Pratham, IIT Bombay Student Satellite Project
Indian Institute of Technology, Bombay
Powai, Mumbai - 400076, INDIA

Website: www.aero.iitb.ac.in/pratham

The IIT Bombay Student Satellite Project is a landmark project taken up by IIT Bombay students. The objective of this project is to make IIT Bombay a respected centre for advancement in Satellite and Space Technology in the world. 'Pratham' is the first satellite under this project. The plan is to build a fully functional microsatellite which would then be launched by Indian Space Research Organization (ISRO). This is entirely a student initiative with mentorship provided by ISRO scientists and IIT Bombay Faculty.

**Four-fold Mission Statement:**

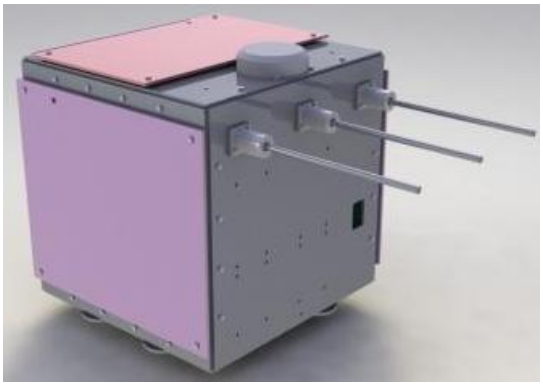
- Enabling students and faculty to gain knowledge and experience in the field of Satellite and Space technology.
- Empowering the Satellite Team with the skills to develop the Satellite through various phases of Design, Analysis, Fabrication and Testing until the Flight Model is made.
- Launching the satellite into orbit and measuring Total Electron Count of the Ionosphere.
- Involving students from other universities in our Satellite mission by building ground stations in their universities.

| Mission Success Criterion | |
|---|---|
| **Description** | **Mission Success** |
| Flight Model ready | 85% |
| Beacon Signal received | 90% |
| TEC measurements at IITB | 95% |
| Satellite functional for 4 months | 100% |

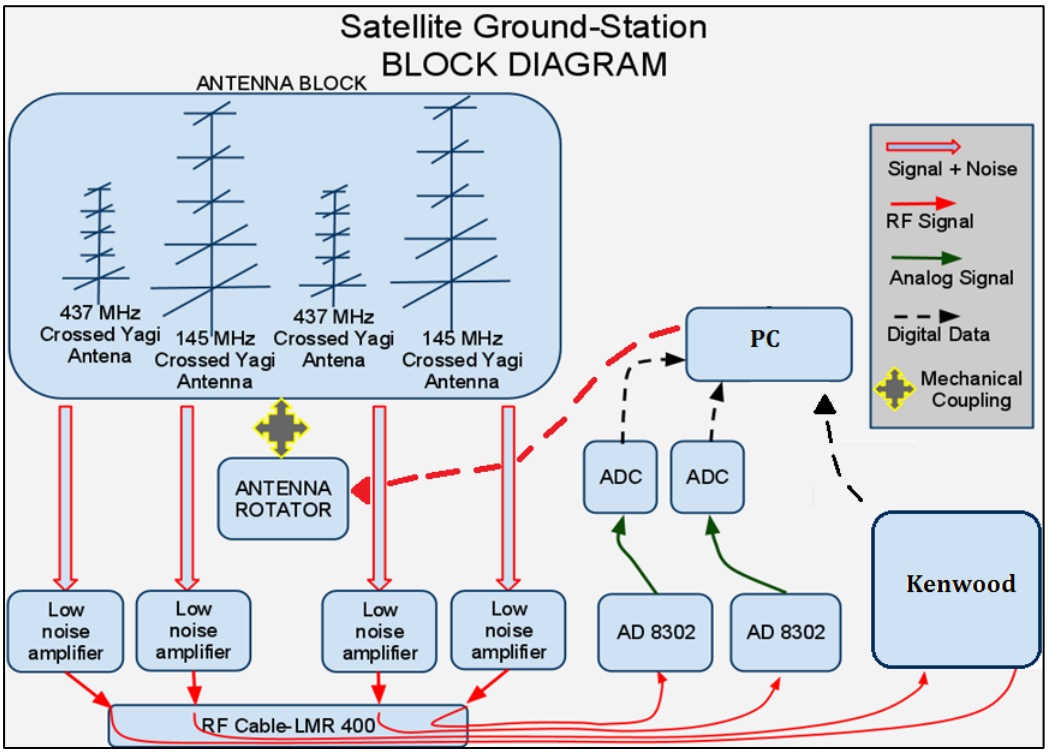
Payload of the satellite is to measure total electron content (TEC) of the ionosphere and to create tomographic map of TEC over India. More ground stations in India will facilitate to get more number of sample points and hence better resolution of map. Hence team Pratham as a part of social goal is aiming to involve other engineering colleges in the project by conducting ground station workshops and make them well equipped to setup a ground station in their campuses. The technical knowledge will be provided by Pratham team. The station setup can also be used to track and collect data from other satellites transmitting in the same frequency band as Pratham. The TEC is useful for scientific studies, correcting errors in communication like GPS and also for Tsunami warnings. Currently, around 8 colleges are involved in this initiative. Atharva College of Engineering (ACE), Mumbai has setup an automated ground station which is being used for weather forecasting and satellite tracking. Also involvement in this project is not restricted to collection of TEC data for Pratham but can facilitate research and engineering in various related fields since the frequency band of Pratham is quite common to many other satellites.

**Some Technical Details of PRATHAM:**
Weight: 10 kgs
Size: 260mm X 260mm X 260mm
Payload: Measuring TEC
Orbit: 10:30 polar sun-synchronous, 817km altitude
Downlink: 437.455MHz and 145.98MHz
Uplink: 437.455 MHz
Mission Life: 4 months

**Details of the Ground Station:**



Schematic of the ground station setup by Pratham team at IIT Bombay and Atharva College of Engineering, Mumbai is shown below. The ground station at other universities might be a simplified version of this.




**Plan of the workshop:**

Pratham team will conduct a workshop at IIT Bombay on a weekend, tentatively in February 2015. The exact dates will be announced later depending on the mutual convenience of IIT Bombay and the colleges which will be participating. Some of the details regarding the same are as follows:

- No pre-requisite knowledge required.
- Technical details covered:
  - Design and simulations
  - Antenna fabrication and manufacturing
  - Radio handling
  - Gathering, storing and analyzing the payload data
- Non-technical details:
  - Team formation
  - Management
  - Gathering of funds.

At the end of this workshop, participants will be able to:-

1. Design and create their own ground station to receive various satellite signals.
2. Modify station to get various other types of data (weather and environmental parameters) and/or as a HAM radio station

For any queries, feel free to contact the project managers of Pratham team:

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