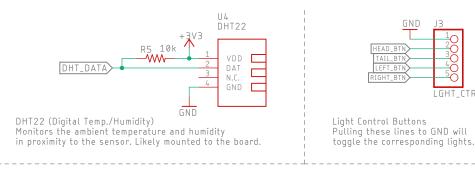
ASME 2020 Schematic V4 Blue Shift - HPVDT UofT

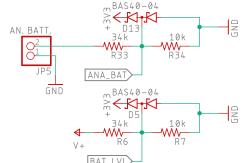
Circuit Design / PCB Layout: Catherine Kucaba / Savo Bajio

Ethan Baron / Yvonne Yang / Savo Bajic



Battery Level Monitoring (main and analog sys. batt.)

Uses resistor voltage dividers to bring the battery voltage (nominally 10V) down to the 3V3 level the STM32 is tolerant to. There are protection diodes for



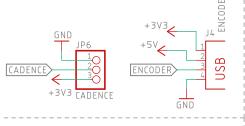


Connected to the digital camera and display to provide a view out



Used to determine the rotational speed of either the pedals (cadence) or wheel (encoder), using a digital interupt to change pins on the STM32.

Both inputs used on the STM32 are 5V tolerant





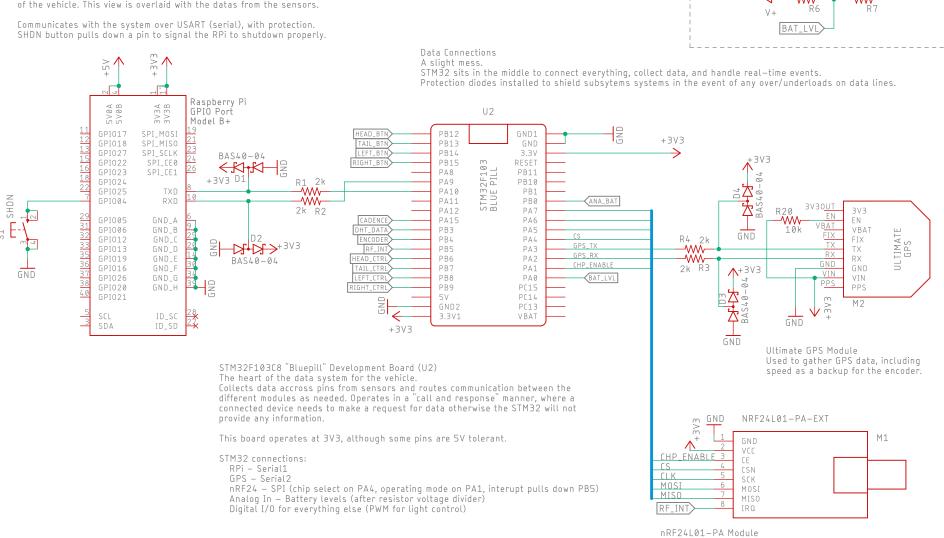


Power connections and test points

- One connector to the battery.
- Another to pass power to the monitor used. - One connector for an external 5V supply if the built in one is non-functional or 5V is needed

Test points are for the power buses.

the battery



Safe voltage level R35

Used for potential telecommunication to pit or chase vechicle. Functional range proven to be up to 1.1km.

GND

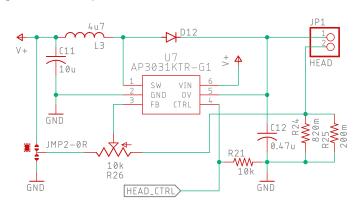
5V/4A Buck Converter Supplies power to RPi, the 3V3 comes from RPi's regulators to the system.

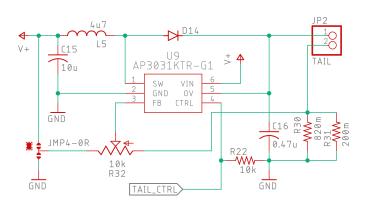
Uses AP65450SP-13 chip and the 5V reference design in the datasheet.

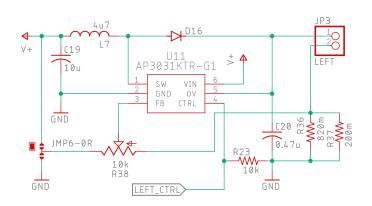
Lighting Lines
Constant current boost converters. Take in the battery voltage and boost it to generate a desired current through the LEDs.

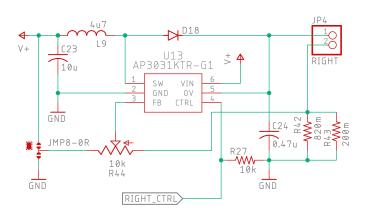
Current set by resistors downstream of LEDs, I = 0.2/R. The 0.2 can be tweaked using the potentiometer and solder the jumper. Solder to ground to decrease the 0.2, $+\dot{V}$ to raise the 0.2.

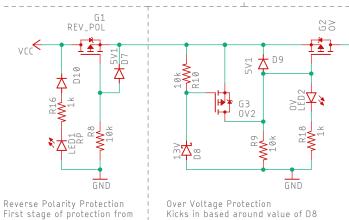
Dimming is achieved though software by applying an approximately $1 \rm kHz~PWM$ signal to the control pin.



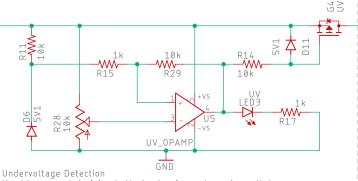








(Currently ~13V)



Used to prevent draining batteries too far and causing cell damage. Cutoff threshold determined by the potentiometer. Hysteresis to prevent oscillating.

If there is any power fault leading up to this an appropriate LED will indicate it, otherwise the OK will light.