

## Building the Gugusse 3.1 Control PCB and EX-DN10 for use with the Gugusse Compact

Gerber Files are provided in the Gugusse Compact Zip file. You can order an 8cm X 10cm PCB by uploading those files to a company that makes PCBs in small runs. A parts list is below with mostly Digikey part numbers. You may be able to source these parts elsewhere but this will give you numbers to look up if you need them. We would suggest getting extras of inexpensive parts in case there are any problems.

The instructions below will build the board from the most shallow to the tallest components. Be very careful when soldering components not to “splash” any solder between pins. This is a pretty easy project to complete but the soldering of the motor boards and Pi connector will take a little time especially. If you have any questions about how to orient anything, see the last PCB picture.

Be sure to read the whole document through before proceeding.

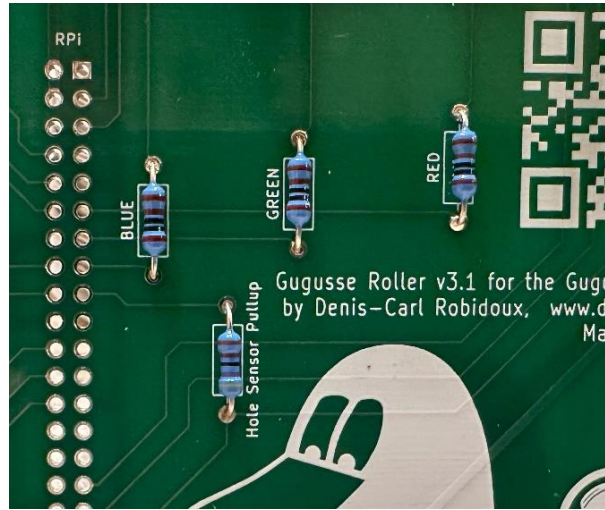
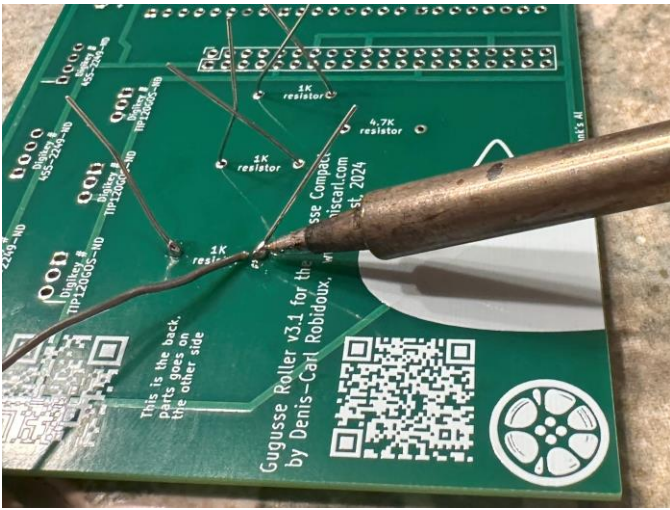
### Purchased Parts Required:

ITEM	Digikey Part Number	QTY	NOTES
CONN HEADER VERT 4POS 2.5MM	455-2249-ND	7	
CONN HEADER VERT 4POS 5.08MM	A1212-ND	1	
TMC2209 STEPPER DRIVER BOARD	505-TMC2209SILENTSTEPSTICK-ND	3	Marked as 1460-1395-ND on PCB
TRANS NPN DARL 60V 5A TO220	TIP120GOS-ND	3	
RES 1K OHM 1% 1/4W AXIAL	MFR-25FBF52-1K	3	
RES 4.7K OHM 1% 1/4W AXIAL	MFR-25FBF52-4K7	1	
RASPBERRY PI GPIO TALL HEADER	1568-1462-ND	1	
CONN SIL HDR MALE PIN 32POS TIN	952-2521-ND	2	(Only need if not included with stepper boards).
SMALL ADHESIVE HEAT SINK	Amazon B07KZG5433	3	See last PCB picture. Only a suggestion to buy.
EX-DN10 OPTICAL FIBER AMPLIFIER	AliExpress EX-DN10	1	(Available on Amazon for Much more money.)
CBL FIBER OPTIC 1000UM SMPLX 1M	FB140-1-ND	1	Cut in half to make two.
JUMPER SXH-001T-P0.6	455-3241-ND	3	
CONN RCPT HSG 4POS 2.50MM	455-2267-ND	1	
#6 x 3/4" Bolts with nuts.	Hardware Store	3	Optional – You can use tape as well.
Shrink Tubing – Various Sizes	Amazon or Digikey		Get a kit with various sizes.
Hot Glue	Hardware Store or Amazon		Used to keep the Light Pipes from falling out of the EX-DN10

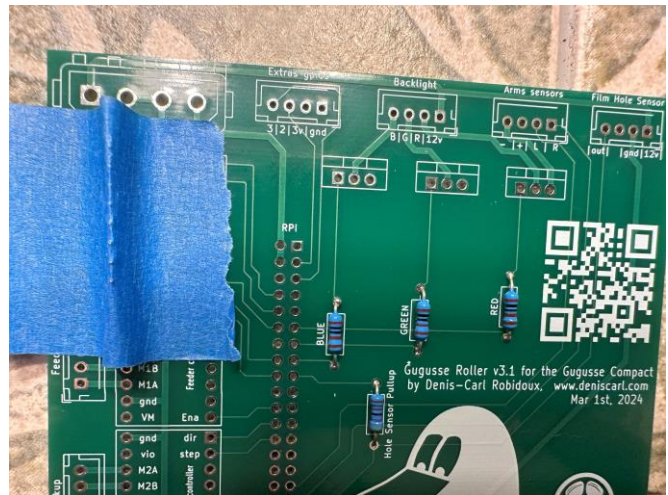
### Printed Parts Required:

EX-DN10 Holder	EX-DN10_Holder.stl	1 Set
----------------	--------------------	-------

Start by soldering in all of the smaller devices like the resistors. Install the 4.7K and 1K Resistors as shown below. Cut any excess leads off of everything you solder (if necessary).

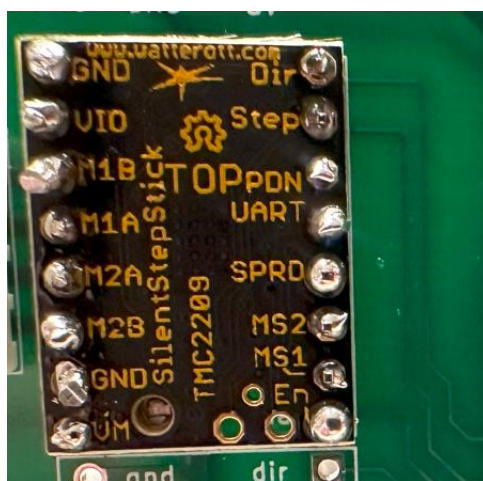
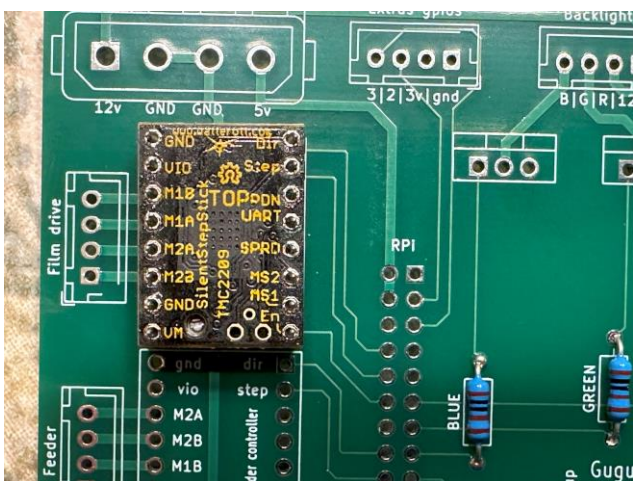
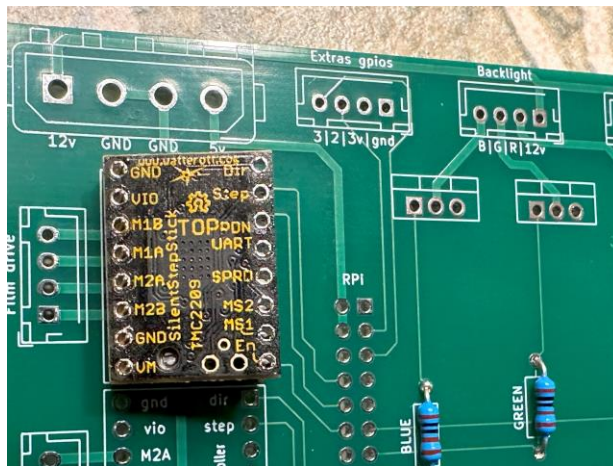
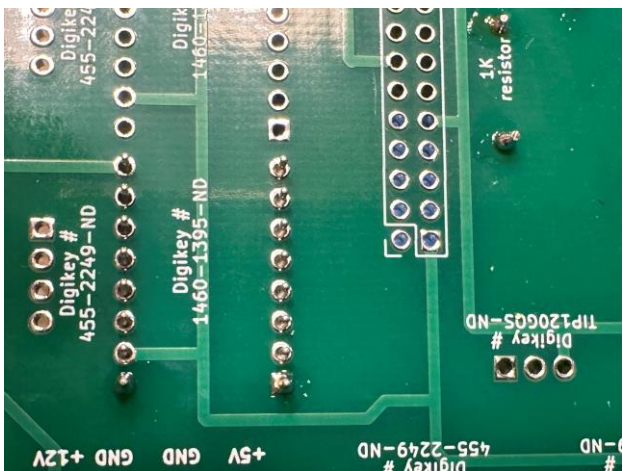


Insert 8 Support Pins for the motor drivers on the PCB as shown with the longer pins going through the board. Put some tape over it to hold it when you turn over the board to solder it in.

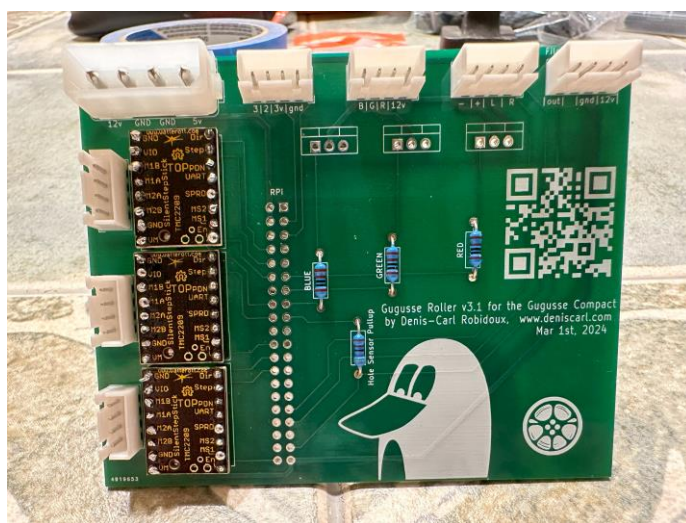




**Solder only one pin** on each of the rows of pins. Do this for both sides of the motor board. Test fit the motor board on the pins and if it doesn't fit, adjust the pins by heating up the pins and moving them until the board goes on. Solder all of the contacts on both sides of the PCB and repeat for the remaining two motor boards.

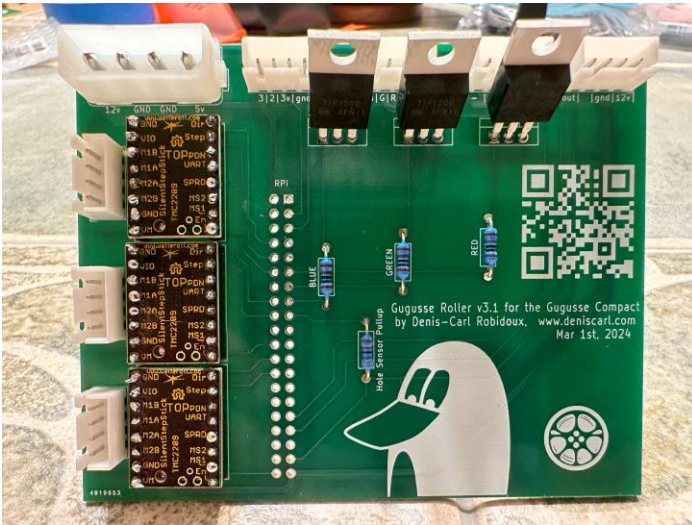


Install the I/O connectors and the power connector. Be sure to follow the orientation on the PCB so that the notches on the connectors are correct.

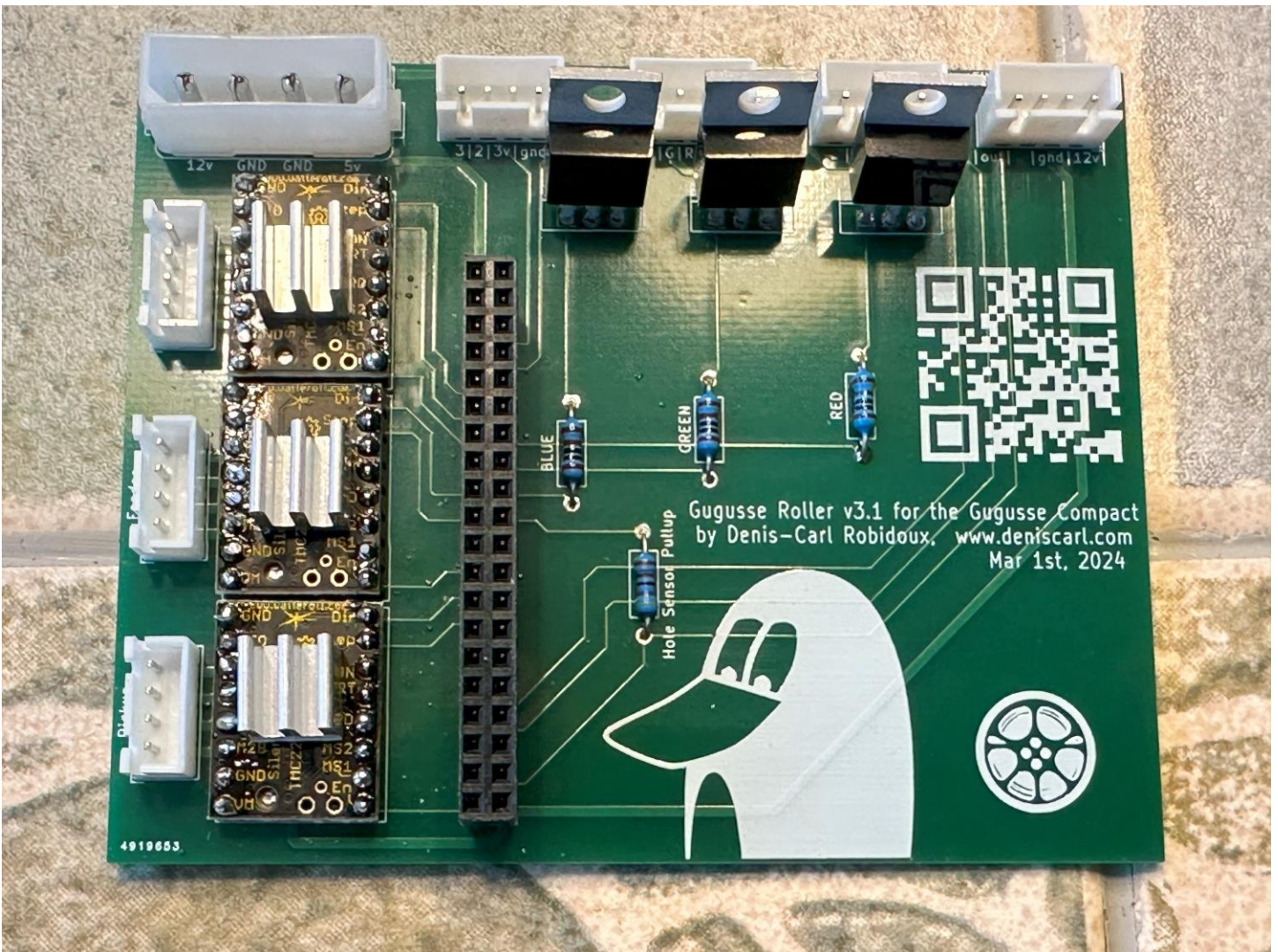




Install the three TIP120G transistors as shown with the metal tabs closest to the connectors. Finish by soldering in the Raspberry Pi connector.



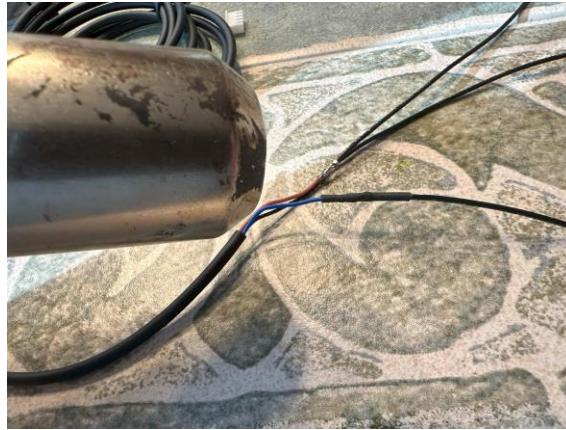
Install three Heatsinks on the motor boards and the PCB is complete.



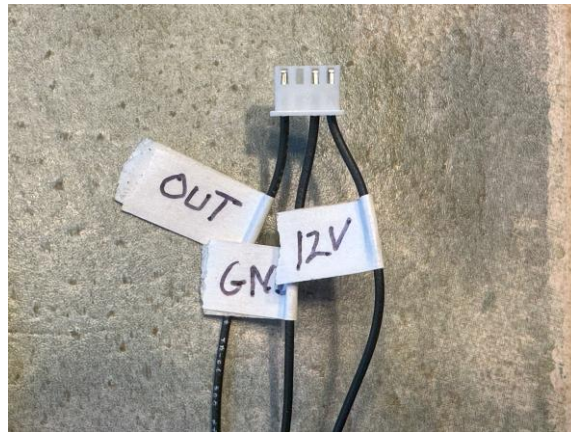


## EX-DN10 Hole Sensor Configuration

Solder/crimp three leads to the EX-DN10 and put shrink tubing over each of them.



Put a piece of thick shrink tubing over all of the wires but before you shrink it, mark each of the ends with the colors or what they do based on the specs written on the side of the EX-DN10. Cover all 3 with a wider piece of shrink tubing. Match them up to the proper pins on the housing following the pinouts on the PCB or use the picture below.



Cut a light pipe in half. Put the EX-DN10 in the 3-D printed EX-DN10\_Holder and run the 3/4" screws through one side but only partially as shown. Insert the two light pipes into the EX-DN10.





Hot glue the light pipes to one side of the housing and put the other side of the housing on while the glue is still soft and screw the two sides together with a #6 nut (you can also just use tape to keep the two sides together). The sensor is complete.



## Software Update

Currently the default software distribution is set up for the 2.2 PCB so the already installed software will need to be updated to work with the new 3.1 PCB. If you haven't installed the Raspberry Pi operating system yet, please follow the "OS and Software Install Guide" on the Gugusse Website to configure your system.

If you are upgrading from the 2.2 PCB be sure to run `MotorAndFtpSetup.py` prior to doing the steps below and take note of the settings. Open a terminal window and type the following, one line at a time (and hit [Enter] after each).

```
cd GugusseRoller
```

```
git fetch -a
```

```
git checkout boardV3_1
```

```
rm hardwarecfg.json
```

```
python3 MotorAndFtpSetup.py
```

Configure the Motors and FTP settings and Save and Exit.

Gugusse Compact and all related devices designed by Denis-Carl Robidoux.  
Documentation by Al Warner.

All Rights Reserved.