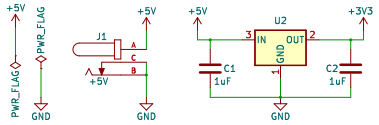
SPOTIFY LED MATRIX

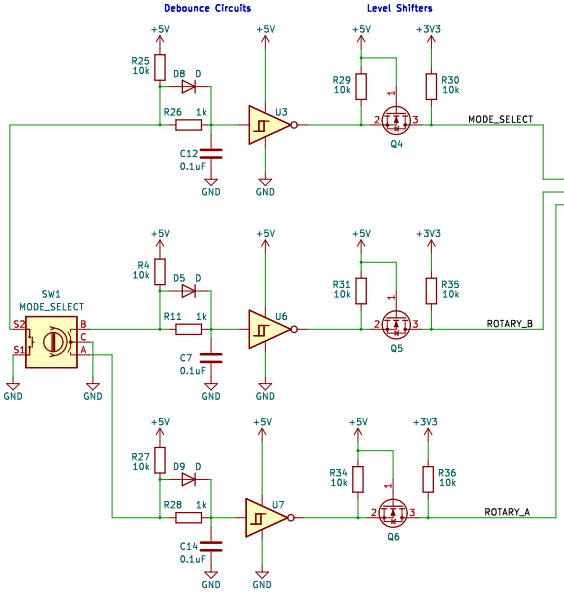
Project by Austin Driggs | Fall 2023

POWER INPUT AND REGULATOR



Display will draw up to 4A; ESP32 will draw up to 500mA.
Power jack is rated for 6A and is 2.1mm x 5.5mm

ROTARY ENCODER CONTROLLER



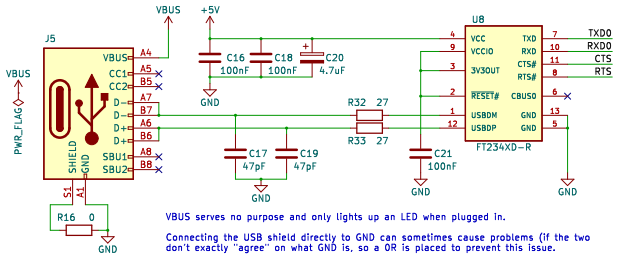
All outputs on the rotary encoder are connected to +5V (high).

When turning the encoder or pressing the switch, it pulls them to ground (low).

When the rotary encoder is pulled low, the schmitt trigger's output goes high.

When the schmitt trigger output goes high, it is then level shifted down to +3V3 so that the ESP32's digital input pins can handle it.

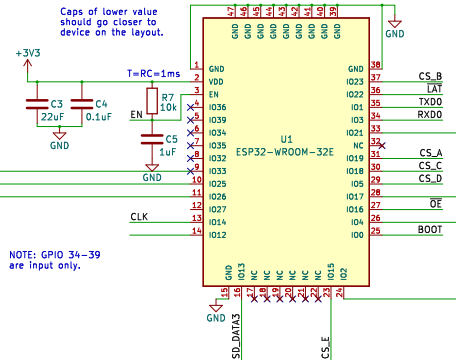
USB TO UART



VBUS serves no purpose and only lights up an LED when plugged in.

Connecting the USB shield directly to GND can sometimes cause problems (if the two don't exactly "agree" on what GND is, so a OR is placed to prevent this issue.

ESP32 MODULE



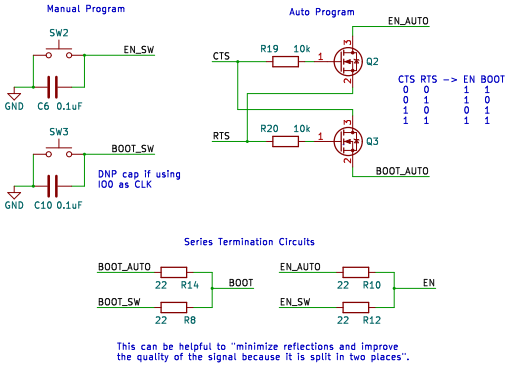
NOTE: GPIO 34-39 are input only.

My inputs: SELECT, ROTARY_B, ROTARY_A
My outputs: ENABLE_PWR, MODES, BRIGHTNESS, VOLUME, DEV

BOOT and EN are found in the PROGRAMMING circuits.

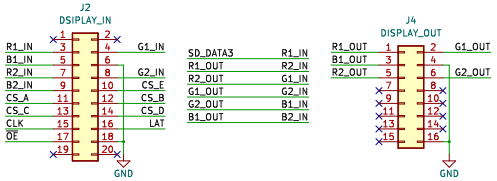
The rest of the connections go to the display's input.

PROGRAMMING



This can be helpful to "minimize reflections and improve the quality of the signal because it is split in two places".

DISPLAY CONNECTORS

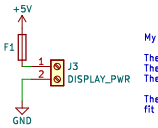


CLK, $\overline{OE}$, and LAT are pulled high on the display's input connector.

CLK and LAT are pulled high on the display's output connector. $\overline{OE}$ is pulled low on the display's output connector.

By connecting the input and output connectors, we create one big shift register, allowing us to use SPI to drive it.

R1_IN internally connects to R1_OUT, and so on.

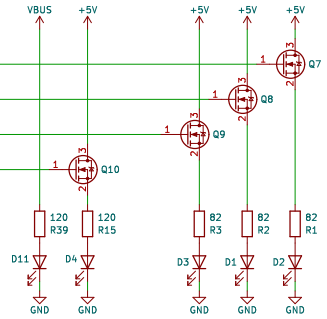


My PCB will screw into the back/side of the display.

The DISPLAY_IN connector will plug directly into the display.
The DISPLAY_OUT connector will have a ribbon cables the display.
The DISPLAY_PWR connector will have a spade to rectangular cable.

The DISPLAY_IN connector is 2x10 in order to more snugly fit into the display's 2x08 connector.

LEDS



(5-2.2)V / 20mA = 140R

LEDs are used to show the USB connection while programming and for general development. This could be to show the rotary encoder is working or other thins TBD later.

(5-3.2)V / 20mA = 90R

LEDs are used to show what mode you are in while turning the rotary encoder.

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