

INTRODUCTION TO CANSATS

What is a Cansat??

Cansat's are full functional satellites designed with all the common subsystems found on conventional satellites e.g. power system, communications, data handling, scientific payload, attitude control and the mechanical structure. A 'Cansat' is a 'fully functional miniature satellite'.

Cansats are designed to fit in a regular sized coke can of 350 ml.



Figure 1 Launch of a Cansat

Systems installed on the cansat

The cansat imitates the functionality of subsystems found on a conventional satellite. The systems on the cansat include

- a communication system;
- power system;
- on-board computer;
- camera;
- GPS and various sensors.

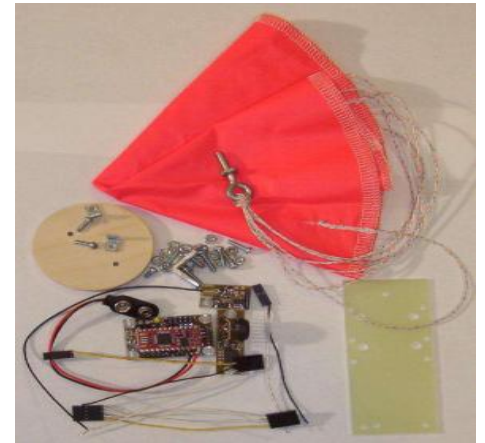


Figure 2 Design of a Cansat

Functionalities of the Cansat

Using the communication downlink, the sub systems and sensors installed the Cansat communicates information of the Temperature, Pressure, Magnetic Fields, Acceleration, Radiation, Air Quality (Co₂, Co₃, Air particles), Humidity and its GPS coordinates.

Cansat can take images of earth using the camera and the pictures along with the telemetry data, can be transmitted to the ground station by making use of the communication downlink.

Design of the Cansat

The Cansat is modularly designed, consisting of round PCBs with two header connectors which form the satellite bus. Each PCB contains a specific subsystem. The various PCBs are stacked on top of one another and fitted into the coke can. The systems of the Cansats are designed using a modular approach. The systems included in the Cansat are

- Communication systems
- Power electronics
- Antenna design
- Computer programming
- On board sensors and application
- Power systems (Solar power systems is used)



Figure 3 A Cansat mounted in a can

Cansats design uses various multidisciplinary areas e.g. mechanical design, telecoms, computer programming, and electronics. A basic functional Cansat can be constructed for as little as N\$8000.

Technical Requirements of Cansat

Radio Communication

The Cansat radio uses a 2 tone frequency modulation, programmable processor with a flash memory and removable onboard data storage is used. It makes use of telemetry commands for communication. The antenna used on board Cansat is an omni directional antenna.

Data communication requirements

The data communication speed used is 1200 bits per second. The ground station collects and displays the telemetry data. The Cansat reports on quality of communication.

Launch of Cansat

The constructed Cansats are carried by a weather balloon up to a maximum altitude of 20km. After reaching the desired altitude a release mechanism separates the Cansat from the weather balloon and the Cansat falls back to earth. During the descent, GPS coordinates are constantly sent to the ground station in order to allow the ground recovery crew to recover the Cansat by using the received GPS coordinates to determine the exact location of the Cansat.

Applications

A Cansat is a great learning tool for schools as well as universities. Cansats can be used to promote Science, Technology, Engineering and Mathematics based educational outreach programs. Cansats can be used to introduce students and learners to real satellite application and missions. The Cansat can be used to introduce the high school learners to satellite technology. It can be used as a design tool in engineering to give the under graduate students a hands on experience in designing and launching a miniature satellite.