

# F\_Interface\_AL v1.00 presentation

Here is an update of the project with improved hardware and software.

On the hardware side, you now have the choice between various versions depending on your needs. They vary in terms of sizes and inputs/output capabilities. They though all use the same base schematic to establish the link with the Fanatec base.

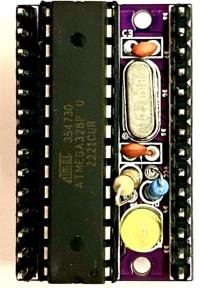
A presentation of the range is available below. The main hardware platform which is described if the original one beeing the FULL\_NANO version.

- A smallest form factor PCB based on an [\*\*ATMEGA328P\*\*](#) microcontroller just to unlock the force feedback for advanced users : ATMEGA328P\_NO\_HEADER
- A smallest form factor PCB based on an [\*\*ATMEGA328P\*\*](#) microcontroller just to unlock the force feedback + a few buttons for advanced user : ATMEGA328P\_WITH\_HEADER
- A small form factor PCB based on an [\*\*arduino nano\*\*](#) just to unlock the force feedback : NANO\_NO\_HEADER
- A small form factor PCB based on an [\*\*arduino nano\*\*](#) just to unlock the force feedback + a few buttons : NANO\_WITH\_HEADER
- A small form factor PCB based on an [\*\*arduino PRO MICRO\*\*](#) just to unlock the force feedback + a few buttons : PROMICRO\_WITH\_HEADER
- A podium hub form factor PCB based on an [\*\*arduino nano\*\*](#) with full features (buttons, rotary encoder, rotary switches) : FULL\_NANO
- A podium hub form factor PCB based on an [\*\*arduino PRO MICRO\*\*](#) with full features (buttons, rotary encoder, rotary switches) : FULL\_PROMICRO
- A button box wich is not intended to work with a Fanatec wheel base but which is very close in terms of I/Os.

# The whole family



# ATMEGA328P\_ NO\_HEADER



# ATMEGA328P\_ WITH\_HEADER



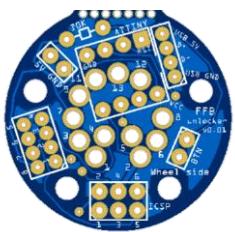
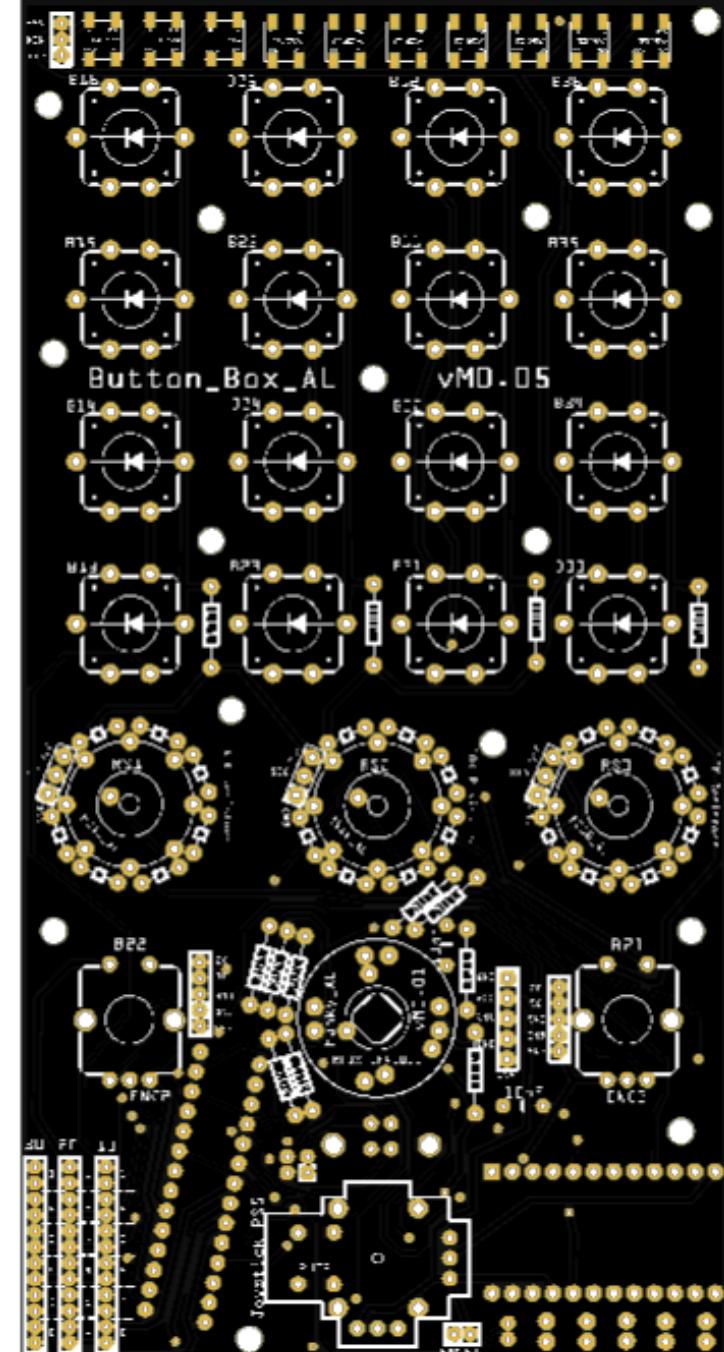
NANO\_NO  
HEADER



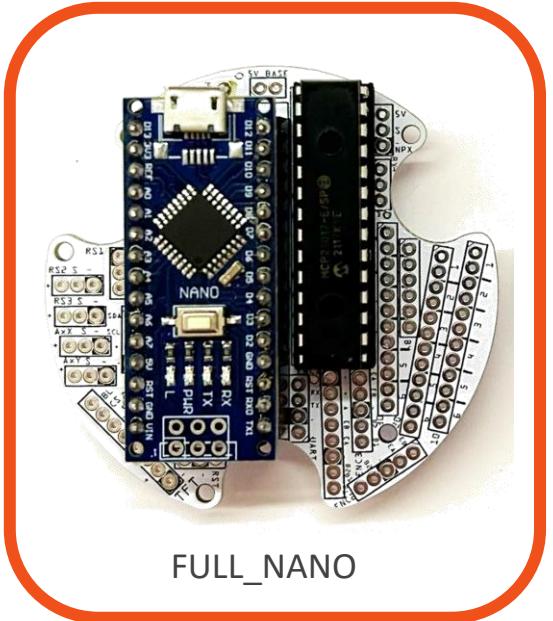
# NANO\_WITH\_HEADER



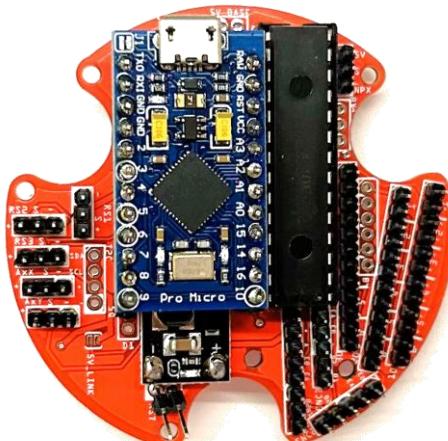
# PROMICRO\_WITH\_HEADER



## ATTINY\_NO\_HEADER



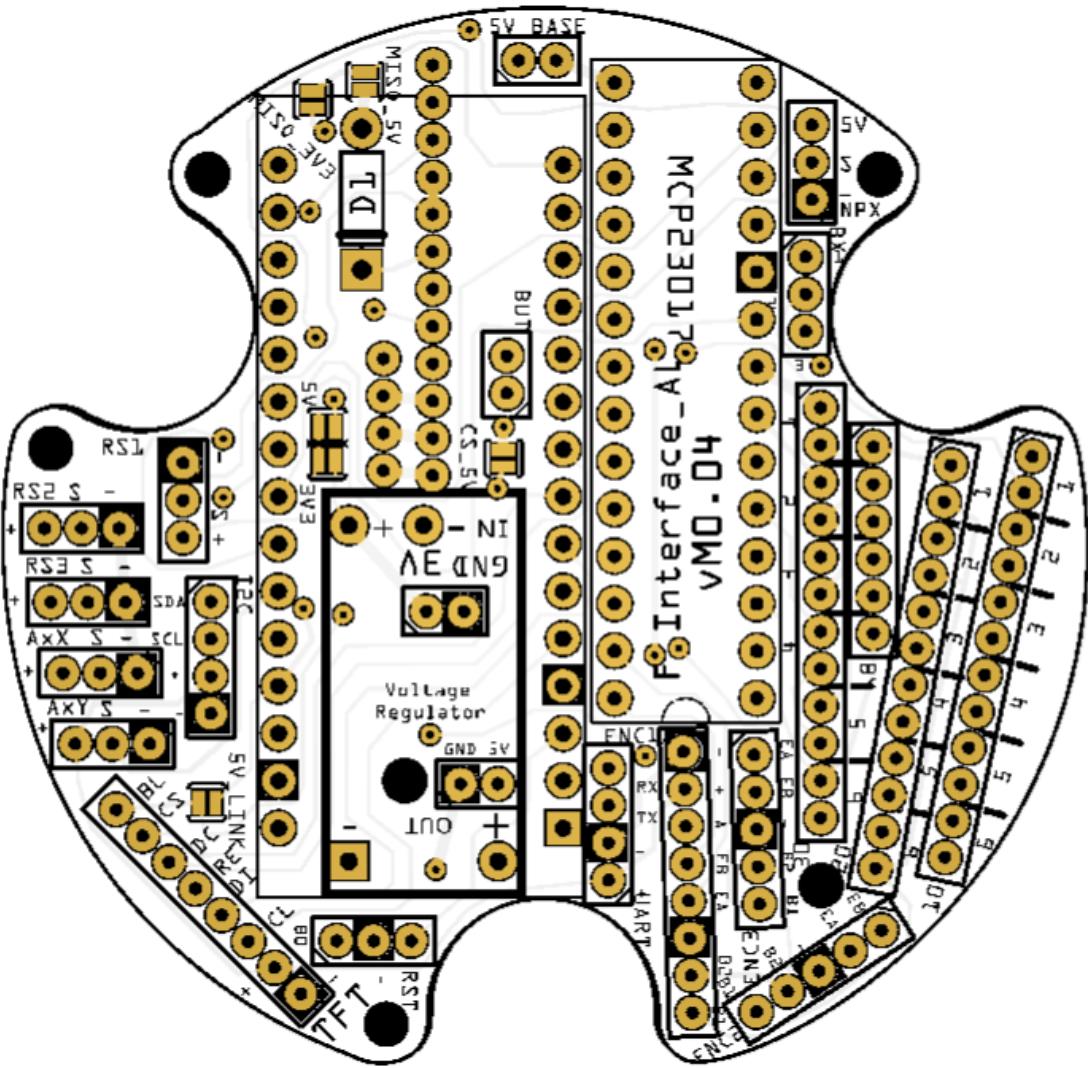
## FULL\_NANO



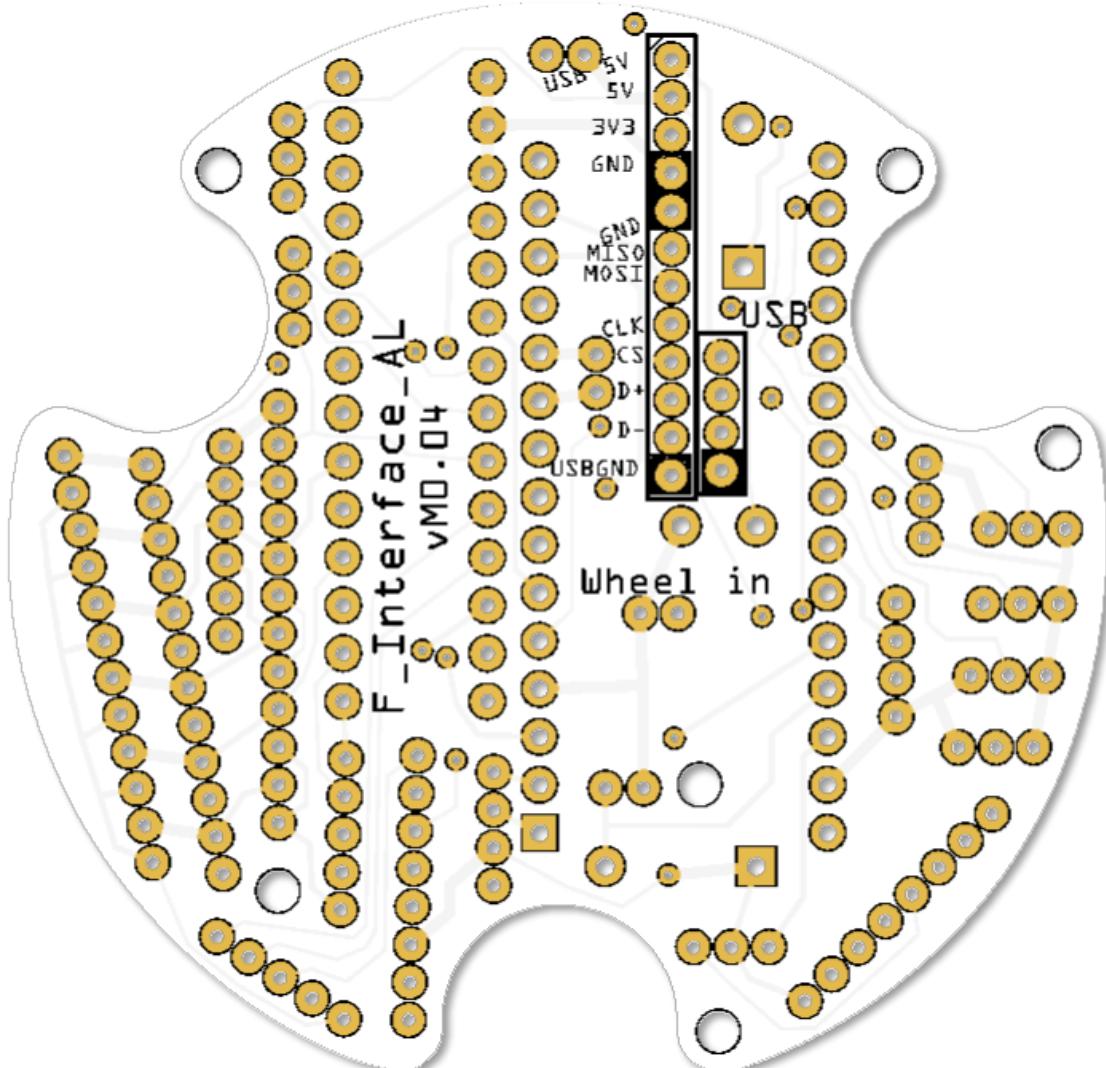
## FULL\_PROMICRO

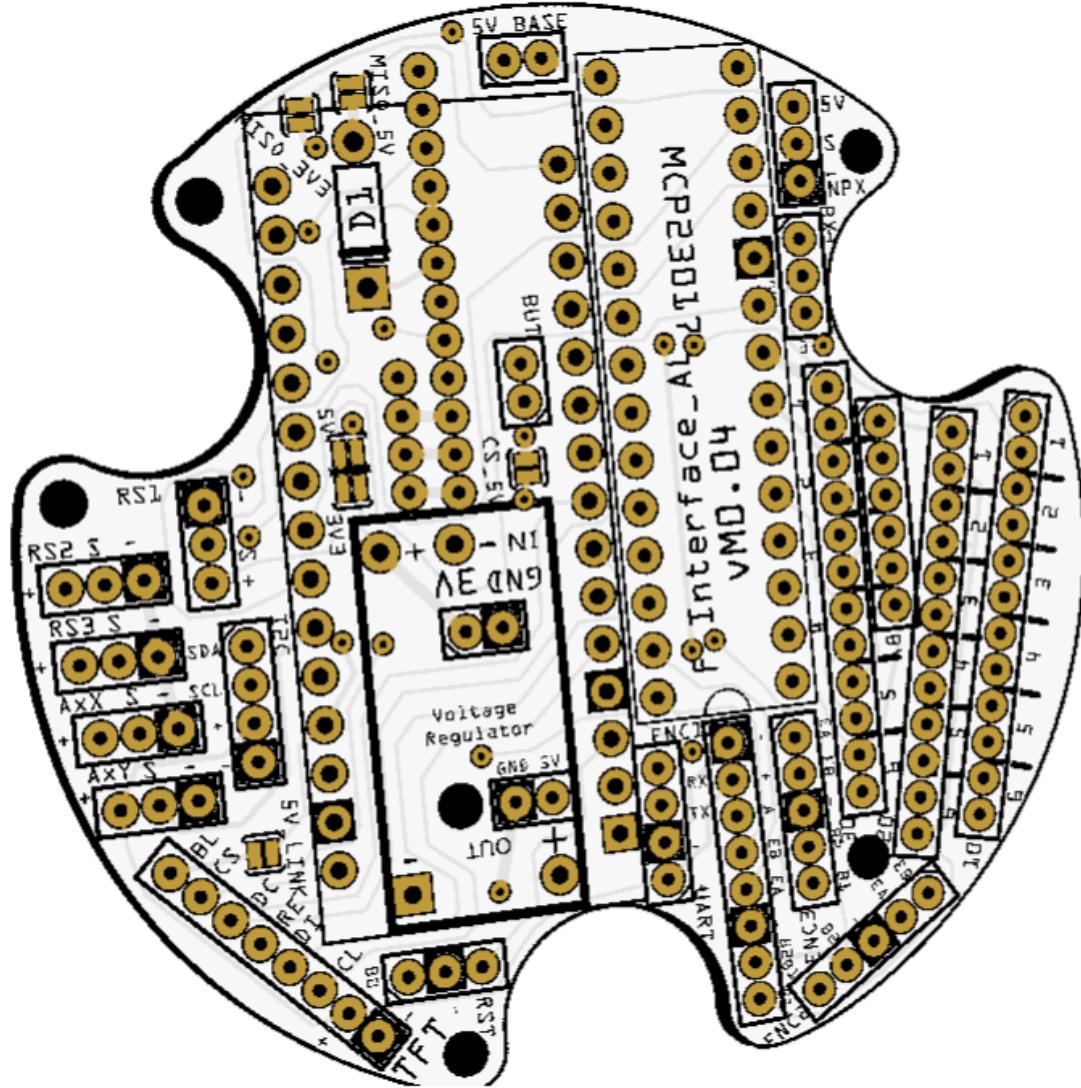
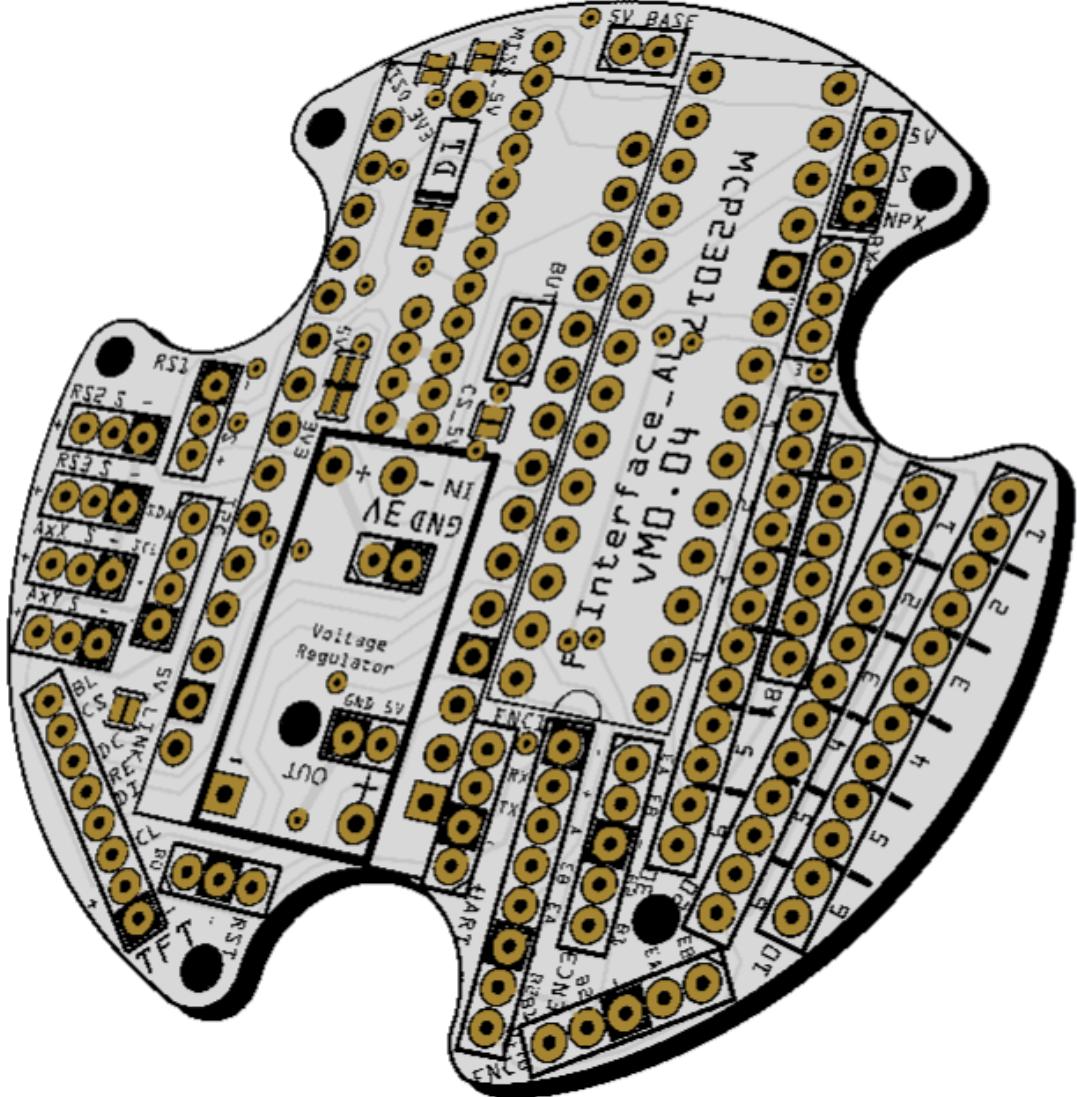
	ATTINY_NO_HEADER	ATMEGA328P_NO_HEADER	ATMEGA328P_WITH_HEADER	NANO_NO_HEADER	NANO_WITH_HEADER	PROMICRO_WITH_HEADER	FULL_NANO	FULL_PROMICRO	PROMICRO_BUTTON_BOX
Base MCU platform	ATTINY85	ATMEGA328P	ATEMGA328P	Arduino Nano	Arduino Nano	Arduino PRO MICRO	Arduino Nano	Arduino PRO MICRO	Arduino PRO MICRO
Size (mm)		17,2 x 36,6	23,4 x 36,6	18,9 x 48,4	25,5 x 48,4	25,5 x 48,4	59,1 x 59,1	59,1 x 59,1	89x171
Operating voltage	3,3V	3,3V	3,3V	5V	5V	5V	5V	5V	5V
Max buttons	0	0	13	0	17	14	21	21	26
Max encoder	0	0	0	0	0	0	3	3	3
Max rotary switches	0	0	3	0	3	3	3	3	3
Max analog axes	0	0	2	0	2	2	2	2	0
LCD screen	NO	NO	NO	NO	NO	NO	YES	YES	NO
RGB LEDs	NO	NO	YES	NO	YES	YES	YES	YES	YES
7 segments	NO	NO	NO	NO	NO	NO	YES	YES	NO
Funky switch	NO	NO	NO	NO	NO	NO	YES	YES	YES

# Front

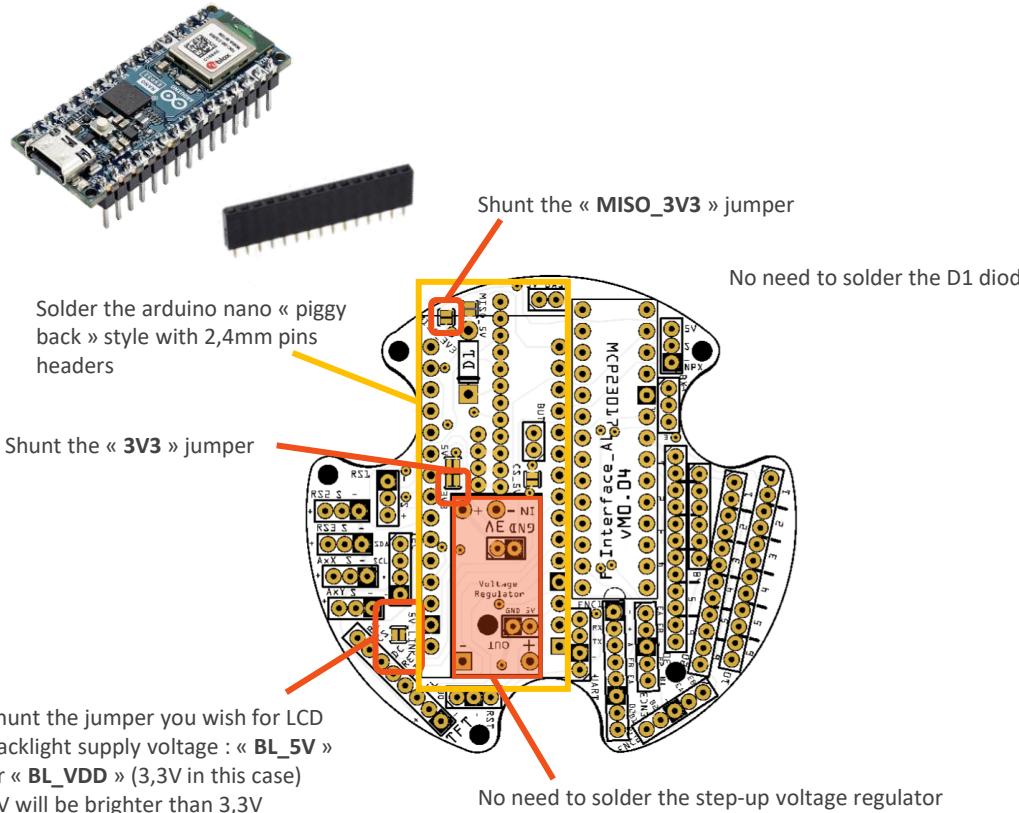


# Rear

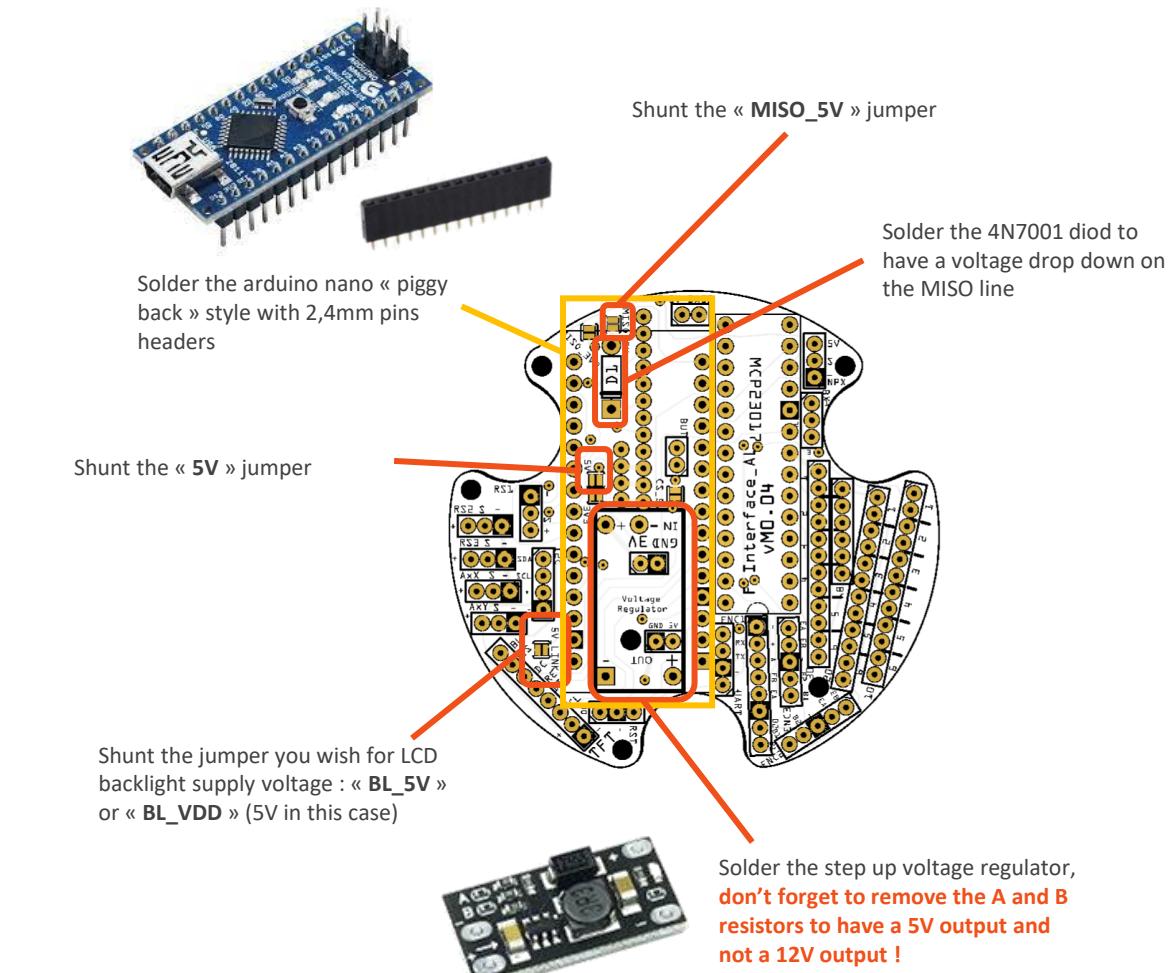




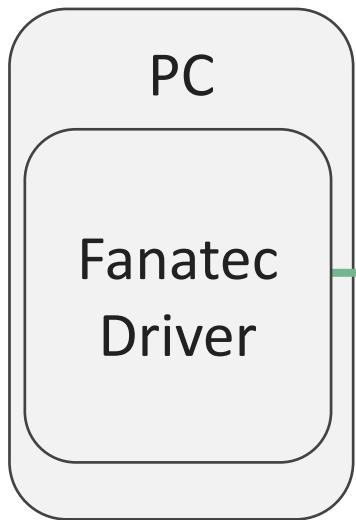
# Arduino nano ESP32 3,3V voltage operation



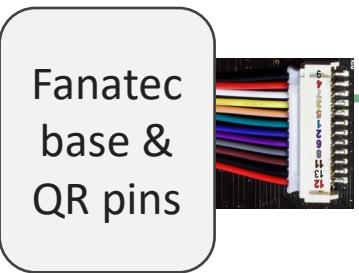
# Arduino nano ATMEGA328p – 5V voltage operation



# Data flow



USB

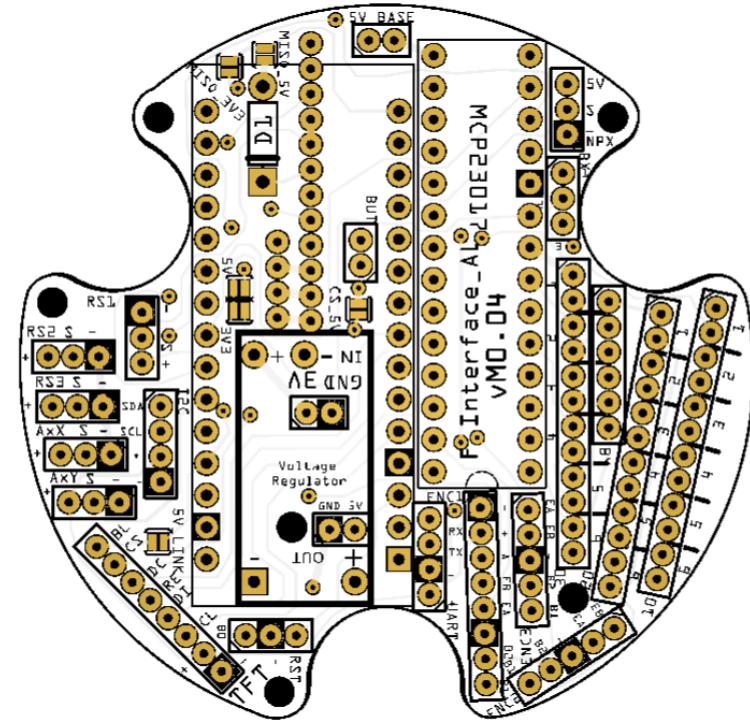


Fanatec SPI protocol

Fanatec custom USB protocol  
Used to plug button modules and extra inputs

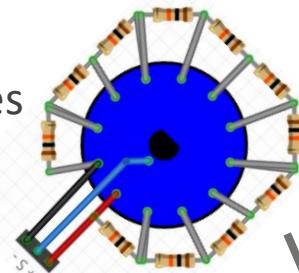
- Can handle :
- 24 buttons
  - 2 Analog axis
  - 9 LEDs handled by Fanalab
  - 3x 7 segments display
  - 2 vibration motors (not managed here)

Inputs management



# Global interfacing view

Up to 4 rotary switches



2 analog axis



TM1637  
Or OLED  
display or I2C



TFT LCD



Stepup voltage regulator.  
Required for arduino nano  
only



Arduino nano  
or Arduino  
nano ESP32



MCP23017  
I/O expander  
DIP-28

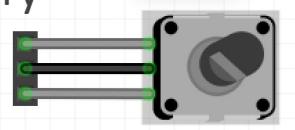
Fanatec QR input



Button matrix  
for up to 21  
buttons



Up to 3 rotary  
encoders



DPAD or Funky  
switch



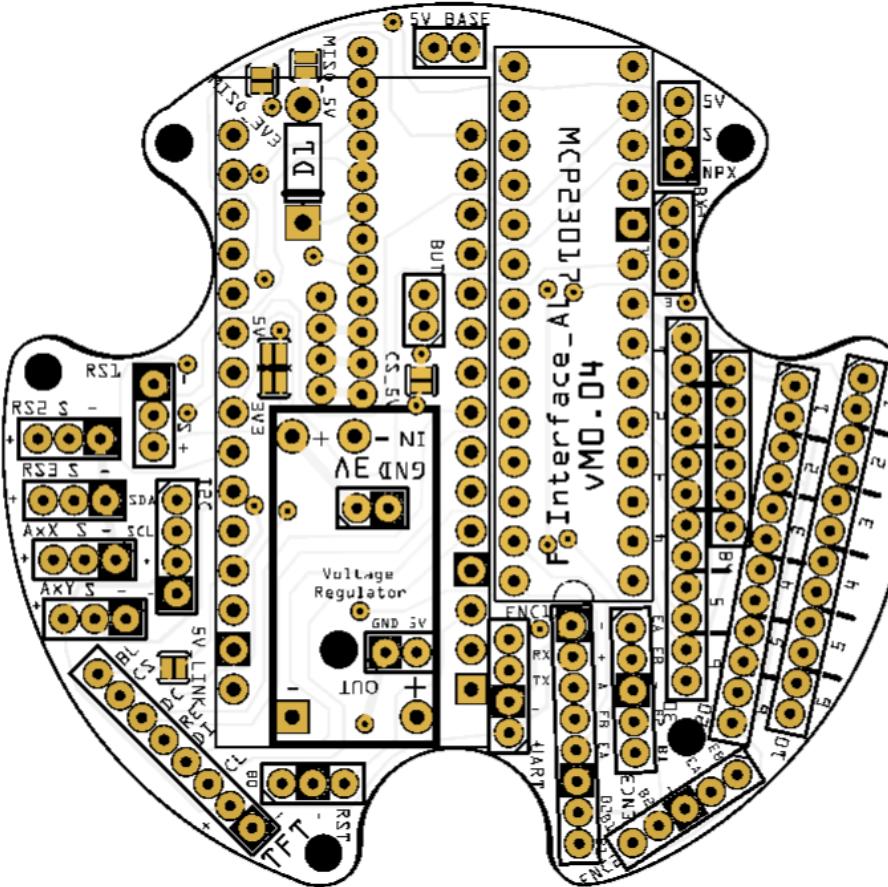
# BOM

- 1 arduino nano (Approx. 3€)
- 1 PCB (Approx. 5-7€ if ordered by 5 on JLCPCB)
- 1 MCP23017 16IO extender - (Approx. 3€)
- 1 step up voltage regulator – 0,5€
- Some 2mm pitch, straight or elbowed pin arrays to hook up your buttons, switches,... - 0,5€
- 1x 10k Ohms pullup resistor – 200mil – 0,1€
- 1x 1N4001 Diod – 0,1 €

Total build cost estimated for the control board 12-13€

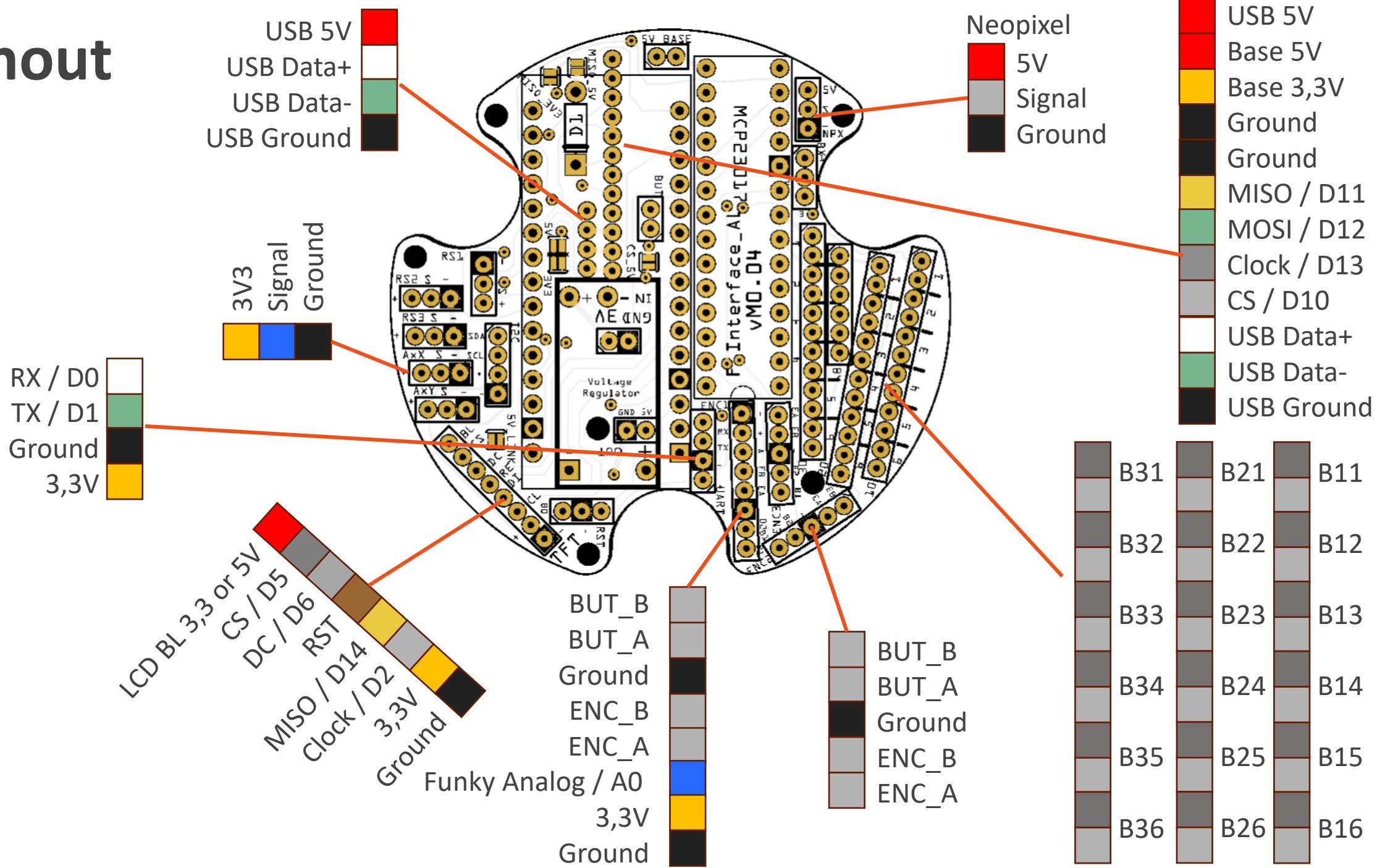
- + Depending on you build, some buttons, encoder, rotary switches,...

# Dimensions



59 mm diameter

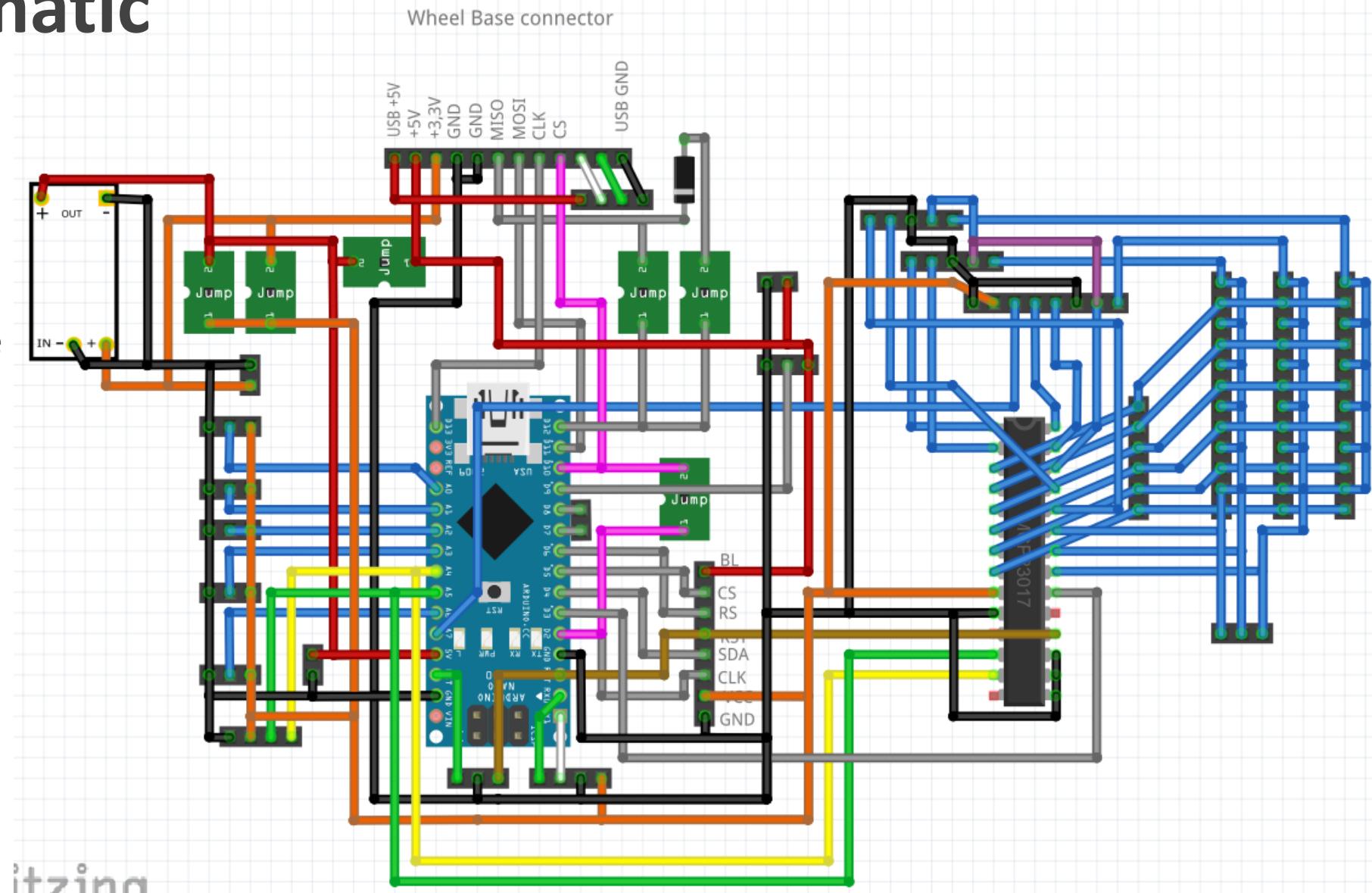
# Pinout



# General schematic

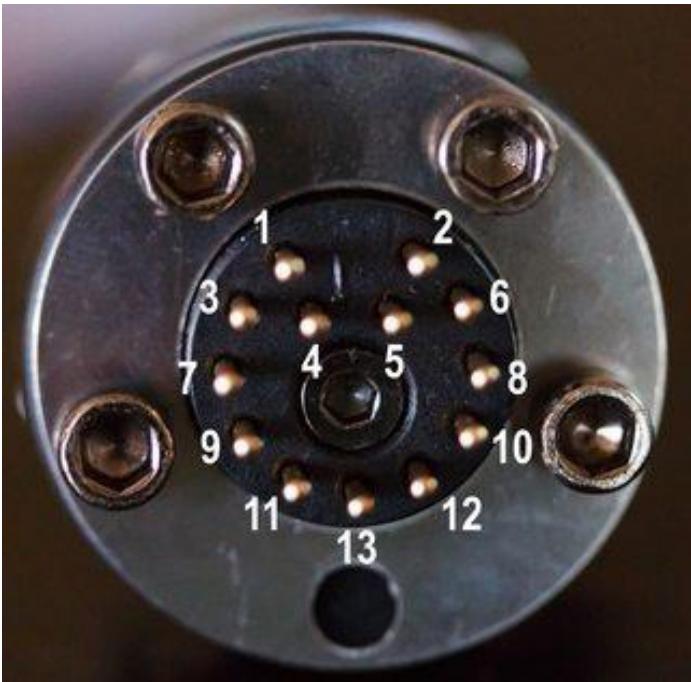
General schematic will help you understand the PCB wiring and link with the code.

It can be found in the Fritzing file

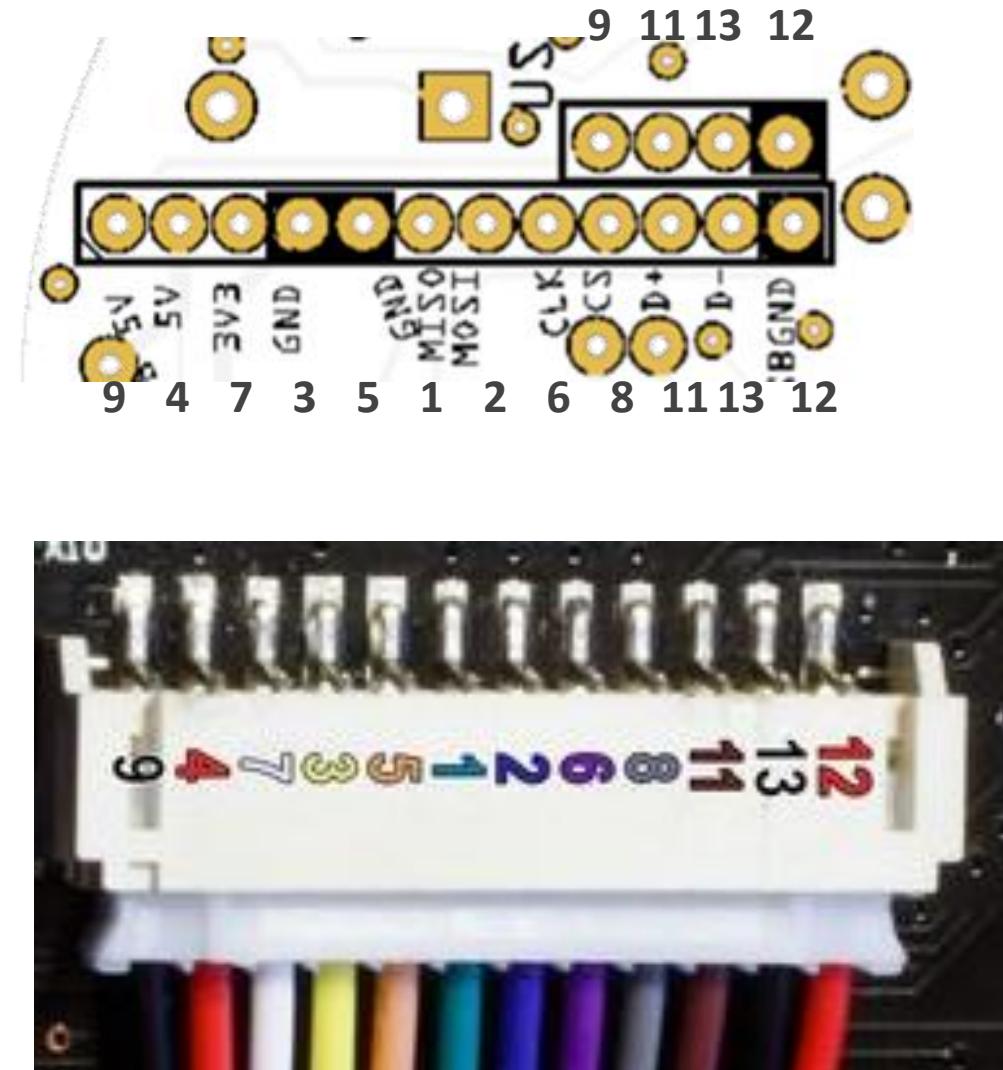


# Wheel input

This connector is used to plug the base ribbon. It respects the pinout standard described by Darknao :



- 1.MISO
- 2.MOSI
- 3.GND
- 4.5v
- 5.GND
- 6.SCK
- 7.3v3
- 8.CS
- 9.USB charge 5v\*
- 10.DataPort1\*
- 11.USB charge GND\*
- 12.DataPort2\*



Credit :

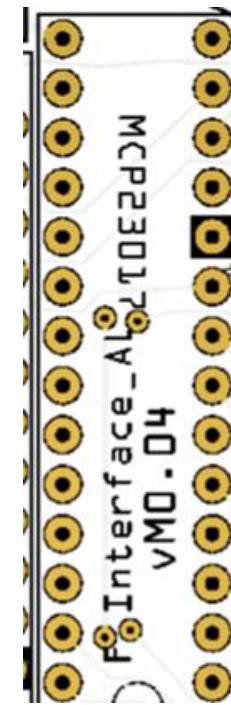
<https://github.com/darknao/btClubSportWheel>

# MCP 23017 16 IO extender

A classic component when it comes to extend the Arduino GPIOs.

Brings 16 more Ios to the project, mostly used to handle the button matrix and the rotary encoders.

Communicates via I2C with the arduino.

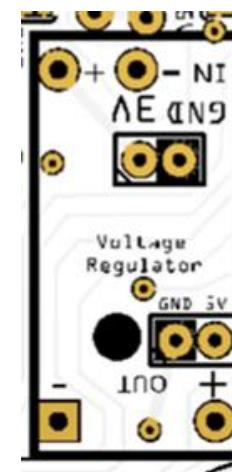


# Step up voltage regulator

Classic component from Aliexpress

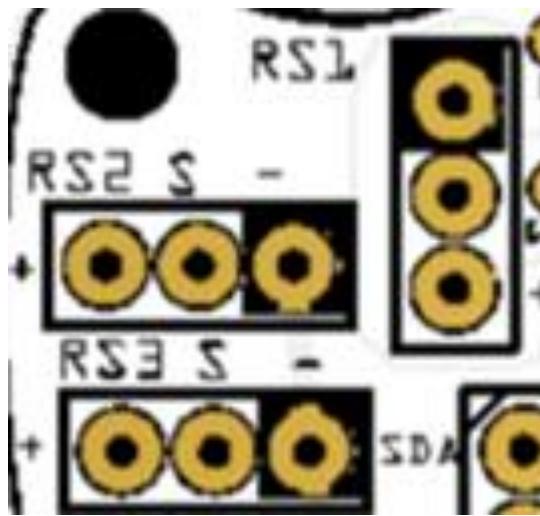
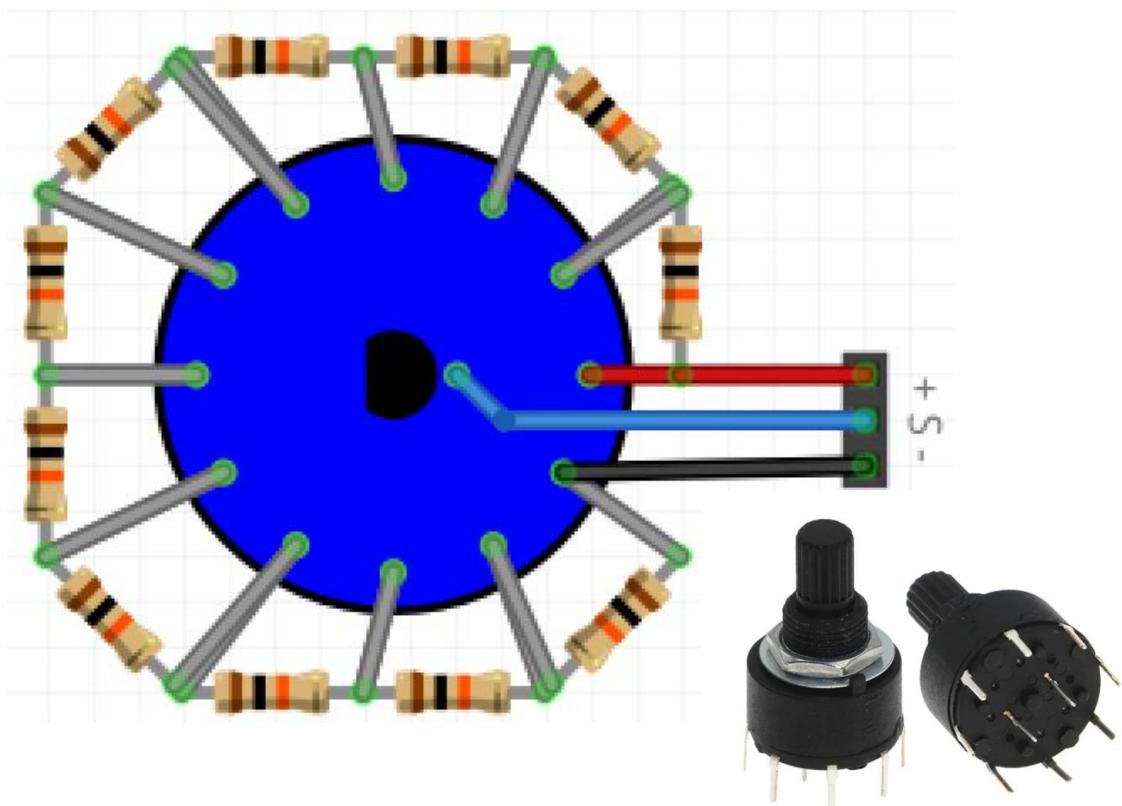
**BE CAREFUL, it comes delivered  
with a 12V output.**

**You need to desolder the A and B  
resistors to have a 5V output**



# Rotary switch

You can use any rotary switch. You just need to solder 10K resistors between each connector according to the below presented schematic. RS16 – 1pole 8 throws from Aliexpress is a good option – approw 1,5€



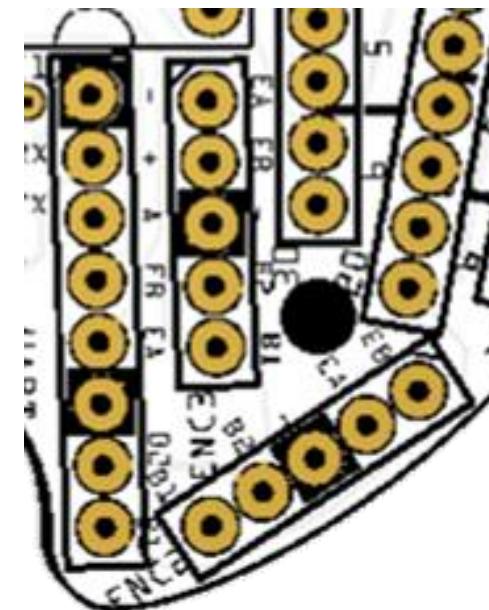
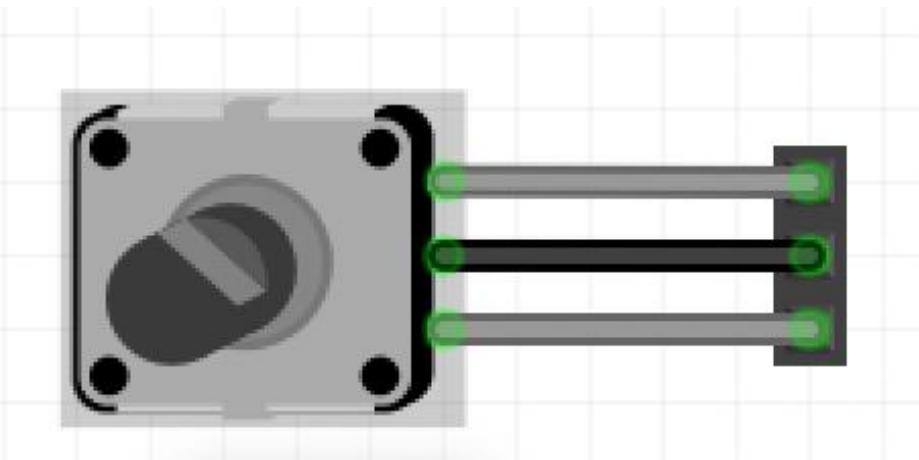
Ground  
Signal  
3V3

If your project requires it, you can use the analog axis X and Y to add 2 extra rotary encoders.

# Encoder

You can hook up to 3 rotary encoders on the PCB.

Thei buttons are affected to B17, B27 and 237 of the button matrix

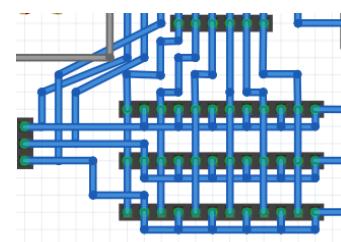
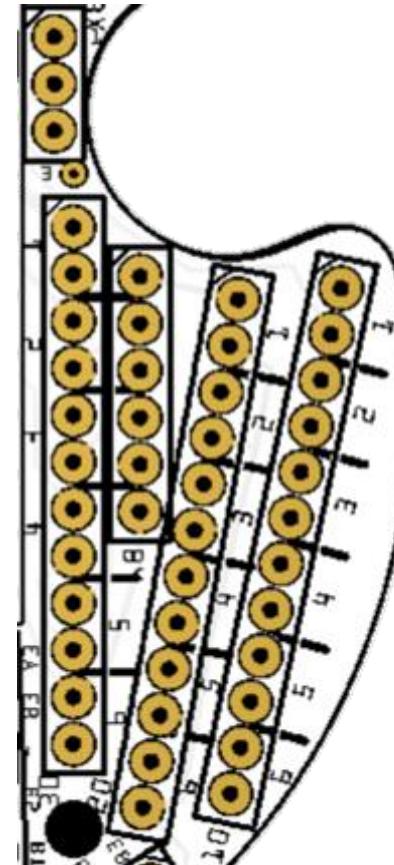
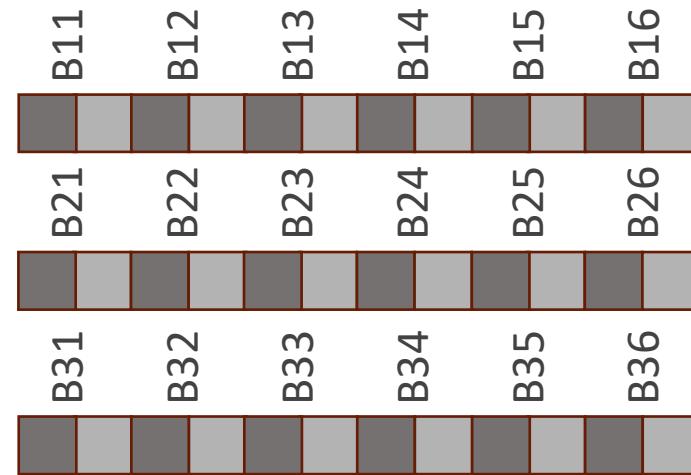
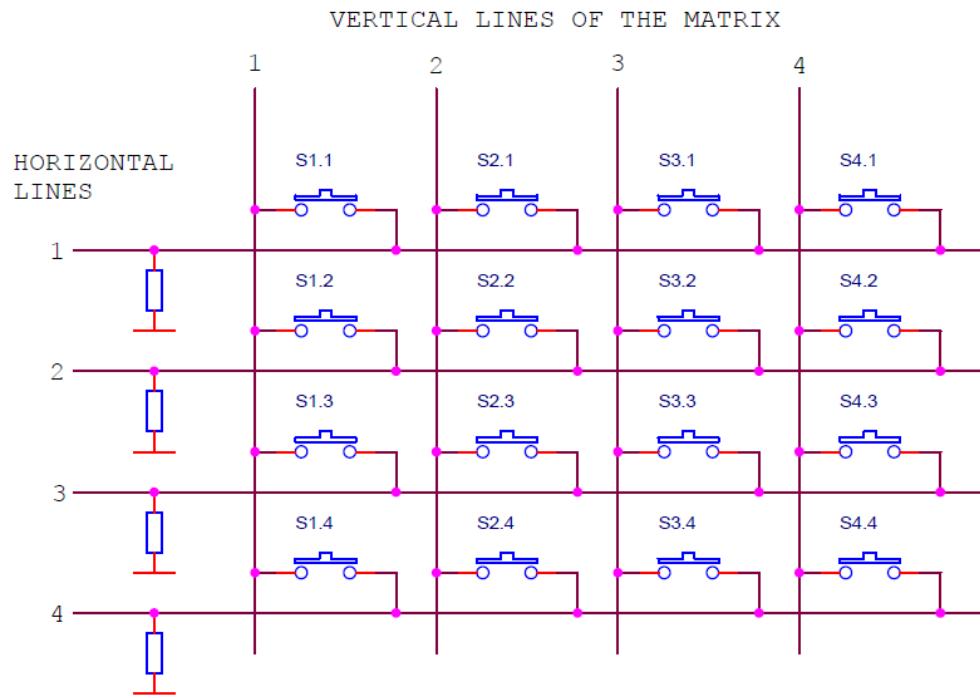


ENC_A
ENC_B
Ground
BUT_A
BUT_B

# Button matrix

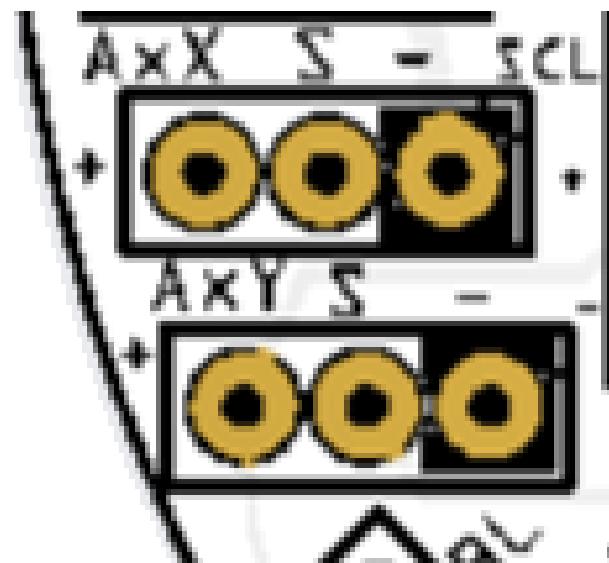
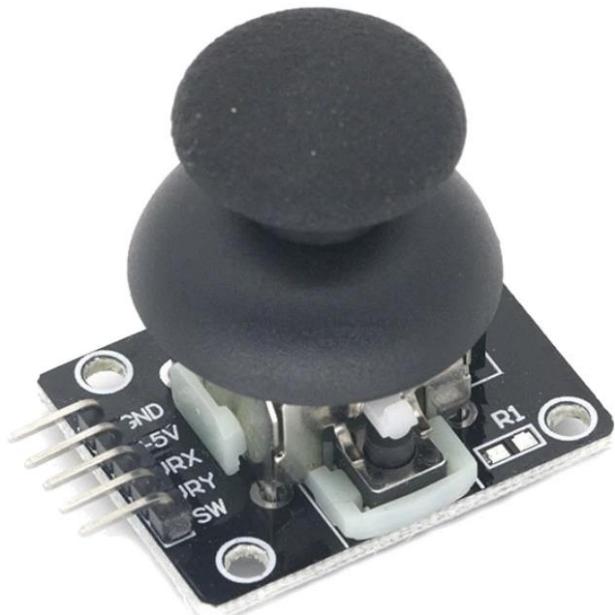
The button matrix is 3 rows x 7 columns bringing a max of 21 buttons.

You can plus each button individually on each pins from B11 to B37 or you can wire you matrix outside of the PCB usin the BX and BY connectors.



# Joystick / Analog Axis

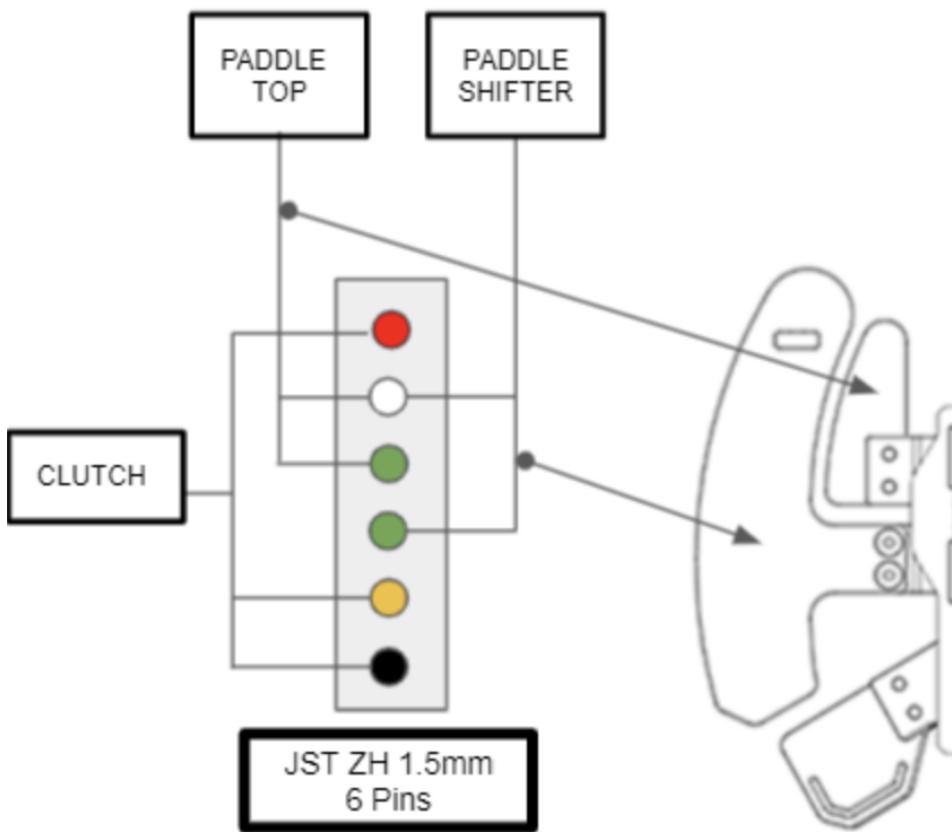
You can plug a joystick module to the board by linking it to the 2 analog axis and 1 button.



3V3  
Signal  
Ground

# APM

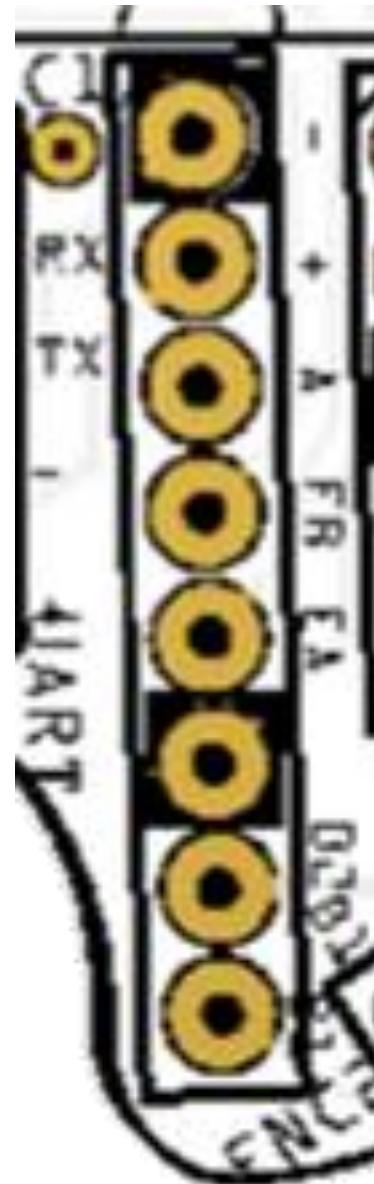
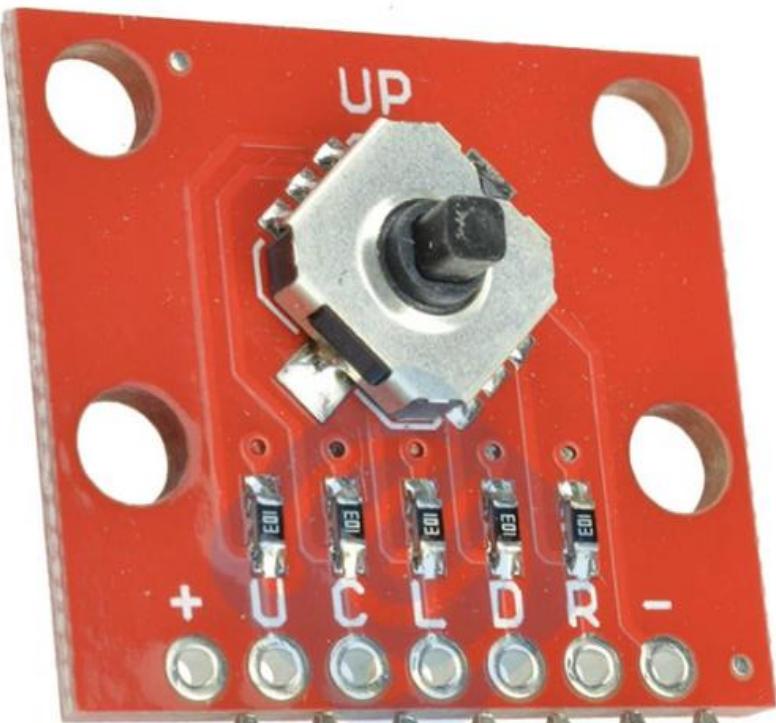
You can plug Advance paddle modules to the board  
by combining a selection of buttons and axis



# DPAD

You can plug a DPAD module in 2 ways :

- via the funky/dpad analog input
- via 5 buttons from the button matrix



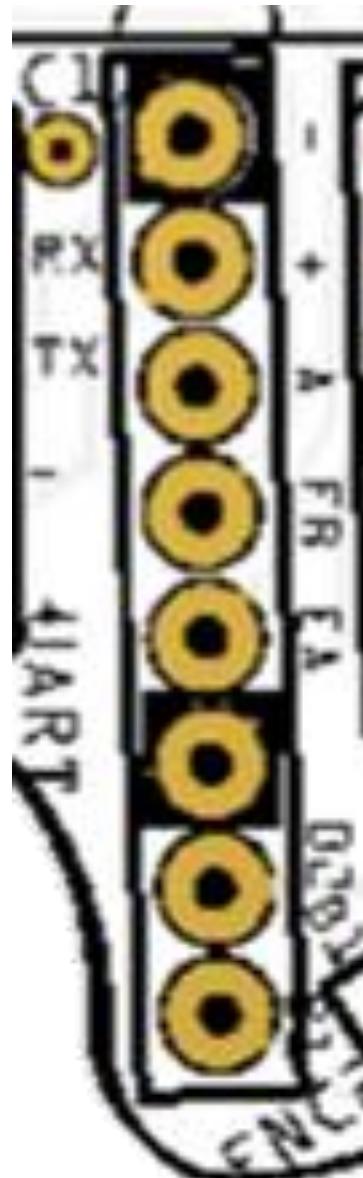
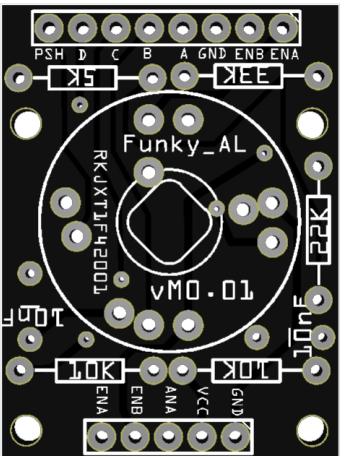
Black	Ground
Yellow	3,3V
Blue	Funky Analog / A0
Grey	ENC_A
Grey	ENC_B
Black	Ground
Grey	BUT_A
Grey	BUT_B

# Funky switch

You can plug a funky switch module



To help you with the wiring and connection of this funky switch, I have a breakout PCB :

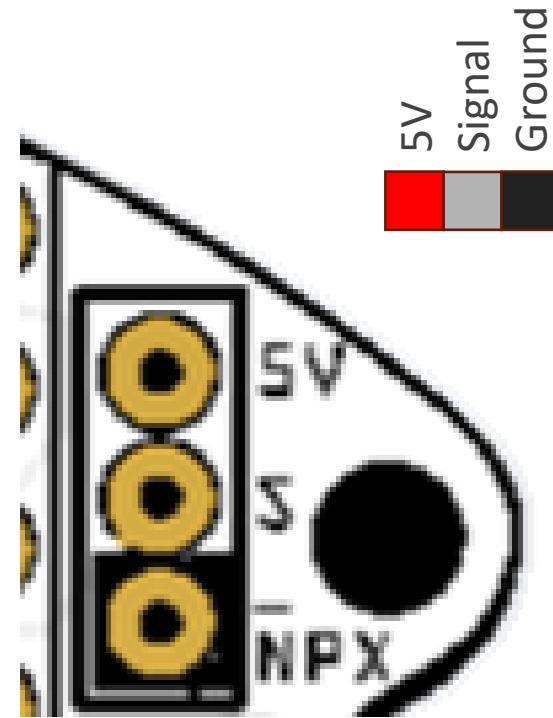
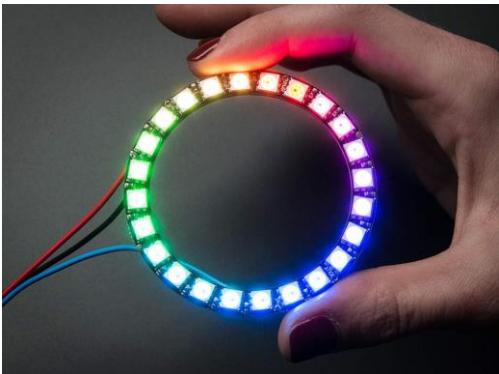


Black	Ground
Yellow	3,3V
Blue	Funky Analog / A0
Grey	ENC_A
Grey	ENC_B
Black	Ground
Grey	BUT_A
Red	BUT_B

# Neopixels / LEDs

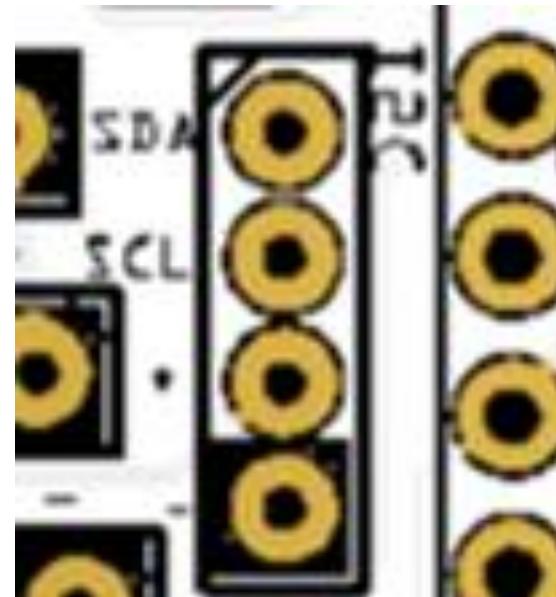
You can hook up any type of Neopixels WS2812b to the board with the 3 wire connector.

Even if the data line is rated for 5v, it has been tested OK for a 3,3V data line input. You may will have the 1st pixel non functionnal as decribed here



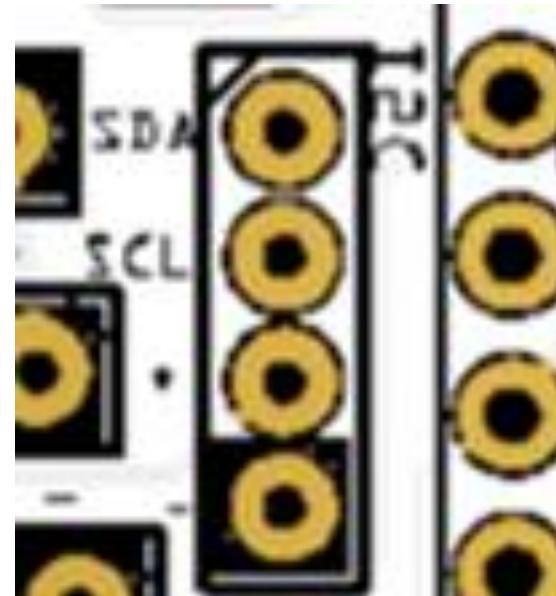
# TM1637

You can hook up a 7 segments display based on TM1637 driver. Nothing special here to connect it



# OLED display

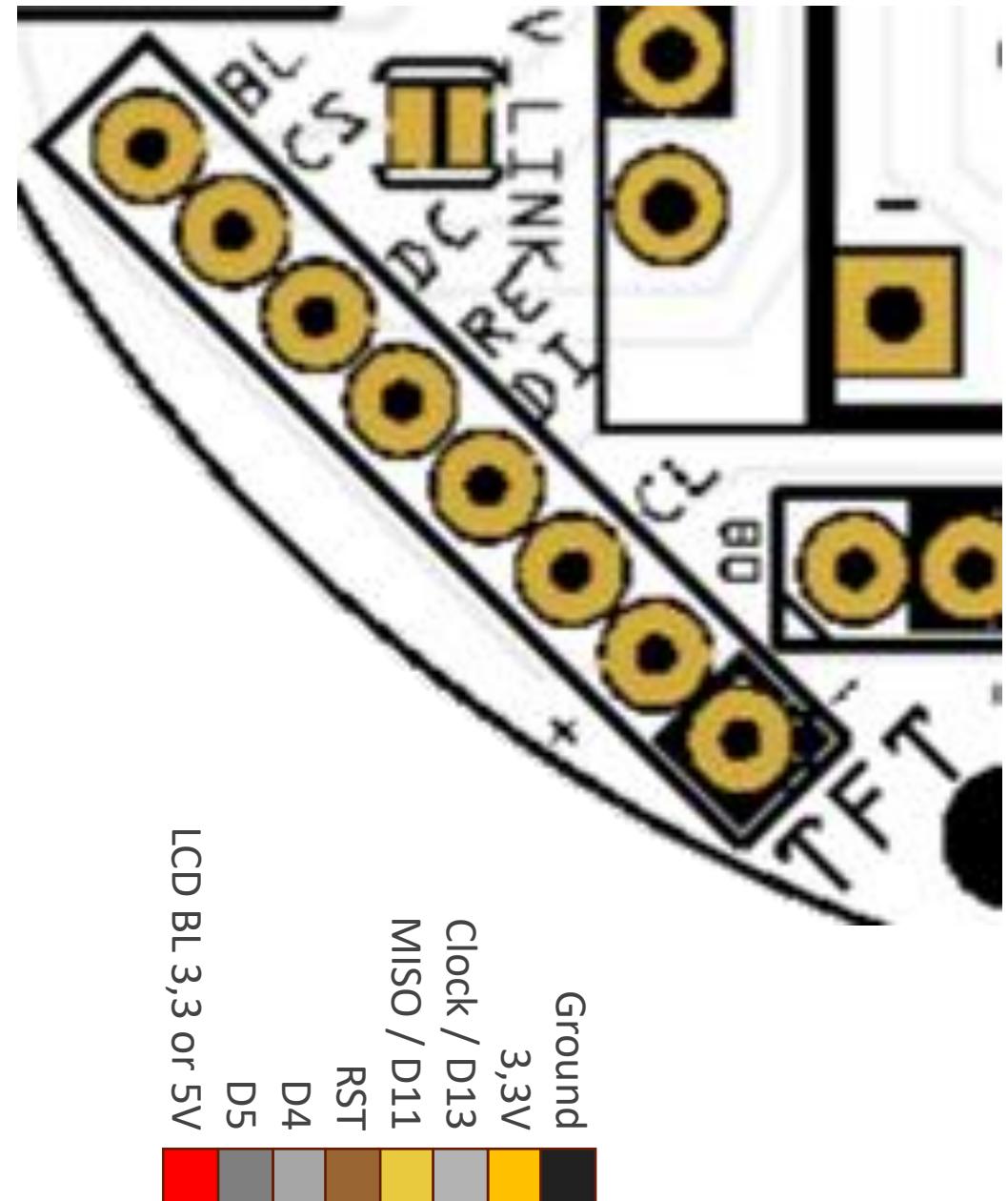
You can hook up an OLED display. Nothing special here to connect it



# TFT LCD

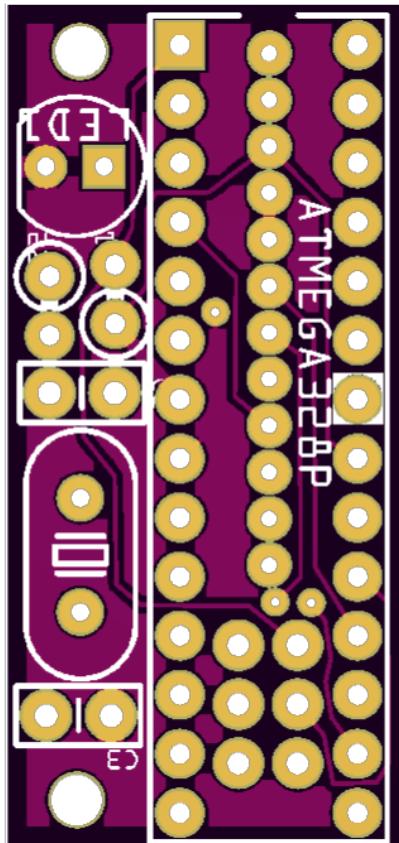
You can hook up an TFT LCD display to the board.  
ESP32 can drive ST7735, ILI93XX, ILI94XX families of  
LCD drivers.

There is a wide variety of sizes and resolutions  
available for 5-15€

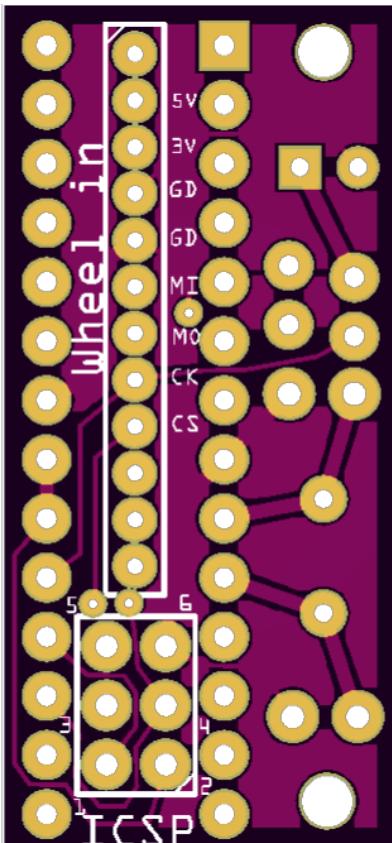


# F\_Interface - ATMEGA328P\_NO\_HEADER

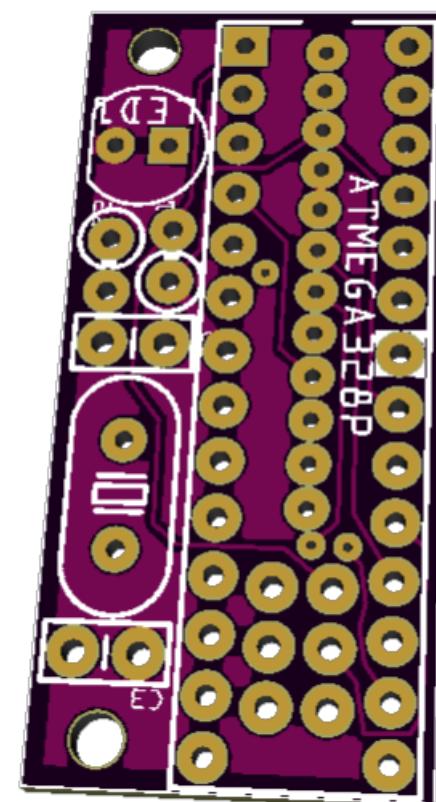
Front



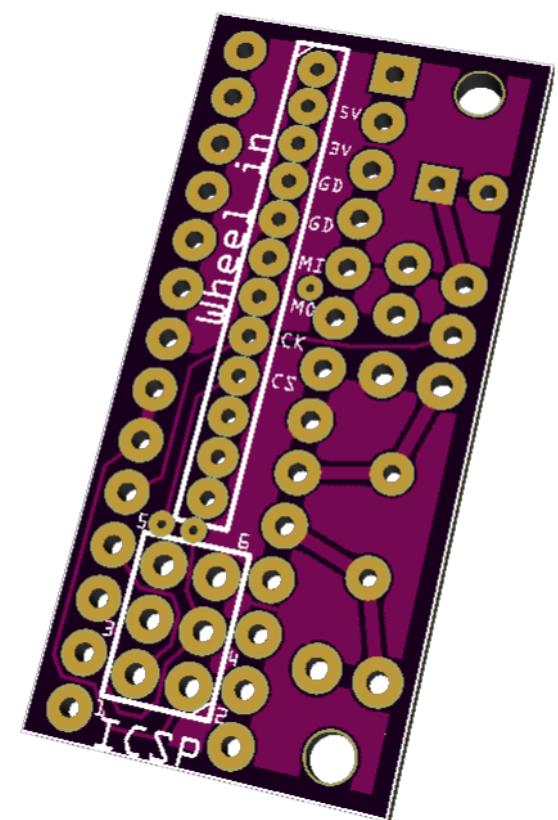
Back



3D Front

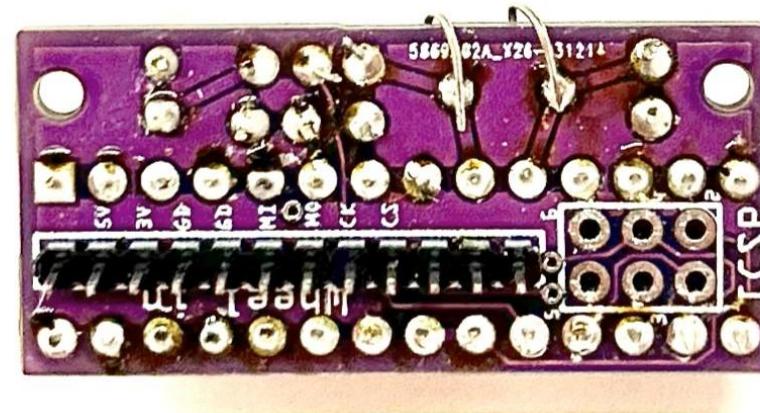
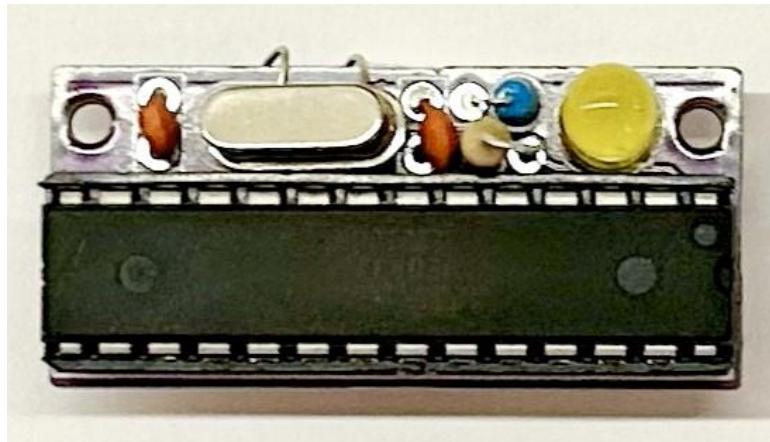


3D Back

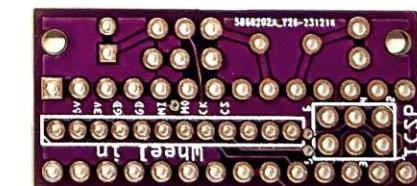
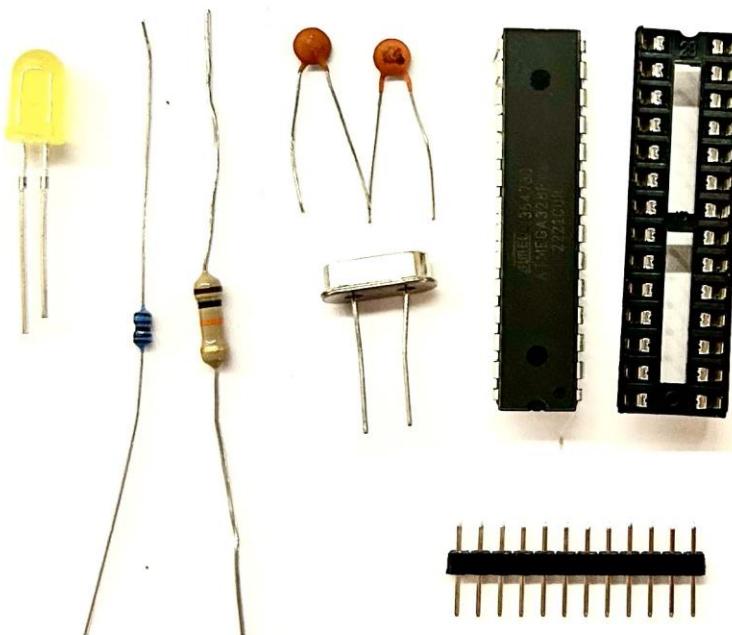


# F\_Interface - ATMEGA328P\_NO\_HEADER

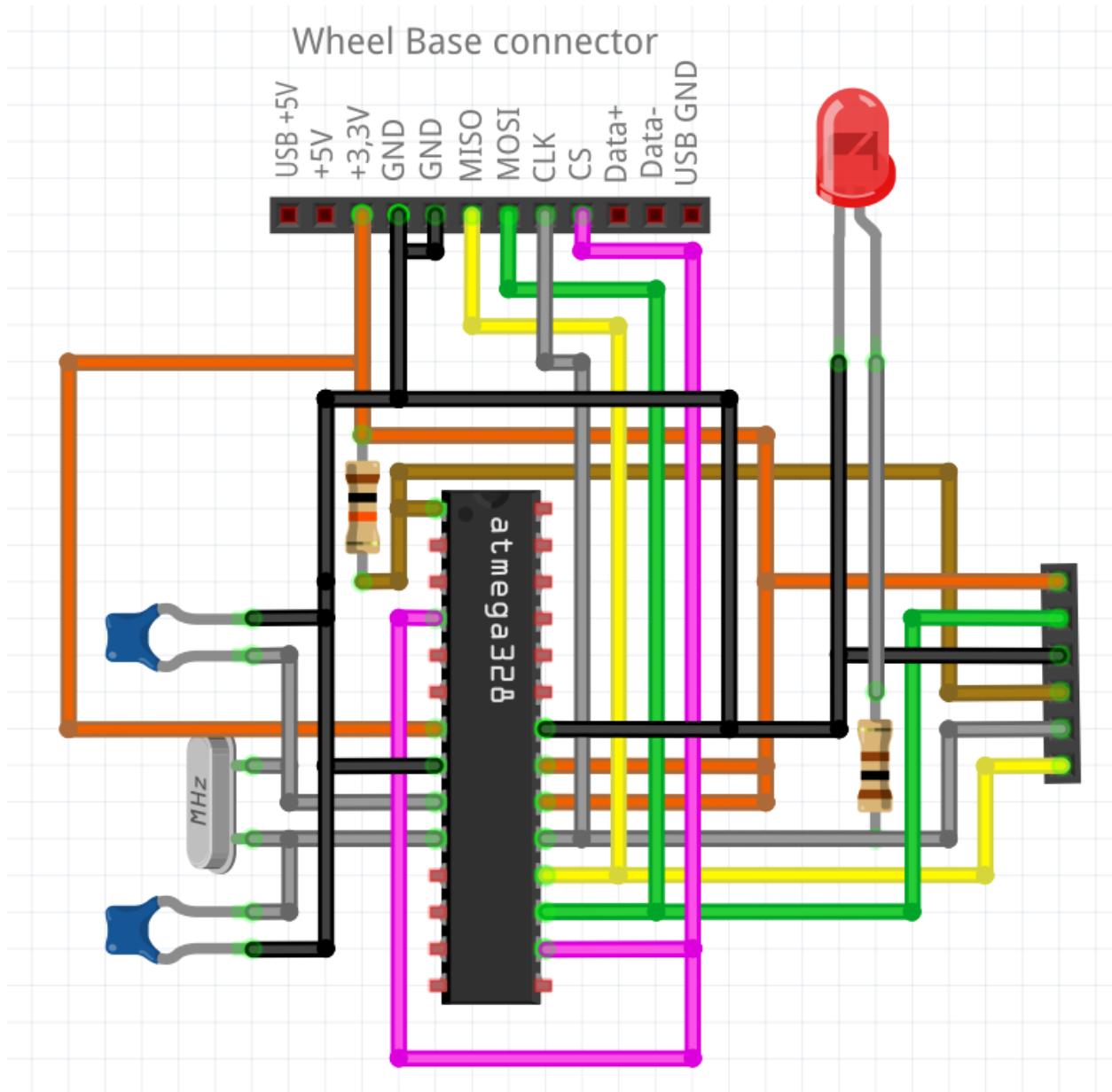
Picture



BOM

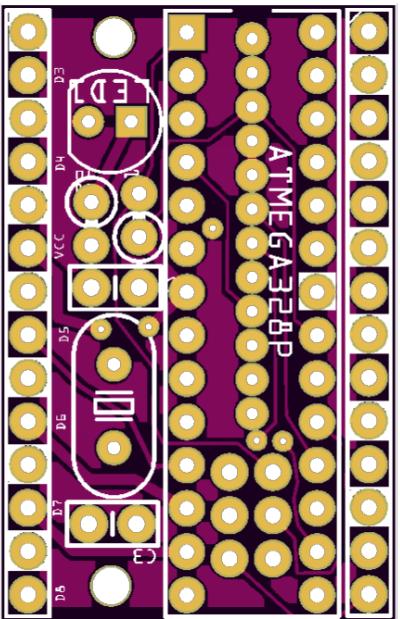


# F\_Interface - ATMEGA328P\_NO\_HEADER

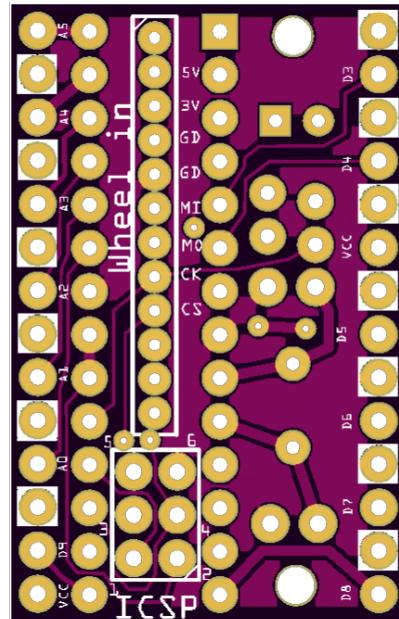


# F\_Interface – ATMEGA328P\_WITH\_HEADER

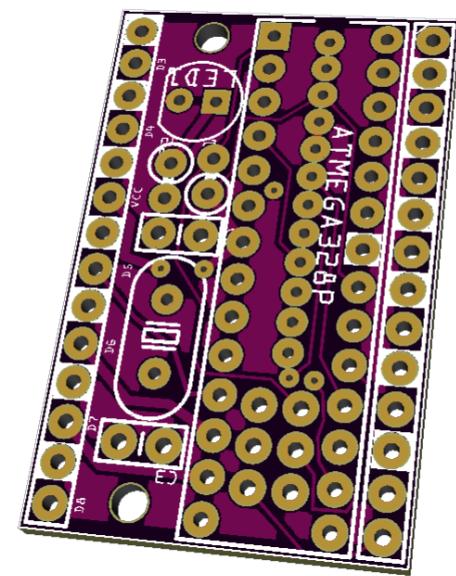
Front



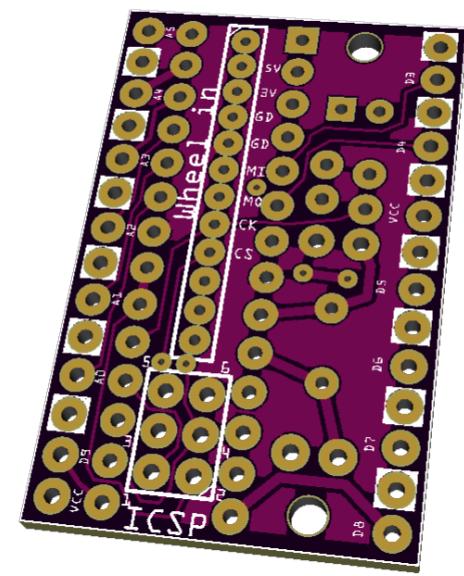
Back



## 3D Front

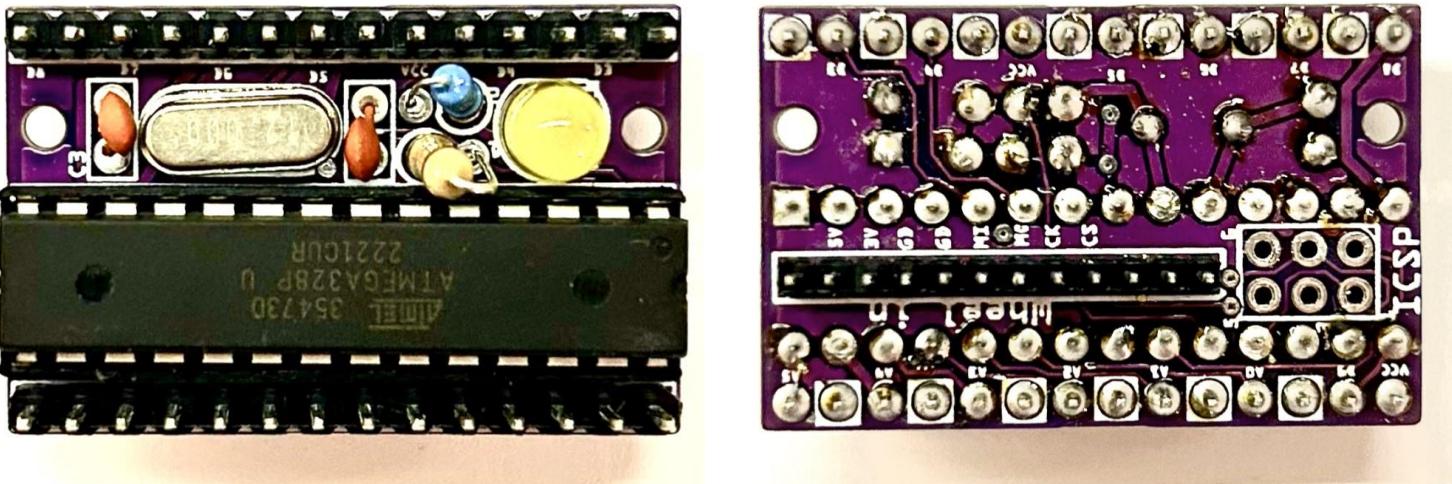


3D Back

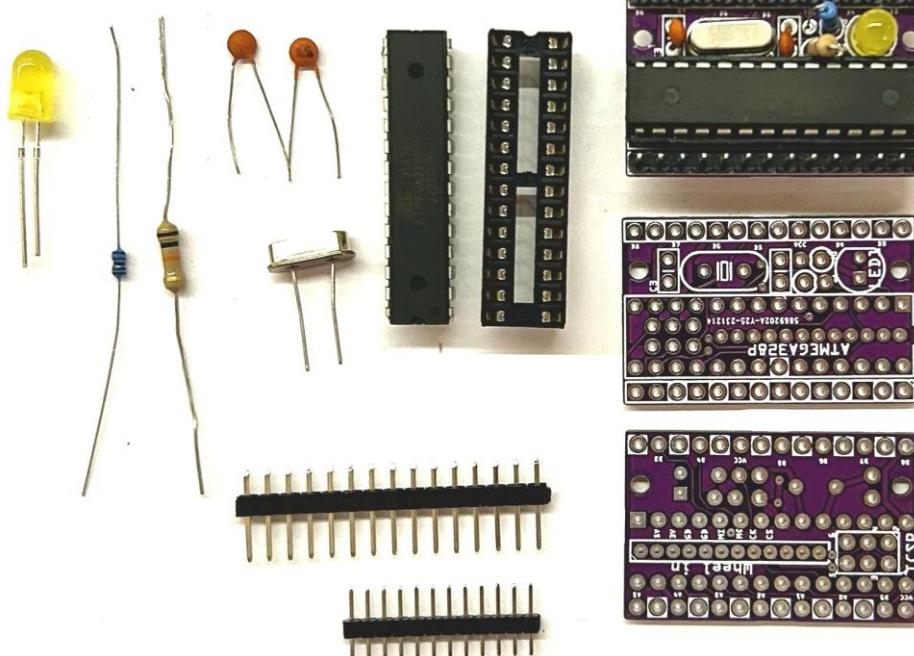


# F\_Interface – ATMEGA328P\_WITH\_HEADER

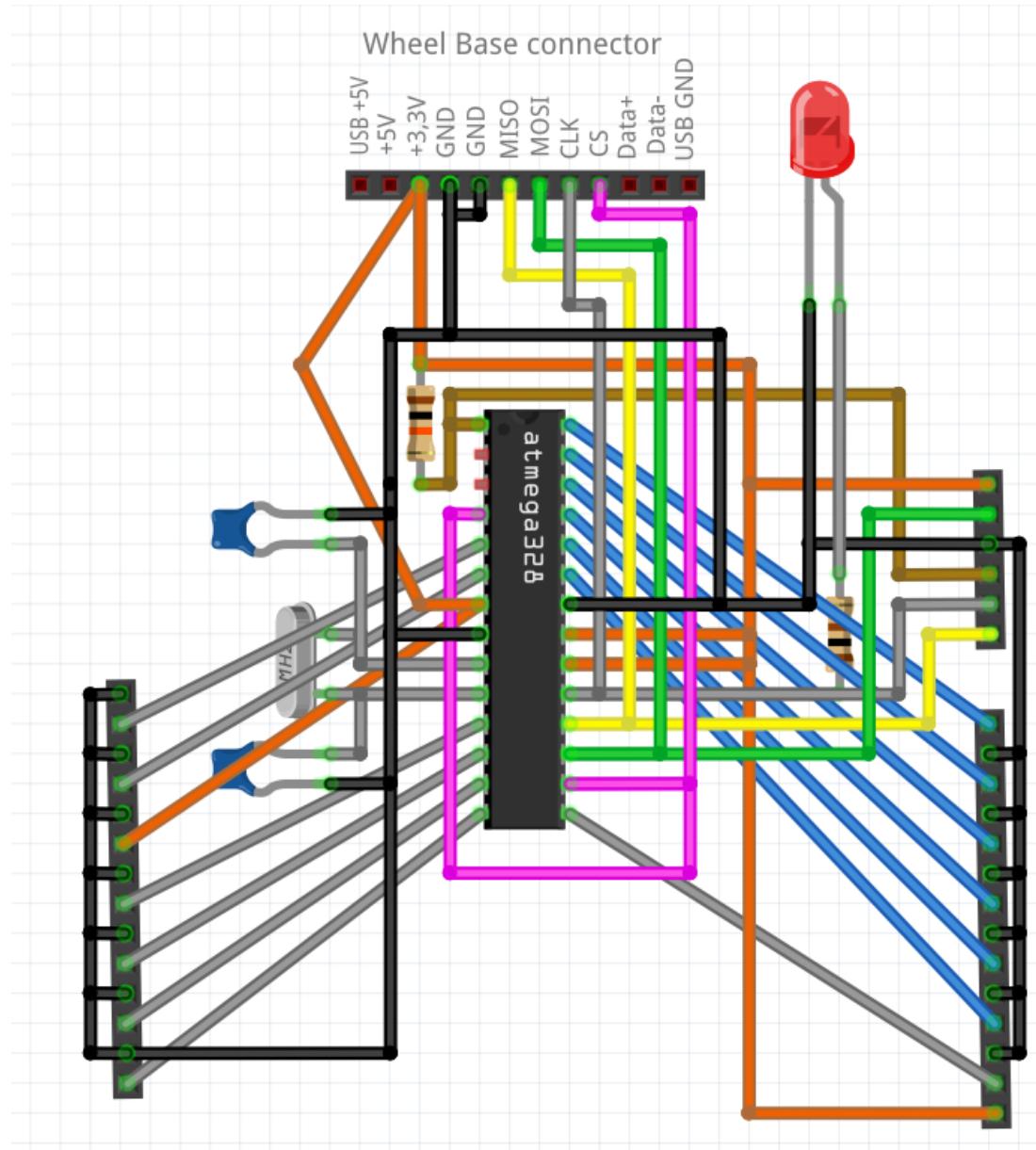
Picture



BOM

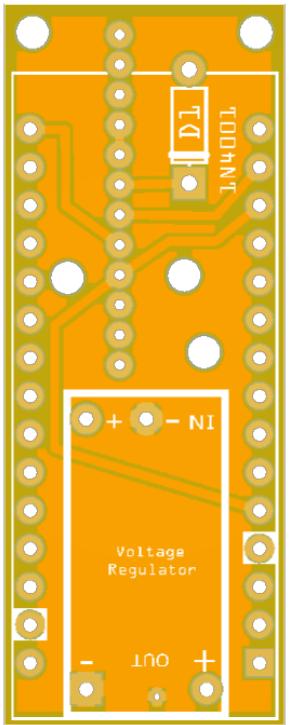


# F\_Interface – ATMEGA328P\_WITH\_HEADER

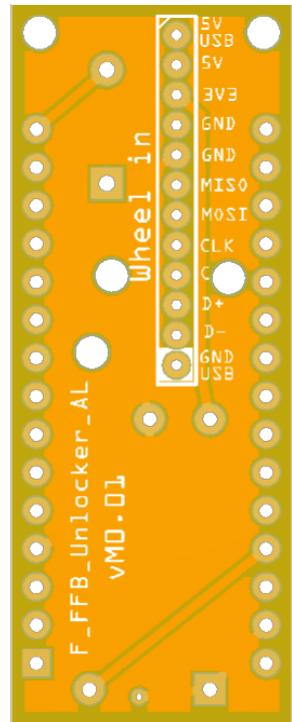


# F\_Interface - NANO\_NO\_HEADER

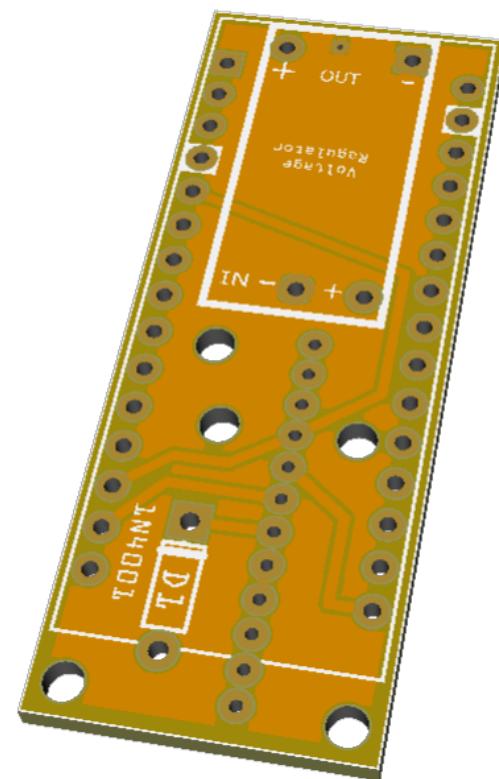
Front



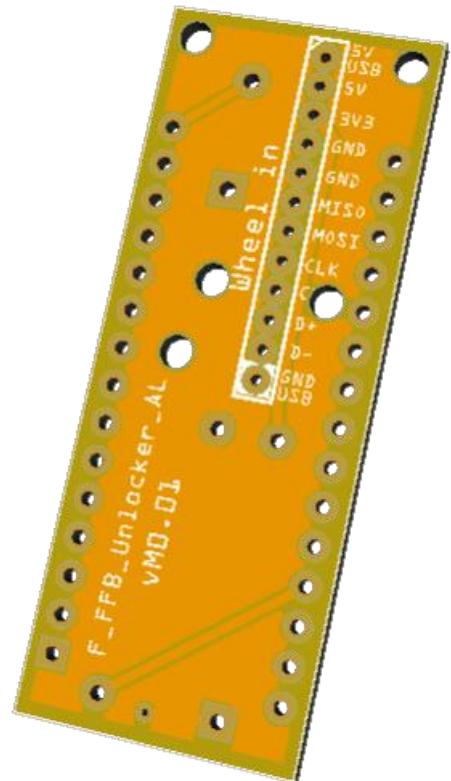
Back



3D Front

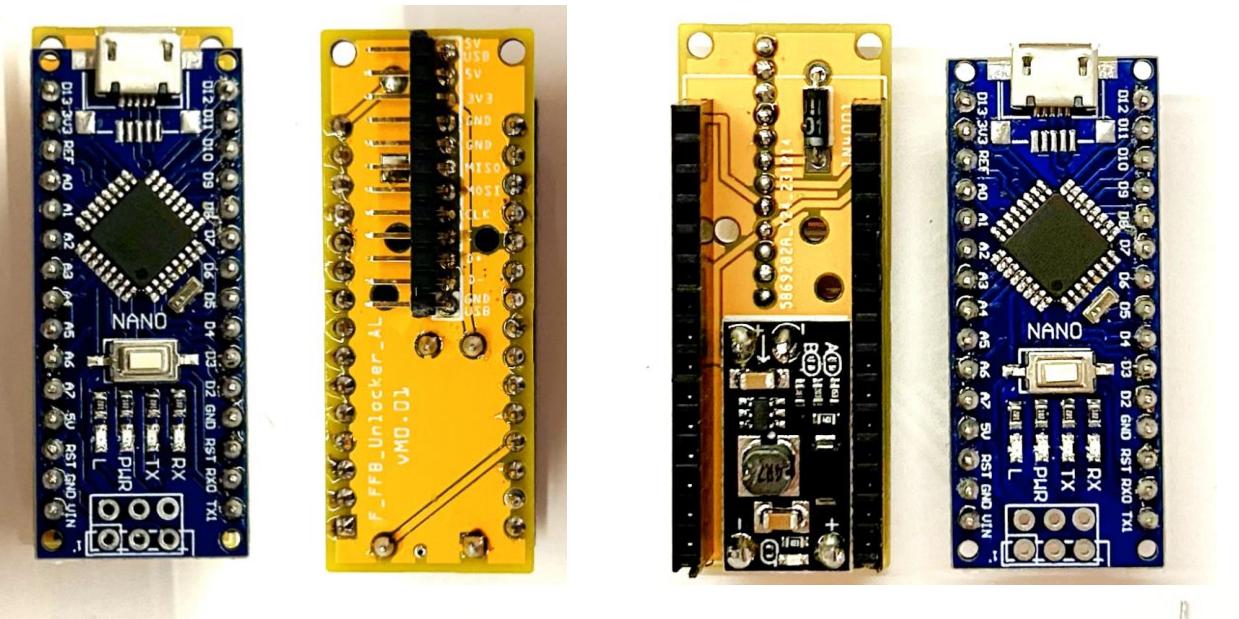


3D Back

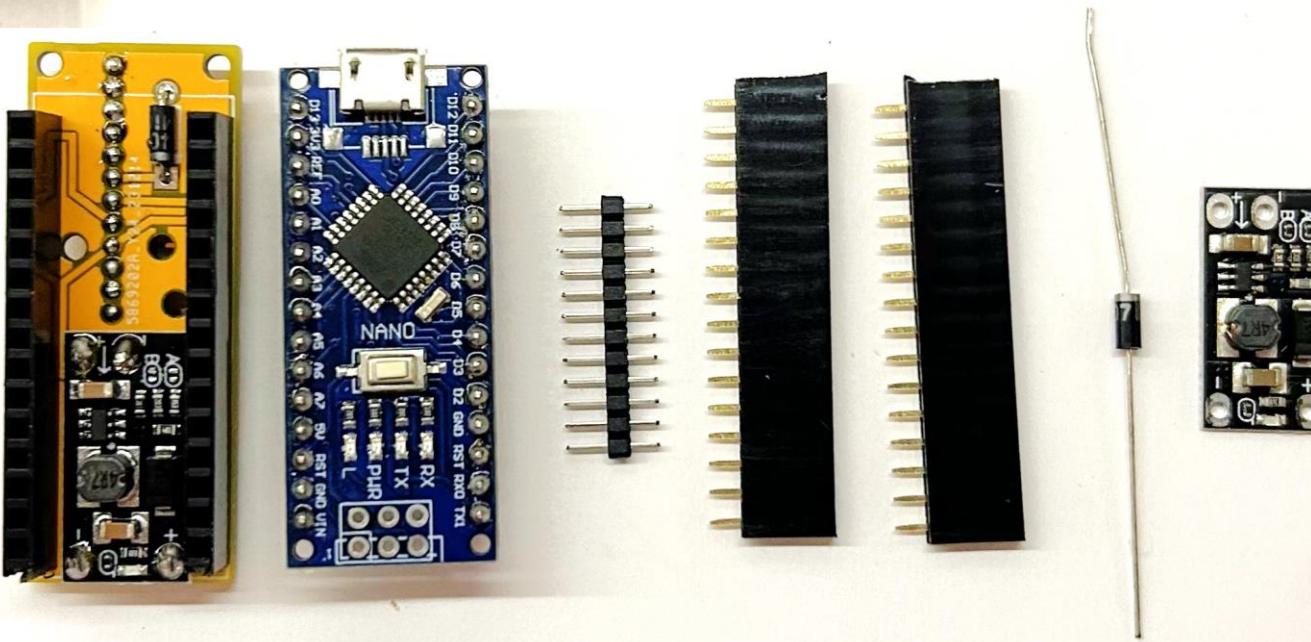


# F\_Interface - NANO\_NO\_HEADER

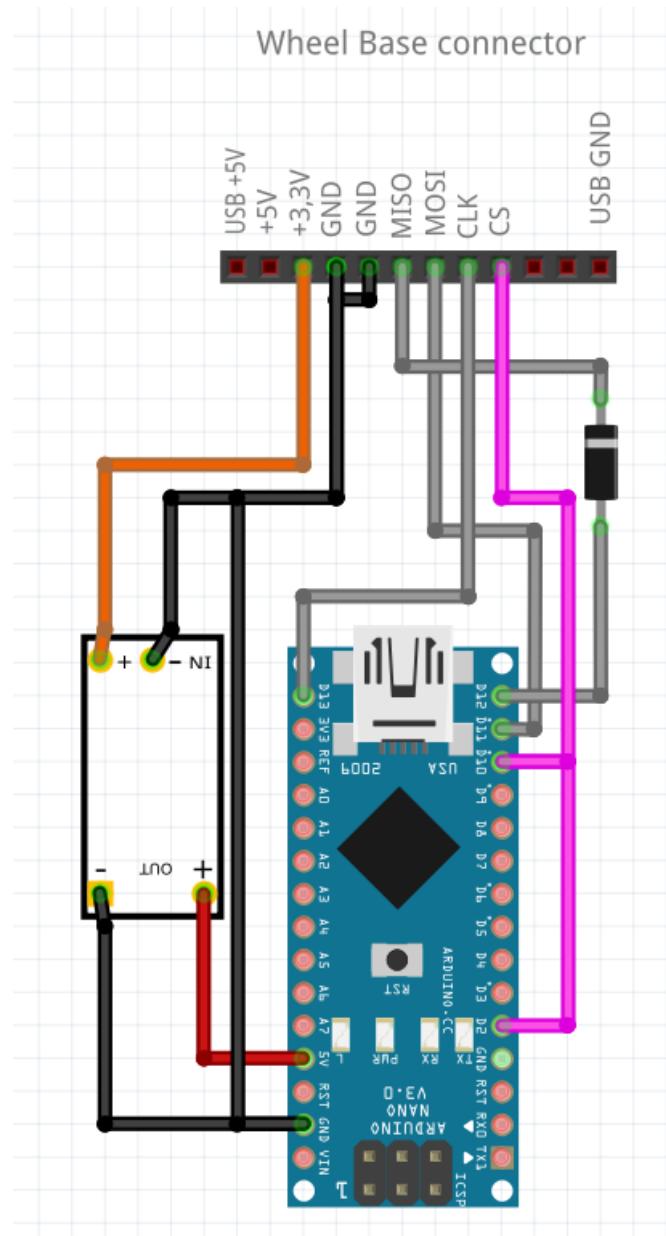
Picture



BOM

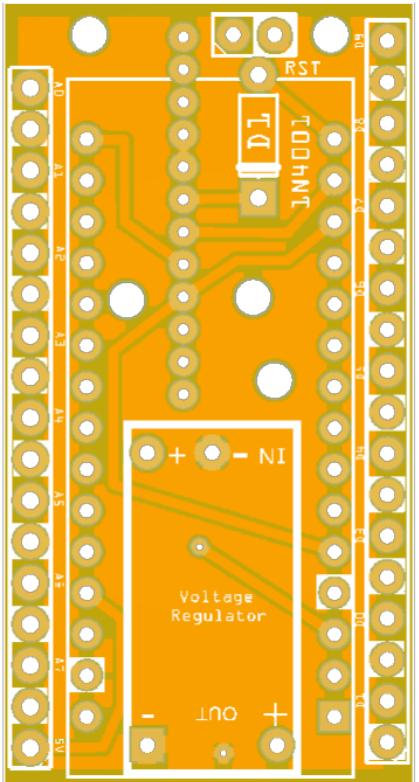


# F\_Interface - NANO\_NO\_HEADER

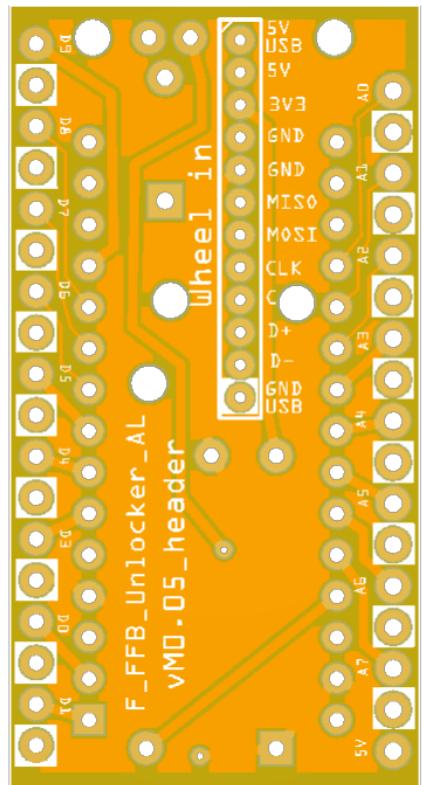


# F\_Interface - NANO\_WITH\_HEADER

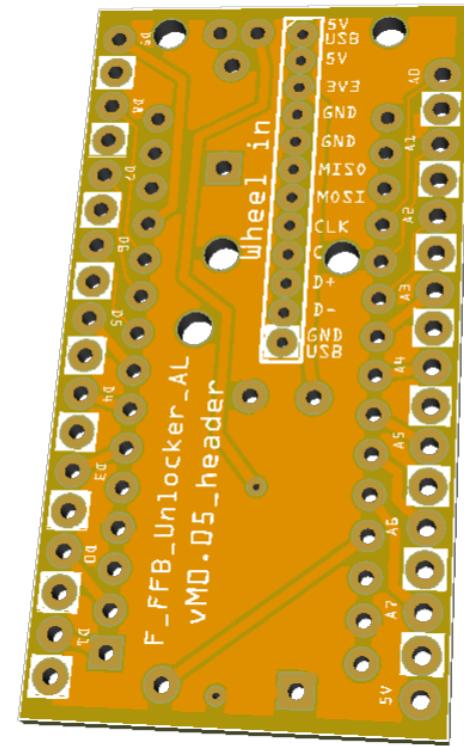
Front



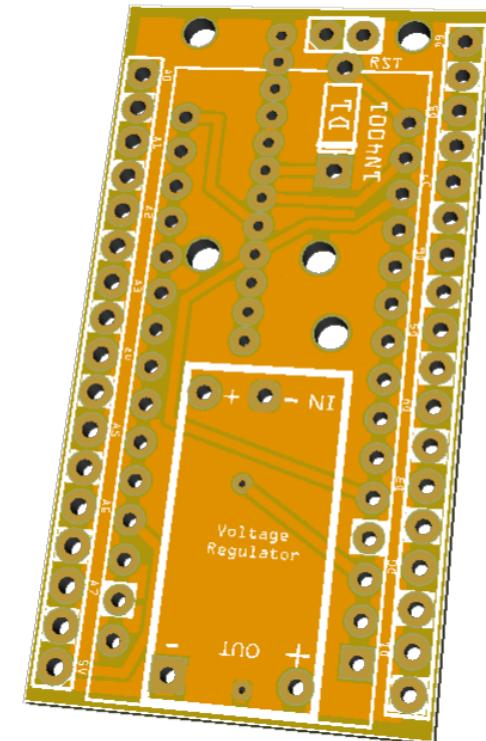
Back



3D Front



3D Back

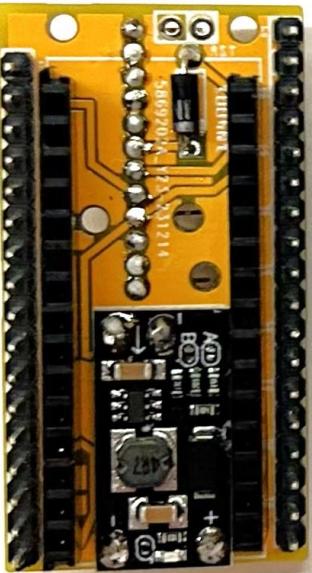


# F\_Interface - NANO\_WITH\_HEADER

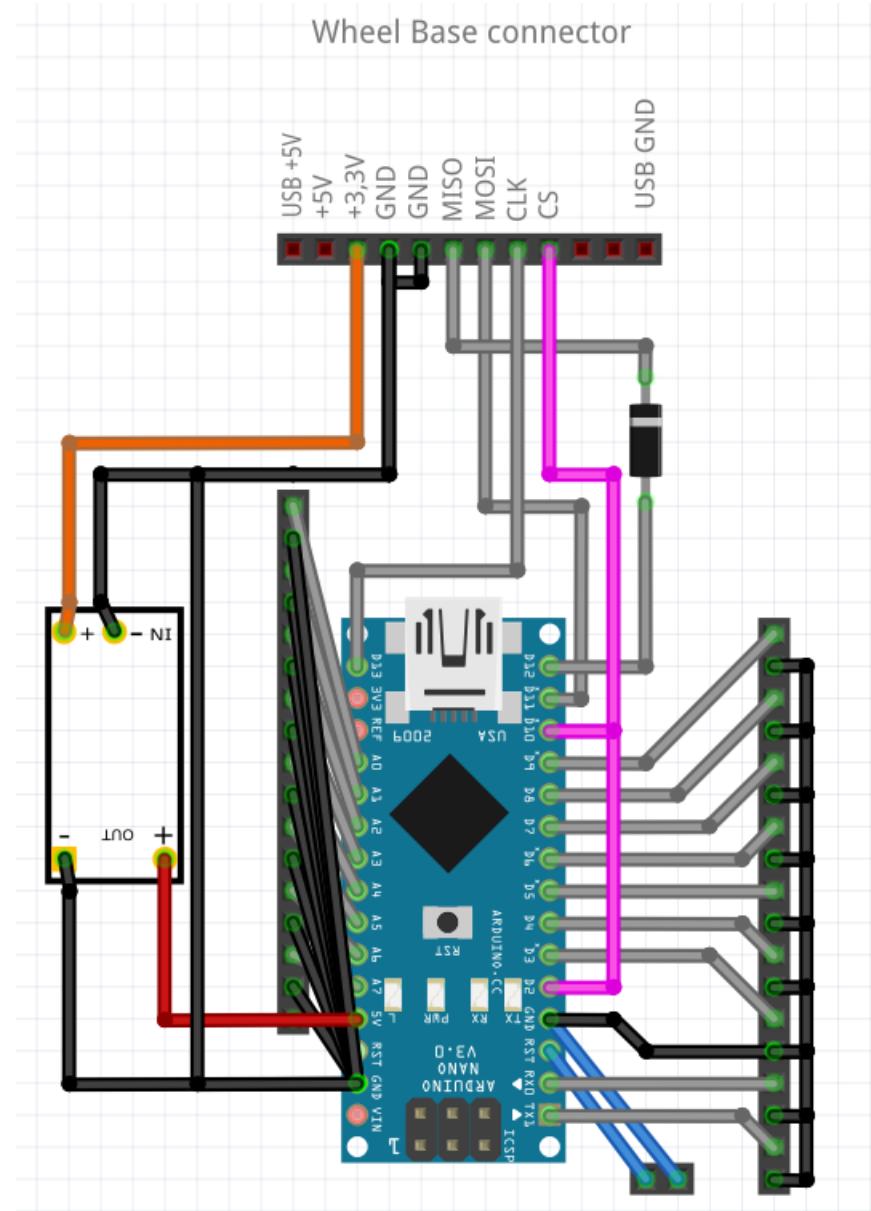
Picture



BOM

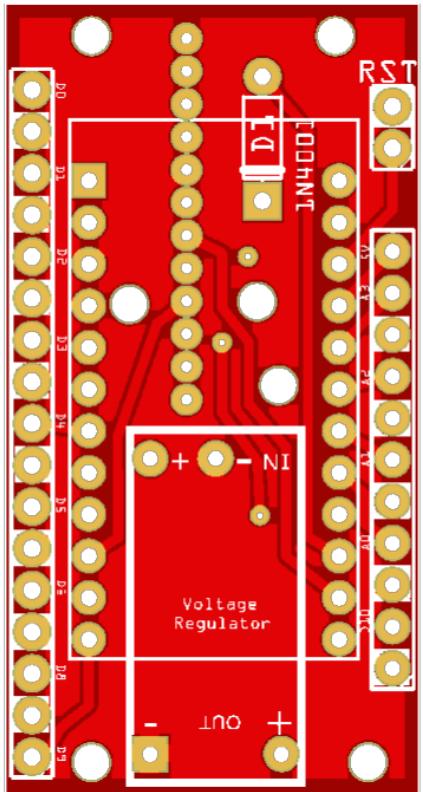


# F\_Interface - NANO\_WITH\_HEADER

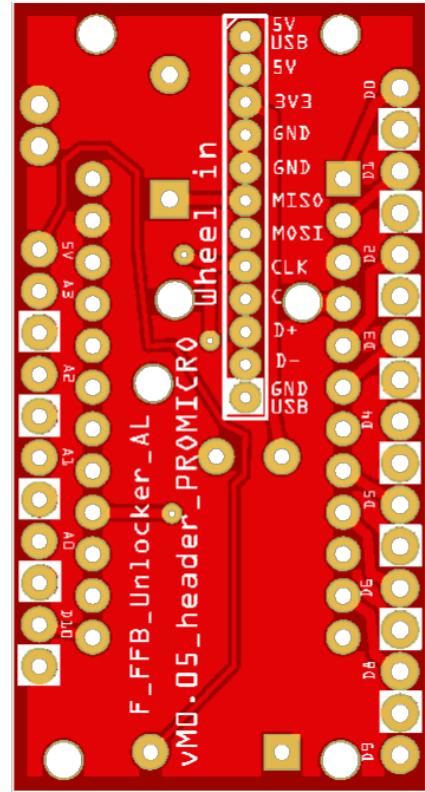


# F\_Interface - MICRO\_WITH\_HEADER

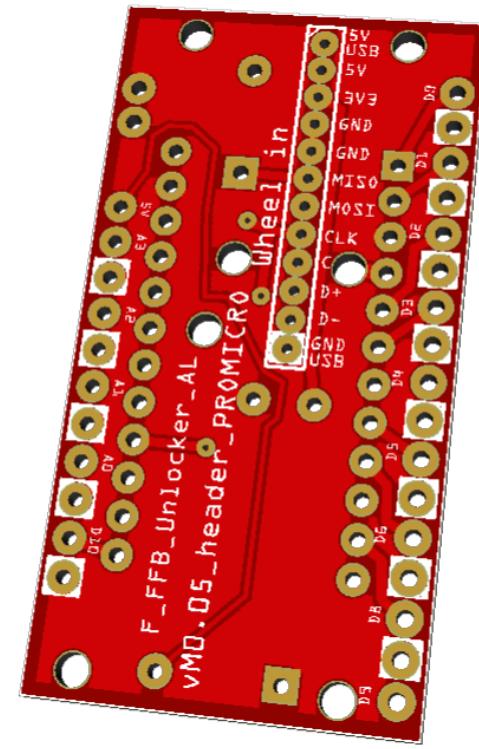
Front



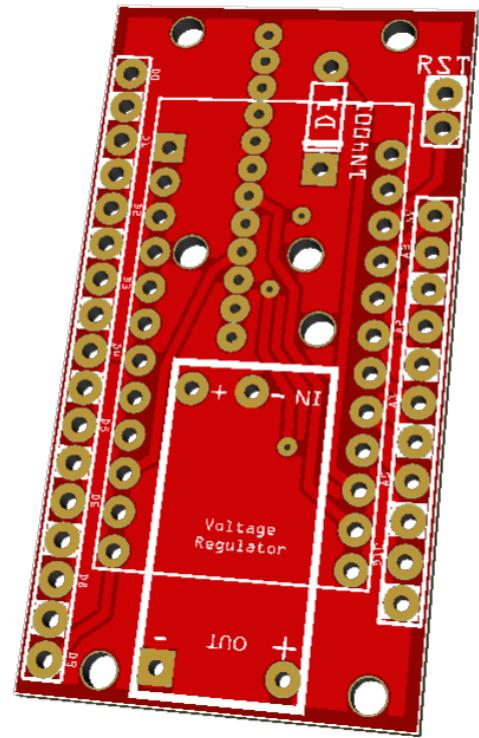
Back



3D Front

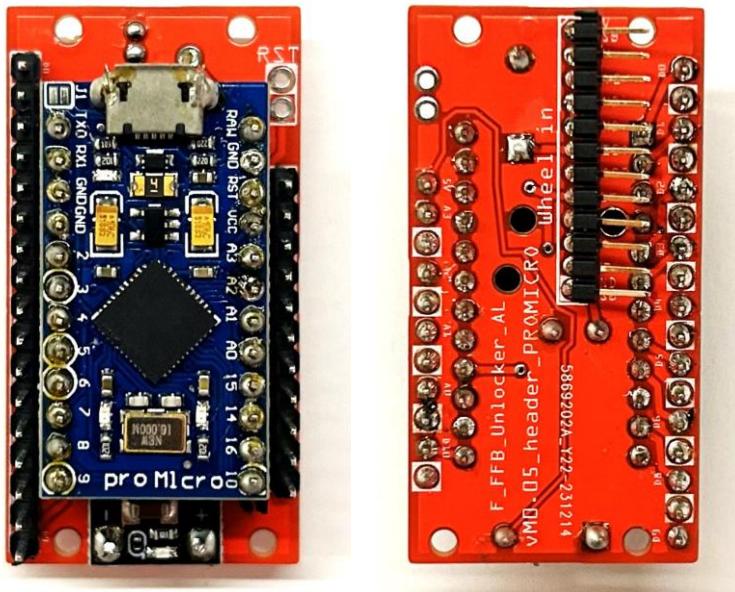


3D Back

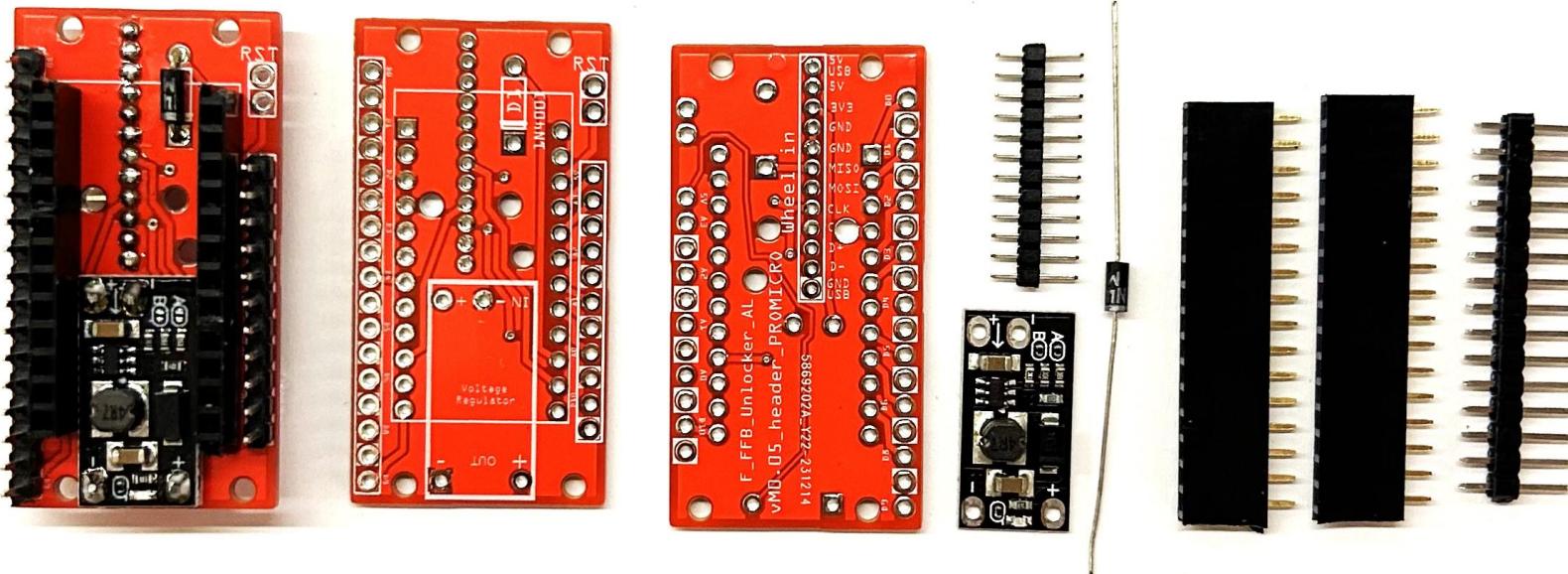


# F\_Interface - MICRO\_WITH\_HEADER

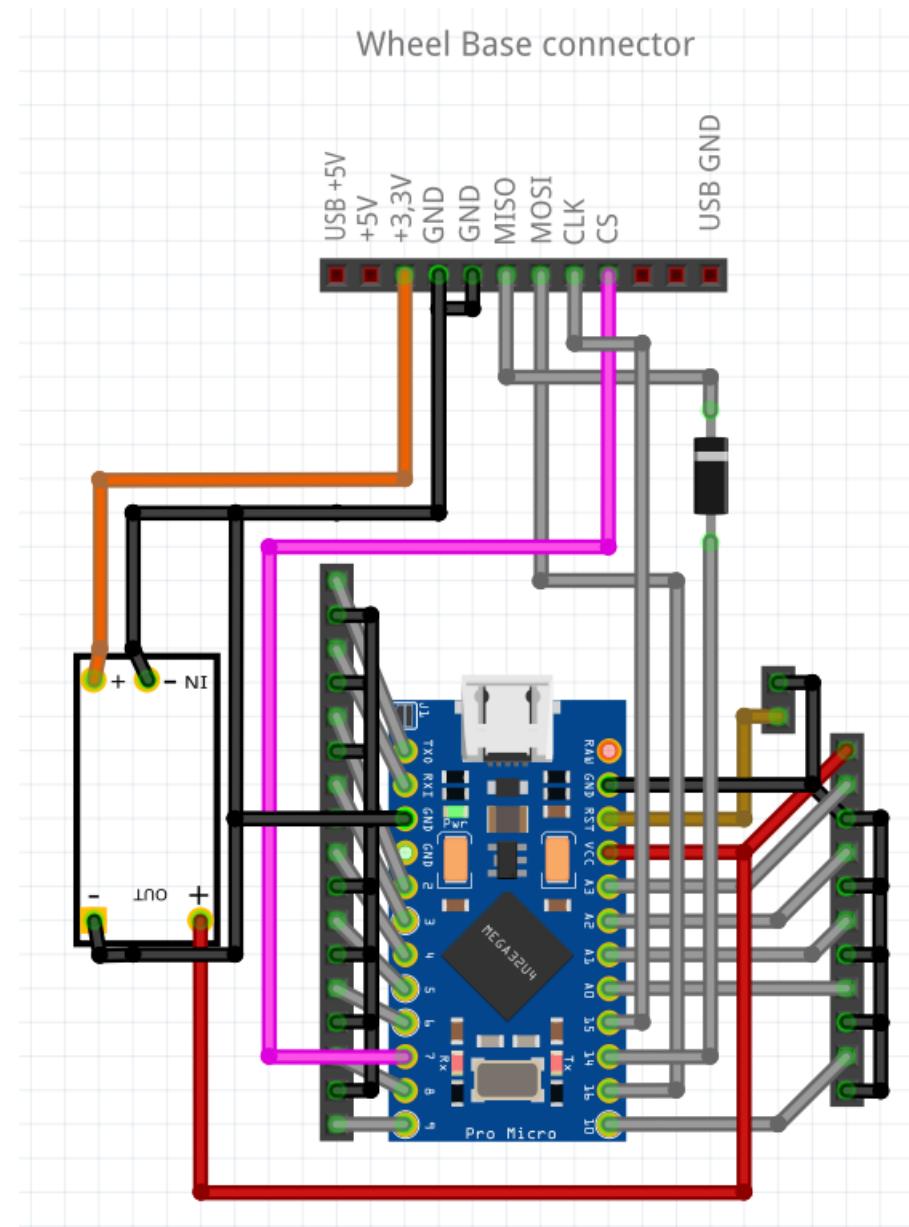
Picture



BOM

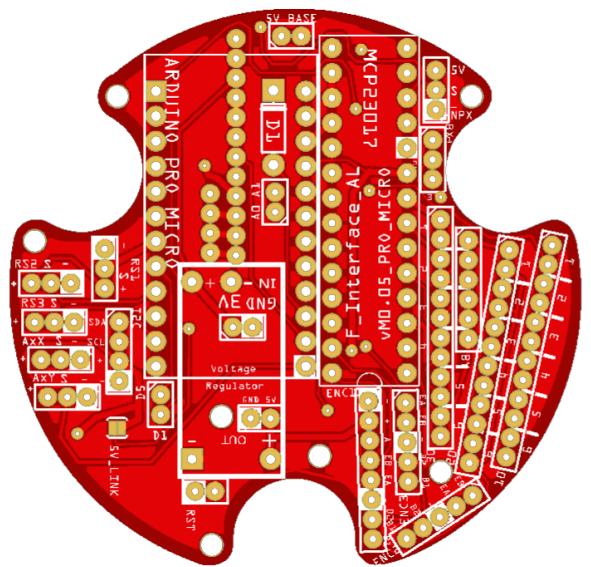


# F\_Interface - MICRO\_WITH\_HEADER

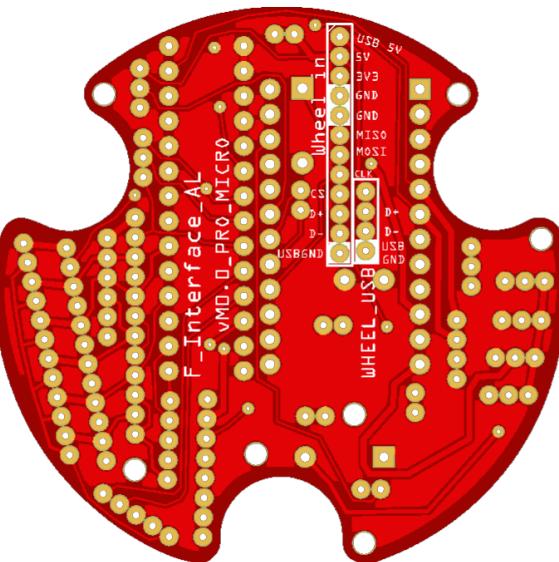


# F\_Interface – FULL\_MICRO

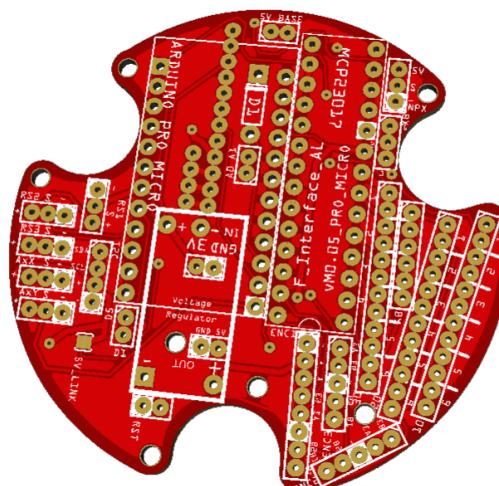
Front



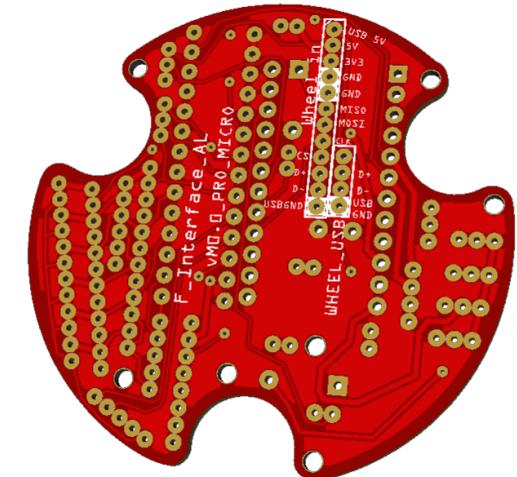
Back



3D Front

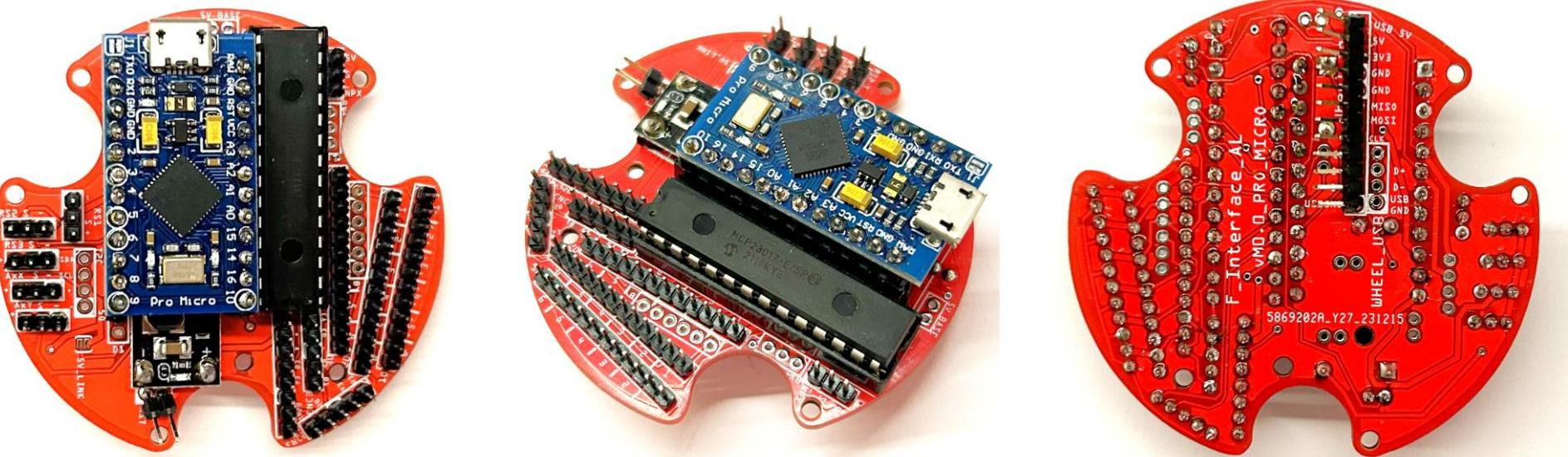


3D Back

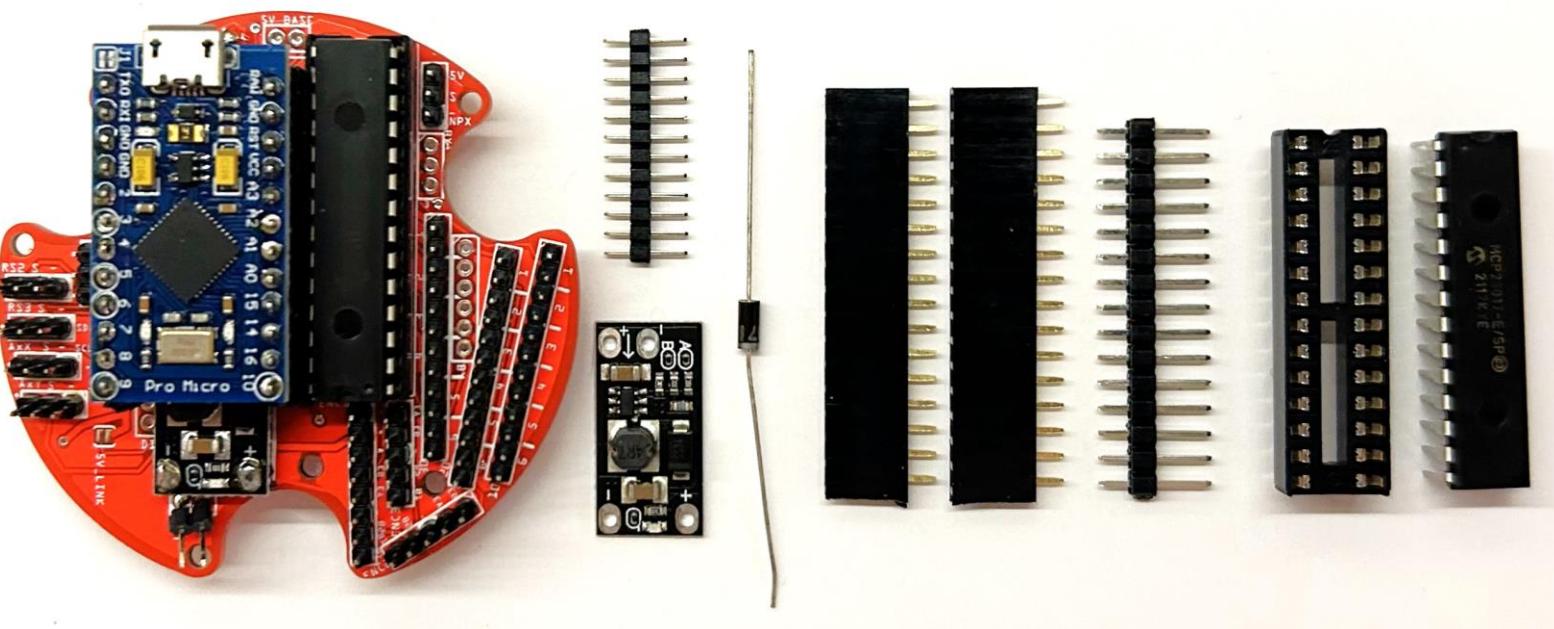


# F\_Interface – FULL\_MICRO

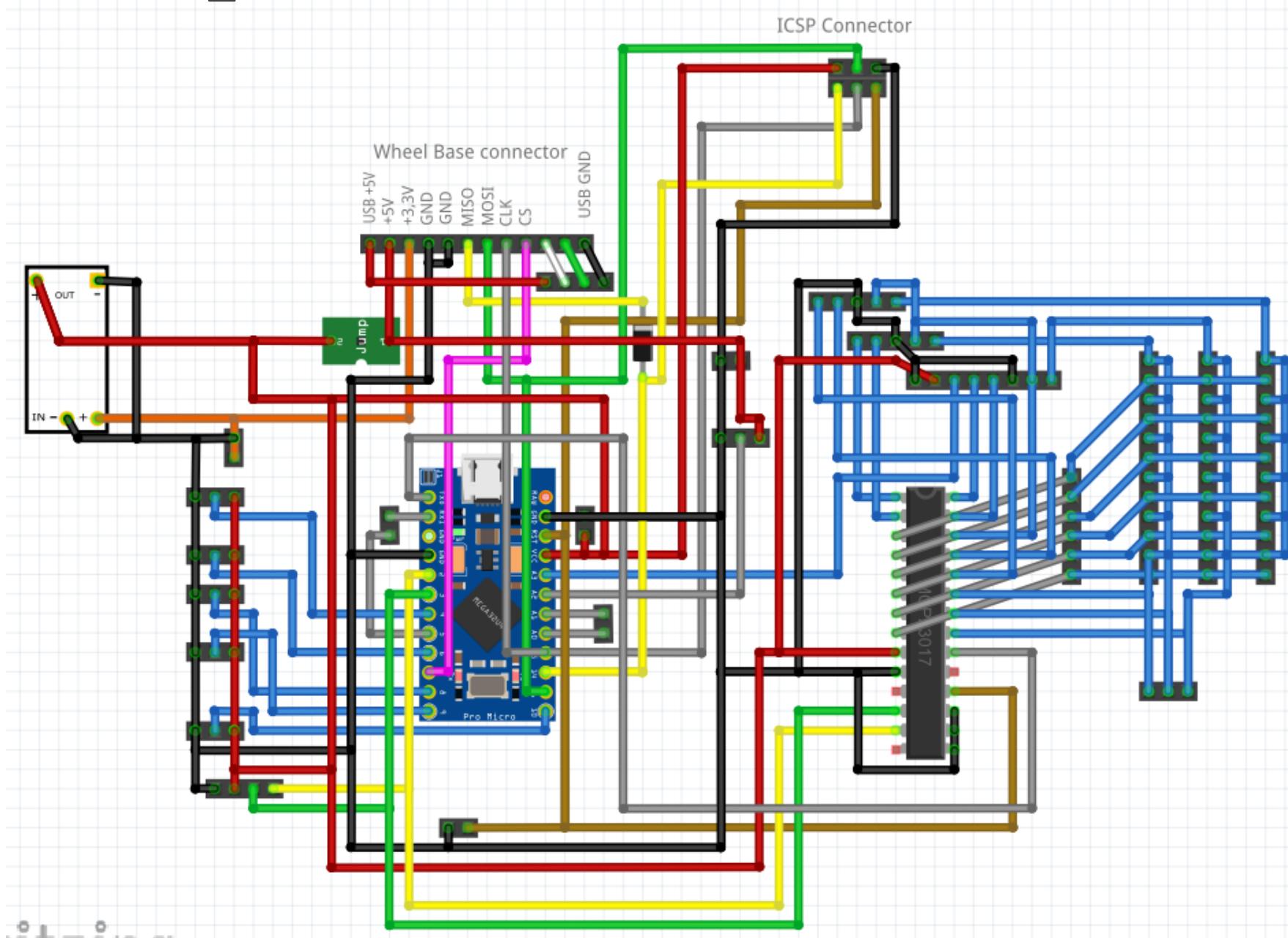
## Picture



BOM

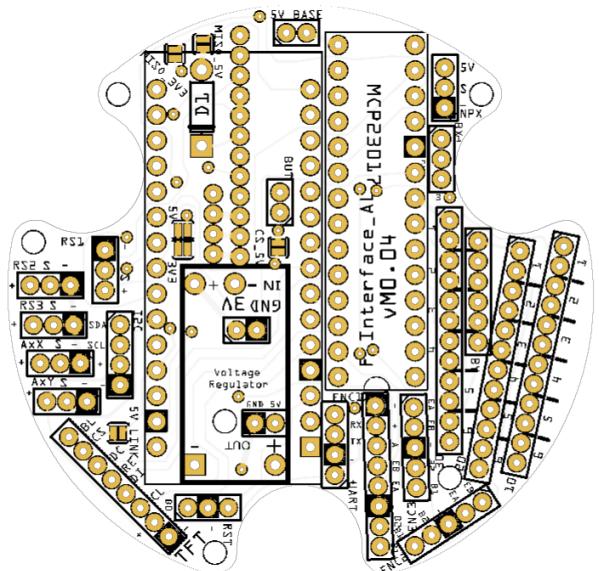


# F\_Interface – FULL\_MICRO

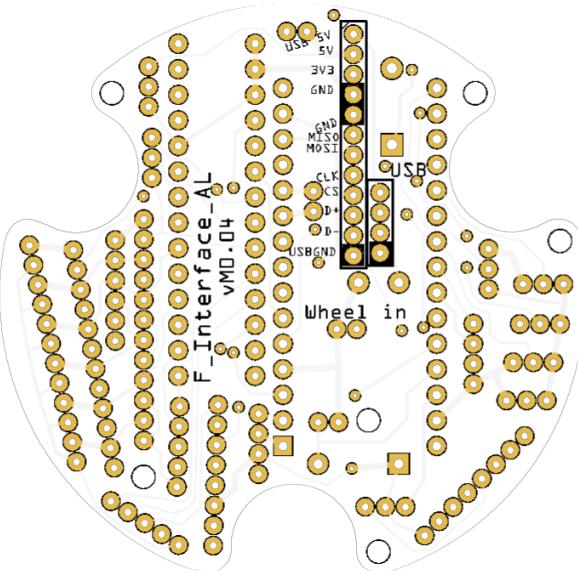


# F\_Interface – FULL\_NANO

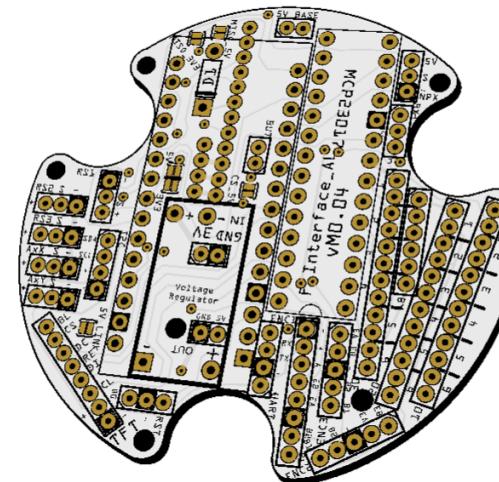
Front



Back



3D Front

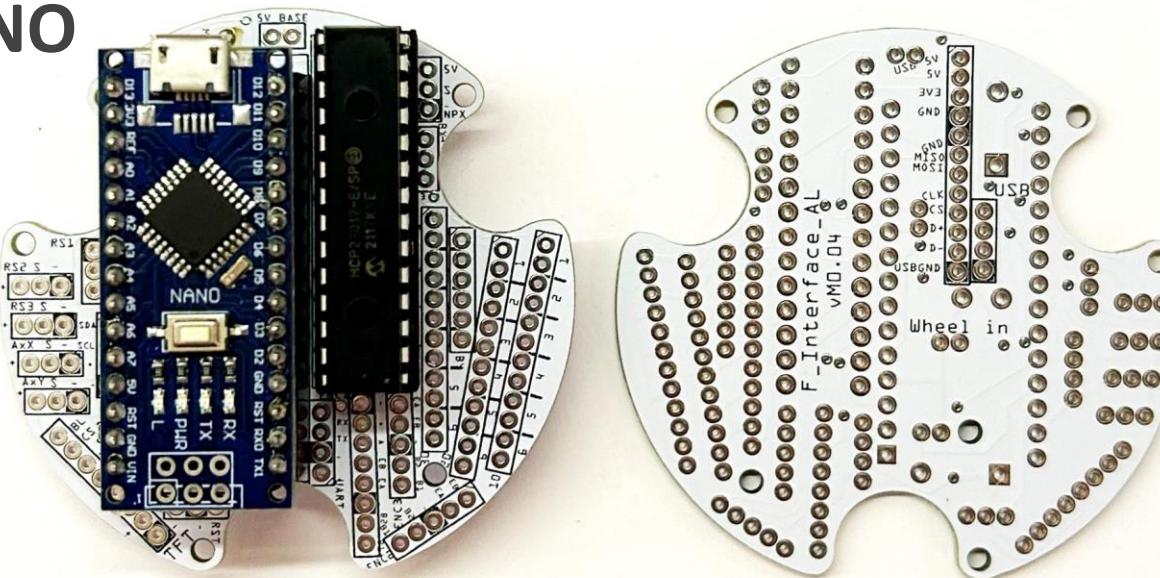


3D Back

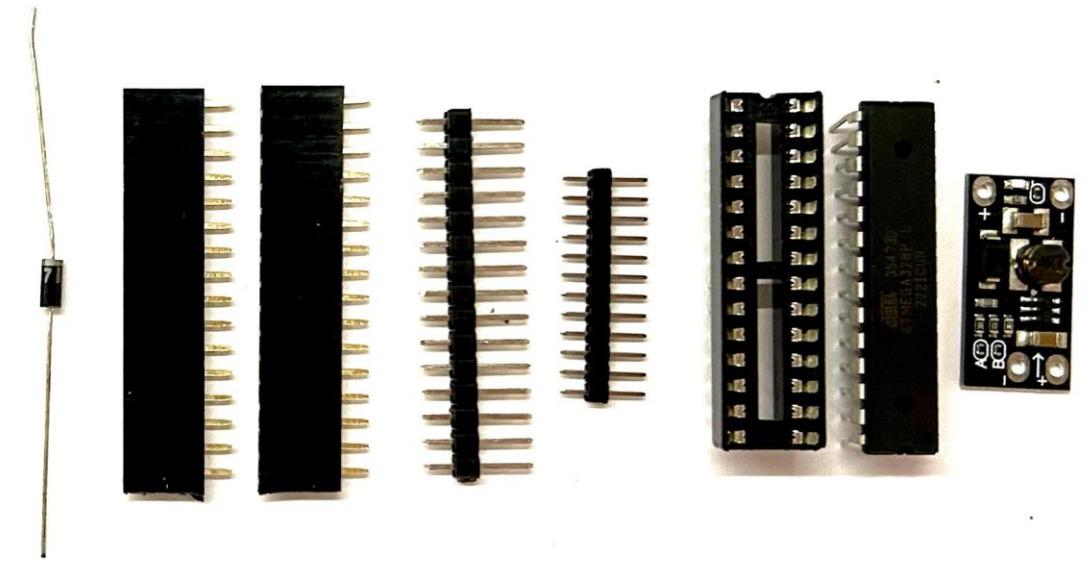
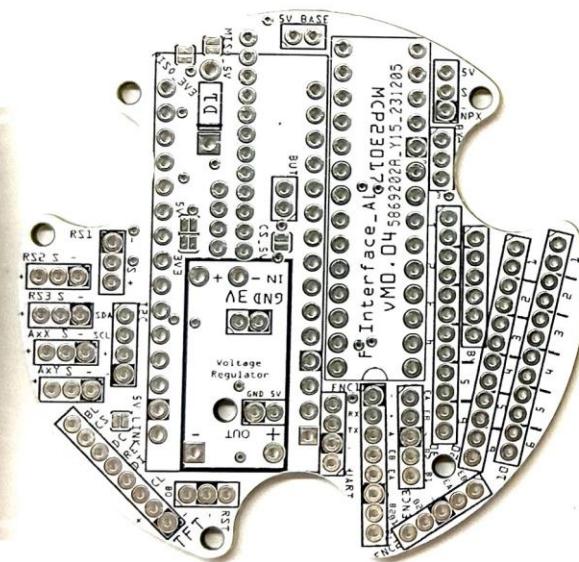


# F\_Interface – FULL\_NANO

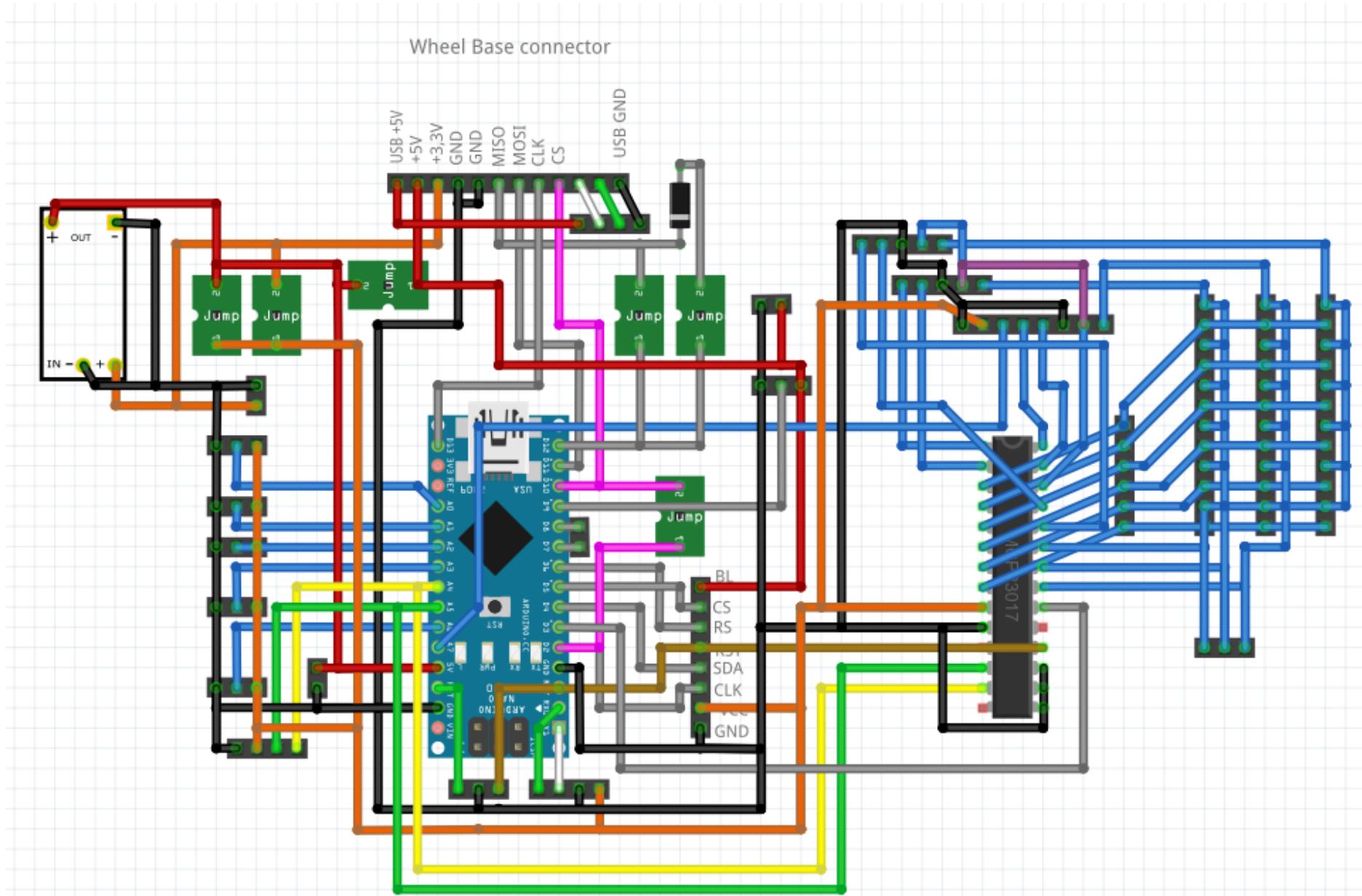
Picture



BOM

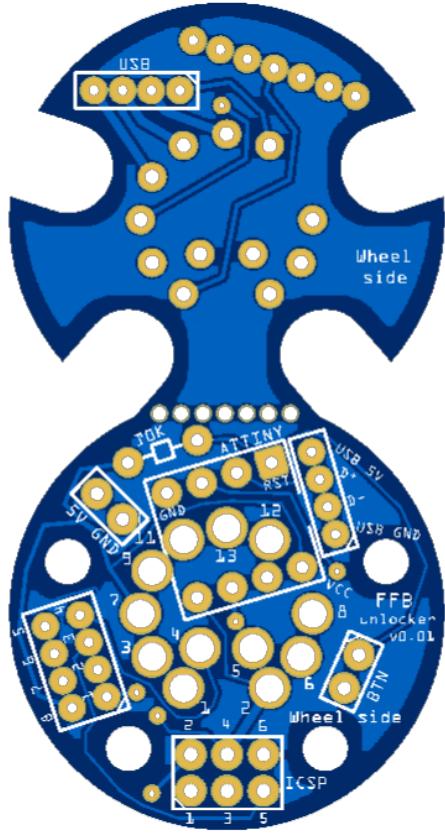


# F\_Interface – FULL\_NANO

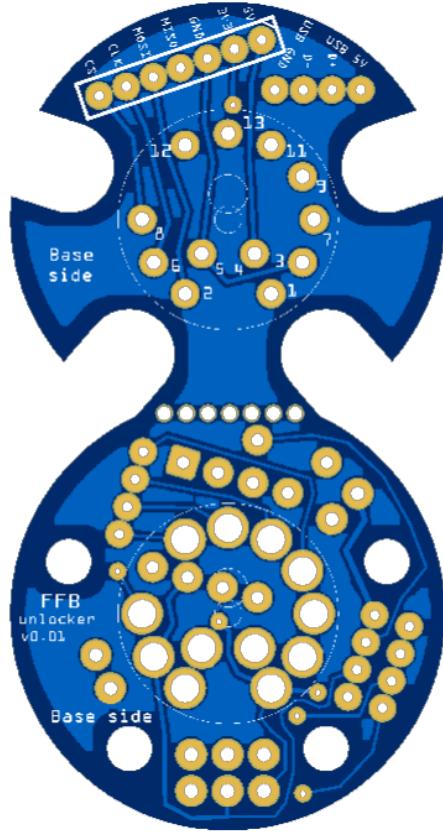


# F\_Interface – ATTINY85\_NO\_HEADER

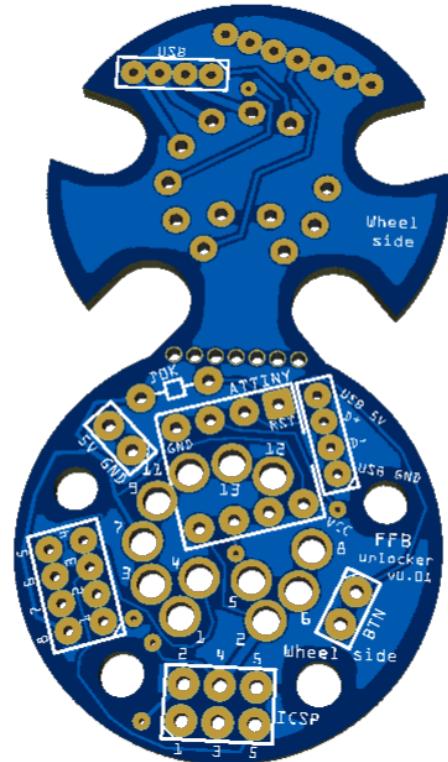
Front



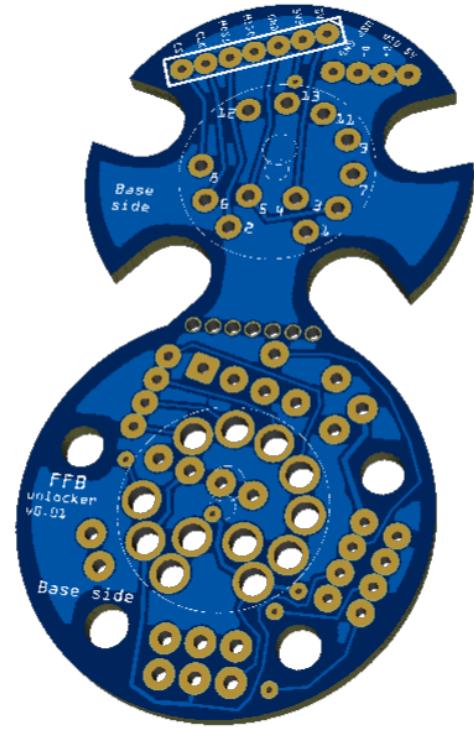
Back



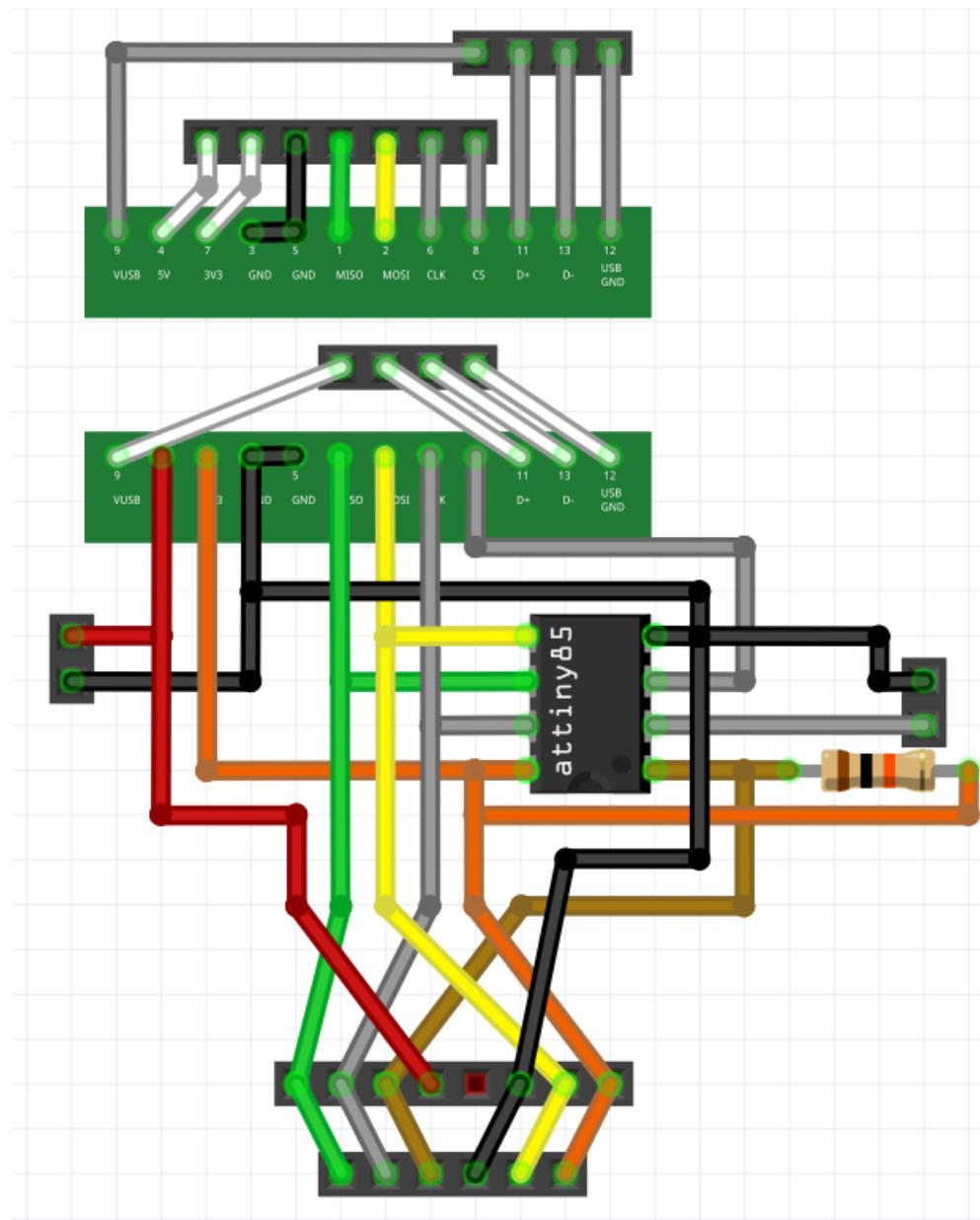
3D Front



3D Back

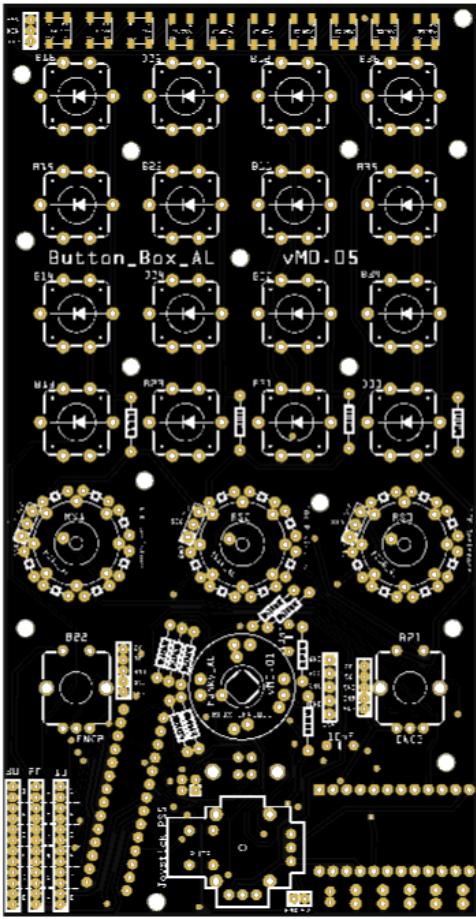


# F\_Interface – ATTINY85\_NO\_HEADER

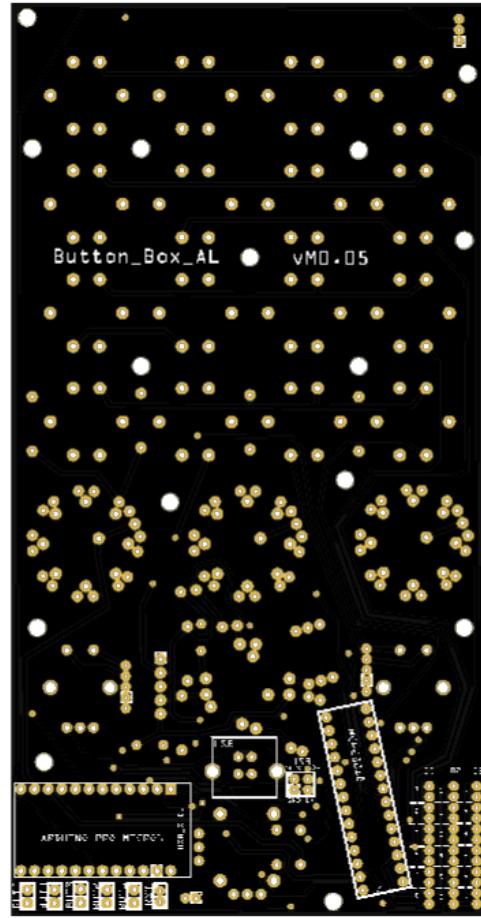


# F\_Interface – BUTTON\_BOX

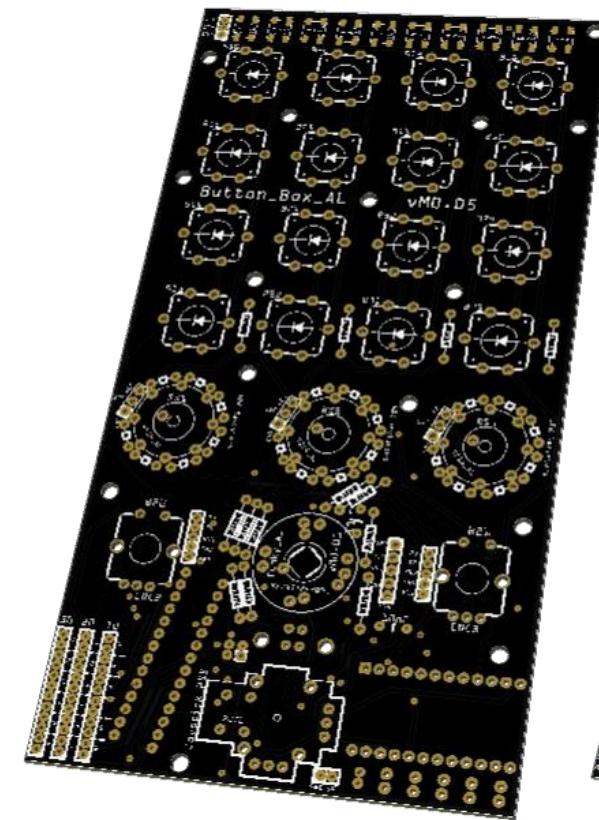
Front



Back



3D Front



## 3D Back



# F\_Interface – BUTTON\_BOX