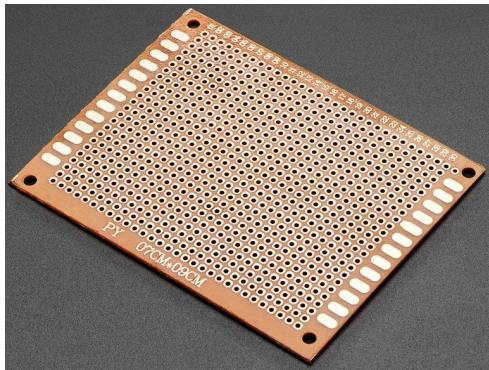


Wave Gauge Circuit Board Assembly Guide

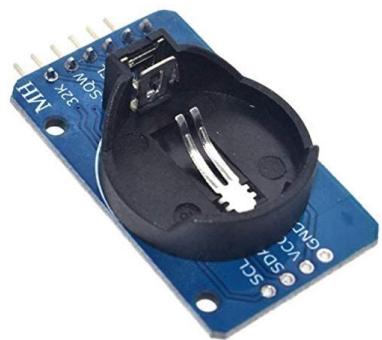
Component List



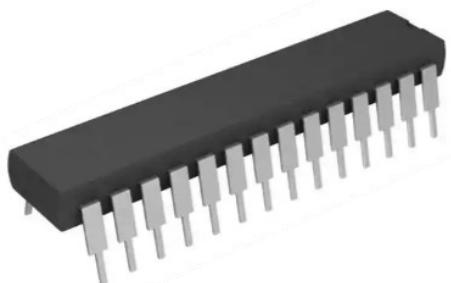
1 x perfboard



1 x 16MHz crystal oscillator



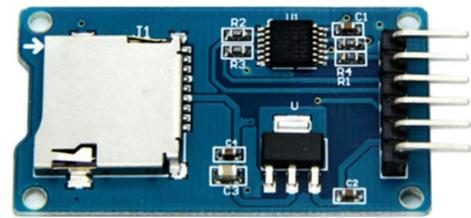
1 x DS3231 RTC breakout



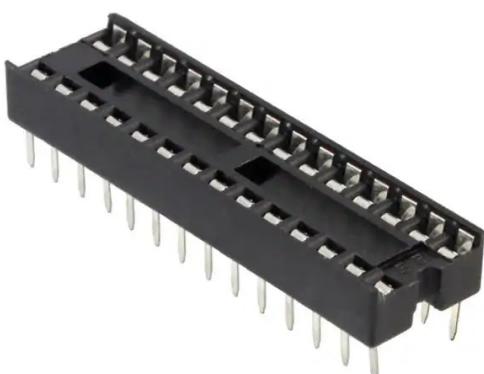
1 x ATMEGA328P microchip



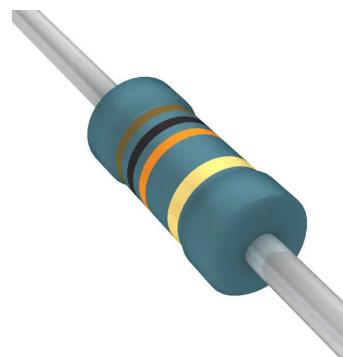
2 x 22pF capacitor



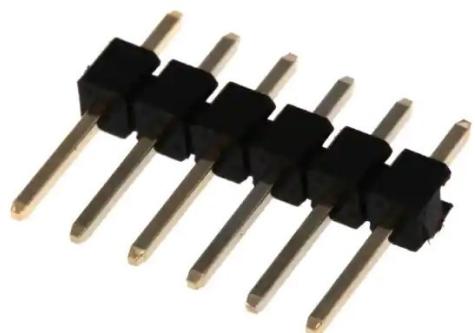
1 x Micro SD card reader breakout



1 x 28 Pin DIP socket
(OPTIONAL)



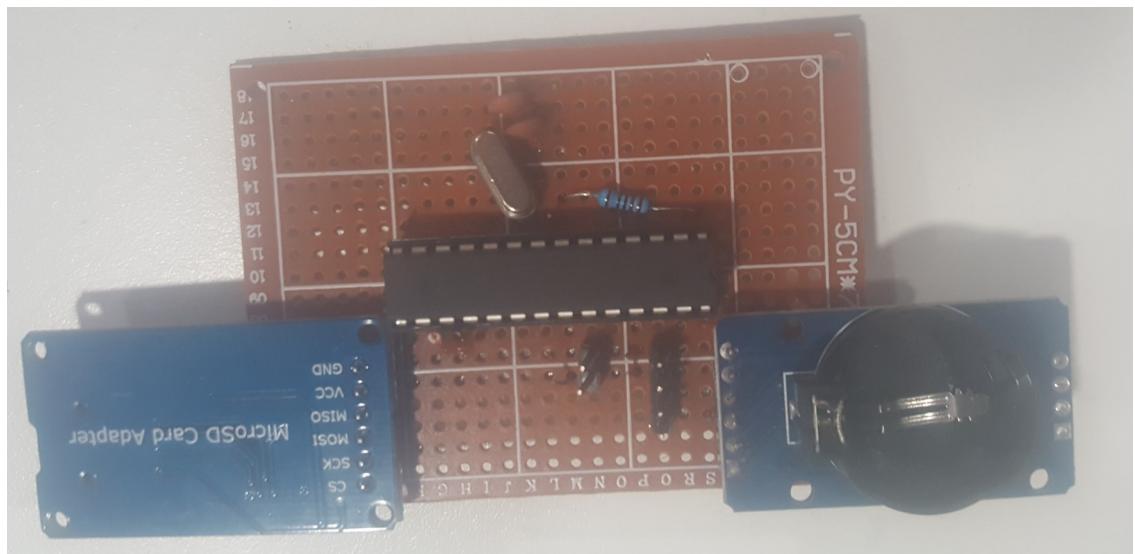
1 x 10K resistor



6 x male header pins

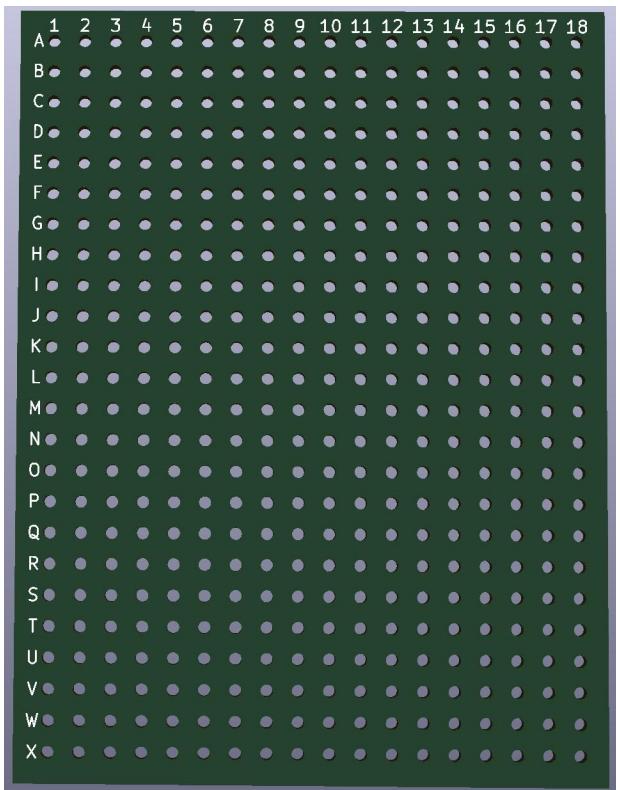
Notes

- 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 any order, but the steps below are organized for ease of soldering.
- All components 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.



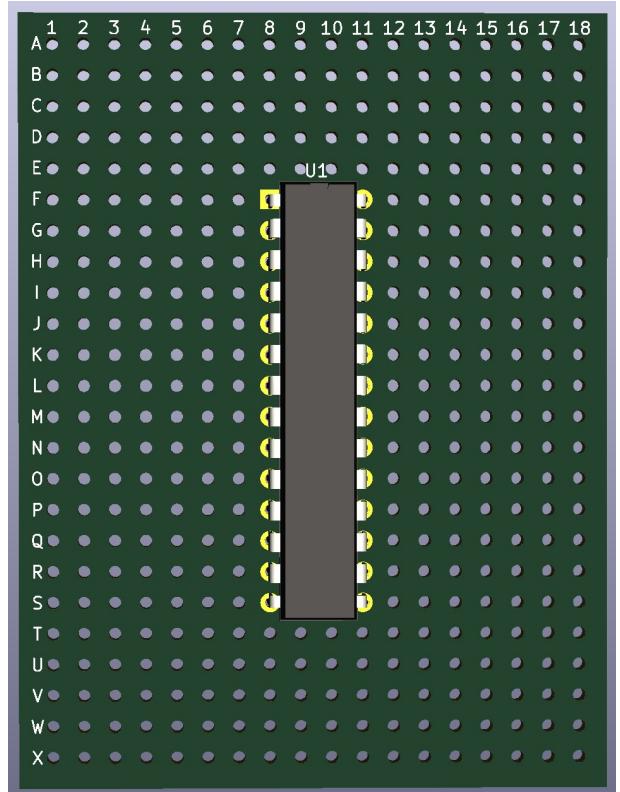
Instructions

Step 1: Start with a blank piece of perfboard

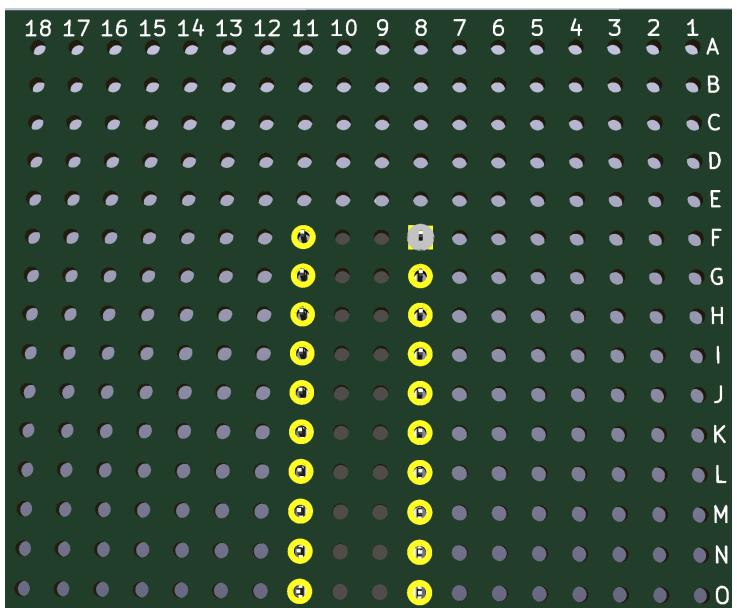


Step 2: Place the 28 pin DIP socket on pins F8, S8, F11, S11.

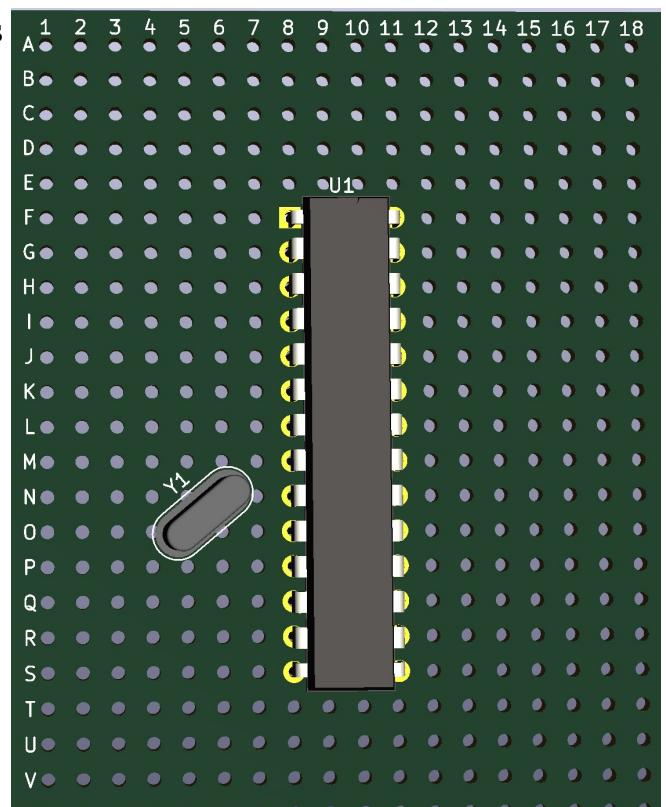
If you don't have a socket, place the ATMEGA328P directly on the board instead (as shown in the image). Note that this microchip must be oriented correctly: the end with the half-circle indentation must be placed closer to the top of the board.



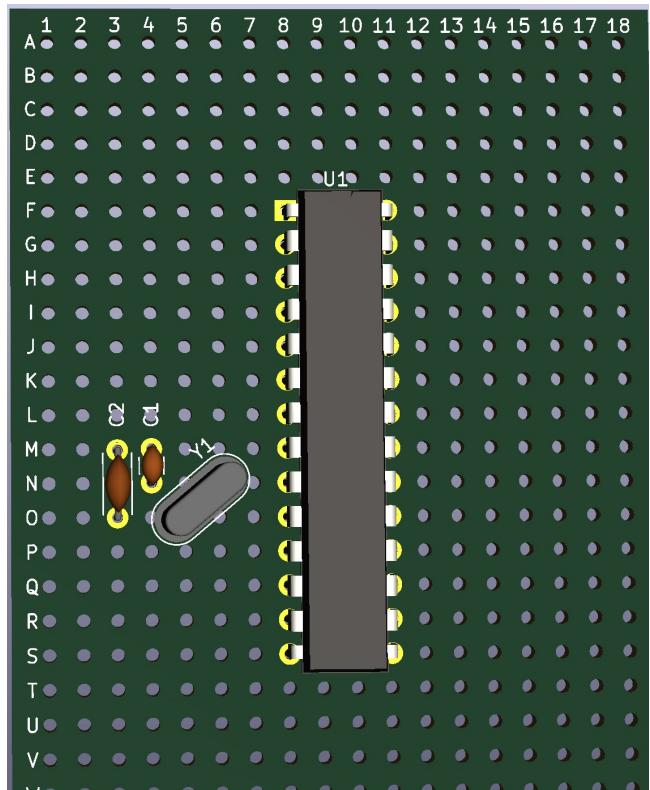
Step 3: Solder pin F8 to hold the piece in place.



Step 4: Place the 16MHz crystal oscillator in holes N6 and O5. The orientation of this piece doesn't matter.



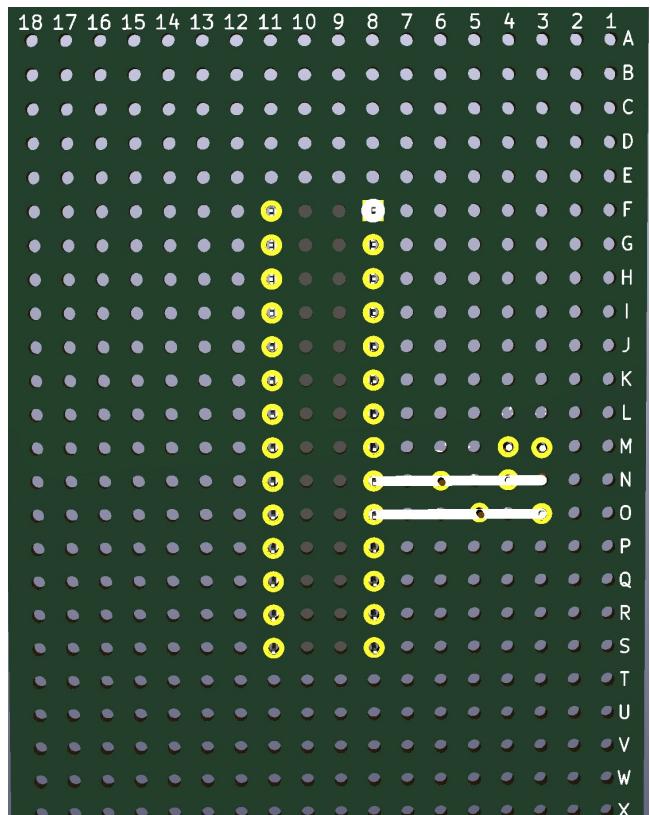
Step 5: Place one 22pF capacitor in holes M4 and N4. Place the other 22pF capacitor in holes N3 and O3. The orientation of these pieces doesn't matter.



Step 6: Solder connections:

N8 to N4 (N3 is not required in the image)
O8 to O3

The components can be held in place by bending the leads and pressing them against the boards. These leads can be clipped off after the component is soldered in place.



Step 7: Place the DS3231 RTC breakout onto the board:

GND through E13

VCC through E14

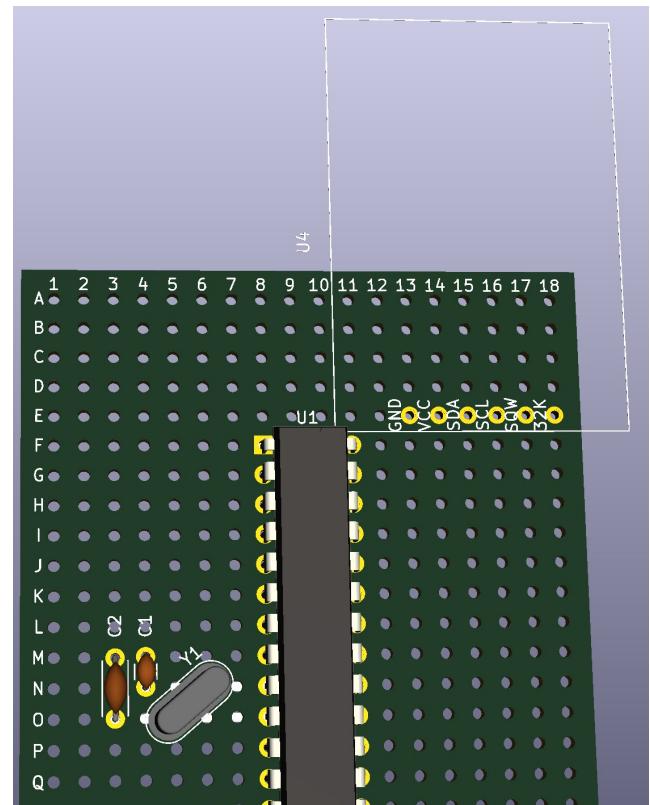
SDA through E15

SCL through E16

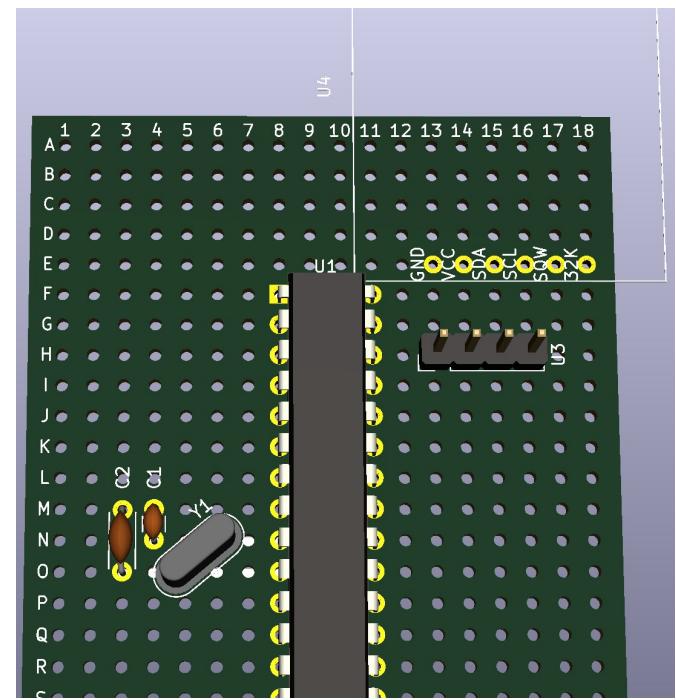
SQW through E17

32K through E18.

Note that the pins of this component may have to be bent so that they are perpendicular to its board.



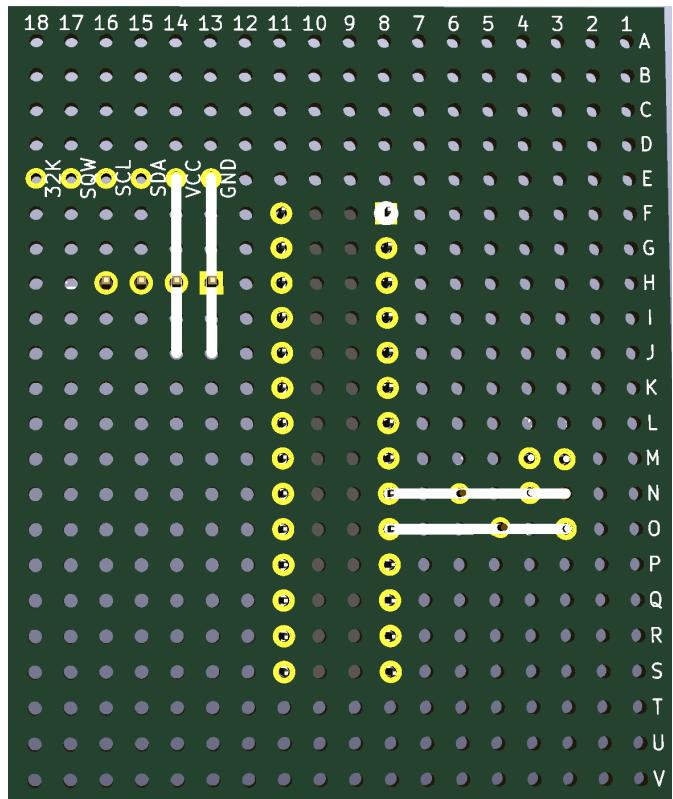
Step 8: Place a set of 4 header pins through H13, H14, H15, and H16.



Step 9: Solder connections:

E13 to J13

E14 to J14



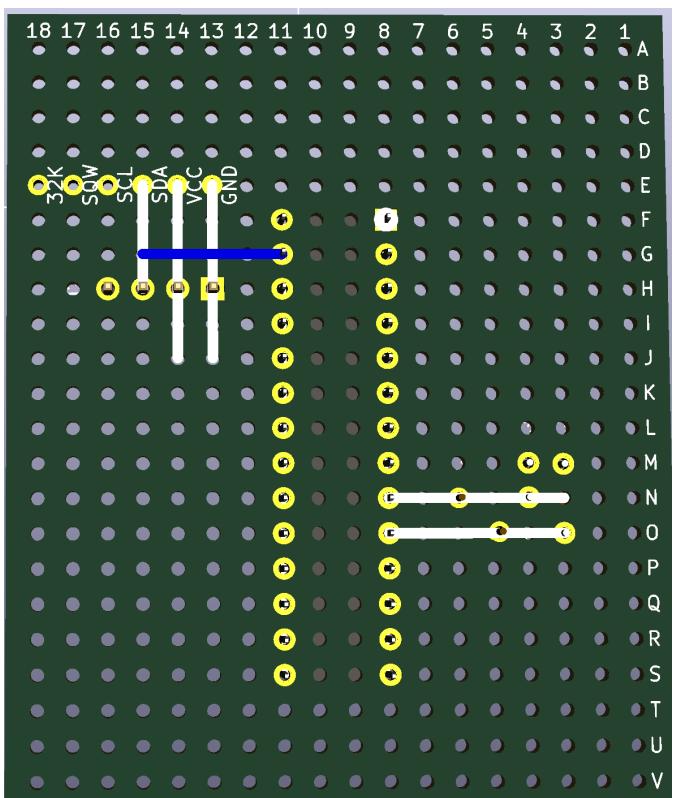
Step 10: Solder connections:

E15 to H15

Connect via jumper cable:

G15 to G11

Soldering the jumper cable can be tricky, as it will heat up very quickly when applying solder. Re-heating the solder on hole G15 and pushing the wire through quickly is one approach. Note that that wire doesn't have to go through the hole, so long as a solid electrical connection is made between the wire and the solder.

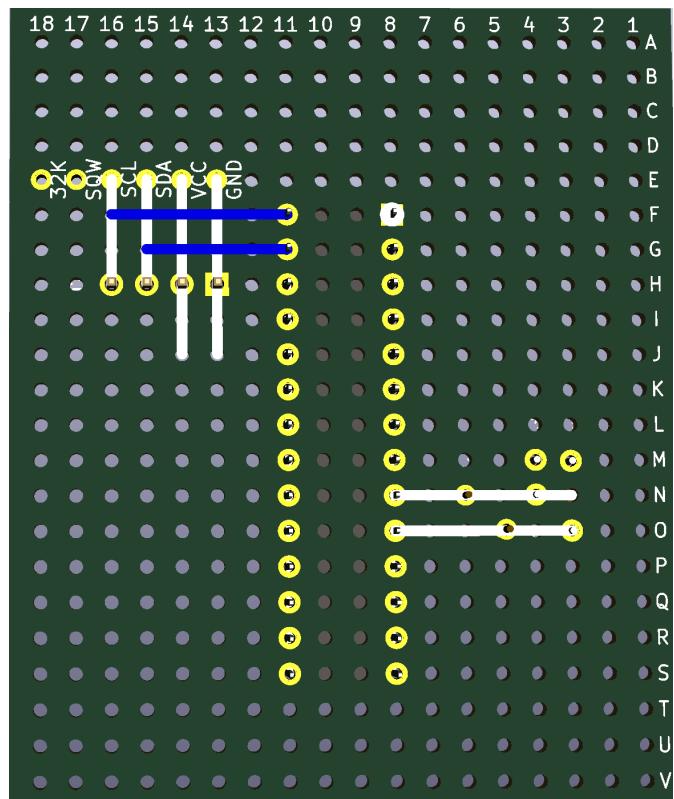


Step 11: Solder connections:

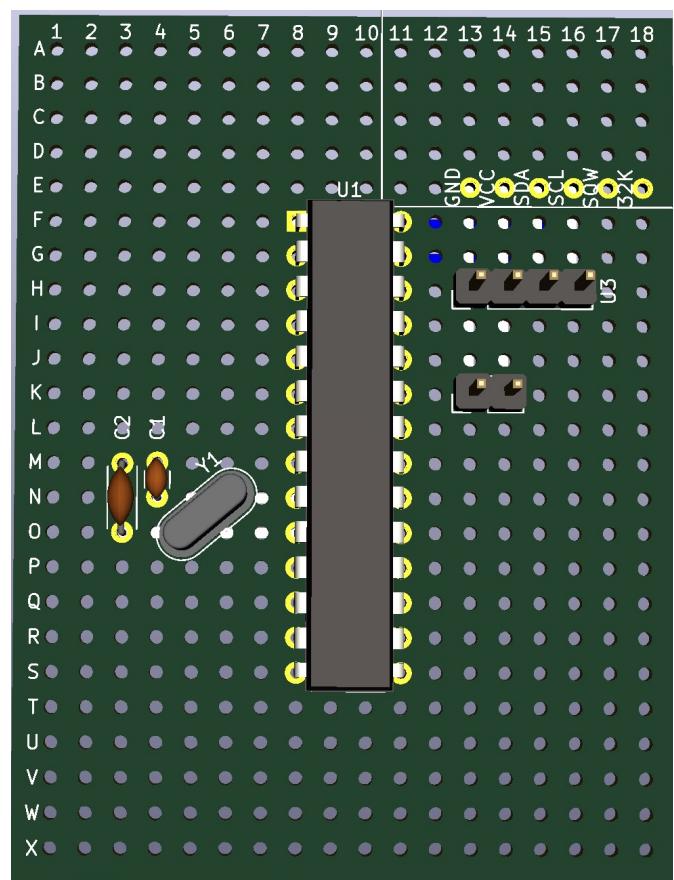
E16 to H16

Connect via jumper cable:

F16 to F11



Step 12: Place a set of two pin headers through holes K13 and K14.

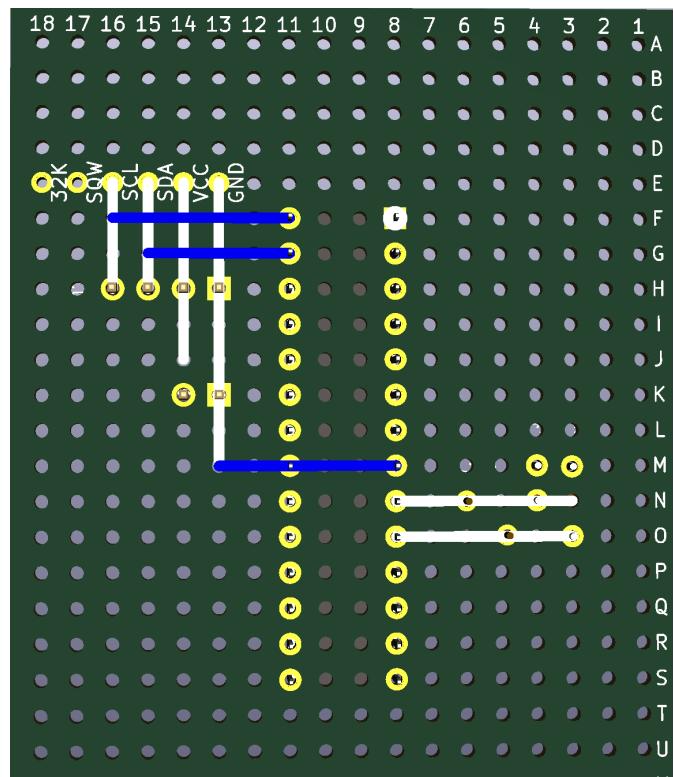


Step 13: Solder connections:

J13 to M13

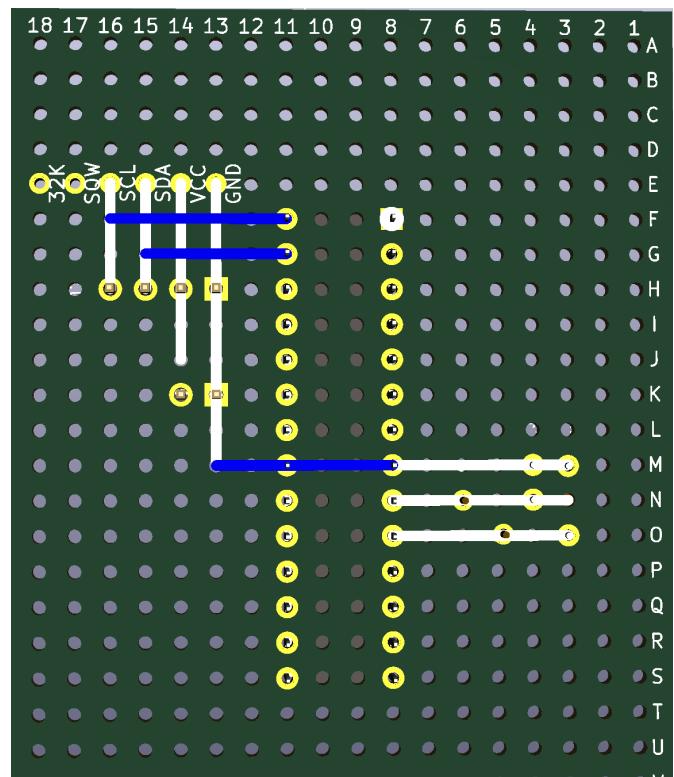
Connect via jumper cable:

M13 to M8



Step 14: Solder connections:

M3 to M8

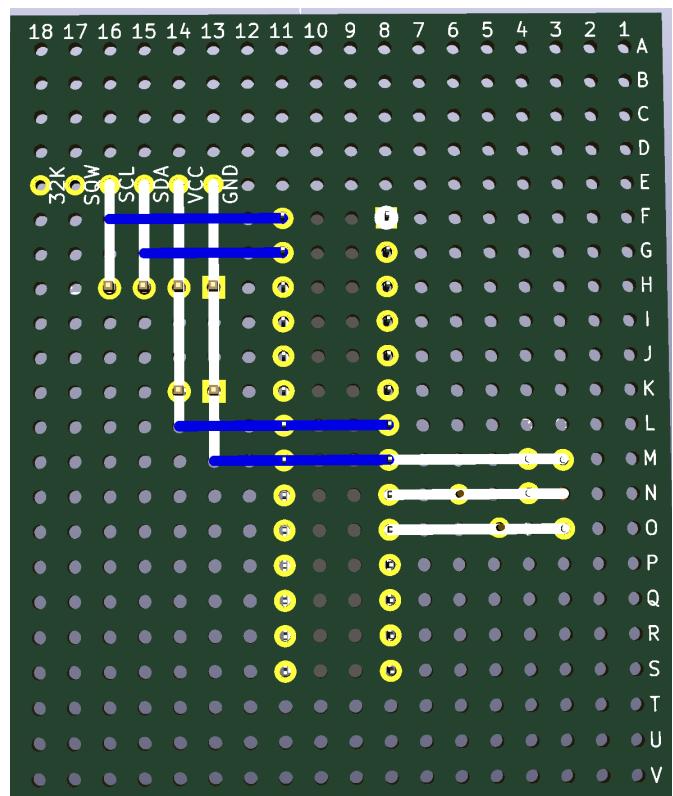


Step 15: Solder connections:

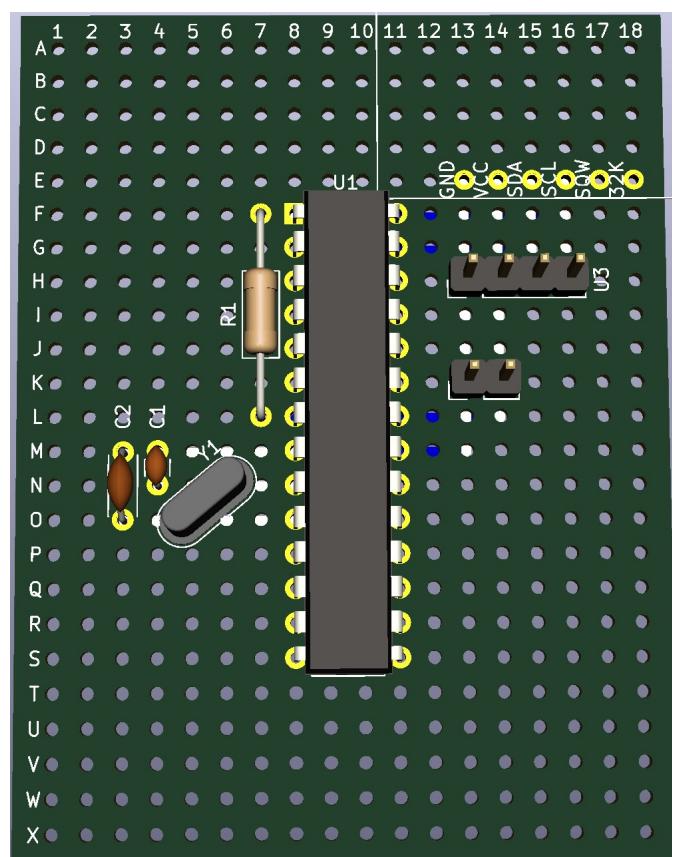
J14 to L14

Connect via jumper cable:

L14 to L8



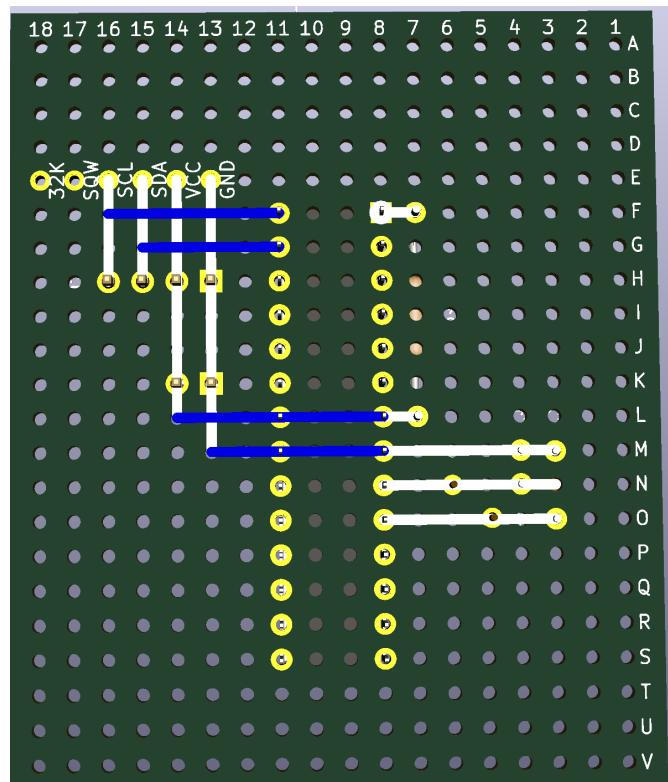
Step 16: Place the 10K resistor across pins F7 and L7. The orientation of this piece doesn't matter.



Step 17: Solder connections:

F8 to F7

L8 to L7



Step 18: Place SD card reader breakout onto the board:

GND through U13

VCC through U14

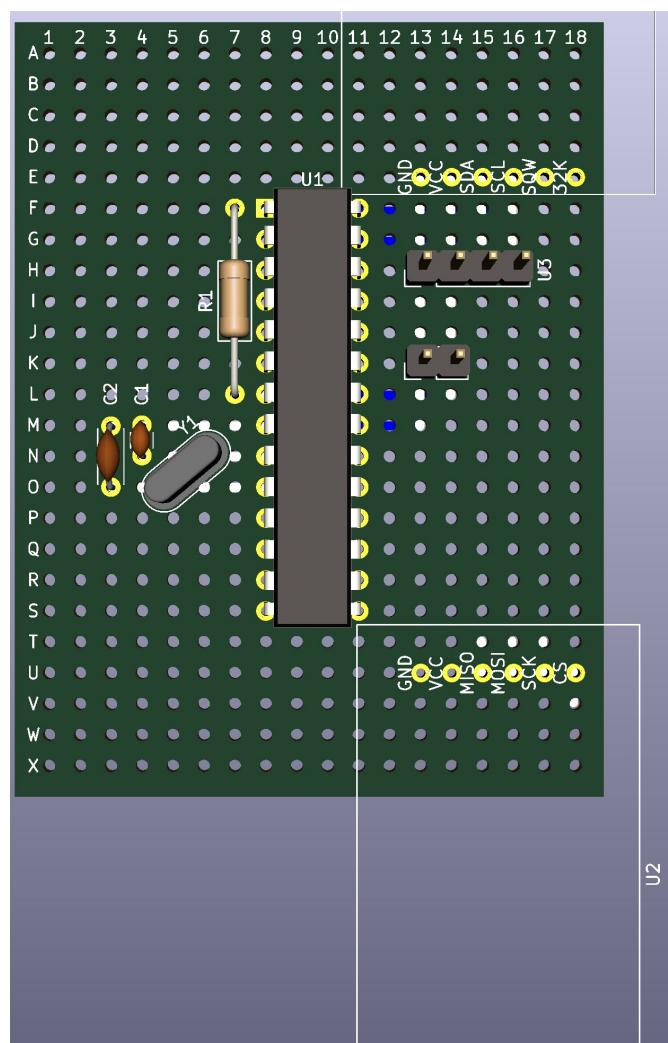
MISO through U15

MOSI through U16

SCK through U17

CS through U18

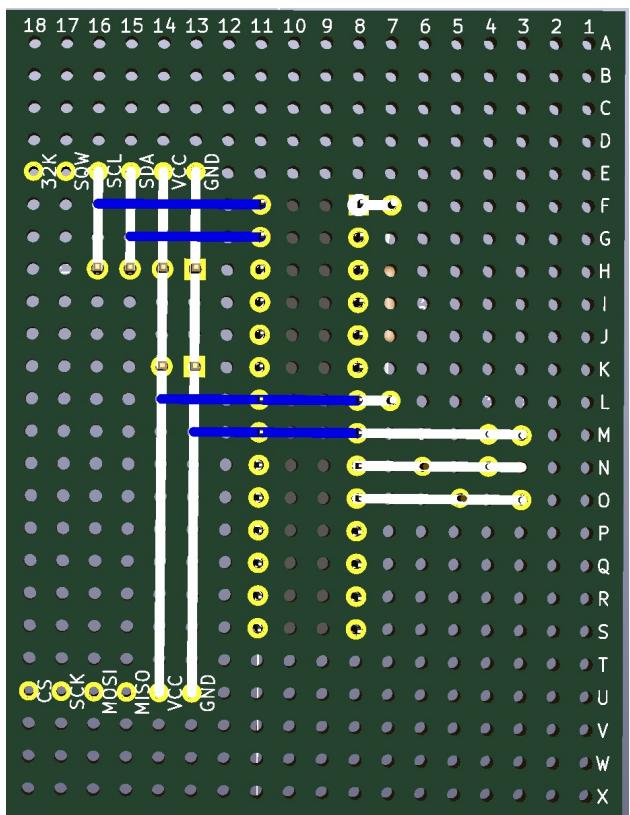
Note that the pins of this component may have to be bent so that they are perpendicular to its board.



Step 19: Solder connections:

U13 to M13

U14 to L14

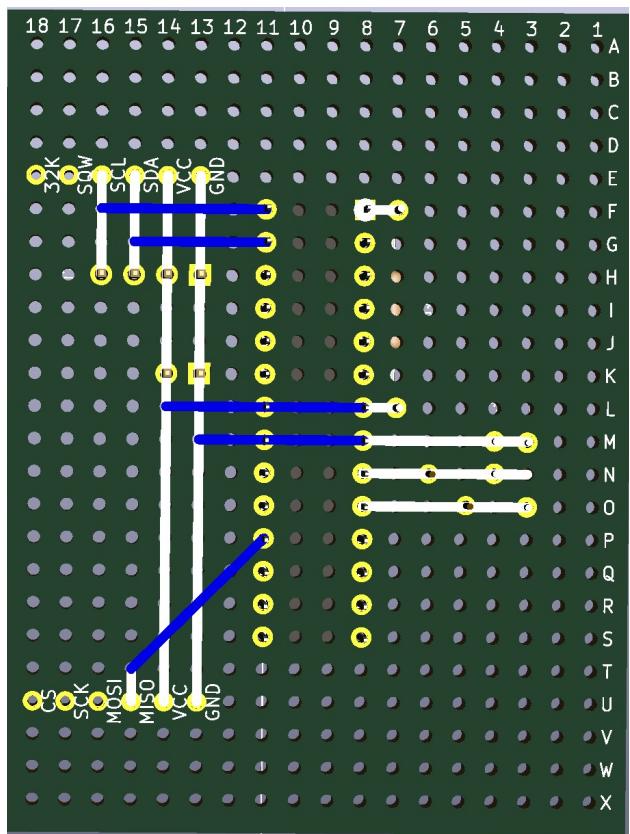


Step 20: Solder connections:

U15 to T15

Connect via jumper:

T15 to P11

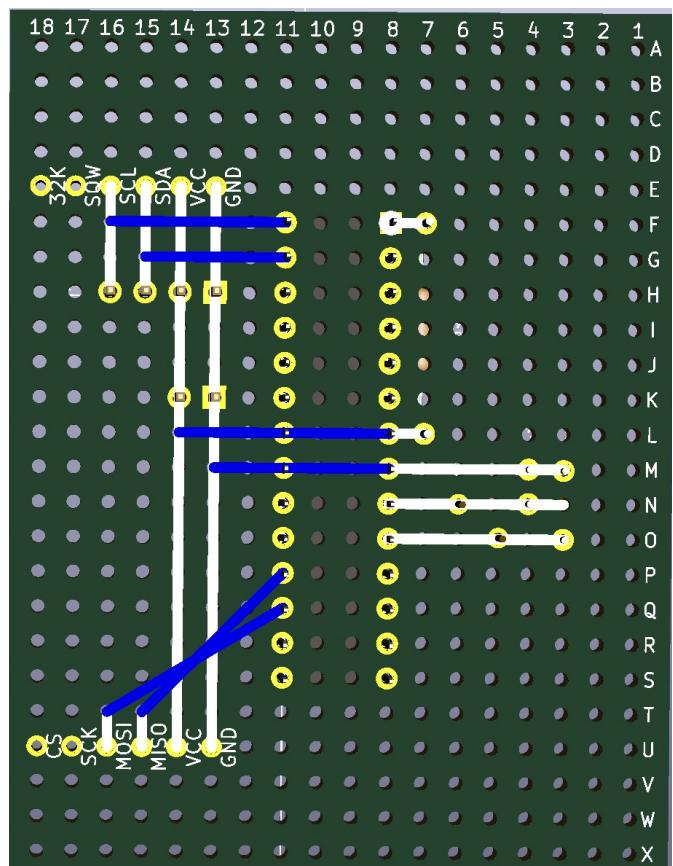


Step 21: Solder connections:

U16 to T16

Connect via jumper:

T16 to Q11

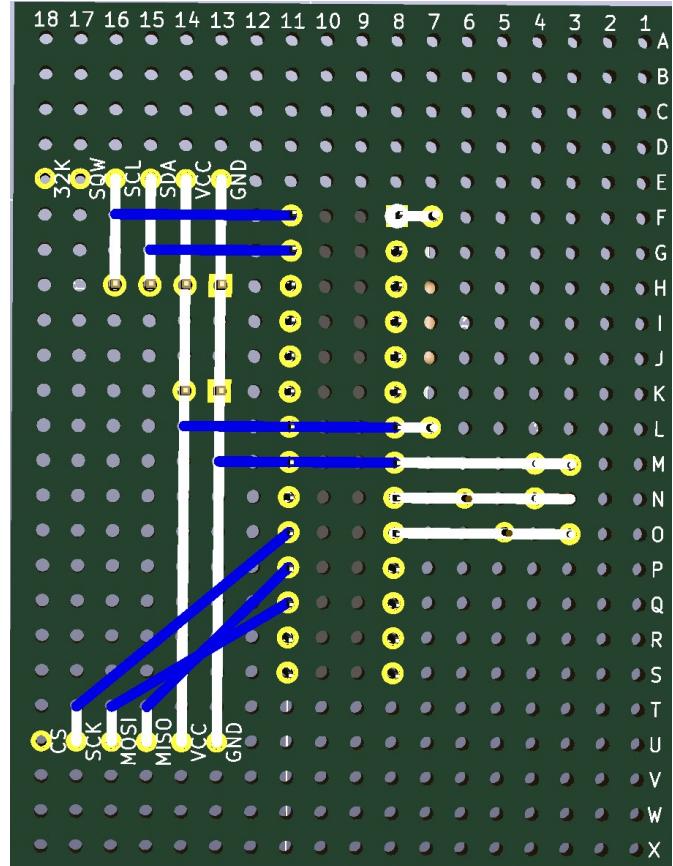


Step 22: Solder connections:

U17 to T17

Connect via jumper:

T17 to O11

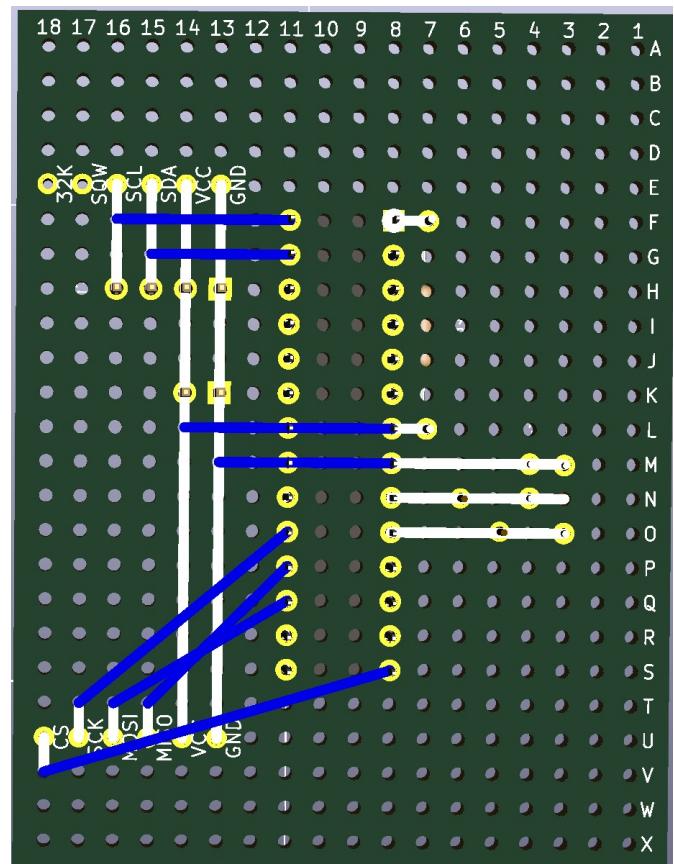


Step 23: Solder connections:

U18 to V18

Connect via jumper:

V18 to S8



Assembly Complete!

