

Design and Development of AntSat 01's 2U CubeSat Flight Subsystems

Systems

Creating the systems architecture. Establishing mission and system requirements for hardware and software to adhere to throughout development.

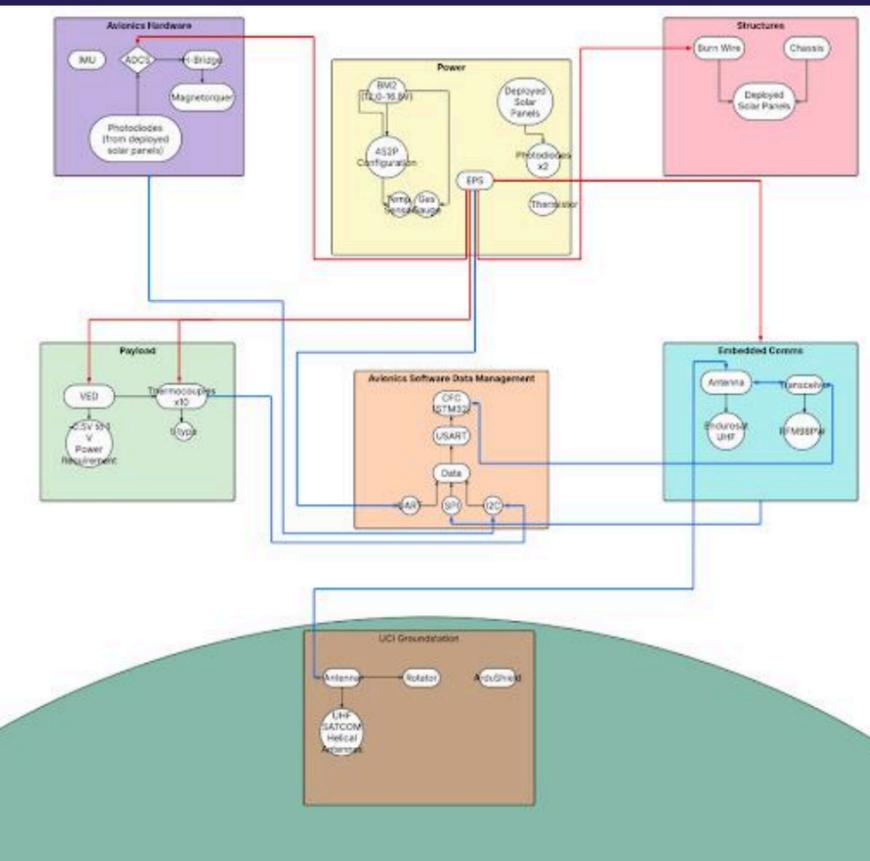


Figure 1: Overall System Architecture Displaying System Interactions

Communications

- 2-way communication between the CubeSat and the ground station which will be located at UCI.
- System utilizes an RFM98PW transceiver module and an Endurosat UHF III Antenna.

Structures

- Maintaining an up to date CAD assembly
- FEA documentation for all internal/external components
- Designing deployment mechanisms: burn wire → integration for panel deployment

Executive Summary

CubeSat is a student-led initiative focused on designing, developing, and launching a nanosatellite. The project is divided into 5 specialized sub-teams, each responsible for key aspects of the satellite's operation.

Mission Statement

Develop, test, integrate, and launch a 2U CubeSat, AntSat 01, into Low Earth Orbit (LEO). Execute and test research experiments in LEO for the payload: Variable Emissivity Device (VED).

Research Significance

Measure the performance of the VED when exposed to orbital conditions to gauge its effectiveness as a cost-effective method of spacecraft thermal regulation. Measure and evaluate AntSat 01's performance over the lifetime of its mission. This effort paves the way for our team's future microsatellite iterations.

Payloads | Variable Emissivity Device

VED changes color and emissivity in response to varying voltages. We will test its performance under direct solar radiation. Similar materials will be used as a method of thermal management on future spacecraft.

Future Recommendations

The team will focus on the following quarters on updating designs and consolidating documentation.

Avionics

- Responsible for the Central Flight Computer (CFC) of the CubeSat which executes the mission plan and coordinates the software/hardware interactions between all subsystems.
- Consists of an STM32 microcontroller and the NanoAvionics MTQ3X magnetorquer, which allows for altitude control of the CubeSat

Power

- Responsible for the power generation and distribution for the Cubesat through the Electric Power System (EPS).
- System consists of an STM32 microcontroller to monitor the ongoing power consumption and battery characteristics.

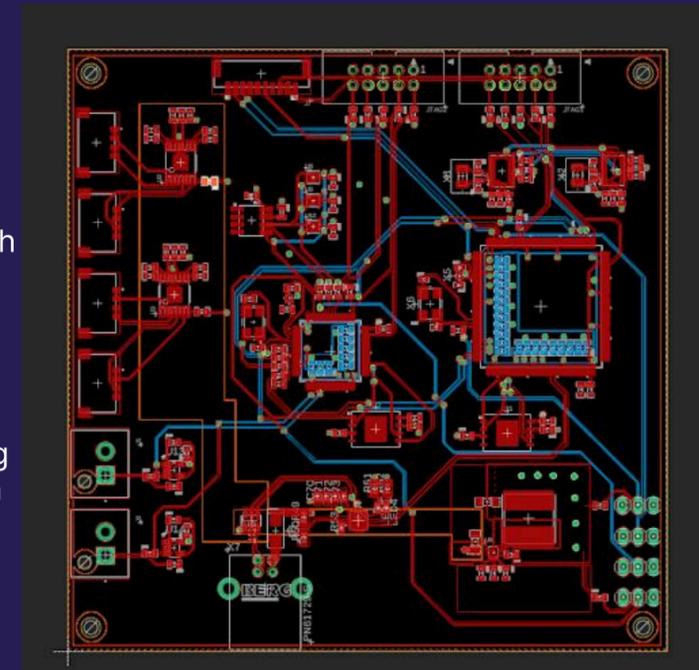


Figure 4: CFC Version 1.0 PCB in Altium

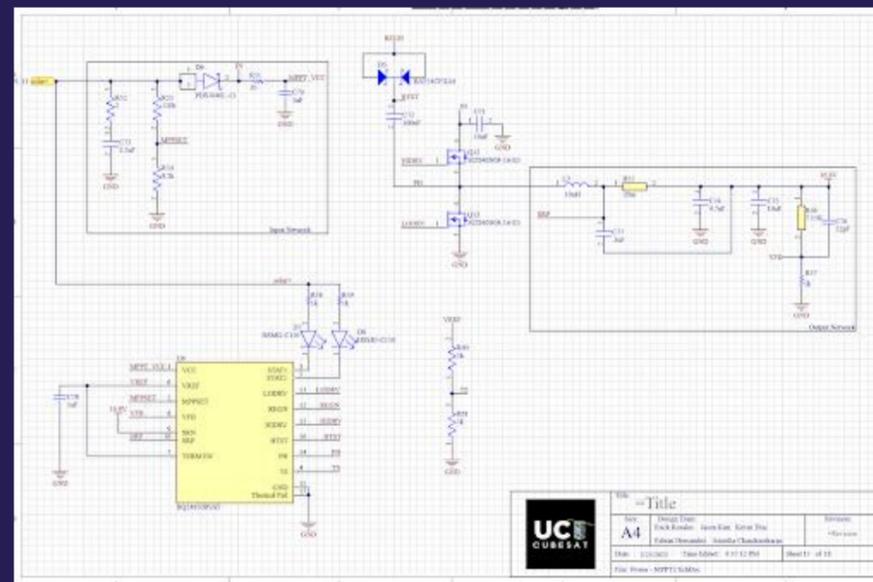


Figure 2: Schematic of Maximum Power Point Tracking (MPPT) Circuit

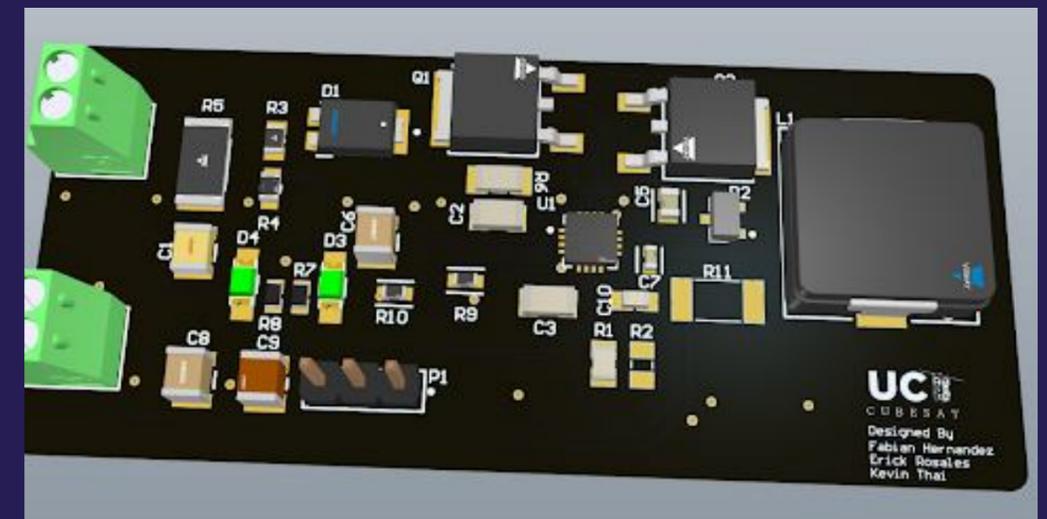


Figure 3: 3D Render of Maximum Power Point Tracking (MPPT) Circuit

Acknowledgments

- Christian Rodriguez - Terran Orbital
- Alec Fuoti - Terran Orbital
- Xavier Lian - Western Digital
- Shakthivel Rajavelu, Masters Graduate Student

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