



Como criar um clone Arduino

Felipe Kühne
PUCRS



Agenda

- Investimento
- Open Hardware e Open Software
- Circuito Completo X Mínimo
- Bootloader
- Montagem do circuito
 - Em protoboard
 - Em PCI



Investimento



Arduino UNO R3 - ORIGINAL ITÁLIA + Cabo USB

Código: 05733

Mais Vendido

Quantidade:

R\$ 144,80

+ 5% de desconto no boleto

1

COMPRAR

Parcelamento

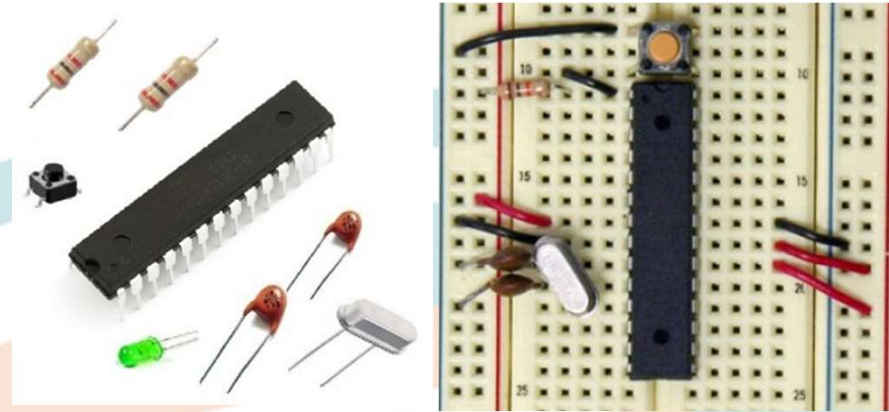
À vista R\$ 144,80	7x de R\$ 23,23
2x de R\$ 75,67	8x de R\$ 20,62
3x de R\$ 51,18	9x de R\$ 18,59
4x de R\$ 38,95	10x de R\$ 16,97
5x de R\$ 31,61	11x de R\$ 15,64
6x de R\$ 26,72	12x de R\$ 14,54

Via PagSeguro



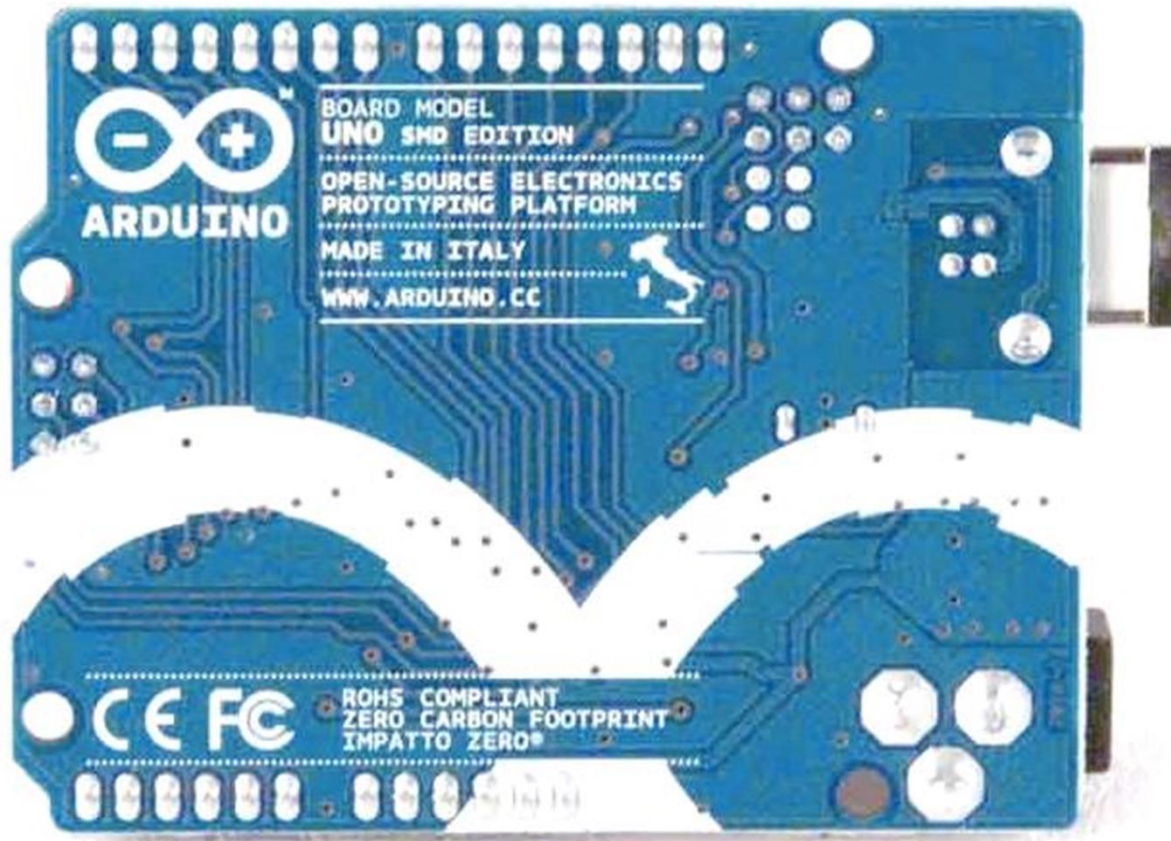
Investimento

- Preço de um clone UNO no Brasil: **R\$39**
- Kit standalone: **R\$20**

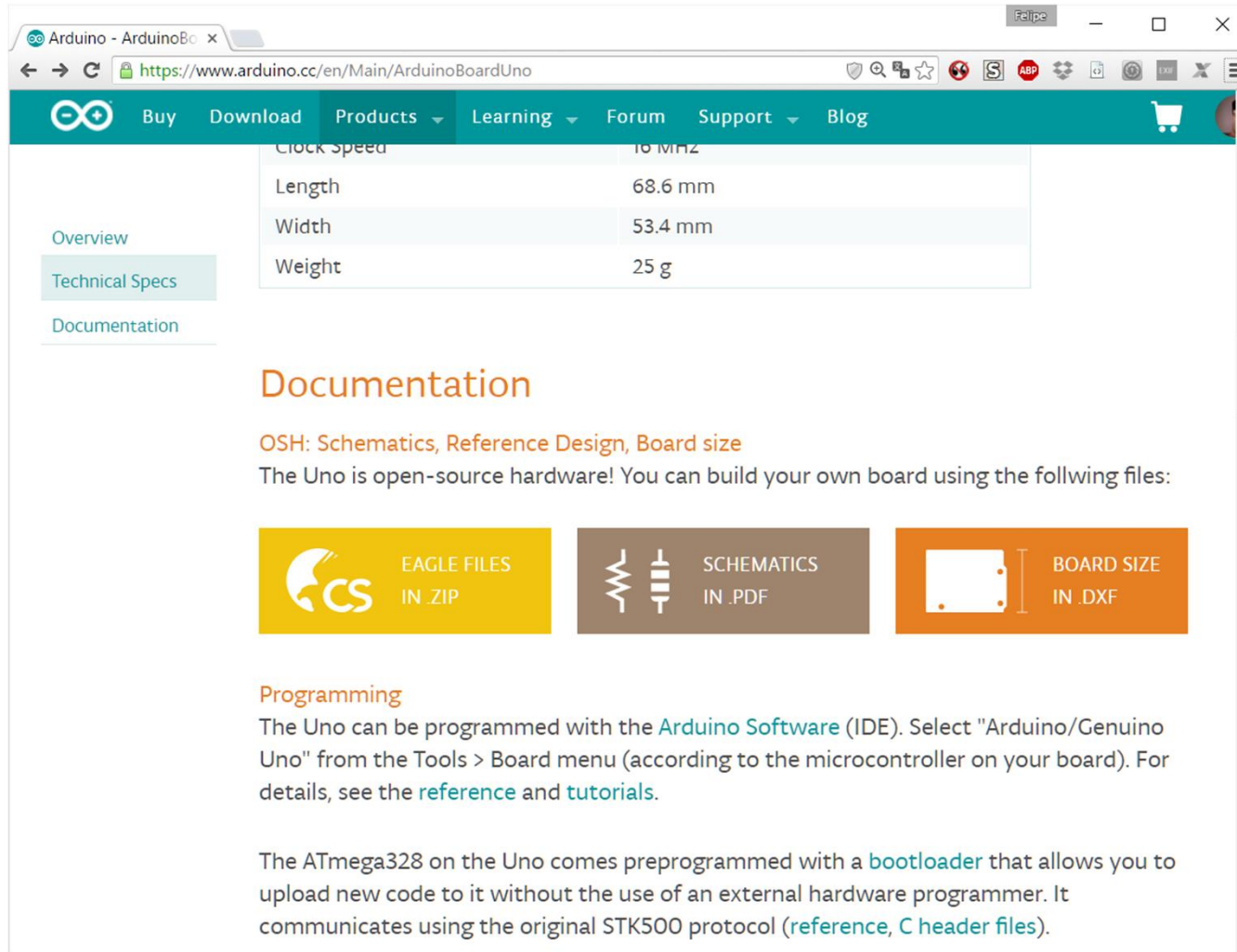


- Atenção: Sem o conversor USB/Serial (FTDI)
- Loja em POA: www.webtronico.com

OPEN SW E HW



OPEN SW E HW






The screenshot shows the Arduino website's page for the Arduino Uno. The browser address bar displays <https://www.arduino.cc/en/Main/ArduinoBoardUno>. The navigation bar includes links for Buy, Download, Products, Learning, Forum, Support, and Blog. On the left, a sidebar lists Overview, Technical Specs, and Documentation. The main content area features a table of technical specifications, a 'Documentation' section with links to OSH files (Eagle, Schematics, Board Size), and a 'Programming' section explaining the use of the Arduino IDE and the ATmega328P microcontroller.

Clock Speed	16 MHz
Length	68.6 mm
Width	53.4 mm
Weight	25 g

Documentation

OSH: Schematics, Reference Design, Board size

The Uno is open-source hardware! You can build your own board using the following files:

-  EAGLE FILES IN .ZIP
-  SCHEMATICS IN .PDF
-  BOARD SIZE IN .DXF

Programming

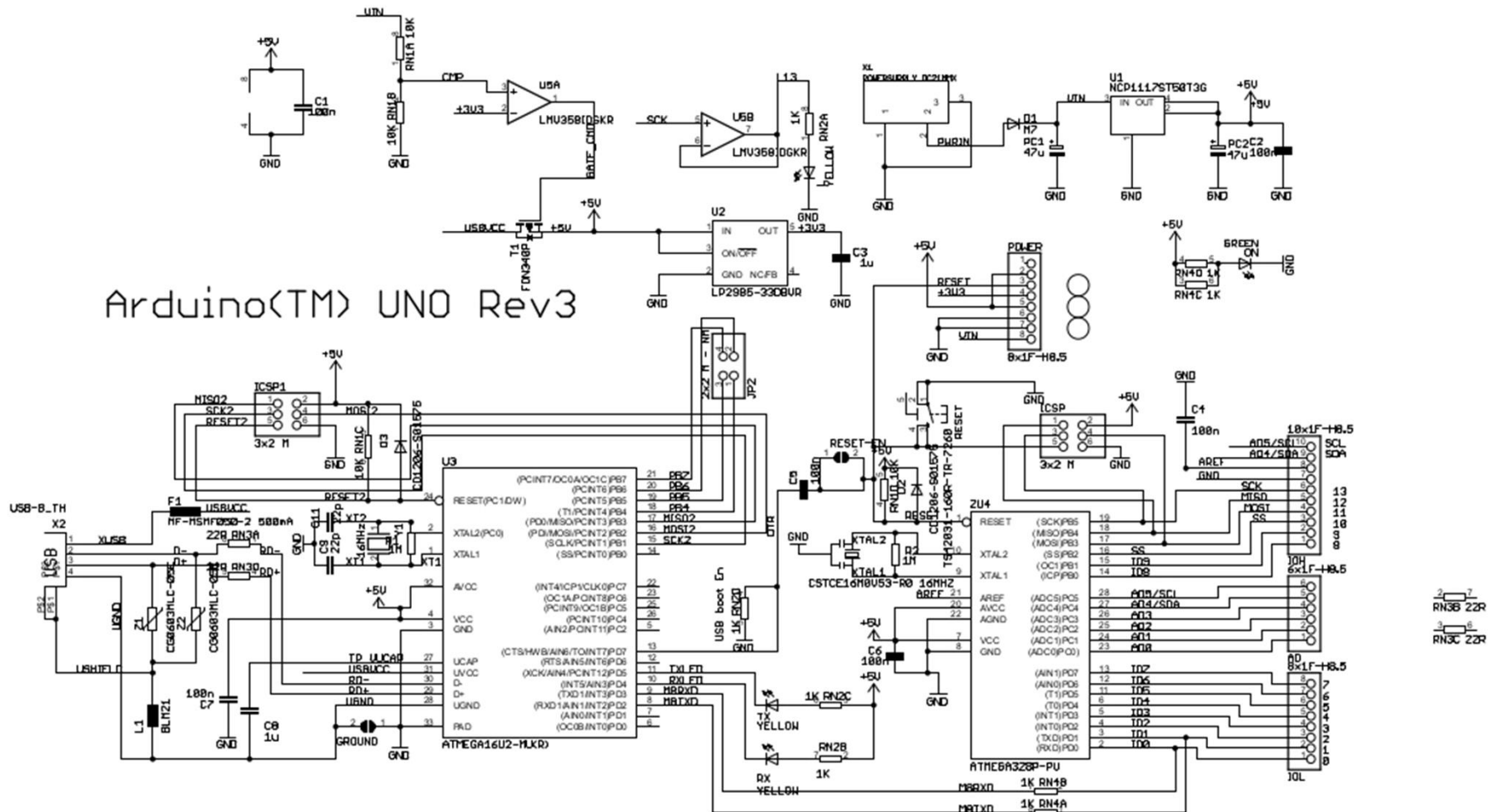
The Uno can be programmed with the [Arduino Software](#) (IDE). Select "Arduino/Genuino Uno" from the Tools > Board menu (according to the microcontroller on your board). For details, see the [reference](#) and [tutorials](#).

The ATmega328 on the Uno comes preprogrammed with a [bootloader](#) that allows you to upload new code to it without the use of an external hardware programmer. It communicates using the original STK500 protocol ([reference](#), [C header files](#)).

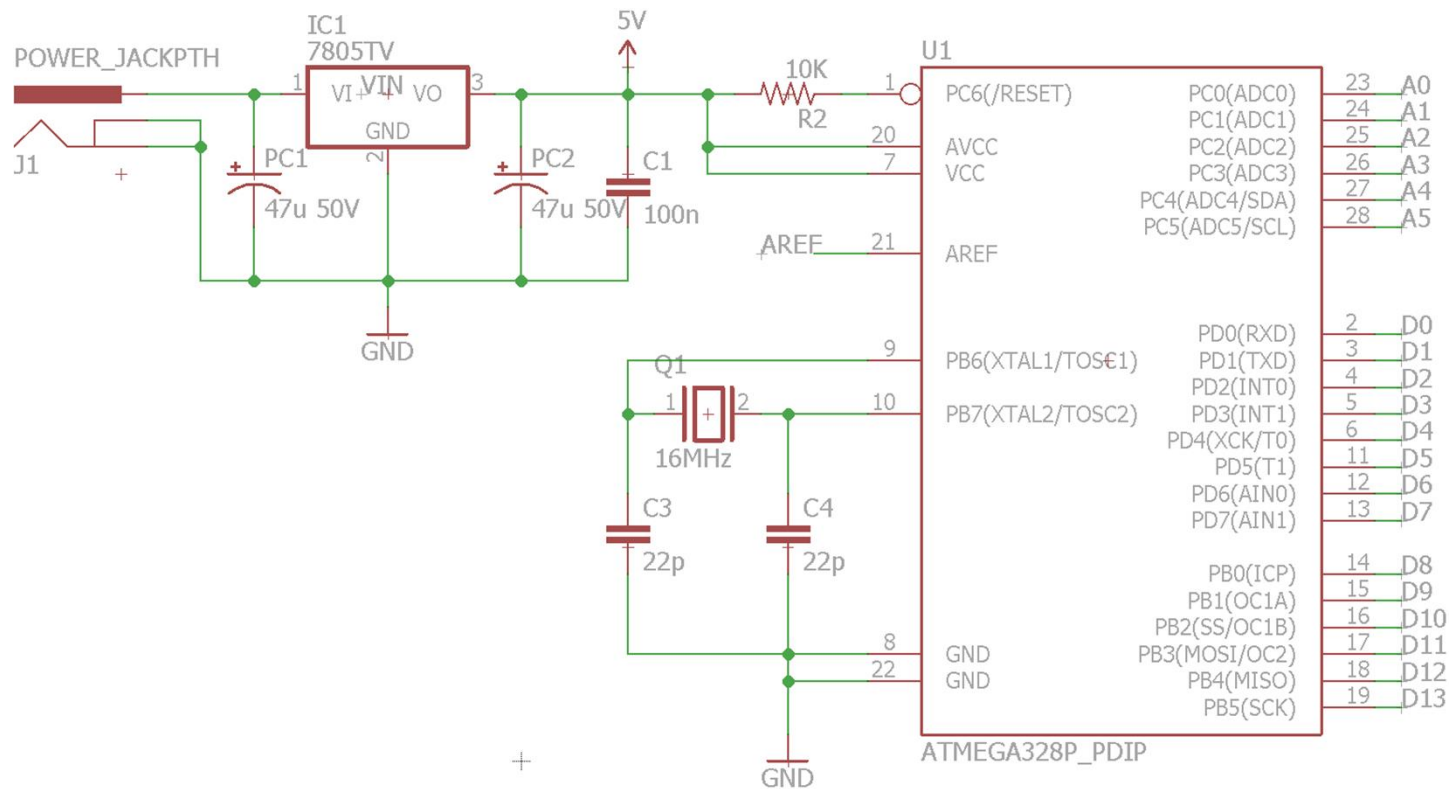


Circuito Completo

Arduino(TM) UNO Rev3

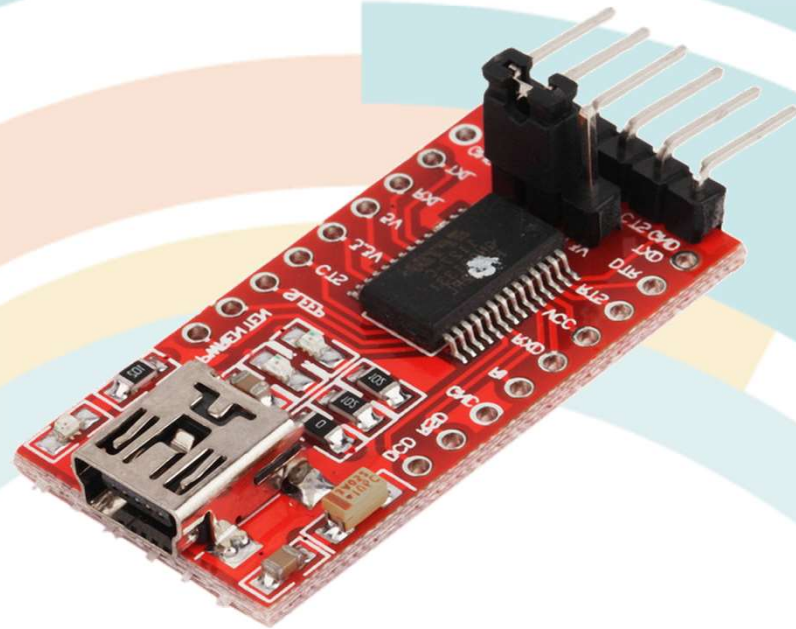


Circuito Mínimo (sem FTDI)



Circuito Mínimo (sem FTDI)

- FTDI: conversor serial/USB
- Necessário quando vamos comunicar com o PC e gravar *sketches*
- Em POA:
 - R\$ 39
- E-bay:
 - R\$ 8
- Cabo!! (mini USB B)



Bootloader

- Programa que gerencia o carregamento de *sketches* via conexão com o Arduino IDE
- Ocupa 512 bytes na memória flash
- <http://www.arduino.cc/en/Hacking/Bootloader>



Bootloader

- Gravando o bootloader no Atmega328P (método: Arduino como ISP)
- <http://www.arduino.cc/en/Tutorial/ArduinoISP>



Bootloader

- Gravando o bootloader no Atmega328P (método: Arduino como ISP)

1º) Conectar o Arduino ISP no PC

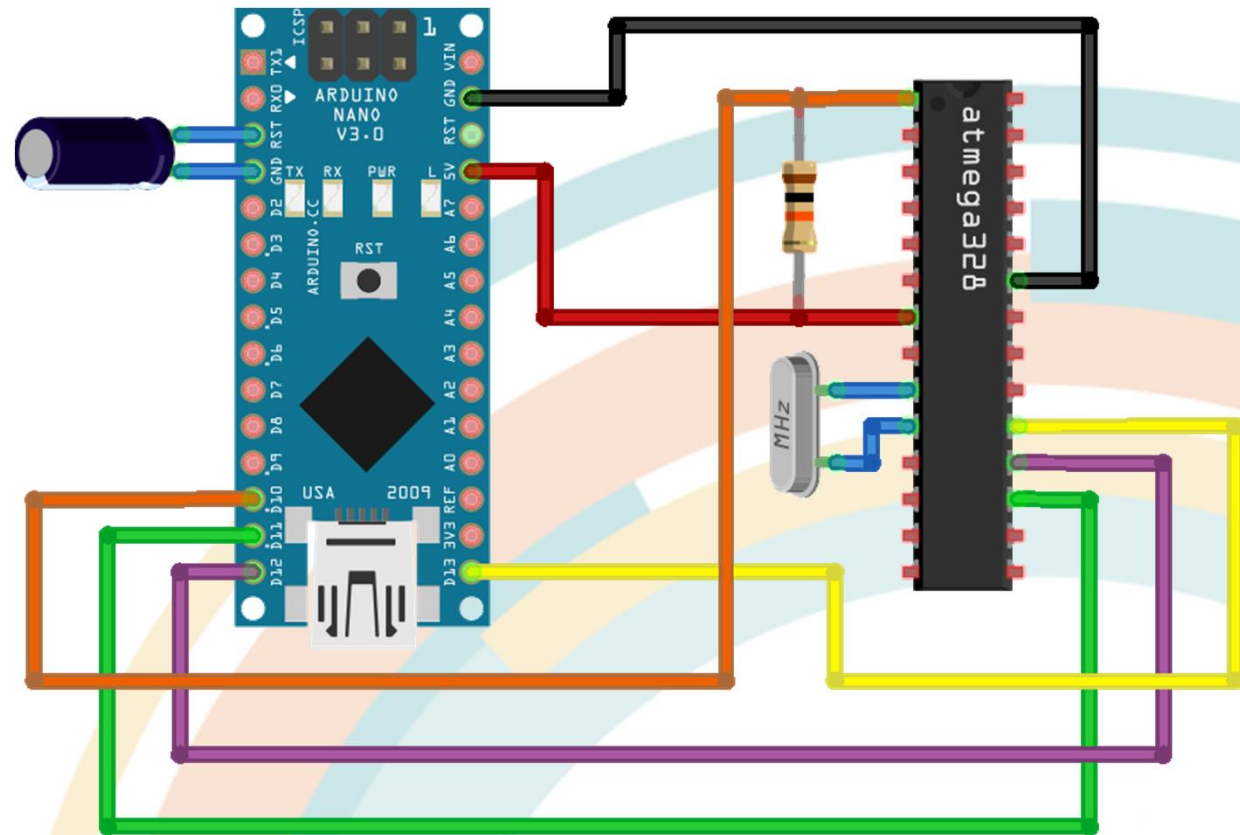
2º) Gravar o sketch *ArduinoISP*

3º) Adicionar um capacitor de 10uF entre o RST e o GND



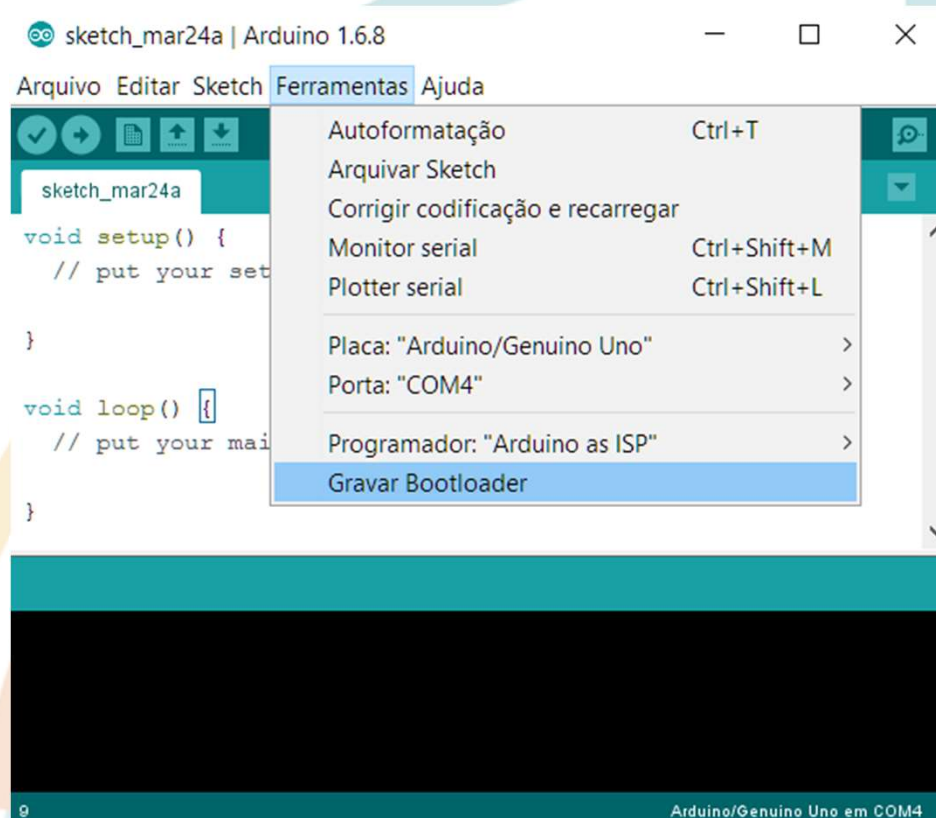
Bootloader

4º) Conectar o Arduino ISP ao Atmega (conexão SPI):

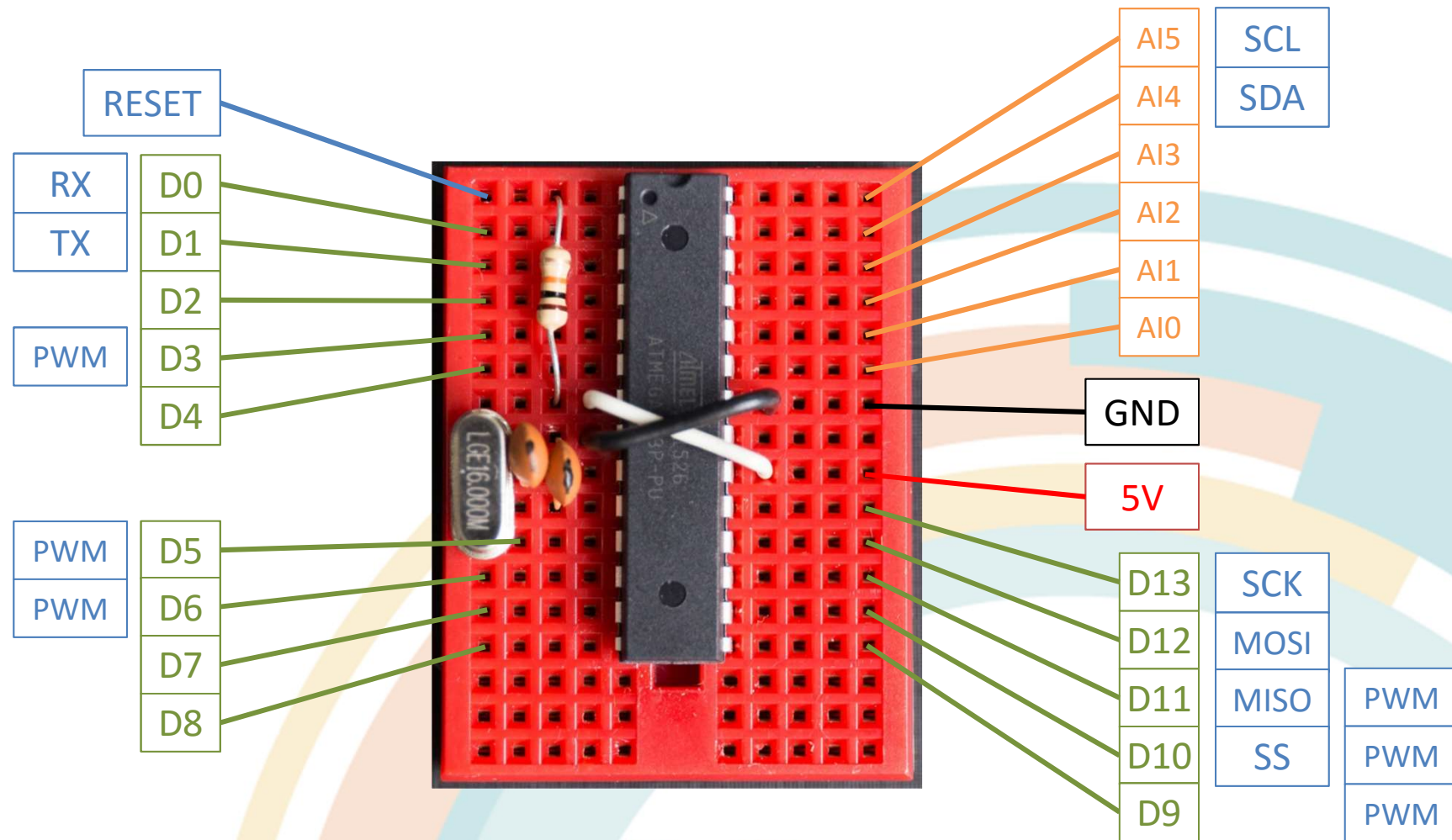


Bootloader

- 5º) Selecionar placa (Uno) e porta serial
- 6º) Selecionar programador "Arduino as ISP"
- 7º) Selecionar "Gravar Bootloader":

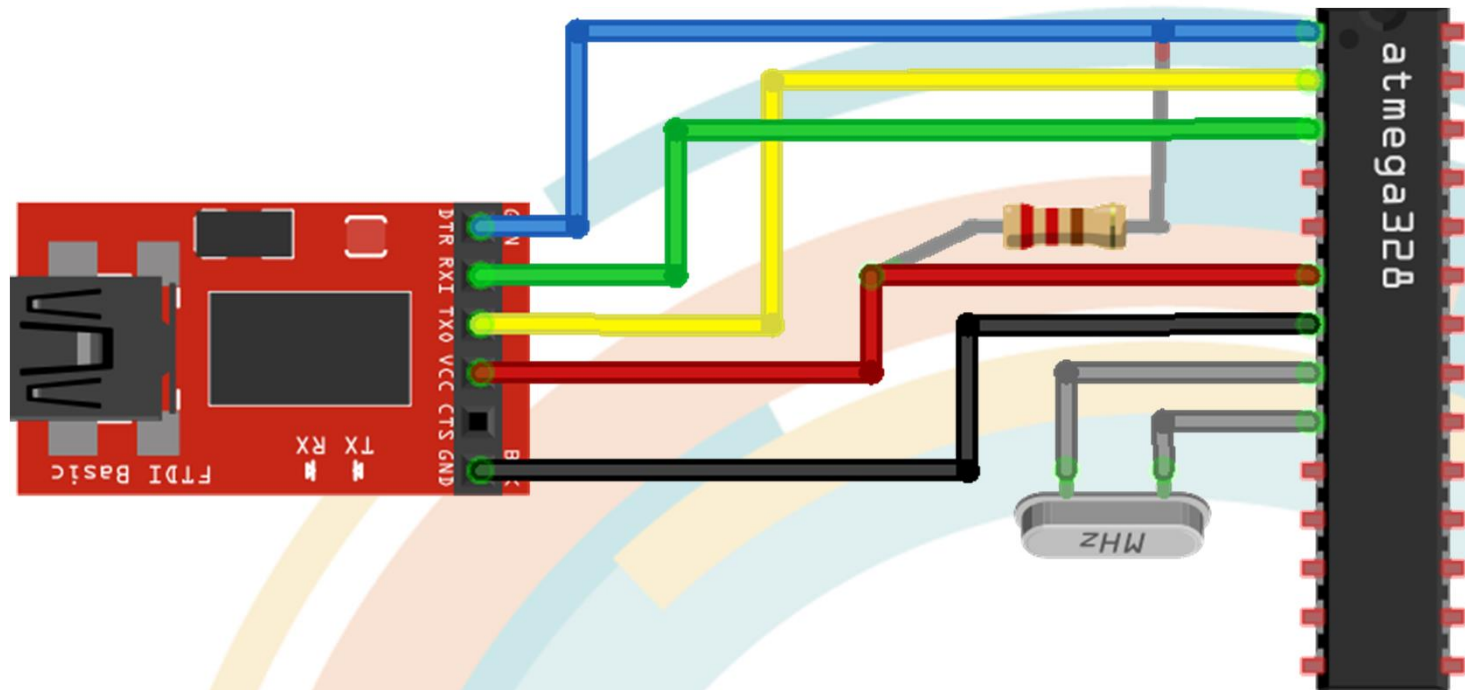


Montagem em Protoboard



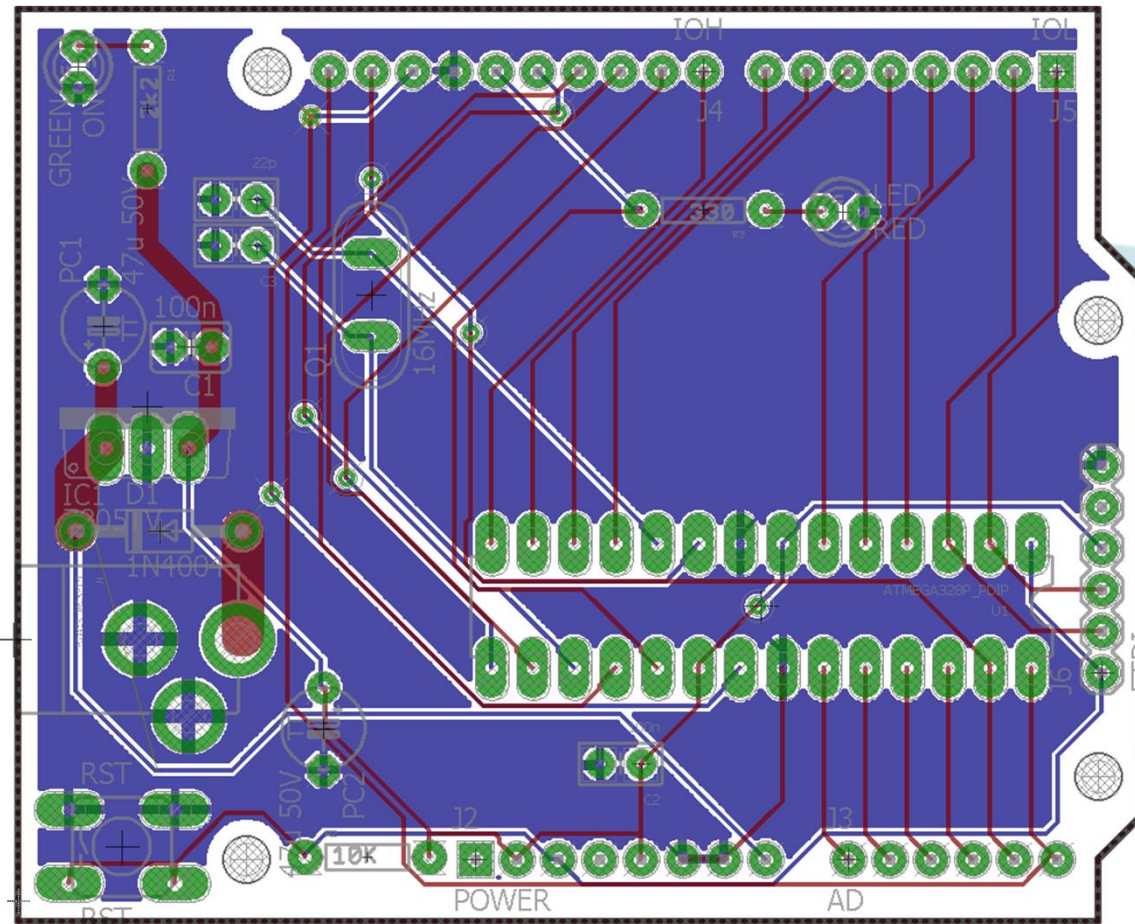
Montagem em Protoboard

- Conexão com a placa FTDI:



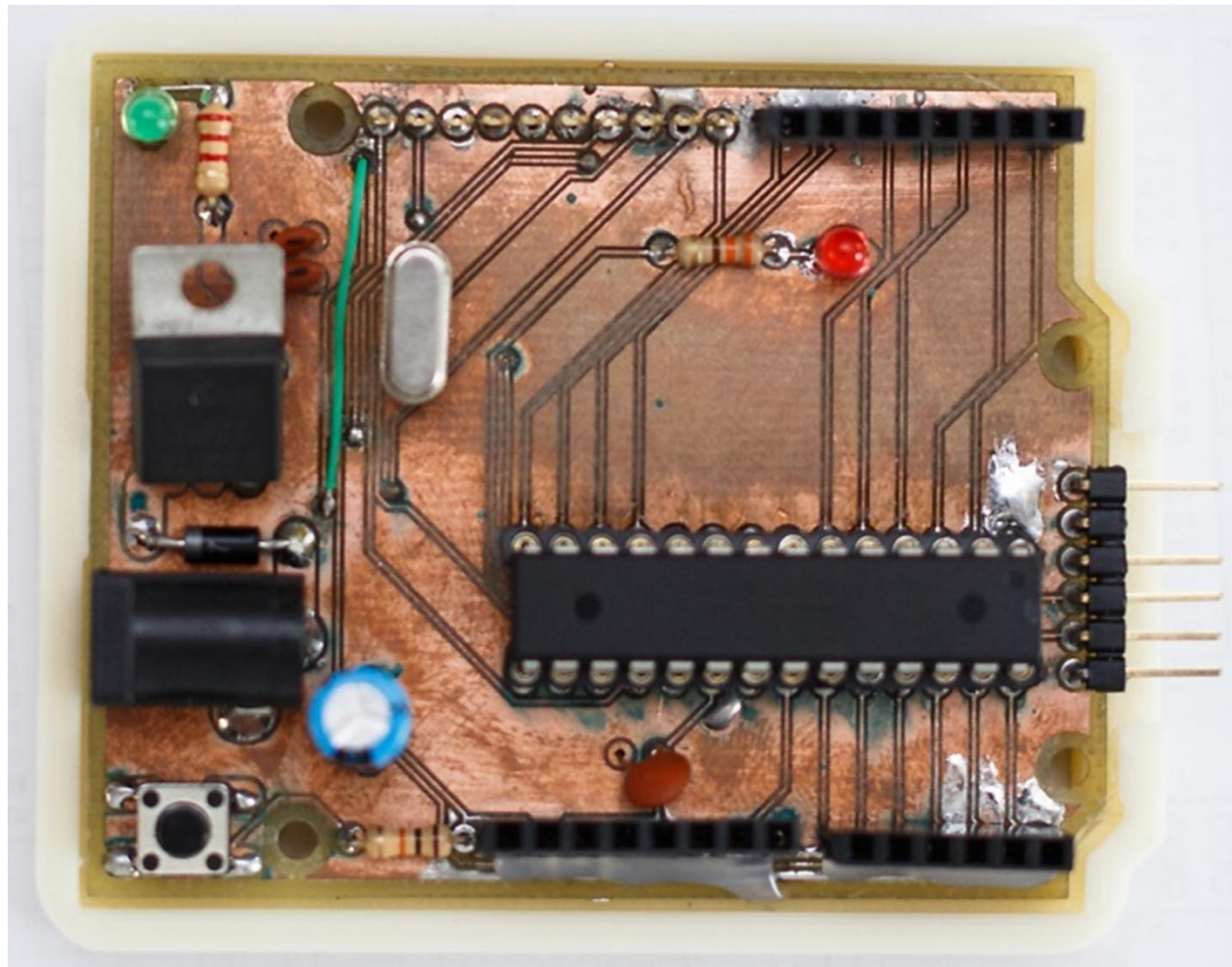
fritzing

Montagem em PCI

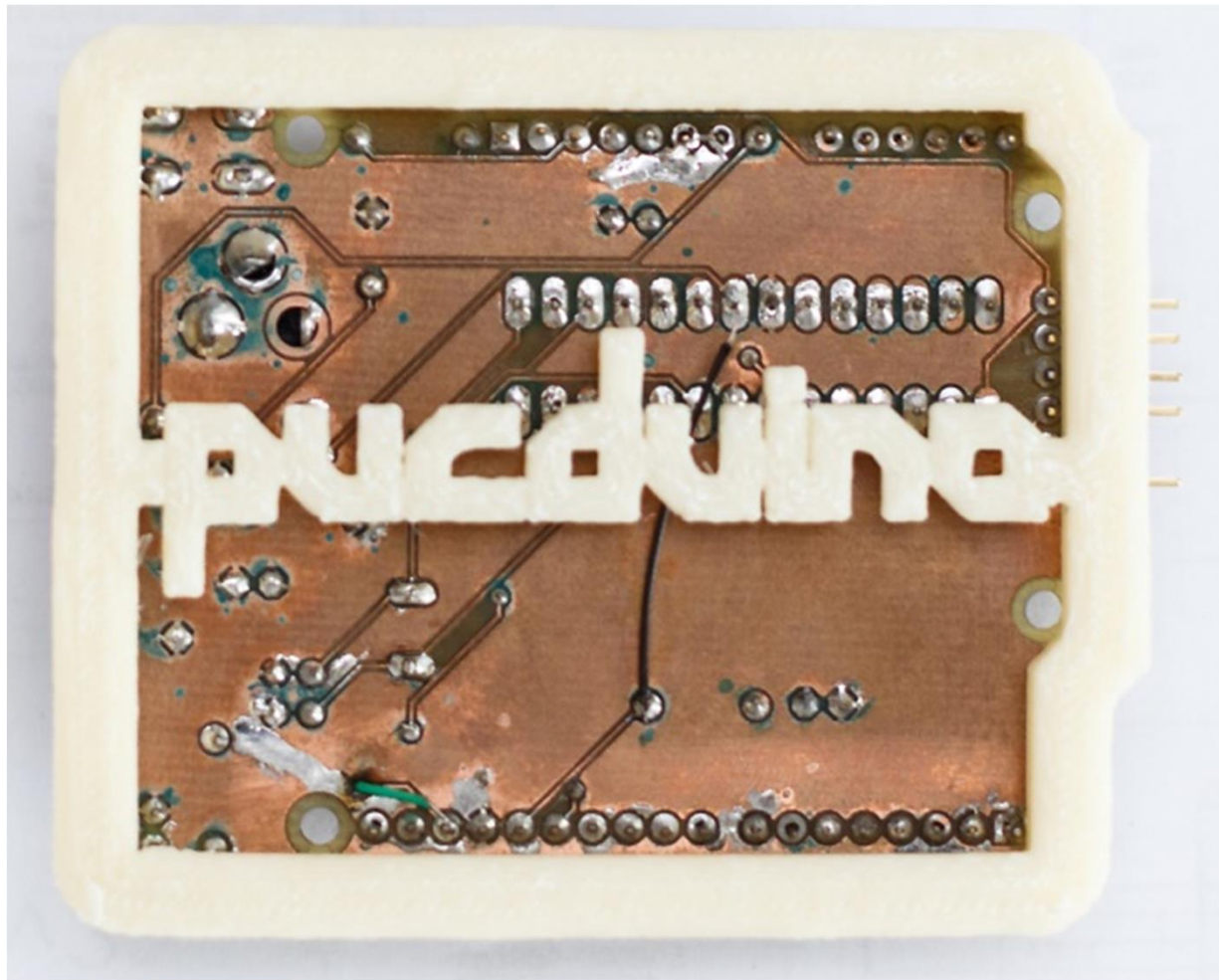


- 

Montagem em PCI



Montagem em PCI



Recursos utilizados neste projeto

- Kit standalone Webtrônico:
www.webtronico.com/arduinos/placas-arduino/kit-arduino-standalone.html
- Arduino Pinouts:
pighixxx.com/atmega328v3_0.pdf
pighixxx.com/unov3pdf.pdf
pighixxx.com/nanopdf.pdf
- Fritzing:
fritzing.org
- EAGLE:
www.cadsoftusa.com/download-eagle
- Lib componentes Sparkfun:
github.com/sparkfun/SparkFun-Eagle-Libraries



Recursos utilizados neste projeto

- Fabricação da PCB no LEE (LPKF)
- Gravação do bootloader: Arduino Nano
- FTDI
- Componentes diversos (resistores, capacitores, LEDs, protoboards) roubados do LEE ou comprados no eBay



Downloads

github.com/fkuhne/pucduino



???

Obrigado! ;D

