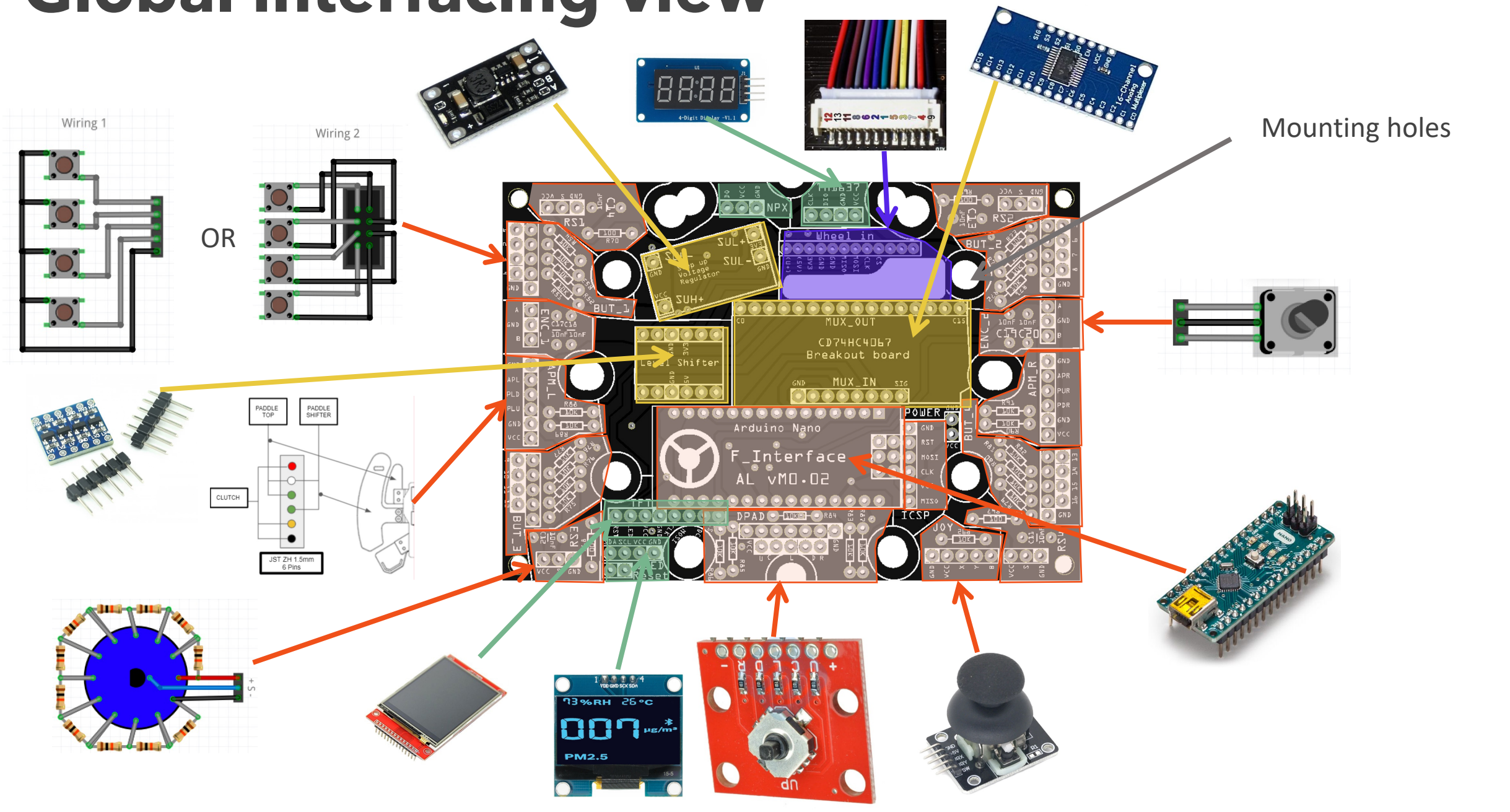
F_Interface_AL v0.02 presentation

Global interfacing view



BOM

- 1 arduino nano (Approx. 3€)
- 1 PCB (Approx. 5-7€ if ordered by 5 on JLCPCB)
- 1 CD74HC4067 - 16 channel multiplexer (Approx. 0,5€)
- 1 Step up voltage regulator (Approx. 2€)
- 1 Level shifter (Approx 2€)
- Depending on you build, some buttons, encoder, rotary switches,…
- Some 2,54 and 2mm pitch, straight or elbowed pin arrays to hook up your buttons, switches,…
- Up to 4x 100 Ohms Resistors for Rotary switches
- Up to 26x 10k Ohms Resitors for buttons
- Up to 8x 10 or 47 nF Capacitors for inputs debounce

I advise to take 1/6W or 1/8W resistors as they are much smaller. 1 or 1/2W resistors are too big to fit on the PCB

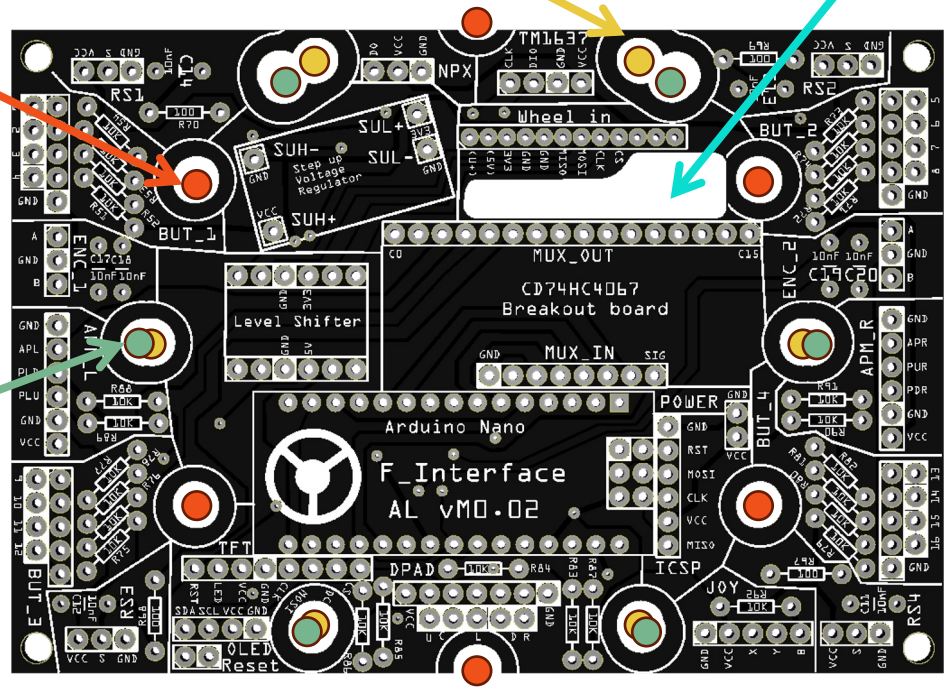
Dimensions

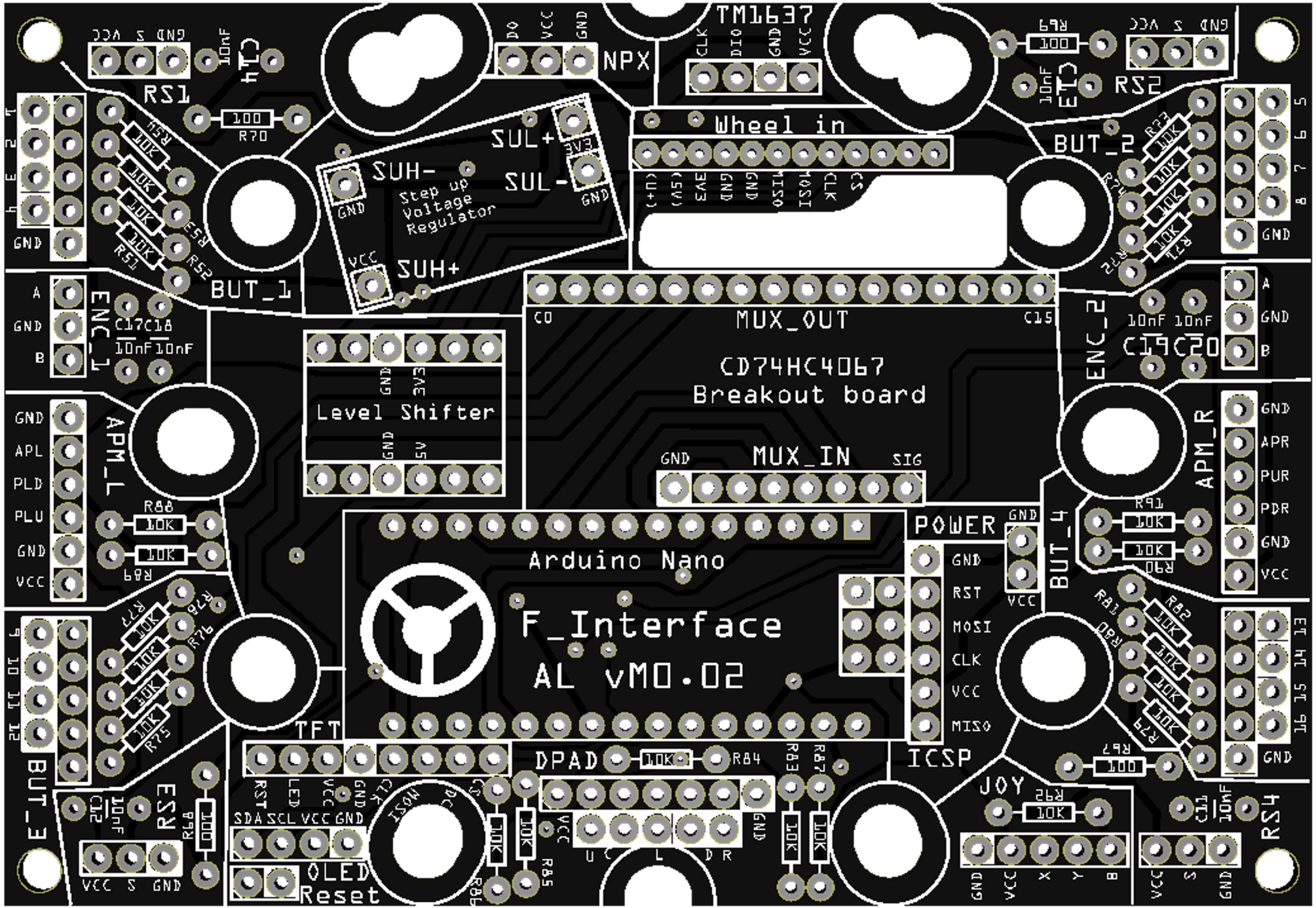
6x70mm mounting holes
30° tilted

Fanatec base ribbon cablle passthrough hole

6x70mm mounting holes

Fanatec QR mounting holes
71mm diameter




F_Interface
AL vM0.02
Arduino Nano
MUX_OUT
CD74HC4067
Breakout board
MUX_IN
Level Shifter
Step up
Voltage
Regulator
TM1637
NPX
Wheel in
POWER
ICSP
DPAD
TFT
OLED
Reset
JOY
RS1
RS2
RS3
RS4
BUT_1
BUT_2
BUT_3
BUT_4
ENC_1
ENC_2
APM_L
APM_R
SUH+
SUH-
SUL+
SUL-

Abbreviations

Abbreviations are used on the PCB and in the software to refer to input types :

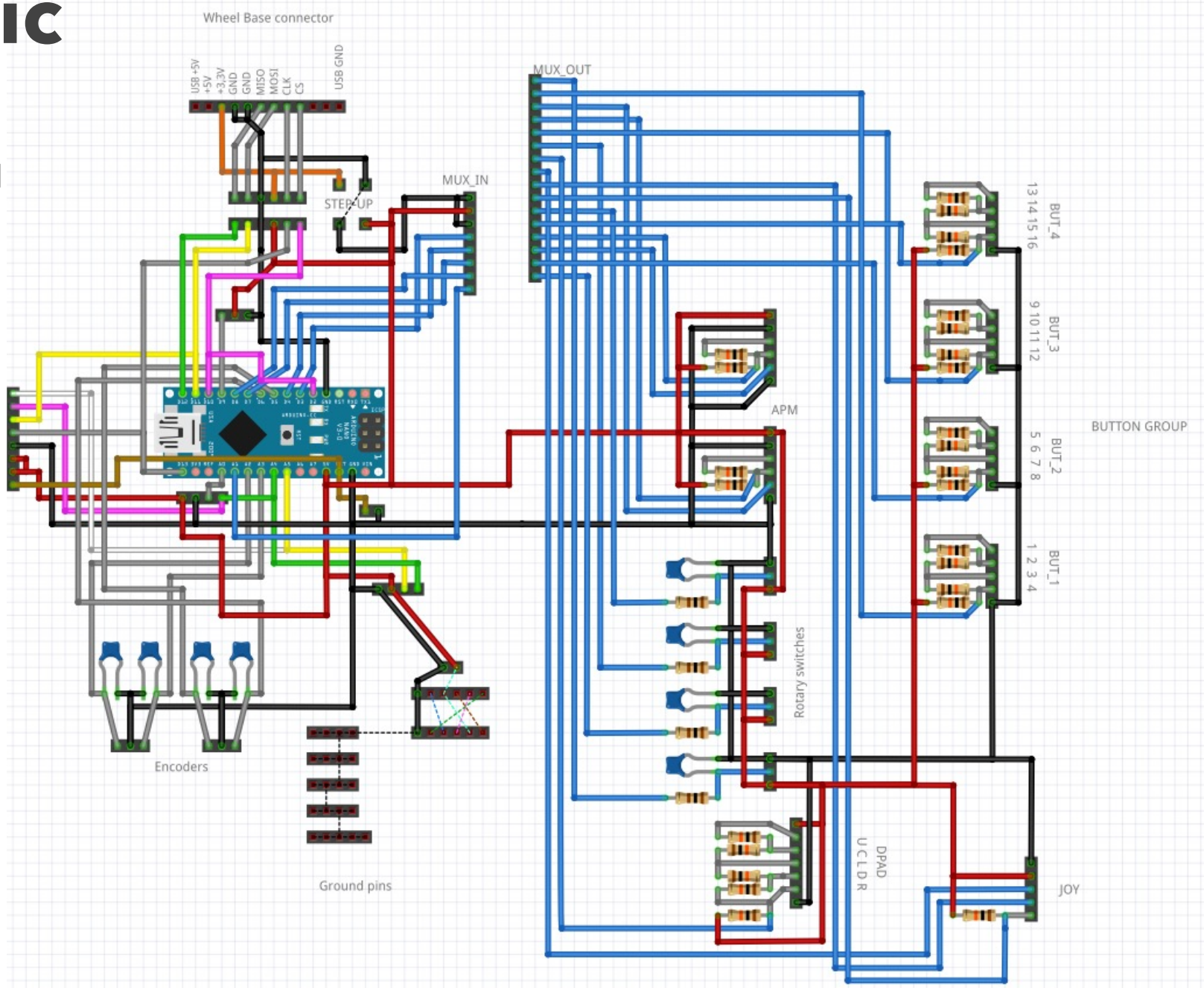
APM	Advance Paddle Module
RS	Rotary switch
BUT	Button group
ENC	Encoder
JOY	Joystick
DPAD	Group of 5 buttons that make a direction pad – up / down / left / right / center

General schematic

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

It can be found in the Fritzing file

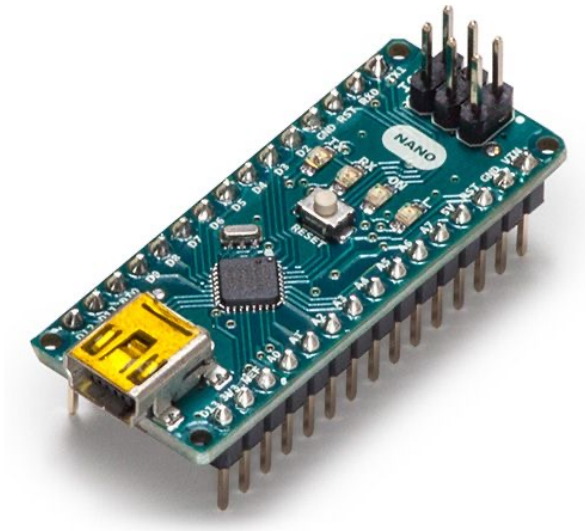
DIY Steering Wheel
AL
2/6/23
v0.02 changelog :
- capacitors labels pF --> nF
- Sensors holes changed to medium size
- changed pins for ENC_2 to D6 and D5 instead of A6 and A7
- changed size of ICSP and POWER pins to 2,54mm pitch instead of 2mm pitch
- Changed PCB holes dimater to fit QR-1 clubsport specs.

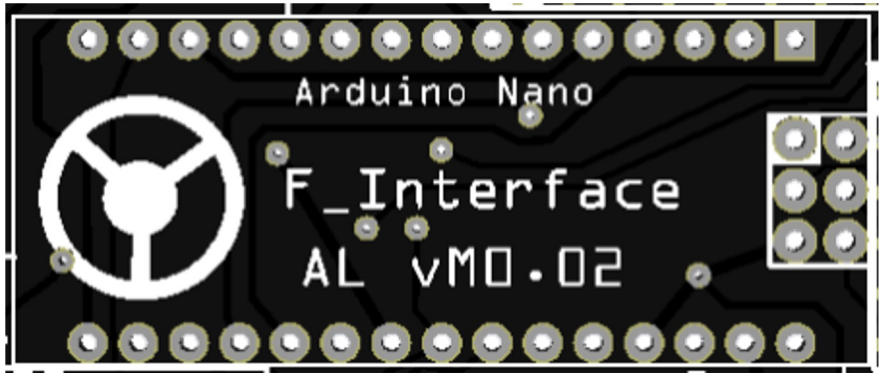


Arduino nano

The setup uses a classic arduino nano, original or clone.
As the wheels run on 3,3v for SPI communication while arduino runs at 5V, some adaptations are necessary like a level shifter and a step up voltage regulator.

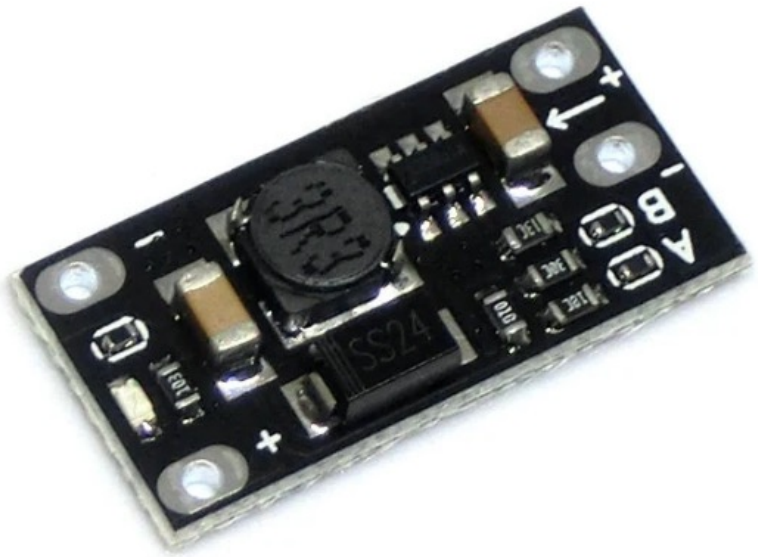
As the base requires a fast response from arduino on SPI communication port at startup, the arduino bootloader has to be removed. Arduino will then be programmed via ICSP port. See this page for further details

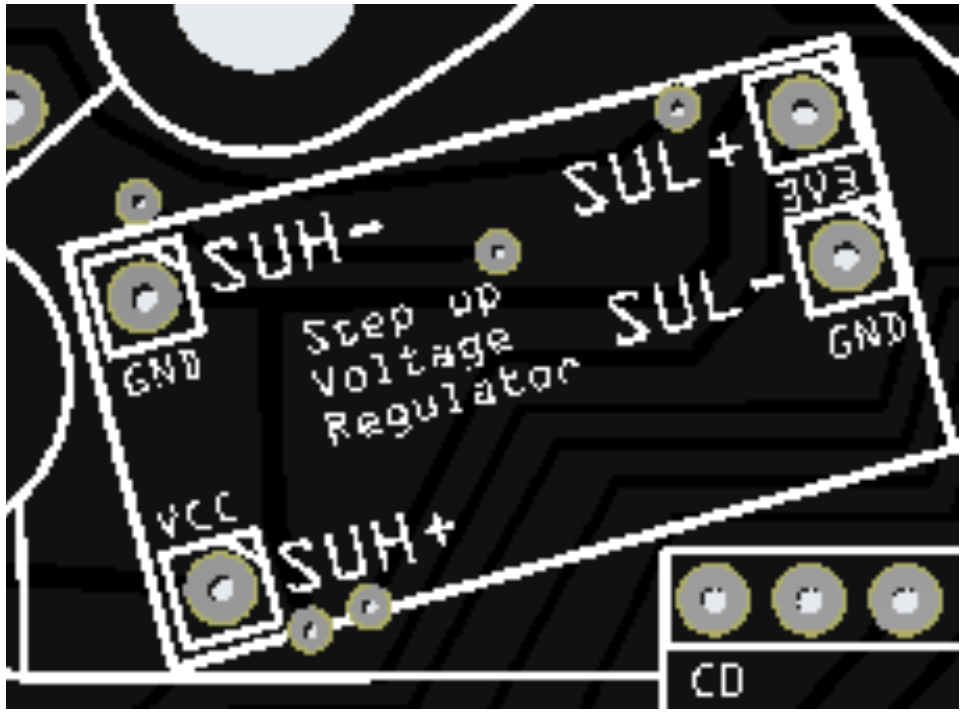




Step up voltage regulator

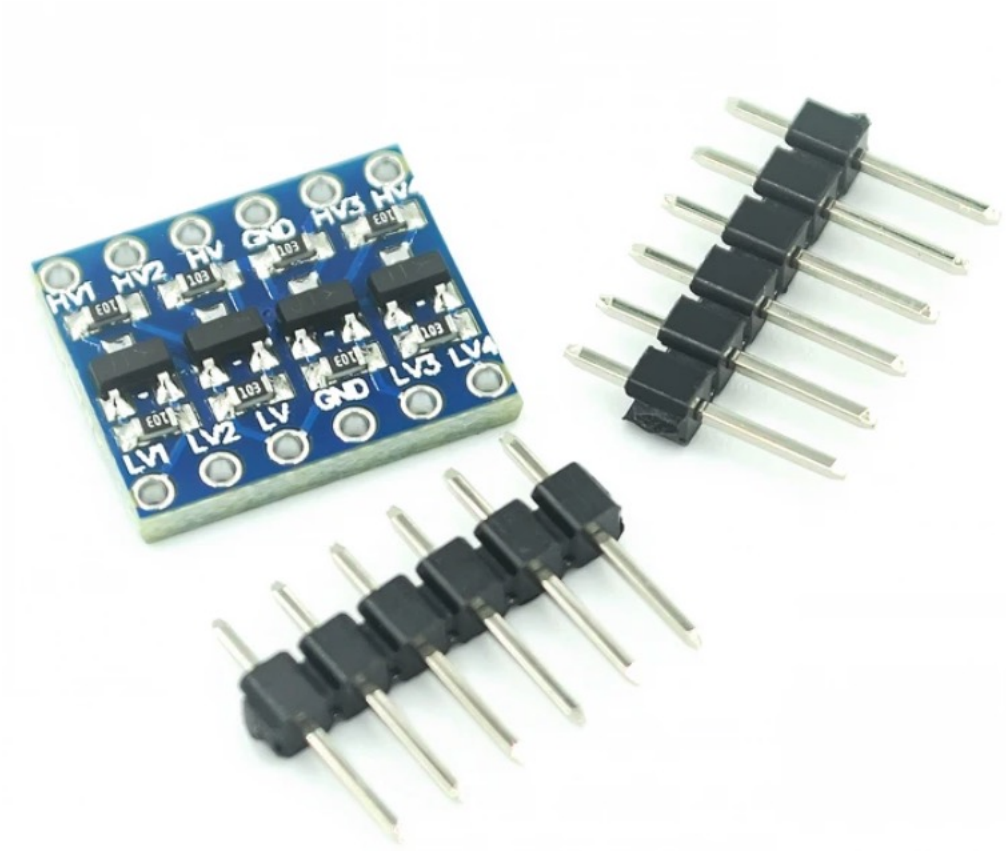
Used to step the voltage received from the base from 3,3 to 5V. Can be found on Aliexpress. Be sure to check the A and B jumpers on the board to have it 5V delivered and not 9 or 12V.

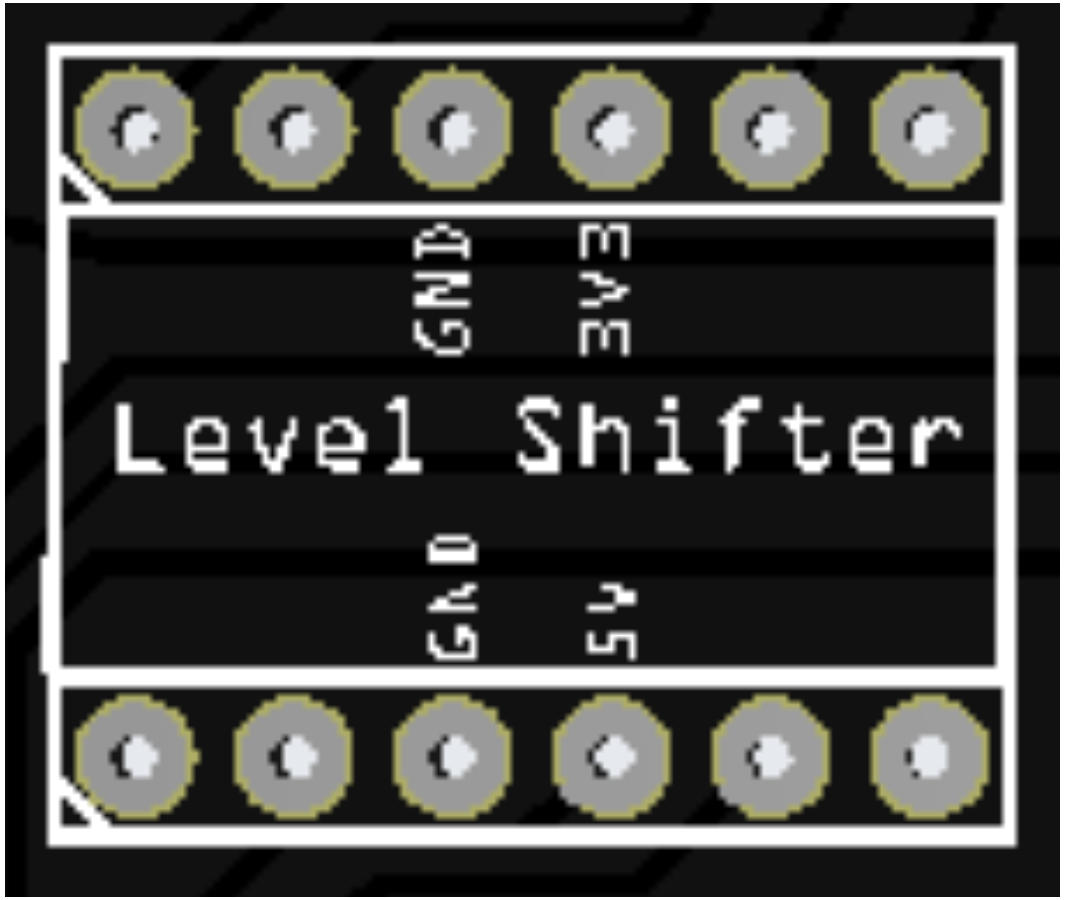




Level shifter

Classic component that shift voltage between 2 circuits. Easily found on Aliexpress

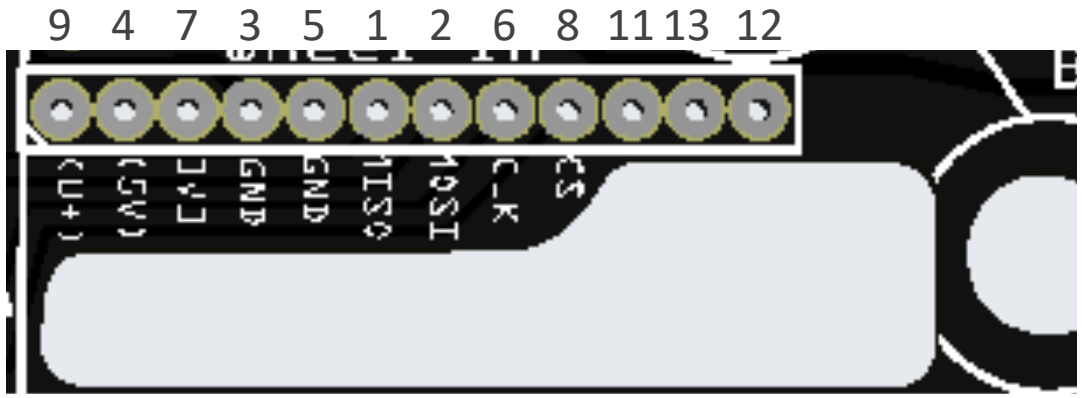




Wheel input

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

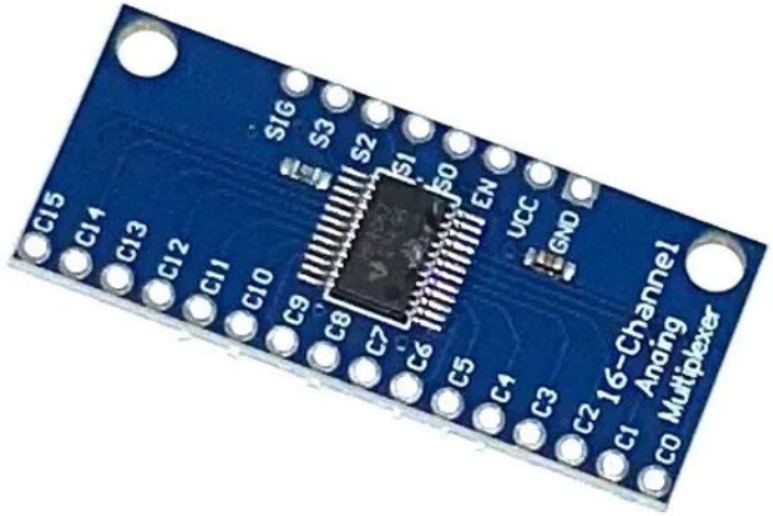
1.MISO
2.MOSI
3.GND
4.5v
5.GND
6.SCK
7.3v3
8.CS
9.USB charge 5v*
10.DataPort1*
11.USB charge GND*
12.DataPort2*

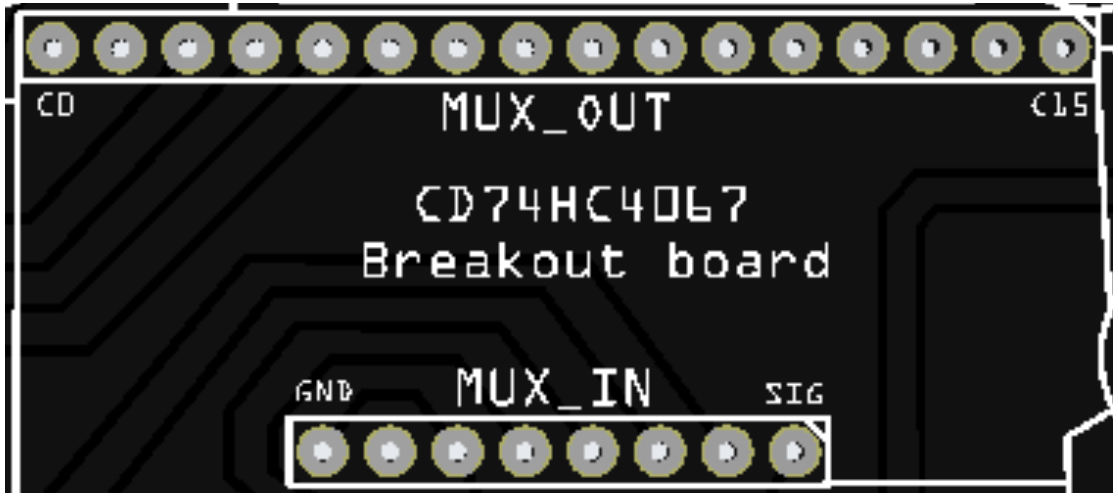


Credit :
https://github.com/darknao/btClubSportWheel

CD74HC4067 multiplexer

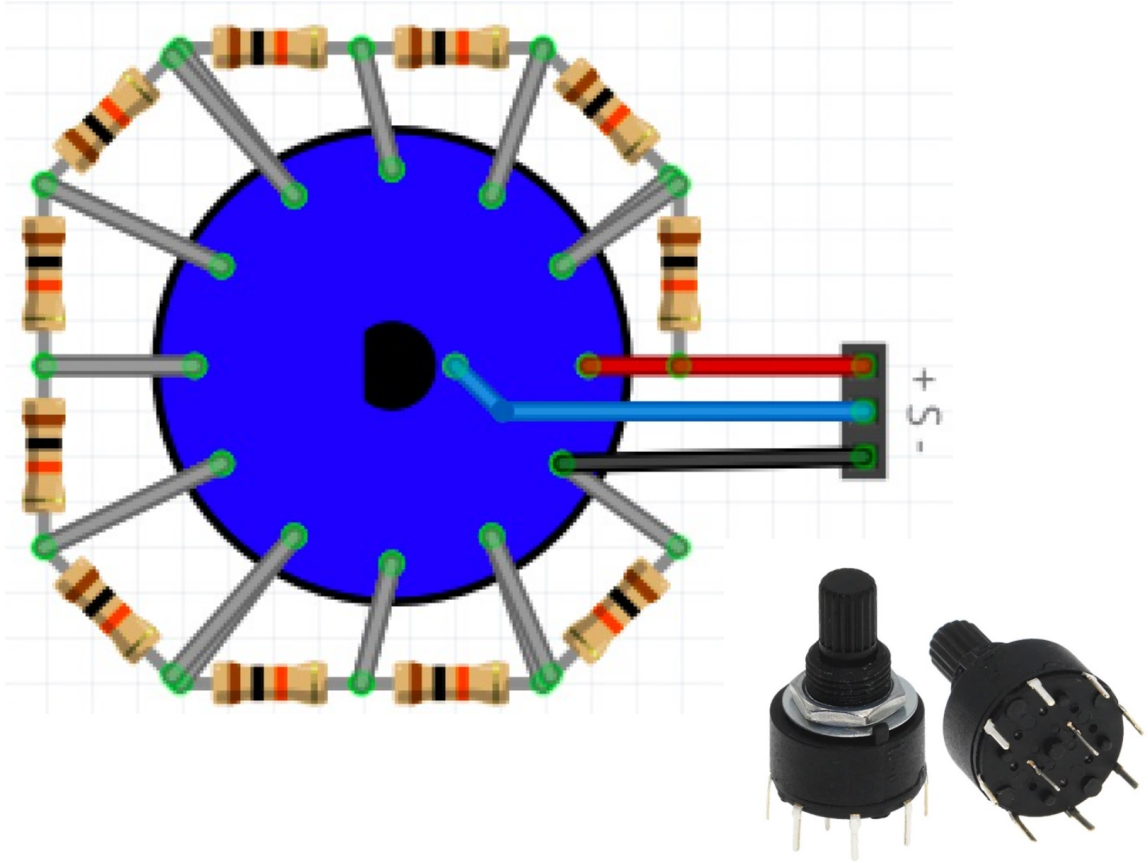
This component is used to multiplexed the analog reading from buttons / rotary switches / … to the arduino.



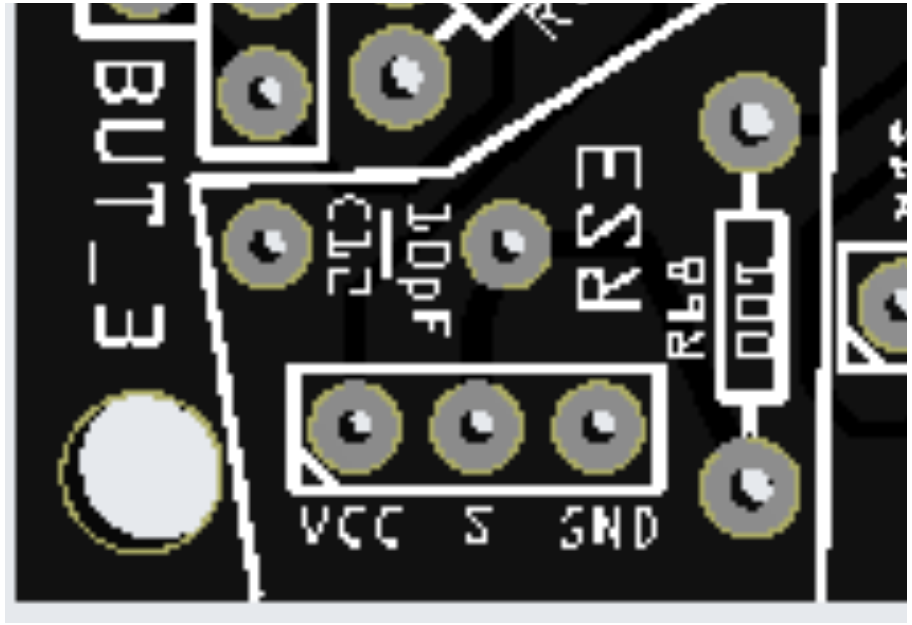


Rotary switch

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

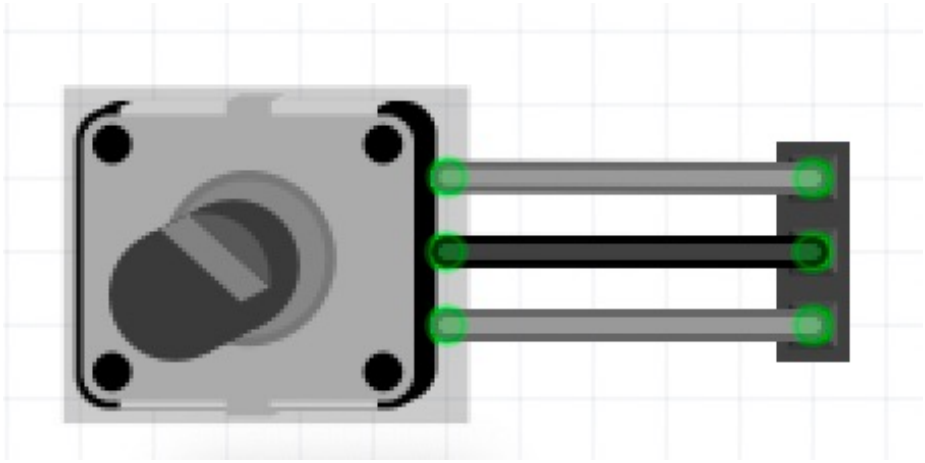


On the PCB side, you will need 1x 100 Ohms resistor + 1x 10pF capacitor for debounce.

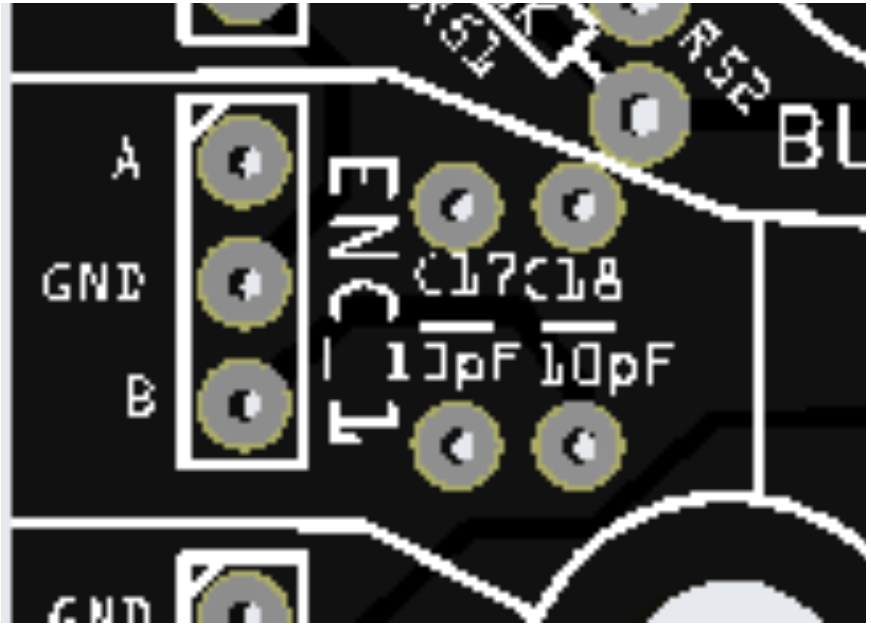


Encoder

Everything needed for the encoder is placed on the PCB.



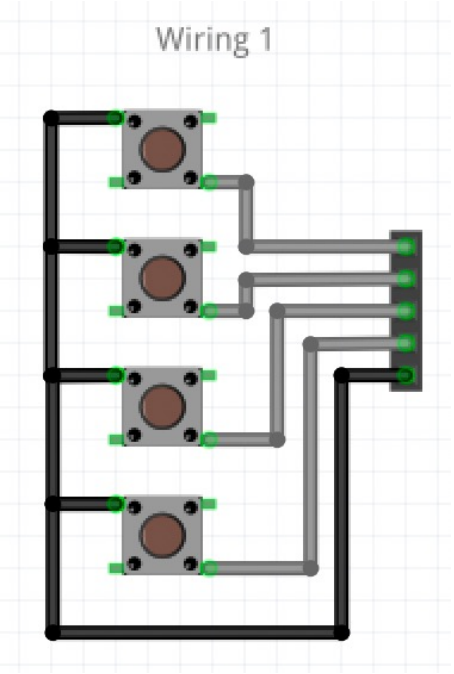
On the PCB side, you will need 2x 10pF capacitors for debounce.



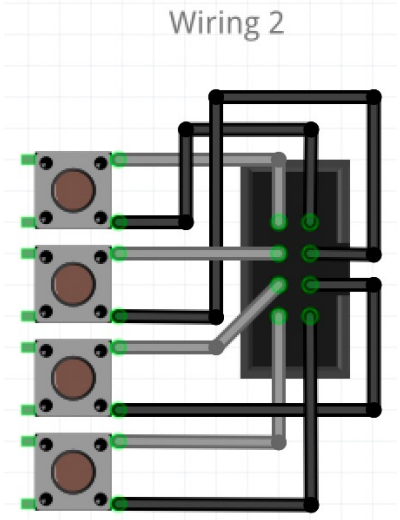
Button groups

You have 4 groups of buttons. They are multiplexed to save I/Os on the microcontroller.

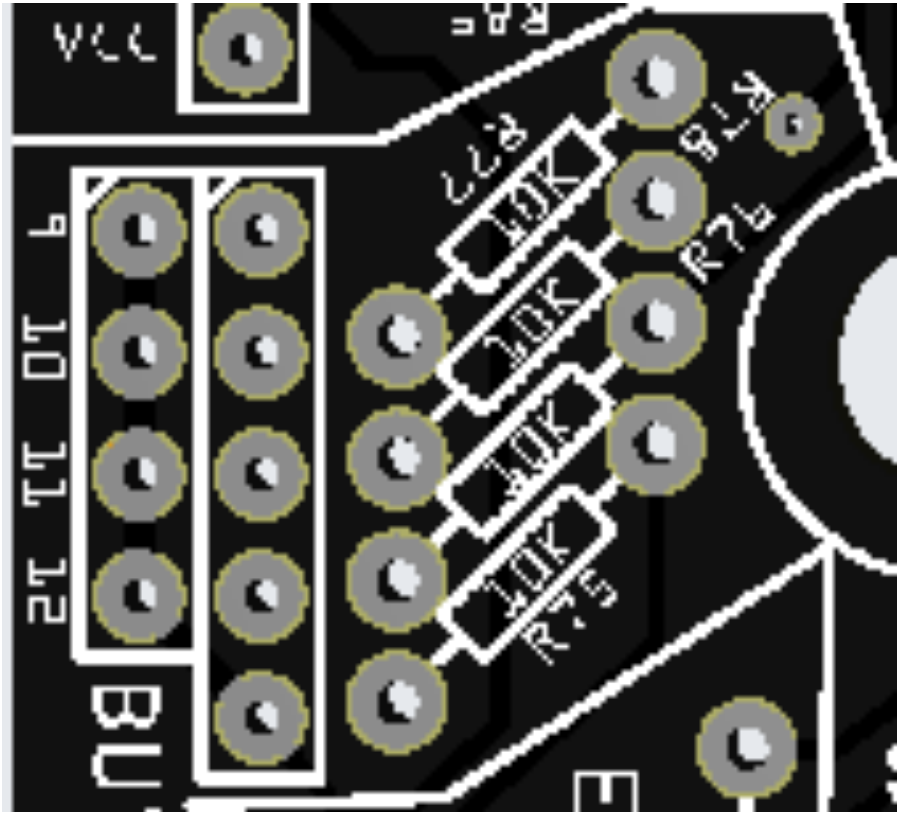
You can wire them by 4 or individually as shown below



OR

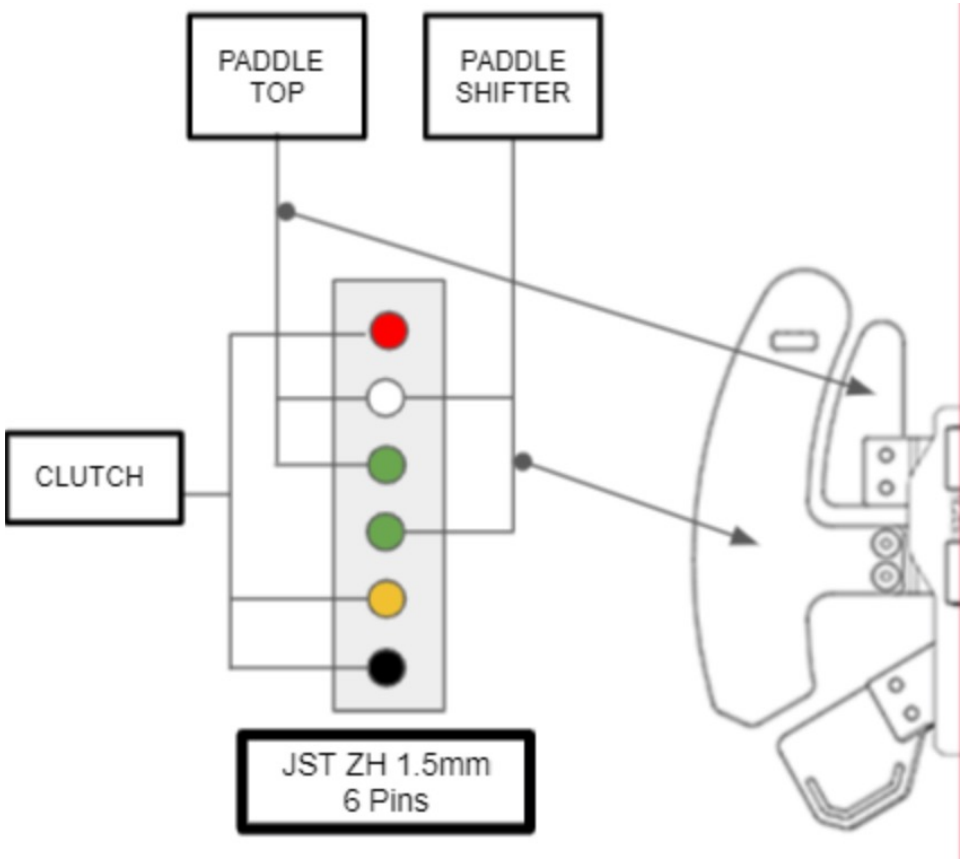


On the PCB side, you will need 4x 10k resistors per button group

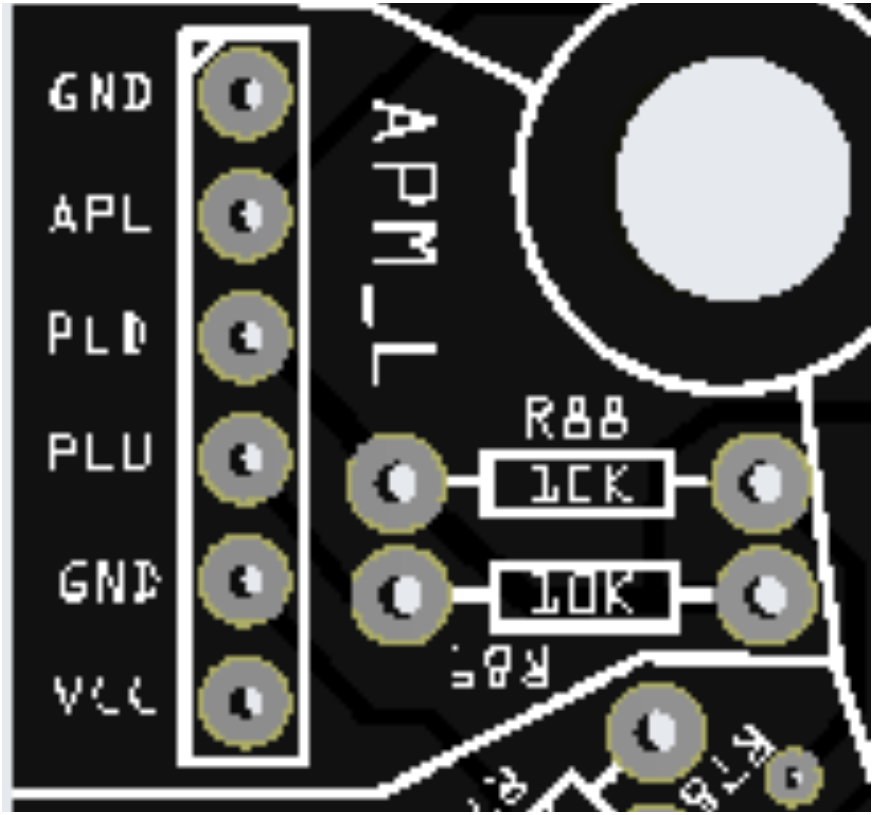


APM

You can plug Advance paddle modules to the board that have the following pinout :



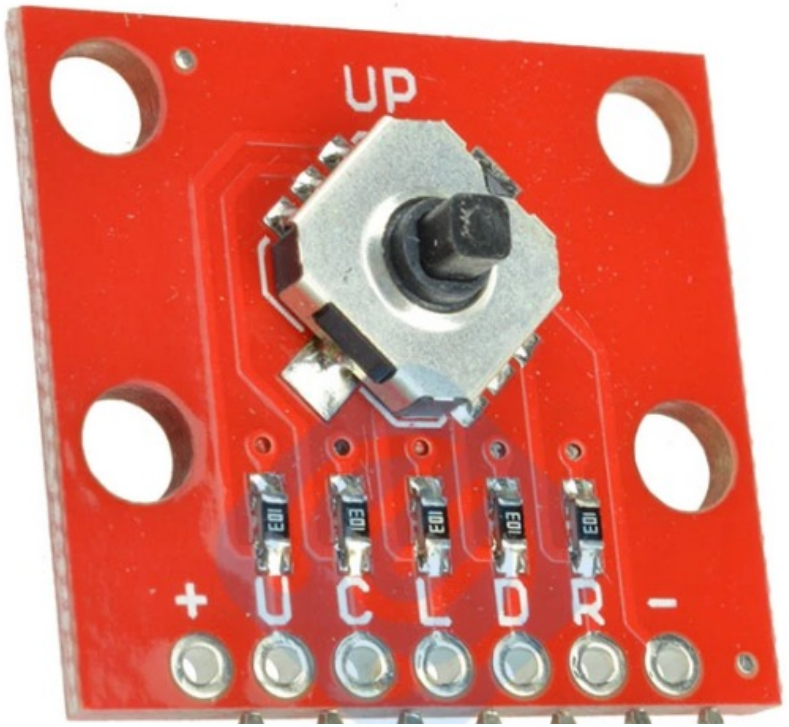
On the PCB side, you will need 2x 10k resistors



DPAD

You can plug a DPAD module to the board that has the following pinout. You can also use 5 seperate pressbuttons.

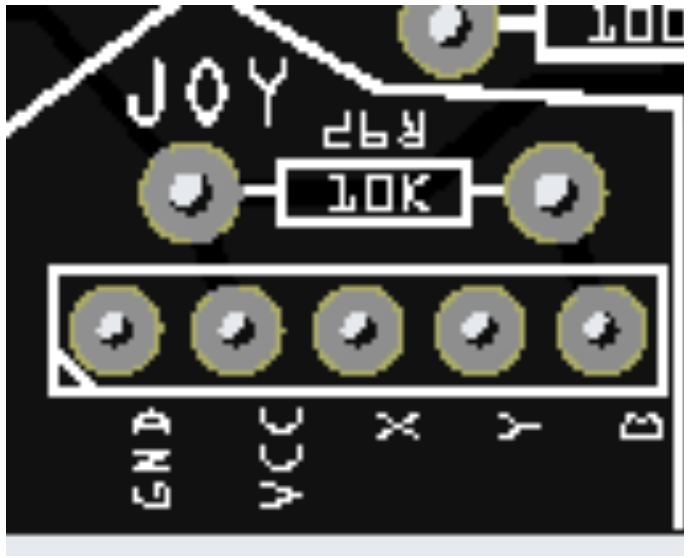
On the PCB side, you will need 5x 10k resistors



Joystick

You can plug a joystick module to the board, a standard one or custom 1.

On the PCB side, you will need 1x 10k resistors to manage the button press

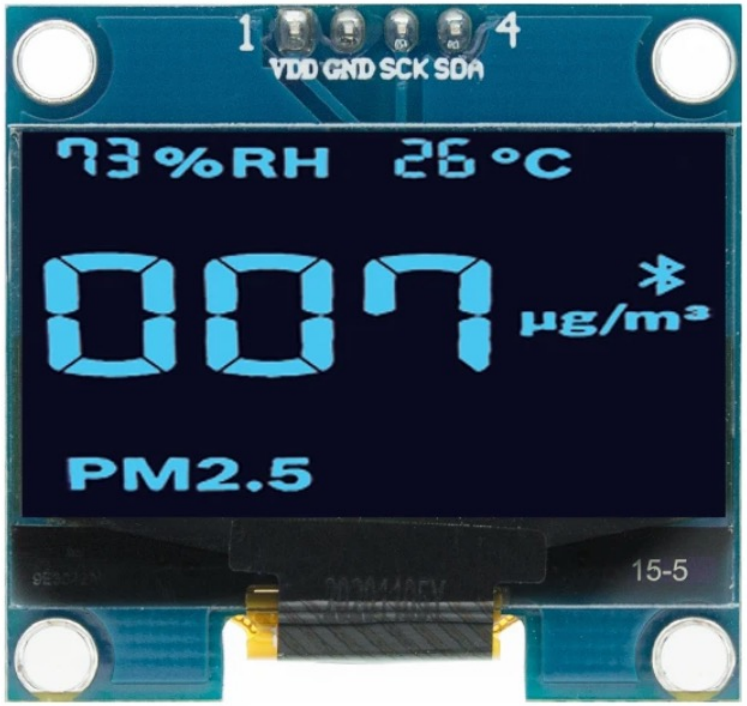


TM1637

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 Display

You can hook up an TFT LCD display based on ST7735 or other SPI based LCD TFT driver.