GitHub repository where all documentation & code can be found. [billbill100 (github.com)]

ESP32 3d print case and Sensor & Laser Enclosures V1.0 06/02/2026

NOTE This prototype was made using vero board where the individual holes are not connected.
However, using a strip-board, where each row of holes is connected on the board, would have made building far easier and neater. This guide will be updated showing the use of this strip-board.

To print the case.
There are three parts to print. The main box top and sides are in one piece. The second part is the bottom.
there are one of three rear panels to choose from.
a) plain, which is the easiest to print.
b) the version with indented legends, labelling the sockets.

c) Third version has flat lettering. This requires a little more skill to print as the lettering needs to be selected and given a different colour to the box. Then the slicer needs setting so it prints all of the text first, followed by the rest of the rear panel.

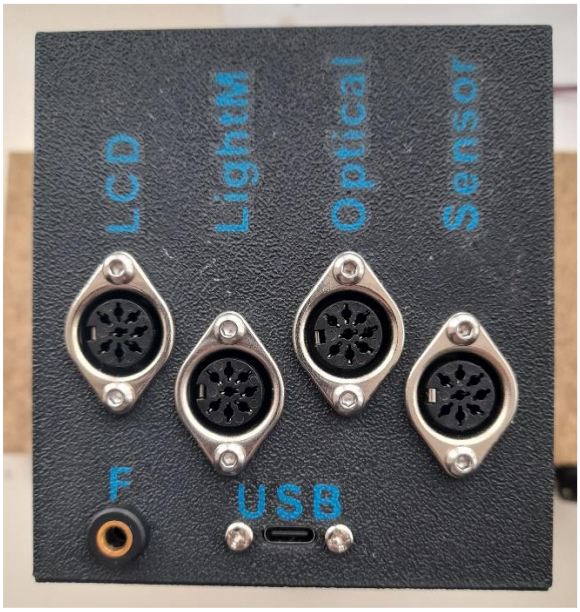
3mm bolts & washers to secure the tft in the case. There are four spacers in the 3d print files. These fit on the inside of the box, on the 3mm bolts, between the case and the tft screen. Be careful not to overtighten the bolts and crack the screen.

Additional 3mm nuts & washers are then put onto the bolts to act as spacers for the expansion board, which fits onto these and then is held in place by a further 4 nuts.

It is easiest to trial fit the tft & expansion board before wiring. Then wire everything other than the sockets, before mounting inside the box.

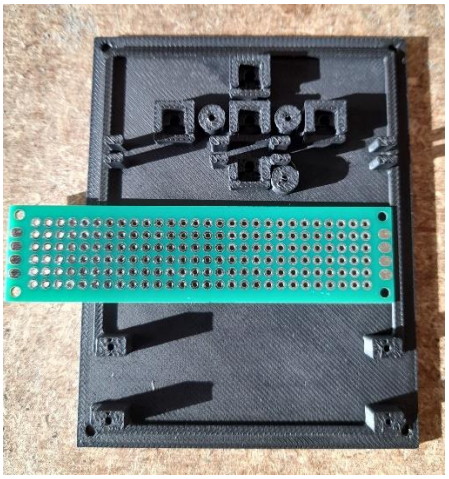
Fitting the tft screen and expansion box in the 3d printed case is very similar to that of the project box. Look at the photos in the 'Build a Box' document, detailing how the tft & expansion board is mounted.

The 3d case is designed to be screwed together using 2mm self-tapping screws.



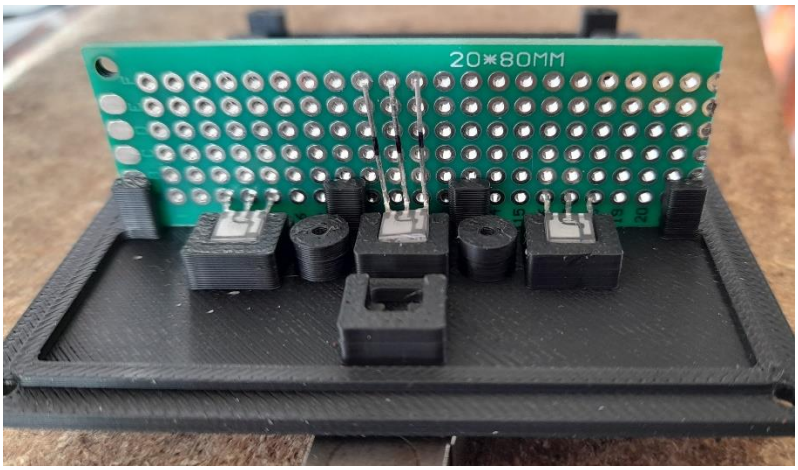
To print & assemble the sensor enclosure.
The sensor holder case consists of two parts.
The front is where the sensors are mounted and the rear box.

The veroboard has to be cut to fit between the two holders. Do not cut it to fit too tightly, a little play makes it easier to align. A junior hacksaw will cut the board.



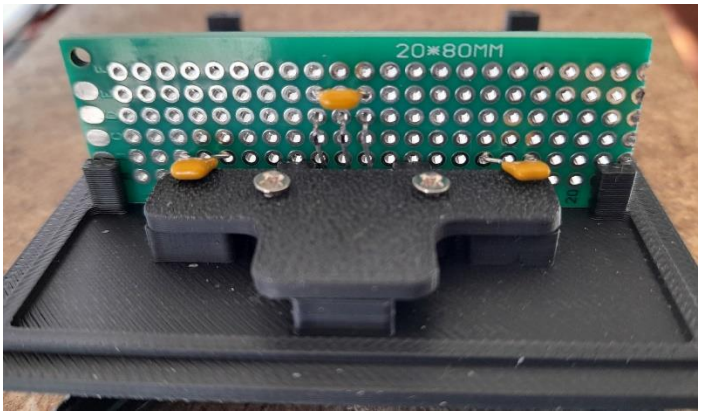
The two outer sensors are the easiest to mount. The outer legs will need bending out slightly to align with the holes in the vero board.

The middle sensor will require the legs carefully bending up, then marked where they need to be bent back to fit into the vero board. Note black marks on the leg indicating where they should be bent back into the vero board.



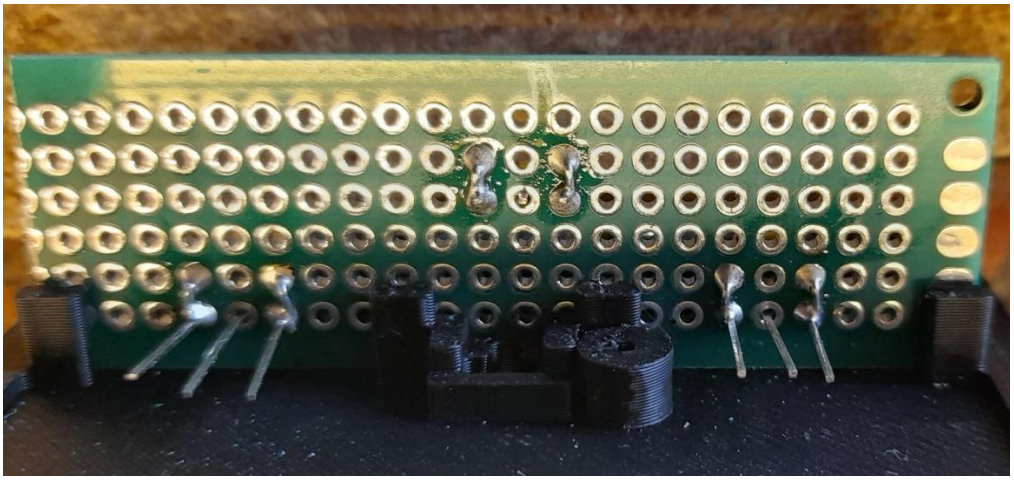
0.1uF capacitors are added. These are spaced the same as the outer legs of the sensors.

The T holding piece can be used to hold the sensors in place, whilst they are soldered.

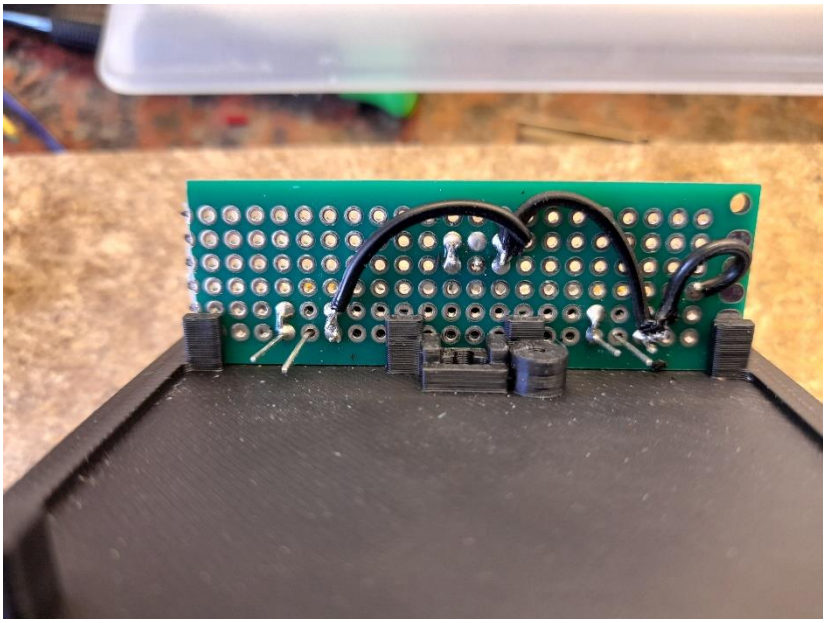


Sensors and capacitors soldered to the vero board.

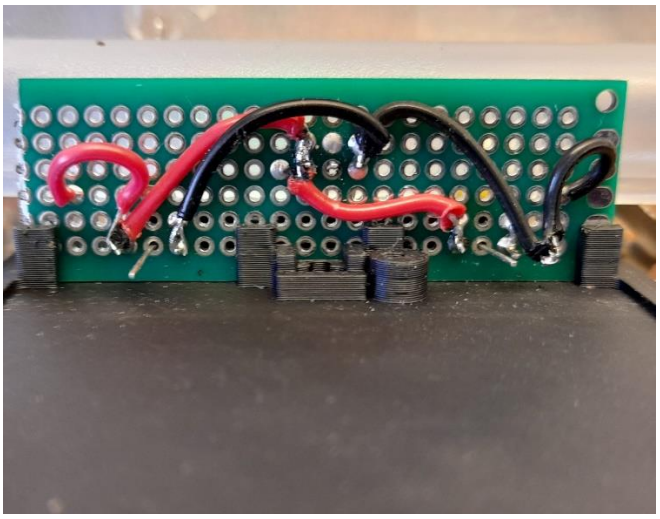
The capacitor legs are now bent down so each one connects across the outer legs of the sensor and are soldered.
Note the middle leg of each sensor has nothing connected.
(Using strip-board, the legs would not have to be bent, as each row of holes are electrically joined)



The 0V leg of each sensor has to be connected together with wire and terminated on the side of the board.



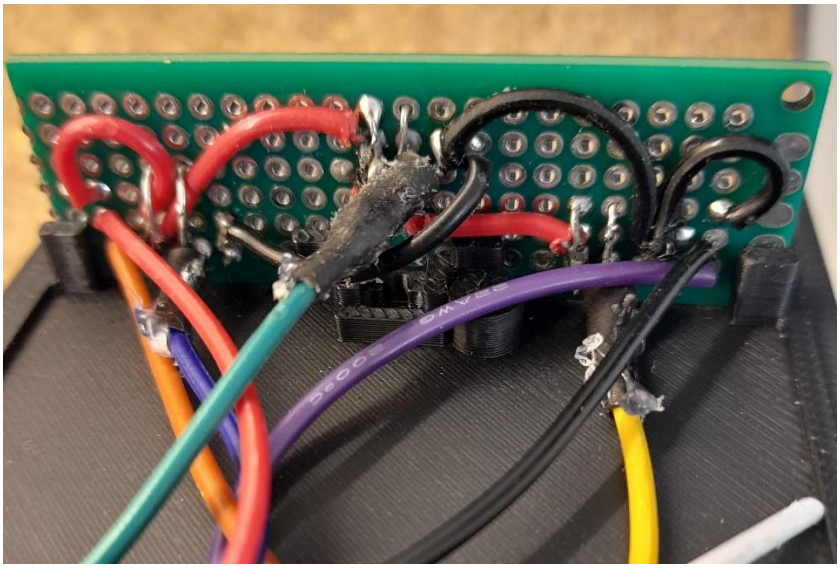
The same is done for the +V legs of the sensors.
It is quite fiddly and difficult to fit all these wires in. Ensure there are no shorts created during soldering.



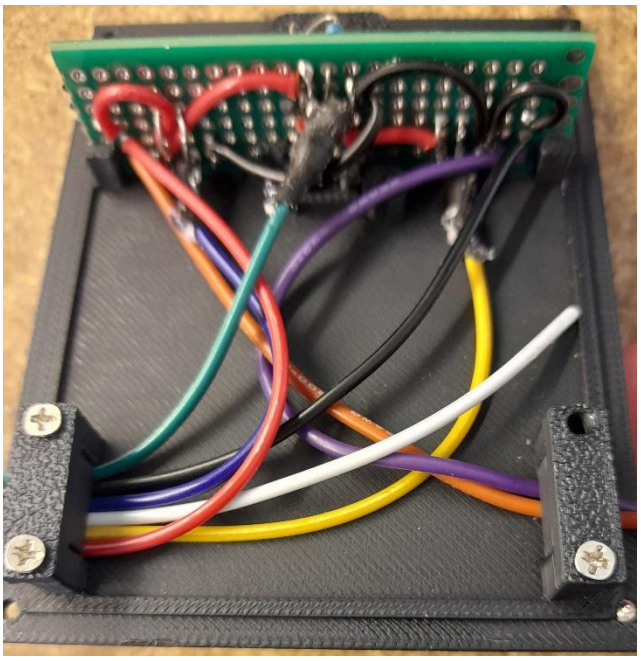
Shrink tube is placed on the sensor wires and then these soldered to the centre leg of each sensor.
The Red & Black power wires are soldered.
Hot-glue is used to hold the shrink-tube and add strength to the joint.

Power for the Lasers is also soldered to the board.

In all honesty, this board is quite messy. But it was the prototype, which had a few changes & alterations.
It will be remade using strip-board and this guide updated.



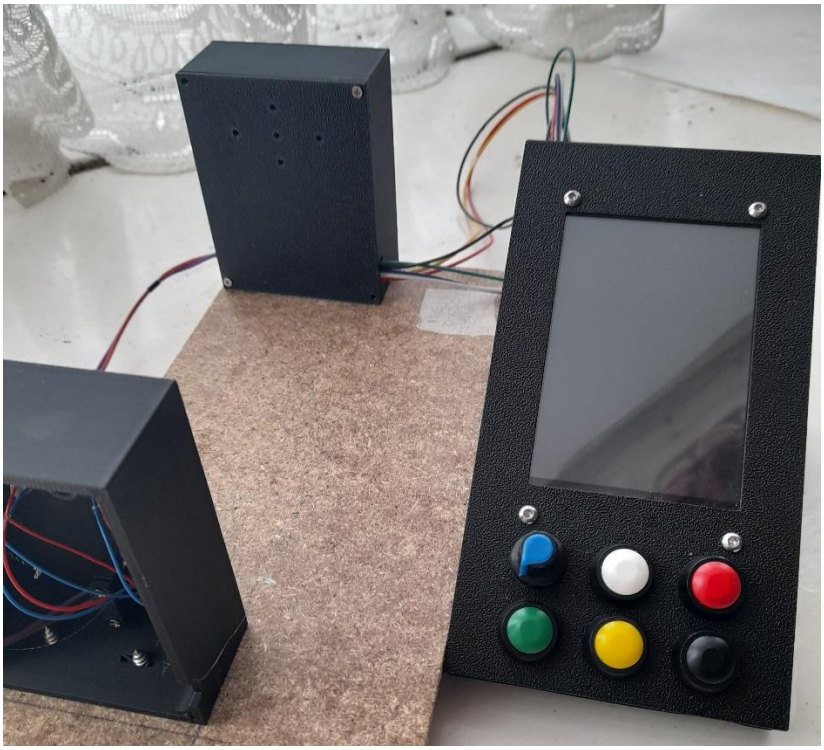
Wires are secured under the clamps.



To mount the enclosures.
The Laser encosure should be printed. This and the sensor enclosure have to be mounted to a suitable baseboard. This should be sturdy enough not to warp. Here a pice of 18mm floring chipboard was used.
(The wood here was left oversize for the prototype & was trimmed later)

Holes were drilled and counterbored in the bottom of the base, as suitable spacings to mount the two boxes.
Pilot holes drilled in the base of the vboxes, to accept self-tapping screws. Nuts & bolts could aslo be used.

Note the orientation of the boxes. The lid of the sensor enclosure faces towards the Lasers.



To assemble & align the Laser enclosure.

The Lasers are fitted into the Laser box.
Do not try to focus the Laser to a pin-point, it needs to illuminate fully, the hole in the sensor box.

Each Laser needs adjusting to point at the corresponding sensor.
The mounting frame can be turned on-end, so the Laser points down. This makes alignment easier.

When the Laser has been test-aligned and the light covering at least the sensor hole diameter,
hot-glue is used to hold the Laser in place. One has to hold the Laser in place until the glue cools.
Additional glue can now be used around the Laser.

Note:- whilst the wiring diagram shows the sensors and Lasers connected to 3v3, they are in fact designed to work with 5V. With the increased wiring length required for the enclosures, it was found they had to be connected to 5v, to work satisfactorily.