Opening the Universe to Every Student



What if a student in a small town in India could explore the universe—without ever leaving their desk?

India's first dedicated space observatory, AstroSat, has been generating valuable scientific data from low Earth orbit for nearly a decade. Yet for most students, this data remains inaccessible—highly technical, complex to process, and largely limited to trained researchers.



At STAR Lab, IIT Bombay, this challenge became an opportunity. Students who engaged directly with AstroSat/CZTI (CZTI is one of hard X-ray payload) data found the experience transformative, shaping their academic journeys and opening pathways into advanced research. The question then emerged: how can this opportunity be extended to students across India?

With support from BDP UGL Global Logistics Pvt. Ltd., a team at IIT Bombay has developed a foundational software system that enables the search for transient cosmic events such as Gamma-Ray Bursts (GRBs) and other high-energy space explosions, using AstroSat/CZTI data. Currently deployed within **IIT Bombay's Space Technology and Astrophysics Research (STAR) Lab**, the platform allows students to work with real scientific datasets while developing practical skills in coding, data analysis, instrumentation, and scientific reasoning.

Practical training is critical for astrophysics students because it bridges the gap between classroom learning and the technical demands of modern space research. By working with real space-telescope data and live research problems, students evolve from passive learners into active researchers capable of processing large datasets, operating complex scientific systems, and contributing to independent discoveries. Such experiential learning significantly strengthens problem-solving abilities, computational thinking, and research readiness—skills increasingly essential in today's data-driven scientific ecosystem.

While still in its early stages, the platform has already demonstrated strong potential as a hands-on learning and research tool. With further development into a public, web-based system, it could provide access to authentic space-science exploration for thousands of students across schools, colleges, and universities in India. The initiative also holds the potential to deepen engagement in STEM education by making advanced scientific research more interactive, accessible, and application-oriented.

Growing Research Leaders

Beyond technology development, the project is already shaping the journeys of young researchers. Abhinav Goyal began contributing to the development of the project's primary software pipeline as a Master's student. Inspired by the experience and research environment, he chose to continue his work as a PhD scholar, contributing further to Indian astronomy research.

Another researcher, Anuraag Arya, now uses the software to detect and announce GRB discoveries using AstroSat/CZTI data, gaining valuable expertise in rapid data processing and hardware integration for next-generation telescope systems. Meanwhile, Hitesh Tanenia is expanding the software's capabilities to support transient searches across multiple Indian space missions, helping move toward a future of integrated, multi-mission astronomical research.





What exists today is more than a software tool. It is a working foundation for experiential space-science education and collaborative research. What lies ahead is the opportunity to build a scalable, open-access platform that brings real astronomical data into classrooms and homes across India.

As India's investments in space science continue to grow, initiatives like these reflect an equally important shift—from generating knowledge to democratising access to it. With continued support, this effort can evolve into a national gateway for space-science education, unlocking curiosity, capability, and future scientific careers for the next generation.

BACK