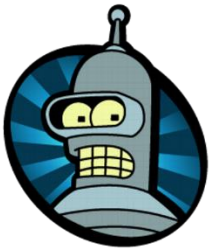
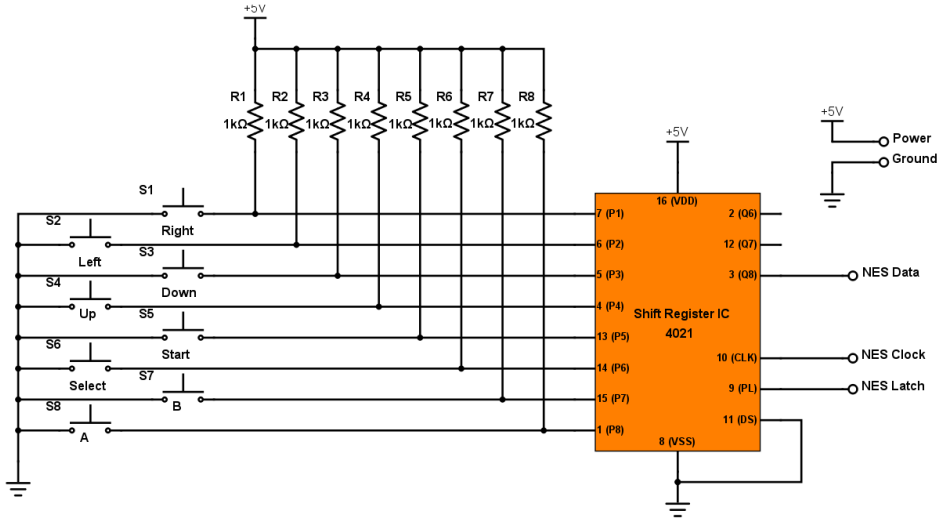
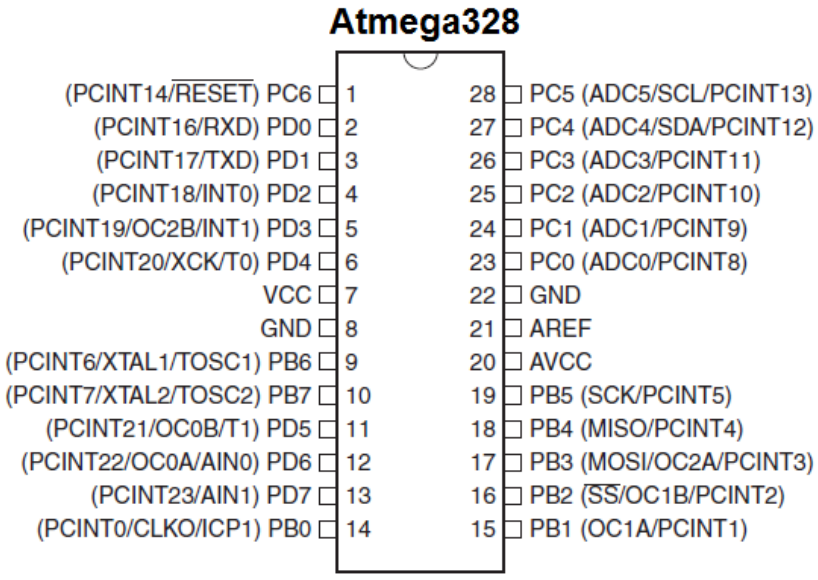
BITE MY SHINY METAL (mini)NES



The basic idea is to connect the holes of the original breadboard of NES 80s controller (removing the original shift register 4021) with the pins of a microcontroller in a smart way (specifically, an Atmega328).





Istruzioni

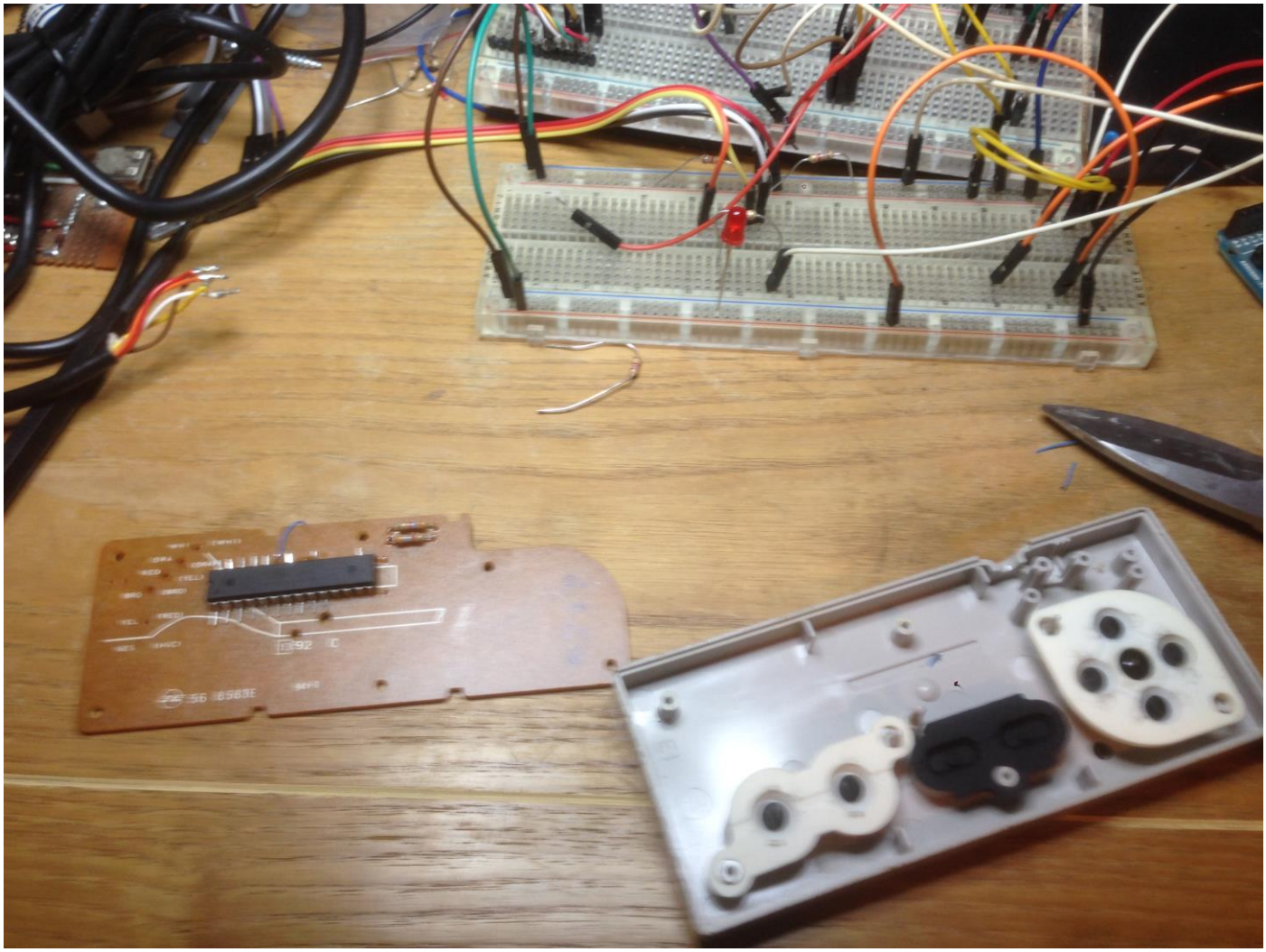
0. Program an Atmega328 with the firmware that I ‘ve put on Github (you can safely use an Atmega328 with the Arduino bootloader burnt on it and program it by using Arduino);

https://github.com/sds1979v/NES4miniNES

To meet Nintendo’s specifications of the 3.3V, the Atmega must run at 8MHz (so remember to set the fuses).

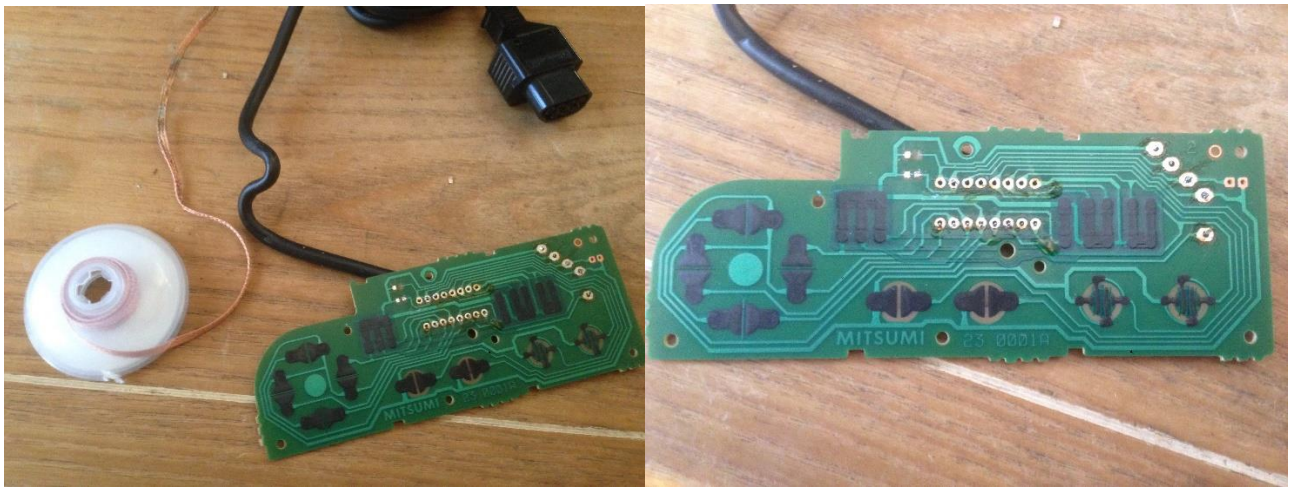
Easy instructions on how to do this step:
http://www.instructables.com/id/Atmega-Standalone-Running-without-crystal-oscillat/

1. Open the original controller, there are two types both original (Nintendo or Mitsumi, a bit like currently Hori is manufacturing original Nintendo Switch stuff), but it changes almost nothing, with Mitsumi you will have to unsolder the original SMD0805 resistors and you will be more uncomfortable soldering the pull-up resistors (while probably with Nintendo you can keep the originals or just take advantage of the holes, remember that a multimeter is your friend, check often continuity);

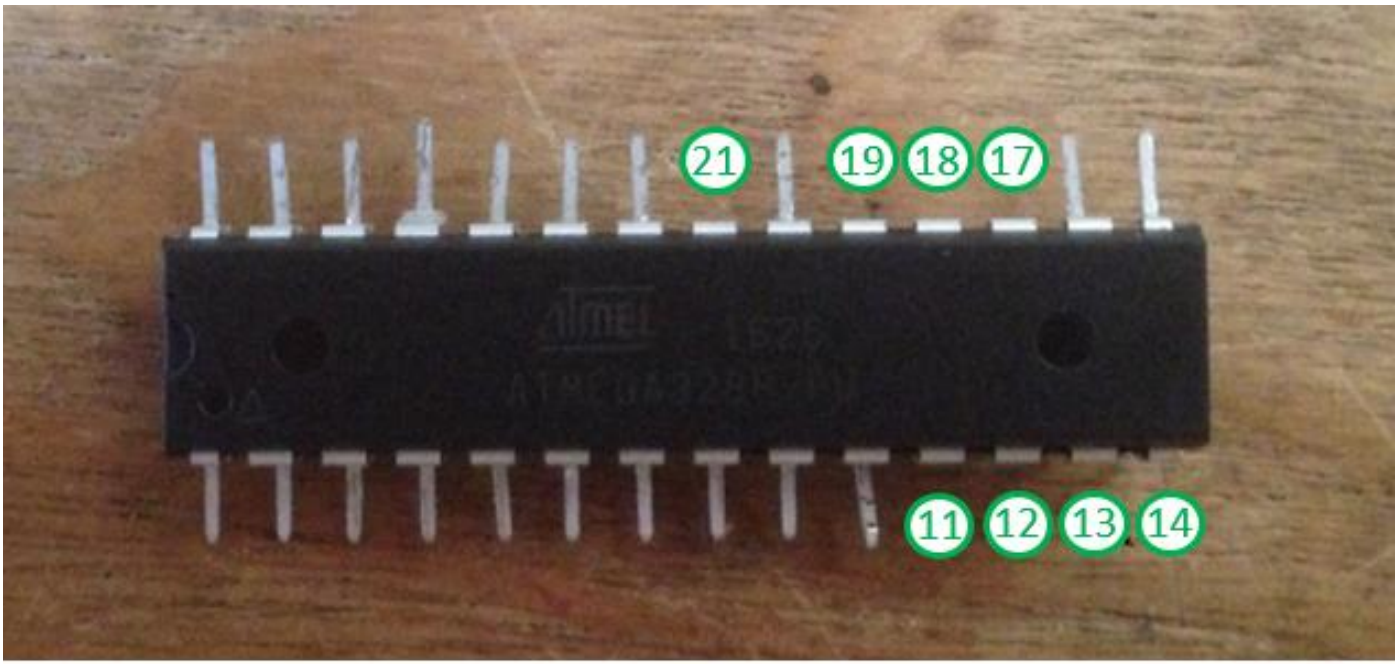


NINTENDO vs MITSUMI

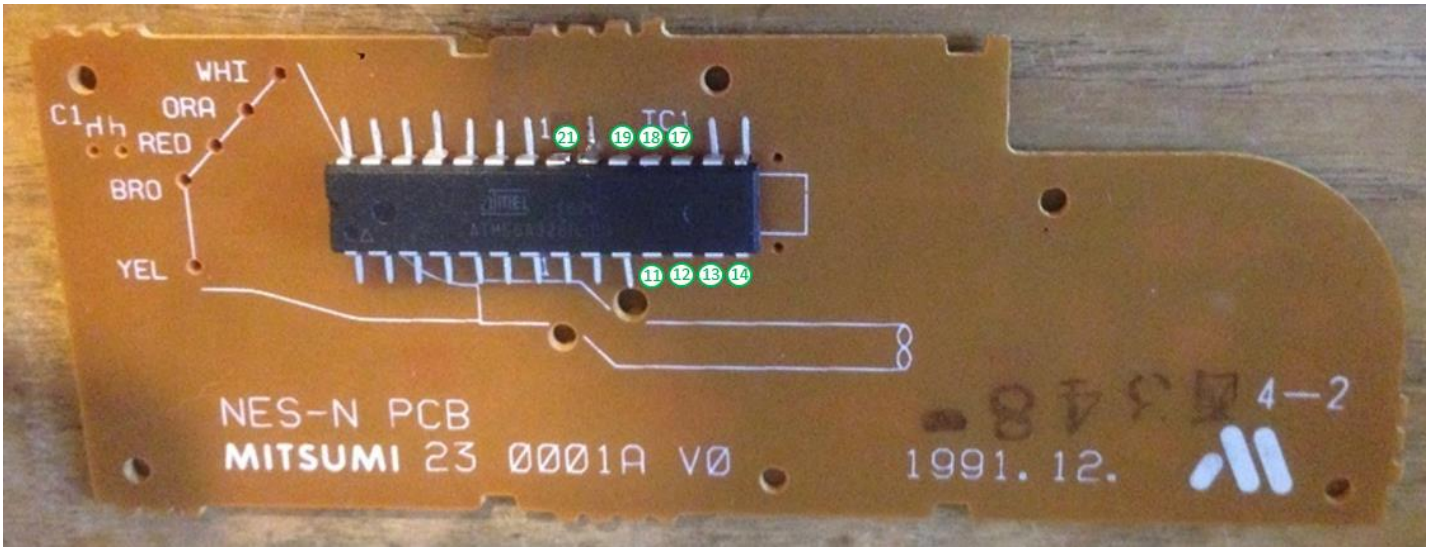
2. De-solder the shift register 4021 using a braid



3. Take the Atmega you've already programmed and fold some pins to match the shift register pins (in red) with the chosen ones of the Atmega (in green), as shown below:

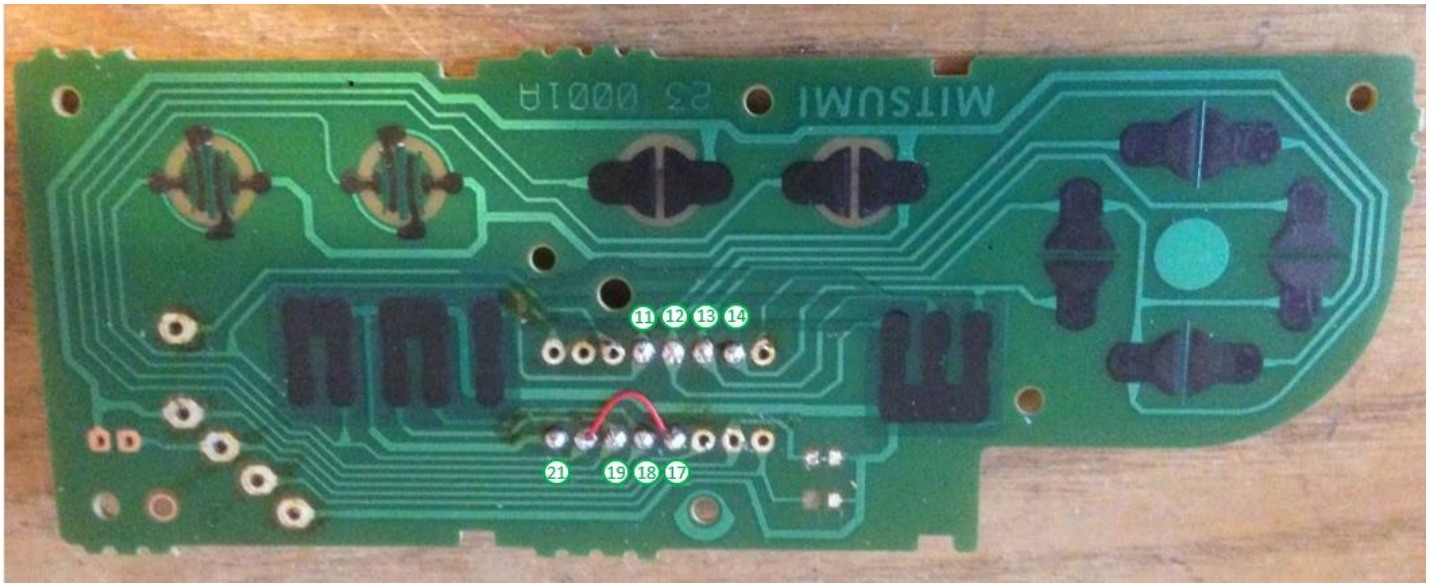


Insert the Atmega into the board as shown in the following picture:

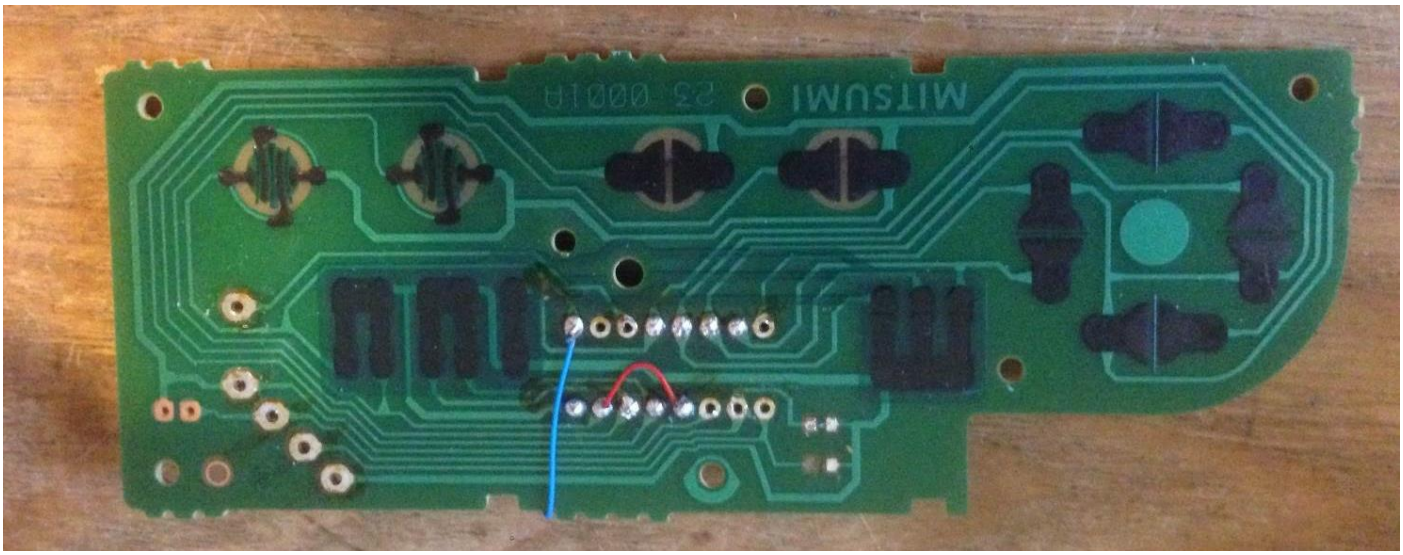


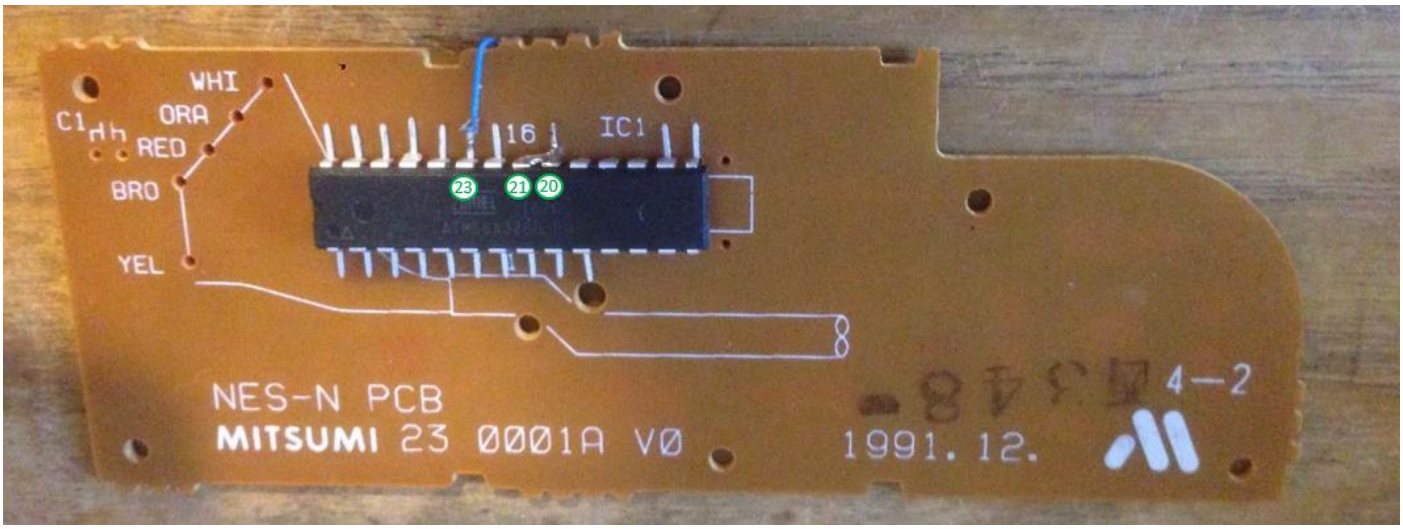
PAY ATTENTION TO LEAVE TWO FREE HOLES ON THE RIGHT OF THE ATMEGA328

4. Solder back the pins that pass through the holes (as shown in the picture below) and make the first wire jumper (red) between pin 17 and the hole between pin 19 and pin 21;



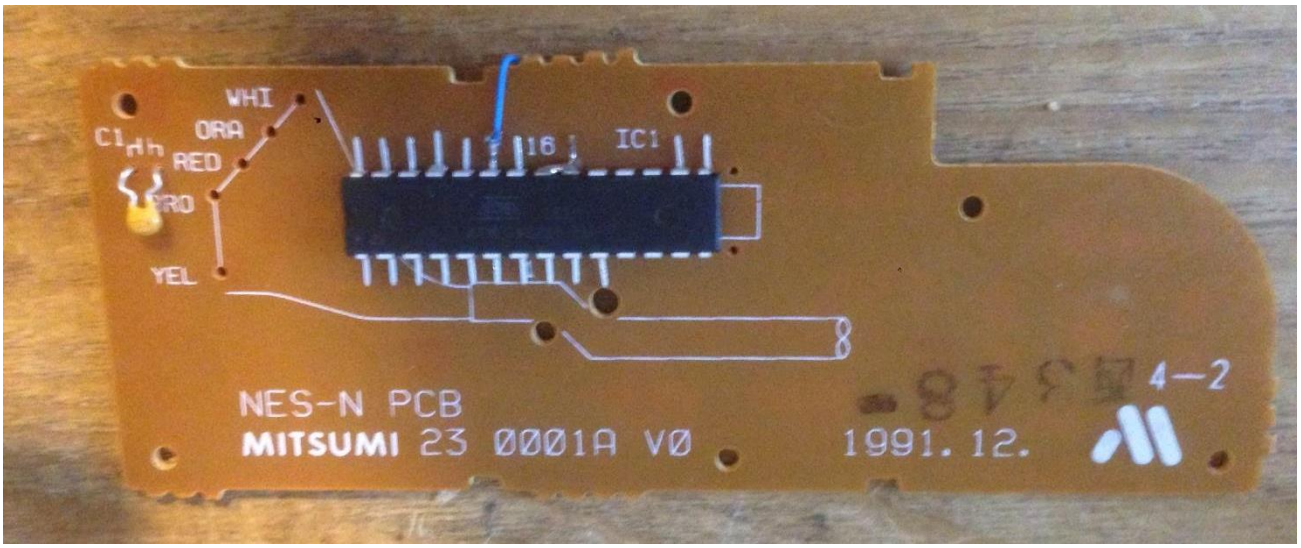
5. Make a second wire jumper between the hole on the upper left corner and the pin 23 on the other side of the base (here in blue)

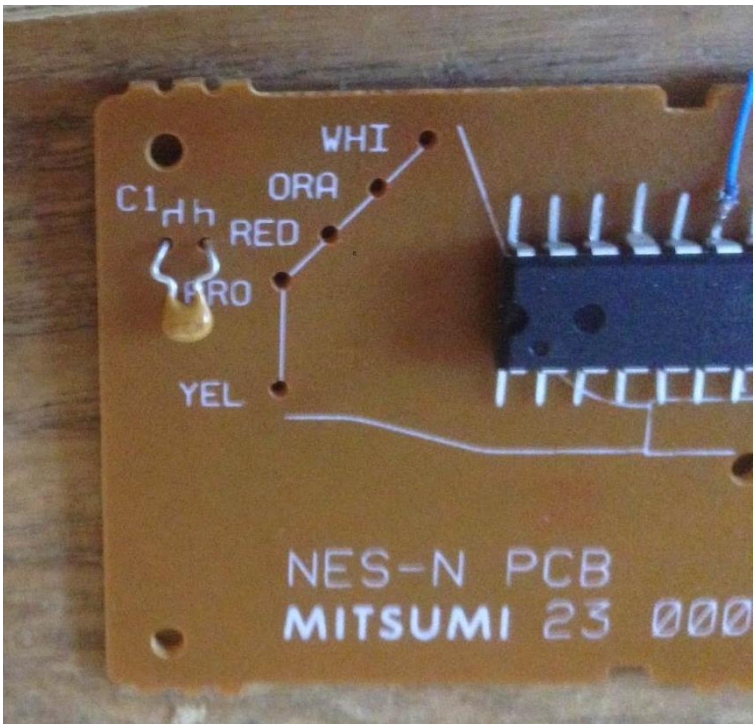




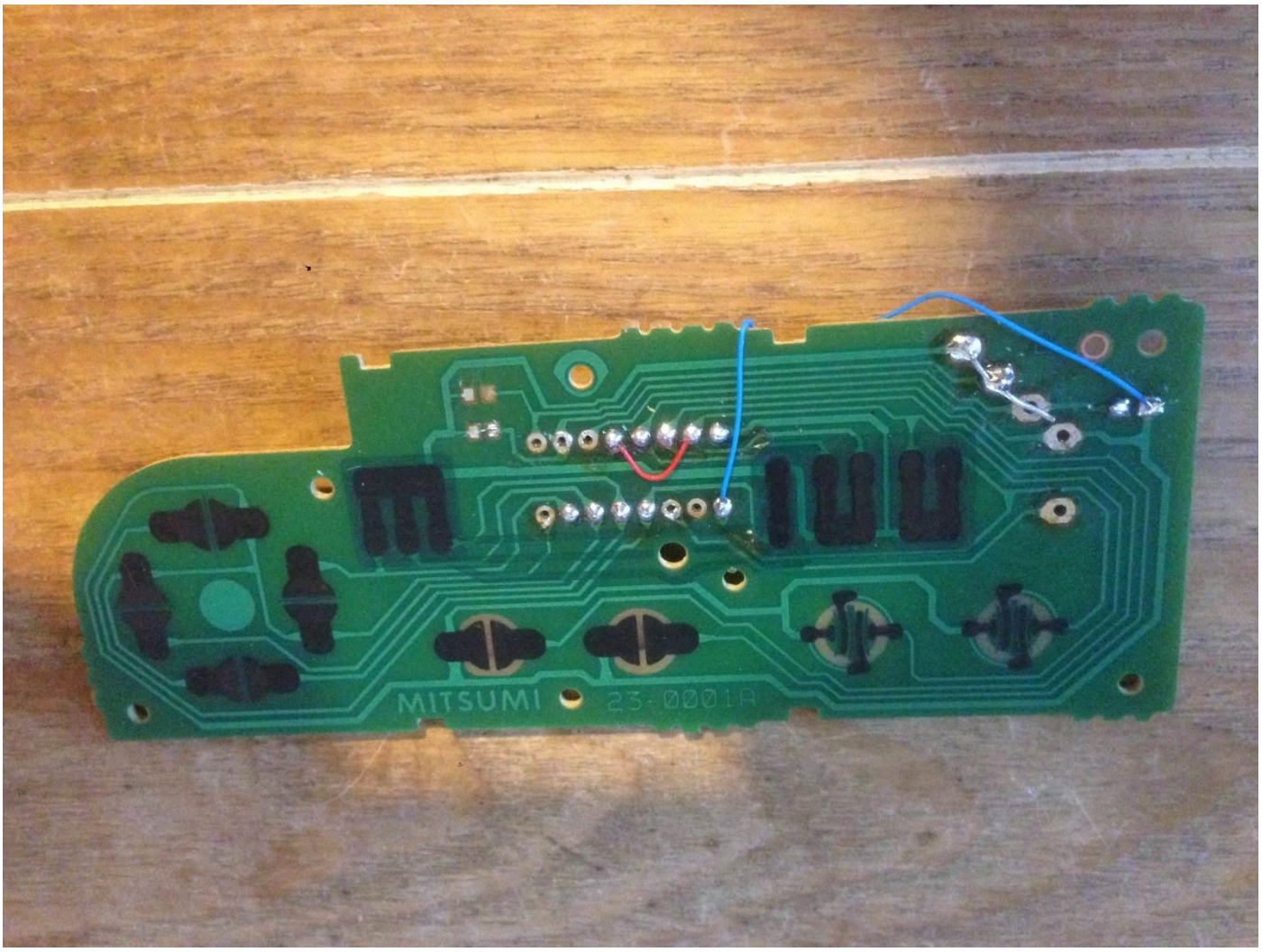
Eventually put a drop of tin between pins 20 and 21 to join them together.

6. Solder a ceramic capacitor (100nF could be enough) to smooth any voltage peaks (as in the following pictures)



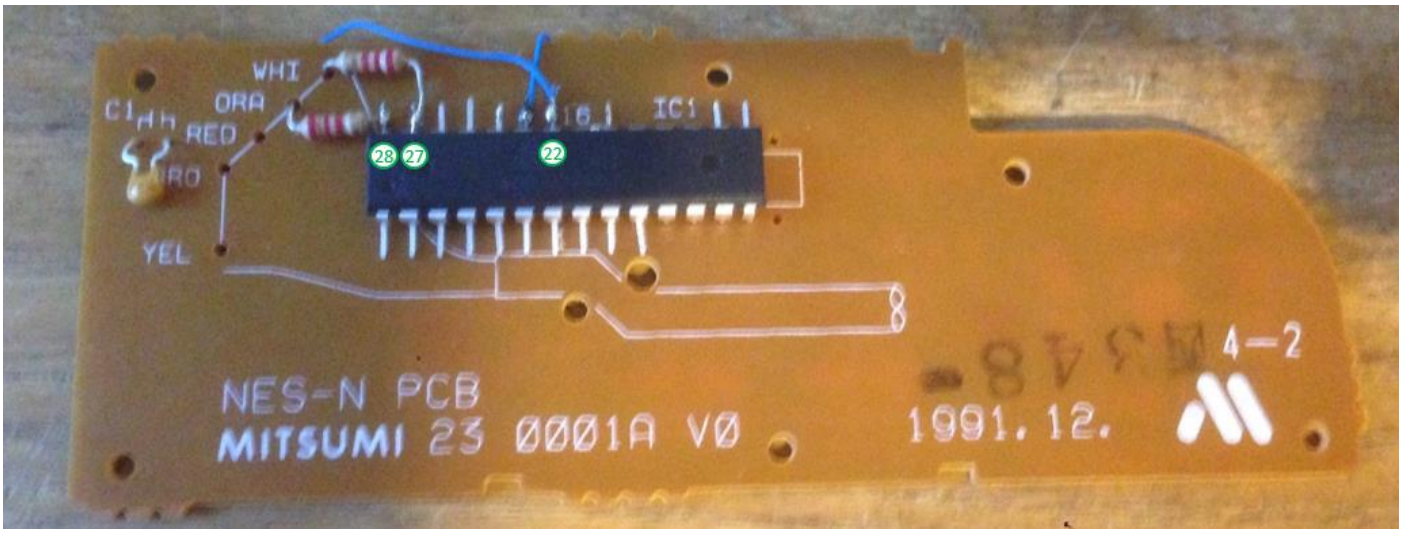


7. Solder a jumper wire for the GND and a strip for Vcc (always test to see where Vcc and GND are connected by using a multimeter)

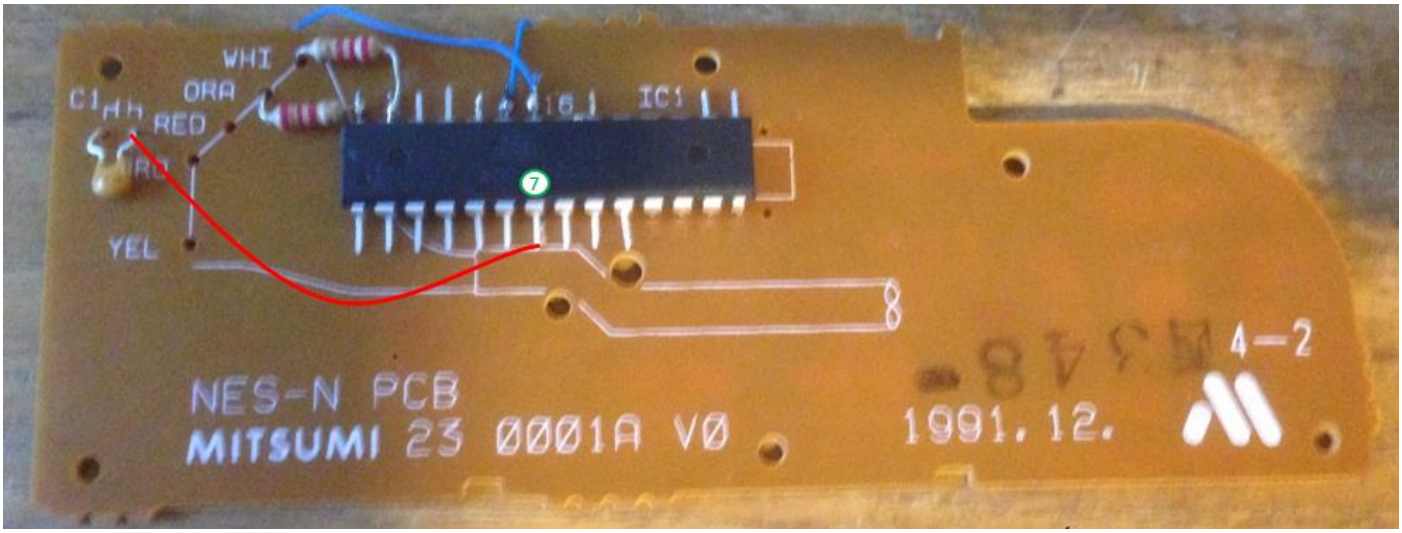


[The hole without tin is the one where you will solder Vcc coming from the extension cable of the mini NES]

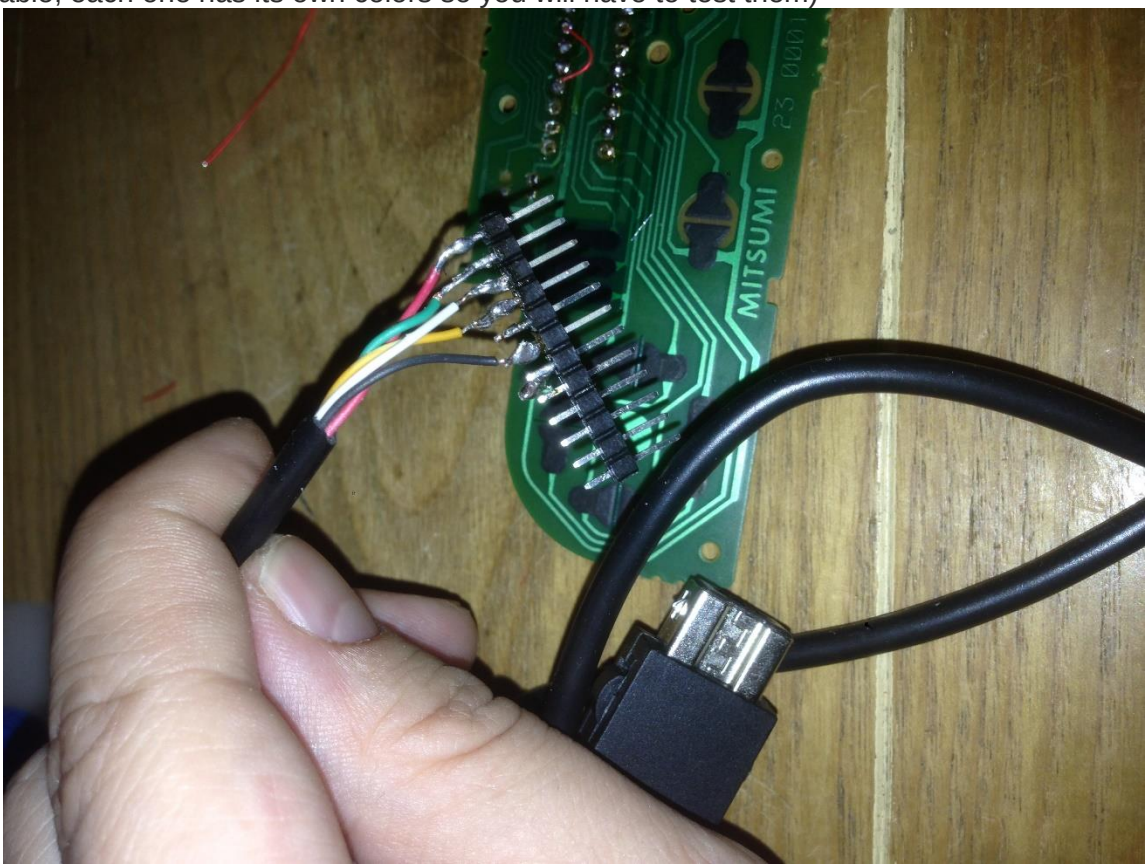
8. Solder two resistors (from 1 to 4.7 kOhm should work fine) between pins 27 and 28 of the Atmega and Vcc
Then bring GND to pin 22 with a jumper wire soldered to the capacitor



9. Connect Vcc to the pin 7 of the Atmega by using a jumper wire



10. Eventually you'll have to solder mini NES extension cable (the only picture I have is when I was testing it on a breadboard):
- two wires will go to the steps of the capacitor (respecting Vcc and GND)
- a third wire to Vcc, it is needed to detect the joypad as connected
- the last two directly to pins 27 and 28 of the Atmega (match SDA-pin 27 and SCL-pin28 of the mini-NES adapter cable, each one has its own colors so you will have to test them)



To test the cable wires with the multimeter you should use the following scheme: