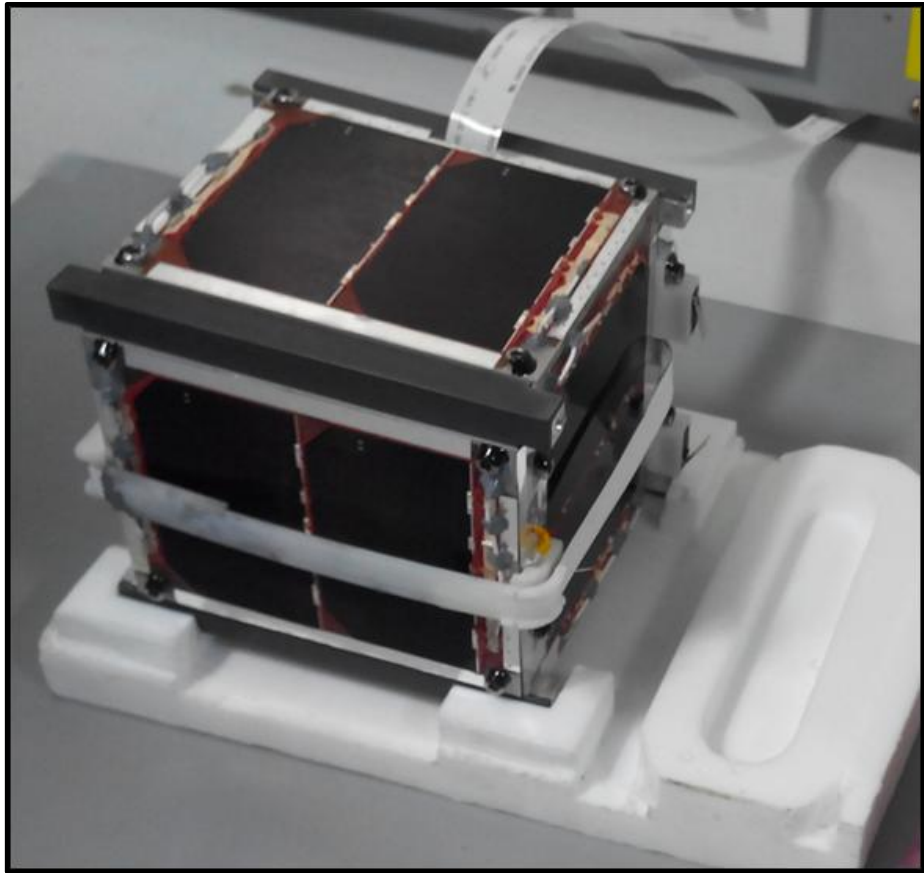
A team of about 20 students visited ISAC for the review. All the subsystem and spacecraft level integrated design specifications and test results were presented before the SRC (Standing Review Committee). The results were approved and a green signal for building the Flight Model (FM) of Swayam was given by the committee.

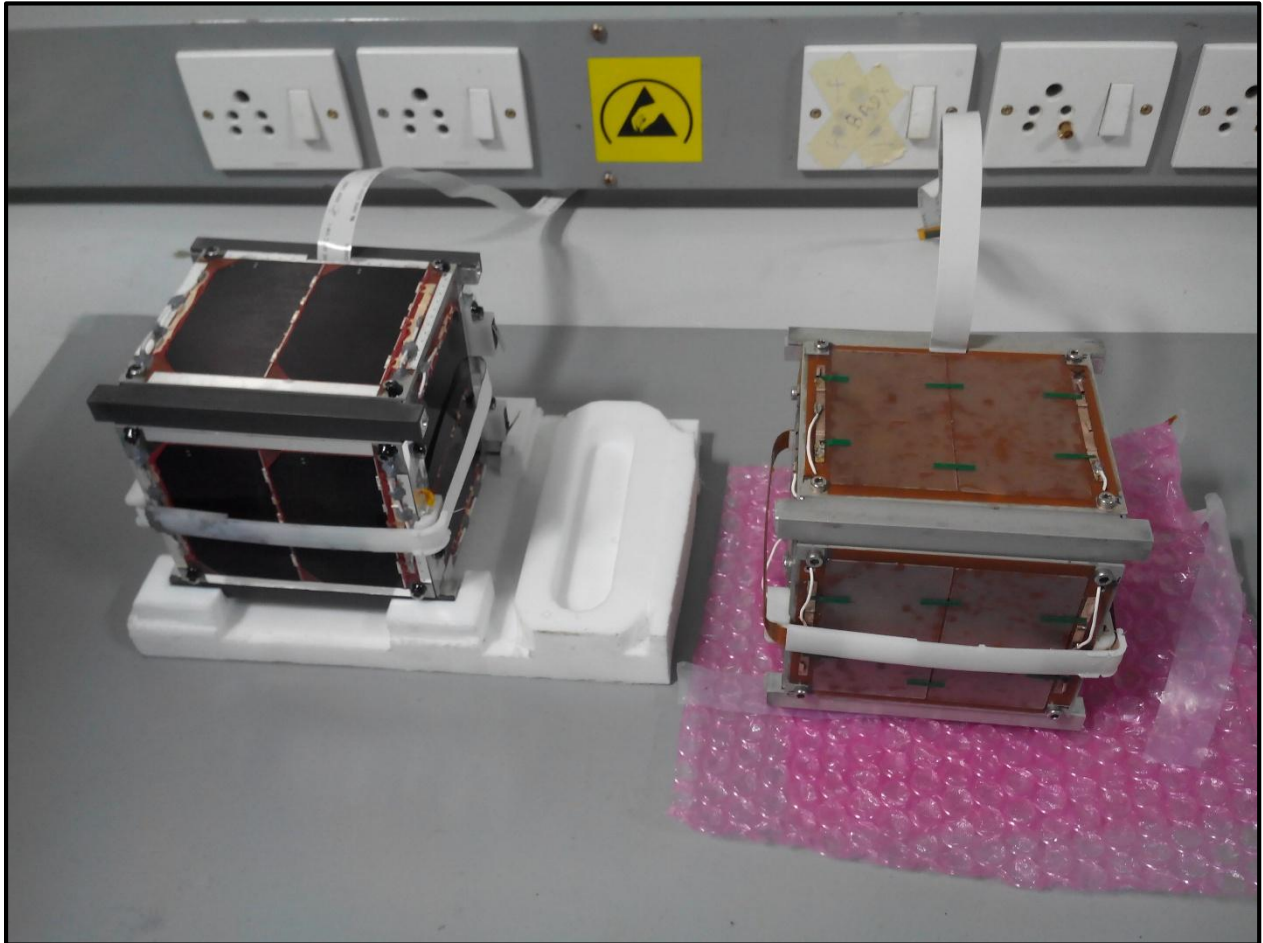


Swayam FM assembly and Environmental tests successfully completed at ISAC between 19th January and 13th February 2015:

Post CDR, the team geared up for the Flight Model (FM) preparations in full swing. The card level fabrication, assembly and testing was completed in Pune. The satellite level assembly started at ISAC on 19th January 2015. After completing the assembly, the satellite was subjected to Acceptance level Vibration and Thermo-Vac tests at ISAC facility. The FM passed all the tests with no damage or degradation in functionality seen.







Swayam FM is complete and ready for launch to experience a thrilling journey in space!!! \m/

For more information, please visit the website:

<http://www.coep.org.in/csat/>