

ELECTRONOBS

Burn the bootloader to a ATmega328p AU SMD



When purchasing a new ATMEGA328P AU microchip they usually come with nothing burned into their memory. To program these microcontrollers you need to pre-burn a bootloader. The bootloader is like the microchip copan duro ntroller. Without this controller the microchip won't understand the language we sent from the Arduino IDE. In order to understand the code we send, we have to burn a bootloader first.

Here I will show you how to burn a bootloader to a ATmega328p AU SMD chip using an Arduino NANO as ISP programmer.

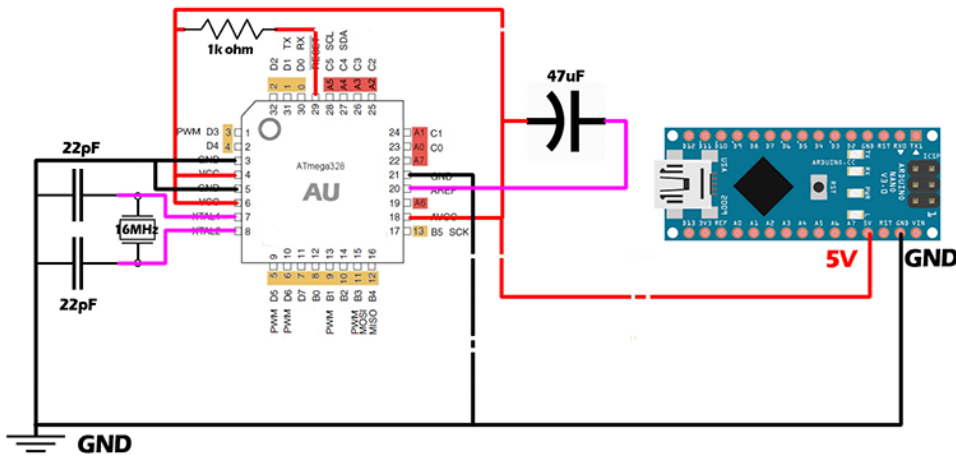
Burn bootloader to ATmega328p AU with Ardui...



First of all we have to do the basic configuration of the microchip ATMEGA328P AU. The integrated won't work without that specific configuration. It will need the manufacture recommended circuit with a basic power source, decoupling capacitors, quartz oscillator and the necessary pullups resistors. In the schematic down below I show you the basic components and connections that have to be made for a proper functioning of the microcontroller.



BOOTLOADER burn schematic



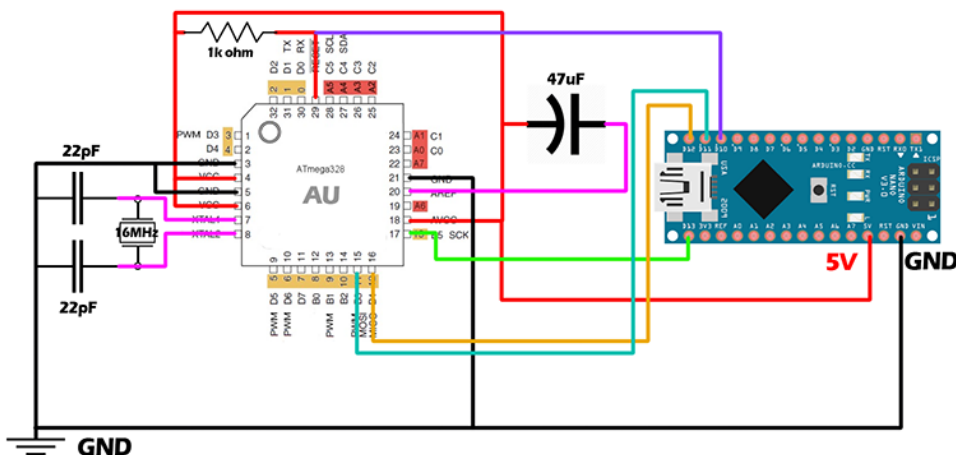
As you can see we have a 16MHz quartz oscillator between pins 7 and 8 of the SMD chip with two 22pF capacitors to ground. We have to connect ground to pins 3, 6 and 21 and a 5V supply to pins 4, 6 and 18. Finally we add a pullup resistor of 1k ohms between 5V and the reset pin which is pin 29 of this SMD chip. It's recommended to connect a 47uF capacitor between Aref pin and 5V.

Once we've done the basic circuit we'll have to make the following connections between the Arduino NANO and the smd chip in order to burn the bootloader to it.

Digital pin 13 from the arduino NANO to pin 17 from the SMD chip (SCK)
 Digital pin 12 from the arduino NANO to pin 16 from the SMD chip (MISO)
 Digital pin 11 from the arduino NANO to pin 15 from the SMD chip (MOSI)
 Digital pin 10 from the arduino NANO to pin 29 from the SMD chip (CS)

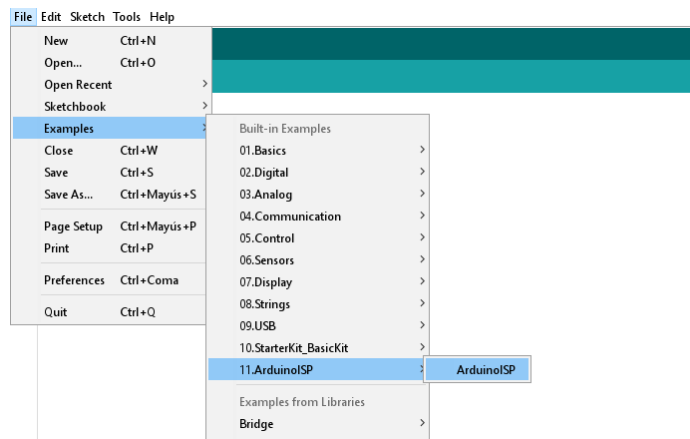
D13 to pin 17 (SCK)
 D12 to pin 16 (MISO)
 D11 to pin 15 (MOSI)
 D10 to pin 29 (CS)

BOOTLOADER burn schematic

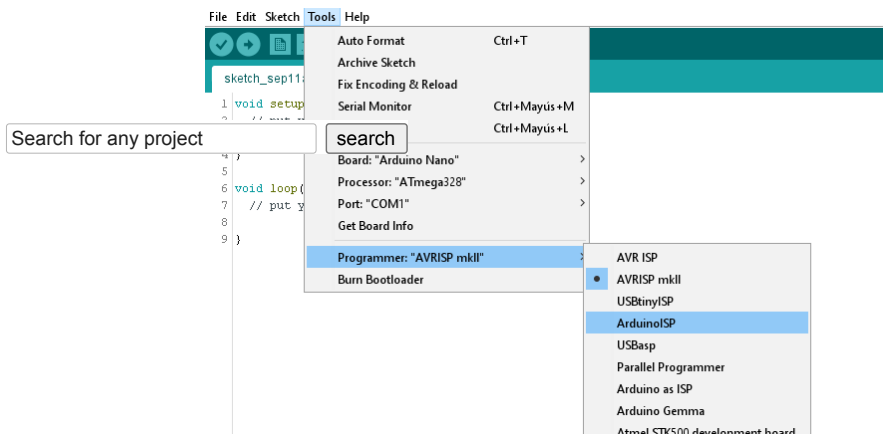


Now we open Arduino IDE. We go to file -> Examples -> Arduino as ISP and we open the ArduinoISP example sketch. In tools we select Arduino NANO as a board, the COM of our USB connected Arduino and we upload the sketch as a normal one like any other to the Arduino NANO.





Once we've upload the ArduinoISP code to the Arduino NANO and with the previous connections we can burn the bootloader. For that we go to Tools -> Programmer -> Arduino as ISP as shown below.

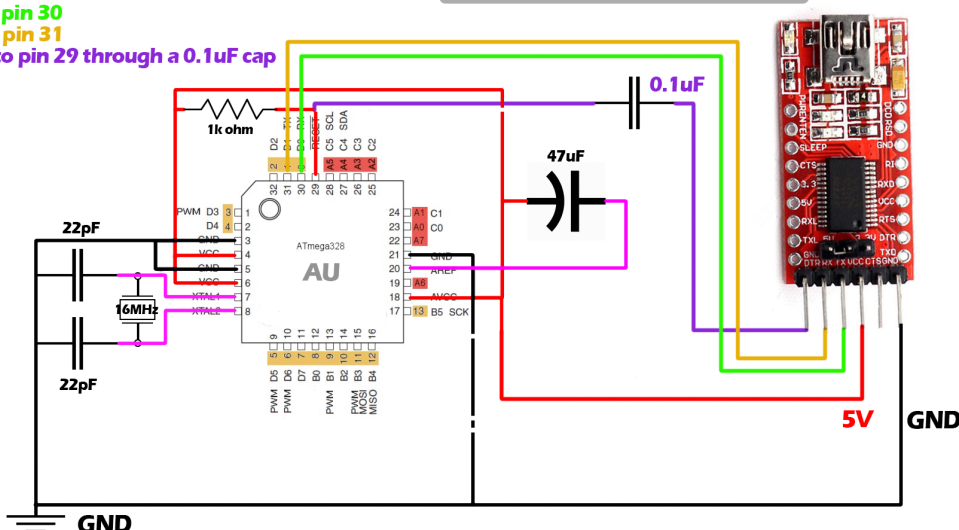


All is left to do is go to Tools and pres burn bootloader. We will see the Arduino NANO lights are blinking a lot. Once it says bootloader burned we are done. We've sucessfully burned a bootloader to an SMD chip.

All we need to do now is test the chip for proper functioning. To do that we will upload a simple blink code using a FTDI conection as shown below. **Don't forget to change the programmer back to normal.**

5 volts
Ground
Tx to pin 30
Rx to pin 31
DTR to pin 29 through a 0.1uF cap

BOOTLOADER burn schematic



Remember that we need a 0.1uF capacitor between the DTR pin of the FTDI module and our reset pin in order to program this chip.

I hope this tutorial helped you. Visit my [YouTube channel](#) to see more totorials and electronics stuff.



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