

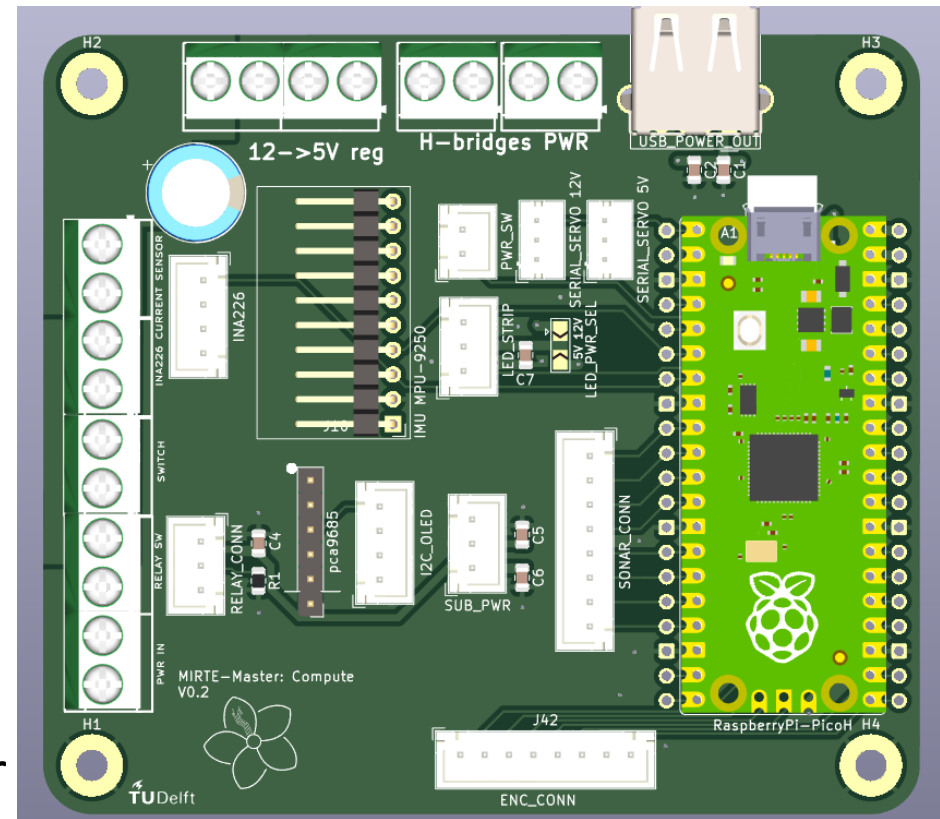
Mirte-Master build

# Updates

- 2024-12-16: Updated wiring, removed relay and bms part

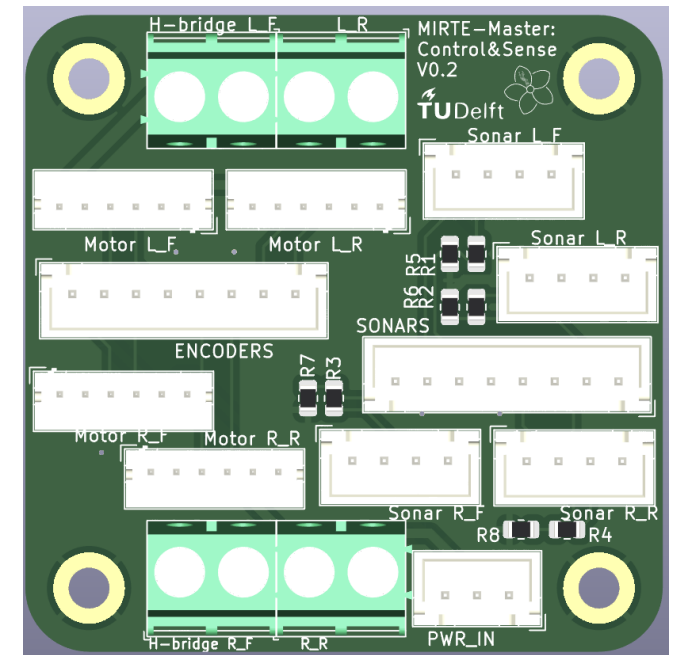
# Mirte master main pcb

- Under pico also small transistor
- ~~R1: 680R~~
- C1, C4-7: 100nF
- C3(round one): 1000uF
- C2: 10uF
- All connectors JST-XH, except servos (jst ph)
- **FIXES:** Relay, R1 and C4 don't work
  - IMU connector is a normal female header



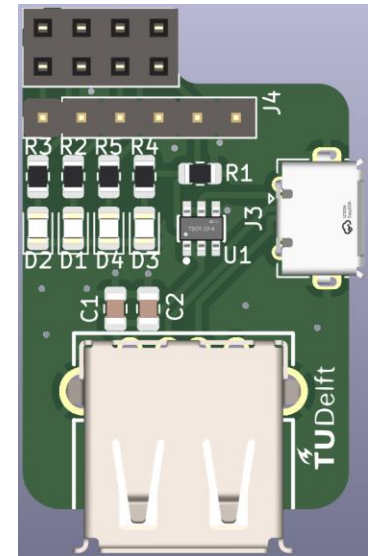
# Mirte-master control&sense board

- Distribute signals to motors and sonars
  - Saves wiring from top to bottom
  - R1-4: 4k7
  - R5-8 : 10k
  - All connectors jst-xh, except motor connectors(jst ph)
- **Fixes:**
    - Sonar (seen from top), just the closest connector to the sonar:
      - Left rear is in L\_F connector
      - Left front is in R\_F connector
      - Right rear is in L\_R connector
      - Right front is in R\_R connector
    - Motors:
      - Left rear is in L\_F connector
      - Left front is in R\_F connector
      - Right rear is in L\_R connector
      - Right front is in R\_R connector



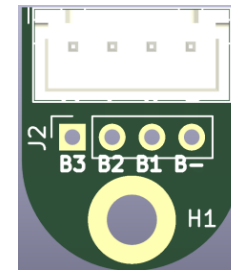
# USB switch pcb

- Switches power to astra camera bc boot issue
- 3 more io for fun, diodes for visualization
- Uses Orange pi GPIO4\_A4
- R1: 10k
- R2-5: 220R
- U1: SIP32509DT-T1-GE3 (switch ic)
- C1: 10uF
- C2: 100nF
- J4 not needed (kicad rendering error)
  - L->R: 3V3, GPIO4\_B4, GPIO4\_B5, GPIO0\_D1, **GPIO4\_A4**, GND
- Header should point downwards (kicad err)
- J3: usb b-micro connector with hooks at bottom



# BMS PCB

- Connects to jst xh connector of battery
- Solder cable from bms to J2
- Fixed: BMS removed as they tended to smoke



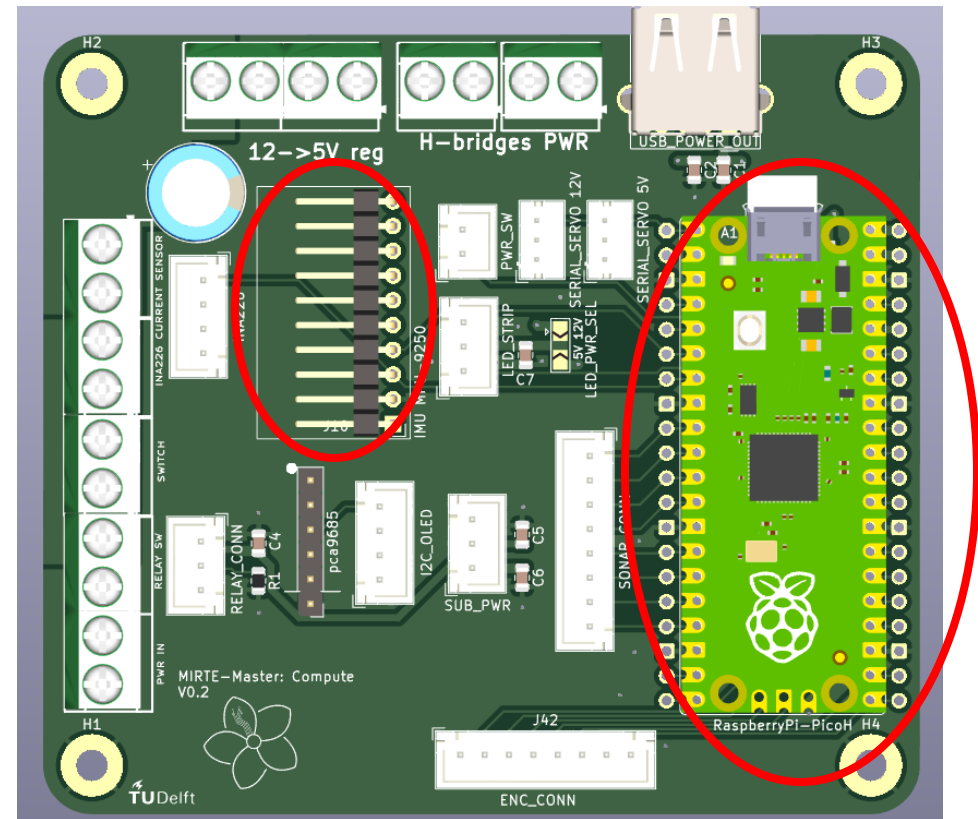
# Other fixes

- Added diode in power cable from main pcb to h-bridge to not back-feed when the system is off.
- **Rest of the slides are how to connect, will add photos later. Ordering might be wrong.**

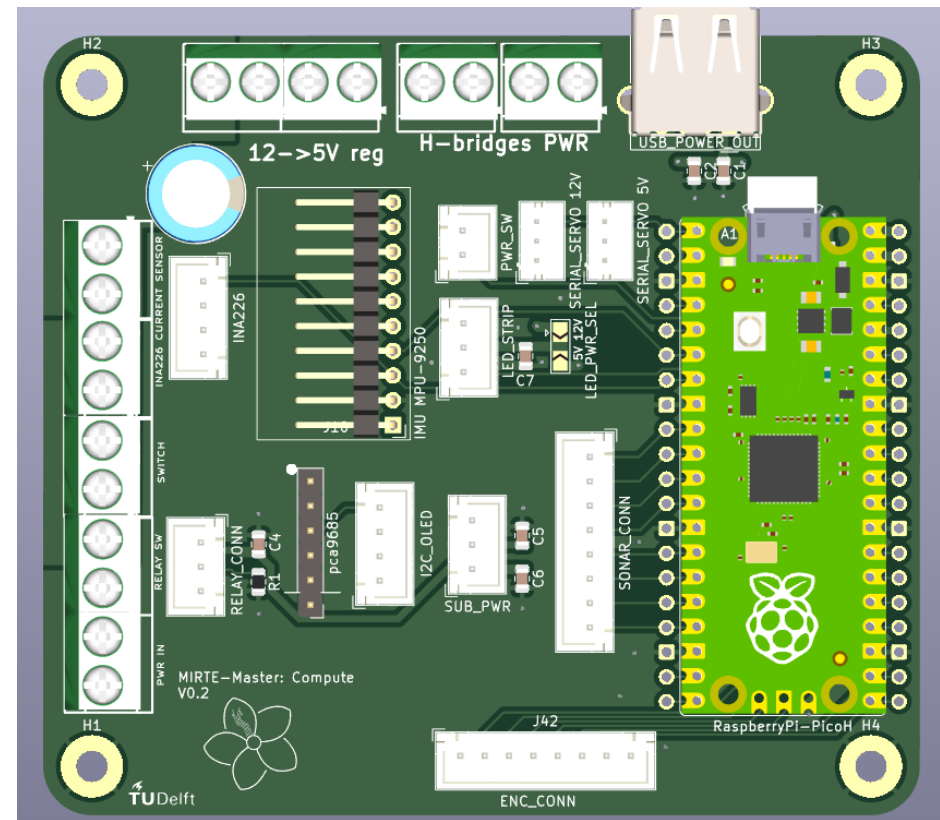
# Requirements

- Pcb's soldered
- Cables
  - Usb cables (2x b micro, 1x C)
  - JST XH 4 PIN (INA226)
  - JST XH 3 pin (relay)
  - Jst xh 4 pin (oled)
  - Jst ph 3 pin (servo), included
  - ....
- Custom cables
  - Switch cable, 180mm
    - + jst xh 2 pin cable
  - Relay cable
  - PSU cable 95-120mm
  - INA226 cable 2x 160mm
  - Power cable
  - Hbridge cables
- Other parts:
  - Pico
  - Imu (not really, it's not great)
  - 12->5v converter with wires(95-120mm length)
  - Ina226
  - ~~Relay module~~
  - Orange pi with emmc and OS installed

- Fit the IMU and Rpi Pico on the PCB
- Pico usb pointing to the top

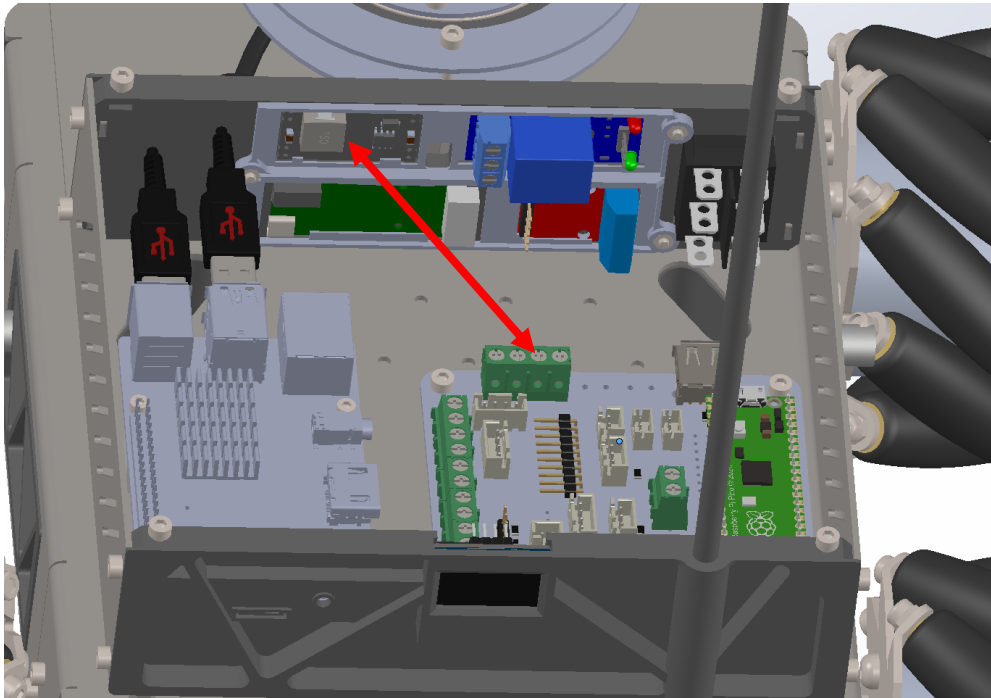


- Screw in the PCB into the frame
  - Nylon/metal standoffs
  - M3 bolts

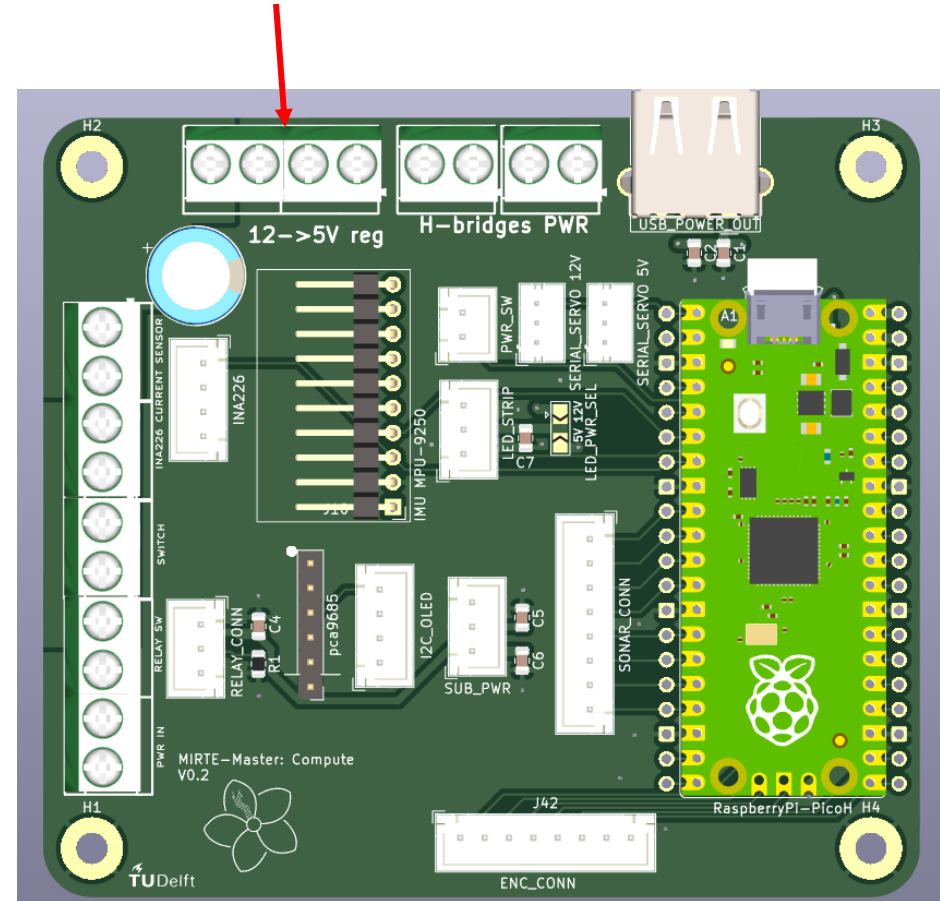


# Connect 5v regulator

- Connect all 4 wires
- **The text on the bottom is wrong**

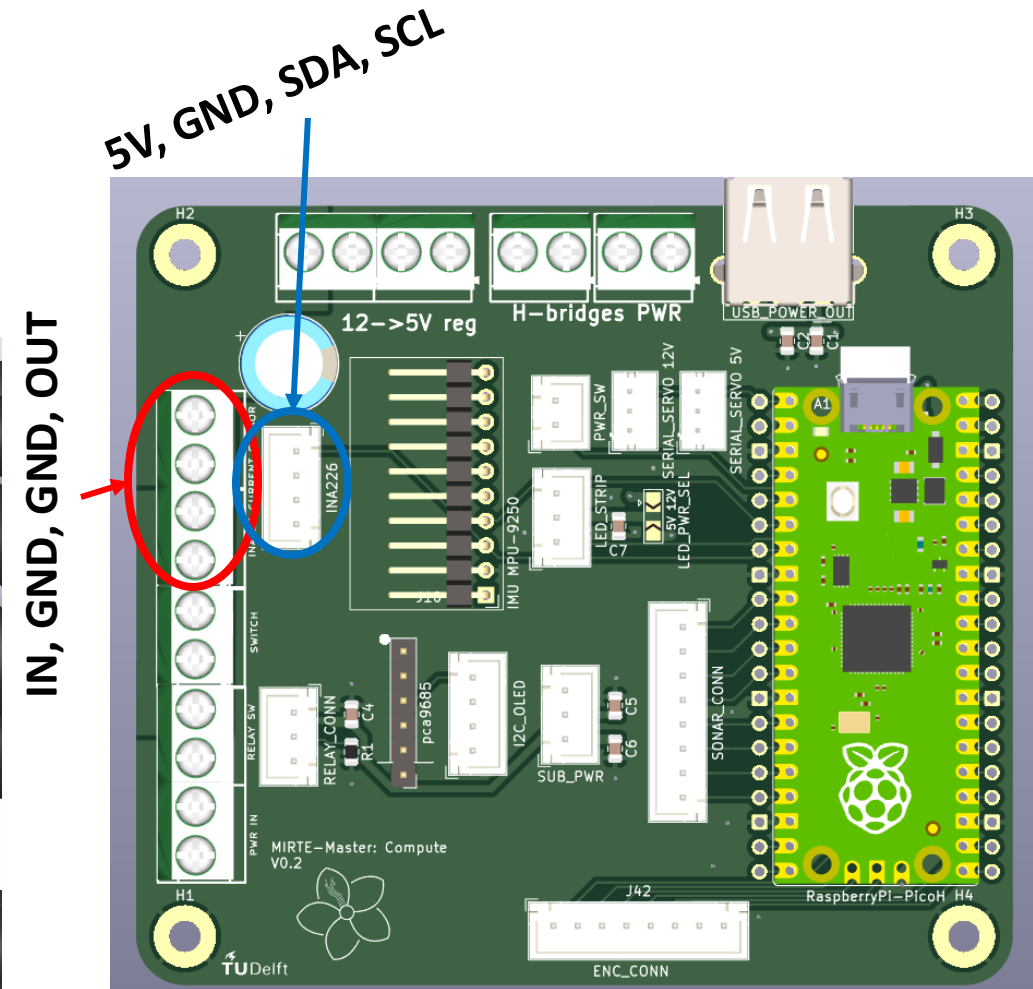
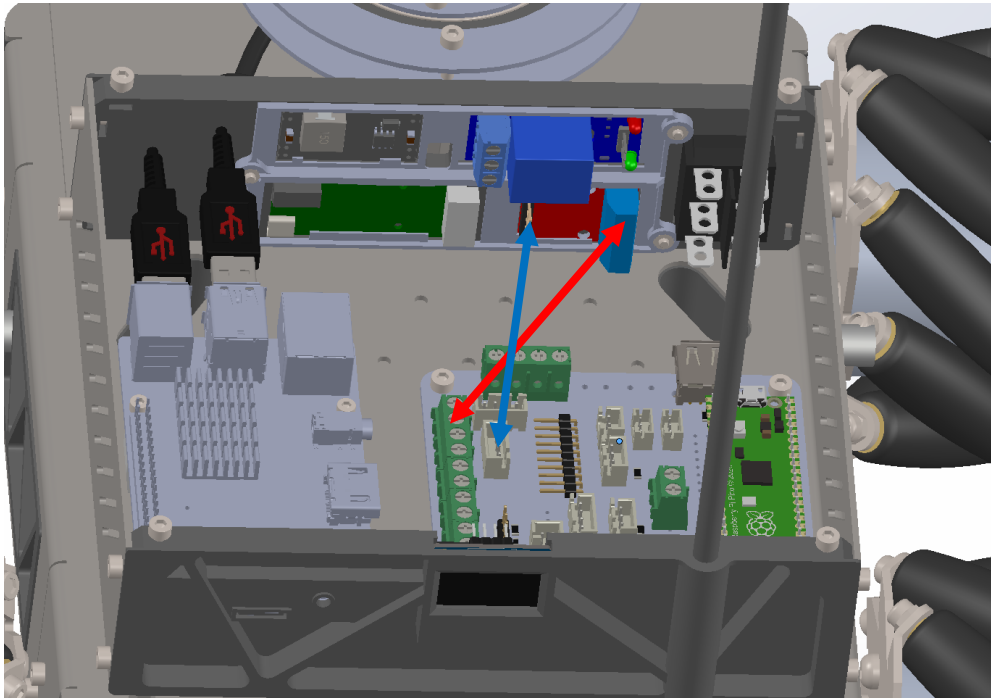


12V, GND, GND, 5v



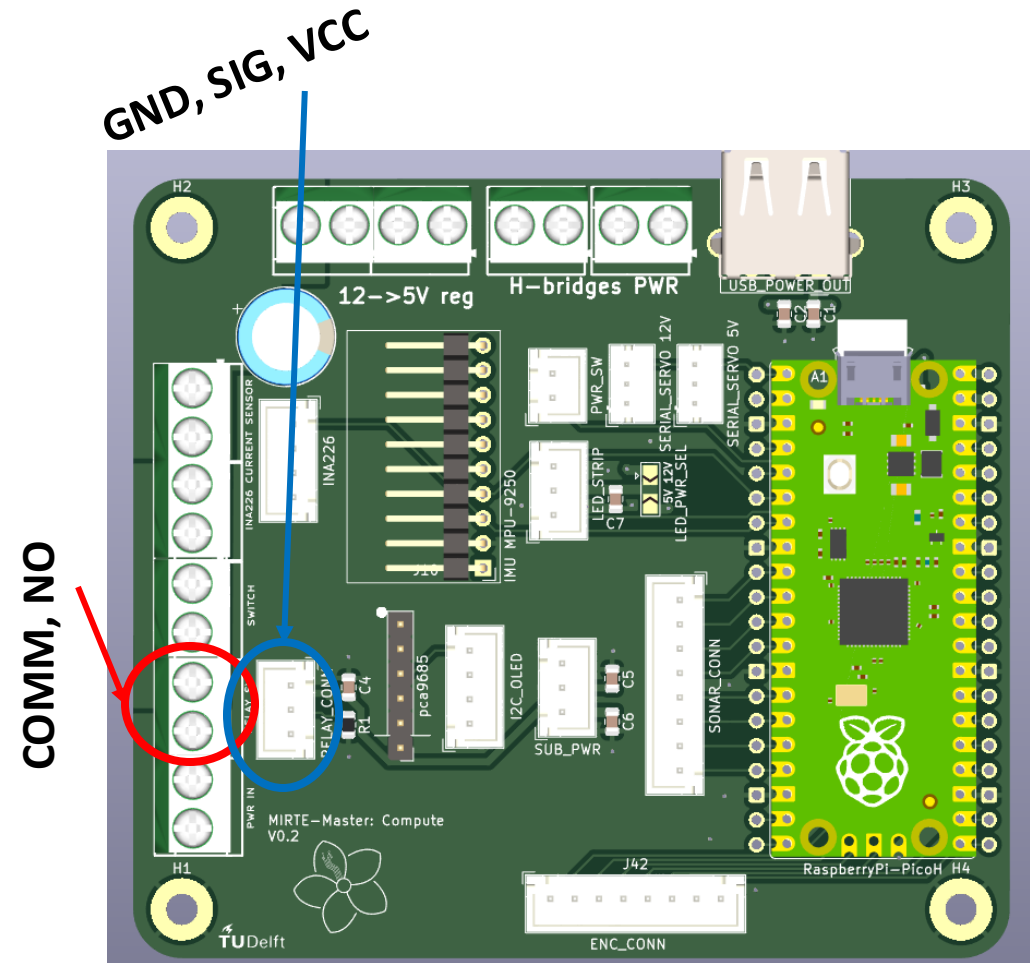
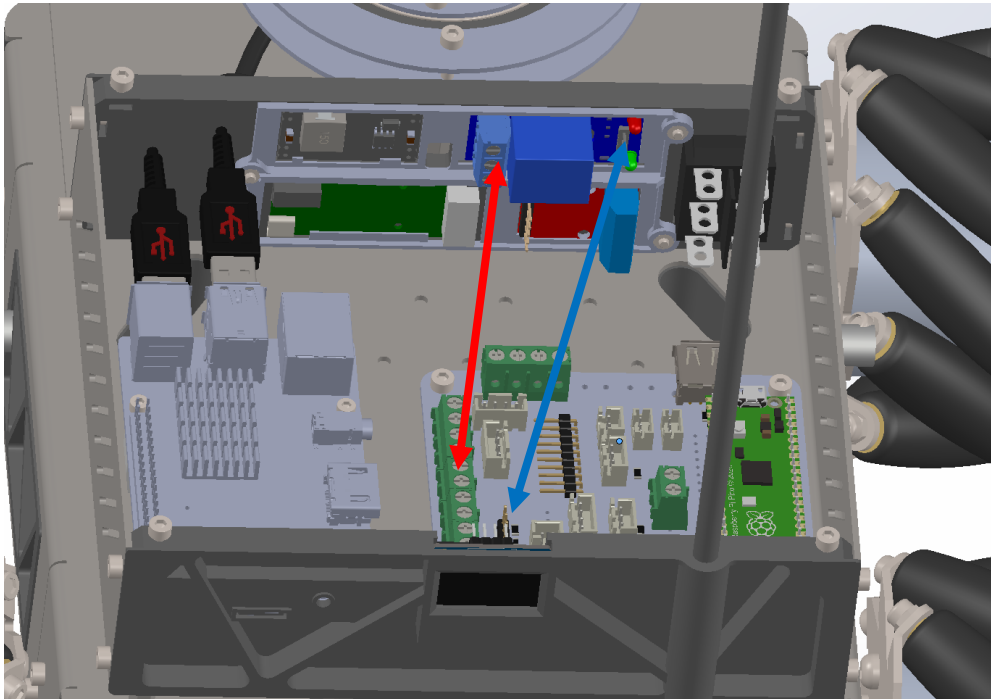
# Connect INA226

- Power
- Signal, hooks away from INA226 pcb



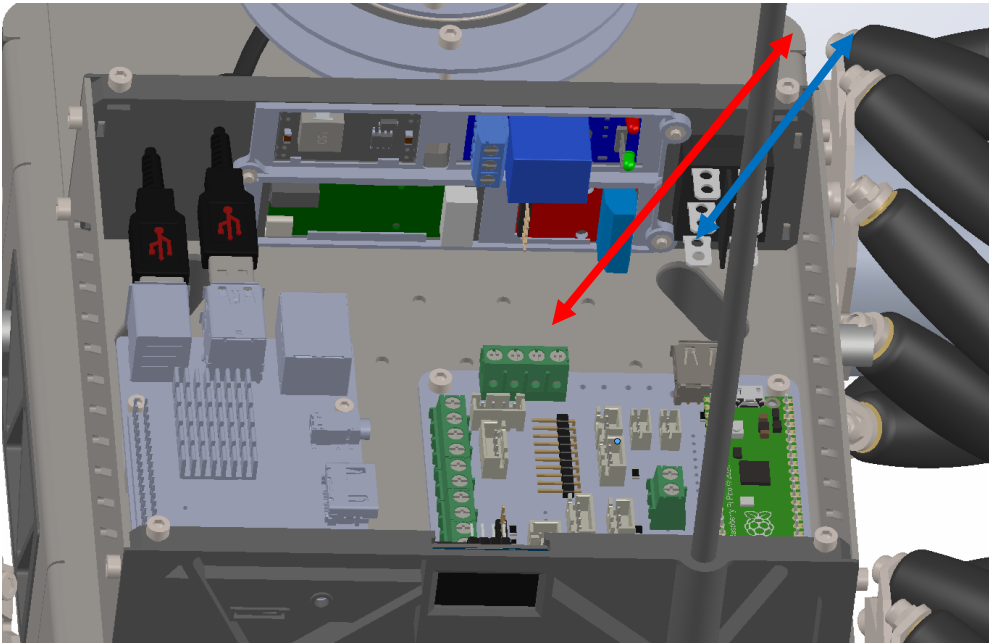
# ~~Connect relay~~ (Don't, it doesn't work)

- Power, connect to NO and COMM
- Signal, hooks away from relay pcb

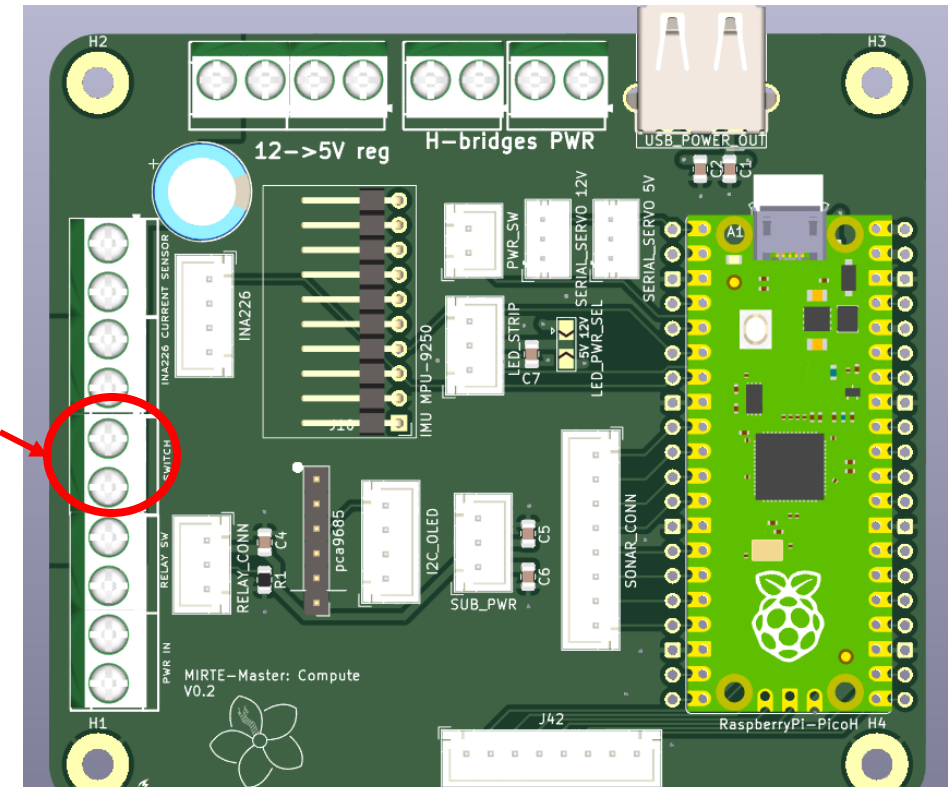


# Connect switch

- Power, use 2 tabs on one side of black divider switch
- ~~Data: use other 2 tabs, not used anymore~~
- Put switch in that the 2 used tabs are up, as otherwise the usb cable doesn't fit anymore.

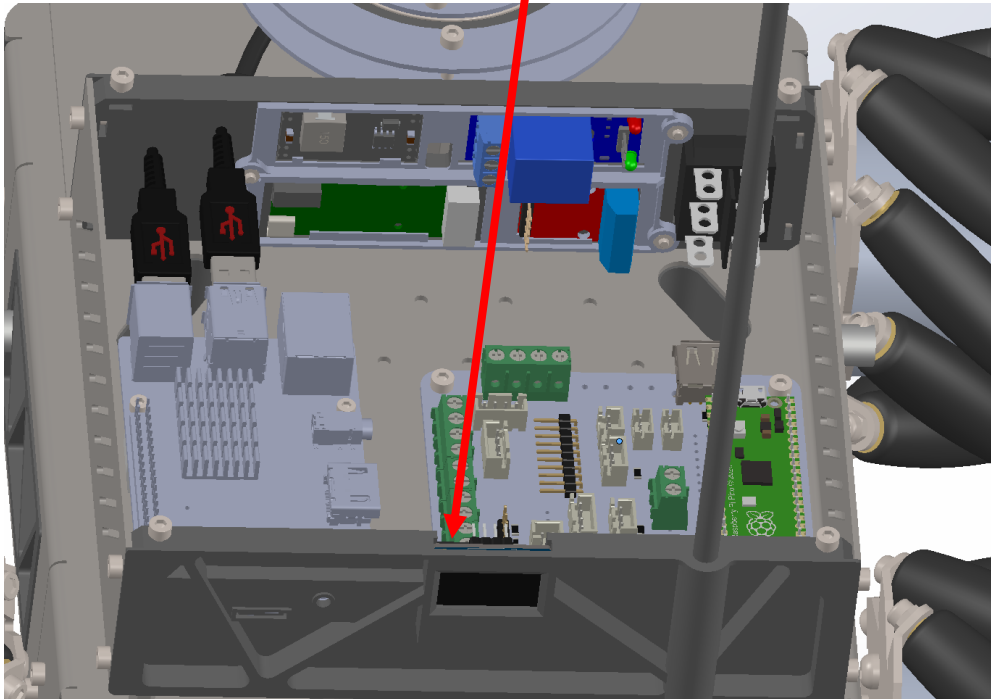


COMM, NO

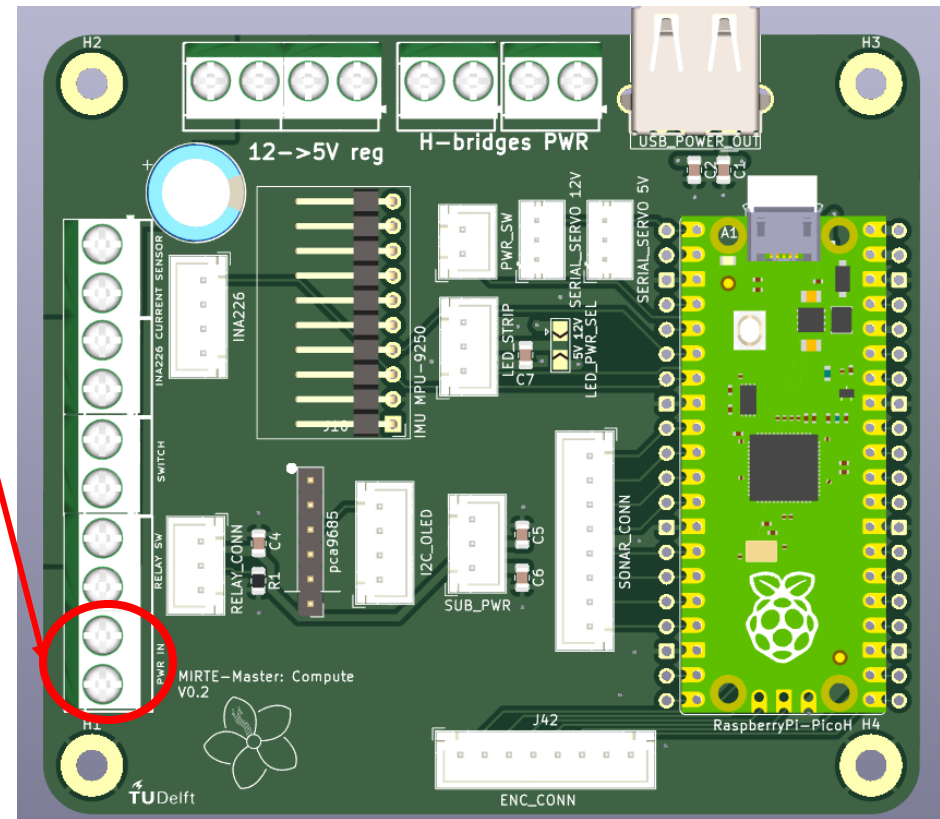


# Connect power

- Power
- Add a fuse in there for safety.

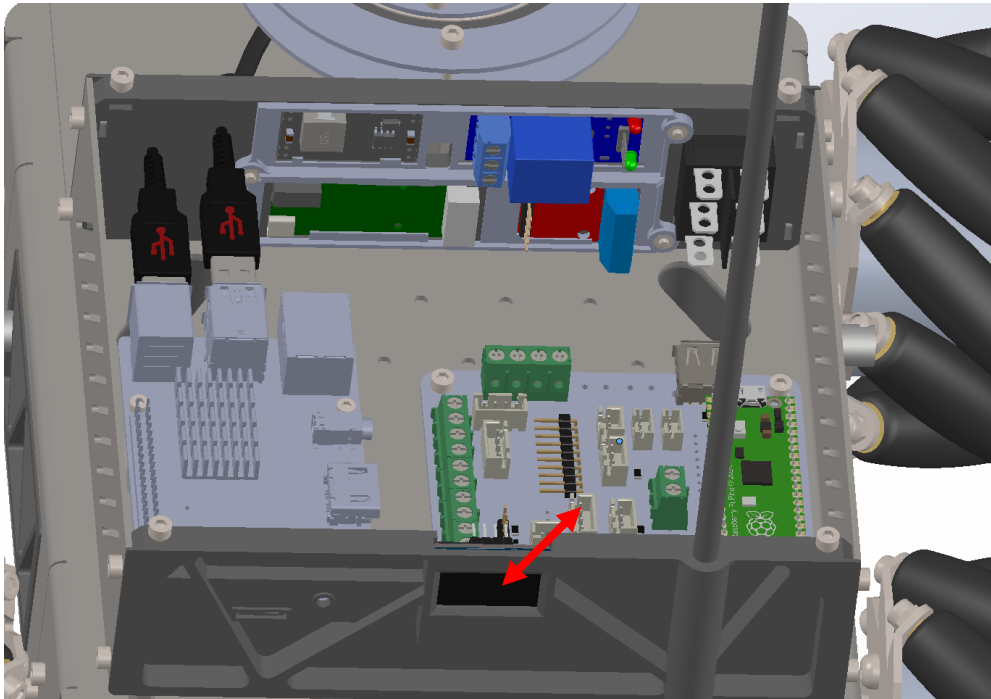


GND, 12V

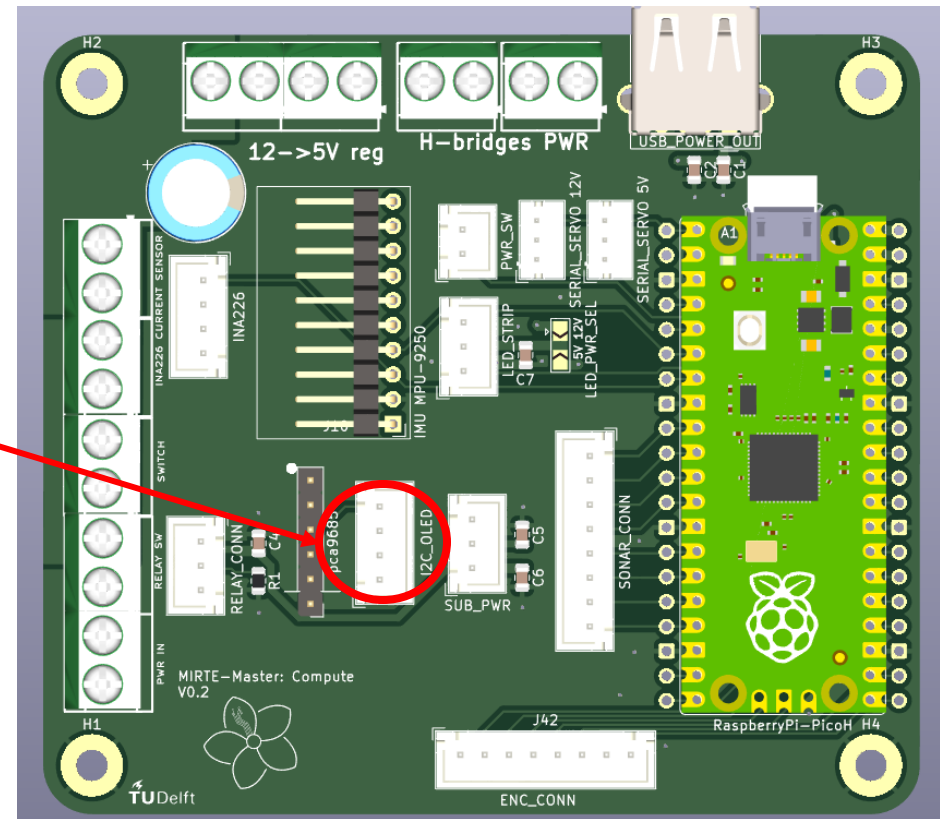


# Connect oled

- Like on normal Mirte
  - Hooks pointing up

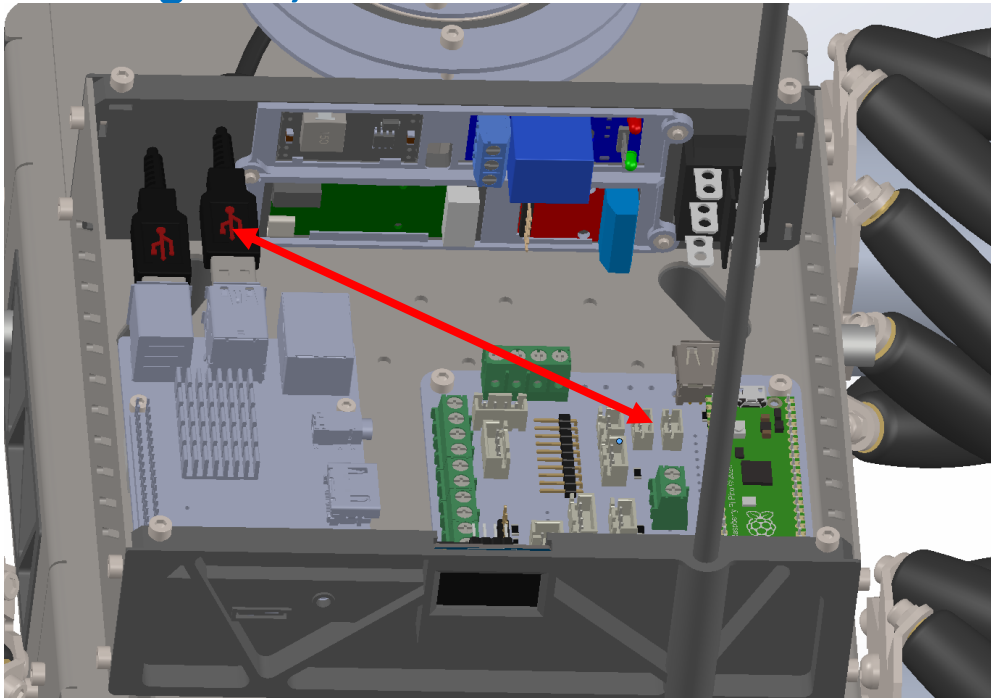


GND, 5v, SCL, SDA

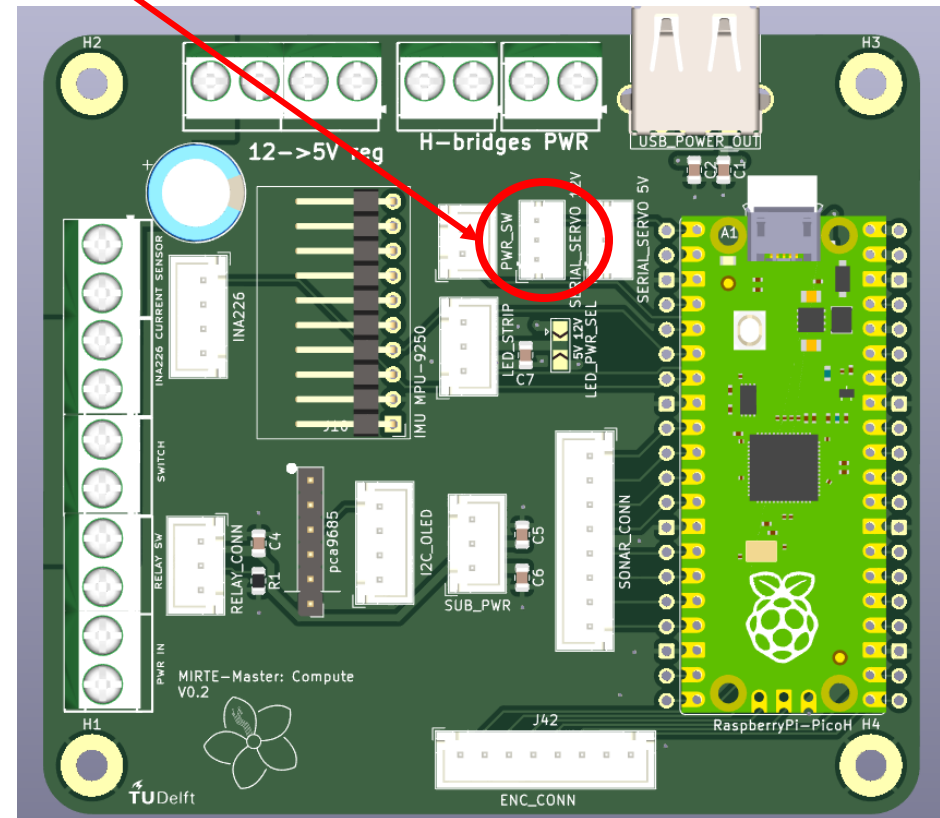


# Connect servo cable

- 1st **ph** cable to outside
- Use 12V connector
- **It's a tight fit, but should be doable**

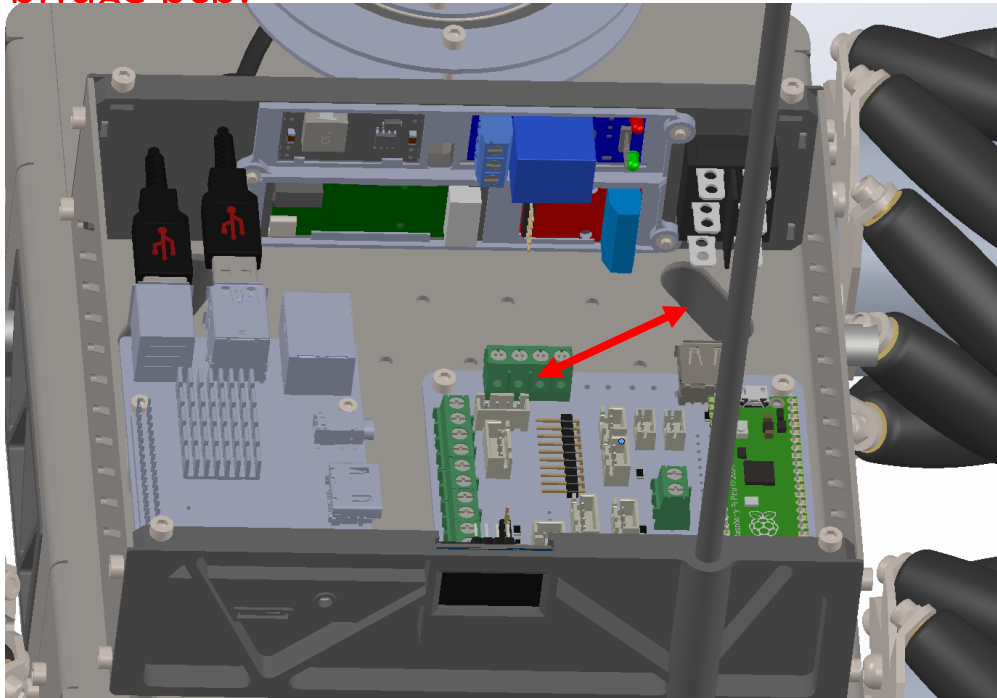


GND, 12V, DATA

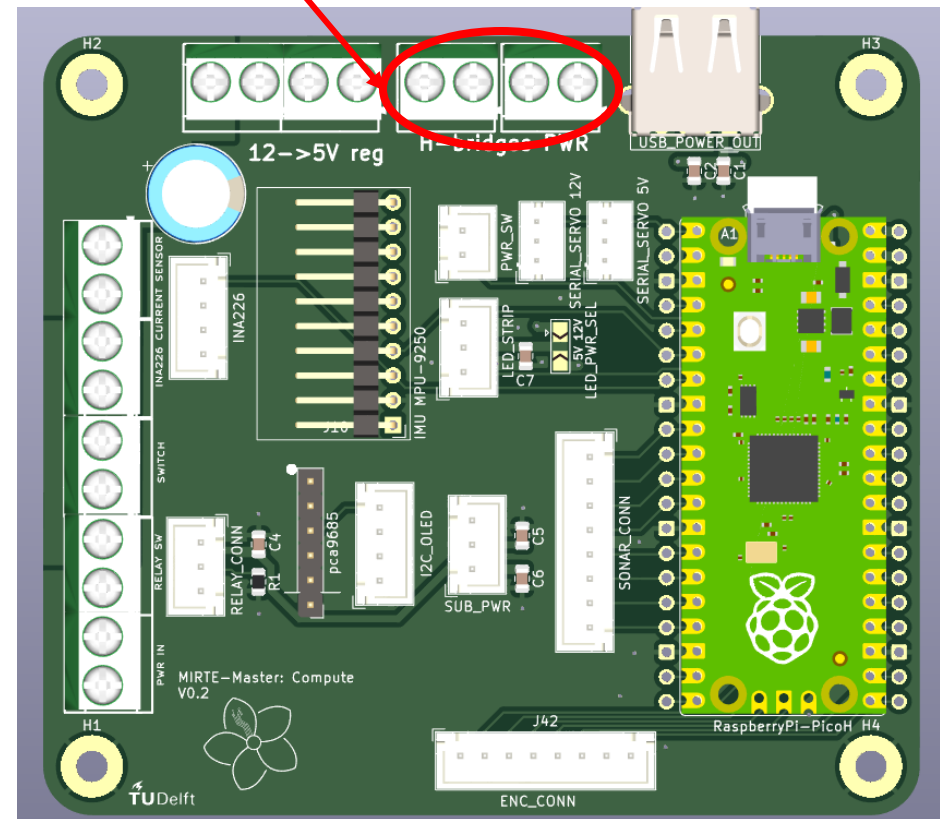


# Connect hbridge power

- Connect 2x 2wires to the H-bridges power screw terminals
- Loop them down to the hbridge
- Don't forget the diodes in the cable pointing the correct way.
- 5v pin is unused as long as all the jumpers are on the h-bridge pcb.

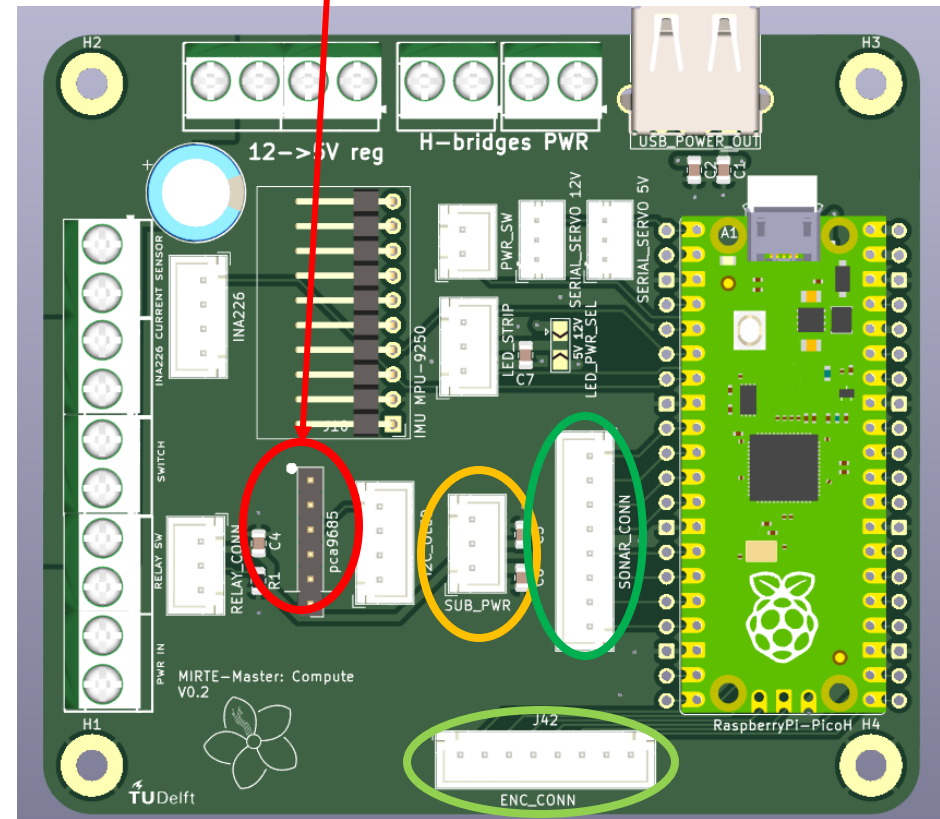
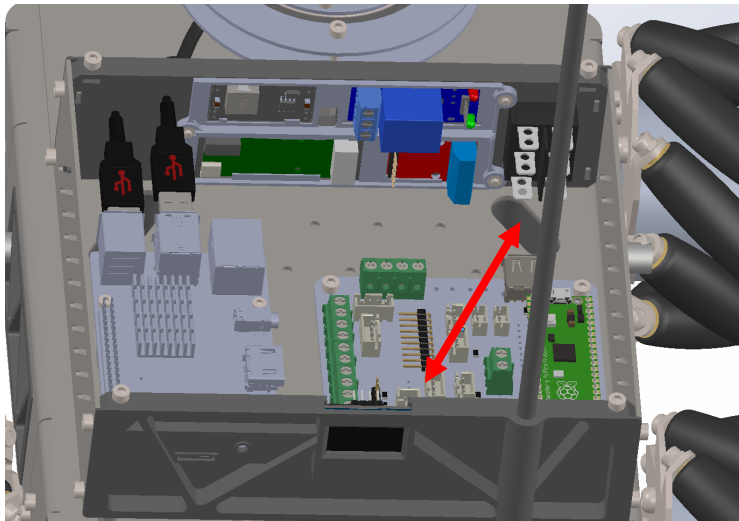


2x {12V, GND}



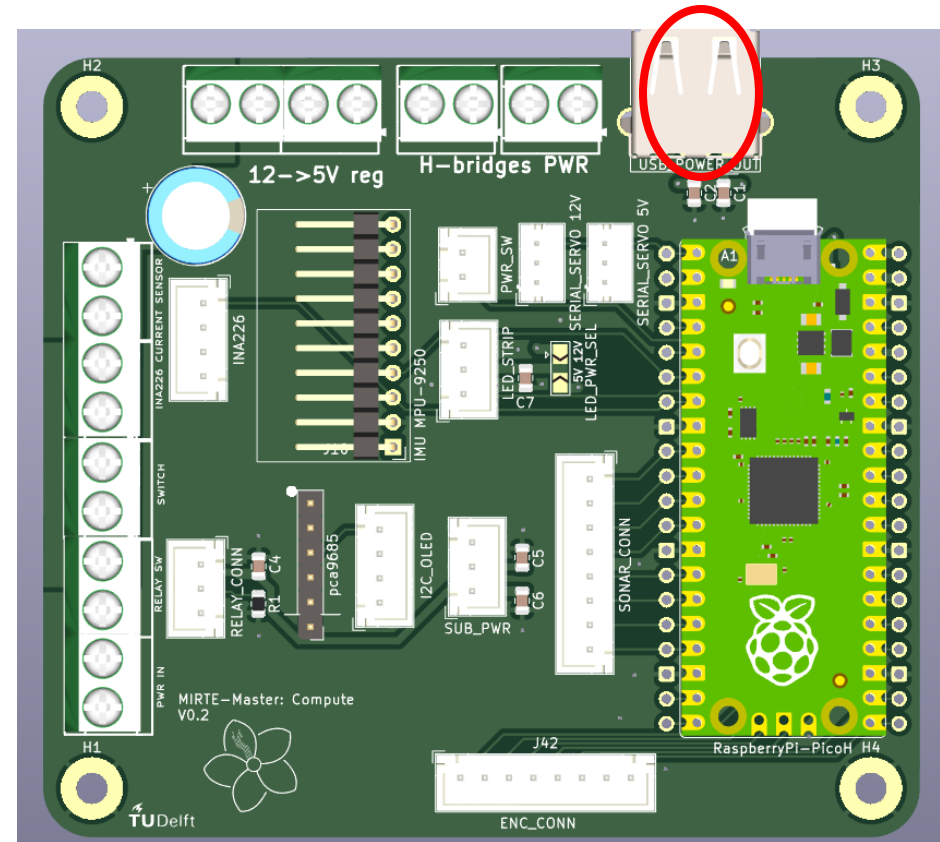
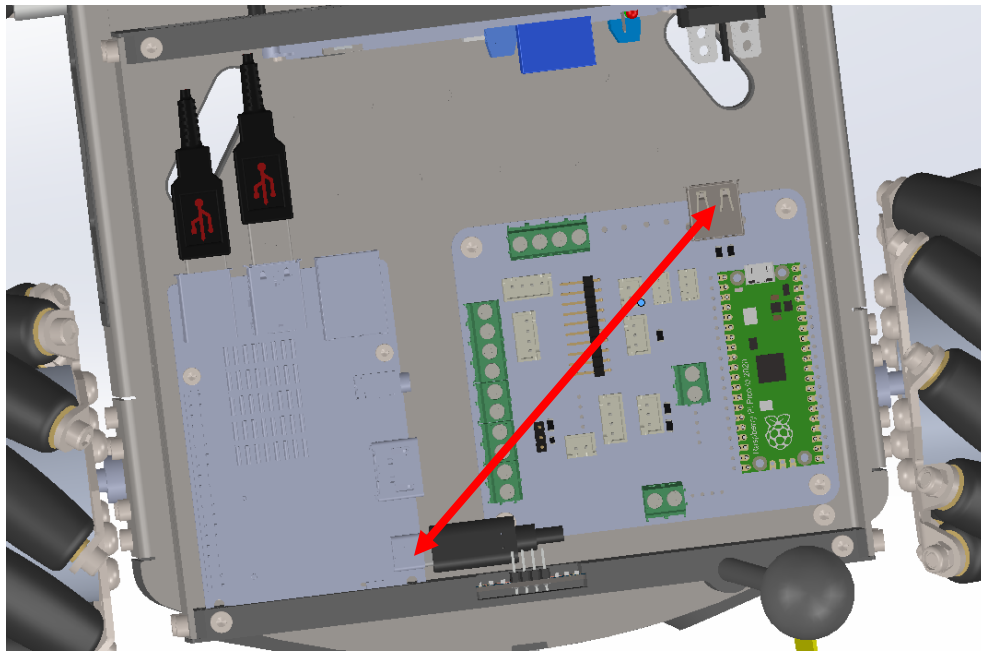
# Connect cable for bottom pcb

- PCA9685 use jst ph 5or6 pin cable
  - Hooks to pico
  - When using 5 pin, skip top pin.
  - Use left hole
- Sub power, jst xh 3 pin
- Encoder cable & sonar cable
  - Jst xh 8 pin, mark sonar cable
- Loop cables thru hole next to pcb



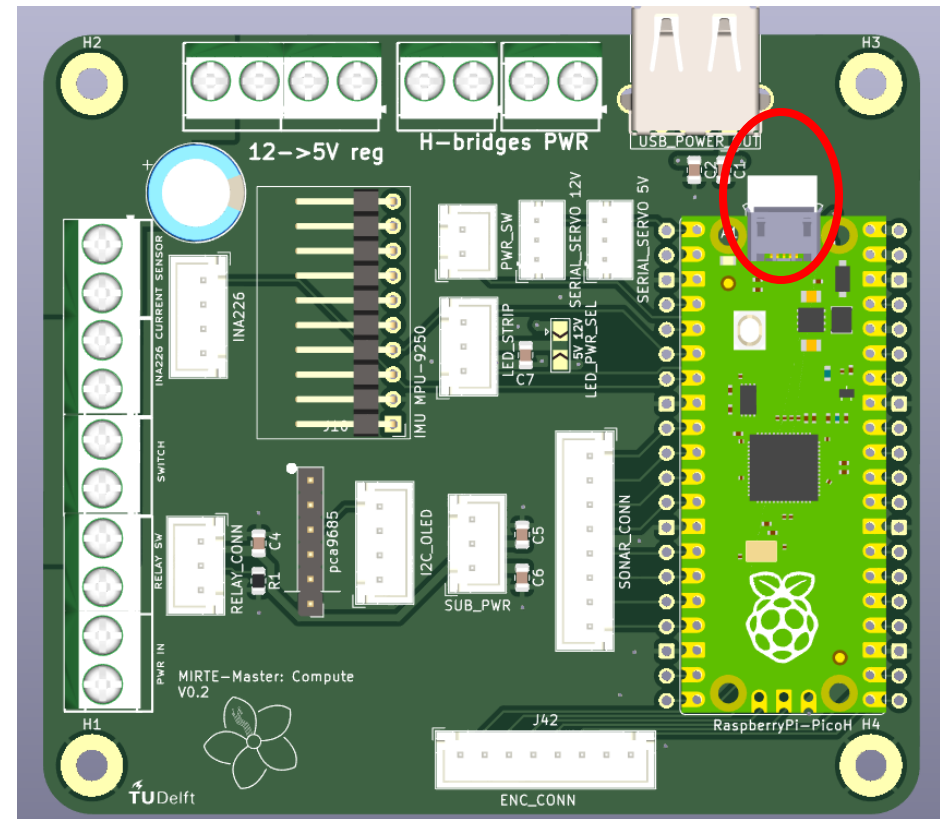
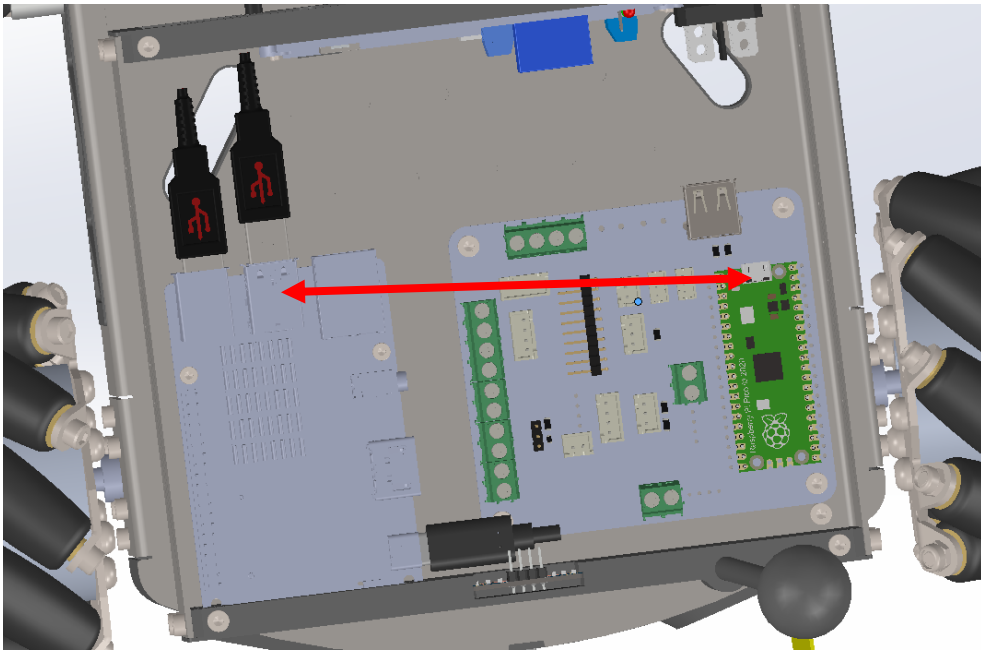
# Connect power orange pi

- Connect usb c cable to orange pi and pcb
- Route it beneath the pcb (around the pico)



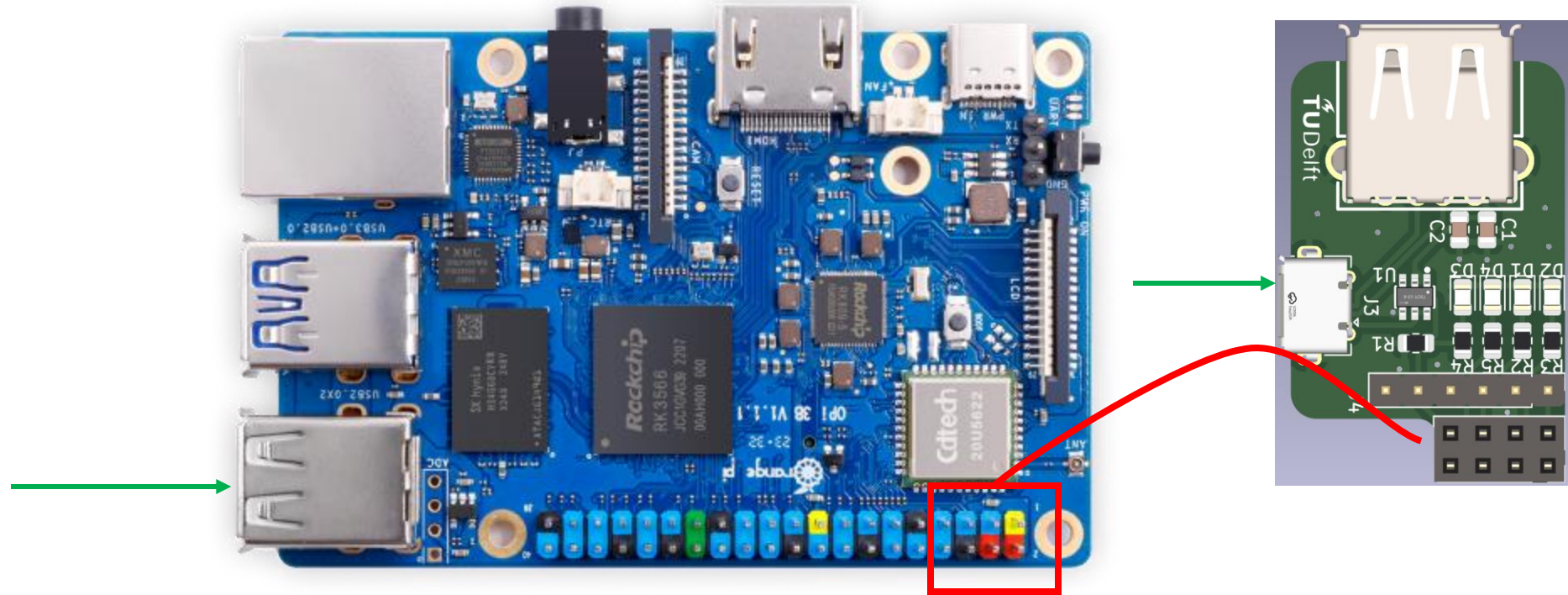
# Connect Rpi pico

- Connect usb b-micro cable to orange pi and pico



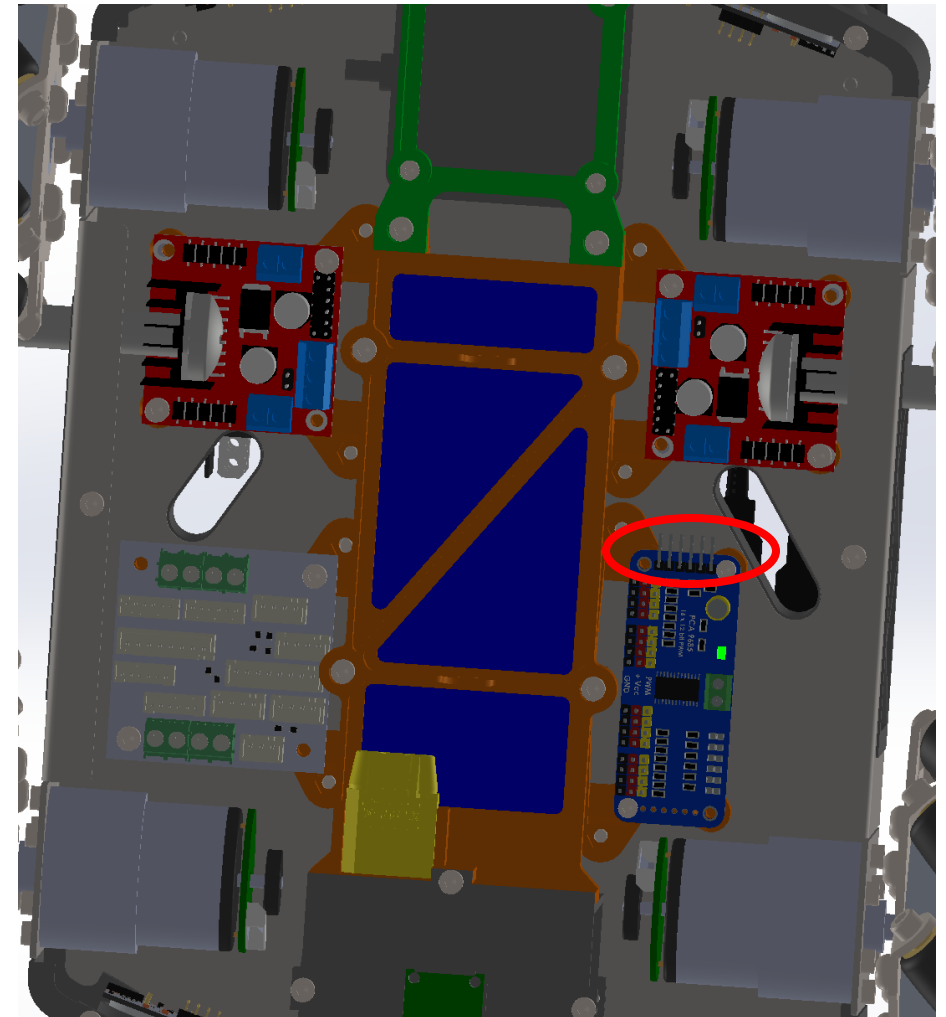
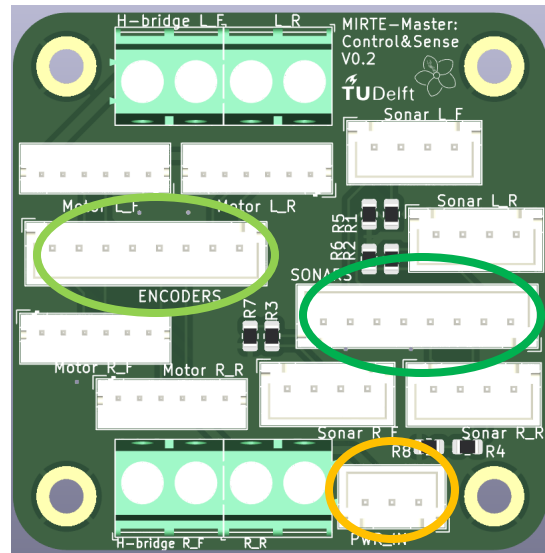
# Add usb power switch

- Put the usb power switch pcb on top of the orange pi, the pins most away from the usb ports.
- Connect usb A -> B-micro cable from orange pi to switch pcb
  - Hooks down



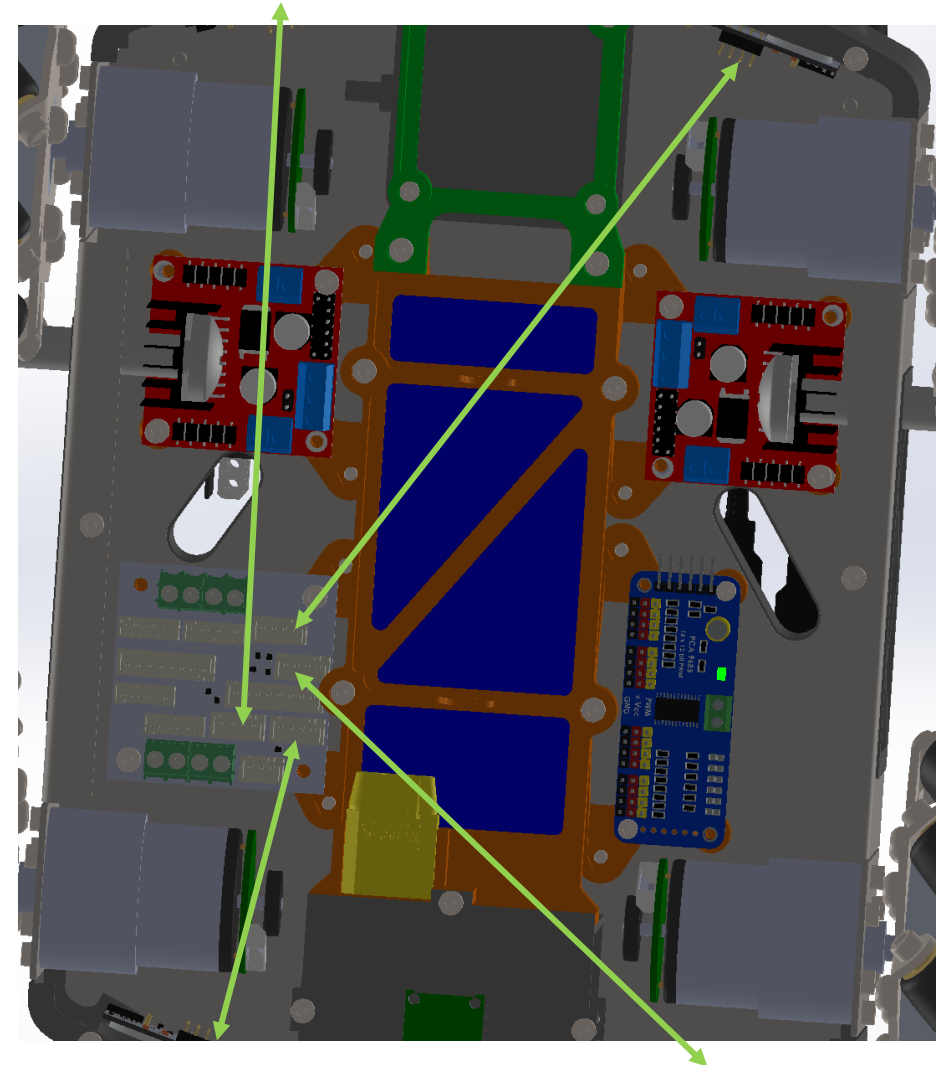
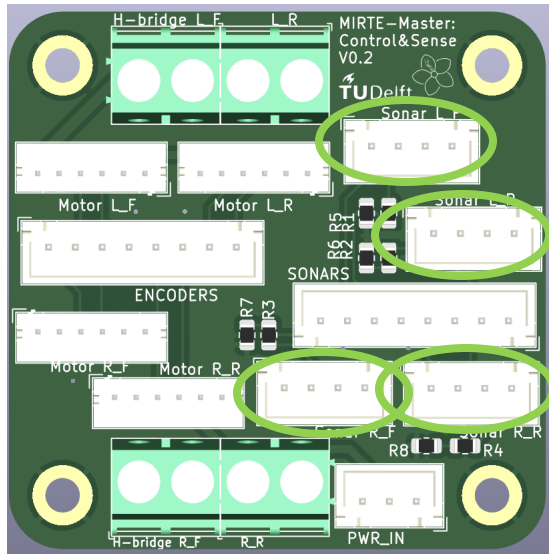
# Connect signals from main pcb

- Connect marked cable for sonars to sonar connector
- Connect other 8pin cable to encoder connector
- Connect 3 pin cable for power
- Connect pca9685 cable, **hooks up**



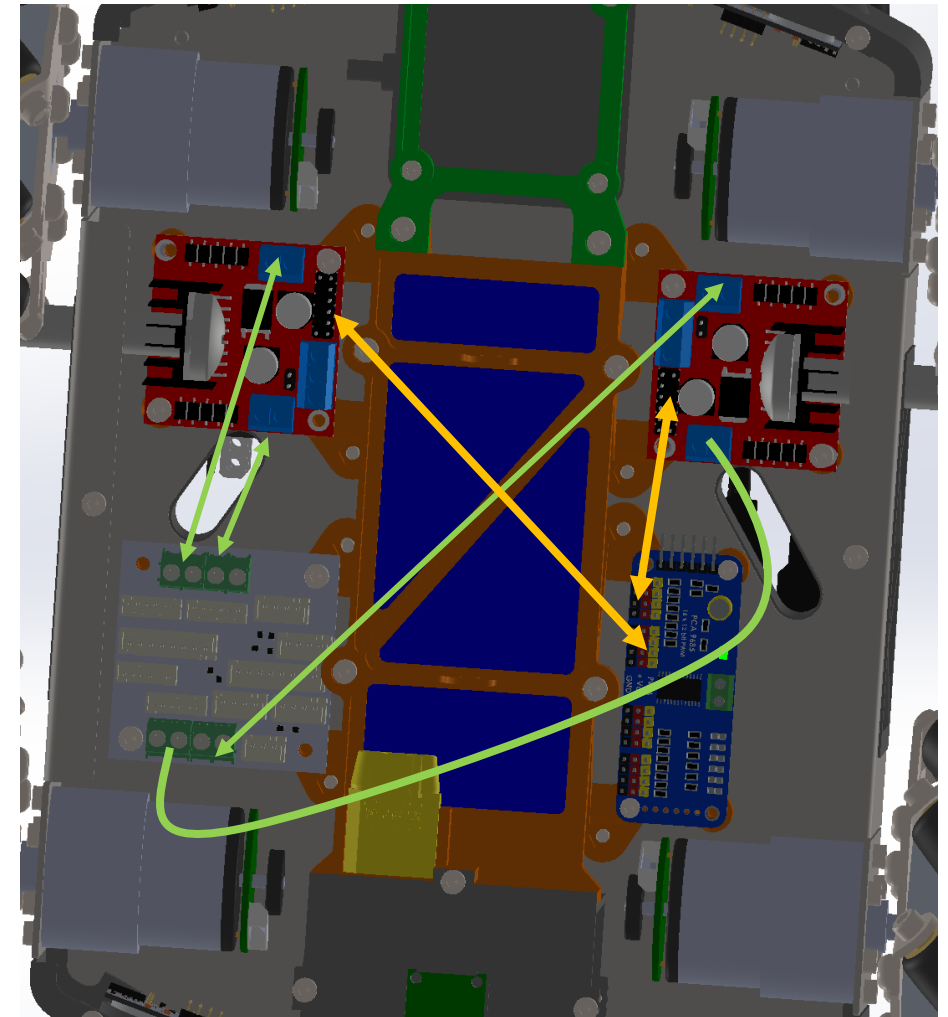
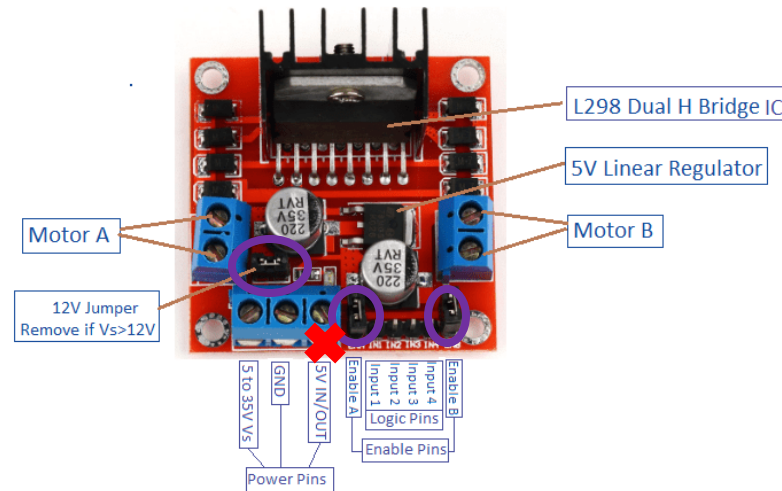
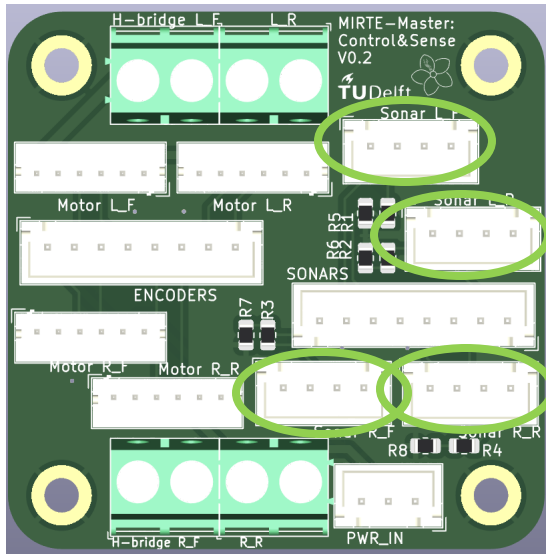
# Sonar wiring

- Connect each sonar connector to a sonar
  - Hooks pointing away from sonar pcb



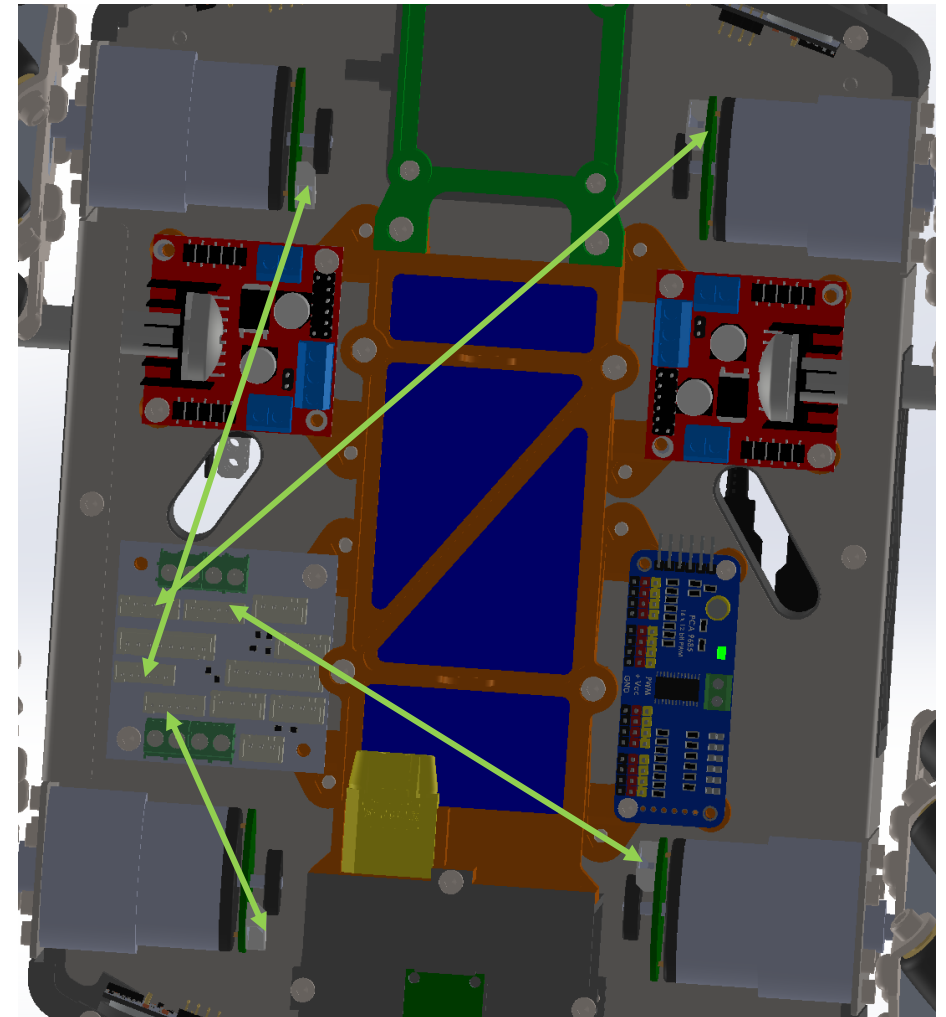
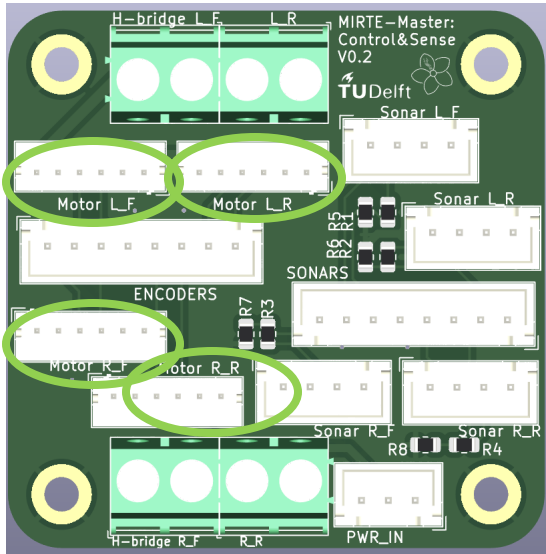
# Hbridge wiring

- Connect power from top pcb to screw terminals
  - 12V and GND, leave 5V unconnected
- Connect outputs to pcb
- Connect inputs to PCA9685 pcb
  - Input 1 on first output yellow row
  - Left hbridge on 1:4, right one on 5:8
- Add jumpers EN1&2 & 5V

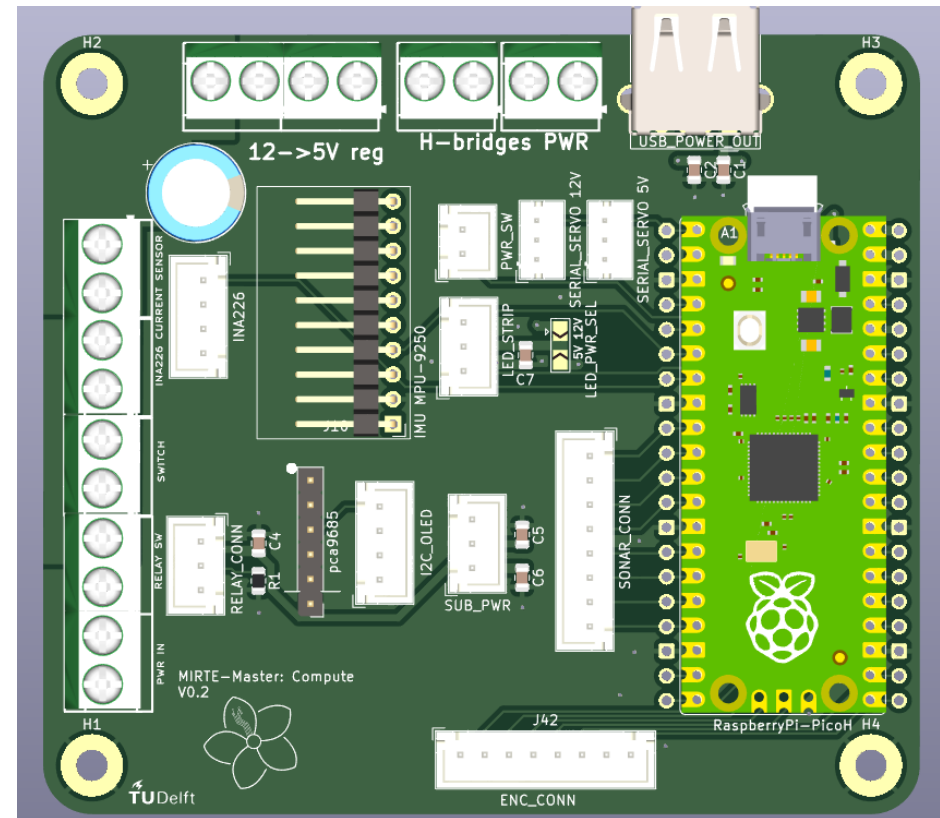
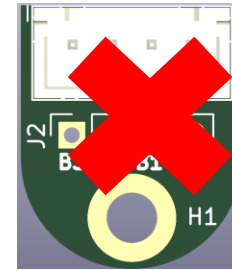
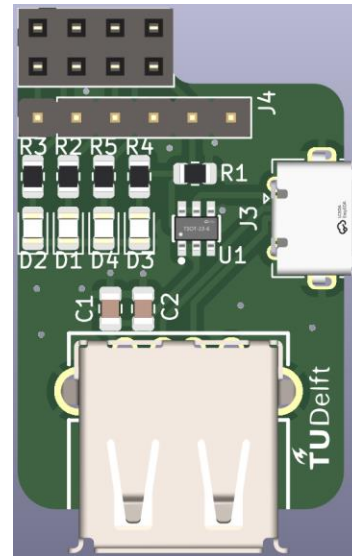
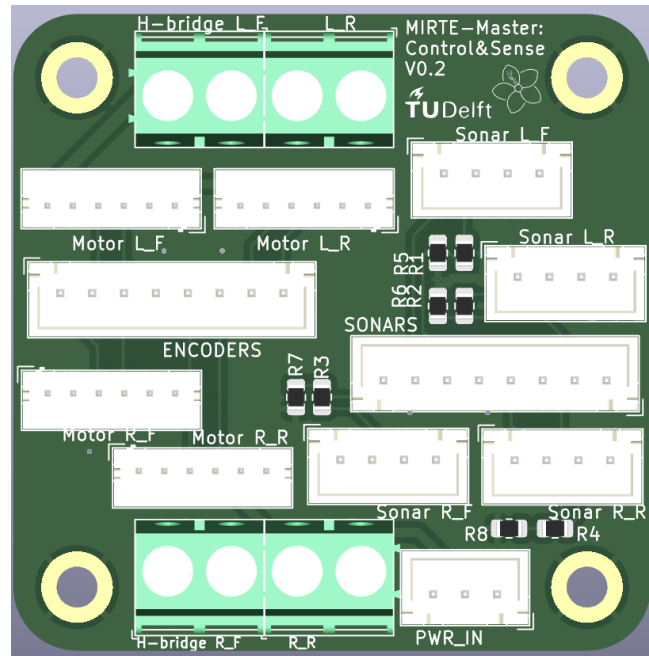


# Motor wiring

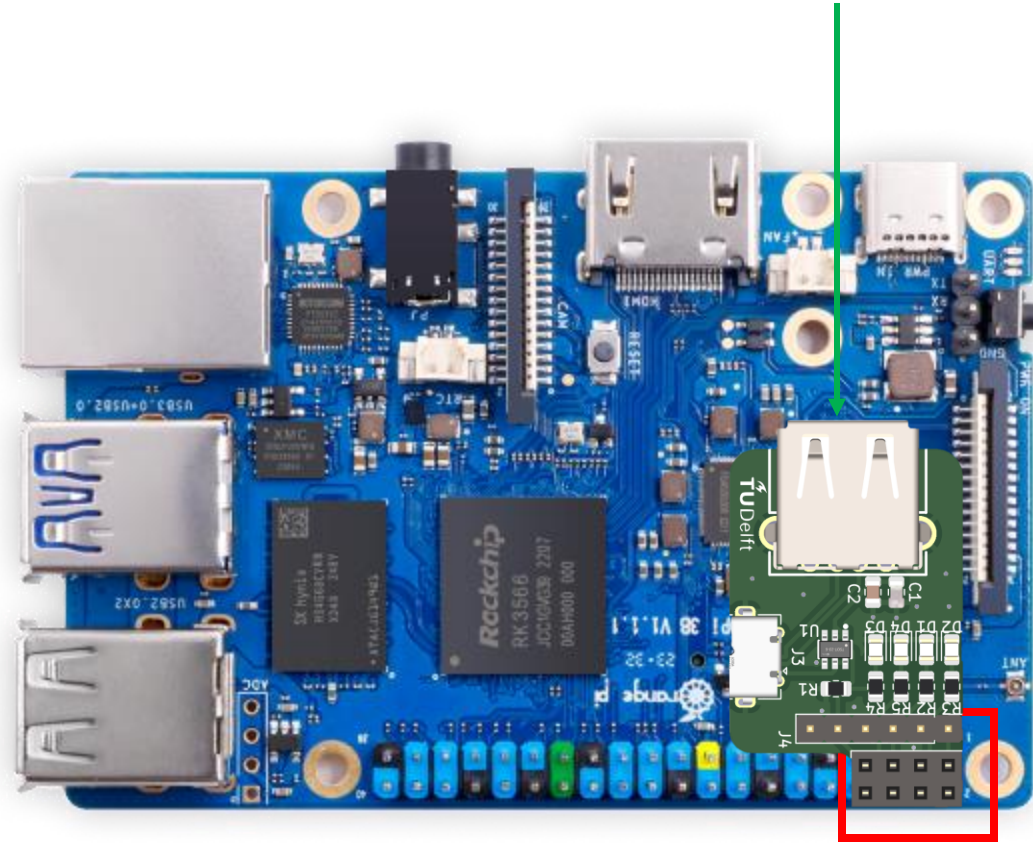
- Connect each motor to the pcb
- Jst ph 6 pin



pcbs

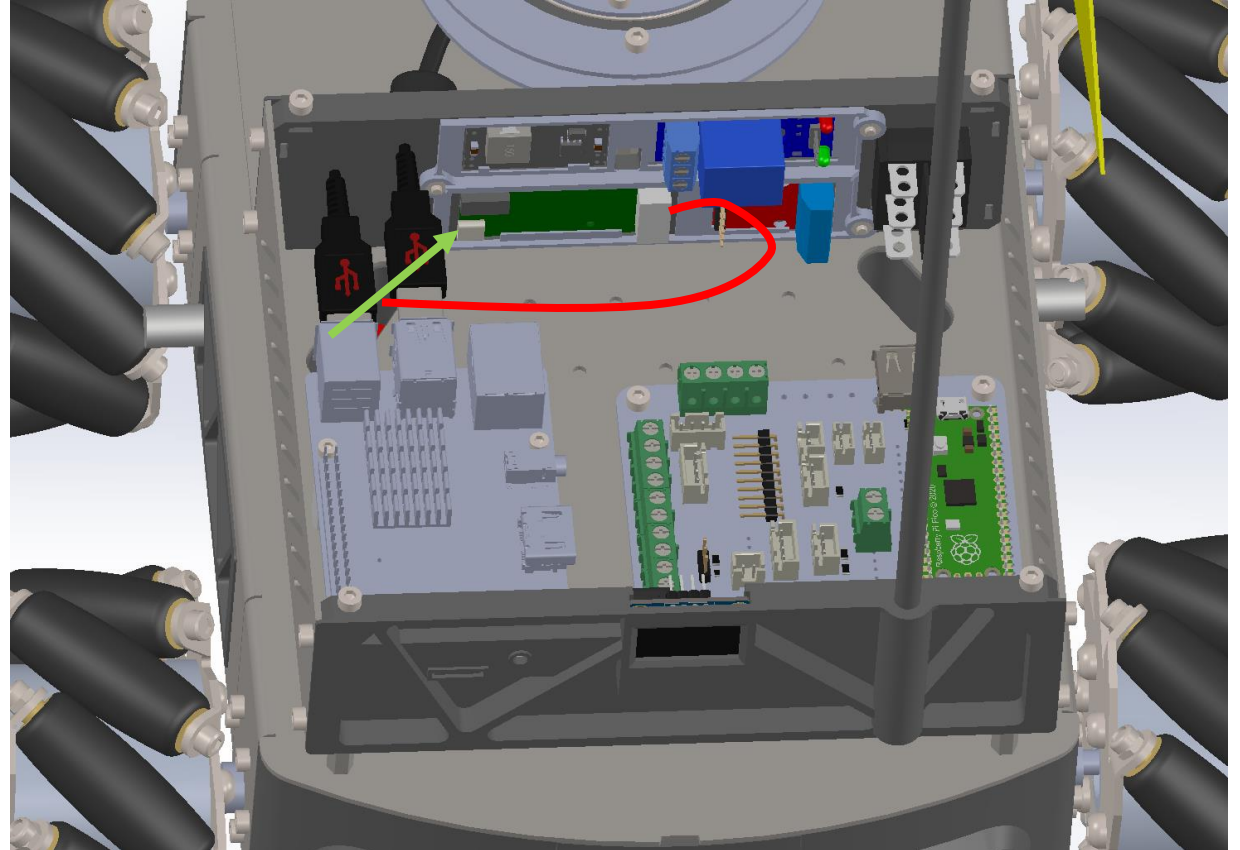


# Connect astra to usb switch pcb



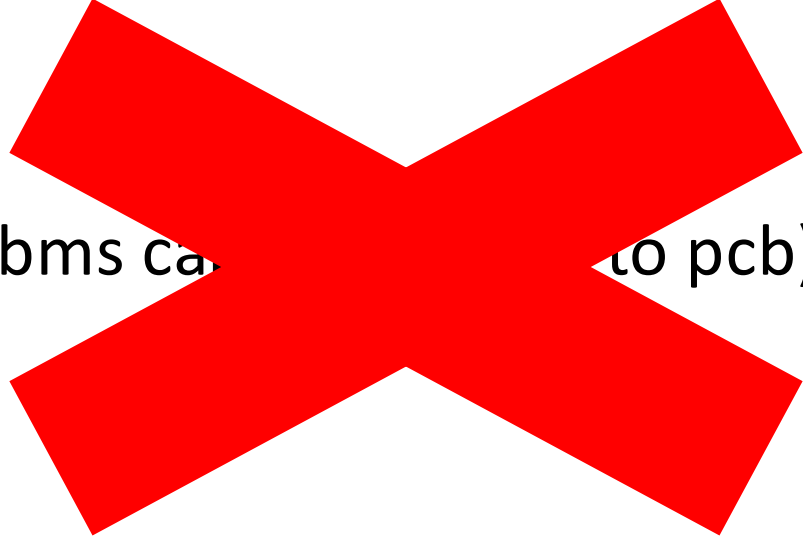
# Connect lidar

- USB A -> B-micro from orange pi to lidar board
- Lidar cable to lidar pcb
  - Loop thru bottom frame



# BMS

- Connect bms can (to pcb) to BMS board



# Setup servos

- Before connecting arm to pcb or to eachother
- #1: Give servos their correct ids and min-max range
  - Set to home position
- Build arm
- #2: Start check script, move arm to home position
  - Offsets will be written to servos automatically

# Servos

- Daisychain rotation servo to shoulder, elbow, wrist and gripper servos.
- Rotation servo

Name	Type	ID	Typ Min	Typ Max	Home angle
Rotation	HX12	2	?	?	?
Shoulder	X	3			
Elbow	X	4			
Wrist	HX12	5			
Gripper	HX12	6			

# Orange pi

- 1 sd card required per build setup
- Flash flasher system image
- Put emmc in orange pi(opi) you want to flash (combo)
- Put sd card in opi
- Power on opi
- Sd card will flash emmc and spi flash automatically
- When the orange pi shuts down automatically, it's done

# Pico

- Flash pico with picotool or normal windows usb-disk method
- [LINK](#)

# Test

- Disconnect opi power from pcb and pico from opi
- Upload test script
- Turn on