FRENCH AND INDIAN STUDENTS COLLABORATE TO STUDY IONOSPHERE USING PRATHAM DATA

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Pratham is a student satellite project initiated by the Indian Institute of Technology of Bombay (IITB) students in 2008. They have been joined by several others universities across India, and by the Space campus Paris Diderot, France in 2010. IITB’s students are working on the
construction of a micro satellite (26 cm × 26 cm × 26 cm, 10 kg) to be launched in 2012 at 800 km altitude (LEO satellite). Pratham will transmit two plane—polarized radio signals: one at 145.980 MHz, the other at 437.455 MHz. The scientific goal of this project is to study the Total Electron Content (TEC) of the Earth’s ionosphere by the Faraday rotation method. From this perspective, all the universities participating to this project are developing and building their own ground stations able to receive, amplify and decode the satellite signal which will help study the ionosphere.

Since 2010 our French student team is working in collaboration with IITB’s students to build an operational ground station in Paris. Currently the team is composed of seven undergraduate students from Paris Diderot University, coming from various departments such as Computer or Earth Sciences. One part of the team is working on the hardware development of our ground station that is entirely built by the team and has been automated for satellite tracking, and another part is developing the software for data analysis. Through this project, we have the opportunity to work in an international collaboration, which is very rewarding to all of us. We present our project with particular emphasis on its challenges as an extra-curricular endeavour and as an international collaboration to combine the expertise of two institutions in different domains to study the ionosphere. We have visited (IITB) twice in the past two years, and an Indian student also came for an internship in the Institut de Physique du Globe de Paris (IPGP) last year to work on the Pratham project.

The system development for Pratham required expertise in the domain of fundamental physics, hardware integration, electronic engineering and software engineering. We present the development of an integrated system for satellite tracking, storage, processing, sharing and distribution of data across 15 universities spread across India and France. Development of one cohesive Telemetry and Decoding package to be used by universities with different capabilities was one of the toughest tasks. The development of groundstation, to measure the TEC, required designing a system with utmost precision. We would like to present our development in the project on both the scientific front and the engineering front and how the system can be emulated in various collaborations between Scientific and Engineering Institutions.