

Assemble the intercom beltpack

Requirements:

Do not assemble the beltpack before told so in the Setup your intercom beltpack guide

List of needed parts can be found in the end of this guide.

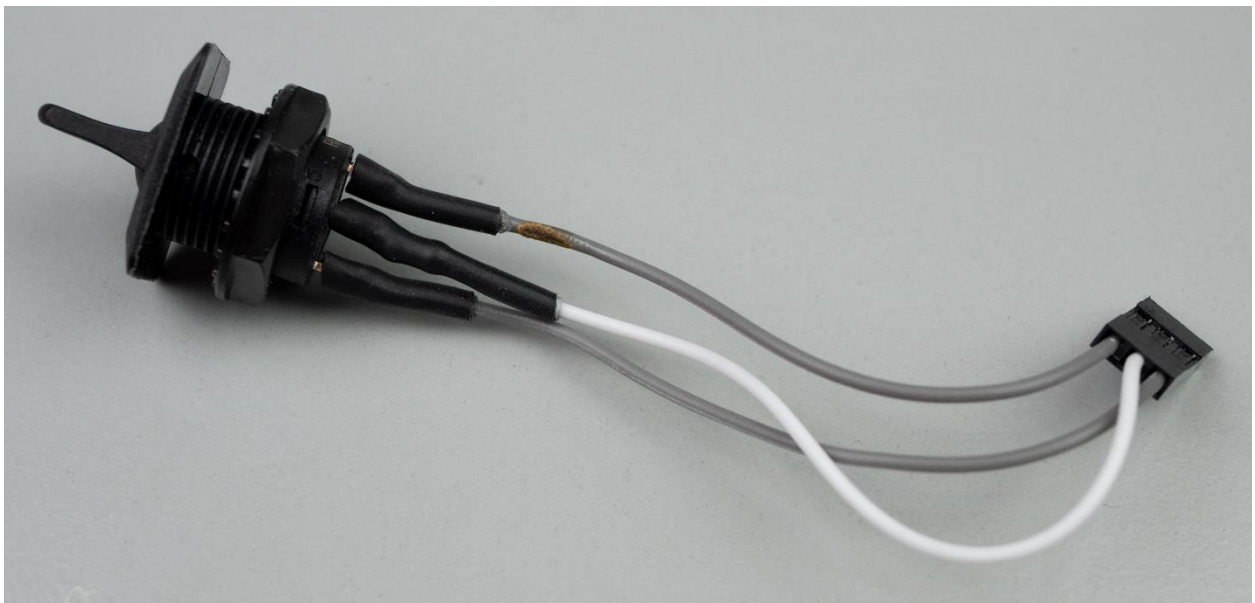


1. Insert brass insert nuts



Start by inserting the brass insert nuts (M4*L 10mm*OD 5mm) into the 6 holes, I've used an old solder iron to carefully heat and press it down until it looks like the picture. Try to get them as straight as possible. Let them cool as they are very hot.

2. Install the push to talk switch



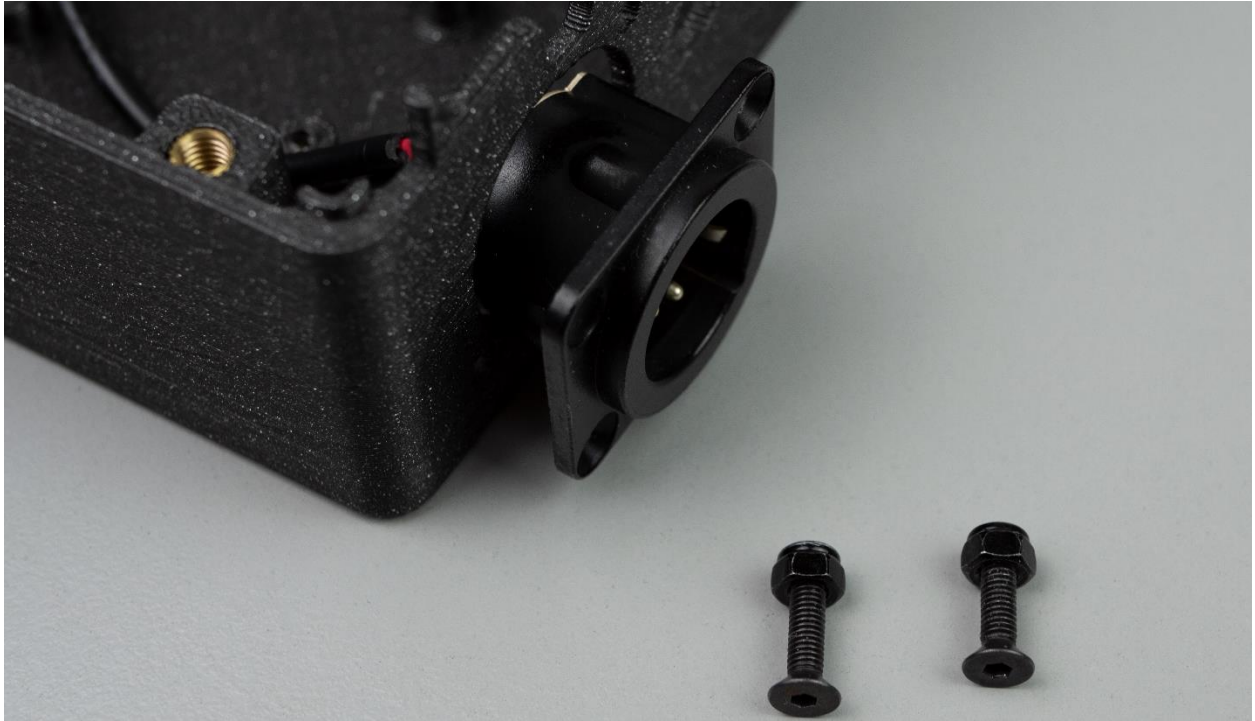
The talk switch has off in the middle and talk to left and right (2 channels). In the picture the white cable provides 3.3V and has a 1k resistor soldered to the middle pin. This is to provide a little protection for the Raspberry in case it is connected to the wrong pin. The heat shrink tube to cover the pins, the other side is inserted into a 3 pin Dupont connector. Hint: Be careful not to melt the cable insulation as I did.



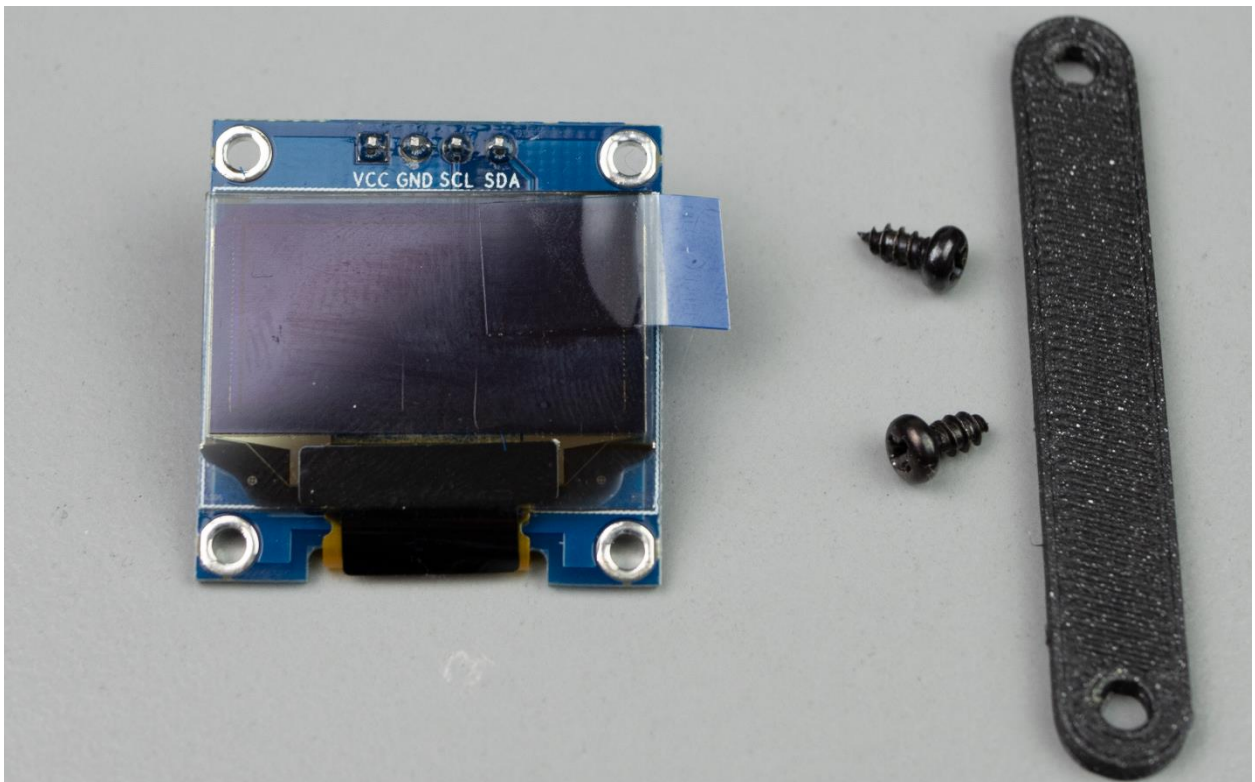
Insert the switch as shown.

3. Installing the XLR headset connector

Take a 3.5mm right angled cable and cut it in half (12-13cm should be enough but check before you cut), solder it to the XLR connector. XLR Pin 1 is connected to ground (check with a multimeter which color it is) on the 3.5mm plug that goes to the microphone on the soundcard and pin 2 is the microphone, solder the 2 remaining wires in the cable to that pin. Pin 3 is ground for the headphones and pin 4 to the left and right channels. Insert the cables through the XLR connectors hole and fasten with M3 screws and use M3 lock nuts on the inside.



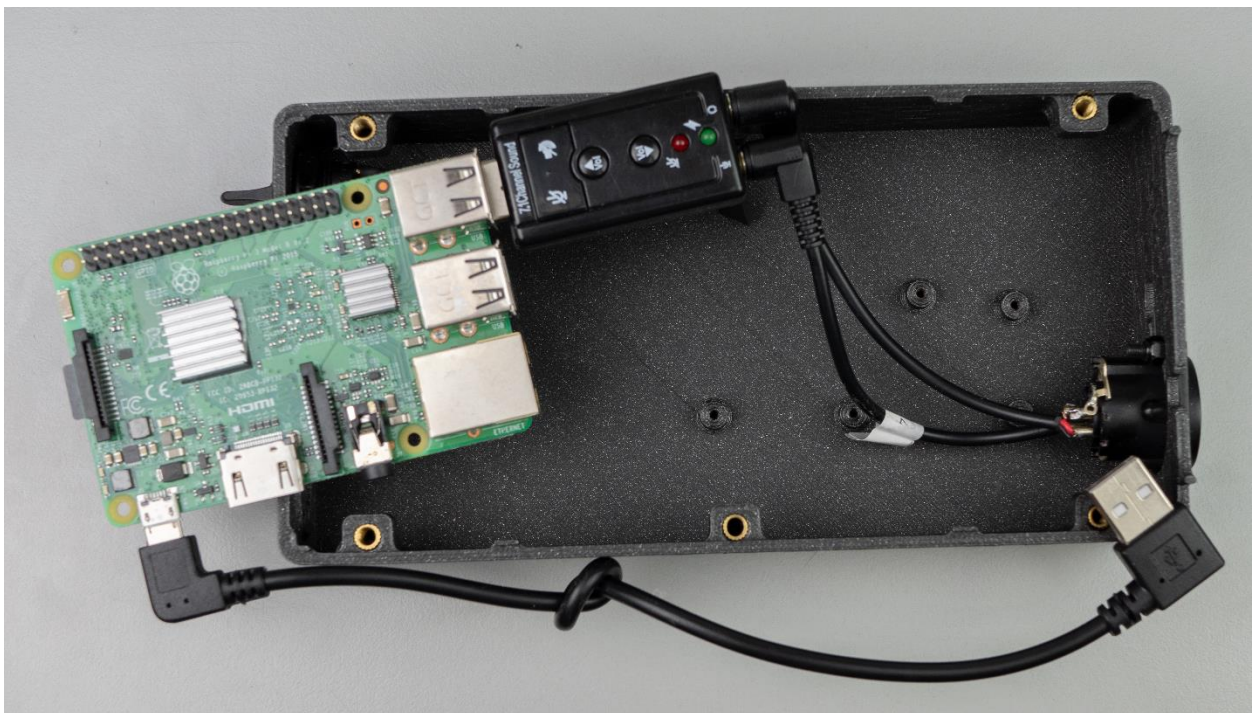
4. Install the 0.96" display



Observe that the display can have different placement of the pins so take note, in this case it is 3.3V (red), GND (black) and I2C bus clock SCL (blue) and data (yellow). Remove the plastic cover from the display and use the 3D printed oled holder and 2 M2.5*5mm screws to install it as seen below.



5. Install the Raspberry Pi 3, the soundcard and the power cable.



Plug the micro USB cable into the Raspberry Pi, attach the USB soundcard and connect the 3.5mm cables from the XLR connector. Two heatsinks are installed to make the Raspberry run a bit cooler. Observe that in this guide the headphone and microphone cables are accidentally reversed in the soundcard. Carefully position the whole package into the enclosure and fasten the Raspberry Pi with 4 M2.5 (5mm) screws.

6. Connect the push to talk switch

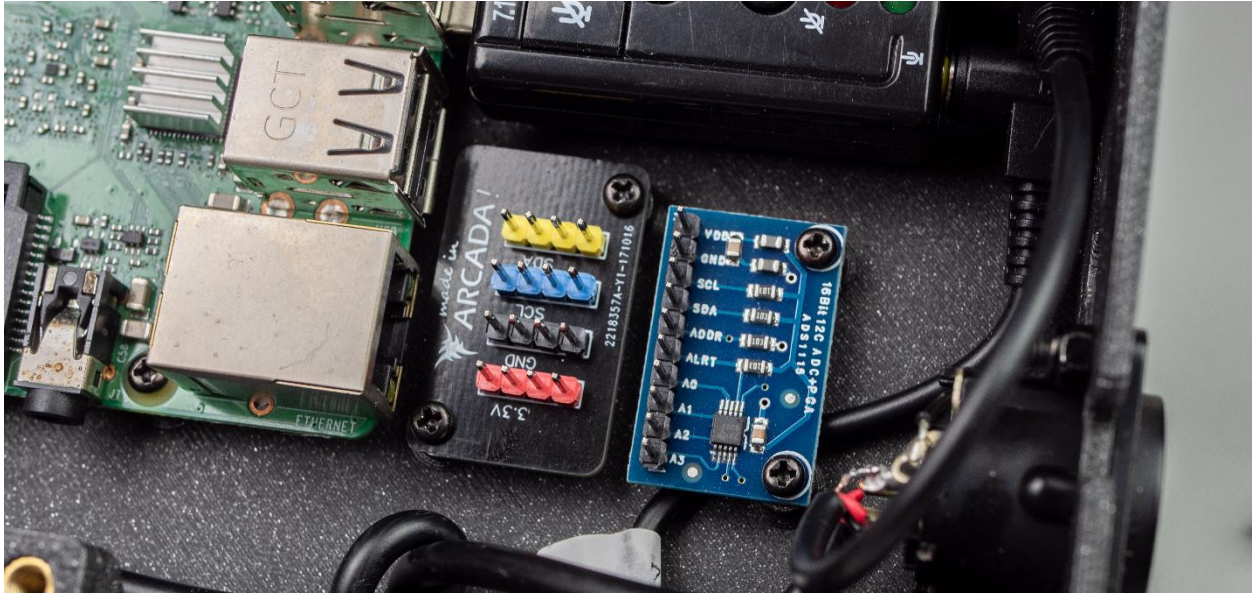


Connect the switch to pins 36,38 and 40 on the Raspberry Pi.

7. Install the breakout board and analog to digital converter

Because we need to split power and the I2C bus to multiple places I made a small PCB for the connectors but you can also use a prototype pcb to solder the connectors on, to the right the ADC for the volume control.



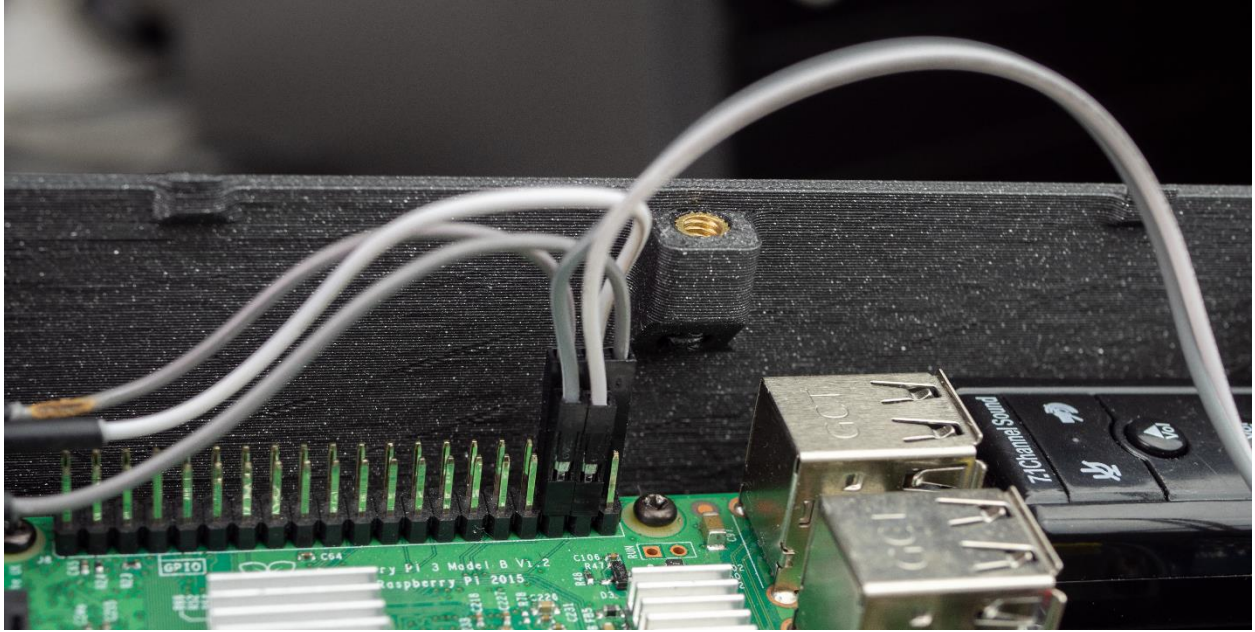


Install the boards with 2 M2.5x5mm screws each as shown in the picture.

8. Install the shutdown button

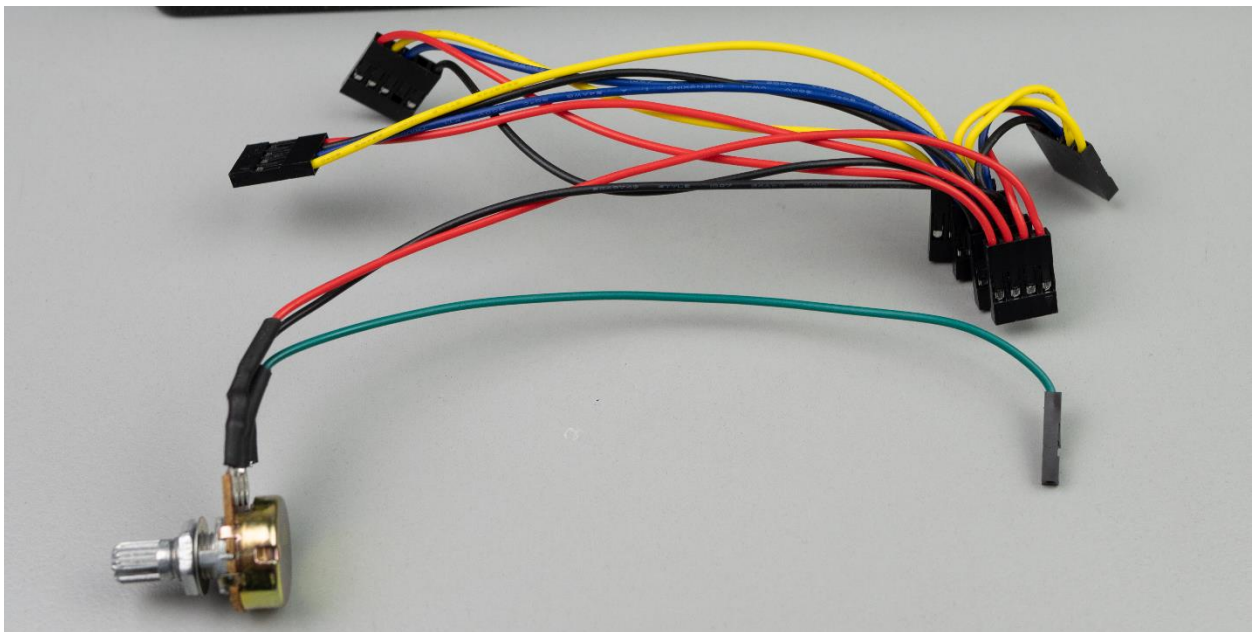


As with the push-to-talk switch, the white wire will be connected to 3.3V and has a 1k resistor soldered between the white wire and the left leg of the button to protect the Raspberry Pi.



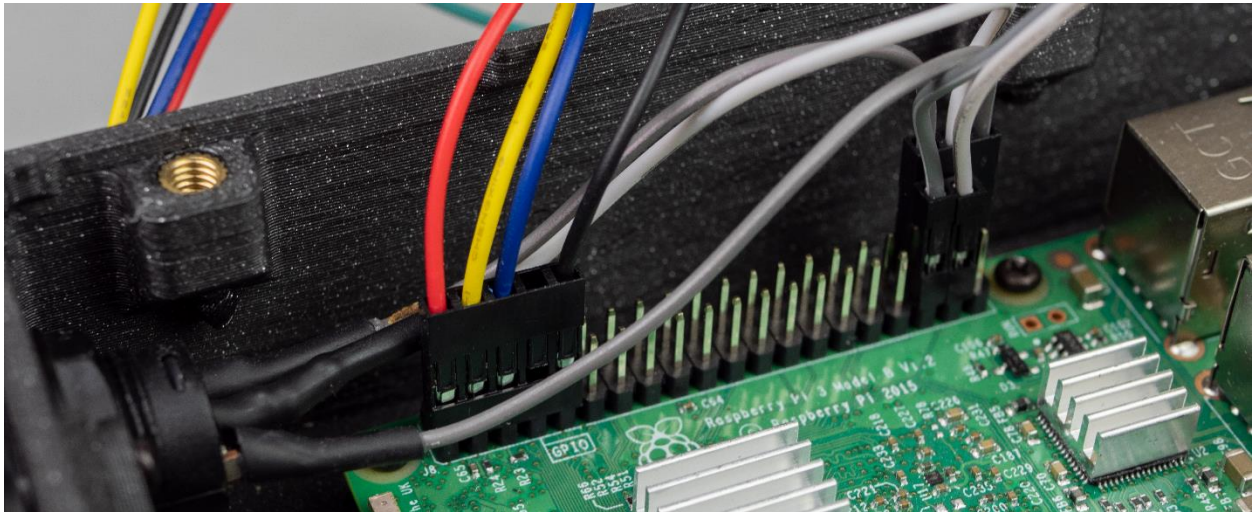
The other end of the wire will be connected to pins 35 & 37 (white wires next to each other). If you want to make it nicer you can use a 3 pin Dupont connector with pin 39 (GND) empty.

9. Connect the wires

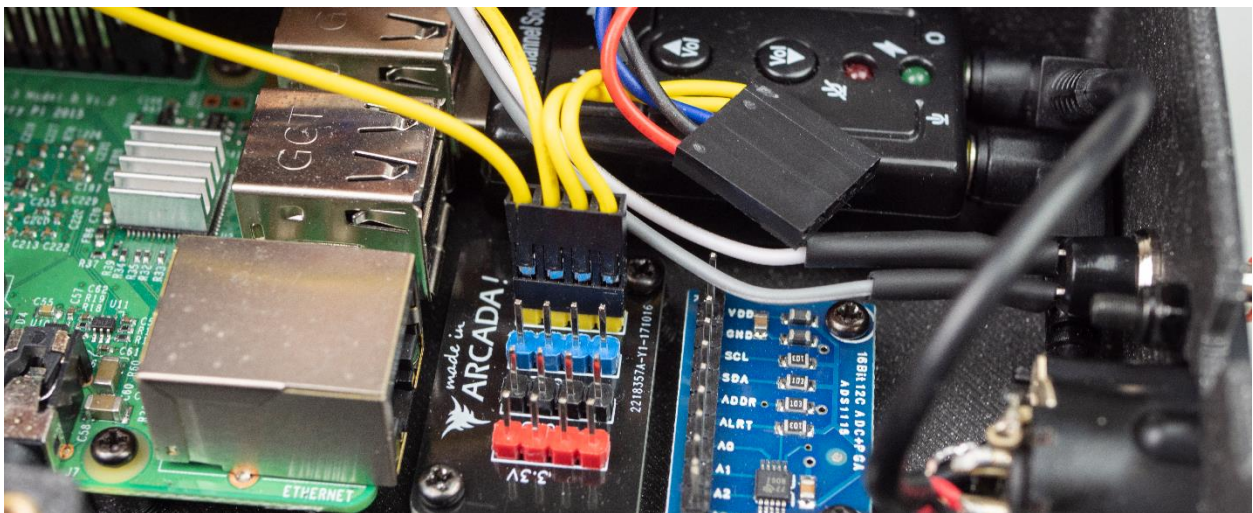


This might look scary but it is actually very simple, the 5 pin Dupont connector at the top is connected to the Raspberry Pi. It is then connected to the breakout board according to color, from there it goes to the

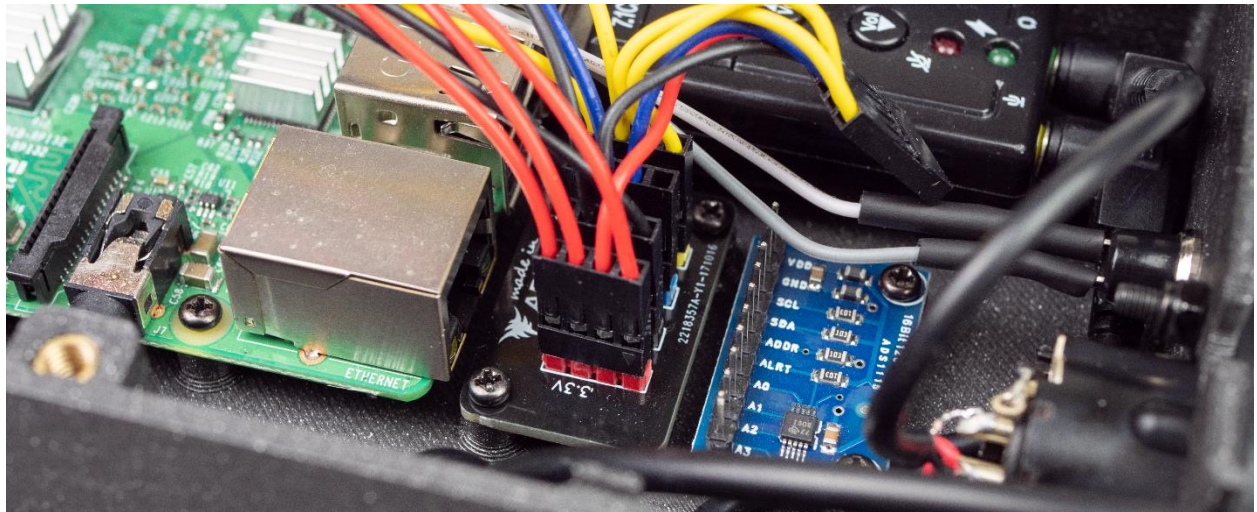
ADC, the display and the volume control board. Let's take it step by step. You do not need to use multipin Dupont connectors but it makes them stay better and are easier to connect.



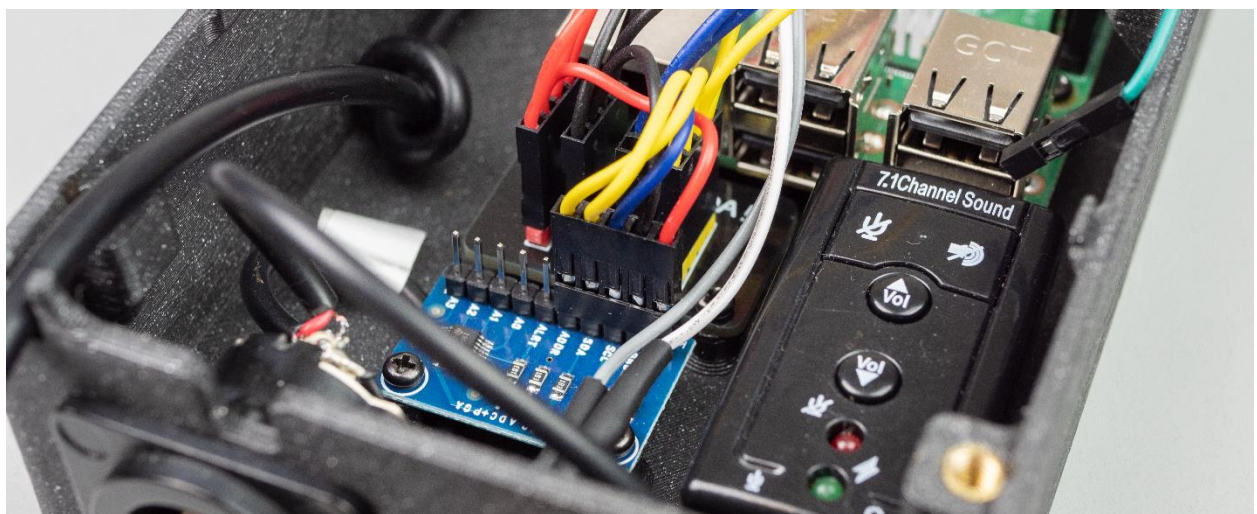
Start by connecting the 5 pin Dupont to the Raspberry Pi pin 1,3,5 and 9. Note that there is one empty pin between the blue and the black wire. We have now connected 3.3V, ground and the I2C data bus (yellow SDA and blue SCL).



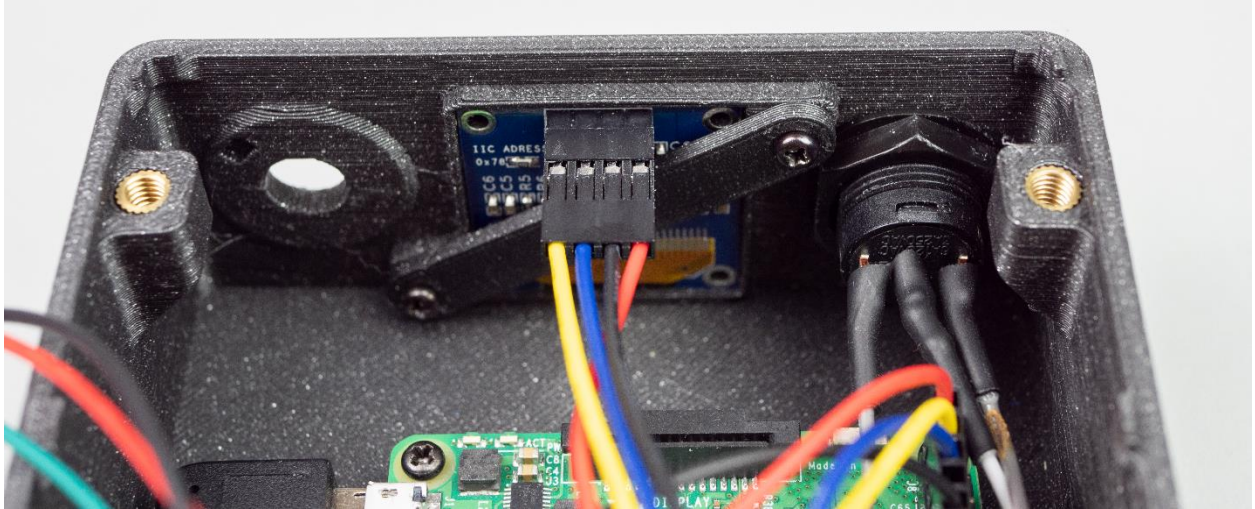
The yellow cable (SDA) connects to the yellow connector on the breakout board. Of the remaining 3 wires one go to the display and 2 to the ADC board (one to the SDA connector and one to the ADDR pin to change the modules I2C address from 0x48 to 0x4A). This is because in an earlier version of the beltpack there was an address issue but this should not actually be needed any more. If you decide not to connect SDA to the ADDR pin remember to change the I2C address in the volume_control.py script.



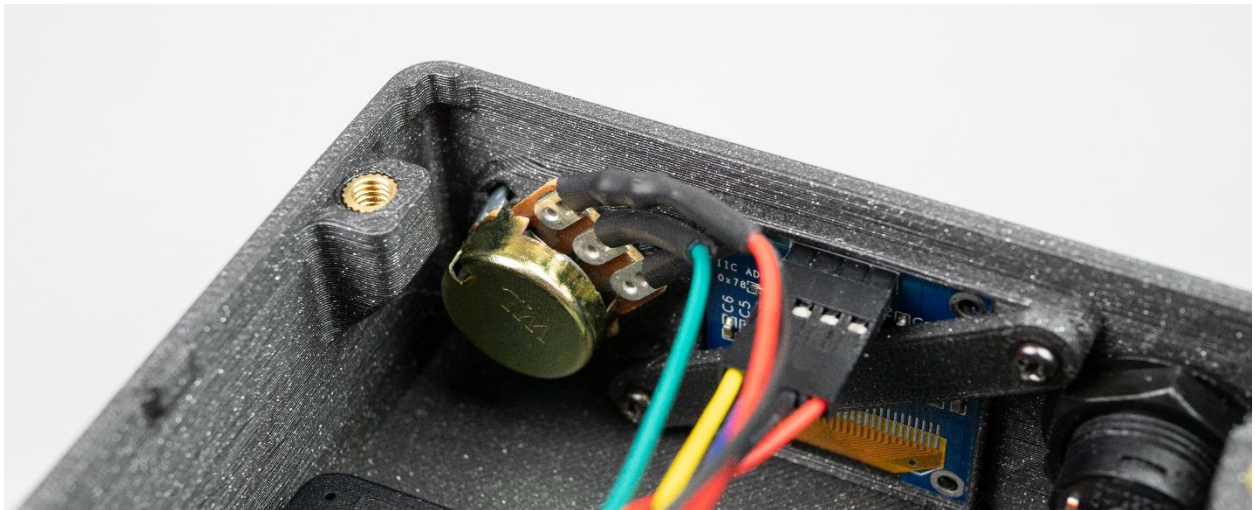
And last the red wire to the red connector, this is then split to the display, the ADC board and the volume potentiometer.



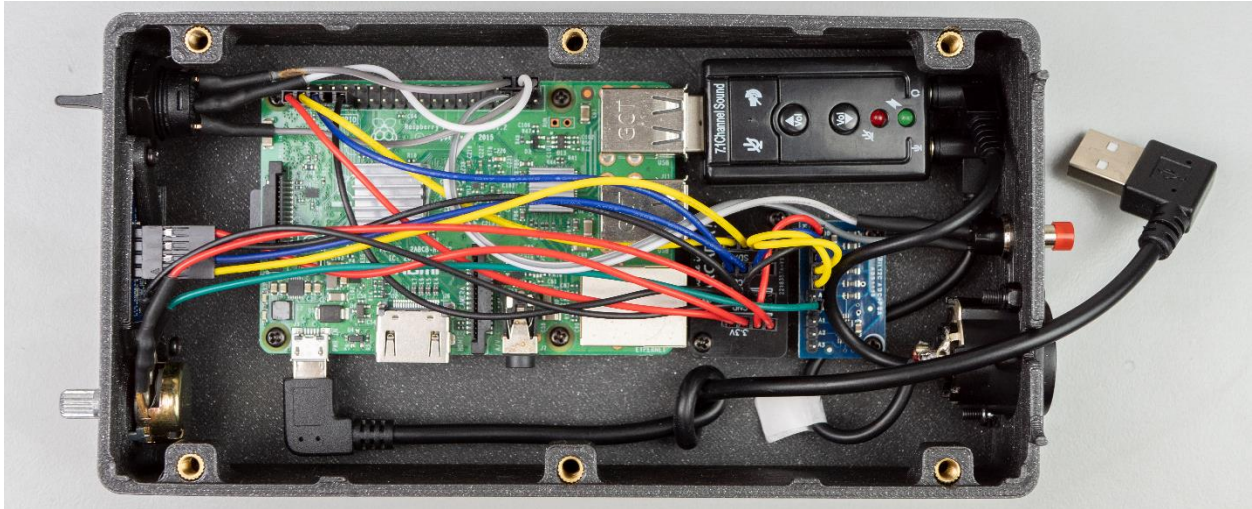
This is what the ADC board connector should look like.



The display is connected as shown but remember to check that the pins on your display has the same order as pointed out in step 4. Also remember that the display is now seen from behind.



The 100k volume potentiometer installed, red wire (3.3V) has a 1k resistor on the wire for protection, the green wire is the output and is connected to the ADC pin A0. The black wire connected to the third pin on the potentiometer. This way we can adjust the voltage between 0V and 3.3V that is then converted to 0-100 in the volume control script that controls the soundcards output level.



With everything connected it is time to assemble the beltpack.



Install the battery plate to separate the battery from the electronics. Now it is time to secure the beltclip to the battery compartment (attached in the first picture) with 2 M4*10mm bolts and locking nuts.



Put the battery on top the the battery plate and finally attach the battery cover with 6 M4*35mm bolts.

Parts needed:

10 pcs M2.5*5mm screws

2 pcs M3*10mm countersunk bolts

2 pcs M3 lock nuts

6 pcs M4*35mm countersunk bolts

6 pcs M4*10*5 Brass insert nuts

<https://www.aliexpress.com/item/200pcs-lot-Brass-Knurl-Nuts-M4-10mm-L-5mm-OD-Metric-Threaded-Nuts-Insert-Round-Shape/32651619949.html>

1 pcs USB 2.0 Left Angle A Male 90 Degrees to Micro Left Angle M Cable Data Cord

<https://www.aliexpress.com/item/2PCS-USB-2-0-Left-Angle-A-Male-90-Degrees-to-Micro-Left-Angle-M-Cable/32784619132.html>

1 pcs 100k Linear potentiometer (volume control + knob)

<https://www.aliexpress.com/item/Free-shipping-10pcs-Single-potentiometer-B100K-amp-potentiometer-handles-type-b-20MM/1954510106.html>

3 pcs 1k resistors

1 pcs breakout board or prototype pcb (Gerber files included)

1 pcs 4pin male Neutrik XLR NC4MD-L-BAG-1

1 pcs ADS1115 ADC board

<https://www.aliexpress.com/item/16-Bit-I2C-ADS1115-Module-ADC-4-channel-with-Pro-Gain-Amplifier-for-Arduino-RPi-1PCS/32718837389.html>

1 pcs 0.96" white i2c Oled display (ssd1306)

<https://www.aliexpress.com/item/Free-Shipping-White-Blue-Whiteand-Blue-color-0-96-inch-128X64-OLED-Display-Module-For-arduino/32713614136.html>

1 pcs Momentary push button (power off)

<https://www.aliexpress.com/item/IMC-Hot-10Pcs-Red-Cap-SPST-Momentary-Mini-Pushbutton-Switch-DC-50V-0-3A/32816983756.html>

1 pcs 3 Position momentary MON-OFF-MON switch

<https://www.aliexpress.com/item/5Pcs-Black-R13-402-Momentary-ON-OFF-ON-3Pin-3Position-SPDT-Round-Toggle-Switch/32817966368.html>

1 pcs Linux compatible USB soundcard

<https://www.aliexpress.com/item/External-USB-Audio-Card-Sound-Adapter-Virtual-7-1ch-USB-Microphone-3-5mm-Jack-Converter-for/32658791595.html>

1 pcs Raspberry Pi 3B (or 3B+)

1 pcs Xiaomi 10000mAh powerbank (IMPORTANT!! case is made for PLM09ZM version)

1 pcs Headset Superlux HMC 660 X used but can be whatever you want (you need to replace connectors with one 4 pin XLR)

1 pcs black belt clip

<https://www.theclip.com/store/metal-belt-clip-661-tempered-belt-clip.html>

Heat shrink tube

<https://www.aliexpress.com/item/1meter-lot-2-4mm-Heat-Shrink-Tube-with-Glue-Adhesive-Lined-3-1-Shrinkage-Dual-Wall/32818131285.html>

0.5m 3.5mm Male to male right angle cable (XLR to soundcard)

<https://www.aliexpress.com/item/LEORY-0-5m-3-5mm-Plug-Aux-Audio-Cable-Right-Angle-Male-To-Male-Headphone-Extension/32911832454.html>

Different sizes Dupont terminal connectors

Connection wire, different colors (white, grey, red, black, yellow, blue, green) AWG 24 recommended but can also be readymade female-female wires with Dupont connectors. The problem with readymade

cables is that they are sold as fixed length and not the length you need. It is usually better to buy wire (AWG24) and Dupont female connectors and crimp yourself.

UL1007 24AWG connection cable (red,green,blue,yellow, black)

<https://www.aliexpress.com/item/10-Meters-UL-1007-Wire-24AWG-1-4mm-PVC-Wire-Electronic-Cable-UL-Certification-Insulated-LED/32821442881.html>

SN-2549 Crimp tool for Dupont connectors

<https://www.aliexpress.com/item/SN-2549-Pin-Crimping-Tool-2-54mm-3-96mm-4-8mm-28-18awg-0-08-1/32823519191.html>

Female Dupont connector

<https://www.aliexpress.com/item/Hot-100x-Dupont-Jumper-Cable-Wire-Female-Pin-Connector-2-54mm-copper-DIY-Good-Quality-wholesale/1850210835.html>

Dupont terminal connector kit

<https://www.aliexpress.com/item/620pcs-Dupont-Connector-2-54mm-Dupont-Cable-Jumper-Wire-Pin-Header-Housing-Kit-Male-Crimp-Pins/32839071531.htm>