Electrical Task List

As of 4/20/2026

General note: some experience dealing with the concept of flux and dielectrics would be appreciated. Not a necessity; basic circuitry knowledge, Google, and Yappy (me) yelling at you for doing something wrong should suffice for most things.

Battery Pack

Taken by Weston.

Master power is delivered by a lithium-ion battery pack configured as 4P3S (4 parallel, 3 series) 21700 form-factor cells (12 total cells). Each 4P cell group is Kapton-tape-wrapped for stability, protection, and insulation. Nominal output of 11.1V, I belive Weston is integrating a step-down transformer to normalize the bus voltage at 5V.

Power controller

Open.

Power is distributed accordingly across the following systems by a power controller (custom-designed from a relay network, probably), ranked by priority in the event of low power:

1. ESP (onboard controller/computer, which launches the scheduler)
2. Attitude *determination* system (adafruit 9 DOF IMU + Magnetometer)
3. Communications radio (SX1262)
4. Attitude *control* system (magnetorquers)
5. Raspi (payload computer)? If included.
6. Camera payload? If included.
7. ~~Onboard microbiology experiment~~ (subject to deletion)

Note that, due to some transceiver options having relatively high power draw, it may be necessary to design a system to allocate between "high-comms/low-torque" and "high-torque/low-comms" mode depending on the relevant needs of each. Or even more modes. Consider this in the power controller design; pins can always be disconnected if unused. Make sure to have surge protection on all pins and have bitflip immunity; this can easily fry our entire satellite if done wrong.

Sun sensing

Taken

We will be using the solar panels on the satellite (12 total, 3 10cmx10cm panels on each of the four long sides) as makeshift Coarse Sun Sensors. Create an interface that uses shunt resistors to divert trace amounts of power from the panels to a controller that quantizes the current and reports it to the ESP. The ESP will do the rest of the work.

Magnetorquers

Taken by Vinayak.

See the main document.

Magnetorquer controller

Open, easy.

Design the H-bridge we will use for PWM control of the magnetorquers. Refer to the main document for specifics.