

# CONTROL

Key:

\*P\* | P\_\* = ATmega328P

\*M\* | M\_\* = ATmega2560

C\* = Capacitor

R\* = Resistor

(plus arbitrary variants like CP\* meaning a capacitor for 328P)

\*N\* | N\_\* = Neopixel (WS2812B's)

References:

<http://www.14core.com/wp-content/uploads/2015/06/ATMEGA-2560-Pin-Out-Diagram.png>

NOTES:

The original boards were manufactured using MacroFab's standard 4-layer turnkey process.

If needed, my own library has been included.

Objects beginning with "MF" are from the MacroFab Eagle library, available on Github, along with the relevant DRC. MacroFab has a relatively long lead time (~1mo) and occasionally makes mistakes, so budget in some ChipQuik and don't procrastinate with orders.

MacroFab's system pulls model numbers from the Eagle "value" field, so if you're not sure what something here is, see if there's not something in it.

Special thanks to SparkFun and Adafruit OSHW designs, on which parts of this are based.

Also FYI: WS2812B's (the LED's) have an equivalent Moisture Sensitivity Level 6!

Using them in a reflow oven without using desiccants and baking them before use will lead to cracked epoxy lenses! Resoldering them by hand was not fun.

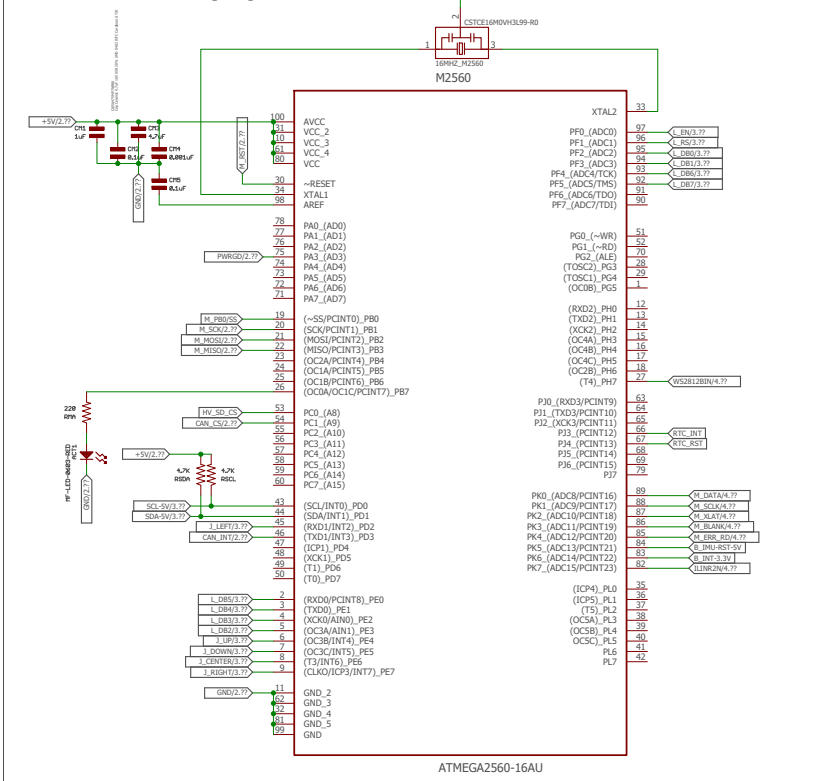
(The next versions will use the newer variants with redundant data lines as an extra precaution.)

Clinton Flowers, 2017-7-01

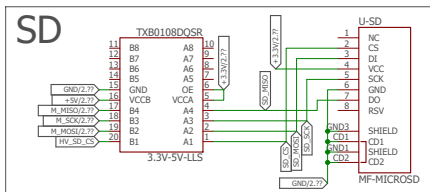
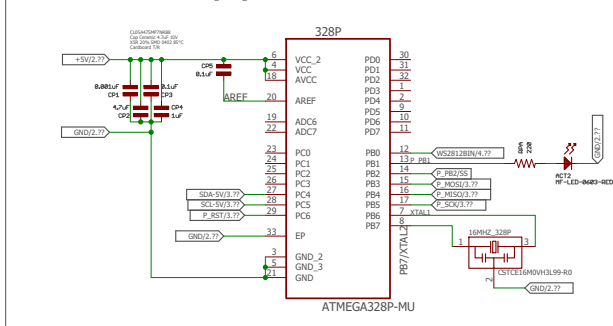
clintonflowers222@gmail.com

Kennesaw State University Motorsports

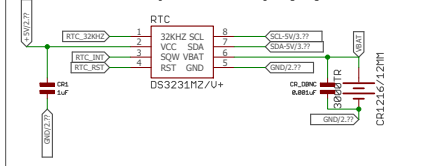
## MEGA2560 (M)



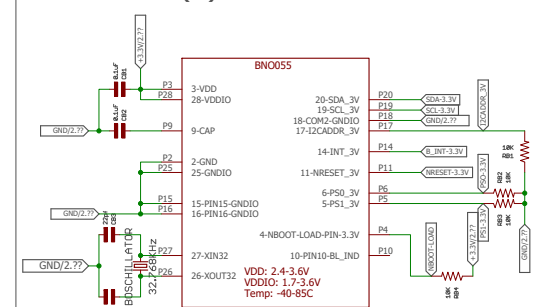
## MEGA328P (P)



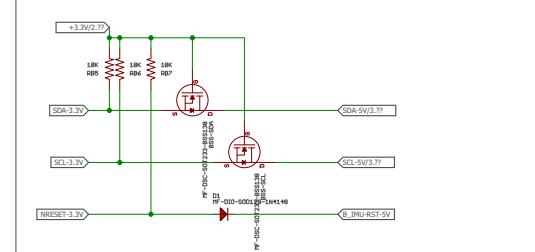
## RTC/Backup Battery (R)



## 9-DOF IMU (B)

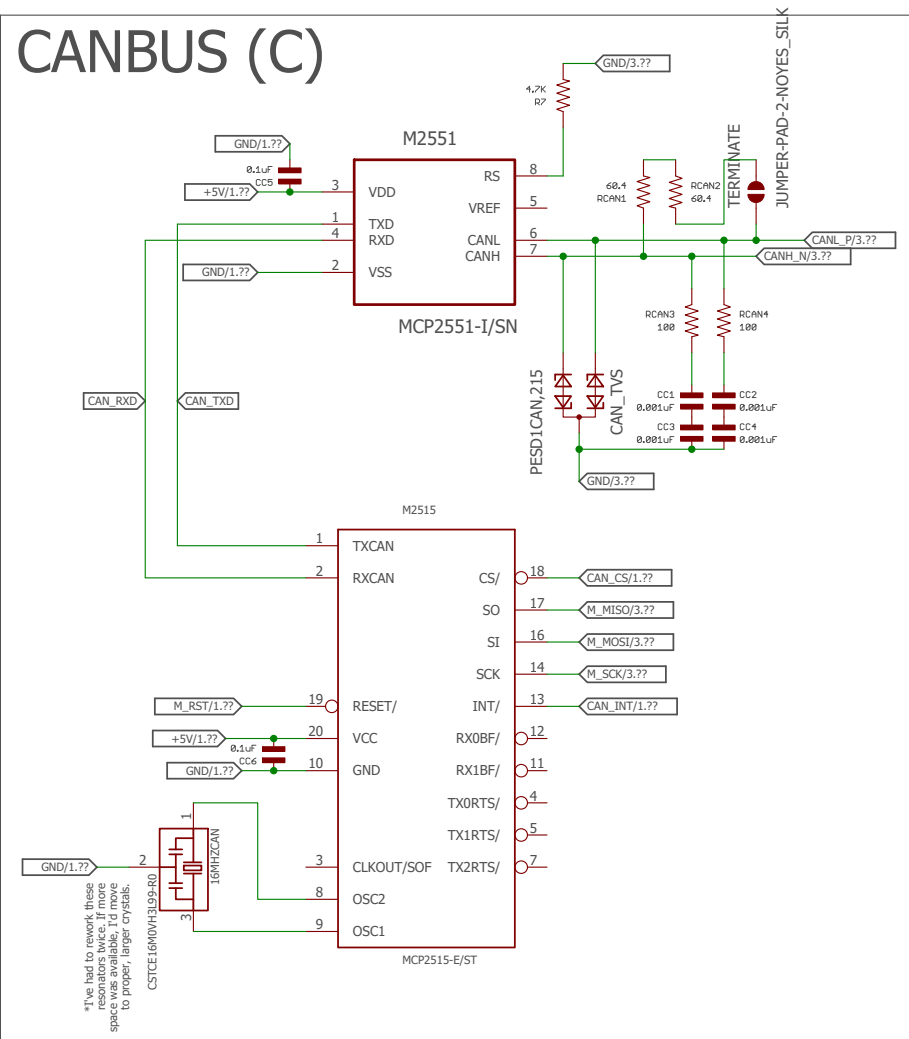


## 3.3-5V IMU I2C LEVEL SHIFTER

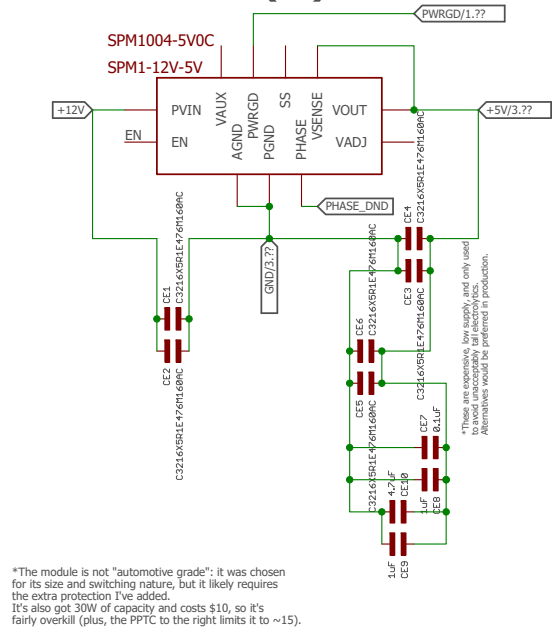


## CANBUS (C)

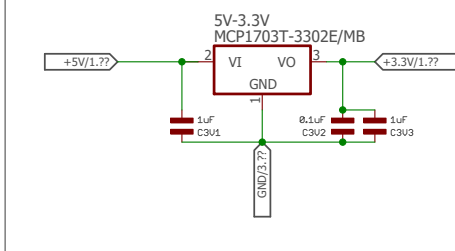
## CANBUS (C)



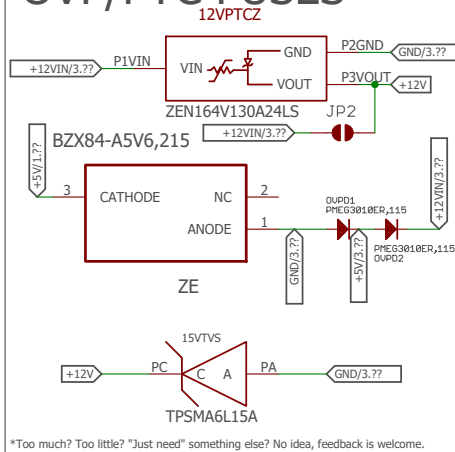
12V->5V (E)



5V->3.3V



## OVP/PTC FUSES



[illegible]

The image contains two circuit diagrams, one for each board, showing the connection of an ESP8266 module to a Raspberry Pi 4. The top diagram is for the first board (ISP1) and the bottom diagram is for the second board (ISP2).

**Top Diagram (ISP1):**

- ESP8266 Pinout:**
  - Pin 1: MISO/2.??
  - Pin 3: SCK/3.??
  - Pin 5: RST/5.??
  - Pin 2: VCC
  - Pin 4: MOSI
  - Pin 6: GND
- Connections:**
  - Pin 1 to M\_MISO/2.??
  - Pin 3 to M\_SCK/2.??
  - Pin 5 to M\_RST/2.??
  - Pin 2 to +5V/4.??
  - Pin 4 to M\_MOSI/2.??
  - Pin 6 to GND/4.??
- Resistor and Capacitor:**
  - A 4.7k resistor (R1) is connected between +5V/2.?? and the RST pin (5).
  - A 1uF capacitor (CHR1) is connected between the RST pin (5) and GND/4.??.
- Label:** MF-SW-TACT-4.2M1 RST1

**Bottom Diagram (ISP2):**

- ESP8266 Pinout:**
  - Pin 1: P\_MISO/1.??
  - Pin 3: P\_SCK/1.??
  - Pin 5: P\_RST/1.??
  - Pin 2: VCC
  - Pin 4: MOSI
  - Pin 6: GND
- Connections:**
  - Pin 1 to P\_MISO/1.??
  - Pin 3 to P\_SCK/1.??
  - Pin 5 to P\_RST/1.??
  - Pin 2 to +5V/4.??
  - Pin 4 to P\_MOSI/1.??
  - Pin 6 to GND/4.??
- Resistor and Capacitor:**
  - A 4.7k resistor (R2) is connected between +5V/2.?? and the RST pin (5).
  - A 1uF capacitor (CPR1) is connected between the RST pin (5) and GND/4.??.
- Label:** MF-SW-TACT-4.2M1 RST2

**Footnote:** \*The reset buttons don't work on the second board. Not sure why atm.

Pinout diagram for the SKRHHAE010 module:

- Top pins: PA1-U (green), A-1-U (red), B-4-R (red), PB4-R (green)
- Right pins: J\_RIGHT/1.?? (green), PCOM5 (red), GND/4.?? (red)
- Bottom pins: P6D-D (green), J\_DOWN/1.?? (green)
- Left pins: J\_UP/1.?? (green), PCEN2 (red), J\_CENTER/1.?? (green), PC3-L (green), J\_LEFT/1.?? (green)

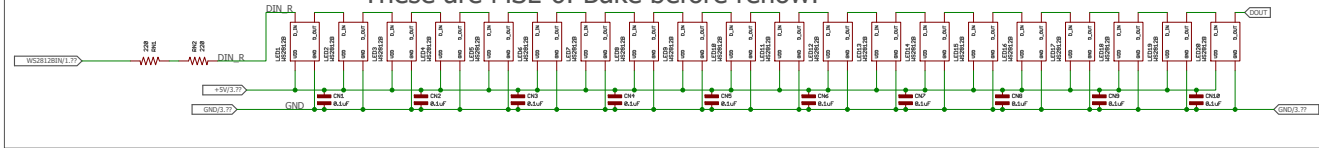
Module label: SKRHHAE010

\*This was soldered upside down on the second board despite the correct footprint. Still works partially.

# OUTPUTS/LEDs

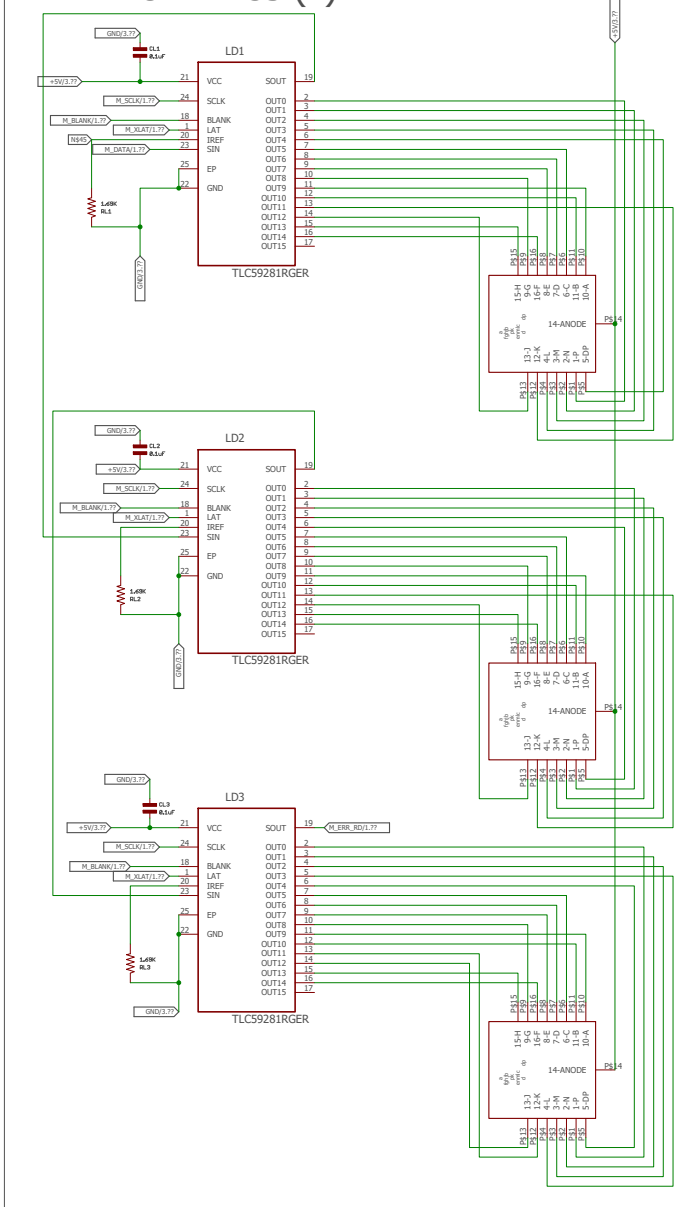
## NEOPIXELS (N)

These are MSL-6! Bake before reflow!

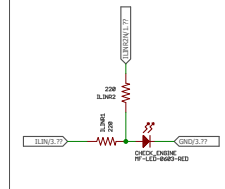


## ALPHANUMERICs (L)

\*Mapping each bit to each display segment (and then to each letter) in software is necessary to use these.



## IDIOT LIGHT



## POWER LED

