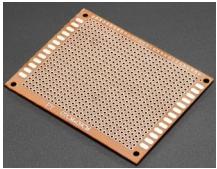
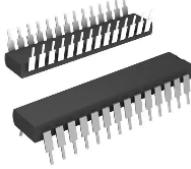
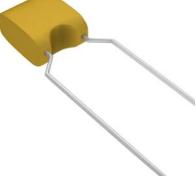
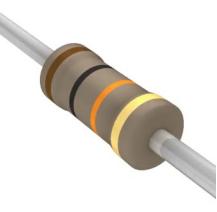


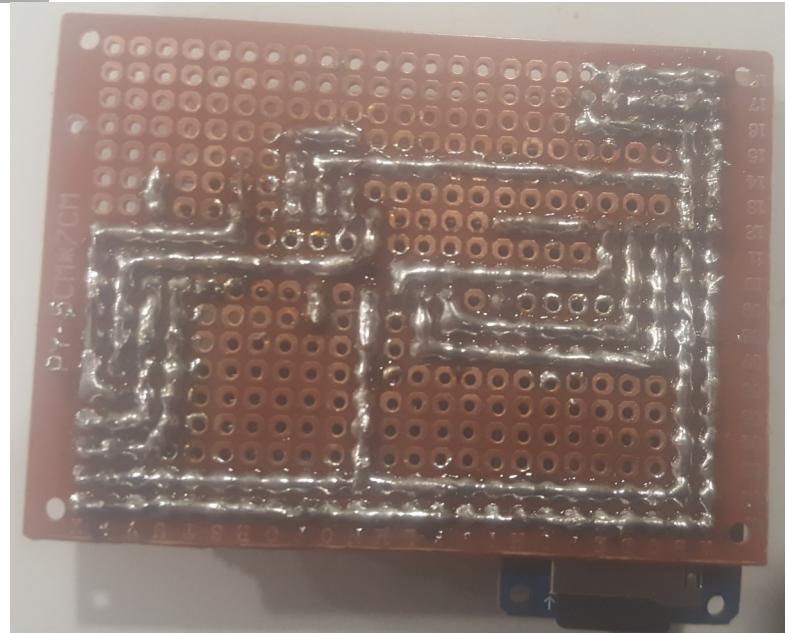
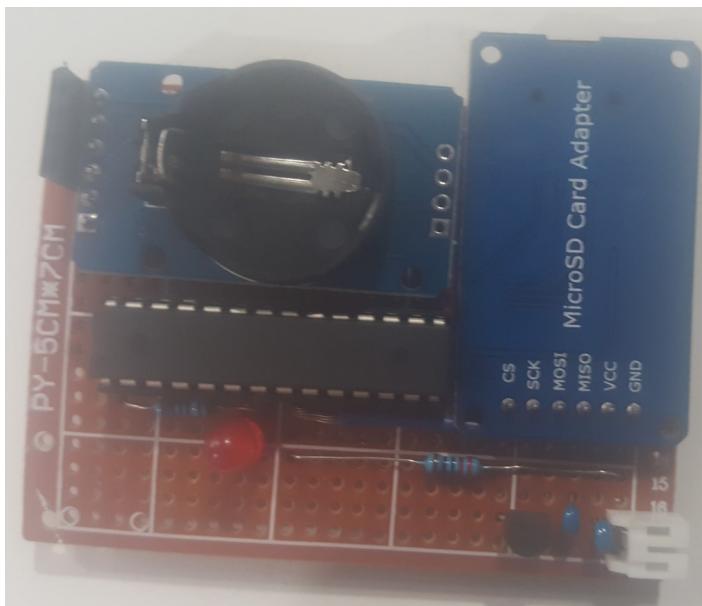
Wave Gauge Circuit Board Assembly Guide

Component List

Image	Part	Quantity	Image	Part	Quantity
	Perfboard	1		3V Linear Voltage Regulator	1
	DS3231SN Breakout	1		Red LED	1
	MicroSD Breakout	1		2 Pin Male JST Connector	1
	ATMega328P-PU	1		1 μF Capacitor	2
	28 Pin Dip Socket	1		0.1 μF Capacitor	1
	10 K Ω Resistor	1		Female Pin Header	1
	130 K Ω Resistor	1		4 Pin Male JST Connector	1

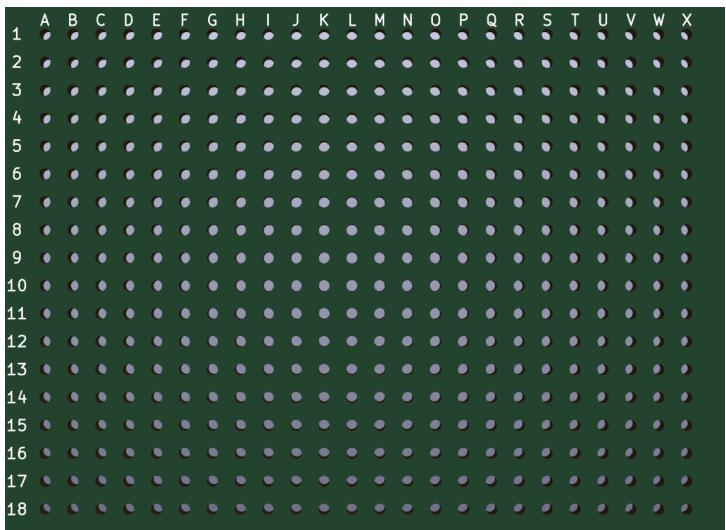
Notes

- Practice soldering on an empty breadboard before starting this build if you aren't very comfortable with it. Attempt to make lines of solder next to each other without shorting them together. When a short is inevitably created between two lines, also practice fixing the connection. Finally, practice cutting a small piece of wire and soldering it to the board to connect two distant points. These are the essential skills for putting together the board.
- The board can be put together in *almost** any order, but the steps below are organized for ease of soldering.
* The two jumper wires used will be covered when the RTC and SD breakout boards are placed on the board, so these jumpers must be at least placed in the proper holes before soldering the RTC and SD breakouts.
- All components and jumper wires are placed on the front of the perfboard, and soldering is done on the back. The back can be identified by the copper rings around each of the holes.

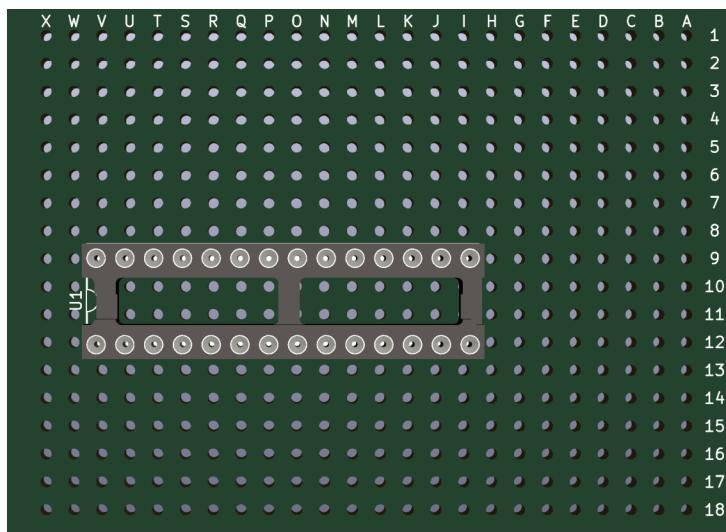


Instructions

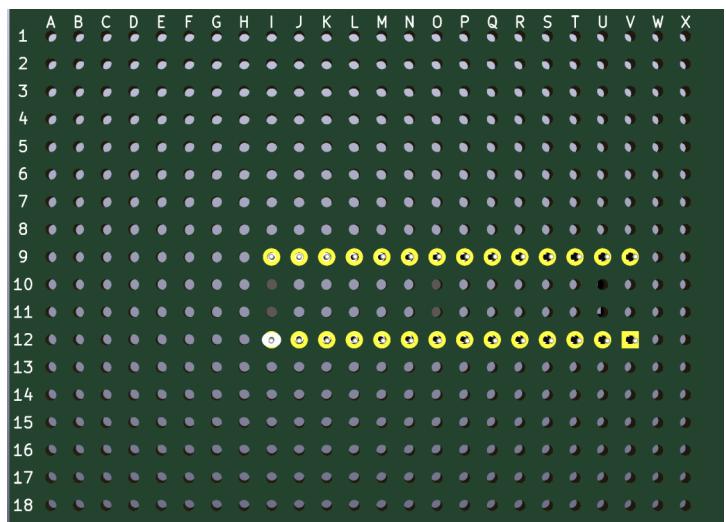
Step 1: Start with a blank piece of Perfboard.



Step 2: Place the 28 Pin DIP Socket through holes V9, V12, K9, K12. The orientation of this piece does not matter.

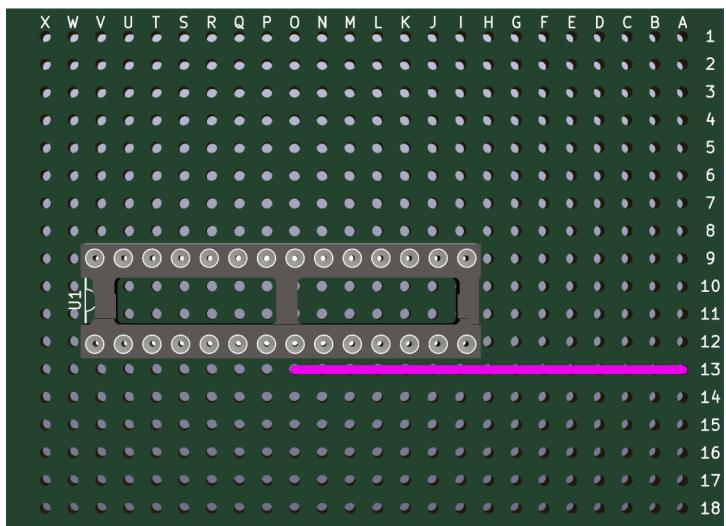


Step 3: Solder pin I12 to hold the socket in place.

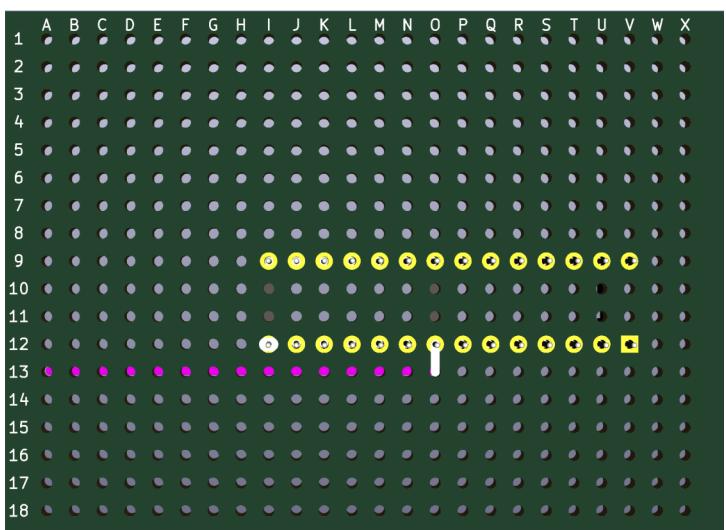


Instructions

Step 4: Place a jumper cable between O13 and A13.
Make sure the cable is on the front of the perfboard,
and that the wires are long enough to poke through
each hole.

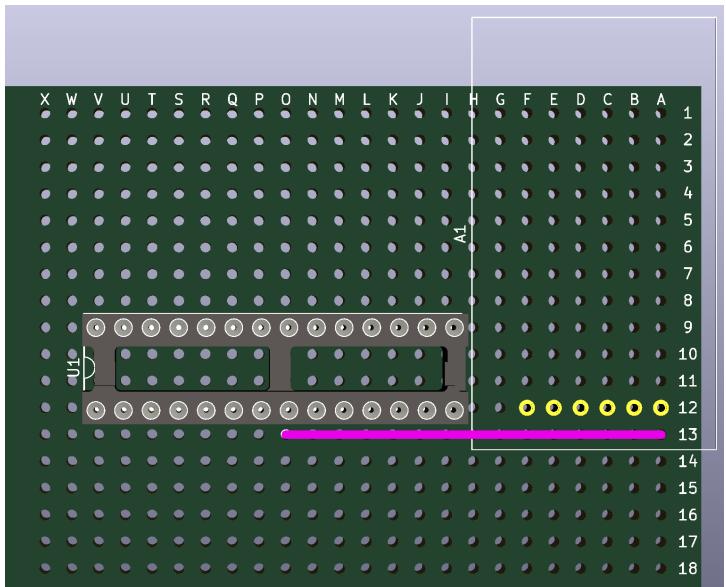


Step 5: Solder connections:
O12 to O13



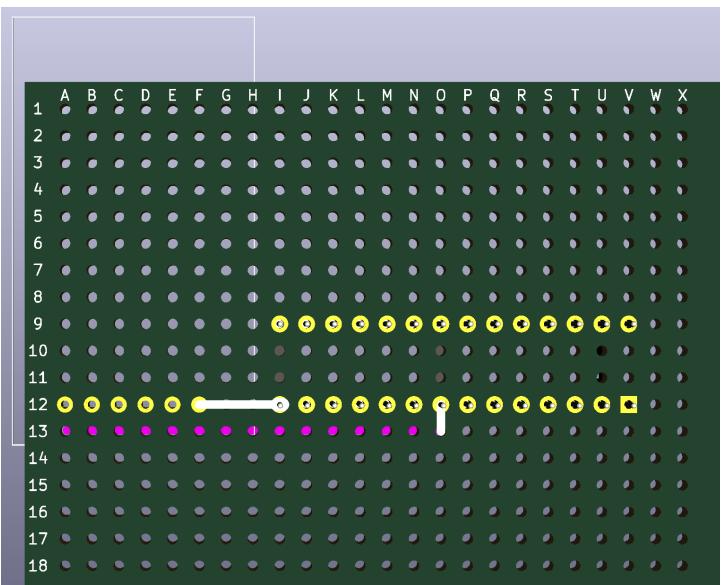
Step 6: Place the MicroSD Breakout onto the
perfboard:

GND goes through A12
VCC goes through B12
MISO goes through C12
MOSI goes through D12
SCK goes through E12
CS goes through F12

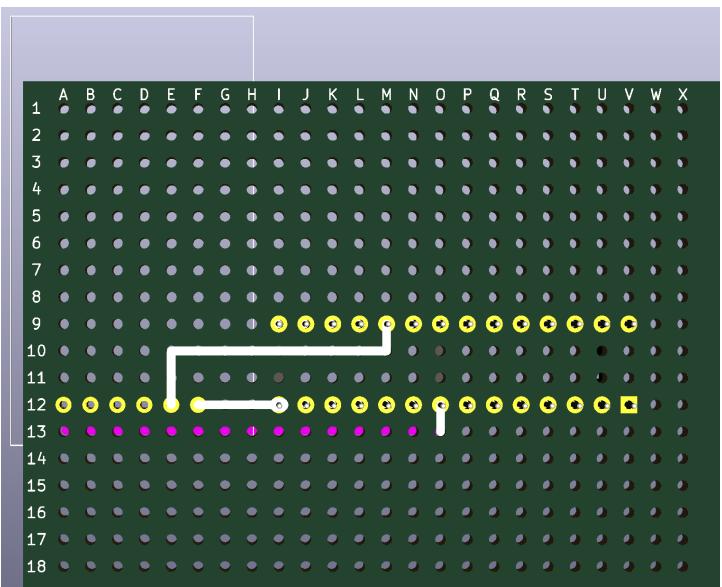


Instructions

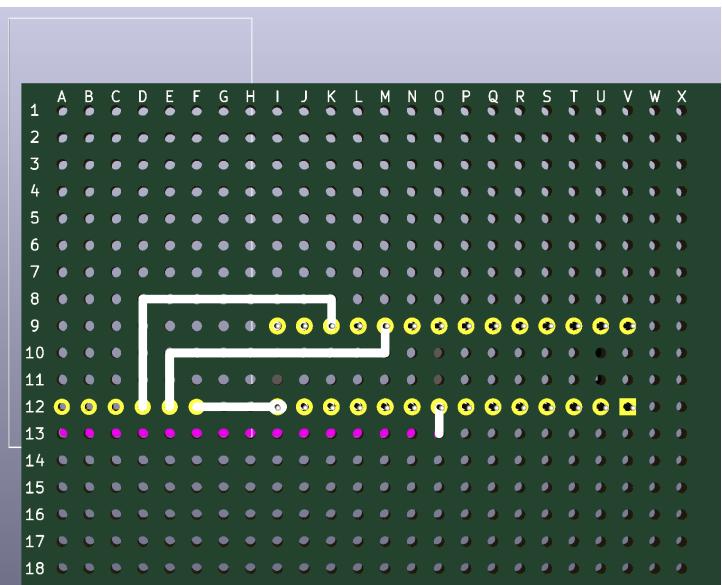
Step 7: Solder connections:
F12 to I12



Step 8: Solder connections:
E12 to E10 to M10 to M9

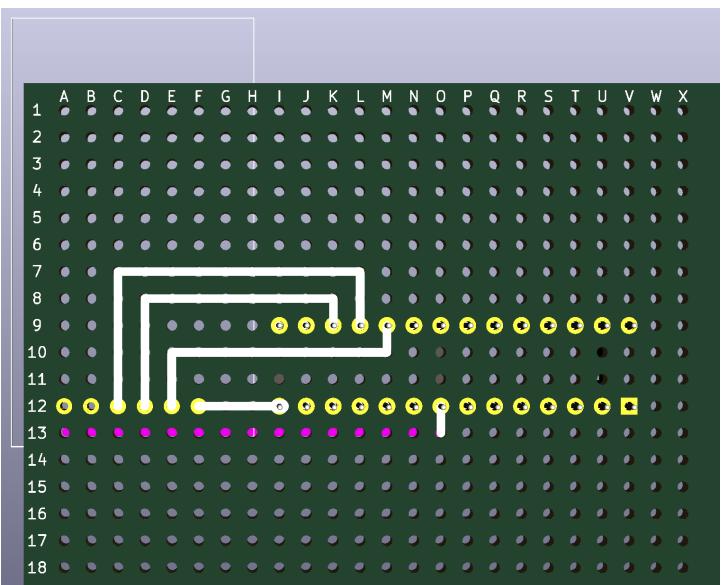


Step 9: Solder connections:
D12 to D8 to K8 to K9

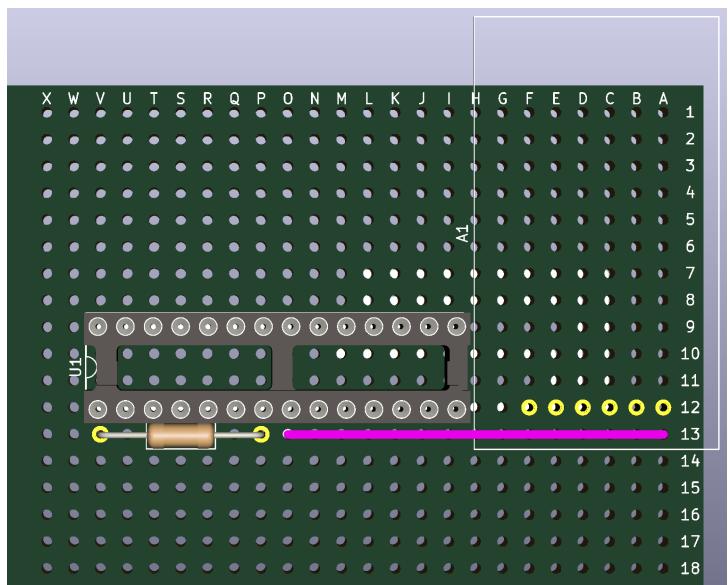


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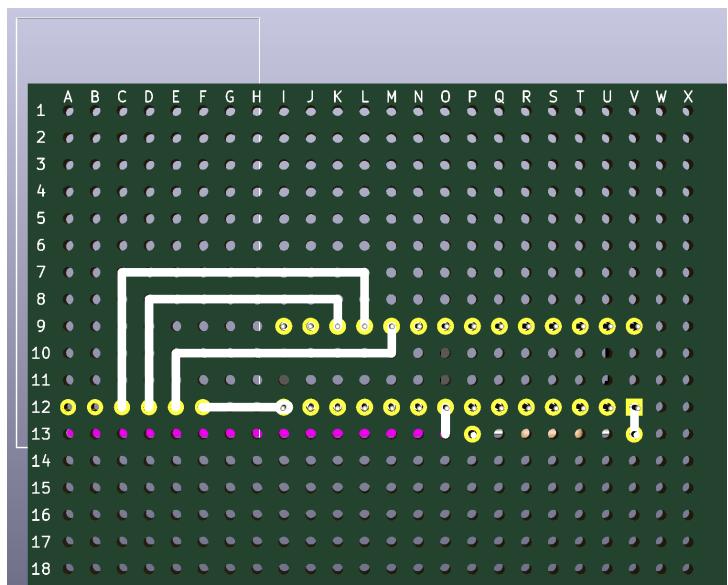
Step 10: Solder connections:
C12 to C7 to L7 to L9



Step 11: Place the 10 KΩ Resistor between V13 and P13. The orientation of this piece does not matter.

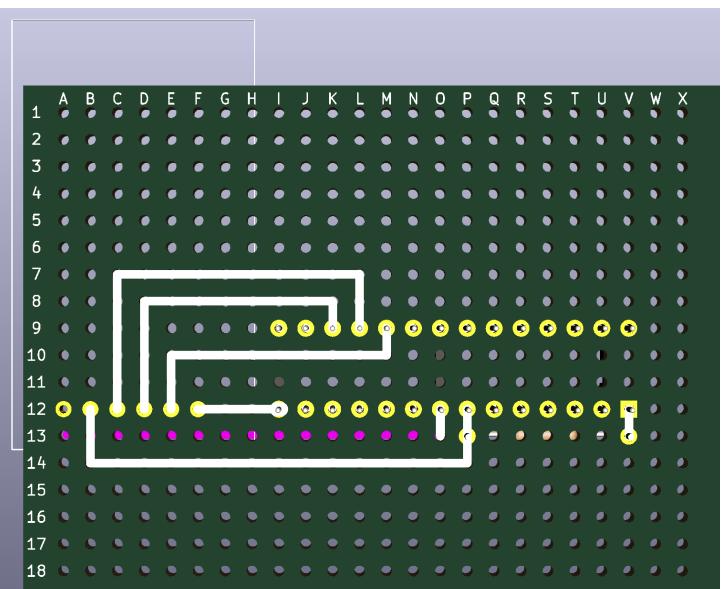


Step 12: Solder connections:
V12 to V13

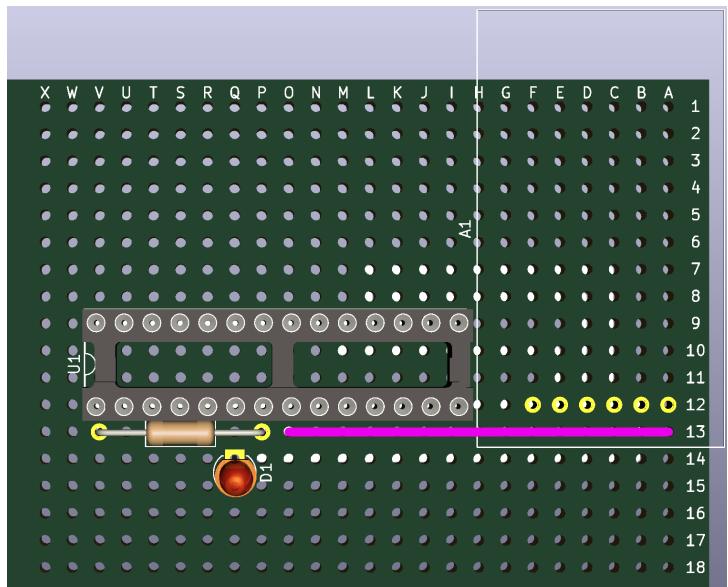


Instructions

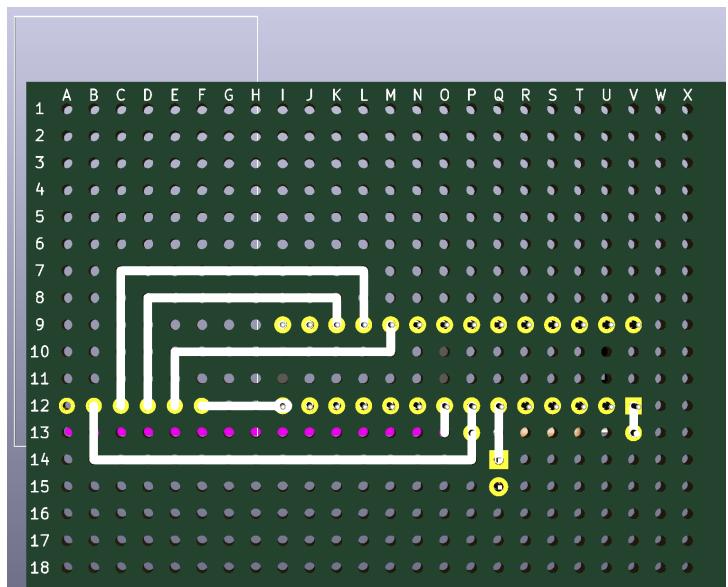
Step 13: Solder connections:
B12 to B14 to P14 to P12



Step 14: Place the Red LED on the board, with the longer lead going through pin Q14 and the shorter lead going through pin Q15. The orientation of this piece DOES matter.



Step 15: Solder connections:
Q12 to Q14

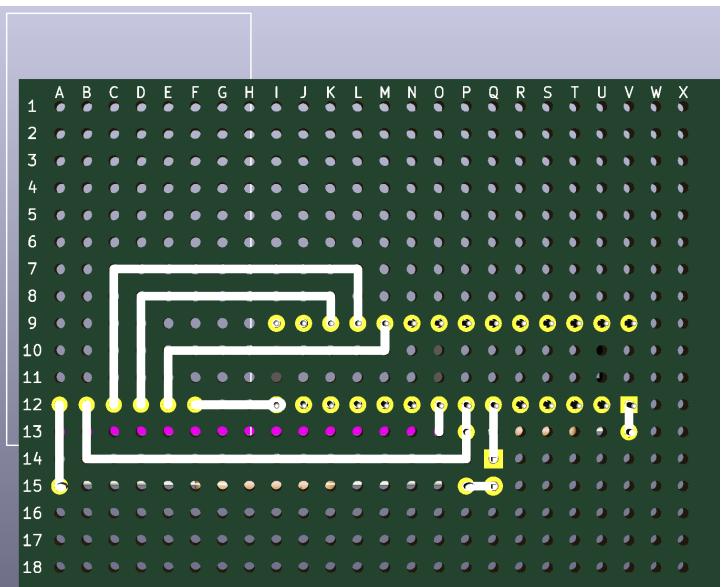


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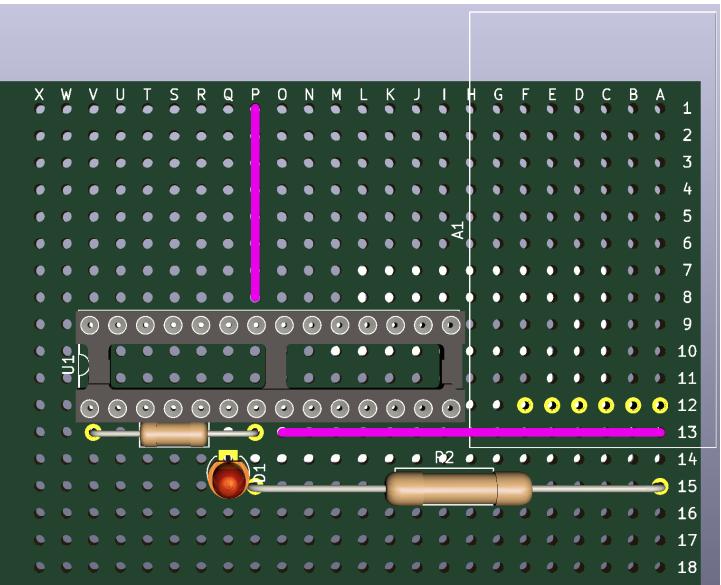
Step 16: Place the $130\ \Omega$ Resistor across pins P15 and A15. The orientation of this piece does not matter.



Step 17: Solder connections:
Q15 to P15
A15 to A12

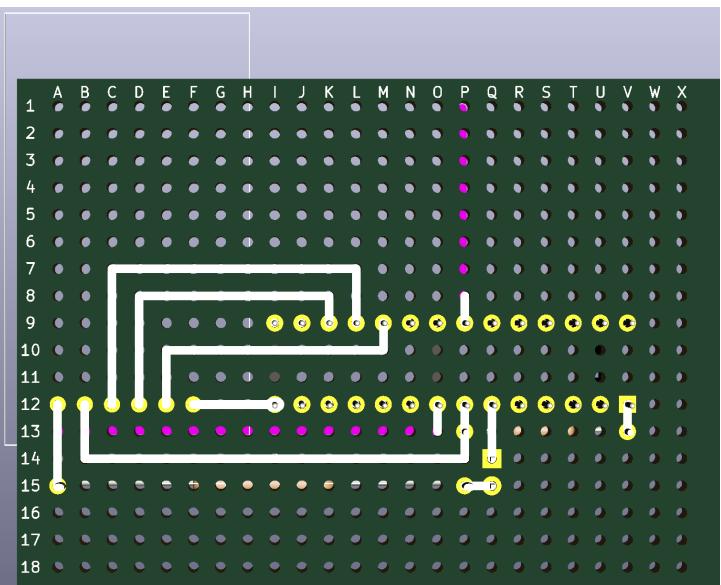


Step 18: Place a jumper cable between P1 and P8.
Make sure the cable is on the front of the perfboard,
and that the wires are long enough to poke through
each hole.

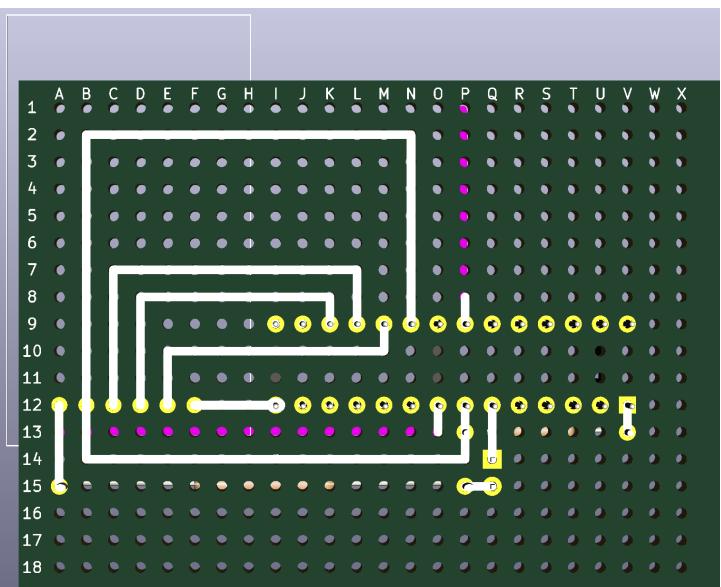


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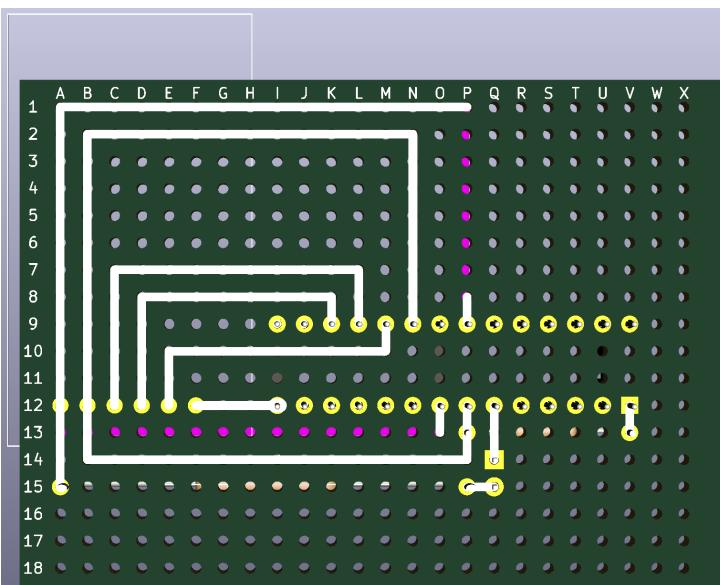
Step 19: Solder connections:
P9 to P8



Step 20: Solder connections:
B12 to B2 to N2 to N9

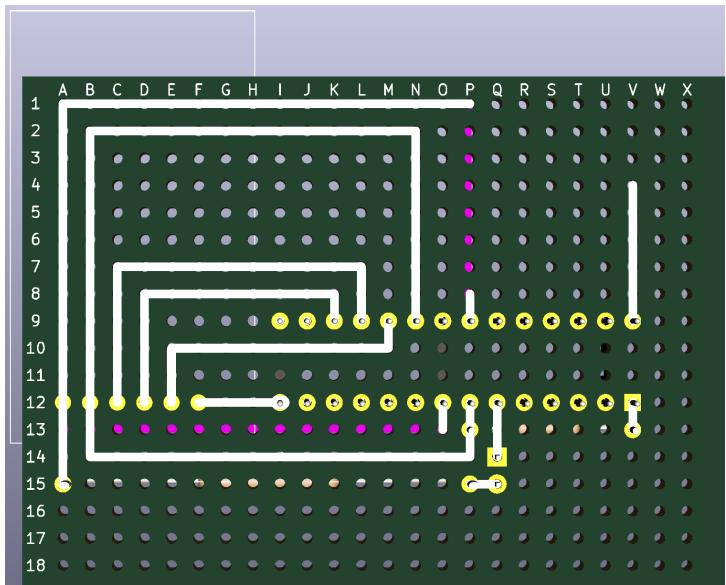


Step 21: Solder connections:
A12 to A1 to P1

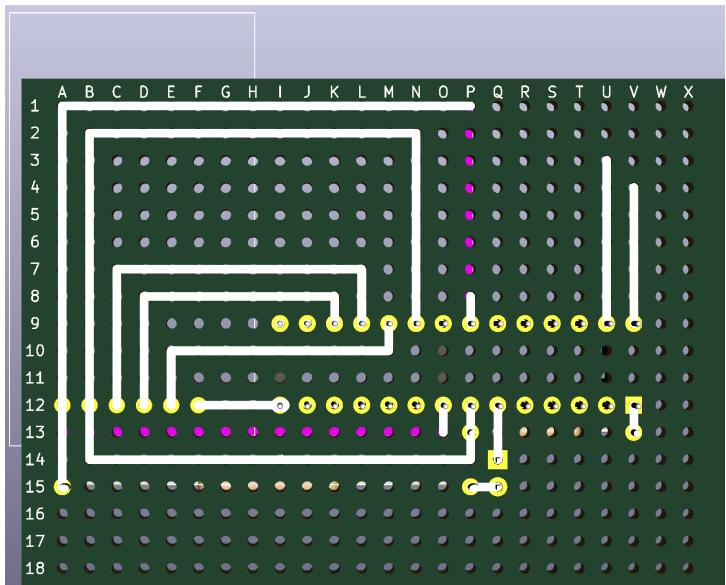


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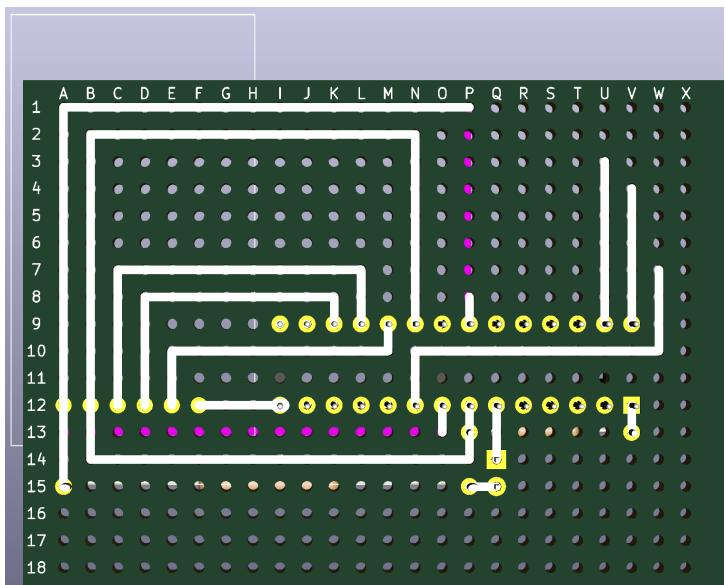
Step 22: Solder connections:
V9 to V4



Step 23: Solder connections:
U9 to U3

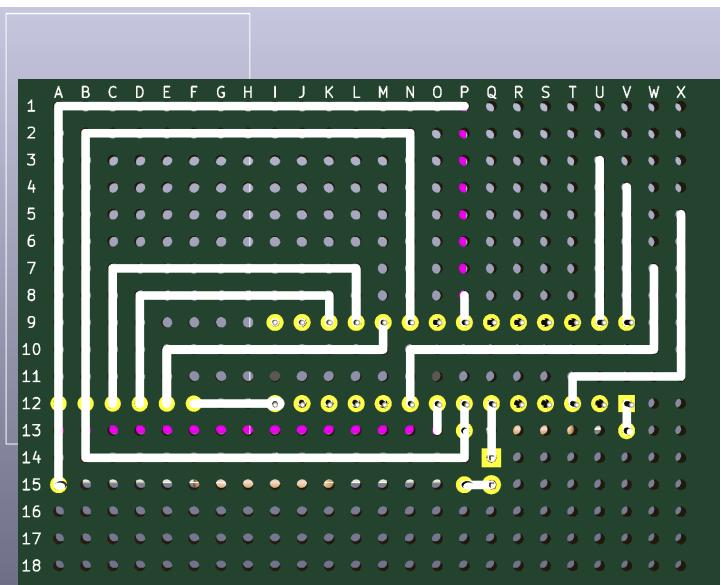


Step 24: Solder connections:
N12 to N10 to W10 to W7

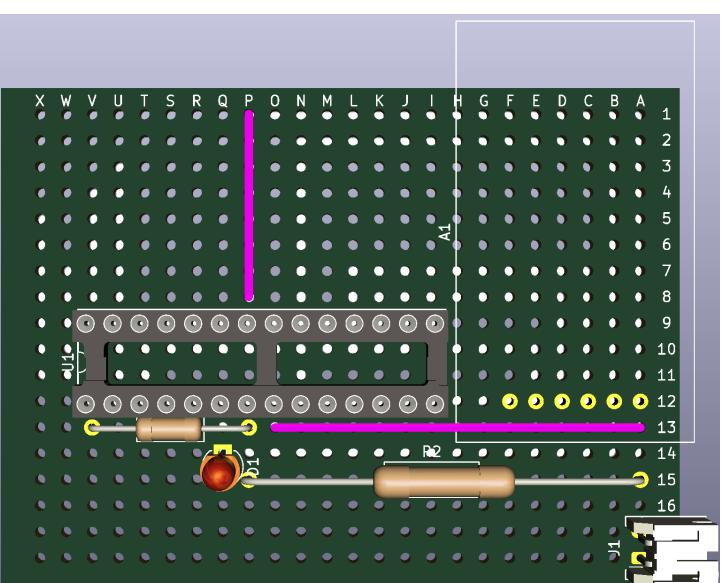


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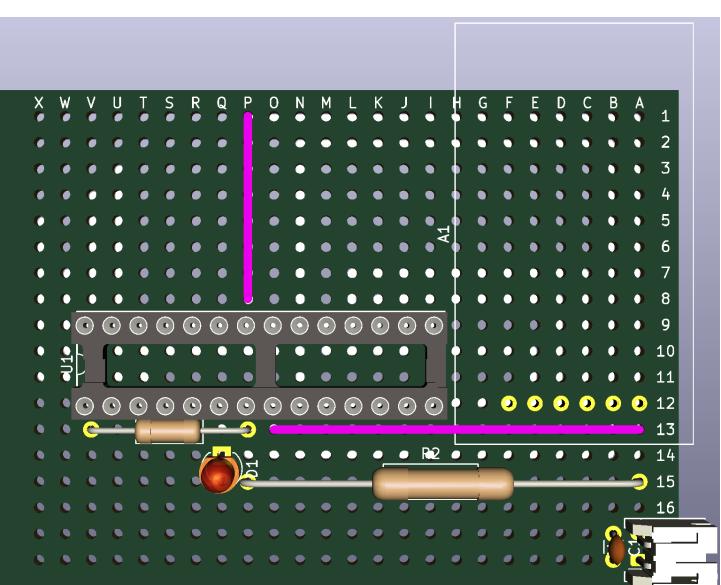
Step 25: Solder connections:
T12 to T11 to X11 to X5



Step 26: Place the 2 Pin Male JST Connector on pins A17 and A18 such that it is facing away from the board. The orientation of this piece DOES matter.

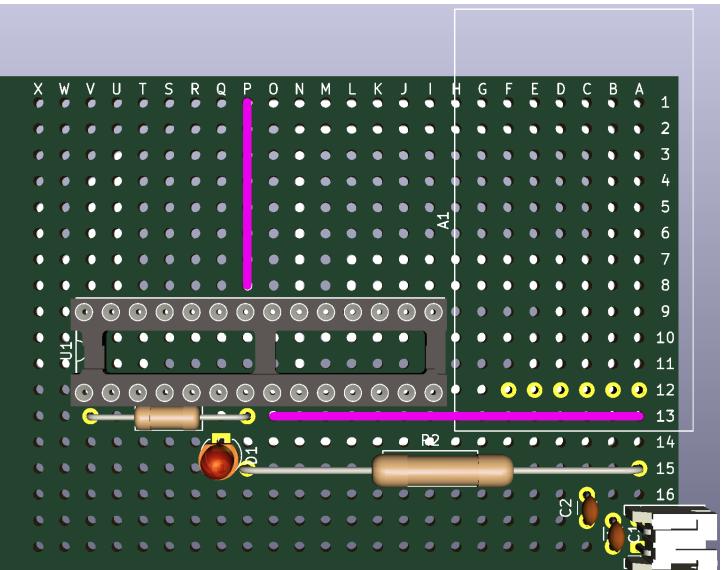


Step 27: Place a $1 \mu\text{F}$ Capacitor across pins B17 and B18. The orientation of this piece does not matter.

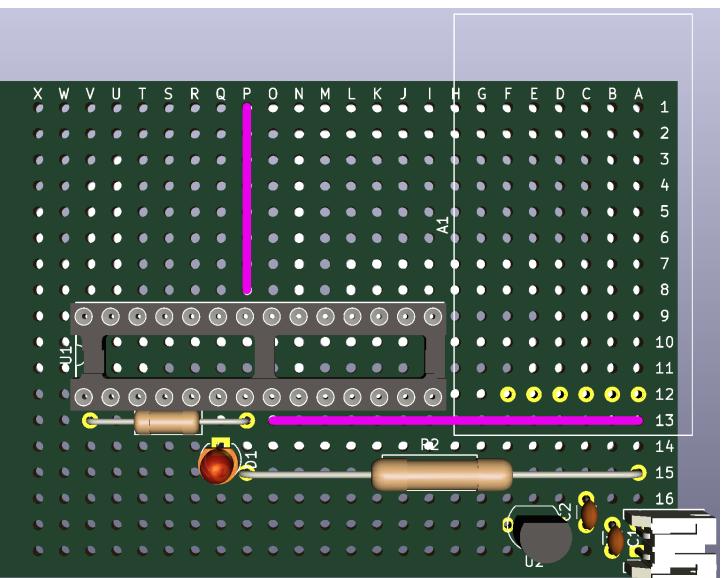


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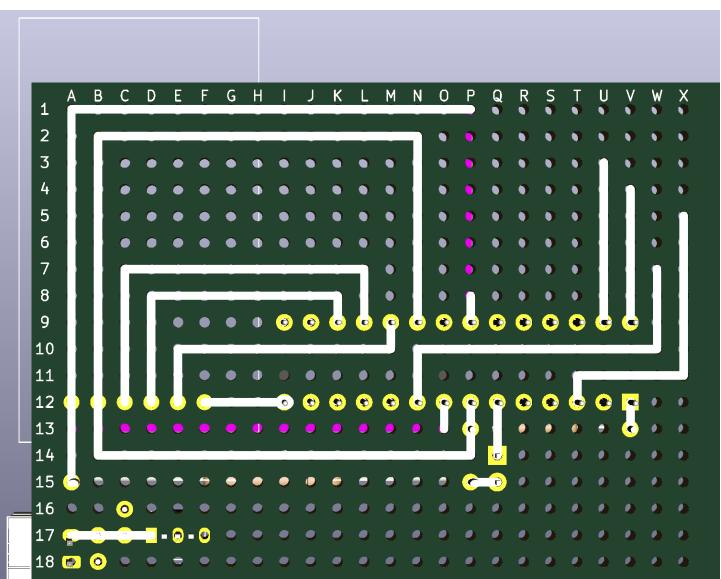
Step 28: Place the other 1 μ F Capacitor across pins C16 and C17. The orientation of this piece does not matter.



Step 29: Place the 3V Linear Voltage Regulator on pins D17 (GND), E17 (V_{IN}), and F17 (V_{OUT}). The orientation of this piece DOES matter. The flat side of the component should face into the board.

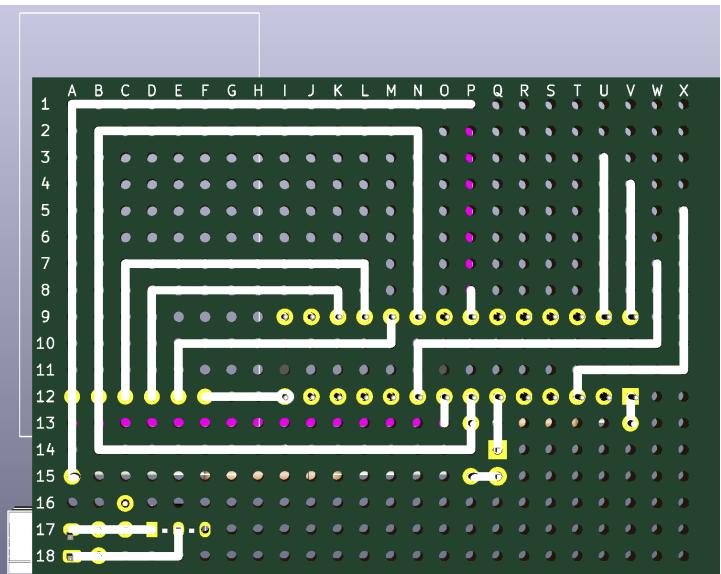


Step 30: Solder connections:
A17 to D17

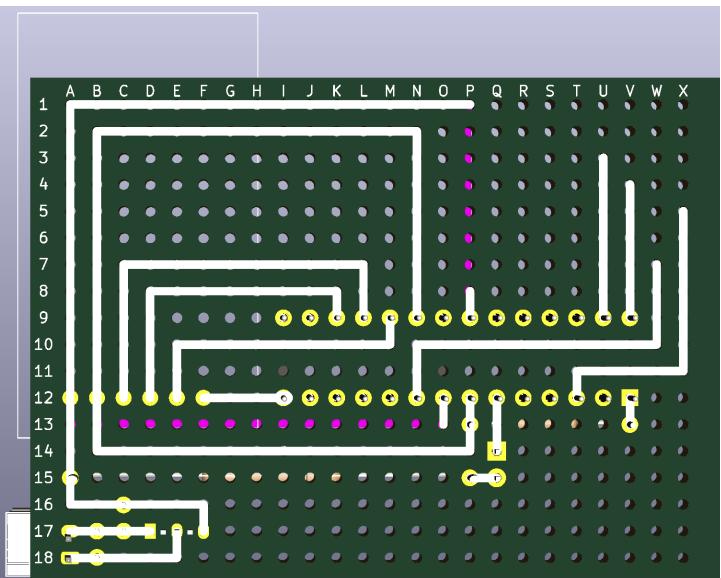


Instructions

Step 31: Solder connections:
A18 to E18 to E17

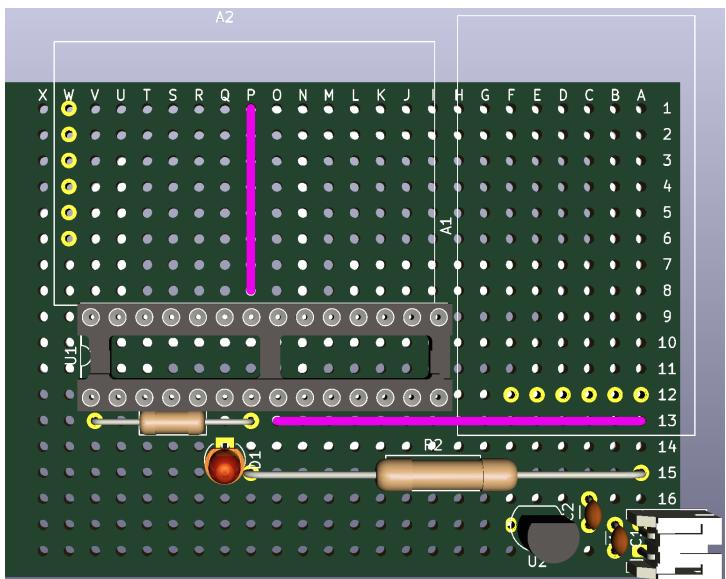


Step 32: Solder connections:
F17 to F16 to A16 to A15



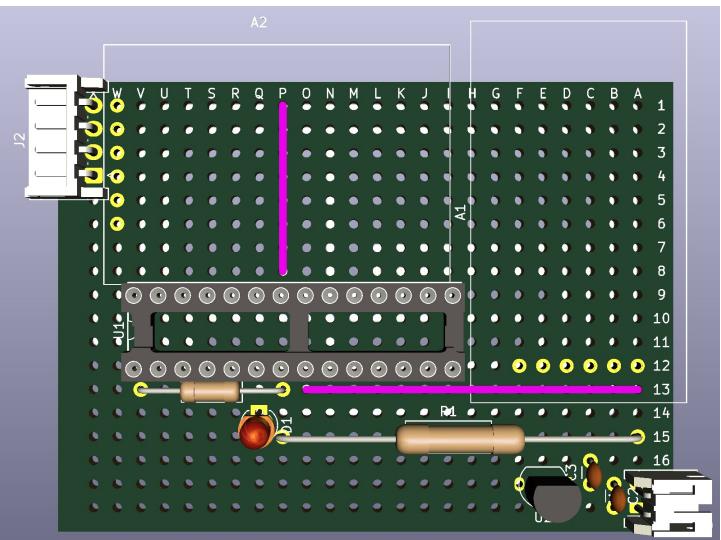
Step 33: Place the DS3231SN Breakout onto the perfboard:

GND goes through W1
VCC goes through W2
SDA goes through W3
SCL goes through W4
SQW goes through W5
32K goes through W6

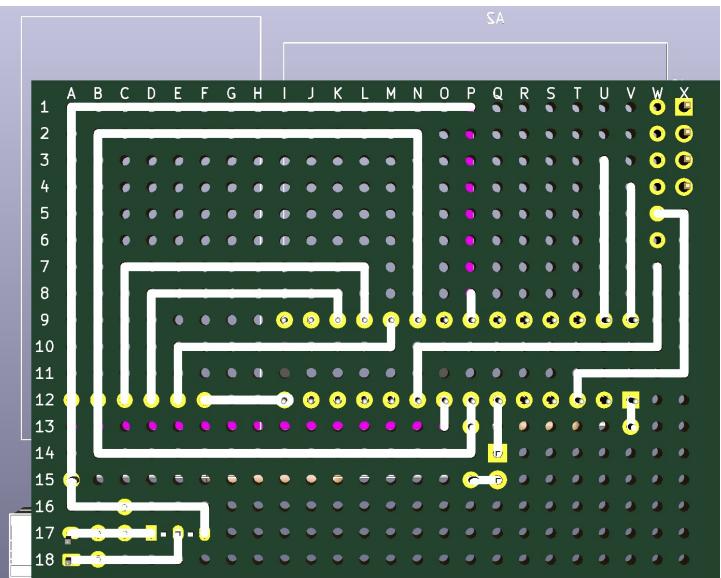


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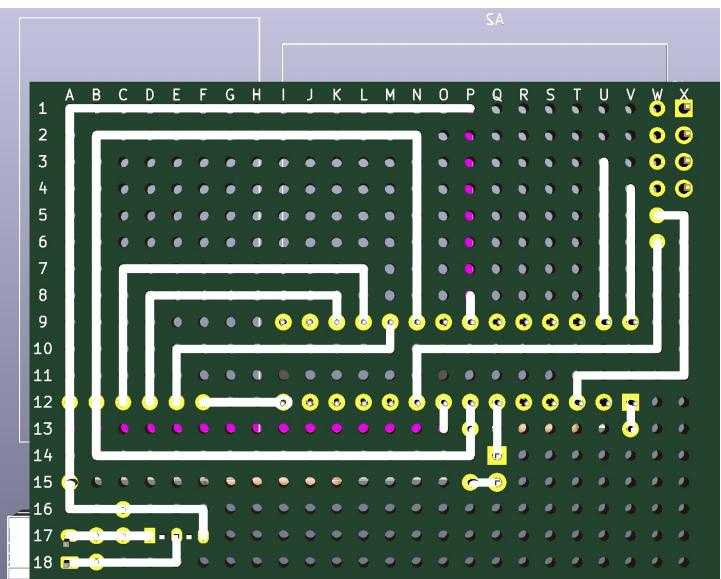
Step 34: Place the 4 Pin Male JST Connector through pins X1, X2, X3, X4 so that it is facing away from the board. The orientation of this piece DOES matter.



Step 35: Solder connections:
X5 to W5

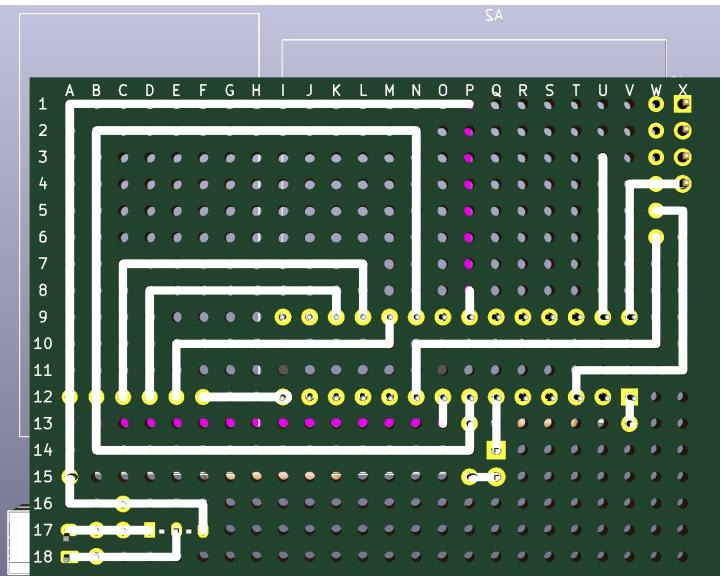


Step 36: Solder connections:
W7 to W6

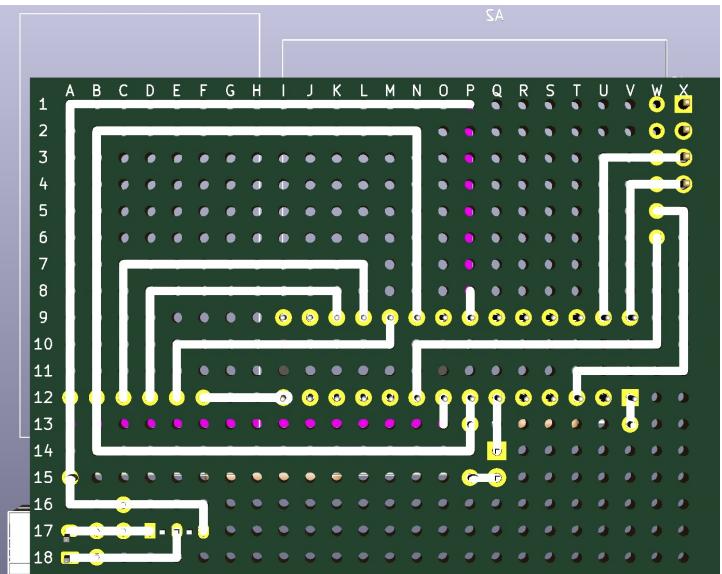


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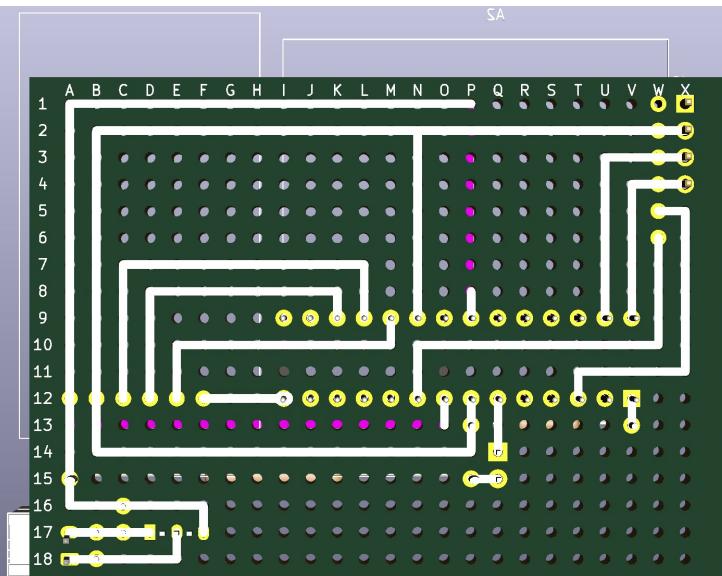
Step 37: Solder connections:
V4 to X4



Step 38: Solder connections:
U3 to X3

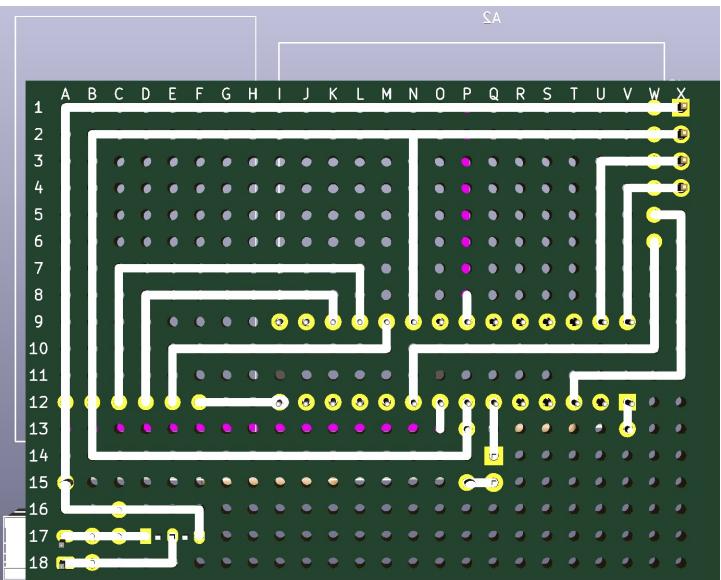


Step 39: Solder connections:
N2 to X2

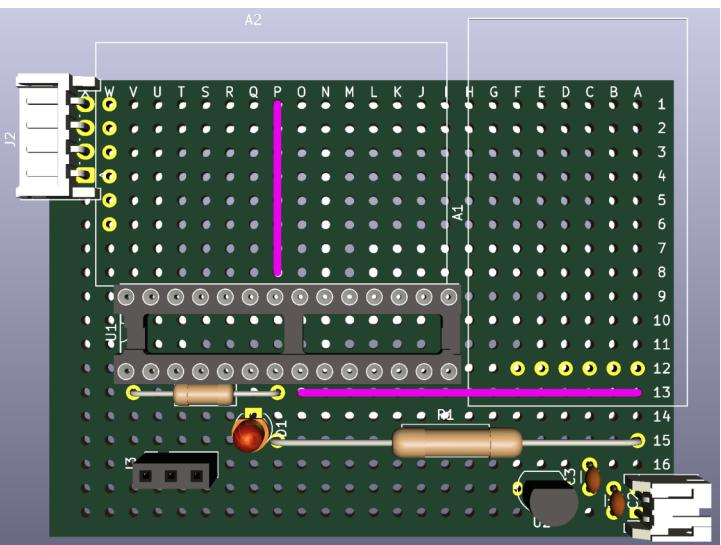


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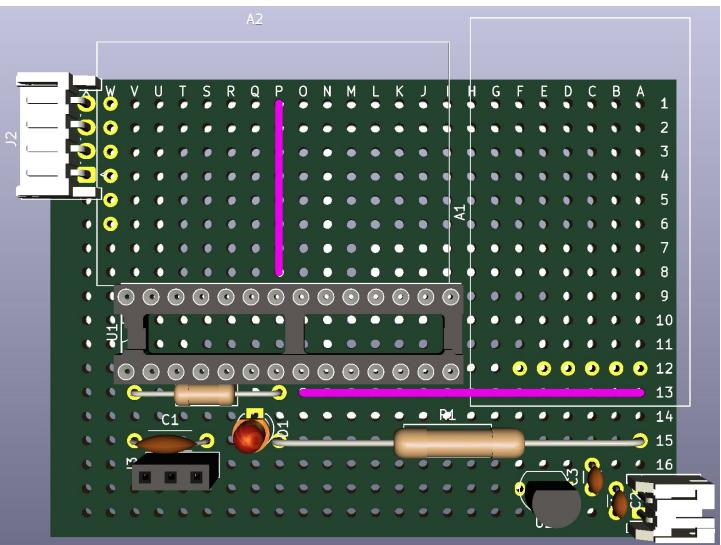
Step 40: Solder connections:
P1 to X1



Step 41: Place a set of 3 Female Header Pins through U16, T16, and S16. The orientation of this piece does not matter.

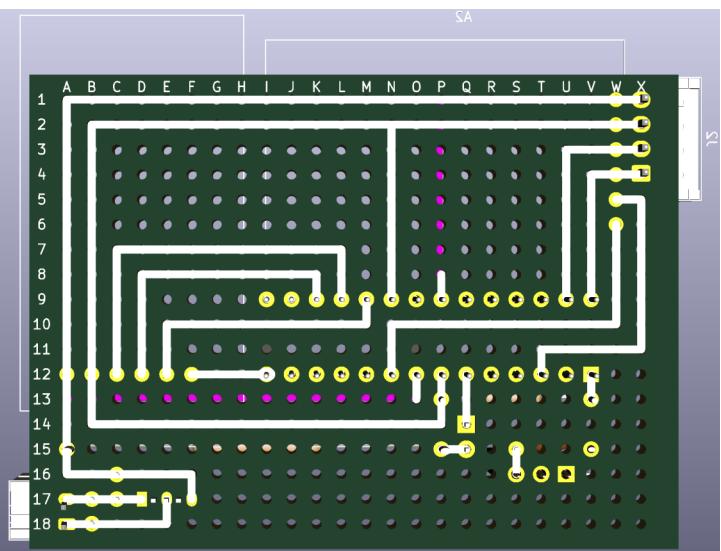


Step 42: Place the 0.1 μF Capacitor across pins S15 and V15. The orientation of this piece does not matter.

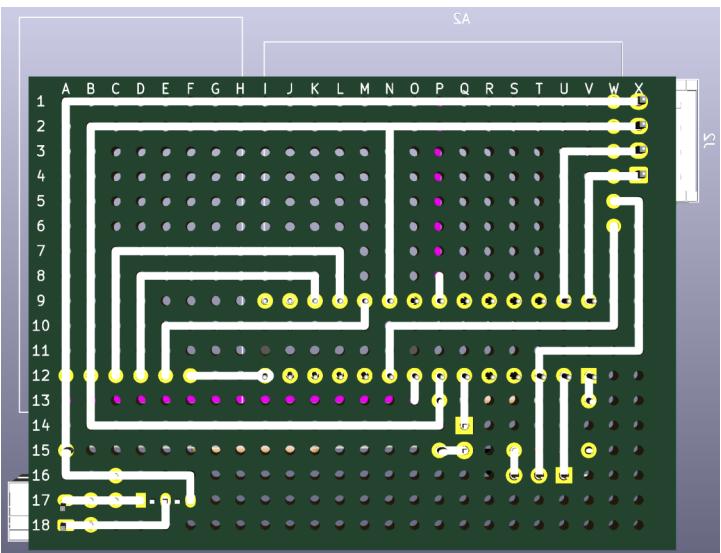


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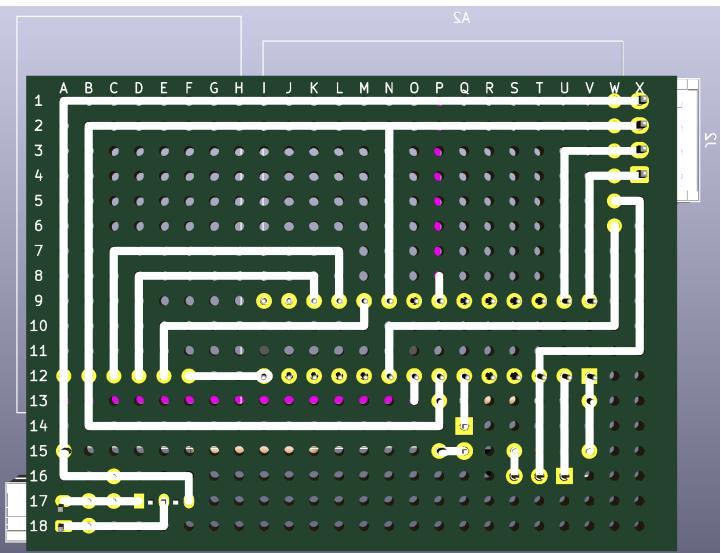
Step 43: Solder connections:
S16 to S15



Step 44: Solder connections:
T16 to T12
U16 to U12



Step 45: Solder connections:
V15 to V13



Instructions

Assembly Complete!

