M1.02 Control Board for Satellite

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Introduction

The control board of a CubeSat is a critical component responsible for controlling and monitoring all of the satellite's systems, which include power, communications, attitude control, and data handling. It acts as the brain of the satellite, controlling its operations and ensuring its reliability and safety in orbit.

This project is set in place to ensure that the control board can withstand the harsh conditions of space, while autonomously performing its function for the entirety of its operating life.

Objectives

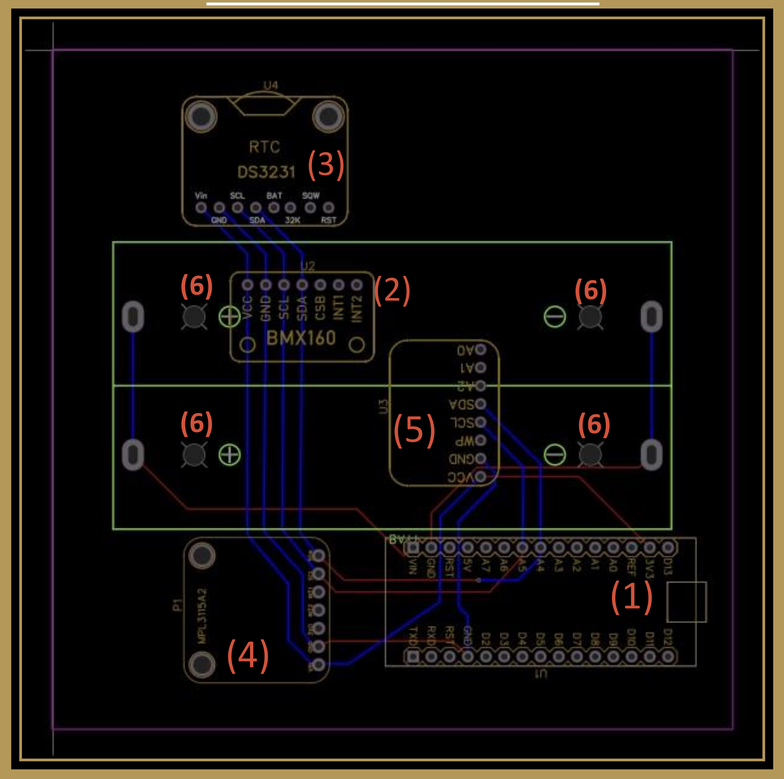
The goal is to create a proper satellite example that future students can use to develop their expertise in the field of satellites. Construction of the control board requires the proper selection of parts for control, communication and collection of data on top of a PCB board that can adequately house these parts and connect them to one another.

Conclusion / Future Goals

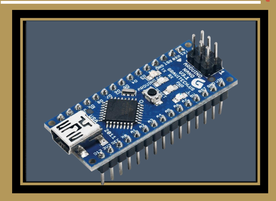
With given time, it would be ideal to manufacture the PCB board in-house, allowing for a cheaper approach while also maintaining the required properties for launch, sustain and operation within space.

Design Process and Schematics

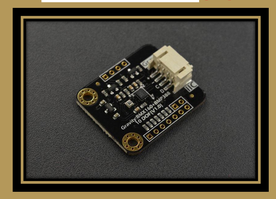
PCB Board Schematic



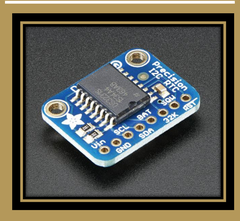
Arduino Nano (1)



BMX160 (2)

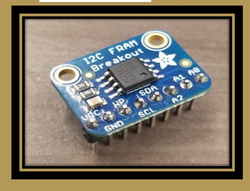


DS3231 RTC (3)

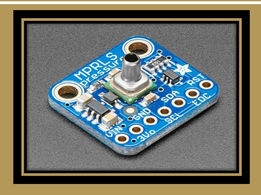


18650 3.7V Batteries (6)

FRAM (5)



Adafruit MPRLS (4)



Contributions

- Designed the PCB board layout that allows for all of the components to communicate and transmit data between interacting components.
- Programmed participating components to calculate Acceleration, position, magnetic field, time, pressure etc. into Arduino Nano.
- Designed PCB board to fit directly into created CubeSat frame
- Designed to accommodate the implementation of radio board

Components/ BOM

Arduino Nano (1)
Main computational component of the control board. Runs code and communicates with all other components

BMX160 (2)
9 Axis Sensor that functions as Accelerometer, Gyroscope and Magnetometer

DS3231 RTC (3)
Real time clock that accurately manages all timekeeping functions

Adafruit MPRLS (4)
Pressure and Temperature monitor catered to a vacuum environment

FRAM (5)
Non-volatile memory unit that can store data even after it's powered off