UCI Samueli School of Engineering

UC CUBESAT

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.

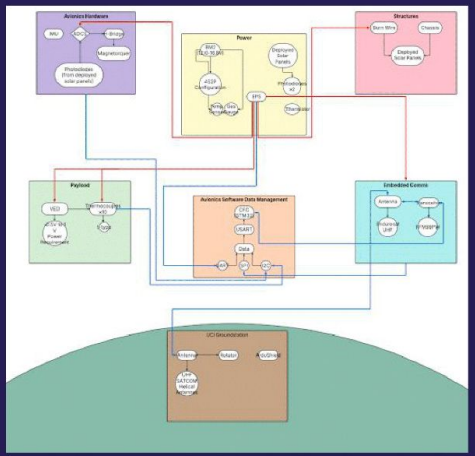

Figure 1 : Overall System Architecture Displaying System Interactions

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.

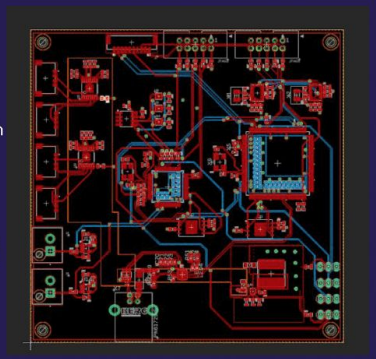

Figure 4: CFC Version 1.0 PCB in Altium

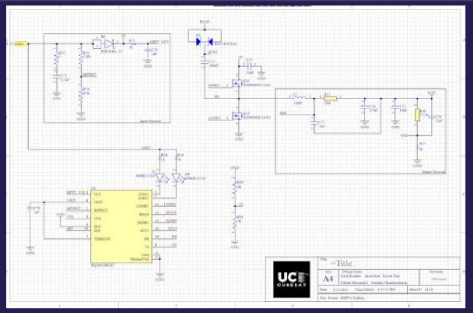

Figure 2: Schematic of Maximum Power Point Tracking (MPPT) Circuit

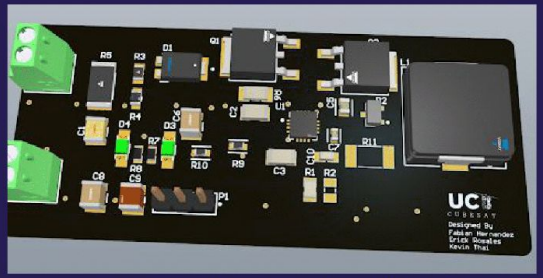

Figure 3: 3D Render of Maximum Power Point Tracking (MPPT) Circuit

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Acknowledgments

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

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