



Needed parts:

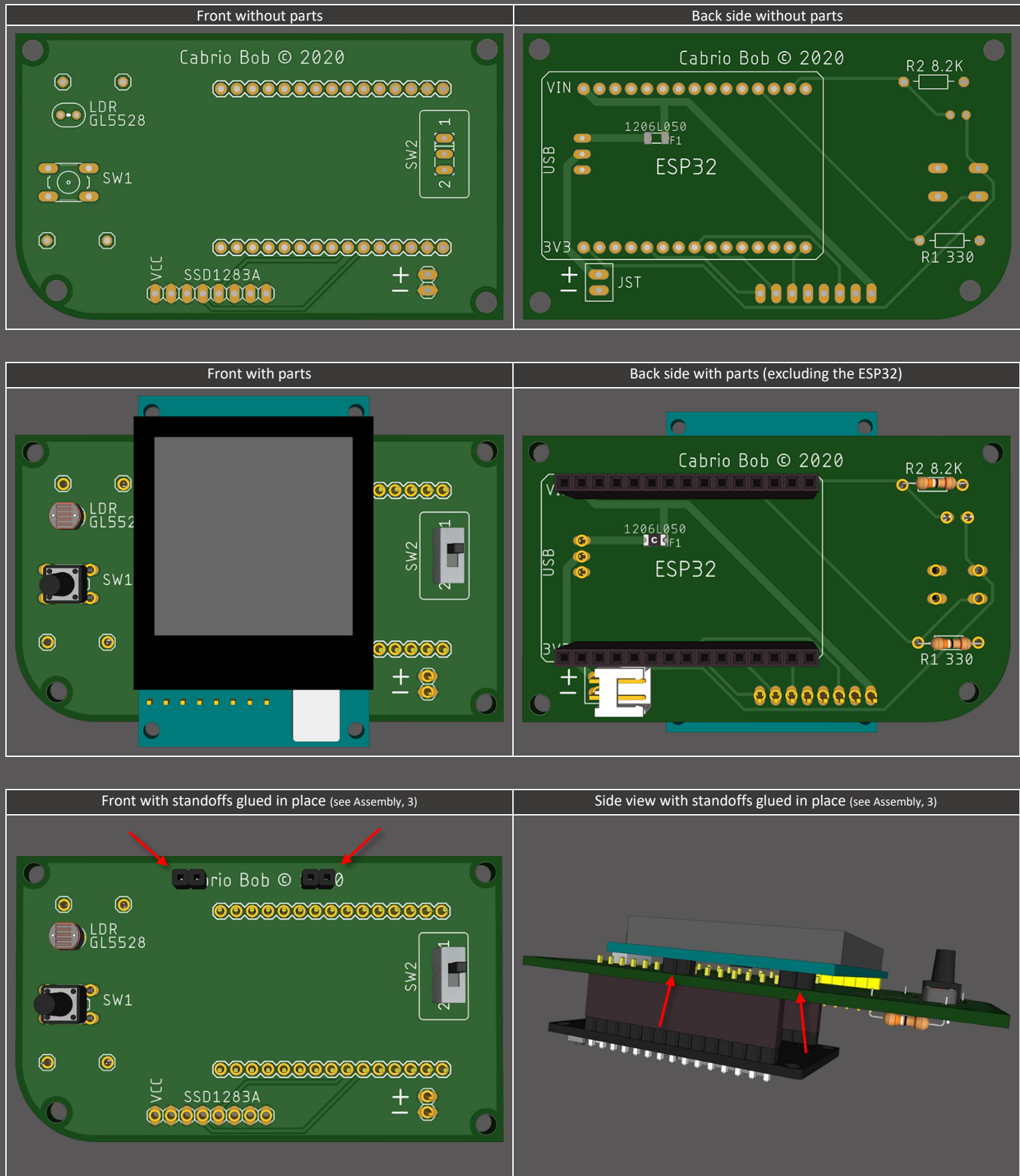
Amount	Part	Amzn link	Alix link	Comment
1	SSD1283a display	click	click	Make sure you get the complete board and exact same type
1	ESP32 "Doit devkit V1"	click	click	
1	Tactile button switch 6*6*9	click	click	
1	Tactile button cap	click	click	
1	Slider switch	click	click	
1	Photo resistor GL5528	click	click	Do not deviate from this 8.2 KΩ value
1	Resistor 8.2 KΩ	click	click	
1	Resistor 200 ~ 500 Ω	click	click	
1	JST-XH set 2-pin	not found	click	
2	PCB female 15-pin single row	not found	click	
1	PCB male header single row	click	click	Or use 6x 5-pin single row headers
1	PTC poly fuse 1206L050	not found	click	Only the plastic needed, pins will be removed
1	Low profile USB car charger	click	click	6V, hold current 0.5A, trip current 1.0A (do not use the 1206L050/15 or /24)
1	90° micro-USB cable	click	click	Any low profile (not USB-C) car charger will do (hardwire option: use something like this)
1	SH008a cable grommet	not found	click	Cable will be dismantled (Micro USB side discarded). If hardwired, this cable is not needed.
1	Shrink tubing (set)	click	click	Custom PCB, fabricated from provided "gerber" file
1	PCB board	click	click	
1	Enclosure 3D print	click	click	
1	Spray can black			Custom 3D print, see section " 3D print enclosure ".
1	Clear coat spray can			Optionally
1	Glue	click		
1	OBDII Bluetooth dongle	click	click	Vgate iCar Pro 4.0

Needed tools:

- Soldering iron, preferable grounded and temperature controlled (I own [this one](#))
- Flux core solder 0.6mm
- Cutting pliers
- Scissors
- Tweezers
- Adhesive tape
- Wire stripper
- Sharp knife
- Crimping tool [SN-2549](#)
- Good eyes, sufficient lighting

PCB:

The PCB board is custom designed to perfectly fit into the ashtray 3D print design.
Below it is shown how it looks with and without the parts on it.





Assembly:

The soldering will not be explained in full detail. Anyone who is attempting this is assumed to know how to solder.

In general:

- Order sequence of soldering:
 1. Slider switch, resistors, photo resistor, PTC 1206050.
 2. Female 15-pin headers (mount the ESP32 onto the headers while soldering, remove afterwards).
 3. SSD1283a display (use a piece of a male header without the pins as standoffs at the top of the display, glue these in place).
 4. JST-XH male angled header, tactile button.
- Make sure any component is soldered as close as possible to the PCB.

The resistors can be soldered on either side of the PCB.

Powering options:

The device can be powered in 2 ways:

Using a (modified) USB cable, or hardwire the setup.

USB option:

If you go for this, you'll need the USB cable and the Low profile USB car charger.

The USB cable needs to be modified, see [appendix A](#).

Hardwire option:

Using the hardwire option, you'll have to source a [voltage converter](#) to 5V.

It is advised to install a fuse in front of the voltage converter of 1A. The device itself consumes $\pm 260\text{mA}$ at 5V at full brightness of the screen.

The route of the wire is different compared to the USB option. The JST-XH connector will fit through "that" hole, see [appendix B](#).

As a 12V power source you can use the cigar lighter, or the power socket in the glove box.

3D print enclosure:

The STL file in the download section can be used to order a 3D print online and have it send to you.

The best result you get when printing technique "Multi Jet Fusion (MJF)" or "Selective Laser Sintering (SLS)".

Check out [this link](#) for an explanation and comparison. I personally prefer MJF over SLS.

[Search online](#) which 3D print service suits you the best.

When the 3D print is delivered to you, it has to be painted.

I used plastic primer, primer, sanding, painted it black, and applied a clear coat.

Downloads:

Visit x150.bobhome.nl in order to download all necessities:

- This and other manuals
- 3D printable (zipped) STL files
- PCB Gerber (zip) file
- firmware downloads
- Arduino and ESP32 installation files

Appendix A: USB cable

1. cut USB cable to 150mm length

JST-XH
with pins



Shrinktube
Ø5mm ID



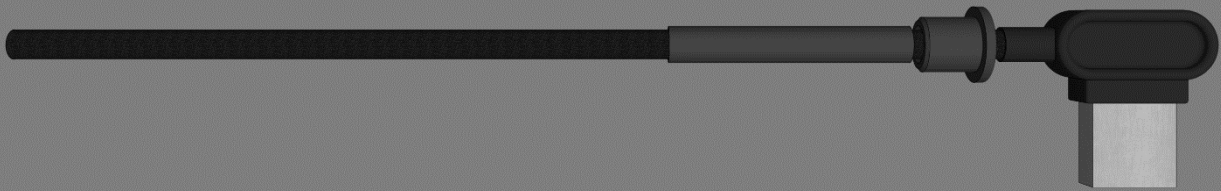
SH008a
grommet



USB Cable already cut to length



2. slide the grommet and shrink tube over the cable



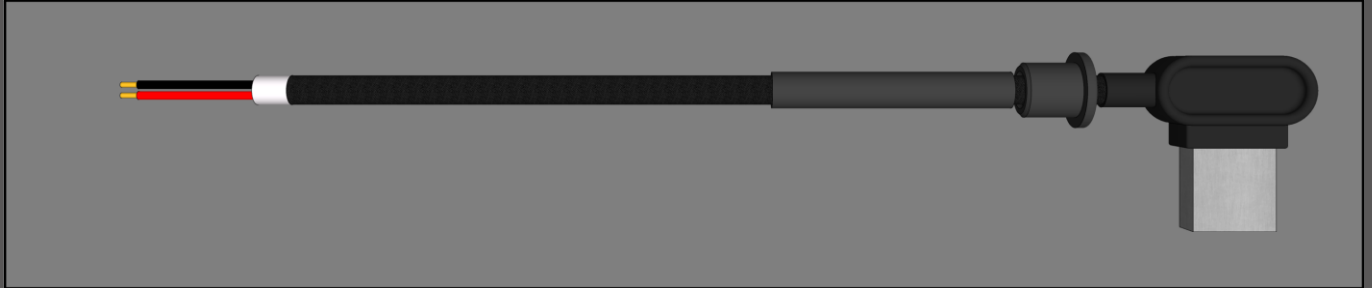
3. Remove 20cm from the fabric with a knife



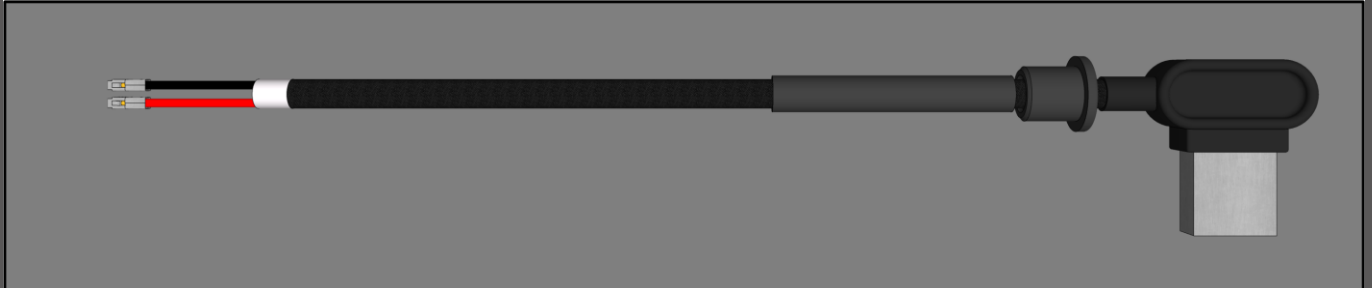
4. Slide the fabric a bit to the right and remove 20cm of the insulation exposing 4 wires



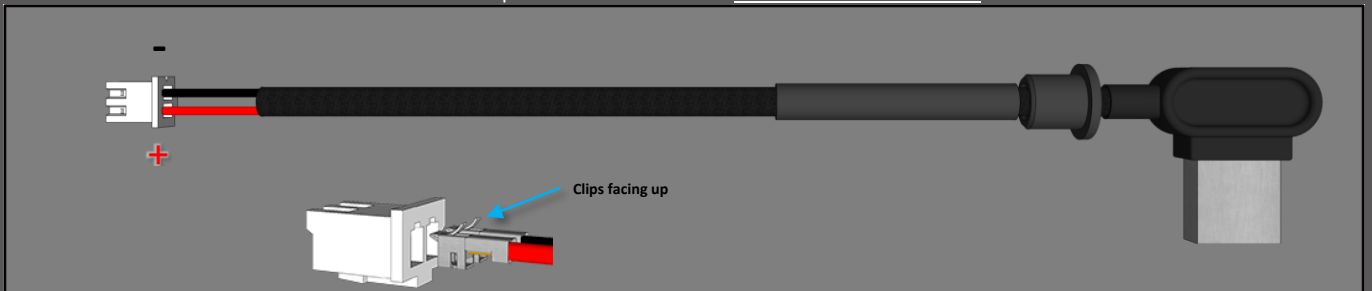
5. Cut off the white and green cable, and strip the red and black cable $\pm 2.5\text{mm}$



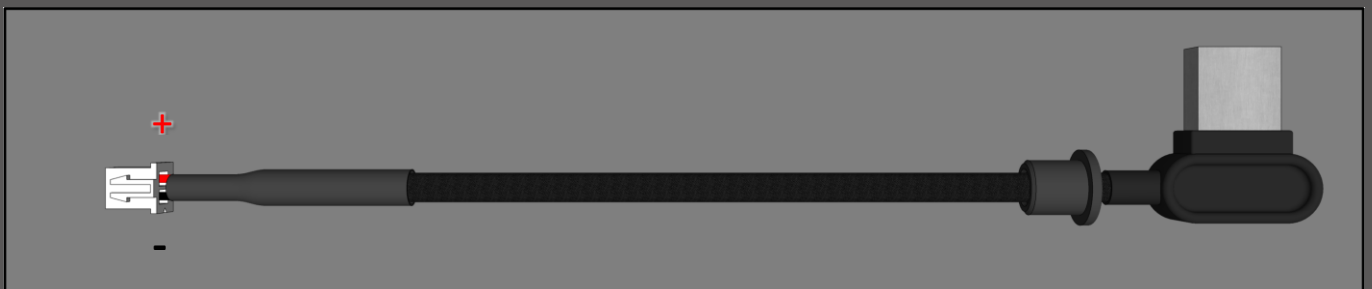
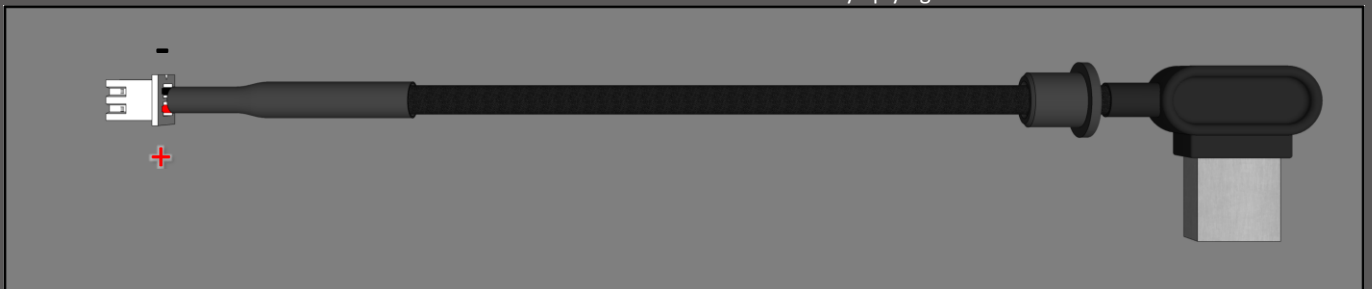
6. Crimp on the pins with Crimping tool SN-2549



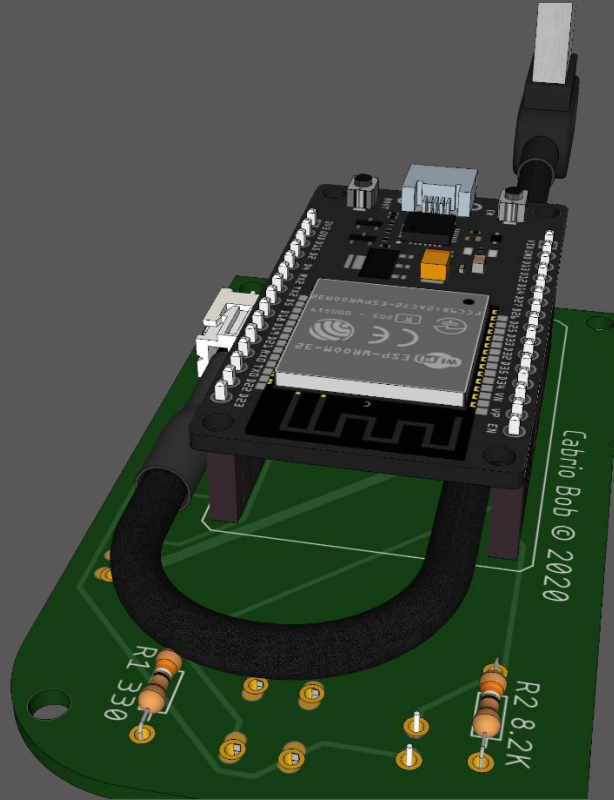
7. Push the pins into the connector in the correct orientation



8. Slide the shrinktube to the left and shrink it by applying heat.



Route of the USB cable



Final view USB cable





Appendix B: hardwire option

