Team Anant 25-26 Recruitments

Resource Document

December 2025

Introduction

Greetings!

We are **Team Anant**, a passionate group of undergraduate students on a mission to design, build, and launch a 3U CubeSat equipped with a state-of-the-art multi-spectral imaging payload. As one of the few entirely undergraduate-led satellite teams in the country, we're pushing the boundaries of what students can achieve in the rapidly growing field of satellite design and space technology!

Fig. Assembled Helmholtz cage

Fig. Antenna testing

Our orientation session is tentatively scheduled for the second week of January, during which we'll provide a more detailed overview of Team Anant, our mission objectives, and the recruitment process. Orientation details and links to the whatsapp groups for the recruitment process will be sent via mail in the first week of January.

An outline of each subsystem as well as a subsystem specific resource doc can be found on the subsequent pages. Before the official orientation and the start of our recruitment process though, we've put together some resources for you all to go through. Although it's not required to read up, these resources cover everything you'd need to know to be a competitive candidate during the recruitment process, and will make your lives in the upcoming tests much easier.

We look forward to seeing your application!

Useful Links

Combined Resource Doc **Team Anant Website** **Team Anant LinkedIn**

Attitude Determination and Control Subsystem (ADCS)

The Attitude Determination and Control Subsystem (ADCS) is responsible for estimating and controlling the satellite's orientation in orbit, ensuring accurate pointing for payload operations and reliable communication with the ground segment.

The subsystem works with an IMU and a GPS module for position and timing information, magnetorquers driven by PWM signals to interact with Earth's magnetic field, and reaction wheels operating in a closed-loop PID control architecture for fine attitude adjustments. It also utilizes a 3-axis gimbal and a Helmholtz cage test setup to emulate on-orbit dynamics and magnetic field changes during ground testing.

At present, the team is focused on the design and fabrication of the magnetorquer module, development and integration of the reaction wheel assembly, and tuning of the associated control algorithms using the 3-axis gimbal and Helmholtz cage to validate and refine ADCS performance.

Resources

Electrical and Power Subsystem (EPS)

The Electrical Power Subsystem (EPS) generates, stores, and distributes electrical power to all satellite subsystems, meeting the demanding requirements of the multi-spectral imaging payload while ensuring reliability throughout the mission lifetime.

The subsystem integrates high-efficiency solar arrays with Maximum Power Point Tracking (MPPT), intelligent battery management systems, and robust power distribution networks with comprehensive protection circuits. It also incorporates housekeeping telemetry for real-time ground monitoring of power status during both sunlit and eclipse phases.

Currently, the team is developing solar panel designs and optimal arrangements, designing and fabricating custom PCBs for power conditioning and distribution and performing detailed power budgeting for the full mission profile.

Resources

On-Board Computer (OBC)

The On-Board Computer (OBC) serves as the brain of the satellite, coordinating all subsystem operations, executing the mission flight plan, managing payload scheduling, and enabling autonomous decision-making for reliable space operations.

The subsystem is built on a System-on-Chip (SoC) platform featuring an integrated processor and programmable logic, running a custom Linux-based operating system with fault-tolerant software architecture. It interfaces with subsystems via SpaceWire protocols for high-speed data transfer, supports various sensors for state monitoring, and handles direct communication links with the Electrical Power System (EPS) for power status oversight and the Telemetry, Tracking, and Command (TTC) system for ground uplink and downlink operations.

Currently, the team is focused on integrating SpaceWire interfaces for sensor data acquisition, developing and testing EPS and TTC communication protocols with the OBC to ensure seamless power management and command execution, and refining the overall software stack for the mission requirements.

Resources

Payload

The Payload System is dedicated to remote sensing through a 32-band Hyperspectral Imaging Camera. Our work focuses on developing the hardware and software architecture required to support a high-resolution 4096-pixel format. We specialise in designing high-speed FPGA-based data pipelines using Verilog, enabling us to process massive data streams in real-time. This includes integrating SpaceWire for high-throughput onboard communication and implementing CCSDS standards to ensure our data handling is space-ready and internationally compatible.

Currently, our technical focus is split between optimizing these hardware pipelines and data compression through Diffusion Modelling. We are developing a research paper on using these generative models for hyperspectral image compression. This work is critical for reconstructing high-fidelity scientific data on the ground while staying within the narrow transmission bandwidths of a nanosatellite.

Resources

Structural and Thermal Subsystem (STS)

The Structural and Thermal Subsystem (STS) provides the main mechanical structure, thermal control interface, and environmental protection for the satellite. It serves as the main load path between the spacecraft and launch vehicle while ensuring all subsystems operate within the mechanical and thermal limits during launch and Low Earth Orbit (LEO) conditions.

The subsystem follows ECSS structural design guidelines with a monoblock architecture to minimize part count, enhance stiffness, and avoid joint failures, designed to withstand combined static and vibrational loads during launch as well as LEO thermal-vacuum extremes while maintaining natural frequencies separated from launch vehicle excitations.

Currently, the team is conducting stress and thermal testing using detailed geometries of integrated components such as PCBs and solar panels from EPS and antennas from TTC. They are also developing comprehensive structural modeling of the satellite and managing procurement of specialized components and testing equipment to validate design performance.

Resources

Telemetry, Tracking and Command (TTC)

Telemetry, Tracking, and Command (TTC) subsystem serves as the communication backbone for the mission, responsible for receiving real-time telemetry (health and status data) from the satellite and transmitting uplink commands from the ground station throughout the mission lifecycle.

The subsystem utilizes a UHF transceiver for beacon transmission, an S-band transceiver for high-rate mission data downlink, deployable antennas, and the AX.25 protocol for reliable data framing and error correction during ground station passes.

Currently, the team is finalizing transceiver designs optimized for 3U CubeSat constraints, developing the communication link budget, collaborating with the OBC team on payload downlinking specifications and interfacing protocols, and preparing for ground station setup with incoming components next semester.

Resources

Design and Publicity (Non technical Vertical)

Along with our six technical subsystems, we will also be recruiting for the design and publicity vertical, which will be responsible for work such as designing posters, standees, and video presentations for the institute's review meets, to external-facing work such as merchandise, recruitment posters and fest promotional posters during APOGEE. Another responsibility is maintaining and updating the Team Anant website, as well as managing the team's social media presence and outreach.

We are recruiting for roles including designers (posters, standees, merchandise), frontend developers and UI/UX designers, and video editors.

Resources