

Building the Gugusse 2.2 Control PCB

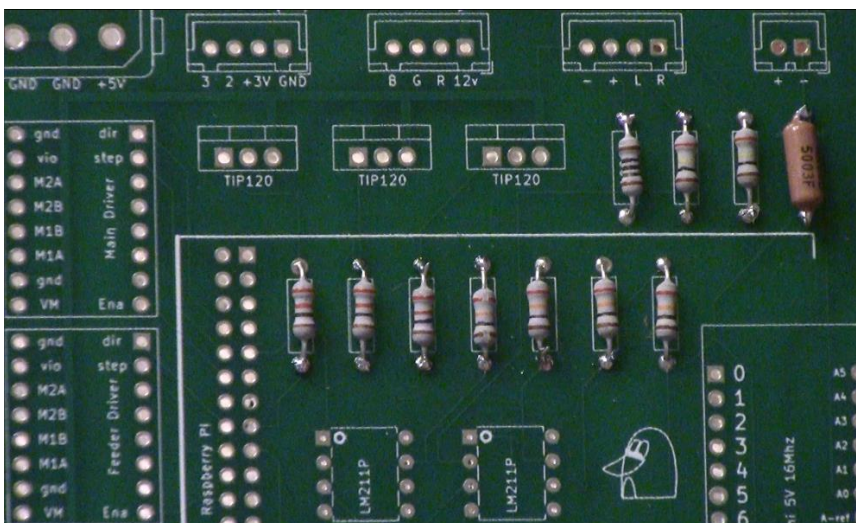
Gerber Files are provided in the Gugusse Compact Zip file. You can order an 8cm X 10cm PCB by uploading those files to a company that makes PCBs in small runs. A parts list is below with Digikey part numbers. You may be able to source these parts elsewhere but this will give you numbers to look up if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

The instructions below 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 Pi connector will take a little time especially. If you have any questions about how to orient anything, see the last picture.

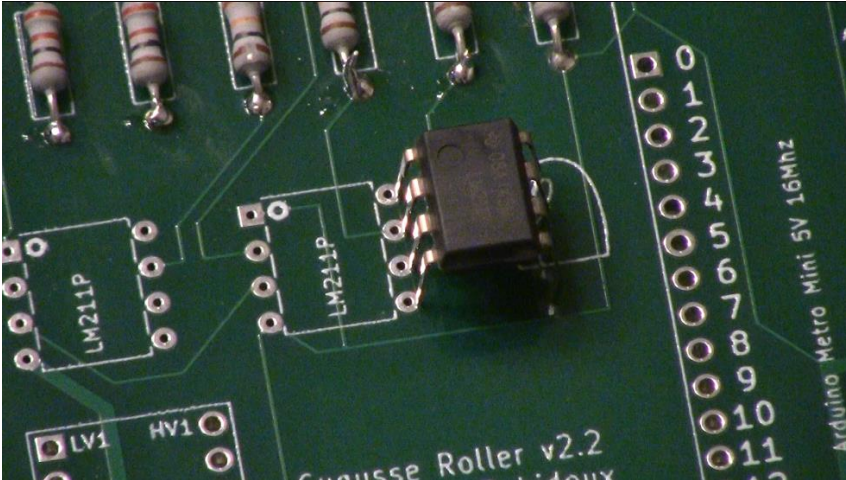
Purchased Parts Required:

ITEM	Digikey Part Number	QTY	NOTES
CONN HEADER VERT 4POS 2.5MM	455-2249-ND	6	
CONN HEADER VERT 2POS 2.54MM	WM4800-ND	1	
CONN HEADER VERT 4POS 5.08MM	A1212-ND	1	
METRO MINI 328 V2 CP2102N USB C	1528-1374-ND	1	
TMC2209 STEPPER DRIVER BOARD	1460-TMC2209SILENTSTEPSTICK-ND	3	
LOGIC LEVEL CONVERTER - BI-DIREC	1568-1209-ND	1	
IC COMPARATOR 1 GEN PUR 8DIP	296-6617-5-ND	2	
TRANS NPN DARL 60V 5A TO220	TIP120GOS-ND	3	
RES 1K OHM 2% 1/4W AXIAL	2368-QW210-ND	3	There may be cheaper options
RES 10K OHM 2% 1/4W AXIAL	2368-QW310-ND	4	There may be cheaper options
RES 100K OHM 2% 1/4W AXIAL	2368-QW410-ND	3	There may be cheaper options
RES 500K OHM 1% 1/4W AXIAL	1135-1620-ND	1	There may be cheaper options
RASPBERRY PI GPIO TALL HEADER	1568-1462-ND	1	
CONN SIL HDR MALE PIN 32POS TIN	952-2521-ND	3	(Buy an extra at least).
SMALL ADHESIVE HEAT SINK		3	See last picture.

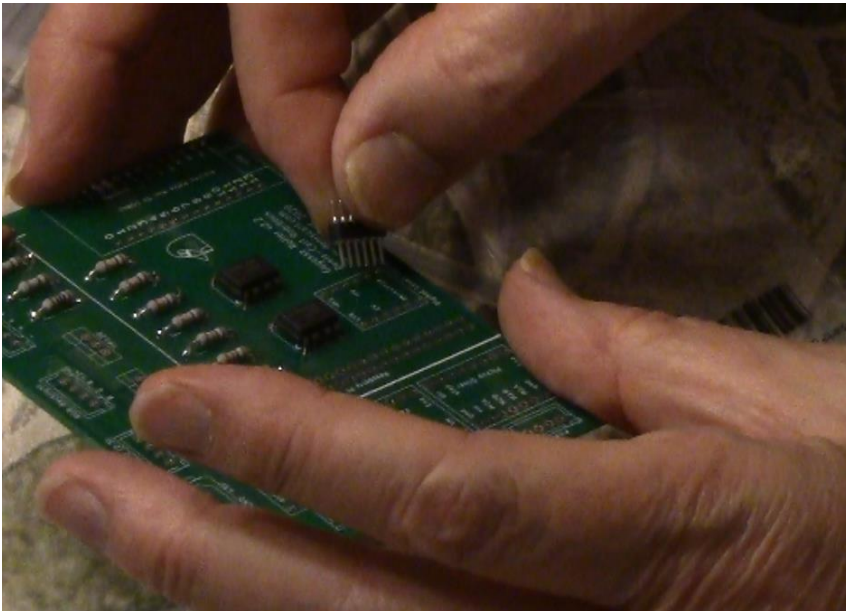
Start by soldering in all of the smaller devices like the resistors.



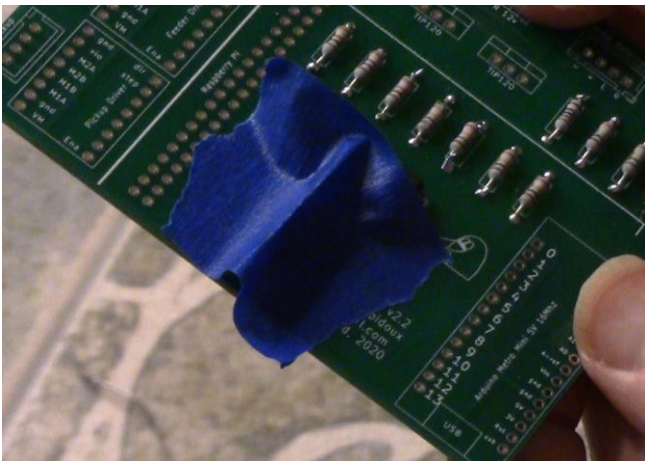
Next, solder in the two LM211P chips being sure to orient the chips so the circle on the chip matches the position pictured on the PCB.



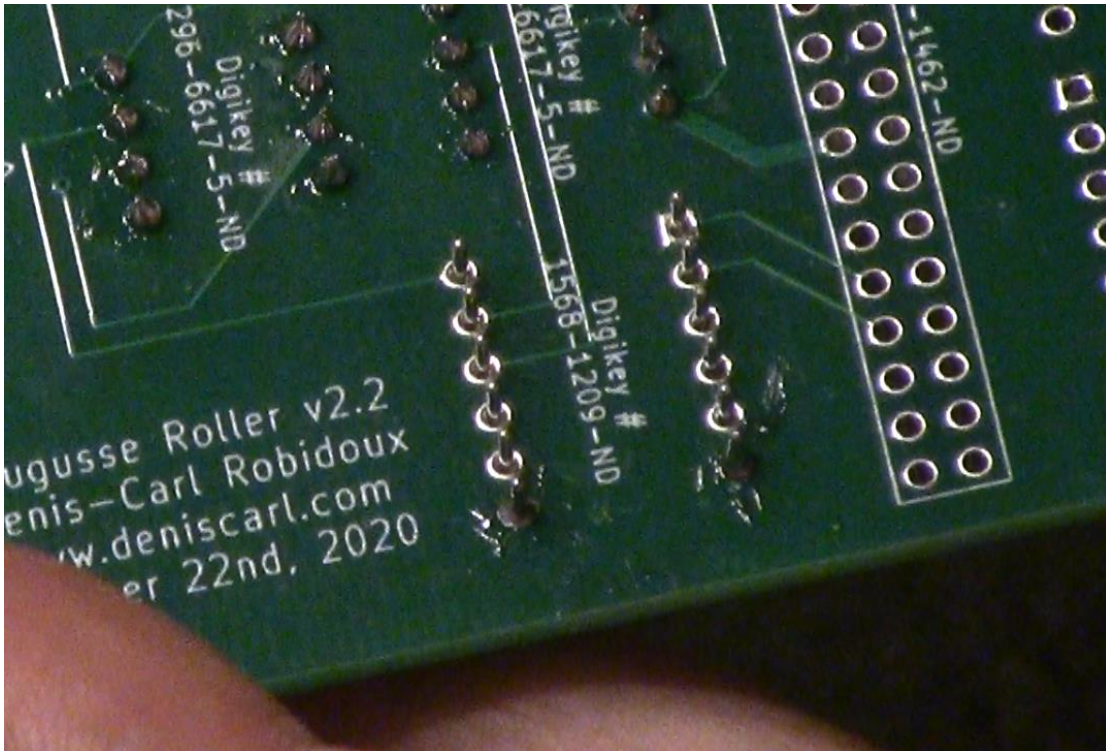
Insert 6 Support Pins for the Digital Level Converter with the long side going through the board.



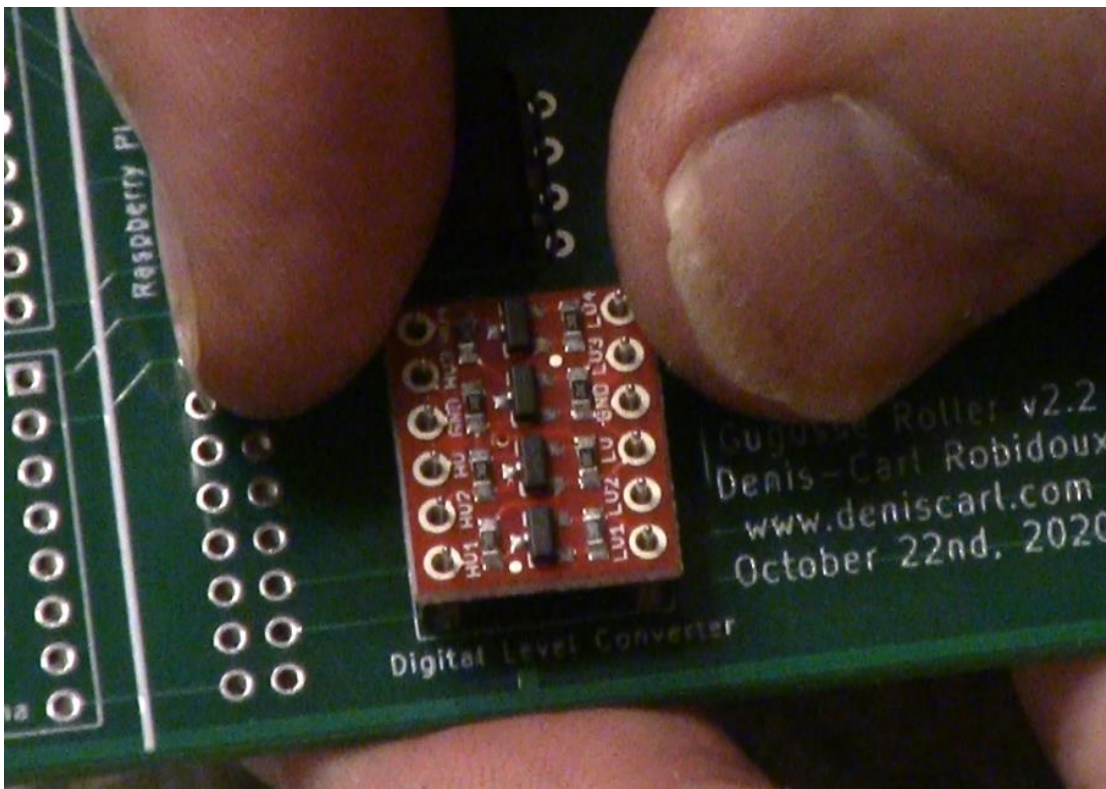
Put some tape over it to hold it when you turn over the board to solder it in.



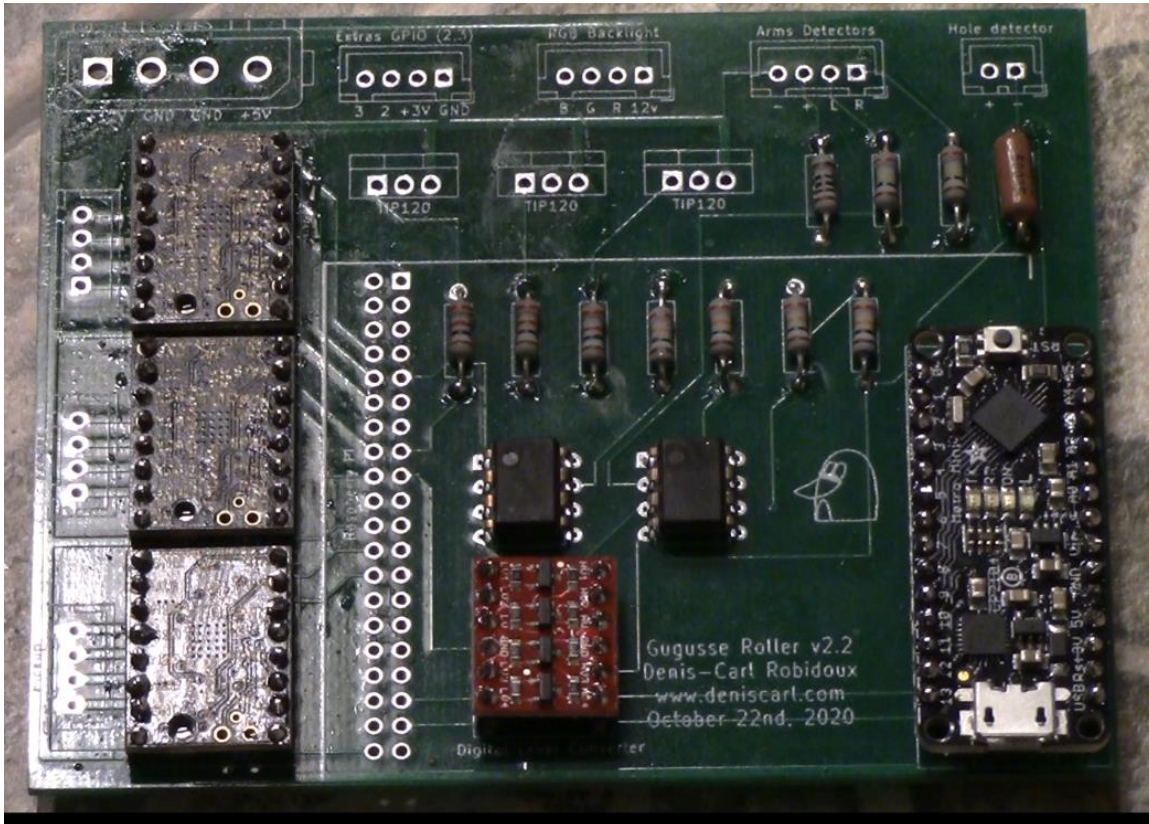
Solder only one pin on each of the rows of pins.



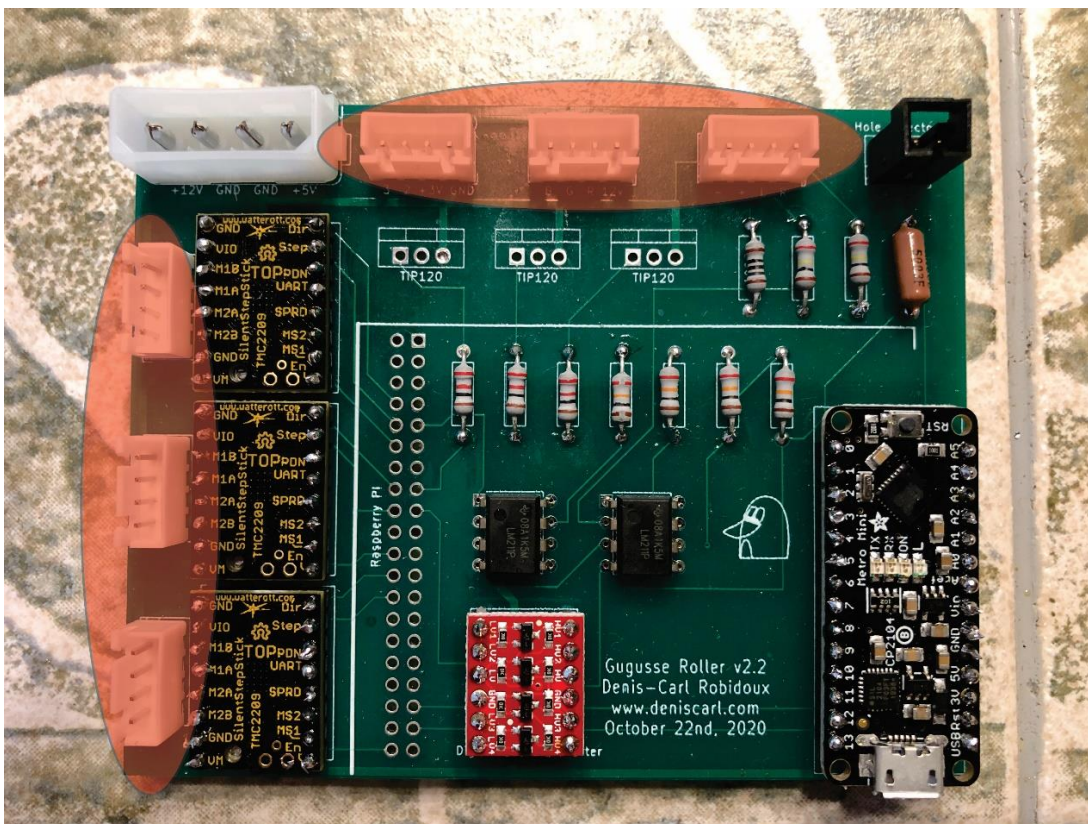
Test fit the Digital Level Converter to make sure the alignment is good and the component is in the right position. If the component won't go on, heat one of the soldered pins and move it so it will. If the component will sit properly on the pins, solder all connections on both sides of the board.



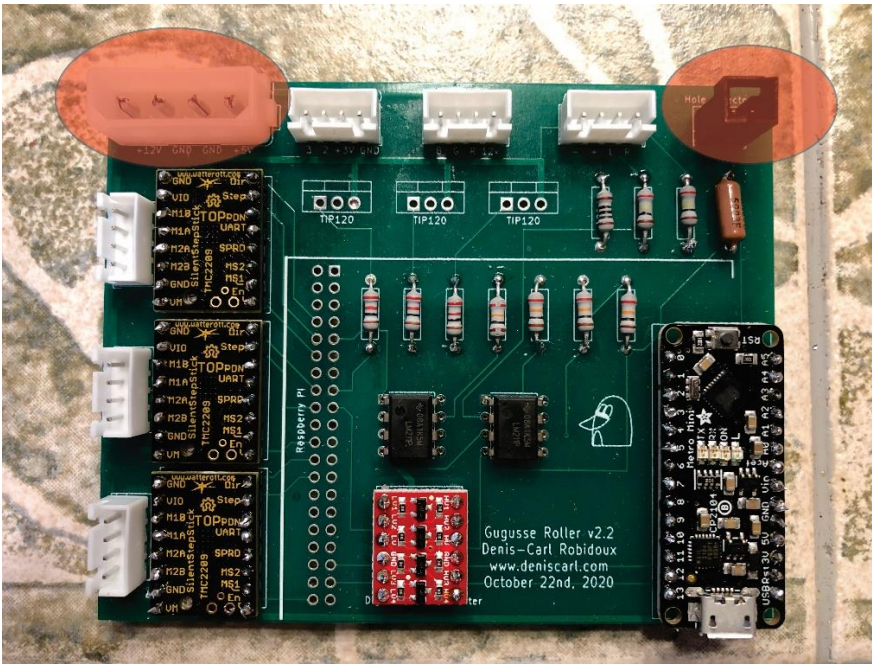
Repeat the process for the Arduino and the three Stepper Driver modules being sure that they are all oriented properly.



Install the connectors highlighted next:



Install the larger Connectors next as highlighted:



Follow this with the TIP 120 transistors and the 40 pin Raspberry Pi connector. Put some small heat sinks on the Stepper Driver controllers to dissipate some of the heat. Your board is complete.

